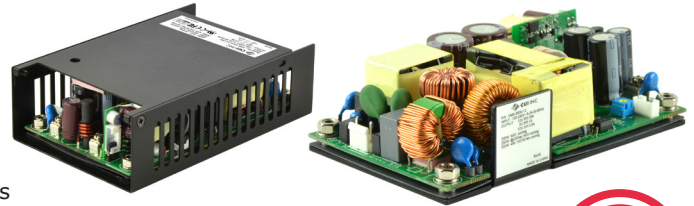




## SERIES: VMS-300A | DESCRIPTION: AC-DC POWER SUPPLY

### FEATURES

- up to 300W continuous power
- universal input voltage range
- industry standard 3" x 5" footprint
- power factor correction
- remote voltage sense & on/off control
- fan & 5 Vdc aux outputs
- covered and open-frame configurations
- over voltage, over current, over temperature, and short circuit protections
- medical 60601-1 (4th edition) safety approvals
- designed for 2 x MOPP applications
- efficiency up to 94%

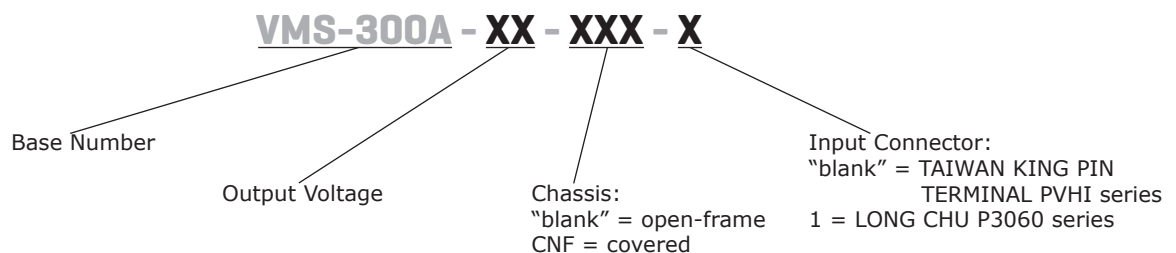


| MODEL             | output voltage | output current max | output power <sup>1</sup> max | ripple and noise <sup>2</sup> max | efficiency <sup>3</sup> typ |
|-------------------|----------------|--------------------|-------------------------------|-----------------------------------|-----------------------------|
|                   | (Vdc)          | (A)                | (W)                           | (mVp-p)                           | (%)                         |
| VMS-300A-12       | 12             | 25                 | 300                           | 120                               | 92.5                        |
| VMS-300A-24       | 24             | 12.5               | 300                           | 150                               | 93.5                        |
| VMS-300A-36       | 36             | 8.34               | 300                           | 150                               | 93.5                        |
| VMS-300A-48       | 48             | 6.25               | 300                           | 150                               | 94                          |
| Vstb <sup>4</sup> | 5              | 1                  | 5                             | 100                               | --                          |

Notes:

1. Maximum output power of 300 W (5 W for Vstb) with 10 CFM forced air, 200 W (3 W for Vstb) with convection cooling.
2. At full load, nominal input, 20 MHz bandwidth oscilloscope, output terminated with 10  $\mu$ F electrolytic and 0.1  $\mu$ F ceramic capacitors.
3. At full load, 25°C, 230 Vac input.
4. Standby output voltage. Present on all models.
5. All specifications are measured at Ta=25°C, 230 Vac input voltage, and 60% rated output load unless otherwise specified.

### PART NUMBER KEY



## INPUT

| parameter                               | conditions/description                           | min | typ | max        | units  |
|-----------------------------------------|--------------------------------------------------|-----|-----|------------|--------|
| voltage                                 |                                                  | 90  |     | 264        | Vac    |
| frequency                               |                                                  | 47  |     | 63         | Hz     |
| current                                 | at 100 Vac<br>at 240 Vac                         |     |     | 4.0<br>1.8 | A<br>A |
| inrush current                          | at 240 Vac, 25°C, cold start                     |     |     | 30         | A      |
| leakage current                         |                                                  |     |     | 0.3        | mA     |
| leakage current (enclosure/<br>patient) |                                                  |     |     | 0.1        | mA     |
| power factor correction                 | meets EN 61000-3-2                               |     |     |            |        |
| no load power consumption               | measured with the PS-ON signal configured to OFF |     |     | 0.3        | W      |

