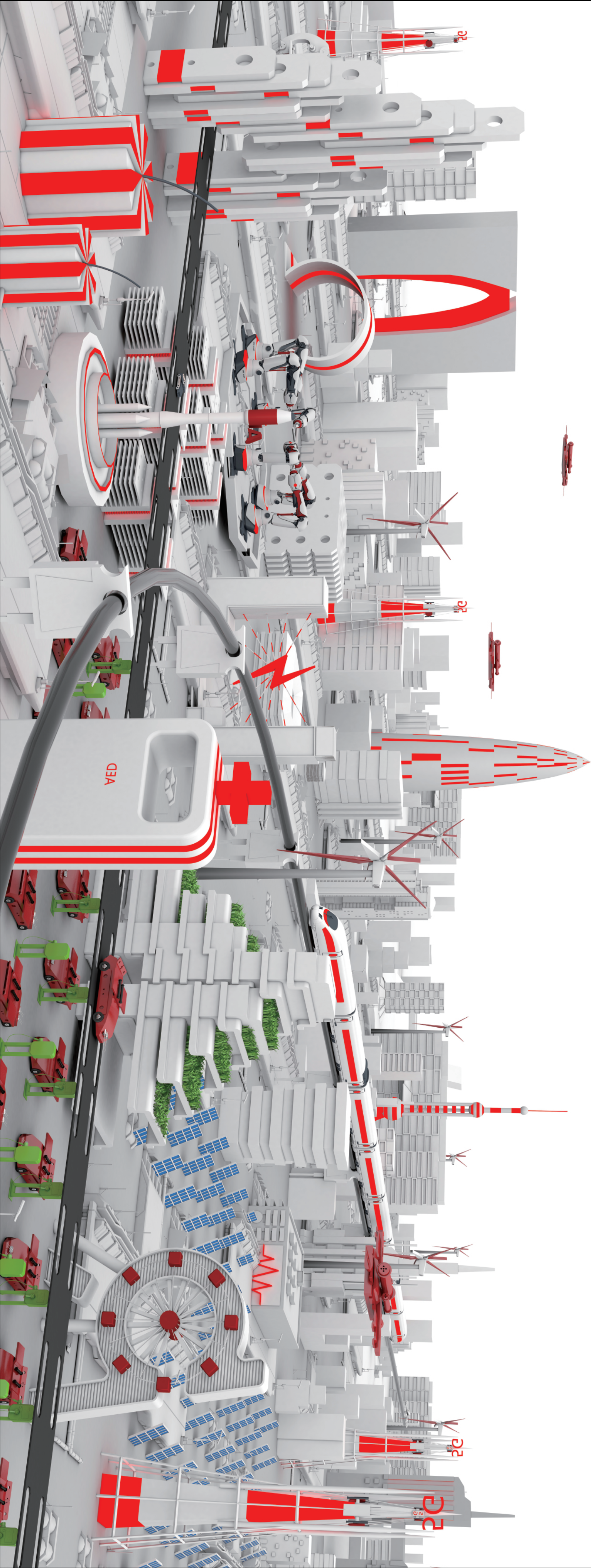


睿思

RESI

PRODUCT CATALOG

2023

R E S I

Resi Resistor

Representing "Quality" and "Service"
Devoting to being a China resistor benchmarking enterprise,
Breaking the monopoly of foreign resistor manufacturers on the high-end market, and
Providing resistors with high quality, reasonable price and stable delivery for Chinese engineers.

Catalogue

Precision Resistor

With the same technology and installation method, the tolerance, TCR, load life, long-term stability and other indicators of the resistor have reached a higher standard.

Long-term stability is a very important indicator. Tight tolerance is meaningless without stability. Precision resistor mainly applies film and foil technology. The electrical performance of foil resistor is more excellent, and can achieve nearly zero TCR and 0.001% tolerance.

Characteristics

- Tight Tolerance
- Low TCR
- Excellent Long-Term Stability

Applications

- Electric Power
- Robot
- Current Sensing
- Precision Instrument

DataSheet No.: E16003
Version: V7
Date: 2023/04/20

睿思

PTFR

Precision Thin Film Chip Resistor

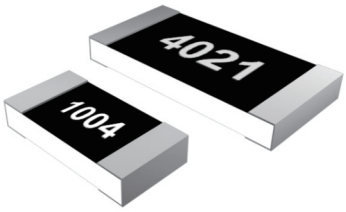
Resistance	10Ω~10MΩ
Tolerance	±0.01%
TCR	±5ppm/℃
Load Life	±0.01%

Applications

Automotive Electronics
Medical Equipment
Precision Instrumentation

Better Solution for Sustainable High End Manufacturing

Precision Thin Film Chip Resistor
High Reliability, Low Noise, Moisture Resistance



Introduction

The long-term stability of thin film chip resistors is the most important. Tight tolerance without good long-term stability is meaningless. The long-term stability of resistors is related to time, power, and temperature. The higher power, higher temperature, and longer time lead to the greater change of resistance. PTFR series launched by Resi have excellent long-term stability. Under rated power at an ambient temperature of +70 ℃, the typical change in resistance after 2000 hours is less than 0.01%. In addition, PTFR has excellent TCR performance in temperature range of -55℃ to +155℃.

In terms of moisture resistance, PTFR adopts an enhanced protective coating to prevent resistive layer from moisture. Under test condition of 85℃, 85%RH and loading 1000 hours, the maximum shift of resistance is less than 500ppm. Larger size, higher rated power, higher resistance, and TCR as low as ± 2ppm/℃ are available for custom requirements. If the standard specifications cannot meet your needs, please contact our sales. Resi is committed to providing customers with the best precision resistor solutions to meet the needs of customers in instrument, medical, automotive, railway, electric power, and other fields.

RoHS AEC-Q200 3D

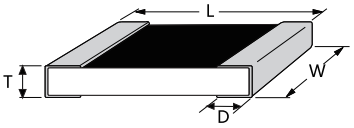
Electrical Parameters

Size	Rated Power (+70℃)	Max. Operating Voltage	Operating Temperature	E-Series Value	TCR ppm/℃	Resistance Ω	Tolerance %
PTFR0402	0.06W	75V	-55℃~+155℃	E24, E96	±100	10≤R<47	±0.5
					±10, ±25	47≤R<100	±0.05, ±0.1, ±0.5
					±5, ±10, ±25	100≤R<3K	±0.01, ±0.02, ±0.05, ±0.1, ±0.5
					±10, ±25	3K≤R<100K	±0.05, ±0.1, ±0.5
					±10, ±25	100K≤R≤150K	±0.1, ±0.5
PTFR0603	0.1W	100V	-55℃~+155℃	E24, E96	±50	10≤R<47	±0.5
					±10, ±25	47≤R<100	±0.05, ±0.1, ±0.5
					±5, ±10, ±25	100≤R<5.1K	±0.01, ±0.02, ±0.05, ±0.1, ±0.5
					±10, ±25	5.1K≤R≤270K	±0.05, ±0.1, ±0.5
					±25	270K<R≤332K	±0.1, ±0.5
					±25	332K<R≤1M	±0.1, ±0.5
PTFR0805	0.13W	150V	-55℃~+155℃	E24, E96	±50	10≤R<47	±0.5
					±10, ±25	47≤R<100	±0.05, ±0.1, ±0.5
					±5, ±10, ±25	100≤R<10.2K	±0.01, ±0.02, ±0.05, ±0.1, ±0.5
					±10, ±25	10.2K≤R≤475K	±0.05, ±0.1, ±0.5
					±25	475K<R≤2.7M	±0.1, ±0.5
PTFR1206	0.25W	200V	-55℃~+155℃	E24, E96	±50	10≤R<47	±0.5
					±10, ±25	47≤R<100	±0.05, ±0.1, ±0.5
					±5, ±10, ±25	100≤R<33.2K	±0.01, ±0.02, ±0.05, ±0.1, ±0.5
					±10, ±25	33.2K≤R≤1M	±0.05, ±0.1, ±0.5
					±25	1M<R≤5.1M	±0.1, ±0.5

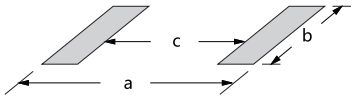
Dimensions

Unit: mm

Resistor



Solder Pad



Size	L	W	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
0402	1.00±0.05	0.50±0.05	0.35±0.05	0.25±0.05	1.60±0.2	0.60±0.2	0.50±0.2	Tape&Reel	5000pcs	0.72mg
0603	1.60±0.20	0.80±0.20	0.40±0.10	0.30±0.20	3.00±0.2	1.20±0.2	1.00±0.2	Tape&Reel	5000pcs	2.07mg
0805	2.00±0.20	1.25±0.20	0.40±0.10	0.40±0.20	4.00±0.2	1.65±0.2	1.20±0.2	Tape&Reel	5000pcs	4.12mg
1206	3.20±0.20	1.60±0.20	0.40±0.10	0.50±0.20	5.00±0.2	2.00±0.2	2.20±0.2	Tape&Reel	5000pcs	8.26mg

Part Number Information

Example: PTFR0402A10K0N9 (PTFR 0402 ±0.05% 10KΩ ±10ppm/°C Standard)

P	T	F	R	0	4	0	2	A	1	0	K	0	N	9

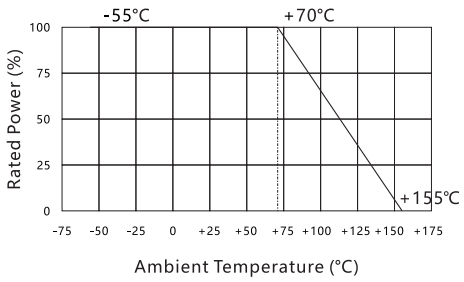
Series	Size	Tolerance	Resistance	TCR	Code
PTFR	0402 0603 0805 1206	T=±0.01% Q=±0.02% A=±0.05% B=±0.1% D=±0.5%	10R0=10Ω 1K00=1000Ω 1M00=1000000Ω 10M0=10000000Ω	V=±5ppm/℃ N=±10ppm/℃ P=±25ppm/℃ Q=±50ppm/℃ K=±100ppm/℃	9=Standard 0-8=Custom

For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+155°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	▵R±0.01%	▵R±0.1%
Temperature Cycling	-55°C, 30min ~ambient temperature<1min~+125°C, 30min, 1000 cycles	AEC-Q200 TEST 4 JESD22 Method JA-104	▵R±0.01%	▵R±0.1%
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	▵R±0.025%	▵R±0.1%
Load Life	2000h @ +70°C, rated power, 90min on，30min off	AEC-Q200 TEST 8 MIL-STD-202 Method 108	▵R±0.01%	▵R±0.1%
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	▵R±0.01%	▵R±0.1%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	▵R±0.01%	▵R±0.1%
Resistance to Solder Heat	+270°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	▵R±0.01%	▵R±0.1%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 300 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	▵R±0.01%	▵R±0.1%
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	-55℃ and +85℃, +25℃ Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Within the nominal value range	
Flammability	Flame the sample for 10 seconds, twice	AEC-Q200 TEST 20 UL-94 V-0 or V-1 is acceptable and does not require electrical testing	Incomplete burnout, thin pad paper not ignited, pine board not charred	
Substrate Bending	0805 and below: 5mm, 1206 1210: 4mm, 2010 2512: 2mm, duration: 60s	AEC-Q200 TEST 21 AEC-Q200-005	▵R±0.01%	▵R±0.1%
Terminal Strength	Apply force 17.7N for 60s	AEC-Q200 TEST 22 AEC-Q200-006	▵R±0.01%	▵R±0.1%
Flame Retardance	9-32 VDC (clamping current up to 500A), increment of 1.0VDC, at least 1h for each voltage level	AEC-Q200 TEST 24 AEC-Q200-001	Non inflammable	
Insulation Resistance	Apply a DC voltage of 100V between the electrode and the substrate for 60s	IEC 60115 -1 4.6	1000MΩ, minimum	
Withstand Voltage	Apply a AC voltage with an effective maximum overload voltage between the electrode and the substrate at a speed of approximately 100V/s for 60s	IEC 60115-1 4.7	No breakdown or flashover	
Short Time Overload	2.5x rated voltage, 5s	IEC 60115-1 4.13	▵R±0.01%	▵R±0.1%
Low Temperature Operation	Unpowered for 1h, powered rated voltage for 45min, Unpowered for 15min	IEC 60115-1 4.36	▵R±0.01%	▵R±0.1%

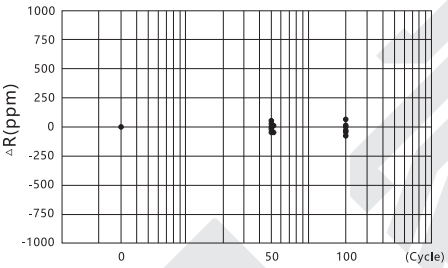
Derating Curve



Temperature Cycling

Test Method:
-55℃ 30min/+125℃ 30min
100 cycles

PTFR0805A100RN9



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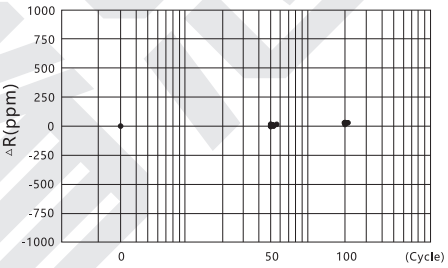
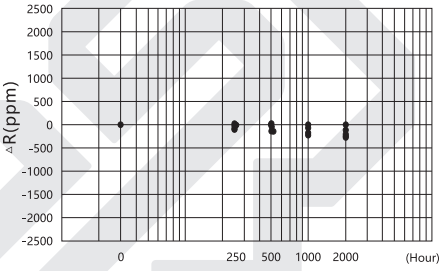


Load Life

Test Method:
+70℃, rated power,
90min on 30min off, 2000h

PTFR0805A100RN9



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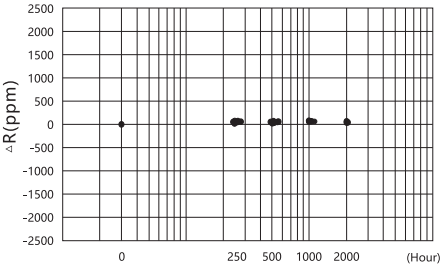
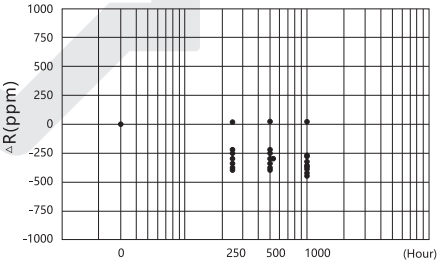


High Temperature Storage

Test Method:
+155℃, unpowered, 1000h

PTFR0805A100RN9



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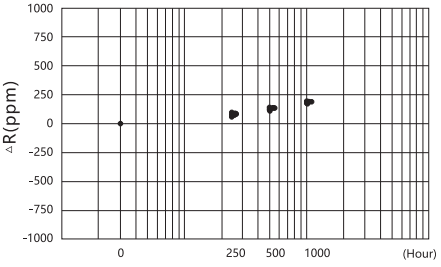
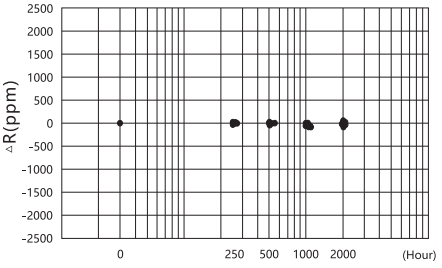


Bias Humidity

Test Method:
+85℃, 85%RH, 1/10 rated power
90min on, 30min off, 2000h

PTFR0805A100RN9



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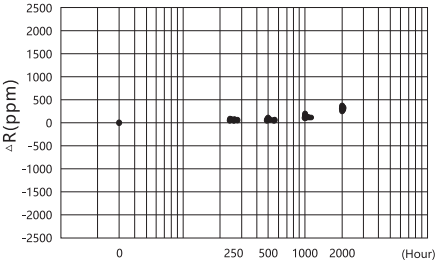
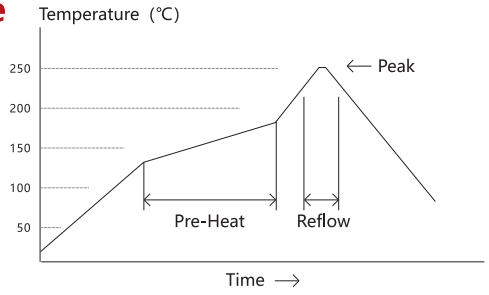


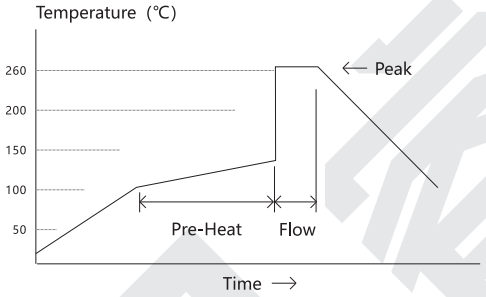
Reflow Soldering Profile

Resistor Surface Temperature:
Pre-Heat: +130℃~+180℃,60~90sec.
Reflow: Above +220℃,30~90sec.
Max. Temperature: +240℃~+250℃, within 10sec.
Applicable Solder Composition: Sn-Ag-Cu solder
Cycles: limited to 2 (cooling between the first and second reflow)

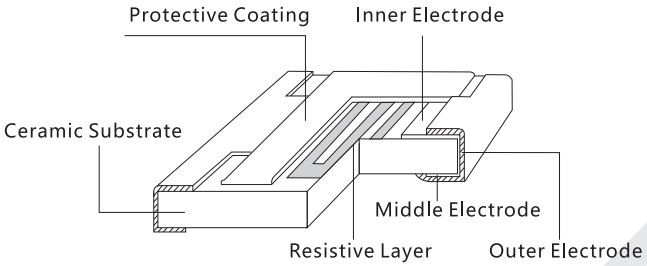


Flow Soldering Profile

Resistor Surface Temperature:
Pre-Heat: +100℃~+120℃,60~80sec.
Max. Temperature: +255℃~+265℃,within 5sec.
Applicable Solder Composition: Sn-Ag-Cu solder
Cycles: limited to 2



Construction



Marking

0402 size: E24 & E96 no marking.
0603 & 0805 size: E24 is a three-digit marking. First two digits are significant and the third digit is the number of zeros; E96 no marking.
1206 size: E24 and E96 are four-digit marking. When 10Ω≤R < 100R, R is used as a decimal point, such as the marking of 75R is 75R0.
When 100Ω≤R，first three digits are significant and the forth digit is the number of zeros.

Size	E-Series Value	Illustration	Demonstration
0402	E24，E96		No Marking
0603	E24	182	182=1800Ω
	E96		No Marking
0805	E24	183	183=18000Ω
	E96		No Marking
1206	E24，E96	1804	1804=1800000Ω
		75R0	75R0=75Ω

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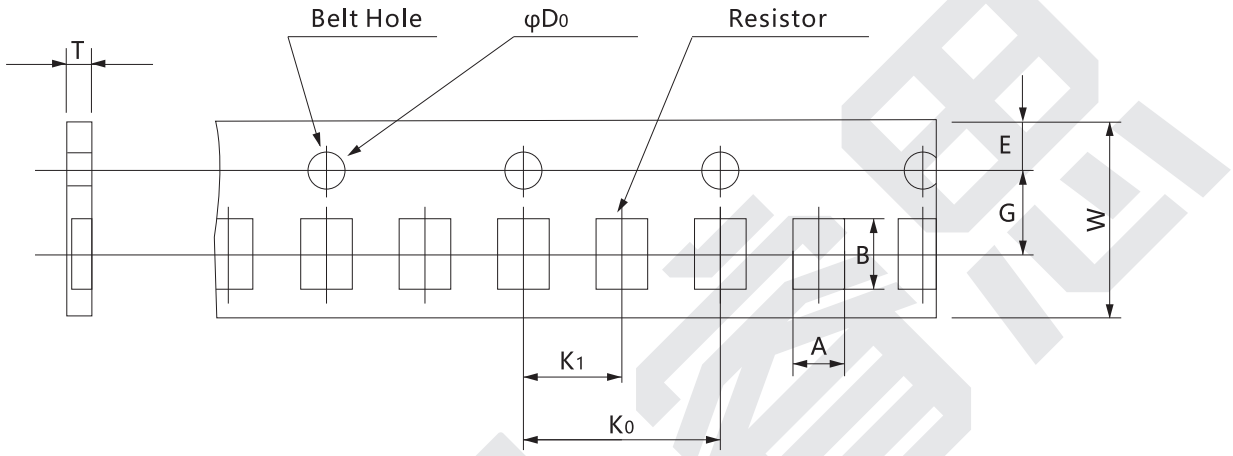
Packaging

Tape Specifications

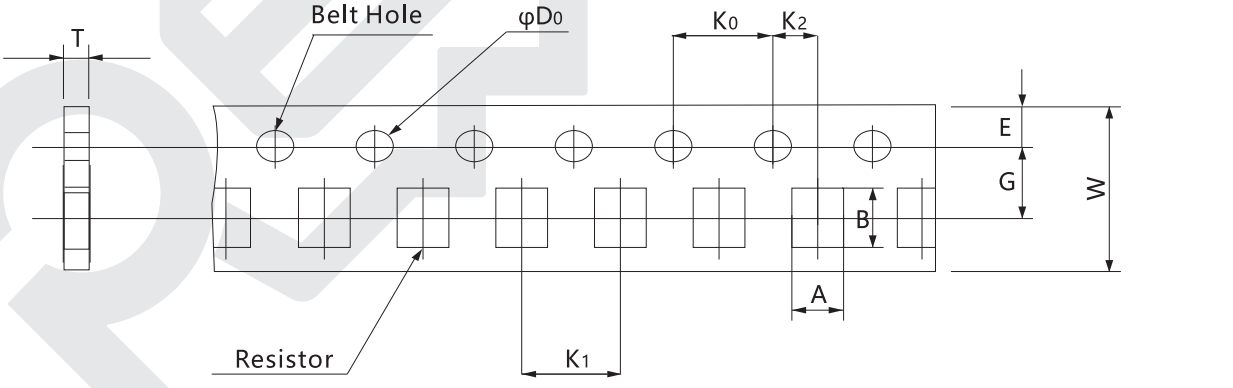
Tape & Reel: 2mm Hole Diameter



Size	A	B	E	φD0	K0	K1	G	W	T
0402	0.63±0.05	1.13±0.05	1.75±0.1	1.50+0.1	4.00±0.1	2.00±0.05	3.50±0.05	8.00±0.3	0.43±0.05

Tape Specifications

Tape & Reel: 4mm Hole Diameter

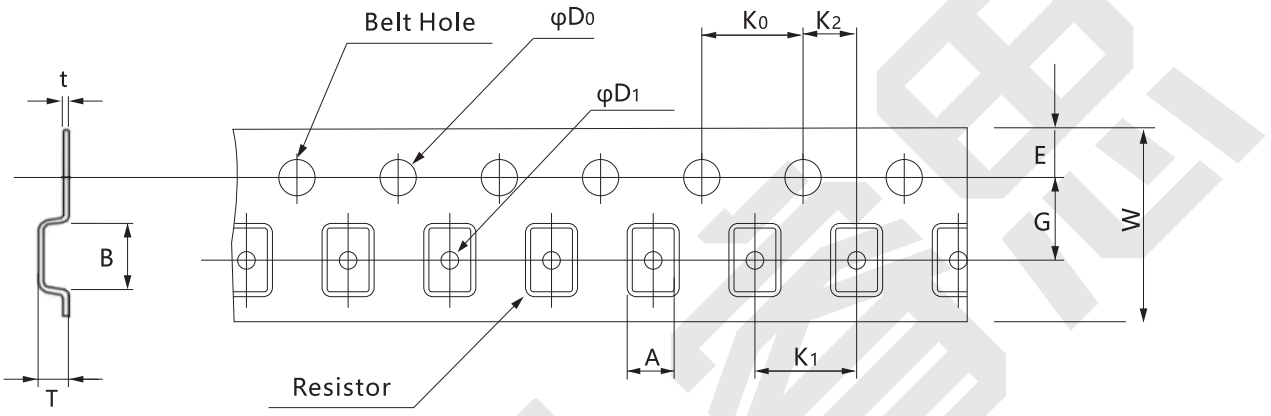


Size	A	B	E	φD0	K0	K1	K2	G	W	T
0603	1.10±0.1	1.90±0.1	1.75±0.1	1.50+0.1	4.00±0.1	4.00±0.1	2.00±0.05	3.50±0.05	8.00±0.3	0.60±0.05
0805	1.65±0.2	2.40±0.2	1.75±0.1	1.50+0.1	4.00±0.1	4.00±0.1	2.00±0.05	3.50±0.05	8.00±0.3	0.75±0.05

Packaging

Tape Specifications

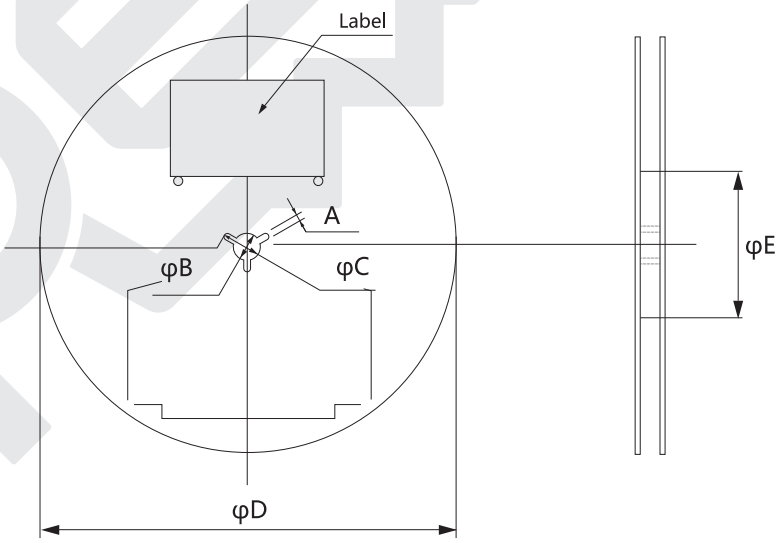
Tape & Reel: 4mm Hole Diameter



Size	A	B	φD0	φD1	K0	K1	K2	E	G	W	T	t
1206	2.00±0.2	3.60±0.2	1.55±0.05	1.05±0.05	4.00±0.1	4.00±0.1	2.00±0.05	1.75±0.1	3.50±0.05	8.00±0.3	1.5Min.	0.3Max.

Reel Specifications

Unit: mm



A	φB	φC	φD	φE
2±0.5	13±0.2	21±0.8	180-1.5	60+1

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
PTFR0603B47R0N9	0603	±0.1%	47Ω	±10ppm/℃	0.1W	100V
PTFR0603B47R0P9	0603	±0.1%	47Ω	±25ppm/℃	0.1W	100V
PTFR0603B51R0N9	0603	±0.1%	51Ω	±10ppm/℃	0.1W	100V
PTFR0603B51R0P9	0603	±0.1%	51Ω	±25ppm/℃	0.1W	100V
PTFR0603B56R0P9	0603	±0.1%	56Ω	±25ppm/℃	0.1W	100V
PTFR0603B68R0P9	0603	±0.1%	68Ω	±25ppm/℃	0.1W	100V
PTFR0603B75R0N9	0603	±0.1%	75Ω	±10ppm/℃	0.1W	100V
PTFR0603B91R0P9	0603	±0.1%	91Ω	±25ppm/℃	0.1W	100V
PTFR0603B100RN9	0603	±0.1%	100Ω	±10ppm/℃	0.1W	100V
PTFR0603B100RP9	0603	±0.1%	100Ω	±25ppm/℃	0.1W	100V
PTFR0603B130RP9	0603	±0.1%	130Ω	±25ppm/℃	0.1W	100V
PTFR0603B160RP9	0603	±0.1%	160Ω	±25ppm/℃	0.1W	100V
PTFR0603B200RN9	0603	±0.1%	200Ω	±10ppm/℃	0.1W	100V
PTFR0603B200RP9	0603	±0.1%	200Ω	±25ppm/℃	0.1W	100V
PTFR0603B330RP9	0603	±0.1%	330Ω	±25ppm/℃	0.1W	100V
PTFR0603B360RP9	0603	±0.1%	360Ω	±25ppm/℃	0.1W	100V
PTFR0603B430RP9	0603	±0.1%	430Ω	±25ppm/℃	0.1W	100V
PTFR0603B470RP9	0603	±0.1%	470Ω	±25ppm/℃	0.1W	100V
PTFR0603B510RN9	0603	±0.1%	510Ω	±10ppm/℃	0.1W	100V
PTFR0603B510RP9	0603	±0.1%	510Ω	±25ppm/℃	0.1W	100V
PTFR0603B560RP9	0603	±0.1%	560Ω	±25ppm/℃	0.1W	100V
PTFR0603B750RP9	0603	±0.1%	750Ω	±25ppm/℃	0.1W	100V
PTFR0603B820RP9	0603	±0.1%	820Ω	±25ppm/℃	0.1W	100V
PTFR0603B910RP9	0603	±0.1%	910Ω	±25ppm/℃	0.1W	100V
PTFR0603B1K00N9	0603	±0.1%	1KΩ	±10ppm/℃	0.1W	100V
PTFR0603B1K00P9	0603	±0.1%	1KΩ	±25ppm/℃	0.1W	100V
PTFR0603B1K30P9	0603	±0.1%	1.3KΩ	±25ppm/℃	0.1W	100V
PTFR0603B1K50N9	0603	±0.1%	1.5KΩ	±10ppm/℃	0.1W	100V
PTFR0603B1K50P9	0603	±0.1%	1.5KΩ	±25ppm/℃	0.1W	100V
PTFR0603B2K00N9	0603	±0.1%	2KΩ	±10ppm/℃	0.1W	100V
PTFR0603B3K60P9	0603	±0.1%	3.6KΩ	±25ppm/℃	0.1W	100V
PTFR0603B3K90P9	0603	±0.1%	3.9KΩ	±25ppm/℃	0.1W	100V
PTFR0603B4K70N9	0603	±0.1%	4.7KΩ	±10ppm/℃	0.1W	100V
PTFR0603B4K70P9	0603	±0.1%	4.7KΩ	±25ppm/℃	0.1W	100V
PTFR0603B5K10N9	0603	±0.1%	5.1KΩ	±10ppm/℃	0.1W	100V
PTFR0603B5K10P9	0603	±0.1%	5.1KΩ	±25ppm/℃	0.1W	100V
PTFR0603B5K60P9	0603	±0.1%	5.6KΩ	±25ppm/℃	0.1W	100V
PTFR0603B6K20P9	0603	±0.1%	6.2KΩ	±25ppm/℃	0.1W	100V
PTFR0603B6K80P9	0603	±0.1%	6.8KΩ	±25ppm/℃	0.1W	100V
PTFR0603B7K50P9	0603	±0.1%	7.5KΩ	±25ppm/℃	0.1W	100V
PTFR0603B8K20P9	0603	±0.1%	8.2KΩ	±25ppm/℃	0.1W	100V
PTFR0603B10K0N9	0603	±0.1%	10KΩ	±10ppm/℃	0.1W	100V
PTFR0603B10K0P9	0603	±0.1%	10KΩ	±25ppm/℃	0.1W	100V
PTFR0603B11K0P9	0603	±0.1%	11KΩ	±25ppm/℃	0.1W	100V
PTFR0603B18K0P9	0603	±0.1%	18KΩ	±25ppm/℃	0.1W	100V
PTFR0603B20K0N9	0603	±0.1%	20KΩ	±10ppm/℃	0.1W	100V
PTFR0603B20K0P9	0603	±0.1%	20KΩ	±25ppm/℃	0.1W	100V
PTFR0603B22K0P9	0603	±0.1%	22KΩ	±25ppm/℃	0.1W	100V
PTFR0603B24K0P9	0603	±0.1%	24KΩ	±25ppm/℃	0.1W	100V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
PTFR0603B30K0P9	0603	±0.1%	30KΩ	±25ppm/℃	0.1W	100V
PTFR0603B33K0P9	0603	±0.1%	33KΩ	±25ppm/℃	0.1W	100V
PTFR0603B36K0P9	0603	±0.1%	36KΩ	±25ppm/℃	0.1W	100V
PTFR0603B39K0P9	0603	±0.1%	39KΩ	±25ppm/℃	0.1W	100V
PTFR0603B43K0P9	0603	±0.1%	43KΩ	±25ppm/℃	0.1W	100V
PTFR0603B47K0N9	0603	±0.1%	47KΩ	±10ppm/℃	0.1W	100V
PTFR0603B47K0P9	0603	±0.1%	47KΩ	±25ppm/℃	0.1W	100V
PTFR0603B51K0P9	0603	±0.1%	51KΩ	±25ppm/℃	0.1W	100V
PTFR0603B62K0P9	0603	±0.1%	62KΩ	±25ppm/℃	0.1W	100V
PTFR0603B91K0P9	0603	±0.1%	91KΩ	±25ppm/℃	0.1W	100V
PTFR0603B100KN9	0603	±0.1%	100KΩ	±10ppm/℃	0.1W	100V
PTFR0603B100KP9	0603	±0.1%	100KΩ	±25ppm/℃	0.1W	100V
PTFR0603B110KP9	0603	±0.1%	110KΩ	±25ppm/℃	0.1W	100V
PTFR0603B150KP9	0603	±0.1%	150KΩ	±25ppm/℃	0.1W	100V
PTFR0603B160KP9	0603	±0.1%	160KΩ	±25ppm/℃	0.1W	100V
PTFR0603B200KN9	0603	±0.1%	200KΩ	±10ppm/℃	0.1W	100V
PTFR0603B200KP9	0603	±0.1%	200KΩ	±25ppm/℃	0.1W	100V
PTFR0603B330KP9	0603	±0.1%	330KΩ	±25ppm/℃	0.1W	100V
PTFR0805B47R0N9	0805	±0.1%	47Ω	±10ppm/℃	0.13W	150V
PTFR0805B51R0N9	0805	±0.1%	51Ω	±10ppm/℃	0.13W	150V
PTFR0805B56R0N9	0805	±0.1%	56Ω	±10ppm/℃	0.13W	150V
PTFR0805B62R0N9	0805	±0.1%	62Ω	±10ppm/℃	0.13W	150V
PTFR0805B68R0N9	0805	±0.1%	68Ω	±10ppm/℃	0.13W	150V
PTFR0805B75R0N9	0805	±0.1%	75Ω	±10ppm/℃	0.13W	150V
PTFR0805B82R0N9	0805	±0.1%	82Ω	±10ppm/℃	0.13W	150V
PTFR0805B100RN9	0805	±0.1%	100Ω	±10ppm/℃	0.13W	150V
PTFR0805B100RP9	0805	±0.1%	100Ω	±25ppm/℃	0.13W	150V
PTFR0805B110RN9	0805	±0.1%	110Ω	±10ppm/℃	0.13W	150V
PTFR0805B120RN9	0805	±0.1%	120Ω	±10ppm/℃	0.13W	150V
PTFR0805B130RN9	0805	±0.1%	130Ω	±10ppm/℃	0.13W	150V
PTFR0805B180RN9	0805	±0.1%	180Ω	±10ppm/℃	0.13W	150V
PTFR0805B200RN9	0805	±0.1%	200Ω	±10ppm/℃	0.13W	150V
PTFR0805B220RN9	0805	±0.1%	220Ω	±10ppm/℃	0.13W	150V
PTFR0805B240RN9	0805	±0.1%	240Ω	±10ppm/℃	0.13W	150V
PTFR0805B270RN9	0805	±0.1%	270Ω	±10ppm/℃	0.13W	150V
PTFR0805B300RN9	0805	±0.1%	300Ω	±10ppm/℃	0.13W	150V
PTFR0805B330RN9	0805	±0.1%	330Ω	±10ppm/℃	0.13W	150V
PTFR0805B390RN9	0805	±0.1%	390Ω	±10ppm/℃	0.13W	150V
PTFR0805B430RN9	0805	±0.1%	430Ω	±10ppm/℃	0.13W	150V
PTFR0805B470RN9	0805	±0.1%	470Ω	±10ppm/℃	0.13W	150V
PTFR0805B510RN9	0805	±0.1%	510Ω	±10ppm/℃	0.13W	150V
PTFR0805B560RN9	0805	±0.1%	560Ω	±10ppm/℃	0.13W	150V
PTFR0805B680RN9	0805	±0.1%	680Ω	±10ppm/℃	0.13W	150V
PTFR0805B750RN9	0805	±0.1%	750Ω	±10ppm/℃	0.13W	150V
PTFR0805B820RN9	0805	±0.1%	820Ω	±10ppm/℃	0.13W	150V
PTFR0805B910RN9	0805	±0.1%	910Ω	±10ppm/℃	0.13W	150V
PTFR0805Q1K00P9	0805	±0.02%	1KΩ	±25ppm/℃	0.13W	150V
PTFR0805B1K00N9	0805	±0.1%	1KΩ	±10ppm/℃	0.13W	150V
PTFR0805B1K00P9	0805	±0.1%	1KΩ	±25ppm/℃	0.13W	150V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
PTFR0805B1K10N9	0805	±0.1%	1.1KΩ	±10ppm/℃	0.13W	150V
PTFR0805B1K20N9	0805	±0.1%	1.2KΩ	±10ppm/℃	0.13W	150V
PTFR0805B1K30N9	0805	±0.1%	1.3KΩ	±10ppm/℃	0.13W	150V
PTFR0805B1K50N9	0805	±0.1%	1.5KΩ	±10ppm/℃	0.13W	150V
PTFR0805D1K50N9	0805	±0.5%	1.5KΩ	±10ppm/℃	0.13W	150V
PTFR0805B2K00N9	0805	±0.1%	2KΩ	±10ppm/℃	0.13W	150V
PTFR0805B2K20N9	0805	±0.1%	2.2KΩ	±10ppm/℃	0.13W	150V
PTFR0805B2K70N9	0805	±0.1%	2.7KΩ	±10ppm/℃	0.13W	150V
PTFR0805B3K00N9	0805	±0.1%	3KΩ	±10ppm/℃	0.13W	150V
PTFR0805B3K60N9	0805	±0.1%	3.6KΩ	±10ppm/℃	0.13W	150V
PTFR0805B3K90N9	0805	±0.1%	3.9KΩ	±10ppm/℃	0.13W	150V
PTFR0805B4K70N9	0805	±0.1%	4.7KΩ	±10ppm/℃	0.13W	150V
PTFR0805B5K10N9	0805	±0.1%	5.1KΩ	±10ppm/℃	0.13W	150V
PTFR0805B5K10P9	0805	±0.1%	5.1KΩ	±25ppm/℃	0.13W	150V
PTFR0805B6K20N9	0805	±0.1%	6.2KΩ	±10ppm/℃	0.13W	150V
PTFR0805B6K80N9	0805	±0.1%	6.8KΩ	±10ppm/℃	0.13W	150V
PTFR0805B7K50N9	0805	±0.1%	7.5KΩ	±10ppm/℃	0.13W	150V
PTFR0805B8K20N9	0805	±0.1%	8.2KΩ	±10ppm/℃	0.13W	150V
PTFR0805B10K0N9	0805	±0.1%	10KΩ	±10ppm/℃	0.13W	150V
PTFR0805B11K0N9	0805	±0.1%	11KΩ	±10ppm/℃	0.13W	150V
PTFR0805B13K0N9	0805	±0.1%	13KΩ	±10ppm/℃	0.13W	150V
PTFR0805B13K7N9	0805	±0.1%	13.7KΩ	±10ppm/℃	0.13W	150V
PTFR0805B16K0N9	0805	±0.1%	16KΩ	±10ppm/℃	0.13W	150V
PTFR0805B18K0N9	0805	±0.1%	18KΩ	±10ppm/℃	0.13W	150V
PTFR0805B24K0N9	0805	±0.1%	24KΩ	±10ppm/℃	0.13W	150V
PTFR0805B33K0N9	0805	±0.1%	33KΩ	±10ppm/℃	0.13W	150V
PTFR0805B36K0N9	0805	±0.1%	36KΩ	±10ppm/℃	0.13W	150V
PTFR0805B39K0N9	0805	±0.1%	39KΩ	±10ppm/℃	0.13W	150V
PTFR0805B47K0N9	0805	±0.1%	47KΩ	±10ppm/℃	0.13W	150V
PTFR0805B51K0N9	0805	±0.1%	51KΩ	±10ppm/℃	0.13W	150V
PTFR0805B56K0N9	0805	±0.1%	56KΩ	±10ppm/℃	0.13W	150V
PTFR0805B62K0N9	0805	±0.1%	62KΩ	±10ppm/℃	0.13W	150V
PTFR0805B68K0N9	0805	±0.1%	68KΩ	±10ppm/℃	0.13W	150V
PTFR0805B75K0N9	0805	±0.1%	75KΩ	±10ppm/℃	0.13W	150V
PTFR0805B82K0N9	0805	±0.1%	82KΩ	±10ppm/℃	0.13W	150V
PTFR0805B100KN9	0805	±0.1%	100KΩ	±10ppm/℃	0.13W	150V
PTFR0805B100KP9	0805	±0.1%	100KΩ	±25ppm/℃	0.13W	150V
PTFR0805B110KN9	0805	±0.1%	110KΩ	±10ppm/℃	0.13W	150V
PTFR0805B120KN9	0805	±0.1%	120KΩ	±10ppm/℃	0.13W	150V
PTFR0805D150KN9	0805	±0.5%	150KΩ	±10ppm/℃	0.13W	150V
PTFR0805B180KN9	0805	±0.1%	180KΩ	±10ppm/℃	0.13W	150V
PTFR0805B200KN9	0805	±0.1%	200KΩ	±10ppm/℃	0.13W	150V
PTFR0805B220KN9	0805	±0.1%	220KΩ	±10ppm/℃	0.13W	150V
PTFR0805B249KN9	0805	±0.1%	249KΩ	±10ppm/℃	0.13W	150V
PTFR0805B300KN9	0805	±0.1%	300KΩ	±10ppm/℃	0.13W	150V
PTFR0805B330KN9	0805	±0.1%	330KΩ	±10ppm/℃	0.13W	150V
PTFR0805B360KN9	0805	±0.1%	360KΩ	±10ppm/℃	0.13W	150V
PTFR0805B390KN9	0805	±0.1%	390KΩ	±10ppm/℃	0.13W	150V
PTFR0805B430KN9	0805	±0.1%	430KΩ	±10ppm/℃	0.13W	150V
PTFR0805B470KN9	0805	±0.1%	470KΩ	±10ppm/℃	0.13W	150V

