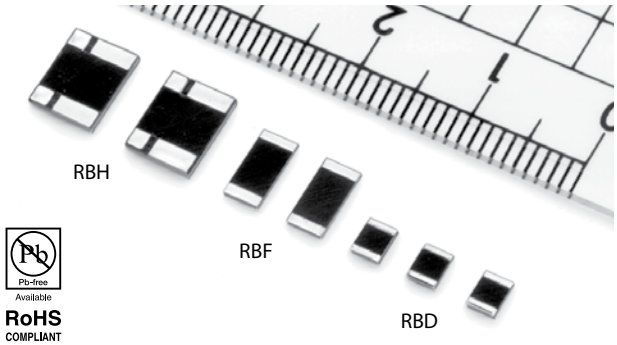
VPG Foil Resistors
VFR · ALPHA ELEC. · POWERTRON · APR

Ultra Precision SMT Current Sense Resistor (Flip-Chip)



Pb-free Available
RoHS COMPLIANT

COMPOSITION OF TYPE NUMBER

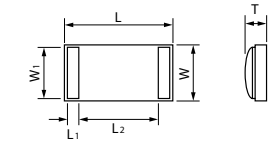
Example:

RBF J R1000 F L

- L — Tape & Reel Package Required
- F — Tolerance
- R1000 — Resistance Value
- J — TCR
- RBF — Type

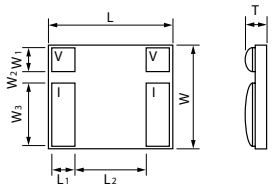
Resistance value in ohm is expressed by a series of four significant digits and an R designates the decimal point.

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_1	0.5 ±0.2	0.7 ±0.2
L_2	2.1 ±0.2	4.7 ±0.2
W_1	2.4 ±0.2	3.0 ±0.2
T	1.05 max.	

Dimensions in mm

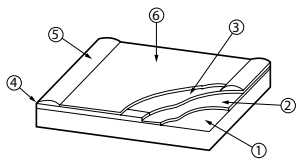


I: Current Sensing Terminal
V: Voltage Terminal

Type	RBH
L	7.5±0.1
W	6.0 ±0.1
L_1	1.4 ±0.2
L_2	4.4 ±0.2
W_1	1.4 ±0.2
W_2	0.7 ±0.2
W_3	3.6 ±0.2
T	1.5 max.

Dimensions in mm

CONSTRUCTION



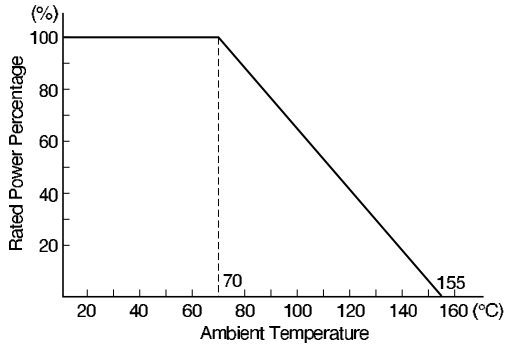
① Ceramic Substrate (High-Purity Alumina)
② Heat-Resistant Bonding Layer
③ Bulk Metal ˚ Foil
④ Metal Plating
⑤ Solder
⑥ Solder-Resist