## OUTPUT

| parameter                  | conditions/description                                                                                                    | min                                                         | typ        | max                                | units                |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|------------|------------------------------------|----------------------|
| output capacitance         | at 115/230 Vac, full load<br>12 Vdc output models<br>24 Vdc output models<br>36 Vdc output models<br>48 Vdc output models |                                                             |            | 25,000<br>12,500<br>5,000<br>3,750 | µF<br>µF<br>µF<br>µF |
| initial set point accuracy | at full load, 25°C<br>Vo<br>Vstb                                                                                          |                                                             | ±1<br>±3   |                                    | %<br>%               |
| line regulation            | high line to low line at full load<br>Vo<br>Vstb                                                                          |                                                             | ±0.5<br>±1 |                                    | %<br>%               |
| load regulation            | from full to 10% load<br>Vo<br>Vstb                                                                                       |                                                             | ±1<br>±5   |                                    | %<br>%               |
| hold-up time               | at 115 Vac                                                                                                                |                                                             | 16         |                                    | ms                   |
| adjustability              | built in trim pot (VR)                                                                                                    |                                                             | ±5         |                                    | %                    |
| switching frequency        | at full load                                                                                                              | 60                                                          |            | 80                                 | kHz                  |
| temperature coefficient    |                                                                                                                           |                                                             | ±0.05      |                                    | %/°C                 |
| PS-ON signal <sup>1</sup>  | power on                                                                                                                  | PS-ON                                                       | 0          | 2                                  | Vdc                  |
|                            |                                                                                                                           | PS-ON = 0V                                                  | 4.5        |                                    | mA                   |
|                            | power off                                                                                                                 | PS-ON = NC (internal circuit will drive PS-On to 11~16 Vdc) |            |                                    |                      |
|                            |                                                                                                                           | PS-ON = NC                                                  | 0          |                                    | mA                   |
| power good (PG)            | TTL goes high 50~250 ms after powered on<br>TTL goes low 5~20 ms before 90% Vo                                            |                                                             |            |                                    |                      |
| standby output voltage     | 5 Vdc / 1 A                                                                                                               |                                                             |            |                                    |                      |
| fan output                 | 12 Vdc / 500 mA                                                                                                           |                                                             |            |                                    |                      |

Notes: 1. When not used, short PS-ON &amp; signal GND.

## PROTECTIONS

| parameter                   | conditions/description                                                                                     | min | typ                  | max | units                    |
|-----------------------------|------------------------------------------------------------------------------------------------------------|-----|----------------------|-----|--------------------------|
| over voltage protection     | latch mode<br>12 Vdc output models<br>24 Vdc output models<br>36 Vdc output models<br>48 Vdc output models |     | 15<br>30<br>43<br>56 |     | Vdc<br>Vdc<br>Vdc<br>Vdc |
| over current protection     |                                                                                                            | 130 | 150                  | 180 | %                        |
| short circuit protection    | hiccup, auto recovery                                                                                      |     |                      |     |                          |
| over temperature protection | auto recovery (temperature of C37)                                                                         |     |                      | 110 | °C                       |

## SAFETY & COMPLIANCE

| parameter            | conditions/description                                                                                                     | min | typ     | max   | units |
|----------------------|----------------------------------------------------------------------------------------------------------------------------|-----|---------|-------|-------|
| isolation voltage    | input to output (2MOPP) for 1 minute                                                                                       |     |         | 4,000 | Vac   |
|                      | input to earth (1MOPP) for 1 minute                                                                                        |     |         | 1,500 | Vac   |
|                      | output to earth (1MOPP) for 1 minute                                                                                       |     |         | 1,500 | Vac   |
| isolation resistance |                                                                                                                            | 100 |         |       | MΩ    |
| safety approvals     | UL/cUL 60601-1, IEC 60601-1, EN 60601-1 (4th edition)                                                                      |     |         |       |       |
| safety class         | class I                                                                                                                    |     |         |       |       |
| EMI/EMC              | EN55011, EN55022 Class B, EN55024, FCC Class B, EN61204-3, EN61000-6-1, EN61000-6-3, EN60601-1-2, EN61000-3-2, EN61000-3-3 |     |         |       |       |
| MTBF                 | as per MIL-HDBK-217F, at 115 Vac, 25°C, GB                                                                                 |     | 100,000 |       | hours |
| RoHS                 | 2011/65/EU                                                                                                                 |     |         |       |       |

Notes: 1. The power supply is considered a component which will be installed into final equipment. The final equipment still must be tested to meet the necessary EMC directives.

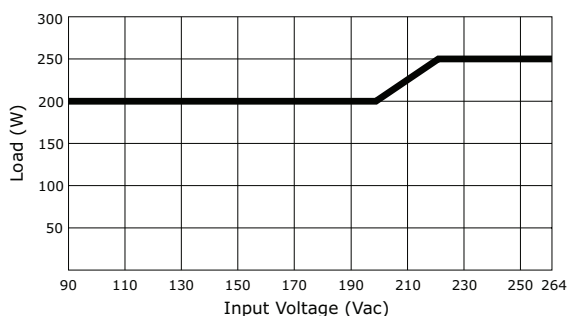
## ENVIRONMENTAL

| parameter              | conditions/description                                                                | min | typ  | max | units |
|------------------------|---------------------------------------------------------------------------------------|-----|------|-----|-------|
| operating temperature  | see derating curves                                                                   | -40 |      | 80  | °C    |
| storage temperature    |                                                                                       | -40 |      | 85  | °C    |
| operating humidity     | non-condensing                                                                        |     |      | 93  | %     |
| operating altitude     |                                                                                       |     | 3000 |     | m     |
| vibration <sup>2</sup> | as per MIL-STD-810F Table 514.5C-VIII; 15~2000 Hz for 1 hour on each axis for 3 hours |     | 4    |     | G     |
| shock <sup>2</sup>     | as per MIL-STD-810F Table 516.5, Table 516.5-1; for 10 ms on each axis 3 times        |     | 75   |     | G     |

