

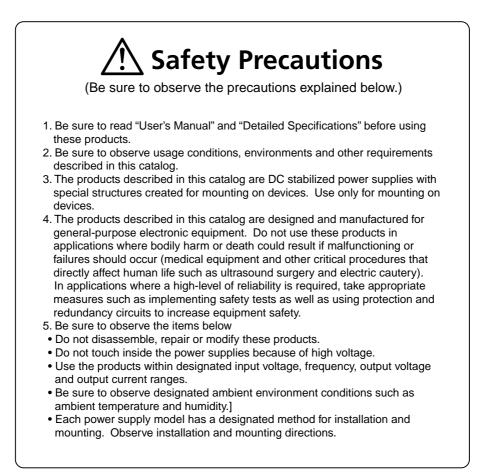
# SANKEN SWITCHING POWER SUPPLIES

STANDARD SWITCHING POWER SUPPLIES CATALOG

# SANKEN ELECTRIC CO., LTD.

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### SANKEN SWITCHING POWER SUPPLIES

# Sanken Switching Power Supplies, Leading the Times with Total Technology

#### Confidence built with technology.

With Sanken's long history as the original domestic maker of switching power supplies and our continuing efforts to constantly improve technology, we have received tremendous support from out customers.

Three technologies have been integrated to create Sanken's total technology:

- [1] Circuit design technology, as a base for product development strength,
- [2] Manufacturing technology, with quality that is proven by our semi-conductor parts, and
- [3] Assessment technology, to objectively evaluate these technologies.

Since we have a high standard of technical elements and a system that organically combines these elements, we are confident that Sanken has an undeniable position as the major domestic switching power supply maker. In that particularly power supply technology innovation came about from the technological innovation of semi-conductors, by using our own semi-conductors for power supply, Sanken continues to maintain its dominance in technology innovation.

In the future as well, Sanken will fully demonstrate this total technology and aim to create products that lead the times and satisfy our customers.

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| Correct Use of Switching Power Supply | 6  |
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| Discontinued products                 | 15 |
| XXX                                   | 17 |

| Output                                  | Input Voltage (V)               | Series Name | Output Power (W)     | (<br>3.3V |   | ut Vo<br>12V       | ltage<br>15V |       | Page |
|---|---------------------------------|-------------|----------------------|-----------|---|--------------------|--------------|-------|------|
|   | 100                             | CSJ         | 10, 15               |           | ٠                                       |                    |              |       | 17   |
|   | 100                             | CSH         | 25, 50, 100, 150     |           |   |                    |              |       | 23   |
|   | 100                             | SSG         | 30, 50, 100, 150     |           |   |                    |              |       | 33   |
|   | 100                             | SSH         | 25, 50, 100          |           |   | •                  | Except 100 W |       | 43   |
| t                                       | 100, wide input/input switching | SLS         | 60, 100, 150         |           |   |                    |              |       | 53   |
| Single Output                           | Wide                            | CWA         | 15, 30, 50           |           |   |                    |              |       | 61   |
| O O                                     | vvide                           | GVVA        | 75, 100, 150         |           |   |                    |              |       | 66   |
| ) gle                                   | Wide                            | SWA         | 15, 30, 50, 100, 150 |           |   |                    |              |       | 73   |
| Si                                      | Wide                            | SWC         | 50, 100              |           |   |                    |              |       | 85   |
|   | Wide                            | SWD         | 60, 100, 150, 240    |           |   |                    |              |       | 91   |
|   | Wide                            | HWA         | 50                   |           |   |                    |              |       | 101  |
|   | Wide                            | ПУУА        | 100, 150, 300, 600   |           |   |                    |              |       | 104  |
|   | Wide/auto switching (60 W)      | HWB         | 15, 30, 60           |           |   | 30,60W             |              | 60W   | 109  |
| Multi Output<br>(2 channels)            | Wide                            | HWB         | 15, 30               |           |   |                    | •<br>±output |       | 114  |
| Multi Output<br>(2 channels)            | Wide                            | SWE         | 100, 150             |           |   |                    |              |       | 121  |
| put                                     |                                 |             | 400                  |           |   | 8 V sing           |              |       |      |
| Multi Output<br>9 cells 6 cells 5 cells | Wide                            | PCU         | 600                  | and       | 14 ch                                   | els (two<br>annels |              | els), | 127  |
| Mult<br>9 cells                         |                                 |             | 900                  |           | (two models) are combined as necessary. |                    |              |       |      |

# **About Switching Power Supplies**

What are switching power supplies?

Switching power supplies are a type of stabilized DC power supply that are controlled by a switching method. When a commercial power source or DC power source is input to a switching power supply unit, semiconductor-based high-speed switching is used to convert the power to an inaudible range of high-frequency power, which is controlled and rectified to yield the desired DC power.This makes for small, lightweight switching power supplies that are well-suited for use in IT hardware, communications devices, and most of other electronic equipment.

## Types of Switching Power Supplies

Today, switching power supplies are used in such a wide range of devices that require a DC power supply that there are only a few types of electronic equipment left that do not use switching power supplies.

### • Application fields for switching power supplies

### Industrial equipment

| Computer hardware        | Mainframe computers, servers, workstations, personal computers, other computer devices, and computer peripheral devices such as storage devices, monitors, printers, ATMs, and POS terminals  |
|--------------------------|---|
| Communications equipment | Digital electronic switching equipment, transmission equipment, land-line communications devices including premises equipment, mobile communications devices, transceivers, wireless communications devices, telemeters, and other communications devices |
| Controllers              | Factory automation controllers, robots, NC machines, power controllers, semiconductor manufacturing equipment, and other controllers  |
| Measuring instruments    | Analyzers, oscilloscopes, chip testers, and other measuring instruments   |
| Medical equipment        | CT, MRI, ultrasound diagnostic devices, blood analysis devices, electrocardiogram equipment, and other medical equipment  |
| Office equipment         | Word processing systems, photocopiers, facsimile devices, and other office equipment  |
| Other                    | Automotive devices, LED display devices, testing equipment, etc.  |

### Consumer products

| Audio-video equipment | TVs, video equipment, videogame systems, karaoke machines, digital audio equipment, disc players, and electronic musical instructions |
|-----------------------|---|
| Other                 | Power supplies for power adapters, household appliances, etc.   |

### **Basic Terminology of Switching Power Supplies**

### 1. Input-Related Terms

| Rated input voltage           | . RMS (Root Mean Square) value of line-to-line voltage applied to input terminals   |
|-------------------------------|---|
| Allowable input voltage range | RMS value of line-to-line voltage in the allowed range for ensuring performance and applied to input terminals  |
| Rated frequency               | Frequency of AC voltage applied to input terminals (commercial frequencies are 50 Hz and 60 Hz)   |
| Allowable frequency range     | Frequency in the allowed range for ensuring performance of power supply device  |
| Power factor                  | . Active input voltage divided by the apparent power  |
| Efficiency                    | Output power (total rated output power) divided by active input power   |
| Inrush current                | <ul> <li>Maximum instantaneous carrying current (0 to peak) that flows after input voltage has been<br/>stopped for a specified time, until normal input current has been restored</li> </ul> |

### 2. Output-Related Terms

| Rated output voltage      | . DC voltage occurring at output terminal   |  |  |  |  |  |  |  |  |  |
|---------------------------|---|--|--|--|--|--|--|--|--|--|
| Output voltage variation  | Range in which output voltage can be adjusted from an external source under conditions for guaranteed constant voltage accuracy         |  |  |  |  |  |  |  |  |  |
| Rated output current      | DC current that can be supplied to a load from  | C current that can be supplied to a load from an output terminal   |  |  |  |  |  |  |  |  |
| Ripple                    | A component that is synchronous with the inpublic between output terminals  | component that is synchronous with the input frequency and switching frequency occurring etween output terminals |  |  |  |  |  |  |  |  |
| Noise                     | High-frequency noise components (other than   | High-frequency noise components (other than ripple) that occur between output terminals                          |  |  |  |  |  |  |  |  |
| Ripple noise              | Combined value of ripple and other noise occu   | urring between output terminals (see Figure 1)   |  |  |  |  |  |  |  |  |
| Constant voltage accuracy | Amount of variation in output voltage (or the a voltage) when any of the following phenomena (g) below, can also occur in combinations. | , , ,  |  |  |  |  |  |  |  |  |
|                           | (a) Static input variation  | (e) Elapsed drift  |  |  |  |  |  |  |  |  |
|                           | (b) Static load variation (f) Dynamic input variation   |  |  |  |  |  |  |  |  |  |
|                           | (c) Ambient temperature variation   | (g) Dynamic load variation   |  |  |  |  |  |  |  |  |
|                           | (d) Initial drift   |  |  |  |  |  |  |  |  |  |
|                           |   |  |  |  |  |  |  |  |  |  |

### 3. Auxiliary Functions

| Overcurrent protection | A protection feature of switching power supplies whereby a current limiting function is used to protect the switching power supply and power load when the current exceeds a specified setting                   |  |
|------------------------|--|--|
| Overvoltage protection | A protection feature of switching power supplies whereby a power cut-off or shorting function is used when the output voltage exceeds a specified setting in relation to an overvoltage between output terminals |  |
| Remote control         | A function that uses an external signal to turn a switching power supply's output voltage ON or OFF  |  |
| Remote sensing         | A function that compensates for voltage drops that occur in the distance between an output terminal and a load   |  |

### 4. General Conditions

| Operating temperature range  | Allowable ambient temperature range for switching power supplies under continuous use and within rated conditions. As ambient temperature, this temperature is measured at a location that is not affected by the switching power supply's own generated heat. |
|------------------------------|--|
| Storage temperature range    | Allowable ambient temperature range for switching power supplies under long-term storage (non-operating) conditions, without causing loss of performance   |
| Operating humidity range     | Allowable ambient humidity range for switching power supplies under continuous use and within rated conditions.  |
| Storage humidity range       | Allowable ambient humidity range for switching power supplies under long-term storage (non-operating) conditions, without causing loss of performance  |
| Insulation withstand voltage | The limit voltage value that must be withstood after a specified voltage has been applied for a specified time (for insulation withstand voltage) so that the insulating strength between two specified points is satisfied                                    |
| Insulation resistance        | DC resistance value that indicates insulation strength between two specified points  |
| Vibration resistance         | Vibration resistance is tested by a type of environmental test for which conditions such as vibration type, frequency range, amplitude, and vibration application method have been specified.  |
| Shock resistance             | An impact is applied to the item to measure shock resistance as a type of stress factor in environmental testing   |
| Leakage current              | Current that leaks from a power supply input line via the product case to the ground   |
| Conducted emission           | High-frequency noise voltage that occurs at a switching power supply's power input terminal  |
| Safety standards             | Technical standards established for various products, parts, materials, and systems to help ensure the safety of switching power supplies in terms of design and use that does not pose a risk of bodily injury or property damage (see Figure 3)              |

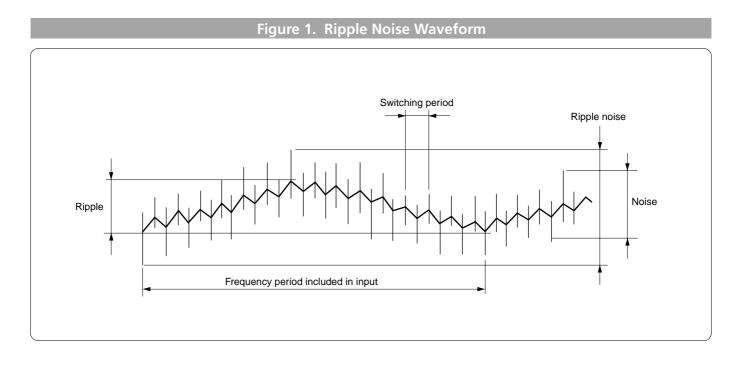
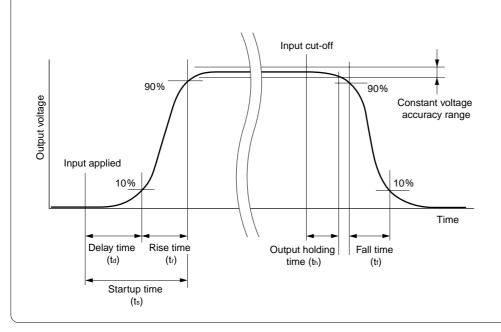


Figure 2. Rise/Fall Waveform



Startup time

This is the time from when an input is applied until 90% of output voltage is reached. (Startup time = delay time + rise time)

#### Output holding time

This is the time, after when an input is cut off, during which the output voltage is held within a specified constant voltage accuracy range and a specified voltage range. Stable output voltage can be supplied even when momentary power outages occur. The output hold function is used to save data to memory or prevent faults in mechanical operations when power outages occur. The output hold time is largely determined based on the following four factors. Input voltage
 Capacitance of input smoothing capacitor

[3] Minimum regulation voltage [4] Output current

Hold time cannot be lengthened by adding more output capacitors, so to do this either by increasing the minimum input voltage or perform derating of the output current. If neither of these methods works adequately, increase the input smoothing capacitor's capacitance or a minor change is required to externally add an input smoothing capacitor.

Figure 3. Safety Standards















C-UL certified product UL certified product UL and C-UL (complies with CSA standard) certified product CSA certified product

TÜV certified product CE certified product VDE certification

# **Correct Use of Switching Power Supply**

### Input

Switching power supply possesses superb small-type, lightweight and high efficiency capabilities. When used correctly, it will help you to improve the reliability of your electronic devices.

### 1.1 Input voltage

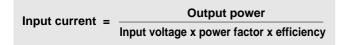
There are many types of switching power supplies, commonly used in every country of the world as well as in Japan, for both AC and DC applications. Check the voltage in the region where it is used, whether it is using AC or DC, the allowable voltage range, the input switching method and other conditions when using switching power supply.

Damage may occur to the power supply when power is applied that differs from the one specified.

Note that it may not operate normally even when within the specified input voltage range due to input voltage waveform distortion.

### **1.2 Input current**

The AC input for standard switching power supply is directly rectified. In this event, the rectification method employs a capacitor in most. Reactive current flows through the smoothing capacitor. As a result, the input current is determined by output power, input voltage, power factor and efficiency.



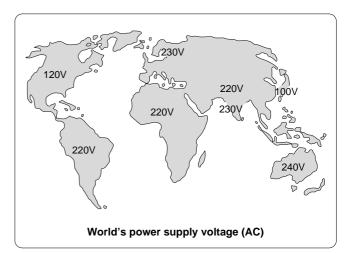
The switching power supply has a power factor of about 0.4 to 0.6 generally. One way to improve the power factor is by adding an inductance or an active filter to the input side. Increasing the inductance on the input side will raise the power factor to about 0.6 to 0.9, and adding an active filter will increase it to at least 0.9.

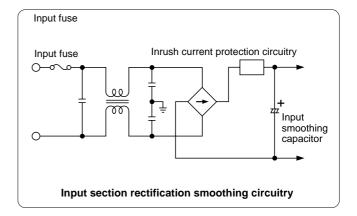
### 1.3 Inrush current

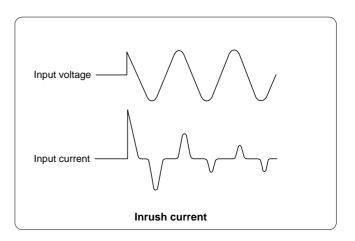
A peak current flows for charging the input smoothing capacitor when power is applied to the switching power supply. This current is called inrush current. While the value for inrush current varies depending on the input timing and inrush current protection circuitry, the value increases several to many times over in comparison to stationary input current. When using multiple switching power supplies, inrush currents are totaled. Pay close attention when selecting a fuse and switches that are added to the input line.

### 1.4 Input fuse

Faults occur in the internal circuitry in the event that the fuse builtin to the switching power supply is fused. Just replacing the fuse will not repair it. At that time, consult with the manufacturer.







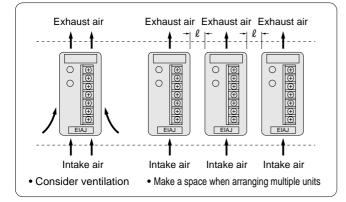
# 2 Mounting/Wiring/Connections

The superb features of switching power supply will not be apparent if a mistake is made in mounting, wiring or connection. Use by observing the methods specified by the manufacturer.

### 2.1 Mounting

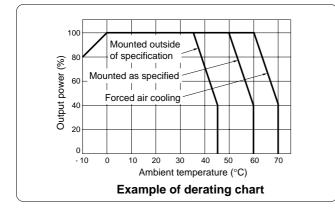
#### (1) Radiation

- a. Consider ventilation.
- b. Observe mounting direction.
- c. Consider heat conduction.
- d. Make a  $\ell$  space (specified by the manufacturer) when arranging multiple units.
- e. A better condition will result when conducting forced air cooling.



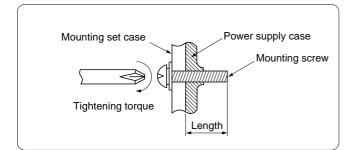
### (2) Output derating

The output power is dependent on the operating temperatures. Use by referring to the derating chart.



### (3) Mounting screws

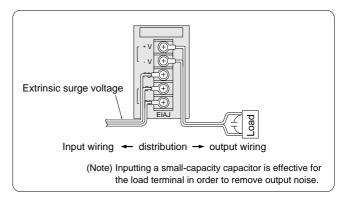
When mounting a power supply to the mounting set case, observe the specified screw length and tightening torque while considering the insulation and tightening strength.



### 2.2 Wiring and connections

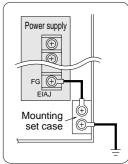
#### (1) Input/output wiring

- a. Separate and bundle input and output wiring so as not to mix up the input line extrinsic surge voltage with the output nor add conducted emission.
- b. Consider the current for output wiring and wire with "thick and short."

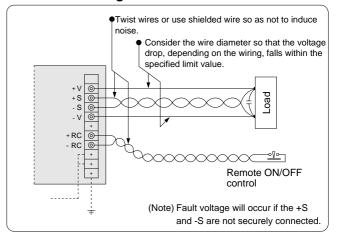


### (2) Grounding connection

Ensure safety and noise prevention for the grounding terminal for the switching power supply and ensure securely connection to the mounting set case.



# (3) Wiring when using remote ON/OFF control and remote sensing



### (4) Correct terminals connection

Use compatible terminal screw diameter, crimp-style terminal, electrical wiring and tools when wiring for the switching power supply.

# **Safety**

Switching power supply is generally the DC stabilized power supply with a special structure created for mounting on devices. Use only for mounting on devices. Also, do not touch a switching power supply that is operating, since it can generate both high voltage and high temperature.

### 3.1 Input voltage

The input voltage range is set for switching power supply. There is a great danger of internal damage when voltage outside of the specified range is applied. Use within the specified input voltage range.

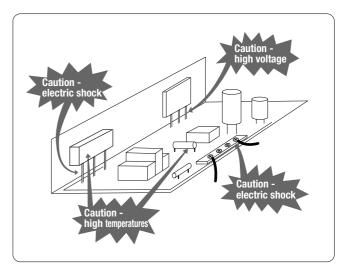
### 3.2 Leakage current

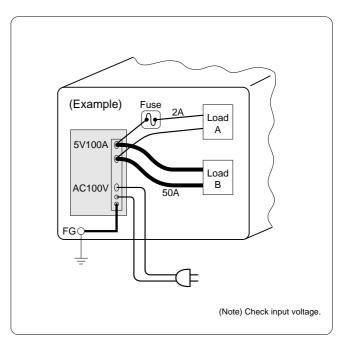
The switching power supply will have leakage current flowing within the value set by the safety standards of each country due to the internal noise filter. Pay close attention to electric shock as currents are totaled when using multiple units. Consider electric shock prevention due to grounding wires, etc.

### 3.3 Wire materials

Wire with thick wires suitable for the output current capacity of switching power supply to prevent heat and fire from being generated by the wiring materials due to an abnormal load. Pay particular attention when distributing current to multiple loads.

Over-current protection (OCP) may not operate even at a load short-circuit when the thin line is used as a branch line. Thus, it's important to consider insertion of the fuse to the wiring, etc. Also, consider rated voltage for electrical wiring used.







The safety standards are set for each country depending on application of switching power supply for mounting on device. Check with the manufacturer's data when used.

# 스 EMI

While switching power supply is created in consideration of EMI, its performance may not be demonstrated sufficiently due to wiring for power supply and load or grounding wire, etc. Note the following items.

### 4.1 Wiring separation

The conducted emission increases when the distance between wiring at the input and output narrows. In addition, radiation noise from devices (noise electric field strength) generally increases when the input conducted emission increases.

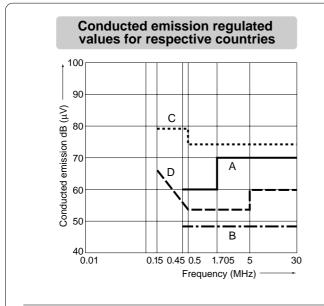
Separate wiring, as an increase in conducted emission is caused when the input wiring and the device's internal wiring (especially digital circuitry) is approached while also causing device operation errors due to external noise.

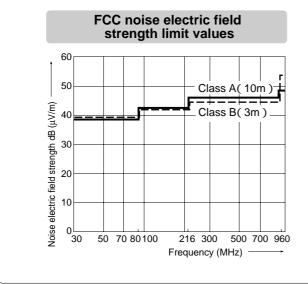
### 4.2 Thick and short

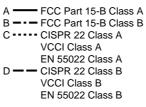
Wire the input wiring and output wiring within the device with "thick and short", which are also the two respective parallel wires, or with twisted wires. In addition, looping of the wiring causes degraded noise performance.

### 4.3 Grounding wire

Make a short connection for the wiring to the device case securely with the thick wire.



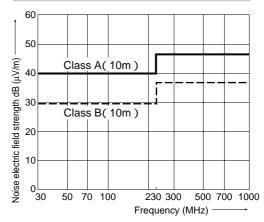




In FCC Part 15, Subpart J has been replaced by Subpart B (Unintentional Radiator).

Although there are other European standards such as VDE, here the EN standard is used as a representative standard that is unified among EU countries.

CISPR 22 Classes A and B are still being studied (as of January 2001) for frequencies of 0.15 MHz or less. In the technical standards of the Electric Appliance and Material Safety Law, values are specified for certain models under "Appended Table 8, 1. Common items, (5) Noise strength", but only a limited range of models is included, so this is omitted here.



# CISPR, VCCI, and EN55022 noise electric field strength limit values

#### Request

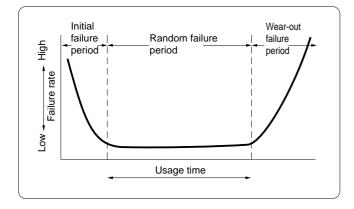
Consider the above-mentioned details when manufacturing a device using EMI standards of the respective country. In addition, refer to the manufacturer's data for details.



### 5.1 Life cycle and failures

The level of reliability for the switching power supply has already been validated in home electronic appliance products and industrial products with satisfactory results received. This fact is the reason why switching power supply has received high evaluation.

The diagram below is called a failure ratio curve (bathtub curve) and is typically used to show a product's life cycle.



#### (1) Initial failure period

The manufacturer performs screening at the parts stage and an aging test after product completion and then ships the product in order to eliminate initial failures. Therefore, the switching power supply is already within the random failure period once the user has received it.

#### (2) Random failure period

The switching power supply is operated in stable condition based on each mean time between failures (MTBF) reliability, thus the probability for failures is basically very low. However, failures that occur within this period depend greatly on mounting operating conditions by the user (ambient temperature, mounting method, derating, ventilation, vibration, shock and other conditions).

#### (3) Wear-out failure period

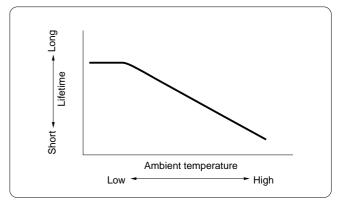
Switching power supply will also head into the wear-out failure period before long.

#### **5.2** Ambient temperatures and lifetime

The switching power supply is made very compact through improvements in high efficiency switching at high frequencies, parts improvements and improvements in mounting technology. Thus, the mounting density is improved and parts are mounted closely together.

The lifetime of these individual parts used in the switching power supply changes extremely due to ambient temperatures.

A chemical reaction is conducted in the interior of the aluminum electrolytic capacitor used as a smoothing filter part, thus it is very sensitive to changes at ambient temperatures. Generally, the aluminum electrolytic capacitor follows "Arrhenius's Law", the 2 × principal at 10 , which possesses characteristics whereby the lifetime is doubled when the ambient temperature drops by 10 while the lifetime is cut in half when the ambient temperature goes up by 10 .



The relationship between the ambient temperatures for the switching power supply and lifetime are shown in the diagram above. The aluminum electrolytic capacitor may already plunge into the wear-out failure period even when the other parts are still within the random failure period if the switching power supply is used at high temperatures. In this case, the aluminum electrolytic capacitor must be replaced and an overhaul must be performed for long use.

### 5.3 Overhaul

Continuous operating systems are steadily increasing with progress in current electronics. Thus, the lifetime of switching power supply is extending. However, switching power supply is not something that can be used forever. Therefore, we recommend an overhaul in order to use this more safely.

The timing of overhaul varies greatly depending on operating conditions and operating temperatures of the product. Thus, the thing to be most careful of is continuous operations over long periods. The overhaul standard when there are continuous operations is as follows.

| Ta = 40    | or more and less than 45   | 3 years      |
|------------|----------------------------|--------------|
| Ta = 35    | or more and less than 40   | 4 years      |
| Ta = 30    | or more and less than 35   | 5 years      |
| (Ta is the | ambient temperatures for p | ower supply) |

These values vary depending on the switching power supply. Consult with the respective manufacturer for further details on overhauls and lifetime.

Document reference: "Current Status and Trends for Switching Power Supplies", by the Switching Power Supply Subcommittee of the JEITA (Japan Electronics and Information Technology Association).

# **Selection Guide**

# [Based on input voltage]

|                                 | Input                            |             | Output Power                |            | Outp    | out Volt                                     | age                |       | Main Features   | Safety                                   | See  |
|---------------------------------|----------------------------------|-------------|-----------------------------|------------|---------|--|--------------------|-------|---|--|------|
|                                 | Voltage (V)                      | Series Name | (W)                         | 3.3V       | 5V      | 12V  | 15V                | 24V   | Main Applications   | Standards                                | page |
|                                 | 100                              | CSJ         | 10, 15                      |            | •       | •  | •                  | •     | Low cost, PCB type<br>Office equipment,<br>information equipment  | UL and CSA certified product             | 17   |
|                                 | 100                              | CSH         | 25, 50, 100, 150            |            | •       | •  | •                  | •     | Low cost, PCB type,<br>resonant-mode, compact,<br>high efficiency, low noise<br>Office equipment, information equipment   | UL and CSA certified product             | 23   |
|                                 | 100                              | SSG         | 30, 50, 100, 150            |            | •       | •  | •                  | •     | Thin, open frame, compact<br>Office equipment,<br>information equipment   | UL and CSA certified product             | 33   |
|                                 | 100                              | SSH         | 25, 50, 100                 |            | •       | •  | (Except100W)       | •     | Resonant-mode, open frame,<br>high efficiency, low noise, compact<br>Office equipment, information equipment  | UL and CSA certified product             | 43   |
|                                 | 100 /<br>wide-range<br>switching | SLS         | 60, 100, 150<br>(switching) |            |         |  |                    | •     | Peak load support,<br>open frame<br>Mechatronics products (motors,  | UL, CSA, TÜV certified products          | 53   |
| t                               |                                  |             | 15, 30, 50                  |            | •       | •  |                    | •     | solenoids, etc.), compact printer drivers<br>Low cost, PCB type, includes power<br>factor correction circuit (75 W to 150 W)  |  |      |
| outpu                           | Wide                             | CWA         | 75, 100, 150                |            |         | •  | +                  | •     | Computer-related equipment<br>and office equipment  | UL, C-UL, TÜV<br>certified products      | 61   |
| Single output                   | Wide                             | SWA         | 15, 30, 50, 100, 150        |            | •       | •  | •                  | •     | Power factor correction circuit (100 W<br>and 150 W), harmonic current control<br>Information and communications  | UL, CSA, TÜV certified products          | 73   |
|                                 | Wide                             | SWC         | 50, 100                     | •          | •       | •  |                    | •     | equipment, gauge controllers<br>Ultra-compact general-purpose switching power<br>supplies, power factor correction circuit (100 W)<br>Computer-related equipment<br>and industrial equipment  | UL, C-UL, TÜV certified products         | 85   |
|                                 | Wide                             | SWD         | 60, 100, 150, 240           |            |         |  |                    | ٠     | Peak load support, built-in power factor<br>correction circuit, harmonic current control<br>Mechatronics products (motors,<br>solenoids, etc.), compact printer drivers   | UL, C-UL,<br>SEMKO<br>certified products | 91   |
|                                 | Wide                             | HWA         | 50<br>100, 150, 300, 600    |            | •       | •  |                    | •     | Compact, long life, high reliability, harmonic<br>current control, resonant-mode, case cover included<br>Factory automation controllers, power and<br>plant controllers, industrial equipment such  | UL, CSA, VDE certified products          | 101  |
|                                 | Wide/auto<br>switching<br>(60 W) | HWB         | 15, 30, 60                  |            | •       | (30,60W)                                     | •                  | (60W) | as semiconductor manufacturing devices<br>Resonant-mode, ultra low-noise<br>equivalent to dropper power supply<br>Measuring instruments, semiconductor manufacturing<br>and testing equipment, controllers, medical equipment,<br>equipment with dropper power supply | UL, C-UL, TÜV<br>certified products      | 109  |
| Multi output (2 channels)       | Wide                             | HWB         | 15, 30                      |            |         |  | (±output)          |       | Resonant-mode, ultra low-noise<br>equivalent to dropper power supply<br>Measuring instruments, semiconductor manufacturing<br>and testing equipment, controllers, medical equipment,<br>equipment with dropper power supply   | UL, C-UL, TÜV certified products         | 114  |
| Multi output                    | Wide                             | SWE         | 100, 150                    |            | •       |  |                    | •     | Peak current support,<br>active filter (PFC) adopted<br>Mechatronics products adopting motors, solenoids,<br>etc., devices applying and mounting thermal head   | UL, C-UL,<br>SEMKO<br>certified products | 121  |
| ells                            |                                  |             | 400                         |            | I       |  | 1                  | I     | Power factor correction circuit,<br>complies with harmonic current<br>control regulations, output can be<br>configured freely when combined   |  |      |
| Multi output<br>lls 6 cells 5 c | Wide                             | PCU         | 600                         | 2 c<br>4 c | hannels | 48 V sii<br>s (two m<br>s (two m<br>ation as | odels) o<br>odels) | r     | with a DC cell module,<br>microprocessor-based sequence<br>control, and various alarm functions   | UL, C-UL, TÜV certified products         | 127  |
| 9 cells                         |                                  |             | 900                         |            |         |  |                    |       | Semiconductor manufacturing and<br>testing equipment, factory automation<br>controllers, computer peripherals,<br>photographic laboratory system,<br>medical equipment (CT, MRI, etc.)  |  |      |

# Selection Guide Based on Output Voltage

|                       |                     |                       | Sin                  | gle Output Power Sເ    | upplies                             |           |                             |
|-----------------------|---------------------|-----------------------|----------------------|------------------------|-------------------------------------|-----------|-----------------------------|
| Output<br>Voltage (V) | Output<br>Power (W) | Output<br>Current (A) | Input<br>Voltage (V) | Model                  | External Dimensions<br>(W×D×H) (mm) | See page  | Remarks                     |
| 2.2                   | 50.0                | 10.0                  | Wide                 | SWC050-3R3             | 136 × 80 × 29                       | 86        |                             |
| 3.3                   | 100.0               | 20.0                  | Wide                 | SWC100-3R3             | 166 × 93 × 34                       | 87        |                             |
|                       | 10.0                | 2.0                   | 100                  | CSJ010-05              | 94 × 49 × 17                        | 18        |                             |
| -                     | 15.0                | 3.0                   | 100                  | CSJ015-05              | 115 × 50 × 17                       | 10        |                             |
|                       | 15.0                | 3.0                   | Wide                 | SWA015-05              | 35 × 99 × 97                        | 74        |                             |
| -                     | 15.0                | 3.0                   | Wide                 | HWB015S-05             | 34 ×110 × 92                        | 110       |                             |
|                       | 15.0                | 3.0                   | Wide                 | CWA015-05              | 125 × 50 × 22                       | 62        |                             |
|                       | 25.0                | 5.0                   | 100                  | CSH025-05              | 115 × 50 × 23                       | 24        |                             |
| -                     | 25.0                | 5.0                   | 100                  | SSH025-05              | 90 × 68 × 25                        | 44        |                             |
|                       | 30.0                | 6.0                   | 100                  | SSG030-05              | 75 × 120 × 25                       | 34        |                             |
| -                     | 30.0                | 6.0                   | Wide                 | SWA030-05              | 35 × 116 × 97                       | 75        |                             |
| -                     | 30.0<br>30.0        | 6.0                   | Wide<br>Wide         | HWB030S-05             | 34 × 136 × 92<br>133 × 55 × 27      | 111<br>63 |                             |
| -                     | 50.0                | 6.0<br>10.0           | 100                  | CWA030-05<br>CSH050-05 | 150 × 50 × 25                       | 25        |                             |
| ·                     | 50.0                | 10.0                  | 100                  | SSG050-05              | 90 × 135 × 25                       | 35        |                             |
| 5                     | 50.0                | 10.0                  | 100                  | SSH050-05              | 110 × 75 × 29                       | 45        |                             |
| J                     | 50.0                | 10.0                  | Wide                 | SWA050-05              | 37 ×159 × 97                        | 76        |                             |
| -                     | 50.0                | 10.0                  | Wide                 | HWA050-05-C            | 40 × 127 × 85                       | 102       |                             |
|                       | 50.0                | 10.0                  | 100/200              | HWB060S-05             | 38 ×170 × 92                        | 112       | Auto switching              |
|                       | 50.0                | 10.0                  | Wide                 | CWA050-05              | 195 × 55 × 27                       | 64        |                             |
|                       | 50.0                | 10.0                  | Wide                 | SWC050-05              | 125 × 80 × 29                       | 86        |                             |
|                       | 100.0               | 20.0                  | 100                  | CSH100-05              | 222 × 62 × 32                       | 26        |                             |
|                       | 100.0               | 20.0                  | 100                  | SSG100-05              | 93 ×160 × 40                        | 36        |                             |
|                       | 100.0               | 20.0                  | 100                  | SSH100-05              | 135 × 93 × 33                       | 46        | 18 A when cover is included |
| -                     | 100.0               | 20.0                  | Wide                 | SWA100-05              | 50 × 180 × 93                       | 77        |                             |
| -                     | 100.0               | 20.0                  | Wide                 | SWC100-05              | 150 × 93 × 34                       | 87<br>27  |                             |
| -                     | 150.0<br>150.0      | 30.0<br>30.0          | 100<br>100           | CSH150-05<br>SSG150-05 | 222 × 75 × 36<br>93 × 177 × 57      | 37        |                             |
|                       | 150.0               | 30.0                  | Wide                 | SWA150-05              | 65 × 200 × 93                       | 80        |                             |
|                       |                     |                       |                      |                        |                                     |           |                             |
|                       | 10.2                | 0.9                   | 100                  | CSJ010-12              | 94 × 49 × 17                        | 18        |                             |
|                       | 15.0                | 1.3                   | 100                  | CSJ015-12              | 115 × 50 × 17                       | 19        |                             |
|                       | 15.6<br>15.6        | 1.3<br>1.3            | Wide<br>Wide         | SWA015-12<br>CWA015-12 | 35 × 99 × 97<br>125 × 50 × 22       | 74<br>62  |                             |
| -                     | 25.2                | 2.1                   | 100                  | CWA015-12<br>CSH025-12 | 125 × 50 × 22<br>115 × 50 × 23      | 24        |                             |
|                       | 25.2                | 2.1                   | 100                  | SSH025-12              | 90 × 68 × 25                        | 44        |                             |
| -                     | 30.0                | 2.5                   | 100                  | SSG030-12              | 75 × 120 × 25                       | 34        |                             |
| -                     | 30.0                | 2.5                   | Wide                 | SWA030-12              | 35 × 116 × 97                       | 75        |                             |
|                       | 30.0                | 2.5                   | Wide                 | CWA030-12              | 133 × 55 × 27                       | 63        |                             |
|                       | 36.0                | 3.0                   | Wide                 | HWB030S-12             | 34 ×136 × 92                        | 111       |                             |
|                       | 50.4                | 4.2                   | 100                  | CSH050-12              | 150 × 50 × 25                       | 25        |                             |
|                       | 50.4                | 4.2                   | 100                  | SSG050-12              | 90 ×135 × 25                        | 35        |                             |
|                       | 50.4                | 4.2                   | 100                  | SSH050-12              | 110 × 75 × 29                       | 45        |                             |
|                       | 50.4                | 4.2                   | Wide                 | SWA050-12              | 37 ×159 × 97                        | 76        |                             |
| 12                    | 50.4                | 4.2                   | Wide                 | HWA050-12-C            | 40 × 127 × 85                       | 102       |                             |
| -                     | 50.4                | 4.2                   | Wide                 | SWC050-12              | 125 × 80 × 29                       | 86        |                             |
| -                     | 51.6                | 4.3                   | Wide                 | CWA050-12              | 195 × 55 × 27                       | 64        | Auto autobio a              |
|                       | 62.4<br>75.6        | 5.2                   | 100/200<br>Wide      | HWB060S-12             | 38 × 170 × 92<br>222 × 55 × 37      | 112<br>66 | Auto switching              |
|                       | 102.0               | 6.3<br>8.5            | 100                  | CWA075-12<br>CSH100-12 | 222 × 55 × 57<br>222 × 62 × 32      | 26        | Peak: 8.1A                  |
|                       | 102.0               | 8.5                   | 100                  | SSG100-12              | 93 × 160 × 40                       | 36        |                             |
|                       | 102.0               | 8.5                   | 100                  | SSH100-12              | 135 × 93 × 33                       | 46        |                             |
|                       | 102.0               | 8.5                   | Wide                 | SWA100-12              | 50 × 180 × 93                       | 77        |                             |
|                       | 102.0               | 8.5                   | Wide                 | CWA100-12              | 222 × 62 × 37                       | 67        | Peak: 11.0A                 |
|                       | 102.0               | 8.5                   | Wide                 | SWC100-12              | 150 × 93 × 34                       | 87        |                             |
|                       | 150.0               | 12.5                  | 100                  | CSH150-12              | 222 × 75 × 36                       | 27        |                             |
|                       | 150.0               | 12.5                  | Wide                 | CWA050-12              | 222 × 75 × 42                       | 68        | Peak: 16.2A                 |
|                       | 156.0               | 13.0                  | 100                  | SSG150-12              | 93 ×177 × 57                        | 37        |                             |
|                       | 156.0               | 13.0                  | Wide                 | SWA050-12              | 65 ×200 × 93                        | 76        |                             |

# Selection Guide Based on Output Voltage

|                       |                     |                       | Sin                  | gle Output Power S     | upplies                             |           |                             |
|-----------------------|---------------------|-----------------------|----------------------|------------------------|-------------------------------------|-----------|-----------------------------|
| Output<br>Voltage (V) | Output<br>Power (W) | Output<br>Current (A) | Input<br>Voltage (V) | Model                  | External Dimensions<br>(W×D×H) (mm) | See page  | Remarks                     |
|                       | 10.5                | 0.7                   | 100                  | CSJ010-15              | 94 × 49 × 17                        | 18        |                             |
|                       | 15.0                | 1.0                   | 100                  | CSJ015-15              | 115 × 50 × 17                       | 19        |                             |
|                       | 15.0                | 1.0                   | Wide                 | SWA015-15              | 35 × 99 × 97                        | 74        |                             |
|                       | 19.5                | 1.3                   | Wide                 | HWB015S-15             | 34 ×110 × 92                        | 110       |                             |
|                       | 25.5                | 1.7                   | 100                  | CSH025-15              | 115 × 50 × 23                       | 24        |                             |
|                       | 25.5                | 1.7                   | 100                  | SSH025-15              | 90 × 68 × 25                        | 44        |                             |
|                       | 30.0<br>30.0        | 2.0<br>2.0            | 100<br>Wide          | SSG030-15<br>SWA030-15 | 75 × 120 × 25<br>35 × 116 × 97      | 34<br>75  |                             |
|                       | 39.0                | 2.0                   | Wide                 | HWB030S-15             | 34 ×136 × 92                        | 111       |                             |
| 15                    | 51.0                | 3.4                   | 100                  | CSH050-15              | 150 × 50 × 25                       | 25        |                             |
|                       | 51.0                | 3.4                   | 100                  | SSG050-15              | 90 × 135 × 25                       | 35        |                             |
| -                     | 51.0                | 3.4                   | 100                  | SSH050-15              | 110 × 75 × 29                       | 45        |                             |
|                       | 51.0                | 3.4                   | Wide                 | SWA050-15              | 37 ×159 × 97                        | 76        |                             |
|                       | 78.0                | 5.2                   | 100/200              | HWB060S-15             | 38 ×170 × 92                        | 112       | Auto switching              |
| -                     | 105.0               | 7.0                   | 100                  | CSH100-15              | 222 × 62 × 32                       | 26        |                             |
|                       | 105.0               | 7.0                   | 100                  | SSG100-15              | 93 ×160 × 40                        | 36        |                             |
|                       | 105.0               | 7.0                   | Wide                 | SWA100-15              | 50 × 180 × 93                       | 77        |                             |
|                       | 150.0               | 10.0                  | 100                  | CSH150-15              | 222 × 75 × 36                       | 27        |                             |
|                       | 150.0               | 10.0                  | 100                  | SSG150-15              | 93 ×177 × 57                        | 37        |                             |
|                       | 150.0               | 10.0                  | Wide                 | SWA150-15              | 65 ×200 × 93                        | 80        |                             |
|                       | 10.8                | 0.5                   | 100                  | CSJ010-24              | 94 × 49 × 17                        | 18        |                             |
|                       | 15.6                | 0.65                  | 100                  | CSJ015-24              | 115 × 50 × 17                       | 19        |                             |
|                       | 16.8                | 0.7                   | Wide                 | SWA015-24              | 35 × 99 × 97                        | 74        |                             |
| -                     | 16.8<br>26.4        | 0.7                   | Wide<br>100          | CWA015-24<br>CSH025-24 | 125 × 50 × 22<br>115 × 50 × 23      | 62<br>24  |                             |
|                       | 26.4                | 1.1                   | 100                  | SSH025-24              | 90 × 68 × 25                        | 44        |                             |
|                       | 31.2                | 1.1                   | 100                  | SSG030-24              | 75 × 120 × 25                       | 34        |                             |
|                       | 31.2                | 1.3                   | Wide                 | SWA030-24              | 35 × 116 × 97                       | 75        |                             |
|                       | 31.2                | 1.3                   | Wide                 | CWA030-24              | 133 × 55 × 27                       | 63        |                             |
|                       | 50.4                | 2.1                   | 100                  | CSH050-24              | 150 × 50 × 25                       | 25        |                             |
|                       | 50.4                | 2.1                   | 100                  | SSG050-24              | 90 ×135 × 25                        | 35        |                             |
|                       | 50.4                | 2.1                   | 100                  | SSH050-24              | 110 × 75 × 29                       | 45        |                             |
|                       | 50.4                | 2.1                   | Wide                 | SWA050-24              | 37 ×159 × 97                        | 76        |                             |
|                       | 50.4                | 2.1                   | Wide                 | HWA050-24-C            | 40 × 127 × 85                       | 102       |                             |
|                       | 50.4                | 2.1                   | Wide                 | CWA050-24              | 195 × 55 × 27                       | 64        |                             |
|                       | 60.0                | 2.5                   | 100                  | SLS060P                | 160 × 80 × 40                       | 54        | Peak: 6A                    |
|                       | 60.0                | 2.5                   | 200                  | SLS060PH               | 160 × 80 × 40                       | 54        | Peak: 6A                    |
|                       | 60.0                | 2.5                   | Wide                 | SWD060P-24             | 160 × 80 × 40                       | 92        | Peak: 6A                    |
| 24                    | 76.8                | 3.2                   | Wide                 | CWA075-24              | 222 × 55 × 37<br>38 × 170 × 92      | 66        | Peak: 4.1A                  |
|                       | 84.0<br>96.0        | 3.5<br>4.0            | Wide<br>100          | HWB060S-24<br>SLS100P  | 160 × 98 × 40                       | 112<br>56 | Auto switching<br>Peak: 10A |
|                       | 96.0                | 4.0                   | 200                  | SLS100PH               | 160 × 98 × 40                       | 56        | Peak: 10A                   |
|                       | 96.0                | 4.0                   | Wide                 | SWD100P-24             | 160 × 98 × 40                       | 93        | Peak: 10A                   |
|                       | 100.8               | 4.2                   | Wide                 | HWA100-24-C            | 50 × 145 × 92                       | 104       |                             |
|                       | 103.2               | 4.3                   | 100                  | CSH100-24              | 222 × 62 × 32                       | 26        | Peak: 5.5A                  |
|                       | 103.2               | 4.3                   | Wide                 | CWA100-24              | 222 × 62 × 37                       | 67        |                             |
|                       | 108.0               | 4.5                   | 100                  | SSG100-24              | 93 ×160 × 40                        | 36        |                             |
|                       | 108.0               | 4.5                   | 100                  | SSH100-24              | 135 × 93 × 33                       | 46        |                             |
|                       | 108.0               | 4.5                   | Wide                 | SWA100-24              | 50 × 180 × 93                       | 77        | Peak: 15A                   |
|                       | 144.0               | 6.0                   | 100/200              | SLS150PW               | 220 × 98 × 52                       | 56        | Peak: 15A                   |
|                       | 144.0               | 6.0                   | Wide                 | SWD150P-24             | 220 × 98 × 52                       | 94        | Dook: 0.44                  |
|                       | 151.2               | 6.3                   | 100                  | CSH150-24              | 222 × 75 × 36                       | 27        | Peak: 8.1A                  |
|                       | 151.2               | 6.3                   | Wide<br>100          | CWA150-24              | 222 × 75 × 42<br>93 × 177 × 57      | 68<br>37  |                             |
|                       | 156.0               | 6.5<br>6.5            | Wide                 | SSG150-24<br>SWA150-24 | 65 × 200 × 93                       | 80        |                             |
|                       | 156.0               | 6.5                   | Wide                 | HWA150-24-C            | 50 × 163 × 92                       | 96        | Peak: 20.0A                 |
|                       | 240.0               | 10.0                  | Wide                 | SWD240P-24             | 220 × 110 × 65                      | 90        |                             |
|                       | 336.0               | 14.0                  | Wide                 | HWA300-24-C            | 110 × 175 × 92                      | 106       |                             |
|                       | 648.0               | 27.0                  | Wide                 | HWA600-24-C            | 170 ×179 × 92                       | 106       |                             |

# Selection Guide Based on Output Voltage

|                    | Multi Output Power Supplies |           |             |              |                     |          |               |  |  |
|--------------------|-----------------------------|-----------|-------------|--------------|---------------------|----------|---------------|--|--|
| Output Voltage (V) | Output Current (A)          | Output    | Input       | Model        | External Dimensions | See page | Remarks       |  |  |
| ch1                | ch2                         | Power (W) | Voltage (V) | Woder        | (W×D×H) (mm)        | See page | Kelliarks     |  |  |
| + 15 / 0.65        | + 15 / 0.65                 | 19.5      | Wide        | HWB015D-15   | 34 ×110 × 92        | 114      |               |  |  |
| + 15 / 1.3         | + 15 / 1.3                  | 39.0      | Wide        | HWB030D-15   | 34 ×136 × 92        | 115      |               |  |  |
| + 5 / 3.0          | + 24 / 4.0                  | 111.0     | Wide        | SWE100P-2405 | 220 × 98 × 52       | 122      | Peak: 24V 10A |  |  |
| + 5 / 6.0          | + 24 / 6.0                  | 174.0     | Wide        | SWE150P-2405 | 240 ×110 × 65       | 123      | Peak: 24V 15A |  |  |

### Semi-custom Power Supplies

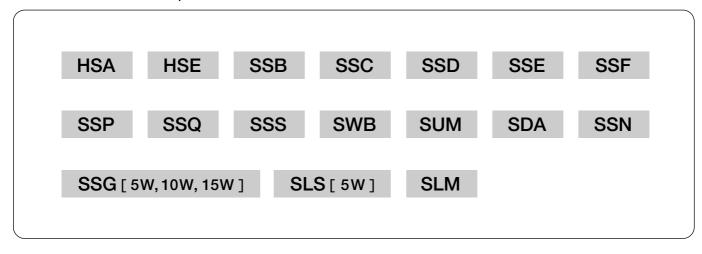
| Main Unit           |                                   |      |                 |   |          |         |
|---------------------|-----------------------------------|------|-----------------|---|----------|---------|
| Output<br>Power (W) | No. of Mounted<br>DC Cell Modules |      | Model           | External Dimensions<br>(W × D × H) (mm) | See page | Remarks |
| 400                 | 5                                 | Wide | PCU400- * * * * | 124 ×280 × 64                           | 128      |         |
| 600                 | 6                                 | Wide | PCU600- * * * * | 148 ×280 × 64                           | 129      |         |
| 900                 | 9                                 | Wide | PCU900- * * * * | 220 ×280 × 64                           | 130      |         |

### DC Cell Modules

| No. of<br>Outputs | Output<br>Power (W) | Output<br>Voltage (V)     | Output<br>Current (A)     | Symbol | Remarks |
|-------------------|---------------------|---------------------------|---------------------------|--------|---------|
|                   | 48                  | 2.0                       | 24                        | Н      |         |
|                   | 79.2                | 3.3                       | 24                        | A      |         |
|                   | 120                 | 5.0                       | 24                        | В      |         |
|                   | 120                 | 6.0                       | 20                        | J      |         |
| Single<br>Output  | 120                 | 12.0                      | 10                        | С      |         |
| Carpar            | 120                 | 15.0                      | 8                         | D      |         |
|                   | 120                 | 24.0                      | 5                         | E      |         |
|                   | 120                 | 36.0                      | 36                        | F      |         |
|                   | 120                 | 48.0                      | 2.5                       | G      |         |
| Double            | 40                  | 5V / 4A,                  | 5V / 4A                   | W11    |         |
| Output            | 96                  | 12V / 4A,                 | 12V / 4A                  | W22    |         |
| Quadruple         | 38                  | + 5V / 3A,<br>+ 12V / 1A, | - 5V / 1A<br>- 12V / 5A   | Q1     |         |
| Output            | 42.5                |                           | - 5V / 1A<br>- 15V / 0.5A | Q2     |         |

# **Discontinued products**

The series below are the products that have been discontinued.





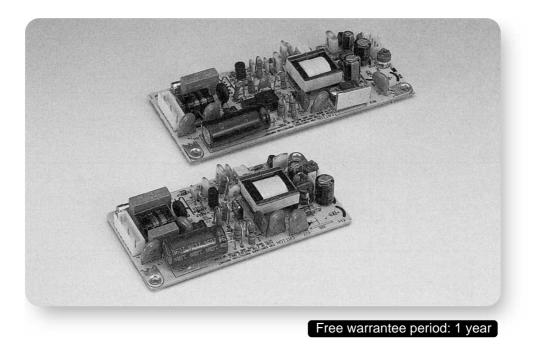
# Single output

Single printed circuit board

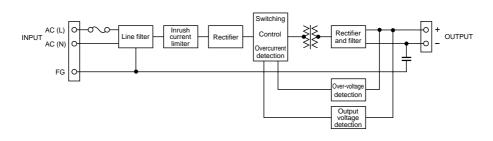




- Lower cost due to simple PCB type
- Small-capacity, single output, 10 or 15 W
- Acquired UL and CSA safety standards



### [CSJ Series Circuit Diagram]





|                                  |                        |                          | Specificatio  | ns and Standards         |                                   |                      |  |  |
|----------------------------------|------------------------|--------------------------|---|--------------------------|-----------------------------------|----------------------|--|--|
|                                  | Мо                     | dal                      |   | 1                        | 0W                                |                      |  |  |
|                                  | IVIO                   | dei                      | CSJ010-05   | CSJ010-12                | CSJ010-15                         | CSJ010-24            |  |  |
|                                  | Rated Input            | Voltage                  |   | AC100                    | //AC120V                          |                      |  |  |
|                                  | Allowable I            | nput Voltage Range       | AC85 to 132V  |                          |                                   |                      |  |  |
| su                               | Input Curre            | nt (typ)                 | 0.3A  |                          |                                   |                      |  |  |
| Input<br>Conditions              | Rated Freq             | uency                    |   | 50                       | /60Hz                             |                      |  |  |
| Ind                              | Allowable F            | requency Range           |   | 47 to                    | 440Hz                             |                      |  |  |
| ٽ <del>ت</del>                   | Efficiency (           |                          | 72%   | 73%                      | 75%                               | 77%                  |  |  |
|                                  |                        | ent (max) Notes          |   | 30 A (max                | i) (at cold start)                |                      |  |  |
|                                  | Leakage Cu             | irrent (max)             |   | (                        | ).3mA                             |                      |  |  |
|                                  | Rated Outp             | ut Voltage               | 5V  | 12V                      | 12V                               | 24V                  |  |  |
| 9                                | Output Volt            | age Variation            |   | Rated outpu              | t voltage ±10%                    |                      |  |  |
| Kote                             | Rated Outp             | ut Current               | 2.0A  | 0.85A                    | 0.85A                             | 0.45A                |  |  |
| ous                              | L                      | utput Current Range      |   | 0 to                     | 100%                              |                      |  |  |
| Output<br>Conditions 🚥           | Rated Outp             |                          | 10.0W   | 10.2W                    | 10.2W                             | 10.8W                |  |  |
| Son                              |                        | oltage Accuracy          |   | <u> </u>                 | -3%                               | 1                    |  |  |
|                                  | Ripple Nois            | C Note2                  | 120mVp-p  | 150mVp-p                 | 150mVp-p                          | 200mVp-p             |  |  |
|                                  | Output Hole            | ding Time (min)          |   | 17                       | msec                              |                      |  |  |
|                                  | Startup Tim            | e (typ)                  |   | 20msec                   |                                   |                      |  |  |
|                                  | Overcurren             | t Protection             | Dete  | ction above 105% of rat  | ed current (automatic reco        | overy)               |  |  |
| Additional<br>Functions          | Overvoltage Protection |                          | Detection above 115% of rated voltage (output cutoff) |                          |                                   |                      |  |  |
| litic                            | Remote ON              | /OFF Control             | Not provided  |                          |                                   |                      |  |  |
| Adc<br>Fun                       | Remote Ser             | nsing                    |   | Not p                    | rovided                           |                      |  |  |
|                                  | Operations             | Display                  | Not provided  |                          |                                   |                      |  |  |
|                                  | Operating Te           | emperature Range Note 4  |   |                          |                                   |                      |  |  |
|                                  | Storage Ter            | nperature Range          | -25 to +85  |                          |                                   |                      |  |  |
|                                  | <u> </u>               | lumidity Range           | 30 to 90% (no condensation)                           |                          |                                   |                      |  |  |
| tal                              |                        | midity Range             | 30 to 90% (no condensation)                           |                          |                                   |                      |  |  |
| Environmental<br>Conditions      | Cooling Re             | quirements               |   |                          | air cooling                       |                      |  |  |
| Environme                        |                        | No. of vibrations        |   |                          | o 55Hz                            |                      |  |  |
| nvir<br>ond                      | Vibration              | Sweep time               |   |                          | inutes                            |                      |  |  |
| шй                               | Resistance             | Acceleration rate        |   |                          | /s2 (2G)                          |                      |  |  |
|                                  |                        | Vibration direction      |   |                          | Y, Z                              |                      |  |  |
|                                  | Installation           | Vibration time           |   |                          | of three directions               |                      |  |  |
|                                  | Installation           | Conditions               |   | Derating may be required |                                   |                      |  |  |
|                                  | Insulation             | Between input and output | 2000 V AC   | for 1 minute or 2400 V A | C for 1 second (leakage cu        | rrent: 15 mA)        |  |  |
| uo                               | Withstand              | Between input and FG     |   |                          |                                   | ,                    |  |  |
| Insulation                       | Voltage                | Between output and FG    | 500 V AC  | for 1 minute or 600 V AC | for 1 second (leakage cur         | rent: 15 mA)         |  |  |
| nsu                              | Insulation             | Between input and output |   | (00 M (                  |                                   |                      |  |  |
| _                                | Resistance             |                          |   | 100 M (measured          | with 500 V DC Megger)             |                      |  |  |
|                                  |                        | Between output and FG    |   |                          |                                   |                      |  |  |
| 7                                | External Appearance    |                          |   |                          | ed circuit board                  |                      |  |  |
| ture                             | Input Type             |                          |   |                          | nector                            |                      |  |  |
| truc                             | Output Typ             |                          |   |                          | nector                            |                      |  |  |
| al S<br>ards                     | External Di            | mensions                 |   |                          | <sup>D</sup> x 17 <sup>H</sup> mm |                      |  |  |
| External Structure/<br>Standards | Weight                 |                          |   |                          | 55g                               | d Matariala O Statul |  |  |
| Sta                              | Safety Stan            |                          |   | -                        | eet Electrical Appliance ar       |                      |  |  |
|                                  | Conducted              | Emission                 | Designa   | ted to meet FCC Class B  | (100-120 V AC) and VCC            | I Class B            |  |  |

Note At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated

**18** output current, and rated frequency, at an ambient temperature of 25 with 60% humidity.

**Specifications and Standards** 15W Model CSJ015-12 CSJ015-15 CSJ015-05 CSJ015-24 Rated Input Voltage AC100V/AC120V Allowable Input Voltage Range AC85 to 132V Input Current (typ) 0.4A **Rated Frequency** 50/60Hz Allowable Frequency Range 47 to 440 Hz (rated frequency: 50/60 Hz) Efficiency (typ) 72% 73% 75% 77% Inrush Current (max) Note1 30 A (max) (at cold start) Leakage Current (max) 0.3mA Rated Output Voltage 5V 12V 15V 24V Rated output voltage  $\pm 10\%$ Output Voltage Variation Note 3 3.0A 0.65A **Rated Output Current** 1.25A 1.0A Allowable Output Current Range 0 to 100% **Rated Output Power** 15.0W 15.0W 15.0W 15.6W ±3% C off **Constant Voltage Accuracy** Ripple Noise Note2 120mVp-p 150mVp-p 150mVp-p 200mVp-p 16msec **Output Holding Time (min)** Startup Time (typ) 20msec **Overcurrent Protection** Detection above 105% of rated current (automatic recovery) **Overvoltage Protection** Detection above 115% of rated voltage (output cutoff) **Remote ON/OFF Control** Not provided Remote Sensing Not provided **Operations Display** Not provided **Operating Temperature Range** -10 to 60°C (70% load at 60°C) Storage Temperature Range -25 to +85°C **Operating Humidity Range** 30 to 90% (no condensation) Storage Humidity Range 30 to 90% (no condensation) ironmental **Cooling Requirements** Natural air cooling tions No. of vibrations 10 to 55Hz Sweep time 3 minutes Envii Conc Vibration 19.6m/s<sup>2</sup> (2G) Acceleration rate Resistance Vibration direction X, Y, Z Vibration time One hour in each of three directions Installation Conditions Derating may be required due to mounting direction Insulation Between input and output 2000 V AC for 1 minute or 2400 V AC for 1 second (leakage current: 15 mA) Withstand Between input and FG Voltage Between output and FG 500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA) Between input and output Insulation Resistance Between input and FG  $100M\Omega$  (measured with 500 V DC Megger) Between output and FG **External Appearance** Single printed circuit board Input Type Connector **Output Type** Connector **External Dimensions**  $115^{W} \ge 50^{D} \ge 17^{H} \text{ mm}$ Weight 70g UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law Safety Standards Ξ÷ Conducted Emission Designated to meet FCC Class B (100-120 V AC) and VCCI Class B

Moter At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note: Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

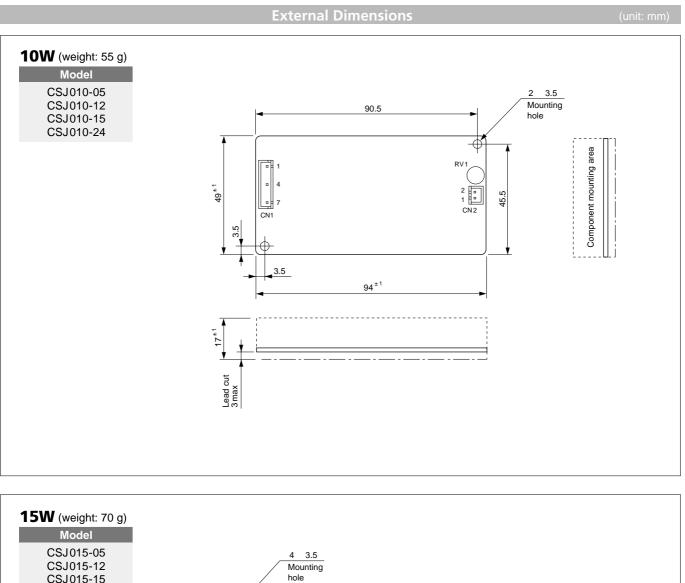
t may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

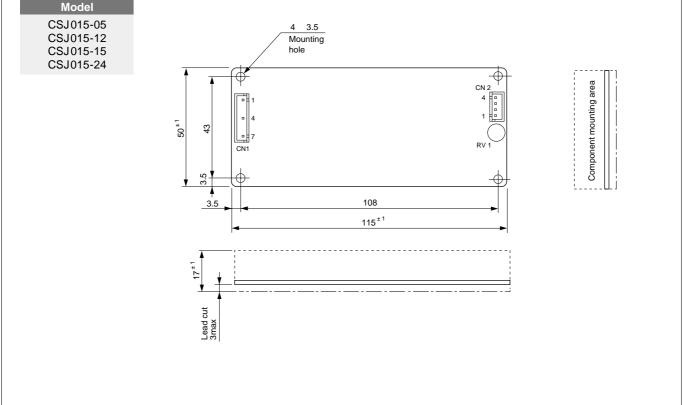
\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

**SJ** Series

CSJ Series







### **Operating Instruction**

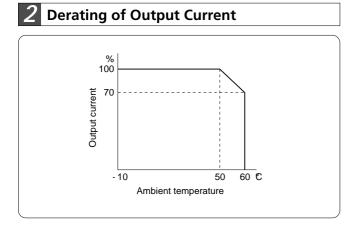
Terminal Connection

CSJ010 connector type

| Symbol | Pin No. | Function | Connector                | Corresponding<br>connector | Corresponding contact |
|--------|---------|----------|--------------------------|----------------------------|-----------------------|
|        | 1       | AC (L)   |                          |                            |                       |
|        | 2       | NC       |                          | XHP-7<br>(JST)             |                       |
|        | 3       | NC       |                          |                            | SXH-001T-P0.6         |
| CN1    | 4       | AC (N)   | B3 (7.5) B-XH-A<br>(JST) |                            | (JST)                 |
|        | 5       | NC       | (001)                    |                            | or                    |
|        | 6       | NC       |                          |                            | BXH-001T-P0.6         |
|        | 7       | FG       |                          |                            | (JST)                 |
| CN2    | 1       | -        | B2B-XH-A                 | XHP-2                      |                       |
| UNZ    | 2       | +        | (JST)                    | (JST)                      |                       |

#### CSJ015 connector type

| Symbol | Pin No. | Function | Connector                | Corresponding connector | Corresponding contact |
|--------|---------|----------|--------------------------|-------------------------|-----------------------|
|        | 1       | AC (L)   |                          | (JST)                   |                       |
|        | 2       | NC       |                          |                         |                       |
| CN1    | 3       | NC       |                          |                         | SXH-001T-P0.6         |
|        | 4       | AC (N)   | B3 (7.5) B-XH-A<br>(JST) |                         | (JST)                 |
|        | 5       | NC       | ()                       |                         | or                    |
|        | 6       | NC       |                          |                         | BXH-001T-P0.6         |
|        | 7       | FG       |                          |                         | (JST)                 |
| CN2    | 1 to 2  | -        | B4B-XH-A                 | XHP-4                   |                       |
| 0112   | 3 to 4  | +        | (JST)                    | (JST)                   |                       |

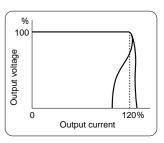


### **3** Setting Output Voltage

Output voltage may be adjusted using the adjustment knob found near the output connector. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

### **4** Overcurrent Protection

When the output load becomes excessive, the output current is restricted as shown at right. After the source of the excess load is removed, the normal output voltage is recovered automatically.



