

# **R3111x SERIES**

### LOW VOLTAGE DETECTOR

NO.EA-056-170428

## **OUTLINE**

The R3111x series are CMOS-based voltage detector ICs with high detector threshold accuracy and ultra-low supply current, which can be operated at an extremely low voltage and is used for system reset as an example.

Each of these ICs consists of a voltage reference unit, a comparator, resistors for detector threshold setting, an output driver and a hysteresis circuit. The detector threshold is fixed with high accuracy internally and does not require any adjustment.

Three output types, Nch open drain "L" type, Nch open drain "H" type and CMOS type are available.

The R3111x Series are operable at a lower voltage than that for the Rx5VL series, and can be driven by a single battery.

Seven types of packages, TO-92, SOT-89, SOT-23-3, SOT-23-5, SC-82AB, SC-88A and SON1612-6 are available.

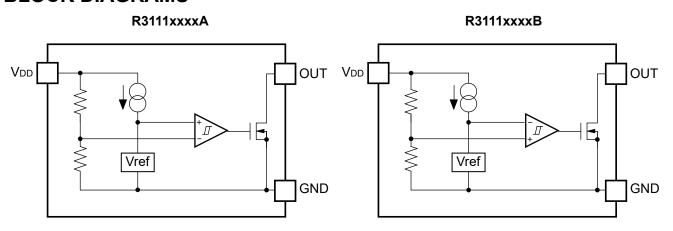
### **FEATURES**

Supply Current	Τyp. 0.8μA (-Vdet=1.5V, Vdd=-Vdet-0.1V)
Operating Voltage Range	0.7V to 10.0V (Ta=25°C)
Detector Threshold Range	0.9V to 6.0V (0.1V steps)
(F	For other voltages, please refer to MARK INFORMATIONS.)
Detector Threshold Accuracy	±2.0%
Temperature-Drift Coefficient of Detector Threshold	Typ. ±100ppm/°C
Output Types	Nch Open Drain "L", Nch Open Drain "H", and
	CMOS
Packages	SON1612-6, SC-82AB, SC-88A, SOT-23-3,
	SOT-23-5, SOT-89, TO-92

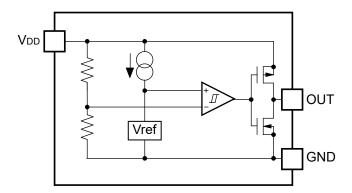
#### **APPLICATIONS**

- CPU and Logic Circuit Reset
- · Battery Checker
- Window Comparator
- · Wave Shaping Circuit
- Battery Back-up Circuit
- Power Failure Detector

# **BLOCK DIAGRAMS**



### R3111xxxxC



## **SELECTION GUIDE**

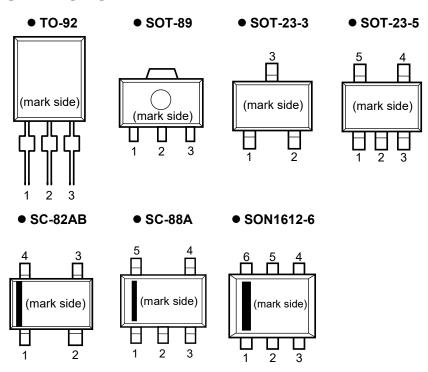
The package type, the detector threshold, the output type and the taping type for the ICs can be selected at the users' request. The selection can be made with designating the part number as shown below;

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R3111Dxx1*-TR-FE	SON1612-6	4,000 pcs	Yes	Yes
R3111Qxx1*-TR-FE	SC-82AB	3,000 pcs	Yes	Yes
R3111Qxx2*-TR-FE	SC-88A	3,000 pcs	Yes	Yes
R3111Nxx1*-TR-FE	SOT-23-5	3,000 pcs	Yes	Yes
R3111Nxx2\$-TR-FE	SOT-23-3	3,000 pcs	Yes	Yes
R3111Hxx1\$-T1-FE	SOT-89	1,000 pcs	Yes	Yes
R3111Exx1\$-TZ-F	TO-92	2,500 pcs	Yes	No

xx: The detector threshold can be designated in the range from 0.9V(09) to 6.0V(60) in 0.1V steps. (For other voltages, please refer to MARK INFORMATIONS.)

- \* : Designation of Output Type
  - (A) Nch Open Drain (Output "L" at Detection)
  - (B) Nch Open Drain (Output "H" at Detection)
  - (C) CMOS (Output "L" at Detection)
- \$: Designation of Output Type
  - (A) Nch Open Drain (Output "L" at Detection)
  - (C) CMOS (Output "L" at Detection)

## **PIN CONFIGURATIONS**



## **PIN DESCRIPTIONS**

### ● TO-92

Pin No.	Symbol
1	V <sub>DD</sub>
2	GND
3	OUT

## ● SOT-89

Pin No.	Symbol
1	OUT
2	V <sub>DD</sub>
3	GND

### • SOT-23-3

Pin No.	Symbol
1	OUT
2	GND
3	V <sub>DD</sub>

## ● SOT-23-5

Pin No.	Symbol
1	OUT
2	V <sub>DD</sub>
3	GND
4	NC
5	NC

#### • SC-82AB

· 00 02/12	
Pin No.	Symbol
1	OUT
2	$V_{DD}$
3	NC
4	GND

• SC-88A

Pin No.	Symbol
1	OUT
2*	NC
3	$V_{DD}$
4	NC
5	GND

#### • SON1612-6

- 00111012	•
Pin No.	Symbol
1	OUT
2	$V_{DD}$
3	GND
4	NC
5	$V_{DD}$
6	NC

<sup>\*</sup> Pin No. 2 is connected to the bottom of the IC. It is recommended that the pin be connected to the VDD pin on the board, or otherwise be left floating so that there is no contact with other potentials.

## ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit	
V <sub>DD</sub>	Supply Voltage	12	V	
Vout	Output Voltage (CMOS)	Vss-0.3 to V <sub>DD</sub> +0.3	V	
Voui	Output Voltage (Nch)	Vss-0.3 to 12	\ \ \	
Іоит	Output Current	70	mA	
P□	Power Dissipation (TO-92)*	300		
	Power Dissipation (SOT-89)*	900		
	Power Dissipation (SOT-23-3)*	420		
	Power Dissipation (SOT-23-5)* 420		mW	
	Power Dissipation (SC-82AB)*	380		
	Power Dissipation (SC-88A)*	380		
	Power Dissipation (SON1612-6)*	500	1	
Та	Operating Temperature Range	-40 to 85	°C	
Tstg	Storage Temperature Range	–55 to 125	°C	

<sup>\*)</sup> For Power Dissipation, please refer to PACKAGE INFORMATION.

#### **ABSOLUTE MAXIMUM RATINGS**

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

#### RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

## **ELECTRICAL CHARACTERISTICS**

• **R3111xxxxA** Ta=25°C

Symbol	Item		Condi	tions		Min.	Тур.	Max.	Unit	
-VDET	Detector Threshold				-V <sub>DET</sub> × 0.98		-V <sub>DET</sub> × 1.02	V		
V <sub>HYS</sub>	Detector Threshold Hysteresis					-V <sub>DET</sub> × 0.03	-V <sub>DET</sub> × 0.05	-V <sub>DET</sub> × 0.07	V	
		0.01/	≤ -V <sub>DET</sub> < 2.0V	V <sub>DD</sub> =-	-VDET -0.10V		0.8	2.4		
		0.9	3 - V DET < 2.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.0	3.0		
		2 0\/	≤ -V <sub>DET</sub> < 3.0V	V <sub>DD</sub> =-	-VDET -0.10V		0.9	2.7		
		2.00	3 - V DET < 3.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.1	3.3		
Iss	Supply Current	3 0)/	≤-V <sub>DET</sub> <4.0V	V <sub>DD</sub> =-	-VDET -0.13V		1.0	3.0	^	
ISS	Supply Current	3.00	S-VDET < 4.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.2	3.6	μΑ	
		4.0\/	< \/ps5.0\/	V <sub>DD</sub> =-	-VDET -0.16V		1.1	3.3		
		4.0V ≤ -V <sub>DET</sub> < 5.0V		V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.3	3.9		
		5.0V ≤ -Vdet ≤ 6.0V		V <sub>DD</sub> =-	-VDET -0.20V		1.2	3.6		
				V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.4	4.2		
V <sub>DDH</sub>	Maximum Operating Voltage						10	V		
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Minimum Operating	Ta=2	5°C				0.55	0.70	\/	
V <sub>DDL</sub>	Voltage*1	-40°C	C ≤ Ta ≤ 85°C				0.65	0.80	V	
			V <sub>DS</sub> =0.05V, V <sub>I</sub>	op=0.70	)V	0.01	0.05		mA	
	0.44 0		0.9V ≤ -V <sub>DET</sub> <	1.1V	V <sub>DS</sub> =0.50V V <sub>DD</sub> =0.85V	0.05	0.5			
Іоит	Output Current (Driver Output Pin)	Nch	1.1V ≤ -V <sub>DET &lt;</sub>	1.6V	V <sub>DS</sub> =0.50V V <sub>DD</sub> =1.00V	0.2	1.0		mA	
			$1.6V \le -V_{DET} \le 6.0V$ $V_{DD}=0.50V$ $V_{DD}=1.50V$		1.0	2.0				
<b>t</b> PLH	Output Delay Time* <sup>2</sup>						100	μs		
Δ-V <sub>DET</sub> / ΔTa	Detector Threshold Temperature Coefficient	-40°C	C ≤ Ta ≤ 85°C				±100		ppm/° C	

<sup>\*1:</sup> Minimum operating voltage means the value of input voltage when output voltage maintains 0.1V or less. (In the case of the output pin is pulled up with a resistance of  $470k\Omega$  to 5.0V.)

<sup>\*2:</sup> The output pin is pulled up with a resistance of  $470k\Omega$  to 5.0V, the time interval between the rising edge of V<sub>DD</sub> input pulse from 0.7V to  $(+V_{DET}) + \Box 2.0V$  and output voltage level becoming to 2.5V.

## R3111x

• **R3111xxxxB** Ta=25°C

Symbol	Item		Condi	tions	Min.	Тур.	Max.	Unit
-V <sub>DET</sub>	Detector Threshold				-V <sub>DET</sub> × 0.98		-V <sub>DET</sub> × 1.02	V
V <sub>HYS</sub>	Detector Threshold Hysteresis				-V <sub>DET</sub> × 0.03	-V <sub>DET</sub> × 0.05	-V <sub>DET</sub> × 0.07	V
		0.0\/<	-V <sub>DET</sub> < 2.0V	VDD=-VDET -0.10V		0.8	2.4	
		0.9√ ≥ -	-VDET < 2.UV	V <sub>DD</sub> =-V <sub>DET</sub> +2.0V		1.0	3.0	
		201/	-V <sub>DET</sub> < 3.0V	V <sub>DD</sub> =-V <sub>DET</sub> -0.10V		0.9	2.7	
		2.0 ∨ ≤ -	-VDET < 3.0 V	V <sub>DD</sub> =-V <sub>DET</sub> +2.0V		1.1	3.3	
Iss	Supply Current	3 01/ <	-V <sub>DET</sub> < 4.0V	VDD=-VDET -0.13V		1.0	3.0	^
188	Supply Current	3.0V <u>3</u> ·	-VDET<4.0V	V <sub>DD</sub> =-V <sub>DET</sub> +2.0V		1.2	3.6	μΑ
		4.0V ≤ -V <sub>DET</sub> < 5.0V	VDD=-VDET -0.16V		1.1	3.3		
			V <sub>DD</sub> =-V <sub>DET</sub> +2.0V		1.3	3.9		
		5.0\/ <	-VDET≤6.0V	V <sub>DD</sub> =-V <sub>DET</sub> -0.20V		1.2	3.6	
		5.0 √ ≥ -	-VDET≥0.0V	V <sub>DD</sub> =-V <sub>DET</sub> +2.0V		1.4	4.2	
V <sub>DDH</sub>	Maximum Operating Voltage						10	V
\/	Minimum Operating	Ta=25°	С			0.55	0.70	V
V <sub>DDL</sub>	Voltage*1	-40°C ≤	≤ Ta ≤ 85°C			0.65	0.80	V
Іоит	Output Current (Driver Output Pin)	Nch \	Nch V <sub>DS</sub> =0.10V, V <sub>DD</sub> =6.5V		2.5			mA
<b>t</b> PLH	Output Delay Time* <sup>2</sup>						100	μS
Δ-V <sub>DET</sub> / ΔTa	Detector Threshold Temperature Coefficient	_40°C ≤	≤ Ta ≤ 85°C			±100		ppm/° C

<sup>\*1:</sup> Minimum operating voltage means the value of input voltage when output voltage maintains 0.1V or less. (In the case of the output pin is pulled up with a resistance of  $470k\Omega$  to 5.0V.)

<sup>\*2:</sup> The output pin is pulled up with a resistance of  $470k\Omega$  to 5.0V, the time interval between the rising edge of  $V_{DD}$  input pulse from 0.7V to  $(+V_{DET}) + \Box 2.0V$  and output voltage level becoming to 2.5V.

## R3111x

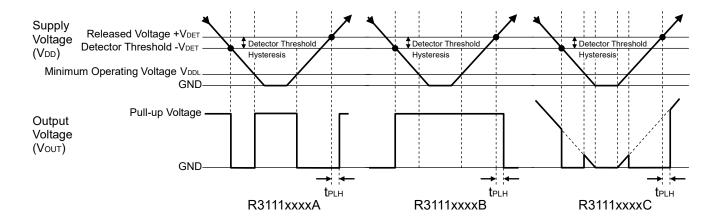
• **R3111xxxxC** Ta=25°C

Symbol	Item	Conditions			Min.	Тур.	Max.	Unit				
-V <sub>DET</sub>	Detector Threshold					-V <sub>DET</sub> × 0.98		-V <sub>DET</sub> × 1.02	V			
V <sub>HYS</sub>	Detector Threshold Hysteresis					-V <sub>DET</sub> × 0.03	-V <sub>DET</sub> × 0.05	-V <sub>DET</sub> × 0.07	٧			
		0.0\/	≤ -V <sub>DET</sub> < 2.0V	V <sub>DD</sub> =-	VDD=-VDET -0.10V		0.8	2.4				
		0.90	S - V DET < 2.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.0	3.0				
		2 0\/	≤ -VDET < 3.0V	V <sub>DD</sub> =-	-VDET -0.10V		0.9	2.7				
		2.0 V	3 - V DET < 3.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.1	3.3				
Iss	Supply Current	3 0\/	≤ -V <sub>DET</sub> < 4.0V	V <sub>DD</sub> =-	-VDET -0.13V		1.0	3.0	^			
188	Supply Culterit	3.00	S-VDET < 4.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.2	3.6	μΑ			
		4.0\/	≤ -VDET < 5.0V	V <sub>DD</sub> =-	-VDET -0.16V		1.1	3.3				
		4.00	S - V DET < 3.0 V	V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.3	3.9				
		5.0\/	< \/< 6.0\/	V <sub>DD</sub> =-	-VDET -0.20V		1.2	3.6	İ			
		5.0V ≤ -V <sub>DET</sub> ≤ 6.0V		V <sub>DD</sub> =-	-V <sub>DET</sub> +2.0V		1.4	4.2				
V <sub>DDH</sub>	Maximum Operating Voltage						10	V				
\/	Minimum Operating	Ta=25°C			0.55	0.70	V					
VDDL	Voltage*1	-40°C	–40°C ≤ Ta ≤ 85°C			0.65	0.80	V				
			V <sub>DS</sub> =0.05V, V <sub>DD</sub> =0.70		)V	0.01	0.05		mA			
			0.9V ≤ -V <sub>DET</sub> <		V <sub>DS</sub> =0.50V V <sub>DD</sub> =0.85V	0.05	0.5					
	0.1.1.0	Outrout Ourse st	Output Current	Outrast Ourse at	Nch	1 1 1 /		V <sub>DS</sub> =0.50V V <sub>DD</sub> =1.00V	0.2	1.0		
Іоит	(Driver Output Pin)		1.6V ≤ -V <sub>DET</sub> ≤	≤ 6.0V	V <sub>DS</sub> =0.50V V <sub>DD</sub> =1.50V	1.0	2.0		mA			
		Dob	0.9V ≤ -V <sub>DET</sub> <	4.0V	V <sub>DS</sub> =-2.1V V <sub>DD</sub> =4.5V	1.0	2.0					
		PGII	Pch 4.0V ≤ -V <sub>DET</sub> ≤ 6.0V		V <sub>DS</sub> =-2.1V V <sub>DD</sub> =8.0V	1.5	3.0					
<b>t</b> PLH	Output Delay Time* <sup>2</sup>							100	μs			
Δ-V <sub>DET</sub> / ΔTa	Detector Threshold Temperature Coefficient	–40°C ≤ Ta ≤ 85°C				±100		ppm/°				

<sup>\*1:</sup> Minimum operating voltage means the value of input voltage when output voltage maintains 0.1V or less.