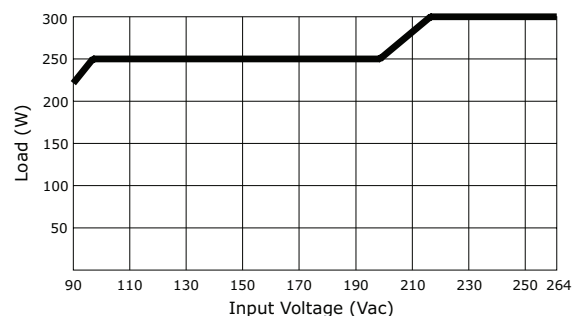
Notes: 2. See Installation Instructions for mounting requirements.

## DERATING CURVES

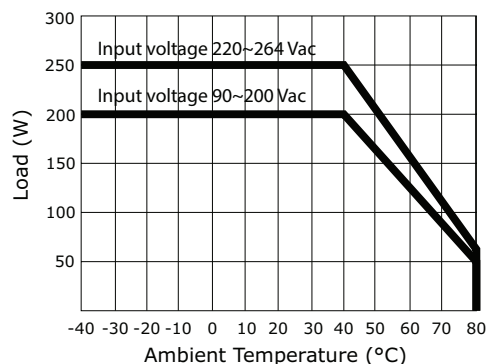
VMS-300A Output Power vs. Input Voltage  
(Natural Convection)



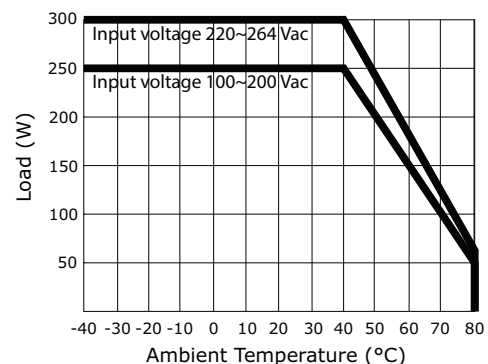
VMS-300A-CNF Output Power vs. Input Voltage  
(Natural Convection)



VMS-300A Output Power vs. Ambient Temperature  
(Natural Convection)

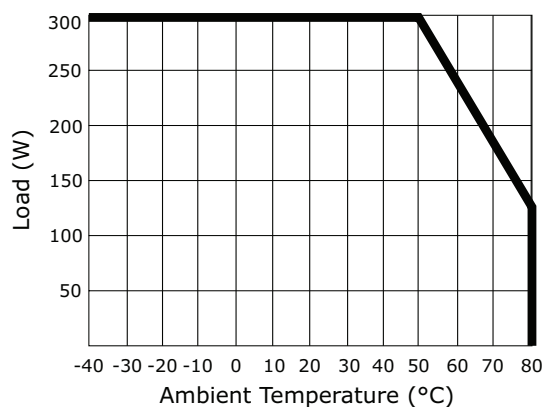


VMS-300A-CNF Output Power vs. Ambient Temperature  
(Natural Convection)

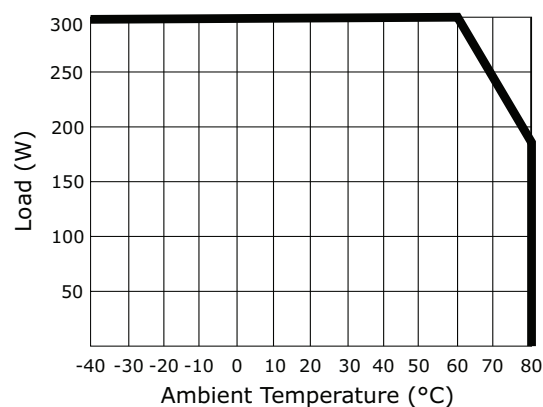


## DERATING CURVES (CONTINUED)

VMS-300A Output Power vs. Ambient Temperature  
(with 10 CFM airflow)