The overcurrent protection function is set to operate

when the output current exceeds 105% of the rated current value (120% of the standard output value).

NOTE: Never operate the target equipment with an excessive load for long periods, since this can result in degradation of the power supply unit.

### **5** Overvoltage Protection

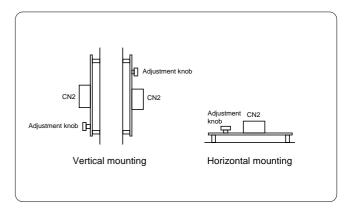
If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about a minute before turning the power on again.

Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

### 6 Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.

The power supply can be mounted in two directions as shown below. When a metal case is used, mount the power supply considering insulation distance. Please contact Sanken for more information.

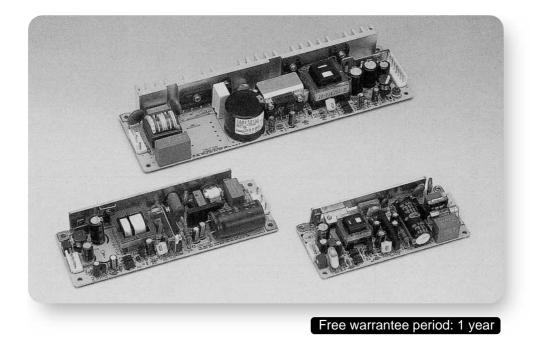


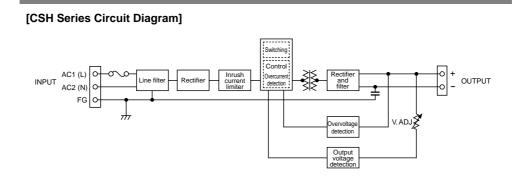
For safety's sake, be sure to connect FG to the grounding terminal of the target device. Otherwise, conducted emission, radiation noise and ripple noise will increase.

Employs resonant-mode hybrid ICs. Compact, high efficiency, low noise unit realized.



- Resonant-mode features low noise and high efficiency
- Low cost due to very simple printed circuit board type
- Wide-ranging lineup (single output: 25 W to 150 W) to meet any requirements
- Proprietary power hybrid IC realizes compact, light unit
- Acquired UL and CSA safety standards







|                             |   |                          | Specificatio   | ns and Standards           |                                   |           |  |
|-----------------------------|---|--------------------------|--|----------------------------|-----------------------------------|-----------|--|
|                             | Ma  | امام                     |  | 2!                         | 5W                                |           |  |
|                             | IVIO  | del                      | CSH025-05  | CSH025-12                  | CSH025-15                         | CSH025-24 |  |
|                             | Rated Input   | Voltage                  |  | AC100\                     | //AC120V                          |           |  |
|                             |   | nput Voltage Range       |  | AC85                       | to 132V                           |           |  |
| રા                          | Input Curre   | nt (typ)                 |  | 0.6/                       | V0.5A                             |           |  |
| tion                        | Rated Freq  | uency                    | 50/60Hz  |                            |                                   |           |  |
| Input<br>Conditions         | Allowable F   | requency Range           |  | 47 to 440 Hz (rated        | frequency: 50/60 Hz)              |           |  |
| ů <u> </u>                  | Efficiency (typ)  |                          | 81%  | 83%                        | 84%                               | 86%       |  |
|                             | Inrush Curr   | ent (max) Note1          |  | 30 A (max)                 | (at cold start)                   |           |  |
|                             | Leakage Cu  | ırrent (max)             |  | 0.                         | 5mA                               |           |  |
|                             | Rated Outp  | ut Voltage               | 5V   | 12V                        | 15V                               | 24V       |  |
|                             |   | age Variation            |  | Rated outpu                | voltage ±10%                      |           |  |
| Note 3                      | Rated Outp  | -                        | 5.0A   | 2.1A                       | 1.7A                              | 1.1A      |  |
| suo                         |   | utput Current Range      |  |                            | 100%                              | 1         |  |
| ditio                       | Rated Outp  | •                        | 25.0W  | 25.2W                      | 25.5W                             | 26.4W     |  |
| Output<br>Conditic          | Constant V  | oltage Accuracy          |  | ±                          | 3%                                |           |  |
| 00                          | Ripple Nois   | C Note 2                 | 80mVp-p  | 100mVp-p                   | 100mVp-p                          | 100mVp-p  |  |
|                             | Output Hole   | ding Time (min)          |  | 16r                        | nsec                              |           |  |
|                             | Startup Tim   | ie (typ)                 |  | 400                        | msec                              |           |  |
|                             | Overcurren  | t Protection             | ſ  | Detection above 105% of    | rated current (output cuto        | ff)       |  |
| Additional<br>Functions     |   | e Protection             | Detection above 105% of rated current (output cutoff)<br>Detection above 115% of rated voltage (output cutoff) |                            |                                   |           |  |
| litional                    |   | /OFF Control             |  | Not provided               |                                   |           |  |
| un.                         | Remote Se   | nsing                    | Not provided   |                            |                                   |           |  |
| < ╙                         | Operations  | Display                  | Not provided   |                            |                                   |           |  |
|                             | Operating Te  | emperature Range Note4   | -10 to +60°C   |                            |                                   |           |  |
|                             |   | mperature Range          | -10 t0 +60 C<br>-25 to +85°C   |                            |                                   |           |  |
|                             | -   | lumidity Range           | -25 t0 +65 C<br>30 to 90% (no condensation)  |                            |                                   |           |  |
| a                           |   | midity Range             |  | · · · · ·                  | o condensation)                   |           |  |
| Environmental<br>Conditions | Cooling Re  |                          |  | · · · ·                    | air cooling                       |           |  |
| ion                         |   | No. of vibrations        |  | 10 to                      | 55Hz                              |           |  |
| Environme<br>Conditions     |   | Sweep time               |  | 3 m                        | nutes                             |           |  |
| Co                          | Vibration<br>Resistance   | Acceleration rate        |  | 19.6m                      | /s²(2G)                           |           |  |
|                             |   | Vibration direction      |  | Х,                         | Y, Z                              |           |  |
|                             |   | Vibration time           |  | One hour in each           | of three directions               |           |  |
|                             | Installation  | Conditions               |  | Derating may be required   | due to mounting direction         | n         |  |
|                             | Insulation  | Between input and output |  |                            |                                   |           |  |
| ç                           | Withstand   | Between input and FG     |  | 2000 V AC for 1 minute     | (leakage current: 15 mA)          |           |  |
| Insulation                  | Voltage   | Between output and FG    |  | 500 V AC for 1 minute      | (leakage current: 15 mA)          |           |  |
| sula                        | Inculation  | Between input and output |  |                            |                                   |           |  |
| <u> </u>                    | Insulation<br>Resistance  | Between input and FG     |  | 100 M $\Omega$ (measured v | vith 500 V DC Megger)             |           |  |
|                             |   | Between output and FG    |  |                            |                                   |           |  |
|                             | External Appearance<br>Input Type<br>Output Type<br>External Dimensions<br>Weight<br>Safety Standards |                          |  | Single printe              | d circuit board                   |           |  |
| ure/                        |   |                          |  |                            | nector                            |           |  |
| uct                         |   |                          |  |                            | nector                            |           |  |
| l Str<br>ds                 | External Di   | mensions                 |  | 115 <sup>W</sup> x 50      | <sup>D</sup> x 23 <sup>H</sup> mm |           |  |
| erna                        | Weight  |                          |  | 8                          | 5g                                |           |  |
| Exte<br>Star                | Safety Stan   | dards                    | UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law               |                            |                                   |           |  |
|                             | Conducted   | Emission                 |  | Designated to meet FCC     | Class B and VCCI Class            | В         |  |
| A 4 -                       |   | a aurrant than about a   | noted value may flow at re   | otort)                     |                                   |           |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Construction Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

**CSH** Series 25W,50W,100W,150W

|                                  |                          |                          | Specificatio  | ns and Standard          | S                                   |           |  |  |
|----------------------------------|--------------------------|--------------------------|---|--------------------------|-------------------------------------|-----------|--|--|
|                                  | Мо                       | امام                     |   | 5                        | 0W                                  |           |  |  |
|                                  | IVIO                     | aei                      | CSH050-05   | CSH050-12                | CSH050-15                           | CSH050-24 |  |  |
|                                  | Rated Input              | Voltage                  |   | AC100                    | V/AC120V                            |           |  |  |
|                                  | Allowable I              | nput Voltage Range       | AC85 to 132V  |                          |                                     |           |  |  |
| us                               | Input Curre              | nt (typ)                 |   |                          | 1.0A                                |           |  |  |
| Input<br>Conditions              | Rated Freq               | uency                    | 50/60Hz   |                          |                                     |           |  |  |
| pud                              |                          | requency Range           |   | 47 to 440 Hz (rate       | d frequency: 50/60 Hz)              | -         |  |  |
| <u>్</u> చ                       | Efficiency (             |                          | 81%   | 81% 86% 87% 90%          |                                     |           |  |  |
|                                  |                          | ent (max) Note1          |   | 30 A (max                | ) (at cold start)                   |           |  |  |
|                                  | Leakage Cu               | irrent (max)             |   | 0                        | ).5mA                               |           |  |  |
|                                  | Rated Outp               | ut Voltage               | 5V  | 12V                      | 15V                                 | 24V       |  |  |
| _                                | -                        | age Variation            |   |                          | ut voltage ±10%                     |           |  |  |
| Kote3                            | Rated Outp               | -                        | 10.0A   | 4.2A                     | 3.4A                                | 2.1A      |  |  |
| sug                              | <u> </u>                 | utput Current Range      |   | O to                     | o 100%                              |           |  |  |
| Output<br>Conditions             | Rated Outp               |                          | 50.0W   | 50.4W                    | 51.1W                               | 50.4W     |  |  |
| one                              | Constant V               | oltage Accuracy          |   |                          | ±3%                                 | •         |  |  |
| 00                               | Ripple Nois              | C Note2                  | 80mVp-p   | 100mVp-p                 | 100mVp-p                            | 100mVp-p  |  |  |
|                                  | Output Hole              | ding Time (min)          |   | 16                       | 6msec                               |           |  |  |
|                                  | Startup Tim              | ie (typ)                 |   | 400                      | Omsec                               |           |  |  |
|                                  | Overcurren               | t Protection             | Г   | Detection above 105% o   | f rated current (output cuto        | ff)       |  |  |
| Additional<br>Functions          |                          | e Protection             | Detection above 105% of rated current (output cutoff) Detection above 115% of rated voltage (output cutoff) |                          |                                     |           |  |  |
| tio                              |                          | /OFF Control             | Not provided  |                          |                                     |           |  |  |
| ddi                              | Remote Ser               |                          | Not provided  |                          |                                     |           |  |  |
| A IT                             | Operations               | -                        |   |                          | provided                            |           |  |  |
|                                  | Operating Te             | emperature Range         | -10 to +60°C  |                          |                                     |           |  |  |
|                                  |                          | nperature Range          | -10 t0 +00 C<br>-25 to +85°C  |                          |                                     |           |  |  |
|                                  | -                        | Iumidity Range           | 30 to 90% (no condensation)   |                          |                                     |           |  |  |
| a                                |                          | midity Range             |   |                          | no condensation)                    |           |  |  |
| Environmental<br>Conditions      | Cooling Re               | quirements               |   |                          | l air cooling                       |           |  |  |
| Environme                        |                          | No. of vibrations        |   | 10 t                     | to 55Hz                             |           |  |  |
| virc<br>ndi                      | Vibration                | Sweep time               |   | 3 n                      | ninutes                             |           |  |  |
| C E                              | Resistance               | Acceleration rate        |   | 19.6r                    | m/s² (2G)                           |           |  |  |
|                                  |                          | Vibration direction      |   | Х                        | , Y, Z                              |           |  |  |
|                                  |                          | Vibration time           |   | One hour in eac          | ch of three directions              |           |  |  |
|                                  | Installation             | Conditions               |   | Derating may be require  | ed due to mounting directio         | n         |  |  |
|                                  | Insulation               | Between input and output |   |                          |                                     |           |  |  |
| Ę                                | Withstand                | Between input and FG     |   | 2000 V AC for 1 minute   | e (leakage current: 15 mA)          |           |  |  |
| Insulation                       | Voltage                  | Between output and FG    |   | 500 V AC for 1 minute    | e (leakage current: 15 mA)          |           |  |  |
| suls                             | Inculation               | Between input and output |   |                          |                                     |           |  |  |
| <u> </u>                         | Insulation<br>Resistance | Between input and FG     |   | 100 M $\Omega$ (measured | with 500 V DC Megger)               |           |  |  |
|                                  |                          | Between output and FG    |   |                          |                                     |           |  |  |
|                                  | External Ap              | pearance                 |   | Single print             | ed circuit board                    |           |  |  |
| nre/                             |                          |                          |   | • ·                      | nnector                             |           |  |  |
| uct                              |                          |                          |   |                          | nnector                             |           |  |  |
| l Str<br>ds                      | External Di              |                          |   |                          | 0 <sup>D</sup> x 25 <sup>H</sup> mm |           |  |  |
| ernal                            | Weight                   |                          |   |                          | 150g                                |           |  |  |
| External Structure/<br>Standards | Safety Stan              | dards                    | UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law            |                          |                                     |           |  |  |
|                                  | Conducted                | Emission                 |   | Designated to meet FCC   | C Class B and VCCI Class            | В         |  |  |
|                                  |                          |                          | noted value may flow at re  |                          |                                     |           |  |  |

At cold start. (More current than above noted value may flow at restart.)

Note: Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Construction Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.



|                                  |                                   |                          | Specificatio  | ns and Standards                                      |                                   |                          |  |  |
|----------------------------------|-----------------------------------|--------------------------|---|---|-----------------------------------|--------------------------|--|--|
|                                  | Ma                                | del                      |   | 10  | ow                                |                          |  |  |
|                                  | IVIC                              | aei                      | CSH100-05   | CSH100-12   | CSH100-15                         | CSH100-24                |  |  |
|                                  | Rated Input                       | t Voltage                |   | AC100V  | /AC120V                           |                          |  |  |
|                                  |                                   | nput Voltage Range       |   |   | to 132V                           |                          |  |  |
| ຽ                                | ୁଥ Input Current (typ)            |                          |   | 2   | 2A                                |                          |  |  |
| itions                           | Rated Freq                        | uency                    | 50/60Hz   |   |                                   |                          |  |  |
| Input<br>Condi                   | Allowable F                       | Frequency Range          |   | 47 to 440 Hz (rated                                   | frequency: 50/60 Hz)              |                          |  |  |
| <del>آ</del> و                   | Efficiency (                      | typ)                     | 82%   | 87%   | 90%                               | 90%                      |  |  |
|                                  | Inrush Curi                       | ent (max) Note1          |   | 25A   | (max)                             |                          |  |  |
|                                  | Leakage Cu                        | urrent (max)             | 0.3mA   |   |                                   |                          |  |  |
|                                  | Rated Outp                        | ut Voltage               | 5V  | 12V   | 15V                               | 24V                      |  |  |
|                                  |                                   | age Variation            | 50  |   | voltage ±10%                      | 240                      |  |  |
| Note 3                           | Rated Output                      |                          | 20.0A   | 8.5A  | 7.0A                              | 4.3A                     |  |  |
| su                               |                                   | utput Current Range      | 20.07   |   | 100%                              | 7.0/1                    |  |  |
| Output<br>Conditions             | Rated Outp                        | • •                      | 100.0W  | 102.0W  | 105.0W                            | 103.2W                   |  |  |
| Output<br>Conditi                |                                   | oltage Accuracy          | 100.000   |   | 3%                                | 100.211                  |  |  |
| ōŭ                               | Ripple Nois                       | <u> </u>                 | 120mVp-p  | 150mVp-p  | 150mVp-p                          | 200mVp-p                 |  |  |
|                                  | - · ·                             | ding Time (min)          |   |   | nsec                              |                          |  |  |
|                                  | Startup Tin                       |                          |   |   | nsec                              |                          |  |  |
|                                  |                                   |                          |   |   |                                   |                          |  |  |
| s al                             |                                   | t Protection             |   | Detection above 105% of rated current (output cutoff) |                                   |                          |  |  |
| ion                              |                                   | e Protection             | Detection above 115% of rated voltage (output cutoff) |   |                                   |                          |  |  |
| Additional<br>Functions          |                                   | /OFF Control             | Not provided  |   |                                   |                          |  |  |
| Ad<br>Fu                         | Remote Se                         | U                        | Not provided  |   |                                   |                          |  |  |
|                                  | Operations                        | Display                  | Not provided  |   |                                   |                          |  |  |
|                                  | Operating To                      | emperature Range Noted   | -10 to +60°C  |   |                                   |                          |  |  |
|                                  | Storage Te                        | mperature Range          | -25 to +85°C  |   |                                   |                          |  |  |
|                                  | Operating I                       | lumidity Range           |   | 30 to 90% (no condensation)                           |                                   |                          |  |  |
| tal                              | -                                 | midity Range             |   | 30 to 90% (no   | condensation)                     |                          |  |  |
| Environmental<br>Conditions      | Cooling Re                        | quirements               |   | Natural a   | air cooling                       |                          |  |  |
| Environme<br>Conditions          |                                   | No. of vibrations        |   | 10 to   | 55Hz                              |                          |  |  |
| vir                              | Vibration                         | Sweep time               |   | • ····  | nutes                             |                          |  |  |
| ыс                               | Resistance                        | Acceleration rate        |   | 19.6m   | /s (2G)                           |                          |  |  |
|                                  |                                   | Vibration direction      |   | Χ,  | Y, Z                              |                          |  |  |
|                                  |                                   | Vibration time           |   | One hour in each                                      | of three directions               |                          |  |  |
|                                  | Installation                      | Conditions               |   | Derating may be required                              | due to mounting direction         | n                        |  |  |
|                                  | Insulation                        | Between input and output |   |   |                                   |                          |  |  |
| Ę                                |                                   | Between input and FG     |   | 2000 V AC for 1 minute                                | (leakage current: 15 mA)          |                          |  |  |
| Insulation                       | Voltage                           | Between output and FG    |   | 500 V AC for 1 minute (                               | leakage current: 15 mA)           |                          |  |  |
| sula                             | Inculation                        | Between input and output |   |   |                                   |                          |  |  |
| Ë                                | Insulation<br>Resistance          | Between input and FG     |   | 100 M $\Omega$ (measured w                            | ith 500 V DC Megger)              |                          |  |  |
|                                  |                                   | Between output and FG    |   |   |                                   |                          |  |  |
|                                  | External Ar                       | pearance                 |   | Single printer  | d circuit board                   |                          |  |  |
| lre/                             | External Appearance<br>Input Type |                          |   |   | nector                            |                          |  |  |
| nctu                             | Output Type                       | e                        |   |   | nector                            |                          |  |  |
| Stru<br>Is                       | External Di                       |                          |   |   | <sup>D</sup> x 32 <sup>H</sup> mm |                          |  |  |
| rnal<br>darc                     | Weight                            |                          |   |   | 80g                               |                          |  |  |
| External Structure/<br>Standards | Safety Stan                       | dards                    | UL1950, CSA No. 950 d                                 |   | eet Electrical Appliance ar       | nd Materials Control Law |  |  |
| -шω                              | Conducted                         |                          |   |   | Class B and VCCI Class            |                          |  |  |
|                                  |                                   |                          | noted value may flow at re                            | -   |                                   |                          |  |  |

At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Construction Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rrated ated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

**CSH** Series 25W,50W,100W,150W

|                                  |                     |                          | Specificatio   | ns and Standard                       | S                                   |           |  |
|----------------------------------|---------------------|--------------------------|--|---------------------------------------|-------------------------------------|-----------|--|
|                                  | Мо                  | dal                      |  | 15                                    | 50W                                 |           |  |
|                                  |                     | aei                      | CSH150-05  | CSH150-12                             | CSH150-15                           | CSH150-24 |  |
|                                  | Rated Input         | Voltage                  |  | AC100                                 | V/AC120V                            |           |  |
|                                  | Allowable I         | nput Voltage Range       | AC85 to 132V   |                                       |                                     |           |  |
| Input<br>Conditions              | Input Curre         |                          | 3.5A   |                                       |                                     |           |  |
| t<br>litio                       | Rated Freq          | •                        |  |                                       | )/60Hz                              |           |  |
| ouc                              |                     | requency Range           |  |                                       | d frequency: 50/60 Hz)              | 1         |  |
| ن <del>-</del>                   | Efficiency (        |                          | 78%  | 84%                                   | 86%                                 | 87%       |  |
|                                  |                     | ent (max) Note1          |  |                                       | A (max)                             |           |  |
|                                  | Leakage Cu          | irrent (max)             |  | 0                                     | .3mA                                |           |  |
|                                  | Rated Outp          | ut Voltage               | 5V   | 12V                                   | 15V                                 | 24V       |  |
| Ø                                | Output Volt         | age Variation            |  | Rated outpu                           | ut voltage ±10%                     |           |  |
| Note                             | Rated Outp          | ut Current               | 30.0A  | 12.5A                                 | 10.0A                               | 6.3A      |  |
| ons                              | Allowable O         | utput Current Range      |  | 0 te                                  | o 100%                              |           |  |
| Output<br>Conditions 1288        | Rated Outp          | ut Power                 | 100.0W   | 102.0W                                | 105.0W                              | 103.2W    |  |
| Con                              |                     | oltage Accuracy          |  |                                       | ±3%                                 |           |  |
|                                  | Ripple Nois         |                          | 120mVp-p   | 150mVp-p                              | 150mVp-p                            | 200mVp-p  |  |
|                                  |                     | ding Time (min)          |  | 1                                     | 7msec                               |           |  |
|                                  | Startup Tim         | e (typ)                  |  | 60                                    | Omsec                               |           |  |
|                                  | Overcurren          | t Protection             | Γ  | Detection above 105% o                | f rated current (output cuto        | ff)       |  |
| Additional<br>Functions          | Overvoltage         | e Protection             | Detection above 115% of rated voltage (output cutoff)  |                                       |                                     |           |  |
| litio                            | Remote ON           | /OFF Control             | Not provided   |                                       |                                     |           |  |
| Add<br>Tun                       | Remote Ser          | nsing                    |  | Not                                   | provided                            |           |  |
|                                  | Operations          | Display                  | Not provided   |                                       |                                     |           |  |
|                                  | Operating Te        | emperature Range Note 4  | -10 to +60°C   |                                       |                                     |           |  |
|                                  |                     | nperature Range          | -10 t0 +80 C<br>-25 to +85°C   |                                       |                                     |           |  |
|                                  |                     | lumidity Range           | 30 to 90% (no condensation)  |                                       |                                     |           |  |
| al                               | _ · · · ·           | midity Range             |  | · · · · · · · · · · · · · · · · · · · | no condensation)                    |           |  |
| Environmental<br>Conditions      | Cooling Re          | quirements               |  |                                       | l air cooling                       |           |  |
| tion                             |                     | No. of vibrations        |  | 10 t                                  | o 55Hz                              |           |  |
| virc<br>ndi                      | Vibration           | Sweep time               |  | 3 n                                   | ninutes                             |           |  |
| Con                              | Resistance          | Acceleration rate        |  | 19.6r                                 | m/s² (2G)                           |           |  |
|                                  |                     | Vibration direction      |  | Х                                     | , Y, Z                              |           |  |
|                                  |                     | Vibration time           |  |                                       | h of three directions               |           |  |
|                                  | Installation        | Conditions               |  | Derating may be require               | ed due to mounting directio         | n         |  |
|                                  | Insulation          | Between input and output |  |                                       | ()                                  |           |  |
| Ę                                | Withstand           | Between input and FG     |  | 2000 V AC for 1 minute                | e (leakage current: 15 mA)          |           |  |
| Insulation                       | Voltage             | Between output and FG    |  | 500 V AC for 1 minute                 | (leakage current: 15 mA)            |           |  |
| sul                              | Insulation          | Between input and output |  |                                       |                                     |           |  |
| 느                                | Resistance          | Between input and FG     |  | 100 M $\Omega$ (measured              | with 500 V DC Megger)               |           |  |
|                                  |                     | Between output and FG    |  |                                       |                                     |           |  |
|                                  | External Appearance |                          |  | Single print                          | ed circuit board                    |           |  |
| ure/                             | Input Type          | -                        |  |                                       | nnector                             |           |  |
| .ucti                            | Output Typ          | e                        |  | Co                                    | nnector                             |           |  |
| ll Sti<br>ds                     | External Di         | mensions                 |  | 222 <sup>W</sup> x 7                  | 5 <sup>D</sup> x 36 <sup>H</sup> mm |           |  |
| erna                             | Weight              |                          |  | Ę                                     | 520g                                |           |  |
| External Structure/<br>Standards | Safety Stan         | dards                    | UL1950, CSA No. 950 certified, designated to meet Electrical Appliance and Materials Control Law |                                       |                                     |           |  |
|                                  | Conducted           | Emission                 |  | Designated to meet FCC                | C Class B and VCCI Class            | В         |  |
|                                  |                     |                          | oted value may flow at re  |                                       |                                     |           |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

More Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

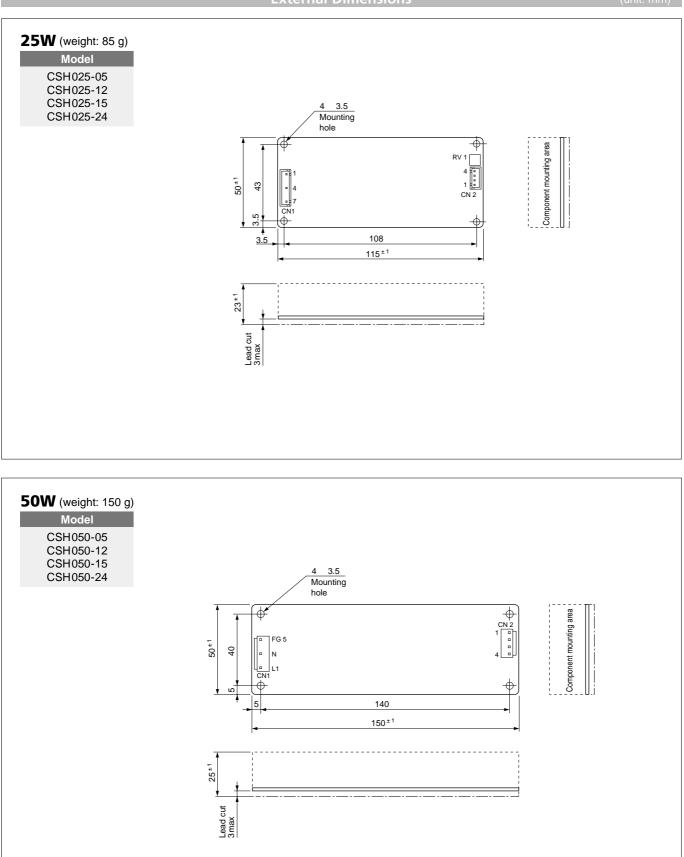
\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.



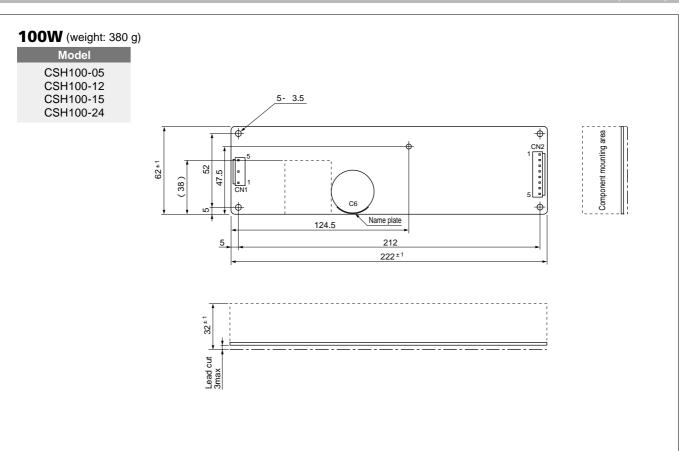
**External Dimensions** 

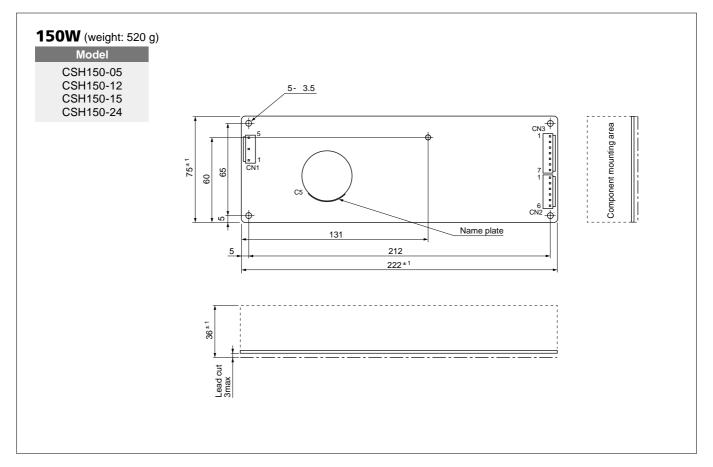
(unit: mm)



**CSH** Series 25W,50W,100W,150W

**External Dimensions** 







### **Operating Instruction**

### Terminal connection

### CSH025 connector type

| Symbol | Pin No. | Terminal name | Corresponding<br>connector | Corresponding contact                         |  |  |
|--------|---------|---------------|----------------------------|---|--|--|
|        | 1       | AC (L)        |                            |   |  |  |
|        | 2       | NC            |                            |   |  |  |
|        | 3       | NC            |                            |   |  |  |
| CN1    | 4       | AC (N)        | XHP-7<br>(JST)             | SXH-001T-P0.6<br>or<br>BXT-001T-P0.6<br>(JST) |  |  |
|        | 5       | NC            | (551)                      |   |  |  |
|        | 6       | NC            |                            |   |  |  |
|        | 7       | FG            |                            |   |  |  |
| CNI2   | 1 to 2  | -             | XHP-4                      |   |  |  |
| CN2    | 3 to 4  | +             | (JST)                      |   |  |  |

#### CSH050, CSH100, CSH150 connector types

|        | Model  | Symbol | Pin No. | Terminal name | Corresponding<br>connector | Corresponding contact |  |
|--------|--------|--------|---------|---------------|----------------------------|-----------------------|--|
|        |        |        | 1       | AC (L)        |                            |                       |  |
|        |        |        | 2       | NC            |                            | SVH-21T-P1.1          |  |
| Input  | Common | CN1    | 3       | AC (N)        | VHR-5N<br>(JST)            | SVH-211-P1.1<br>(JST) |  |
|        |        |        | 4       | NC            | ()                         |                       |  |
|        |        |        | 5       | FG            | 1                          |                       |  |
|        | CSH050 | ) CN2  | 1 to 2  | -             | VHR-4N                     |                       |  |
|        | 050000 |        | 3 to 4  | +             | (JST)                      |                       |  |
|        | 001100 | CN2    | 1 to 4  | -             | VHR-8N                     |                       |  |
| Output | CSH100 | GNZ    | 5 to 8  | +             | (JST)                      | SVH-21T-P1.1<br>(JST) |  |
|        |        | CN2    | 1 to 6  | +             | VHR-6N<br>(JST)            | (331)                 |  |
|        | CSH150 | CN3    | 1 to 7  | -             | VHR-7N<br>(JST)            |                       |  |

### % 100 CSH025, 050 70 Output current 0 - 10 0 50 60 C Ambient temperature % 100 **CSH100** 70 Output current 0 60 C - 10 0 50 Ambient temperature % 100 **CSH150** 70 Output current 60

Installation condition and output current derating for ambient temperature

2

### **3** Setting output voltage

Output voltage may be adjusted using the adjustment knob found near the output connector. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

0

-10 0

25

Ambient temperature

60 C

50



### **4** Overcurrent protection

When the output is overloaded, the power supply's built-in overcurrent protection will shut off the output. The overcurrent protection is set to function when the output current exceeds 105% of the rated current value (about 130% of a standard output value).

To reset the overcurrent protection, remove the source of the overload, turn off the power, and wait about a minute before turning the power on again.

### **5** Overvoltage Protection

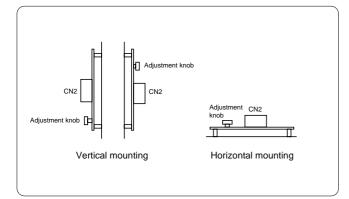
If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about a minute before turning the power on again.

Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

### 6 Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.

The power supply can be mounted in two directions as shown below. When a metal case is used, mount the power supply considering insulation distance. Please contact Sanken for more information.



Be sure to connect FG to the grounding terminal of the target device. Otherwise, conducted emission, radiation noise and ripple noise will increase.

### A high efficiency, thin and compact unit

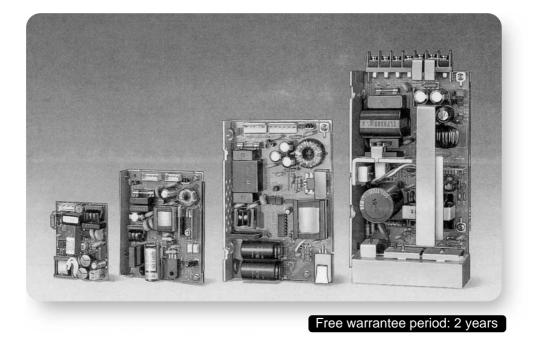


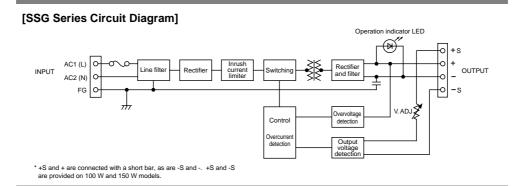
### Single output With chassis (30 to 150 W)



The SSG Series employs a higher switching frequency, unique mixed-mounting technology and innovative parts such as barrier-less transformers to create reliable, compact, high-performance switching power supplies through integrating Sanken's technologies. Sanken is proud to provide this product to meet the power supply needs for the next generation.

- New barrier-less transformer
- Mixed-mounting technology
- Thin, compact models
- 4 to 5% higher efficiency than our existing products
- Acquired UL and CSA safety standards
- Conducted emission conforms to FCC class B







: Please contact Sanken for delivery time in advance.

**Specifications and Standards** 

| Specifications and Standards     |                                     |   |   |                    |                       |          |
|----------------------------------|-------------------------------------|---|---|--------------------|-----------------------|----------|
| Model -                          |                                     |   | 30W   |                    |                       |          |
| Model                            |                                     | SSG030-05   | SSG030-12   | SSG030-15          | SSG030-24             |          |
| Input<br>Conditions              | Rated Input Voltage                 |   | AC100V/AC120V   |                    |                       |          |
|                                  | Allowable Input Voltage Range       |   | AC85 to 132V  |                    |                       |          |
|                                  | Input Current (typ)                 |   | 0.7A  |                    |                       |          |
|                                  | Rated Frequency                     |   | 50/60Hz   |                    |                       |          |
| put                              | Allowable Frequency Range           |   | 47 to 440Hz   |                    |                       |          |
| ن<br>ک ۲                         | Efficiency (typ)                    |   | 75%   | 78%                | 78%                   | 80%      |
|                                  | Inrush Current (max) 🔤              |   | 30A (max)   |                    |                       |          |
|                                  | Leakage Current (max)               |   | 0.4mA   |                    |                       |          |
| Output<br>Conditions 1000        | Rated Output Voltage                |   | 5V  | 12V                | 15V                   | 24V      |
|                                  | Output Voltage Variation            |   |   | Rated output       | voltage ±10%          |          |
|                                  | Rated Output Current                |   | 6.0A  | 2.5A               | 2.0A                  | 1.3A     |
|                                  | Allowable Output Current Range      |   |   | 0 to               | 100%                  |          |
|                                  | Rated Output Power                  |   | 30.0W   | 30.0W              | 30.0W                 | 31.2W    |
|                                  | Constant Voltage Accuracy           |   |   |                    | 3%                    |          |
|                                  | Ripple Noise Note2                  |   | 120mVp-p  | 150mVp-p           | 150mVp-p              | 200mVp-p |
|                                  | Output Holding Time (min)           |   | 16msec  |                    |                       |          |
|                                  | Startup Time (typ)                  |   | 400msec   |                    |                       |          |
| Additional<br>Functions          | Overcurrent Protection              |   | Detection above 105% of rated current   |                    |                       |          |
|                                  | Overvoltage Protection              |   | Detection from 115 to 135% of rated voltage   |                    |                       |          |
|                                  | Remote ON/OFF Control               |   | Not provided  |                    |                       |          |
|                                  | Remote Sensing                      |   | Not provided  |                    |                       |          |
|                                  | Operations Display                  |   | Red LED indicator   |                    |                       |          |
| Environmental<br>Conditions      | Operating Temperature Range         |   | 0 to +50°C (0 to +40°C with cover)  |                    |                       |          |
|                                  | Storage Temperature Range           |   | -25 to +85°C  |                    |                       |          |
|                                  | Operating Humidity Range            |   | 30 to 90% (no condensation)   |                    |                       |          |
|                                  | Storage Humidity Range              |   | 30 to 90% (no condensation)   |                    |                       |          |
|                                  | Cooling Requirements                |   | Natural air cooling   |                    |                       |          |
|                                  |                                     | No. of vibrations                                 | 10 to 55Hz  |                    |                       |          |
|                                  | Vibration<br>Resistance             | Sweep time  | 1.5 minutes   |                    |                       |          |
|                                  |                                     | Acceleration rate                                 | 19.6m/s²(2G)  |                    |                       |          |
|                                  |                                     | Vibration direction                               | X, Y, Z   |                    |                       |          |
|                                  | Installation                        | Vibration time<br>Conditions                      | One hour in each of three directions Derating may be required due to mounting direction           |                    |                       |          |
|                                  |                                     |   |   |                    |                       |          |
| Insulation                       | Insulation Between input and output |   | 2000 V AC for 1 minute  |                    |                       |          |
|                                  | Withstand<br>Voltage                | Between input and FG                              |   |                    |                       |          |
|                                  | voitage                             | Between output and FG<br>Between input and output | 500 V AC for 1 minute   |                    |                       |          |
|                                  | Insulation                          | Between input and FG                              |   | 100 MO (measured w | (ith 500 V DC Megger) |          |
|                                  | Resistance                          | Between output and FG                             | 100 M $\Omega$ (measured with 500 V DC Megger)  |                    |                       |          |
|                                  |                                     |   |   |                    |                       |          |
| External Structure/<br>Standards | External Appearance                 |   | With chassis (cover is optional)  |                    |                       |          |
|                                  | Input Type                          |   | Connector (terminal stand is optional)  |                    |                       |          |
|                                  | Output Type<br>External Dimensions  |   | Connector (terminal stand is optional)<br>75 <sup>w</sup> x 120 <sup>D</sup> x 25 <sup>H</sup> mm |                    |                       |          |
|                                  | Weight                              |   | 250g  |                    |                       |          |
|                                  | Safety Standards                    |   | UL1950, CSA EB1402C certified   |                    |                       |          |
|                                  | Conducted Emission                  |   | Designated to meet FCC Class B  |                    |                       |          |
| 10                               | Terminal Stand                      |   | -<br>-<br>-   |                    |                       |          |
| Options                          | Chassis                             |   | Provided<br>Provided as standard  |                    |                       |          |
|                                  |                                     |   | Provided as standard  |                    |                       |          |
|                                  | Cover                               |   | Provided  |                    |                       |          |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

30W, 50W, 100W, 150W

**SSG** Series

: Please contact Sanken for delivery time in advance.

|                                  |  |                          | Specificatio                                       | ns and Standards           | ;                                   |           |  |
|----------------------------------|--|--------------------------|--|----------------------------|-------------------------------------|-----------|--|
|                                  | Ma   | del                      |  | 5                          | 0W                                  |           |  |
|                                  | IVIO   | aei                      | SSG050-05  | SSG050-12                  | SSG050-15                           | SSG050-24 |  |
|                                  | Rated Input  | t Voltage                | AC100V/AC120V                                      |                            |                                     |           |  |
|                                  |  | nput Voltage Range       |  |                            | to 132V                             |           |  |
| ns                               | Input Curre  | nt (typ)                 |  | 1                          | .3A                                 |           |  |
| t<br>litions                     | Rated Freq   | uency                    |  | 50.                        | /60Hz                               |           |  |
| Input<br>Condi                   |  | Frequency Range          |  | 47 to                      | 440Hz                               |           |  |
| చ్ స                             | Efficiency (                                       |                          | 75%  | 77%                        | 79%                                 | 81%       |  |
|                                  |  | rent (max) Note1         |  | 30/                        | (max)                               |           |  |
|                                  | Leakage Cu   | urrent (max)             | 0.4mA  |                            |                                     |           |  |
|                                  | Rated Outp   | ut Voltage               | 5V   | 12V                        | 15V                                 | 24V       |  |
| Note 3                           | Output Volt  | age Variation            |  | Rated outpu                | t voltage ±10%                      |           |  |
| put<br>ditions                   | Rated Outp   | ut Current               | 10.0A  | 4.2A                       | 3.4A                                | 2.1A      |  |
|                                  |  | utput Current Range      |  | 0 tc                       | 100%                                | 1         |  |
|                                  | Rated Outp   |                          | 50.0W  | 50.4W                      | 51.0W                               | 50.4W     |  |
| Sout<br>Court                    |  | oltage Accuracy          | 4001/  |                            | =3%                                 | 0001/     |  |
|                                  | Ripple Nois  |                          | 120mVp-p   | 150mVp-p                   | 150mVp-p                            | 200mVp-p  |  |
|                                  |  | ding Time (min)          |  |                            | msec                                |           |  |
|                                  | Startup Time (typ)                                 |                          |  | 400                        | 11360                               |           |  |
| Additional<br>Functions          | Overcurrent Protection                             |                          | Detection above 105% of rated current              |                            |                                     |           |  |
|                                  | Overvoltage Protection<br>Remote ON/OFF Control    |                          | Detection from 115 to 135% of rated voltage        |                            |                                     |           |  |
|                                  |  |                          | Not provided Not provided                          |                            |                                     |           |  |
|                                  | Remote Sensing<br>Operations Display               |                          | Red LED indicator                                  |                            |                                     |           |  |
|                                  | · · · ·  |                          |  |                            |                                     |           |  |
|                                  | Operating Temperature Range                        |                          |  | 1                          | +40°C with cover)                   |           |  |
|                                  | Storage Temperature Range Operating Humidity Range |                          | -25 to +85°C<br>30 to 90% (no condensation)        |                            |                                     |           |  |
| a                                | Storage Humidity Range                             |                          |  |                            | ,                                   |           |  |
| Environmenta<br>Conditions       | Cooling Requirements                               |                          | 30 to 90% (no condensation)<br>Natural air cooling |                            |                                     |           |  |
| Environme<br>Conditions          |  | No. of vibrations        | 10 to 55Hz   |                            |                                     |           |  |
| iro<br>Idit                      |  | Sweep time               | 1.5 minutes  |                            |                                     |           |  |
| Sor                              | Vibration<br>Resistance                            | Acceleration rate        |  | 19.6                       | m/s² (2G)                           |           |  |
|                                  | Resistance   | Vibration direction      |  | Χ,                         | Y, Z                                |           |  |
|                                  |  | Vibration time           |  | One hour in eac            | n of three directions               |           |  |
|                                  | Installation                                       | Conditions               |  | Derating may be require    | d due to mounting directio          | n         |  |
|                                  | Insulation   | Between input and output |  |                            |                                     |           |  |
| n                                | Withstand  | Between input and FG     |  | 2000 V AC                  | for 1 minute                        |           |  |
| Insulation                       | Voltage  | Between output and FG    |  | 500 V AC                   | for 1 minute                        |           |  |
| sul                              | Insulation   | Between input and output |  |                            |                                     |           |  |
| <u> </u>                         | Resistance   | Between input and FG     |  | 100 M $\Omega$ (measured v | vith 500 V DC Megger)               |           |  |
|                                  |  | Between output and FG    |  |                            |                                     |           |  |
| 7                                | External Ap  | opearance                |  | With chassis (             | cover is optional)                  |           |  |
| ture                             | Input Type   |                          |  | Connector (termin          | nal stand is optional)              |           |  |
| truc                             | Output Typ   |                          |  |                            | nal stand is optional)              |           |  |
| External Structure/<br>Standards | External Di  | mensions                 |  |                            | 5 <sup>D</sup> x 25 <sup>H</sup> mm |           |  |
| tern                             | Weight   |                          |  |                            | 00g                                 |           |  |
| Sta                              | Safety Stan  |                          |  |                            | EB1402C certified                   |           |  |
|                                  | Conducted  | Emission                 |  | Designated to r            | neet FCC Class B                    |           |  |
| sue                              | Terminal St  | and                      |  | Pro                        | ovided                              |           |  |
| Options                          | Chassis  |                          |  |                            | as standard                         |           |  |
| 0                                | Cover  |                          |  | Pro                        | ovided                              |           |  |

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Come Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.



: Please contact Sanken for delivery time in advance.

| Specifications and Standards     |  |                          |   |                            |                                   |           |  |  |
|----------------------------------|--|--------------------------|---|----------------------------|-----------------------------------|-----------|--|--|
|                                  | Мо   | del                      |   | 10                         | OW                                |           |  |  |
|                                  | INIC   | luer                     | SSG100-05   | SSG100-12                  | SSG100-15                         | SSG100-24 |  |  |
|                                  | Rated Input  | t Voltage                | AC100V/AC120V   |                            |                                   |           |  |  |
|                                  | Allowable I  | nput Voltage Range       |   | AC85                       | to 132V                           |           |  |  |
| su                               | Input Curre  | nt (typ)                 |   | 2                          | .0A                               |           |  |  |
| itio                             | Rated Freq   | uency                    |   | 50/                        | 60Hz                              |           |  |  |
| Input<br>Conditions              | Allowable Frequency Range                                |                          |   | 47 to                      | 440Hz                             |           |  |  |
| _= ŏ                             | Efficiency (   |                          | 79%   | 83%                        | 84%                               | 86%       |  |  |
|                                  |  | ent (max) Note1          |   | 20A                        | (max)                             |           |  |  |
|                                  | Leakage Cu   | urrent (max)             |   | 0.4                        | 4mA                               |           |  |  |
|                                  | Rated Outp   |                          | 5V  | 12V                        | 15V                               | 24V       |  |  |
| dote 3                           |  | age Variation            |   |                            | t voltage ±10%                    |           |  |  |
| าร เ                             | Rated Outp   |                          | 20.0A   | 8.5A                       | 7.0A                              | 4.5A      |  |  |
| t                                |  | utput Current Range      | (00.011)  |                            | 100%                              | ( 22 2) 4 |  |  |
| Output<br>Conditions 🚥           | Rated Outp   |                          | 100.0W  | 102.0W                     | 105.0W                            | 108.0W    |  |  |
| Col                              |  | oltage Accuracy          | 120m)/n n   |                            | 3%                                | 240m)/n n |  |  |
|                                  | Ripple Nois  |                          | 120mVp-p  | 180mVp-p                   | 180mVp-p<br>msec                  | 240mVp-p  |  |  |
|                                  | Output Holding Time (min)<br>Startup Time (typ)          |                          |   |                            |                                   |           |  |  |
|                                  |  | t Protection             |   | 300msec                    |                                   |           |  |  |
| Additional<br>Functions          |  |                          | Detection above 105% of rated current                       |                            |                                   |           |  |  |
| tio                              | Overvoltage Protection<br>Remote ON/OFF Control          |                          | Detection from 115 to 135% of rated voltage<br>Not provided |                            |                                   |           |  |  |
| ddi                              | Remote Sensing   |                          | Available   |                            |                                   |           |  |  |
| ΑĒ                               | Operations   | -                        | Red LED indicator   |                            |                                   |           |  |  |
|                                  | -  |                          | 0 to +50°C (0 to +40°C with cover)                          |                            |                                   |           |  |  |
|                                  | Operating Temperature Range<br>Storage Temperature Range |                          |   | · · · · ·                  | /                                 |           |  |  |
|                                  |  | lumidity Range           | -25 to +85°C<br>30 to 90% (no condensation)                 |                            |                                   |           |  |  |
| ସ                                |  | midity Range             | 30 to 90% (no condensation)                                 |                            |                                   |           |  |  |
| Environmental<br>Conditions      |  | quirements               | Natural air cooling   |                            |                                   |           |  |  |
| vironme<br>nditions              | J  | No. of vibrations        | 10 to 55Hz  |                            |                                   |           |  |  |
| /iro                             |  | Sweep time               |   | 1.5 m                      | ninutes                           |           |  |  |
| Cor                              | Vibration<br>Resistance                                  | Acceleration rate        |   | 19.6r                      | n/s² (2G)                         |           |  |  |
|                                  | Resistance   | Vibration direction      |   | Х,                         | Y, Z                              |           |  |  |
|                                  |  | Vibration time           |   | One hour in each           | of three directions               |           |  |  |
|                                  | Installation   | Conditions               | Derating may be required due to mounting direction          |                            |                                   |           |  |  |
|                                  | Insulation   | Between input and output |   | 0000.1/ 10                 |                                   |           |  |  |
| E                                | Withstand  | Between input and FG     |   | 2000 V AC                  | for 1 minute                      |           |  |  |
| Insulation                       | Voltage  | Between output and FG    |   | 500 V AC                   | for 1 minute                      |           |  |  |
| sul                              | Insulation   | Between input and output |   |                            |                                   |           |  |  |
| <u> </u>                         | Resistance   | Between input and FG     |   | 100 M $\Omega$ (measured v | vith 500 V DC Megger)             |           |  |  |
|                                  |  | Between output and FG    |   |                            |                                   |           |  |  |
| 2                                | External Ap  | opearance                |   | With chassis (c            | cover is optional)                |           |  |  |
| ture                             | Input Type   |                          |   | Termir                     | nal stand                         |           |  |  |
| truc                             | Output Typ   |                          |   |                            | nal stand                         |           |  |  |
| External Structure/<br>Standards | External Di  | mensions                 |   |                            | <sup>D</sup> x 40 <sup>H</sup> mm |           |  |  |
| ern                              | Weight   |                          |   |                            | 70g                               |           |  |  |
| Ext<br>Sta                       | Safety Stan  |                          |   |                            | No. 234 certified                 |           |  |  |
|                                  | Conducted  | Emission                 |   | Designated to n            | neet FCC Class A                  |           |  |  |
| ions                             | Chassis  |                          |   | Provided                   | as standard                       |           |  |  |
| Cover                            |  |                          | Pro   | vided                      |                                   |           |  |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Notes Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V,  $47-\mu F$  electrolytic capacitor connected to that point.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity

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SSG Series 30W,50W,100W,150W

: Please contact Sanken for delivery time in advance.

|                                  | 84-                       | -1-1                         |   | 15                         | OW                                    |           |  |
|----------------------------------|---------------------------|------------------------------|---|----------------------------|---------------------------------------|-----------|--|
|                                  | IVIO                      | del                          | SSG150-05                                   | SSG150-12                  | SSG150-15                             | SSG150-24 |  |
|                                  | Rated Input               | t Voltage                    | AC100V/AC120V                               |                            |                                       |           |  |
|                                  |                           | nput Voltage Range           |   |                            | to 132V                               |           |  |
| SU                               | Input Curre               |                              |   |                            | 5A                                    |           |  |
| tio                              | Rated Freq                |                              |   | 50/                        | 60Hz                                  |           |  |
| lnput<br>Condi                   | Allowable Frequency Range |                              |   | 47 to                      | 440Hz                                 |           |  |
| ے S                              | Efficiency (typ)          |                              | 79%   | 83%                        | 84%                                   | 86%       |  |
|                                  | Inrush Curr               | rent (max) Noted             |   | 20A                        | (max)                                 |           |  |
|                                  | Leakage Cu                | urrent (max)                 |   |                            | 1mA                                   |           |  |
|                                  | Rated Outp                | ut Voltage                   | 5V  | 12V                        | 15V                                   | 24V       |  |
| 8                                |                           | tage Variation               |   | Rated output               | voltage ±10%                          |           |  |
| Note 3                           | Rated Outp                | -                            | 30.0A                                       | 13.0A                      | 10.0A                                 | 6.5A      |  |
| suo                              |                           | output Current Range         |   | 0 to                       | 100%                                  |           |  |
| diti                             | Rated Outp                | out Power                    | 150.0W                                      | 156.0W                     | 150.0W                                | 156.0W    |  |
| Outpu<br>Condi                   |                           | oltage Accuracy              |   | ±                          | 3%                                    |           |  |
| 00                               | Ripple Nois               | Se Note 2                    | 120mVp-p                                    | 180mVp-p                   | 180mVp-p                              | 240mVp-p  |  |
|                                  | Output Holding Time (min) |                              |   | 20                         | msec                                  |           |  |
|                                  | Startup Tim               | ne (typ)                     |   | 300                        | msec                                  |           |  |
| le s                             | Overcurrent Protection    |                              | Detection above 105% of rated current       |                            |                                       |           |  |
| Additional<br>Functions          | Overvoltage Protection    |                              | Detection from 115 to 135% of rated voltage |                            |                                       |           |  |
| ditio                            | Remote ON/OFF Control     |                              | Not provided                                |                            |                                       |           |  |
| Pd<br>Fui                        | Remote Sensing            |                              | Available                                   |                            |                                       |           |  |
|                                  | Operations Display        |                              | Red LED indicator                           |                            |                                       |           |  |
|                                  |                           | Femperature Range            |   | 0 to +50°C (0 to           | +40°C with cover)                     |           |  |
|                                  | Storage Temperature Range |                              |   | -25 to                     | +85°C                                 |           |  |
| _                                | Operating Humidity Range  |                              | 30 to 90% (no condensation)                 |                            |                                       |           |  |
| ntal                             |                           | midity Range                 | 30 to 90% (no condensation)                 |                            |                                       |           |  |
| Environmental<br>Conditions      | Cooling Re                |                              | Natural air cooling                         |                            |                                       |           |  |
| on litic                         |                           | No. of vibrations            | 10 to 55Hz                                  |                            |                                       |           |  |
| nvir<br>Dnd                      | Vibration                 | Sweep time                   |   |                            | ninutes                               |           |  |
| шŏ                               | Resistance                | Acceleration rate            |   |                            | n/s² (2G)                             |           |  |
|                                  |                           | Vibration direction          |   |                            | Y, Z                                  |           |  |
|                                  | Installation              | Vibration time<br>Conditions |   |                            | of three directions                   | -         |  |
|                                  | Installation              | conditions                   |   | Derating may be required   | a due to mounting directio            | 11        |  |
|                                  | Insulation                | Between input and output     |   | 2000 V AC                  | for 1 minute                          |           |  |
| uo                               |                           | Between input and FG         |   |                            |                                       |           |  |
| Insulation                       | Voltage                   | Between output and FG        |   | 500 V AC                   | for 1 minute                          |           |  |
| nsı                              | Insulation                | Between input and output     |   |                            |                                       |           |  |
| <u> </u>                         | Resistance                | Between input and FG         |   | 100 M $\Omega$ (measured w | vith 500 V DC Megger)                 |           |  |
|                                  |                           | Between output and FG        |   |                            |                                       |           |  |
| e/                               | External Ap               | opearance                    |   | With chassis (c            | over is optional)                     |           |  |
| tur                              | Input Type                |                              |   | Termir                     | al stand                              |           |  |
| trud                             | Output Typ                |                              |   |                            | al stand                              |           |  |
| al S<br>Irds                     | External Dimensions       |                              |   |                            | <sup>D</sup> x 57 <sup>H</sup> mm     |           |  |
|                                  | Weight                    |                              | 830g  |                            |                                       |           |  |
| iern                             | -                         |                              | UL1950, CSA No. 234 certified               |                            |                                       |           |  |
| External Structure/<br>Standards | Safety Stan               |                              |   |                            |                                       |           |  |
| Exterr<br>Stand                  | -                         |                              |   |                            | No. 234 certified<br>neet FCC Class A |           |  |
| tions Stand                      | Safety Stan               |                              |   | Designated to n Provided   |                                       |           |  |

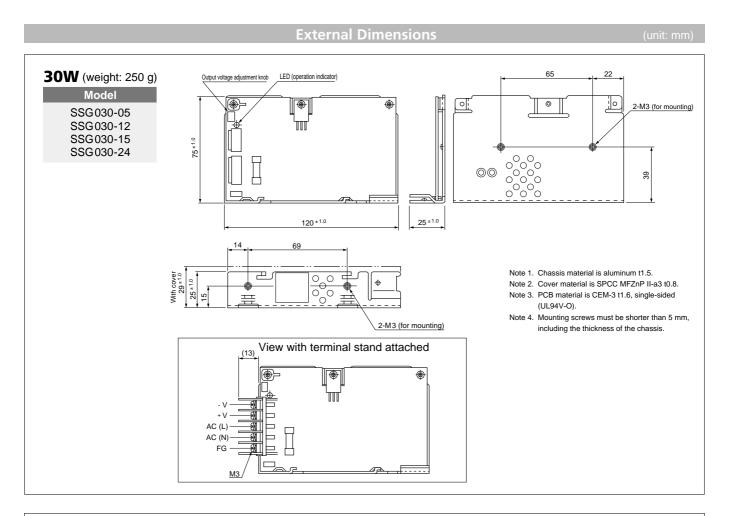
Note: At cold start. (More current than above noted value may flow at restart.)