<sup>\*2:</sup> The time interval between the rising edge of  $V_{DD}$  input pulse from 0.7V to  $(+V_{DET}) + \Box 2.0V$  and output voltage level becoming to  $((+V_{DET})+2.0V)/2$ .

## **TIMING CHART**



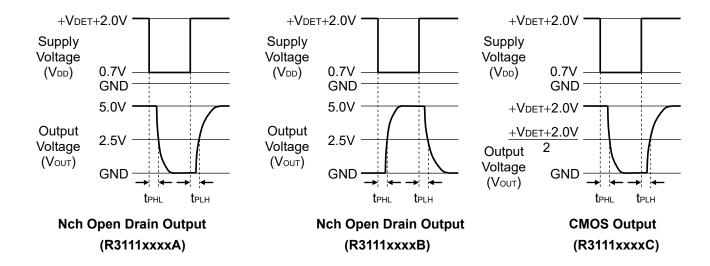
## **DEFINITION OF OUTPUT DELAY TIME**

Output Delay Time (tplh) is defined as follows:

- 1. In the case of Nch Open Drain Output:(R3111xxxxA/B)

  Under the condition of the output pin (OUT) is pulled up through a resistor of 470kΩ to 5V, the time interval between the rising edge of V<sub>DD</sub> pulse from 0.7V to (+V<sub>DET</sub>)+2.0V and becoming of the output voltage to 2.5V.
- 2. In the case of CMOS Output:(R3111xxxxC)

  The time interval between the rising edge of V<sub>DD</sub> pulse from 0.7V to (+V<sub>DET</sub>)+2.0V and becoming of the output voltage to ((+V<sub>DET</sub>)+2.0V)/2.



## **ELECTRICAL CHARACTERISTICS BY DETECTOR THRESHOLD**

### • R3111x09x to R3111x60x

Part	Detec	ctor Three	shold		tor Three		Supply	Supply Current 1		Supply Current 2		
Number		-VDET[V]			VHYS[V]		Iss₁[μA]		Is	Iss2[μA]		
	Min.	Тур.	Max.	Min.	Тур.	Max.	Condition	Тур.	Max.	Condition	Тур.	Max.
R3111x09xx	0.882	0.900	0.918	0.027	0.045	0.063					0.9	2.7
R3111x10xx	0.980	1.000	1.020	0.030	0.050	0.070						
R3111x11xx	1.078	1.100	1.122	0.033	0.055	0.077						
R3111x12xx	1.176	1.200	1.224	0.036	0.060	0.084						
R3111x13xx	1.274	1.300	1.326	0.039	0.065	0.091						
R3111x14xx	1.372	1.400	1.428	0.042	0.070	0.098		0.8	2.4		1.0	3.0
R3111x15xx	1.470	1.500	1.530	0.045	0.075	0.105					1.0	3.0
R3111x16xx	1.568	1.600	1.632	0.048	0.080	0.112						
R3111x17xx	1.666	1.700	1.734	0.051	0.085	0.119						
R3111x18xx	1.764	1.800	1.836	0.054	0.090	0.126	V <sub>DD</sub> =					
R3111x19xx	1.862	1.900	1.938	0.057	0.095	0.133	(-VDET)					
R3111x20xx	1.960	2.000	2.040	0.060	0.100	0.140	-0.10V					
R3111x21xx	2.058	2.100	2.142	0.063	0.105	0.147						
R3111x22xx	2.156	2.200	2.244	0.066	0.110	0.154						
R3111x23xx	2.254	2.300	2.346	0.069	0.115	0.161						
R3111x24xx	2.352	2.400	2.448	0.072	0.120	0.168		0.9	2.7		1.1	3.3
R3111x25xx	2.450 2.548	2.500	2.550 2.652	0.075 0.078	0.125 0.130	0.175 0.182						
R3111x26xx												
R3111x27xx	2.646 2.744	2.700	2.754	0.081	0.135 0.140	0.189						
R3111x28xx R3111x29xx	2.744	2.800	2.856	0.087		0.196						
	2.042		2.958		0.145	0.203						
R3111x30xx R3111x31xx	3.038	3.000 3.100	3.060 3.162	0.090	0.150 0.155	0.210 0.217						
R3111x32xx	3.136	3.200	3.264	0.093	0.160	0.217						
R3111x33xx	3.234	3.300	3.366	0.099	0.165	0.224						
R3111x34xx	3.332	3.400	3.468	0.102	0.170	0.238	VDD=			VDD=		
R3111x35xx	3.430	3.500	3.570	0.105	0.175	0.245	(-VDET)	1.0	3.0	(-VDET)	1.2	3.6
R3111x36xx	3.528	3.600	3.672	0.108	0.180	0.252	-0.13V			+2.0V		
R3111x37xx	3.626	3.700	3.774	0.111	0.185	0.259						
R3111x38xx	3.724	3.800	3.876	0.114	0.190	0.266						
R3111x39xx	3.822	3.900	3.978	0.117	0.195	0.273						
R3111x40xx	3.920	4.000	4.080	0.120	0.200	0.280						
R3111x41xx	4.018	4.100	4.182	0.123	0.205	0.287						
R3111x42xx	4.116	4.200	4.284	0.126	0.210	0.294						
R3111x43xx	4.214	4.300	4.386	0.129	0.215	0.301	\/					
R3111x44xx	4.312	4.400	4.488	0.132	0.220	0.308	VDD=	1.1	2.2		1.3	3.9
R3111x45xx	4.410	4.500	4.590	0.135	0.225	0.315	(-VDET)	1.1	3.3		1.3	3.9
R3111x46xx	4.508	4.600	4.692	0.138	0.230	0.322	-0.16V					
R3111x47xx	4.606	4.700	4.794	0.141	0.235	0.329						
R3111x48xx	4.704	4.800	4.896	0.144	0.240	0.336						
R3111x49xx	4.802	4.900	4.998	0.147	0.245	0.343						
R3111x50xx	4.900	5.000	5.100	0.150	0.250	0.350						
R3111x51xx	4.998	5.100	5.202	0.153	0.255	0.357						
R3111x52xx	5.096	5.200	5.304	0.156	0.260	0.364						
R3111x53xx	5.194	5.300	5.406	0.159	0.265	0.371						
R3111x54xx	5.292	5.400	5.508	0.162	0.270	0.378	V <sub>DD</sub> =					
R3111x55xx	5.390	5.500	5.610	0.165	0.275	0.385	(-VDET)	1.2	3.6		1.4	4.2
R3111x56xx	5.488	5.600	5.712	0.168	0.280	0.392	-0.20V					
R3111x57xx	5.586	5.700	5.814	0.171	0.285	0.399						
R3111x58xx	5.684	5.800	5.916	0.174	0.290	0.406						
R3111x59xx	5.782	5.900	6.018	0.177	0.295	0.413						
R3111x60xx	5.880	6.000	6.120	0.180	0.300	0.420						

<sup>\*1)</sup> In the case of CMOS output type; when the voltage is forced to Vpp from 0.7V to (+Vpet)+2.0V, time interval between the rising edge of Vpp and the reaching point at ((+Vpet)+2.0V)/2. In the case of Nch open drain output type: The output pin is pulled up to 5V through 470kΩ, and when the voltage is forced to Vpp from 0.7V to (+Vpet)+2.0V, time interval between the rising edge of VDD and the reaching point at ((+Vpet)+2.0V)/2.

Condition 1: Ta=25°C

Condition 2:  $-40^{\circ}$ C  $\leq$  Ta  $\leq$  85°C

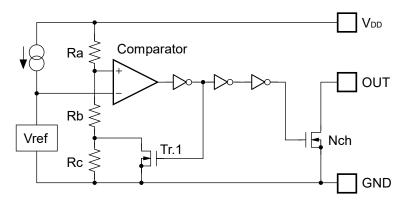
<sup>\*2)</sup> Vop value when Output Voltage is equal or less than 0.1V. In the case of Nch open drain output type, the output pin is pulled up to 5V through 470kΩ resistor.

Outpu	t Current	1	(	Output Cu	ırrent 2 *3	3	Output Delay Time		mum g Voltage	Detector Three Temperature Coe	
lou	IT1[mA]			IOUT2	[mA]		tpLH[µs]	VDD		Δ-VDET/ΔTa[pr	
Condition	Min.	Тур.	Cond		Min.	Тур.	Max.	Тур.	Max.	Condition	Тур.
				V <sub>DD</sub> = 0.85V V <sub>DD</sub> = 1.0V	0.05	1.0					
<a c="" version=""> Nch Vps=0.05V Vpp=0.7V</a>	0.01	0.05	Nch VDS= 0.5V	V <sub>DD=</sub> 1.5V	1.0	2.0	100 *1	0.55	*2 Condition 1 0.70 Condition 2 0.80	Ta < 85°C	±100
<b version=""> Nch Vps=0.10V Vpd=6.5V</b>	2.5	-									

<sup>\*3)</sup> Only A/C versions.

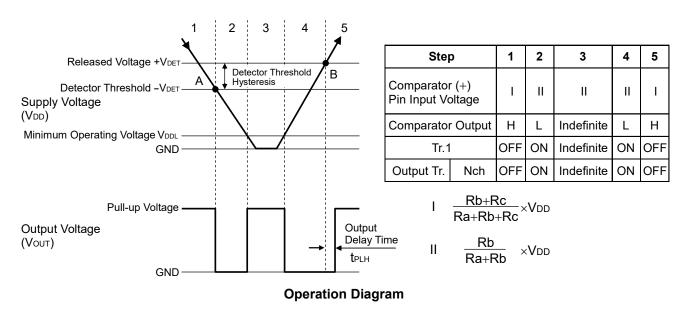
### **OPERATION**

#### Operation of R3111xxxxA



OUT pin should be pulled-up to VDD or an external voltage level.

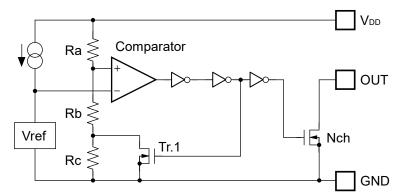
Block Diagram (R3111xxxxA)



#### • Explanation of operation

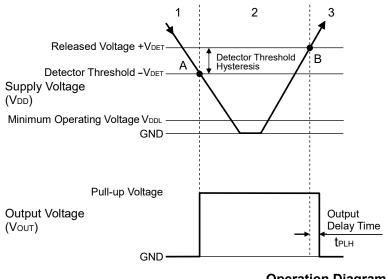
- Step 1. The output voltage is equal to the pull-up voltage.
- Step 2. At Point "A", Vref ≥ VDD×(Rb+Rc)/(Ra+Rb+Rc) is true, as a result, the output of comparator is reversed from "H" to "L", therefore the output voltage becomes the GND level. The voltage level of Point A means a detector threshold voltage (-VDET).
- Step 3. When the supply voltage is lower than the minimum operating voltage, the operation of the output transistor becomes indefinite. The output voltage is equal to the pull-up voltage.
- Step 4. The output Voltage is equal to the GND level.
- Step 5. At Point "B", Vref ≤ V<sub>DD</sub>×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "L" to "H", then the output voltage is equal to the pull-up voltage. The voltage level of Point B means a released voltage (+V<sub>DET</sub>).
- \*) The difference between a released voltage and a detector threshold voltage is a detector threshold hysteresis.

#### Operation of R3111xxxxB



OUT pin should be pulled-up to V<sub>DD</sub> or an external voltage level.

#### Block Diagram (R3111xxxxB)



Ste	1	2	3	
Comparator Pin Input Vo	-	П	_	
Comparator	L	Н	L	
Tr.1	OFF	ON	OFF	
Output Tr.	Nch	ON	OFF	ON

Rb+Rc\_\_×V<sub>DD</sub> Ra+Rb+Rc Rb Ш  $\times V_{DD}$ 

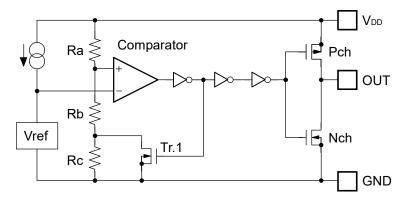
Ra+Rb

**Operation Diagram** 

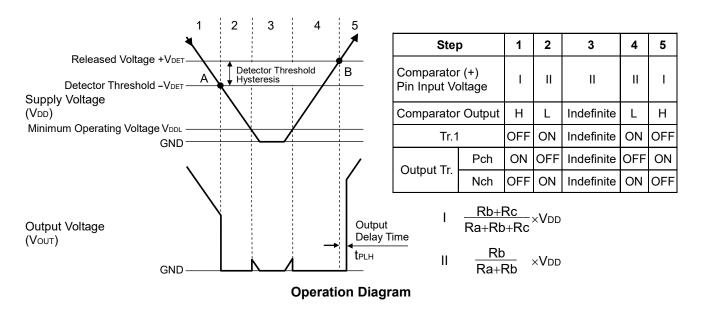
#### Explanation of operation

- Step 1. The output voltage is equal to the GND level.
- Step 2. At Point "A", Vref ≥ VDD×(Rb+Rc)/(Ra+Rb+Rc) is true, as a result, the output of comparator is reversed from "L" to "H", therefore the output voltage becomes the pull-up voltage. The voltage level of Point A means a detector threshold voltage (-VDET).
- Step 3. At Point "B", Vref ≤ V<sub>DD</sub>×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "H" to "L", then the output voltage is equal to the GND level. The voltage level of Point B means a released voltage (+VDET).
- \*) The difference between a released voltage and a detector threshold voltage is a detector threshold hysteresis.

#### Operation of R3111xxxxC



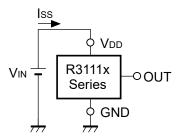
Block Diagram (R3111xxxxC)



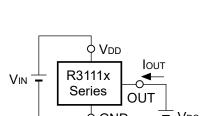
#### Explanation of operation

- Step 1. The output voltage is equal to the supply voltage (VDD).
- Step 2. At Point "A", Vref ≥ V<sub>DD×</sub>(Rb+Rc)/(Ra+Rb+Rc) is true, as a result, the output of comparator is reversed from "H" to "L", therefore the output voltage becomes the GND level. The voltage level of Point A means a detector threshold voltage (-V<sub>DET</sub>).
- Step 3. When the supply voltage is lower than the minimum operating voltage, the operation of the output transistor becomes indefinite.
- Step 4. The output Voltage is equal to the GND level.
- Step 5. At Point "B", Vref ≤ V<sub>DD</sub>×Rb/(Ra+Rb) is true, as a result, the output of comparator is reversed from "L" to "H", then the output voltage is equal to the supply voltage (V<sub>DD</sub>). The voltage level of Point B means a released voltage (+V<sub>DET</sub>).
- \*) The difference between a released voltage and a detector threshold voltage is a detector threshold hysteresis.