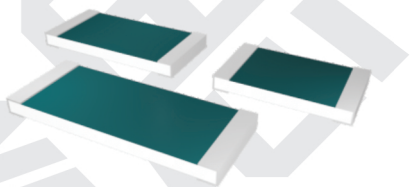
Revision

Version	Revised Content	Date	Approver
V0-V1	1.Add a table of the tightest tolerance and lowest TCR corresponding to different resistance 2.The tightest tolerance has been optimized from ±0.02% to ±0.01% 3.Add reliability test charts of load life, bias humidity, temperature cycling and high temperature storage 4.Add a table of Standing Stock	2020/01/16	LFY
V1-V2	1.Modify Code in Part Number Information to: 9=standard product, 0-8=custom product 2.Upload the latest product image 3.Modify the format of resistance in the table of Standing Stock 4.Unify header and footer	2020/02/19	LFY
V2-V3	1.Add Q=±0.02% in Part Number Information	2020/03/19	YBP
V3-V4	1.Add derating curve, with an operating temperature range of -55 ℃ -+155 ℃	2020/06/05	LFY
V4-V5	1.The TCR of 0402 size and greater-than-100Kohm resistance increases ±10ppm/℃	2020/12/09	LFY
V5-V6	1.Temperature of load life: +70℃. Duration: 2000h	2021/11/10	LWW
V6-V7	1.Change the datasheet style 2.Add logo of 3D model diagrams 3.Add packaging dimension information 4.Add resistor structure diagram 5.Add marking information 6.Add recommended solder pad 7.Add reflow soldering curve 8.Add weight information 9.Display revision logs 10.Add disclaimer 11.Temporarily remove 2512 size	2023/04/20	LFY

Operation temperature up to +175°C, TCR ±2ppm/°C, tolerance ±0.01%
Low noise, strong anti-pulse ability, anti-static
Excellent shelf life and load life

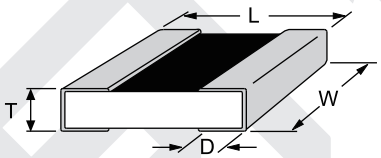
Introduction

High precision and high stability should be discussed at the same time. Whether it is a film resistor or an alloy resistor, tight initial tolerance can be achieved by trimming. However, during transportation, storage, and soldering process, the value will be changed. In addition, the resistor will work at different ambient temperatures with load, TCR and PCR should be taken into consideration. Therefore, high-precision resistor must be with high stability.



PZFR series can be delivered within 3 days, MOQ=1pcs, each resistor will be tested of value, TCR, load life and so on before shipment. Due to special trimming process of foil resistor, any value can be reached, such as 1.23456 ohms .

Specifications & Dimensions (mm)



Model	Rated Power (70℃)	Resistance Range	Max. working Voltage	Resistance, Tolerance and TCR			Dimensions (mm)			
				Value Range	Tol.	TCR①	L±0.13	W±0.13	T max	D±0.13
PZFR0603	0.10W	100-4K	22V	5R-<10R	±0.50%	±7.8ppm/℃	1.60	0.81	0.64	0.28
PZFR0805	0.20W	5-8K	40V	10R-<25R	±0.25%	±3.8ppm/℃	2.03	1.27	0.64	0.38
PZFR1206	0.30W	5-25K	87V	25R-<50R	±0.10%	±3.8ppm/℃	3.20	1.57	0.64	0.51
PZFR1506	0.30W	5-30K	95V	50R-<100R	±0.05%	±2.8ppm/℃	3.81	1.57	0.64	0.51
PZFR2010	0.50W	5-70K	187V	100R-<250R	±0.02%	±2ppm/℃	5.03	2.46	0.64	0.64
PZFR2512	0.75W	5-125K	220V	250R-<125K	±0.01%	±2ppm/℃	6.32	3.23	0.64	0.81

① The working temperature range is -55℃ to +175℃, according to different temperature range, the lowest TCR is +/-1ppm℃.

Part Number Information

Example: PZFR2010Q100RL9 (PZFR 2010 ±0.02% 100Ω ±2ppm/℃)

P	Z	F	R	2	0	1	0	Q	1	0	0	R	L	9

- Series: PZFR
- Size: 0603 1506 / 0805 2010 / 1206 2512
- Tolerance: T=± 0.01% / Q=± 0.02% / A=± 0.05% / B=± 0.1% / C=± 0.25% / D=± 0.5%
- Resistance: 5R00=5Ω / 50R0=50Ω / 100R=100Ω / 1K00=1KΩ / 10K0=10KΩ / 70K0=70KΩ
- TCR: L=Standard / Z=Custom
- Code: 9=S Green Coding / 8=M Green Coding / 7=L Blue Coding

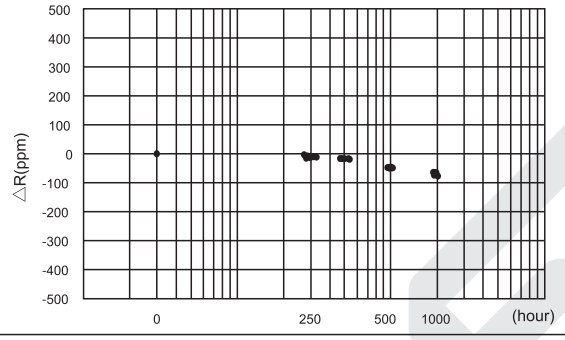
* The differences of coating have no effect on the product performance. Please contact us to confirm the product packaging information.

Performance

Test	Test limits	Test method
High Temperature Exposure	△R±0.005% typical △R±0.01% max	No load for 100 hours at +150°C
Thermal Shock	△R±0.005% typical △R±0.01% max	-65°C 15min ~ room temperature<20s ~ +175°C 15min, 100 cycles
Moisture resistance	△R±0.005% typical △R±0.01% max	MIL-STD-202 Method 103, 85°C, 85%RH, load not less than 10% rated power, 1000 hours
Load Life	△R±0.0025% typical △R±0.02% max	MIL-STD-202 Method 108, 2000 hours at +70°C, rated power, 90 minutes on, 30 minutes off
Resistance to Soldeing heat	△R±0.005% typical △R±0.02% max	Hold at 245°C tin bath for 5 seconds, +235°C tin bath for 10 seconds
ESD	△R±0.001% typical △R±0.005% max	AEC-Q200TEST 17 / AEC-Q200-002, human body model, two discharge, positive and negative once
Solderability	No visible damage, 95% Minimum critical area	IEC 60115-1 4.17, +245°C tin bath, hold for 3 seconds
Short Time Overload	△R±0.005% typical △R±0.02% max	6.25 times rated power, 5 seconds
Low Temperature Operation	△R±0.005% typical △R±0.015% max	-65°C, rated voltage, 45 minutes

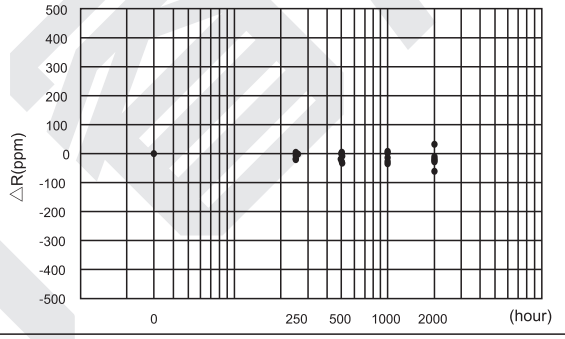
Moisture resistance

Test Method: 0.01W, +85 ℃ / 85% RH, 1000 h



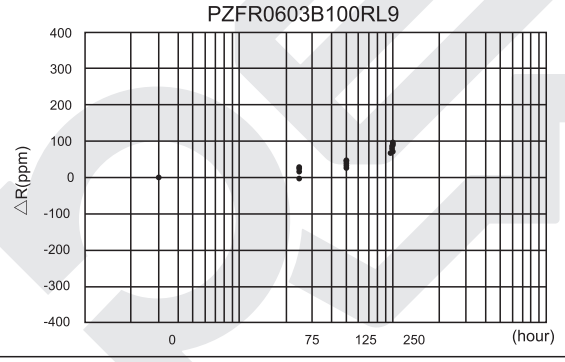
Load Life

Test Method: 0.1W, +70 ℃, 2000 h



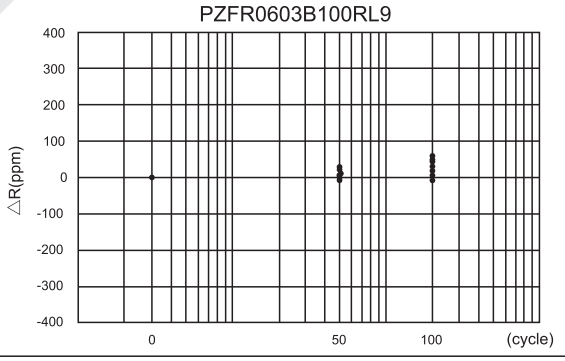
High Temperature Exposure

Test Method: +200°C, 250 h

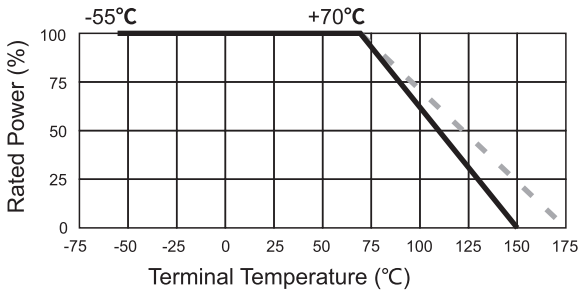


Thermal Shock

Test Method: -65°C 15min / +175°C 15min, 100 cycle



Derating Curve



Recommend Part Number

Model Number	Size	Resistance (Ω)	Tolerance (%)	Power (W)	TCR (ppm/°C)	Model Number	Size	Resistance (Ω)	Tolerance (%)	Power (W)	TCR (ppm/°C)
PZFR0805T100RL9	0805	100	±0.01	0.2	±2	PZFR1206T2K00L9	1206	2K	±0.01	0.3	±2
PZFR0805T500RL9	0805	500	±0.01	0.2	±2	PZFR1206T5K00L9	1206	5K	±0.01	0.3	±2
PZFR0805T1K00L9	0805	1K	±0.01	0.2	±2	PZFR1206T10K0L9	1206	10K	±0.01	0.3	±2
PZFR0805T2K00L9	0805	2K	±0.01	0.2	±2	PZFR1206T20K0L9	1206	20K	±0.01	0.3	±2
PZFR0805T5K00L9	0805	5K	±0.01	0.2	±2	PZFR2512D5R00L9	2512	5	±0.5	0.75	±7.8
PZFR0805T10K0L9	0805	10K	±0.01	0.2	±2	PZFR2512D10R0L9	2512	10	±0.5	0.75	±3.8
PZFR1206T100RL9	1206	100	±0.01	0.3	±2	PZFR2512T100RL9	2512	100	±0.01	0.75	±2
PZFR1206T500RL9	1206	500	±0.01	0.3	±2	PZFR2512T50K0L9	2512	50K	±0.01	0.75	±2
PZFR1206T1K00L9	1206	1K	±0.01	0.3	±2	PZFR2512T100KL9	2512	100K	±0.01	0.75	±2

DataSheet No.: E13010
Version: V0
Date: 2023/04/28

睿思

MMFR

Precision Metal Film Molded Resistor

Resistance	10Ω-1MΩ
Tolerance	±0.05%
TCR	±5ppm/℃
Load Life	±0.05%

Applications

Precision Instrumentation

Better Solution for Sustainable High End Manufacturing

Precision Metal Film Molded Resistor
Tight Tolerance, Low TCR, High Load Life Stability

Introduction

MMFR series uses 96% alumina ceramic cores, combined with precision metal film deposition technology, to achieve the target resistance through laser trimming. The lowest TCR of MMFR series is ±5ppm/℃. Load life stability is significantly improved compared to general metal film resistor. At +70℃ ambient temperature, the maximum resistance change after loading the rated power for 1000 hours is ±0.05%, with strong moisture resistance. The pin structure is conducive to reducing the impact of PCB stress on resistor. Highly suitable for electronic circuits with high requirements of TCR and stability.

Electrical Parameters

Size	Rated Power (+70℃)	Max. Operating Voltage	Max. Overload Voltage	Operating Temperature	E-Series Value	TCR ppm/℃	Resistance Ω	Tolerance %
MMFR2568	0.25W	250V	500V	-50℃~+125℃	E24, E96	±5	10≤R≤1M	±0.05, ±0.1, ±0.5, ±1.0
MMFR3710	0.5W	300V	600V	-50℃~+125℃	E24, E96	±5	10≤R≤1M	±0.05, ±0.1, ±0.5, ±1.0
MMFR5215	0.75W	350V	700V	-50℃~+125℃	E24, E96	±5	10≤R≤1M	±0.05, ±0.1, ±0.5, ±1.0
MMFR6518	1.0W	400V	800V	-50℃~+125℃	E24, E96	±5	10≤R≤1M	±0.05, ±0.1, ±0.5, ±1.0

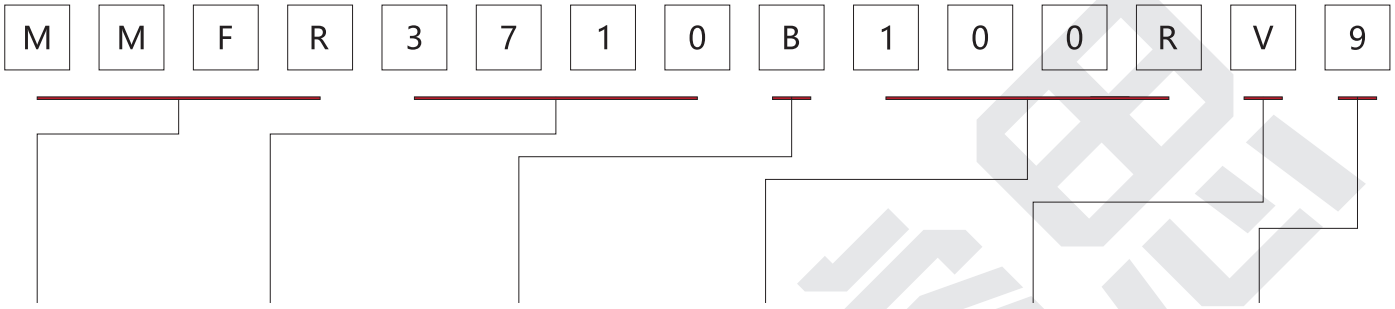
Dimensions & Packaging

Unit: mm

Size	L	D	d	Packaging	Quantity Per Bulk
2568	6.8±0.4	2.5±0.4	0.6±0.05	Bulk	200pcs
3710	10.0±0.4	3.7±0.4	0.6±0.05	Bulk	100pcs
5215	14.8±0.4	5.2±0.4	0.6±0.05	Bulk	100pcs
6518	18.3±0.4	6.5±0.4	0.8±0.05	Bulk	100pcs

Part Number Information

Example: MMFR3710B100RV9 (MMFR 3710 ±0.1% 100Ω ±5ppm/℃ Standard)



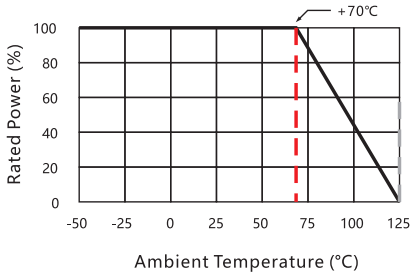
Series	Size	Tolerance	Resistance	TCR	Code
MMFR	2568 3710 5215 6518	A=±0.05% B=±0.1% D=±0.5% F=±1.0%	10R0=10Ω 1K00=1000Ω 1M00=1000000Ω	V=±5ppm/℃	9=Standard 0-8=Custom

For more options of resistance, tolerance and TCR, please contact us.

Performance

Test	Test Method	Standards	Max.
Load Life	70±2℃, 1000h, RCWV or maximum operating voltage (the lower one)	IEC 60115-1 4.25	±0.05%+0.05Ω
TCR	+85℃, +25℃ Ref.	IEC 60115-1 4.8	Within the nominal value range
Resistance to Solder Heat	+260±3℃, 10±1s, immersed 3±0.5mm of the body	IEC 60115-1 4.18	±0.05%+0.05Ω
Short-Time Overload	10x RCWV or 2x maximum operating voltage (the lower one) for 5s	IEC60115-1 4.13	±0.02% No visible damage
Resistance to Solvent	Immerse in IPA for 5 min with ultrasonic	IEC 60115-1 4.30	Clear marking No visible damage
Solderability	235±5℃, 3±0.5s	IEC 60115-1 4.17	95% coverage
Moisture Resistance	40±2℃, 90-95% RH for 56 days, 0.1xRCWV or the maximum operating voltage (the lower one)	IEC 60115-1, 4.24	±0.05%+0.05Ω
Dielectric Withstanding Voltage	Apply a AC voltage with an effective maximum overload voltage between the electrode and the substrate at a speed of approximately 100V/s, for 60s	IEC 60115-1 4.7	No breakdown or flashover
Insulation Resistance	Apply a DC voltage of 100V between the electrode and the substrate for 60s and measure the insulation resistance	IEC 600115-1 4.6	10000MΩ, minimum

Derating Curve



Marking

The first line: The first four digits represent brand and the second four digits represent resistance;
The second line: The first digit represents tolerance, the second and third digits represent TCR, and the last four digits represent date code.

Illustration

RESI（Brand）、10R0（Resistance 10Ω）、B（Tolerance ±0.1%）、T5（TCR ±5ppm/℃）
2320（Date Code. Week 20 of 2023）

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
MMFR2568B10R0V9	2568	±0.1%	10Ω	±5ppm/℃	0.25W	250V
MMFR2568B20R0V9	2568	±0.1%	20Ω	±5ppm/℃	0.25W	250V
MMFR2568B50R0V9	2568	±0.1%	50Ω	±5ppm/℃	0.25W	250V
MMFR2568B100RV9	2568	±0.1%	100Ω	±5ppm/℃	0.25W	250V
MMFR2568B200RV9	2568	±0.1%	200Ω	±5ppm/℃	0.25W	250V
MMFR2568B250RV9	2568	±0.1%	250Ω	±5ppm/℃	0.25W	250V
MMFR2568B500RV9	2568	±0.1%	500Ω	±5ppm/℃	0.25W	250V
MMFR2568B1K00V9	2568	±0.1%	1KΩ	±5ppm/℃	0.25W	250V
MMFR2568B2K00V9	2568	±0.1%	2KΩ	±5ppm/℃	0.25W	250V
MMFR2568B5K00V9	2568	±0.1%	5KΩ	±5ppm/℃	0.25W	250V
MMFR2568B10K0V9	2568	±0.1%	10KΩ	±5ppm/℃	0.25W	250V
MMFR2568B20K0V9	2568	±0.1%	20KΩ	±5ppm/℃	0.25W	250V
MMFR2568B50K0V9	2568	±0.1%	50KΩ	±5ppm/℃	0.25W	250V
MMFR2568B100KV9	2568	±0.1%	100KΩ	±5ppm/℃	0.25W	250V
MMFR2568B200KV9	2568	±0.1%	200KΩ	±5ppm/℃	0.25W	250V
MMFR2568B500KV9	2568	±0.1%	500KΩ	±5ppm/℃	0.25W	250V
MMFR2568B1M00V9	2568	±0.1%	1MΩ	±5ppm/℃	0.25W	250V
MMFR3710B10R0V9	3710	±0.1%	10Ω	±5ppm/℃	0.5W	300V
MMFR3710B20R0V9	3710	±0.1%	20Ω	±5ppm/℃	0.5W	300V
MMFR3710B50R0V9	3710	±0.1%	50Ω	±5ppm/℃	0.5W	300V
MMFR3710B100RV9	3710	±0.1%	100Ω	±5ppm/℃	0.5W	300V
MMFR3710B200RV9	3710	±0.1%	200Ω	±5ppm/℃	0.5W	300V
MMFR3710B250RV9	3710	±0.1%	250Ω	±5ppm/℃	0.5W	300V
MMFR3710B500RV9	3710	±0.1%	500Ω	±5ppm/℃	0.5W	300V
MMFR3710B1K00V9	3710	±0.1%	1KΩ	±5ppm/℃	0.5W	300V
MMFR3710B2K00V9	3710	±0.1%	2KΩ	±5ppm/℃	0.5W	300V
MMFR3710B5K00V9	3710	±0.1%	5KΩ	±5ppm/℃	0.5W	300V
MMFR3710B10K0V9	3710	±0.1%	10KΩ	±5ppm/℃	0.5W	300V
MMFR3710B20K0V9	3710	±0.1%	20KΩ	±5ppm/℃	0.5W	300V
MMFR3710B50K0V9	3710	±0.1%	50KΩ	±5ppm/℃	0.5W	300V
MMFR3710B100KV9	3710	±0.1%	100KΩ	±5ppm/℃	0.5W	300V
MMFR3710B200KV9	3710	±0.1%	200KΩ	±5ppm/℃	0.5W	300V
MMFR3710B500KV9	3710	±0.1%	500KΩ	±5ppm/℃	0.5W	300V
MMFR3710B1M00V9	3710	±0.1%	1MΩ	±5ppm/℃	0.5W	300V
MMFR5215B10R0V9	5215	±0.1%	10Ω	±5ppm/℃	0.75W	350V
MMFR5215B20R0V9	5215	±0.1%	20Ω	±5ppm/℃	0.75W	350V
MMFR5215B50R0V9	5215	±0.1%	50Ω	±5ppm/℃	0.75W	350V
MMFR5215B100RV9	5215	±0.1%	100Ω	±5ppm/℃	0.75W	350V
MMFR5215B200RV9	5215	±0.1%	200Ω	±5ppm/℃	0.75W	350V
MMFR5215B250RV9	5215	±0.1%	250Ω	±5ppm/℃	0.75W	350V
MMFR5215B500RV9	5215	±0.1%	500Ω	±5ppm/℃	0.75W	350V
MMFR5215B1K00V9	5215	±0.1%	1KΩ	±5ppm/℃	0.75W	350V
MMFR5215B2K00V9	5215	±0.1%	2KΩ	±5ppm/℃	0.75W	350V
MMFR5215B5K00V9	5215	±0.1%	5KΩ	±5ppm/℃	0.75W	350V
MMFR5215B10K0V9	5215	±0.1%	10KΩ	±5ppm/℃	0.75W	350V
MMFR5215B20K0V9	5215	±0.1%	20KΩ	±5ppm/℃	0.75W	350V
MMFR5215B50K0V9	5215	±0.1%	50KΩ	±5ppm/℃	0.75W	350V
MMFR5215B100KV9	5215	±0.1%	100KΩ	±5ppm/℃	0.75W	350V
MMFR5215B200KV9	5215	±0.1%	200KΩ	±5ppm/℃	0.75W	350V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
MMFR5215B500KV9	5215	±0.1%	500KΩ	±5ppm/℃	0.75W	350V
MMFR5215B1M00V9	5215	±0.1%	1MΩ	±5ppm/℃	0.75W	350V
MMFR6518B10R0V9	6518	±0.1%	10Ω	±5ppm/℃	1.0W	400V
MMFR6518B20R0V9	6518	±0.1%	20Ω	±5ppm/℃	1.0W	400V
MMFR6518B50R0V9	6518	±0.1%	50Ω	±5ppm/℃	1.0W	400V
MMFR6518B100RV9	6518	±0.1%	100Ω	±5ppm/℃	1.0W	400V
MMFR6518B200RV9	6518	±0.1%	200Ω	±5ppm/℃	1.0W	400V
MMFR6518B250RV9	6518	±0.1%	250Ω	±5ppm/℃	1.0W	400V
MMFR6518B500RV9	6518	±0.1%	500Ω	±5ppm/℃	1.0W	400V
MMFR6518B1K00V9	6518	±0.1%	1KΩ	±5ppm/℃	1.0W	400V
MMFR6518B2K00V9	6518	±0.1%	2KΩ	±5ppm/℃	1.0W	400V
MMFR6518B5K00V9	6518	±0.1%	5KΩ	±5ppm/℃	1.0W	400V
MMFR6518B10K0V9	6518	±0.1%	10KΩ	±5ppm/℃	1.0W	400V
MMFR6518B20K0V9	6518	±0.1%	20KΩ	±5ppm/℃	1.0W	400V
MMFR6518B50K0V9	6518	±0.1%	50KΩ	±5ppm/℃	1.0W	400V
MMFR6518B100KV9	6518	±0.1%	100KΩ	±5ppm/℃	1.0W	400V
MMFR6518B200KV9	6518	±0.1%	200KΩ	±5ppm/℃	1.0W	400V
MMFR6518B500KV9	6518	±0.1%	500KΩ	±5ppm/℃	1.0W	400V
MMFR6518B1M00V9	6518	±0.1%	1MΩ	±5ppm/℃	1.0W	400V

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023/4/28	LFY

Current Sensing Resistor

The resistor used to measure the current in a circuit.

By measuring the voltage drop generated by the current flowing through the resistor with known resistance, the current can be accurately calculated by Ohm's law (I=U/R).

Generally, the resistance of sensing resistor is very small, ranging from 1m Ω to 1 Ω, with tight tolerance and low TCR.

Characteristics

- Low Resistance
- Low TCR
- Low Thermal EMF
- Excellent Stability

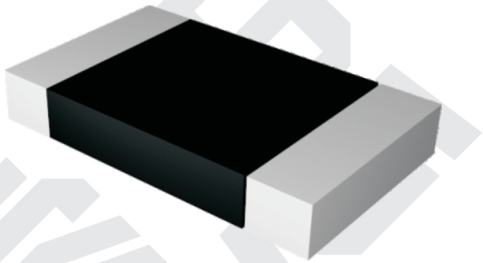
Applications

- Electric Power
- Automobile
- Current Sensing
- Precision Measurement

TCR ⩽±15ppm/°C (-55~125°C,+20°C Ref), Tightest tolerance ±0.1%
Excellent long-term stability Low thermal EMF
AEC-Q200 qualified

Introduction

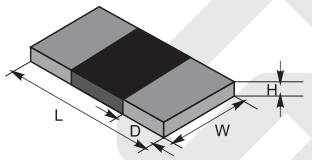
This series is made from a precision Nickel-Chrome alloy and which is then precisely machined and welded using exclusive EB-Welding equipment designed and manufactured independently by C&B Group. PCSR series is molded version which can achieve ultra-low TCR within ±15 ppm/°C and high tolerance up to ±0.1%. With an operating temperature range of -65°C to +170°C, the series is ideal for current sensing circuits which ask for high precision and low TCR at the same time. Visit www.resistor.today to check stock and more information.

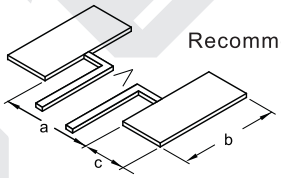


Application

- Precision Instrument
- Semiconductor ATE
- Battery test equipment
- Precision power supply

Specifications (mm)





Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Material	Packaging
PCSR	2512	1W	10mΩ~100mΩ	±0.1% ±0.5% ±1% ±5%	≤±15ppm/°C (-55°C~+125°C,+20°C Ref)	-65°C~+170°C	Nickel-Chrome	tape&reel 4000pcs/reel

Dimensions

L	W	H	D	a	b	c
6.40±0.2	3.2±0.2	0.8±0.1	0.8±0.2	3.6±0.1	3.6±0.1	2.0±0.1

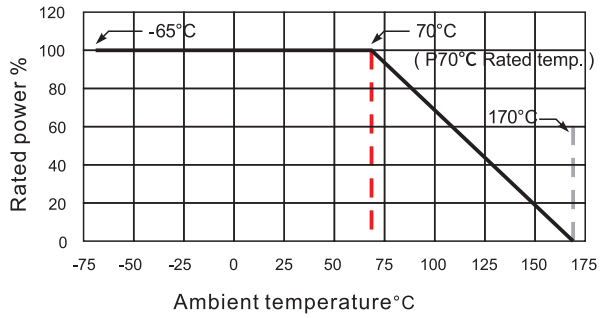
Part Number Information

Example: PCSR2512BR010M9 (PCSR 2512 ±0.1% 10mΩ ±15ppm/℃ Standard)

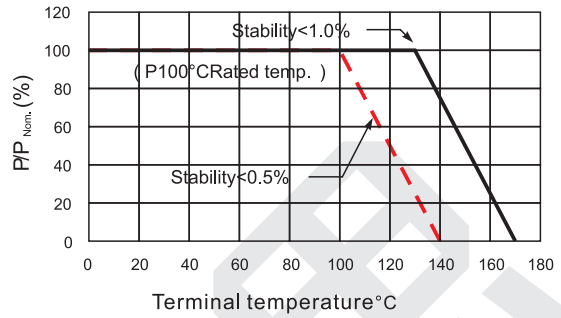
P	C	S	R	2	5	1	2	B	R	0	1	0	M	9

- Series: PCSR
- Size: 2512
- Tolerance: B=±0.1%, D=±0.5%, F=±1%, J=±5%
- Resistance: R010=10mΩ, R015=15mΩ, R020=20mΩ, R050=50mΩ, R100=100mΩ
- TCR: M=±15ppm/°C
- Code: 9=Standard, 6=Unmarked

Derating curve(Ambient temp.)