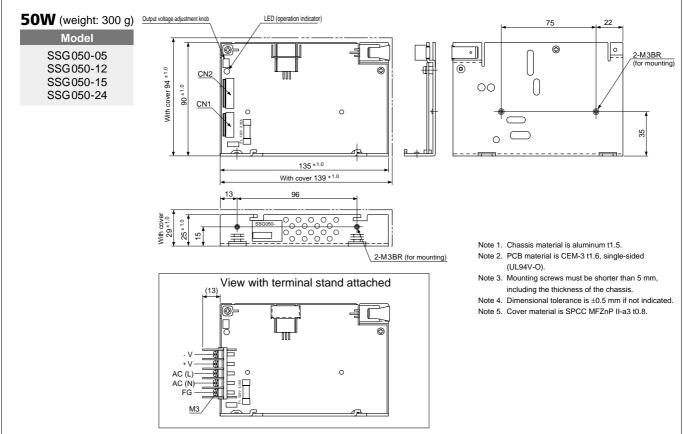
Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

Constructed to the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.



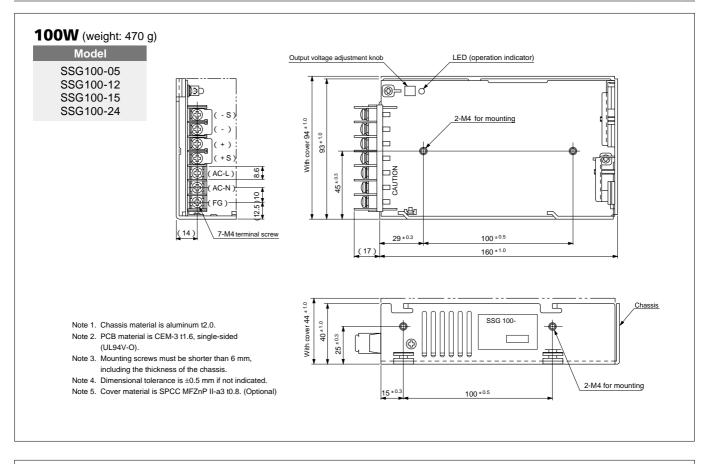


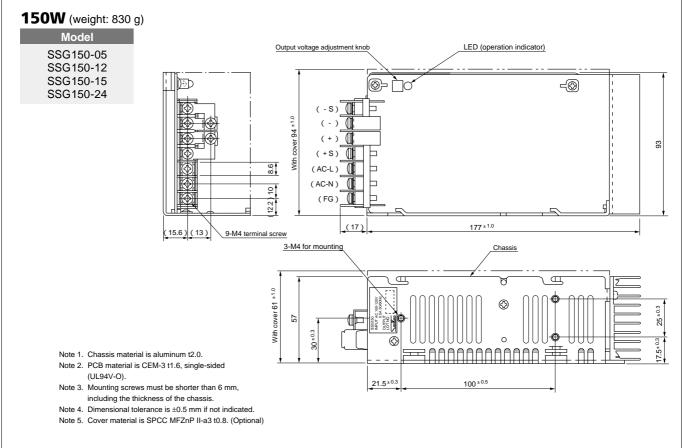


## SSG Series 30W,50W,100W,150W

**External Dimensions** 

#### (unit: mm)



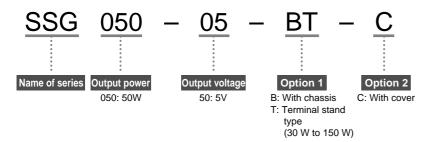


## SSG Series 30W,50W,100W,150W

## Option

| Symbol at end of<br>product name | Description                                | Application          |  |
|----------------------------------|--|----------------------|--|
| В                                | Connector type with chassis                | 30W, 50W             |  |
| B-C                              | Connector type with chassis and cover      | 30W, 50W             |  |
| BT                               | Terminal stand type with chassis           | 30W, 50W, 100W, 150W |  |
| BT-C                             | Terminal stand type with chassis and cover | 30W, 50W, 100W, 150W |  |

## Description of model name





## **Operating Instruction**

Terminal connection

#### Connectors (for models SSG030 and SSG050)

| Model                    | Connector | Pin    | Name   | Corresponding<br>connector | Corresponding contact |  |  |  |
|--------------------------|-----------|--------|--------|----------------------------|-----------------------|--|--|--|
|                          |           | 1      | FG     |                            |                       |  |  |  |
|                          |           | 2      | NC     |                            |                       |  |  |  |
| Input<br>(for all models | CN1       | 3      | AC (N) | VHR-5N<br>(JST)            | SVH-21T-P1.1<br>(JST) |  |  |  |
| listed above)            |           | 4      | NC     |                            |                       |  |  |  |
|                          |           | 5      | AC (L) |                            |                       |  |  |  |
|                          | CN2       | 1, 2   | + V    | VHR-4N<br>(JST)            | SVH-21T-P1.1          |  |  |  |
| SSG030 type              |           | 3, 4   | 0V     |                            | (JST)                 |  |  |  |
|                          | CN3       | 1      | FG     | #250 Fas                   | ten receptacle        |  |  |  |
|                          | CNID      | 1 to 3 | + V    | VHR-6N                     | SVH-21T-P1.1          |  |  |  |
| SSG050 type              | CN2       | 4 to 6 | 0V     | (JST)                      | (JST)                 |  |  |  |
|                          | CN3       | 1      | FG     | #250 Fas                   | ten receptacle        |  |  |  |

#### Terminal Stand (for models SSG030, 050, 100, and 150)

| Model                      | Pin | Name   | Corresponding crimp terminal |
|----------------------------|-----|--------|------------------------------|
|                            | 1   | FG     |                              |
|                            | 2   | AC (N) |                              |
| SSG030 type<br>SSG050 type | 3   | AC (L) | V1.25-3 (JST) or equivalent  |
| 000000 type                | 4   | + V    |                              |
|                            | 5   | 0V     |                              |
|                            | 1   | FG     |                              |
|                            | 2   | AC (N) |                              |
|                            | 3   | AC (L) |                              |
| SSG100 type<br>SSG150 type | 4   | + S    | V2-4 (JST) or equivalent     |
| 33G130 type                | 5   | + V    |                              |
|                            | 6   | 0V     |                              |
|                            | 7   | - S    |                              |

Note: Check the diagram for each model to verify terminal arrangement.

#### Terminal name and function

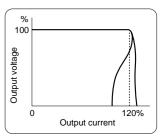
|         | Terminal name | Function                                       |  |  |
|---------|---------------|--|--|--|
|         | AC (L)        | AC input terminals. Connect the grounding line |  |  |
| Input   | AC (N)        | to AC (N). AC (L) has an input fuse.           |  |  |
|         | FG            | Ground terminal (Connect it to a ground line.) |  |  |
|         | + V           | DC output terminal. Use these terminals for    |  |  |
| Outrout | 0V            | connection to the load.                        |  |  |
| Output  | + S           | Remote sensing terminals. For remote sensing,  |  |  |
|         | - S           | connect these terminals to the sensing point.  |  |  |

## 2 Setting output voltage

Output voltage may be adjusted using the adjustment knob found near the output connector or terminal stand. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

#### **3** Overcurrent protection

When the output load becomes excessive, the output current is restricted as shown at right. After the source of the excess load is removed, the normal output voltage is recovered automatically.



The overcurrent protection function is set to operate

when the output current exceeds 105% of the rated current value (120% of the standard output value).

Note: Never operate the target equipment with an excessive load for long periods, since this can result in degradation of the power supply unit.

#### **4** Overvoltage protection

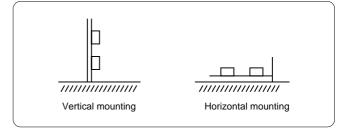
If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about three minutes before turning the power on again.

Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

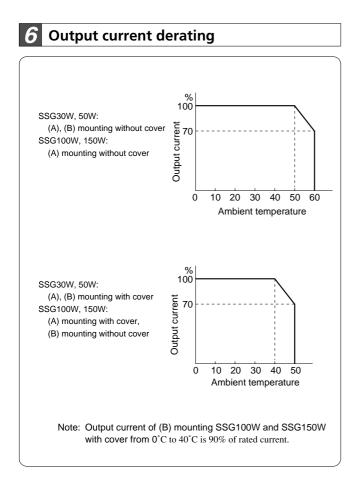
## **5** Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.

SSG series can be mounted in two directions as shown below. Output current derating is needed according to the model. Please refer to item  $\boldsymbol{6}$ .







#### Leakage current

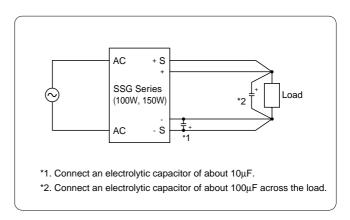
Leakage current is 0.5 mA or less (differs according to model, approx. 0.2 mA) per unit. Take care when using multiple supplies simultaneously.

#### Inrush current limiting

The power supply is equipped with an inrush current limiting circuit to restrict the amount of current that flows when the power is turned on. Since the 30 W to 50 W models use a power thermistor, current greater than that listed in the specifications may flow when restarting the supply, or due to ambient temperature conditions. The 100 W and 150 W models may also allow more current than that listed in the specifications if restarting after a short period of time. Take adequate precautions.

### **9** Remote sensing

The SSG100W and 150W models are equipped with a remote sensing feature to guard against output line drop. The guaranteed output voltage range, including line drop effects, is 5% of rated output voltage. Limit line drop on the minus side to 125 mV or less



### 10 Others

The SSG series (except 5W model) can be connected in series and used as minus output. However, they cannot be connected in parallel to increase output capacity, Please return malfanctioning units via the channel through which the unit was purchased.

#### 11 When there is not output

- Check that all terminals are connected correctly as described in item **1**.
- Output will be cut off when over voltage protection is active. Check the supply as described in item 4. Overvoltage protection may be activated if the output voltage is set too high. Verify that the output voltage adjustment knob is set towards the middle of its range. Overvoltage protection may be activated if the remote sensing terminals are not properly connected. Check their connections.
- The overcurrent protection will be activated and the output will decrease if there is an overload condition.

8

Employs resonant-mode hybrid IC. Realizes high efficiency with low noise, small, lightweight.

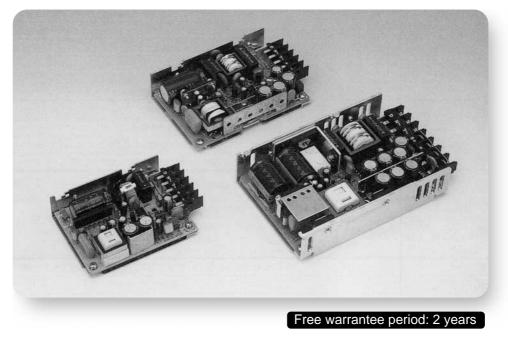


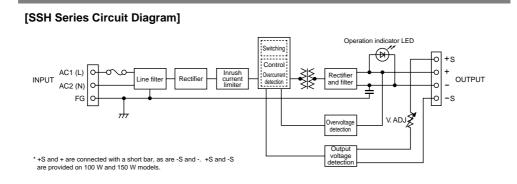
### Single output With chassis type



The SSH Series features Sanken's proprietary resonant-mode power hybrid IC and transformer. Along with high efficiency and low noise that can only be realized with a resonant-mode supply, these models provide a smaller size and are more economical than previously possible with conventional resonant-mode power supplies. With this series, Sanken delivers the next generation of power supplies to the market today.

- High 81 to 90% efficiency
- Low noise
- Small and lightweight, occupying only 2/3 of the volume of Sanken's equivalent FCC power supplies.







: Please contact Sanken for delivery time of connector type product in advance.

**Specifications and Standards** 

|                                  |                        |                          | Specificatio  | ns and Standards                       |                                   |          |  |
|----------------------------------|------------------------|--------------------------|---|--|-----------------------------------|----------|--|
|                                  | Мо                     |                          | 25W   |  |                                   |          |  |
|                                  |                        | SSH025-05                | SSH025-12   | SSH025-15                              | SSH025-24                         |          |  |
|                                  | Rated Input            | Voltage                  | AC100V/AC120V   |  |                                   |          |  |
|                                  | Allowable I            | nput Voltage Range       |   | AC85                                   | to 132V                           |          |  |
| Input<br>Conditions              | Input Curre            | nt (typ)                 |   | 0.64                                   | V0.5A                             |          |  |
| itio                             | Rated Frequ            | uency                    |   | 50/                                    | 60Hz                              |          |  |
| put                              | Allowable F            | Frequency Range          |   | 47 to                                  | 440Hz                             |          |  |
| <u>ت</u> = ک                     | Efficiency (           |                          | 80%   | 83%                                    | 84%                               | 85%      |  |
|                                  |                        | rent (max) Note1         |   | 30A                                    | (max)                             |          |  |
|                                  | Leakage Cu             | irrent (max)             |   | 0.3                                    | 3mA                               |          |  |
|                                  | Rated Outp             | ut Voltage               | 5V  | 12V                                    | 15V                               | 24V      |  |
|                                  |                        | age Variation            | -   | Rated outpu                            | t voltage ±10%                    |          |  |
| Note 3                           | Rated Outp             |                          | 5.0A  | 2.1A                                   | 1.7A                              | 1.1A     |  |
| suo                              | Allowable O            | utput Current Range      |   | 0 to                                   | 100%                              |          |  |
| out<br>diti                      | Rated Outp             | ut Power                 | 25W   | 25.2W                                  | 25.5W                             | 26.4W    |  |
| Output<br>Conditions             | Constant V             | oltage Accuracy          |   | ±                                      | 3%                                |          |  |
| 00                               | Ripple Nois            |                          | 80mVp-p   | 100mVp-p                               | 100mVp-p                          | 100mVp-p |  |
|                                  |                        | ding Time (min)          |   | 16                                     | msec                              |          |  |
|                                  | Startup Tim            | ne (typ)                 |   | 400                                    | msec                              |          |  |
| Additional<br>Functions          | Overcurren             | t Protection             | ]   | Detection above 105% of                | rated current (output cutof       | f)       |  |
|                                  | Overvoltage            | e Protection             | Detection above 115% of rated voltage (output cutoff) |  |                                   |          |  |
|                                  | Remote ON              | /OFF Control             | Not provided  |  |                                   |          |  |
| pb√                              | Remote Ser             | nsing                    | Not provided  |  |                                   |          |  |
|                                  | Operations             | Display                  | Red LED indicator                                     |  |                                   |          |  |
|                                  | Operating Te           | emperature Range Note 4  |   | 0 to                                   | +60°C                             |          |  |
|                                  |                        | mperature Range          |   |  | +85°C                             |          |  |
|                                  |                        | lumidity Range           |   |  | o condensation)                   |          |  |
| a                                | Storage Humidity Range |                          | 30 to 90% (no condensation)                           |  |                                   |          |  |
| Environmental<br>Conditions      | Cooling Re             |                          | Natural air cooling                                   |  |                                   |          |  |
| tior                             |                        | No. of vibrations        | 10 to 55Hz  |  |                                   |          |  |
| /iro<br>ndii                     | Vibration              | Sweep time               | 3 minutes   |  |                                   |          |  |
| C D                              | Resistance             | Acceleration rate        |   | 19.6r                                  | m/s² (2G)                         |          |  |
|                                  | literetario            | Vibration direction      |   | Х,                                     | Y, Z                              |          |  |
|                                  |                        | Vibration time           |   |  | n of three directions             |          |  |
|                                  | Installation           | Conditions               |   | Derating may be require                | d due to mounting direction       | l        |  |
|                                  | Insulation             | Between input and output | 00  |  |                                   | )        |  |
| E                                | Withstand              | Between input and FG     | 20  | 00 V AC for 1 minute (lea              | akage current: 15 mA or le        | SS)      |  |
| Insulation                       | Voltage                | Between output and FG    | 50  | 00 V AC for 1 minute (lea              | kage current: 15 mA or les        | s)       |  |
| sul                              | Insulation             | Between input and output |   |  |                                   |          |  |
| 드                                | Resistance             | Between input and FG     |   | 100 M $\Omega$ (measured v             | vith 500 V DC Megger)             |          |  |
|                                  |                        | Between output and FG    |   |  |                                   |          |  |
| _                                | External Ap            | pearance                 |   | With chassis (                         | cover is optional)                |          |  |
| External Structure/<br>Standards | Input Type             |                          |   | 1                                      | onnector is optional)             |          |  |
| ruci                             | Output Typ             |                          |   | `````````````````````````````````````` | onnector is optional)             |          |  |
| al St<br>rds                     | External Di            | mensions                 |   | 90 <sup>W</sup> x 68                   | <sup>D</sup> x 25 <sup>H</sup> mm |          |  |
| erna<br>ndai                     | Weight                 |                          |   |  | 70g                               |          |  |
| Exte                             | Safety Stan            |                          |   |  | No. 950 certified                 |          |  |
|                                  | Conducted              | Emission                 |   | Designated to meet                     | FCC Class B (120 V AC)            |          |  |
| SL                               | Remote ON              | /OFF Control             |   | Not p                                  | provided                          |          |  |
| Options                          | I/O Connect            |                          |   | · ·                                    | ovided                            |          |  |
| ő                                | Cover                  |                          |   | Pro                                    | ovided                            |          |  |
|                                  |                        |                          |   |  |                                   |          |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

th may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,



: Please contact Sanken for delivery time of connector type product in advance.

**Specifications and Standards** 

|                                  | Specifications and Standards |  |   |                            |  |           |  |  |
|----------------------------------|------------------------------|--|---|----------------------------|--|-----------|--|--|
|                                  | Model -                      |  |   | 5                          | ow   |           |  |  |
|                                  |                              |  | SSH050-05   | SSH050-12                  | SSH050-15  | SSH050-24 |  |  |
|                                  | Rated Input                  | Voltage  | AC100V/AC120V   |                            |  |           |  |  |
|                                  | Allowable I                  | nput Voltage Range                               |   | AC85                       | 5 to 132V  |           |  |  |
| ns                               | Input Curre                  |  |   | 1.0                        | A/0.9A   |           |  |  |
| itio                             | Rated Freq                   | uency  |   | 50                         | )/60Hz   |           |  |  |
| Input<br>Conditions              |                              | Frequency Range                                  |   | 47 te                      | o 440Hz  |           |  |  |
| ن <u>۽</u>                       | Efficiency (                 |  | 81%   | 86%                        | 87%  | 90%       |  |  |
|                                  | <u> </u>                     | ent (max) Note1                                  |   | 30.                        | A (max)  |           |  |  |
|                                  | Leakage Current (max)        |  |   | 0                          | .3mA   |           |  |  |
|                                  | Rated Outp                   | ut Voltage                                       | 5V  | 12V                        | 15V  | 24V       |  |  |
| 8                                |                              | age Variation                                    |   | Rated outpu                | ut voltage ±10%  |           |  |  |
| C Kote                           | Rated Outp                   | ut Current                                       | 10A   | 4.2A                       | 3.4A   | 2.1A      |  |  |
| ions                             | Allowable O                  | utput Current Range                              |   | 0 te                       | o 100%   |           |  |  |
| put<br>diti                      | Rated Outp                   |  | 50W   | 50.4W                      | 51W  | 50.4W     |  |  |
| Output<br>Conditions             |                              | oltage Accuracy                                  |   |                            | ±3%  |           |  |  |
|                                  | Ripple Nois                  |  | 80mVp-p   | 100mVp-p                   | 100mVp-p   | 100mVp-p  |  |  |
|                                  |                              | ding Time (min)                                  |   |                            | 6msec  |           |  |  |
|                                  | Startup Time (typ)           |  | 400msec   |                            |  |           |  |  |
| Additional<br>Functions          |                              | t Protection                                     |   | Detection above 105% o     | f rated current (output cutof  | F)        |  |  |
|                                  | Overvoltage Protection       |  | Detection above 115% of rated voltage (output cutoff)                                   |                            |  |           |  |  |
|                                  |                              | /OFF Control                                     | Not provided  |                            |  |           |  |  |
| Ado<br>Fur                       | Remote Ser                   | •  | Not provided  |                            |  |           |  |  |
|                                  | Operations Display           |  |   | Red LE                     | D indicator  |           |  |  |
|                                  | Operating Te                 | emperature Range                                 |   | 0 to                       | o +60°C  |           |  |  |
|                                  | Storage Temperature Range    |  | -25 to +85°C  |                            |  |           |  |  |
|                                  | Operating Humidity Range     |  | 30 to 90% (no condensation)   |                            |  |           |  |  |
| Environmental<br>Conditions      | Storage Humidity Range       |  | 30 to 90% (no condensation)   |                            |  |           |  |  |
| ner                              | Cooling Requirements         |  | Natural air cooling   |                            |  |           |  |  |
| oni<br>litio                     |                              | No. of vibrations                                |   |                            | to 55Hz  |           |  |  |
| nvir<br>ond                      | Vibration                    | Sweep time                                       |   |                            | ninutes  |           |  |  |
| шõ                               | Resistance                   |  |   |                            | 5m/s² (2G)   |           |  |  |
|                                  |                              | Vibration direction<br>Vibration time            | X, Y, Z   |                            |  |           |  |  |
|                                  | Installation                 | Conditions                                       | One hour in each of three directions Derating may be required due to mounting direction |                            |  |           |  |  |
|                                  |                              |  |   | beraung may be require     |  |           |  |  |
|                                  |                              | Between input and output                         | 2   | 000 V AC for 1 minute (le  | eakage current: 15 mA or les   | ss)       |  |  |
| ion                              | Withstand<br>Voltage         | Between input and FG                             |   |                            | 5  |           |  |  |
| Insulation                       | voltage                      | Between output and FG                            |   | DUD V AC FOR 1 MINUTE (lea | akage current: 15 mA or les  | s)        |  |  |
| Insu                             | Insulation                   | Between input and output<br>Between input and FG |   | 100 MO (mossured           | with 500 V DC Megger)  |           |  |  |
|                                  | Resistance                   | Between output and FG                            |   | 100 1022 (1116450160       | with 500 v DC Megger)  |           |  |  |
|                                  | Frank 1.5                    | •  |   |                            | / · · · ·  |           |  |  |
| re/                              | External Ap                  | opearance  |   |                            | (cover is optional)  |           |  |  |
| lctu                             | Input Type<br>Output Typ     | 9  |   | ,                          | connector is optional)   |           |  |  |
| External Structure/<br>Standards | External Di                  |  |   | ,                          | <sup>connector is optional)</sup><br>5 <sup>D</sup> x 29 <sup>H</sup> mm |           |  |  |
| nal<br>lard                      | Weight                       |  |   |                            | 220g   |           |  |  |
| xter<br>tanc                     | Safety Stan                  | dards  |   |                            | No. 950 certified  |           |  |  |
| ы м                              | Conducted                    |  |   |                            | FCC Class B (120 V AC)   |           |  |  |
|                                  |                              |  |   |                            |  |           |  |  |
| Options                          |                              | /OFF Control                                     |   |                            | provided<br>ovided   |           |  |  |
| Opti                             | I/O Connec<br>Cover          |  |   |                            | ovided   |           |  |  |
| 0                                | Cover                        |  |   | PI                         | UNICEU   |           |  |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

It may be necessary to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

Output characteristics are measured at the output connector. Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.



|                                  |  |   | Specifications a                                      | nd Standards  |           |  |  |
|----------------------------------|--|---|---|---|-----------|--|--|
|                                  | Мо   | del   |   | 100W  |           |  |  |
|                                  |  |   | SSH100-05   | SSH100-12   | SSH100-24 |  |  |
|                                  | Rated Input                                    | Voltage                                       |   | AC100V/AC120V   |           |  |  |
|                                  | Allowable I                                    | nput Voltage Range                            |   | AC85 to 132V  |           |  |  |
| suo                              | Input Curre                                    |   |   | 2.0A/1.8A   |           |  |  |
| Input<br>Conditions              | Rated Freq                                     |   |   | 50/60Hz   |           |  |  |
|                                  | Allowable Frequency Range                      |   |   | 47 to 440Hz   |           |  |  |
| = ບັ                             | Efficiency (                                   |   | 82%   | 87%   | 90%       |  |  |
|                                  |  | ent (max) Notes                               |   | 30A (max)   |           |  |  |
|                                  | Leakage Cu                                     | irrent (max)                                  |   | 0.3mA   |           |  |  |
|                                  | Rated Outp                                     | ut Voltage                                    | 5V  | 12V   | 24V       |  |  |
| Note 3                           | Output Volt                                    | age Variation                                 |   | Rated output voltage ±10%                               |           |  |  |
| 2                                | Rated Outp                                     |   | 20A (18A) Note 4                                      | 8.5A  | 4.5A      |  |  |
|                                  |  | utput Current Range                           |   | 0 to 100%   |           |  |  |
| ndit<br>Idit                     | Rated Outp                                     |   | 100W  | 102W  | 108W      |  |  |
| Cont                             |  | oltage Accuracy                               |   | ±3%   |           |  |  |
|                                  | Ripple Nois                                    |   | 80mVp-p   | 100mVp-p  | 100mVp-p  |  |  |
|                                  | Output Holding Time (min)                      |   |   | 16msec  |           |  |  |
|                                  | Startup Tim                                    |   |   | 280msec   |           |  |  |
| Additional<br>Functions          |  | t Protection                                  | Detection above 105% of rated current (output cutoff) |   |           |  |  |
|                                  | -  | e Protection<br>/OFF Control                  | Detection above 115% of rated voltage (output cutoff) |   |           |  |  |
|                                  | Remote ON                                      |   | Not provided Provided                                 |   |           |  |  |
|                                  |  | •   |   | Red LED indicator                                       |           |  |  |
|                                  | Operations Display                             |   |   |   |           |  |  |
|                                  | Operating Temperature Range                    |   |   | 0 to +60°C  |           |  |  |
|                                  | Storage Temperature Range                      |   |   | -25 to +85°C  |           |  |  |
| -                                | Operating Humidity Range                       |   |   | 30 to 90% (no condensation)                             |           |  |  |
| shta                             | Storage Humidity Range<br>Cooling Requirements |   | 30 to 90% (no condensation)<br>Natural air cooling    |   |           |  |  |
| Environmental<br>Conditions      |  | No. of vibrations                             | 10 to 55Hz  |   |           |  |  |
| diti                             |  | Sweep time                                    | 3 minutes   |   |           |  |  |
|                                  | Vibration                                      | Acceleration rate                             |   | 19.6m/s² (2G)   |           |  |  |
|                                  | Resistance                                     | Vibration direction                           |   | X, Y, Z   |           |  |  |
|                                  |  | Vibration time                                |   | One hour in each of three directions                    |           |  |  |
|                                  | Installation                                   | Conditions                                    | Derating may be required due to mounting direction    |   |           |  |  |
|                                  |  | Between input and output                      | 2000 V A  | C for 1 minute (leakage current: 15 mA                  | or less)  |  |  |
| Insulation                       | Withstand<br>Voltage                           | Between input and FG<br>Between output and FG | 500 V A   | C for 1 minute (leakage current: 15 mA                  |           |  |  |
| iula                             |  | Between input and output                      |   |   |           |  |  |
| lns                              | Insulation                                     | Between input and FG                          | 10  | 0 M $\Omega$ (measured with 500 V DC Megge              | er)       |  |  |
|                                  | Resistance                                     | Between output and FG                         |   |   | ,         |  |  |
| _                                | External Ap                                    | pearance                                      |   | With chassis (cover is optional)                        |           |  |  |
| External Structure/<br>Standards | Input Type                                     | •   |   | Terminal stand  |           |  |  |
| Luc.                             | Output Typ                                     | e   |   | Terminal stand  |           |  |  |
| l St<br>ds                       | External Di                                    | mensions                                      |   | 135 <sup>W</sup> x 93 <sup>D</sup> x 33 <sup>H</sup> mm |           |  |  |
| erna<br>ndar                     | Weight   |   |   | 420g  |           |  |  |
| Exte<br>Star                     | Safety Stan                                    |   |   | UL1950, CSA No. 950 certified                           |           |  |  |
|                                  | Conducted                                      | Emission                                      | De  | esignated to meet FCC Class B (120 V                    | AC)       |  |  |
| su                               | Remote ON                                      | /OFF Control                                  |   | Not provided  |           |  |  |
| Remote ON/OFF Control            |  | tor   |   | Not provided  |           |  |  |
| <u> </u>                         | Cover  |   |   | Provided  |           |  |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

 Note:
 Output characteristics are measured at the output connector.
 Ripple noise is measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

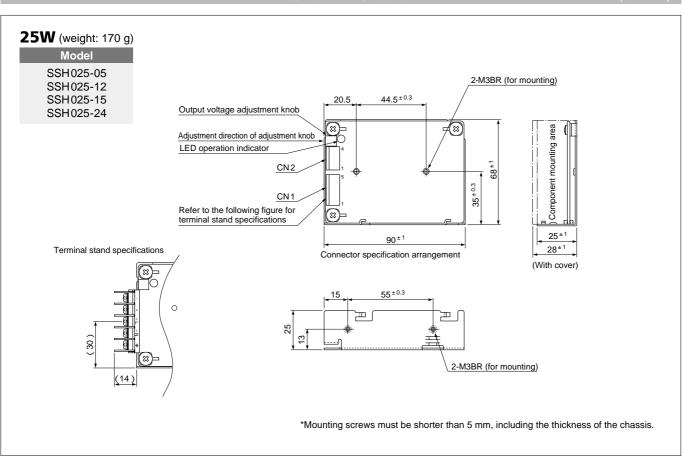
Note 4 Rated output current is 18 A for models with cover.

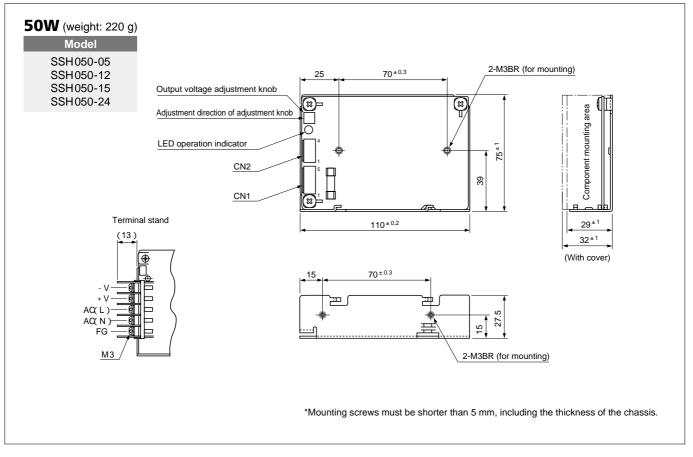
to derate the output current depending on the operating conditions. Refer to the derated output current for the installation conditions and ambient temperature.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

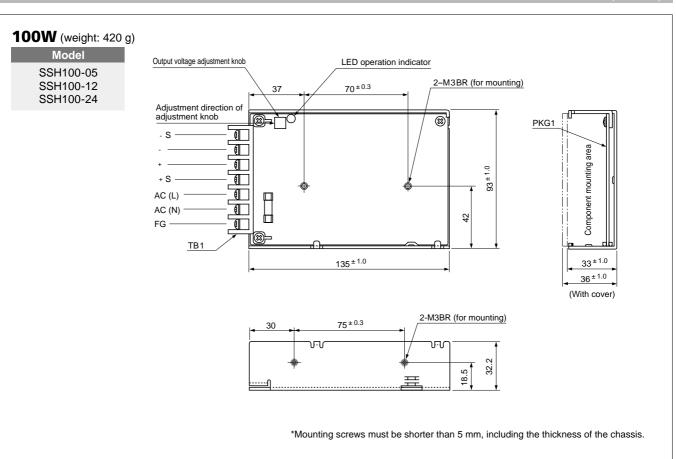
## SSH Series 25W,50W,100W

External Dimensions









(unit: mm)



## Option

| Symbol at end of<br>product name | Description                       | Application    |  |
|----------------------------------|-----------------------------------|----------------|--|
| None                             | Terminal stand type without cover | All models     |  |
| -CN                              | Connector type without cover      | SSH025, SSH050 |  |
| -C                               | Terminal stand type with cover    | All models     |  |
| -CN-C                            | Connector type with cover         | SSH025, SSH050 |  |

: Please contact Sanken for delivery time of connector type product in advance.



## **Operating Instruction**

#### **1** Terminal connection

#### SSH025/SSH050 connector type

| Symbol | Pin No. | Terminal name | Corresponding<br>connector | Corresponding contact |  |  |  |
|--------|---------|---------------|----------------------------|-----------------------|--|--|--|
|        | 1       | FG            |                            |                       |  |  |  |
| CN1    | 2       | NC            |                            | SVH-21T-P1.1<br>(JST) |  |  |  |
|        | 3       | AC (N)        | VHR-5N<br>(JST)            |                       |  |  |  |
|        | 4       | NC            | (001)                      |                       |  |  |  |
|        | 5       | AC (L)        |                            |                       |  |  |  |
| CNID   | 1, 2    | +             | VHR-4N                     | SVH-21T-P1.1          |  |  |  |
| CN2    | 3, 4    | -             | (JST)                      | (JST)                 |  |  |  |

#### SSH025/SSH050 stand type

| Symbol | Terminal symbol | Terminal name | Corresponding crimp terminal |  |  |  |  |
|--------|-----------------|---------------|------------------------------|--|--|--|--|
|        | -               | -             |                              |  |  |  |  |
|        | +               | +             |                              |  |  |  |  |
| TB1    | ~ L             | AC(L)         | V1.25-3 (JST) or equivalent  |  |  |  |  |
|        | ~ N             | AC(N)         |                              |  |  |  |  |
|        | G               | FG            |                              |  |  |  |  |

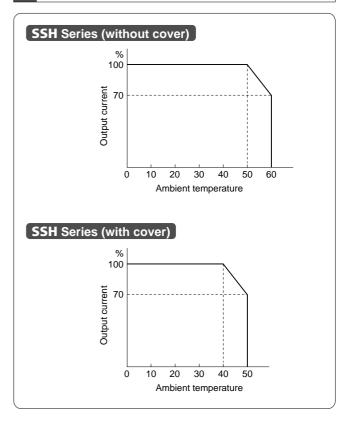
#### SSH100 stand type (terminal stand type only)

| Symbol | Terminal symbol | Terminal name | Corresponding crimp terminal |
|--------|-----------------|---------------|------------------------------|
|        | - S             | - S           |                              |
|        | -               | -             |                              |
|        | +               | +             |                              |
| TB1    | + S             | + S           | V2-4 (JST) or equivalent     |
|        | ~ L             | AC (L)        |                              |
|        | ~ N             | AC (N)        |                              |
|        | G               | FG            |                              |

#### Terminal name and function

|         | Terminal name | Function  |  |
|---------|---------------|---|--|
|         | AC (L)        | AC input terminal. Fuse insertion side.           |  |
| Input   | AC (N)        | AC input terminal.                                |  |
|         | FG            | Frame grounding. Grounding terminal.              |  |
|         | +             | DC output terminal. + side                        |  |
| Outrout | -             | DC output terminal side                           |  |
| Output  | + S           | Remote sensing terminal. + side (100W model only) |  |
|         | - S           | Remote sensing terminal side (100W model only)    |  |
|         | NC            | No connection                                     |  |

### **2** Derating of output current



## **3** Setting output voltage

Output voltage may be adjusted using the adjustment knob found near the output connector or terminal stand. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

#### **4** Overcurrent protection

When the output is overloaded, the power supply's built-in overcurrent protection will shut off the output. The overcurrent protection is set to function when the output current exceeds 105% of the rated current value (about 130% of a standard output value).

To reset the overcurrent protection, remove the source of the overload, turn off the power, and wait about a minute before turning the power on again.

#### **5** Overvoltage Protection

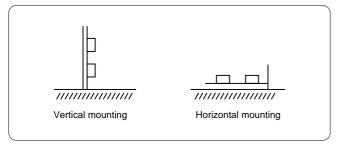
If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off as long as the input supply is energized. To reset the overvoltage protection, turn off the power and wait about a minute before turning the power on again.

Take care when applying power again, as there may still be a problem with the output voltage (if there is, the overvoltage protection will shut down the output again).

## 6 Mounting

To use the power supply with natural cooling, mount the supply so that both sides and the top are open, and there is sufficient air flow.

The power supply can be mounted in two directions as shown below. Use mounting screws that are 5 mm long or less, including the thickness of the chassis.



#### Leakage current

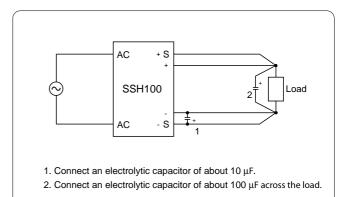
Leakage current is 0.3 mA or less per unit. Take care when using multiple supplies simultaneously.

#### 8 Inrush current limiting

The power supply is equipped with an inrush current limiting circuit to restrict the amount of current that flows when the power is turned on. Since the 25 W and 50 W models use a power thermistor, current greater than that listed in the specifications may flow when restarting the supply, or due to ambient temperature conditions. The 100 W model may also allow more current than that listed in the specifications if restarting after a short period of time. Take adequate precautions.

### **9** Remote sensing

The SSH100 model is equipped with a remote sensing feature to guard against output line drop. The guaranteed output voltage range, including line drop effects, is 5% of rated output voltage. Limit line drop on the minus side to 125 mV or less



### 10 Serial and parallel connection

The SSH series cannot be connected in series or in parallel to increase output capacity.

#### 11 When there is not output

- Check that all terminals are connected correctly as described in item 1.
- Output will be cut off when overcurrent protection is active. Check the supply as described in item 5.
   Overvoltage protection may be activated if the output voltage is set too high. Verify that the output voltage adjustment knob is set towards the middle of its range.
   Overvoltage protection may be activated if the remote sensing terminals are not properly connected. Check their connections.
- The overcurrent protection will be activated and the output will decrease if there is an overload condition.

## Supports peak power

# **SLS** Peak Power Series

60W 100W 150W

# Single output, compatible with specific applications

#### With chassis

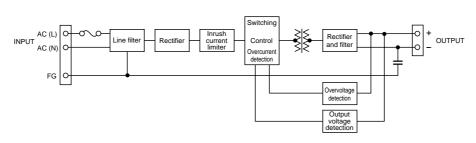
SLS060P, 100P, and 150P are single output switching power supplies that are designed for specific applications. They offer prompt delivery of general-purpose products and the special functions of customized products to meet a variety of customer needs. Please check the specifications when evaluating or employing this series.



- Standard products for specific applications
- Supports peak loads: 2.5 times the rated current (within 15 seconds)
- Input voltage switching method (100 V/200 V) (for 150 W unit)
   \* Different models are provided for 60 W and 100 W depending on the input voltage.
- Meets safety standards of each country



[SLS Series Circuit Diagram]





60W,100W,150W

#### Please contact Sanken for delivery time in advance.

|                                  |   | Specifications and Standards                       |                                    |  |  |  |
|----------------------------------|---|--|------------------------------------|--|--|--|
|                                  | Model   | 60   | W                                  |  |  |  |
|                                  | model   | SLS060P  | SLS060PH                           |  |  |  |
|                                  | Rated Input Voltage                             | AC100V/AC120V                                      | AC200V/AC240V                      |  |  |  |
|                                  | Allowable Input Voltage Rang                    | AC85 to 132V                                       | AC170 to 264V                      |  |  |  |
| su                               | Input Current (typ)                             | 1.2A   | 0.8A                               |  |  |  |
| Input<br>Conditions              | Rated Frequency                                 | 50/60Hz  |                                    |  |  |  |
| ndu                              | Allowable Frequency Range                       | 47 to  |                                    |  |  |  |
| ن <del>ن</del>                   | Efficiency (typ)                                | 73   |                                    |  |  |  |
|                                  | Inrush Current (max)                            | 30A  | 40A                                |  |  |  |
|                                  | Leakage Current (max)                           | 0.5mA  | 0.75mA                             |  |  |  |
|                                  | Rated Output Voltage                            | 5V   | 24V                                |  |  |  |
| Note 3                           | Output Voltage Variation                        | Fix  |                                    |  |  |  |
| S                                | Rated Output Current                            | 2.5  |                                    |  |  |  |
| tior                             | Maximum Peak Current                            | 6A (withi  |                                    |  |  |  |
| Output<br>Conditi                | Allowable Output Current Rang                   | e 0 to 60  |                                    |  |  |  |
| Outl                             | Rated Output Power<br>Constant Voltage Accuracy |  |                                    |  |  |  |
|                                  | Ripple Noise                                    | 300m   |                                    |  |  |  |
|                                  | Output Holding Time (min)                       | 20m  |                                    |  |  |  |
|                                  |   |  |                                    |  |  |  |
|                                  | Overcurrent Protection Overvoltage Protection   | Detection above 105% of peal                       |                                    |  |  |  |
| Additional<br>Functions          | Overheating Protection                          | 115 to 145% (output cutoff) Not pro                | 110 to 145% (output cutoff)        |  |  |  |
| ditio                            | Remote ON/OFF Control                           |  |                                    |  |  |  |
| Add                              | Remote Sensing                                  | Not provided Not provided                          |                                    |  |  |  |
|                                  | Operations Display                              | Not provided                                       |                                    |  |  |  |
|                                  |   |  |                                    |  |  |  |
|                                  | Operating Temperature Range                     |  |                                    |  |  |  |
|                                  | Operating Humidity Range                        | -25 to +80°C<br>30 to 90% (no condensation)        |                                    |  |  |  |
| ធ                                | Storage Humidity Range                          | 30 to 90% (no condensation)                        |                                    |  |  |  |
| Environmental<br>Conditions      | Cooling Requirements                            | Natural air cooling                                |                                    |  |  |  |
| Environme<br>Conditions          | No. of vibrations                               | 5 to 100Hz   | 10 to 55Hz                         |  |  |  |
| viro                             | Vibration Sweep time                            | 3 minutes  | 1.5 minutes                        |  |  |  |
| Co E                             | Resistance Acceleration rate                    | 14.7m/s <sup>2</sup> (1.5G)                        | 19.6m/s² (2G)                      |  |  |  |
|                                  | Vibration direction                             |  | ·                                  |  |  |  |
|                                  | Vibration time                                  | One hour in each                                   |                                    |  |  |  |
|                                  | Installation Conditions                         | 10 G (3 times each in the X, Y, Z directions)      |                                    |  |  |  |
|                                  | Installation Conditions                         | Derating may be required due to mounting direction |                                    |  |  |  |
|                                  | Insulation Between input and output             |  | or 1 minute                        |  |  |  |
| ion                              | Withstand Between input and F                   | 3  |                                    |  |  |  |
| Insulation                       | Voltage Between output and F                    |  | 600 V AC for 1 second              |  |  |  |
| nsı                              | Insulation Between input and output             |  |                                    |  |  |  |
|                                  | Resistance Between input and For                |  | (in SOU V DC Megger)               |  |  |  |
|                                  | · · · · · · · · · · · · · · · · · · ·           |  |                                    |  |  |  |
|                                  | External Appearance                             | With c   |                                    |  |  |  |
| re/                              | Input Type<br>Output Type                       | Connector  |                                    |  |  |  |
| uctu                             | External Dimensions                             | 160 <sup>w</sup> x 80 <sup>c</sup>                 |                                    |  |  |  |
| Stru<br>Is                       | Weight  | 400  |                                    |  |  |  |
| External Structure/<br>Standards | Safety Standards                                | Designated to meet UL1950 D3, CSA EB 1402C         | TÜV (EN60950) certified            |  |  |  |
| <u></u> б б                      | Conducted Emission                              | Designated to meet FCC Class B<br>and VCCI Class B | Designated to meet CISPR22 Class B |  |  |  |
| S                                | Romoto ON/OFE Control                           | Natas  | vided                              |  |  |  |
| ption                            | Remote ON/OFF Control Cover                     | Not provided                                       |                                    |  |  |  |
| 0                                |   | Not provided                                       |                                    |  |  |  |

Note: At cold start. (More inrush current than above noted value may flow at restart.)

2 The constant voltage accuracy is measured within the input voltage variable range of 85 to 132 V AC, within the output current variable range, with a time drift of 10 minutes to eight hours and an ambient temperature range from 0 to +50°C.

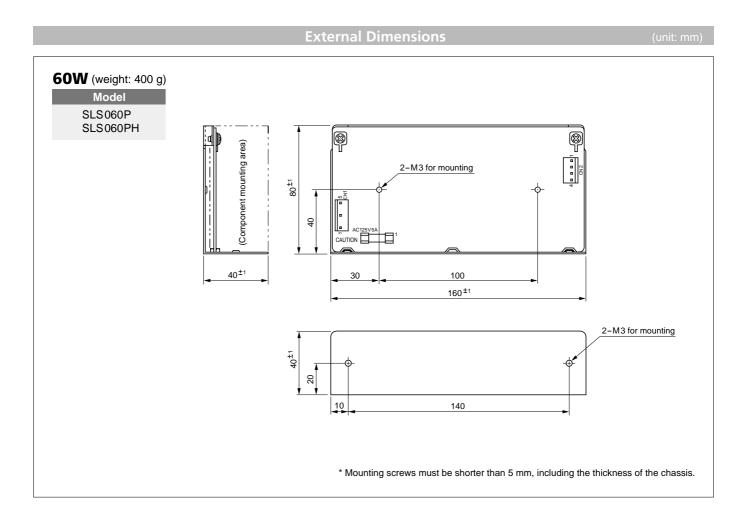
Res Although the SLS060P has a thermal shutdown function to prevent overheating (SLS100P does not have this function), because it is a simple system, the device must not be continuously operated when the output current exceeds the rated current. Note: The maximum rated values for the remote ON/OFF control pins (pins 1 & 2 of CN2) are 15 V and 15 mA.

\* Measurements are made at a point 5 cm from the output connector for all output characteristics, with a 63-V, 47-µF electrolytic capacitor

connected to that point. (Use a 1:1 probe.) \* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

**SLS** Peak Power Series

60W,100W,150W





#### 60W,100W,150W

|                                  |                           |                              | Specification   | ns and Standards                      |   |  |  |  |
|----------------------------------|---------------------------|------------------------------|---|---------------------------------------|---|--|--|--|
|                                  | Mc                        | odel                         | 10  | <b>W</b>                              | 150W  |  |  |  |
|                                  | IVIC                      |                              | SLS100P   | SLS100PH                              | SLS150PW  |  |  |  |
|                                  | Rated Inpu                | t Voltage                    | AC100V/AC120V   | AC200V/AC240V                         | AC100V/AC200V   |  |  |  |
|                                  | Allowable I               | nput Voltage Range           | AC85 to 132V  | AC170 to 264V                         | AC85 to 132V/AC170 to 265V                                      |  |  |  |
| suc                              | Input Curre               |                              | 2.3A  | 1.2A                                  | 4.2A  |  |  |  |
| li tio                           | Rated Freq                |                              | 50/60Hz   |                                       |   |  |  |  |
| nd                               |                           | Frequency Range              | 47 to 63Hz  |                                       |   |  |  |  |
| ٽ ≟                              | Efficiency (              |                              |   |                                       | 0%  |  |  |  |
|                                  |                           | rent (max) Moto              | 30A   | 40A                                   | 20A/50A   |  |  |  |
|                                  | Leakage Cu                | urrent (max)                 | 0.5mA   | 0.75mA                                | 0.5mA/0.75mA  |  |  |  |
|                                  | Rated Outp                | out Voltage                  | 24V   |                                       |   |  |  |  |
| Note 3                           | Output Vol                | tage Variation               |   | Fi                                    | ked   |  |  |  |
| S<br>S                           | Rated Outp                | out Current                  | 4/  | 4                                     | 6A  |  |  |  |
| ion                              | Maximum F                 | Peak Current                 | 10 A (with  | n 15 sec)                             | 15 A (within 15 sec)  |  |  |  |
| put<br>diti                      |                           | Output Current Range         |   |                                       | 0.1 to 15A  |  |  |  |
| Output<br>Conditi                | Rated Outp                |                              | 96  |                                       | 144W  |  |  |  |
|                                  |                           | oltage Accuracy Meet         |   | ±5                                    | 5%  |  |  |  |
|                                  | Ripple Nois               |                              | 250mVp-p  |                                       | 400mVp-p  |  |  |  |
|                                  | Output Holding Time (min) |                              |   | 20n                                   | nsec  |  |  |  |
|                                  | Overcurren                | t Protection                 | Dete  | ction above 105% of pea               | k current (automatic recovery)                                  |  |  |  |
| s al                             | Overvoltag                | e Protection                 | 115 to 145% (output cutoff)   | 110 to 145% (output cutoff)           | 110 to 145% (output cutoff)                                     |  |  |  |
| tion                             | Overheatin                | g Protection                 |   | Not pr                                | ovided  |  |  |  |
| Additional<br>Functions          | Remote ON                 | I/OFF Control                | Not provided Provided Not   |                                       |   |  |  |  |
| ΡĹ                               | Remote Se                 |                              | Not provided  |                                       |   |  |  |  |
|                                  | Operations                | Display                      | Not provided  |                                       |   |  |  |  |
|                                  | Operating To              | emperature Range             | 0 to +50°C  |                                       |   |  |  |  |
|                                  |                           | nperature Range              | -25 to +80°C  |                                       |   |  |  |  |
|                                  | Operating I               | Humidity Range               | 30 to 90% (no condensation)   |                                       |   |  |  |  |
| ital                             | Storage Hu                | midity Range                 | 30 to 90% (no condensation)   |                                       |   |  |  |  |
| Environmental<br>Conditions      | Cooling Re                | quirements                   | Natural air cooling   |                                       |   |  |  |  |
| itio                             |                           | No. of vibrations            | 5 to 100Hz 10 to 55Hz 5 to 10   |                                       | 5 to 100Hz  |  |  |  |
| vir                              | Vibration                 | Sweep time                   | 3 minutes   |                                       | 1.5 minutes   |  |  |  |
| ыs                               | Resistance                |                              | 14.7m/s² (1.5G)   |                                       | 19.6m/s (2G)  |  |  |  |
|                                  |                           | Vibration direction          |   | X, Y, Z                               |   |  |  |  |
|                                  | Installation              | Vibration time<br>Conditions | One hour in each of three directions  |                                       |   |  |  |  |
|                                  |                           | Conditions                   | 10 G (3 times each in the X, Y, Z directions)<br>Derating may be required due to mounting direction |                                       |   |  |  |  |
|                                  |                           |                              |   | berating may be required              |   |  |  |  |
|                                  |                           | Between input and output     | 1500 V AC f   | or 1 minute                           | 2000 V AC for 1 minute or 2400 V AC for 1 second                |  |  |  |
| Insulation                       |                           | Between input and FG         |   |                                       |   |  |  |  |
| llat                             | Voltage                   | Between output and FG        |   | 500 V AC for 1 minute c               | or 600 V AC for 1 second  |  |  |  |
| ISU                              | Insulation                | Between input and output     |   | 400 MO (                              |   |  |  |  |
| _                                | Resistance                |                              | 1   | 100 MΩ (measured w                    | ith 500 V DC Megger)  |  |  |  |
|                                  |                           | Between output and FG        |   |                                       |   |  |  |  |
|                                  | External Ap               | opearance                    |   |                                       | chassis   |  |  |  |
| e                                | Input Type                |                              | Conr  | ector                                 | Terminal stand  |  |  |  |
| ctri                             | Output Typ                |                              | 4.00W 00F   |                                       |   |  |  |  |
| Stru<br>s                        | External Di<br>Weight     | mensions                     | 160 <sup>₩</sup> x 98 <sup>□</sup><br>50  |                                       | 220 <sup>w</sup> x 98 <sup>D</sup> x 52 <sup>H</sup> mm<br>850g |  |  |  |
| External Structure/<br>Standards | Safety Star               | ndards                       | UL1950 D3,<br>CSA EB 1402C certified  | TÜV (EN60950) certified               | UL1950, CSA No. 950, TÜV (EN60950) certified                    |  |  |  |
| С <sup>5</sup> Ш                 | Conducted                 | Emission                     | Designated to meet FCC (Part 15-J)<br>Class A and VCCI Class A                                      | Designated to meet<br>CISPR22 Class A | Designated to meet FCC (Part 15-J)<br>Class A and VCCI Class A  |  |  |  |
| su                               | Remote ON                 | I/OFF Control                | Not pr  | ovided                                | Provided as standard  |  |  |  |
| ption                            | Cover                     |                              |   |                                       | rovided   |  |  |  |
|                                  |                           |                              | 1   | 101 pi                                |   |  |  |  |

Note: At cold start. (More inrush current than above noted value may flow at restart.)

The constant voltage accuracy is measured within the input voltage variable range of 85 to 132 V AC, within the output current variable range, with a time drift of 10 minutes to eight hours and an ambient temperature range from 0 to +50°C.

Although the SLS060P has a thermal shutdown function to prevent overheating (SLS100P does not have this function), because it is a simple system, the device must not be continuously operated when the output current exceeds the rated current.
 The maximum rated values for the remote ON/OFF control pins (pins 1 & 2 of CN2) are 15 V and 15 mA.

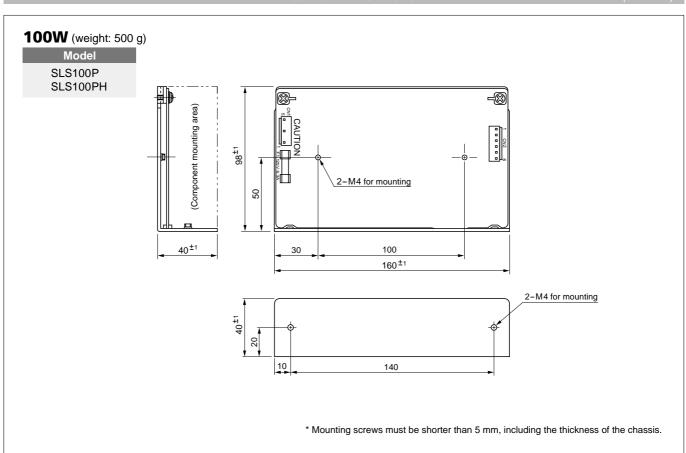
\* Measurements are made at a point 5 cm from the output connector for all output characteristics, with a 63-V, 47-μF electrolytic capacitor connected to that point. (Use a 1:1 probe.)

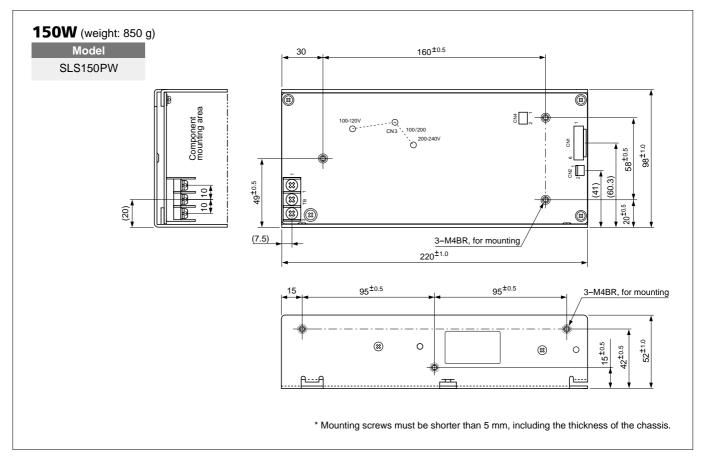
\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

#### **SLS** Peak Power Series

#### 60W,100W,150W

**External Dimensions** 





**JLJ**Series 60W,100W,150W

## **Operating Instruction**

#### **1** Terminal connection

#### SLS060P(H), SLS100P(H)

| $\geq$ |               |           |         |          |                          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|--------|---------------|-----------|---------|----------|--------------------------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--|-------|
|        | Model         | Connector | Pin arr | angement | Corresponding<br>housing | Corresponding<br>contact |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|        |               |           | 1       | AC (L)   |                          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|        | SLS 060P      |           | 2       | (NC)     |                          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
| Input  | 060PH<br>100P | CN1       | 3       | AC (N)   | VHR-5N<br>(JST)          | SHV-21T-P1.1             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
| -      | 100PH         |           | 4       | (NC)     | ()                       |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|        |               |           | 5       | FG       |                          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|        | SLS 060P      | S060P CN2 | 1       | + 24V    | + 241/                   | + 241/                   | + 241/ | + 241/ | + 241/ | 1.241/ | - 241/ | - 241/ | - 241/ | - 241/ | 1.241/ | 1.241/ | - 241/ | - 241/ | 1.241/ | 1.241/ |  | (JST) |
|        |               |           | 2       |          | VHR-4N<br>(JST)          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
| Output | 060PH         | CINZ      | 3       | 0V       |                          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
| O      | Oni           |           | 4       | 00       |                          |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|        | SLS 100P      | CN2       | 1 to 3  | + 24V    | VHR-6N                   |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |
|        | 100PH         |           | 4 to 6  | 0V       | (JST)                    |                          |        |        |        |        |        |        |        |        |        |        |        |        |        |        |  |       |

**Peak Power** 

#### SLS150PW

| Symbol | Pin No. | Terminal name | Corresponding connector |
|--------|---------|---------------|-------------------------|
|        | 1       | AC (N)        |                         |
| TB1    | 2       | AC (L)        | M4 terminal             |
|        | 3       | FG            |                         |
| CN1    | 1 to 3  | + 24V         | VHR-6N                  |
| CINT   | 4 to 6  | SG            | SVH-21T-P1.1 (JST)      |
| CN2    | 1       | RC +          | H2P-SHF-AA              |
|        | 2       | RC -          | SHF-001T-0.8SS (JST)    |

#### **2** Setting output voltage

The output voltage is preset at factory shipping, and cannot be adjusted.

#### **3** Overcurrent protection

When the output is overloaded, the output current will be limited, which characteristics as shown in the graph. When the cause of the overload is removed, the output will automatically return to its normal voltage. The overcurrent detection is set to function when the

| 100%           |                |   |
|----------------|----------------|---|
| e              |                |   |
| Output voltage |                |   |
| it vo          |                |   |
| rtbr           |                |   |
| õ              | /:             |   |
| (              | ) Peak value   |   |
|                | Output current | J |

output current exceeds 105% of the peak current. This product cannot be used over the specified time with overload of more than the rated current value.

## **4** Overvoltage protection

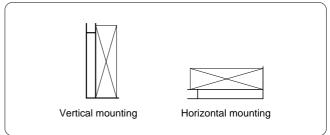
If the output voltage increases for some reason, the overvoltage condition is detected and the output is shut off. Once the overvoltage protection is activated, the output will remain cut off until the input supply is cut off.

To apply power again, turn off the power and wait about three minutes before turning the power on again.

Check that the output voltage is normal without load for protection.

#### **5** Mounting

The power supply can be mounted in two directions, without any output derating.



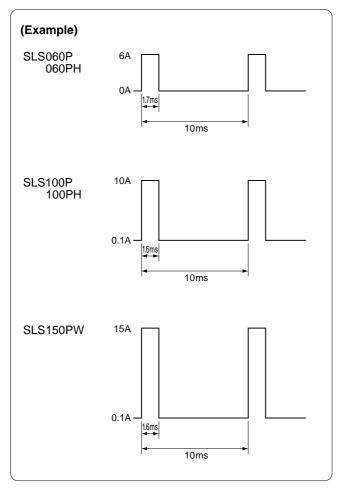
Mount the supply so that both sides and the top are open, to obtain sufficient air flow.



60W,100W,150W

#### 6 Dynamic load

This series can be used with dynamic load. In this case, use the supply with an effective value less than the rated output current.



#### Inrush current

SLS060P/PH use a power thermistor to limit inrush current. Therefore, current higher than the specifications may flow due to the ambient temperature conditions and reinput after energizing (momentary input cutoff, etc.). Take proper precautions.

SLS100P/PH and SLS150PW use a resistor and thyristor to limit inrush current. Current higher than the specifications may flow due to the short reinput time.

#### 8 Remote ON/OFF control (SLS150PW)

SLS150PW can perform remote ON/OFF control. When 3.5 to 5.5 V (current 5 mA recommend) is applied to between RC+ and RC- (pins 1 and 2 of connector CN2), the output goes ON. When 0.8 V or less is applied or open between RC+ and RC-, the output goes OFF.

When remote ON/OFF control is not used, the output can go ON regardless of CN2 by short-circuiting pins 1 and 2 of CN4.

#### **9** Switching input voltage (SLS150PW)

SLS150PW can use 100 V AC power supply or 200 V AC power by switching the connector. For 100-120 V AC input, connect CN3 to the 100-120 V side. For 200 V-240 V AC input, connect CN3 to 200-240 V side.

At factory shipping, the connector is set to the 100-120 V side. When using SLS150PW with 200-240 V AC, be sure to switch CN3.

#### **10** Precautions along with safety standards (SLS150PW)

SLS150PW acquired UL, CSA and TÜV safety standards. A built-in fuse may need to be replaced according to applicable safety standards. Replace the built-in fuse with attached fuse for TÜV.

|         | Rating    | Standards   | Manufacturer | At factory<br>shipping |
|---------|-----------|-------------|--------------|------------------------|
| UL, CSA | 250V 12A  | No. 31412   | Retail fuse  | Built-in               |
| TÜV     | 250V 6.3A | No. 215 6.3 | Retail fuse  | Attached               |

## Single output, open frame PCB type, low-cost, general-purpose switching power supply



Single printed circuit board

 Wide input range for world-wide support Input voltages from 85 V to 264 V AC can be continuously input in this model that is ready for use in all markets world-wide.