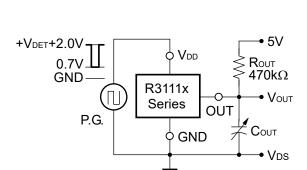
## **TEST CIRCUITS**



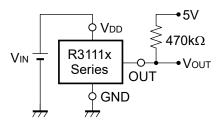




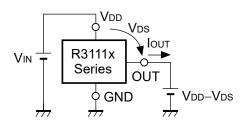
**Nch Driver Output Current Test Circuit** 



Output Delay Time Test Circuit (1) (Pull-up circuit is not necessary for CMOS Output type.)

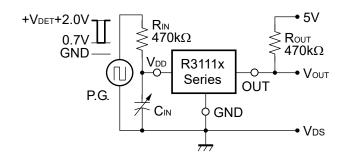


**Detector Threshold Test Circuit** (Pull-up circuit is not necessary for CMOS Output type.)



Pch Driver Output Current Test Circuit

\*Apply to CMOS Output type only



**Output Delay Time Test Circuit (2)** 

## R3111x

## • Power Dissipation (SON1612-6)

Power Dissipation ( $P_D$ ) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

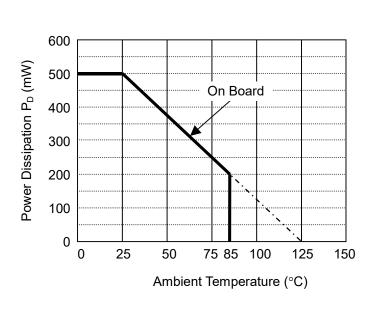
#### **Measurement Conditions**

	Standard Land Pattern
Environment	Mounting on Board (Wind velocity 0m/s)
Board Material	Glass cloth epoxy plastic (Double layers)
Board Dimensions	40mm × 40mm × 1.6mm
Copper Ratio	Top side: Approx. 50%, Back side: Approx. 50%
Through - hole	φ 0.5mm × 24pcs

#### Measurement Results

(Ta=25°C, Timax=125°C)

Mododi official Teodate	(1d 20 0, 1)max 120 0)
	Standard Land Pattern
Power Dissipation	500mW
Thermal Resistance	θja = (125-25°C)/ 0.5W = 200°C/W



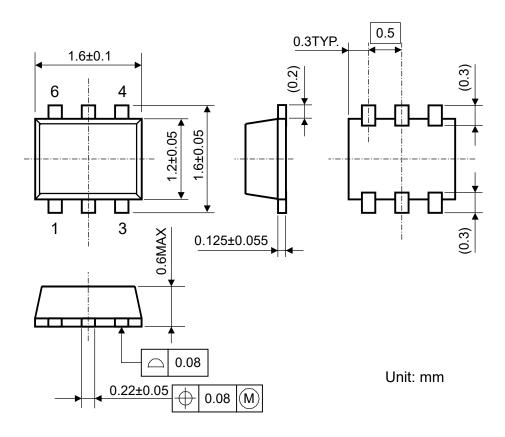
**SON1612-6 Power Dissipation** 

**Measurement Board Pattern** 

( ) IC Mount Area Unit : mm

# **RICOH**

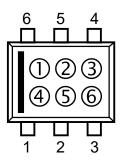
## • Package Dimensions (SON1612-6)



## • Mark Specification (SON1612-6)

①②③④ : Product Code ... Refer to Mark Specification Table (SON1612-6).

⑤⑥ : Lot No. ...... Alphanumeric Serial Number



## • Marking Specification Table (SON1612-6)

R3111Dxx1A		R3111Dxx1C		R3111Dxx1B	
Part Number	0234	Part Number	0234	Part Number ①	234
R3111D091A	A09A	R3111D091C	A09C	R3111D091B	409B
R3111D101A R3111D1111A	A10A A11A	R3111D101C R3111D111C	A10C A11C		A10B A11B
R3111D121A	A12A	R3111D121C	A12C		A12B
R3111D131A R3111D141A	A13A A14A	R3111D131C R3111D141C	A13C A14C		A13B A14B
R3111D151A	A15A	R3111D151C	A15C		A15B
R3111D161A	A16A	R3111D161C	A16C		A16B
R3111D171A R3111D181A	A17A A18A	R3111D171C R3111D181C	A17C A18C		A17B A18B
R3111D101A	A10A A19A	R3111D101C	A19C		A19B
R3111D201A	A20A	R3111D201C	A20C		A20B
R3111D211A R3111D221A	A21A	R3111D211C R3111D221C	A21C		A21B
R3111D231A	A22A A23A	R3111D221C	A22C A23C		A22B A23B
R3111D241A	A24A	R3111D241C	A24C	R3111D241B A	A24B
R3111D251A	A25A	R3111D251C	A25C		A25B
R3111D261A R3111D271A	A26A A27A	R3111D261C R3111D271C	A26C A27C		A26B A27B
R3111D281A	A28A	R3111D281C	A28C		A28B
R3111D291A	A29A	R3111D291C	A29C	R3111D291B	A29B
R3111D301A	A30A	R3111D301C	A30C		A30B
R3111D311A R3111D321A	A31A A32A	R3111D311C R3111D321C	A31C A32C		A31B A32B
R3111D331A	A33A	R3111D331C	A33C		A33B
R3111D341A	A34A	R3111D341C	A34C		A34B
R3111D351A R3111D361A	A35A A36A	R3111D351C R3111D361C	A35C A36C		A35B A36B
R3111D371A	A37A	R3111D371C	A37C		A37B
R3111D381A	A38A	R3111D381C	A38C	R3111D381B A	438B
R3111D391A	A39A	R3111D391C	A39C		A39B
R3111D401A R3111D411A	A40A A41A	R3111D401C R3111D411C	A40C A41C		A40B A41B
R3111D421A	A42A	R3111D421C	A42C		A42B
R3111D431A	A43A	R3111D431C	A43C		443B
R3111D441A R3111D451A	A44A A45A	R3111D441C R3111D451C	A44C A45C		A44B A45B
R3111D461A	A46A	R3111D461C	A46C		446B
R3111D471A	A47A	R3111D471C	A47C	R3111D471B A	A47B
R3111D481A R3111D491A	A48A A49A	R3111D481C R3111D491C	A48C A49C		A48B A49B
R3111D491A	A49A A50A	R3111D491C	A49C A50C		450B
R3111D511A	A51A	R3111D511C	A51C	I I -	A51B
R3111D521A	A52A	R3111D521C	A52C	R3111D521B	A52B
R3111D531A R3111D541A	A53A A54A	R3111D531C R3111D541C	A53C A54C		A53B A54B
R3111D541A	A54A A55A	R3111D541C	A54C A55C		A54B A55B
R3111D561A	A56A	R3111D561C	A56C	R3111D561B	456B
R3111D571A	A57A	R3111D571C	A57C		A57B
R3111D581A R3111D591A	A58A A59A	R3111D581C R3111D591C	A58C A59C		458B 459B
R3111D601A	A60A	R3111D601C	A60C		A60B

### Power Dissipation (SC-82AB)

Power Dissipation  $(P_D)$  depends on conditions of mounting on board. This specification is based on the measurement at the condition below;

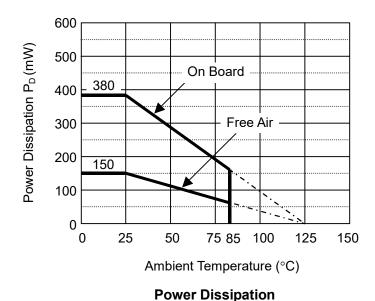
#### **Measurement Conditions**

Mcasarchicht Conditions		
	Standard Land Pattern	
Environment Mounting on Board (Wind velocity=0m/s)		
Board Material Glass cloth epoxy plastic (Double Layers)		
Board Dimensions	$40mm \times 40mm \times 1.6mm$	
Copper Ratio Top side: Approx. 50%, Back side: Approx. 50%		
Through-hole	φ0.5mm × 44pcs	

Measurement Result

(Ta=25°C, Tjmax=125°C)

	Standard Land Pattern	Free Air
Power Dissipation	380mW	150mW
Thermal Resistance	θja=(125-25°C)/0.38W=263°C/W	667°C/W

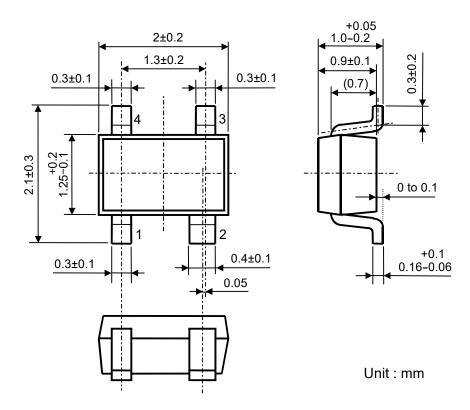


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**Measurement Board Pattern** 

IC Mount Area (Unit : mm)

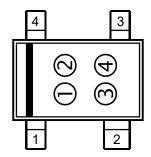
## • Package Dimensions (SC-82AB)



## Mark Specification (SC-82AB)

①② : Product Code ... Refer to Mark Specification Table (SC-82AB).

③④ : Lot No. ...... Alphanumeric Serial Number



## • Marking Specification Table (SC-82AB)

R3111Qxx1A		R3111Qxx1C		R3111Qxx1B
Part Number	12	Part Number	12	Part Number ①②
R3111Q091A	K9	R3111Q091C	Т9	R3111Q091B <b>09</b>
R3111Q101A R3111Q111A R3111Q121A R3111Q131A R3111Q141A R3111Q151A R3111Q161A R3111Q171A R3111Q181A R3111Q191A	L0 L1 L2 L3 L4 L5 L6 L7 L8	R3111Q101C R3111Q111C R3111Q121C R3111Q131C R3111Q141C R3111Q151C R3111Q161C R3111Q171C R3111Q181C R3111Q191C	U0 U1 U2 U3 U4 U5 U6 U7 U8 U9	R3111Q101B R3111Q111B R3111Q121B R3111Q131B R3111Q141B R3111Q151B R3111Q161B R3111Q161B R3111Q171B R3111Q181B R3111Q191B
R3111Q201A R3111Q211A R3111Q221A R3111Q231A R3111Q241A R3111Q251A R3111Q261A R3111Q271A R3111Q281A R3111Q291A	M0 M1 M2 M3 M4 M5 M6 M7 M8 M9	R3111Q201C R3111Q211C R3111Q221C R3111Q231C R3111Q241C R3111Q251C R3111Q261C R3111Q271C R3111Q281C R3111Q291C	V0 V1 V2 V3 V4 V5 V6 V7 V8 V9	R3111Q201B R3111Q211B R3111Q221B 22 R3111Q231B R3111Q241B R3111Q251B R3111Q261B R3111Q271B R3111Q281B R3111Q291B 20 21 22 23 24 25 25 26 R3111Q261B R3111Q271B
R3111Q301A R3111Q311A R3111Q321A R3111Q331A R3111Q341A R3111Q351A R3111Q361A R3111Q371A R3111Q381A R3111Q391A	N0 N1 N2 N3 N4 N5 N6 N7 N8	R3111Q301C R3111Q311C R3111Q321C R3111Q331C R3111Q341C R3111Q351C R3111Q361C R3111Q371C R3111Q381C R3111Q391C	W0 W1 W2 W3 W4 W5 W6 W7 W8	R3111Q301B 30 R3111Q311B 31 R3111Q321B 32 R3111Q331B 33 R3111Q341B 34 R3111Q351B 35 R3111Q361B 36 R3111Q371B 37 R3111Q381B 38 R3111Q391B 39
R3111Q401A R3111Q411A R3111Q421A R3111Q431A R3111Q441A R3111Q451A R3111Q461A R3111Q471A R3111Q481A R3111Q491A	P0 P1 P2 P3 P4 P5 P6 P7 P8	R3111Q401C R3111Q411C R3111Q421C R3111Q431C R3111Q441C R3111Q451C R3111Q461C R3111Q471C R3111Q481C R3111Q491C	X0 X1 X2 X3 X4 X5 X6 X7 X8 X9	R3111Q401B R3111Q411B R3111Q421B R3111Q431B R3111Q441B R3111Q451B R3111Q461B R3111Q471B R3111Q471B R3111Q481B R3111Q491B
R3111Q501A R3111Q511A R3111Q521A R3111Q531A R3111Q541A R3111Q551A R3111Q561A R3111Q571A R3111Q581A R3111Q591A	R0 R1 R2 R3 R4 R5 R6 R7 R8 R9	R3111Q501C R3111Q511C R3111Q521C R3111Q531C R3111Q541C R3111Q551C R3111Q561C R3111Q571C R3111Q581C R3111Q591C R3111Q601C	Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9	R3111Q501B 50 R3111Q511B 51 R3111Q521B 52 R3111Q531B 53 R3111Q541B 54 R3111Q551B 55 R3111Q561B 56 R3111Q571B 57 R3111Q581B 58 R3111Q591B 59 R3111Q601B 60

## • Power Dissipation (SC-88A)

Power Dissipation ( $P_D$ ) depends on conditions of mounting on board. This specification is based on the measurement at the condition below;

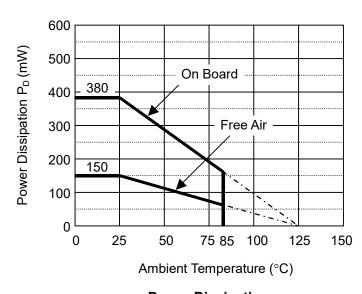
#### **Measurement Conditions**

Standard Land Pattern		
Environment	Mounting on Board (Wind velocity=0m/s)	
Board Material	Glass cloth epoxy plastic (Double Layers)	
Board Dimensions	40mm × 40mm × 1.6mm	
Copper Ratio	Top side: Approx. 50%, Back side: Approx. 50%	
Through-hole	φ0.5mm × 44pcs	

## Measurement Result

(Ta=25°C, Tjmax=125°C)

	Standard Land Pattern	Free Air
Power Dissipation	380mW	150mW
Thermal Desistance	θja=(125-25°C)/0.38W=263°C/W	θja=(125-25°C)/0.15W=667°C/W
Thermal Resistance	θjc=75°C/W	-

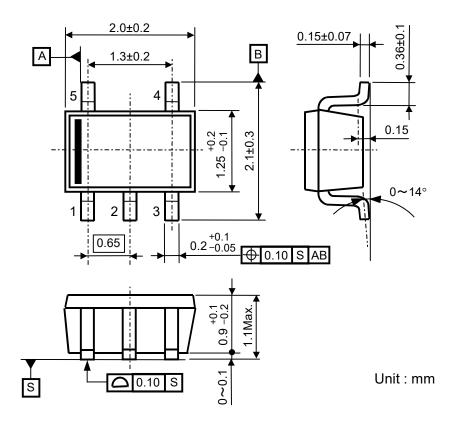


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**Measurement Board Pattern** 

IC Mount Area (Unit : mm)

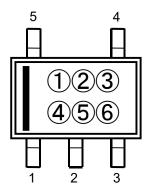
## • Package Dimensions (SC-88A)



## • Mark Specification (SC-88A)

①②③④ : Product Code ... Refer to Mark Specification Table (SC-88A).