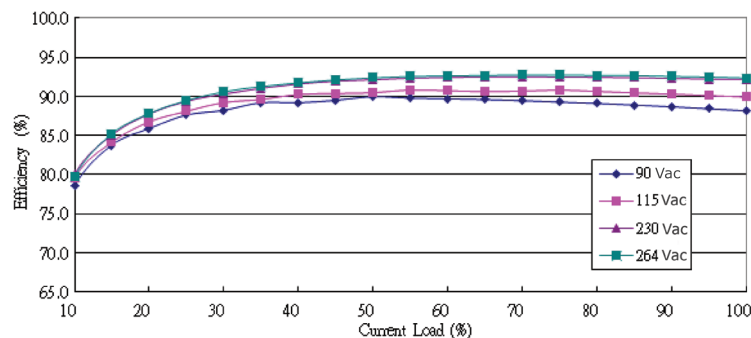


VMS-300A-CNF Output Power vs. Ambient Temperature  
(with 10 CFM airflow)

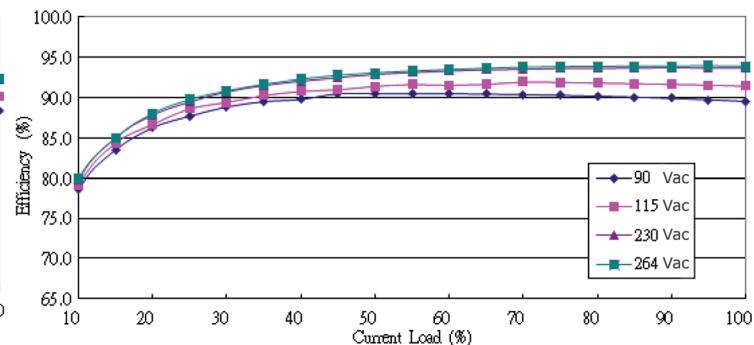


## EFFICIENCY CURVES

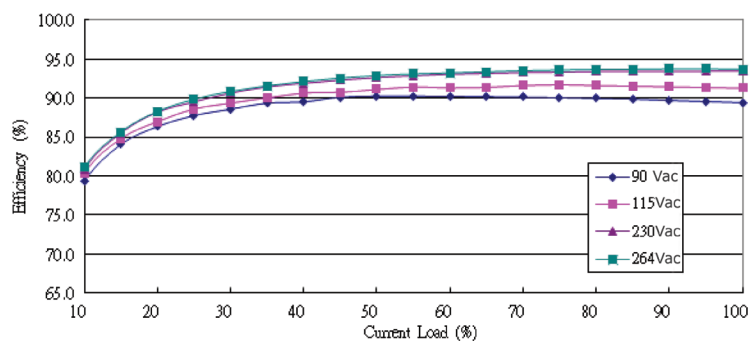
12 Vdc Output Efficiency Curve  
(at 25°C)



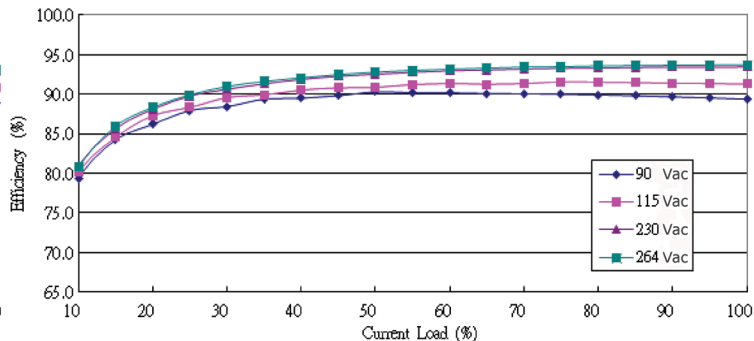
24 Vdc Output Efficiency Curve  
(at 25°C)



36 Vdc Output Efficiency Curve  
(at 25°C)



48 Vdc Output Efficiency Curve  
(at 25°C)



## MECHANICAL

| parameter                      | conditions/description                                                                                                     | min | typ        | max | units        |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----|------------|-----|--------------|
| dimensions                     | VMS-300A models: 5.00 x 3.00 x 1.38 (127 x 76.2 x 35.1 mm)<br>VMS-300A-CNF models: 5.35 x 3.46 x 1.59 (136 x 88 x 40.4 mm) |     |            |     | inch<br>inch |
| weight                         | VMS-300A models<br>VMS-300A-CNF models                                                                                     |     | 410<br>515 |     | g<br>g       |
| cooling                        | external fan                                                                                                               |     |            |     |              |
| CN1 input connector            | CN1 mates with JST housing VHR series or equivalent                                                                        |     |            |     |              |
| CN1 input connector (optional) | CN1 mates with MOLEX housing 5195 series or equivalent                                                                     |     |            |     |              |
| CN4 output connector           | CN4 mates with JST housing PH series or equivalent                                                                         |     |            |     |              |
| CN5 output connector           | CN5 mates with JST housing PH series or equivalent                                                                         |     |            |     |              |
| output terminals               | +Vo & -Vo terminals are M3 screws that mate with round or Y terminals with max OD of 6.75 mm and max ID of 3.9 mm          |     |            |     |              |

