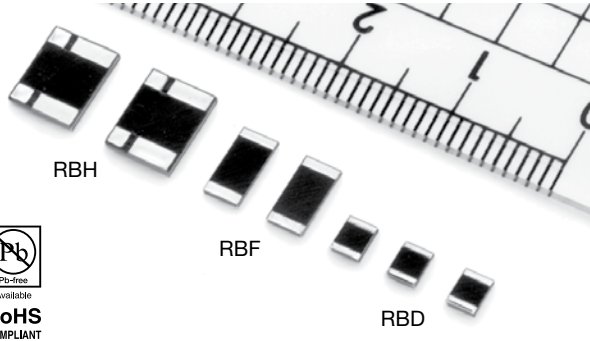


# Ultra Precision SMT Current Sense Resistor (Flip-Chip)



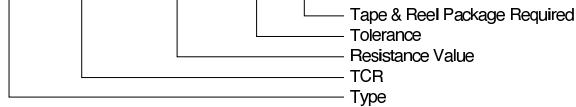
TCR, RESISTANCE RANGE, TOLERANCE, RATED POWER				
Type	TCR (ppm/°C) -25°C to 125°C*	Resistance Range (Ω)	Resistance Tolerance (%)*	Rated Power (W) at 70°C
RBD	0±25 (J)	0.01 to 0.1	±1 (F) ±2 (G) ±5 (J)	0.5
	0±10 (C) 0±25 (J)	0.1 to 1	±0.5 (D) ±1 (F) ±2 (G) ±5 (J)	
RBF	0±25 (J)	0.01 to 0.1	±1 (F) ±2 (G) ±5 (J)	1
	0±10 (C) 0±25 (J)	0.1 to 1	±0.5 (D) ±1 (F) ±2 (G) ±5 (J)	
RBH	0±10 (C) 0±25 (J)	0.01 to 0.1	±0.5 (D) ±1 (F) ±2 (G) ±5 (J)	1.5

\*Symbols parenthesized are for type number composition.

### COMPOSITION OF TYPE NUMBER

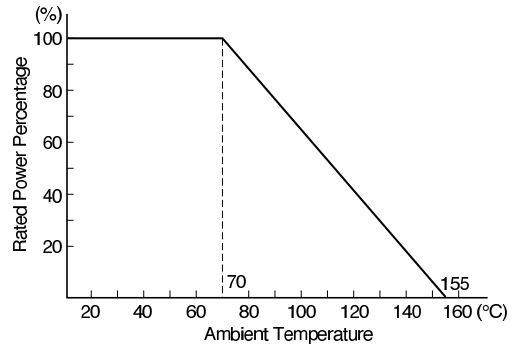
Example:

**RBF J R1000 F L**

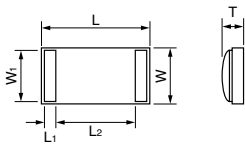


Resistance value in ohm is expressed by a series of four significant digits and an R designates the decimal point.

### POWER DERATING CURVE

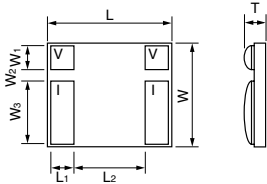


### CONFIGURATION (DIMENSIONS IN mm)



Type	RBD	RBF
L	3.2±0.1	6.3±0.1
W	2.5±0.1	3.2±0.1
L <sub>1</sub>	0.5±0.2	0.7±0.2
L <sub>2</sub>	2.1±0.2	4.7±0.2
W <sub>1</sub>	2.4±0.2	3.0±0.2
T	1.05 max.	

Dimensions in mm

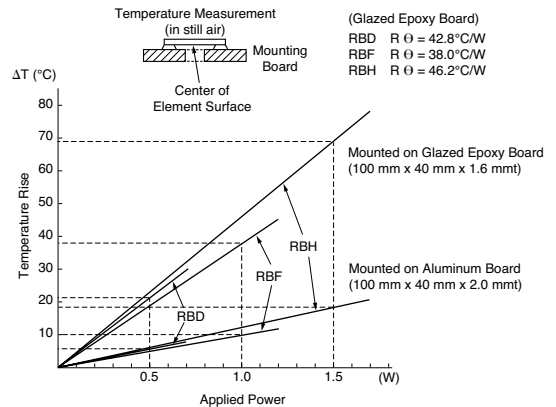


Type	RBH
L	7.5±0.1
W	6.0±0.1
L <sub>1</sub>	1.4±0.2
L <sub>2</sub>	4.4±0.2
W <sub>1</sub>	1.4±0.2
W <sub>2</sub>	0.7±0.2
W <sub>3</sub>	3.6±0.2
T	1.5 max.

Dimensions in mm

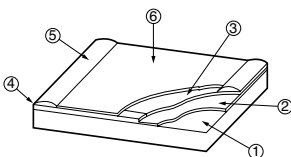
I: Current Sensing Terminal  
V: Voltage Terminal

### TEMPERATURE OF RESISTOR SURFACE



Please use board made of metal for continuous use with 2W at 70°C. Please keep the temperature of board less than 90°C when using the glazed epoxy board.