⑤⑥ : Lot No. ...... Alphanumeric Serial Number



## • Marking Specification Table (SC-88A)

R3111Qxx2A		R3111Qxx2C		R3111Qxx2B	
Part Number	0234	Part Number	0234	Part Number	0234
R3111Q092A	U009	R3111Q092C	V009	R3111Q092B	W009
R3111Q102A	U010	R3111Q102C	V010	R3111Q102B	W010
R3111Q112A	U011	R3111Q112C	V011	R3111Q112B	W011
R3111Q122A	U012	R3111Q122C	V012	R3111Q122B	W012
R3111Q132A R3111Q142A	U013 U014	R3111Q132C R3111Q142C	V013 V014	R3111Q132B R3111Q142B	W013 W014
R3111Q152A	U015	R3111Q152C	V014 V015	R3111Q152B	W014 W015
R3111Q162A	U016	R3111Q162C	V016	R3111Q162B	W016
R3111Q172A	U017	R3111Q172C	V017	R3111Q172B	W017
R3111Q182A	U018	R3111Q182C	V018	R3111Q182B	W018
R3111Q192A	U019	R3111Q192C	V019	R3111Q192B	W019
R3111Q202A	U020	R3111Q202C	V020	R3111Q202B	W020
R3111Q212A	U021	R3111Q212C	V021	R3111Q212B	W021
R3111Q222A	U022	R3111Q222C	V022	R3111Q222B	W022
R3111Q232A	U023	R3111Q232C	V023	R3111Q232B	W023
R3111Q242A R3111Q252A	U024 U025	R3111Q242C R3111Q252C	V024 V025	R3111Q242B R3111Q252B	W024 W025
R3111Q262A	U026	R3111Q262C	V025 V026	R3111Q262B	W025 W026
R3111Q272A	U027	R3111Q272C	V027	R3111Q272B	W027
R3111Q282A	U028	R3111Q282C	V028	R3111Q282B	W028
R3111Q292A	U029	R3111Q292C	V029	R3111Q292B	W029
R3111Q302A	U030	R3111Q302C	V030	R3111Q302B	W030
R3111Q312A	U031	R3111Q312C	V031	R3111Q312B	W031
R3111Q322A	U032	R3111Q322C	V032	R3111Q322B	W032
R3111Q332A	U033	R3111Q332C	V033	R3111Q332B	W033
R3111Q342A R3111Q352A	U034	R3111Q342C R3111Q352C	V034	R3111Q342B R3111Q352B	W034
R3111Q362A	U035 U036	R3111Q352C	V035 V036	R3111Q352B R3111Q362B	W035 W036
R3111Q372A	U037	R3111Q372C	V030 V037	R3111Q372B	W037
R3111Q382A	U038	R3111Q382C	V038	R3111Q382B	W038
R3111Q392A	U039	R3111Q392C	V039	R3111Q392B	W039
R3111Q402A	U040	R3111Q402C	V040	R3111Q402B	W040
R3111Q412A	U041	R3111Q412C	V041	R3111Q412B	W041
R3111Q422A	U042	R3111Q422C	V042	R3111Q422B	W042
R3111Q432A	U043	R3111Q432C	V043	R3111Q432B	W043
R3111Q442A	U044	R3111Q442C R3111Q452C	V044	R3111Q442B R3111Q452B	W044
R3111Q452A R3111Q462A	U045 U046	R3111Q462C	V045 V046	R3111Q462B	W045 W046
R3111Q472A	U047	R3111Q472C	V047	R3111Q472B	W047
R3111Q482A	U048	R3111Q482C	V048	R3111Q482B	W048
R3111Q492A	U049	R3111Q492C	V049	R3111Q492B	W049
R3111Q502A	U050	R3111Q502C	V050	R3111Q502B	W050
R3111Q512A	U051	R3111Q512C	V051	R3111Q512B	W051
R3111Q522A	U052	R3111Q522C	V052	R3111Q522B	W052
R3111Q532A	U053	R3111Q532C R3111Q542C	V053	R3111Q532B R3111Q542B	W053
R3111Q542A	U054	R3111Q542C	V054 V055	R3111Q542B	W054 W055
R3111Q552A R3111Q562A	U055 U056	R3111Q562C	V055 V056	R3111Q562B	W056
R3111Q572A	U056	R3111Q572C	V057	R3111Q572B	W057
R3111Q582A	U058	R3111Q582C	V058	R3111Q582B	W058
R3111Q592A	U059	R3111Q592C	V059	R3111Q592B	W059
R3111Q602A	U060	R3111Q602C	V060	R3111Q602B	W060
R3111Q222A5	U001				

### • Power Dissipation (SOT-23-5)

Power Dissipation  $(P_D)$  depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

(Power Dissipation (SOT-23-5) is substitution of SOT-23-6.)

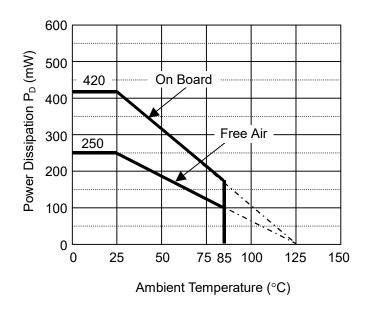
#### Measurement Conditions

	Standard Test Land Pattern
Environment Mounting on Board (Wind velocity=0m/s)	
Board Material	Glass cloth epoxy plastic (Double sided)
Board Dimensions	40mm × 40mm × 1.6mm
Copper Ratio	Top side: Approx. 50%, Back side: Approx. 50%
Through-holes	φ 0.5mm × 44pcs

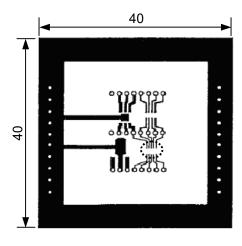
#### Measurement Result

(Ta=25°C, Tjmax=125°C)

	Standard Land Pattern	Free Air
Power Dissipation	420mW	250mW
Thermal Resistance	θja = (125-25°C)/0.42W = 238°C/W	400°C/W



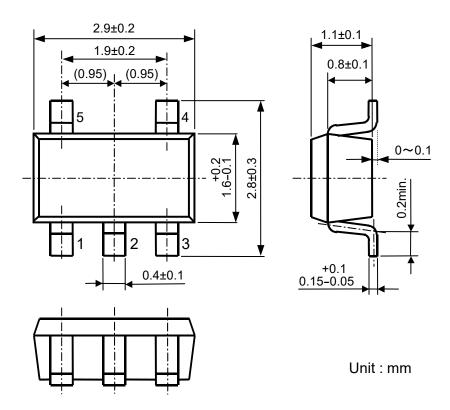
**Power Dissipation** 



**Measurement Board Pattern** 

ic Mount Area (Unit: mm)

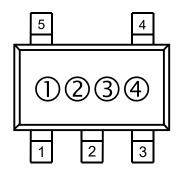
## • Package Dimensions (SOT-23-5)



## • Mark Specification (SOT-23-5)

①② : Product Code ... Refer to Mark Specification Table (SOT-23-5).