Derating curve(Terminal temp.)



Performance

Test Item	Test Method	Standard	Typical	Maximum
Short-time overload	5x rated power for 5s,measured 24±2h after test	MIL-STD-202 Method 201	±0.1%	±0.3%
High temp. storage	+170°C,1000h,no load,measured 24±2h after test	MIL-STD-202 Method 108	±0.2%	±0.5%
Moisture resistance	T=24h/cycle,no load,7a and 7b not required,measured 24±2h after test	MIL-STD-202 Method 106	±0.02%	±0.05%
Load life	+70°C,2000h,rated power,measured 24±2h after test	MIL-STD-202 Method 108	±0.2%	±0.5%
Resistance to soldering heat	+260°C±5°C,10s±1s,measured 24±2h after test	MIL-STD-202 Method 210	±0.05%	±0.3%
Thermal shock	-55°C~+125°C,1000 cycles,measured 24±2h after test	JESD22 Method JA-104	±0.1%	±0.5%
High temp. & high humidity	+85°C,85%RH,10% of rated power,1000h,measured 24±2h after test	MIL-STD-202 Method 103	±0.05%	±0.3%
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	

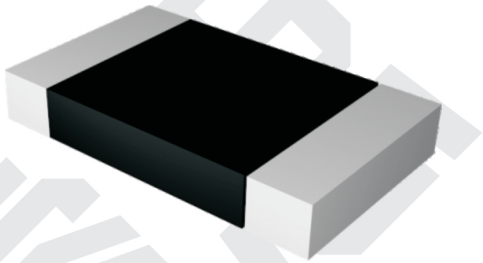
Popular Part Number

Part Number	Size	Tolerance	Resistance	TCR
PCSR2512JR010M9	2512	±5%	10mΩ	±15ppm/°C
PCSR2512JR015M9	2512	±5%	15mΩ	±15ppm/°C
PCSR2512JR020M9	2512	±5%	20mΩ	±15ppm/°C
PCSR2512JR050M9	2512	±5%	50mΩ	±15ppm/°C
PCSR2512JR100M9	2512	±5%	100mΩ	±15ppm/°C
PCSR2512FR010M9	2512	±1%	10mΩ	±15ppm/°C
PCSR2512FR015M9	2512	±1%	15mΩ	±15ppm/°C
PCSR2512FR020M9	2512	±1%	20mΩ	±15ppm/°C
PCSR2512FR050M9	2512	±1%	50mΩ	±15ppm/°C
PCSR2512FR100M9	2512	±1%	100mΩ	±15ppm/°C
PCSR2512DR010M9	2512	±0.5%	10mΩ	±15ppm/°C
PCSR2512DR015M9	2512	±0.5%	15mΩ	±15ppm/°C
PCSR2512DR020M9	2512	±0.5%	20mΩ	±15ppm/°C
PCSR2512DR050M9	2512	±0.5%	50mΩ	±15ppm/°C
PCSR2512DR100M9	2512	±0.5%	100mΩ	±15ppm/°C
PCSR2512BR010M9	2512	±0.1%	10mΩ	±15ppm/°C
PCSR2512BR015M9	2512	±0.1%	15mΩ	±15ppm/°C
PCSR2512BR020M9	2512	±0.1%	20mΩ	±15ppm/°C
PCSR2512BR050M9	2512	±0.1%	50mΩ	±15ppm/°C
PCSR2512BR100M9	2512	±0.1%	100mΩ	±15ppm/°C

TCR ⩽±25ppm/°C (-55~125°C,+20°C Ref), Tightest tolerance ±0.5%
Excellent long-term stability Low thermal EMF
AEC-Q200 qualified

Introduction

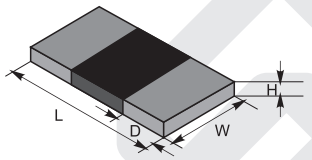
This series is made from a precision Nickel-Chrome alloy and which is then precisely machined and welded using exclusive EB-Welding equipment designed and manufactured independently by C&B Group. PCSR series is molded version which can achieve ultra-low TCR within ±15 ppm/°C and high tolerance up to ±0.1%. With an operating temperature range of -65°C to +170°C, the series is ideal for current sensing circuits which ask for high precision and low TCR at the same time. Visit www.resistor.today to check stock and more information.

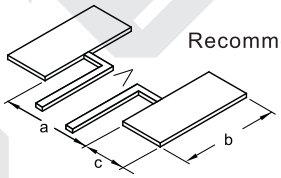


Application

- Precision Instrument
- Semiconductor ATE
- Battery test equipment
- Precision power supply

Specifications (mm)





Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Material	Packaging
PCSK	2512	1W	10mΩ~100mΩ	±0.5% ±1% ±5%	≤±25ppm/°C (-55°C~+125°C,+20°C Ref)	-65°C~+170°C	Nickel-Chrome	tape&reel 4000pcs/reel

Dimensions

L	W	H	D	a	b	c
6.40±0.2	3.2±0.2	0.8±0.1	0.8±0.2	3.6±0.1	3.6±0.1	2.0±0.1

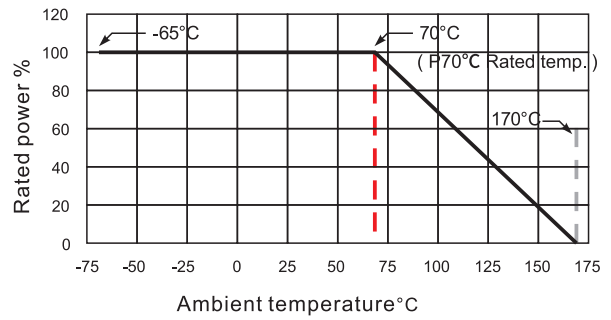
Part Number Information

Example: PCSK2512BR010P9 (PCSK 2512 ±1% 10mΩ ±25ppm/℃ Standard)

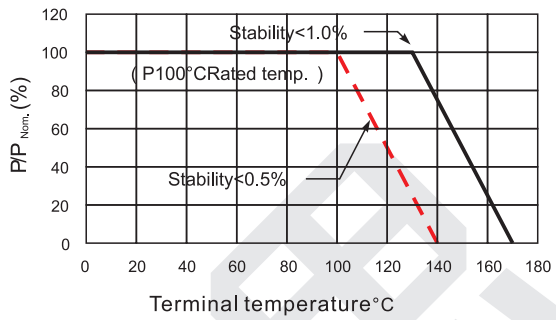
P	C	S	K	2	5	1	2	F	R	0	1	0	P	9

- Series: PCSK
- Size: 2512
- Tolerance: D=±0.5%, F=±1%, J=±5%
- Resistance: R010=10mΩ, R015=15mΩ, R020=20mΩ, R050=50mΩ, R100=100mΩ
- TCR: M=±25ppm/°C
- Code: 9=Standard, 6=Unmarked

Derating curve(Ambient temp.)



Derating curve(Terminal temp.)



Performance

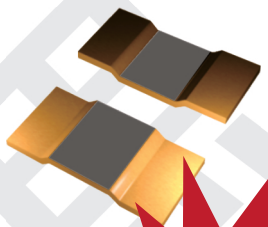
Test Item	Test Method	Standard	Typical	Maximum
Short-time overload	5x rated power for 5s,measured 24±2h after test	MIL-STD-202 Method 201	±0.1%	±0.3%
High temp. storage	+170°C,1000h,no load,measured 24±2h after test	MIL-STD-202 Method 108	±0.2%	±0.5%
Moisture resistance	T=24h/cycle,no load,7a and 7b not required,measured 24±2h after test	MIL-STD-202 Method 106	±0.02%	±0.05%
Load life	+70°C,2000h,rated power,measured 24±2h after test	MIL-STD-202 Method 108	±0.2%	±0.5%
Resistance to soldering heat	+260°C±5°C,10s±1s,measured 24±2h after test	MIL-STD-202 Method 210	±0.05%	±0.3%
Thermal shock	-55°C~+125°C,1000 cycles,measured 24±2h after test	JESD22 Method JA-104	±0.1%	±0.5%
High temp. & high humidity	+85°C,85%RH,10% of rated power,1000h,measured 24±2h after test	MIL-STD-202 Method 103	±0.05%	±0.3%
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	

Popular Part Number

Part Number	Size	Tolerance	Resistance	TCR
PCSK2512JR010P9	2512	±5%	10mΩ	±25ppm/°C
PCSK2512JR015P9	2512	±5%	15mΩ	±25ppm/°C
PCSK2512JR020P9	2512	±5%	20mΩ	±25ppm/°C
PCSK2512JR050P9	2512	±5%	50mΩ	±25ppm/°C
PCSK2512JR100P9	2512	±5%	100mΩ	±25ppm/°C
PCSK2512FR010P9	2512	±1%	10mΩ	±25ppm/°C
PCSK2512FR015P9	2512	±1%	15mΩ	±25ppm/°C
PCSK2512FR020P9	2512	±1%	20mΩ	±25ppm/°C
PCSK2512FR050P9	2512	±1%	50mΩ	±25ppm/°C
PCSK2512FR100P9	2512	±1%	100mΩ	±25ppm/°C
PCSK2512DR010P9	2512	±0.5%	10mΩ	±25ppm/°C
PCSK2512DR015P9	2512	±0.5%	15mΩ	±25ppm/°C
PCSK2512DR020P9	2512	±0.5%	20mΩ	±25ppm/°C
PCSK2512DR050P9	2512	±0.5%	50mΩ	±25ppm/°C
PCSK2512DR100P9	2512	±0.5%	100mΩ	±25ppm/°C

TCR ⩽±25ppm/°C (-55~+170°C, +20°C Ref), tightest tolerance ±0.5%
No trimming&Non-hot-spot design, Low EMF
AEC-Q200 qualified

Introduction

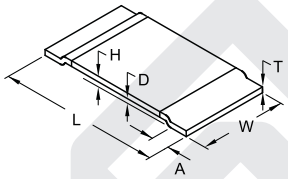


This series is made from a precision metal alloy and which is then precisely machined and welded using exclusive EB-Welding equipment designed and manufactured independently by C&B Group. The combination of excellent consistency of metal alloy, the precision machining capability and the efficient welding process allow the product to achieve a tight tolerance up to ±0.5% without trimming. The "Trimming Free" technology avoids the loss of rated current and the hot-spot due to notches in the trimming process, which greatly increases the reliability of the product. At the same time, the improved welding quality ensures very low EMF and high stability of the product. From the raw material to equipment and core process, whole process is strictly controlled inside of the house to make sure stable quality and timely delivery.

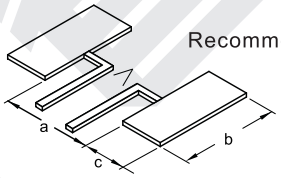
This series is ideal for high current sensing circuits which ask for high precision at the same time. Visit www.resistor.today to learn more.

Only for DC current sensing circuits

Specifications (mm)



Recommend solder pad



Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Packaging
SEWF2512J2L00P9	2512	4W	3mΩ	±5%	⩽±25ppm/°C (-55~+170°C,+20°C Ref)	-65~+170°C	tape&reel 4000pcs/reel
SEWF2512F2L00P9				±1%			
SEWF2512D2L00P9				±0.5%			

Dimensions

Size	L	W	A	D	T	H	a	b	c
2512	6.3±0.2	3.0±0.2	1.0±0.2	0.35±0.1	0.45±0.1	0.8±0.2	3.9±0.25	3.4±0.25	1.8±0.25

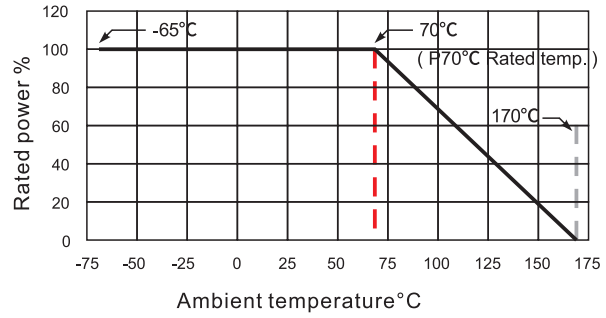
Part Number Information

Example: SEWF2512F3L00P9 (SEWF 2512 ±1% 3mΩ ±25ppm/℃ Standard)

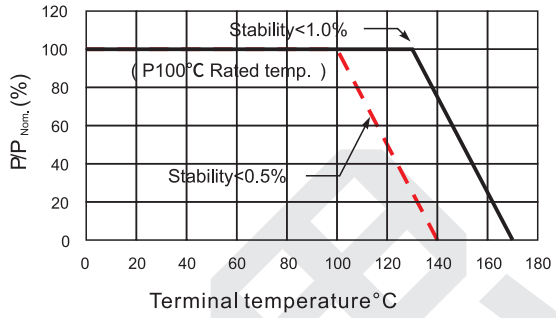
S	E	W	F	2	5	1	2	F	3	L	0	0	P	9

- Series: SEWF
- Size: 2512
- Tolerance: D=±0.5%, F=±1%, J=±5%
- Resistance: 3L00=3mΩ
- TCR: P=±25ppm/℃
- Code: 9=Standard

Derating curve(Ambient temp.)



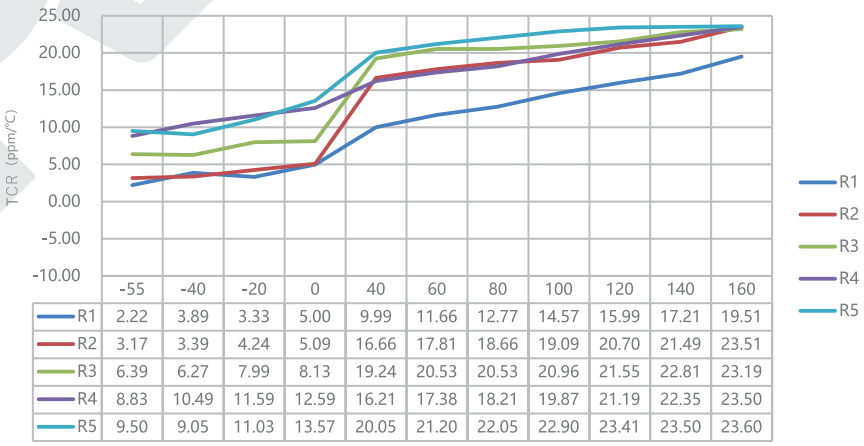
Derating curve(Terminal temp.)



Performance

Test Item	Test Method	Standard	Typical	Maximum
Short-time overload	5x rated power for 5s,measured 24±2h after test	MIL-STD-202 Method 201	±0.1%	±0.5%
Thermal shock	-55°C~+125°C,1000 cycles,measured 24±2h after test	JESD22 Method JA-104	±0.1%	±0.5%
Moisture resistance	T=24h/cycle,no load,7a and 7b not required,measured 24±2h after test	MIL-STD-202 Method 106	±0.2%	±0.5%
Load life	+70°C,2000h,rated power,measured 24±2h after test	MIL-STD-202 Method 108	±0.5%	±1.0%
Resistance to soldering heat	+260,±5°C,10s±1s,measured 24±2h after test	MIL-STD-202 Method 210	±0.2%	±0.5%
High temp. & high humidity	+85°C,85%RH,10% of rated power,1000h,measured 24±2h after test	MIL-STD-202 Method 103	±0.2%	±0.5%
Low temp. storage	-65°C for 96h,measured 24±2h after test	IEC 60068-2-1	±0.1%	±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 20 minutes,acceleration 5g X-Y-Z direction°C12 cycles	MIL-STD-202 Method 204	±0.05%	±0.2%
Mechanical shock	100g,6ms,half-sine shock wave,3 times/direction,18 times measured 24±2h after test	MIL-STD-202 Method 107	±0.05%	±0.2%
Resistance to solvent	Immerse in solvent for 3 min and then wipe 10 times 3 cycles of 3 solvents,clean and dry at ambient temperature	MIL-STD-202 Method 215	Clear marking No visible damage	
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	
TCR	-55°C and +170°C,+20°C Ref.	IEC 60115-1 4.8	Within the nominal value range	
Substrate bending	2mm,for 60s	AEC-Q200-005	±0.01%	±0.1%
Terminal strength	Force 17.7N,hold for 60s	AEC-Q200-006	±0.01%	±0.1%
Low temp. operation	-55°C,no load for 1h,rated voltage load for 45 min,no load for 15 min	IEC 60115-1 4.36	±0.2%	±0.5%

TCR Test Chart-3mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	2.22	3.89	3.33	5.00	9.99	11.66	12.77	14.57	15.99	17.21	19.51
R2	3.17	3.39	4.24	5.09	16.66	17.81	18.66	19.09	20.70	21.49	23.51
R3	6.39	6.27	7.99	8.13	19.24	20.53	20.53	20.96	21.55	22.81	23.19
R4	8.83	10.49	11.59	12.59	16.21	17.38	18.21	19.87	21.19	22.35	23.50
R5	9.50	9.05	11.03	13.57	20.05	21.20	22.05	22.90	23.41	23.50	23.60

DataSheet No.: E19015
Version: V2
Date: 2023/08/12

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SEWF3920

High-Precision Low-TCR Alloy Current Sensing Resistor

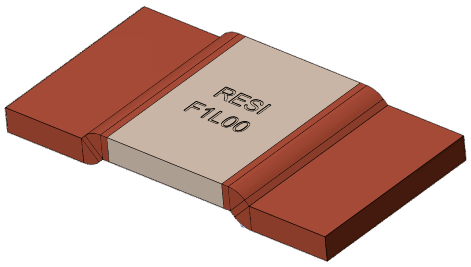
Resistance	1.0mΩ ~ 5.0mΩ
Tolerance	±0.5%
TCR	≤±25ppm/℃
Rated Current	25A~89A

Applications

Automotive Electronics
Precision Power Supply
Instrumentation
Sorting & Formation of Battery
Medical Equipment

Better Solution for Sustainable High End Manufacturing

High-Precision Low-TCR Alloy Current Sensing Resistor
High Reliability & Stability



RoHS AEC-Q200 3D

Introduction

SEWF series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, SEWF achieves a maximum target tolerance of ± 0.5% after stamping without trimming. TCR of SEWF series within the temperature range of -55 ℃ to +170 ℃ is ≤ ± 25ppm/℃.

"Trimming Free" technology avoids the loss of rated current caused by trimming and also avoids current accumulation hotspots caused by trimmed notch, greatly improving the reliability of the product. Meanwhile, due to the improvement of welding quality, thermal EMF of the product is significantly reduced, improving its long-term stability.

SEWF series, from raw materials, core equipment, to core processes, achieves independent and controllable production, stable quality, and timely delivery. If the standard specifications cannot meet your needs, please contact our sales for consultation. Resi is committed to providing the best precision resistor solutions to meet the needs of customers in instrumentation, medical equipment, automotive electronics, precision power supplies, sorting & formation of battery, testing and measurement equipment and other fields.

Electrical Parameters

Size	Resistance	Rated Power (+70℃)	Max. Operating Current	Operating Temperature	TCR ppm/℃	Thermal Resistance ℃/W	Tolerance %
SEWF3920	1mΩ	8W	89A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	7.8	±0.5 ±1.0 ±5.0
SEWF3920	2mΩ	6W	55A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	15.4	±0.5 ±1.0 ±5.0
SEWF3920	3mΩ	5W	41A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	23	±0.5 ±1.0 ±5.0
SEWF3920	4mΩ	4W	32A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	31.1	±0.5 ±1.0 ±5.0
SEWF3920	5mΩ	3W	25A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	38.4	±0.5 ±1.0 ±5.0

* Thermal Resistance: Refers to the internal thermal resistance between the center of the resistive alloy and the copper electrode.
As the heat dissipation efficiency is influenced by operating environment, copper bus bars, PCB design, etc., this parameter is only for reference.

Applications

SEWF series is only applicable to DC low-frequency sampling circuit. If needs of AC or high-frequency applications are present, please contact us.

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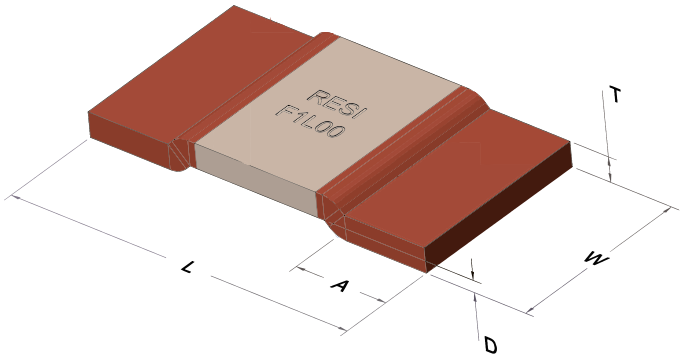
SEWF3920

High-Precision Low-TCR Alloy Current Sensing Resistor

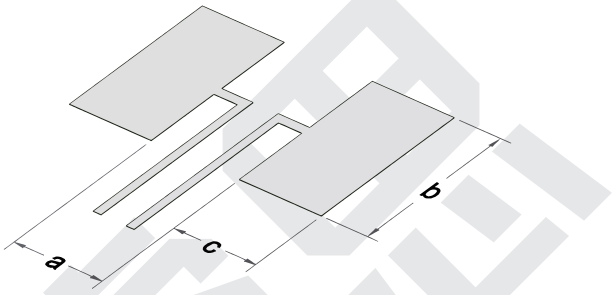
Dimensions

Unit: mm

Resistor



Solder Pad



Resistance	L	W	A	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
1mΩ	10.0±0.3	5.2±0.3	2.0±0.3	1.3±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000	0.56±0.1g
2mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.65±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000	0.28±0.1g
3mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.45±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000	0.20±0.1g
4mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.33±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000	0.15±0.1g
5mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.27±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000	0.12±0.1g

Part Number Information

Example: SEWF3920F1L00P9 (SEWF 3920 ±1.0% 1.0mΩ ±25ppm/°C Standard)

S	E	W	F	3	9	2	0	F	1	L	0	0	P	9

Series	Size	Tolerance	Resistance	TCR	Code
SEWF	3920	D=±0.5% F=±1.0% J=±5.0%	1L00=1.0mΩ 2L00=2.0mΩ 3L00=3.0mΩ 4L00=4.0mΩ 5L00=5.0mΩ	P=±25ppm/°C	9=Standard 0-8=Custom

For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

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SEWF3920

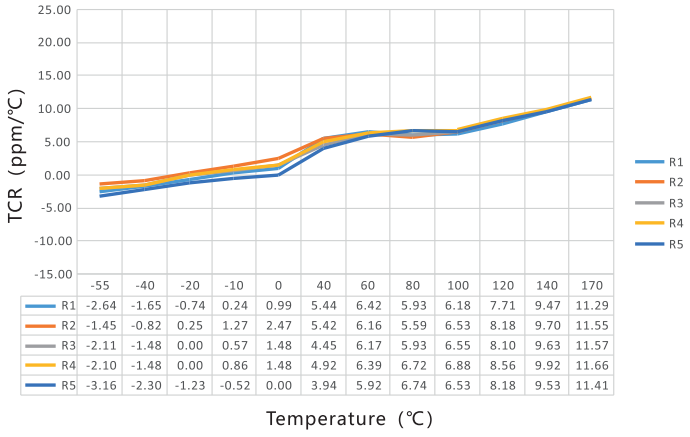
High-Precision Low-TCR Alloy Current Sensing Resistor

Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	ΔR≤±0.5%	ΔR≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	ΔR≤±0.1%	ΔR≤±0.5%
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	ΔR≤±0.2%	ΔR≤±0.5%
Load Life	2000h @ +70°C, rated power, 90min on，30min off +70℃ refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	ΔR≤±0.5%	ΔR≤±1.0%
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	ΔR≤±0.05%	ΔR≤±0.2%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	ΔR≤±0.05%	ΔR≤±0.2%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	ΔR≤±0.2%	ΔR≤±0.5%
Solderability	+235°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	-55℃ and +170℃, +20℃ Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, max. value ≤ 25ppm/℃	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	ΔR≤±0.01%	ΔR≤±0.1%
Short Time Overload	5x rated voltage, 5s	IEC 60115-1 4.13	ΔR≤±0.1%	ΔR≤±0.5%
Low Temperature Storage	-55℃ for 96h, unpowered	IEC 60068-2-1	ΔR≤±0.1%	ΔR≤±0.5%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	ΔR≤±0.1%	ΔR≤±0.5%
Low Temperature Operating	-55°C, unpowered for 1h, load rated power for 45min, unpowered for 15min	IEC 60068-2-1 4.36	ΔR≤±0.1%	ΔR≤±0.5%

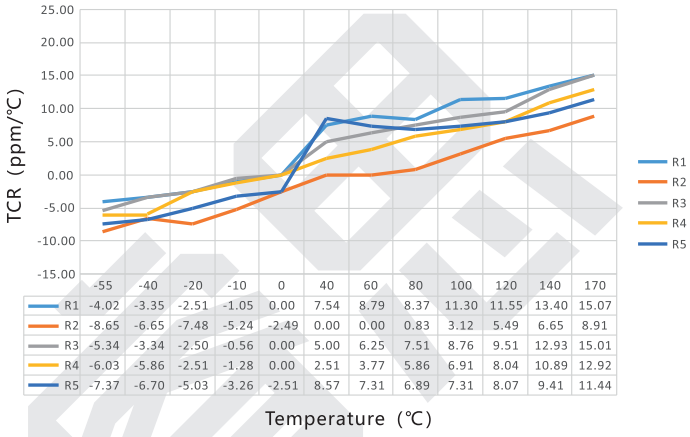
Temperature Coefficient of Resistance Test Curve

TCR Test Curve - SEWF3920 1mΩ



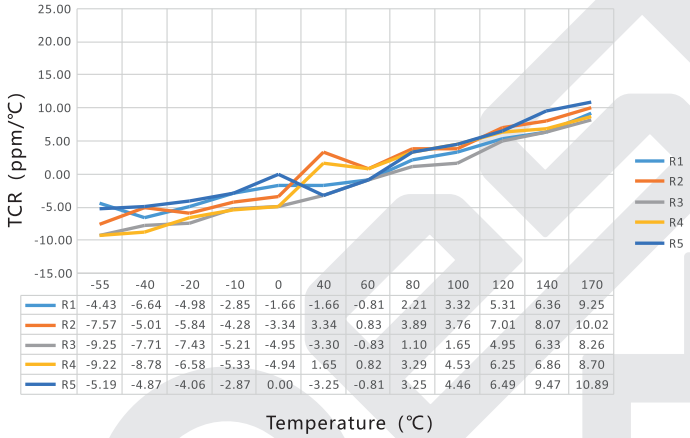
	-55	-40	-20	-10	0	40	60	80	100	120	140	170
R1	-2.64	-1.65	-0.74	0.24	0.99	5.44	6.42	5.93	6.18	7.71	9.47	11.29
R2	-1.45	-0.82	0.25	1.27	2.47	5.42	6.16	5.59	6.53	8.18	9.70	11.55
R3	-2.11	-1.48	0.00	0.57	1.48	4.45	6.17	5.93	6.55	8.10	9.63	11.57
R4	-2.10	-1.48	0.00	0.86	1.48	4.92	6.39	6.72	6.88	8.56	9.92	11.66
R5	-3.16	-2.30	-1.23	-0.52	0.00	3.94	5.92	6.74	6.53	8.18	9.53	11.41

TCR Test Curve - SEWF3920 2mΩ



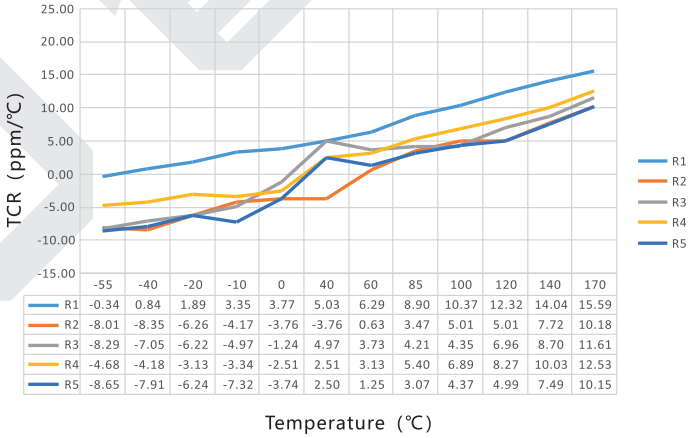
	-55	-40	-20	-10	0	40	60	80	100	120	140	170
R1	-4.02	-3.35	-2.51	-1.05	0.00	7.54	8.79	8.37	11.30	11.55	13.40	15.07
R2	-8.65	-6.65	-7.48	-5.24	-2.49	0.00	0.00	0.83	3.12	5.49	6.65	8.91
R3	-5.34	-3.34	-2.50	-0.56	0.00	5.00	6.25	7.51	8.76	9.51	12.93	15.01
R4	-6.03	-5.86	-2.51	-1.28	0.00	2.51	3.77	5.86	6.91	8.04	10.89	12.92
R5	-7.37	-6.70	-5.03	-3.26	-2.51	8.57	7.31	6.89	7.31	8.07	9.41	11.44

TCR Test Curve - SEWF3920 3mΩ



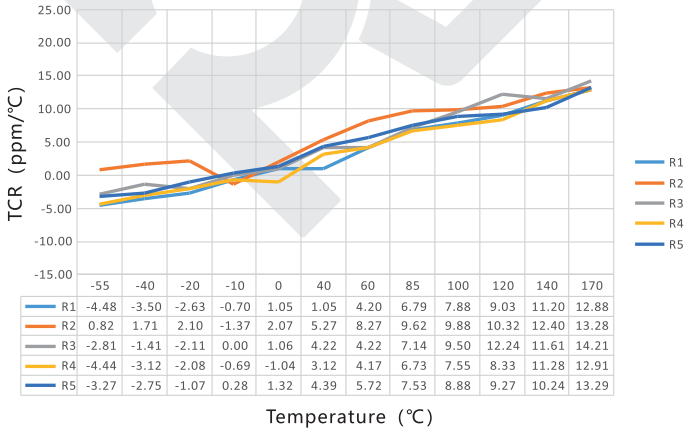
	-55	-40	-20	-10	0	40	60	80	100	120	140	170
R1	-4.43	-6.64	-4.98	-2.85	-1.66	-1.66	-0.81	2.21	3.32	5.31	6.36	9.25
R2	-7.57	-5.01	-5.84	-4.28	-3.34	3.34	0.83	3.89	3.76	7.01	8.07	10.02
R3	-9.25	-7.71	-7.43	-5.21	-4.95	-3.30	-0.83	1.10	1.65	4.95	6.33	8.26
R4	-9.22	-8.78	-6.58	-5.33	-4.94	1.65	0.82	3.29	4.53	6.25	6.86	8.70
R5	-5.19	-4.87	-4.06	-2.87	0.00	-3.25	-0.81	3.25	4.46	6.49	9.47	10.89

TCR Test Curve - SEWF3920 4mΩ



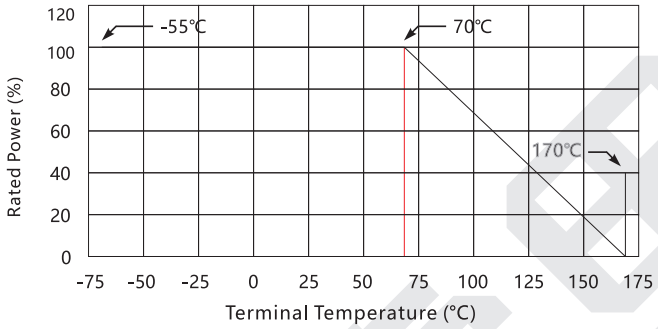
	-55	-40	-20	-10	0	40	60	85	100	120	140	170
R1	-0.34	0.84	1.89	3.35	3.77	5.03	6.29	8.90	10.37	12.32	14.04	15.59
R2	-8.01	-8.35	-6.26	-4.17	-3.76	-3.76	0.63	3.47	5.01	5.01	7.72	10.18
R3	-8.29	-7.05	-6.22	-4.97	-1.24	4.97	3.73	4.21	4.35	6.96	8.70	11.61
R4	-4.68	-4.18	-3.13	-3.34	-2.51	2.51	3.13	5.40	6.89	8.27	10.03	12.53
R5	-8.65	-7.91	-6.24	-7.32	-3.74	2.50	1.25	3.07	4.37	4.99	7.49	10.15

TCR Test Curve - SEWF3920 5mΩ



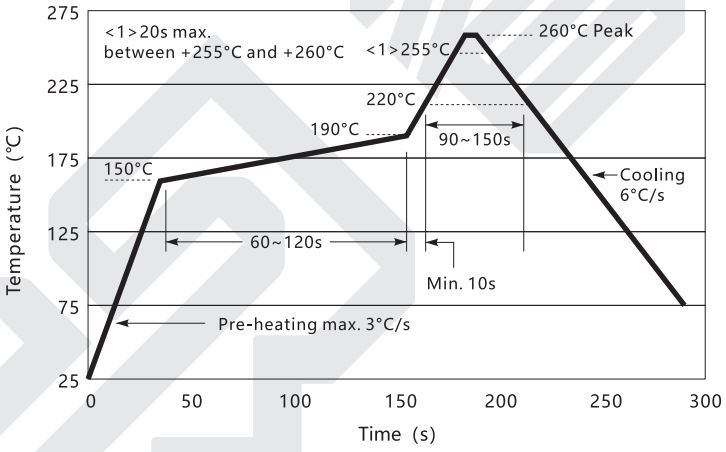
	-55	-40	-20	-10	0	40	60	85	100	120	140	170
R1	-4.48	-3.50	-2.63	-0.70	1.05	1.05	4.20	6.79	7.88	9.03	11.20	12.88
R2	0.82	1.71	2.10	-1.37	2.07	5.27	8.27	9.62	9.88	10.32	12.40	13.28
R3	-2.81	-1.41	-2.11	0.00	1.06	4.22	4.22	7.14	9.50	12.24	11.61	14.21
R4	-4.44	-3.12	-2.08	-0.69	-1.04	3.12	4.17	6.73	7.55	8.33	11.28	12.91
R5	-3.27	-2.75	-1.07	0.28	1.32	4.39	5.72	7.53	8.88	9.27	10.24	13.29

Derating Curve

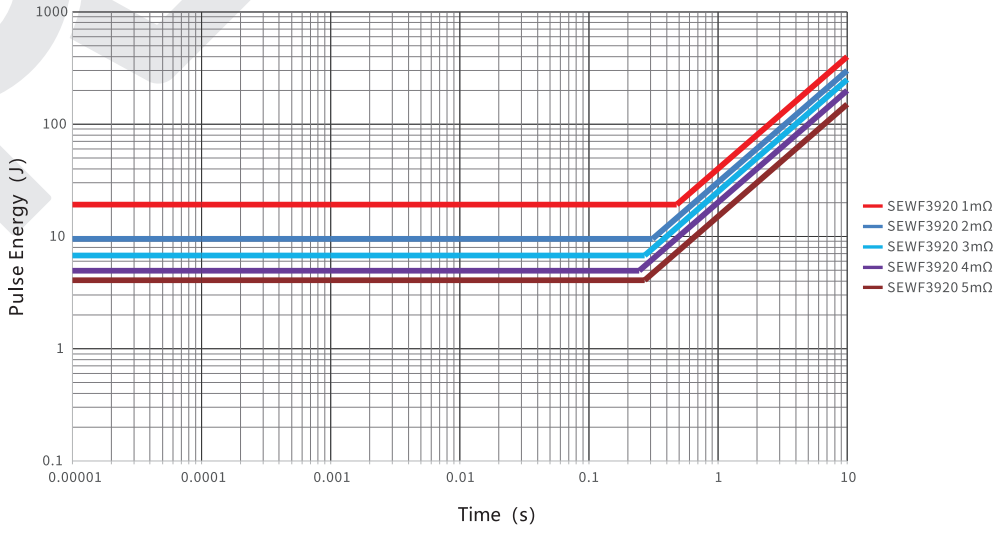


Reflow Soldering Profile

Resistor Surface Temperature:
Pre-Heat: +150℃~+190℃,60~120sec.
Reflow: Above +220℃,90~150sec.
Applicable Solder Composition: Sn-Ag-Cu



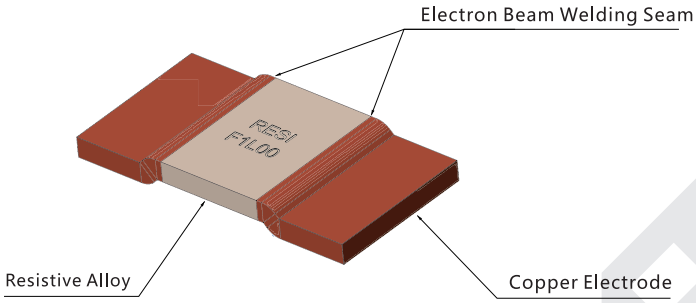
Maximum Pulse Energy Curve



SEWF3920

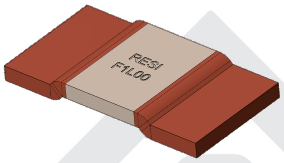
High-Precision Low-TCR Alloy Current Sensing Resistor

Construction



Marking

The first line (four digits) represents brand. The second line (five digits) represents tolerance and resistance.