Lineup

|       | Outp   | ut voltage   |  | Circuit type   |
|-------|--|--|--|--|
| power | 5V   | 12V  | 24V Circuit type                           |  |
| 15W   |  |  |  | RCC type   |
| 30W   |  |  |  | Flyback type   |
| 50W   |  |  |  | Flyback type   |
| 75W   |  |  |  | Resonant-mode (active PFC)   |
| 100W  |  |  |  | Resonant-mode (active PFC)   |
| 150W  |  |  |  | Resonant-mode (active PFC)   |
|       | power           15W           30W           50W           75W           100W | power         5v           15W         30W           50W         75W           100W         100W | power         5V         12V           15W | 15W         30W           30W         50W           75W         100W |

\* Circuit type information noted in parentheses indicates PFC type

- Employs the circuit type that suited to the output power
- Employs the circuit type that suits the output capacity regarding load and target application
- Compact size meets standards and does not require design changes
- Uses harmonic current control (PFC) Active filter type PFC (Power Factor Correction) is used in 75 to 150 W and 12 V or 24 V models
- Supports peak current suited to L load Supports approximately 130% of rated peak current for 12 V or 24 V output when output power is 75 W or above.

- Includes CE mark for LVD (Low Voltage Directive). Meets safety standards of each country.
- Reduced conducted emission Class B compliant (VCCI, FCC, and CISPR)

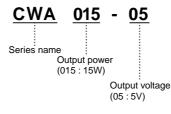
#### Applications

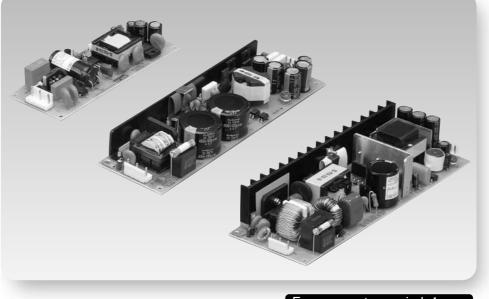
#### **Computer-related equipment**

Printers and other peripherals, ATMs, POS equipment, MO devices, etc.

**Communications terminal equipment** Routers, hubs, modems, game devices, factory automation and controllers

#### Description of model name





Free warrantee period: 1 year

# **CWA** Series

15W,30W,50W,75W,100W,150W

|                                  |                                    | Specifications and Standards   |  |  |  |  |  |
|----------------------------------|------------------------------------|--|--|--|--|--|--|
|                                  | Model                              | 15W  |  |  |  |  |  |
|                                  | Model                              | CWA015-05 CWA015-12 CWA015-24  |  |  |  |  |  |
|                                  | Rated Input Voltage                | AC100V/AC240V  |  |  |  |  |  |
|                                  | Allowable Input Voltage Rang       | AC85 to 264V   |  |  |  |  |  |
| suc                              | Input Current (typ) 🔤              | 0.4A (VIN = 100V)  |  |  |  |  |  |
| Input<br>Conditions              | Rated Frequency                    | 50/60Hz  |  |  |  |  |  |
| ndu                              | Allowable Frequency Range          | 47 to 440Hz  |  |  |  |  |  |
| ٽ <del>ن</del>                   | Efficiency (typ) Notes             | 72% 76% 79%  |  |  |  |  |  |
|                                  | Inrush Current (max) 10002         | $15A (V_{IN} = 100V) / 30A (V_{IN} = 240V) (at cold start)$  |  |  |  |  |  |
|                                  | Leakage Current (max) Month        | 0.75mA   |  |  |  |  |  |
|                                  | Rated Output Voltage               | 5V 12V 24V   |  |  |  |  |  |
| Note 3                           | Output Voltage Variation           | Rated output voltage ±10%  |  |  |  |  |  |
|                                  | Rated Output Current               | 3.0A 1.3A 0.7A   |  |  |  |  |  |
| Output<br>Conditions             | Allowable Output Current Rang      | ge 0 to 100%   |  |  |  |  |  |
| but                              | Rated Output Power                 | 15W 15.6W 16.8W  |  |  |  |  |  |
| Outpu<br>Condit                  | Constant Voltage Accuracy          |  |  |  |  |  |  |
|                                  | Ripple Noise Note1                 |  |  |  |  |  |  |
|                                  |                                    |  |  |  |  |  |  |
|                                  | Startup time                       | 20msec (V <sub>IN</sub> = 100V)  |  |  |  |  |  |
|                                  | Overcurrent Protection             | Detection above approx. 105% of rated current (drooping automatic recovery)  |  |  |  |  |  |
| al<br>Is                         | Overvoltage Protection Note7       | Detection above 115% of rated voltage (output cutoff)  |  |  |  |  |  |
| Additional<br>Functions          | Overheating Protection             | Not provided   |  |  |  |  |  |
| adi                              | Remote ON/OFF Control              | Not provided   |  |  |  |  |  |
| ΡΓ<br>Έ                          | Remote Sensing                     | Not provided   |  |  |  |  |  |
|                                  | Operations Display                 | Not provided   |  |  |  |  |  |
|                                  | Operating Temperature Range        | -10 to +60°C   |  |  |  |  |  |
|                                  | Storage Temperature Range          | -25 to +85°C   |  |  |  |  |  |
|                                  | Operating Humidity Range           | 30 to 90% (no condensation)  |  |  |  |  |  |
|                                  | Storage Humidity Range             | 30 to 90% (no condensation)  |  |  |  |  |  |
| <u>ज</u>                         | Cooling Requirements               | Natural air cooling  |  |  |  |  |  |
| ent                              | No. of vibrations                  | 10 to 55Hz   |  |  |  |  |  |
| ion T                            | Vibration Sweep time               | 3 minutes  |  |  |  |  |  |
| iro                              | Resistance Acceleration rate       |  |  |  |  |  |  |
| Environmental<br>Conditions      | Vibration direction                |  |  |  |  |  |  |
|                                  | Vibration time                     | One hour in each of three directions   |  |  |  |  |  |
|                                  | Shock Resistance                   | 98m/s <sup>2</sup> (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.      |  |  |  |  |  |
|                                  |                                    | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.      |  |  |  |  |  |
|                                  | Installation Conditions            | Derating may be required due to mounting direction   |  |  |  |  |  |
| 8                                | Insulation Between input and outp  | ut 3000 V AC for 1 minute (leakage current: 15 mA or less)   |  |  |  |  |  |
| Note 8                           | Withstand Between input and F      | G 2000 V AC for 1 minute (leakage current: 15 mA or less)  |  |  |  |  |  |
| Insulation                       | Voltage Between output and F       |  |  |  |  |  |  |
| nlat                             | Insulation Between input and outp  |  |  |  |  |  |  |
| Insi                             | Resistance Between input and F     |  |  |  |  |  |  |
|                                  | Between output and F               | G  |  |  |  |  |  |
| 1                                | External Appearance                | Single printed circuit board   |  |  |  |  |  |
| External Structure/<br>Standards | Input Type                         | Connector  |  |  |  |  |  |
| truc                             | Output Type                        | Connector  |  |  |  |  |  |
| al Si<br>rds                     | External Dimensions                | 125 <sup>W</sup> x 50 <sup>D</sup> x 22 <sup>H</sup> mm  |  |  |  |  |  |
| erna                             | Weight                             |  |  |  |  |  |  |
| Ext<br>Sta                       | Safety Standards                   | UL60950, CSA No. 60950-00, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law |  |  |  |  |  |
|                                  | Conducted Emission                 | Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC), and VCCI Class B (100 V AC)                          |  |  |  |  |  |
| ions                             | Remote ON/OFF Control              | Not provided   |  |  |  |  |  |
| Opt                              | Cover                              | Not provided   |  |  |  |  |  |
| Sec.                             | cified under rated input/output co | nditions at an ambient temperature of 25°C.  |  |  |  |  |  |

Specified under rated input/output conditions at an ambient temperature of 25°C.

More current above noted values may flow at restart (power thermistor used).

Construct Control Cont

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output voltage can be changed within the maximum output power and rated output current.

The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.

Reset is performed by reapplying input voltage. Insulation conditions are specified at normal temperature and humidity.

15W,30W,50W,75W,100W,150W

**CWA** Series

| Model         30W           Reted Input Voltage Annop<br>Input Current (vp) 33<br>Reted Input Voltage Range<br>Input Current (vp) 33<br>Reted Input Voltage Range<br>Input Current (vp) 33<br>Reted Input Voltage Range<br>Input Current (vp) 33<br>Reted Input Voltage Range<br>Efficiency (vp) 33<br>Reted Input Voltage Range<br>Efficiency (vp) 33<br>Reted Voltage Voltage Voltage<br>Stratege Current (max) 33<br>Reted Output Voltage Voltage Voltage<br>Stratege The Voltage Voltage Voltage<br>Stratege The Voltage Volt  |  |              |                          | Specifications an                                     | nd Standards                                  |                                       |  |  |  |
|---|--|--------------|--------------------------|---|---|---------------------------------------|--|--|--|
| CWA030-05         CWA030-12         CWA030-24           Allowable Input Voltage Arage<br>Input Current (typ) (2)<br>Allowable Frequency Range<br>Frequency Range<br>Efficiency (typ) (2)<br>Allowable Frequency |  | Ma           | dal                      |   | 30W   |                                       |  |  |  |
| Allowable Input Voltage Range         AC35 to 24/V           Allowable Figurency         5000Hz           Attor Greguency         5000Hz           Attor Greguency         5000Hz           Allowable Froquency         70%           Trus 40Hz         77%           Efficiency (by) that         70%           Trus 40Hz         77%           Rated Courput Voltage         5V           Rated Courput Voltage         5V           Rated Courput Voltage         5V           Rated Courput Voltage Variation         Rated Courput Voltage Variation           Rated Courput Voltage Variation         0.100%           Rated Courput Voltage Variation         0.100%           Rated Courput Voltage Variation         120mVp.p           Output Voltage Variation         200W           Startup time         100mVp.p           Output Voltage Variation         200mVp.p           Output Voltage Variation         200mVp.p           Startup time         100m Pp.p           Overottage Protection         Detection above 105% of rated voltage (output cut0f)           Remote Sensing         Not provided           Remote Sensing         Not provided           Operating Temperature Range         -10 to 40°C <t< th=""><th></th><th>INIC</th><th>bdei</th><th>CWA030-05</th><th>CWA030-12</th><th>CWA030-24</th></t<>   |  | INIC         | bdei                     | CWA030-05   | CWA030-12                                     | CWA030-24                             |  |  |  |
| Name         OBA (Min = 100V)           Input Current (typ) (Company (Ar))         0.8 (Min = 100V)           Allowable Frequency Range         47 to 440Hz           Inrush Current (max) (Company (Min )         0.75mA           Inrush Current (max) (Company (Min )         0.75mA           Output Voltage Variation         0.75mA           Rated Output Voltage (Variation)         0.75mA           Output Voltage Variation         0.75mA           Rated Output Voltage (Variation)         0.75mA           Nowable Output Current (max) (Company (Min )         0.75mA           Output Voltage Variation         0.75mA           Nowable Output Current Range         0.16 100%           Nowable Output Current Range         0.16 100%           Nowable Output Current Range         120mVp.p           Output Holding Time (min) (Company (Min )         200mVp.p           Output Ho  |  | -            |                          |   | AC100V to AC240V                              |                                       |  |  |  |
| Inrush Current (max) (ma)         30A (Vm = 100V)/02A (Vm = 240V) (at cold start))           Lakage Current (max) (ma) (ma)         0.75mA           Output Voltage Variation         Rated Output voltage +10%,           Rated Output Current         6.0A         2.5A         1.3A           Allowable Output Current Amage         0.to 100%,  |  |              |                          |   | AC85 to 264V                                  |                                       |  |  |  |
| Inrush Current (max) (ma)         30A (Vm = 100V)/02A (Vm = 240V) (at cold start))           Lakage Current (max) (ma) (ma)         0.75mA           Output Voltage Variation         Rated Output voltage +10%,           Rated Output Current         6.0A         2.5A         1.3A           Allowable Output Current Amage         0.to 100%,  | suc  |              |                          |   |   |                                       |  |  |  |
| Inrush Current (max) (ma)         30A (Vm = 100V)/02A (Vm = 240V) (at cold start))           Lakage Current (max) (ma) (ma)         0.75mA           Output Voltage Variation         Rated Output voltage +10%,           Rated Output Current         6.0A         2.5A         1.3A           Allowable Output Current Amage         0.to 100%,  | ditio  | · · ·        |                          |   |   |                                       |  |  |  |
| Inrush Current (max) (ma)         30A (Vm = 100V)/02A (Vm = 240V) (at cold start))           Lakage Current (max) (ma) (ma)         0.75mA           Output Voltage Variation         Rated Output voltage +10%,           Rated Output Current         6.0A         2.5A         1.3A           Allowable Output Current Amage         0.to 100%,  | ndr  |              |                          |   |   |                                       |  |  |  |
| Leakage Current (max) m         0.75mA           Rated Output Voltage         5V         12V         24V           Rated Output Voltage 210%         Rated Output Voltage 210%         Rated Output Voltage 210%           Rated Output Voltage Accuracy mode         0.0A         2.5A         1.3A           Comparison Voltage Accuracy mode         0.0V         30W         31.2W           Constant Voltage Accuracy mode         0.0D         2.3%         Common Voltage         200mV(p-p)           Output Holding Time (min)         0         200msc (vs. = 100V)         000msc (vs. = 100V)           Overvoltage Protection         Detection above 105% of rated current (dropping automatic recovery)         Overvoltage Protection         Detection above 105% of rated output cutoff)           Overvlating Protection         Detection above 105% of rated current (dropping automatic recovery)         Overvlating Protection         Operating Not provided           Remote OMOFF Control         Detection above 105% of rated current (dropping automatic recovery)         Overvlating Protection         Operating Not provided           Between the ange         -20 to 45°C         -20 to 45°C         -20 to 45°C           Operating Temperature Range         -20 to 45°C         -20 to 45°C         -20 to 45°C           Storage Humidity Range         -30 to 95% (no condenation)         -25 to   | -0   |              |                          |   |   |                                       |  |  |  |
| Rated Output Voltage         5V         12V         24V           Output Voltage Variation         Rated Output Current         6.0A         2.5A         1.3A           Allowable Output Current         6.0A         2.5A         1.3A           Allowable Output Current         8.0A         2.5A         1.3A           Allowable Output Current         8.0A         2.5A         1.3A           Allowable Output Current         30W         30W         31.2W           Constant Voltage Accuracy Common Forection         20mVp-p         20mVp-p         20mVp-p           Output Holding Time (min)         30W         20msec         33W         31.2W           Overroltage Protection         Detection above 105% of rated voltage (output cutoff)         0vervoltage (output cutoff)         0vervoltage (output cutoff)           Overroltage Protection         Not provided         Remote Sonsing         Not provided         Not provided           Operating Temperature Range         -10 to 460°C         Storage Temperature Range         -25 to 455°C         000000000000000000000000000000000000  |  |              |                          | 30A (   |   | starty                                |  |  |  |
| Output Voitage Variation         Rated output voitage ±10%           Allowable Output Current         6.0A         2.5A         1.3A           Allowable Output Current         6.0A         2.5A         1.3A           Allowable Output Current         8.0A         3.0W         30W         31.2W           Constant Voitage Accuracy TBION         3.3W         30W         31.2W         20mVp-p           Output Holding Time (min) TD         20msec         20mVp-p         20mVp-p         20mVp-p           Startup time Tortection         Detection above 105% of rated current (drooping automatic recovery)         0vercurrent Protection TD         Detection above 105% of rated current (drooping automatic recovery)           Overcurrent Protection         Detection above 105% of rated current (drooping automatic recovery)         0vercurrent (drooping automatic recovery)           Overcurrent Protection         Not provided         Remote Sensing         Not provided           Operating Temperature Range         -10 to 40°C         Storage Temperature Range         -25 to 485°C           Operating Temperature Range         -10 to 40°C         Storage Temperature Range         -26 to 485°C           Operating Temperature Range         -10 to 40°C         -27 to 485°C           Operating Humidity Range         30 to 90% (no condensation)         -0 to 561/2 <th></th> <th>-</th> <th>· · · —</th> <th></th> <th></th> <th>2.4.4</th>  |  | -            | · · · —                  |   |   | 2.4.4                                 |  |  |  |
| Ratied Output Current         6.0A         2.5A         1.3A           Ratied Output Current Range         0 to 100%         30W         30W         31.2W           Constant Voltage Accuracy 300  |  |              |                          | 5V  |   | 24V                                   |  |  |  |
| Normatic Output Current Range         0 to 100%         31.2W           Rated Output Power         30W         30W         31.2W           Constant Votage Accuracy 2010         .3%         20mVp-p         20mVp-p           Output Holding Time (min) 20         20msec         20mVp-p         20mVp-p           Startup time         20         B00msec (Viv = 100V)         20msec           Startup time         20         Detection above 105% of rated current (forcoging automatic recovery)         0vercurrent Protection         Detection above 105% of rated voltage (output cutoff)         0vercurrent Protection 20         Detection above 105% of rated voltage (output cutoff)         0vercurent Protection 20         Protection 20 <th></th> <th></th> <th>-</th> <th>6.04</th> <th></th> <th>1 34</th>  |  |              | -                        | 6.04  |   | 1 34                                  |  |  |  |
| National Voltage Accuracy 300         3000         3000         31.240           Output Holding Time (nin)         3000         120mVp-p         150mVp-p         200mVp-p           Output Holding Time (nin)         3000         200msec         3000         200msec           Startup time         300         Detection above 105% of rated output (dropping automatic recovery)         000000000000000000000000000000000000   | us   |              |                          | 0.0A  |   | 1.54                                  |  |  |  |
| Nipple Noise         Jacka         T20mpp         T20mmpp         T20mmpp <tht20mpp< th="">         &lt;</tht20mpp<>  | litio  |              | · · ·                    | 30W   |   | 31.2W                                 |  |  |  |
| Nipple Noise         Jacka         T20mpp         T20mmpp         T20mmpp <tht20mpp< th="">         &lt;</tht20mpp<>  | utp<br>onc   |              |                          |   |   |                                       |  |  |  |
| Startup time         Control         800msec (Vis = 100V)           Overcurrent Protection         Detection above 105% of rated current (drooping automatic recovery).           Overcurrent Protection         Detection above 105% of rated current (drooping automatic recovery).           Overheating Protection         Detection above 105% of rated current (drooping automatic recovery).           Overheating Protection         Detection above 105% of rated current (drooping automatic recovery).           Overheating Protection         Detection above 105% of rated current (drooping automatic recovery).           Porting Temperature Range         -0.0 to thoroided           Operating Temperature Range         -0.0 to 460°C           Operating Temperature Range         -0.0 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Storage Temperature Range         -0.0 to 90% (no condensation)           Vibration         Sweep time         Natural air cooling           Vibration         Sweep time         Natural air cooling           Vibration time         Operating Humidity Range         10 to 55Hz           Sweep time         Conduct this   | 00   | Ripple Nois  | SC Note 1 Note 4         | 120mVp-p  | 150mVp-p                                      | 200mVp-p                              |  |  |  |
| Overcurrent Protection         Detection above 105% of rated current (drooping automatic recovery)           Overvoltage Protection         Detection above 115% of rated voltage (output cutoff)           Overvoltage Protection         Not provided           Remote Sensing         Not provided           Operating Temperature Range         -10 to +60°C           Storage Temperature Range         -25 to +85°C           Operating Temperature Range         -30 to 90% (no condensation)           Storage Fumidity Range         30 to 90% (no condensation)           Storage Fumidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         No. of vibrations           Vibration tatic         Ny, Y, Z           Vibration tatic         Operating Humidity Range           Shock Resistance         Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Insulation           Reven input and output         300 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and output           Resistance  |  | Output Hol   | ding Time (min) 🔤        |   | 20msec  |                                       |  |  |  |
| Store         Difference         Detection above 115% of rated voltage (output cutoff)           Overheating Protection         Not provided           Overheating Protection         Not provided           Remote Sonsing         Not provided           Operating Temperature Range         -10 to +60° C           Storage Temperature Range         -25 to +85° C           Operating Temperature Range         -25 to +85° C           Operating Rumidity Range         30 to 90% (no condensation)           Storage Temperature Range         -25 to +85° C           Operating Rumidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           No. of vibrations         10 to 561/z           Wibration         Sweep time           Acceleration rate         19.6m/s² (2G)           Vibration time         One hour in each of three directions           Vibration direction         X, Y, Z           Vibration time         Conduct this test on an ack board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and dop it on the board. Drop 3 times for each of 4 sides.           Insulation         Between input and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         2000 V AC for 1 minute (leakage current: 15 m  |  | Startup tim  | e Note 1                 |   | 800msec (V <sub>IN</sub> = 100V)              |                                       |  |  |  |
| Operations Display         Not provided           Operating Temperature Range         -10 to +60°C           Storage Temperature Range         -22 to +85°C           Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         Sweep time           Acceleration rate         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19,6m/s² (2G)           Vibration direction         X, Y, Z           Vibration time         One hour in each of three directions           Shock Resistance         Conduct this test on an oak board with all surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conduct this test on an oak board with all surface auge current: 15 mA or less)           Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG           Insulation         Between input and FG           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           <  |  | Overcurren   | t Protection             | Detection above                                       | e 105% of rated current (drooping aut         | omatic recovery)                      |  |  |  |
| Operations Display         Not provided           Operating Temperature Range         -10 to +60°C           Storage Temperature Range         -22 to +85°C           Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         Sweep time           Acceleration rate         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19,6m/s² (2G)           Vibration direction         X, Y, Z           Vibration time         One hour in each of three directions           Shock Resistance         Conduct this test on an oak board with all surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conduct this test on an oak board with all surface auge current: 15 mA or less)           Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG           Insulation         Between input and FG           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           <  | ns   | -            |                          | Detection above 115% of rated voltage (output cutoff) |   |                                       |  |  |  |
| Operations Display         Not provided           Operating Temperature Range         -10 to +60°C           Storage Temperature Range         -22 to +85°C           Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         Sweep time           Acceleration rate         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19,6m/s² (2G)           Vibration direction         X, Y, Z           Vibration time         One hour in each of three directions           Shock Resistance         Conduct this test on an oak board with all surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conduct this test on an oak board with all surface auge current: 15 mA or less)           Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG           Insulation         Between input and FG           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           <  | tio  |              | •                        | Not provided  |   |                                       |  |  |  |
| Operations Display         Not provided           Operating Temperature Range         -10 to +60°C           Storage Temperature Range         -22 to +85°C           Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         Sweep time           Acceleration rate         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19,6m/s² (2G)           Vibration direction         X, Y, Z           Vibration time         One hour in each of three directions           Shock Resistance         Conduct this test on an oak board with all surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conduct this test on an oak board with all surface auge current: 15 mA or less)           Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG           Insulation         Between input and FG           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           <  | ddi  |              |                          |   |   |                                       |  |  |  |
| Operating Temperature Range         -10 to +60°C           Storage Temperature Range         -25 to +85°C           Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         Sweep time           Acceleration rate         19.6m/s² (2G)           Vibration direction         X, Y, Z           Vibration direction         Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of Installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Insulation<br>Weinstance         Etween output and FG           Storage Humidity Type         Connector           Output Type         Connector           Output Type         Connector           Getween output and FG   | ⋖⋢   |              | •                        | ·   |   |                                       |  |  |  |
| Storage Temperature Range         -25 to +85°C           Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         Sweep time           Sweep time         3 minutes           Acceleration rate         19.6m/s² (2G)           Vibration direction         X, Y, Z           Vibration direction         X, Y, Z           Vibration direction         X, Y, Z           Vibration direction         Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         133 <sup>W</sup> × 55 <sup>D</sup> × 27 <sup>H</sup> mm           Vibration         Between output and FG           Between output and FG         133 <sup>W</sup> × 55 <sup>D</sup> × 27 <sup>H</sup> mm           Weight         133 <sup>W</sup> × 55 <sup>D</sup> × 27 <sup>H</sup> mm <th></th> <th>Operations</th> <th>Display</th> <th colspan="5">Not provided</th>  |  | Operations   | Display                  | Not provided  |   |                                       |  |  |  |
| Operating Humidity Range         30 to 90% (no condensation)           Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           Vibration         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19.6m/s² (2G)           Vibration         Keep time           Acceleration rate         98m/s² (10G)           Shock Resistance         Conduct this test on ack board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conditions         Derating may be required due to mounting direction           Withstand         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Betwee  |  | <b>_</b>     | <u> </u>                 |   |   |                                       |  |  |  |
| Storage Humidity Range         30 to 90% (no condensation)           Cooling Requirements         Natural air cooling           No. of vibrations         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19.6m/s² (2G)           Vibration direction         X,Y,Z           Vibration time         0 to board with a flat sufface and a thickness of 10 mm or more.<br>Lift one side of installation sufface of the unit 50 mm and dropt to an the board with a flat sufface and a thickness of 10 mm or more.<br>Lift one side of installation sufface of the unit 50 mm and dropt to an the board. Drop 3 times for each of 4 sides.           Installation         Conduct this test on an oak board with a flat sufface and a thickness of 10 mm or more.<br>Lift one side of installation sufface of the unit 50 mm and dropt to an the board. Drop 3 times for each of 4 sides.           Installation         Conduct this test on an oak board with a flat sufface acturent: 15 mA or less)           Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         100 MΩ  |  |              |                          |   |   |                                       |  |  |  |
| Cooling Re-uirements         Natural air cooling           Vibration<br>Resistance         No. of vibrations         10 to 55Hz           Sweep time<br>Acceleration rate         3 minutes           Acceleration rate         19.Gm/s² (2G)           Vibration direction         X, Y, Z           Vibration time         One hour in each of three directions           Shock Resistance         98m/s² (10G)           Installation Conditions         Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conditions         Derating may be required due to mounting direction           Withstand<br>Voltage         Between input and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         200 N ΩΩ (measured with 500 V DC Megger)           Between input and FG         100 MΩ (measured wit  |  |              |                          |   |   |                                       |  |  |  |
| No. of vibrations         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19.6m/s² (2G)           Vibration         Conduction           Resistance         Vibration direction           Vibration direction         X, Y, Z           Vibration conditions         One hour in each of three directions           Shock Resistance         Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conditions         Derating may be required due to mounting direction           Withstand<br>Voltage         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and output         100 MΩ (measured with 500 V DC Megger)           Between input and FG         100 MΩ (measured with 500 V DC Megger)           External Appearance         Single printed circuit board           Input Type         Connector           Output Type         Connector           Output Type         Connector           Safety Standards         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control La  |  |              |                          |   |   |                                       |  |  |  |
| Provide of the connectors         Since New Participation time         Other Hold Infection of time of one choice of the sections           Shock Resistance         Shock Resistance         Since New Participation of the board. Drop 3 times for each of 4 sides.<br>Installation Conditions         Derating may be required due to mounting direction           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction           Withstand Voltage         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and output         Between input and output         100 MΩ (measured with 500 V DC Megger)           Insulation Resistance         Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         Connector         Connector           Input Type         Connector         Connector           Output Type         Connector         Connector           Safety Standards         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law Conducted Emission           Besignated to meet FCC Class B  | Ital   | Cooling Ke   |                          |   |   |                                       |  |  |  |
| Provide of the connectors         Since New Participation time         Other Hold Infection of time of one choice of the sections           Shock Resistance         Shock Resistance         Since New Participation of the board. Drop 3 times for each of 4 sides.<br>Installation Conditions         Derating may be required due to mounting direction           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction           Withstand Voltage         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and output         Between input and output         100 MΩ (measured with 500 V DC Megger)           Insulation Resistance         Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         Connector         Connector           Input Type         Connector         Connector           Output Type         Connector         Connector           Safety Standards         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law Conducted Emission           Besignated to meet FCC Class B  | mel  |              |                          |   |   |                                       |  |  |  |
| Provide of the connectors         Since New Participation time         Other Hold Infection of time of one choice of the sections           Shock Resistance         Shock Resistance         Since New Participation of the board. Drop 3 times for each of 4 sides.<br>Installation Conditions         Derating may be required due to mounting direction           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction           Withstand Voltage         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and output         Between input and output         100 MΩ (measured with 500 V DC Megger)           Insulation Resistance         Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         Connector         Connector           Input Type         Connector         Connector           Output Type         Connector         Connector           Safety Standards         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law Conducted Emission           Besignated to meet FCC Class B  | itic   |              | Acceleration rate        |   |   |                                       |  |  |  |
| Provide of the connectors         Since New Participation time         Other Hold Infection of time of one choice of the sections           Shock Resistance         Shock Resistance         Since New Participation of the board. Drop 3 times for each of 4 sides.<br>Installation Conditions         Derating may be required due to mounting direction           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction         Installation of the board. Drop 3 times for each of 4 sides.           Installation Conditions         Derating may be required due to mounting direction           Withstand Voltage         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and output         Between input and output         100 MΩ (measured with 500 V DC Megger)           Insulation Resistance         Between input and FG         100 MΩ (measured with 500 V DC Megger)           Between input and FG         Connector         Connector           Input Type         Connector         Connector           Output Type         Connector         Connector           Safety Standards         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law Conducted Emission           Besignated to meet FCC Class B  | nvii<br>onc  | Resistance   | Vibration direction      |   |   |                                       |  |  |  |
| Shock Resistance         Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.           Installation         Conditions         Derating may be required due to mounting direction           Insulation         Between input and output         3000 V AC for 1 minute (leakage current: 15 mA or less)           Between input and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Insulation         Between input and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         100 MΩ (measured with 500 V DC Megger)           Between output and FG         Connector           Output Type         Connector           Output Type         Connector           Output Type         Connector           Safety Standards         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law           Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC)           Set         Remote ON/OFF Control         Not   | шО   |              | Vibration time           |   |   |                                       |  |  |  |
| Insulation Withstand Voltage       Between input and output       3000 V AC for 1 minute (leakage current: 15 mA or less)         Between input and FG       2000 V AC for 1 minute (leakage current: 15 mA or less)         Between output and FG       500 V AC for 1 minute (leakage current: 15 mA or less)         Insulation Resistance       Between input and output         Between output and FG       500 V AC for 1 minute (leakage current: 15 mA or less)         Between input and output       Between input and output         Between input and output       Between input and output         Between input and FG       500 V AC for 1 minute (leakage current: 15 mA or less)         Between input and output       Between input and output         Between output and FG       100 MΩ (measured with 500 V DC Megger)         Between output and FG       100 MΩ (measured with 500 V DC Megger)         Between output and FG       Connector         Output Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law         Conducted Emission       Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Re   |  | Shock Resi   | istance                  |   | n oak board with a flat surface and a thickne |                                       |  |  |  |
| Withstand<br>Voltage       Between input and FG       2000 V AC for 1 minute (leakage current: 15 mA or less)         Between output and FG       500 V AC for 1 minute (leakage current: 15 mA or less)         Insulation<br>Resistance       Between input and output<br>Between output and FG       100 MΩ (measured with 500 V DC Megger)         External Appearance       100 MΩ (measured with 500 V DC Megger)         Input Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law<br>Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Remote ON/OFF Control       Not provided   |  | Installation | Conditions               | Deratin   | ng may be required due to mounting d          | lirection                             |  |  |  |
| Withstand<br>Voltage         Between input and FG         2000 V AC for 1 minute (leakage current: 15 mA or less)           Between output and FG         500 V AC for 1 minute (leakage current: 15 mA or less)           Insulation<br>Resistance         Between input and output<br>Between output and FG<br>Between output and FG           Fexternal Appearance         100 MΩ (measured with 500 V DC Megger)           Input Type         Connector           Output Type         Connector           External Dimensions         133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm           Weight         UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law<br>Conducted Emission           Onducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC           Remote ON/OFF Control         Not provided  | E Contraction de la contractio | Insulation   | Between input and output | 3000 V A  | C for 1 minute (leakage current: 15 m         | nA or less)                           |  |  |  |
| Between output and FG         Between output and FG         External Appearance       Single printed circuit board         Input Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law         Conducted Emission       Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Remote ON/OFF Control       Not provided   |  |              | Between input and FG     | 2000 V A  | C for 1 minute (leakage current: 15 m         | nA or less)                           |  |  |  |
| Between output and FG         Between output and FG         External Appearance       Single printed circuit board         Input Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law         Conducted Emission       Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Remote ON/OFF Control       Not provided   | ion  | Voltage      | Between output and FG    | 500 V AC  | C for 1 minute (leakage current: 15 m         | A or less)                            |  |  |  |
| Between output and FG         Between output and FG         External Appearance       Single printed circuit board         Input Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law         Conducted Emission       Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Remote ON/OFF Control       Not provided   | nlat   | Insulation   |                          | -   |   |                                       |  |  |  |
| External Appearance       Single printed circuit board         Input Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law         Conducted Emission       Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Signate ON/OFF Control       Not provided  | Insi   |              | •                        | ,   | ) M $\Omega$ (measured with 500 V DC Megg     | ger)                                  |  |  |  |
| Input Type       Connector         Output Type       Connector         External Dimensions       133 <sup>W</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm         Weight       170g         Safety Standards       UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law         Conducted Emission       Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC         Set       Remote ON/OFF Control       Not provided  |  |              | Between output and FG    |   |   |                                       |  |  |  |
| Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC           Remote ON/OFF Control         Not provided   | e/   |              | opearance                |   |   |                                       |  |  |  |
| Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC           Remote ON/OFF Control         Not provided   | ctur   |              | _                        |   |   |                                       |  |  |  |
| Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC           Remote ON/OFF Control         Not provided   | Stru   |              |                          |   |   |                                       |  |  |  |
| Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC           Remote ON/OFF Control         Not provided   | ards   |              | mensions                 |   |   |                                       |  |  |  |
| Conducted Emission         Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V AC           Remote ON/OFF Control         Not provided   | tern<br>and  |              | dards                    | UI 1950 CSA No 950 and TÜV (EN                        |   | al Appliance and Material Control Law |  |  |  |
| Remote ON/OFF Control         Not provided  | δ û  |              |                          |   |   |                                       |  |  |  |
|   | su   |              |                          |   |   |                                       |  |  |  |
|   | Optio  |              |                          |   |   |                                       |  |  |  |
| www.specified under rated input/output conditions at an ambient temperature of 25°C.  |  |              | ated input/output cond   | itions at an ambient temperature                      | · · · ·                                       |                                       |  |  |  |

More current above noted values may flow at restart (power thermistor used).

Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.
 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output voltage can be changed within the maximum output power and rated output current.

The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to  $60^\circ C$ .

(1007) Reset is performed by reapplying input voltage. (1007) Insulation conditions are specified at normal temperature and humidity.

# **CWA** Series

15W,30W,50W,75W,100W,150W

| Model       50W         CWA050-05       CWA050-12       CWA050-24         Rated Input Voltage       AC100V to AC240V       Allowable Input Voltage Range         Allowable Input Voltage Range       AC85 to 264V       1.2A (VIN = 100V)         Rated Frequency       50/60Hz       47 to 440Hz         Allowable Frequency Range       47 to 440Hz       83%   |   |  |  |  |
|---|---|--|--|--|
| CWA050-05     CWA050-12     CWA050-24       Rated Input Voltage     AC100V to AC240V       Allowable Input Voltage Range     AC85 to 264V   |   |  |  |  |
| Allowable Input Voltage Range AC85 to 264V  |   |  |  |  |
|   |   |  |  |  |
| Input Current (typ)         1.2A (ViN = 100V)           Rated Frequency         50/60Hz           Allowable Frequency Range         440Hz   | -   |  |  |  |
| Rated Frequency     50/60Hz       Allowable Frequency Range     47 to 440Hz   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |
| Inrush Current (max) 1002 30A (VIN = 100V) /60A (VIN = 240V) (at cold start)  |   |  |  |  |
| Leakage Current (max)         0.75mA  |   |  |  |  |
| Rated Output Voltage         5V         12V         24V   |   |  |  |  |
| Output Voltage Variation         Rated output voltage ±10%  |   |  |  |  |
|   |   |  |  |  |
| Kated Output Current Range     10.0A     4.0A     2.1A       Allowable Output Current Range     0 to 100%     10.0A     10.0A   |   |  |  |  |
|   |   |  |  |  |
| Rated Output Power     50W     51.6W     50.4W       Constant Voltage Accuracy [303] [305]     ±3%  |   |  |  |  |
| O O         Ripple Noise         Image: March 120mVp-p         150mVp-p         200mVp-p  |   |  |  |  |
| Output Holding Time (min) Keet 20msec   |   |  |  |  |
| Startup time         Non1         700msec (VIN = 100V)  |   |  |  |  |
| Overcurrent Protection Detection above approx. 105% of rated current (drooping automatic recovery)  |   |  |  |  |
|   |   |  |  |  |
| Overvoltage Protection         Overvoltage Protection           Overvoltage Protection         Detection above 115% of rated voltage (output cutoff)           Overheating Protection         Not provided           Remote ON/OFF Control         Not provided           Remote Sensing         Not provided   |   |  |  |  |
| Remote ON/OFF Control Not provided  |   |  |  |  |
| Remote Sensing Not provided   | Not provided                                |  |  |  |
| Operations Display Not provided   |   |  |  |  |
|   |   |  |  |  |
|   | -10 to +60°C                                |  |  |  |
| Storage Temperature Range -25 to +85°C  | -25 to +85°C<br>30 to 90% (no condensation) |  |  |  |
|   |   |  |  |  |
| Storage Humidity Range         30 to 90% (no condensation)           Gooling Requirements         Natural air cooling   | Natural air cooling                         |  |  |  |
|   | 10 to 55Hz                                  |  |  |  |
| Sweep time 3 minutes  |   |  |  |  |
| Vibration Acceleration rate 19.6m/s <sup>2</sup> (2G)   |   |  |  |  |
| Resistance Vibration direction X, Y, Z  |   |  |  |  |
| Vibration time One hour in each of three directions   |   |  |  |  |
| 98m/s² (10G)  |   |  |  |  |
| Shock Resistance Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.  |   |  |  |  |
| Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 s  | des.  |  |  |  |
| Installation Conditions         Derating may be required due to mounting direction. See page 71.  |   |  |  |  |
| Insulation Between input and output 3000 V AC for 1 minute (leakage current: 15 mA or less)   |   |  |  |  |
| Withstand<br>Voltage     Between input and Guput     Construction       Insulation<br>Resistance     Between input and FG     2000 V AC for 1 minute (leakage current: 15 mA or less)       Between input and FG     500 V AC for 1 minute (leakage current: 15 mA or less)       Insulation<br>Resistance     Between input and FG       100 MΩ (measured with 500 V DC Megger)  |   |  |  |  |
| Figure 1         Detween number and FG         500 V AC for 1 minute (leakage current: 15 mA or less)   |   |  |  |  |
| Between input and output  |   |  |  |  |
| Insulation Between input and FG 100 MΩ (measured with 500 V DC Megger)  |   |  |  |  |
| Resistance Between nutration FG   |   |  |  |  |
| External Appearance Single printed circuit board  |   |  |  |  |
| External Appearance         Single printed circuit board           Input Type         Connector   |   |  |  |  |
| Output Type         Connector   |   |  |  |  |
| Input Type     Connector       Output Type     Connector       External Dimensions     195 <sup>w</sup> x 55 <sup>D</sup> x 27 <sup>H</sup> mm       Weight     170g       Safety Standards     UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Content of the provide of |   |  |  |  |
| Weight 170g   |   |  |  |  |
| Safety Standards UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Col   | trol Law                                    |  |  |  |
| Conducted Emission Designated to meet FCC Class B (120 V), CISPR22 Class B (230 V AC) and VCCI Class B (100 V).   |   |  |  |  |
|   |   |  |  |  |
| Remote ON/OFF Control Not provided  |   |  |  |  |
| B     Cover     Not provided  |   |  |  |  |

Specified under rated input/output conditions at an ambient temperature of 25°C.

More current above noted values may flow at restart (power thermistor used).

Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output voltage can be changed within the maximum output power and rated output current.

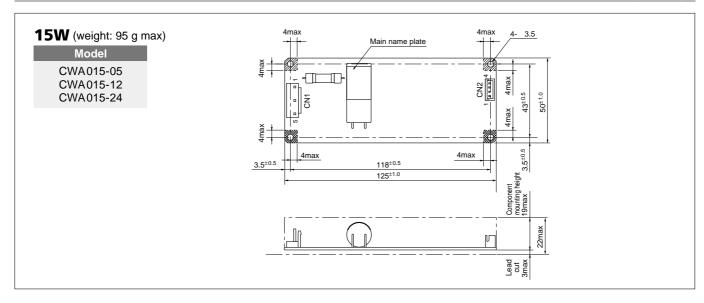
the constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.

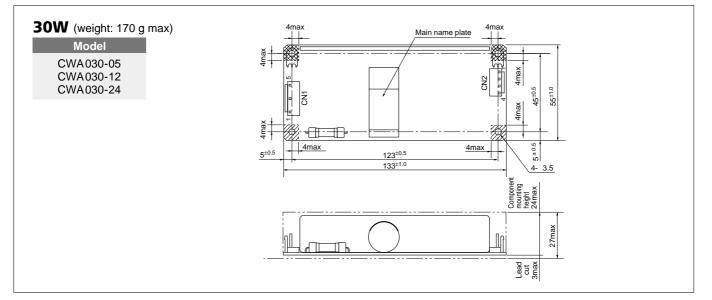
Reset is performed by reapplying input voltage. Insulation conditions are specified at normal temperature and humidity.

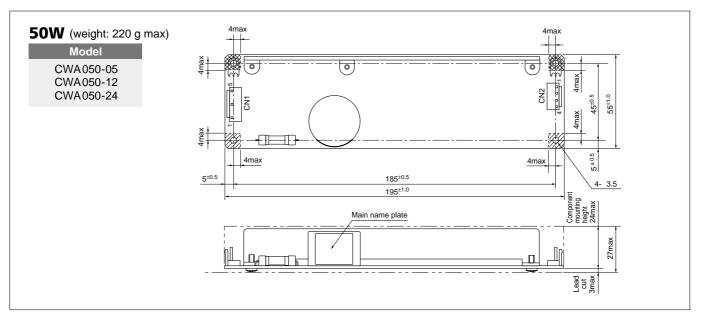
## **CWA** Series 15W,30W,50W,75W,100W,150W

#### **External Dimensions**

(unit: mm)







# **CWA** Series

15W,30W,50W,75W,100W,150W

#### **Specifications and Standards**

|                                  | Specifications and Standards                             |                            |   |                             |  |
|----------------------------------|--|----------------------------|---|-----------------------------|--|
|                                  |  |                            | 75  | N/                          |  |
|                                  | Ma   | del                        | /5  | VV                          |  |
|                                  |  |                            | CWA075-12   | CWA075-24                   |  |
|                                  |  |                            |   |                             |  |
|                                  | Rated Input  |                            | AC100V to   |                             |  |
|                                  |  | nput Voltage Range         | AC85 to   |                             |  |
| suo                              | Input Curre  |                            | 1.1A (Vin   | ,                           |  |
| di i                             | Rated Freq   |                            | 50/6  |                             |  |
| du                               | Power Fact   | Frequency Range            | 47 to (<br>0.99A (V <sub>IN</sub> = 100V)/  |                             |  |
| -0                               | Efficiency (   |                            | 0.99A (VIN = 100V)/<br>80%  | 82%                         |  |
|                                  |  | rent (max) Mee             | 30A (V <sub>IN</sub> = 100V)/60A (V   |                             |  |
|                                  |  | urrent (max) Not           | 0.75mA  |                             |  |
|                                  |  | · / _                      |   |                             |  |
| _                                | Rated Outp   |                            | 12V   | 24V                         |  |
| Note 3                           | Output Voltage Variation<br>Rated Output Current         |                            | Rated output v  | 0                           |  |
| S                                | · · · ·  | Peak Current               | 6.3A  | 3.2A                        |  |
| itio                             |  |                            | 8.1 A (10 sec)<br>0 to 1  | 4.1 A (10 sec)              |  |
| Output<br>Conditi                | Rated Outp   | Output Current Range       | 75.6W   | 76.8W                       |  |
| ဝိပိ                             |  | Itage Accuracy Notes Notes | +3.0W   |                             |  |
|                                  | Ripple Nois  |                            | 150mVp-p  | 200mVp-p                    |  |
|                                  |  | ding Time (min)            | 20m   |                             |  |
|                                  | Startup tim  |                            | 1500msec (  |                             |  |
|                                  |  | t Protection               |   |                             |  |
|                                  |  | e Protection               | Detection above approx. 105% of peak  |                             |  |
| ons                              |  | g Protection               | Detection above 115% of rated voltage (output cutoff)<br>Not provided                                       |                             |  |
| Additional<br>Functions          |  | I/OFF Control              | Not provided  |                             |  |
|                                  | Remote Sensing   |                            | Not provided  |                             |  |
|                                  | Operations Display                                       |                            | Not provided  |                             |  |
|                                  |  |                            |   |                             |  |
|                                  | Operating Temperature Range<br>Storage Temperature Range |                            | -10 to +60°C<br>-25 to +85°C  |                             |  |
|                                  | -  | Humidity Range             | -25 to -<br>30 to 90% (no   |                             |  |
|                                  |  | midity Range               | 30 to 90% (no   | ,                           |  |
| _                                |  | quirements                 | Natural ai  |                             |  |
| Environmental<br>Conditions      |  | No. of vibrations          | 10 to 55Hz  |                             |  |
| me                               |  | Sweep time                 | 3 minutes   |                             |  |
| liti                             | Vibration<br>Resistance                                  | Acceleration rate          | 19.6m/s <sup>2</sup> (2G)   |                             |  |
| nvi                              | Resistance   | Vibration direction        | Х, Ү  | , Z                         |  |
| шо                               |  | Vibration time             | One hour in each o  | of three directions         |  |
|                                  |  |                            | 98m/s² (10G)  |                             |  |
|                                  | Shock Resi   | istance                    | Conduct this test on an oak board with a flat s   |                             |  |
|                                  | Installatio  | Condition -                | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each     |                             |  |
|                                  | Installation   | Conditions                 | Derating may be required  | uue to mounting airection   |  |
| 8                                | Insulation   | Between input and output   | 3000 V AC for 1 minute (leak  | ,                           |  |
| Note 8                           | Withstand  | Between input and FG       | 2000 V AC for 1 minute (leak  |                             |  |
| tio                              | Voltage  | Between output and FG      | 500 V AC for 1 minute (leaka  | age current: 15 mA or less) |  |
| Insulation                       | Insulation   | Between input and output   |   |                             |  |
| lns                              | Resistance   | Between input and FG       | 100 MΩ (measured wit  | in 500 V DC Megger)         |  |
|                                  |  | Between output and FG      |   |                             |  |
|                                  | External Ap  | opearance                  | Single printed  | circuit board               |  |
| External Structure/<br>Standards | Input Type   |                            | Conne   |                             |  |
| Lici                             | Output Typ   |                            | Conne   |                             |  |
| al St<br>ds                      | External Di  | mensions                   | 222 <sup>w</sup> x 55 <sup>D</sup>  |                             |  |
| erna                             | Weight   | darda                      | 330   | 5                           |  |
| Exte                             | Safety Stan  |                            | UL1950, CSA No. 950, and TÜV (EN60950) certified, design<br>Designated to meet FCC Class B (120 V), CISPR22 |                             |  |
|                                  | Conducted<br>Harmonic C                                  |                            | Designated to meet FCC Class B (120 V), CISPR22<br>Designated to meet IEC6100                               |                             |  |
| (0)                              |  |                            |   |                             |  |
| tions                            |  | I/OFF Control              | Not pro   |                             |  |
| ð                                | Cover  |                            | Not pro   | ovided                      |  |
|                                  |  |                            |   |                             |  |

Specified under rated input/output conditions at an ambient temperature of 25°C.

More current above noted values may flow at restart (power thermistor used).

Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor connected to that point.

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output voltage can be changed within the maximum output power and rated output current.

the constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.

Reset is performed by reapplying input voltage. Insulation conditions are specified at normal temperature and humidity.

15W,30W,50W,75W,100W,150W

**CWA** Series

| Shocitications | and Standards |
|----------------|---------------|
| Specifications | anu stanuarus |

|                                  | Specifications and Standards |                             |  |  |  |
|----------------------------------|------------------------------|-----------------------------|--|--|--|
|                                  | 84-                          | 4-1                         | 100  | W  |  |
|                                  | Мо                           | del                         | CWA100-12  | CWA100-24  |  |
|                                  | Rated Input                  | Voltage                     | AC100V to  | AC240V   |  |
|                                  | · ·                          | nput Voltage Range          | AC1007 10  |  |  |
| Š                                | Input Curre                  | <u> </u>                    | 1.4A (V <sub>IN</sub> =  |  |  |
| Input<br>Conditions              | Rated Freq                   |                             | 50/60  |  |  |
| git                              | ·                            | Frequency Range             | 47 to 6  |  |  |
| Input<br>Condi                   | Power Fact                   |                             | 0.99A (V <sub>IN</sub> = 100V)/0   |  |  |
|                                  | Efficiency (                 |                             | 81%  | 84%  |  |
|                                  |                              | rent (max) Note 2           | 30A (VIN = 100V)/60A (VIN  |  |  |
|                                  |                              | urrent (max) Me             | 0.75n  |  |  |
|                                  |                              |                             |  |  |  |
| _                                | Rated Outp                   | -                           | 12V  | 24V  |  |
| Note 3                           | <u> </u>                     | age Variation               | Rated output ve  |  |  |
| S                                | Rated Outp                   |                             | 8.5A   | 4.3A   |  |
| tio                              |                              | Peak Current                | 11.0 A (10 sec)  | 5.5 A (10 sec)   |  |
| ndi<br>ndi                       |                              | utput Current Range         | 0 to 10  |  |  |
| Output<br>Conditions 1000        | Rated Outp                   |                             | 102W   | 103.2W   |  |
|                                  |                              | tage Accuracy Note 5 Note 6 | ±39  |  |  |
|                                  | Ripple Nois                  |                             | 150mVp-p   | 200mVp-p   |  |
|                                  |                              | ding Time (min)             | 20ms   |  |  |
|                                  | Startup time                 | C Note 1                    | 1500msec (V  | IN = 100V)   |  |
|                                  | Overcurren                   | t Protection                | Detection above approx. 105% of peak   | current (drooping automatic recovery)                      |  |
| ns<br>ns                         |                              | e Protection Note 7         | Detection above 115% of rat  | ted voltage (output cutoff)                                |  |
| tio                              |                              | g Protection                | Not provided   |  |  |
| Additional<br>Functions          |                              | /OFF Control                | Not provided   |  |  |
|                                  | Remote Sensing               |                             | Not provided   |  |  |
|                                  | Operations                   | Display                     | Not provided   |  |  |
|                                  | Operating Temperature Range  |                             | -10 to +   | 60°C   |  |
|                                  | Storage Ten                  | nperature Range             | -25 to +   | 85°C   |  |
|                                  | Operating H                  | lumidity Range              | 30 to 90% (no o  | condensation)  |  |
|                                  | Storage Hu                   | midity Range                | 30 to 90% (no c  | condensation)  |  |
| _                                | Cooling Re                   | quirements                  | Natural air  | cooling  |  |
| s at                             |                              | No. of vibrations           | 10 to 5  | 5Hz  |  |
| й<br>й                           | Vibration                    | Sweep time                  | 3 minutes  |  |  |
| li i i                           | Resistance                   | Acceleration rate           | 19.6m/s  | s²(2G)   |  |
| Environmental<br>Conditions      |                              | Vibration direction         | X, Y,  | Z  |  |
|                                  |                              | Vibration time              | One hour in each of three directions   |  |  |
|                                  |                              |                             | 98m/s² (10G)   |  |  |
|                                  | Shock Resi                   | stance                      | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |  |  |
|                                  |                              | O a malifi a ma             |  |  |  |
|                                  | Installation                 | Conditions                  | Derating may be required due to m  | ounting direction. See page 71.                            |  |
|                                  | Insulation                   | Between input and output    | 3000 V AC for 1 minute (leaka  | age current: 15 mA or less)                                |  |
| Note 8                           | Withstand                    | Between input and FG        | 2000 V AC for 1 minute (leaka  |  |  |
| ion                              | Voltage                      | Between output and FG       | 500 V AC for 1 minute (leaka   | ge current: 15 mA or less)                                 |  |
| Insulation                       | Insulation                   | Between input and output    |  |  |  |
| nsu                              | Resistance                   | Between input and FG        | 100 M $\Omega$ (measured with  | n 500 V DC Megger)   |  |
|                                  |                              | Between output and FG       |  |  |  |
|                                  | External Ap                  | pearance                    | Single printed of  | circuit board  |  |
| lre/                             | Input Type                   |                             | Conne  | ctor   |  |
| External Structure/<br>Standards | Output Typ                   | e                           | Conne  |  |  |
| Stri<br>Stri                     | External Di                  | mensions                    | 222 <sup>W</sup> x 62 <sup>D</sup> >   | k 37 <sup>H</sup> mm                                       |  |
| nal<br>Jaro                      | Weight                       |                             | 4000   | g  |  |
| xter<br>tand                     | Safety Stan                  | dards                       | UL1950, CSA No. 950, and TÜV (EN60950) certified, designation  | ated to meet Electrical Appliance and Material Control Law |  |
| шŏ                               | Conducted                    | Emission                    | Designated to meet FCC Class B (120 V), CISPR22 (  | Class B (230 V AC) and VCCI Class B (100 V AC)             |  |
|                                  | Harmonic C                   | Current                     | Designated to meet IEC6100   | 0-3-2 (active filter method)                               |  |
| suc                              | Remote ON                    | /OFF Control                | Not prov   | vided  |  |
| Optic                            | Cover                        |                             | Not prov   |  |  |
|                                  |                              |                             | tions at an ambient temperature of 25°C  |  |  |

Specified under rated input/output conditions at an ambient temperature of 25°C.

Note2 More current above noted values may flow at restart (power thermistor used).

Output characteristics such as ripple noise and constant voltage accuracy are measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.
 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Nors Output voltage can be changed within the maximum output power and rated output current.

The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.

Note 7 Reset is performed by reapplying input voltage.

Note B Insulation conditions are specified at normal temperature and humidity.

## **CWA** Series

15W,30W,50W,75W,100W,150W

|                                  |                           |  | Specifications and Standards                                |                                       |  |
|----------------------------------|---------------------------|--|---|---------------------------------------|--|
|                                  | 84-                       |  | 150   | W                                     |  |
|                                  | INIC                      | odel                                   | CWA150-12   | CWA150-24                             |  |
|                                  | Rated Input Voltage       |  | AC100V to   | 0 AC240V                              |  |
|                                  |                           | nput Voltage Range                     | AC85 to   |                                       |  |
| su                               | Input Curre               | ent (typ) Note1                        | 2.0A (VIN   | = 100V)                               |  |
| litio                            | Rated Freq                | -                                      | 50/6  |                                       |  |
| Input<br>Conditions              |                           | Frequency Range                        | 47 to   |                                       |  |
| <del>ت</del> = ت                 | Power Fact                |  | 0.99A (V <sub>IN</sub> = 100V)/                             |                                       |  |
|                                  | Efficiency (              |  | 80%   | 82%                                   |  |
|                                  |                           | rent (max) Note2<br>urrent (max) Note1 | 30A (VIN = 100V)/60A (V<br>0.75                             |                                       |  |
|                                  |                           |  |   |                                       |  |
|                                  | Rated Outp                |  | 12V   | 24V                                   |  |
| Note 3                           |                           | tage Variation                         | Rated output  |                                       |  |
| su                               | Rated Outp                |  | 12.5A   | 6.3A                                  |  |
| itio                             |                           | Peak Current<br>Output Current Range   | 16.2 A (10 sec)<br>0 to 1                                   | 8.1 A (10 sec)                        |  |
| Output<br>Condit                 | Rated Outp                |  | 150W  | 151.2W                                |  |
| ဝီပိ                             |                           | Itage Accuracy Note 5 Note 6           | ±3  |                                       |  |
|                                  | Ripple Nois               |  | 150mVp-p  | 200mVp-p                              |  |
|                                  |                           | ding Time (min) Note1                  | 20m   |                                       |  |
|                                  | Startup tim               | e Note 1                               | 1500msec (  | V <sub>IN</sub> = 100V)               |  |
|                                  | Overcurren                | t Protection                           | Detection above approx. 105% of peak                        | current (drooping automatic recovery) |  |
| s al                             | Overvoltag                | e Protection Note 7                    | Detection above 115% of rated voltage (output cutoff)       |                                       |  |
| ion                              | Overheatin                | g Protection                           | Not provided  |                                       |  |
| Additional<br>Functions          | Remote ON/OFF Control     |  | Not provided  |                                       |  |
| Ρu                               | Remote Sensing            |  | Not pro   | ovided                                |  |
|                                  | Operations                | Display                                | Not provided  |                                       |  |
|                                  | Operating Te              | emperature Range                       | -10 to -  | +60°C                                 |  |
|                                  | Storage Ter               | nperature Range                        | -25 to +85°C  |                                       |  |
|                                  | Operating Humidity Range  |  | 30 to 90% (no   | condensation)                         |  |
|                                  |                           | midity Range                           | -   | condensation)                         |  |
| Environmental<br>Conditions      | Cooling Re                |  | Natural a   | -                                     |  |
| nen<br>ns                        |                           | No. of vibrations<br>Sweep time        | 10 to 55Hz<br>3 minutes                                     |                                       |  |
| itio                             | Vibration                 | Acceleration rate                      |   | /s² (2G)                              |  |
| vir                              | Resistance                | Vibration direction                    | X, Y  |                                       |  |
| шй                               |                           | Vibration time                         | One hour in each  |                                       |  |
|                                  |                           |  | 98m/s   | ² (10G)                               |  |
|                                  | Shock Resi                | istance                                | Conduct this test on an oak board with a flat               |                                       |  |
|                                  | -                         |  | Lift one side of installation surface of the unit 50 mm and |                                       |  |
|                                  | Installation              | Conditions                             | Derating may be required due to r                           | nounting direction. See page 71.      |  |
|                                  | Insulation                | Between input and output               | 3000 V AC for 1 minute (leal                                |                                       |  |
| Note 8                           | Withstand                 | Between input and FG                   | 2000 V AC for 1 minute (leal                                | ,                                     |  |
| Insulation                       | Voltage                   | Between output and FG                  | 500 V AC for 1 minute (leak                                 | age current: 15 mA or less)           |  |
| ula                              | Insulation                | Between input and output               |   |                                       |  |
| lus                              | Resistance                |  | 100 MΩ (measured wi   | th 500 V DC Megger)                   |  |
|                                  | _                         | Between output and FG                  |   |                                       |  |
| -                                | External Ap               | opearance                              | Single printed  |                                       |  |
| External Structure/<br>Standards | Input Type                | •                                      | Conn  |                                       |  |
| truc                             | Output Typ<br>External Di |  | Conn<br>222 <sup>w</sup> x 75 <sup>D</sup>                  |                                       |  |
| al S<br>ards                     | Weight                    |  | 540   |                                       |  |
| tern<br>anda                     | Safety Stan               | Idards                                 | UL1950, CSA No. 950, and TÜV (EN60950) certified, desigr    |                                       |  |
| St E                             | Conducted                 |  | Designated to meet FCC Class B (120 V), CISPR22             |                                       |  |
|                                  | Harmonic C                | Current                                | Designated to meet IEC610                                   |                                       |  |
| suo                              | Remote ON                 | I/OFF Control                          | Not pro   | ovided                                |  |
| Optio                            | Cover                     |  | Not pro   |                                       |  |
|                                  |                           |  |   |                                       |  |

Specified under rated input/output conditions at an ambient temperature of 25°C.

More current above noted values may flow at restart (power thermistor used).

V 47-μF electrolytic capacitor connected to that point.

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Output voltage can be changed within the maximum output power and rated output current.

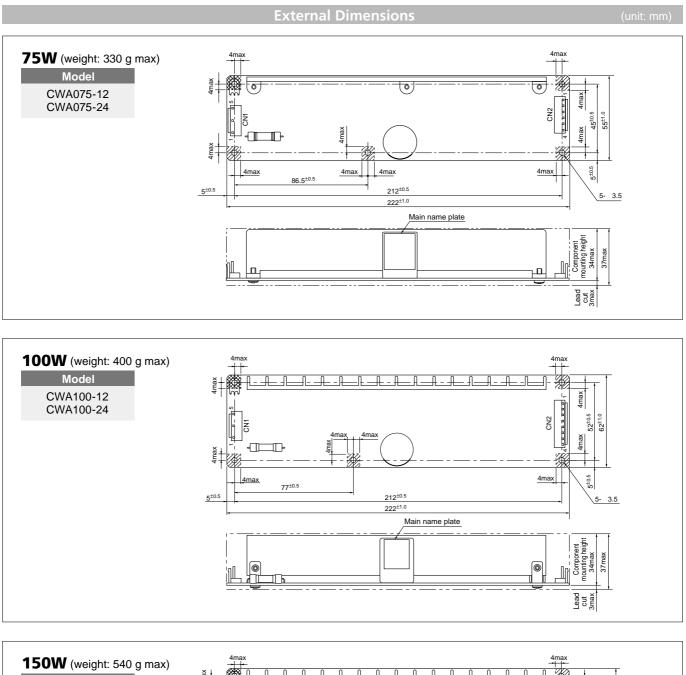
The constant voltage accuracy is measured with a static input range of 85 to 246 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C.