34 : Lot No. ..... Alphanumeric Serial Number



## • Marking Specification Table (SOT-23-5)

Part Number   O@   Part Number	R3111Nxx1A R3111Nxx1C R3111Nxx1B					
R3111N091A		<u>(1)(2)</u>		<u>(1)(2)</u>		<u>(1)(2)</u>
R3111N101A						
R3111N111A						
R3111N121A   2B   R3111N121C   2J   R3111N121B   D4   R3111N131A   3B   R3111N131C   3J   R3111N131B   D5   R3111N141A   4B   R3111N141C   4J   R3111N151B   D6   R3111N151A   D7   R3111N151B   D7   R3111N151A   D7   R3111N151B   D7   R3111N151A   D7   R3111N151B   D7   R3111N151A   D7   R3111N151B   D8   R3111N151C   T7   R3111N151B   D8   R3111N151C   T7   R3111N151B   D9   R3111N201A   D8   R3111N201C   OK   R3111N201B   D8   R3111N201C   OK   R3111N201B   D8   R3111N201C   OK   R3111N201B   D8   R3111N201A   D8   R3111N201C   OK   R3111N201A   D8   R3111N201C   OK   R3111N201B   D8   R3111N201A   D8   R3111N301C   OL   R3111N301B   EG   R3111N301A   OD   R3111N301C   OD   R3111N301B   EG   R3111N301B   EG   R3111N301A   OD   R3111N301C   OD   R3111N301B   EG   R3111N301B						
R3111N131A						
R3111N151A	R3111N131A		R3111N131C			
R3111N161A   6B   R3111N161C   6J   R3111N161B   D8   R3111N171A   7B   R3111N171B   D9   R3111N191A   P8   R3111N191C   P3   R3111N191B   J2   R3111N201A   DC   R3111N201C   DK   R3111N201B   J3   R3111N231A   CC   R3111N221C   ZK   R3111N201B   J3   R3111N231A   CC   R3111N221C   ZK   R3111N231B   J6   R3111N231A   CC   R3111N221C   ZK   R3111N231B   J6   R3111N231A   CC   R3111N231C   SK   R3111N231B   J6   R3111N251A   CC   R3111N251C   SK   R3111N231B   J6   R3111N261A   AC   R3111N261C   KR   R3111N261B   EC   R3111N261A   AC   R3111N261C   KR   R3111N261B   EC   R3111N261A   AC   R3111N261C   KR   R3111N261B   EC   R3111N261A   AC   R3111N261C   SK   R3111N261B   EC   R3111N261A   AC   R3111N361C   SK   R3111N361B   EF   R3111N361A   AD   R3111N361C   AC   R3111N361B   EG   R3111N361B   AC   R3111N361B		4B				D6
R3111N171A					-	
R3111N181A						
R3111N191A   9B						
R3111N211A						
R3111N221A   2C   R3111N221C   2K   R3111N221B   J5   R3111N231A   3C   R3111N231C   3K   R3111N231B   J6   R3111N241A   4C   R3111N251C   5K   R3111N251B   EB   R3111N261A   6C   R3111N261C   6K   R3111N251B   ED   R3111N261A   6C   R3111N261C   6K   R3111N261B   EC   R3111N261A   6C   R3111N261C   8K   R3111N261B   ED   R3111N261A   9C   R3111N261C   9K   R3111N261B   EF   R3111N301A   0D   R3111N301C   0L   R3111N301B   EF   R3111N321A   2D   R3111N321C   2L   R3111N301B   EJ   R3111N321A   2D   R3111N321C   2L   R3111N331B   EJ   R3111N331A   3D   R3111N331C   3L   R3111N331B   EJ   R3111N361A   6D   R3111N361C   6L   R3111N361B   EJ   R3111N361A   6D   R3111N361C   6L   R3111N361B   KC   R3111N361A   6D   R3111N361C   6L   R3111N361B   KC   R3111N361A   8D   R3111N361C   8L   R3111N361B   KF   R3111N461A   8E   R3111N461C   0M   R3111N461B   CB   R3111N461A   6E   R3111N461C   6M   R3111N461B   CB   R3111N561B						
R3111N231A   3C   R3111N231C   3K   R3111N231B   J6   R3111N241A   4C   R3111N241C   4K   R3111N241B   J7   R3111N251A   5C   R3111N251C   5K   R3111N251B   EB   R3111N251A   6C   R3111N251C   6K   R3111N261B   EC   R3111N261A   6C   R3111N261C   6K   R3111N261B   EC   R3111N291A   9C   R3111N291C   9K   R3111N291B   EF   R3111N301A   DD   R3111N301C   0L   R3111N301B   EG   R3111N301A   DD   R3111N301C   0L   R3111N301B   EG   R3111N331A   3D   R3111N331C   3L   R3111N321B   EJ   R3111N331A   3D   R3111N331C   3L   R3111N331B   EK   R3111N331A   3D   R3111N331C   3L   R3111N351B   EK   R3111N351A   5D   R3111N351C   5L   R3111N351B   KC   R3111N351A   6D   R3111N351C   6L   R3111N351B   KC   R3111N351A   7D   R3111N351C   6L   R3111N351B   KC   R3111N391A   9D   R3111N391C   9L   R3111N391B   KG   R3111N401A   0E   R3111N391C   9L   R3111N391B   KG   R3111N411A   1E   R3111N411C   1M   R3111N41B   KJ   R3111N421A   2E   R3111N431C   2M   R3111N421B   KK   R3111N431A   3E   R3111N431C   3M   R3111N431B   QB   R3111N451A   5E   R3111N451C   5M   R3111N451B   QB   R3111N451A   5E   R3111N451C   5M   R3111N451B   QG   R3111N451A   5E   R3111N451C   3M   R3111N451B   QG   R3111N451A   5E   R3111N451C   3M   R3111N451B   QG   R3111N551A   5F   R3111N551C   5N   R3111N551B   VE   R3111N551B						
R3111N241A					-	
R3111N251A   5C   R3111N251C   5K   R3111N251B   EB   R3111N261A   6C   R3111N261C   6K   R3111N261B   EC   R3111N261A   7C   R3111N271C   7K   R3111N261B   EC   R3111N261A   8C   R3111N261C   8K   R3111N261B   EE   R3111N261A   9C   R3111N261C   9K   R3111N261B   EF   R3111N301A   9C   R3111N301C   0L   R3111N301B   EG   R3111N301A   1D   R3111N301C   1L   R3111N301B   EG   R3111N321A   2D   R3111N321C   2L   R3111N331B   EH   R3111N331A   3D   R3111N331C   3L   R3111N331B   EK   R3111N361A   4D   R3111N361C   5L   R3111N361B   KC   R3111N361A   6D   R3111N361C   6L   R3111N361B   KC   R3111N361A   8D   R3111N361C   8L   R3111N361B   KG   R3111N361A   8D   R3111N361C   8L   R3111N361B   KG   R3111N361A   8D   R3111N361C   8L   R3111N361B   KG   R3111N401A   9D   R3111N361C   9L   R3111N361B   KG   R3111N461A   4E   R3111N461C   2M   R3111N461B   KJ   R3111N461A   4E   R3111N461C   3M   R3111N461B   QE   R3111N461A   4E   R3111N461C   5M   R3111N461B   QE   R3111N461A   4E   R3111N461C   5M   R3111N461B   QE   R3111N461A   4E   R3111N461C   5M   R3111N461B   QE   R3111N461A   5E   R3111N461C   5M   R3111N461B   QE   R3111N461A   4E   R3111N461C   3M   R3111N461B   QE   R3111N461A   4E   R3111N461C   3M   R3111N461B   QE   R3111N461A   4F   R3111N461C   3M   R3111N461B   QE   R3111N461A   4F   R3111N561C   5M   R3111N561B   VE   R3111N561A   4F   R3111N561C   5M   R3111N561B						
R3111N271A						
R3111N281A   R3111N281C   R3111N281B   EE   R3111N291A   9C   R3111N291C   9K   R3111N291B   EF   R3111N301A   0D   R3111N301C   0L   R3111N301B   EG   R3111N311A   1D   R3111N31C   1L   R3111N31B   EH   R3111N321A   2D   R3111N331C   3L   R3111N331B   EK   R3111N341A   4D   R3111N331C   3L   R3111N331B   EK   R3111N351A   5D   R3111N351C   5L   R3111N351B   KC   R3111N351A   5D   R3111N351C   5L   R3111N351B   KC   R3111N351A   7D   R3111N371C   7L   R3111N361B   KD   R3111N391A   9D   R3111N391C   9L   R3111N391B   KG   R3111N401A   0E   R3111N401C   0M   R3111N401B   KH   R3111N411A   1E   R3111N401C   1M   R3111N401B   KH   R3111N431A   3E   R3111N401C   2M   R3111N401B   KK   R3111N431A   3E   R3111N401C   2M   R3111N401B   KK   R3111N441A   4E   R3111N441C   2M   R3111N401B   KG   R3111N451A   5E   R3111N451C   5M   R3111N461B   QE   R3111N451A   5E   R3111N451C   5M   R3111N461B   QE   R3111N461A   6E   R3111N461C   6M   R3111N461B   QE   R3111N491A   9E   R3111N491C   9M   R3111N491B   QH   R3111N501A   3F   R3111N501C   3N   R3111N501B   VE   R3111N501B   VE   R3111N501A   3F   R3111N501C   3N   R311						
R3111N291A   9C						
R3111N301A						
R3111N311A						
R3111N321A         2D         R3111N321C         2L         R3111N321B         EJ           R3111N331A         3D         R3111N331C         3L         R3111N331B         EK           R3111N341A         4D         R3111N331C         3L         R3111N331B         EK           R3111N351A         5D         R3111N351C         5L         R3111N361B         KD           R3111N371A         7D         R3111N361C         6L         R3111N361B         KD           R3111N381A         8D         R3111N371C         7L         R3111N371B         KE           R3111N391A         9D         R3111N391C         9L         R3111N391B         KG           R3111N401A         0E         R3111N401C         0M         R3111N401B         KH           R3111N421A         1E         R3111N401C         1M         R3111N401B         KK           R3111N431A         3E         R3111N431C         3M         R3111N431B         QB           R3111N441A         4E         R3111N441C         4M         R3111N441B         QC           R3111N451A         5E         R3111N451C         5M         R3111N451B         QC           R3111N491A         7E         R3111N491C		_				
R3111N331A         3D         R3111N331C         3L         R3111N331B         EK           R3111N341A         4D         R3111N341C         4L         R3111N341B         KB           R3111N351A         5D         R3111N351C         5L         R3111N351B         KC           R3111N361A         6D         R3111N361C         6L         R3111N361B         KD           R3111N381A         8D         R3111N371C         7L         R3111N361B         KD           R3111N391A         9D         R3111N361C         8L         R3111N361B         KF           R3111N391A         9D         R3111N391C         9L         R3111N391B         KG           R3111N491A         9D         R3111N491C         0M         R3111N401B         KH           R3111N41A         1E         R3111N401C         0M         R3111N401B         KJ           R3111N421A         2E         R3111N431C         3M         R3111N421B         KK           R3111N441A         4E         R3111N431C         3M         R3111N431B         QB           R3111N451A         5E         R3111N451C         5M         R3111N441B         QC           R3111N461A         6E         R3111N461C						
R3111N351A         5D         R3111N351C         5L         R3111N351B         KC           R3111N361A         6D         R3111N361C         6L         R3111N361B         KD           R3111N371A         7D         R3111N371C         7L         R3111N371B         KE           R3111N381A         8D         R3111N381C         8L         R3111N371B         KE           R3111N391A         9D         R3111N391C         9L         R3111N381B         KF           R3111N401A         0E         R3111N401C         0M         R3111N401B         KH           R3111N411A         1E         R3111N41C         1M         R3111N401B         KJ           R3111N421A         2E         R3111N421C         2M         R3111N421B         KK           R3111N431A         3E         R3111N431C         3M         R3111N431B         QB           R3111N451A         4E         R3111N451C         5M         R3111N441B         QC           R3111N451A         5E         R3111N451C         5M         R3111N451B         QB           R3111N481A         8E         R3111N461C         6M         R3111N471B         QF           R3111N481A         8E         R3111N461C		3D				
R3111N361A         6D         R3111N361C         6L         R3111N361B         KD           R3111N371A         7D         R3111N371C         7L         R3111N371B         KE           R3111N381A         8D         R3111N381C         8L         R3111N31B         KF           R3111N391A         9D         R3111N391C         9L         R3111N391B         KG           R3111N401A         0E         R3111N401C         0M         R3111N401B         KH           R3111N421A         1E         R3111N41C         1M         R3111N41B         KJ           R3111N431A         2E         R3111N421C         2M         R3111N421B         KK           R3111N451A         3E         R3111N431C         3M         R3111N431B         QB           R3111N451A         4E         R3111N451C         5M         R3111N441B         QC           R3111N451A         5E         R3111N451C         5M         R3111N451B         QB           R3111N481A         8E         R3111N471C         7M         R3111N471B         QF           R3111N491A         9E         R3111N491C         9M         R3111N491B         QH           R3111N501A         1F         R3111N501C						
R3111N371A         7D         R3111N371C         7L         R3111N371B         KE           R3111N381A         8D         R3111N381C         8L         R3111N381B         KF           R3111N391A         9D         R3111N391C         9L         R3111N381B         KF           R3111N401A         0E         R3111N401C         0M         R3111N401B         KH           R3111N411A         1E         R3111N41C         1M         R3111N401B         KJ           R3111N421A         2E         R3111N421C         2M         R3111N421B         KK           R3111N431A         3E         R3111N431C         3M         R3111N431B         QB           R3111N441A         4E         R3111N441C         4M         R3111N431B         QB           R3111N451A         5E         R3111N451C         5M         R3111N451B         QC           R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N491A         8E         R3111N491C         8M         R3111N491B         QF           R3111N501A         9E         R3111N501C         0N         R3111N501B         QJ           R3111N531A         3F         R3111N531C						
R3111N381A         8D         R3111N381C         8L         R3111N381B         KF           R3111N391A         9D         R3111N391C         9L         R3111N391B         KG           R3111N401A         0E         R3111N401C         0M         R3111N401B         KH           R3111N41A         1E         R3111N41C         1M         R3111N41B         KJ           R3111N421A         2E         R3111N421C         2M         R3111N421B         KK           R3111N431A         3E         R3111N431C         3M         R3111N431B         QB           R3111N451A         3E         R3111N441C         4M         R3111N441B         QB           R3111N451A         5E         R3111N451C         5M         R3111N451B         QC           R3111N471A         7E         R3111N471C         7M         R3111N461B         QE           R3111N491A         8E         R3111N491C         9M         R3111N481B         QG           R3111N501A         9E         R3111N501C         0N         R3111N501B         QJ           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N551C						
R3111N391A         9D         R3111N391C         9L         R3111N391B         KG           R3111N401A         0E         R3111N401C         0M         R3111N401B         KH           R3111N411A         1E         R3111N411C         1M         R3111N41B         KJ           R3111N421A         2E         R3111N421C         2M         R3111N421B         KK           R3111N431A         3E         R3111N431C         3M         R3111N421B         QB           R3111N441A         4E         R3111N431C         3M         R3111N441B         QB           R3111N451A         5E         R3111N451C         5M         R3111N451B         QD           R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N491A         8E         R3111N491C         8M         R3111N481B         QG           R3111N501A         9E         R3111N501C         0N         R3111N501B         QJ           R3111N511A         1F         R3111N51C         1N         R3111N51B         QK           R3111N531A         2F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N551C						
R3111N411A         1E         R3111N411C         1M         R3111N411B         KJ           R3111N421A         2E         R3111N421C         2M         R3111N421B         KK           R3111N431A         3E         R3111N431C         3M         R3111N431B         QB           R3111N441A         4E         R3111N441C         4M         R3111N431B         QB           R3111N451A         5E         R3111N451C         5M         R3111N451B         QC           R3111N461A         6E         R3111N461C         6M         R3111N461B         QE           R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N481A         8E         R3111N481C         8M         R3111N481B         QG           R3111N501A         9E         R3111N501C         0N         R3111N501B         QJ           R3111N521A         2F         R3111N521C         2N         R3111N531B         VG           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N571A         7F         R3111N571C						
R3111N421A         2E         R3111N421C         2M         R3111N421B         KK           R3111N431A         3E         R3111N431C         3M         R3111N431B         QB           R3111N441A         4E         R3111N441C         4M         R3111N431B         QB           R3111N451A         5E         R3111N451C         5M         R3111N451B         QC           R3111N451A         5E         R3111N461C         6M         R3111N451B         QE           R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N491A         8E         R3111N491C         8M         R3111N491B         QG           R3111N501A         0F         R3111N501C         0N         R3111N501B         QJ           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N551A         4F         R3111N541C         4N         R3111N541B         VB           R3111N561A         6F         R3111N561C         6N         R3111N551B         VE           R3111N581A         8F         R3111N581C						
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R3111N441A         4E         R3111N441C         4M         R3111N441B         QC           R3111N451A         5E         R3111N451C         5M         R3111N451B         QD           R3111N461A         6E         R3111N461C         6M         R3111N451B         QE           R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N481A         8E         R3111N481C         8M         R3111N481B         QG           R3111N501A         9E         R3111N501C         9M         R3111N501B         QJ           R3111N511A         1F         R3111N51C         1N         R3111N501B         QJ           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C						
R3111N451A         5E         R3111N451C         5M         R3111N451B         QD           R3111N461A         6E         R3111N461C         6M         R3111N461B         QE           R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N481A         8E         R3111N481C         8M         R3111N471B         QG           R3111N491A         9E         R3111N501C         9M         R3111N501B         QG           R3111N501A         0F         R3111N501C         0N         R3111N501B         QJ           R3111N521A         2F         R3111N521C         1N         R3111N521B         QK           R3111N531A         3F         R3111N531C         3N         R3111N521B         VB           R3111N541A         4F         R3111N541C         4N         R3111N541B         VC           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH				4 8 4		
R3111N471A         7E         R3111N471C         7M         R3111N471B         QF           R3111N481A         8E         R3111N481C         8M         R3111N481B         QG           R3111N501A         9E         R3111N501C         9M         R3111N501B         QH           R3111N511A         1F         R3111N511C         1N         R3111N501B         QJ           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH						
R3111N481A         8E         R3111N481C         8M         R3111N481B         QG           R3111N501A         0F         R3111N501C         0N         R3111N501B         QJ           R3111N511A         1F         R3111N511C         1N         R3111N511B         QK           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N561A         6F         R3111N561C         6N         R3111N571B         VG           R3111N571A         7F         R3111N581C         8N         R3111N581B         VH						
R3111N491A         9E         R3111N491C         9M         R3111N491B         QH           R3111N501A         0F         R3111N501C         0N         R3111N501B         QJ           R3111N511A         1F         R3111N511C         1N         R3111N511B         QK           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N561A         6F         R3111N561C         6N         R3111N571B         VG           R3111N571A         7F         R3111N581C         8N         R3111N581B         VH						
R3111N501A         OF         R3111N501C         ON         R3111N501B         QJ           R3111N511A         1F         R3111N511C         1N         R3111N511B         QK           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N561A         6F         R3111N561C         6N         R3111N561B         VF           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH						
R3111N511A         1F         R3111N511C         1N         R3111N511B         QK           R3111N521A         2F         R3111N521C         2N         R3111N521B         VB           R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N561A         6F         R3111N561C         6N         R3111N571B         VF           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH						
R3111N531A         3F         R3111N531C         3N         R3111N531B         VC           R3111N541A         4F         R3111N541C         4N         R3111N541B         VD           R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N561A         6F         R3111N561C         6N         R3111N561B         VF           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH						
R3111N541A       4F       R3111N541C       4N       R3111N541B       VD         R3111N551A       5F       R3111N551C       5N       R3111N551B       VE         R3111N561A       6F       R3111N561C       6N       R3111N561B       VF         R3111N571A       7F       R3111N571C       7N       R3111N571B       VG         R3111N581A       8F       R3111N581C       8N       R3111N581B       VH						
R3111N551A         5F         R3111N551C         5N         R3111N551B         VE           R3111N561A         6F         R3111N561C         6N         R3111N561B         VF           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH						
R3111N561A         6F         R3111N561C         6N         R3111N561B         VF           R3111N571A         7F         R3111N571C         7N         R3111N571B         VG           R3111N581A         8F         R3111N581C         8N         R3111N581B         VH						
R3111N571A						
		7F		7 N		
TOTAL CONTROL OF THE PROPERTY						
R3111N601A   <b>0G</b>   R3111N601C   <b>0P</b>   R3111N601B   <b>VK</b>						

### • Power Dissipation (SOT-23-3)

Power Dissipation  $(P_D)$  depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

(Power Dissipation (SOT-23-3) is substitution of SOT-23-6.)

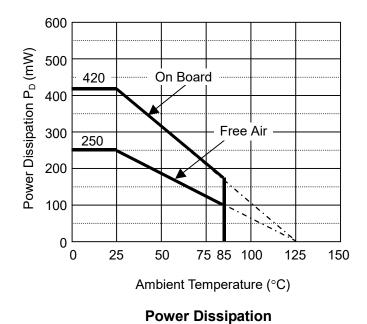
#### **Measurement Conditions**

	Standard Test Land Pattern
Environment	Mounting on Board (Wind velocity=0m/s)
Board Material	Glass cloth epoxy plastic (Double sided)
Board Dimensions	40mm × 40mm × 1.6mm
Copper Ratio	Top side: Approx. 50%, Back side: Approx. 50%
Through-holes	φ 0.5mm × 44pcs

#### Measurement Result

(Ta=25°C, Tjmax=125°C)

	Standard Land Pattern	Free Air
Power Dissipation	420mW	250mW
Thermal Resistance	θja = (125-25°C)/0.42W = 238°C/W	400°C/W

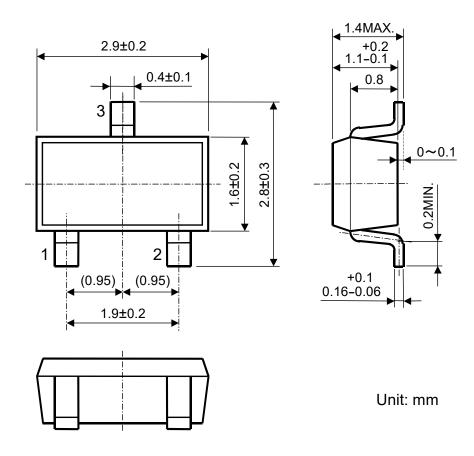


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**Measurement Board Pattern** 

:::: IC Mount Area (Unit: mm)

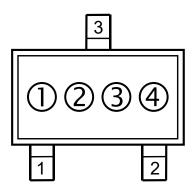
## • Package Dimensions (SOT-23-3)



### • Mark Specification (SOT-23-3)

①② : Product Code ... Refer to Mark Specification Table (SOT-23-3).