### CONSTRUCTION



- ① Ceramic Substrate (High-Purity Alumina)
- ② Heat-Resistant Bonding Layer
- ③ Bulk<sup>®</sup> Metal Foil
- ④ Metal Plating
- ⑤ Solder
- ⑥ Solder-Resist

PERFORMANCE			
Parameters	Test Condition	ALPHA Specification	ALPHA Typical Test Data
Maximum Rated Operating Temperature		70°C	
Working Temperature Range		-65°C to +155°C	
Thermal Shock Overload	-65°C/30 min. ↔ +155°C/30 min., 5 cycles Rated Voltage x 2.5, 5 sec.	±0.1% ±0.1%	±0.03% ±0.03%
Low Temperature Storage and Operation	-65°C, No Load, 24 hrs. → Rated Voltage, 45 min.	±0.1% ±0.1%	±0.05% ±0.05%
Substrate Bending Test	Substrate Bent 3 mm, 60 sec.		
Dielectric Withstanding Voltage	Atmo. Pres.: AC 200V, 1 min.	±0.05% over 10,000 MΩ	±0.01% over 10,000 MΩ
Insulation Resistance	DC 100V, 1 min.		
Resistance to Soldering Heat	260°C, 10 sec.	±0.1% ±0.1%	±0.03% ±0.03%
Moisture Resistance	+65°C to -10°C, 90% RH to 98% RH, Rated Voltage, 10 cycles (240 hrs.)		
Shock	100G, 6 ms, Sawtooth Wave, X, Y, Z, each 10 shocks	±0.05% ±0.05%	±0.01% ±0.01%
Vibration, High Frequency	20G, 10 Hz to 2,000 Hz to 10 Hz, 20 min., X, Y, Z, each 2.5 hrs.		
Life	70°C, Rated Power, 1.5 hr. – ON, 0.5 hr. – OFF, 2,000 hrs	±0.1% ±0.1%	±0.05% ±0.05%
Storage Life	15°C to 35°C, 15% RH to 75% RH, No Load, 10,000 hrs.	±0.05% ±0.05%	±0.01% ±0.01%
High Temperature Exposure	155°C, No Load, 2,000 hrs.	±0.1% ±0.1%	±0.05% ±0.05%

**TAPE AND REEL PACKAGE (BASED ON EIA-481-1) (DIMENSIONS IN mm)**

Tape Dimensions										Reel Dimensions Reel Capacity   RBH: 1,000 pieces/reel   RBD, RBF: 4,000 pieces/reel								
RBD, RBF: 0.25±0.05 RBH: 0.30±0.05  RBD, RBF: 1.2±0.1 RBH: 1.80±0.1																		
Type	A0	B0	W	F	E	P1	P2	P0	D0	Type	A	N	B	C	D	W1	W2	r
RBD	2.85 ±0.1	3.7 ±0.1	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Dia.1.5 +0.1-0	RBD	Dia.178 ±2	Dia.60 min.	Dia.13 ±0.5	Dia.21 ±0.8	2.0 ±0.5	8.4 +2.0-0	14.4 max.	1.0 ±0.5
RBF	3.4 ±0.1	6.7 ±0.1	12.0 ±0.2	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Dia.1.5 +0.1-0	RBF	Dia.178 ±2	Dia.60 min.	Dia.13 ±0.5	Dia.21 ±0.8	2.0 ±0.5	12.4 +2.0-0	18.4 max.	1.0 ±0.5
RBH	6.3 ±0.1	7.8 ±0.1	16.0 ±0.2	7.5 ±0.1	1.75 ±0.1	8.0 ±0.1	2.0 ±0.1	4.0 ±0.1	Dia.1.5 +0.1-0	RBH	Dia.178 ±2	Dia.60 min.	Dia.13 ±0.5	Dia.21 ±0.8	2.0 ±0.5	17.0 ±0.3	19.4 ±0.1	1.0 ±0.5

**PRECAUTION IN USING SMD CURRENT SENSE RESISTORS**

**1. Storage**

Storage condition or environment may adversely affect solderability of the exterior terminals. Do not store in high temperature and humidity. The recommended storage environment is lower than 40°C, has less than 70% RH humidity and is free from harmful gases such as sulphur and chlorine.

**2. Caution in Soldering**

- ① Solder Reflow in Furnace Recommended
  - Peak Temperature: 250+0/-5°C
  - Holding time: 10 sec. max.
  - To cool gradually at room temperature.
- ② Dipping in Solder (Wave or Still) Recommended
  - Temp. of Solder: 260°C max.
  - Length of Dipping: 10 sec.

③ Other  
Soldering iron is never recommended. Corrosion-free flux such as rosin is recommended.

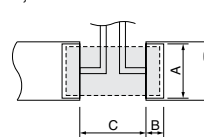
**3. Cleaning**

Use volatile cleaner such as methylalcohol or propylalcohol.

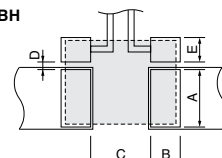
**4. Circuit Board Design**

- ① Solder Land Dimensions  
The dimensions of solder land must be determined in conformity with the size of resistors and with the soldering method. They are also subject to the mounting machine and the material of the substrate. See example at right.

RBD, RBF



RBH



Type	Dimensions in mm				
	A	B	C	D	E
RBD	2.6 to 2.8	0.8	2.0	/	/
RBF	3.4 to 3.6	1.2	4.5		
RBH	3.8 to 4.0	2.0	4.0		

**② Circuit Design**

It is recommended that the circuit be drawn so that current may approach, cross and go away from the mounted resistor in one direction as illustrated below. Thicker copper foil should be used if possible.