## MECHANICAL DRAWING

### Open-frame

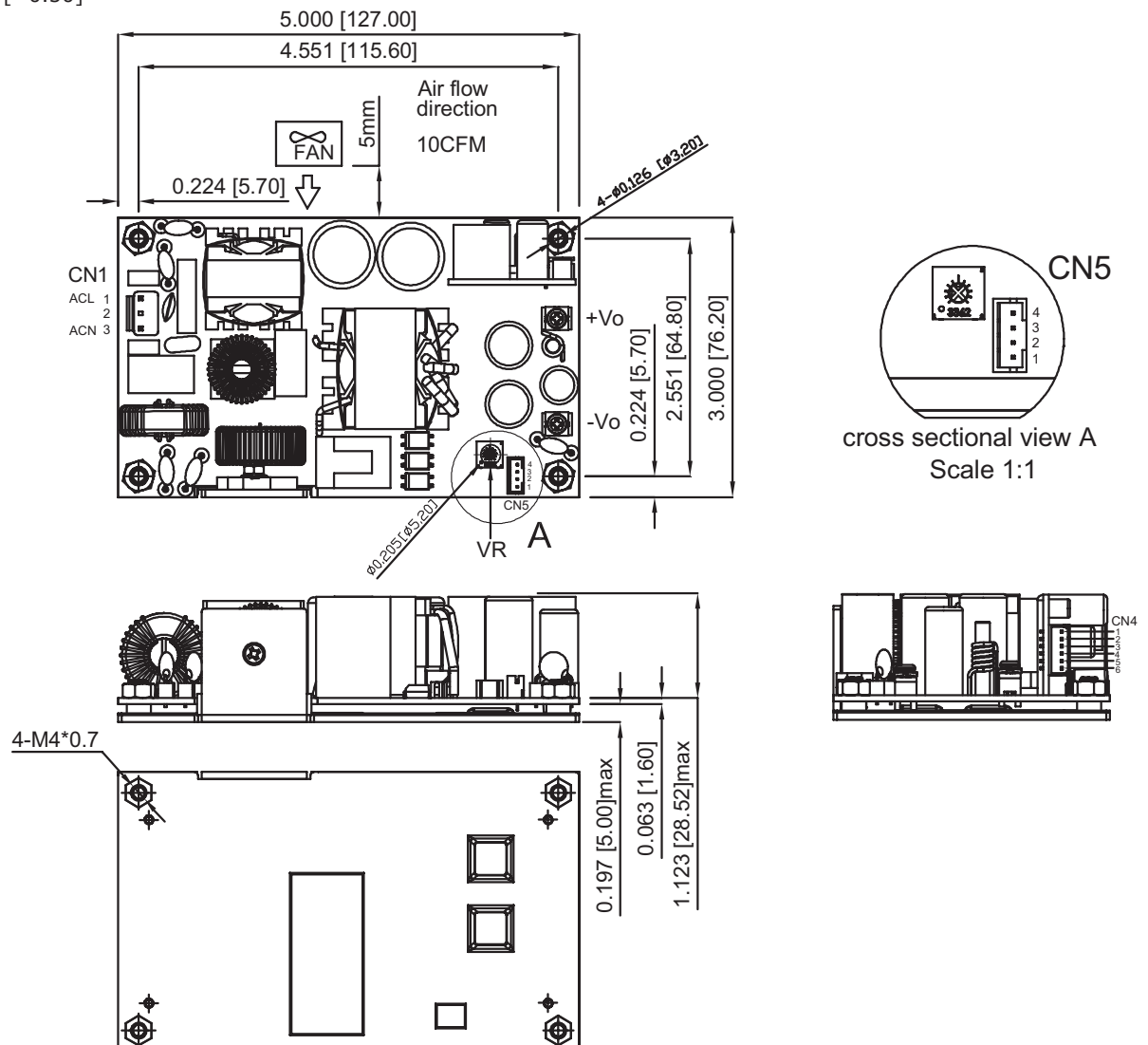
units: inch [mm]

tolerance: X.XXX =  $\pm 0.020$  [ $\pm 0.50$ ]

| CN1 |          |
|-----|----------|
| PIN | Function |
| 1   | ACL      |
| 2   | -        |
| 3   | ACN      |

| CN4 |          |
|-----|----------|
| PIN | Function |
| 1   | -FAN     |
| 2   | +FAN     |
| 3   | GND      |
| 4   | +5 VSB   |
| 5   | GND      |
| 6   | PS-ON    |

| CN5 |          |
|-----|----------|
| PIN | Function |
| 1   | GND      |
| 2   | PG       |
| 3   | -Sense   |
| 4   | +Sense   |