③④ : Lot No. ..... Alphanumeric Serial Number



## • Marking Specification Table (SOT-23-3)

## R3111Nxx2A

#### R3111Nxx2C

Part Number         ⊕@           R3111N092A         A9         R3111N092C         H9           R3111N112A         B0         R3111N102C         J0           R3111N112A         B1         R3111N112C         J1           R3111N112A         B2         R3111N12C         J2           R3111N132A         B3         R3111N132C         J3           R3111N152A         B4         R3111N152C         J4           R3111N162A         B6         R3111N162C         J4           R3111N162A         B6         R3111N162C         J6           R3111N182A         B6         R3111N162C         J6           R3111N192A         B7         R3111N192C         J7           R3111N202A         B9         R3111N192C         J9           R3111N202A         C0         R3111N202C         K0           R3111N202A         C1         R3111N202C         K1           R3111N22A         C2         R3111N22C         K2           R3111N22A         C3         R3111N22C         K3           R3111N26A         C6         R3111N26C         K6           R3111N26A         C6         R3111N26C         K6           R3111N32	R3111Nxx2A			R3111Nxx2C	
R3111N102A         B0         R3111N102C         J0           R3111N112A         B1         R3111N112C         J1           R3111N122A         B2         R3111N112C         J2           R3111N132A         B3         R3111N132C         J3           R3111N152A         B4         R3111N152C         J5           R3111N152A         B5         R3111N152C         J5           R3111N162A         B6         R3111N172C         J7           R3111N192A         B7         R3111N192C         J9           R3111N202A         C0         R3111N202C         K0           R3111N212A         C1         R3111N202C         K0           R3111N22A         C1         R3111N202C         K1           R3111N22A         C2         R3111N22C         K2           R3111N22A         C3         R3111N23C         K3           R3111N26A         C4         R3111N25C         K4           R3111N26A         C5         R3111N26C         K6           R3111N26A         C6         R3111N26C         K6           R3111N29A         C9         R3111N32C         K3           R3111N32A         D1         R3111N32C         K3	Part Number	02		Part Number	02
R3111N112A B1 R3111N112C J1 R3111N122A B2 R3111N12C J2 R3111N132A B3 R3111N132C J3 R3111N142A B4 R3111N152C J5 R3111N152A B5 R3111N152C J5 R3111N162A B6 R3111N162C J6 R3111N172A B7 R3111N172C J7 R3111N192A B9 R3111N192C J9 R3111N202A C0 R3111N202C K0 R3111N212A C1 R3111N212C K1 R3111N22A C2 R3111N22C K2 R3111N232A C3 R3111N232C K2 R3111N252A C4 R3111N252C K3 R3111N262A C6 R3111N26C K6 R3111N26CA C6 R3111N26C K6 R3111N272A C7 R3111N272C K6 R3111N292A C9 R3111N292C K8 R3111N292A C9 R3111N292C K9 R3111N302A D0 R3111N302C K8 R3111N302A D1 R3111N302C K8 R3111N302A D1 R3111N312C L1 R3111N32A D1 R3111N32C L2 R3111N352A D2 R3111N32C L2 R3111N36CA D6 R3111N36C L6 R3111N39A D9 R3111N39C L5 R3111N39A D9 R3111N39C L7 R3111N39A D9 R3111N39C L9 R3111N40A E0 R3111N39C L7 R3111N40A E1 R3111N312C M3 R3111N442A E4 R3111N42C M4 R3111N42A E1 R3111N42C M4 R3111N442A E4 R3111N42C M4 R3111N442A E4 R3111N42C M6 R3111N442A E7 R3111N42C M7 R3111N442A E8 R3111N49C M9 R3111N442A E9 R3111N49C M9 R3111N49A E9 R3111N49C M9 R3111N49A E9 R3111N49C M9 R3111N50A F0 R3111N50C N0 R3111N50A F1 R3111N50C N0 R3111N50A F2 R3111N50C N0 R3111N50A F3 R3111N50C N0 R3111N50A F3 R3111N50C N1 R3111N50A F3 R3111N50C N1 R3111N50A F6 R3111N50C N1 R3111N50A F7 R3111N50C N1 R3111N50A F6 R3111N50C N1 R3111N50A F6 R3111N50C N1 R3111N50A F6 R3111N50C N1 R3111N50A F6 R3111N50C N1 R3111N50A F7 R3111N50C N1 R3111N50A F6 R3111N50C N1 R3111N50A F9 R3111N50C N1	R3111N092A	A9		R3111N092C	Н9
R3111N122A B2 R3111N122C J2 R3111N132A B3 R3111N132C J3 R3111N142A B4 R3111N132C J5 R3111N152A B5 R3111N152C J5 R3111N162A B6 R3111N162C J6 R3111N172A B7 R3111N172C J7 R3111N182A B8 R3111N192C J9 R3111N192A C0 R3111N202C K0 R3111N202A C1 R3111N212C K1 R3111N22A C1 R3111N22C K2 R3111N22A C2 R3111N22C K2 R3111N22A C3 R3111N23C K3 R3111N26A C4 R3111N25C K4 R3111N26A C5 R3111N25C K5 R3111N26A C6 R3111N26C K6 R3111N27A C7 R3111N27C K7 R3111N28A C9 R3111N29C K8 R3111N30A D0 R3111N30C K8 R3111N30A D1 R3111N30C K8 R3111N30A D1 R3111N30C L0 R3111N31A D1 R3111N31C L1 R3111N32A D2 R3111N32C L2 R3111N32A D2 R3111N32C L2 R3111N32A D3 R3111N32C L2 R3111N30A D4 R3111N32C L2 R3111N30A D5 R3111N32C L2 R3111N30A D6 R3111N30C L6 R3111N30A D7 R3111N30C L6 R3111N30A D8 R3111N30C L6 R3111N30A D9 R3111N30C L6 R3111N30A D9 R3111N30C L7 R3111N30A D9 R3111N30C R3 R3111N30A R3					
R3111N132A B3 R3111N132C J3 R3111N142A B4 R3111N142C J4 R3111N152A B5 R3111N152C J5 R3111N162A B6 R3111N162C J6 R3111N172A B7 R3111N172C J7 R3111N182A B8 R3111N192C J9 R3111N2D2A C0 R3111N20C K0 R3111N212A C1 R3111N212C K1 R3111N22A C2 R3111N232C K2 R3111N232A C3 R3111N232C K3 R3111N24A C4 R3111N24C K4 R3111N25CA C5 R3111N25C K5 R3111N26CA C6 R3111N25C K5 R3111N26CA C7 R3111N27C K7 R3111N28A C8 R3111N29C K6 R3111N29A C9 R3111N29C K9 R3111N30A D0 R3111N30C L0 R3111N312A D1 R3111N312C L1 R3111N32A D3 R3111N32C L2 R3111N32A D4 R3111N32C L2 R3111N32A D5 R3111N32C L2 R3111N32A D6 R3111N32C L2 R3111N32A D7 R3111N32C L4 R3111N32A D8 R3111N35C L5 R3111N39CA D9 R3111N39C L6 R3111N39CA D9 R3111N39C L6 R3111N39CA D9 R3111N39C L6 R3111N31A D9 R3111N39C L7 R3111N32A D8 R3111N39C L6 R3111N32A D8 R3111N39C L6 R3111N32A D9 R3111N39C L6 R3111N32A D9 R3111N39C L9 R3111N40CA E0 R3111N40C M0 R3111N41A E1 R3111N41C M1 R3111N41A E1 R3111N41C M1 R3111N41A E1 R3111N41C M4 R3111N42A E2 R3111N49C M9 R3111N49CA E3 R3111N49C M9 R3111N49CA E6 R3111N49C M9 R3111N49CA E7 R3111N49C M9 R3111N5CA F6 R3111N5CC N6 R3111N5CA F1 R3111N5CC N6 R	_				-
R3111N142A         B4         R3111N142C         J4           R3111N152A         B5         R3111N152C         J5           R3111N162A         B6         R3111N172C         J7           R3111N182A         B8         R3111N192C         J9           R3111N202A         C0         R3111N202C         K0           R3111N212A         C1         R3111N212C         K1           R3111N222A         C2         R3111N22C         K2           R3111N232A         C3         R3111N23C         K3           R3111N252A         C3         R3111N25C         K4           R3111N262A         C4         R3111N25C         K4           R3111N262A         C5         R3111N25C         K5           R3111N292A         C9         R3111N29C         K7           R3111N302A         C9         R3111N30C         K9           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L2           R3111N32A         D4         R3111N32C         L2           R3111N32A         D5         R3111N32C         L3					
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R3111N202A         C0         R3111N202C         K0           R3111N212A         C1         R3111N212C         K1           R3111N222A         C2         R3111N22C         K2           R3111N232A         C3         R3111N232C         K3           R3111N252A         C4         R3111N252C         K4           R3111N262A         C5         R3111N262C         K6           R3111N272A         C7         R3111N262C         K6           R3111N292A         C8         R3111N292C         K7           R3111N302A         C9         R3111N302C         K9           R3111N312A         D1         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D3         R3111N32C         L2           R3111N32A         D4         R3111N32C         L2           R3111N32A         D4         R3111N32C         L4           R3111N32A         D4         R3111N32C         L4           R3111N32A         D5         R3111N32C         L5           R3111N32A         D6         R3111N32C         L6           R3111N32A         D7         R3111N32C         L7		B8			J8
R3111N212A C1 R3111N212C K1 R3111N222A C2 R3111N22CC K2 R3111N232A C3 R3111N23CC K3 R3111N242A C4 R3111N25CC K4 R3111N252A C5 R3111N25CC K5 R3111N262A C6 R3111N262C K6 R3111N272A C7 R3111N272C K7 R3111N292A C9 R3111N29CC K9 R3111N302A D0 R3111N302C L0 R3111N312A D1 R3111N312C L1 R3111N32A D2 R3111N32C L2 R3111N32A D3 R3111N32C L2 R3111N352A D4 R3111N32C L3 R3111N352A D5 R3111N35CC L5 R3111N352A D6 R3111N35CC L6 R3111N392A D7 R3111N36CC L6 R3111N392A D9 R3111N39CC L7 R3111N392A D9 R3111N39CC L9 R3111N402A E0 R3111N39CC L9 R3111N412A E1 R3111N40CC M0 R3111N412A E1 R3111N412C M1 R3111N42A E2 R3111N42C M2 R3111N42A E3 R3111N42C M2 R3111N42A E4 R3111N42C M4 R3111N42A E5 R3111N42C M2 R3111N42A E7 R3111N42C M4 R3111N45A E8 R3111N42C M4 R3111N49A E9 R3111N49C M6 R3111N49A E9 R3111N49C M6 R3111N49A E9 R3111N49C M9 R3111N502A F0 R3111N50C N0 R3111N502A F1 R3111N50C N1 R3111N502A F2 R3111N50C N2 R3111N502A F3 R3111N50C N2 R3111N50A F1 R3111N50C N2 R3111N50A F2 R3111N50C N2 R3111N50A F3 R3111N50C N3 R3111N50A F5 R3111N50C N4 R3111N50A F6 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F7 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F7 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F7 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F7 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F6 R3111N50C N6 R3111N50A F7 R311N50C N6	R3111N192A	В9		R3111N192C	J9
R3111N222A         C2         R3111N222C         K2           R3111N232A         C3         R3111N232C         K3           R3111N252A         C4         R3111N252C         K4           R3111N252A         C5         R3111N262C         K5           R3111N272A         C7         R3111N262C         K6           R3111N272A         C7         R3111N282C         K7           R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D1         R3111N32C         L2           R3111N32A         D3         R3111N32C         L2           R3111N352A         D3         R3111N352C         L3           R3111N352A         D4         R3111N362C         L4           R3111N352A         D5         R3111N362C         L5           R3111N392A         D7         R3111N362C         L6           R3111N392A         D8         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N402A         E1         R3111N402C	R3111N202A				
R3111N232A         C3         R3111N232C         K3           R3111N242A         C4         R3111N242C         K4           R3111N252A         C5         R3111N252C         K5           R3111N272A         C7         R3111N262C         K6           R3111N282A         C8         R3111N282C         K8           R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         K9           R3111N312A         D1         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L4           R3111N352A         D4         R3111N352C         L5           R3111N352A         D5         R3111N352C         L5           R3111N352A         D6         R3111N352C         L5           R3111N352A         D7         R3111N352C         L6           R3111N392A         D8         R3111N392C         L7           R3111N402A         D9         R3111N402C         M0           R3111N402A         E1         R3111N402C	R3111N212A	C1		R3111N212C	K1
R3111N232A         C3         R3111N232C         K3           R3111N242A         C4         R3111N242C         K4           R3111N252A         C5         R3111N252C         K5           R3111N272A         C7         R3111N262C         K6           R3111N282A         C8         R3111N282C         K8           R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         K9           R3111N312A         D1         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L4           R3111N352A         D4         R3111N352C         L5           R3111N352A         D5         R3111N352C         L5           R3111N352A         D6         R3111N352C         L5           R3111N352A         D7         R3111N352C         L6           R3111N392A         D8         R3111N392C         L7           R3111N402A         D9         R3111N402C         M0           R3111N402A         E1         R3111N402C	R3111N222A	C2		R3111N222C	K2
R3111N242A         C4         R3111N252A         K4           R3111N252A         C5         R3111N252C         K5           R3111N262A         C6         R3111N262C         K6           R3111N272A         C7         R3111N272C         K7           R3111N282A         C8         R3111N282C         K8           R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L3           R3111N352A         D4         R3111N352C         L5           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N382A         D8         R3111N392C         L7           R3111N392A         D9         R3111N402C         M0           R3111N402A         E0         R3111N402C         M0           R3111N402A         E1         R3111N402C         M2           R3111N42A         E3         R3111N42C <t< td=""><td>R3111N232A</td><td></td><td></td><td>R3111N232C</td><td></td></t<>	R3111N232A			R3111N232C	
R3111N252A         C5         R3111N252C         K5           R3111N262A         C6         R3111N262C         K6           R3111N272A         C7         R3111N272C         K7           R3111N282A         C8         R3111N282C         K8           R3111N302A         C9         R3111N302C         K9           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L2           R3111N32A         D4         R3111N32C         L3           R3111N35A         D4         R3111N32C         L5           R3111N35A         D5         R3111N35C         L5           R3111N35A         D6         R3111N36C         L6           R3111N35A         D7         R3111N36C         L6           R3111N39A         D7         R3111N39C         L7           R3111N39A         D8         R3111N39C         L9           R3111N40A         E0         R3111N40C         M0           R3111N42A         E1         R3111N40C         M2           R3111N42A         E3         R3111N42C         M4 <td></td> <td></td> <td></td> <td></td> <td>-</td>					-
R3111N262A         C6         R3111N272C         K6           R3111N272A         C7         R3111N272C         K7           R3111N282A         C8         R3111N282C         K8           R3111N302A         C9         R3111N302C         K9           R3111N312A         D1         R3111N312C         L1           R3111N32A         D1         R3111N32C         L2           R3111N32A         D3         R3111N32C         L2           R3111N32A         D4         R3111N32C         L3           R3111N35A         D5         R3111N35C         L5           R3111N36A         D6         R3111N36C         L6           R3111N37A         D7         R3111N37C         L7           R3111N39A         D8         R3111N38C         L8           R3111N39A         D9         R3111N39C         L9           R3111N40A         E0         R3111N40C         M0           R3111N40A         E0         R3111N40C         M0           R3111N42A         E1         R3111N42C         M2           R3111N42A         E2         R3111N42C         M4           R3111N42A         E3         R3111N42C         M4					
R3111N272A         C7         R3111N272C         K7           R3111N282A         C8         R3111N282C         K8           R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L3           R3111N34A         D4         R3111N32C         L4           R3111N35A         D5         R3111N35C         L5           R3111N36A         D6         R3111N36C         L6           R3111N36A         D7         R3111N36C         L6           R3111N38A         D8         R3111N38C         L8           R3111N39A         D9         R3111N39C         L9           R3111N40A         E0         R3111N40C         M0           R3111N412A         E1         R3111N40C         M1           R3111N42A         E2         R3111N42C         M2           R3111N42A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M5					
R3111N282A         C8         R3111N292C         K8           R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N32A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L3           R3111N352A         D4         R3111N32C         L4           R3111N352A         D5         R3111N352C         L5           R3111N352A         D6         R3111N362C         L6           R3111N352A         D7         R3111N362C         L6           R3111N352A         D8         R3111N362C         L7           R3111N392A         D9         R3111N392C         L9           R3111N402A         D9         R3111N402C         M0           R3111N402A         E0         R3111N402C         M1           R3111N42A         E1         R3111N42C         M2           R3111N42A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M5           R3111N42A         E4         R3111N42C         M6 <td></td> <td></td> <td></td> <td></td> <td>-</td>					-
R3111N292A         C9         R3111N292C         K9           R3111N302A         D0         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N322A         D2         R3111N32C         L2           R3111N332A         D3         R3111N32C         L3           R3111N342A         D4         R3111N32C         L4           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N362C         L6           R3111N392A         D8         R3111N392C         L7           R3111N392A         D9         R3111N402C         M0           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N42C         M1           R3111N42A         E1         R3111N42C         M2           R3111N42A         E3         R3111N42C         M4           R3111N42A         E4         R3111N42C         M4           R3111N42A         E4         R3111N42C         M5           R3111N42A         E7         R3111N42C         M6 <td></td> <td></td> <td></td> <td></td> <td></td>					
R3111N302A         D0         R3111N302C         L0           R3111N312A         D1         R3111N312C         L1           R3111N322A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L3           R3111N32A         D4         R3111N32C         L4           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N36C         L6           R3111N372A         D7         R3111N37C         L7           R3111N392A         D8         R3111N39C         L9           R3111N392A         D9         R3111N39C         L9           R3111N402A         E0         R3111N402C         M0           R3111N402A         E1         R3111N402C         M1           R3111N412A         E1         R3111N42C         M2           R3111N42A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M4           R3111N42A         E4         R3111N42C         M6           R3111N42A         E4         R3111N42C         M6           R3111N42A         E7         R3111N42C         M6	_				
R3111N312A         D1         R3111N312C         L1           R3111N322A         D2         R3111N32C         L2           R3111N32A         D3         R3111N32C         L3           R3111N342A         D4         R3111N32C         L4           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N32C         L7           R3111N392A         D8         R3111N392C         L9           R3111N492A         D9         R3111N492C         M0           R3111N492A         E0         R3111N492C         M1           R3111N42A         E1         R3111N492C         M2           R3111N42A         E1         R3111N492C         M2           R3111N42A         E3         R3111N492C         M3           R3111N42A         E4         R3111N492C         M4           R3111N42A         E4         R3111N492C         M4           R3111N42A         E4         R3111N492C         M5           R3111N42A         E5         R3111N492C         M6           R3111N49A         E9         R3111N492C         M6 <td></td> <td></td> <td></td> <td></td> <td></td>					
R3111N322A         D2         R3111N322C         L2           R3111N332A         D3         R3111N332C         L3           R3111N342A         D4         R3111N342C         L4           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N42A         E1         R3111N42C         M2           R3111N42A         E2         R3111N42C         M2           R3111N432A         E3         R3111N42C         M4           R3111N452A         E4         R3111N452C         M5           R3111N462A         E6         R3111N462C         M6           R3111N492A         E7         R3111N492C         M9           R3111N502A         F1         R3111N502C         N0           R3111N52A         F3         R3111N532C <t< td=""><td></td><td>_</td><td></td><td></td><td></td></t<>		_			
R3111N332A         D3         R3111N332C         L3           R3111N342A         D4         R3111N342C         L4           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N42A         E2         R3111N42C         M2           R3111N432A         E3         R3111N42C         M4           R3111N452A         E4         R3111N42C         M4           R3111N452A         E5         R3111N42C         M6           R3111N492A         E7         R3111N42C         M7           R3111N492A         E9         R3111N492C         M9           R3111N502A         F0         R3111N502C         N0           R3111N502A         F1         R3111N502C         N1           R3111N52A         F3         R3111N52C					
R3111N342A         D4         R3111N342C         L4           R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N42A         E2         R3111N42C         M2           R3111N42A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M4           R3111N45A         E5         R3111N42C         M4           R3111N46A         E6         R3111N42C         M6           R3111N49A         E7         R3111N42C         M7           R3111N49A         E7         R3111N42C         M8           R3111N50A         E9         R3111N50C         N0           R3111N50A         F1         R3111N50C         N1           R3111N52A         F3         R3111N52C         N3	R3111N322A	D2		R3111N322C	
R3111N352A         D5         R3111N352C         L5           R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N42A         E2         R3111N42C         M2           R3111N42A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M4           R3111N45A         E5         R3111N45C         M5           R3111N45A         E6         R3111N45C         M6           R3111N49A         E7         R3111N49C         M7           R3111N49A         E9         R3111N50C         M9           R3111N50A         F0         R3111N50C         N0           R3111N50A         F1         R3111N50C         N1           R3111N53A         F3         R3111N53C         N3           R3111N55A         F4         R3111N55C         N5 </td <td>R3111N332A</td> <td>D3</td> <td></td> <td>R3111N332C</td> <td>L3</td>	R3111N332A	D3		R3111N332C	L3
R3111N362A         D6         R3111N362C         L6           R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N42A         E2         R3111N42C         M2           R3111N432A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M4           R3111N45A         E5         R3111N45C         M5           R3111N45A         E6         R3111N45C         M6           R3111N49A         E7         R3111N49C         M7           R3111N49A         E9         R3111N49C         M9           R3111N50A         F0         R3111N50C         N0           R3111N50A         F1         R3111N50C         N1           R3111N53A         F3         R3111N53C         N3           R3111N55A         F4         R3111N55C         N5           R3111N55A         F5         R3111N55C         N6 <td>R3111N342A</td> <td>D4</td> <td></td> <td>R3111N342C</td> <td>L4</td>	R3111N342A	D4		R3111N342C	L4
R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N422A         E2         R3111N42C         M2           R3111N432A         E3         R3111N42C         M3           R3111N42A         E4         R3111N42C         M4           R3111N452A         E5         R3111N45C         M5           R3111N472A         E6         R3111N46C         M6           R3111N472A         E7         R3111N49C         M7           R3111N492A         E8         R3111N49C         M8           R3111N492A         E9         R3111N50C         N0           R3111N502A         F1         R3111N50C         N1           R3111N52A         F1         R3111N52C         N2           R3111N532A         F3         R3111N53C         N3           R3111N552A         F4         R3111N55C         N5           R3111N552A         F6         R3111N56C         N6	R3111N352A	D5		R3111N352C	L5
R3111N372A         D7         R3111N372C         L7           R3111N382A         D8         R3111N382C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N422A         E2         R3111N42C         M2           R3111N432A         E3         R3111N432C         M3           R3111N452A         E4         R3111N42C         M4           R3111N452A         E5         R3111N452C         M5           R3111N472A         E7         R3111N492C         M6           R3111N492A         E8         R3111N492C         M7           R3111N492A         E9         R3111N492C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N52C         N1           R3111N52A         F2         R3111N52C         N2           R3111N52A         F3         R3111N52C         N4           R3111N552A         F4         R3111N552C         N5           R3111N552A         F6         R3111N562C <td< td=""><td>R3111N362A</td><td>D6</td><td></td><td>R3111N362C</td><td>L6</td></td<>	R3111N362A	D6		R3111N362C	L6
R3111N382A         D8         R3111N392C         L8           R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N422A         E2         R3111N42C         M2           R3111N432A         E3         R3111N432C         M3           R3111N42A         E4         R3111N42C         M4           R3111N452A         E5         R3111N452C         M5           R3111N472A         E7         R3111N42C         M6           R3111N492A         E8         R3111N492C         M7           R3111N492A         E9         R3111N492C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N502C         N1           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F7         R3111N562C         N6           R3111N592A         F8         R3111N592C	R3111N372A			R3111N372C	
R3111N392A         D9         R3111N392C         L9           R3111N402A         E0         R3111N402C         M0           R3111N412A         E1         R3111N412C         M1           R3111N422A         E2         R3111N42C         M2           R3111N432A         E3         R3111N432C         M3           R3111N42A         E4         R3111N42C         M4           R3111N452A         E5         R3111N45C         M5           R3111N472A         E7         R3111N47C         M7           R3111N492A         E8         R3111N49C         M8           R3111N492A         E9         R3111N49C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N52A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N552A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F7         R3111N572C         N7           R3111N592A         F8         R3111N592C         N					
R3111N412A         E1         R3111N412C         M1           R3111N422A         E2         R3111N42C         M2           R3111N432A         E3         R3111N432C         M3           R3111N442A         E4         R3111N442C         M4           R3111N452A         E5         R3111N452C         M5           R3111N462A         E6         R3111N462C         M6           R3111N472A         E7         R3111N492C         M7           R3111N492A         E8         R3111N492C         M8           R3111N502A         E9         R3111N502C         M9           R3111N512A         F1         R3111N512C         N1           R3111N52A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N52C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F6         R3111N572C         N7           R3111N592A         F8         R3111N592C         N8           R3111N592A         F9         R3111N592C         N9		_			
R3111N412A         E1         R3111N412C         M1           R3111N422A         E2         R3111N42C         M2           R3111N432A         E3         R3111N432C         M3           R3111N442A         E4         R3111N442C         M4           R3111N452A         E5         R3111N452C         M5           R3111N462A         E6         R3111N462C         M6           R3111N472A         E7         R3111N492C         M7           R3111N492A         E8         R3111N492C         M8           R3111N502A         E9         R3111N502C         M9           R3111N512A         F1         R3111N512C         N1           R3111N52A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N52C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F6         R3111N572C         N7           R3111N592A         F8         R3111N592C         N8           R3111N592A         F9         R3111N592C         N9	R3111N402A	F0		R3111N402C	MO
R3111N422A         E2         R3111N422C         M2           R3111N432A         E3         R3111N432C         M3           R3111N442A         E4         R3111N442C         M4           R3111N452A         E5         R3111N452C         M5           R3111N462A         E6         R3111N472C         M6           R3111N472A         E7         R3111N472C         M7           R3111N492A         E8         R3111N492C         M8           R3111N502A         E9         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F6         R3111N562C         N6           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N432A         E3         R3111N432C         M3           R3111N442A         E4         R3111N442C         M4           R3111N452A         E5         R3111N452C         M5           R3111N472A         E6         R3111N472C         M6           R3111N482A         E8         R3111N482C         M8           R3111N492A         E9         R3111N502C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F6         R3111N562C         N6           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N442A         E4         R3111N442C         M4           R3111N452A         E5         R3111N452C         M5           R3111N462A         E6         R3111N472C         M6           R3111N472A         E7         R3111N472C         M7           R3111N482A         E8         R3111N482C         M8           R3111N502A         E9         R3111N502C         M9           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F6         R3111N562C         N6           R3111N582A         F8         R3111N582C         N7           R3111N592A         F8         R3111N592C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N452A         E5         R3111N452C         M5           R3111N462A         E6         R3111N472C         M6           R3111N472A         E7         R3111N472C         M7           R3111N482A         E8         R3111N482C         M8           R3111N502A         E9         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N572A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N592A         F8         R3111N592C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N462A         E6         R3111N462C         M6           R3111N472A         E7         R3111N472C         M7           R3111N482A         E8         R3111N482C         M8           R3111N502A         E9         R3111N502C         M9           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N562A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N472A         E7         R3111N472C         M7           R3111N482A         E8         R3111N482C         M8           R3111N492A         E9         R3111N492C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N562A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N482A         E8         R3111N492C         M8           R3111N492A         E9         R3111N492C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N562A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					-
R3111N492A         E9         R3111N492C         M9           R3111N502A         F0         R3111N502C         N0           R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N52C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N562A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N502A F0 R3111N502C N0 R3111N512A F1 R3111N512C N1 R3111N522A F2 R3111N52C N2 R3111N532A F3 R3111N532C N3 R3111N542A F4 R3111N552A F5 R3111N552A F5 R3111N562A F6 R3111N572A F7 R3111N572A F7 R3111N572C N7 R3111N582A F8 R3111N582C N8 R3111N592A F9 R3111N592C N9					
R3111N512A         F1         R3111N512C         N1           R3111N522A         F2         R3111N522C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N562A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9	R3111N492A	E9		R3111N492C	М9
R3111N522A         F2         R3111N522C         N2           R3111N532A         F3         R3111N532C         N3           R3111N542A         F4         R3111N542C         N4           R3111N552A         F5         R3111N552C         N5           R3111N562A         F6         R3111N562C         N6           R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N532A       F3       R3111N532C       N3         R3111N542A       F4       R3111N542C       N4         R3111N552A       F5       R3111N552C       N5         R3111N562A       F6       R3111N562C       N6         R3111N572A       F7       R3111N572C       N7         R3111N582A       F8       R3111N582C       N8         R3111N592A       F9       R3111N592C       N9					
R3111N542A       F4       R3111N542C       N4         R3111N552A       F5       R3111N552C       N5         R3111N562A       F6       R3111N562C       N6         R3111N572A       F7       R3111N572C       N7         R3111N582A       F8       R3111N582C       N8         R3111N592A       F9       R3111N592C       N9	R3111N522A	F2		R3111N522C	
R3111N552A       F5       R3111N552C       N5         R3111N562A       F6       R3111N562C       N6         R3111N572A       F7       R3111N572C       N7         R3111N582A       F8       R3111N582C       N8         R3111N592A       F9       R3111N592C       N9	R3111N532A	F3			N3
R3111N552A       F5       R3111N552C       N5         R3111N562A       F6       R3111N562C       N6         R3111N572A       F7       R3111N572C       N7         R3111N582A       F8       R3111N582C       N8         R3111N592A       F9       R3111N592C       N9	R3111N542A	F4		R3111N542C	N4
R3111N562A       F6       R3111N562C       N6         R3111N572A       F7       R3111N572C       N7         R3111N582A       F8       R3111N582C       N8         R3111N592A       F9       R3111N592C       N9	R3111N552A			R3111N552C	
R3111N572A         F7         R3111N572C         N7           R3111N582A         F8         R3111N582C         N8           R3111N592A         F9         R3111N592C         N9					
R3111N582A F8 R3111N582C N8 R3111N592A F9 R3111N592C N9					
R3111N592A <b>F9</b> R3111N592C <b>N9</b>					
	R3111N602A			R3111N602C	