Size	Illustration	Demonstration
3920		RESI: Brand F: Tolerance 1L00: Resistance

Storage Instructions

(1) Resistors should be stored at a temperature of 5 to 35 ℃, with a humidity of<60% RH. The humidity should be kept as low as possible.
(2) Resistors should be protected from direct sunlight.
(3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H2S, etc.)
(4) Do not move the resistor from the packaging unless use it.
(5) Under the above storage conditions, the resistor can be stored for at least 1 year.

Usage Suggestions

(1) Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
(2) Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
(3) When installing and using resistors, avoid the impact of mechanical stress on the resistor.
(4) The long-term operating power of resistors should be ≤ rated power to avoid resistance drift caused by long-term overload.
(5) Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
(6) If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
(7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.

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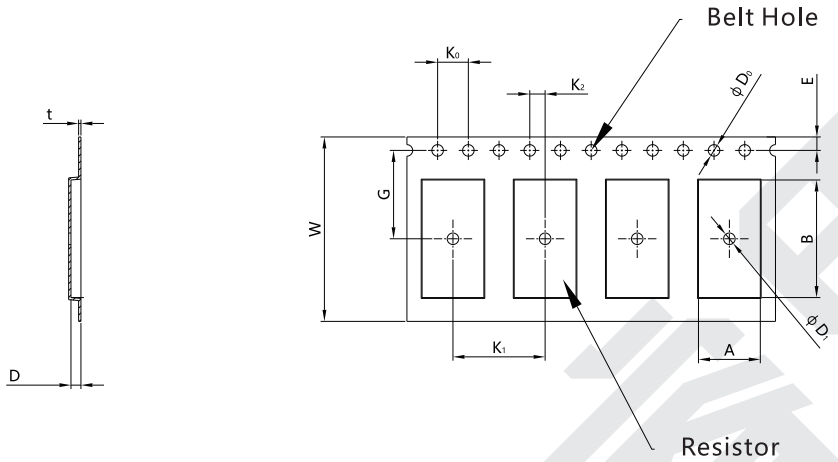
Packaging

Tape Specifications

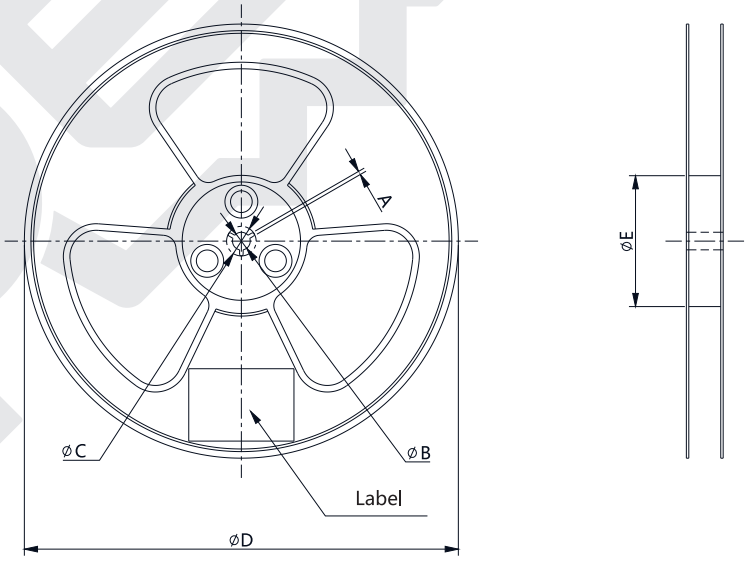
Unit: mm



Resistance	A	B	φD0	φD1	K0	K1	K2	E	G	W	D	t
1mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	2.1±0.1	0.3±0.05
2mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05
3mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05
4mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05
5mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05

Reel Specifications

Unit: mm



A	φB	φC	φD	φE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Current
SEWF3920D1L00P9	3920	±0.5%	1.0mΩ	≤±25ppm/℃	8.0W	89A
SEWF3920F1L00P9	3920	±1.0%	1.0mΩ	≤±25ppm/℃	8.0W	89A
SEWF3920J1L00P9	3920	±5.0%	1.0mΩ	≤±25ppm/℃	8.0W	89A
SEWF3920D2L00P9	3920	±0.5%	2.0mΩ	≤±25ppm/℃	6.0W	55A
SEWF3920F2L00P9	3920	±1.0%	2.0mΩ	≤±25ppm/℃	6.0W	55A
SEWF3920J2L00P9	3920	±5.0%	2.0mΩ	≤±25ppm/℃	6.0W	55A
SEWF3920D3L00P9	3920	±0.5%	3.0mΩ	≤±25ppm/℃	5.0W	41A
SEWF3920F3L00P9	3920	±1.0%	3.0mΩ	≤±25ppm/℃	5.0W	41A
SEWF3920J3L00P9	3920	±5.0%	3.0mΩ	≤±25ppm/℃	5.0W	41A
SEWF3920D4L00P9	3920	±0.5%	4.0mΩ	≤±25ppm/℃	4.0W	32A
SEWF3920F4L00P9	3920	±1.0%	4.0mΩ	≤±25ppm/℃	4.0W	32A
SEWF3920J4L00P9	3920	±5.0%	4.0mΩ	≤±25ppm/℃	4.0W	32A
SEWF3920D5L00P9	3920	±0.5%	5.0mΩ	≤±25ppm/℃	3.0W	25A
SEWF3920F5L00P9	3920	±1.0%	5.0mΩ	≤±25ppm/℃	3.0W	25A
SEWF3920J5L00P9	3920	±5.0%	5.0mΩ	≤±25ppm/℃	3.0W	25A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2022.07.28	LWW
V1	Add temperature coefficient of resistance test curve	2022.10.28	LWW
V2	Add new resistance 4mR & 5mR; Change datasheet to the new template	2023.08.12	LWW

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DataSheet No.: E19017
Version: V1
Date: 2023/06/12

SEWF5930

High-Precision Low-TCR Alloy Current Sensing Resistor

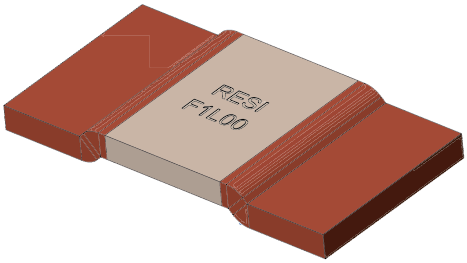
Resistance	1mΩ~3mΩ
Tolerance	±0.5%
TCR	≤±25ppm/℃
Rated Current	45A~100A

Applications

Automotive Electronics
Precision Power Supply
Instrumentation
Sorting & Formation of Battery
Medical Equipment

Better Solution for Sustainable High End Manufacturing

High-Precision Low-TCR Alloy Current Sensing Resistor
High Reliability & Stability



Introduction

SEWF series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, SEWF achieves a maximum target tolerance of ± 0.5% after stamping without trimming. TCR of SEWF series within the temperature range of -55 ℃ to +170 ℃ is ≤ ± 25ppm/℃.

"Trimming Free" technology avoids the loss of rated current caused by trimming and also avoids current accumulation hotspots caused by trimmed notch, greatly improving the reliability of the product. Meanwhile, due to the improvement of welding quality, thermal EMF of the product is significantly reduced, improving its long-term stability.

SEWF series, from raw materials, core equipment, to core processes, achieves independent and controllable production, stable quality, and timely delivery. If the standard specifications cannot meet your needs, please contact our sales for consultation. Resi is committed to providing the best precision resistor solutions to meet the needs of customers in instrumentation, medical equipment, automotive electronics, precision power supplies, sorting & formation of battery, testing and measurement equipment and other fields.

Electrical Parameters

Size	Resistance	Rated Power (+70℃)	Max. Operating Voltage	Operating Temperature	TCR ppm/℃	Thermal Resistance ℃/W	Tolerance %
SEWF5930	1.0mΩ	10W	100A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	6.4	±0.5 ±1.0 ±5.0
SEWF5930	2.0mΩ	8W	63A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	12.6	±0.5 ±1.0 ±5.0
SEWF5930	3.0mΩ	6W	45A	-55℃~+170℃	≤±25 (-55℃~+170℃, 20℃Ref)	19.1	±0.5 ±1.0 ±5.0

* Thermal Resistance: Refers to the internal thermal resistance between the center of the resistive alloy and the copper electrode.
As the heat dissipation efficiency is influenced by operating environment, copper bus bars, PCB design, etc., this parameter is only for reference.

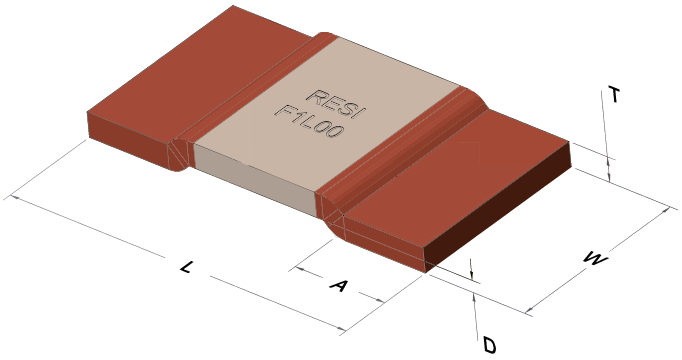
Application

SEWF series is only applicable to DC sampling circuits. If you have AC sampling demands, please contact us.

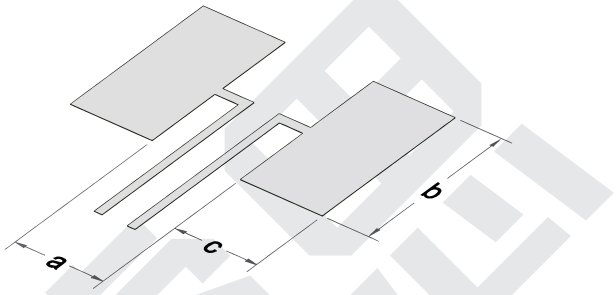
Dimensions

Unit: mm

Resistor



Solder Pad



Resistance	L	W	A	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
1.0mΩ	15.0±0.3	7.75±0.3	3.8±0.3	1.05±0.2	0.5±0.2	5.6±0.1	8.75±0.2	5.2±0.2	Tape&Reel	2000pcs	1.01±0.1g
2.0mΩ	15.0±0.3	7.75±0.3	3.8±0.3	0.53±0.2	0.5±0.2	5.6±0.1	8.75±0.2	5.2±0.2	Tape&Reel	2000pcs	0.51±0.1g
3.0mΩ	15.0±0.3	7.75±0.3	3.8±0.3	0.35±0.2	0.5±0.2	5.6±0.1	8.75±0.2	5.2±0.2	Tape&Reel	2000pcs	0.34±0.1g

Part Number Information

Example: SEWF5930F1L00P9 (SEWF 5930 ±1.0% 1.0mΩ ±25ppm/°C Standard)

S	E	W	F	5	9	3	0	F	1	L	0	0	P	9

Series	Size	Tolerance	Resistance	TCR	Code
SEWF	5930	D=±0.5% F=±1.0% J=±5.0%	1L00=1.0mΩ 2L00=2.0mΩ 3L00=3.0mΩ	P=±25ppm/°C	9=Standard 0-8=Custom

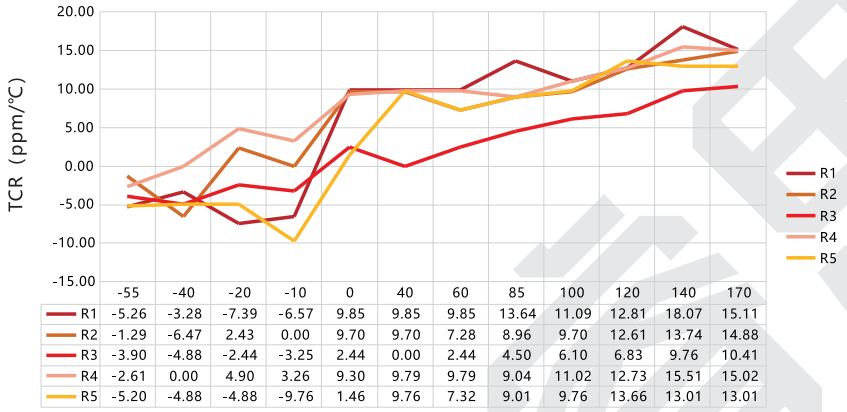
For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	▵R≤±0.5%	▵R≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	▵R≤±0.1%	▵R≤±0.5%
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	▵R≤±0.2%	▵R≤±0.5%
Load Life	2000h @ +70°C, rated power, 90min on，30min off +70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	▵R≤±0.5%	▵R≤±1.0%
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	▵R≤±0.05%	▵R≤±0.2%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	▵R≤±0.05%	▵R≤±0.2%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	▵R≤±0.2%	▵R≤±0.5%
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	-55°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, max. value ≤ 25ppm/°C	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	▵R≤±0.01%	▵R≤±0.1%
Short Time Overload	5x rated voltage, 5s	IEC 60115-1 4.13	▵R≤±0.1%	▵R≤±0.5%
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	▵R≤±0.1%	▵R≤±0.5%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	▵R≤±0.1%	▵R≤±0.5%

Temperature Coefficient of Resistance Test Curve

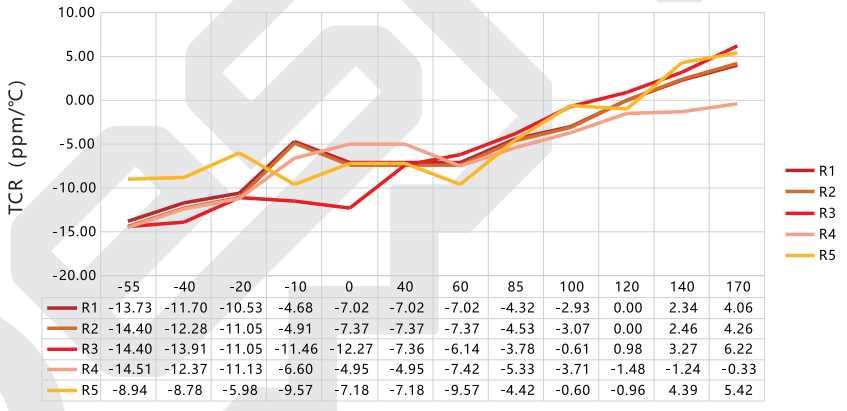
TCR Test Curve - SEWF5930 1mΩ



	-55	-40	-20	-10	0	40	60	85	100	120	140	170
R1	-5.26	-3.28	-7.39	-6.57	9.85	9.85	9.85	13.64	11.09	12.81	18.07	15.11
R2	-1.29	-6.47	2.43	0.00	9.70	9.70	7.28	8.96	9.70	12.61	13.74	14.88
R3	-3.90	-4.88	-2.44	-3.25	2.44	0.00	2.44	4.50	6.10	6.83	9.76	10.41
R4	-2.61	0.00	4.90	3.26	9.30	9.79	9.79	9.04	11.02	12.73	15.51	15.02
R5	-5.20	-4.88	-4.88	-9.76	1.46	9.76	7.32	9.01	9.76	13.66	13.01	13.01

Temperature (℃)

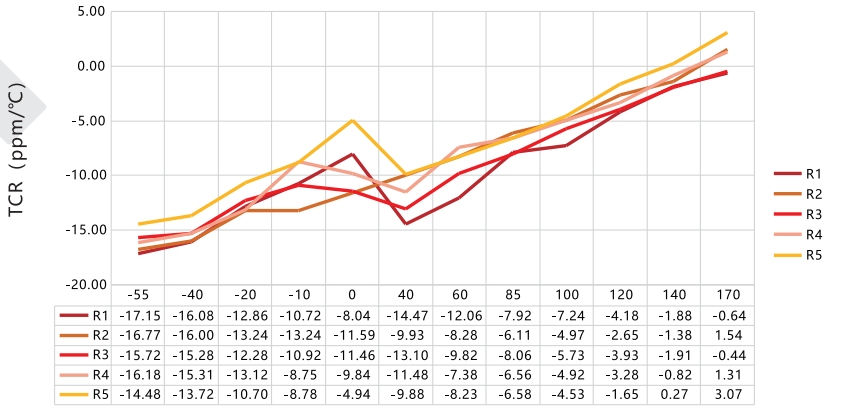
TCR Test Curve - SEWF5930 2mΩ



	-55	-40	-20	-10	0	40	60	85	100	120	140	170
R1	-13.73	-11.70	-10.53	-4.68	-7.02	-7.02	-7.02	-4.32	-2.93	0.00	2.34	4.06
R2	-14.40	-12.28	-11.05	-4.91	-7.37	-7.37	-7.37	-4.53	-3.07	0.00	2.46	4.26
R3	-14.40	-13.91	-11.05	-11.46	-12.27	-7.36	-6.14	-3.78	-0.61	0.98	3.27	6.22
R4	-14.51	-12.37	-11.13	-6.60	-4.95	-4.95	-7.42	-5.33	-3.71	-1.48	-1.24	-0.33
R5	-8.94	-8.78	-5.98	-9.57	-7.18	-7.18	-9.57	-4.42	-0.60	-0.96	4.39	5.42

Temperature (℃)

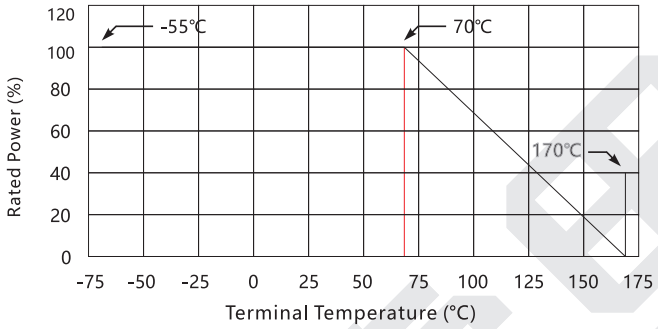
TCR Test Curve - SEWF5930 3mΩ



	-55	-40	-20	-10	0	40	60	85	100	120	140	170
R1	-17.15	-16.08	-12.86	-10.72	-8.04	-14.47	-12.06	-7.92	-7.24	-4.18	-1.88	-0.64
R2	-16.77	-16.00	-13.24	-13.24	-11.59	-9.93	-8.28	-6.11	-4.97	-2.65	-1.38	1.54
R3	-15.72	-15.28	-12.28	-10.92	-11.46	-13.10	-9.82	-8.06	-5.73	-3.93	-1.91	-0.44
R4	-16.18	-15.31	-13.12	-8.75	-9.84	-11.48	-7.38	-6.56	-4.92	-3.28	-0.82	1.31
R5	-14.48	-13.72	-10.70	-8.78	-4.94	-9.88	-8.23	-6.58	-4.53	-1.65	0.27	3.07

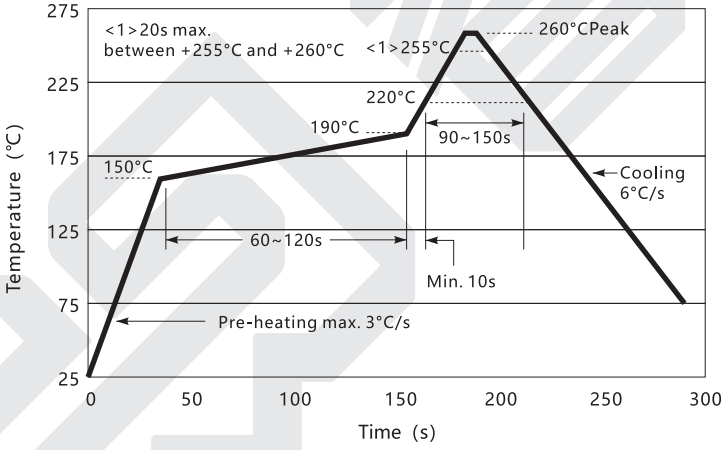
Temperature (℃)

Derating Curve

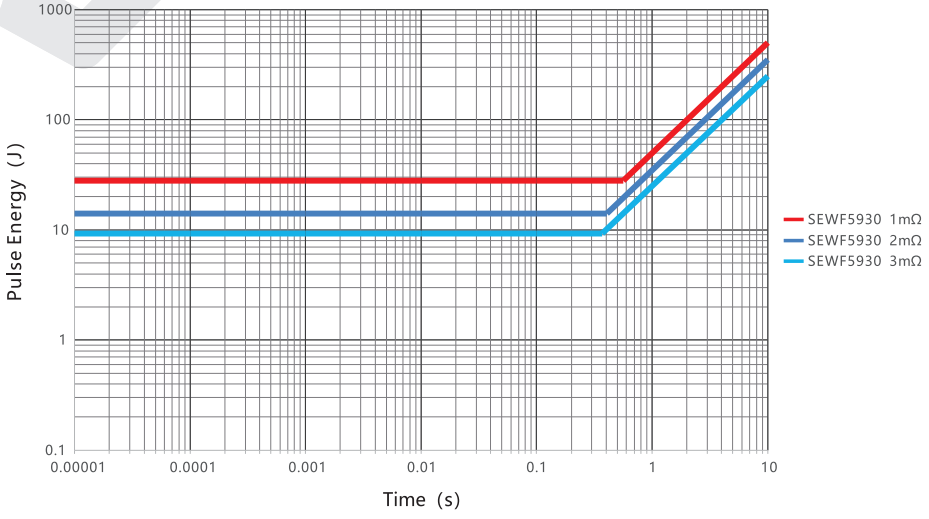


Reflow Soldering Profile

Resistor Surface Temperature:
Pre-Heat: +150℃~+190℃,60~120sec.
Reflow: Above +220℃,90~150sec.
Applicable Solder Composition: Sn-Ag-Cu



Maximum Pulse Energy Curve



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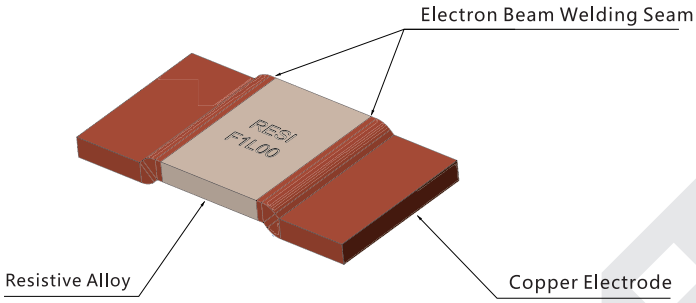
SEWF5930

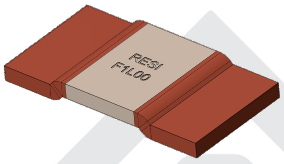
High-Precision Low-TCR Alloy Current Sensing Resistor

Construction



Marking

The first line (four digits) represents brand. The second line (five digits) represents tolerance and resistance.

Size	Illustration	Demonstration
5930		RESI: Brand F: Tolerance 1L00: Resistance

Storage Instructions

(1) Resistors should be stored at a temperature of 5 to 35 ℃, with a humidity of<60% RH. The humidity should be kept as low as possible.
(2) Resistors should be protected from direct sunlight.
(3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H2S, etc.)
(4) Do not move the resistor from the packaging unless use it.
(5) Under the above storage conditions, the resistor can be stored for at least 1 year.

Usage Suggestions

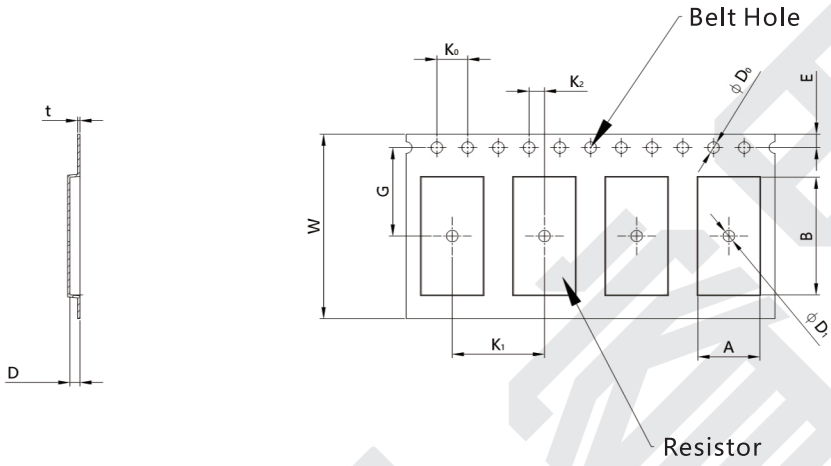
(1) Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
(2) Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
(3) When installing and using resistors, avoid the impact of mechanical stress on the resistor.
(4) The long-term operating power of resistors should be ≤ rated power to avoid resistance drift caused by long-term overload.
(5) Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
(6) If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
(7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.

C&B Electronics Shenzhen CO., LTD. | www.resistor.today | resi@cbeureka.com | Tel:0755-83981080/83981010

Packaging

Tape Specifications

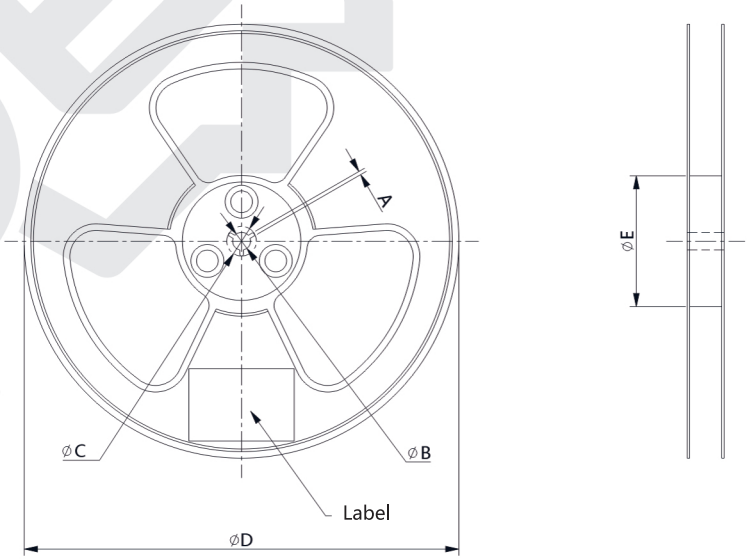
Unit: mm



Resistance	A	B	φD0	φD1	K0	K1	K2	E	G	W	D	t
1.0mΩ	8.05±0.2	15.30±0.2	1.5±0.1	1.5±0.1	4.00±0.1	12.00±0.1	2.00±0.1	1.75±0.1	11.50±0.05	24.00±0.3	1.9±0.1	0.3±0.05
2.0mΩ	8.05±0.2	15.30±0.2	1.5±0.1	1.5±0.1	4.00±0.1	12.00±0.1	2.00±0.1	1.75±0.1	11.50±0.05	24.00±0.3	1.3±0.1	0.3±0.05
3.0mΩ	8.05±0.2	15.30±0.2	1.5±0.1	1.5±0.1	4.00±0.1	12.00±0.1	2.00±0.1	1.75±0.1	11.50±0.05	24.00±0.3	1.3±0.1	0.3±0.05

Reel Specifications

Unit: mm



A	φB	φC	φD	φE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Current
SEWF5930D1L00P9	5930	±0.5%	1.0mΩ	≤±25ppm/℃	10.0W	100A
SEWF5930D2L00P9	5930	±0.5%	2.0mΩ	≤±25ppm/℃	8.0W	63A
SEWF5930D3L00P9	5930	±0.5%	3.0mΩ	≤±25ppm/℃	6.0W	45A
SEWF5930F1L00P9	5930	±1.0%	1.0mΩ	≤±25ppm/℃	10.0W	100A
SEWF5930F2L00P9	5930	±1.0%	2.0mΩ	≤±25ppm/℃	8.0W	63A
SEWF5930F3L00P9	5930	±1.0%	3.0mΩ	≤±25ppm/℃	6.0W	45A
SEWF5930J1L00P9	5930	±5.0%	1.0mΩ	≤±25ppm/℃	10.0W	100A
SEWF5930J2L00P9	5930	±5.0%	2.0mΩ	≤±25ppm/℃	8.0W	63A
SEWF5930J3L00P9	5930	±5.0%	3.0mΩ	≤±25ppm/℃	6.0W	45A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023.01.25	LWW
V1	Add 2mΩ and 3mΩ specifications and other product information	2023.06.03	LWW

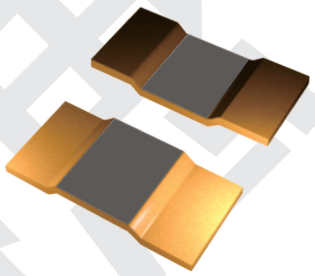
EBWM2512

Precision Trimming-free Alloy Current Sensor

TCR ⩽±200ppm/°C (-55~+170°C, +20°C Ref), tightest tolerance ±0.5%
No trimming&Non-hot-spot design, Low EMF
AEC-Q200 qualified

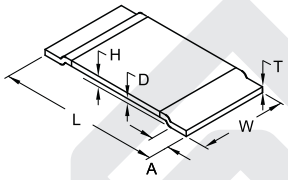
Introduction

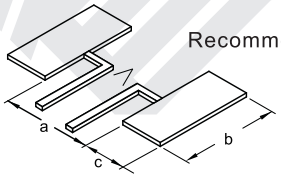
This series is made from a precision Manganin alloy and which is then precisely machined and welded using exclusive EB-Welding equipment designed and manufactured independently by C&B Group. The combination of excellent consistency of metal alloy, the precision machining capability and the efficient welding process allow the product to achieve a tight tolerance up to ±0.5% without trimming. The "Trimming Free" technology avoids the loss of rated current and the hot-spot due to notches in the trimming process, which greatly increases the reliability of the product. At the same time, the improved welding quality ensures very low EMF and high stability of the product. From the raw material to equipment and core process, whole process is strictly controlled inside of the house to make sure stable quality and timely delivery.



This series is ideal for high current sensing circuits which ask for high precision at the same time. Visit www.resistor.today to learn more.

Specifications (mm)





Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Material	Packaging
EBWM2512JL500S9	2512	6W	0.5mΩ	±5%	⩽±200ppm/°C (-55~+170°C,+20°C Ref)	-65~+170°C	Manganese-Copper	tape&reel 4000pcs/reel
EBWM2512FL500S9				±1%				
EBWM2512DL500S9				±0.5%				
EBWM2512J1L00S9	2512	6W	1mΩ	±5%	⩽±200ppm/°C (-55~+170°C,+20°C Ref)	-65~+170°C	Manganese-Copper	tape&reel 4000pcs/reel
EBWM2512F1L00S9				±1%				
EBWM2512D1L00S9				±0.5%				

Dimensions

Size	Resistance	L	W	A	D	T	H	a	b	c
2512	0.5mΩ	6.3±0.2	3.0±0.2	1.0±0.2	0.35±0.1	0.9±0.1	1.25±0.2	3.9±0.25	3.4±0.25	1.8±0.25
	1mΩ	6.3±0.2	3.0±0.2	1.0±0.2	0.35±0.1	0.4±0.1	0.75±0.2	3.9±0.25	3.4±0.25	1.8±0.25

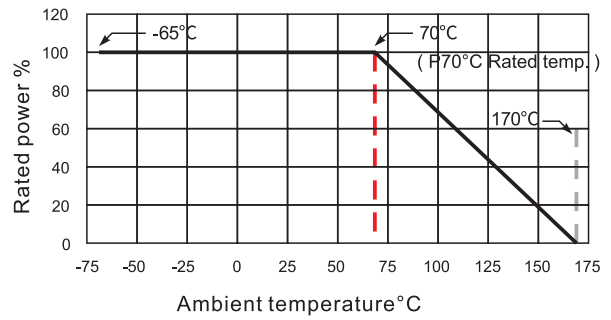
Part Number Information

Example: EBWM2512F1L00S9 (EBWM 2512 ±1% 1mΩ ±200ppm/°C Standard)

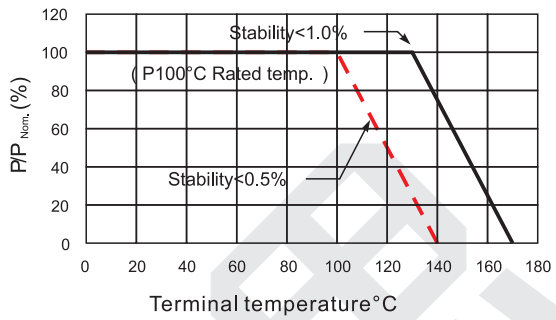
E	B	W	M	2	5	1	2	F	1	L	0	0	S	9

- Series: EBWM
- Size: 2512
- Tolerance: D=±0.5%, F=±1%, J=±5%
- Resistance: L500=0.5mΩ, 1L00=1mΩ
- TCR: S=±200ppm/°C
- Code: 9=Standard

Derating curve(Ambient temp.)



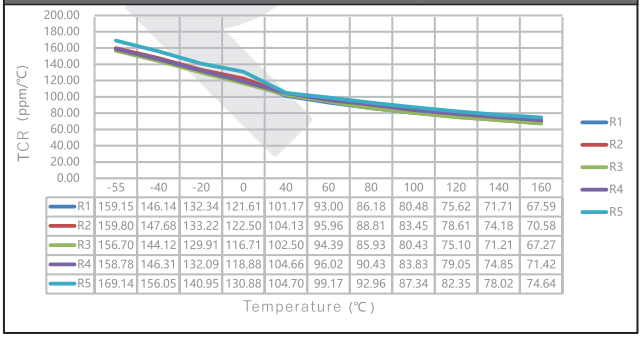
Derating curve(Terminal temp.)