TCR, RESISTANCE RANGE, TOLERANCE, RATED POWER

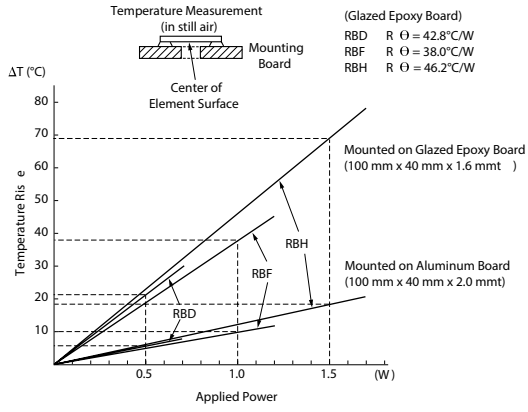
Type	TCR (ppm/°C) –25°C to 125°C*	Resistance Range (Ω)	Resistance Tolerance (%)*	Rated Power (W) at 70°C
RBD	0±25 (J)	0.01 to 0.1	±1 (F) ±2 (G) ±5 (J)	0.5
	0±10 (C) 0±25 (J)	0.1 to 1	±0.5 (D) ±1 (F) ±2 (G) ±5 (J)	
RBF	0±25 (J)	0.01 to 0.1	±1 (F) ±2 (G) ±5 (J)	1
	0±10 (C) 0±25 (J)	0.1 to 1	±0.5 (D) ±1 (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.

POWER DERATING CURVE



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.

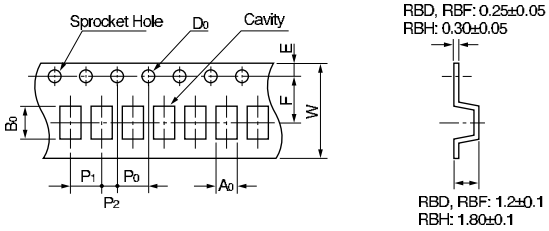
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PERFORMANCE

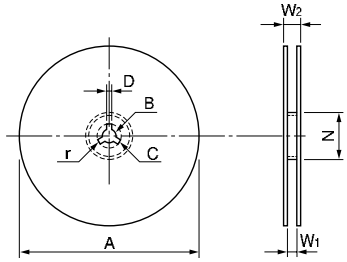
Parameters	Test Condition	ALPHA Specification	ALPHA Typical Test Data
Maximum Rated Operating Temperature Working Temperature Range		70°C –65°C to +155°C	
Thermal Shock Overload	–65°C/30 min. ↔ +155°C/30 min., 5 cycles Rated Power x 2.5, 5 sec.	±0.1% ±0.1%	±0.03% ±0.03%
Low Temperature Storage and Operation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

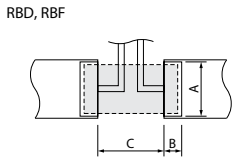


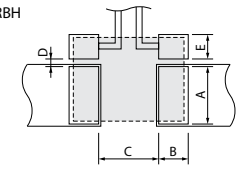
Type	A0	B0	W	F	E	P1	P2	P0	D0
RBD	2.85 ±0.1	3.7 ±0.1	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Dia.1.5 +0.1-0
RBF	3.4 ±0.1	6.7 ±0.1	12.0 ±0.2	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Dia.1.5 +0.1-0
RBH	6.3 ±0.1	7.8 ±0.1	16.0 ±0.2	7.5 ±0.1	1.75 ±0.1	8.0 ±0.1	2.0 ±0.1	4.0 ±0.1	Dia.1.5 +0.1-0

Type	A	N	B	C	D	W1	W2	r
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	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	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

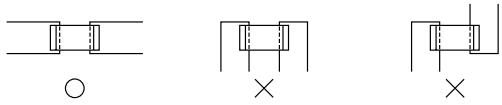
1. Storage
   Storage condition or environment may adversely affect solderability of the exterior terminals. Do not store in high temperature and humidity. The recommended storage environment is lower than 40°C, has less than 70% RH humidity and is free from harmful gases such as sulphur and chlorine.
2. Caution in Soldering
   Ê Solder Reflow in Furnace
   Recommended
   • Peak Temperature: 250+0/-5°C
   • Holding time: 10 sec. max.
   • To cool gradually at room temperature.
   Ë Dipping in Solder (Wave or Still)
   Recommended
   • Temp. of Solder: 260°C max.
   • Length of Dipping: 10 sec.
   Ì 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
   Ê 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.





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	0.5	1.7

Ë 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.



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