## • Power Dissipation (SOT-89-3)

Power Dissipation  $(P_D)$  depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

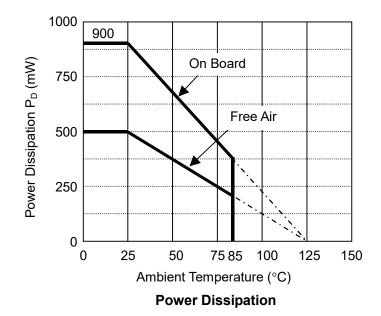
#### Measurement Conditions

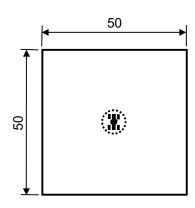
	Standard Land Pattern
Environment	Mounting on Board (Wind velocity=0m/s)
Board Material	Glass cloth epoxy plastic (Double sided)
Board Dimensions	50mm × 50mm × 1.6mm
Copper Ratio	Top side : Approx. 10% , Back side : Approx. 100%
Through-hole	-

#### Measurement Result

(Ta=25°C,Tjmax=125°C)

	Standard Land Pattern	Free Air
Power Dissipation	900mW	500mW
Thermal Resistance	θja = (125-25°C)/0.9W = 111°C/W	200°C/W

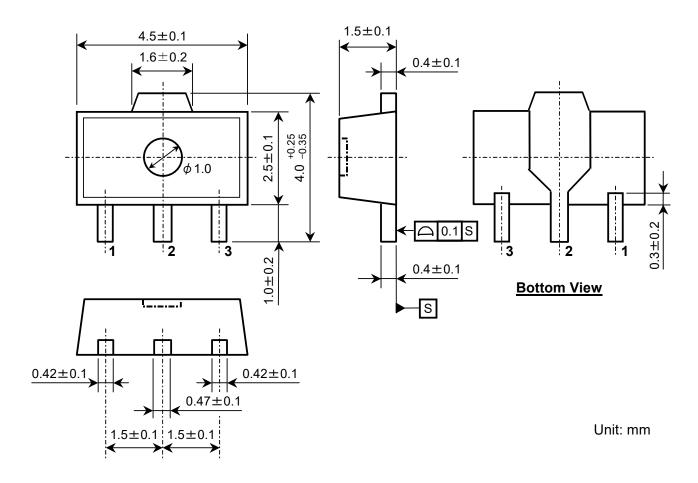




#### **Measurement Board Pattern**

IC Mount Area Unit : mm

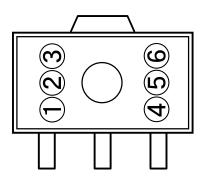
## • Package Dimensions (SOT-89-3)



## • Mark Specification (SOT-89-3)

①②③④ : Product Code ... Refer to Mark Specification Table (SOT-89-3).