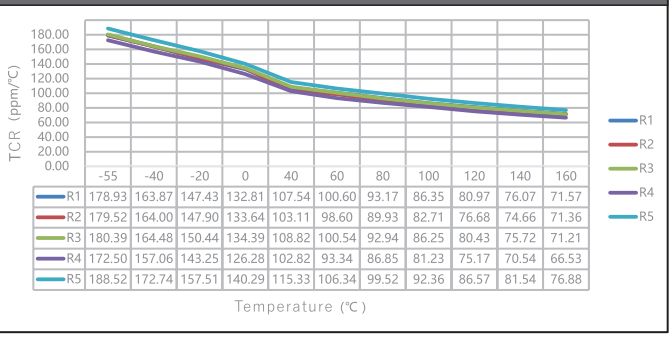
Performance

Test Item	Test Method	Standard	Typical	Maximum
Short-time overload	5x rated power for 5s,measured 24±2h after test	MIL-STD-202 Method 201	±0.1%	±0.5%
Thermal shock	-55°C~+125°C,1000 cycles,measured 24±2h after test	JESD22 Method JA-104	±0.1%	±0.5%
Moisture resistance	T=24h/cycle,no load,7a and 7b not required,measured 24±2h after test	MIL-STD-202 Method 106	±0.2%	±0.5%
Load life	+70°C,2000h,rated power,measured 24±2h after test	MIL-STD-202 Method 108	±0.5%	±1.0%
Resistance to soldering heat	+260,±5°C,10s±1s,measured 24±2h after test	MIL-STD-202 Method 210	±0.2%	±0.5%
High temp. & high humidity	+85°C,85%RH,10% of rated power,1000h,measured 24±2h after test	MIL-STD-202 Method 103	±0.2%	±0.5%
Low temp. storage	-65°C for 96h,measured 24±2h after test	IEC 60068-2-1	±0.1%	±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 20 minutes,acceleration 5g X-Y-Z direction°C12 cycles	MIL-STD-202 Method 204	±0.05%	±0.2%
Mechanical shock	100g,6ms,half-sine shock wave,3 times/direction,18 times measured 24±2h after test	MIL-STD-202 Method 107	±0.05%	±0.2%
Resistance to solvent	Immerse in solvent for 3 min and then wipe 10 times 3 cycles of 3 solvents,clean and dry at ambient temperature	MIL-STD-202 Method 215	Clear marking No visible damage	
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	
TCR	-55°C and +170°C,+20°C Ref.	IEC 60115-1 4.8	Within the nominal value range	
Substrate bending	2mm,for 60s	AEC-Q200-005	±0.01%	±0.1%
Terminal strength	Force 17.7N,hold for 60s	AEC-Q200-006	±0.01%	±0.1%
Low temp. operation	-55°C,no load for 1h,rated voltage load for 45 min,no load for 15 min	IEC 60115-1 4.36	±0.2%	±0.5%

TCR Test Chart-0.5mΩ



TCR Test Chart-1mΩ



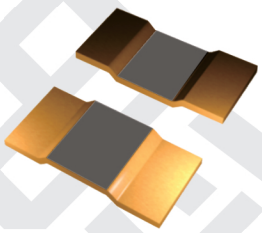
EBWK2512

Precision Trimming-free Alloy Current Sensor

TCR ⩽±100ppm/°C (-55~+170°C, +20°C Ref), tightest tolerance ±0.5%
No trimming&Non-hot-spot design, Low EMF
AEC-Q200 qualified

Introduction

This series is made from a precision Nickel-Chrome alloy and which is then precisely machined and welded using exclusive EB-Welding equipment designed and manufactured independently by C&B Group. The combination of excellent consistency of metal alloy, the precision machining capability and the efficient welding process allow the product to achieve a tight tolerance up to ±0.5% without trimming. The "Trimming Free" technology avoids the loss of rated current and the hot-spot due to notches in the trimming process, which greatly increases the reliability of the product. At the same time, the improved welding quality ensures very low EMF and high stability of the product. From the raw material to equipment and core process, whole process is strictly controlled inside of the house to make sure stable quality and timely delivery.



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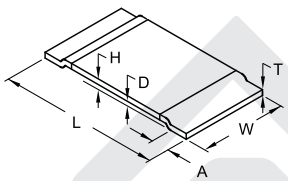
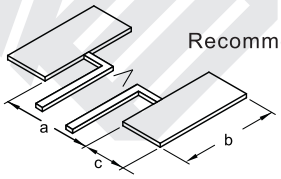
Specifications (mm)



Recommend solder pad



Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Material	Packaging
EBWK2512J2L00K9	2512	5W	2mΩ	±5%	⩽±100ppm/°C (-55~+170°C,+20°C Ref)	-65~+170°C	Nickel-Chrome	tape&reel 4000pcs/reel
EBWK2512F2L00K9				±1%				
EBWK2512D2L00K9				±0.5%				
EBWK2512J3L00K9		4W	3mΩ	±5%				
EBWK2512F3L00K9				±1%				
EBWK2512D3L00K9				±0.5%				

Dimensions

Size	Resistance	L	W	A	D	T	H	a	b	c
2512	2mΩ	6.3±0.2	3.0±0.2	1.0±0.2	0.35±0.1	0.6±0.1	0.95±0.2	3.9±0.25	3.4±0.25	1.8±0.25
	3mΩ	6.3±0.2	3.0±0.2	1.0±0.2	0.35±0.1	0.4±0.1	0.75±0.2	3.9±0.25	3.4±0.25	1.8±0.25

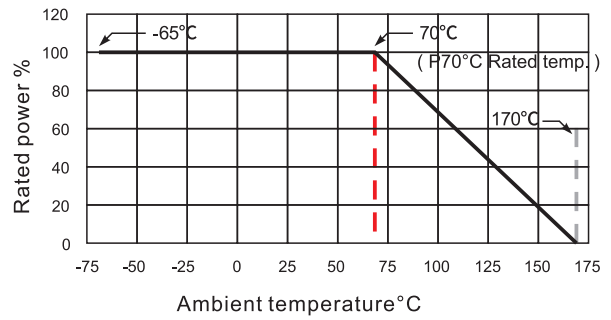
Part Number Information

Example: EBWK2512F2L00K9 (EBWK 2512 ±1% 2mΩ ±100ppm/℃ Standard)

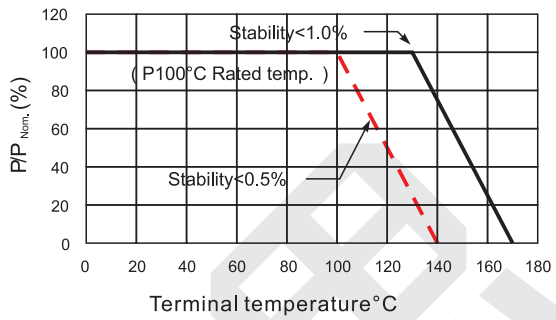
E	B	W	K	2	5	1	2	F	2	L	0	0	K	9

- Series: EBWK
- Size: 2512
- Tolerance: D=±0.5%, F=±1%, J=±5%
- Resistance: 2L00=2mΩ, 3L00=3mΩ
- TCR: K=±100ppm/℃
- Code: 9=Standard

Derating curve(Ambient temp.)



Derating curve(Terminal temp.)



Performance

Test Item	Test Method	Standard	Typical	Maximum
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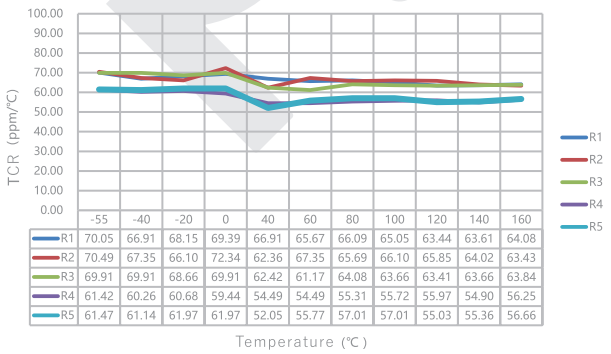
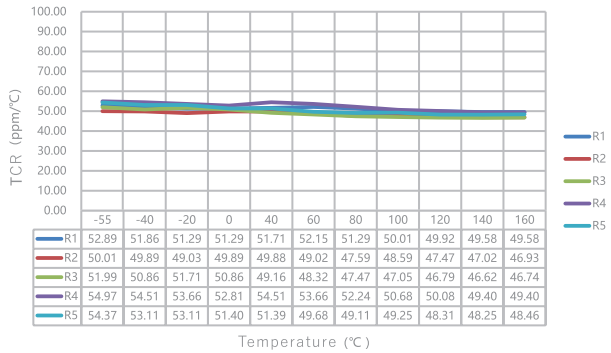
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	
TCR	-55°C and +170°C,+20°C Ref.	IEC 60115-1 4.8	Within the nominal value range	
Substrate bending	2mm,for 60s	AEC-Q200-005	±0.01%	±0.1%
Terminal strength	Force 17.7N,hold for 60s	AEC-Q200-006	±0.01%	±0.1%
Low temp. operation	-55°C,no load for 1h,rated voltage load for 45 min,no load for 15 min	IEC 60115-1 4.36	±0.2%	±0.5%

TCR Test Chart-2mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	70.05	66.91	68.15	69.39	66.91	65.67	66.09	65.05	63.44	63.61	64.08
R2	70.49	67.35	66.10	72.34	62.36	67.35	65.69	66.10	65.85	64.02	63.43
R3	69.91	69.91	68.66	69.91	62.42	61.17	64.08	63.66	63.41	63.66	63.84
R4	61.42	60.26	60.68	59.44	54.49	54.49	55.31	55.72	55.97	54.90	56.25
R5	61.47	61.14	61.97	61.97	52.05	55.77	57.01	57.01	55.03	55.36	56.66

TCR Test Chart-3mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	52.89	51.86	51.29	51.29	51.71	52.15	51.29	50.01	49.92	49.58	49.58
R2	50.01	49.89	49.03	49.89	49.88	49.02	47.59	48.59	47.47	47.02	46.93
R3	51.99	50.86	51.71	50.86	49.16	48.32	47.47	47.05	46.79	46.62	46.74
R4	54.97	54.51	53.66	52.81	54.51	53.66	52.24	50.68	50.08	49.40	49.40
R5	54.37	53.11	53.11	51.40	51.39	49.68	49.11	49.25	48.31	48.25	48.46

PEWF2512

High-Precision Low-TCR Alloy Current Sensor

TCR ⩽±25ppm/°C (-55~+170°C, +20°C Ref), tightest tolerance ±0.5%
No trimming&Non-hot-spot design, Low EMF
AEC-Q200 qualified

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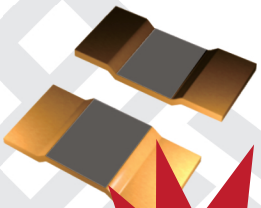
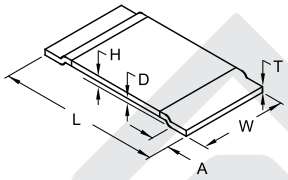
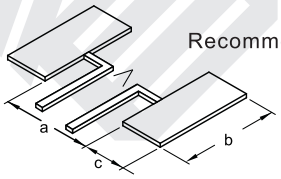


Specifications (mm)



Recommend solder pad



Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Material	Packaging
PEWF2512J2L00Q9	2512	5W	2mΩ	±5%	⩽±100ppm/°C (-55~+170°C,+20°C Ref)	-65~+170°C	Nickel-Chrome	tape&reel 4000pcs/reel
PEWF2512F2L00Q9				±1%				
PEWF2512D2L00Q9				±0.5%				

Dimensions

Size	L	W	A	D	T	H	a	b	c
2512	6.3±0.2	3.0±0.2	1.0±0.2	0.35±0.1	0.65±0.1	1.0±0.2	3.9±0.25	3.4±0.25	1.8±0.25

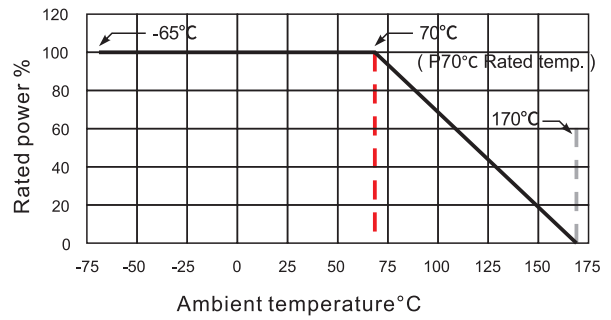
Part Number Information

Example: PEWF2512D2L00Q9 (PEWF 2512 ±0.5% 2mΩ ±50ppm/℃ Standard)

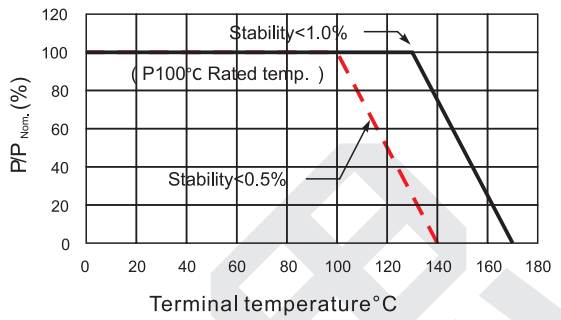
P	E	W	F	2	5	1	2	D	2	L	0	0	Q	9

- Series: PEWF
- Size: 2512
- Tolerance: D=±0.5%, F=±1%, J=±5%
- Resistance: 2L00=2mΩ
- TCR: Q=±50ppm/℃
- Code: 9=Standard

Derating curve(Ambient temp.)



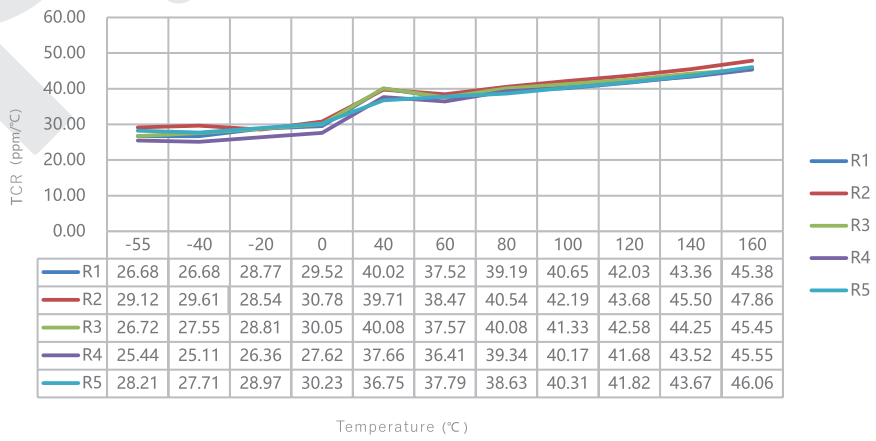
Derating curve(Terminal temp.)



Performance

Test Item	Test Method	Standard	Typical	Maximum
Short-time overload	5x rated power for 5s,measured 24±2h after test	MIL-STD-202 Method 201	±0.1%	±0.5%
Thermal shock	-55°C~+125°C,1000 cycles,measured 24±2h after test	JESD22 Method JA-104	±0.1%	±0.5%
Moisture resistance	T=24h/cycle,no load,7a and 7b not required,measured 24±2h after test	MIL-STD-202 Method 106	±0.2%	±0.5%
Load life	+70°C,2000h,rated power,measured 24±2h after test	MIL-STD-202 Method 108	±0.5%	±1.0%
Resistance to soldering heat	+260,±5°C,10s±1s,measured 24±2h after test	MIL-STD-202 Method 210	±0.2%	±0.5%
High temp. & high humidity	+85°C,85%RH,10% of rated power,1000h,measured 24±2h after test	MIL-STD-202 Method 103	±0.2%	±0.5%
Low temp. storage	-65°C for 96h,measured 24±2h after test	IEC 60068-2-1	±0.1%	±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 20 minutes,acceleration 5g X-Y-Z direction°C12 cycles	MIL-STD-202 Method 204	±0.05%	±0.2%
Mechanical shock	100g,6ms,half-sine shock wave,3 times/direction,18 times measured 24±2h after test	MIL-STD-202 Method 107	±0.05%	±0.2%
Resistance to solvent	Immerse in solvent for 3 min and then wipe 10 times 3 cycles of 3 solvents,clean and dry at ambient temperature	MIL-STD-202 Method 215	Clear marking No visible damage	
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	
TCR	-55°C and +170°C,+20°C Ref.	IEC 60115-1 4.8	Within the nominal value range	
Substrate bending	2mm,for 60s	AEC-Q200-005	±0.01%	±0.1%
Terminal strength	Force 17.7N,hold for 60s	AEC-Q200-006	±0.01%	±0.1%
Low temp. operation	-55°C,no load for 1h,rated voltage load for 45 min,no load for 15 min	IEC 60115-1 4.36	±0.2%	±0.5%

TCR Test Chart-2mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	26.68	26.68	28.77	29.52	40.02	37.52	39.19	40.65	42.03	43.36	45.38
R2	29.12	29.61	28.54	30.78	39.71	38.47	40.54	42.19	43.68	45.50	47.86
R3	26.72	27.55	28.81	30.05	40.08	37.57	40.08	41.33	42.58	44.25	45.45
R4	25.44	25.11	26.36	27.62	37.66	36.41	39.34	40.17	41.68	43.52	45.55
R5	28.21	27.71	28.97	30.23	36.75	37.79	38.63	40.31	41.82	43.67	46.06

DataSheet No: E16012
Version: V2
Date: 2023/08/09

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PEWM3920

High-Precision Low-Inductance Alloy Current Sensing Resistor

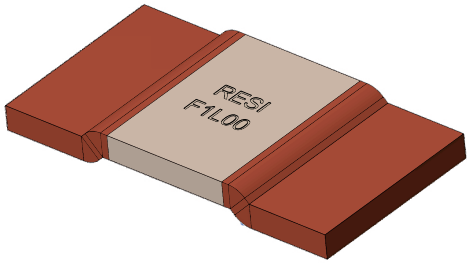
Resistance	0.3mΩ~1.0mΩ
Tolerance	±0.5%
TCR	≤±100ppm/℃
Rated Current	89A~182A

Applications

Automotive Electronics
Precision Power Supply
Sorting & Formation of Battery
Electric Tools
Medical Equipment

Better Solution for Sustainable High End Manufacturing

Low-Inductance Alloy Current Sensing Resistor
High Precision, Reliability & Stability



RoHS AEC-Q200 3D

Introduction

PEWM series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, PEWM achieves a maximum target tolerance of ± 0.5% after stamping without trimming. TCR of PEWM series within the temperature range of +20 ℃ to +170 ℃ is ≤ ±100ppm/℃. Inductance is < 3nH.

"Trimming Free" technology avoids the loss of rated current caused by trimming and also avoids current accumulation hotspots caused by trimmed notch, greatly improving the reliability of the product. Meanwhile, due to the improvement of welding quality, thermal EMF of the product is significantly reduced, improving its long-term stability.

PEWM series, from raw materials, core equipment, to core processes, achieves independent and controllable production, stable quality, and timely delivery. If the standard specifications cannot meet your needs, please contact our sales for consultation. Resi is committed to providing the best precision resistor solutions to meet the needs of customers in instrumentation, medical equipment, automotive electronics, precision power supplies, testing and measurement equipment and other fields.

Electrical Parameters

Size	Resistance	Rated Power (+70℃)	Max. Operating Current	Operating Temperature	TCR ppm/℃	Thermal Resistance*	Tolerance %
PEWM3920	0.3mΩ	10W	182A	-55℃~+170℃	≤±100 (+20℃~+170℃, 20℃Ref)	3.8℃/W	±0.5 ±1.0 ±5.0
PEWM3920	0.5mΩ	9W	134A	-55℃~+170℃	≤±100 (+20℃~+170℃, 20℃Ref)	6.3℃/W	±0.5 ±1.0 ±5.0
PEWM3920	1.0mΩ	8W	89A	-55℃~+170℃	≤±100 (+20℃~+170℃, 20℃Ref)	12.6℃/W	±0.5 ±1.0 ±5.0

* Thermal Resistance: Refer to the internal thermal resistance between the center of the resistive alloy and the copper electrode.
As the heat dissipation efficiency is influenced by operating environment, copper bus bars, PCB design, etc., this parameter is only for reference.

Applications

Inductance of PEWM3920 current sensing resistors is less than 3nH, suitable for AC, DC low and high frequency sampling circuits.

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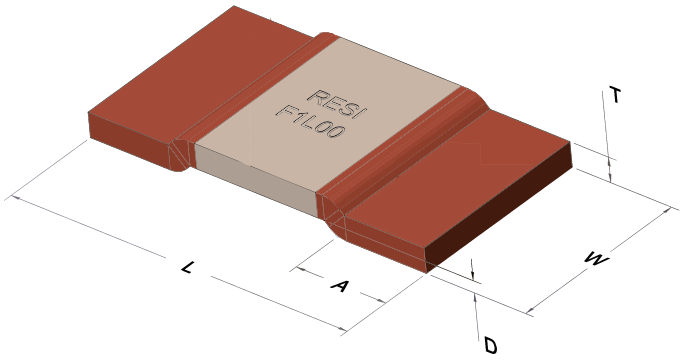
PEWM3920

High-Precision Low-Inductance Alloy Current Sensing Resistor

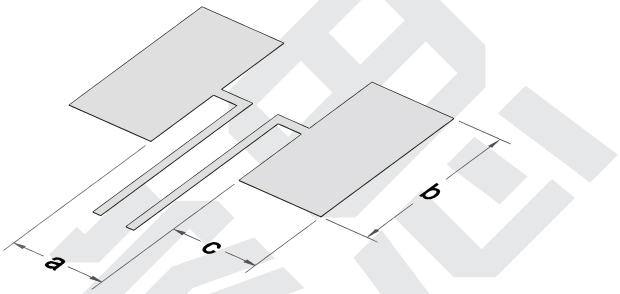
Dimensions

Unit: mm

Resistor



Solder Pad



Resistance	L	W	A	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
0.3mΩ	10.0±0.3	5.2±0.3	2.0±0.3	1.3±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000pcs	0.59±0.1g
0.5mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.8±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000pcs	0.36±0.1g
1.0mΩ	10.0±0.3	5.2±0.3	2.0±0.3	0.4±0.2	0.5±0.2	5.6±0.1	6.2±0.2	2.7±0.2	Tape&Reel	2000pcs	0.18±0.1g

Part Number Information

Example: PEWM3920F1L00K9 (PEWM 3920 ±1.0% 1.0mΩ ±100ppm/°C Standard)

P	E	W	M	3	9	2	0	F	1	L	0	0	K	9

Series	Size	Tolerance	Resistance	TCR	Code
PEWM	3920	D=±0.5% F=±1.0% J=±5.0%	L300=0.3mΩ L500=0.5mΩ 1L00=1.0mΩ	K=±100ppm/°C	9=Standard 0-8=Custom

For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

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PEWM3920

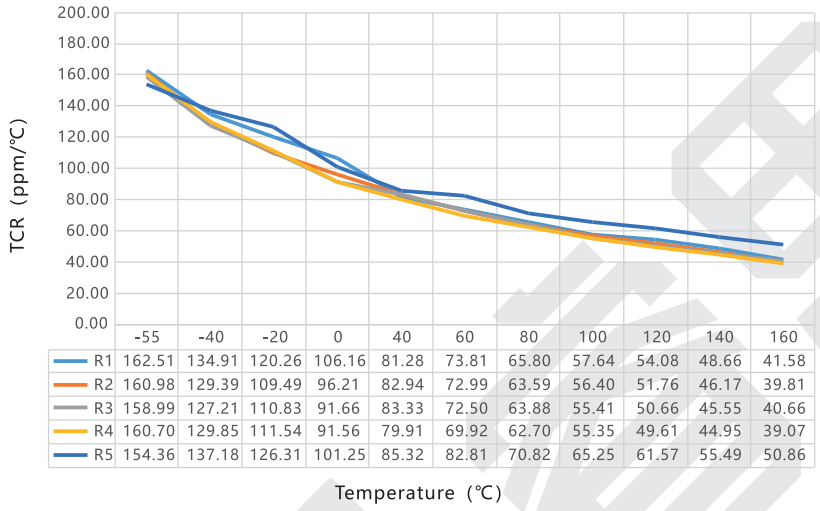
High-Precision Low-Inductance Alloy Current Sensing Resistor

Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	△R≤±0.1%	△R≤±0.5%
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	△R≤±0.2%	△R≤±0.5%
Load Life	2000h @ +70°C, rated power, 90min on，30min off +70℃ refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	△R≤±0.05%	△R≤±0.2%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	△R≤±0.05%	△R≤±0.2%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	△R≤±0.2%	△R≤±0.5%
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	+20℃ and +170℃, +20℃ Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, max. value ≤ 100ppm/℃	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	△R≤±0.01%	△R≤±0.1%
Short Time Overload	5x rated voltage, 5s	IEC 60115-1 4.13	△R≤±0.1%	△R≤±0.5%
Low Temperature Storage	-55℃ for 96h, unpowered	IEC 60068-2-1	△R≤±0.1%	△R≤±0.5%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	△R≤±0.1%	△R≤±0.5%

Temperature Coefficient of Resistance Test Curve

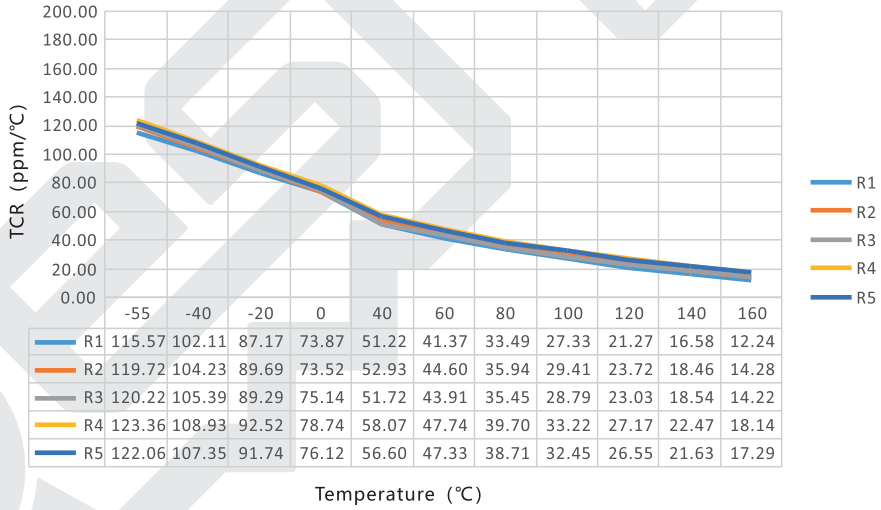
TCR Test Curve - PEWM3920 0.3mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	162.51	134.91	120.26	106.16	81.28	73.81	65.80	57.64	54.08	48.66	41.58
R2	160.98	129.39	109.49	96.21	82.94	72.99	63.59	56.40	51.76	46.17	39.81
R3	158.99	127.21	110.83	91.66	83.33	72.50	63.88	55.41	50.66	45.55	40.66
R4	160.70	129.85	111.54	91.56	79.91	69.92	62.70	55.35	49.61	44.95	39.07
R5	154.36	137.18	126.31	101.25	85.32	82.81	70.82	65.25	61.57	55.49	50.86

Temperature（℃）

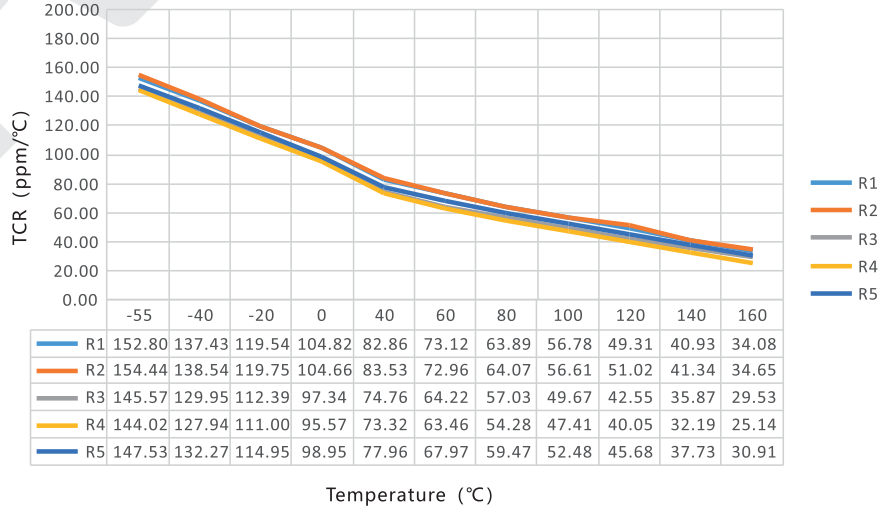
TCR Test Curve - PEWM3920 0.5mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	115.57	102.11	87.17	73.87	51.22	41.37	33.49	27.33	21.27	16.58	12.24
R2	119.72	104.23	89.69	73.52	52.93	44.60	35.94	29.41	23.72	18.46	14.28
R3	120.22	105.39	89.29	75.14	51.72	43.91	35.45	28.79	23.03	18.54	14.22
R4	123.36	108.93	92.52	78.74	58.07	47.74	39.70	33.22	27.17	22.47	18.14
R5	122.06	107.35	91.74	76.12	56.60	47.33	38.71	32.45	26.55	21.63	17.29

Temperature（℃）

TCR Test Curve - PEWM3920 1mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	152.80	137.43	119.54	104.82	82.86	73.12	63.89	56.78	49.31	40.93	34.08
R2	154.44	138.54	119.75	104.66	83.53	72.96	64.07	56.61	51.02	41.34	34.65
R3	145.57	129.95	112.39	97.34	74.76	64.22	57.03	49.67	42.55	35.87	29.53
R4	144.02	127.94	111.00	95.57	73.32	63.46	54.28	47.41	40.05	32.19	25.14
R5	147.53	132.27	114.95	98.95	77.96	67.97	59.47	52.48	45.68	37.73	30.91

Temperature（℃）

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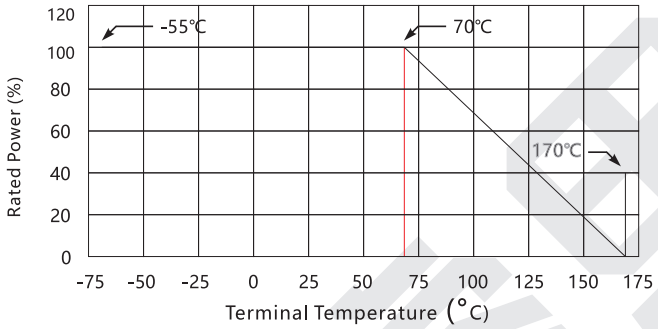
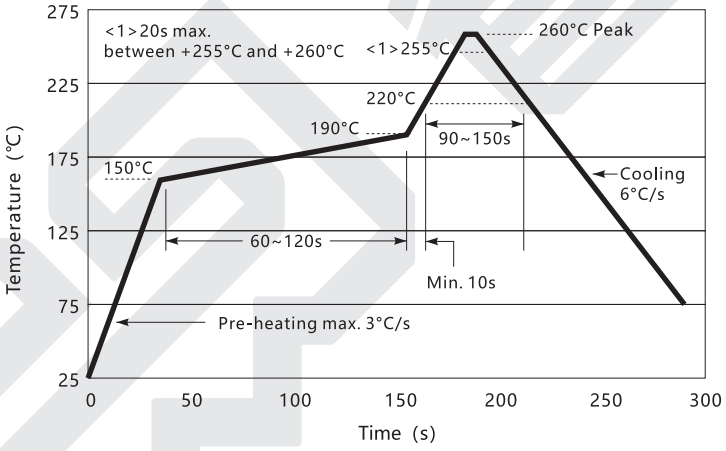
Derating Curve

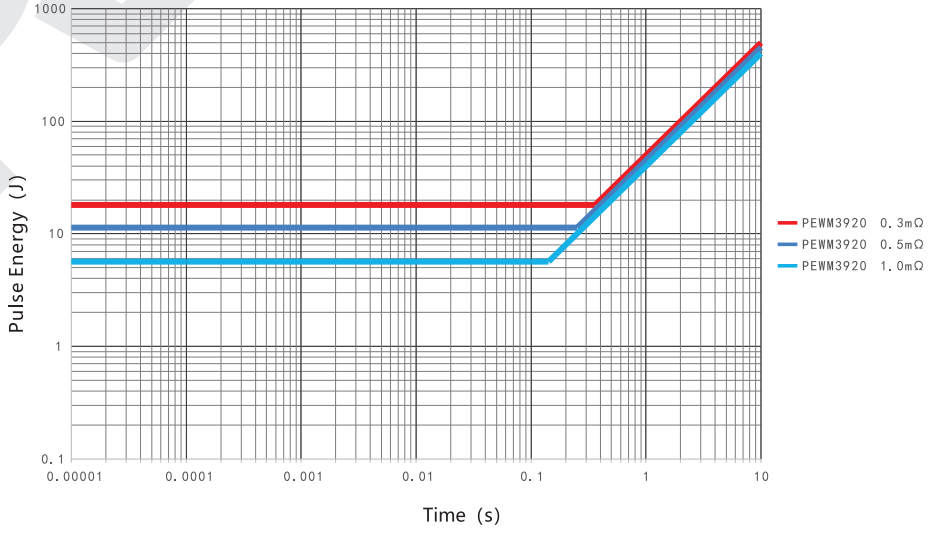


Reflow Soldering Profile

Resistor Surface Temperature:
Pre-Heat: +150℃~+190℃,60~120sec.
Reflow: Above +220℃,90~150sec.
Applicable Solder Composition: Sn-Ag-Cu



Maximum Pulse Energy Curve



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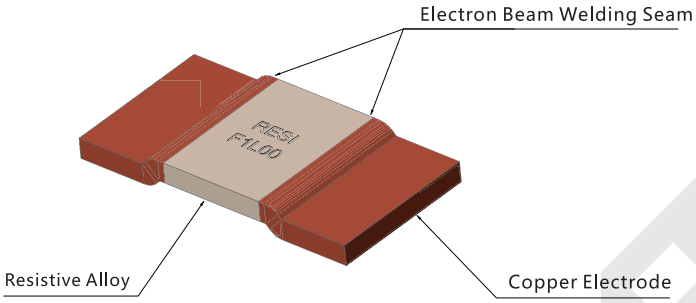
PEWM3920

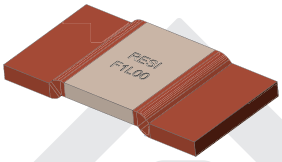
High-Precision Low-Inductance
Alloy Current Sensing Resistor

Construction



Marking

The first line (four digits) represents brand. The second line (five digits) represents tolerance and resistance.

Size	Illustration	Demonstration
3920		RESI: Brand F: Tolerance 1L00: Resistance

Storage Instructions

(1) Resistors should be stored at a temperature of 5 to 35 ℃, with a humidity of<60% RH. The humidity should be kept as low as possible.
(2) Resistors should be protected from direct sunlight.
(3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H2S, etc.)
(4) Do not move the resistor from the packaging unless use it.
(5) Under the above storage conditions, the resistor can be stored for at least 1 year.

Usage Suggestions

(1) Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
(2) Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
(3) When installing and using resistors, avoid the impact of mechanical stress on the resistor.
(4) The long-term operating power of resistors should be ≤ rated power to avoid resistance drift caused by long-term overload.
(5) Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
(6) If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
(7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.