## MECHANICAL DRAWING (CONTINUED)

### Covered

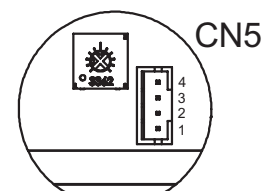
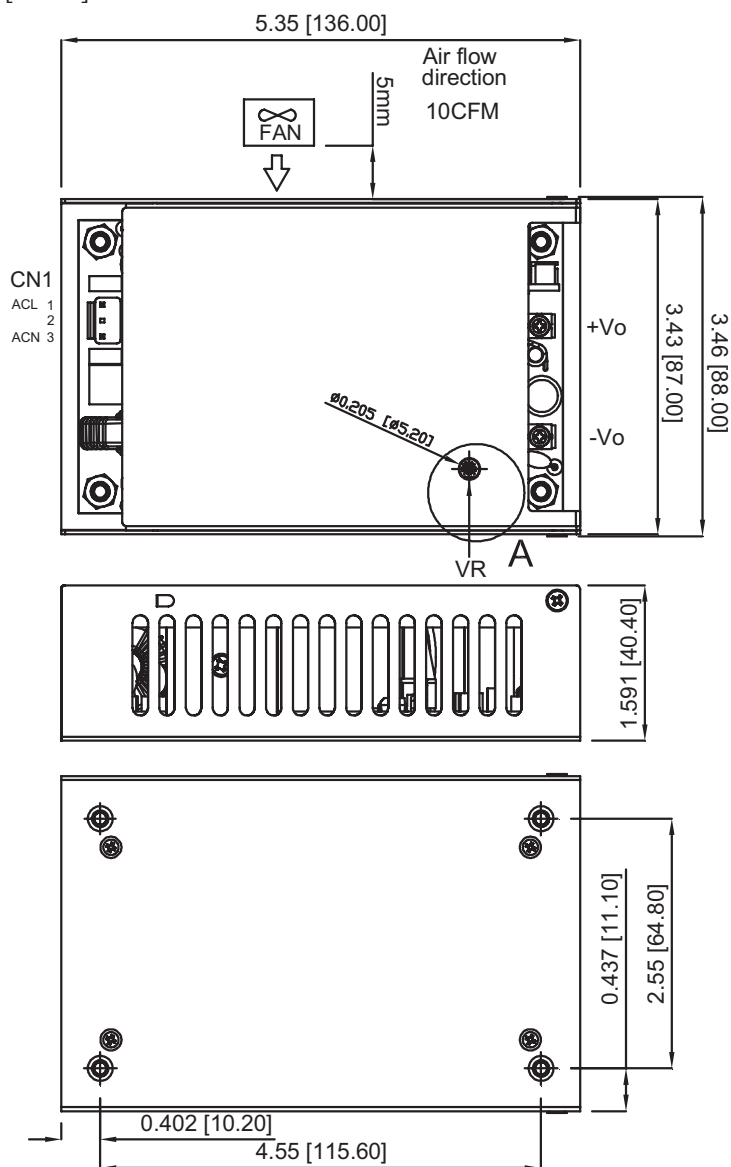
units: inch [mm]

tolerance: X.XXX =  $\pm 0.020$  [ $\pm 0.50$ ]

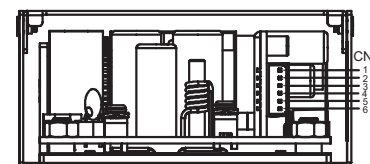
| CN1 |          |
|-----|----------|
| PIN | Function |
| 1   | ACL      |
| 2   | -        |
| 3   | ACN      |

| CN4 |          |
|-----|----------|
| PIN | Function |
| 1   | -FAN     |
| 2   | +FAN     |
| 3   | GND      |
| 4   | +5 VSB   |
| 5   | GND      |
| 6   | PS-ON    |

| CN5 |          |
|-----|----------|
| PIN | Function |
| 1   | GND      |
| 2   | PG       |
| 3   | -Sense   |
| 4   | +Sense   |



cross sectional view A  
Scale 1:1



## INSTALLATION INSRUCTIONS

The VMS-300A series has (4) 4 mm diameter mounting holes that can be used in (3) types of installations.

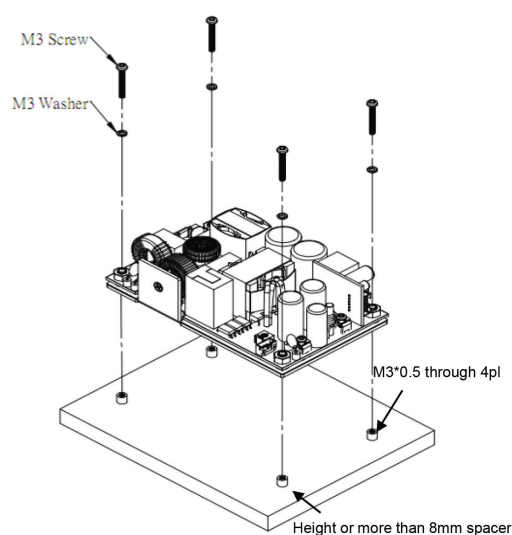
### Type 1

Mounting from top with spacers (required to meet vibration specifications)