⑤⑥ : Lot No. ...... Alphanumeric Serial Number



## • Marking Specification Table (SOT-89-3)

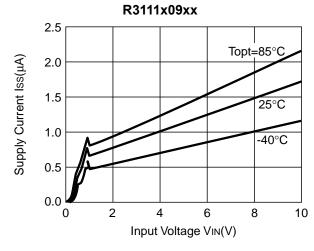
### R3111Hxx1A

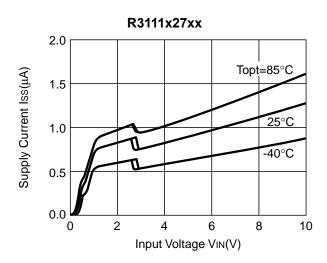
#### **R3111Hxx1C**

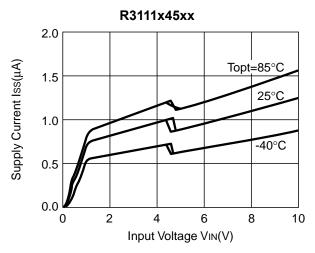
R3111Hxx1A		R3111Hxx1C	
Part Number	0234	Part Number	1234
R3111H091A	A09A	R3111H091C	A09C
R3111H101A	A10A	R3111H101C	A10C
R3111H111A	A11A	R3111H111C	A11C
R3111H121A	A12A	R3111H121C	A12C
R3111H131A	A13A	R3111H131C	A13C
R3111H141A	A14A	R3111H141C	A14C
R3111H151A	A15A	R3111H151C	A15C
R3111H161A	A16A	R3111H161C	A16C
R3111H171A	A17A	R3111H171C	A17C
R3111H181A	A18A	R3111H181C	A18C
R3111H191A	A19A	R3111H191C	A19C
R3111H201A	A20A	R3111H201C	A20C
R3111H211A	A21A	R3111H211C	A21C
R3111H221A	A22A	R3111H221C	A22C
R3111H231A	A23A	R3111H231C	A23C
R3111H241A	A24A	R3111H241C	A24C
R3111H251A	A25A	R3111H251C	A25C
R3111H261A	A26A	R3111H261C	A26C
R3111H271A	A27A	R3111H271C	A27C
R3111H281A	A28A	R3111H281C	A28C
R3111H291A	A29A	R3111H291C	A29C
R3111H301A	A30A	R3111H301C	A30C
R3111H311A	A31A	R3111H311C	A31C
R3111H321A	A32A	R3111H321C	A32C
R3111H331A	A33A	R3111H331C	A33C
R3111H341A	A34A	R3111H341C	A34C
R3111H351A	A35A	R3111H351C	A35C
R3111H361A R3111H371A	A36A	R3111H361C R3111H371C	A36C
R3111H381A	A37A A38A	R3111H381C	A37C A38C
R3111H391A	A39A	R3111H391C	A39C
R3111H401A	A40A	R3111H401C	A40C
R3111H411A	A41A	R3111H411C	A41C
R3111H421A	A42A	R3111H421C	A42C
R3111H431A	A43A	R3111H431C	A43C
R3111H441A	A44A	R3111H441C	A44C
R3111H451A	A45A	R3111H451C	A45C
R3111H461A	A46A	R3111H461C	A46C
R3111H471A	A47A	R3111H471C	A47C
R3111H481A	A48A	R3111H481C	A48C
R3111H491A	A49A	R3111H491C	A49C
R3111H501A	A50A	R3111H501C	A50C
R3111H511A	A51A	R3111H511C	A51C
R3111H521A	A52A	R3111H521C	A52C
R3111H531A	A53A	R3111H531C	A53C
R3111H541A	A54A	R3111H541C	A54C
R3111H551A	A55A	R3111H551C	A55C
R3111H561A	A56A	R3111H561C	A56C
R3111H571A	A57A	R3111H571C	A57C
R3111H581A	A58A	R3111H581C	A58C
R3111H591A	A59A	R3111H591C	A59C
R3111H601A	A60A	R3111H601C	A60C

## **TYPICAL CHARACTERISTICS**

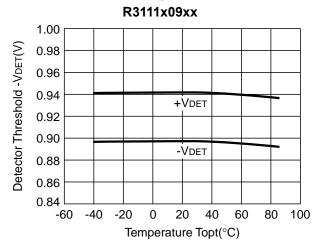
## 1) Supply Current vs. Input Voltage

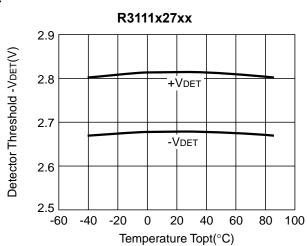


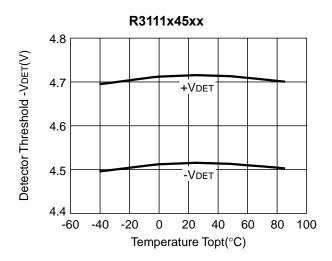




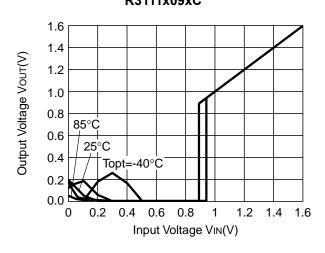
## 2) Detector Threshold Hysteresis vs. Temperature

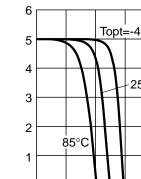




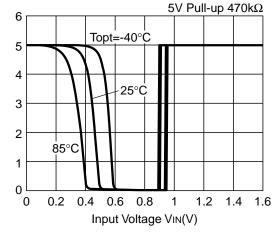


## 3) Output Voltage vs. Input Voltage R3111x09xC

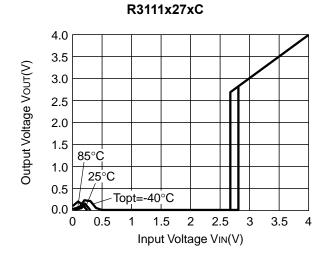


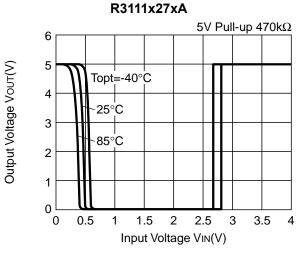


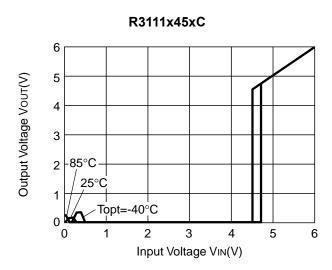
Output Voltage Vout(V)

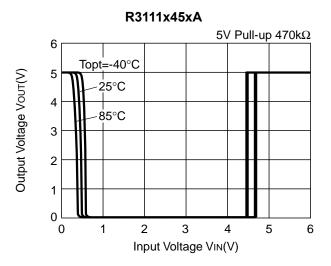


R3111x09xA

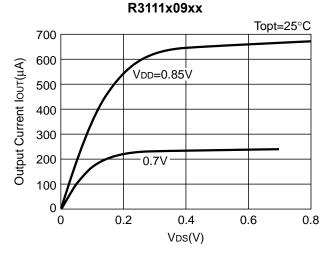


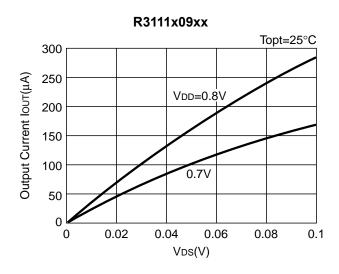


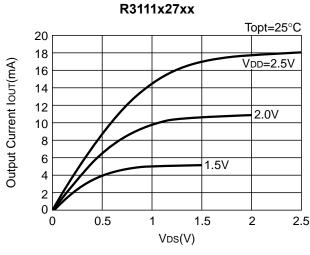


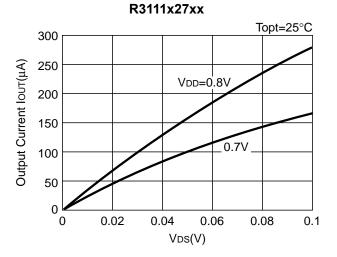


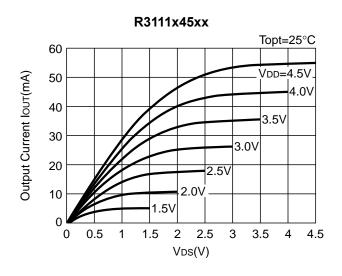
# 4) Nch Driver Output Current vs. $V_{\text{DS}}$

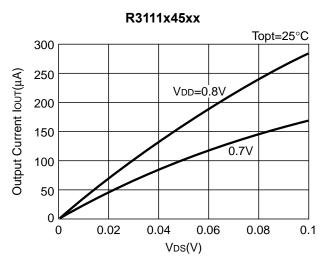




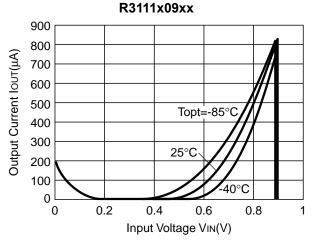


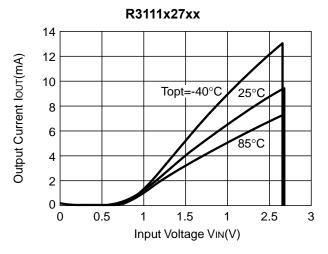


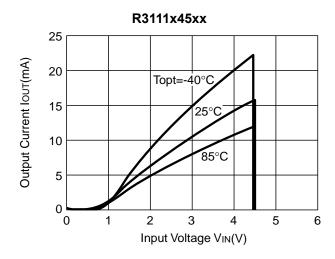




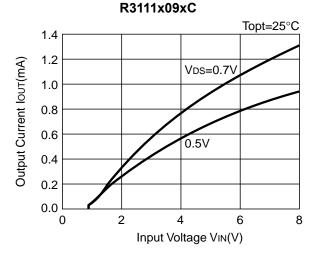
# 5) Nch Driver Output Current vs. Input Voltage

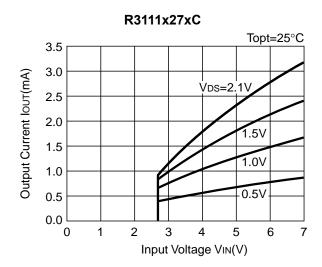


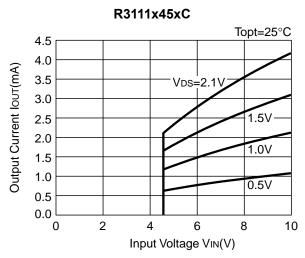




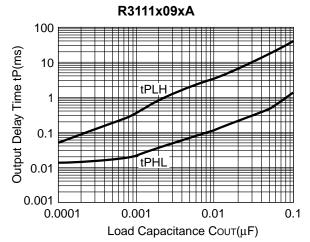
# 6) Pch Driver Output Current vs. Input Voltage

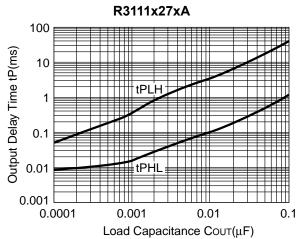


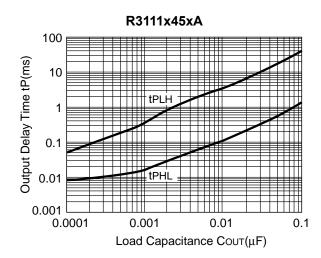




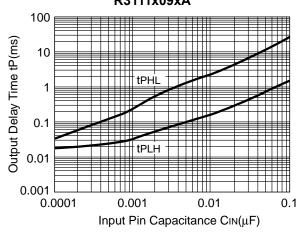
## 7) Output Delay Time vs. Load Capacitance (Ta=25°C)

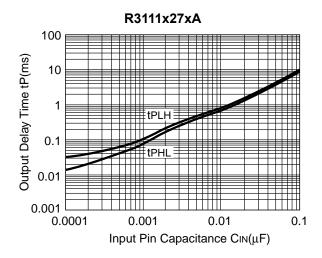


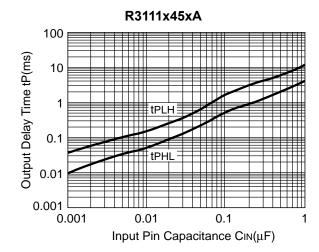




## 8) Output Delay Time vs. Input Pin Capacitance R3111x09xA



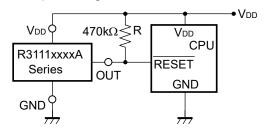




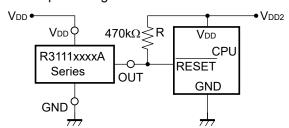
## TYPICAL APPLICATION

• R3111xxxxA CPU Reset Circuit (Nch Open Drain Output)

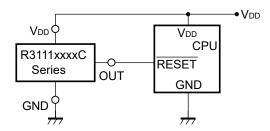
Case 1.Input Voltage to R3111xxxxA is equal to Input Voltage to CPU



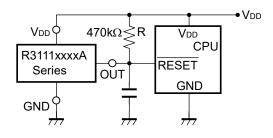
Case 2. Input Voltage to R3111xxxxA is unequal to Input Voltage to CPU



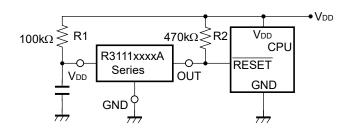
• R3111xxxxC CPU Reset Circuit (CMOS Output)



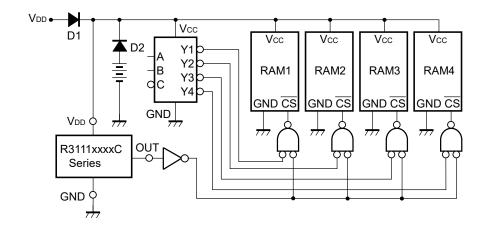
 R3111xxxxA Output Delay Time Circuit 1 (Nch Open Drain Output)



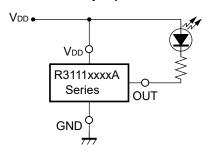
 R3111xxxxA Output Delay Time Circuit 2 (Nch Open Drain Output)



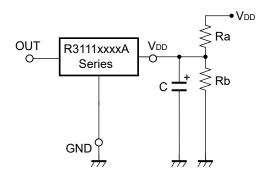
Memory Back-up Circuit



 Voltage level Indicator Circuit (lighted when the power runs out) (Nch Open Drain Output)



 Detector Threshold Adjustable Circuit (Nch Open Drain Output)

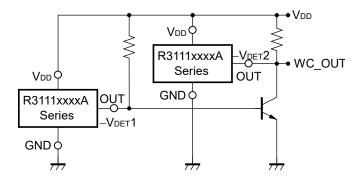


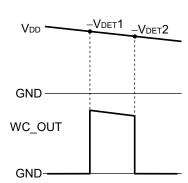
Adjusted Detector Threshold  $=(-V_{DET})\times(Ra+Rb)/Rb$ 

Hysteresis Voltage = $(V_{HYS})\times(Ra+Rb)/Rb$ 

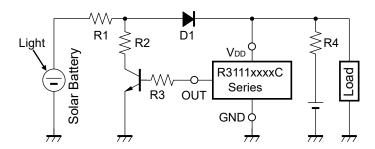
\*) If the value of Ra is set excessively large, voltage drop may occur caused by the supply current of IC itself, and detector threshold may vary.

 Window Comparator Circuit (Nch Open Drain Output)





Over-charge Preventing Circuit



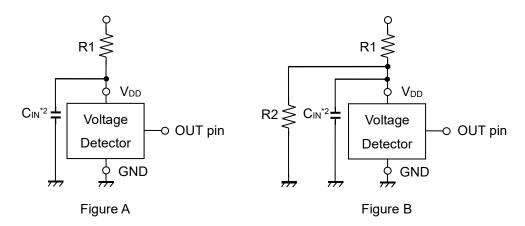
## **TECHNICAL NOTES**

#### When connecting resistors to the device's input pin

When connecting a resistor (R1) to an input of this device, the input voltage decreases by [Device's Consumption Current] x [Resistance Value] only. And, the cross conduction current\*<sup>1</sup>, which occurs when changing from the detecting state to the release state, is decreased the input voltage by [Cross Conduction Current] x [Resistance Value] only. And then, this device will enter the re-detecting state if the input voltage reduction is larger than the difference between the detector voltage and the released voltage.

When the input resistance value is large and the VDD is gone up at mildly in the vicinity of the released voltage, repeating the above operation may result in the occurrence of output.

As shown in Figure A/B, set R1 to become 100 k $\Omega$  or less as a guide, and connect C<sub>IN</sub> of 0.1  $\mu$ F and more to between the input pin and GND. Besides, make evaluations including temperature properties under the actual usage condition, with using the evaluation board like this way. As a result, make sure that the cross conduction current has no problem.



<sup>\*1</sup> In the CMOS output type, a charging current for OUT pin is included.

<sup>\*2</sup> Note the bias dependence of capacitors.



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