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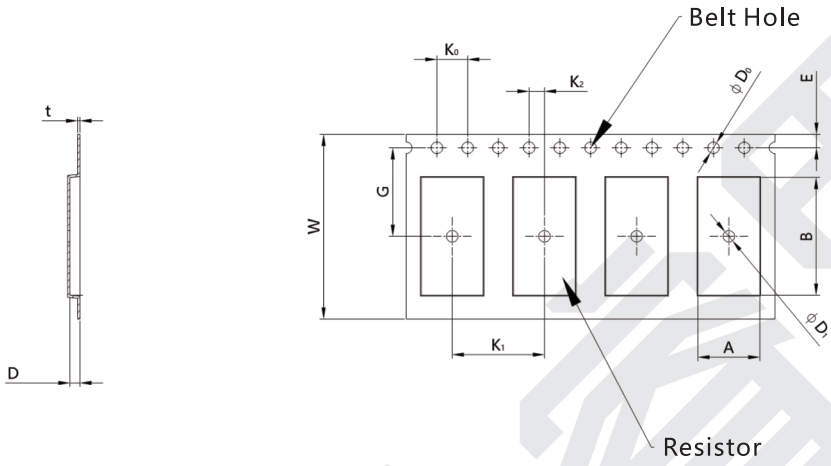
Packaging

Tape Specifications

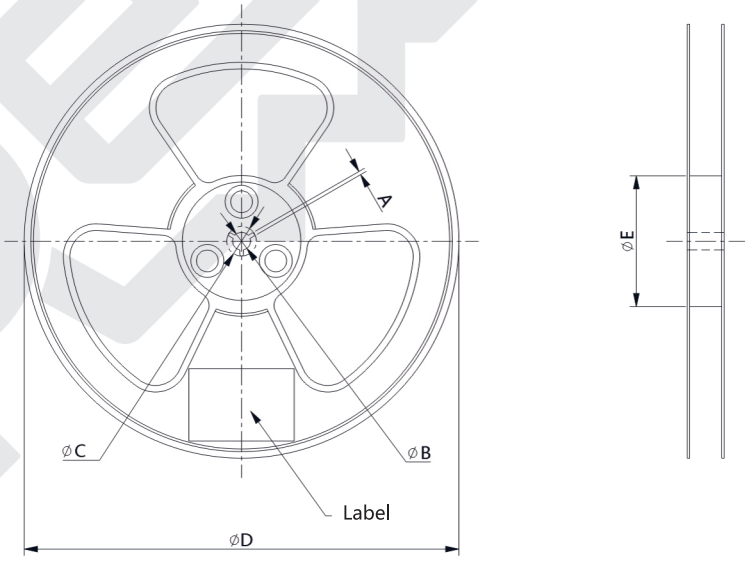
Unit: mm



Resistance	A	B	φD0	φD1	K0	K1	K2	E	G	W	D	t
0.3mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	2.1±0.1	0.3±0.05
0.5mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05
1.0mΩ	5.5±0.2	10.5±0.2	1.5±0.1	1.5±0.1	4.00±0.1	8.00±0.1	2.00±0.1	1.75±0.1	7.50±0.05	16.00±0.3	1.5±0.1	0.3±0.05

Reel Specifications

Unit: mm



A	φB	φC	φD	φE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

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PEWM3920

High-Precision Low-Inductance
Alloy Current Sensing Resistor

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Current
PEWM3920DL300K9	3920	±0.5%	0.3mΩ	≤±100ppm/℃	10.0W	182A
PEWM3920DL500K9	3920	±0.5%	0.5mΩ	≤±100ppm/℃	9.0W	134A
PEWM3920D1L00K9	3920	±0.5%	1.0mΩ	≤±100ppm/℃	8.0W	89A
PEWM3920FL300K9	3920	±1.0%	0.3mΩ	≤±100ppm/℃	10.0W	182A
PEWM3920FL500K9	3920	±1.0%	0.5mΩ	≤±100ppm/℃	9.0W	134A
PEWM3920F1L00K9	3920	±1.0%	1.0mΩ	≤±100ppm/℃	8.0W	89A
PEWM3920JL300K9	3920	±5.0%	0.3mΩ	≤±100ppm/℃	10.0W	182A
PEWM3920JL500K9	3920	±5.0%	0.5mΩ	≤±100ppm/℃	9.0W	134A
PEWM3920J1L00K9	3920	±5.0%	1.0mΩ	≤±100ppm/℃	8.0W	89A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2022.07.28	LWW
V1	Add TCR test curve	2022.10.28	LWW
V2	Add a new resistance 0.3mR; Change datasheet to the new template	2023.08.06	LWW

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DataSheet No.: E16017
Version: V0
Date: 2023/06/03

PEWM5930

High-Precision Low-Inductance Alloy Current Sensing Resistor

Resistance	0.5mΩ
Tolerance	±0.5%
TCR	≤±100ppm/℃
Rated Current	142A

Applications

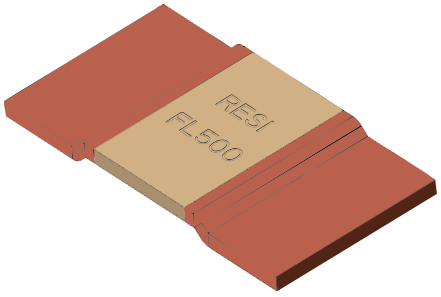
Automotive Electronics
Precision Power Supply
Instrumentation
Testing & Measurement Equipment
Medical Equipment

Better Solution for Sustainable High End Manufacturing

PEWM5930

High-Precision Low-Inductance
Alloy Current Sensing Resistor

Low-Inductance Alloy Current Sensing Resistor
High Precision, Reliability & Stability



RoHS AEC-Q200 3D

Introduction

PEWM series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, PEWM achieves a maximum target tolerance of ± 0.5% after stamping without trimming. TCR of PEWM series within the temperature range of +20 ℃ to +170 ℃ is ≤ ±100ppm/℃. Inductance is < 3nH.

"Trimming Free" technology avoids the loss of rated current caused by trimming and also avoids current accumulation hotspots caused by trimmed notch, greatly improving the reliability of the product. Meanwhile, due to the improvement of welding quality, thermal EMF of the product is significantly reduced, improving its long-term stability.

PEWM series, from raw materials, core equipment, to core processes, achieves independent and controllable production, stable quality, and timely delivery. If the standard specifications cannot meet your needs, please contact our sales for consultation. Resi is committed to providing the best precision resistor solutions to meet the needs of customers in instrumentation, medical equipment, automotive electronics, precision power supplies, testing and measurement equipment and other fields.

Electrical Parameters

Size	Resistance	Rated Power (+70℃)	Max. Operating Current	Operating Temperature	Tolerance
PEWM5930	0.5mΩ	10W	142A	-55~+170℃	±0.5% ±1% ±5%

TCR ppm/℃	Thermal Resistance*	Inductance	Technology	Welding Tech.	Formation
≤±100ppm/℃ (20℃~+170℃，20℃Ref)	7.5℃/W	<3nH	Trimming Free	Electron Beam Welding	Stamping

* Thermal Resistance: Refer to the internal thermal resistance between the center of the resistive alloy and the copper electrode.
As the heat dissipation efficiency is influenced by operating environment, copper bus bars, PCB design, etc., this parameter is only for reference.

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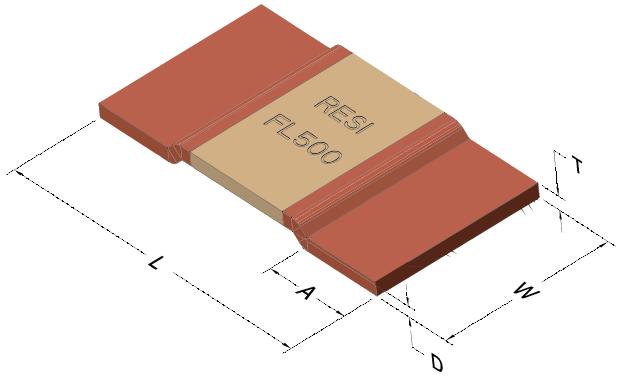
PEWM5930

High-Precision Low-Inductance Alloy Current Sensing Resistor

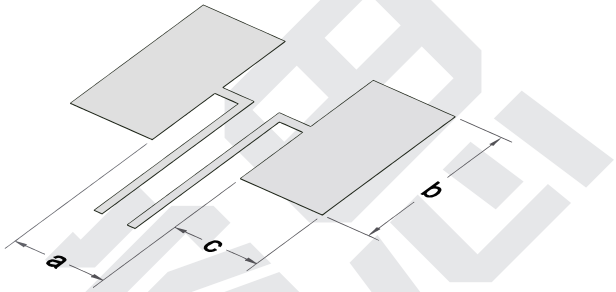
Dimensions

Unit: mm

Resistor



Solder Pad



Resistance	L	W	A	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
0.5mΩ	15.0±0.3	7.75±0.3	3.8±0.3	0.65±0.2	0.5±0.2	5.6±0.1	8.75±0.2	5.2±0.2	Tape&Reel	2000pcs	0.66±0.1g

Part Number Information

Example: PEWM5930FL500K9 (PEWM 5930 ±1.0% 0.5mΩ ±100ppm/°C Standard)

P	E	W	M	5	9	3	0	F	L	5	0	0	K	9

Series	Size	Tolerance	Resistance	TCR	Code
PEWM	5930	D=±0.5% F=±1.0% J=±5.0%	L500=0.5mΩ	K=±100ppm/℃	9=Standard 0-8=Custom

For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

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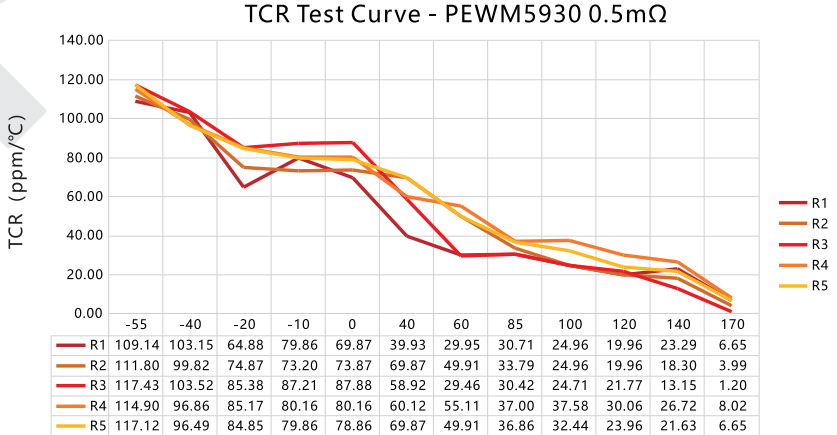
PEWM5930

High-Precision Low-Inductance Alloy Current Sensing Resistor

Performance

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	△R≤±0.1%	△R≤±0.5%
Bias Humidity	+85°C, 85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	△R≤±0.2%	△R≤±0.5%
Load Life	2000h @ +70°C, rated power, 90min on，30min off +70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	△R≤±0.05%	△R≤±0.2%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	△R≤±0.05%	△R≤±0.2%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	△R≤±0.2%	△R≤±0.5%
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	+20°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, max. value ≤ 100ppm/°C	
Substrate Bending	2mm. Duration: 60s.	AEC-Q200 TEST 21 AEC-Q200-005	△R≤±0.01%	△R≤±0.1%
Short Time Overload	5x rated voltage, 5s	IEC 60115-1 4.13	△R≤±0.1%	△R≤±0.5%
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	△R≤±0.1%	△R≤±0.5%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	△R≤±0.1%	△R≤±0.5%

Temperature Coefficient of Resistance Test Curve



	-55	-40	-20	-10	0	40	60	85	100	120	140	170
R1	109.14	103.15	64.88	79.86	69.87	39.93	29.95	30.71	24.96	19.96	23.29	6.65
R2	111.80	99.82	74.87	73.20	73.87	69.87	49.91	33.79	24.96	19.96	18.30	3.99
R3	117.43	103.52	85.38	87.21	87.88	58.92	29.46	30.42	24.71	21.77	13.15	1.20
R4	114.90	96.86	85.17	80.16	80.16	60.12	55.11	37.00	37.58	30.06	26.72	8.02
R5	117.12	96.49	84.85	79.86	78.86	69.87	49.91	36.86	32.44	23.96	21.63	6.65

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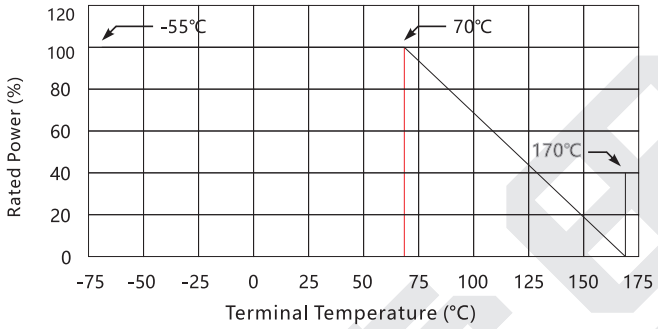
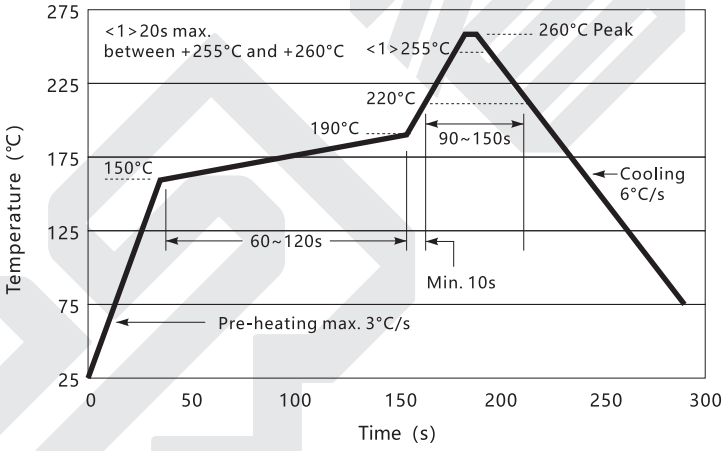
Derating Curve

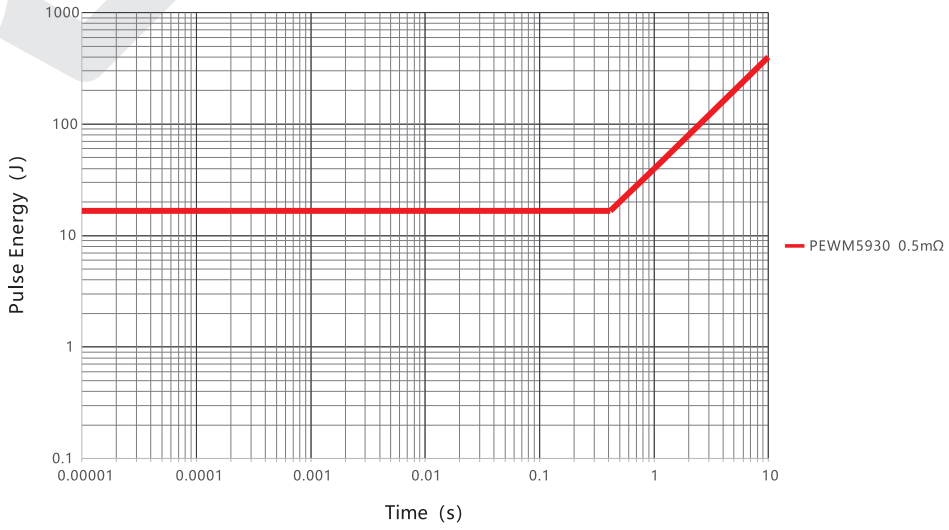


Reflow Soldering Profile

Resistor Surface Temperature:
Pre-Heat: +150℃~+190℃,60~120sec.
Reflow: Above +220℃,90~150sec.
Applicable Solder Composition: Sn-Ag-Cu



Maximum Pulse Energy Curve



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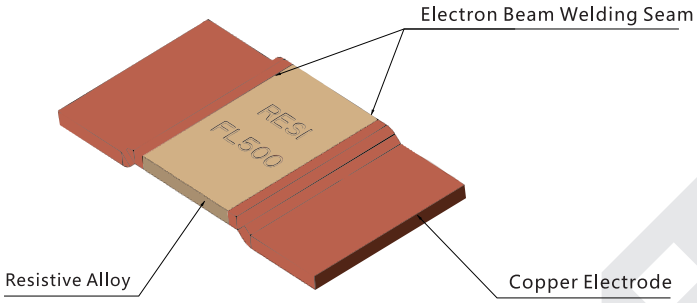
PEWM5930

High-Precision Low-Inductance Alloy Current Sensing Resistor

Construction



Marking

The first line (four digits) represents brand. The second line (five digits) represents tolerance and resistance.

Size	Illustration	Demonstration
5930		RESI: Brand F: Tolerance L500: Resistance

Storage Instructions

(1) Resistors should be stored at a temperature of 5 to 35 ℃, with a humidity of<60% RH. The humidity should be kept as low as possible.
(2) Resistors should be protected from direct sunlight.
(3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H2S, etc.)
(4) Do not move the resistor from the packaging unless use it.
(5) Under the above storage conditions, the resistor can be stored for at least 1 year.

Usage Suggestions

(1) Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
(2) Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
(3) When installing and using resistors, avoid the impact of mechanical stress on the resistor.
(4) The long-term operating power of resistors should be ≤ rated power to avoid resistance drift caused by long-term overload.
(5) Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
(6) If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
(7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.

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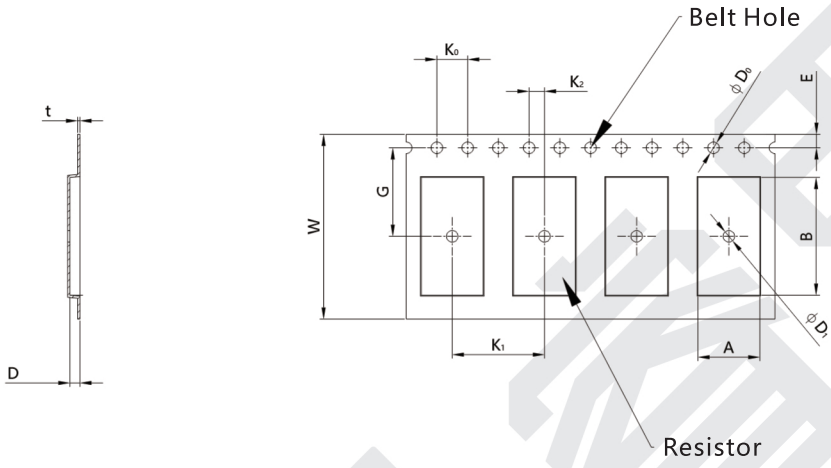
Packaging

Tape Specifications

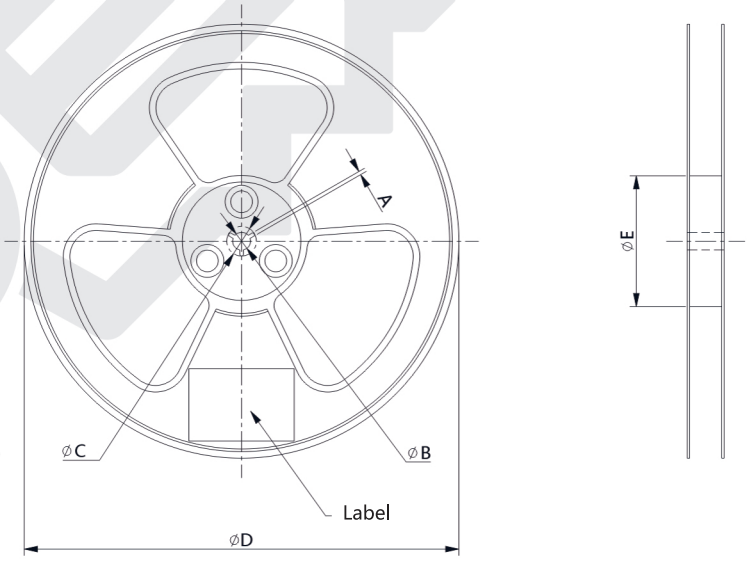
Unit: mm



Resistance	A	B	φD0	φD1	K0	K1	K2	E	G	W	D	t
0.5mΩ	8.05±0.2	15.30±0.2	1.5±0.1	1.5±0.1	4.00±0.1	12.00±0.1	2.00±0.1	1.75±0.1	11.50±0.05	24.00±0.3	1.3±0.1	0.3±0.05

Reel Specifications

Unit: mm



A	φB	φC	φD	φE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

PEWM5930

High-Precision Low-Inductance
Alloy Current Sensing Resistor

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	TCR	Power	Max. Operating Current
PEWM5930DL500K9	5930	±0.5%	0.5mΩ	≤±100ppm/℃	10.0W	142A
PEWM5930FL500K9	5930	±1%	0.5mΩ	≤±100ppm/℃	10.0W	142A
PEWM5930JL500K9	5930	±5%	0.5mΩ	≤±100ppm/℃	10.0W	142A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023.06.03	LWW

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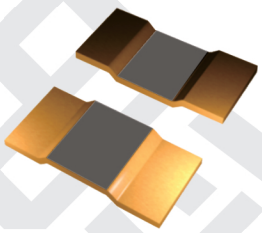
TCR ≤±50ppm/°C (-55~+170°C, +20°C Ref), tightest tolerance ±0.5%
No trimming&Non-hot-spot design, Low EMF
AEC-Q200 qualified

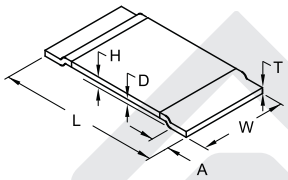
Introduction

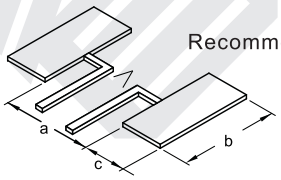


This series is made from a precision Nickel-Chrome alloy and which is then precisely machined and welded using exclusive EB-Welding equipment designed and manufactured independently by C&B Group. The combination of excellent consistency of metal alloy, the precision machining capability and the efficient welding process allow the product to achieve a tight tolerance up to ±0.5% without trimming. The "Trimming Free" technology avoids the loss of rated current and the hot-spot due to notches in the trimming process, which greatly increases the reliability of the product. At the same time, the improved welding quality ensures very low EMF and high stability of the product. From the raw material to equipment and core process, whole process is strictly controlled inside of the house to make sure stable quality and timely delivery.

This series is ideal for high current sensing circuits which ask for high precision at the same time. Visit www.resistor.today to learn more.

Specifications (mm)





Series	Size	Rated Power	Resistance range	Tolerance	TCR	Operating temp	Material	Packaging
PEWK3920J2L00Q9	3920	6W	2mΩ	±5%	≤±50ppm/°C (-55~+170°C,20+°C Ref)	-65~+170°C	Nickel-Chrome	tape&reel 2000pcs/reel
PEWK3920F2L00Q9				±1%				
PEWK3920D2L00Q9				±0.5%				
PEWK3920J3L00Q9		5W	3mΩ	±5%				
PEWK3920F3L00Q9				±1%				
PEWK3920D3L00Q9				±0.5%				

Dimensions

Size	Resistance	L	W	A	D	T	H	a	b	c
3920	2mΩ	10.0±0.3	5.2±0.3	2.0±0.2	0.5±0.1	0.6±0.1	1.1±0.2	5.6±0.1	6.2±0.2	2.7±0.2
	3mΩ	10.0±0.3	5.2±0.3	2.0±0.2	0.5±0.1	0.4±0.1	0.9±0.2	5.6±0.1	6.2±0.2	2.7±0.2

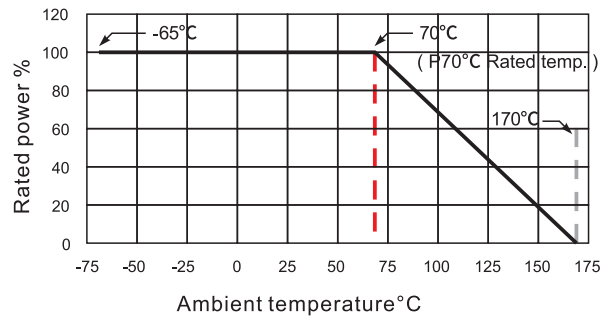
Part Number Information

Example: PEWK3920F2L00Q9 (PEWK 3920 ±1% 2mΩ ±50ppm/℃ Standard)

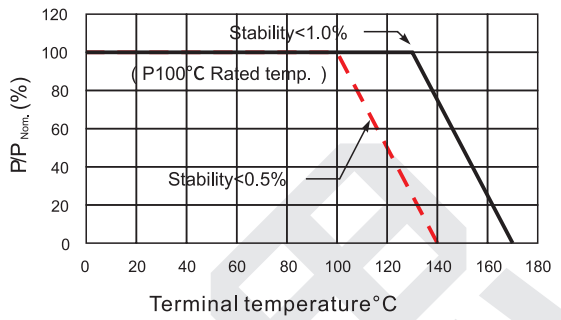
P	E	W	K	3	9	2	0	F	2	L	0	0	Q	9

- Series: PEWK
- Size: 3920
- Tolerance: D=±0.5%, F=±1%, J=±5%
- Resistance: 2L00=2mΩ, 3L00=3mΩ
- TCR: Q=±50ppm/℃
- Code: 9=Standard

Derating curve(Ambient temp.)



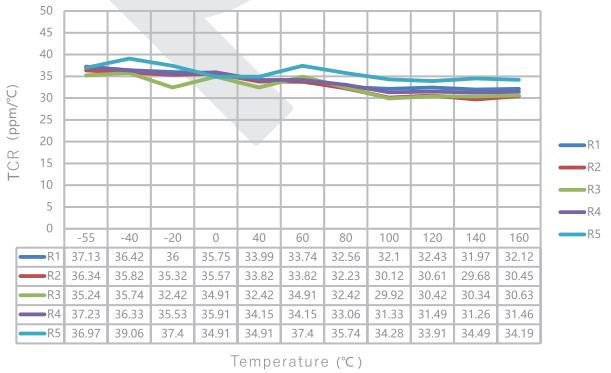
Derating curve(Terminal temp.)



Performance

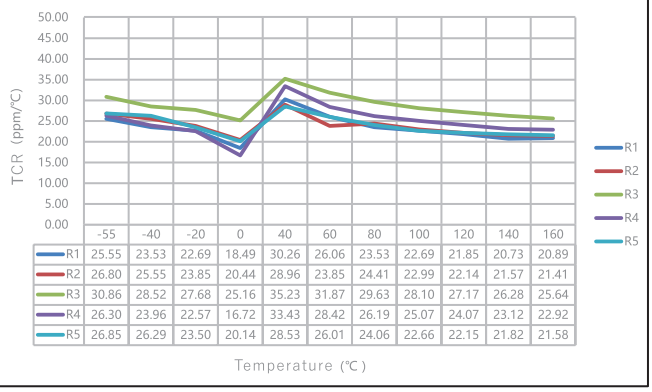
Test Item	Test Method	Standard	Typical	Maximum
Short-time overload	5x rated power for 5s,measured 24±2h after test	MIL-STD-202 Method 201	±0.1%	±0.5%
Thermal shock	-55°C~+125°C,1000 cycles,measured 24±2h after test	JESD22 Method JA-104	±0.1%	±0.5%
Moisture resistance	T=24h/cycle,no load,7a and 7b not required,measured 24±2h after test	MIL-STD-202 Method 106	±0.2%	±0.5%
Load life	+70°C,2000h,rated power,measured 24±2h after test	MIL-STD-202 Method 108	±0.5%	±1.0%
Resistance to soldering heat	+260,±5°C,10s±1s,measured 24±2h after test	MIL-STD-202 Method 210	±0.2%	±0.5%
High temp. & high humidity	+85°C,85%RH,10% of rated power,1000h,measured 24±2h after test	MIL-STD-202 Method 103	±0.2%	±0.5%
Low temp. storage	-65°C for 96h,measured 24±2h after test	IEC 60068-2-1	±0.1%	±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 20 minutes,acceleration 5g X-Y-Z direction°C12 cycles	MIL-STD-202 Method 204	±0.05%	±0.2%
Mechanical shock	100g,6ms,half-sine shock wave,3 times/direction,18 times measured 24±2h after test	MIL-STD-202 Method 107	±0.05%	±0.2%
Resistance to solvent	Immerse in solvent for 3 min and then wipe 10 times 3 cycles of 3 solvents,clean and dry at ambient temperature	MIL-STD-202 Method 215	Clear marking No visible damage	
Solderability	+235°C±5°C,2s±0.5s	J-STD-202	95% coverd	
TCR	-55°C and +170°C,+20°C Ref.	IEC 60115-1 4.8	Within the nominal value range	
Substrate bending	2mm,for 60s	AEC-Q200-005	±0.01%	±0.1%
Terminal strength	Force 17.7N,hold for 60s	AEC-Q200-006	±0.01%	±0.1%
Low temp. operation	-55°C,no load for 1h,rated voltage load for 45 min,no load for 15 min	IEC 60115-1 4.36	±0.2%	±0.5%

TCR Test Chart-2mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	37.13	36.42	36	35.75	33.99	33.74	32.56	32.1	32.43	31.97	32.12
R2	36.34	35.82	35.32	35.57	33.82	33.82	32.23	30.12	30.61	29.68	30.45
R3	35.24	35.74	32.42	34.91	32.42	34.91	32.42	29.92	30.42	30.34	30.63
R4	37.23	36.33	35.53	35.91	34.15	34.15	33.06	31.33	31.49	31.26	31.46
R5	36.97	39.06	37.4	34.91	34.91	37.4	35.74	34.28	33.91	34.49	34.19

TCR Test Chart3mΩ



	-55	-40	-20	0	40	60	80	100	120	140	160
R1	25.55	23.53	22.69	18.49	30.26	26.06	23.53	22.69	21.85	20.73	20.89
R2	26.80	25.55	23.85	20.44	28.96	23.85	24.41	22.99	22.14	21.57	21.41
R3	30.86	28.52	27.68	25.16	35.23	31.87	29.63	28.10	27.17	26.28	25.64
R4	26.30	23.96	22.57	16.72	33.43	28.42	26.19	25.07	24.07	23.12	22.92
R5	26.85	26.29	23.50	20.14	28.53	26.01	24.06	22.66	22.15	21.82	21.58

Data Sheet No.: C05016
Version: V0
Date: 2023/09/09

睿思

EOAR

High Precision Alloy Current Sensing Resistor

Resistance	25mΩ
Tolerance	±0.5%
TCR	±40ppm/℃
Rated Current	14A

Applications

Automotive Electronics
Precision Power Supply
Instrumentation
Battery Sorting & Formation
Medical Equipment

Better Solution for Sustainable High End Manufacturing

High Precision Alloy Current Sensing Resistor
High Precision, High Reliability & High Stability

AEC-Q200

Introduction

EOAR series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, EOAR achieves a maximum target tolerance of ± 0.5% after stamping without trimming. TCR of EOAR series within the temperature range of +20 ℃ to +170 ℃ is ≤ ± 40ppm/℃.

"Trimming Free" technology avoids the loss of rated current caused by trimming and also avoids current accumulation hotspots caused by trimmed notch, greatly improving the reliability of the product. Meanwhile, due to the improvement of welding quality, thermal EMF of the product is significantly reduced, improving its long-term stability.

EOAR series, from raw materials, core equipment, to core processes, achieves independent and controllable production, stable quality, and timely delivery. If the standard specifications cannot meet your needs, please contact our sales for consultation.

Electrical Parameters

Series	Resistance	Rated Power (+70℃)	Max. Operating Current	Operating Temperature	TCR ppm/℃	Tolerance %
EOAR	25mΩ	5W	14A	-55℃~+170℃	±40 (+20℃~+170℃，20℃Ref)	±0.5 ±1.0 ±5.0

Applications

EOAR series is only applicable to DC low-frequency sampling circuit. If needs of AC or high-frequency applications are present, please contact us.

Part Number Information

Example：EOAR0005FR025H9 (EOAR 5W ±1.0% 25mΩ ±40ppm/°C Standard)

E	O	A	R	0	0	0	5	F	R	0	2	5	H	9

Series
EOAR

Power
5W

Tolerance
D=±0.5%
F=±1.0%
J=±5.0%

Resistance
R025=25mΩ

TCR
H=±40ppm/℃

Code
9=Standard
0-8=Custom

For higher/lower resistance, tighter tolerance, higher power, lower TCR and larger size, please contact us.