Spacer: 4 mm diameter max, 8 mm high minimum

Screw Size: (4) M3X0.5

Mounting torque: 3 kgf-cm

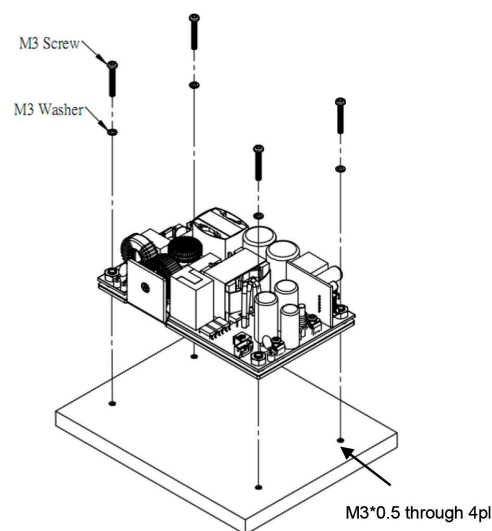


### Type 2

Mounting from top without spacers

Screw Size: (4) M3X0.5

Mounting torque: 3 kgf-cm

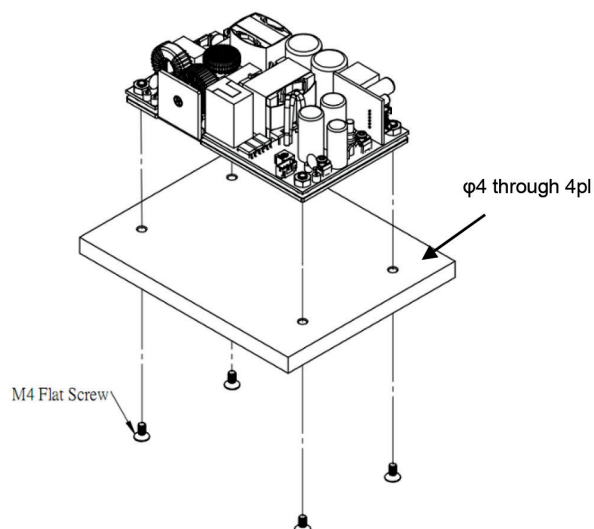


### Type 3

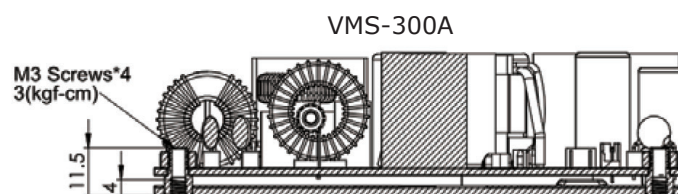
Mounting from bottom

Screw Size: (4) M4X0.7

Mounting torque: 7 kgf-cm



### Mounting Torque



M4 Screws\*4  
7(kgf-cm)

VMS-300A-CNF

M3 Screws\*4  
3(kgf-cm)

M4 Screws\*4  
7(kgf-cm)

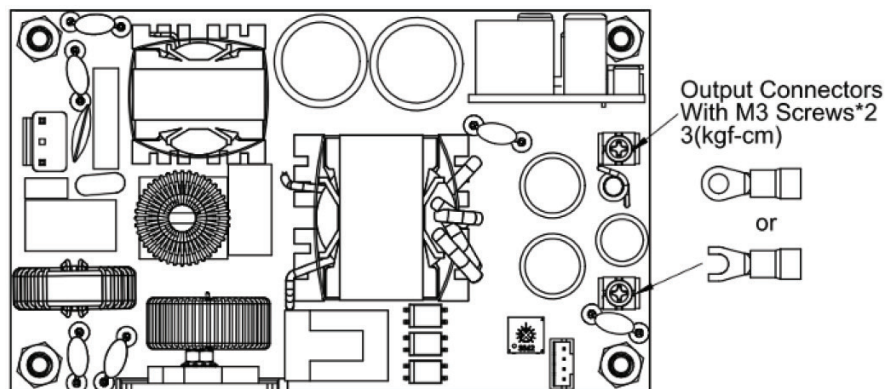
## INSTALLATION INSRUCTIONS (CONTINUED)