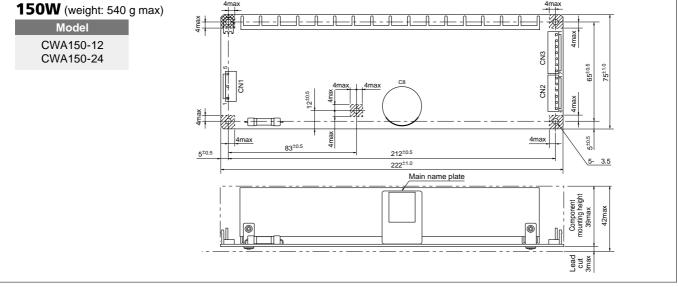
Note7 Reset is performed by reapplying input voltage.

NoteB Insulation conditions are specified at normal temperature and humidity.

# **CWA** Series

15W,30W,50W,75W,100W,150W





## **CWA** Series 15W,30W,50W,75W,100W,150W

## **Operating Instruction**

## Terminal connection

#### CWA015 series

|     | Pin No.      | Connector        | Corresponding<br>connector | Corresponding<br>contact |
|-----|--------------|------------------|----------------------------|--------------------------|
|     | 1 : AC       |                  |                            |                          |
|     | (LIVE)       | B3P5-VH<br>(JST) | VHR-5N<br>(JST)            | SVH-21T-P1.1             |
| CN1 | 3 : AC       |                  |                            | (JST)                    |
|     | (NEUTRAL)    |                  |                            |                          |
|     | 5 : FG       |                  |                            |                          |
| CN2 | 1 to 2 : - V | B4B-XH-A         | XHP-4                      | SXH-001T-P0.6            |
|     | 3 to 4 : + V | (JST)            | (JST)                      | (JST)                    |

#### CWA030 series

|     | Pin No.      | Connector | Corresponding connector | Corresponding<br>contact |
|-----|--------------|-----------|-------------------------|--------------------------|
|     | 1 : AC       |           |                         |                          |
|     | (LIVE)       | B3P5-VH   | VHR-5N                  |                          |
| CN1 | 3 : AC       | (JST)     | (JST)                   | SVH-21T-P1.1<br>(JST)    |
|     | (NEUTRAL)    |           |                         |                          |
|     | 5 : FG       |           |                         | (331)                    |
| CN2 | 1 to 2 : - V | B4P-VH    | XHR-4N                  |                          |
|     | 3 to 4 : + V | (JST)     | (JST)                   | бT)                      |

#### CWA050 series

|      | Pin No.      | Connector | Corresponding connector | Corresponding contact |
|------|--------------|-----------|-------------------------|-----------------------|
|      | 1 : AC       |           |                         |                       |
|      | (LIVE)       | B3P5-VH   | VHR-5N                  |                       |
| CN1  | 3 : AC       | (JST)     | (JST)                   | SVH-21T-P1.1<br>(JST) |
|      | (NEUTRAL)    |           |                         |                       |
|      | 5 : FG       |           |                         | (301)                 |
| CN2  | 1 to 2 : - V | B4P-VH    | XHR-4N                  |                       |
| GINZ | 3 to 4 : + V | (JST)     | (JST)                   |                       |

#### CWA075 series

|     | Pin No.      | Connector | Corresponding<br>connector | Corresponding<br>contact |
|-----|--------------|-----------|----------------------------|--------------------------|
|     | 1 : AC       |           |                            |                          |
|     | (LIVE)       | B3P5-VH   | VHR-5N                     |                          |
| CN1 | 3 : AC       | (JST)     | (JST)                      |                          |
|     | (NEUTRAL)    | (001)     | (001)                      | SVH-21T-P1.1<br>(JST)    |
|     | 5 : FG       |           |                            | (301)                    |
| CN2 | 1 to 3 : - V | B6P-VH    | XHR-6N                     |                          |
| GNZ | 4 to 6 : + V | (JST)     | (JST)                      |                          |

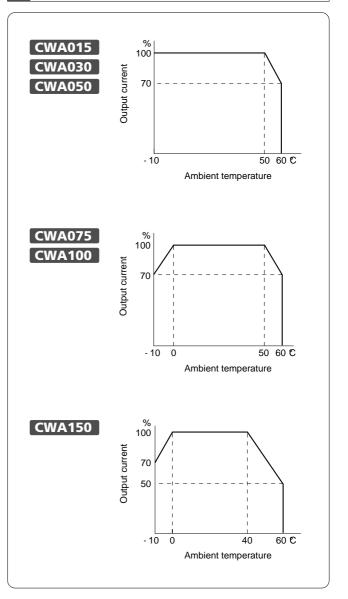
#### CWA100 series

|     | Pin No.      | Connector        | Corresponding<br>connector | Corresponding contact |
|-----|--------------|------------------|----------------------------|-----------------------|
|     | 1 : AC       |                  |                            |                       |
|     | (LIVE)       |                  |                            |                       |
| CN1 | 3 : AC       | B3P5-VH<br>(JST) | VHR-5N<br>(JST)            | SVH-21T-P1.1<br>(JST) |
|     | (NEUTRAL)    |                  |                            |                       |
|     | 5 : FG       |                  |                            | (331)                 |
| CN2 | 1 to 4 : - V | B8P-VH           | XHR-6N                     |                       |
|     | 5 to 8 : + V | (JST)            | (JST)                      |                       |

### CWA150 series

|     | Pin No.      | Connector | Corresponding<br>connector | Corresponding<br>contact |
|-----|--------------|-----------|----------------------------|--------------------------|
|     | 1 : AC       |           |                            |                          |
|     | (LIVE)       | B3P5-VH   | VHR-5N<br>(JST)            |                          |
| CN1 | 3 : AC       | (JST)     |                            | SVH-21T-P1.1             |
|     | (NEUTRAL)    |           |                            |                          |
|     | 5 : FG       |           |                            |                          |
| CN2 | 1 to 6 : + V | B4B-XH-A  | XHR-4                      | (JST)                    |
|     | 1 to 7: - V  | (JST)     | (JST)                      |                          |

## **2** Derating of output current



70

## **CWA** Series 15W,30W,50W,75W,100W,150W

### **3** Mounting

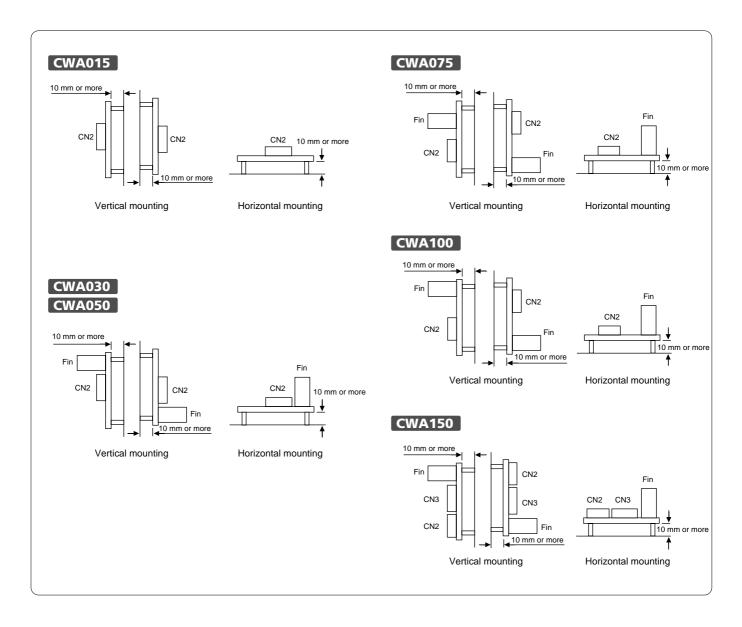
For safety's sake, be sure to connect the FG (frame ground) terminal to the target equipment's grounding terminal. Failure to make this ground connection may result in greater conducted emission, radiant noise, and ripple noise.

To use the power supply with natural air cooling, mount the

supply so that both sides and the top are open, and there is sufficient air flow.

When using a metal case, take insulation distance into account when mounting.

Please contact Sanken if there are any questions about this.

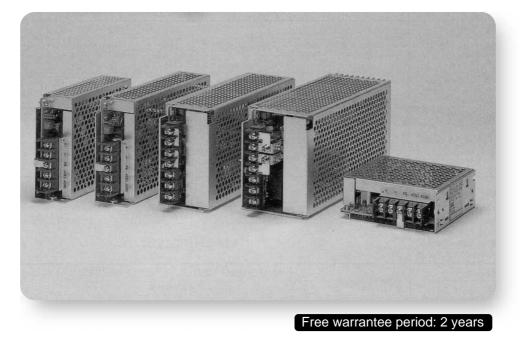


World-wide continuous input range. Advanced design with power factor correction.

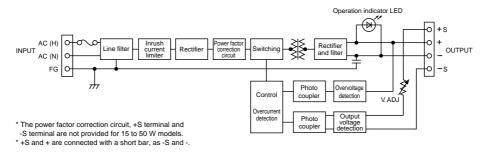


The SWA series employs a continuous input method so that input voltages from 85 V to 264 V can be supported without the need for manual switching. This series has been designed to be easily used anywhere in the world. This series has five single-output models ranging from 15 to 150 W. The 100 and 150 W models are equipped with powerfactor-correction circuits for realizing harmonic current control. These are advance power supplies which take into account international regulations on harmonic currents.

- World-wide, continuous input system (85 to 264 V)
- DC input possible (90 to 165 V)
- Conforms to harmonic current regulations IEC61000-3-2 (100 W/150 W models)
- Attains a high power factor of 0.95 with dedicated power factor correction IC (100 W/150 W models)
- Compact unit due to employing proprietary barrierless transformer
- Employs MOS FET-based main switching circuit for achieving high efficiency



### [SWA Series Circuit Diagram]



# SWA Series

15W,30W,50W,100W,150W

|                                  |   |                          | Chacificatio  | Please contact Sank               | en for delivery time of conne | ector type product in advance |  |
|----------------------------------|---|--------------------------|---|-----------------------------------|-------------------------------|-------------------------------|--|
| _                                | _   |                          | specificatio  |                                   |                               |                               |  |
|                                  | Mo  | del                      |   | 15                                | W                             |                               |  |
|                                  |   |                          | SWA015-05   | SWA015-12                         | SWA015-15                     | SWA015-24                     |  |
|                                  | Rated Input                                     | t Voltage                | 100 V AC to 240 V AC or 110 V DC 🔤                          |                                   |                               |                               |  |
|                                  | Allowable I                                     | nput Voltage Range       | 85 V AC to 264 V AC or 90 V DC to 165 V DC                  |                                   |                               |                               |  |
| su                               | Input Curre                                     |                          | 0.4A/0.23A  |                                   |                               |                               |  |
| t<br>litio                       | Rated Freq                                      |                          | 50/60Hz   |                                   |                               |                               |  |
| Input<br>Condit                  |   | requency Range           | 47 to 440Hz   |                                   |                               |                               |  |
| <u>ت</u> =                       | Efficiency (typ)                                |                          | 72%   | 75%                               | 75%                           | 77%                           |  |
|                                  |   | rent (max) Meet          | 25A/50A   |                                   |                               |                               |  |
|                                  | Leakage Ci                                      | urrent (max)             |   | 0.5mA/                            | 0.75mA                        |                               |  |
|                                  | Rated Outp                                      | ut Voltage               | 5V  | 12V                               | 15V                           | 24V                           |  |
| Note 3                           | · ·   | age Variation            |   | Rated output                      | voltage ±10%                  |                               |  |
|                                  | <u> </u>  | ut Current Note 4        | 3.0A (2.4A)   | 1.3A (1.0A)                       | 1.0A (0.8A)                   | 0.7A (0.5A)                   |  |
| put<br>ditions                   |   | utput Current Range      |   | 0 to 1                            |                               |                               |  |
| ipur                             | Rated Outp                                      |                          | 15W   | 15.6W                             | 15W                           | 16.8W                         |  |
| Output<br>Conditi                |   | Itage Accuracy           | 400   | ±3                                |                               | 040-14                        |  |
|                                  | Ripple Nois                                     |                          | 120mVp-p  | 180mVp-p                          | 180mVp-p                      | 240mVp-p                      |  |
|                                  | Output Holding Time (min)<br>Startup time (typ) |                          |   | 10m                               |                               |                               |  |
|                                  |   |                          | 20msec  |                                   |                               |                               |  |
|                                  |   | t Protection             | Detection above 105% of rated current                       |                                   |                               |                               |  |
| Additional<br>Functions          |   | e Protection             | Detection from 115 to 145% of rated voltage (output cutoff) |                                   |                               |                               |  |
| itio                             |   | g Protection             |   | Not pro                           |                               |                               |  |
| pp                               |   | /OFF Control             | Not provided Not provided                                   |                                   |                               |                               |  |
| ⋖╙                               | Remote Ser<br>Operations                        | -                        | Red LED indicator   |                                   |                               |                               |  |
|                                  | -   |                          |   | Red LED                           | Indicator                     |                               |  |
|                                  |   | emperature Range         | 0 to +50°C  |                                   |                               |                               |  |
|                                  | _   | nperature Range          | -25 to +85°C  |                                   |                               |                               |  |
| _                                |   | lumidity Range           | 30 to 90% (no condensation)<br>30 to 90% (no condensation)  |                                   |                               |                               |  |
| Environmental<br>Conditions      | Cooling Re                                      | midity Range             | Natural air cooling   |                                   |                               |                               |  |
| Environme<br>Conditions          | Cooling Re                                      | No. of vibrations        | 10 to 55Hz  |                                   |                               |                               |  |
| ir or<br>diti                    |   | Sweep time               | 3 minutes   |                                   |                               |                               |  |
| in vi                            | Vibration                                       | Acceleration rate        | 3 minutes<br>19.6m/s² (2G)                                  |                                   |                               |                               |  |
|                                  | Resistance                                      | Vibration direction      | X, Y, Z   |                                   |                               |                               |  |
|                                  |   | Vibration time           | One hour in each of three directions                        |                                   |                               |                               |  |
|                                  | Installation                                    | Conditions               | Derating may be required due to mounting direction          |                                   |                               |                               |  |
|                                  | Insulation                                      | Between input and output |   |                                   |                               |                               |  |
| <b>_</b>                         |   | Between input and FG     |   | 2000 V AC f                       | or 1 minute                   |                               |  |
| Insulation                       | Voltage   | Between output and FG    |   | 500 V AC fo                       | or 1 minute                   |                               |  |
| sula                             | Insulation                                      | Between input and output |   |                                   |                               |                               |  |
| lns                              | Resistance                                      | Between input and FG     |   | 100 M $\Omega$ (measured wi       | th 500 V DC Megger)           |                               |  |
|                                  |   | Between output and FG    |   |                                   |                               |                               |  |
|                                  | External Ap                                     | pearance                 |   | With c                            | nassis                        |                               |  |
| ure/                             | Input Type                                      | -                        |   | Termina                           |                               |                               |  |
| ruct                             | Output Typ                                      | e                        |   | Termina                           | al stand                      |                               |  |
| ll Sti<br>ds                     | External Di                                     | mensions                 |   | 35 <sup>w</sup> x 99 <sup>D</sup> |                               |                               |  |
| erna                             | Weight  |                          |   | 27                                | 0                             |                               |  |
| External Structure/<br>Standards | Safety Stan                                     |                          |   | UL1950, CSA No. 950, an           | · · ·                         |                               |  |
|                                  | Conducted                                       | Emission                 | De  | esignated to meet CISPR2          | 2 Class A and FCC Class       | s B                           |  |
| ions                             | Remote ON                                       | /OFF Control             |   | Not pro                           | ovided                        |                               |  |
| Opt                              | Cover   |                          |   | Prov                              | ided                          |                               |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note3 All output characteristics are measured at the output connector.

Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

74 rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

15W,30W,50W,100W,150W

**SWA** Series

Please contact Sanken for delivery time of connector type product in advance.

| citication | - and Stan |  |
|------------|------------|--|
|            | s and Stan |  |
|            |            |  |

|   |                          |                                     | Specificatio   | ons and Standard                      | ls                                   |             |  |  |
|---|--------------------------|-------------------------------------|--|---------------------------------------|--------------------------------------|-------------|--|--|
|   |                          |                                     |  | 3                                     | BOW                                  |             |  |  |
|   | Mo                       | del                                 | SWA030-05  | SWA030-12                             | SWA030-15                            | SWA030-24   |  |  |
|   | Rated Input              | t Voltage                           | 100 V AC to 240 V AC or 110 V DC 1001  |                                       |                                      |             |  |  |
|   |                          | nput Voltage Range                  | 85 V AC to 264 V AC or 90 V DC to 165 V DC   |                                       |                                      |             |  |  |
| Input<br>Conditions                       | Input Curre              | ent (typ)                           | 0.7A/0.46A   |                                       |                                      |             |  |  |
| tio                                       | Rated Freq               |                                     | 50/60Hz  |                                       |                                      |             |  |  |
| put<br>ndi                                | Allowable F              | Frequency Range                     | 47 to 440Hz  |                                       |                                      |             |  |  |
| S II                                      | Efficiency (             | typ)                                | 72%  | 75%                                   | 75%                                  | 77%         |  |  |
|   | Inrush Curi              | rent (max) Note1                    | 25A/50A  |                                       |                                      |             |  |  |
|   | Leakage Cu               | urrent (max)                        |  | 0.5m                                  | nA/0.75mA                            |             |  |  |
|   | Rated Outp               | ut Voltage                          | 5V   | 12V                                   | 15V                                  | 24V         |  |  |
| P   | Output Voltage Variation |                                     |  |                                       | out voltage ±10%                     | 2.10        |  |  |
| Note 3                                    | - ·                      |                                     | 6.0A (4.8A)  | 2.5A (2.0A)                           | 2.0A (1.6A)                          | 1.3A (1.0A) |  |  |
| suc                                       |                          | Output Current Range                |  | . ,                                   | to 100%                              |             |  |  |
| litio                                     | Rated Outp               |                                     | 30W  | 30W                                   | 30W                                  | 31.2W       |  |  |
| Output<br>Conditions                      |                          | Itage Accuracy                      |  |                                       | ±3%                                  |             |  |  |
| οŭ  | Ripple Nois              |                                     | 120mVp-p   | 180mVp-p                              | 180mVp-p                             | 240mVp-p    |  |  |
|   | Output Hol               | ding Time (min)                     |  | 1                                     | 0msec                                |             |  |  |
|   | Startup tim              |                                     | 20msec   |                                       |                                      |             |  |  |
|   | Overcurrent Protection   |                                     |  |                                       |                                      |             |  |  |
| - s                                       |                          | e Protection                        | Detection above 105% of rated current<br>Detection from 115 to 145% of rated voltage (output cutoff) |                                       |                                      |             |  |  |
| ona                                       |                          | g Protection                        | Not provided   |                                       |                                      |             |  |  |
| Additional<br>Functions                   |                          | /OFF Control                        |  |                                       | provided                             |             |  |  |
| Pul                                       | Remote Se                | nsing                               |  |                                       | provided                             |             |  |  |
|   | Operations               | -                                   | Red LED indicator  |                                       |                                      |             |  |  |
|   | -                        |                                     | 0 to 15000   |                                       |                                      |             |  |  |
|   |                          | emperature Range<br>nperature Range |  |                                       | to +50°C                             |             |  |  |
|   |                          | Humidity Range                      | -25 to +85°C<br>30 to 90% (no condensation)  |                                       |                                      |             |  |  |
| a   |                          | midity Range                        | 30 to 90% (no condensation)  |                                       |                                      |             |  |  |
| Environmental<br>Conditions               |                          | quirements                          | Natural air cooling  |                                       |                                      |             |  |  |
| un di |                          | No. of vibrations                   | 10 to 55Hz   |                                       |                                      |             |  |  |
| diti                                      |                          | Sweep time                          | 3 minutes  |                                       |                                      |             |  |  |
| N N                                       | Vibration                | Acceleration rate                   |  |                                       | 6m/s <sup>2</sup> (2G)               |             |  |  |
|   | Resistance               | Vibration direction                 |  | X, Y, Z                               |                                      |             |  |  |
|   |                          | Vibration time                      | One hour in each of three directions   |                                       |                                      |             |  |  |
|   | Installation             | Conditions                          | Derating may be required due to mounting direction   |                                       |                                      |             |  |  |
|   | Inculation               | Between input and output            |  |                                       |                                      |             |  |  |
|   | Insulation<br>Withstand  | Between input and FG                |  | 2000 V A                              | C for 1 minute                       |             |  |  |
| Insulation                                | Voltage                  | Between output and FG               |  | 500 V A                               | C for 1 minute                       |             |  |  |
| ula                                       |                          | Between input and output            |  |                                       |                                      |             |  |  |
| lns                                       | Insulation               | Botwoon input and EG                |  | 100 M $\Omega$ (measured              | l with 500 V DC Megger)              |             |  |  |
|   | Resistance               | Between output and FG               |  | , , , , , , , , , , , , , , , , , , , | 00 ,                                 |             |  |  |
|   | External Ap              | · · · · · ·                         |  | \\/i+                                 | h chassis                            |             |  |  |
| Ire/                                      | Input Type               | /pourune                            |  |                                       | n chassis                            |             |  |  |
| External Structure/<br>Standards          | Output Type              | e                                   |  |                                       | ninal stand                          |             |  |  |
| Stru                                      | External Di              |                                     |  |                                       | 16 <sup>D</sup> x 97 <sup>H</sup> mm |             |  |  |
| nal<br>lard                               | Weight                   |                                     |  |                                       | 370g                                 |             |  |  |
| xter<br>tanc                              | Safety Stan              | dards                               |  |                                       | and TÜV (EN60950) certifi            | ed          |  |  |
| шŏ  | Conducted                |                                     | C  |                                       | R22 Class A and FCC Clas             |             |  |  |
|   |                          |                                     |  | 5                                     |                                      |             |  |  |
| ption                                     | Cover                    | /OFF Control                        |  |                                       | provided<br>rovided                  |             |  |  |
|   |                          | o ourroot there also                | ated value recording of  |                                       |                                      |             |  |  |
| Note 1 At C                               | ola start. (Mol          | e current than above n              | oted value may flow at   | restart.)                             |                                      |             |  |  |

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note 3 All output characteristics are measured at the output connector.

Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage, rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

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# **SWA** Series

15W,30W,50W,100W,150W

|                                  |                           |   | Specificatio  | Please contact Sar<br>ns and Standards | iken for delivery time of conne   | ector type product in advance |  |
|----------------------------------|---------------------------|---|---|--|-----------------------------------|-------------------------------|--|
|                                  |                           |   |   |  | w                                 |                               |  |
|                                  | Мо                        | del   | SWA050-05   | SWA050-12                              | SWA050-15                         | SWA050-24                     |  |
|                                  | Rated Input               | t Voltage                                     | 100 V AC to 240 V AC or 110 V DC 🔤  |  |                                   |                               |  |
|                                  | Allowable I               | nput Voltage Range                            |   | 85 V AC to 264 V AC                    | or 90 V DC to 165 V DC 🛽          | ote 4                         |  |
| ons                              | Input Curre               | nt (typ)                                      | 1.2A/0.7A   |  |                                   |                               |  |
| itio                             | Rated Freq                | uency   | 50/60Hz   |  |                                   |                               |  |
| Input<br>Condi                   | Allowable F               | Frequency Range                               |   | 47 to                                  | 440Hz                             |                               |  |
| ن ہے۔<br>ان                      | Efficiency (              | typ)  | 72%   | 75%                                    | 75%                               | 77%                           |  |
|                                  | Inrush Current (max) 🔤    |   |   | 25 <i>A</i>                            | /50A                              |                               |  |
|                                  | Leakage Cu                | urrent (max)                                  | 0.5mA/0.75mA  |  |                                   |                               |  |
|                                  | Rated Outp                | ut Voltage                                    | 5V  | 12V                                    | 15V                               | 24V                           |  |
| Note 3                           |                           | age Variation                                 |   | Rated output                           | voltage ±10%                      | I                             |  |
|                                  |                           |   | 10A (8A)  | 4.2A (3.3A)                            | 3.4A (2.7A)                       | 2.1A (1.6A)                   |  |
| suo                              |                           | utput Current Range                           | . /   | , ,                                    | 100%                              |                               |  |
| out<br>diti                      | Rated Outp                | ut Power                                      | 50W   | 50.4W                                  | 51W                               | 50.4W                         |  |
| Output<br>Conditi                |                           | Itage Accuracy                                |   | ±                                      | 3%                                |                               |  |
| 00                               | Ripple Nois               | C Note 2                                      | 120mVp-p  | 180mVp-p                               | 180mVp-p                          | 240mVp-p                      |  |
|                                  | Output Holding Time (min) |   |   | 10r                                    | nsec                              |                               |  |
|                                  | Startup time              | e (typ)                                       | 20msec  |  |                                   |                               |  |
|                                  | Overcurren                | t Protection                                  | Detection above 105% of rated current   |  |                                   |                               |  |
| ns<br>ns                         |                           | e Protection                                  | Detection from 115 to 145% of rated voltage (output cutoff)                             |  |                                   |                               |  |
| tio                              |                           | g Protection                                  | Not provided  |  |                                   |                               |  |
| Additional<br>Functions          |                           | /OFF Control                                  |   |  | rovided                           |                               |  |
| άĽ                               | Remote Ser                | -   |   |  | rovided                           |                               |  |
|                                  | Operations                | Display                                       |   | Red LEI                                | D indicator                       |                               |  |
|                                  | Operating Te              | emperature Range                              | 0 to +50°C  |  |                                   |                               |  |
|                                  | -                         | nperature Range                               | -25 to +85°C  |  |                                   |                               |  |
|                                  | Operating Humidity Range  |   | 30 to 90% (no condensation)   |  |                                   |                               |  |
| nta                              |                           | midity Range                                  | 30 to 90% (no condensation)   |  |                                   |                               |  |
| Environmental<br>Conditions      | Cooling Re                |   | Natural air cooling   |  |                                   |                               |  |
| Environme<br>Conditions          |                           | No. of vibrations                             | 10 to 55Hz<br>3 minutes   |  |                                   |                               |  |
| nvir                             | Vibration                 | Sweep time                                    |   |  |                                   |                               |  |
| шö                               | Resistance                | Acceleration rate<br>Vibration direction      | 19.6m/s² (2G)   |  |                                   |                               |  |
|                                  |                           | Vibration time                                | X, Y, Z   |  |                                   |                               |  |
|                                  | Installation              | Conditions                                    | One hour in each of three directions Derating may be required due to mounting direction |  |                                   |                               |  |
|                                  |                           |   |   |  |                                   |                               |  |
|                                  | Insulation<br>Withstand   | Between input and output                      |   | 2000 V AC                              | for 1 minute                      |                               |  |
| Insulation                       | Voltage                   | Between input and FG<br>Between output and FG |   | 500 V AC                               | for 1 minute                      |                               |  |
| ulat                             | Tonago                    | Between input and output                      |   | 300 V AO                               |                                   |                               |  |
| nsu                              | Insulation                | Botwoon input and EG                          |   | 100 MQ (measured v                     | vith 500 V DC Megger)             |                               |  |
|                                  | Resistance                | Between output and FG                         |   |  |                                   |                               |  |
|                                  | External Ap               | •   |   | ۱۸/٬۰۰۲                                | chassis                           |                               |  |
| Ire/                             | Input Type                | /poaranoe                                     |   |  | nal stand                         |                               |  |
| External Structure/<br>Standards | Output Typ                | e   |   |  | al stand                          |                               |  |
| Stru<br>5                        | External Di               |   |   |  | <sup>D</sup> x 97 <sup>H</sup> mm |                               |  |
| nal<br>darc                      | Weight                    |   |   |  | 10g                               |                               |  |
| xter<br>tand                     | Safety Stan               | dards   |   |  | nd TÜV (EN60950) certifie         | d                             |  |
| -ш <sub>о</sub>                  | Conducted                 |   | De  | esignated to meet CISPR                | 22 Class A and FCC Class          | s B                           |  |
| suc                              | Remote ON                 | /OFF Control                                  |   | Not p                                  | rovided                           |                               |  |
| Optic                            | Cover                     |   |   |  | vided                             |                               |  |
|                                  |                           | e current than above n                        | oted value may flow at re   |  |                                   |                               |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note2 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note3 All output characteristics are measured at the output connector.

Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

15W,30W,50W,100W,150W

**SWA** Series

|                                  |                           |   | Specificatio  | ns and Standards         |                                   |                     |  |  |
|----------------------------------|---------------------------|---|---|--------------------------|-----------------------------------|---------------------|--|--|
|                                  |                           |   |   | 10                       | 0W                                |                     |  |  |
|                                  | Мо                        | del   | SWA100-05   | SWA100-12                | SWA100-15                         | SWA100-24           |  |  |
|                                  | Rated Input               | t Voltage                                     | 100 V AC to 240 V AC or 110 V DC 1004   |                          |                                   |                     |  |  |
|                                  |                           | nput Voltage Range                            | 85 V AC to 264 V AC or 90 V DC to 165 V DC  |                          |                                   |                     |  |  |
| ns                               | Input Curre               | nt (typ)                                      | 1.6A/0.7A   |                          |                                   |                     |  |  |
| itio                             | Rated Freq                | uency   | 50/60Hz   |                          |                                   |                     |  |  |
| put                              |                           | Frequency Range                               | 47 to 63Hz  |                          |                                   |                     |  |  |
| ن <u>ا</u>                       | Power Fact                | or (typ)                                      |   | 0.99                     | 9/0.92                            | 1                   |  |  |
|                                  | Efficiency (              |   | 74%   | 76%                      | 76%                               | 77%                 |  |  |
|                                  |                           | ent (max) Note1                               | 20A/40A   |                          |                                   |                     |  |  |
|                                  | Leakage Cu                | urrent (max)                                  |   | 0.5mA                    | /0.75mA                           |                     |  |  |
|                                  | Rated Outp                | ut Voltage                                    | 5V  | 12V                      | 15V                               | 24V                 |  |  |
| Note 3                           | Output Volt               | age Variation                                 |   | Rated output             | voltage ±10%                      |                     |  |  |
| 2<br>0                           | Rated Outp                | ut Current Note 4                             | 20A (16A)   | 8.5A (6.8A)              | 7.0A (5.6A)                       | 4.5A (3.6A)         |  |  |
| ion                              |                           | utput Current Range                           |   | 0 to                     | 100%                              |                     |  |  |
| put<br>diti                      | Rated Outp                |   | 100W  | 102W                     | 105W                              | 108W                |  |  |
| Output<br>Condit                 |                           | Itage Accuracy                                |   | 1                        | 3%                                | 1                   |  |  |
|                                  | Ripple Nois               |   | 120mVp-p  | 180mVp-p                 | 180mVp-p                          | 240mVp-p            |  |  |
|                                  | Output Holding Time (min) |   |   |                          | nsec                              |                     |  |  |
|                                  | Startup tim               | e (typ)                                       |   | 1000/6                   | 00msec                            |                     |  |  |
|                                  | Overcurren                | t Protection                                  | Detection approx. 120% of rated current   |                          |                                   |                     |  |  |
| ns<br>Ns                         | Overvoltage Protection    |   | Detection from 115 to 145% of rated voltage (output cutoff)                             |                          |                                   |                     |  |  |
| Additional<br>Functions          | Overheating Protection    |   | Not provided  |                          |                                   |                     |  |  |
| ddif                             | Remote ON/OFF Control     |   | Not provided  |                          |                                   |                     |  |  |
| ĂĔ                               | Remote Sensing            |   | Not provided  |                          |                                   |                     |  |  |
|                                  | Operations                | Display                                       |   | Red LED                  | ) indicator                       |                     |  |  |
|                                  | Operating Te              | emperature Range                              | 0 to +50°C  |                          |                                   |                     |  |  |
|                                  | Storage Temperature Range |   | -25 to +85°C  |                          |                                   |                     |  |  |
|                                  | Operating Humidity Range  |   | 30 to 90% (no condensation)   |                          |                                   |                     |  |  |
| Environmental<br>Conditions      | Storage Humidity Range    |   | 30 to 90% (no condensation)   |                          |                                   |                     |  |  |
| mei                              | Cooling Requirements      |   | Natural air cooling   |                          |                                   |                     |  |  |
| on litic                         |                           | No. of vibrations                             | 10 to 55Hz  |                          |                                   |                     |  |  |
| nvir<br>onc                      | Vibration                 | Sweep time                                    |   | -                        | nutes                             |                     |  |  |
| шo                               | Resistance                | Acceleration rate<br>Vibration direction      | 19.6m/s² (2G)   |                          |                                   |                     |  |  |
|                                  |                           | Vibration time                                | X, Y, Z   |                          |                                   |                     |  |  |
|                                  | Installation Conditions   |   | One hour in each of three directions Derating may be required due to mounting direction |                          |                                   |                     |  |  |
|                                  |                           |   |   |                          | Ŭ                                 |                     |  |  |
|                                  | Insulation                | Between input and output                      |   | 2000 V AC                | for 1 minute                      |                     |  |  |
| Insulation                       | Withstand<br>Voltage      | Between input and FG<br>Between output and FG |   | 500 \/ AC                | for 1 minute                      |                     |  |  |
| ılat                             | Tonage                    | Between input and output                      |   | 300 V AC                 |                                   |                     |  |  |
| ISU                              | Insulation                | Potwoon input and EC                          |   | 100 MQ (measured w       | vith 500 V DC Megger)             |                     |  |  |
|                                  | Resistance                | Between output and FG                         |   |                          |                                   |                     |  |  |
|                                  | External Ap               | •   |   | 10/:46                   | chassis                           |                     |  |  |
| re/                              | Input Type                | pearance                                      |   |                          | al stand                          |                     |  |  |
| lotu                             | Output Type               | ۵   |   |                          | al stand                          |                     |  |  |
| External Structure/<br>Standards | External Di               |   |   |                          | <sup>D</sup> x 93 <sup>H</sup> mm |                     |  |  |
| 'nal<br>dard                     | Weight                    |   |   |                          | 50g                               |                     |  |  |
| xter<br>tane                     | Safety Stan               | dards   |   |                          | nd TÜV (EN60950) certifi          | ed                  |  |  |
| <u>м</u> м                       | Conducted                 |   | Designated to mee   | et CISPR22 Class A (200- | 240 V AC) and FCC Clas            | ss A (100-120 V AC) |  |  |
| su                               | Remote ON                 | /OFF Control                                  |   | Not n                    | rovided                           |                     |  |  |
| Optio                            | Cover                     |   |   | •                        | vided                             |                     |  |  |
|                                  |                           |   | noted value may flow at   |                          |                                   |                     |  |  |

 $\ensuremath{\,^{\mbox{Motel}}}$  At cold start. (More current than above noted value may flow at restart.)

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

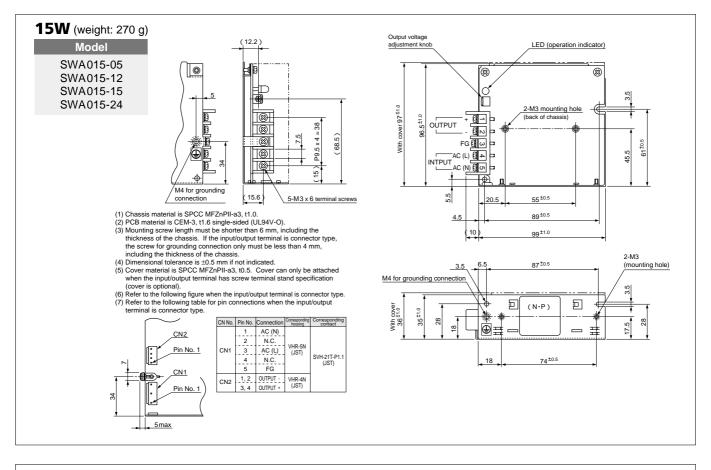
 $\ensuremath{\texttt{Note3}}$  All output characteristics are measured at the output connector.

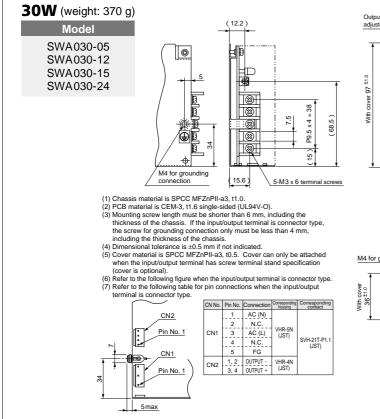
Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.

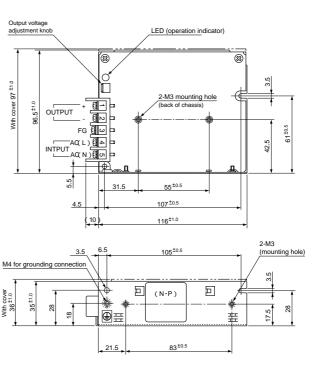
\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.





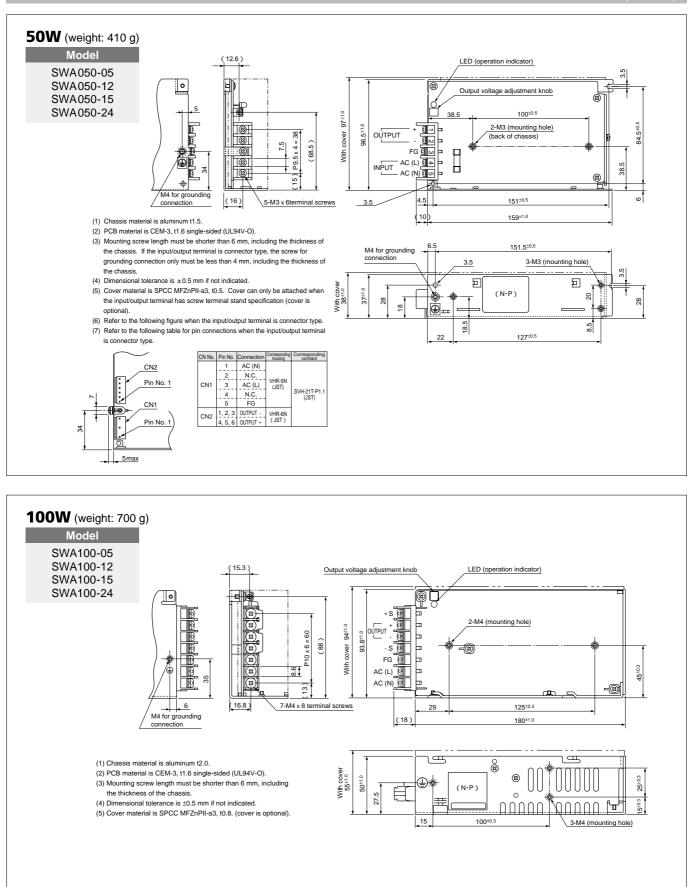




# **SWA** Series 15W,30W,50W,100W,150W

**External Dimensions** 

unit: mm)



# **SWA** Series

15W,30W,50W,100W,150W

|                                  |  |                          | Specificatio  | ns and Standards           |   |             |  |
|----------------------------------|--|--------------------------|---|----------------------------|---|-------------|--|
|                                  |  |                          |   | 15                         | 0W  |             |  |
|                                  | Мо   | del                      | SWA150-05   | SWA150-12                  | SWA150-15                                     | SWA150-24   |  |
|                                  | Rated Input  | Voltage                  | 100 V AC to 240 V AC or 110 V DC 1004                       |                            |   |             |  |
|                                  | · ·  | nput Voltage Range       | 85 V AC to 264 V AC or 90 V DC to 165 V DC Noted            |                            |   |             |  |
| su                               | Input Curre  |                          | 2.4A/1.7A   |                            |   |             |  |
| itions                           | Rated Freq   | uency                    | 50/60Hz   |                            |   |             |  |
| put                              |  | requency Range           | 47 to 63Hz  |                            |   |             |  |
| ن <u>ا</u>                       | Power Fact   |                          |   | 0.99                       | 9/0.95  | 1           |  |
|                                  | Efficiency (                                       |                          | 75%   | 77%                        | 78%   | 79%         |  |
|                                  |  | ent (max) Note1          | 20A/40A<br>0.5mA/0.75mA                                     |                            |   |             |  |
|                                  | Leakage Cu   | irrent (max)             |   | 0.5mA                      | /0.75mA                                       |             |  |
|                                  | Rated Outp   | ut Voltage               | 5V  | 12V                        | 15V   | 24V         |  |
| Note 3                           |  | age Variation            |   | Rated output               | voltage ±10%                                  |             |  |
| N N                              |  | ut Current Note 4        | 30A (24A)   | 13A (10A)                  | 10A (8A)                                      | 6.5A (5.2A) |  |
| t                                |  | utput Current Range      |   |                            | 100%  |             |  |
| Output<br>Conditi                | Rated Outp   |                          | 150W  | 156W                       | 150W  | 156W        |  |
| Col                              |  | tage Accuracy            | 400 \/  |                            | 3%  | 040.14      |  |
|                                  | Ripple Nois  |                          | 120mVp-p  | 180mVp-p                   | 180mVp-p                                      | 240mVp-p    |  |
|                                  | Output Holding Time (min)<br>Startup time (typ)    |                          |   |                            | nsec<br>00msec                                |             |  |
|                                  |  |                          |   | 1000/0                     | oomsec  |             |  |
|                                  |  | t Protection             | Detection approx. 120% of rated current                     |                            |   |             |  |
| nal                              | Overvoltage Protection                             |                          | Detection from 115 to 145% of rated voltage (output cutoff) |                            |   |             |  |
| Additional<br>Functions          | Overheating Protection                             |                          | Not provided Not provided                                   |                            |   |             |  |
| Pdd<br>Tun <sup>=</sup>          | Remote ON/OFF Control<br>Remote Sensing            |                          | provided  |                            |   |             |  |
|                                  | Operations Display                                 |                          | Red LED indicator   |                            |   |             |  |
|                                  | -  |                          |   |                            |   |             |  |
|                                  | Operating Temperature Range                        |                          | 0 to +50°C  |                            |   |             |  |
|                                  | Storage Temperature Range                          |                          | -25 to +85°C<br>30 to 90% (no condensation)                 |                            |   |             |  |
| ធ                                | Operating Humidity Range<br>Storage Humidity Range |                          | 30 to 90% (no condensation)<br>30 to 90% (no condensation)  |                            |   |             |  |
| Environmental<br>Conditions      | Cooling Re   |                          | Natural air cooling   |                            |   |             |  |
| Environme<br>Conditions          |  | No. of vibrations        | 10 to 55Hz  |                            |   |             |  |
| /iro                             | Vibratian  | Sweep time               | 3 minutes   |                            |   |             |  |
| Col                              | Vibration<br>Resistance                            | Acceleration rate        | 19.6m/s <sup>2</sup> (2G)                                   |                            |   |             |  |
|                                  |  | Vibration direction      |   | Х,                         | Y, Z  |             |  |
|                                  |  | Vibration time           | One hour in each of three directions                        |                            |   |             |  |
|                                  | Installation                                       | Conditions               |   | Derating may be required   | I due to mounting direction                   | ٦           |  |
|                                  | Insulation   | Between input and output |   | 2000 \/ 40                 | for 1 minute                                  |             |  |
| u                                |  | Between input and FG     |   |                            |   |             |  |
| Insulation                       | Voltage  | Between output and FG    |   | 500 V AC                   | for 1 minute                                  |             |  |
| nsı                              | Insulation   | Between input and output |   | (                          |   |             |  |
| -                                | Resistance   |                          |   | 100 M $\Omega$ (measured w | vith 500 V DC Megger)                         |             |  |
|                                  |  | Between output and FG    |   |                            |   |             |  |
| e/                               | External Ap  | pearance                 |   |                            | chassis                                       |             |  |
| ctur                             | Input Type   | _                        |   |                            | al stand                                      |             |  |
| External Structure/<br>Standards | Output Typ   |                          |   |                            | al stand<br><sup>D</sup> x 93 <sup>H</sup> mm |             |  |
| ards                             | External Di<br>Weight                              | mensions                 |   |                            | 50g   |             |  |
| terr<br>and                      | Safety Stan  | dards                    |   |                            | nd TÜV (EN60950) certifie                     | ed          |  |
| ũ từ                             | Conducted  |                          |   |                            | 22 Class A and FCC Clas                       |             |  |
| s                                |  | /OFF Control             |   |                            |   |             |  |
| ption                            | Cover  |                          |   |                            | rovided<br>vided                              |             |  |
|                                  |  | ore ourrent then charge  | noted value may flow at                                     | · · · · · ·                |   |             |  |

Note: At cold start. (More current than above noted value may flow at restart.)

Note: Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Note3 All output characteristics are measured at the output connector.

Safety standards do not apply during DC input. Use the SWA Series with 80% of the input current or less during DC input.

\* Rated input/output conditions means that the switching power supply is operated within the rated input voltage, rated output voltage,

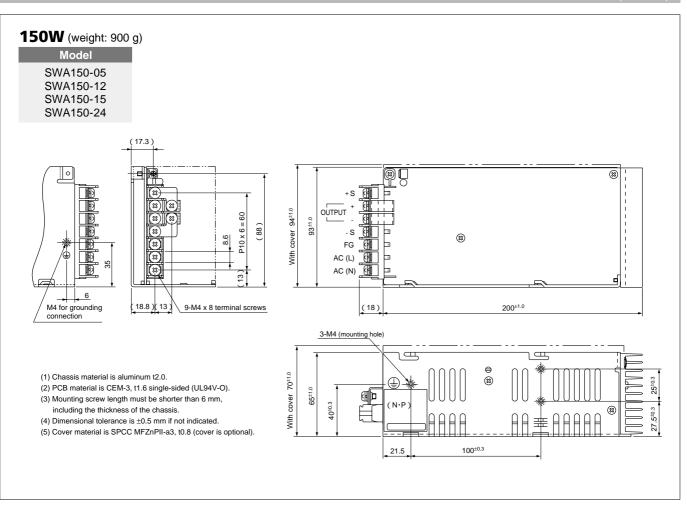
80 rated output current, and rated frequency, at an ambient temperature of 25°C with 60% humidity.

### 15W,30W,50W,100W,150W

**SWA** Series

External Dimensions

(unit: mm)





## Option

| Symbol at end of<br>product name | Description                        | Application               |
|----------------------------------|------------------------------------|---------------------------|
| None                             | Terminal stand type, without cover | All models                |
| -C                               | Terminal stand type, with cover    | All models                |
| -CN                              | Connector type, without cover      | 15W, 30W, 50W, 100W, 150W |

Please contact Sanken for delivery time of connector type product in advance.



### **Operating Instruction**

### **Terminal connection**

| <b>b</b> æn |                   | Adjustment<br>knob | Output voltage adjustment knob | Knob for changing output voltage                                   |
|-------------|-------------------|--------------------|--------------------------------|--|
| Adju        | ustment knob<br>) | LED                | Operation indicator LED (red)  | Lights when output voltage is ON                                   |
| + S         |                   | + S                | + side output sensing terminal | Remove short bar and connect to + side of load when remote sensing |
| ∰_<br>+     |                   | +                  | + side output terminal         | Connect to + side of load  |
| ») -        |                   | -                  | - side output terminal         | Connect to - side of load  |
| ≋)s<br>≋)Fg |                   | - S                | - side output sensing terminal | Remove short bar and connect to - side of load when remote sensing |
| 3) AC       | (L)               | FG                 | Frame grounding                | Connect to grounding   |
| ) AC        | (N)               | ~ L                | AC input terminal              | Connect to AC input (built-in fuse side)                           |
| щ<br>Щ      | E                 | ~ N                | Connect to AC input            | Connect to AC input  |

Refer to the external diagram for terminal arrangement.

### Input

You can use this power supply with input voltage of from 85 to 264 V without switching because of the wide input.

The 100W and 150W models are also equipped with a power-factor-correction circuit for wide input and small input current.

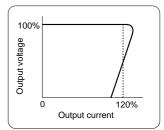
Avoid using this power supply in environments where large input changes occur frequently.

### 3 Setting output voltage

Output voltage may be adjusted using the output voltage adjustment knob. Turning the knob clockwise increases output voltage, while turning it counterclockwise decreases output voltage. Use the power supply with the output voltage within its adjustable range and with the output capacity within the rated output power.

### **Overcurrent protection**

The SWA series has an overcurrent protection function with drooping back characteristics. When the cause of the overload is removed, the output will automatically return to its normal voltage. Overcurrent is detected when the output current exceeds 105% of the



rated current value (120% of the standard output value). Avoid continuous operation with overload because it deteriorates the power supply and causes failure.

### **Overvoltage protection** 5

If the output voltage increases for some reason, the output is shut off. To reset the overvoltage protection, turn off the power and wait about five minutes before turning the power on again.

This function may be activated when the voltage adjustment knob has turned clockwise up to the limit or sensing terminal are not connected securely (100W and 150W models). Take adequate precautions.

# **SWA** Series 15W,30W,50W,100W,150W

### 6 Mounting

Mount the power supply with space around so that there is sufficient air flow.

Derating is needed according to whether there is a cover or not as well as installation direction. Check before use.

(1) Vertical mounting without cover:

Ambient temperature 0 to +50°C /Output 100% (15 to 150 W)

(2) Vertical mounting with cover: Ambient temperature 0 to +40°C

- /Output 100% (15 to 150 W)
- (3) Horizontal mounting without cover:

Ambient temperature 0 to +50°C

/Output 100% (15 to 150 W)

(4) Horizontal mounting with cover:

Ambient temperature 0 to +40°C /Output 100% (15 to 150 W)

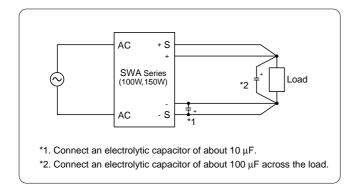
### Inrush current limiting

The power supply is equipped with an inrush current limiting circuit. Since the 15W to 50W models use a power thermistor, current greater than that listed in the specifications may flow when restarting the supply, or due to ambient temperature conditions. Take adequate precautions.

The 100W and 150W models are equipped with a limit resistor and a triac. They may also allow more current than that listed in the specifications at ON/OFF for a short period of time such as momentary power failure. Take adequate precautions.

### **8** Remote sensing

The SWA100W and 150W models are equipped with a remote sensing feature to guard against output load line drop. Use them with a line drop of 250 mV or less.



### **9** Dynamic load variation

When using the supply with dynamic load variation, keep the minimum current about 1% of rated current.

## 10 Others

When an abnormality such as no output occurs, remove the load and check if screws are tight at the sensing part for turning adjustment knob. Then restart the power supply.

### Ultra-compact general-purpose switching power supplies





### Single output With chassis



SWC series are general-purpose switching power supplies that include Sanken Electric's original transformer and feature an optimum layout of heat sources to achieve an ultracompact and ultra-light product.

As such, SWC Series switching power supplies contribute to the further miniaturization of computers and various other equipment.

### Main applications

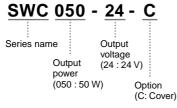
### Computer-related equipment

Printer peripherals, terminals, ATMs, POS equipment, filing systems

### Industrial equipment

Semiconductor manufacturing equipment, measuring instruments, test equipment, analytical tools, broadcasting equipment



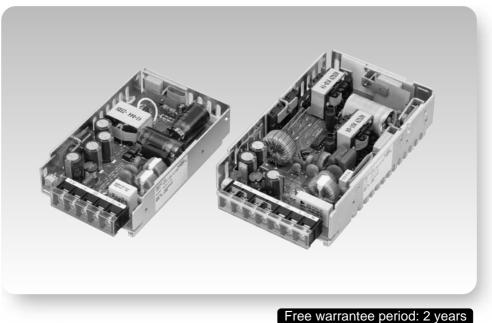


• The industry's top ultra-compact series

This is the industry's smallest and lightest series - roughly half the size of Sanken's existing models. You can now get 100 W of power from units as small as conventional 50-W models.

- World-wide input Supports global markets with a wide-range continuous input method from 85 to 264 V AC.
- Features active filter (PFC) (100W model) The 100 W model features an active filter (PFC: Power Factor Correction circuit) for harmonic current control (complies with IEC61000-3-2).
- Conducted emission Complies with Class B standards under VCCI, FCC and EN55022.
- Acquired CE mark for LVD (Low Voltage Directive) Complies with CE mark standards set by the EU.
- Acquired safety standards of a variety of countries

Complies with safety standards of a variety of countries, including UL60950, CSA60950-00 (C-UL), and TÜV (EN60950:2000).





Model

| Specifications and Standards |            |           |           |  |  |  |
|------------------------------|------------|-----------|-----------|--|--|--|
|                              | 50W        |           |           |  |  |  |
|                              | SWC050-3R3 | SWC050-05 | SWC050-12 |  |  |  |
|                              |            | AC100V to | 2 AC240V  |  |  |  |

SWC050-24

|                                  | Deted Innut  | Valtara                                  |  | 10400144                           | 100101                          |                         |  |
|----------------------------------|--|--|--|------------------------------------|---------------------------------|-------------------------|--|
|                                  | Rated Input Voltage<br>Allowable Input Voltage Range |  | AC100V to AC240V   |                                    |                                 |                         |  |
| Input<br>Conditions              | Input Current (typ) Note                             |  | AC85 to 264V   |                                    |                                 |                         |  |
|                                  |  |  | 1.2A – 0.6A<br>50/60Hz   |                                    |                                 |                         |  |
|                                  | Rated Frequ  |  | 47 to 440Hz  |                                    |                                 |                         |  |
|                                  |  | requency Range                           |  | 47 IU 440HZ                        |                                 |                         |  |
| <u>n n</u>                       | Power Factor (typ)                                   |  |  |                                    |                                 |                         |  |
|                                  | Efficiency (typ)                                     |  | 73%  | 76%                                | 80%                             | 83%                     |  |
|                                  | Inrush Current (max) Note1 Note2                     |  |  | 30A/60A (a                         | 1                               |                         |  |
|                                  | Leakage Cu   | irrent (max) 🔤                           |  | 0.5mA (V <sub>IN</sub> = 120V)/    | 0.75mA (V <sub>IN</sub> = 240V) |                         |  |
|                                  | Rated Output Voltage                                 |  | 3.3V   | 5V                                 | 12V                             | 24V                     |  |
| Output<br>Conditions 🚥           | Output Voltage Variation                             |  | 0.01   | -                                  | voltage ±10%                    | 2                       |  |
|                                  | Rated Outp   | -  | 10A  | 10A                                | 4.2A                            | 2.1A                    |  |
|                                  |  | eak Current                              |  |                                    |                                 |                         |  |
|                                  |  | utput Current Range                      |  | 0 to 2                             | 00%                             |                         |  |
| ji rt                            | Rated Outp   | •  | 33W 50W 50.4W 50.4W  |                                    |                                 |                         |  |
| on c                             |  | tage Accuracy Note6                      |  | ±3                                 |                                 |                         |  |
| οõ                               | Ripple Nois  |  | 80mVp-p  | <br>100mVp-p                       | 100mVp-p                        | 150mVp-p                |  |
|                                  |  | ding Time (min) 🔤                        | contrp p   |                                    | nsec                            | 1001117 P               |  |
|                                  | Startup time   | • · · ·                                  |  |                                    | nsec                            |                         |  |
|                                  |  |  |  | 2001                               |                                 |                         |  |
|                                  |  | t Protection                             | Detection  | above 105% of rated cu             | rent (drooping automatic        | recovery)               |  |
| ns<br>ns                         | Overvoltage  | e Protection Note7                       | D  | etection above 115% of r           | ated voltage (output cuto       | ff)                     |  |
| ţi ji                            | Overheating  | g Protection                             | Not provided   |                                    |                                 |                         |  |
| Additional<br>Functions          | Remote ON  | OFF Control                              | Not provided   |                                    |                                 |                         |  |
| ΡŪ                               | Remote Ser   | nsing                                    | Not provided   |                                    |                                 |                         |  |
|                                  | Operations Display                                   |  | Green LED indicator  |                                    |                                 |                         |  |
|                                  | Operating To   | mporaturo Bango me                       | -10°C to +60°C   |                                    |                                 |                         |  |
|                                  | Operating Temperature Range Notes                    |  | -10 C to +80 C<br>-20°C to +85°C   |                                    |                                 |                         |  |
|                                  | Storage Temperature Range                            |  | -20°C t0 +85°C<br>30 to 90%  |                                    |                                 |                         |  |
|                                  | Operating Humidity Range                             |  | 30 to 90%  |                                    |                                 |                         |  |
|                                  | Storage Humidity Range<br>Cooling Requirements       |  |  |                                    |                                 |                         |  |
| Environmental<br>Conditions      | Cooling Re   | No. of vibrations                        | Natural air cooling<br>10 to 55Hz  |                                    |                                 |                         |  |
| me                               |  |  | 3 minutes  |                                    |                                 |                         |  |
| itic                             | Vibration  | Sweep time                               |  |                                    |                                 |                         |  |
| ond<br>N                         | Resistance   | Acceleration rate<br>Vibration direction | 19.6m/s² (2G)  |                                    |                                 |                         |  |
| шй                               |  |  | X, Y, Z  |                                    |                                 |                         |  |
|                                  |  | Vibration time                           | One hour in each of three directions   |                                    |                                 |                         |  |
|                                  | Shock Resistance                                     |  | 98m/s <sup>2</sup> (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |                                    |                                 |                         |  |
|                                  | Installation   | Conditions                               | Derating may be required due to mounting direction   |                                    |                                 |                         |  |
|                                  |  | Between input and output                 | 200  | OOVAC for 1 minute (leas           | age current: 15 mA ar la        | (22)                    |  |
| Note 9                           |  | Between input and FG                     | 3000 V AC for 1 minute (leakage current: 15 mA or less)<br>2000 V AC for 1 minute (leakage current: 15 mA or less)   |                                    |                                 |                         |  |
| ion                              | Voltage  | Between output and FG                    |  | 0 V AC for 1 minute (leak          | •                               | ,                       |  |
| latic                            |  | Between input and output                 | 50   |                                    | ago current. To mA ULIES        |                         |  |
| n                                | Insulation   | Between input and FG                     |  | 100 M $\Omega$ (measured w         | th 500 V DC Meager)             |                         |  |
| lus                              | Resistance   | Between output and FG                    |  | 100 M32 (measured w                | in see v De Megger)             |                         |  |
|                                  |  | -  |  |                                    |                                 |                         |  |
|                                  | External Ap  | pearance                                 | With chassis   |                                    |                                 |                         |  |
| inre                             | Input Type   |  | Terminal stand (connector is optional)   |                                    |                                 |                         |  |
| Inct                             | Output Type  |  |  | Terminal stand (co                 | • •                             |                         |  |
| ds Sti                           | External Di  | nensions                                 |  | 125 <sup>₩</sup> x 80 <sup>□</sup> | x 29 <sup>H</sup> mm            |                         |  |
| External Structure/<br>Standards | Weight   |  |  | 270g                               |                                 |                         |  |
| tan                              | Safety Stan  |  |  | and TÜV (EN60950:2000) certified   | · · ·                           |                         |  |
| ш v                              | Conducted  |  | Designated to meet FCC   | Class B (120 V AC), EN550          |                                 | VCCI Class B (100 V AC) |  |
|                                  | Harmonic C   | urrent                                   |  | Immunity: Designated to            | meet IEC61000-4-2, 5            |                         |  |
|                                  | Remote ON  | /OFF Control                             |  | Not pr                             | ovided                          |                         |  |
| s                                | Chassis  |  |  | I                                  | s standard                      |                         |  |
| ion                              | Cover  |  |  |                                    | rided                           |                         |  |
| Options                          |  | Terminal stand                           |  |                                    | is standard                     |                         |  |
|                                  |  |  |  |                                    |                                 |                         |  |
|                                  | Connection Connector                                 |  | Provided   |                                    |                                 |                         |  |

Specified under rated input/output conditions at an ambient temperature of 25°C.

Note2 More current above noted values may flow at restart.

Course Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor and 0.1-μF film capacitor connected to that point.
 Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe Specified under rated input/output conditions. 86 The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.

Note 5 Output voltage can be changed within the maximum output power and

Note7 Reset is performed by reapplying input voltage.

rated output current.

Core Derating for ambient temperature applies. Core Insulation conditions are specified at normal temperature and humidity.