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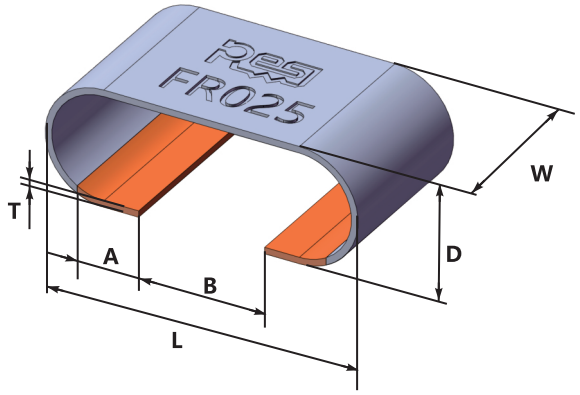
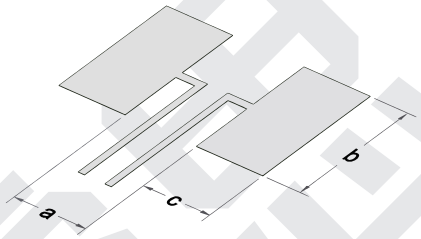
Dimensions

Unit: mm

Resistor



Recommended Solder Pad Size

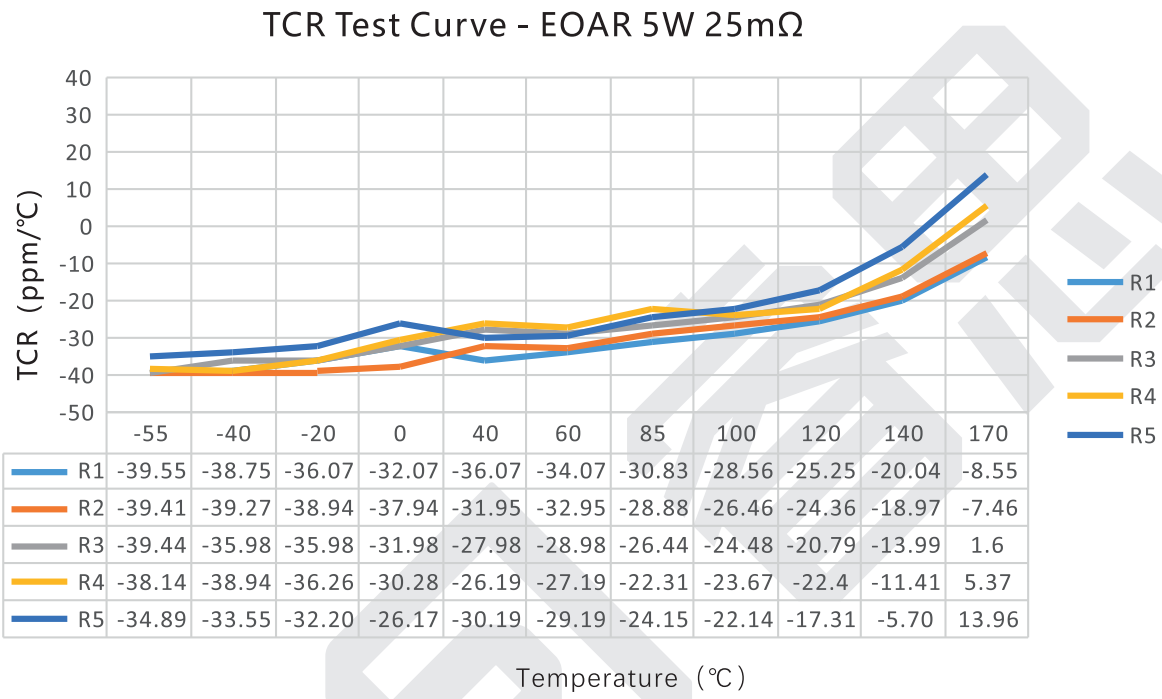


Resistance	L	W	A	B	T	D	a	b	c	Packaging	Quantity Per Reel	Net Weight
25mΩ	12±0.38	6.35±0.38	2.36±0.25	4.83±0.76	0.25	4.5±0.76	3.23	7.24	3.18	Tape&Reel	1200	0.22±0.1g

Performance

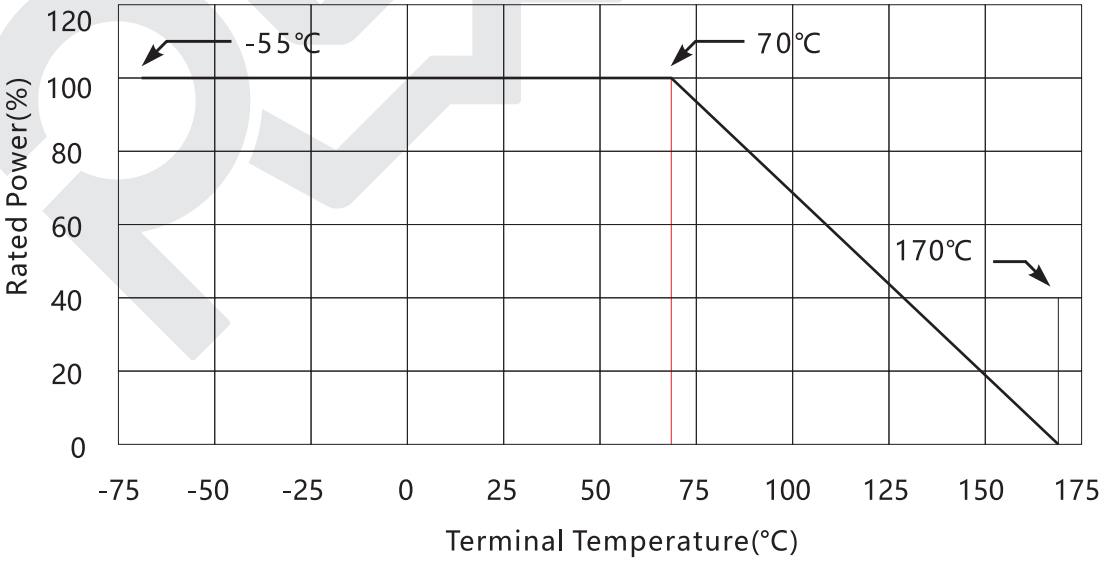
Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, no load	AEC-Q200 TEST 3 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+155°C, 15min, 1000 Cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	△R≤±0.2%	△R≤±0.75%
Bias Humidity	+85°C, 85%RH, load 10% rated power, 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	△R≤±0.2%	△R≤±0.5%
Load Life	2000h @ +70°C, rated power, 90min on, 30min off +70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	△R≤±0.5%	△R≤±1.0%
Resistance to Solvent	Immerse in solvent for 3 min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	△R≤±0.05%	△R≤±0.5%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	△R≤±0.05%	△R≤±0.5%
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	△R≤±0.2%	△R≤±0.5%
Solderability	+235°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	+20°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to tested curve, max. value ≤ 40ppm/°C	
Short Time Overload	5 times rated voltage, 5s	IEC 60115-1 4.13	△R≤±0.2%	△R≤±1.0%
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	△R≤±0.1%	△R≤±0.5%

Temperature Coefficient of Resistance Test Curve



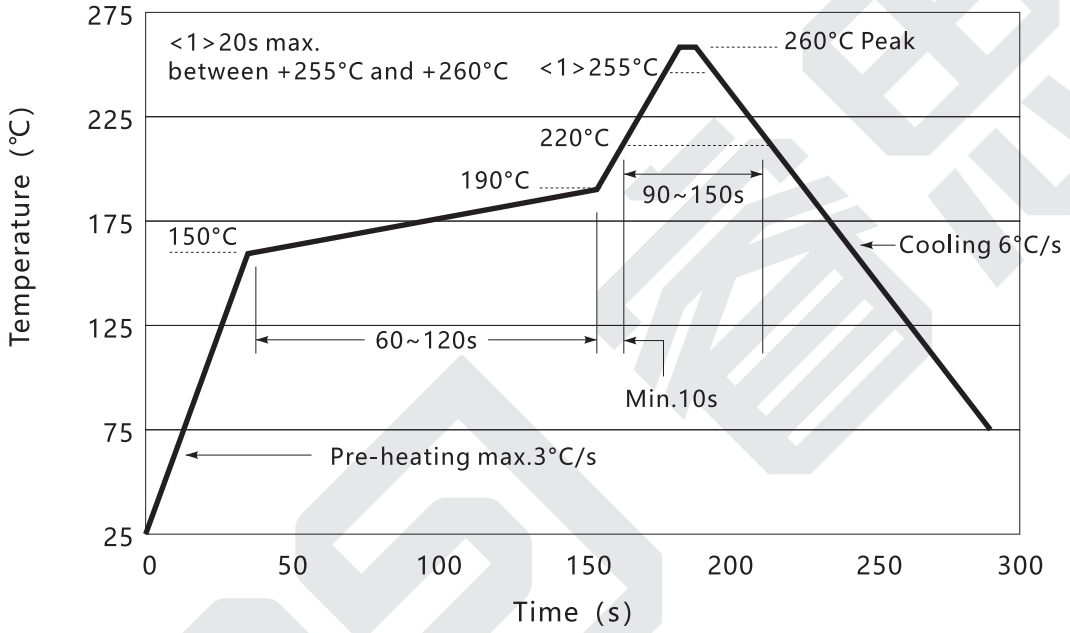
	-55	-40	-20	0	40	60	85	100	120	140	170
R1	-39.55	-38.75	-36.07	-32.07	-36.07	-34.07	-30.83	-28.56	-25.25	-20.04	-8.55
R2	-39.41	-39.27	-38.94	-37.94	-31.95	-32.95	-28.88	-26.46	-24.36	-18.97	-7.46
R3	-39.44	-35.98	-35.98	-31.98	-27.98	-28.98	-26.44	-24.48	-20.79	-13.99	1.6
R4	-38.14	-38.94	-36.26	-30.28	-26.19	-27.19	-22.31	-23.67	-22.4	-11.41	5.37
R5	-34.89	-33.55	-32.20	-26.17	-30.19	-29.19	-24.15	-22.14	-17.31	-5.70	13.96

Derating Curve

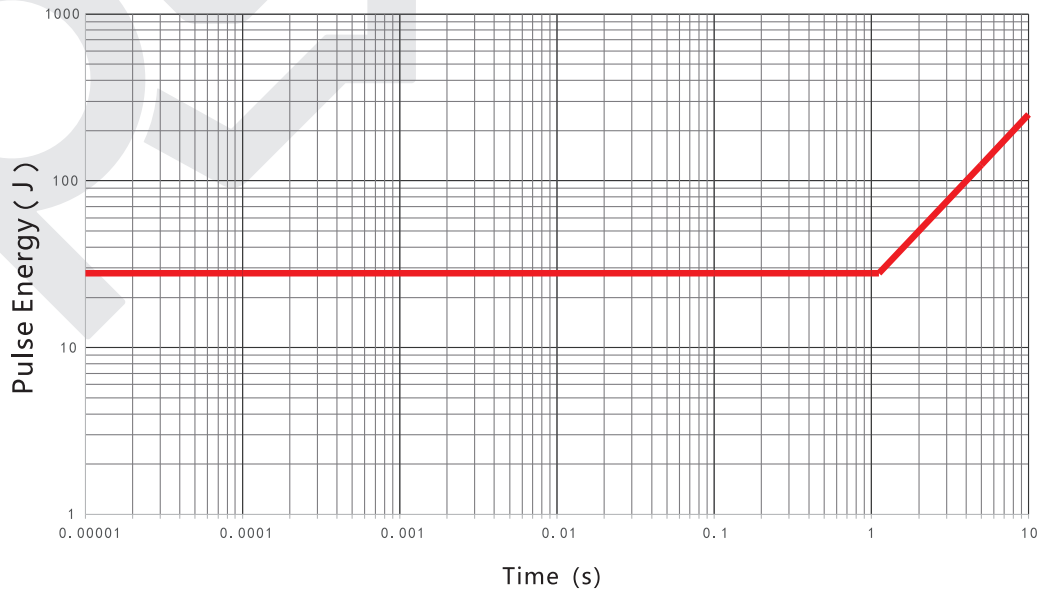


Reflow Soldering Profile

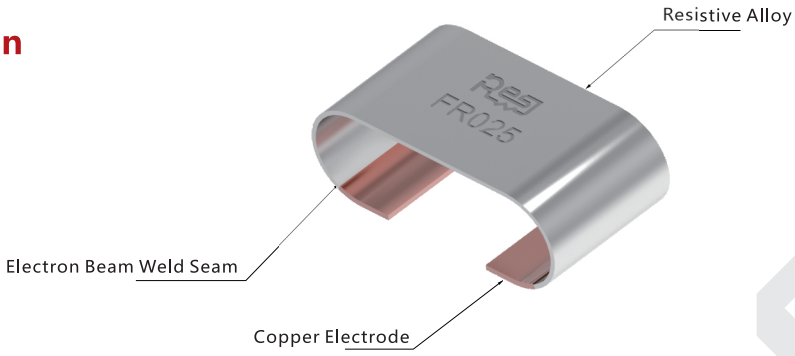
Resistor Surface Temperature:
Pre-Heat: +150℃~+190℃, 60~120sec.
Reflow: Above +220℃, 90~150sec.
Applicable Solder Composition: Sn-Ag-Cu



Maximum Pulse Energy Curve



Construction



Marking

The first line (four digits) represents brand. The second line (five digits) represents tolerance and resistance.

Series	Illustration	Demonstration
EOAR		RESI: Brand F: Tolerance R025: Resistance

Storage Instructions

(1) Resistors should be stored at a temperature of 5 to 35 ℃, with a humidity of<60% RH. The humidity should be kept as low as possible.
(2) Resistors should be protected from direct sunlight.
(3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H2S, etc.)
(4) Do not move the resistor from the packaging unless use it.
(5) Under the above storage conditions, the resistor can be stored for at least 1 year.

Usage Suggestions

(1) Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
(2) Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
(3) When installing and using resistors, avoid the impact of mechanical stress on the resistor.
(4) The long-term operating power of resistors should be ≤ rated power to avoid resistance drift caused by long-term overload.
(5) Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
(6) If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
(7) If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor welding caused by oxidation of the resistor.

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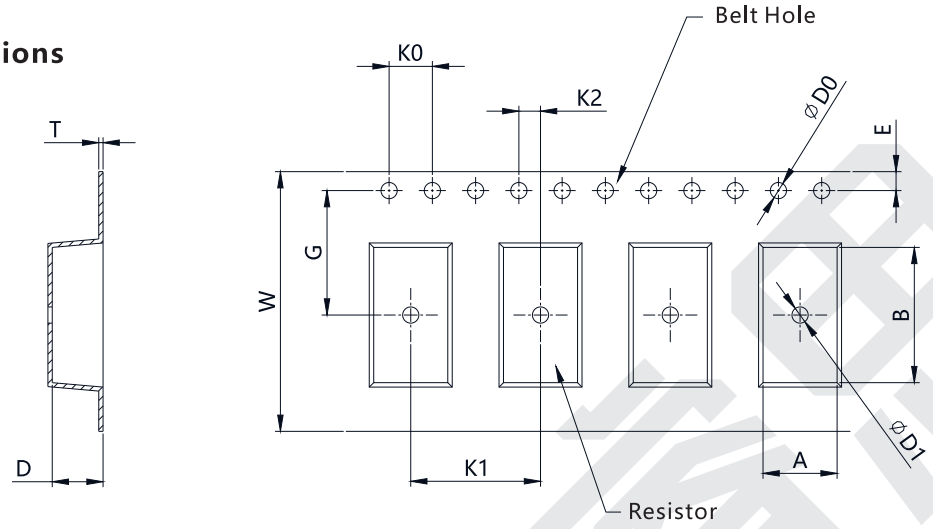
Packaging

Tape Specifications

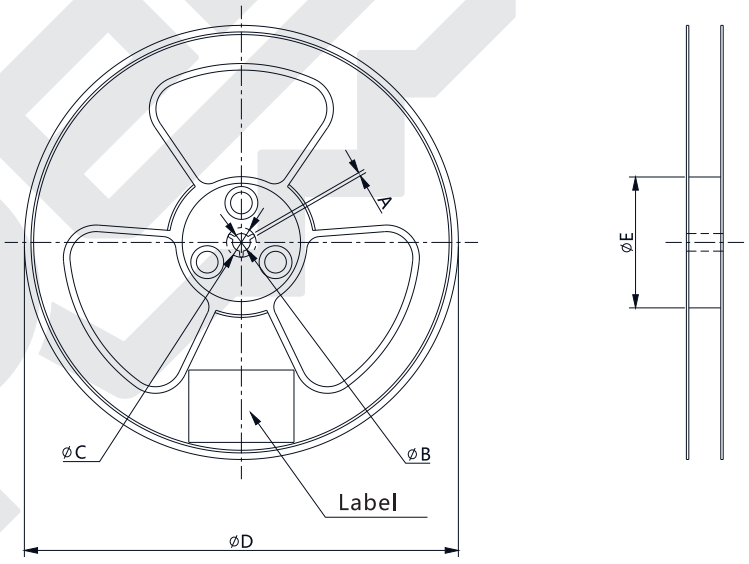
Unit: mm



Resistance	A	B	φD0	φD1	K0	K1	K2	E	G	W	D	T
25mΩ	6.85±0.1	12.50±0.1	1.5+0.1/-0	1.5+0.1/-0	4.00±0.1	12.00±0.1	2.00±0.1	1.75±0.1	11.50±0.1	24.00±0.3	4.7±0.1	0.4±0.05

Reel Specifications

Unit: mm



A	φB	φC	φD	φE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

Popular Part Numbers

Part Number	Tolerance	Resistance	TCR	Power	Max. Operating Current
EOAR0005DR025H9	±0.5%	25mΩ	±40ppm/℃	5W	14A
EOAR0005FR025H9	±1%	25mΩ	±40ppm/℃	5W	14A
EOAR0005JR025H9	±5%	25mΩ	±40ppm/℃	5W	14A

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023.09.09	LWW

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CB350

Automotive Grade Current Sensor

Rated Sensing Current Range

-8000A~+8000A

Continuous Sensing Current Range

-350A~+350A

+20A~+350A or -350A~-20A
Current Measurement Accuracy:±0.5%

-350A~+350A
Resolution:10mA

Temperature Measurement Range

-50°C~+150°C

Communication

CAN2.0 A/B

Temperature Range

6V~18V

Operating Temperature Range

-40°C~+105°C

Power Consumption

≤216mW @12VDC

Ingress Protection

3000VAC

Applications

Automotive Current Monitoring
Grid Energy Storage
Charging Station
UPS

Rated Sensing Current Range

-20000A~+20000A

Continuous Sensing Current Range

-600A~+600A

+50A~+600A or -600A~-50A
Current Measurement Tolerance:±0.1%

-600A~+600A
Resolution: 1mA

Applications

Automotive Current Monitoring
Grid Energy Storage
Charging Station
UPS

CB600

Automotive Grade Current Sensor

Temperature Measurement Range

-50°C~+150°C

Communication

CAN2.0 A/B

Supply Voltage

6V~18V

Operating Temperature Range

-40°C~+105°C

Power Consumption

≤384mW @12VDC

Ingress Protection

3000VAC

PCBS

Automotive Grade Current Sensor

PSBS is a shunt welded with a PCB, including a RC filter circuit, a PTC, and a connector. It can collect bus current and shunt temperature, and support customized design based on customer specific technical requirements.

Shunt

Size	6918 8518 8436 8536
Resistance	25μΩ~100μΩ
Tolerance	±5%
Continuous Operating Current	350A~800A
Operating Temp. Range	-60°C~+175°C
Rated Power	12.5W
Thermal EMF	<0.5μV/°C
Inductance	<3nH

NTC Automotive Grade

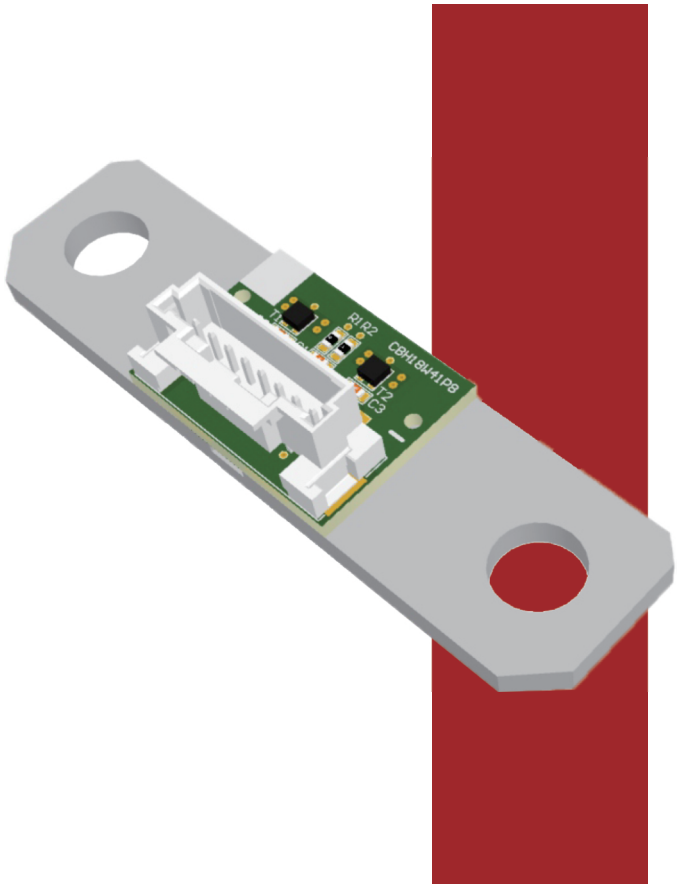
Resistance @ 0℃	10KΩ
Tolerance	±1%
TCR	3435ppm/K
Operating Temp. Range	-50°C~+150°C

CAP Automotive Grade

Capacitance	100nF
Tolerance	±1%
Rated Voltage	50VDC
Operating Temp. Range	-40°C~+125°C

RES Automotive Grade

Resistance	68Ω
Tolerance	±1%
TCR	100ppm/K
Operating Temp. Range	-40°C~+125°C



High Energy Resistor

The resistor that can withstand short-time overload and high peak power.

Pulse inrushing or continuous high power operation of resistor will generate high heat.

The common high-energy anti-pulse resistor applies thick film technology and wire winding technology. If the heat is not diffused in time, all the heat will gather on the few resistance elements and affect the performance.

Characteristics

- Non-Inductance Design
- Small Size
- High Power Dissipation
- Excellent Long-Term Stability

Applications

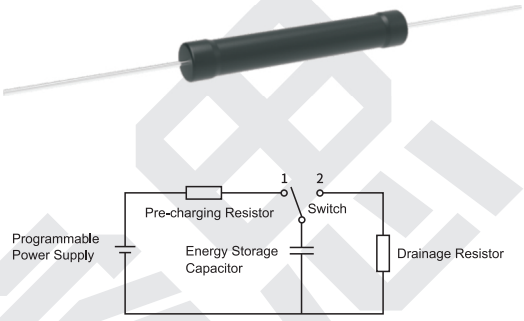
- Electric Power
- Medical
- Battery Precharging
- EV

Non-inductive high energy anti-pulse resistors, small size high humidity resistance, high reliabilitySingle pulse energy up to 1000J suitable for high pulse and high energy applications such as capacitor charging and discharging

Introduction

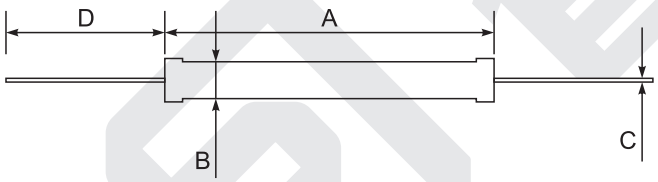
APLR series non-inductive high energy anti-pulse resistors are made of special self-developed resistive materials and are suitable for high energy and high pulse environments, and are non-inductance, small size, high humidity resistance and high reliability. Typical applications are in medical instruments, high voltage power supplies, automotive electronics, etc.

The resistor anti-pulse test is based on the first order capacitor charging and discharging principle, as Figure 1 shows. The programmable power supply U firstly charges the energy storage capacitor C through the pre-charge resistor Rc. When the voltage across the capacitor C reaches the specified voltage, the pulse energy release to the release resistor Rd begins. The energy release process is the inverse of the energy pre-charge process. This test uses the APLR series resistor as the release resistor for the pulse test, and the pulse type through the release resistor is a high voltage spike pulse, which is equivalent to a rectangular wave pulse.



Resistor Pulse Test Schematics

Specifications & Dimensions



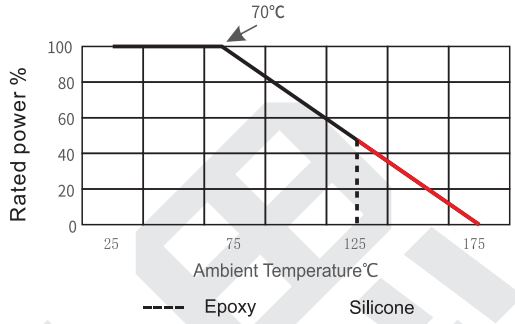
Model	Resistance	Rated Power (70℃)	Peak Energy①	Peak Voltage②	Tolerance	Size(mm)			
						A	B	C	D
APLR1000K20R0SE	20□	6W	1000J	400V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K50R0SE	50□	6W	1000J	700V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K100RSE	100□	6W	1000J	1000V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K150RSE	150□	6W	1000J	1500V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K200RSE	200□	6W	1000J	1900V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K300RSE	300□	6W	1000J	2500V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K500RSE	500□	6W	1000J	3500V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K1K00SE	1k□	6W	1000J	5000V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K2K00SE	2k□	6W	1000J	5000V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K3K30SE	3. 3k□	6W	1000J	5000V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K4K70SE	4. 7k□	6W	1000J	5000V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2
APLR1000K10K0SE	10k□	6W	1000J	5000V	±5%,±10%	52±1.5	8.5±1.0	1.0±0.05	36±0.2

Note: ①Peak energy may vary under different working conditions.
②Peak voltage is related to peak energy, please contact us for confirmation of higher peak voltage.

Performance

Test	Test method	Performance
Operating Temp. Range	Different packaging materials, different operating temperature ranges	Epoxy Coating:-55°C~+125°C
		Silicone Coating:-55°C~+175°C
Standard TCR	-55°C~+125°C,+25°C Ref	±200ppm/°C
Short Time Overload	10x rated power,10 times cycles, 5s ON,90s OFF	△R≤±0.5%
Load Life	+70°C, rated power for 1000h	△R≤±2%
Thermal Shock	-55°C to+125°C,10 times cycles	△R≤±0.5%
Moisture Resistance	MIL-STD-202 Method 106	Epoxy Coating:△R≤±0.5%
		Silicone Coating:△R≤±2%
High Temp. Storage	+125°C for 1000h	△R≤±0.5%

Derating Curve



Comparison of Performance among Pre-Charging Resistors

Item	Type			
	Wirewound Resistor	Film Resistor	Solid Ceramic Resistor	RESI Proprietary Materials Technology
Anti-Pulse Capability	Average	Average	Excellent	Excellent
Reliability	Poor	Poor	Good	Excellent
Inductance	Positive	Positive	Negative	Negative
Moisture Resistance	Average	Poor	Poor	Excellent
Long-Term Stability	Average	Poor	Good	Excellent
Price	Various	Low	High	Moderate
Volume	Large	Large	Small	Low

Part Number Information

Example: APLR1000K50R0SE (50Ω ±10% ±200ppm/°C Epoxy Coating)

A	P	L	R	1	0	0	0	K	5	0	R	0	S	E

- Series: APLR1000
- Tolerance: K=±10%, J=±5%
- Resistance: 20R0=20Ω, 100R=100Ω, 1K00=1KΩ, 10K0=10KΩ
- TCR: S=±200ppm/°C
- Coating: E=Epoxy, S=Silicone

Thermistor

The resistor that is extremely sensitive to temperature changes. When the ambient temperature changes, the resistance of the thermistor changes greatly and basically presents a linear relationship with the temperature. Therefore, the temperature detection can be completed by measuring the change of the resistance.

There are two types of thermistors, NTC and PTC. PTC thermistor means that the resistance increases when the ambient temperature increases, and decreases when the ambient temperature decreases. NTC thermistor means that resistance change is inversely proportional to temperature change.

Characteristics

- High Sensitivity
- Small Size
- Good Stability
- Wide Operating Temperature Range

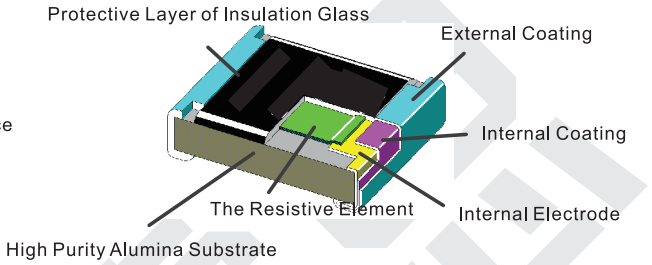
Applications

- Avionics
- Automotive Electronics
- Industrial Electronics

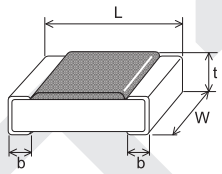
High reliability, tight temperature detection tolerance AEC-Q200 qualified

Structure & Features

- The resistive element on the alumina substrate is protected by insulation glass, which lead to good mechanical strength and reliability;
- Regardless of the resistance, the thickness of the resistor is constant;
- The three-layer structure electrode ensures good solderability and resistance to soldering heat;
- AEC-Q200 qualified;
- Some models comply with the UL 1434 standard;
- The operating temperature of some models can be up to 150℃.



Dimensions (mm)



Model	L	W	t	b	Package Quantity
TCTR0402	1.00±0.05	0.50±0.05	0.35±0.05	0.25+0.05-0.10	10,000pcs
TCTR0603	1.60±0.15	0.80±0.15	0.50±0.10	0.30±0.20	5,000pcs
TCTR0805	2.00±0.20	1.25±0.20	0.55±0.10	0.40±0.20	

Parameter

Model	Tolerance	B Value Tolerance	Coefficient of Heat Release δ≧1.5mW/℃	Thermal Time Constant τ≦5.0sec	Maximum Working Power	Rated Power	Operating Temp. Range
TCTR0402	±1%,±2%, ±3%,±5%,±10%	±1%,±2%, ±3%,±5%	≒1.1 mW/℃	≒1.5sec	5mW	110mW	-40~+125℃
TCTR0603			≒1.2 mW/℃	≒2.0sec		120mW	
TCTR0805			≒1.3 mW/℃	≒2.5sec		130mW	

B Value(25℃/85℃)	Standard Resistance Range(25℃)		
	TCTR0402 (Ω)	TCTR0603 (Ω)	TCTR0805 (Ω)
4610~4800K	75k~820k	47k~1.6M	24k~470k
4410~4600K	24k~470k	15k~910k	8.2k~430k
4210~4400K	9.1k~110k	6.2k~200k	3.0k~91k
4010~4200K	7.5k~100k	4.7k~200k	2.7k~91k
3810~4000K	3.6k~62k	2.4k~110k	1.2k~51k
3610~3800K	2k~30k	1.2k~56k	620~27k
3410~3600K	1.8k~30k	1.1k~56k	620~27k
3210~3400K	2.4k~22k	1.5k~43k	750~18k
3010~3200K	1.1k~10k	750~20k	390~9.1k
2810~3000K	560~5.1k	360~10k	180~4.3k
2610~2800K	270~2.4k	160~4.7k	100~2k
2410~2600K	120~1.2k	82~2.2k	47~1k

Resistance & Temperature Table

TEMP. (℃)	Resistance (25℃) / B value (25℃/85℃) Unit: Ω									
	R:1kΩ	R:1kΩ	R:1kΩ	R:10kΩ	R:10kΩ	R:10kΩ	R:10kΩ	R:100kΩ	R:100kΩ	R:100kΩ
	B:2750K	B:3000K	B:3200K	B:3450K	B:3700K	B:3900K	B:4100K	B:4300K	B:4500K	B:4700K
40	11,290	14,270	17,200	217,300	274,600	331,000	399,100	4,812,000	5,802,000	6,995,000
-35	9,012	11,130	13,180	162,800	201,100	238,200	282,000	3,339,000	3,954,000	4,682,000
-30	7,248	8,761	10,200	123,200	149,000	173,400	201,800	2,349,000	2,734,000	3,182,000
-25	5,872	6,953	7,959	94,240	111,600	127,700	146,200	1,674,000	1,916,000	2,193,000
-20	4,791	5,561	6,265	72,720	84,410	95,100	107,100	1,207,000	1,360,000	1,532,000
-15	3,935	4,481	4,971	56,620	64,470	71,530	79,370	880,600	977,100	1,084,000
-10	3,253	3,636	3,975	44,450	49,690	54,330	59,400	649,400	710,000	776,300
-5	2,705	2,971	3,202	35,170	38,630	41,640	44,890	483,900	521,600	562,200
0	2,262	2,443	2,597	28,040	30,280	32,200	34,240	364,000	387,100	411,600
5	1,902	2,020	2,120	22,520	23,920	25,100	26,340	276,400	290,100	304,400
10	1,608	1,681	1,741	18,210	19,040	19,730	20,440	211,800	219,400	227,400
15	1,366	1,406	1,439	14,820	15,260	15,620	15,990	163,600	167,500	171,400
20	1,166	1,183	1,196	12,130	12,310	12,450	12,600	127,400	128,900	130,400
25	1,000	1,000	1,000	10,000	10,000	10,000	10,000	100,000	100,000	100,000
30	861.3	849.5	840.1	8,286	8,172	8,082	7,993	79,050	78,180	77,320
35	745.0	725.0	709.4	6,903	6,718	6,573	6,432	62,930	61,580	60,250
40	647.0	621.5	601.8	5,782	5,554	5,378	5,208	50,400	48,840	47,300
45	564.1	535.1	513.0	4,867	4,617	4,426	4,243	40,680	39,000	37,390
50	493.6	462.6	439.2	4,116	3,858	3,663	3,477	33,020	31,350	29,760
55	433.5	401.5	377.7	3,498	3,240	3,047	2,866	26,950	25,350	23,840
60	382.1	349.9	326.1	2,986	2,734	2,548	2,375	22,130	20,620	19,220
65	337.9	306.0	282.6	2,560	2,318	2,141	1,978	18,270	16,880	15,590
70	299.8	268.6	246.0	2,203	1,974	1,808	1,656	15,160	13,880	12,720
75	266.8	236.5	214.8	1,904	1,688	1,533	1,392	12,650	11,480	10,430
80	238.2	209.0	188.3	1,652	1,450	1,306	1,177	10,600	9,548	8,601
85	213.3	185.3	165.6	1,439	1,251	1,118	998.8	8,927	7,978	7,130
90	191.5	164.8	146.2	1,258	1,083	960.2	851.5	7,552	6,698	5,940
95	172.4	147.0	129.4	1,103	940.9	828.2	729.0	6,417	5,649	4,972
100	155.7	131.5	115.0	971.3	820.6	717.1	626.7	5,476	4,785	4,182
105	140.9	118.0	102.4	857.7	718.3	623.2	540.8	4,692	4,072	3,533
110	127.9	106.2	91.52	759.8	63.90	543.6	468.5	4,037	3,479	2,998
115	116.4	95.82	82.02	675.3	555.9	475.9	407.3	3,486	2,984	2,554
120	106.1	86.68	73.71	601.9	491.5	418.0	355.4	3,022	2,570	2,186
125	97.0	78.61	66.42	538.1	435.9	368.3	311.2	2,630	2,222	1,877

Part Number Information

Example: TCTR0805J1K00H3200T (TCTR 0805 ±5% 1KΩ B value tol 3% B value 3200K tape and reel)

T	C	T	R	0	8	0	5	J	1	K	0	0	H	3	2	0	0	T

- Model: TCTR
- Size: 0402, 0603, 0805
- Tolerance: F=±1%, G=±2%, H=±3%, J=±5%, K=±10%
- Resistance: 1R00=1R, 1K00=1000R, 1M00=1000000R, 1M60=1600000R
- BValue Tolerance: F=±1%, G=±2%, H=±3%, J=±5%
- B Value: 3200=3200K, 4000=4000K, 4800=4800K
- Code: T=tape

B value: Calculated from the resistance without load at 25℃ and 85℃

Shunt

The shunt is a low resistance resistor, which is usually used to measure a large current.

When the current flows through the shunt, a millivolt voltage will appear at both ends of the shunt, then use a millivolt voltmeter to measure this voltage, finally convert this voltage into current.

Characteristics

- High accuracy (0.1 Level)
- Low Thermal EMF
- Low TCR
- Low PCR
- Maximum Rated Current 100KA

Applications

- Power Equipment
- Industrial Control Equipment
- BMS

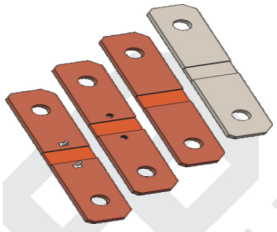
Automotive-Grade Precision Mn-Cu Alloy Shunt
Tightest Tolerance ± 0.5%, Various Structure of Voltage Output
Low thermal EMF & Power Coefficient

Introduction

The ARCS series which targets automotive market can cover from hundreds to thousands of amperes. Due to special alloy materials, the ARCS series has good long-term stability and is capable to withstand pulse current several times, which is higher than the rated current.

Shunt resistance value and surface temperature will keep changing when loaded. The factors that cause the change in resistance include TCR and dimensional change caused by thermal expansion, etc. Shunt resistance tends to be stable when self- heating and heat dissipation reach dynamic balance, but high current coefficient will cause the change of shunt resistance greater than nominal tolerance. The special heat treatment process of the ARCS series make it a low current coefficient with very good compensation characteristics.

Because there is always a distance between the voltage sampling point and the resistor heating center, temperature difference is appeared, so a lower thermal EMF is particularly important. The ARCS series has thermal EMF of less than 0.5μV/℃ to copper, and has little effect on the voltage output of the millivolt level. The flat structure of the ARCS series makes the inductance less than 3nH, which also performs perfect at high frequency applications.



AEC-Q200 compliant

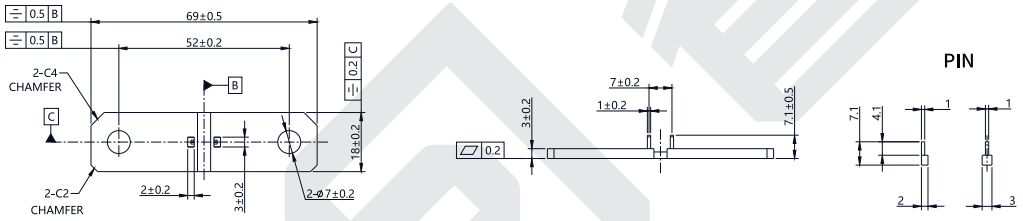
3D Model

Application

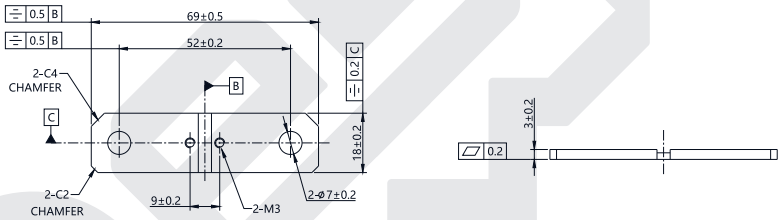
- Battery Management System
- Current Sensing
- Frequency Converter
- UPS
- Motor Control
- Electronic Load Equipment

Dimensions (mm)

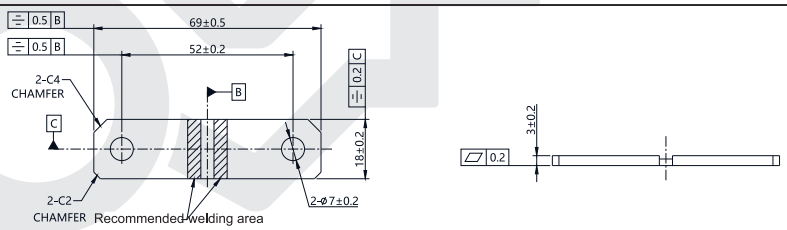
PIN



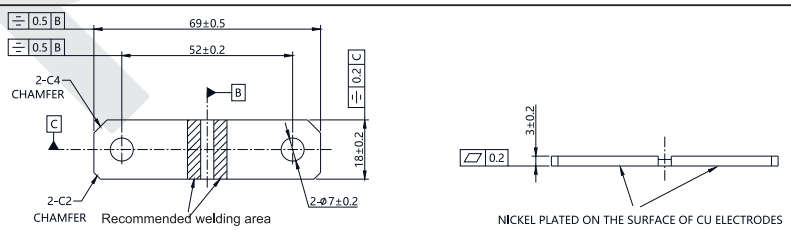
M3

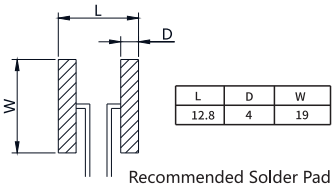


Standard



Standard
Nickel Plated





L	D	W
12.8	4	19

Recommended Solder Pad

Not following the recommended solder pad design may seriously affect the accuracy of current measurement!