### Output Terminals

Mate with round or Y terminals with max OD of 6.75 mm and max ID of 3.9 mm

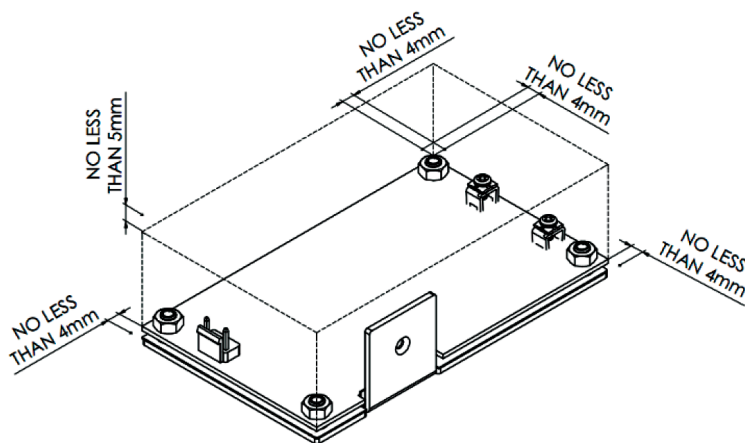
Terminal Size: (2) M3

Torque: 3 kgf-cm



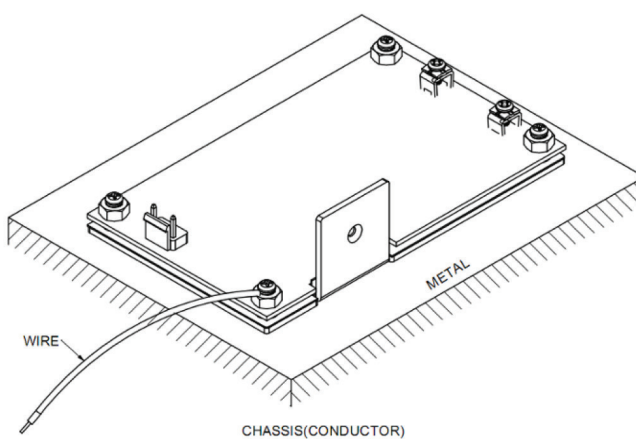
### Mounting Clearance

Allow at least 4 mm side clearance and 5 mm height clearance. If clearances aren't met, the isolation and withstand specifications may not be met.



### Field Ground

Should be connected to the earth (ground) terminal of the apparatus otherwise conducted noise and output noise will increase.

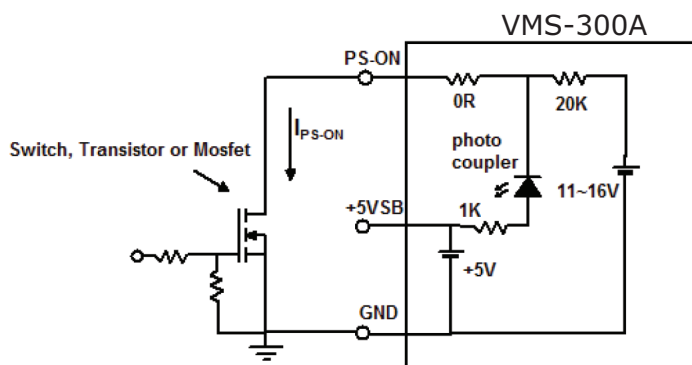


## APPLICATION NOTES

### On/off Remote Control

A PS On/Off remote control is provided in CN4. See Figure 1 for the PS-ON diagram and control function.

Figure 1



Note: Power on:  $V_{PS-ON} \leq 2V$ ,  $I_{PS-ON} \geq 2\text{ mA}$

(PS-ON and GND short,  $I_{PS-ON} = 4.5\text{ mA}$  typical)

Power off: Open circuit,  $V_{PS-ON} = 11\sim 16\text{ V}$

When the PS On/off remote control function is not used, connect a short circuit between the PS-ON control & the signal GND.

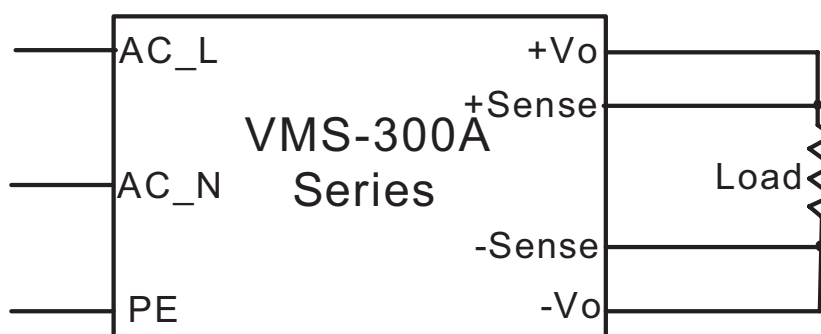
### Output Remote Sensing

The VMS-300A series can remotely sense both lines of the output. The feature moves the effective voltage regulation point from the output of the unit to the point of connection of the remote sense pins. This feature automatically adjusts the real output in order to compensate for voltage drops in distribution and maintain a regulated voltage at the point of load. The remote sense voltage range is as follows:

$$[(+V_{out}) - (-V_{out})] - [(+Sense) - (-Sense)] \leq 10\% V_{o\_nominal}$$

If the remote sense is not used, the sense pins should be connected locally to the respective Vout pins. The remote sense pins are located on CN4.

Figure 2



## REVISION HISTORY

| rev. | description                             | date       |
|------|-----------------------------------------|------------|
| 1.0  | initial release                         | 12/06/2016 |
| 1.01 | updated safety approvals to 4th edition | 05/16/2017 |
| 1.02 | updated datasheet                       | 01/31/2018 |

The revision history provided is for informational purposes only and is believed to be accurate.

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