# **SWC** Series 50W,100W

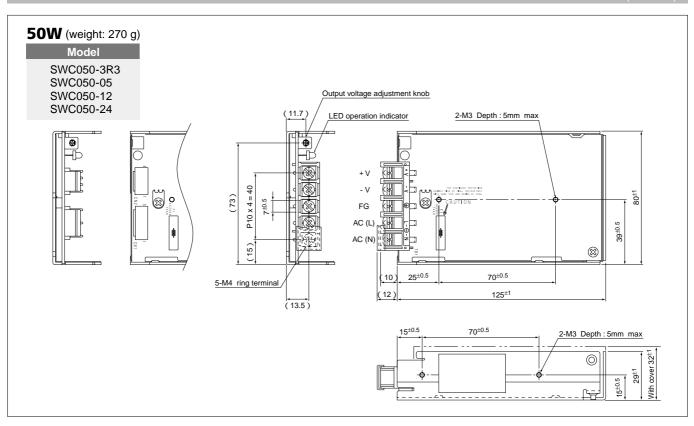
| Rated Input Voltage         AC100V to AC240           Allowable Input Voltage Range         AC85 to 264V           Input Current (typ) (III)         1.6A – 0.6A           Rated Frequency         50/60Hz           Allowable Frequency Range         47 to 63Hz           Power Factor (typ)         0.99/0.95           Efficiency (typ) (III)         72%           Inrush Current (max) (IIII)         0.5mA (VIN = 120V)/0.75mA           Rated Output Voltage         3.3V           V         5V           Output Voltage Variation (IIII)         Rated output voltage           Rated Output Current         20A           Maximum Peak Current         100%max           Allowable Output Current Range         0 to 100%           Rated Output Power         66W           Constant Voltage Accuracy (III)         20msec           Startup time (typ) (III)         80mVp-p           Overvoltage Protection         Detection above 105% of rated current (dro           Overvoltage Protection         Detection above 105% of rated voltad           Overleating Protection         Detection above 105% of rated voltad           Overleating Protection         Not provided   | 81% 82%<br>art)   |  |  |  |  |  |
|---|---|--|--|--|--|--|
| SWC100-3R3         SWC100-05         SW           Rated Input Voltage         AC100V to AC240           Allowable Input Voltage Range         AC85 to 264V           Input Current (typ) (III)         1.6A - 0.6A           Rated Frequency         50/60Hz           Allowable Frequency Range         47 to 63Hz           Power Factor (typ)         0.99/0.95           Efficiency (typ) (III)         72%           Inrush Current (max) (IIII)         30A/60A (at cold state)           Leakage Current (max) (IIII)         0.5mA (VIN = 120V)/0.75mA           Rated Output Voltage         3.3V         5V           Output Voltage Variation (IIII)         Rated output voltage         3.3V           Rated Output Voltage         3.3V         5V         100%max           Allowable Output Current         20A         20A         100%max           Allowable Output Current Range         0 to 100%         100W         100W           Constant Voltage Accuracy (IIII)         80mVp-p         100mVp-p         1           Output Holding Time (min)         80mVp-p         500msec         500msec  | NV<br>81% 82%<br>art)   |  |  |  |  |  |
| Allowable Input Voltage Range       AC85 to 264V         Input Current (typ) (III)       1.6A – 0.6A         Rated Frequency       50/60Hz         Allowable Frequency Range       47 to 63Hz         Power Factor (typ)       0.99/0.95         Efficiency (typ) (III)       72%         Inrush Current (max) (IIII)       30A/60A (at cold str.         Leakage Current (max) (IIII)       0.5mA (VIN = 120V)/0.75mA         Maximum Peak Current       20A         Maximum Peak Current       20A         Allowable Output Current Range       0 to 100%         Rated Output Power       66W         Allowable Output Power       66W         Output Holding Time (min) (IIII)       20mvp-p         Output Holding Time (min) (IIII)       20mvp-p         Overcurrent Protection       Detection above 105% of rated current (dr.   | 81% 82%<br>art)   |  |  |  |  |  |
| Input Current (typ) (III)       1.6A-0.6A         Rated Frequency       50/60Hz         Allowable Frequency Range       47 to 63Hz         Power Factor (typ)       0.99/0.95         Efficiency (typ) (III)       72%         Inrush Current (max) (IIII)       30A/60A (at cold state)         Leakage Current (max) (IIII)       0.5mA (VIN = 120V)/0.75mA         Rated Output Voltage       3.3V       5V         Output Voltage Variation (IIII)       20A       20A         Maximum Peak Current       20A       20A         Allowable Output Current Range       0 to 100%       4.100%/max         Allowable Output Power       66W       100W       4.3%         Rated Output Power       66W       100W       4.3%         Constant Voltage Accuracy (IIII)       80mVp-p       100mVp-p       1         Output Holding Time (min)       20msec       500msec         Startup time (typ) (III)       Detection above 105% of rated current (droptic)       500msec   | art)  |  |  |  |  |  |
| Rated Frequency       50/60Hz         Allowable Frequency Range       47 to 63Hz         Power Factor (typ)       0.99/0.95         Efficiency (typ)       72%         Inrush Current (max)       72%         Leakage Current (max)       30A/60A (at cold state)         Leakage Current (max)       0.5mA (ViN = 120V)/0.75mA         Rated Output Voltage       3.3V       5V         Output Voltage Variation       Rated output voltage         Rated Output Current       20A       20A         Maximum Peak Current       100%max         Allowable Output Current Range       0 to 100%         Rated Output Power       66W       100W         Constant Voltage Accuracy       80mVp-p       100mVp-p         Output Holding Time (min)       80mVp-p       500msec         Startup time (typ)       500msec       500msec   | art)  |  |  |  |  |  |
| Inrush Current (max) Image       12.78       17.78         Inrush Current (max) Image       30A/60A (at cold states)         Leakage Current (max) Image       0.5mA (ViN = 120V)/0.75mA         Rated Output Voltage       3.3V         Output Voltage Variation Image       Rated output voltage         Rated Output Current       20A         Maximum Peak Current       100%max         Allowable Output Current Range       0 to 100%         Rated Output Power       66W         Constant Voltage Accuracy Image       ±3%         Ripple Noise Image       80mVp-p         Output Holding Time (min) Image       20msec         Startup time (typ) Image       500msec   | art)  |  |  |  |  |  |
| Inrush Current (max) Image       12.78       17.78         Inrush Current (max) Image       30A/60A (at cold states)         Leakage Current (max) Image       0.5mA (ViN = 120V)/0.75mA         Rated Output Voltage       3.3V         Output Voltage Variation Image       Rated output voltage         Rated Output Current       20A         Maximum Peak Current       100%max         Allowable Output Current Range       0 to 100%         Rated Output Power       66W         Constant Voltage Accuracy Image       ±3%         Ripple Noise Image       80mVp-p         Output Holding Time (min) Image       20msec         Startup time (typ) Image       500msec   | art)  |  |  |  |  |  |
| Inrush Current (max) (max) (max)       30A/60A (at cold states)         Inrush Current (max) (max) (max) (max)       30A/60A (at cold states)         Leakage Current (max) (max) (max)       0.5mA (V <sub>IN</sub> = 120V)/0.75mA         Rated Output Voltage       3.3V         Output Voltage Variation (max)       SV         Rated Output Voltage Variation (max)       Rated output voltage states)         Rated Output Current       20A         Maximum Peak Current       100%max         Allowable Output Current Range       0 to 100%         Rated Output Power       66W         Constant Voltage Accuracy (max)       ±3%         Ripple Noise (max) (max)       80mVp-p       100mVp-p         Output Holding Time (min)       20msec         Startup time (typ) (max)       500msec   | art)  |  |  |  |  |  |
| Leakage Current (max) (max)       0.5mA (V <sub>IN</sub> = 120V)/0.75mA         Rated Output Voltage       3.3V       5V         Output Voltage Variation (max)       Rated output voltage :       Rated output voltage :         Rated Output Voltage Variation (max)       0.5mA (V <sub>IN</sub> = 120V)/0.75mA         Maximum Peak Current       20A       20A         Allowable Output Current Range       0 to 100%         Rated Output Power       66W       100W         Constant Voltage Accuracy (max)       ±3%         Ripple Noise (max) (max)       80mVp-p       100mVp-p         Output Holding Time (min) (max)       500msec         Startup time (typ) (max)       500msec   | *   |  |  |  |  |  |
| Output Voltage Variation Image       Rated output voltage         Rated Output Current       20A       20A         Maximum Peak Current       20A       20A         Allowable Output Current Range       0 to 100%         Rated Output Power       66W       100W         Constant Voltage Accuracy Image       ±3%         Ripple Noise Image       80mVp-p       100mVp-p       1         Output Holding Time (min) Image       500msec       500msec         Startup time (typ) Image       Detection above 105% of rated current (dropped)   |   |  |  |  |  |  |
| Rated Output Current     20A     20A       Maximum Peak Current     100%max       Allowable Output Current Range     0 to 100%       Rated Output Power     66W     100W       Constant Voltage Accuracy IIII     ±3%       Ripple Noise IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII   | 12V 24V   |  |  |  |  |  |
| Maximum Peak Current     100%max       Allowable Output Current Range     0 to 100%       Rated Output Power     66W     100W       Constant Voltage Accuracy Image     ±3%       Ripple Noise     80mVp-p     100mVp-p       Output Holding Time (min)     20msec       Startup time (typ)     500msec   |   |  |  |  |  |  |
| Allowable Output Current Range       0 to 100%         Rated Output Power       66W       100W         Constant Voltage Accuracy IIII       ±3%         Ripple Noise IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII   |   |  |  |  |  |  |
| Rated Output Power     66W     100W       Constant Voltage Accuracy (Integration of the second of t |   |  |  |  |  |  |
| Ripple Noise (cod) (cod)     80mVp-p     100mVp-p     1       Output Holding Time (min) (cod)     20msec       Startup time (typ) (cod)     500msec   | 102W 108W   |  |  |  |  |  |
| Output Holding Time (min)         20msec           Startup time (typ)         500msec           Overcurrent Protection         Detection above 105% of rated current (dropped)  | 00m)/p p 100m)/p z  |  |  |  |  |  |
| Startup time (typ) Image         500msec           Overcurrent Protection         Detection above 105% of rated current (dropped)   | 00mVp-p 100mVp-p  |  |  |  |  |  |
|   |   |  |  |  |  |  |
| Overvoltage Protection         Detection above 115% of rated volta           Overheating Protection         Not provided           Remote ON/OFF Control         Not provided   | poping automatic recovery)  |  |  |  |  |  |
| Overheating Protection         Not provided           Remote ON/OFF Control         Not provided  | ge (output cutoff)  |  |  |  |  |  |
| Periode Several Control   |   |  |  |  |  |  |
| Remote Sensing provided   | provided  |  |  |  |  |  |
| Operations Display Green LED indicat  | Green LED indicator   |  |  |  |  |  |
| Operating Temperature Range Temperature -10°C to +60°C  |   |  |  |  |  |  |
| Storage Temperature Range -20°C to +85°C  | -20°C to +85°C<br>30 to 90%   |  |  |  |  |  |
| Operating Humidity Range         30 to 90%           Storage Humidity Range         30 to 90%   |   |  |  |  |  |  |
|   | g   |  |  |  |  |  |
| Cooling Requirements         Natural air cooling           Vibration         No. of vibrations         10 to 55Hz           Sweep time         3 minutes           Acceleration rate         19.6m/s² (2G)           Vibration direction         x, Y, Z  |   |  |  |  |  |  |
| Sweep time         3 minutes           Vibration         Acceleration rate         19.6m/s² (2G)  | 19.6m/s² (2G)<br>X, Y, Z  |  |  |  |  |  |
| Vibration direction X, Y, Z   |   |  |  |  |  |  |
| Vibration time One hour in each of three  | One hour in each of three directions<br>98m/s <sup>2</sup> (10G)  |  |  |  |  |  |
| Shock Resistance Conduct this test on an oak board with a flat surface a  | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.                             |  |  |  |  |  |
|   | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |  |  |  |  |  |
| Installation Conditions Derating may be required due to n   | Derating may be required due to mounting direction  |  |  |  |  |  |
|   |   |  |  |  |  |  |
|   | ,   |  |  |  |  |  |
| Voltage         Between output and FG         500 V AC for 1 minute (leakage curr           Insulation         Between input and output         Between input and FG         100 MΩ (measured with 500 V  | <u>,</u>  |  |  |  |  |  |
| Resistance Between input and FG 100 MΩ (measured with 500 V<br>Between output and FG  | DC Megger)  |  |  |  |  |  |
| External Appearance With chassis  |   |  |  |  |  |  |
|   |   |  |  |  |  |  |
| Output Type         Terminal stand           External Dimensions         150 <sup>W</sup> x 93 <sup>D</sup> x 34 <sup>H</sup> m   |   |  |  |  |  |  |
| External Dimensions150 <sup>w</sup> x 93 <sup>D</sup> x 34 <sup>H</sup> mWeight500g (typ)   | .m  |  |  |  |  |  |
| Safety Standards UL60950, CSA60950-00 (C-UL), and TÜV (EN60950:2000) certified, designate   | ed to meet Electrical Appliance and Material Control Law  |  |  |  |  |  |
| Input Type         Terminal stand           Output Type         Terminal stand           Output Type         Terminal stand           External Dimensions         150 <sup>w</sup> x 93 <sup>D</sup> x 34 <sup>H</sup> m           Weight         500g (typ)           Safety Standards         UL60950, CSA60950-00 (C-UL), and TÜV (EN60950:2000) certified, designate           Conducted Emission         Designated to meet FCC Class B (120 V AC), EN55022 Class           Harmonic current: Designated to meet FCC Class B (120 V AC), EN55022 Class   |   |  |  |  |  |  |
| Harmonic Current Immunity: Designated to meet If  |   |  |  |  |  |  |
| Remote ON/OFF Control Not provided  |   |  |  |  |  |  |
|   | ard   |  |  |  |  |  |
| Chassis         Provided as standard provided           Cover         provided           Input/Output         Terminal stand         Provided as standard provided  | ard   |  |  |  |  |  |
| Connection         Connector         Not provided   |   |  |  |  |  |  |
| <ul> <li>Specified under rated input/output conditions at an ambient temperature of 25°C.</li> <li>More current above noted values may flow at restart.</li> <li>More Current above noted values may flow at restart.</li> <li>Connector, with a 63-V, 47-μF electrolytic capacitor connected to that point.</li> </ul>   |   |  |  |  |  |  |

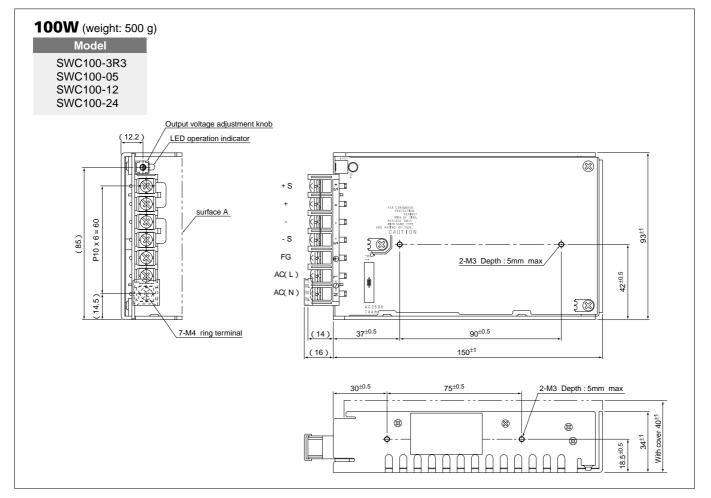
capacitor connected to that point. Repet Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe. Specified under rated input/output conditions. Derating for ambient temperature applies. Repet Insulation conditions are specified at normal temperature and humidity.

SWC Series

**External Dimensions** 

(unit: mm)





# SWC Series 50W,100W

## **Operating Instruction**

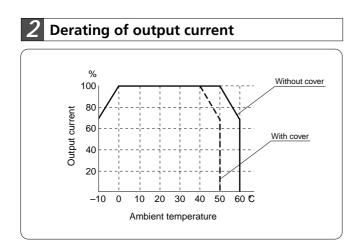
**1** Terminal connection

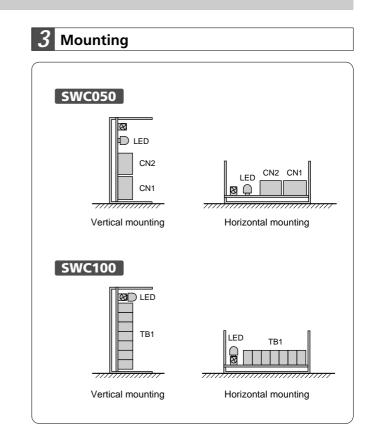
### SWC050

| Symbol         |     | Pin No. | Function | Connector        | Corresponding<br>connector | Corresponding<br>contact |
|----------------|-----|---------|----------|------------------|----------------------------|--------------------------|
|                |     | 1       | AC (N)   |                  |                            |                          |
| Connector      |     | 2       | NC       | 0005141          |                            |                          |
|                | CN1 | 3       | AC (L)   | B3P5-VH<br>(JST) | VHR-5N<br>(JST)            | SVH-21T-P1.1<br>(JST)    |
|                |     | 4       | NC       |                  |                            | (331)                    |
| Cor            |     | 5       | FG       |                  |                            |                          |
|                | CN2 | 1 to 2  | -        | B4P-VH           | VHR-4N                     | SVH-21T-P1.1             |
|                |     | 3 to 4  | +        | (JST)            | (JST)                      | (JST)                    |
| рс             |     | AC (N)  | AC (N)   |                  |                            |                          |
| star           |     | AC (L)  | AC (L)   |                  |                            |                          |
| nal            | TB1 | ≟ or G  | FG       |                  |                            |                          |
| Terminal stand |     | -       | -        |                  |                            |                          |
| ₽              |     | +       | +        |                  |                            |                          |

### SWC100

| _        |     |        |   |  |
|----------|-----|--------|---|--|
| Symbol   |     | Pin    | Function                                    |  |
|          |     | + S    | + S side output sensing (+ remote sensing)  |  |
| p        |     | +      | + output                                    |  |
| stand    |     | -      | - output                                    |  |
| nal      | TB1 | - S    | - S side output sensing ( - remote sensing) |  |
| Terminal |     | FG     |   |  |
| μΨ       |     | AC (L) | AC (L)                                      |  |
|          |     | AC (N) | AC (N)                                      |  |





Features world-wide input and active filter (PFC) Supports peak current

# **SWD** Series

60W (100W) (150W) (240W)

## Single output

With chassis

Supports 2.5x peak current

Supports top-class peak current: 2.5 times the rated current (within 15 seconds)\*. This helps save space and lower costs for power supplies in equipment sets.

\* (2.0 times in 240 W model).

- World-wide input Supports global markets with a wide-range continuous input method from 85 to 264 V AC.
- Full-fledged lineup With four models for up to 240 W of output power, the SWD Series provides a full lineup to meet a wide range of needs.
- Features active filter (PFC) SWD series features an active filter (PFC: Power Factor Correction circuit) for harmonic current control (complies with IEC-61000-3-2).
- Conducted emission Complies with Class B standards under VCCI, FCC, and EN55022.
- Acquired CE mark for LVD (Low Voltage Directive)

Complies with CE mark standards set by the EU. Acquired safety standards of a

### variety of countries

Complies with safety standards of a variety of countries, including UL1950, CSA950 (C-UL), and EN60950.

### applications

Mechatronics products (motors, solenoids, etc.)

Equipment that uses thermal heads

Examples: Ticket dispensers, card readers, POS terminals, ATMs, change machines, bill and coin counters, scales, printers, printing press, and other industrial equipment

ired UL. CSA (C-UL

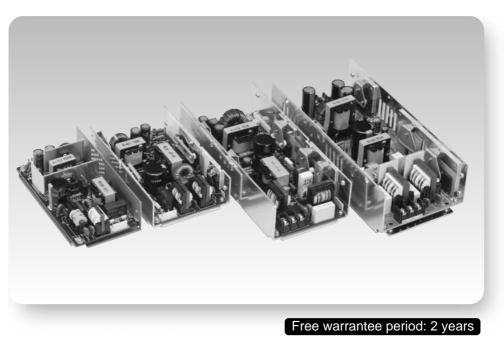
### Options

Cover (with derating) **Remote ON/OFF control** (available for 150 and 240 W models)

### Description of model name

### SWD 150P - 24 - R- C

| Series name | Output<br>voltage<br>(24: 24 V) | Option<br>(C: With cover)          |
|-------------|---------------------------------|------------------------------------|
|             |                                 | on<br>With remote<br>/OFF control) |





60W, 100W, 150W, 240W

|                                  |                               |                          | Specifications and Standards  |
|----------------------------------|-------------------------------|--------------------------|---|
|                                  | Мо                            | dal                      | 60W   |
|                                  |                               | uer                      | SWD060P-24  |
|                                  | Rated Input                   | Voltage                  | AC100V to AC240V  |
|                                  | Allowable Input Voltage Range |                          | AC85 to 264V  |
| S                                | Input Curre                   |                          | 0.9A (V <sub>IN</sub> = 100V)   |
| Input<br>Conditions              | Rated Freq                    |                          | 50/60Hz   |
| diti                             |                               | Frequency Range          | 47 to 63Hz  |
| ond                              | Power Fact                    |                          | $0.95 (V_{IN} = 100V)/0.90 (V_{IN} = 240V)$   |
| - O                              | Efficiency (                  |                          | 80%   |
|                                  |                               |                          |   |
|                                  | Inrush Current (max)          |                          | $15A (V_{IN} = 100V)/30A (V_{IN} = 240V)$   |
|                                  | Leakage Current (max) Notes   |                          | 0.75mA (V <sub>IN</sub> = 240V)   |
|                                  | Rated Outp                    | ut Voltage               | 24V   |
|                                  | Output Volt                   | age Variation            | Fixed   |
|                                  | Rated Outp                    | ut Current               | 2.5A  |
| Note 3                           |                               | Peak Current Note 8      | 6.0 A (within 15 sec)   |
| us                               |                               | utput Current Range      | 0 to 6.0A   |
| Output<br>Conditions             | Rated Outp                    | •                        | 60W   |
| ndi<br>ndi                       |                               | tage Accuracy Mes        | ±5%   |
| Cont                             |                               |                          |   |
|                                  | Ripple Nois                   |                          | 240mVp-p  |
|                                  |                               | ding Time (min) 🔤        | 60msec  |
|                                  | Startup time                  | e (typ)                  | 1000msec  |
|                                  | Overcurren                    | t Protection             | Detection above 105% of maximum peak current (drooping automatic recovery)  |
| Additional<br>Functions          | Overvoltage                   | e Protection Note 6      | Detection above 115% of rated voltage (output cutoff)   |
| ;;; i:                           |                               | g Protection             | Not provided  |
| ip d                             | Remote Ser                    |                          | Not provided  |
| АЦ                               | Operations                    | •                        | Not provided  |
|                                  |                               |                          | Not provided  |
|                                  | Operating Te                  | emperature Range         | -10°C to +60°C  |
|                                  | Storage Ten                   | nperature Range          | -25°C to +85°C  |
|                                  | Operating Humidity Range      |                          | 30 to 90%   |
|                                  | Storage Humidity Range        |                          | 30 to 90%   |
| <u>a</u>                         | Cooling Re                    | quirements               | Natural air cooling   |
| Environmental<br>Conditions      |                               | No. of vibrations        | 10 to 55Hz  |
| Ĕ                                |                               | Sweep time               | 3 minutes   |
| liti o                           | Vibration                     | Acceleration rate        | 19.6m/s² (2G)   |
| o vi                             | Resistance                    | Vibration direction      | X, Y, Z   |
| ШÖ                               |                               | Vibration time           | One hour in each of three directions  |
|                                  |                               | vibration time           |   |
|                                  | Shock Resi                    | stanco                   | 98m/s² (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.                                   |
|                                  | Ollock Resi                   | Stance                   | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.                       |
|                                  | Installation                  | Conditions               |   |
|                                  | misialiation                  | Conditions               | Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down) |
| 6                                | Insulation                    | Between input and output | 3000 V AC for 1 minute (leakage current: 15 mA or less)   |
| Note 7                           | Withstand                     | Between input and FG     | 2000 V AC for 1 minute (leakage current: 15 mA or less)   |
| Б                                | Voltage                       | Between output and FG    | 500 V AC for 1 minute (leakage current: 15 mA or less)  |
| nsulation                        |                               | Between input and output |   |
| sul                              | Insulation                    | Between input and FG     | 100 M $\Omega$ (measured with 500 V DC Megger)  |
| <u> </u>                         | Resistance                    | Between output and FG    |   |
|                                  |                               | •                        |   |
|                                  | External Ap                   | pearance                 | With chassis  |
| e/                               | Input Type                    |                          | Connector   |
| etu                              | Output Typ                    | e                        | Connector   |
| tra                              | External Di                   | mensions                 | 160 <sup>w</sup> x 80 <sup>D</sup> x 40 <sup>H</sup> mm   |
| al S<br>rds                      | Weight                        |                          | 500g  |
| arna                             | Safety Stan                   | dards                    | UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law                   |
| External Structure/<br>Standards | Conducted                     |                          | Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)   |
| ш о                              |                               |                          | Harmonic current: Designated to meet IEC61000-3-2   |
|                                  | Harmonic C                    | Current                  | Immunity: Designated to meet IEC61000-4-2, 5  |
|                                  |                               |                          |   |
| Options                          |                               | OFF Control              | Not provided  |
| - purchas                        | Cover                         |                          | Provided  |

Note: Specified under rated input/output conditions at an ambient temperature of  $25^{\circ}C$ .

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.

Note 6 Reset is performed by reapplying input voltage.

(too) Insulation conditions are specified at normal temperature and humidity.

Comparison of the second seco that point.

#### **Specifications and Standards** 100W Model SWD100P-24 Rated Input Voltage AC100V to AC240V Allowable Input Voltage Range AC85 to 264V Input Current (typ) Note1 $1.5A (V_{IN} = 100V)$ Rated Frequency 50/60Hz Allowable Frequency Range 47 to 63Hz Power Factor (typ) 0.95 (VIN = 100V)/0.90 (VIN = 240V) Efficiency (typ) 80% Inrush Current (max) 10002 15A (V<sub>IN</sub> = 100V)/30A (V<sub>IN</sub> = 240V) Leakage Current (max) Notes 0.75mA (V<sub>IN</sub> = 240V) Rated Output Voltage 24V **Output Voltage Variation** Fixed **Rated Output Current** lote 3 4.0A Maximum Peak Current Note 8 10.0 A (within 15 sec) Allowable Output Current Range 0 to 10.0A **Rated Output Power** 96W ort Sort Constant Voltage Accuracy ±5% Ripple Noise Note1 Note4 240mVp-p Output Holding Time (min) 60msec 1000msec Startup time (typ) **Overcurrent Protection** Detection above 105% of maximum peak current (drooping automatic recovery) Overvoltage Protection Note 6 Detection above 115% of rated voltage (output cutoff) **Overheating Protection** Not provided **Remote Sensing** Not provided **Operations Display** Not provided **Operating Temperature Range** -10°C to +60°C Storage Temperature Range -25°C to +85°C **Operating Humidity Range** 30 to 90% Storage Humidity Range 30 to 90% **Cooling Requirements** Natural air cooling No. of vibrations Note 9 10 to 55Hz Sweep time 3 minutes Vibration Acceleration rate 19.6m/s2 (2G) Resistance ы С Ш Vibration direction X, Y, Z Vibration time One hour in each of three directions 98m/s2 (10G) Shock Resistance Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. Installation Conditions Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down) Insulation Between input and output 3000 V AC for 1 minute (leakage current: 15 mA or less) Note 7 Withstand Between input and FG 2000 V AC for 1 minute (leakage current: 15 mA or less) Voltage Between output and FG 500 V AC for 1 minute (leakage current: 15 mA or less) Between input and output Insulation Resistance Between input and FG 100 M $\Omega$ (measured with 500 V DC Megger) Between output and FG **External Appearance** With chassis Input Type Connector **Output Type** Connector 160<sup>w</sup> x 98<sup>D</sup> x 40<sup>H</sup> mm **External Dimensions** Weight 650g UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law Safety Standards **Conducted Emission** Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC) in à Harmonic current: Designated to meet IEC61000-3-2 Harmonic Current Immunity: Designated to meet IEC61000-4-2, 5 **Remote ON/OFF Control** Not provided Options Cover Provided

Note: Specified under rated input/output conditions at an ambient temperature of 25°C.

Note2 More current above noted values may flow at restart.

More Support Connected to that point.

Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.

Note 6 Reset is performed by reapplying input voltage.

Note 7 Insulation conditions are specified at normal temperature and humidity.

Note 8 Up to rated output current at startup.

When mounted on mounting surface B, the No. of vibrations is from 10 to 25 Hz (refer to External Dimensions).

**D** Series

60W,100W,150W,240W

# **SWD** Series 60W,100W,150W,240W

|                                  |                               |                          | Specifications and Standards  |
|----------------------------------|-------------------------------|--------------------------|---|
|                                  | <b>NA</b> -                   | 4.1                      | 150W  |
|                                  | Мо                            | del                      | SWD150P-24  |
|                                  | Rated Input                   | t Voltage                | AC100V to AC240V  |
|                                  | Allowable Input Voltage Range |                          | AC85 to AC264V  |
| Ś                                | Input Curre                   | nt (typ) Noted           | 1.9A (V <sub>IN</sub> = 100V)   |
| out<br>nditions                  | Rated Freq                    | uency                    | 50/60Hz   |
| dit                              | Allowable F                   | Frequency Range          | 47 to 63Hz  |
| d L D                            | Power Fact                    | or (typ) Note1           | 0.95 (V <sub>IN</sub> = 100V)/0.90 (V <sub>IN</sub> = 240V)   |
|                                  | Efficiency (                  | typ) Note1               | 80%   |
|                                  | Inrush Curr                   | ent (max) 🔤              | 20A (V <sub>IN</sub> = 100V)/40A (V <sub>IN</sub> = 240V)   |
|                                  | Leakage Current (max) Note    |                          | 0.75mA (V <sub>IN</sub> = 240V)   |
|                                  | Rated Outp                    | ut Voltage               | 24V   |
|                                  |                               | age Variation            | Fixed   |
|                                  | Rated Outp                    | -                        | 6.0A  |
| Kote 3                           | · · · · ·                     | Peak Current Moss        | 15.0 A (within 15 sec)  |
| suc                              |                               | utput Current Range      | 0 to 15.0A  |
| it ic                            | Rated Outp                    | · · ·                    | 144W  |
| Output<br>Condition              |                               | Itage Accuracy Note 5    | ±5%   |
| ōŭ                               | <b>Ripple Nois</b>            | C Note 1 Note 4          | 400mVp-p  |
|                                  | Output Hole                   | ding Time (min) 🔤        | 60msec  |
|                                  | Startup time                  | e (typ)                  | 1000msec  |
|                                  | Overcurren                    | t Protection             | Detection above 105% of maximum peak current (drooping automatic recovery)  |
| Additional<br>Functions          |                               | e Protection Note6       | Detection above 105% of maximum peak current (drooping automatic receively)   |
| ți ți                            |                               | g Protection             | Not provided  |
| ddi                              | Remote Ser                    | •                        | Not provided  |
| A Ē                              | Operations                    | 0                        | Not provided  |
|                                  | On enertinen Te               | P                        |   |
|                                  |                               | emperature Range         | -10°C to +60°C  |
|                                  |                               | lumidity Range           | -25°C to +85°C<br>30 to 90%   |
|                                  |                               | midity Range             | 30 to 90%   |
| _                                | Cooling Re                    |                          | Natural air cooling   |
| Environmental<br>Conditions      | cooling ite                   | No. of vibrations        | 10 to 55Hz  |
| me                               |                               | Sweep time               | 3 minutes   |
| liti o                           | Vibration                     | Acceleration rate        | 19.6m/s² (2G)   |
| onc                              | Resistance                    | Vibration direction      | X, Y, Z   |
| ШÖ                               |                               | Vibration time           | One hour in each of three directions  |
|                                  |                               | I                        | 98m/s² (10G)  |
|                                  | Shock Resi                    | stance                   | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.   |
|                                  |                               |                          | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.                       |
|                                  | Installation                  | Conditions               | Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down) |
|                                  | Insulation                    | Between input and output | 3000 V AC for 1 minute (leakage current: 15 mA or less)   |
| Note 7                           | Withstand                     | Between input and FG     | 2000 V AC for 1 minute (leakage current: 15 mA or less)   |
| on                               | Voltage                       | Between output and FG    | 500 V AC for 1 minute (leakage current: 15 mA or less)  |
| Insulation                       | Insulation                    | Between input and output |   |
| nsı                              | Resistance                    | Between input and FG     | 100 M $\Omega$ (measured with 500 V DC Megger)  |
| _                                | ricolotanoo                   | Between output and FG    |   |
|                                  | External Ap                   | pearance                 | With chassis  |
| 7                                | Input Type                    | •                        | Terminal stand  |
| External Structure/<br>Standards | Output Typ                    | e                        | Connector   |
| truc                             | External Di                   |                          | 220 <sup>w</sup> x 98 <sup>D</sup> x 52 <sup>H</sup> mm   |
| al S<br>rds                      | Weight                        |                          | 950g  |
| erni<br>nda                      | Safety Stan                   | dards                    | UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law                   |
| Ext                              | Conducted                     | Emission                 | Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)   |
|                                  | Harmonic C                    | Current                  | Harmonic current: Designated to meet IEC61000-3-2   |
|                                  |                               |                          | Immunity: Designated to meet IEC61000-4-2, 5  |
| Ontion                           | Remote ON                     | /OFF Control             | Provided  |
| Options                          | Cover                         |                          | Provided  |
|                                  |                               |                          |   |

Note: Specified under rated input/output conditions at an ambient temperature of 25°C.

More current above noted values may flow at restart. Compose Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.

The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.

Note 6 Reset is performed by reapplying input voltage.

Note7 Insulation conditions are specified at normal temperature and humidity.

Note B Up to rated output current at startup.

# **SWD** Series 60W,100W,150W,240W

|                                  |  |                          | Specifications and Standards  |
|----------------------------------|--|--------------------------|---|
|                                  | Mo   | del                      | 240W  |
|                                  |  |                          | SWD240P-24  |
|                                  | Rated Input Voltage  |                          | AC100V to AC240V  |
|                                  | Allowable Input Voltage Range<br>Input Current (typ) Con<br>Rated Frequency<br>Allowable Frequency Range<br>Power Factor (typ) Con |                          | AC85 to 264V  |
| JS                               |  |                          | 4.0A (V <sub>IN</sub> = 100V)   |
| ţi                               |  |                          | 50/60Hz   |
| put                              |  |                          | 47 to 63Hz  |
| ਿ ਜੋ                             |  |                          | 0.95 (V <sub>IN</sub> = 100V)/0.90 (V <sub>IN</sub> = 240V)   |
|                                  | Efficiency (   |                          | 80%   |
|                                  |  | rent (max) Note 2        | 20A (V <sub>IN</sub> = 100V)/40A (V <sub>IN</sub> = 240V)   |
|                                  | Leakage Cu   | urrent (max) 🔤           | 0.75mA (V <sub>IN</sub> = 240V)   |
|                                  | Rated Outp   | ut Voltage               | 24V   |
| Note 3                           | Output Volt  | tage Variation           | Fixed   |
|                                  | Rated Outp   | out Current              | 10.0A   |
| suo                              | Maximum F  | Peak Current Notes       | 20.0 A (within 15 sec)  |
| but<br>diti                      | Allowable O  | output Current Range     | 0 to 20.0A  |
| Output<br>Conditi                | Rated Outp   |                          | 240W  |
| 00                               |  | Itage Accuracy Note 5    | ±5%   |
|                                  | Ripple Nois  | Se Note 1 Note 4         | 400mVp-p  |
|                                  | -  | ding Time (min) 🔤        | 60msec  |
|                                  | Startup time   | e (typ)                  | 1000msec  |
|                                  | Overcurren   | t Protection             | Detection above 105% of maximum peak current (drooping automatic recovery)  |
| Additional<br>Functions          |  | e Protection Note 6      | Detection above 115% of rated voltage (output cutoff)   |
| itio<br>Stio                     | -  | g Protection             | Not provided  |
| qq                               | Remote Ser   | nsing                    | Not provided  |
| ⋖╙                               | Operations   | Display                  | Not provided  |
|                                  |  | emperature Range         | -10°C to +60°C  |
|                                  |  | nperature Range          |   |
|                                  |  | Humidity Range           | -25°C to +85°C<br>30 to 90%   |
|                                  |  | midity Range             | 30 to 90%   |
| _                                |  | quirements               | Natural air cooling   |
| nta                              |  | No. of vibrations        | 10 to 55Hz  |
| me                               |  | Sweep time               | 3 minutes   |
| litic                            | Vibration  | Acceleration rate        | 19.6m/s² (2G)   |
| Environmental<br>Conditions      | Resistance   | Vibration direction      | X,Y,Z   |
| ШO                               |  | Vibration time           | One hour in each of three directions  |
|                                  |  |                          | 98m/s² (10G)  |
|                                  | Shock Resi   | istance                  | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.   |
|                                  |  |                          | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.                       |
|                                  | Installation   | Conditions               | Derating may be required due to mounting direction (normal installation directions are vertical and horizontal: with mounting holes down) |
| -                                | Insulation   | Between input and output | 3000 V AC for 1 minute (leakage current: 15 mA or less)   |
| Note 7                           |  | Between input and FG     | 2000 V AC for 1 minute (leakage current: 15 mA or less)   |
|                                  | Voltage  | Between output and FG    | 500 V AC for 1 minute (leakage current: 15 mA or less)  |
| Insulation                       | -  | Between input and output |   |
| nsı                              | Insulation<br>Resistance   | Between input and FG     | 100 M $\Omega$ (measured with 500 V DC Megger)  |
| <u> </u>                         | Resistance   | Between output and FG    |   |
|                                  | External Ap  | ·                        | With chassis  |
| ~                                | Input Type   |                          | Terminal stand  |
| External Structure/<br>Standards | Output Typ   | e                        | Terminal stand  |
| Luc                              | External Di  |                          | 240 <sup>w</sup> x 110 <sup>D</sup> x 65 <sup>H</sup> mm  |
| nl St<br>rds                     | Weight   |                          | 1200g   |
| erna                             | Safety Stan  | dards                    | UL60950, CSA No. 60950, and SEMKO (EN60950) certified, designated to meet Electrical Appliance and Material Control Law                   |
| Exte                             | Conducted  |                          | Designated to meet FCC Class B (120 V AC), EN55022 Class B (230 V AC) and VCCI Class B (100 V AC)   |
|                                  | Harmonic   | Surront                  | Harmonic current: Designated to meet IEC61000-3-2   |
|                                  | Harmonic C   | Juneni                   | Immunity: Designated to meet IEC61000-4-2, 5  |
|                                  | Remote ON  | I/OFF Control            | Provided  |
| Options                          | Cover  |                          | Provided  |
|                                  |  |                          | at an ambient temperature of 25°C.  |

Note: Specified under rated input/output conditions at an ambient temperature of 25°C.

More current above noted values may flow at restart. More Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-μF electrolytic capacitor and 0.1-μF film capacitor connected to that point. Not Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe.

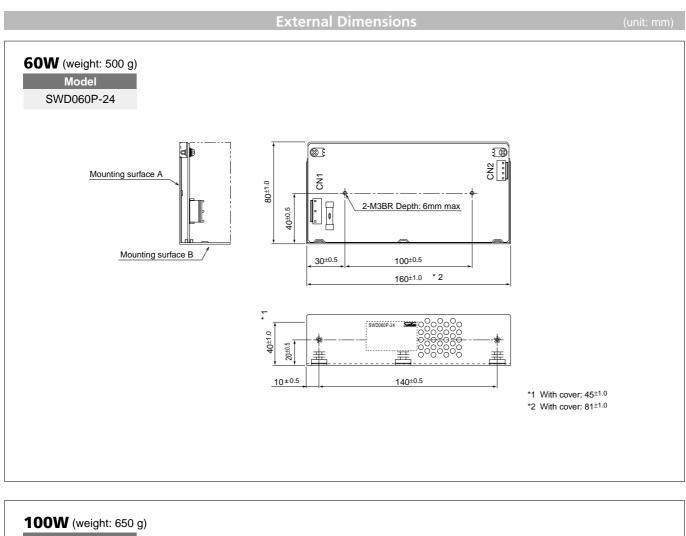
The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range.

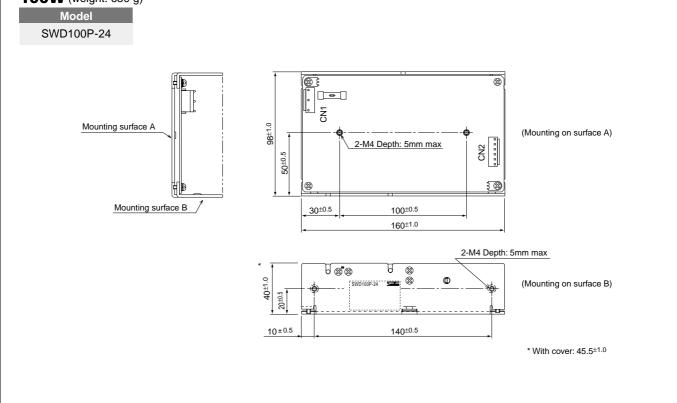
Note 6 Reset is performed by reapplying input voltage.

Note7 Insulation conditions are specified at normal temperature and humidity.

Note B Up to rated output current at startup.

**SWD** Series 60W,100W,150W,240W

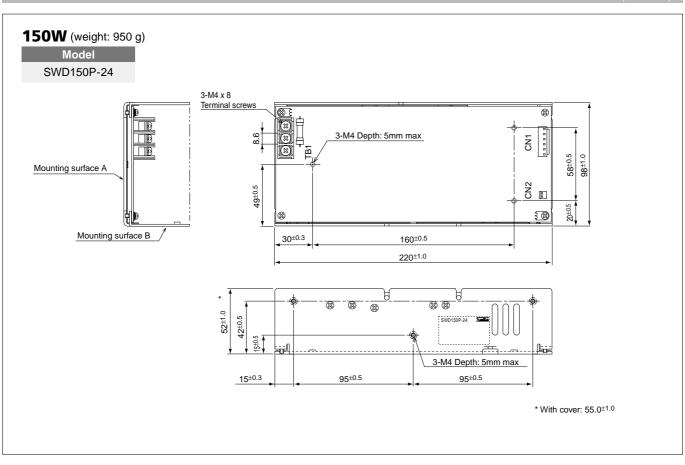


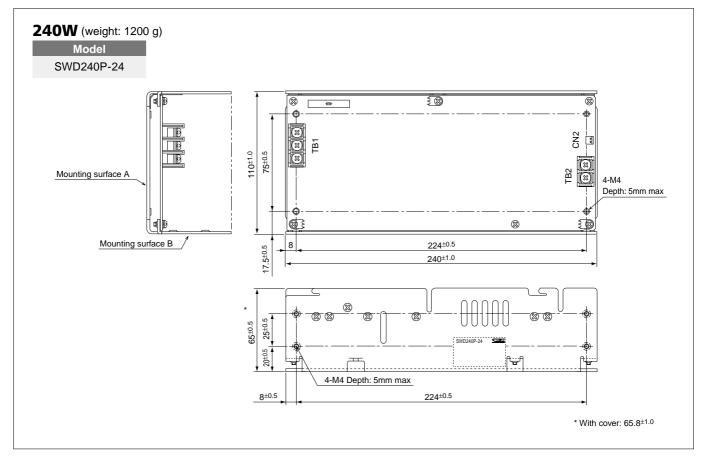


# **SWD** Series 60W, 100W, 150W, 240W

**External Dimensions** 

(unit: mm)







## **Operating Instruction**

1

**Terminal connection** 

### Input/output connectors

SWD060P-24

| Symbol | Pin No.         | Connector        | Corresponding<br>connector | Corresponding<br>contact |  |
|--------|-----------------|------------------|----------------------------|--------------------------|--|
|        | 1: AC (LIVE)    |                  | VHR-5N<br>(JST)            |                          |  |
|        | 2: NC           |                  |                            |                          |  |
| CN1    | 3: AC (NEUTRAL) | B3P5-VH<br>(JST) |                            | SVH-21T-P1.1<br>(JST)    |  |
|        | 4: NC           | (001)            |                            |                          |  |
|        | 5: FG           |                  |                            |                          |  |
|        | 1: +            |                  |                            |                          |  |
| CN2    | 2: +            | B4P-VH           | VHR-4N<br>(JST)            | SVH-21T-P1.1<br>(JST)    |  |
|        | 3: -            | (JST)            |                            |                          |  |
|        | 4: -            |                  |                            |                          |  |

### SWD100P-24

| Symbol | Pin No.         | Connector        | Corresponding<br>connector | Corresponding contact |
|--------|-----------------|------------------|----------------------------|-----------------------|
|        | 1: AC (LIVE)    |                  |                            |                       |
|        | 2: NC           |                  |                            |                       |
| CN1    | 3: AC (NEUTRAL) | B3P5-VH<br>(JST) | VHR-5N<br>(JST)            | SVH-21T-P1.1<br>(JST) |
|        | 4: NC           | (001)            | (001)                      | (001)                 |
|        | 5: FG           |                  |                            |                       |
|        | 1: +            |                  |                            |                       |
|        | 2: +            |                  | VHR-6N                     | SVH-21T-P1.1<br>(JST) |
| CN2    | 3: +            | B6P-VH           |                            |                       |
| CIN2   | 4: -            | (JST)            | (JST)                      |                       |
|        | 5: -            |                  |                            |                       |
|        | 6: -            |                  |                            |                       |

### SWD150P-24

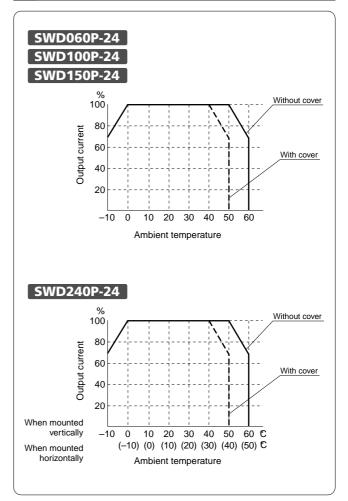
| Symbol | Pin No.                      | Connector     | Corresponding<br>connector | Corresponding<br>contact |
|--------|------------------------------|---------------|----------------------------|--------------------------|
|        | 1: AC (LIVE)                 | M110D-3C      | M4 terminals               |                          |
| TB1    | 2: AC (NEUTRAL)              | (Morimatsu)   |                            |                          |
|        | 3: FG                        | or equivalent |                            |                          |
|        | 1: +                         |               |                            |                          |
|        | 2: +                         | B6P-VH        | VHR-6N<br>(JST)            | SVH-21T-P1.1<br>(JST)    |
| CN1    | 3: +                         |               |                            |                          |
| CINT   | 4: -                         | (JST)         |                            |                          |
|        | 5: -                         |               |                            |                          |
|        | 6: -                         |               |                            |                          |
| CN2    | 1: RC +                      | B2P-SHF-1AA   | H2P-SHF-AA                 | SHF-001T-0.8SS<br>(JST)  |
| GNZ    | 2: RC -                      | (JST)         | (JST)                      |                          |
|        | CN2 is open on standard mode |               |                            |                          |

### SWD060P-24

| -      |                 |                              |                            |                          |  |
|--------|-----------------|------------------------------|----------------------------|--------------------------|--|
| Symbol | Pin No.         | Connector                    | Corresponding<br>connector | Corresponding<br>contact |  |
|        | 1: AC (LIVE)    | M110D-3C                     |                            |                          |  |
| TB1    | 2: AC (NEUTRAL) | (Morimatsu)                  | M4 terminals               |                          |  |
|        | 3: FG           | or equivalent                |                            |                          |  |
| TB2    | 1: +            | M110D-2C                     |                            |                          |  |
| 1D2    | 2: -            | (Morimatsu)<br>or equivalent | IVI4 ter                   | minals                   |  |
| CN2    | 1: RC +         | B2P-SHF-1AA                  | H2P-SHF-AA                 | SHF-001T-0.8SS           |  |
| GNZ    | 2: RC -         | (JST)                        | (JST)                      | (JST)                    |  |

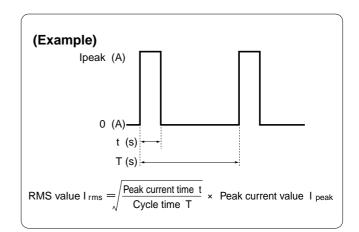
CN2 is open on standard model

### **2** Derating of output current



### **3** Dynamic load

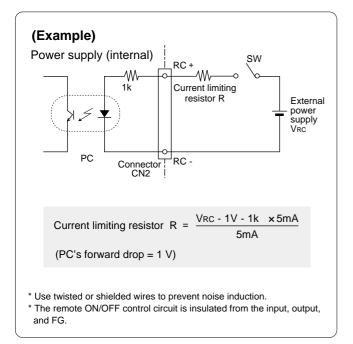
The peak current load occurs within 15 seconds. This series can also be used with dynamic (pulse) load. During dynamic operation, use the supply with the output current's RMS value equal to or less than the rated current.





### 4 Remote ON/OFF control (optional) SWD150P SWD240P

The SWD150P and SWD240P models enable remote ON/OFF control. However, this function requires the use of a DC power supply external to the SWD series power supply. Output goes ON when a voltage from 4.5 to 5.5 V (recommended current is 5 mA) is applied between the RC+ and RC- connectors (connector CN2's pins 1 and 2) for remote ON/OFF control. Output goes OFF when the voltage drops below 0.8 V or is discharged. If the external power supply's voltage is too high, insert a current limiting resistor.



# Ultra-compact, long life, high reliability, harmonic current control, resonant-mode switching power supply



Single output With chassis and cover

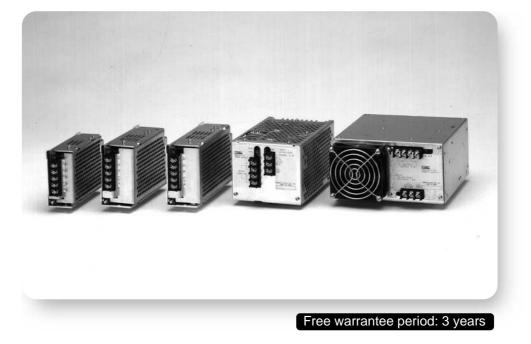


The HWA Series is an ultra-compact and reliable power supply with high efficiency, low noise and long life using proprietary Softswitching Multi-resonant Zero-cross (SMZ) type resonant-mode circuits; resonant-mode power IC and resonant-mode transformer.

### Applications

Industrial equipment such as factory automation controllers, power/plant controllers and semiconductor manufacturing equipment

- World-wide input range (85 to 264 V AC)
- Long life and high reliability
- CE mark compatible
- Conforms to harmonic current regulations (EN61000-3-2)
- Conforms to EMI regulations (electrical field emissions, conducted emission EN5081-1, FCC Class B)
- Complies with immunity regulations (EN61000-4 related)
- Complies with Machinery Directive (VDE0160, UL508)
- Natural air cooling (50 W to 300 W models)
- Ultra-compact model (Up to 42% smaller than our existing products)
- Parallel operation Possible by adjusting overcurrent protection (OCP) setting knob (HWA300W, 600W)
- DIN rail



50W,100W,150W,300W,600W

|                                  |                     |                              | Specifications and  | d Standards   |             |  |
|----------------------------------|---------------------|------------------------------|---------------------|---|-------------|--|
|                                  | Ma                  | del                          |                     | 50W   |             |  |
|                                  |                     |                              | HWA050-05-C         | HWA050-12-C   | HWA050-24-C |  |
|                                  | Rated Input         | t Voltage                    |                     | AC100V to AC240V  |             |  |
|                                  | Allowable I         | nput Voltage Range           | AC85 to 264V        |   |             |  |
| S                                | Input Curre         | nt (typ) Note1               | 0.9A/0.45A          |   |             |  |
| ion                              | Rated Freq          | -                            | 50/60Hz             |   |             |  |
| Input<br>Conditions              |                     | Frequency Range              | 47 to 63Hz          |   |             |  |
| Sor                              | Power Fact          |                              |                     | 0.95 (V <sub>IN</sub> = 100V, Load = 100%)              |             |  |
| Ŭ                                | Efficiency (        |                              | 83%                 | 84%   | 84%         |  |
|                                  |                     | ent (max) Note1              |                     | 25A/50A (at 25°C cold start)                            |             |  |
|                                  | Leakage Cu          | urrent (max) Note1           |                     | 0.5mA/1.0mA   |             |  |
|                                  | Rated Outp          | ut Voltage                   | 5V                  | 12V   | 24V         |  |
|                                  | Output Volt         | age Variation                |                     | -5% to +10%   |             |  |
| su                               | Rated Outp          |                              | 10A                 | 4.2A  | 2.1A        |  |
| itio                             |                     | utput Current Range          |                     | 0 to 100%   |             |  |
| Output<br>Conditions             | Rated Outp          |                              | 50W                 | 50.4W   | 50.4W       |  |
| ဝိပိ                             | Ripple Nois         |                              | 100mVp-p            | 240mVp-p  | 480mVp-p    |  |
|                                  |                     | ding Time (min)              |                     | 20msec  |             |  |
|                                  | Startup Tim         | ne (max)                     |                     | 1000msec  |             |  |
|                                  | Overcurren          | t Protection Note2           |                     | Provided  |             |  |
| ial<br>IS                        | <u>م</u> overvoltag | e Protection                 | Provided            |   |             |  |
| Additional<br>Functions          |                     | g Protection                 | Not provided        |   |             |  |
| ddit                             | Remote ON           | /OFF Control                 | Not provided        |   |             |  |
| Ъ,                               | Remote Ser          | 0                            | Not provided        |   |             |  |
|                                  | Operations          | Display                      | Green LED indicator |   |             |  |
|                                  | Operating Te        | emperature Range             | -10 to +55°C        |   |             |  |
|                                  |                     | nperature Range              | -25 to +65°C        |   |             |  |
|                                  | Operating H         | lumidity Range               | 25 to 85%           |   |             |  |
| ital                             | Storage Hu          | midity Range                 |                     | 25 to 85%   |             |  |
| Environmental<br>Conditions      | Cooling Re          | quirements                   |                     | Natural air cooling                                     |             |  |
| Environme<br>Conditions          |                     | No. of vibrations            |                     | 10 to 55Hz  |             |  |
| wir                              | Vibration           | Sweep time                   |                     | 3 minutes   |             |  |
| ы                                | Resistance          | Acceleration rate            |                     | Single-sided amplitude: 0.75 mm                         |             |  |
|                                  |                     | Vibration direction          | X, Y, Z             |   |             |  |
|                                  | Installation        | Vibration time<br>Conditions |                     | ght minutes in each of three direction                  |             |  |
|                                  | Installation        | Conditions                   | Deraunų             | g may be required due to mounting                       | allection   |  |
|                                  | Insulation          | Between input and output     |                     | 3000 V AC for 1 minute                                  |             |  |
| on                               |                     | Between input and FG         |                     | 2200 V AC for 1 minute                                  |             |  |
| Insulation                       | Voltage             | Between output and FG        |                     | 1000 V AC for 1 minute                                  |             |  |
| nsu                              | Insulation          | Between input and output     |                     |   |             |  |
| _                                | Resistance          |                              |                     | 10 M $\Omega$ or above                                  |             |  |
|                                  |                     | Between output and FG        |                     |   |             |  |
| _                                | External Ap         | opearance                    |                     | With chassis and cover                                  |             |  |
| ure                              | Input Type          |                              |                     | Terminal stand  |             |  |
| External Structure/<br>Standards | Output Typ          |                              |                     |   |             |  |
| il St<br>ds                      | External Di         | mensions                     |                     | 40 <sup>W</sup> x 127 <sup>D</sup> x 85 <sup>H</sup> mm |             |  |
| erna                             | Weight              | danda 🖚                      |                     | 420g  |             |  |
| Exte                             | Safety Stan         |                              |                     | 08, CSA No. 950, VDE (EN60950), a                       |             |  |
|                                  | Conducted<br>EMC    | Emission                     | U                   | ated to meet FCC Class B and EN                         |             |  |
|                                  |                     |                              |                     | o meet EN55022, EN61000-4 and                           |             |  |
| Options                          |                     | /OFF Control                 |                     | Not provided  |             |  |
|                                  | Cover               |                              |                     | Provided as standard                                    |             |  |

Note1 Regulated at rated input voltage (100/200 V AC), 100% load.

Detection above 105% (101 to 105% for 300W only) for overcurrent protection, and automatic recovery from drooping. For 600W type, output is shut off when overcurrent continues for more than 5 seconds.

CE Marking: The CE mark is indicated in accordance with certification to low voltage directive (EN60950) and EMC directive (EN55022, EN61000-4, EN61000-3-2).

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### 50W, 100W, 150W, 300W, 600W

xternal Dimensions

50W (weight: 420g) Model HWA050-05-C HWA050-12-C jĞ 高速意 HOT SURFACE HWA050-24-C ٦ 0 8 8 117<sup>±0.35</sup> DIN rail Without DIN rail 3.5 đ ø e e e +v −v ⊕ L-0-N 85<sup>±0.35</sup> 72±0.35 16 HWA050-\*\* POWER SUPPLY INPUT AC110-2 1 (46.2) 4 0 7±0.3 . 5<sup>±0.3</sup> 1.6 3.5 7±0.3 20<sup>±1.0</sup> Without DIN rail 127 With DIN rail 136.1<sup>±1.0</sup> (Side view when the DIN rail is attached.) 3 - M3( Depth: 6mm max ) 117<sup>±0.35</sup> ±0.3 Note 1) 3.5 5 Without cover 39<sup>±0.5</sup> <del>ال</del>ا With cover 40<sup>±0.5</sup> റ്റ 16 28 24 Ð, Note 1) The height of a screw head for installation should be 4.5 mm max. 2) The screw head for connecting I/O pin is M4 x 8 (with square screw nut and spring washer) 3) The figures in parentheses show reference sizes. 5±0.3 (11.4) 1.6 100<sup>±0.35</sup> 12.5

50W,100W,150W,300W,600W

|   | Specifications and Standards                            |   |  |  |
|---|---|---|--|--|
|   | 100W  | 150W  |  |  |
| Model   | HWA100-24-C   | HWA150-24-C   |  |  |
| Rated Input Voltage   | AC100V 1  | o AC240V  |  |  |
| Allowable Input Voltage Ran   | ge AC85   | to 264V   |  |  |
| nput Current (typ) Note1  | 1.8A/0.9A   | 2.7A/1.4A   |  |  |
| <b>Rated Frequency</b>  | 50/0  | 60Hz  |  |  |
| Rated Frequency<br>Allowable Frequency Range<br>Power Factor (typ)  |   | 63Hz  |  |  |
| Power Factor (typ)  |   | V, Load = 100%)   |  |  |
| Efficiency (typ) Mars   |   | 4%  |  |  |
| Inrush Current (max)  Leakage Current (max)  Interview  |   | 25°C cold start)  |  |  |
|   | 0.5/11/4  | /1.0mA  |  |  |
| Rated Output Voltage  | 2   | 4V  |  |  |
| Output Voltage Variation  |   | 0 +10%  |  |  |
| Rated Output Current  | 4.2A  | 6.5A  |  |  |
| Allowable Output Current Ran  | ge 0 to 100.8W  | 100%<br>156W  |  |  |
| Rated Output Current<br>Allowable Output Current Ran<br>Rated Output Power<br>Ripple Noise  |   | nVp-p   |  |  |
| Output Holding Time (min)   |   | msec  |  |  |
| Startup Time (max)  |   | msec  |  |  |
| · · · ·   |   |   |  |  |
| Overcurrent Protection $\overline{m}$ <u>o</u> $\overline{m}$ <u>o</u>  |   | /ided   |  |  |
| Overheating Protection  |   | Provided<br>Not provided                                      |  |  |
| Remote ON/OFF Control   | Not provided  |   |  |  |
| Overvoltage Protection           Overheating Protection           Remote ON/OFF Control           Remote Sensing  | Not provided  |   |  |  |
| Operations Display  | Green LED indicator                                     |   |  |  |
| Operating Temperature Range   | -10 to +55°C  |   |  |  |
| Storage Temperature Range   | -25 to +65°C  |   |  |  |
| Operating Humidity Range  | 25 to 85%   |   |  |  |
| Storage Humidity Range  | 25 to   | 9 85%   |  |  |
| Storage Humidity Range<br>Cooling Requirements<br>No. of vibrations<br>Sweep time<br>Acceleration rate  |   | air cooling   |  |  |
| Cooling Requirements No. of vibrations Sweep time Vibration Resistance  |   | 55Hz  |  |  |
| Vibration Sweep time  |   | nutes   |  |  |
| Resistance Acceleration rate     Vibration directi  | enigie ciaca an   | nplitude: 0.75 mm   |  |  |
| Vibration direct  |   | Y, Z<br>ch of three directions                                |  |  |
| Installation Conditions   |   | due to mounting direction                                     |  |  |
| Insulation Between input and out  |   | for 1 minute  |  |  |
|   |   | for 1 minute  |  |  |
| Withstand         Between input and           Voltage         Between output and           Insulation         Between input and out           Between input and out         Between input and out |   | for 1 minute  |  |  |
| Between input and out   |   |   |  |  |
| Resistance Between input and  | -G 10 MΩ 0  | or above  |  |  |
| Between output and  | FG  |   |  |  |
| External Appearance   | With chass  | is and cover  |  |  |
| Input Type  | Termin  | al stand  |  |  |
| Output Type   |   | al stand  |  |  |
| External Dimensions   | 50 <sup>W</sup> x 145 <sup>D</sup> x 92 <sup>H</sup> mm | 50 <sup>W</sup> x 163 <sup>D</sup> x 92 <sup>H</sup> mm       |  |  |
| Input Type<br>Output Type<br>External Dimensions<br>Weight<br>Safety Standards  | 600g  | 900g  |  |  |
| Safety Standards Conducted Emission   |   | VDE (EN60950), and VDE0160 certified<br>Class B and EN50081-1 |  |  |
| EMC   |   | , EN61000-4 and EN61000-3-2                                   |  |  |
|   |   |   |  |  |
| Options Remote ON/OFF Control   | •   | rovided   |  |  |
| Cover   | Provided a  | as standard   |  |  |

Note1 Regulated at rated input voltage (100/200 V AC), 100% load.

Detection above 105% (101 to 105% for 300W only) for overcurrent protection, and automatic recovery from drooping. For 600W type, output is shut off when overcurrent continues for more than 5 seconds.

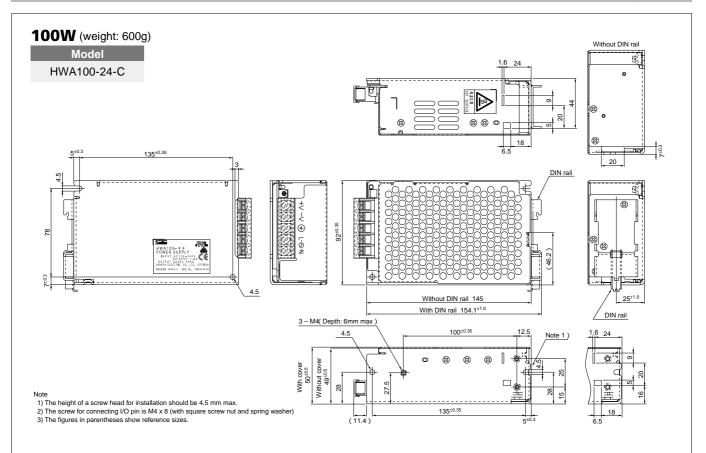
CE Marking: The CE mark is indicated in accordance with certification to low voltage directive (EN60950) and EMC directive (EN55022, EN61000-4, EN61000-3-2).

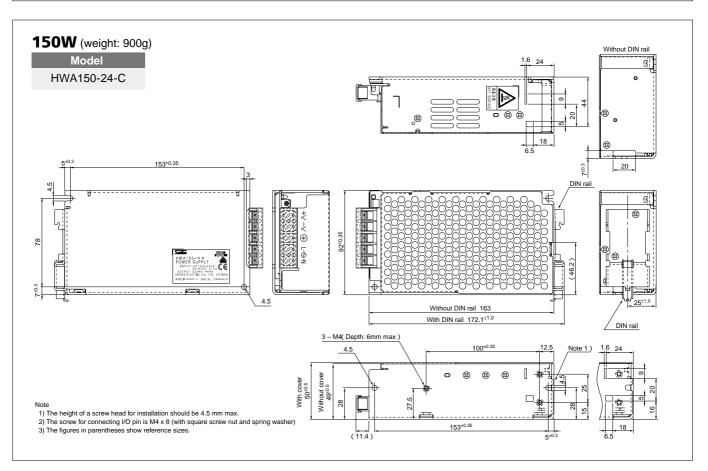
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# **HWA** Series 50W, 100W, 150W, 300W, 600W

**External Dimensions** 

(unit: mm)





50W,100W,150W,300W,600W

| _                                | _                             |  | Specifications and Standards                             |  |  |
|----------------------------------|-------------------------------|--|--|--|--|
|                                  | Мос                           |  | 300W   | 600W   |  |
|                                  | IN OC                         |  | HWA300-24-C  | HWA600-24-C  |  |
|                                  | Rated Input                   | Voltage  | AC100V t   | o AC240V   |  |
|                                  | Allowable Input Voltage Range |  | AC85 t   | to 264V  |  |
| w                                | Input Curren                  |  | 5.4A/2.7A  | 10A/5A   |  |
| ion                              | Rated Frequ                   |  |  | 60Hz   |  |
| Input<br>Conditions              |                               | equency Range                                    | 1  | 63Hz   |  |
| lnp<br>Cor                       | Power Facto                   |  |  | V, Load = 100%)  |  |
|                                  | Efficiency (t                 |  | 83%  | 83%  |  |
|                                  |                               | ent (max) Note1<br>rrent (max) Note1             |  | 5°C cold start)<br>/1.0mA                                |  |
|                                  | -                             |  | 0.5111A  | 71.0IIIA   |  |
|                                  | Rated Outpu                   | -  |  | 4V   |  |
|                                  |                               | ige Variation                                    |  | 0 +10%   |  |
| ons                              | Rated Outpu                   |  | 14A  | 27A  |  |
| put<br>diti                      | Allowable Ou<br>Rated Outpu   | tput Current Range                               | 0 to 1<br>336W   | 100%<br>648W   |  |
| Output<br>Conditions             | Ripple Noise                  |  |  | nVp-p  |  |
| 00                               | <u> </u>                      | ;<br>ing Time (min)                              |  | nvp-p<br>msec  |  |
|                                  | Startup Time                  |  |  | msec   |  |
|                                  |                               |  |  |  |  |
| =                                | Overcurrent<br>Overvoltage    |  |  | /ided<br>/ided   |  |
| ons                              | Overvoltage                   |  | Not provided   | Provided   |  |
| ditio                            | Remote ON/                    |  | Not provided Not provided                                |  |  |
| Additional<br>Functions          | Remote Sen                    |  | Not provided   |  |  |
|                                  | Operations I                  | 0  | Green LED indicator                                      |  |  |
|                                  |                               | nperature Range                                  | -10 to   | +55°C  |  |
|                                  |                               | perature Range                                   | -10 to +55°C<br>-25 to +65°C                             |  |  |
|                                  | -                             | umidity Range                                    | 25 to 85%  |  |  |
| ta                               | Storage Hun                   |  | 25 tc  | 9 85%  |  |
| Environmental<br>Conditions      | Cooling Req                   |  | Natural a  | air cooling  |  |
| itioi                            |                               | No. of vibrations                                | 10 to  | 55Hz   |  |
| Environmeı<br>Conditions         | Vibration –                   | Sweep time                                       |  | nutes  |  |
| မ် မိ                            | Resistance                    | Acceleration rate                                |  | nplitude: 0.75 mm  |  |
|                                  | -                             | Vibration direction                              |  | Y, Z   |  |
|                                  | Installation (                | Vibration time                                   | 0  | ch of three directions                                   |  |
|                                  | installation                  | Solutions  | Derating may be required                                 | due to mounting direction                                |  |
|                                  |                               | Between input and output                         |  | for 1 minute   |  |
| ion                              | L b                           | Between input and FG                             |  | for 1 minute   |  |
| Insulation                       |                               | Between output and FG                            | 1000 V AC  | for 1 minute   |  |
| ารน                              | Insulation                    | Between input and output<br>Between input and FG | 40.140   | ar above   |  |
|                                  |                               | Between output and FG                            | 10 M22 C   | or above   |  |
|                                  |                               | •  |  |  |  |
| e/                               | External App                  | bearance   |  | is and cover   |  |
| ctur                             | Input Type<br>Output Type     |  |  | al standal standal stand                                 |  |
| External Structure/<br>Standards | External Din                  |  | 110 <sup>W</sup> x 175 <sup>D</sup> x 92 <sup>H</sup> mm | 170 <sup>W</sup> x 179 <sup>D</sup> x 92 <sup>H</sup> mm |  |
| ards                             | Weight                        |  | 2200g  | 3500g  |  |
| terr<br>and                      | Safety Stand                  | lards Note3                                      | UL1950, UL1012, UL508, CSA No. 950,                      | 5  |  |
| щų                               | Conducted I                   |  |  | Class B and EN50081-1                                    |  |
|                                  | EMC                           |  | Designated to meet EN55022,                              | EN61000-4 and EN61000-3-2                                |  |
|                                  | Pomoto ON/                    | OFF Control                                      | Not or   | ovided   |  |
| Options                          |                               |  |  |  |  |

Note1 Regulated at rated input voltage (100/200 V AC), 100% load.

Detection above 105% (101 to 105% for 300W only) for overcurrent protection, and automatic recovery from drooping. For 600W type, output is shut off when overcurrent continues for more than 5 seconds.

CE Marking: The CE mark is indicated in accordance with certification to low voltage directive (EN60950) and EMC directive (EN55022, EN61000-4, EN61000-3-2).

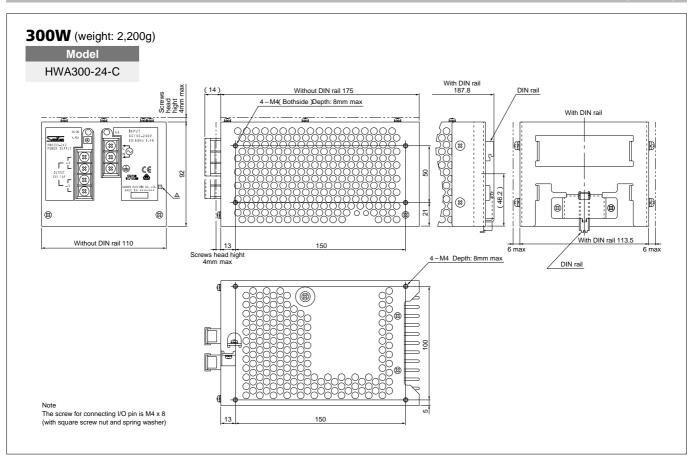
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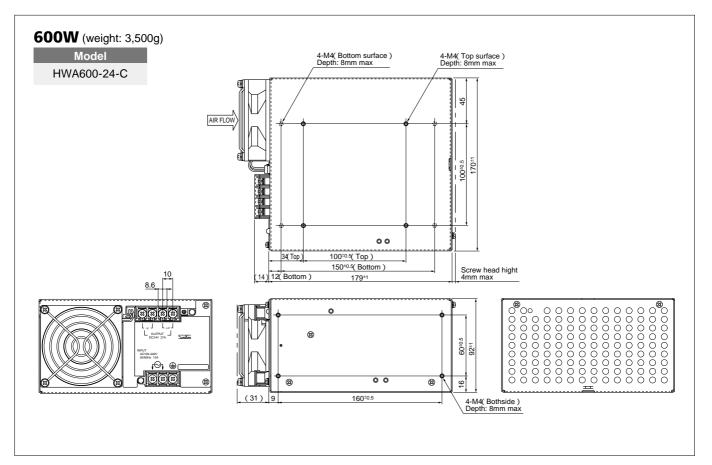
## **HWA** Series

50W, 100W, 150W, 300W, 600W

**External Dimensions** 

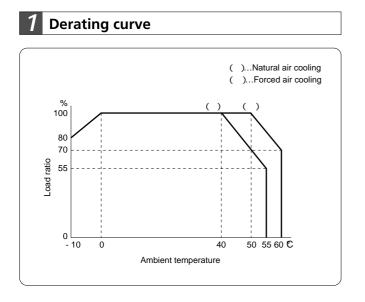
(unit: mm)







### **Operating Instruction**



### **2** Parallel operation

Parallel operation can be performed only with the HWA300W and 600W models. Please contact Sanken if you intend to perform parallel operation. Sanken provides this product as optional. During parallel operation, each unit must be operated within 90% of rated current.

### Employs proprietary SMZ type resonant-mode circuits. Realizes compact, low price, ultra-low noise like dropper power supply.



Single 15W 30W 60W Single output

(output voltages: each 5 V,

**Double output** (output voltage: Å}15 V)

12 V (30 W or 60 W), 15 V, 24 V (60 W))





The HWB Series uses proprietary Softswitched Multiresonant Zerocross (SMZ) type resonant-mode circuits to achieve large noise reduction of the inverter unit. Moreover, this is a switching power supply which has realized ultra-low noise (ripple voltage, conducted emission, noise electric field strength) like dropper power supply, employing a proprietary resonant-mode

### Applications

hybrid IC and transformer.

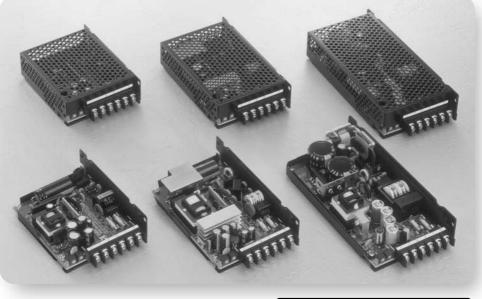
Measuring instruments, semiconductor manufacturing equipment, controllers, medical equipment, etc.

Equipment that uses a dropper power supply (series regulator)

### Options

- C: Cover
- R: Output remote ON/OFF control (external voltage control)
- M: Supports medical equipment ... Low leakage current: 50 μA or less (standard: 0.25 mA or less)

- Low ripple noise
  - 5 mV (p-p) or less \* With a 100-MHz oscilloscope. Spike element excluded.
- Low conducted emission Approx. 20 dB margin for VCCI Class B, FCC Class B, and CISPR Class B standards
- Low noise electric field strength Complies with VCCI Class B, FCC Class B, and CISPR Class B standards
- World-wide input range 85 to 264 V AC continuous input or 85 to 132 V AC and 170 to 264 V AC automatic switching (HWB060S)
- **Compact, lightweight, low price** Volume and weight are approx. 1/4 of dropper type. Price is approx. 1/2.
- CE marking compatible Acquired CE mark for LVD
- Safety standards Acquired UL1950, CSA950, and EN60950 Acquired EN60601-1 and UL2601-1 (HWB030S) (Type with M option: supports medical equipment)
- Parallel operation Possible by adjusting overcurrent protection (OCP) setting knob (HWB060S)



Free warrantee period: 3 years

[Single output] 15W, 30W, 60W [Double output] 15W, 30W

|  |  |  | Specifications and Standar  | ds  |  |
|--|--|--|---|---|--|
|  | Model  |  | <b>15W</b> [s   | ingle output]   |  |
|  | IVIC   |  | HWB015S-05  | HWB015S-15  |  |
|  | Rated Input Voltage  |  | AC10  | DV to AC240V  |  |
|  |  | nput Voltage Range   | AC  | 85 to 264V  |  |
| put<br>nditions                                    | Input Current (typ) Notes  |  | 0.4A  | 0.5A  |  |
| diti   |  | uency<br>Frequency Range   |   | 50/60Hz<br>7 to 440Hz   |  |
| lnp<br>Con   | Efficiency (   |  | 70%   | 75%   |  |
|  |  | rent (max) Note2   |   | (240VAC)max (at cold start)   |  |
|  | Leakage Cu   | urrent (max) 🔤   | 0.25mA (max)  | Option M : 50µA (max)   |  |
|  | Rated Outp   | out Voltage  | 5V  | 15V   |  |
|  |  | tage Variation   | Rated outpu   | t voltage +10%, -5%   |  |
| Note 3   | Rated Outp   |  | 3.0A  | 1.3A  |  |
| S  |  | tput Current Range   |   | to 100%   |  |
| Ęţ   | Rated Outp   |  | 15W   | 19.5W   |  |
| Output<br>Conditions                               | Ripple 1004  | Itage Accuracy Note 5 Note 6   |   | ±3%<br>5mVp-p   |  |
| ōŭ   | Ripple Nois  |  | 1   | 0mVp-p  |  |
|  |  | ding Time (min) 🔤  | 20 ms at ra   | ted output of 15 W  |  |
|  | Startup tim  | e (typ) Note 1   |   | 1sec  |  |
|  | Overcurren   | t Protection   | Detection above approx. 105% of r   | ated current (drooping automatic recovery)  |  |
| = 0  | Overvoltag   | e Protection Note 9  |   | of rated voltage (output cutoff)  |  |
| ona  | Overheatin   | g Protection   | No  | ot provided   |  |
| Additional<br>Functions                            | Remote ON/OFF Control  |  | Optional support<br>(OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)   |   |  |
|  | Remote Sensing   |  | Not provided  |   |  |
|  | Operations Display   |  | Green LED indicator   |   |  |
|  | Operating Temperature Range Note 7   |  | -10°  | °C to +60°C   |  |
|  | Storage Temperature Range  |  |   | °C to +85°C   |  |
|  | Operating Humidity Range   |  | 30 to 90% (no condensation)<br>30 to 90% (no condensation)  |   |  |
|  | Storage Humidity Range<br>Cooling Requirements                                       |  | Natural air cooling   |   |  |
| Environmental<br>Conditions                        |  | No. of vibrations  | 10 to 55Hz  |   |  |
| ime  | Vibration  | Sweep time   | 3   | 3 minutes   |  |
| iron<br>diti                                       | Resistance   |  | 19  | 9.6m/s² (2G)  |  |
|  |  | Vibration direction  |   | X, Y, Z   |  |
|  |  | Vibration time   |   | ach of three directions   |  |
|  | Shock Resistance   |  | 98m/s <sup>2</sup> (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.   |   |  |
|  |  |  | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.   |   |  |
|  | Installation   | Conditions   | Derating may be required due to mounting direction  |   |  |
| e  | Insulation   | Between input and output   | 3000 V AC for 1 minute or 3600 V AC for 1 second (lea   | akage current: 15 mA or less) Option M: 4000 V AC for 1 minute  |  |
|  | Withstand  | Between input and FG   | 1500 V AC for 1 minute or 1800 V AC   | for 1 second (leakage current: 15 mA or less)   |  |
| Insulation   | Voltage  | Between output and FG  | 500 V AC for 1 minute or 600 V AC f   | or 1 second (leakage current: 15 mA or less)  |  |
| sula   | Insulation   | Between input and output   | 100 MO (  |   |  |
| lns  | Resistance   | Between input and FG<br>Between output and FG  | 100 M22 (measure  | d with 500 V DC Megger)   |  |
|  | Extornal   | • •  | 1   | ith choosis   |  |
| /e/  | External Ap  | opearance  |   | ith chassis<br>minal stand  |  |
| rctu   | Output Typ   | e  |   | minal stand   |  |
| stri   | External Di  |  | 34 <sup>W</sup> x 110 <sup>D</sup> x 92 <sup>H</sup> mm (Excluding parts  | for installing input terminal stand and chassis)  |  |
| External Structure/<br>Standards                   | Weight   |  |   | 350g  |  |
| Exte   | Safety Star  |  |   | Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M   |  |
|  | Conducted  |  |   | ISPR Class B (230 V AC) and VCCI Class B (100 V AC)   |  |
| Options  |  | I/OFF Control  |   | Provided  |  |
|  | Cover  |  |   | Provided  |  |
| Note 2 More<br>Note 3 Outp<br>meas<br>Note 4 Rippl | e current above no<br>ut characteristics<br>sured at the end o<br>le and ripple nois | oted values may flow at resta<br>such as ripple, ripple noise<br>of output connector.<br>e are measured with a 100-N | art (power thermistor used).       current at -10         and constant voltage accuracy are       described in the         Notes       Frequency com         VHz oscilloscope using a 1:1 probe.       are -55 dB or le | rature of 0 to 50°C is specified by rated load conditions. The load<br>to 0°C and 50 to 60°C is specified by temperature derating curve<br>attachment.<br>ponent of 100 Hz to 1 kHz and ripple component of 100-Hz interval<br>ss in total (ambient temperature of 25°C).<br>ned by reapplying input voltage. |  |

Notes Reset is performed by reapplying input voltage.

and batch output is 4000 V AC for 1 minute.

Note 11 Prepare a separate power supply for remote ON/OFF control signal.

equipment-support model (option), insulation withstand voltage between batch input

Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe. Output voltage can be changed within the maximum output power and rated output current. The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temporature range of -10 to 60°C. However, the load current at -10 to 6°C

ambient temperature range of -10 to  $60^{\circ}$ C. However, the load current at -10 to  $0^{\circ}$ C and 50 to  $60^{\circ}$ C is specified by temperature derating curve described in the attachment. **110** 

[Single output] 15W, 30W, 60W [Double output] 15W, 30W

|                                  |  |   |   | d Standards   |                                     |
|----------------------------------|--|---|---|---|-------------------------------------|
|                                  | Мо   | del   |   | <b>30W</b> [Single output]  |                                     |
|                                  |  |   | HWB030S-05  | HWB030S-12  | HWB030S-15                          |
|                                  | Rated Input Voltage                                |   |   | AC100V to AC240V  |                                     |
|                                  | Allowable Input Voltage Range                      |   |   | AC85 to 264V  |                                     |
| suo                              | Input Curre  |   | 0.7A  | 0.8A  | 0.9A                                |
| di ti                            | Rated Freq   | uency<br>Frequency Range                      |   | 50/60Hz   |                                     |
| Input<br>Conditions              | Efficiency (                                       |   | 75%   | 47 to 440Hz<br>77%  | 80%                                 |
|                                  |  | rent (max) Note2                              |   | 100VAC)/60A (240VAC)max (at cold  |                                     |
|                                  |  | urrent (max) Note1                            |   | 0.25mA (max) Option M : 50μA (max   | •                                   |
|                                  | Rated Outp   | ut Voltage                                    | 5V  | 12V   | 15V                                 |
|                                  |  | tage Variation                                |   | Rated output voltage +10%, -5%  | 101                                 |
| Note 3                           | Rated Outp   | out Current                                   | 6.0A  | 3.0A  | 2.6A                                |
|                                  |  | tput Current Range                            |   | 0 to 100%   |                                     |
| ıt<br>tions                      | Rated Outp   |   | 30W   | 36W   | 39W                                 |
| Outpu<br>Condit                  | Constant Vo  |   |   | ±3%   |                                     |
| ဝီ ပိ                            | Ripple Nois  |   |   | 5mVp-p<br>10mVp-p   |                                     |
|                                  |  | ding Time (min)                               |   | 20 ms at rated output of 30 W   |                                     |
|                                  | Startup tim  |   |   | 1sec  |                                     |
|                                  | Overcurren   | t Protection                                  | Detection above apr   | prox. 105% of rated current (drooping   | automatic recovery)                 |
|                                  |  | e Protection Note 9                           |   | n above 115% of rated voltage (outp   |                                     |
| ons<br>ons                       | Overheatin   | g Protection                                  |   | Not provided  | ,                                   |
| Additional<br>Functions          | Remote ON/OFF Control                              |   | Optional support  |   |                                     |
|                                  |  |   | (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)     |   |                                     |
|                                  | Remote Sensing                                     |   | Not provided  |   |                                     |
|                                  | Operations Display                                 |   | Green LED indicator   |   |                                     |
|                                  | Operating Temperature Range Note?                  |   | -10°C to +60°C  |   |                                     |
|                                  | Storage Temperature Range                          |   | -25°C to +85°C  |   |                                     |
|                                  | Operating Humidity Range<br>Storage Humidity Range |   | 30 to 90% (no condensation)           30 to 90% (no condensation)   |   |                                     |
|                                  | Cooling Requirements                               |   | Natural air cooling   |   |                                     |
| nta                              |  | No. of vibrations                             | 10 to 55Hz  |   |                                     |
| ons                              | Vibration  | Sweep time                                    |   | 3 minutes   |                                     |
| Environmental<br>Conditions      | Resistance   | Acceleration rate                             |   | 19.6m/s² (2G)   |                                     |
|                                  |  | Vibration direction                           |   | X, Y, Z   |                                     |
|                                  |  | Vibration time                                |   | One hour in each of three directions $O^{2}(100)$   | ;                                   |
|                                  | Shock Resi   | istance                                       | 98m/s <sup>2</sup> (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more. |   |                                     |
|                                  |  |   | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |   |                                     |
|                                  | Installation                                       | Conditions                                    | Derating may be required due to mounting direction  |   |                                     |
| 6                                | Insulation   | Between input and output                      | 3000 V AC for 1 minute or 3600 V AC   | C for 1 second (leakage current: 15 mA or lea   | ss) Option M: 4000 V AC for 1 minut |
| Note 10                          | Withstand  |   | 1500 V AC for 1 minute  | or 1800 V AC for 1 second (leakage  | e current: 15 mA or less)           |
| tion                             | Voltage  | Between output and FG                         | 500 V AC for 1 minute   | or 600 V AC for 1 second (leakage   | current: 15 mA or less)             |
| Insulation                       | Insulation   | Between input and output                      |   |   |                                     |
| lus                              | Resistance   | Between input and FG<br>Between output and FG | 100   | $M\Omega$ (measured with 500 V DC Meg   | ger)                                |
| _                                |  | •   |   |   |                                     |
| re/                              | External Ap  | opearance                                     |   | With chassis  |                                     |
| rctu                             | Output Type  | e   |   | Terminal stand<br>Terminal stand  |                                     |
| str<br>ds                        | External Di  |   | 34 <sup>w</sup> x 136 <sup>D</sup> x 92 <sup>H</sup> mm (E  | xcluding parts for installing input terr  | minal stand and chassis)            |
| smal<br>Idard                    | Weight   |   |   | 380g  | ,                                   |
| External Structure/<br>Standards | Safety Star  |   |   | ed, designated to meet Electrical Appliance and Material C  |                                     |
|                                  | Conducted  | Emission                                      | Designated to meet FCC Class I  | 3 (120 V AC), CISPR Class B (230 V A  | C) and VCCI Class B (100 V AC       |
| ptions                           | Remote ON  | I/OFF Control                                 |   | Provided  |                                     |
| prioris                          | Cover  |   |   | Provided  |                                     |
| e 2 More                         | current above no                                   | oted values may flow at resta                 |   | Ambient temperature of 0 to 50°C is spec<br>current at -10 to 0°C and 50 to 60°C is<br>described in the attachment. |                                     |

Source S Output voltage can be changed within the maximum output power and rated output current.
The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.

Reset is performed by reapplying input voltage.
 Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.

Note 11 Prepare a separate power supply for remote ON/OFF control signal.

[Single output] 15W, 30W, 60W [Double output] 15W, 30W

|   |   |  | Specificatio   | ns and Standards   |  |  |  |
|---|---|--|--|--|--|--|--|
|   | 84.0  |  |  | 60W [Sin   | gle output]  |  |  |
|   | MIC   | odel   | HWB060S-05   | HWB060S-12   | HWB060S-15   | HWB060S-24   |  |
|   | Rated Inpu  | t Voltage  |  | 100 to 120/200 to 240 \  | / AC, automatic switching  |  |  |
|   | Allowable Input Voltage Range   |  |  |  | AC, automatic switching  |  |  |
| su  | Input Curre   | ent (typ) Note1  | 1.2A/0.7A  | 1.5A/0.9A  | 1.8A/1.0A  | 2.0A/1.0A  |  |
| itio  | Rated Frequency<br>Allowable Frequency Range<br>Efficiency (typ) (2010)<br>Inrush Current (max) (2010)      |  |  | 50/  | 60Hz   |  |  |
| Input<br>Conditions                                 |   |  |  |  | 440Hz  |  |  |
| <del>ن</del> = ت                                    |   |  | 75%  | 80%  | 85%  | 85%  |  |
|   |   |  |  |  | OVAC)max (at cold start)   |  |  |
|   | Leakage Current (max)   |  |  | 0.25mA (max) Op  | otion M : 50μA (max)   |  |  |
|   | Rated Outp  | out Voltage  | 5V   | 12V  | 15V  | 24V  |  |
|   |   | tage Variation   |  | 1  | oltage +10%, -5%   |  |  |
| Note 3  | Rated Outp  |  | 10.0A  | 5.2A   | 5.2A   | 3.5A   |  |
| I SI  |   | Itput Current Range  |  |  | 100%   |  |  |
| tior  | Rated Outp  |  | 50W  | 62W  | 78W  | 84W  |  |
| Output<br>Conditions                                |   | Itage Accuracy Note 5 Note 6   |  |  | 3%   |  |  |
| ပိုင်   | Ripple Nois   |  |  |  | יVp-p<br>יVp-p   |  |  |
|   |   | ding Time (min)  | 20   | ms   |  | NS Note 11   |  |
|   | Startup tim   |  | 20   |  | sec  |  |  |
|   |   |  |  |  |  |  |  |
|   |   | t Protection   |  |  | d current (drooping autor  | 37   |  |
| ial<br>IS   |   | e Protection Mass  | L  |  | rated voltage (output cuto<br>rovided  | אדר (אדר איז   |  |
| Additional<br>Functions                             |   | -  |  | •  | Il support   |  |  |
| adit  | Remote ON   | I/OFF Control Note 12  | (OFF at RC terminal open.  |  |  | RC terminal and -V terminal)   |  |
| ĂЧ  | Remote Sensing  |  | (OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)<br>Not provided  |  |  |  |  |
|   | Operations  |  | Green LED indicator  |  |  |  |  |
|   |   |  | -10°C to +60°C   |  |  |  |  |
|   | Operating Temperature Range Storage Temperature Range   |  | -25°C to +85°C   |  |  |  |  |
|   | Operating Humidity Range  |  |  |  | o condensation)  |  |  |
|   |   | midity Range   | 30 to 90% (no condensation)  |  |  |  |  |
| _   | Cooling Re  | quirements   | Natural air cooling  |  |  |  |  |
| Environmental<br>Conditions                         |   | No. of vibrations  | 10 to 55Hz   |  |  |  |  |
| ы<br>С  | Vibration   | Sweep time   |  | 3 m  | inutes   |  |  |
| diti  | Resistance  | Acceleration rate  |  |  | n/s² (2G)  |  |  |
| Son   |   | Vibration direction  |  |  | Y, Z   |  |  |
|   | L   | Vibration time   |  |  | of three directions  |  |  |
|   | Shock Resi  | istance  | Conduct this to  |  | 's² (10G)<br>t surface and a thickness of 1  | 0 mm or more   |  |
|   | Shock Kes   | Istance  | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |  |  |  |  |
|   | Installation  | Conditions   | Derating may be required due to mounting direction   |  |  |  |  |
|   |   |  |  |  |  |  |  |
| Note 10   | Insulation<br>Withstand   | Between input and output<br>Between input and FG   |  |  | ge current: 15 mA or less) Option<br>1 second (leakage current   |  |  |
|   | Voltage   | Between output and FG  |  |  | I second (leakage current  |  |  |
| nsulation   |   | Between input and output   |  |  |  |  |  |
| Ins   | Insulation  | Botwoon input and EG   |  | 100 M $\Omega$ (measured v   | vith 500 V DC Megger)  |  |  |
| 5   | Resistance  | Between output and FG  |  |  |  |  |  |
|   | External Ap   | opearance  |  | \\/ith   | chassis  |  |  |
| /e/   | Input Type  | spearance  |  |  | nal stand  |  |  |
| lctu  | Output Typ  | e  |  |  | nal stand  |  |  |
| External Structure/<br>Standards                    | External Di   |  | 38 <sup>₩</sup> x 170 <sup>D</sup> x 92 <sup>+</sup>   | mm (Excluding parts for  | installing input terminal s  | tand and chassis)  |  |
| 'nal<br>Jaro  | Weight  |  |  |  | 50g  |  |  |
| ixter<br>tand                                       | Safety Star   |  |  |  | trical Appliance and Material Control Law  |  |  |
| SШ  | Conducted Emission Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (10 |  |  |  | VCCI Class B (100 V AC)  |  |  |
| Ontione   | Remote ON   | I/OFF Control  |  | Pro  | vided  |  |  |
| Options   | Cover   |  |  | Pro  | vided  |  |  |
| Note 2 More<br>Note 3 Outpu<br>meas<br>Note 4 Rippl | current above no<br>ut characteristics<br>sured at the end o<br>le and ripple noise                         | oted values may flow at resta<br>such as ripple, ripple noise<br>of output connector.<br>e are measured with a 100-M | ambient temperature of 25°C.<br>ant (power thermistor used).<br>and constant voltage accuracy<br>MHz oscilloscope using a 1:1 pro-<br>utput power and rated output curre                                       | to 0°C and 50 to 60°C<br>are Note: Frequency compon<br>are -55 dB or less in<br>be. Note: Reset is performed | t is specified by temperature derating<br>ent of 100 Hz to 1 kHz and ripp<br>total (ambient temperature of 2<br>by reapplying input voltage. | d conditions. The load current at -10<br>g curve described in the attachment.<br>sle component of 100-Hz interva<br>5°C).<br>rature and humidity. For medica |  |

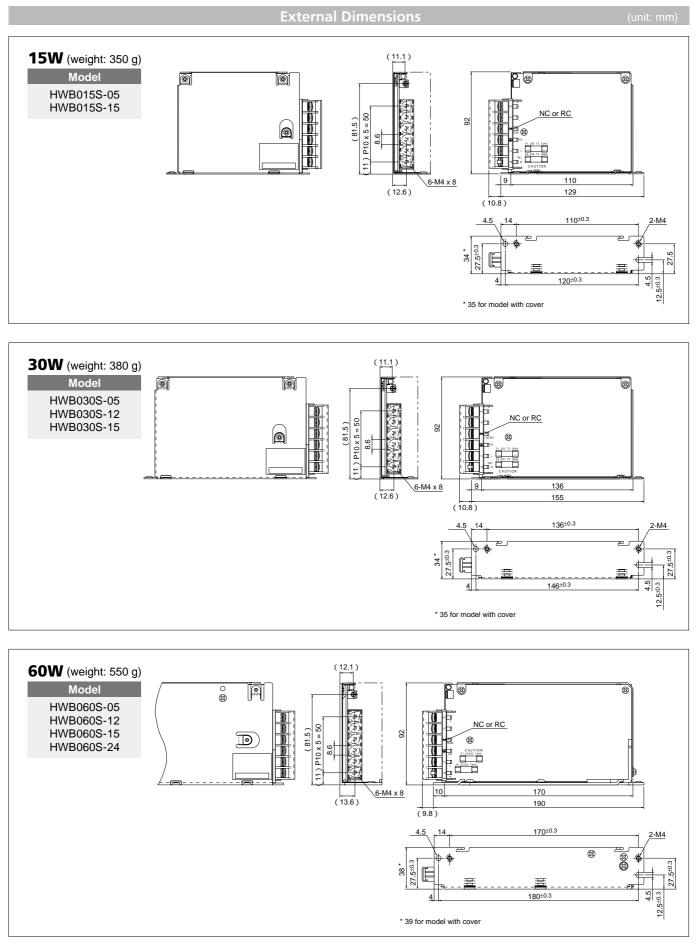
Note 6 The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to  $60^\circ\text{C}$  is specified by temperature derating curve described in the attachment.

and batch output is 4000 V AC for 1 minute. Note 11 Specified at a rated power of 60 W for HWB060S-15 and HWB060S-24.

equipment-support model (option), insulation withstand voltage between batch input

Note 12 Prepare a separate power supply for remote ON/OFF control signal.

### [Single output] 15W, 30W, 60W [Double output] 15W, 30W



[Single output] 15W, 30W, 60W [Double output] 15W, 30W

|  |   |   | Specifications and Standards  |  |
|--|---|---|---|--|
|  | Ma  | طما   | <b>15W</b> [Double output]  |  |
|  | Model   |   | HWB015D-15  |  |
|  | Rated Input   | t Voltago   | 100 to 240 V AC, continuous input   |  |
|  |   | nput Voltage Range  | 85 to 264 V AC, continuous input  |  |
| S  | Input Current (typ) Imp         Rated Frequency         Allowable Frequency Range         Efficiency (typ) Imp         Inrush Current (max) Imp         Leakage Current (max) Imp |   | 0.5A  |  |
| tior   |   |   | 50/60Hz   |  |
| put  |   |   | 47 to 440Hz   |  |
| မ ဂ္ဂ  |   |   | 75%   |  |
|  |   |   | 30A (100VAC)/60A (240VAC)max (at cold start)  |  |
|  |   |   | 0.25mA (max) Option M: 50µA (max)   |  |
|  | Rated Output Voltage  |   | ±15V  |  |
| _  | -   | age Variation   | Rated output voltage +10%, -5% (Double output model: Interlocked (voltage variation)  |  |
| Note 3   | Rated Outp  |   | 0.65A   |  |
| su   | Rated Outp  | tput Current Range  | 0 to 100%<br>19.5W  |  |
| itio<br>Itio   |   | ge Accuracy Note 5 Note 6 Note 12   | ±5%   |  |
| Output<br>Conditions   | Ripple Noted  | • •   | 5mVp-p  |  |
| ° ou   | Ripple Nois   |   | 10mVp-p   |  |
|  |   | ding Time (min) 🔤   | 20 ms at rated output of 15 W   |  |
|  | Startup time  | e (typ) Note 1  | 1sec  |  |
|  | Overcurren  | t Protection  | Detection above approx. 105% of rated current (drooping automatic recovery)   |  |
| is a   |   | e Protection Note 9   | Detection above 115% of rated voltage (output cutoff)   |  |
| tion   | Overheating   | g Protection  |   |  |
| Additional<br>Functions  | Remote ON/OFF Control   |   | Optional support<br>(OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)   |  |
| ⋖╙   | Remote Sensing  |   | Not provided  |  |
|  | Operations Display  |   | Green LED indicator   |  |
|  | Operating Te  | emperature Range Marz   | -10°C to +60°C  |  |
|  | Operating Temperature Range   |   | -25°C to +85°C  |  |
|  |   | lumidity Range  | 30 to 90% (no condensation)   |  |
|  | Storage Humidity Range  |   | 30 to 90% (no condensation)   |  |
| ਯ  | Cooling Requirements  |   | Natural air cooling   |  |
| is<br>is   | No. of vibrations   |   | 10 to 55Hz  |  |
| tior   | vibration   | Sweep time<br>Acceleration rate   | 3 minutes<br>19.6m/s² (2G)  |  |
| Environmental<br>Conditions                                      | Resistance  | Vibration direction   | X, Y, Z   |  |
| ыç   |   | Vibration time  | One hour in each of three directions  |  |
|  | Shock Resistance  |   | 98m/s² (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.  |  |
|  | Installation  | Conditions  | Derating may be required due to mounting direction  |  |
|  |   |   |   |  |
| Note 10  | Insulation<br>Withstand   | Between input and output<br>Between input and FG  | 3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute<br>1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)   |  |
|  | Voltage   | Between output and FG   | 500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)   |  |
| ulati  | Insulation  | Between input and output  |   |  |
| Insulation   | Resistance  | Between input and FG  | 100 M $\Omega$ (measured with 500 V DC Megger)  |  |
|  |   | Between output and FG   |   |  |
| <  | External Ap   | pearance  | With chassis  |  |
| ture   | Input Type  |   | Terminal stand  |  |
| truc   | Output Typ  |   | Terminal stand<br>34 <sup>w</sup> x 110 <sup>D</sup> x 92 <sup>H</sup> mm (Excluding parts for installing input terminal stand and chassis)   |  |
| External Structure/<br>Standards                                 | External Di<br>Weight   | mensions  | 34 <sup>11</sup> X 110 <sup>2</sup> X 92 <sup>11</sup> mm (Excluding parts for installing input terminal stand and chassis)<br>350g   |  |
| tern<br>anda   | Safety Stan   | dards   | UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M  |  |
| ų v  | Conducted Emission  |   | Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)   |  |
| 0  | Remote ON   | /OFF Control  | Provided  |  |
| Options  | Cover   |   | Provided  |  |
| ote 2 More<br>ote 3 Outpu<br>meas<br>ote 4 Ripple<br>ote 5 Outpu | current above no<br>ut characteristics<br>sured at the end o<br>e and ripple noise<br>ut voltage can be o   | oted values may flow at resta<br>such as ripple, ripple noise<br>of output connector.<br>e are measured with a 100-M<br>hanged within the maximum c | ambient temperature of 25°C.       temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.         and constant voltage accuracy are<br>MLz oscilloscope using a 1:1 probe.       The load current at -10 to 0°C is specified by temperature derating curve described in the attachment.         uptut power and rated output current.       The load current at performed by rated load conditions. The load current at are -55 dB or less in total (ambient temperature of 25°C).         tastic input range of 85 to 264 V AC,       The load current at performed by rated load conditions. The load current at no 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment. |  |

Cores Output voltage can be changed within the maximum output power and rated output current.
Cores The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment.

and batch output is 4000 V AC for 1 minute.

Cross-regulation has an accuracy of  $\pm 7\%$  under the condition where load current of one side is less than 10%.

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### [Single output] 15W, 30W, 60W [Double output] 15W, 30W

Specifications and Standards

|                                  |  |  | Specifications and Standards   |  |
|----------------------------------|--|--|--|--|
|                                  | Мо   | del  | <b>30W</b> [Double output]   |  |
|                                  | Rated Input Voltage                                |  | HWB030D-15   |  |
|                                  | Rated Input  | t Voltage  | 100 to 240 V AC, continuous input  |  |
|                                  | Allowable Input Voltage Range                      |  | 85 to 264 V AC, continuous input   |  |
| ns                               | Input Current (typ) Notes                          |  | 0.9A   |  |
| Input<br>Conditions              | Rated Frequency                                    |  | 50/60Hz  |  |
| pud                              |  | Frequency Range  | 47 to 440Hz  |  |
| ్ చ                              | Efficiency (typ)                                   |  | 80%  |  |
|                                  |  | rent (max) Note 2  | 30A (100VAC)/60A (240VAC)max (at cold start)   |  |
|                                  | Leakage Current (max)                              |  | 0.25mA (max) Option M: 50µA (max)  |  |
|                                  | Rated Output Voltage                               |  | ±15V   |  |
|                                  | Output Volt  | tage Variation   | Rated output voltage +10%, -5% (Double output model: Interlocked (voltage variation)   |  |
| Note 3                           | Rated Outp   |  | 1.3A   |  |
| S                                |  | tput Current Range   | 0 to 100%  |  |
| ion                              | Rated Outp   |  | 39W  |  |
| ndii                             |  | Ige Accuracy Note 5 Note 6 Note 12                             | ±5%  |  |
| Output<br>Conditions             |  |  | 5mVp-p   |  |
|                                  | Ripple Nois  | se Note4 Note7<br>ding Time (min) Note1                        | 10mVp-p<br>20 ms at rated output of 30 W   |  |
|                                  | Startup tim  |  | 20 ms at rated output of 30 W<br>1sec  |  |
|                                  |  |  |  |  |
|                                  |  | t Protection   | Detection above approx. 105% of rated current (drooping automatic recovery)  |  |
| s al                             |  | e Protection Notes   | Detection above 115% of rated voltage (output cutoff)  |  |
| Additional<br>Functions          | Overheating Protection                             |  |  |  |
| lditi<br>nct                     | Remote ON/OFF Control Man                          |  | Optional support<br>(OFF at RC terminal open, ON when applying external voltage of 4.5 to 30 V between RC terminal and -V terminal)  |  |
| Fu                               | Remote Sensing                                     |  | Not provided   |  |
|                                  | Operations   |  | Green LED indicator  |  |
|                                  |  |  |  |  |
|                                  | Operating Temperature Range                        |  | -10°C to +60°C   |  |
|                                  | Storage Temperature Range                          |  | -25°C to +85°C   |  |
|                                  | Operating Humidity Range<br>Storage Humidity Range |  | 30 to 90% (no condensation)<br>30 to 90% (no condensation)   |  |
|                                  | Cooling Re   |  | Natural air cooling  |  |
| Environmental<br>Conditions      |  | No. of vibrations  | 10 to 55Hz   |  |
| ner                              |  | Sweep time   | 3 minutes  |  |
| itio                             | Vibration  | Accoloration rate  | 19.6m/s² (2G)  |  |
| ond<br>N                         | Resistance   | Vibration direction  | X,Y,Z  |  |
| шŏ                               |  | Vibration time   | One hour in each of three directions   |  |
|                                  |  |  | 98m/s² (10G)   |  |
|                                  | Shock Resi   | istance  | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.  |  |
|                                  |  |  | Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides.  |  |
|                                  | Installation                                       | Conditions   | Derating may be required due to mounting direction   |  |
| 8                                | Insulation   | Between input and output                                       | 3000 V AC for 1 minute or 3600 V AC for 1 second (leakage current: 15 mA or less) Option M: 4000 V AC for 1 minute   |  |
| Note 10                          | Withstand  | Between input and FG   | 1500 V AC for 1 minute or 1800 V AC for 1 second (leakage current: 15 mA or less)  |  |
| Insulation                       | Voltage  | Between output and FG  | 500 V AC for 1 minute or 600 V AC for 1 second (leakage current: 15 mA or less)  |  |
| nlat                             | Insulation   | Between input and output                                       |  |  |
| usi                              | Resistance   |  | 100 M $\Omega$ (measured with 500 V DC Megger)   |  |
|                                  |  | Between output and FG  |  |  |
|                                  | External Ap  | opearance  | With chassis   |  |
| External Structure/<br>Standards | Input Type   |  | Terminal stand   |  |
| uct                              | Output Typ   |  | Terminal stand   |  |
| ds l                             | External Di  | mensions   | 34 <sup>W</sup> x 136 <sup>D</sup> x 92 <sup>H</sup> mm (Excluding parts for installing input terminal stand and chassis)  |  |
| erna<br>Idar                     | Weight   |  |  |  |
| Exte                             | Safety Stan  |  | UL1950, CSA No. 950, and TÜV (EN60950) certified, designated to meet Electrical Appliance and Material Control Law TÜV (EN60601) certified with option M   |  |
|                                  | Conducted  | Emission   | Designated to meet FCC Class B (120 V AC), CISPR Class B (230 V AC) and VCCI Class B (100 V AC)  |  |
| Options                          | Remote ON  | I/OFF Control  | Provided   |  |
| options                          | Cover  |  | Provided   |  |
|                                  |  | input/output conditions at ar<br>oted values may flow at resta | ambient temperature of 25°C. Ambient temperature of 0 to 50°C is specified by rated load conditions. The load current at -10 to 0°C and 50 to 60°C is specified by temperature derating curve described in the attachment. |  |

Note3 Output characteristics such as ripple, ripple noise and constant voltage accuracy are measured at the end of output connector.

Noted Ripple and ripple noise are measured with a 100-MHz oscilloscope using a 1:1 probe. Notes Output voltage can be changed within the maximum output power and rated output current.

Note: The constant voltage accuracy is measured with a static input range of 85 to 264 V AC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of -10 to 60°C. However, the load current at -10 to 0°C and 50 to  $60^\circ\text{C}$  is specified by temperature derating curve described in the attachment.

NoteB Frequency component of 100 Hz to 1 kHz and ripple component of 100-Hz interval are -55 dB or less in total (ambient temperature of 25°C).

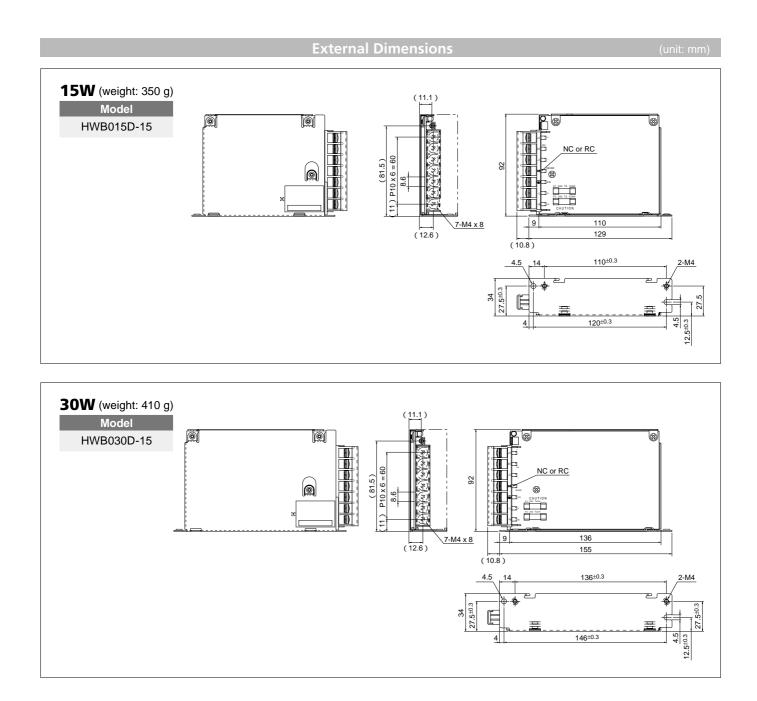
Note 9 Reset is performed by reapplying input voltage.

Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.

Note 11 Prepare a separate power supply for remote ON/OFF control signal.

Note12 Cross-regulation has an accuracy of  $\pm 7\%$  under the condition where load current of one side is less than 10% 115

### [Single output] 15W, 30W, 60W [Double output] 15W, 30W

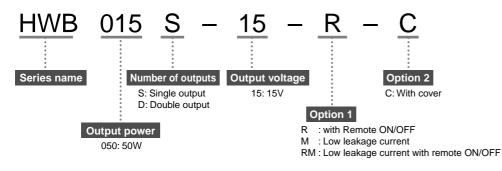


### [Single output] 15W, 30W, 60W [Double output] 15W, 30W

### Option

| Symbol at end of product name | R: Remote ON/OFF | M: Medical equipment-support,<br>low leakage current | C: With cover |
|-------------------------------|------------------|--|---------------|
| None                          | -                | -  | -             |
| -C                            | -                | -  |               |
| -R                            |                  | -  | -             |
| -R-C                          |                  | -  |               |
| -M                            | -                |  | -             |
| -M-C                          | -                |  |               |
| -RM                           |                  |  | -             |
| -RM-C                         |                  |  |               |

Example of model name



[Single output] 15W, 30W, 60W [Double output] 15W, 30W

### **Operating Instruction**

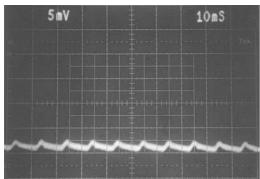
### Terminal connection

| Symbol         |     | Pin No.           |                   |  |
|----------------|-----|-------------------|-------------------|--|
| Syn            |     | Single output     | Double output     |  |
|                |     | 1: AC (NEUTRAL)   | 1: AC (NEUTRAL)   |  |
|                | TB1 | 2: AC             | 2: AC             |  |
|                |     | 3: FG             | 3: FG             |  |
| Terminal stand |     | 4: NC (R: option) | 4: NC (R: option) |  |
|                |     | 5: - V            | 5: - V            |  |
|                |     | 6: +V             | 6: 0 V            |  |
|                |     |                   | 7: +V             |  |



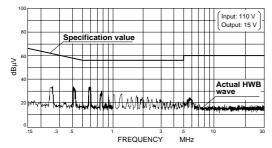
### Noise characteristics HWB060S-15C

Output ripple noise data

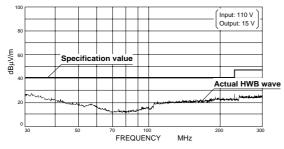


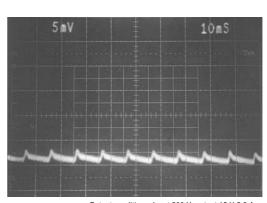
Output conditions: Input 100 V, output 15 V 5.2 A Ambient temperature: normal temperature Vertical axis: 5 mV/div, Horizontal axis: 10 msec/div

• Conducted emission

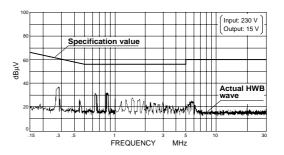


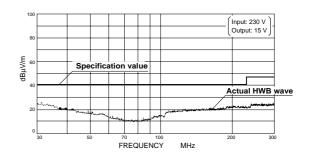
### Noise electric field strength



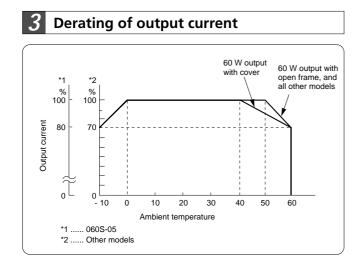


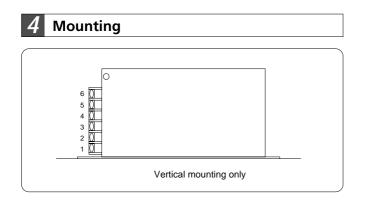
Output conditions: Input 200 V, output 15 V 5.2 A Ambient temperature: normal temperature Vertical axis: 5 mV/div, Horizontal axis: 10 msec/div





### [Single output] 15W, 30W, 60W [Double output] 15W, 30W

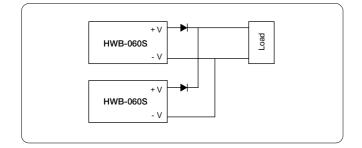




### 5 Parallel operation

Parallel operation can be performed only with the HWB060S model. Please contact Sanken if you intend to perform parallel operation. Sanken provides this product as optional. During parallel operation, each unit must be operated within 90% of rated current.

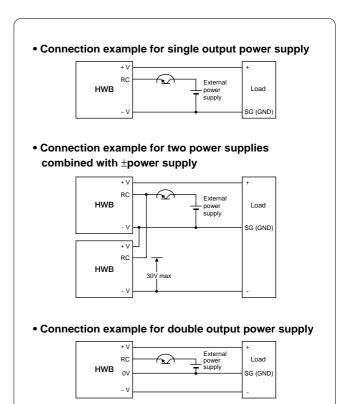
Connect schottky-barrier diodes to the units as shown in the diagram to balance output current of each unit during parallel operation (Sanken FMJ-2303, 30 V 30 A recommended). Select diodes whose withstand voltage is more than the rated output voltage and current is more than output current. Note that diodes need to release heat because they generate heat. This requirement should be thoroughly considered. Adjust and check output voltage of each power supply to ensure that the same voltage is reached. Use load wires with the same thicknesses and lengths to balance output power of each power supply.



### 6 Remote control

must be 30 V or less.

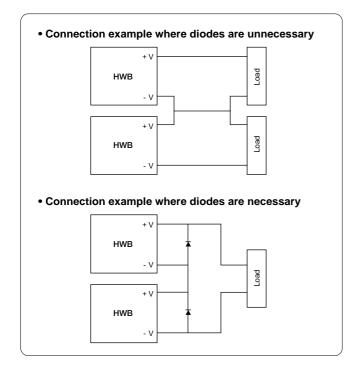
An external power supply (5 to 24 V) is needed for remote control. For remote control of single output power supply, connect RC terminal and -V terminal (GND) to + of the external power supply and SG (GND) of load, respectively. For double output power supply, connect the RC terminal and the 0 V terminal (GND) to the + of the external power supply and the SG (GND) of load, respectively. The remote control goes on by applying voltage. It goes off by releasing between RC terminal and -V terminal. The range of external voltage which can be applied on the RC terminal for remote control is from 4.5 to 30 V DC. The range of inflow current from the external power supply is from 1.5 to 5 mA (typ). Connection examples are as shown in the diagrams below. However, the voltage between RC terminal and -V terminal

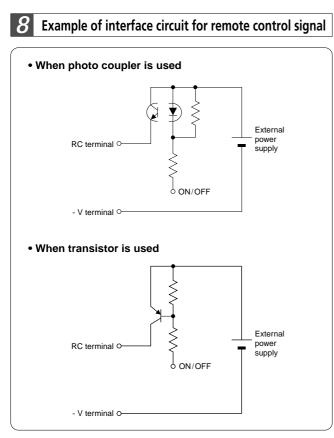


### [Single output] 15W, 30W, 60W [Double output] 15W, 30W

### 7 Series operation

Connect diodes as shown in the diagram according to the way loads are connected for series operation. Select diodes through which rated output current can flow at rise of output voltage. Although current flows through diodes only at rise of output voltage, it does not flow at steady state.







Features world-wide input and active filter (PFC) **Double output supports peak current** 

# **SWE**<sub>Series</sub>

### 100W (150W)

### **Double output**

With chassis

- Supports 2.5x peak current Supports top-class peak current: 2.5 times the rated current (within 15 seconds)\*. This helps save space and lower costs for power supplies in equipment sets.
- World-wide input Supports global markets with a wide-range continuous input method from 85 to 264 V AC.
- Features active filter (PFC) SWD series features an active filter (PFC: Power Factor Correction circuit) for harmonic current control (complies with IEC-61000-3-2).
- Conducted emission Complies with Class B standards under VCCI, FCC, and EN55022.
- Acquired CE mark for LVD (Low Voltage Directive) Complies with CE mark standards set by the EU.
- Acquired safety standards of a variety of countries

Complies with safety standards of a variety of countries, including UL1950, CSA950 (C-UL), and EN60950.

 Remote ON/OFF control Features remote ON/OFF control with 24 V output as standard.



### Mechatronics products (motors, solenoids, etc.)

Equipment that uses thermal heads

Examples: Ticket dispensers, card readers, POS terminals, ATMs, change machines, bill and coin counters, scales, printers, printing press, semiconductor manufacturing equipment, and other industrial equipment

### Options

Cover (with derating) **Terminal stand** 

### Description of model name



Output

voltage

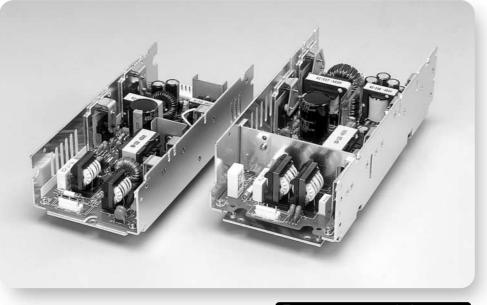
(24:24V 05:5V)

Series name

Option (C: With cover)

Output power (150:150W)

red UL, CSA (C-UL



Free warrantee period: 2 years



|                                  |   |                          | Specifications and Standards   |   |  |
|----------------------------------|---|--------------------------|--|---|--|
|                                  |   |                          | 100  | W   |  |
|                                  | Мо  | del                      | SWE100   |   |  |
|                                  | Rated Input Voltage                                 |                          | AC100V tu  | DAC240V   |  |
|                                  | Allowable Input Voltage Range                       |                          |  |   |  |
| S                                | Input Curre   | nt (typ) Noted           | 1.5A (Vi)  | i = 100V)   |  |
| tior                             | Rated Freq  |                          | 50/60Hz  |   |  |
| Input<br>Conditions              |   | Frequency Range          |  | 63Hz  |  |
| ိ =                              | Power Fact  |                          | 0.95 (V <sub>IN</sub> = 100V)  |   |  |
|                                  | Efficiency (typ) 1000<br>Inrush Current (max) 10002 |                          |  | %<br>/40A (V <sub>IN</sub> = 240V)                                    |  |
|                                  |   | urrent (max)             | 0.75mA (V  | · · · · · ·   |  |
|                                  |   |                          |  |   |  |
|                                  | Rated Outp  | age Variation            | 5V<br>±10%   | 24V<br>±10%   |  |
|                                  | Rated Outp  | -                        | 3.0A   | 4.0A  |  |
| Note 3                           | · · · · ·   | Peak Current Notes       | 0.011  | 10.0 A (within 15 sec)  |  |
| ons                              | Allowable O   | utput Current Range      | 0 to 30.0A   | 0 to 10.0A  |  |
| aiti                             | Rated Outp  | ut Power                 | 15W  | 96W   |  |
| Output<br>Conditions             |   | Itage Accuracy Note 5    | ±3%  | ±5%   |  |
|                                  | Ripple Nois   |                          | 100mVp-p   | 240mVp-p  |  |
|                                  |   | ding Time (min) Norm     |  | nsec  |  |
|                                  | Startup tim   | ,                        | 300r   | lisec   |  |
|                                  |   | t Protection             | 3.15 A or more (drooping automatic recovery)   | 10.5 A or more (drooping automatic recovery)                          |  |
| ons                              |   | e Protection Note6       | Detection above 115% of rated voltage (output cutoff)  |   |  |
| Additional<br>Functions          | Overheating Protection<br>Remote Sensing            |                          | Not provided Not provided  |   |  |
| Fun                              | Operations Display                                  |                          | Not provided   |   |  |
|                                  | Remote ON   | /OFF Control             | Not provided   | Provided  |  |
|                                  | Operating Temperature Range                         |                          | -10°C to +60°C   |   |  |
|                                  | Storage Temperature Range                           |                          | -25°C to +85°C   |   |  |
|                                  | Operating Humidity Range                            |                          | 30 to 90%  |   |  |
| _                                |   | midity Range             | 30 to 90%  |   |  |
| Environmental<br>Conditions      | Cooling Re  | -                        | Natural air cooling  |   |  |
| Suo                              |   | No. of vibrations Notes  | 10 to 55Hz<br>3 minutes  |   |  |
| iro                              | Vibration   | Acceleration rate        | 19.6m/s <sup>2</sup> (2G)  |   |  |
| Son                              | Resistance  | Vibration direction      | X, Y   |   |  |
|                                  | Vibration time                                      |                          | One hour in each of three directions   |   |  |
|                                  |   |                          |  | <sup>2</sup> (10G)  |  |
|                                  | Shock Resi  | stance                   | Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |   |  |
|                                  | Installation  | Conditions               |  | ion directions are vertical and horizontal: with mounting holes down) |  |
| _                                | Insulation  | Between input and output | 3000 V AC for 1 minute (leal   | kage current: 15 mA or less)  |  |
| Note 7                           |   | Between input and FG     | 2000 V AC for 1 minute (lea  | -   |  |
| <u>io</u>                        | Voltage   | Between output and FG    | 500 V AC for 1 minute (leak  | age current: 30 mA or less)   |  |
| llati                            | Insulation  | Between input and output |  |   |  |
| Insulation                       | Resistance  |                          | 100 M $\Omega$ (measured w   | th 500 V DC Megger)   |  |
|                                  |   | Between output and FG    |  |   |  |
|                                  | External Ap   | opearance                | With c   |   |  |
| ure/                             | Input Type  |                          |  | ector   |  |
| ncti                             | Output Typ  |                          | Conn<br>220 <sup>w</sup> x 98 <sup>r</sup>   | ector   |  |
| Stri<br>Stri                     | External Di<br>Weight                               | mensions                 | 220** × 98-  |   |  |
| nal<br>lard                      | Safety Stan   | dards                    | UL60950, CSA No. 60950, and SEMKO (EN60950) certified, de  |   |  |
| External Structure/<br>Standards | Conducted   |                          | Designated to meet FCC Class B (120 V AC), EN550   |   |  |
| ы қ                              | ЕМС   |                          | Harmonic current: Designa  |   |  |
|                                  |   |                          | Immunity: Designated to  | o meet IEC61000-4-2, 5  |  |
| Ontions                          | I/O Termina   | al Stand                 | Prov   | rided   |  |
| ()))dfalal~                      | Options Cover                                       |                          | Brow   | vided   |  |

Note: Specified under rated input/output conditions at an ambient temperature of 25°C.

Note2 More current above noted values may flow at restart.

Come Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film

capacitor connected to that point. Ripple noise is measured with a 100-MHz oscilloscope using a 1:1 probe. The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range. Note: Reset is performed by reapplying input voltage.

Note? Insulation conditions are specified at normal temperature and humidity.

Note B Up to rated output current at startup.

When mounted on mounting surface B, the No. of vibrations is from 10 to 25 Hz (refer to External Dimensions).

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## 100W,150W **Specifications and Standards**

**SWE** Series

| Model                            |   | de l                     | 150W   |   |  |
|----------------------------------|---|--------------------------|--|---|--|
|                                  | IVIO  | aei                      | SWE150   | )P-2405   |  |
|                                  | Rated Input   | t Voltage                | AC100V/t   | AC240V  |  |
|                                  | -   | nput Voltage Range       | AC100V to AC240V<br>AC85 to AC264V   |   |  |
| Š                                | Input Current (typ) Notes                               |                          | 2.4A (Vin = 100V)  |   |  |
| t<br>litions                     | Rated Frequency   |                          | 2.4A (VIN = 100V)<br>50/60Hz   |   |  |
| git                              |   | Frequency Range          | 47 to 63Hz   |   |  |
| d D                              | Power Fact  |                          | 0.98 (V <sub>IN</sub> = 100V).   |   |  |
|                                  | Efficiency (  |                          |  | %   |  |
|                                  |   |                          |  |   |  |
|                                  | Inrush Current (max) 1002<br>Leakage Current (max) 1003 |                          | 20A (V <sub>IN</sub> = 100V)/40A (V <sub>IN</sub> = 240V)<br>0.75mA (V <sub>IN</sub> = 240V)   |   |  |
|                                  | Rated Output Voltage                                    |                          |  | ,   |  |
|                                  | · · · ·   | v                        | 5V   | 24V   |  |
| _                                |   | age Variation            | ±10%   | ±10%  |  |
| Note 3                           | Rated Outp  |                          | 6.0A   | 6.0A  |  |
| S                                |   | Peak Current Note 8      |  | 10.0 A (within 15 sec)  |  |
| tion t                           |   | utput Current Range      | 0 to 6.0A  | 0 to 15.0A  |  |
| ndi                              | Rated Outp  |                          | 30W  | 144W  |  |
| Output<br>Condit                 |   | Itage Accuracy Note 5    | ±3%  | ±5%   |  |
|                                  | Ripple Nois   |                          | 100mVp-p   | 240mVp-p  |  |
|                                  |   | ding Time (min) 🔤        |  | nsec  |  |
|                                  | Startup tim   | e (typ)                  | 800r   | nsec  |  |
|                                  | Overcurren  | t Protection             | 6.3 A or more (drooping automatic recovery)  | 15.75 A or more (drooping automatic recovery)                         |  |
| la l                             | Overvoltag  | e Protection Note 6      | Detection above 115% of r  |   |  |
| E E                              | Overheatin  | g Protection             | Not pr   | ovided  |  |
| Additional<br>Functions          | Remote Sensing  |                          | Not provided   |   |  |
| ĂЧ                               | Operations  | Display                  | Not provided   |   |  |
|                                  | Remote ON   | /OFF Control             | Not provided Provided  |   |  |
|                                  |   |                          |  |   |  |
|                                  | Operating Temperature Range                             |                          | -10°C to +60°C<br>-25°C to +85°C   |   |  |
|                                  | Storage Temperature Range                               |                          |  |   |  |
|                                  | Operating Humidity Range                                |                          | 30 to 90%<br>30 to 90%   |   |  |
| <u></u>                          | Storage Humidity Range<br>Cooling Requirements          |                          | Natural air cooling  |   |  |
| Environmental<br>Conditions      | No. of vibrations                                       |                          | 10 to 55Hz   |   |  |
| ŭ ŭ                              |   | Sweep time               |  | nutes   |  |
| diti                             | Vibration   | Acceleration rate        |  | /s² (2G)  |  |
| N N                              | Resistance  | Vibration direction      | X, Y   |   |  |
|                                  |   | Vibration time           |  | of three directions   |  |
|                                  |   | VIDIATION TIME           |  |   |  |
|                                  | Shock Resi  | stance                   | 98m/s <sup>2</sup> (10G)<br>Conduct this test on an oak board with a flat surface and a thickness of 10 mm or more.<br>Lift one side of installation surface of the unit 50 mm and drop it on the board. Drop 3 times for each of 4 sides. |   |  |
|                                  | Installation  | Conditions               |  | ion directions are vertical and horizontal: with mounting holes down) |  |
| _                                | Insulation  | Between input and output | 3000 V AC for 1 minute (leal   | (age current: 15 mA or less)  |  |
| Note 7                           |   | Between input and FG     | 2000 V AC for 1 minute (leal   | ,<br>,  |  |
|                                  | Voltage   | Between output and FG    | 500 V AC for 1 minute (leak  |   |  |
| Insulation                       |   | Between input and output |  |   |  |
| sul                              | Insulation  | Between input and EC     | 100 M $\Omega$ (measured w   | th 500 V DC Meager)   |  |
| -                                | Resistance  | Between output and FG    |  |   |  |
|                                  | Externs 1.4   |                          |  |   |  |
|                                  | External Ap   | pearance                 |  | hassis  |  |
| nre                              | Input Type  | •                        |  | ector   |  |
| lict                             | Output Typ  |                          |  | ector   |  |
| External Structure/<br>Standards | External Di   | mensions                 | 240 <sup>w</sup> x 110   |   |  |
| al (<br>ard)                     | Weight  | dordo                    |  |   |  |
| ern<br>nda                       | Safety Stan   |                          | UL60950, CSA No. 60950, and SEMKO (EN60950) certified, de  |   |  |
| ≣xt                              | Conducted   | Emission                 | Designated to meet FCC Class B (120 V AC), EN550   |   |  |
|                                  | EMC   |                          | Harmonic current: Designated to  |   |  |
|                                  |   |                          | ·  | o meet IEC61000-4-2, 5  |  |
| Options                          | I/O Termina   | al Stand                 |  | rided   |  |
| options                          | Cover   |                          | Prov   | rided   |  |
| -                                | aified under r  | ated input/output cond   | itions at an ambient temperature of 25°C.  |   |  |

Note: Specified under rated input/output conditions at an ambient temperature of 25°C.

Note2 More current above noted values may flow at restart.

Come Output characteristics are measured at a point 5 cm from the output connector, with a 63-V, 47-µF electrolytic capacitor and 0.1-µF film capacitor connected to that point.

The constant voltage accuracy is measured within static input range, within static load range, with time drift and within ambient temperature range. Note: Reset is performed by reapplying input voltage.

Insulation conditions are specified at normal temperature and humidity.

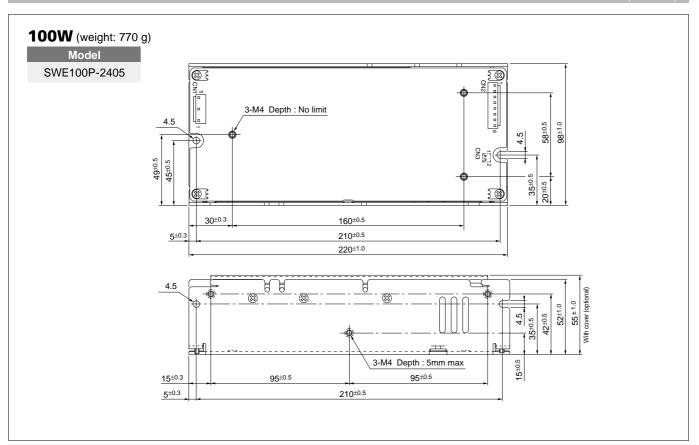
Note B Up to rated output current at startup.

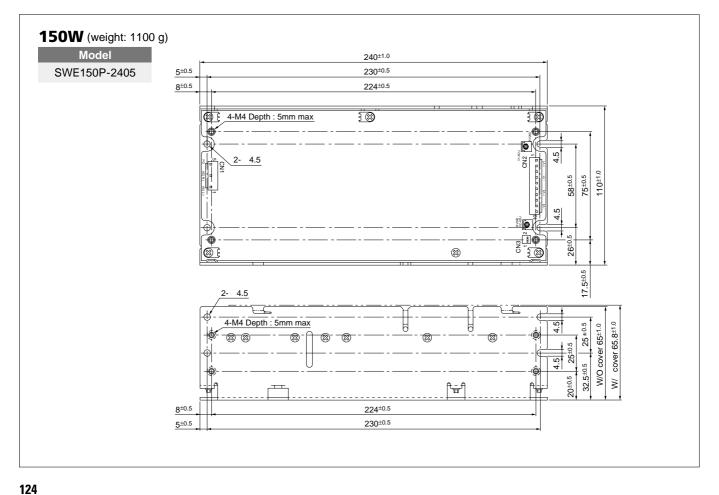
When mounted on mounting surface B, the No. of vibrations is from 10 to 25 Hz (refer to External Dimensions).



**External Dimensions** 

(unit: mm)





### **Operating Instruction**

### Terminal connection

Input/output connectors

### SWE100P-2405

| Pin No.         | Connector  | Corresponding<br>connector  | Corresponding<br>contact  |  |  |  |
|-----------------|--|---|---|--|--|--|
| 1: AC (LIVE)    |  |   |   |  |  |  |
| 2: NC           |  |   |   |  |  |  |
| 3: AC (NEUTRAL) |  | VHR-5N<br>(JST)   | SVH-21T-P1.1<br>(JST)   |  |  |  |
| 4: NC           | (001)  |   |   |  |  |  |
| 5: FG           |  |   |   |  |  |  |
| 1 to 3: +24V    |  | VHR-8N<br>(JST)   | SVH-21T-P1.1<br>(JST)   |  |  |  |
| 4 to 6: GND1    | B8P-VH   |   |   |  |  |  |
| 7: +5V          | (JST)  |   |   |  |  |  |
| 8: GND2         |  |   |   |  |  |  |
| 1: RC +         |  |   |   |  |  |  |
| 2: RC -         | DZP-SHF-TAA  | HZP-SHF-AA  | SHF-001T-0.8SS  |  |  |  |
|                 | 1: AC (LIVE)<br>2: NC<br>3: AC (NEUTRAL)<br>4: NC<br>5: FG<br>1 to 3: +24V<br>4 to 6: GND1<br>7: +5V<br>8: GND2<br>1: RC + | 1: AC (LIVE)           2: NC           3: AC (NEUTRAL)           4: NC           5: FG           1 to 3: +24V           4 to 6: GND1           7: +5V           8: GND2           1: RC +           B2P-SHF-1AA | PH No.         Connector         connector           1: AC (LIVE) |  |  |  |

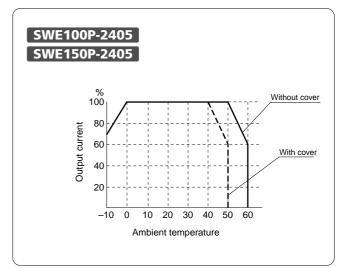
### SWE150P-2405

| Symbol      | Pin No.         | Connector    | Corresponding<br>connector | Corresponding<br>contact |
|-------------|-----------------|--------------|----------------------------|--------------------------|
|             | 1: AC (LIVE)    |              |                            |                          |
|             | 2: NC           |              |                            |                          |
| CN1         | 3: AC (NEUTRAL) | B3P5-VH      | VHR-5N                     | SVH-21T-P1.1             |
|             | 4: NC           |              |                            |                          |
|             | 5: FG           |              |                            |                          |
|             | 1 to 3: +24V    |              | VHR-10N                    | SVH-21T-P1.1             |
| CN2         | 4 to 6: GND1    |              |                            |                          |
| CINZ        | 7, 8: +5V       | B10P-VH      |                            |                          |
|             | 9, 10: GND2     | ]            |                            |                          |
| <u>ONIO</u> | 1: RC +         | B2P-SHF-1AA  |                            | SHF-001T-0.8SS           |
| CN3         | 2: RC -         | BZF-SITE-TAA | HZF-SHF-AA                 | 507-0011-0.855           |

### **Terminal stands**

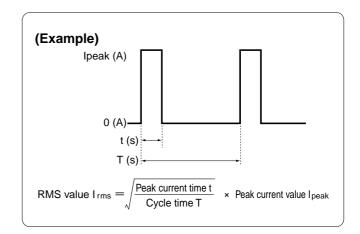
| SWE1   | 100P-2405       | SWE150P       | -2405   |                          |
|--------|-----------------|---------------|---|--------------------------|
| Symbol | Pin No.         | Connector     | Corresponding<br>connector                            | Corresponding<br>contact |
|        | 1: AC (LIVE)    | M110D-3C      |   |                          |
| TB1    | 2: AC (NEUTRAL) | (Morimatsu)   |   | minals                   |
|        | 3: FG           | or equivalent |   |                          |
|        | 1: +24V         |               | M110D-3C<br>(Morimatsu) M4 terminals<br>or equivalent |                          |
| TB2    | 2: GND1         |               |   |                          |
| I DZ   | 3: +5V          |               |   |                          |
|        | 4: GND2         | 1             |   |                          |
| CNI2   | 1: RC +         |               |   | SHF-001T-0.8SS           |
| CN3    | 2: RC -         |               | TIZE-SHE-AA   |                          |

### **2** Derating of output current



### **3** Dynamic load

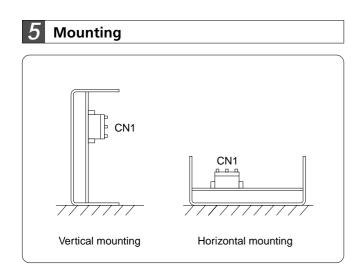
The peak current load occurs within 15 seconds. This series can also be used with dynamic (pulse) load. During dynamic operation, use the supply with the output current's RMS value equal to or less than the rated current.



### **4** Remote ON/OFF control

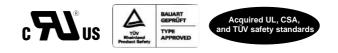
The 24 V output models enable remote ON/OFF control. Output goes ON when the RC+ and RC- connectors (connector CN3's pins 1 and 2) for remote ON/OFF control are open. When they are shorted, the output goes OFF.





### Semi-custom power supply





Flexible multi-output power supply enables various combinations of DC cell modules

Prototype power supply units that meet the customer's specifications can be delivered 10 days after the customer's order is received.

Keep costs low by eliminating the need for design, evaluation, and safety standards certification.

Microprocessor-equipped cell control module provides versatile power management.

Certified under medical standards (PCU400M/600M)

- World-wide input range <85 to 264 V AC continuous input>
- Three types based on total output power: 400 W, 600 W, and 900 W
- Extensive lineup of DC cell modules\* can be freely combined in multi-power supply configurations
- \* 120-W single output DC cell, output voltages: nine types (2, 3.3, 5, 6, 12, 15, 24, 36, and 48 V) ① 40-W and ② 96-W double output DC cell, output voltages: two types (① 5/5 V, ② 12/12 V) 40-W four output DC cell, output voltages: two types (+5/-5/+12/-12, +5/-5/+15/-15 V) Configuration example: PCU900 (nine-cell configuration) ... 15 channels = single output x 7 + multi-output x 2)

• All module types are kept in stock to enable prototype power supply delivery within 10 days.

- Harmonic current control <complies with EN61000-3-2 standard>
- Complies with safety standards
- <certified under EN60950, UL1950, CSA950 (C-UL). CE marking compatible>

  Complies with noise standards
- -complies with EMS: IE61000-4, EMI: FCC Class B, EN55022 Class B, and VCCI Class B>
- Alarm signal output and AC power fail signal output are standard feature
- · Versatile power management using optional functions

 Versatile power management is realized by microprocessor-based control in cell control module Software processing controls management of operations when an alarm occurs, allocation of operations among cells, sequence operations, external remote operations, etc.
 Supports low power consumption

- <Option E: When using economy mode, all internal circuits are stopped. Equipped with internal +5 V STB power supply>
- Power consumption during economy mode: approximately 3.9 W (during 100 V AC input)  $^\circ$  Complies with medical standards

Certified under EN60601-1 (PCU400M/600M)

### Applications

Semiconductor manufacturing and inspection equipment

Factory automation controllers and robots Line printers, disks, ATMs, and computer peripherals

Medical equipment such as CT machines, MRI machines, and ultrasonic diagnostic equipment Photographic laboratory system, ETCs, and other induastrial equipment

### Options

Alarm sequence (signal transmission and shutdown) AC power failure (extension of output hold time) Cell output sequence (startup sequence, etc.) External remote ON/OFF (up to three separate ON/OFF controls) Cell group control (up to three separate ON/OFF controls) Economy mode (standby mode for low power consumption) Support for medical equipment (low leakage current)





|                                    |  | Specifications and Standards   |
|------------------------------------|--|--|
|                                    | Model  | PCU400   |
| Item                               | Total Output Power<br>No. of DC Cell Modules | 400W   |
|                                    |  | 5 cells  |
|                                    | Rated Input Voltage                          | AC100 to 240V  |
|                                    | Allowable Input Voltage Range                | AC85 to 264V   |
| tions                              |  | 6.5A/3A max (AC100V/AC240V)  |
| ondit                              | Rated Frequency                              | 50/60Hz  |
| Input Conditions                   | Allowable Frequency Range                    | 47 to 63Hz   |
| lnp                                | Efficiency Notes                             | 70% (typ)  |
|                                    | Inrush Current Note2                         | 15A/35A max (AC100V/AC240V)  |
|                                    | Power Factor Notes                           | 0.9 (min)  |
| Others                             | Leakage Current 🚥                            | 0.75 mA (max) Option M: 0.5 mA (max)   |
| Oth                                | Output Holding Time                          | 20ms (min)   |
|                                    | Operating Temperature Range                  | -10 to +60°C   |
| ons                                | Storage Temperature Range                    | -20 to +85°C   |
| Environmental Conditions           | Operating Humidity Range                     | 30 to 90% (no condensation)  |
| al Co                              | Storage Humidity Range                       | 30 to 90% (no condensation)  |
| nent                               | Cooling Requirements                         | Forced air cooling by internal fan   |
| ironr                              | Vibration Resistance                         | 10 to 55 Hz, sweep time: 3 minutes, acceleration rate: 29.4 m/s2 (3G), one hour each in the X, Y, Z directions                       |
| Env                                | Shock Resistance                             | 98m/s² (10G)   |
|                                    | Installation Conditions                      | Horizontal or vertical mounting direction  |
| sulation                           | Insulation Withstand Voltage                 | Between input and output: 3000 V AC for 1 minute, between input and FG: 1500 V AC for 1 minute (leakage current: 30 mA or less each) |
| Insul                              | Insulation Resistance                        | Input - output, input - FG and output - FG: 100 M $\Omega$ or above (measured with 500 V DC Megger)                                  |
| rnal<br>ture<br>dards              | External Dimensions                          | 124 <sup>w</sup> x 280 <sup>D</sup> x 64 <sup>H</sup> mm   |
| External<br>Structure<br>/Standard | Weight Note                                  | 2300g  |
| lards                              | Safety Standards                             | UL1950, CSA No. 60950, and TÜV (EN60950) certified, CE marking compatible TÜV (EN60601) certified with option M                      |
| Standards                          | Conducted Emission Note                      | Designated to meet FCC Class B, EN55022 Class B, and VCCI Class B  |
|                                    |  |  |

Specified under rated input/output conditions at an ambient temperature of 25°C. Input current and efficiency depend on implemented DC cell modules. More inrush current than above noted value may flow for approximately one second after restart.

www When the ambient temperature is in the range from 0 to 50°C, use the rated load conditions. When the ambient temperature is in either the range from -10 to 0°C or 50 to 60°C, derate the output current to 80% or less of the rated value.

Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option M), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.

Note 5 For details, refer to the external view diagrams.

The weight is the estimated weight when single output type DC cell module has been fully mounted.

When the medical equipment-support model (option M) is used, this product complies with the FCC Class A, EN55022 Class A, and VCCI Class A standards.

仕様・規格 **PCU600** Model Item **Total Output Power** 600W No. of DC Cell Modules 6 cells **Rated Input Voltage** AC100 to 240V Allowable Input Voltage Range AC85 to 264V Input Current Notes 10A/5A max (AC100V/AC240V) 50/60Hz **Rated Frequency Allowable Frequency Range** 47 to 63Hz Input Efficiency Note1 70% (typ) Inrush Current Note 2 15A/35A max (AC100V/AC240V) Power Factor Note 0.9 (min) ers Leakage Current 0.75 mA (max) Option M: 0.5 mA (max) ð Output Holding Time 20ms (min) Operating Temperature Range Note3 -10 to +60°C Storage Temperature Range -20 to +85°C **Operating Humidity Range** 30 to 90% (no condensation) **Storage Humidity Range** 30 to 90% (no condensation) ental **Cooling Requirements** Forced air cooling by internal fan Vibration Resistance 10 to 55 Hz, sweep time: 3 minutes, acceleration rate: 29.4 m/s2 (3G), one hour each in the X, Y, Z directions Ы Shock Resistance 98m/s<sup>2</sup> (10G) Installation Conditions Horizontal or vertical mounting direction Insulation Withstand Voltage Noted Between input and output: 3000 V AC for 1 minute, between input and FG: 1500 V AC for 1 minute (leakage current: 30 mA or less each) Insulation Resistance Input - output, input - FG and output - FG: 100 MΩ or above (measured with 500 V DC Megger)  $148^{W} \ge 280^{D} \ge 64^{H} \text{ mm}$ External Dimensions Weight Note 6 2600g Safety Standards UL1950, CSA No. 60950, and TÜV (EN60950) certified, CE marking compatible TÜV (EN60601) certified with option M Designated to meet FCC Class B, EN55022 Class B, and VCCI Class B Conducted Emission

Specified under rated input/output conditions at an ambient temperature of 25°C. Input current and efficiency depend on implemented DC cell modules.

More inrush current than above noted value may flow for approximately one second after restart. We when the ambient temperature is in the range from 0 to 50°C, use the rated load conditions. When the ambient temperature is in either the range

from -10 to 0°C or 50 to 60°C, derate the output current to 80% or less of the rated value.

usual Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option M), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.

Notes For details, refer to the external view diagrams.

Note: The weight is the estimated weight when single output type DC cell module has been fully mounted.

When the medical equipment-support model (option M) is used, this product complies with the FCC Class A, EN55022 Class A, and VCCI Class A standards.

**U** Series

400W.**600W**.900W



|                                    | Specifications and Standards          |  |  |  |  |  |
|------------------------------------|---------------------------------------|--|--|--|--|--|
|                                    | Model                                 | PCU900   |  |  |  |  |
| Item                               | Total Output Power                    | 900W   |  |  |  |  |
|                                    | No. of DC Cell Modules                | 9 cells  |  |  |  |  |
|                                    | Rated Input Voltage                   | AC100 to 240V  |  |  |  |  |
|                                    | Allowable Input Voltage Range         | AC85 to 264V   |  |  |  |  |
| ons                                | Input Current 📾                       | 15A/7.5A max (AC100V/AC240V)   |  |  |  |  |
| nditi                              | Rated Frequency                       | 50/60Hz  |  |  |  |  |
| Input Conditions                   | Allowable Frequency Range             | 47 to 63Hz   |  |  |  |  |
| Inpi                               | Efficiency Real                       | 70% (typ)  |  |  |  |  |
|                                    | Inrush Current Note2                  | 15A/35A max (AC100V/AC240V)  |  |  |  |  |
|                                    | Power Factor Meet                     | 0.9 (min)  |  |  |  |  |
| ers                                | Leakage Current 🚥                     | 0.9mA (max)  |  |  |  |  |
| Othe                               | Output Holding Time                   | 20ms (min)   |  |  |  |  |
|                                    | Operating Temperature Range  Internet | -10 to +60°C   |  |  |  |  |
| suo                                | Storage Temperature Range             | -20 to +85°C   |  |  |  |  |
| Environmental Conditions           | Operating Humidity Range              | 30 to 90% (no condensation)  |  |  |  |  |
| al Co                              | Storage Humidity Range                | 30 to 90% (no condensation)  |  |  |  |  |
| nent                               | Cooling Requirements                  | Forced air cooling by internal fan   |  |  |  |  |
| ironr                              | Vibration Resistance                  | 10 to 55 Hz, sweep time: 3 minutes, acceleration rate: 29.4 m/s2 (3G), one hour each in the X, Y, Z directions                       |  |  |  |  |
| Env                                | Shock Resistance                      | 98m/s² (10G)   |  |  |  |  |
|                                    | Installation Conditions               | Horizontal or vertical mounting direction  |  |  |  |  |
| lation                             | Insulation Withstand Voltage          | Between input and output: 3000 V AC for 1 minute, between input and FG: 1500 V AC for 1 minute (leakage current: 30 mA or less each) |  |  |  |  |
| Insul                              | Insulation Resistance                 | Input - output, input - FG and output - FG: 100 M $\Omega$ or above (measured with 500 V DC Megger)                                  |  |  |  |  |
| rnal<br>ture<br>lards              | External Dimensions                   | 220 <sup>W</sup> x 280 <sup>D</sup> x 64 <sup>H</sup> mm   |  |  |  |  |
| External<br>Structure<br>/Standard | Weight 🔤                              | 3900g  |  |  |  |  |
| ards                               | Safety Standards                      | UL1950, CSA No. 60950, and TÜV (EN60950) certified, CE marking compatible TÜV (EN60601) certified with option M                      |  |  |  |  |
| Standards                          | Conducted Emission Note               | Designated to meet FCC Class B, EN55022 Class B, and VCCI Class B  |  |  |  |  |
|                                    |                                       | · · · · · · · · · · · · · · · · · · ·  |  |  |  |  |

Specified under rated input/output conditions at an ambient temperature of 25°C. Input current and efficiency depend on implemented DC cell modules. More inrush current than above noted value may flow for approximately one second after restart.

www When the ambient temperature is in the range from 0 to 50°C, use the rated load conditions. When the ambient temperature is in either the range from -10 to 0°C or 50 to 60°C, derate the output current to 80% or less of the rated value.

Insulation conditions are specified at normal temperature and humidity. For medical equipment-support model (option M), insulation withstand voltage between batch input and batch output is 4000 V AC for 1 minute.

Note 5 For details, refer to the external view diagrams.

The weight is the estimated weight when single output type DC cell module has been fully mounted.

When the medical equipment-support model (option M) is used, this product complies with the FCC Class A, EN55022 Class A, and VCCI Class A standards.

## **PCU** Series 400W,600W,900W

### **Output Specifications (DC cell module)**

| Single output type                 |             |             |               |               |               |               |               |             |                              |
|------------------------------------|-------------|-------------|---------------|---------------|---------------|---------------|---------------|-------------|------------------------------|
|                                    |             | SII         | ngle o        | utput         | type          |               |               |             |                              |
| DC Cell Module Symbol              | Α           | В           | С             | D             | E             | F             | G             | Н           | J                            |
| Rated Output Voltage               | 3.3V        | 5V          | 12V           | 15V           | 24V           | 36V           | 48V           | 2V          | 6V                           |
| Output Voltage Variation Notes     |             | I           | Rated o       | butput voltag | e ±10%        | I             |               | 1.8 to 2.4V | Rated output<br>voltage ±10% |
| Rated Output Current               | 24A         | 24A         | 10A           | 8A            | 5A            | 3.3A          | 2.5A          | 24A         | 20A                          |
| Allowable Output Current Range     |             | 0           | to 100% (wit  | hout exceed   | ing maximur   | n output pow  | er and curre  | nt)         |                              |
| Rated Output Power                 | 79.2W       | 120W        | 120W          | 120W          | 120W          | 118.8W        | 120W          | 48W         | 120W                         |
| Ripple Noise Note 2 Note 3         | 100mV       | 100mV       | 200mV         | 200mV         | 300mV         | 350mV         | 400mV         | 100mV       | 100mV                        |
| Constant Voltage Accuracy 1004     |             |             |               |               | ±3%           |               |               |             |                              |
| Overcurrent Protection (min) Notes | 26.4A       | 26.4A       | 11.0A         | 8.8A          | 5.5A          | 3.7A          | 2.8A          | 26.4A       | 22A                          |
| Overvoltage Protection             | 3.7 to 4.7V | 5.6 to 7.0V | 13.3 to 16.8V | 16.6 to 22.5V | 26.5 to 33.6V | 39.7 to 50.4V | 52.9 to 60.0V | 2.6 to 3.2V | 6.7 to 8.4V                  |
| Remote Sensing Note?               |             |             |               |               | Provided      |               |               |             |                              |
| Overheating Protection Mass        |             |             |               |               | Provided      |               |               |             |                              |
| Series Operation                   |             |             |               |               | Enabled       |               |               |             |                              |
| Parallel Operation Image           |             |             |               |               | Enabled       |               |               |             |                              |
| Orations Display                   |             | Provided    |               |               |               |               |               |             |                              |
| Output Terminal Type               |             |             |               | Т             | erminal stan  | d             |               |             |                              |
| Required Number of Cells           |             |             |               |               | 1 cell        |               |               |             |                              |

| Multi-output type                  |             |      |               |          |             |      |               |           |              |               |               |               |
|------------------------------------|-------------|------|---------------|----------|-------------|------|---------------|-----------|--------------|---------------|---------------|---------------|
| DC Cell Module Symbol              |             | Q1(  | 4ch)          |          |             | Q2(  | 4ch)          |           | W11          | (2ch)         | W22           | (2ch)         |
| Rated Output Voltage               | +5V         | -5V  | +12V          | -12V     | +5V         | -5V  | +15V          | -15V      | 5V           | 5V            | 12V           | 12V           |
| Output Voltage Variation           |             | Fi   | xed           |          |             | Fiz  | ked           |           | Rated output | t voltage ±5% | Rated output  | t voltage ±5% |
| Rated Output Current               | ЗA          | 1A   | 1A            | 0.5A     | ЗA          | 1A   | 1A            | 0.5A      | 4A           | 4A            | 4A            | 4A            |
| Allowable Output Current Range     |             | 0 to | 100%          |          |             | 0 to | 100%          |           | 0 to         | 100%          | 0 to 7        | 100%          |
| Rated Output Power                 | 38W         |      | 42.5W         |          |             | 40   | W             | 96W       |              |               |               |               |
| Ripple Noise Note2 Note3           | 100         | mV   | 150           | )mV      | 100         | mV   | 150           | mV        | 100mV        | 100mV         | 200mV         | 200mV         |
| Constant Voltage Accuracy Noted    |             | ±5%  |               | ±5%      |             | ±5%  |               | ±5%       | ±3           | 3%            | ±3            | 3%            |
| Overcurrent Protection (min) Notes | 3.3A        | 1.1A | 1.1A          | 0.6A     | 3.3A        | 1.1A | 1.1A          | 0.6A      | 4.4A         | 4.4A          | 4.4A          | 4.4A          |
| Overvoltage Protection Notes       | 5.6 to 7.0V | -    | 13.3 to 16.8V | -        | 5.6 to 7.0V | -    | 16.6 to 22.5V | -         | 5.6 to 7.0V  | 5.6 to 7.0V   | 13.3 to 16.8V | 13.3 to 16.8V |
| Remote Sensing Note?               |             |      | -             |          |             |      | -             |           |              | -             |               | -             |
| Overheating Protection Notes       |             | -    |               | Provided |             | -    |               | Provided  | Prov         | rided         | Prov          | /ided         |
| Series Operation 1000              |             | Dis  | abled         |          | Disabled    |      | Enabled       |           | Enabled      |               |               |               |
| Parallel Operation                 |             | Dis  | abled         |          | Disabled    |      |               |           | Disa         | bled          | Disa          | abled         |
| Orations Display                   | Provided    |      |               |          | Provided    |      |               | Prov      | vided        | Prov          | /ided         |               |
| Output Terminal Type               |             | Con  | nector        |          | Connector   |      |               | Connector |              | Connector     |               |               |
| Required Number of Cells           |             | 1    | cell          |          |             | 1    | cell          |           | 1 0          | cell          | 1 0           | cell          |

The rated output current and maximum output power are both specified even when the output voltage is variable.

Specified under rated input/output conditions at an ambient temperature of 25°C.

Ripple noise value was measured using a 1:1 probe and a 100-MHz oscilloscope, with measurements taken 5 cm from an output connector and with a connected 63-V, 47-μF electrolytic capacitor. Ripple noise is measured by a 100-MHz oscilloscope using a 1:1 probe at a point 5 cm from the output connector, with a 47-μF electrolytic capacitor connected to that point.

The constant voltage accuracy is measured with a static input range of 300 to 410 V DC, a static load range of 0 to 100%, a time drift of 10 minutes to eight hours and an ambient temperature range of 0 to +50°C.

(When the ambient temperature is in the range from -10 to  $0^{\circ}$ C or 50 to  $60^{\circ}$ C, the rating is based on 80% derating of the rated output current.)

The constant voltage accuracy for multi-output type with output voltage of either -12 V or -15 V is specified when total output power of either 6 or 7 W for other channel output. (When a -15 V output current is in the range from 0 to 0.1 A, the total output power for other channel output must be at least 1.5 W.)

Overcurrent protection uses the constant current drooping method (delayed shutdown method).

When the overvoltage protection function kicks in, output is shut down. This output shutdown remains active for as long as the control voltage (+VCC) is being supplied.

The remote sensing function should be set to correct for line drops of up to 250 mV. Use twisted pair or shielded wires as the sensing lines, and if the lines are long, insert capacitors between +S and +V and between -S and -V. The maximum output power is specified for the power supply's output voltage.

Overheating protection operates when an abnormal ambient temperature is detected.

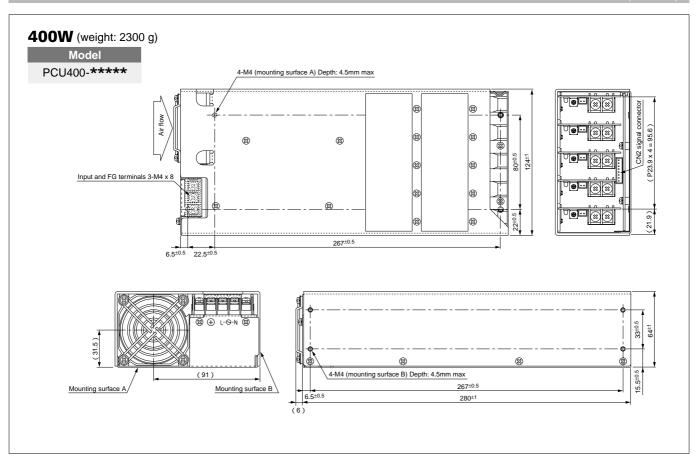
Please contact Sanken when using DC cell modules for series operation or parallel operation.

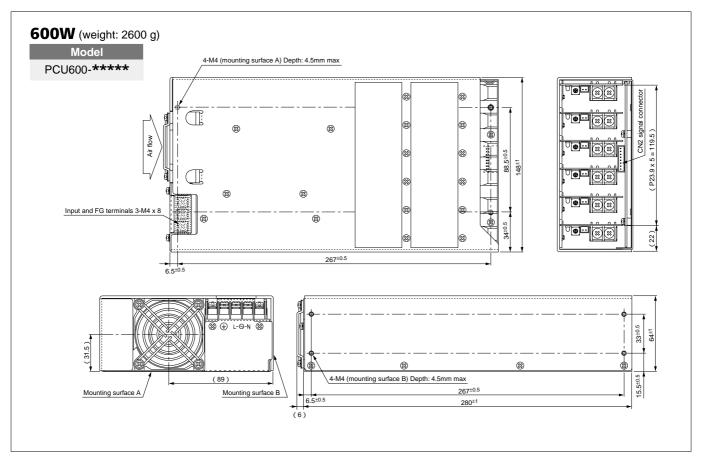
Terminal stand type is also supported for multi-output types W11, W22, Q1, and Q2. (Their DC cell module symbols are W11T, W22T, Q1T, and Q2T.)



**External Dimensions** 

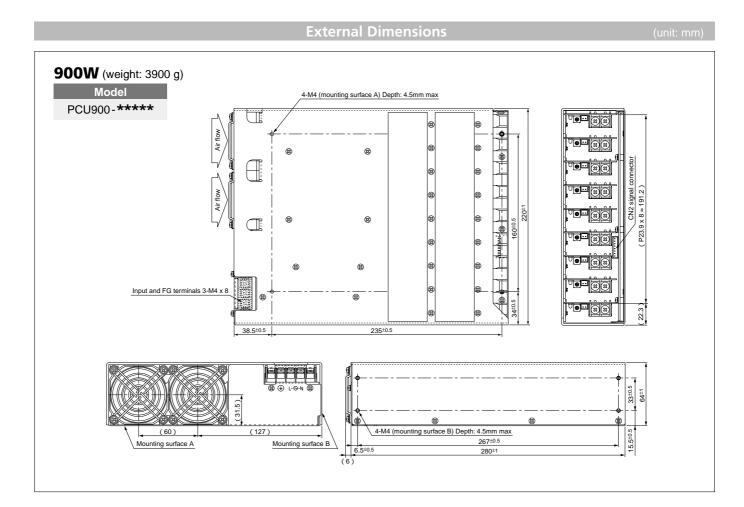
(unit: mm)





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## **PCU** Series 400W,600W,900W





### **Description of Functions** (main functions)

### Signal output (standard equipped)

The PCU series includes standard-equipped signal output, which can be used as needed.

Alarm signals ... For undervoltage, overvoltage, fan malfunction, DC output fault, overheating protection, etc.

AC power fail signal ... For reduction or setup of AC input voltage

- \* The fan alarm signal can be transmitted as an independent signal. For details, please contact Sanken.
- \* When an alarm status continues for a certain amount of time, the DC cell module's output is turned off.
- \* The timing for transmitting signals and turning off the DC cell module output is set based on standard values set by Sanken.

### 2 Protection functions

Each of the PCU Series DC cell modules contains independent protection circuitry (for overcurrent protection, overvoltage protection, and overheating protection).

### **3** Output voltage variation

The output voltage can be changed in each of the PCU Series DC cell modules (variation range:  $\pm 10\%$  of rated voltage).

However, there is no output variation function for multioutput DC cell modules Q1 and Q2.

### Remote sensing

Each of the PCU Series DC cell modules has a remote sensing function. The voltage correction value should be within 0.25 V.

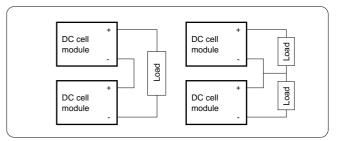
However, there is no remote sensing function for multioutput DC cell modules W11, W22, Q1, and Q2.

### **5** Series operation

The PCU Series DC cell modules can be used for series operation. When performing series operation, the specification for the DC cell module with the lower rated current applies.

However, multi-output DC cell modules Q1 and Q2 cannot be used for series operation.

For details, please contact Sanken.



### **6** Parallel operation

The PCU Series DC cell modules can be used for parallel operation. When DC cell modules are used for parallel operation, Sanken changes their internal settings and connects the output terminals of the parallel DC cell modules using a short bar.

The parallel DC cell modules operate using a load balancing function.

However, multi-output DC cell modules W11, W22, Q1, and Q2 cannot be used for parallel operation.

For details, please contact Sanken.

Example: When using a 24-V load at 10 A (240 W) Two DC cell E modules (rated at 24 V, 5 A, 120 W) are used for parallel operation, and their output is 10 A (240 W).

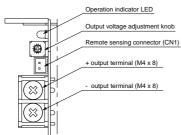
### Negative power supply

Due to the structure of the PCU Series DC cell modules, the polarity (+ or -) of the DC output terminals cannot be changed.

When using them as a negative output power supply, use positive (+) terminals as SG and negative (-) terminals as negative output.

### **Output terminals and connectors**

• Single output DC cell module



| CN No. | Pin No. | Function         | Compatible housing | Corresponding contact  |  |
|--------|---------|------------------|--------------------|------------------------|--|
| CN1    | 1       | Remote sensing - | XHP-2              | SXH-001T-P0.6          |  |
| CINT   | 2       | Remote sensing + | (JST)              | (JST)                  |  |
|        | 1       | + 5V STB         |                    |                        |  |
|        | 2       | SG               |                    |                        |  |
|        | 3       | RMT2 ON/OFF      |                    | SXH-001T-P0.6<br>(JST) |  |
| CN2    | 4       | RMT3 ON/OFF      | XHP-8              |                        |  |
| GINZ   | 5       | RMT4 ON/OFF      | (JST)              |                        |  |
|        | 6       | RMT1 ON/OFF      |                    |                        |  |
|        | 7       | Alarm            |                    |                        |  |
|        | 8       | AC power fail    |                    |                        |  |

\* Recommended screw fastening torque

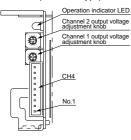
(1) Terminal screws: 118 N· cm (2) Mounting holes: 142 N· cm

CN4 Pin No

W11, W22

• Multi-output DC cell module

W11, W22 (connector type)



Q1, Q2 (connector type)

(

CN3

No.1

Operation indicator LED

Channel 1 output voltage adjustment knob ₩. ₩ No.1

Q1T, Q2T (terminal stand type)

Operation indicator LED

7

0

W11T, W22T (terminal stand type)

Operation indicator LED W11T, W22T Channel 2 output voltage adjustment knob al stand t 8.9 4 5V or 12V (CH1) 3 GND (CH1) 6, 7

Function

| CN3 Pin No. Q1, Q2 Q1T, Q2T (connector type) (terminal stand type) |   | Function        |                | , Q2<br>tor type)      | Q1T, Q2T<br>(terminal stand type)<br>Corresponding wiring |
|--|---|-----------------|----------------|------------------------|---|
|  |   |                 |                |                        |   |
| 1, 2   | 1 | 5V or 12V (CH2) |                |                        | Sheath stripping length:<br>7 to 10 mm                    |
| 3, 4   | 2 | GND (CH2)       |                |                        | (TÜV)<br>Sheath atrianing length:                         |
| 5  |   | NC              | XHP-9<br>(JST) | SXH-001T-P0.6<br>(JST) | (UL, C-UL)<br>Stranded wire AWG16 to 24                   |
|  |   |                 |                |                        |   |

W11, W22

W11T, W22T

Single wire AWG16 to 26

Stranded wire AWG16 to 22

(UL C-UL TÜV)

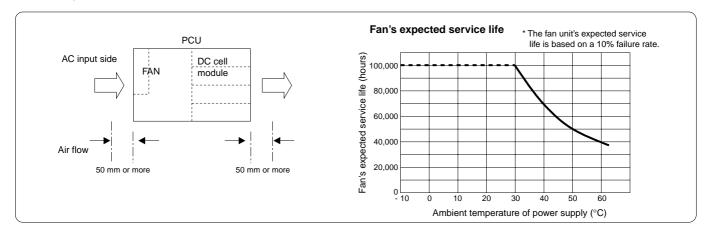
| CN3 P                      | CN3 Pin No.                       |                |        | , Q2                                | Q1T, Q2T                                      |  |
|----------------------------|-----------------------------------|----------------|--------|-------------------------------------|---|--|
| Q1, Q2<br>(connector type) | Q1T, Q2T<br>(terminal stand type) | Function       | ,<br>  | ctor type)<br>Corresponding contact | (terminal stand type)<br>Corresponding wiring |  |
| 11, 12                     | 6                                 | + 5V           |        |                                     | Single wire AWG16 to 26                       |  |
| 9 & 10                     | 5                                 | GND            |        |                                     | (UL, C-UL, TÜV)                               |  |
| 7 & 8                      | 4                                 | - 5V           | XHP-12 | SXH-001T-P0.6                       | Stranded wire AWG16 to 22<br>(UL, C-UL, TÜV)  |  |
| 5&6                        | 3                                 | + 12V or + 15V | (JST)  | (JST) (JST)                         | Stranded wire AWG24 only<br>(TÜV)             |  |
| 3 & 4                      | 2                                 | GND            |        |                                     | Sheath stripping length:<br>7 to 10 mm        |  |
| 1 & 2                      | 1                                 | - 12V or - 15V |        |                                     | 7 10 10 mm                                    |  |

#### 9 **Cooling method**

The PCU Series uses an internal fan for forced air cooling. The fan is an intake fan mounted on the input terminal side. Leave at least 50 mm of space on the AC input terminal side or DC cell module output terminal side, where the fan is mounted.

If the internal fan has stopped, output may be shut off by the overheating protection circuit.

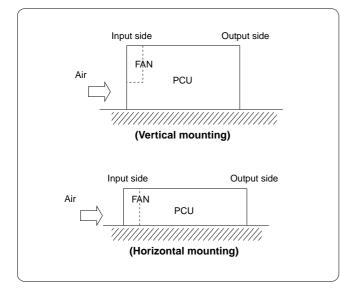
The fan's expected service life span may be affected by the power supply's use conditions, so the fan should be checked regularly. The fan must be replaced periodically because its service life is limited.





### 10 Mounting

Sanken recommends using the standard mounting method for its power supplies. This standard mounting method is illustrated below.



The length of the screws should take into account the insulation distance from the internal parts. Adjust the length so that the depth from the PCU case's surface is not greater than 4.5 mm.

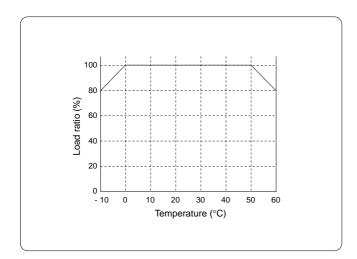
The recommended mounting screw fastening torque is 142  $\ensuremath{\mathsf{N}\xspace\ensuremath{\mathsf{o}}\xspace}$  recommended mounting screw fastening torque is 142  $\ensuremath{\mathsf{N}\xspace\ensuremath{\mathsf{o}$ 

Please contact Sanken if you intend to use any nonstandard mounting method.

### **11** Derating for ambient temperature

Sanken recommends using the standard mounting method to mount its power supplies.

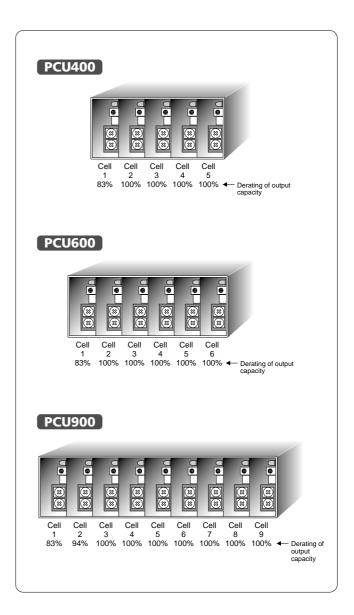
Use the output derating values shown below, based on the power supply's ambient temperature.



### **12** Derating based on mounting positions of DC cell modules

Derating based on the mounting positions of the DC cell modules is required for PCU Series power supply.

Derating values based on DC cell module position of various capacities are shown below. Refer to this when determining a configuration of DC cell modules for PCU Series power supplies.





### Options

| What are the<br>optional functions<br>in PCU Series<br>devices? | <ul> <li>The cell control module provides a wealth of optional functions using microprocessor control.</li> <li>Microprocessor control means that various types of processing that had previously been handled by hardware (operation of relay circuits, delay circuits, etc.) are now performed as software processing.</li> <li>The desired operation mode can be easily selected via program settings.</li> <li>If specification changes are required during the customer's evaluation process, these can also be supported via simple changes in program settings, thus minimizing time loss.</li> </ul>  |
|---|---|
| • Alarm sequence  | <ul> <li>When a fan malfunction or DC output fault is detected, the unit can be switched off at any specified time following transmission of the alarm signal.</li> <li>* The standard-equipped alarm signal turns off the DC cell module's output at a time (following transmission of the alarm signal) based on standard values set by Sanken.</li> <li>* If a DC output fault occurs, the corresponding output is shut off immediately. Shut-off times can be set for other output.</li> </ul>  |
| • AC power failure<br>Option P                                  | The AC input voltage is monitored, and an AC power fail signal is transmitted when the AC input voltage is set up or reduced. If a power failure (AC power failure) is detected, output can be shut off at any specified time following transmission of the power fail signal (varies depending on the load capacity and DC cell module used). The DC cell module's output hold time can be extended by stopping unnecessary DC output.<br>* When a longer time setting is entered for the power supply's output hold time (which differs according to the specifications and setup conditions), the DC cell module's output is reduced before the set time has elapsed. For details, please contact Sanken.<br>* The time for transmission of the standard-equipped AC power fail signal is fixed. |
| • Cell output sequence  | The startup sequence can be set for each DC cell module. Up to nine levels can be set in the startup sequence (when the PCU900-9 cells are used).<br>* The shut-off sequence can also be set in combination with other options.   |
| • External remote ON/OFF  | An external signal can be used to remotely turn the PCU Series DC cell modules ON or OFF (select among turning ON or OFF all DC cell modules at once, half of the cells, or one third of the cells).  |
| • Cell group control  | <ul> <li>DC cell modules can be grouped (and divided into three groups) and a separate startup sequence can be set for each group.</li> <li>* When this is done during economy mode (Option E), the shut-down sequence can also be set.</li> <li>* When this cell group control function (Option C) is selected, the external remote ON/OFF function (Option R) is included. However, it is not possible to use a group sequence after using the external remote ON/OFF function (Option R).</li> </ul>   |
| • Economy mode  | Power consumption can be reduced during standby by shutting down the PCU Series cell models (PFC cells and DC cells) and stopping the internal fan (power consumption in economy mode is approximately 3.9 W during 100 V AC input). In this case as well, a +5 V STB power supply (CN2's pin 1, 5 V 50 mA, standard equipped) can be used.   |
| Medical equipment support     Option M                          | Medical equipment standard EN60601-1 (TÜV) certified (PCU400M/600M).<br>The leakage current is 0.5 mA or less.  |



### Options

### Combining optional functions

Any combination of PCU Series device options can be used. The following are some examples for reference. For details, please contact Sanken.

• Example of combining cell output sequence Option S with external remote ON/OFF Option R

```
Operation mode
```

① External remote ON/OFF function (PCU ON) is used to enable operation of DC cell modules.
 ② Cell output sequence function is used to sequentially start DC cell modules.

Similarly, shut-down operations also can be set.

• Example of combining cell output sequence Option S with economy mode Option E

Operation mode

Economy mode function (PCU ON) is used to enable operation of PCU Series power supply.
 Cell output sequence function is used to sequentially start DC cell modules.
 Similarly, shut-down operations also can be set.

• Example of combining cell output sequence Option S with cell group control Option C

Operation mode

 Cell group control function (PCU 1G ON) is used to set up group No. 1 and enable operation of the group.

- 2 Cell output sequence function is used to sequentially start DC cell modules in group No. 1.
- 3 Operation modes 1 and 2 are repeated to sequentially start group Nos. 2 and 3.
- 4 Similarly, shut-down operations also can be set.

| Examples of<br>parameter setting<br>ranges for optional<br>functions | When optional functions have been selected for a PCU Series power supply, parameters can be set for each function. The setting ranges for some of these parameters are listed below for reference.<br>Unless otherwise specified by the customer, Sanken's standard value is set.<br>* Please contact Sanken concerning use of any other operation mode. |
|--|--|
|--|--|

### Alarm signals

| Item                  | Description  | Setting range        | Standard setting     |
|-----------------------|--|----------------------|----------------------|
| Fan alarm             | Sets time between fan stoppage and alarm signal output                 | 2s to 25s            | 10s                  |
| DC output fault alarm | Sets time between DC output fault and alarm signal output              | 0s to 25s            | 3s                   |
| AC power fail signal  | Sets time between AC power failure and AC power fail signal output     | Within 25 ms (fixed) | Within 25 ms (fixed) |
|                       | Sets time between alarm signal output and shut-off of DC power         | 0s to 25s            | 0s                   |
| DC output OFF         | Sets time between AC power fail signal output and shut-off of DC power | 0 to 250ms           | 250ms                |

### Sequences

| Item   | Description   | Setting range | Standard setting |
|--|---|---------------|------------------|
| Enable operation of DC cells when AC power is ON | Sets time between AC power ON and setting of operation enabled status for DC cells        | Within 500 ms |                  |
| Coll output coguonoo                             | Sets startup sequence for each DC cell  | 0 to 2500ms   | 0ms              |
| Cell output sequence                             | Sets the shut-down sequence for each DC cell  | 0 10 2500ms   | oms              |
|  | Sets time between external remote ON and setting of operation enabled status for DC cells | 60 10 mg      |                  |
| Enternal semate ON/OFF                           | Sets time between external remote OFF and stopping of DC cell operation                   | 60±10ms       |                  |
| External remote ON/OFF                           | Sets time between external remote ON and DC cell startup sequence                         | 0.45.0500     | 0                |
|  | Sets time between external remote OFF and DC cell shut-down sequence                      | 0 to 2500ms   | 0ms              |
|  | Sets time between external remote ON and setting of operation enabled status for DC cells | Within 500 ms |                  |
|  | Sets each group's startup sequence  | 0.45.005      |                  |
| Cell group control                               | Sets each group's shut-down sequence  | 0 to 60s      | 0s               |
|  | Sets startup sequence of DC cells in each group   | 0.1.0500      | 0                |
|  | Sets shut-down sequence of DC cells in each group   | 0 to 2500ms   | 0ms              |
| Freedow  | Sets time between economy mode ON and setting of operation enabled status for DC cells    | 260±10ms      |                  |
| Economy mode                                     | Sets time between economy mode OFF and stopping of DC cell operation                      | 60±10ms       |                  |

### Settings for standard-equipped alarm signals

### Sanken's standard settings for alarm signals are listed below.

| Item                  | Description  | Standard setting |
|-----------------------|--|------------------|
| Fan alarm             | Sets time between fan stoppage and alarm signal output         | 10s              |
| DC output fault alarm | Sets time between DC output fault and alarm signal output      | 3s               |
| DC output OFF         | Sets time between alarm signal output and shut-off of DC power | 3s               |

Note: When a DC output fault occurs for any output, the output is shut off immediately. Other output is shut off after a specified amount of time for "DC output OFF".

### Interface

### The logic and interface for the external remote control and alarm signals are described below.

| CN2 Pin No. | Item  | Logic (TTL level) | Interface                                       |  |  |  |
|-------------|---|-------------------|---|--|--|--|
| 3           | RMT2 ON/OFF<br>Turns all DC cell modules ON or OFF  | L: ON<br>H: OFF   |   |  |  |  |
| 3, 4, 5     | RMT2, 3, 4 ON/OFF<br>Divides DC cell modules into three<br>groups and turns grouped cells ON or OFF | L: ON<br>H: OFF   | CN2-3,4,5,6                                     |  |  |  |
| 6           | RMT1 ON/OFF<br>Turns OFF PFC cell modules to set<br>economy mode                                    | L: ON<br>H: OFF   | PCU Sink current: 3.5 mA<br>Max. open collector |  |  |  |

### • Remote control <configured by four channels consist of CN2's pins 3 to 6>

### • Alarm signals <configured by two channels consist of CN2's pins 7 and 8>

| CN2 Pin No. | Item   | Logic (TTL level)  | Interface   |
|-------------|--|--|---|
| 7           | Alarm<br>Alarm signal is output when specified<br>time has elapsed following alarm detection | L: Normal<br>H: Abnormal   | CN2-1<br>+5V<br>STB<br>CN2-7,8<br>Alarm<br>AC power |
| 8*          | AC power failure<br>Signal is output when input voltage<br>reduction or setup occur          | L: AC voltage is abnormal<br>(60 to 75 V AC or below)<br>H: AC voltage is normal<br>(70 to 80 V AC or above) | PCU SG<br>CN2-2<br>Source current: 3.5 mA           |

\* The fan alarm signal can be transmitted separately instead of the AC power fail signal.

For details, please contact Sanken.



### Product Names

• Product names: The name is set as shown below for PCU Series products.



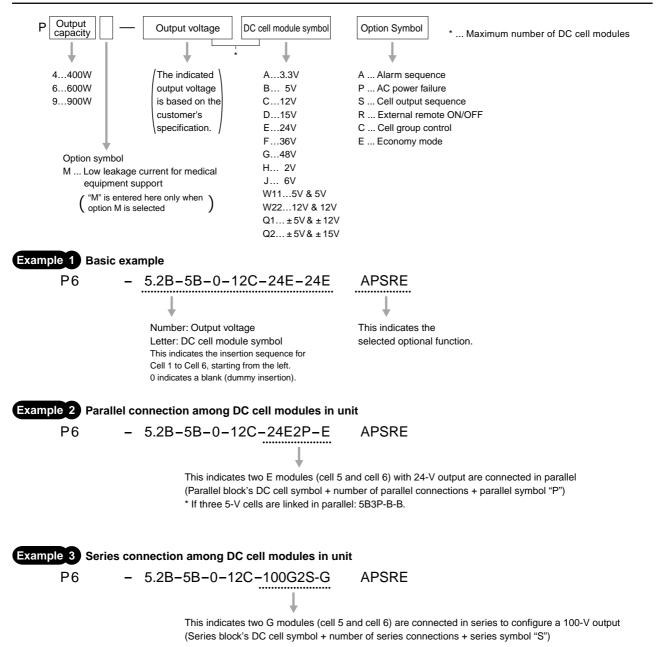
\*\*\*\*

Example PCU600-10001

Registration number (five-digit numerical value)

Registration number is assigned to at Sanken for each of your ordering specifications.

• Product configuration names: The product configuration name is set as shown below to designate DC cell configurations and option configurations for PCU Series products.





### Sample Order Sheet

### From your company to Sanken

|         | Company name:           | Address:                          |  |  |  |  |  |
|---------|-------------------------|-----------------------------------|--|--|--|--|--|
|         | Division/Department:    |                                   |  |  |  |  |  |
| company | Contact person:         |                                   |  |  |  |  |  |
| -       | Telephone number:       | Email address:                    |  |  |  |  |  |
| Your    | Fax number:             | Name of device or equipment used: |  |  |  |  |  |
|         | Application or purpose: |                                   |  |  |  |  |  |
|         | Other:                  |                                   |  |  |  |  |  |

|                | Input voltage  |                      |        | AC     | ν (    | ١      | /~                     | <b>V</b> ) |        |        |
|----------------|--|----------------------|--------|--------|--------|--------|------------------------|------------|--------|--------|
|                | Output specifications  | Cell 1               | Cell 2 | Cell 3 | Cell 4 | Cell 5 | Cell 6                 | Cell 7     | Cell 8 | Cell 9 |
|                | Output voltage (V)   |                      |        |        |        |        |                        |            |        |        |
|                | Output current (A)   |                      |        |        |        |        |                        |            |        |        |
| suc            | Output capacity (W)  |                      |        |        |        |        |                        |            |        |        |
| catic          | Total output<br>capacity (W)                                 |                      | 1      |        |        |        |                        |            |        | I      |
| specifications | Optional functions   | Alarm sequence       |        | ۲      | Yes No |        | External remote ON/OFF |            | Yes    | No     |
|                |  | AC power failure     |        | ١      | Yes No |        | Cell group control     |            | Yes    | No     |
| uest           |  | Cell output sequence |        | ١      | Yes No |        | Economy mode           |            | Yes    | No     |
| Request        | Number of samples<br>and requested<br>delivery date<br>Other |                      |        |        |        |        |                        |            |        |        |
|                |  |                      |        |        |        |        |                        |            |        |        |

### From Sanken to your company

|                         | Product name                 |        |        |        |        |        |        |        |        |        |
|-------------------------|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Proposal specifications | Product configuration name   |        |        |        |        |        |        |        |        |        |
|                         | Output specifications        | Cell 1 | Cell 2 | Cell 3 | Cell 4 | Cell 5 | Cell 6 | Cell 7 | Cell 8 | Cell 9 |
|                         | Output voltage (V)           |        |        |        |        |        |        |        |        |        |
|                         | Output current (A)           |        |        |        |        |        |        |        |        |        |
|                         | Output capacity (W)          |        |        |        |        |        |        |        |        |        |
|                         | Total output<br>capacity (W) |        |        |        | 1      |        | I      |        |        | 1      |
| -                       | Other                        |        |        |        |        |        |        |        |        |        |

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