Specifications

Model	Tolerance	Resistance	TCR (+20℃ Ref)	Rated Current	Current Coefficient*	Rated Power	Inductance	Structure	Weight
ARCS6918DL050A9	±0.5%	50μΩ	150ppm/℃ (+20℃~+175℃) 200ppm/℃ (-55℃~+20℃)	700A	<10ppm/A	25W	<3nH (20KHz)	PIN	35g
ARCS6918FL050A9	±1%								
ARCS6918GL050A9	±2%								
ARCS6918JL050A9	±5%								
ARCS6918DL050B9	±0.5%		150ppm/℃ (+20℃~+175℃) 200ppm/℃ (-55℃~+20℃)					M3	
ARCS6918FL050B9	±1%								
ARCS6918GL050B9	±2%								
ARCS6918JL050B9	±5%								
ARCS6918DL050S9	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Standard	
ARCS6918FL050S9	±1%								
ARCS6918GL050S9	±2%								
ARCS6918JL050S9	±5%								
ARCS6918DL050SN	±0.5%		150ppm/℃ (+20℃~+175℃) 200ppm/℃ (-55℃~+20℃)					Standard Nickel plated*	
ARCS6918FL050SN	±1%								
ARCS6918GL050SN	±2%								
ARCS6918JL050SN	±5%								
ARCS6918DL050S4	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Nickel plated terminal*	
ARCS6918FL050S4	±1%								
ARCS6918GL050S4	±2%								
ARCS6918JL050S4	±5%								

*$(R_1-R_2)/[(I_1-I_2)*R_0]$($R_1$: 2/3 times rated current, 10 min; R_2: 1/10 times rated current, 10 min; R_0: Initial resistance; I_1: 2/3 times rated current; I_2: 1/10 times rated current.)
*Full nickel plating is the whole nickel plating, including the resistive alloy part, can completely prevent resistive alloy part from the oxidation,but the TCR performance is slightly reduced; half nickel plating type is partial nickel plating, the resistive alloy part is not nickel plated but only the copper terminal.

Performance

Test	Test method	Test limits
Thermal Shock	-55°C/+155°C,1000cycles,15minutes each	△ R≤±0.5%
Short-Time Overload	5 times rated power, 5 seconds	△ R≤±0.5%
Low Temp.Storage	-55°C for 24 hours	△ R≤±0.5%
High Temp.Exposure	+170°C for 1000 hours	△ R≤±1.0%
Humidity Resistance	+85°C, 85% RH 0.1 times rated power, 1000 hours	△ R≤±0.5%
Moisture Resistance	100G 6mS, 5 times	△ R≤±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 1minute, X-Y-Z direction, 12 hours	△ R≤±0.5%
Load Life Stability	Rated power, +70°C, 1.5 hours on, 0.5 hours off, 1000 hours	△ R≤±1.0%

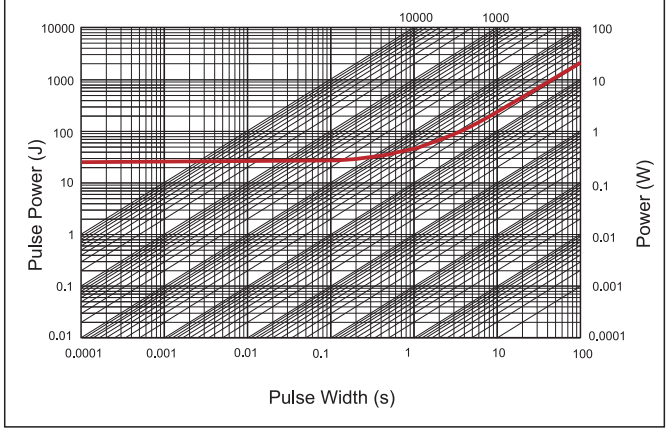
Part Number Information

Example: ARCS6918FL050A9 (ARCS 6918 ±1% 50μΩ PIN)

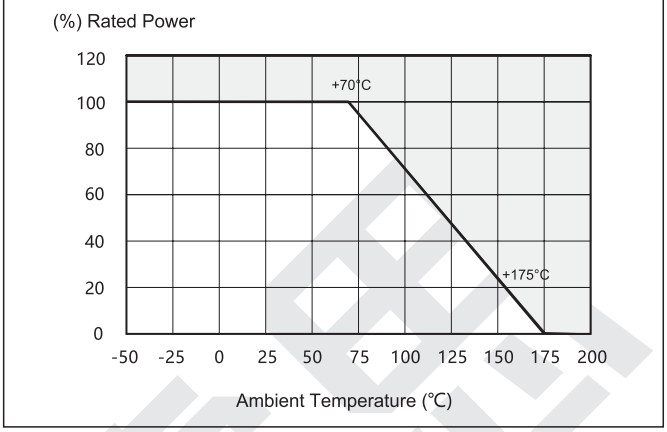
A	R	C	S	6	9	1	8	F	L	0	5	0	A	9

- Series: ARCS
- Size: 6918
- Tolerance: D=±0.5% F=±1% G=±2% J=±5%
- Resistance: L050=50μΩ
- Structure: A=PIN B=M3hole S=Standard
- Packaging: 9=Standard 0-8=Custom N= Nickel plated 4=Nickel plated terminal

Pulse Power



Derating Curve



Safe Storage

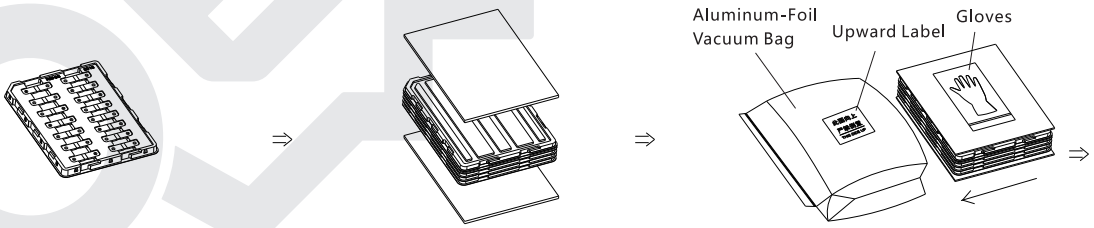
(1) The shunt should be stored at a temperature of +5 to +35°C, humidity <60% RH, and the humidity should be kept as low as possible.
(2) The shunt should be protected from direct sunlight.
(3) The shunt should be stored in a clean, dry and free of harmful gases environment (hydrogen chloride, sulfuric acid, hydrogen sulfide).
(4) Wear gloves for installation and storage, to reduce the risk of surface oxidation.
(5) The shunt can be stored for at least 1 year in original package by following above instructions.

Installation Suggestions

The recommended installation torque for the M3 threaded hole is 0.4~0.8 N.m.

Packaging

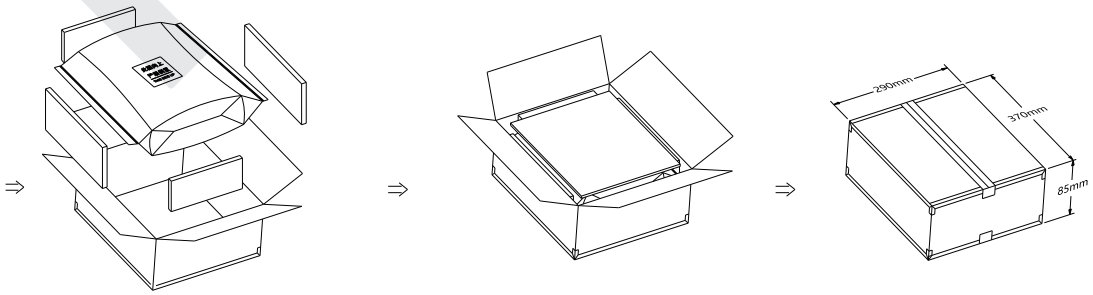
(1) 15 pcs./PVC tray, with the pin facing downwards.
(2) Pack every 4 trays into a bundle (60pcs).
(3) Place each bundle into an aluminum-foil vacuum bag and vacuum seal it.
(4) A pair of PE gloves and a pair of cotton work gloves in each bag.
(5) Product unit weight: 27±5g. Box net weight: 1.62kg. Box gross weight: 2.7kg.
(6) Outer box size: 370×290×85mm.



1. 15 pcs./PVC tray, with the pin facing downwards.

2. 4 trays/bundle (60pcs.) with a cover. Place EPE at the top and bottom.

3. One bundle packs into one aluminum-foil bag, with one PE gloves and one cotton work gloves. Vacuum seal the bag.



4. Place vacuumed bag into an outer box and place EPE on 4 sides of the bag for protection.

5. Fill the empty space around the bag with EPE.

6. Seal the box with transparent tape.

Automotive-Grade Precision Mn-Cu Alloy Shunt
Tightest Tolerance ± 0.5%, Various Structure of Voltage Output
Low thermal EMF & Power Coefficient

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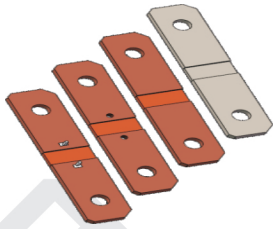


AEC-Q200 compliant

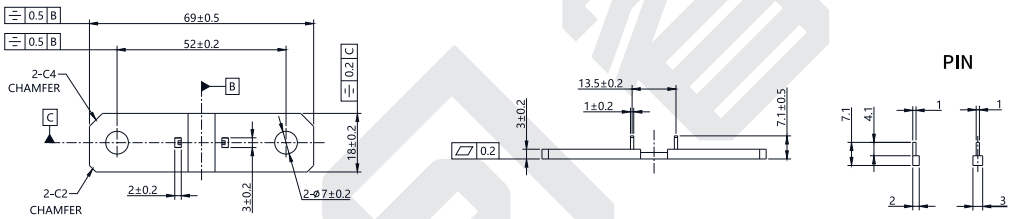
3D Model

Application

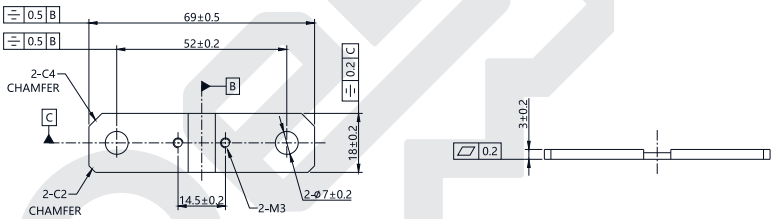
- Battery Management System
- Current Sensing
- Frequency Converter
- UPS
- Motor Control
- Electronic Load Equipment

Dimensions (mm)

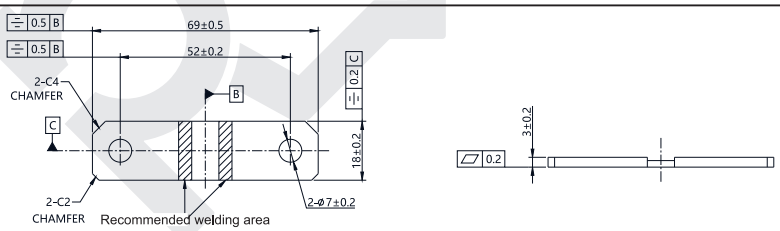
PIN



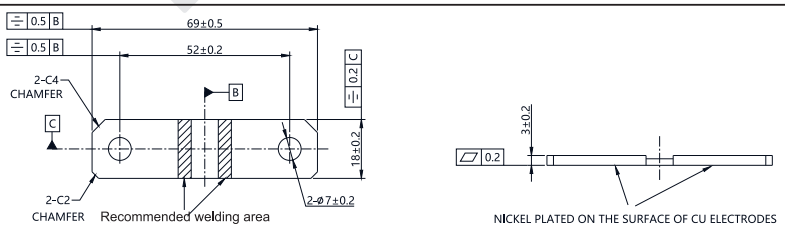
M3

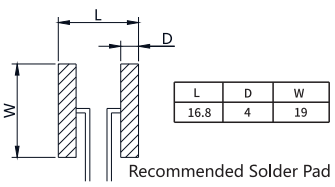


Standard



Standard
Nickel Plated





L	D	W
16.8	4	19

Recommended Solder Pad

Not following the recommended solder pad design may seriously affect the accuracy of current measurement!

ARCS6918-L100

Shunt Resistor

Specifications

Model	Tolerance	Resistance	TCR (+20℃ Ref)	Rated Current	Current Coefficient*	Rated Power	Inductance	Structure	Weight
ARCS6918DL100A9	±0.5%	100μΩ	100ppm/℃ (+20℃~+175℃) 175ppm/℃ (-55℃~+20℃)	500A	<7ppm/A	25W	<3nH (20KHz)	PIN	35g
ARCS6918FL100A9	±1%								
ARCS6918GL100A9	±2%								
ARCS6918JL100A9	±5%								
ARCS6918DL100B9	±0.5%		100ppm/℃ (+20℃~+175℃) 175ppm/℃ (-55℃~+20℃)					M3	
ARCS6918FL100B9	±1%								
ARCS6918GL100B9	±2%								
ARCS6918JL100B9	±5%								
ARCS6918DL100S9	±0.5%		50ppm/℃ (+20℃~+175℃) 100ppm/℃ (-55℃~+20℃)					Standard	
ARCS6918FL100S9	±1%								
ARCS6918GL100S9	±2%								
ARCS6918JL100S9	±5%								
ARCS6918DL100SN	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Standard Nickel plated*	
ARCS6918FL100SN	±1%								
ARCS6918GL100SN	±2%								
ARCS6918JL100SN	±5%								
ARCS6918DL100S4	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Nickel plated terminal*	
ARCS6918FL100S4	±1%								
ARCS6918GL100S4	±2%								
ARCS6918JL100S4	±5%								

*$(R_1-R_2)/[(I_1-I_2)*R_0]$($R_1$: 2/3 times rated current, 10 min; R_2: 1/10 times rated current, 10 min; R_0: Initial resistance; I_1: 2/3 times rated current; I_2: 1/10 times rated current.)
*Full nickel plating is the whole nickel plating, including the resistive alloy part, can completely prevent resistive alloy part from the oxidation,but the TCR performance is slightly reduced; half nickel plating type is partial nickel plating, the resistive alloy part is not nickel plated but only the copper terminal.

Performance

Test	Test method	Test limits
Thermal Shock	-55°C/+155°C,1000cycles,15minutes each	△ R≤±0.5%
Short-Time Overload	5 times rated power, 5 seconds	△ R≤±0.5%
Low Temp.Storage	-55°C for 24 hours	△ R≤±0.5%
High Temp.Exposure	+170°C for 1000 hours	△ R≤±1.0%
Humidity Resistance	+85°C, 85% RH 0.1 times rated power, 1000 hours	△ R≤±0.5%
Moisture Resistance	100G 6mS, 5 times	△ R≤±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 1minute, X-Y-Z direction, 12 hours	△ R≤±0.5%
Load Life Stability	Rated power, +70°C, 1.5 hours on, 0.5 hours off, 1000 hours	△ R≤±1.0%

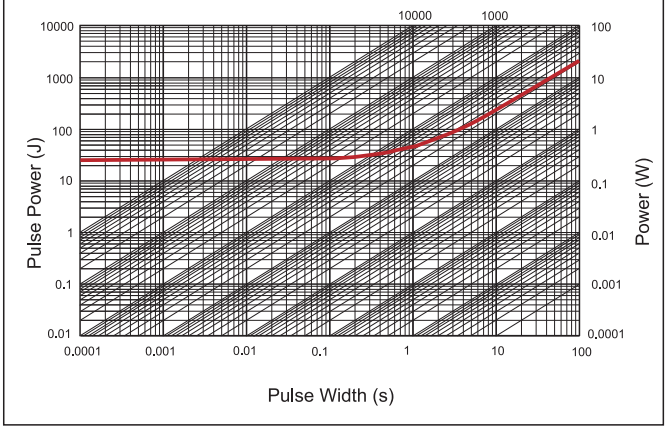
Part Number Information

Example: ARCS6918FL100A9 (ARCS 6918 ±1% 100μΩ PIN)

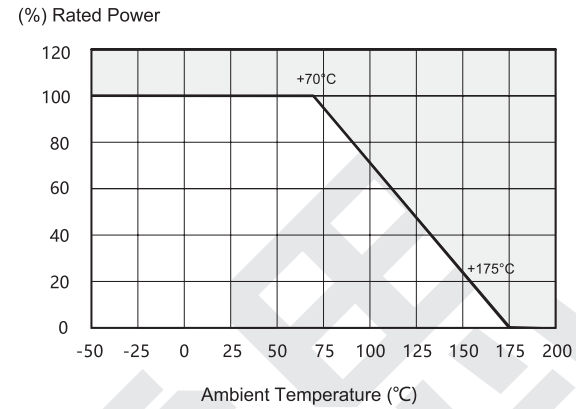
A	R	C	S	6	9	1	8	F	L	1	0	0	A	9

- Series: ARCS
- Size: 6918
- Tolerance: D=±0.5%, F=±1%, G=±2%, J=±5%
- Resistance: L100=100μΩ
- Structure: A=PIN, B=M3 hole, S=Standard
- Packaging: 9=Standard, 0-8=Custom, N= Nickel plated, 4=Nickel plated terminal

Pulse Power



Derating Curve



Safe Storage

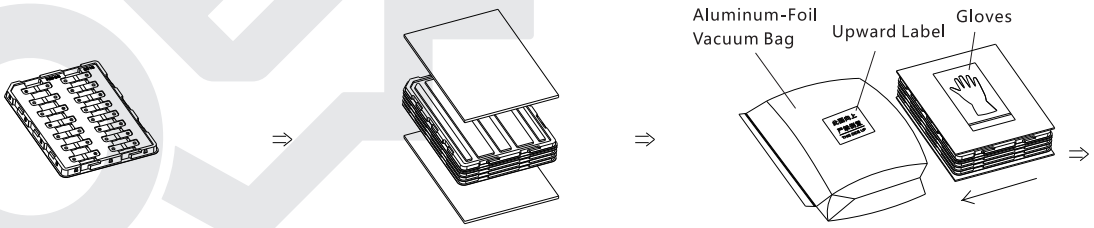
(1) The shunt should be stored at a temperature of 5 to 35°C, humidity <60% RH, and the humidity should be kept as low as possible.
(2) The shunt should be protected from direct sunlight.
(3) The shunt should be stored in a clean, dry and free of harmful gases environment (hydrogen chloride, sulfuric acid, hydrogen sulfide).
(4) Wear gloves for installation and storage, to reduce the risk of surface oxidation.
(5) The shunt can be stored for at least 1 year in original package by following above instructions.

Installation Suggestions

The recommended installation torque for the M3 threaded hole is 0.4~0.8 N.m.

Packaging

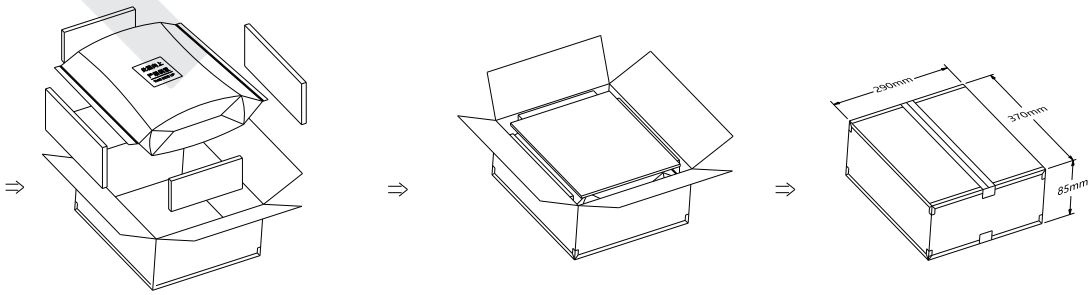
(1) 15 pcs./PVC tray, with the pin facing downwards.
(2) Pack every 4 trays into a bundle (60pcs).
(3) Place each bundle into an aluminum-foil vacuum bag and vacuum seal it.
(4) A pair of PE gloves and a pair of cotton work gloves in each bag.
(5) Product unit weight: 27±5g. Box net weight: 1.62kg. Box gross weight: 2.7kg.
(6) Outer box size: 370×290×85mm.



1. 15 pcs./PVC tray, with the pin facing downwards.

2. 4 trays/bundle (60pcs.) with a cover. Place EPE at the top and bottom.

3. One bundle packs into one aluminum-foil bag, with one PE gloves and one cotton work gloves. Vacuum seal the bag.



4. Place vacuumed bag into an outer box and place EPE on 4 sides of the bag for protection.

5. Fill the empty space around the bag with EPE.

6. Seal the box with transparent tape.

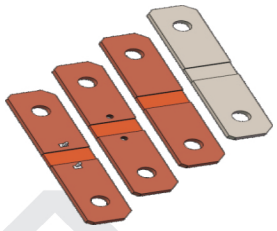
Automotive-Grade Precision Mn-Cu Alloy Shunt
Tightest Tolerance ± 0.5%, Various Structure of Voltage Output
Low thermal EMF & Power Coefficient

Introduction

The ARCS series which targets automotive market can cover from hundreds to thousands of amperes. Due to special alloy materials, the ARCS series has good long-term stability and is capable to withstand pulse current several times, which is higher than the rated current.

Shunt resistance value and surface temperature will keep changing when loaded. The factors that cause the change in resistance include TCR and dimensional change caused by thermal expansion, etc. Shunt resistance tends to be stable when self- heating and heat dissipation reach dynamic balance, but high current coefficient will cause the change of shunt resistance greater than nominal tolerance. The special heat treatment process of the ARCS series make it a low current coefficient with very good compensation characteristics.

Because there is always a distance between the voltage sampling point and the resistor heating center, temperature difference is appeared, so a lower thermal EMF is particularly important. The ARCS series has thermal EMF of less than 0.5μV/℃ to copper, and has little effect on the voltage output of the millivolt level. The flat structure of the ARCS series makes the inductance less than 3nH, which also performs perfect at high frequency applications.



AEC-Q200 compliant

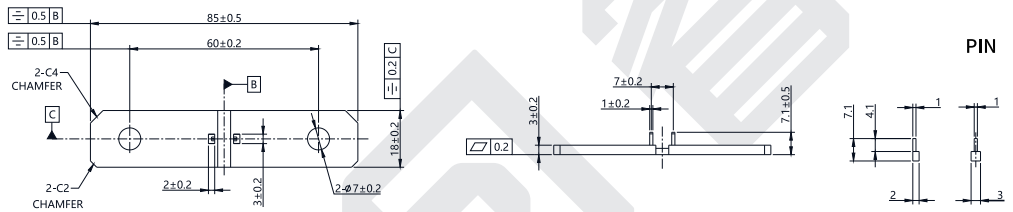
3D Model

Application

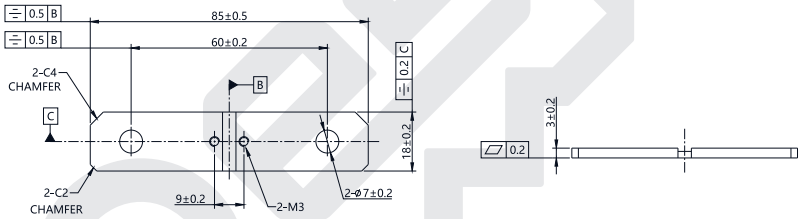
- Battery Management System
- Current Sensing
- Frequency Converter
- UPS
- Motor Control
- Electronic Load Equipment

Dimensions (mm)

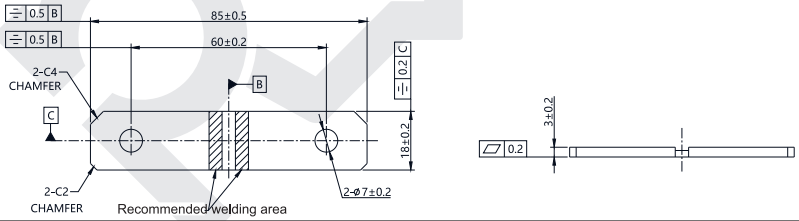
PIN



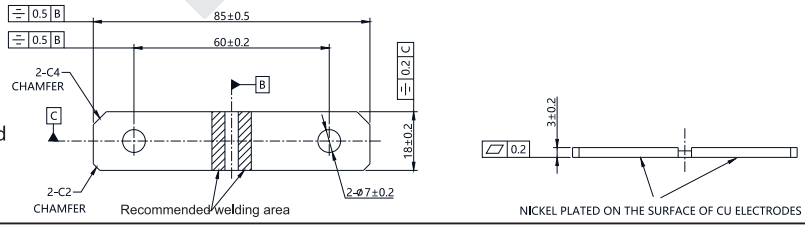
M3

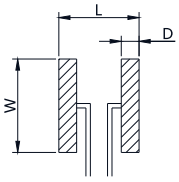


Standard



Standard
Nickel Plated





L	D	W
12.8	4	21

Recommended Solder Pad

Not following the recommended solder pad design may seriously affect the accuracy of current measurement!

Specifications

Model	Tolerance	Resistance	TCR (+20℃ Ref)	Rated Current	Current Coefficient*	Rated Power	Inductance	Structure	Weight
ARCS8518DL050A9	±0.5%	50μΩ	150ppm/℃ (+20℃~+175℃) 200ppm/℃ (-55℃~+20℃)	840A	<10ppm/A	36W	<3nH (20KHz)	PIN	40g
ARCS8518FL050A9	±1%								
ARCS8518GL050A9	±2%								
ARCS8518JL050A9	±5%								
ARCS8518DL050B9	±0.5%		150ppm/℃ (+20℃~+175℃) 200ppm/℃ (-55℃~+20℃)					M3	
ARCS8518FL050B9	±1%								
ARCS8518GL050B9	±2%								
ARCS8518JL050B9	±5%								
ARCS8518DL050S9	±0.5%		100ppm/℃ (20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Standard	
ARCS8518FL050S9	±1%								
ARCS8518GL050S9	±2%								
ARCS8518JL050S9	±5%								
ARCS8518DL050SN	±0.5%		150ppm/℃ (+20℃~+175℃) 200ppm/℃ (-55℃~+20℃)					Standard Nickel plated*	
ARCS8518FL050SN	±1%								
ARCS8518GL050SN	±2%								
ARCS8518JL050SN	±5%								
ARCS8518DL050S4	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Nickel plated terminal*	
ARCS8518FL050S4	±1%								
ARCS8518GL050S4	±2%								
ARCS8518JL050S4	±5%								

*$(R_1-R_2)/[(I_1-I_2)*R_0]$($R_1$: 2/3 times rated current, 10 min; R_2: 1/10 times rated current, 10 min; R_0: Initial resistance; I_1: 2/3 times rated current; I_2: 1/10 times rated current.)
*Full nickel plating is the whole nickel plating, including the resistive alloy part, can completely prevent resistive alloy part from the oxidation,but the TCR performance is slightly reduced; half nickel plating type is partial nickel plating, the resistive alloy part is not nickel plated but only the copper terminal.

Performance

Test	Test method	Test limits
Thermal Shock	-55°C/+155°C,1000cycles,15minutes each	△ R≤±0.5%
Short-Time Overload	5 times rated power, 5 seconds	△ R≤±0.5%
Low Temp.Storage	-55°C for 24 hours	△ R≤±0.5%
High Temp.Exposure	+170°C for 1000 hours	△ R≤±1.0%
Humidity Resistance	+85°C, 85% RH 0.1 times rated power, 1000 hours	△ R≤±0.5%
Moisture Resistance	100G 6mS, 5 times	△ R≤±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 1minute, X-Y-Z direction, 12 hours	△ R≤±0.5%
Load Life Stability	Rated power, +70°C, 1.5 hours on, 0.5 hours off, 1000 hours	△ R≤±1.0%

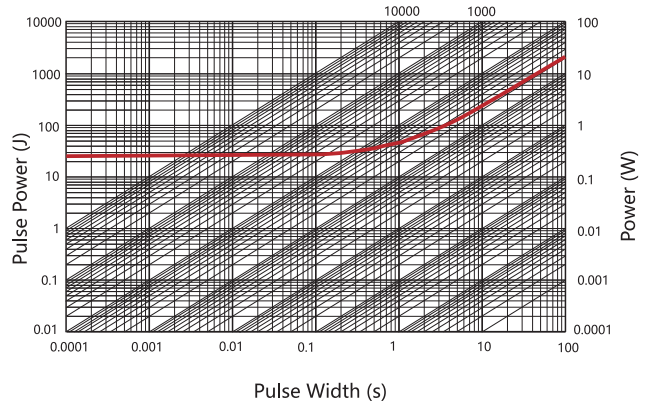
Part Number Information

Example: ARCS8518FL050A9 (ARCS 8518 ±1% 50μΩ PIN)

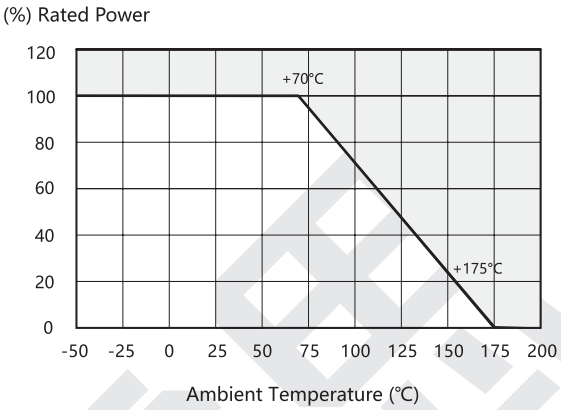
A	R	C	S	8	5	1	8	F	L	0	5	0	A	9

- Series: ARCS
- Size: 8518
- Tolerance: D=±0.5%, F=±1%, G=±2%, J=±5%
- Resistance: L050=50μΩ
- Structure: A=PIN, B=M3 hole, S=Standard
- Packaging: 9=Standard, 0-8=Custom, N= Nickel plated, 4=Nickel plated terminal

Pulse Power



Derating Curve



Safe Storage

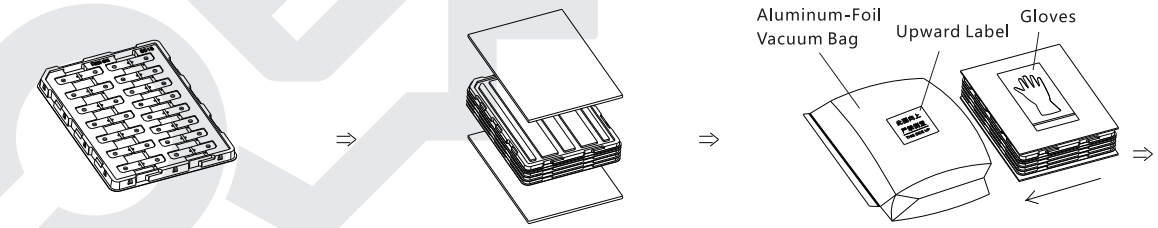
(1) The shunt should be stored at a temperature of 5 to 35°C, humidity <60% RH, and the humidity should be kept as low as possible.
(2) The shunt should be protected from direct sunlight.
(3) The shunt should be stored in a clean, dry and free of harmful gases environment (hydrogen chloride, sulfuric acid, hydrogen sulfide).
(4) Wear gloves for installation and storage, to reduce the risk of surface oxidation.
(5) The shunt can be stored for at least 1 year in original package by following above instructions.

Installation Suggestions

The recommended installation torque for the M3 threaded hole is 0.4~0.8 N.m.

Packaging

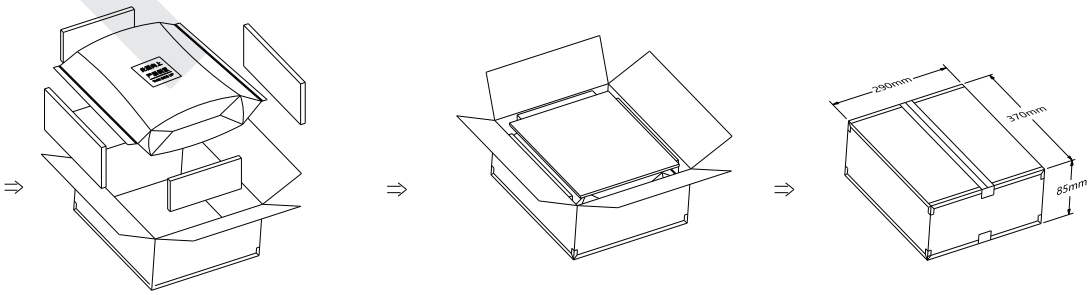
(1) 15 pcs./PVC tray, with the pin facing downwards.
(2) Pack every 4 trays into a bundle (60pcs).
(3) Place each bundle into an aluminum-foil vacuum bag and vacuum seal it.
(4) A pair of PE gloves and a pair of cotton work gloves in each bag.
(5) Product unit weight: 35±5g. Box net weight: 2.1kg. Box gross weight: 3.2kg.
(6) Outer box size: 370×290×85mm.



1. 15 pcs./PVC tray, with the pin facing downwards.

2. 4 trays/bundle (60pcs.) with a cover. Place EPE at the top and bottom.

3. One bundle packs into one aluminum-foil bag, with one PE gloves and one cotton work gloves. Vacuum seal the bag.



4. Place vacuumed bag into an outer box and place EPE on 4 sides of the bag for protection.

5. Fill the empty space around the bag with EPE.

6. Seal the box with transparent tape.

Automotive-Grade Precision Mn-Cu Alloy Shunt
Tightest Tolerance ± 0.5%, Various Structure of Voltage Output
Low thermal EMF & Power Coefficient

Introduction

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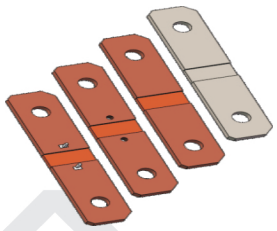


AEC-Q200 compliant

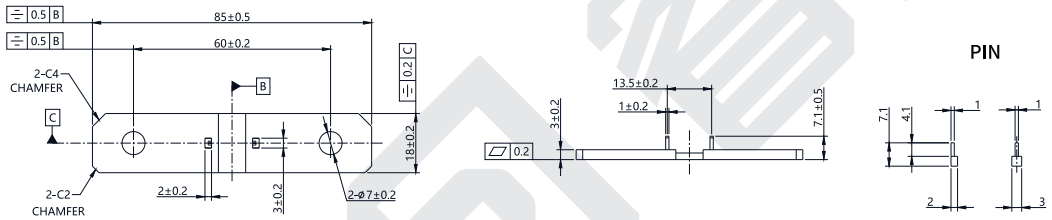
3D Model

Application

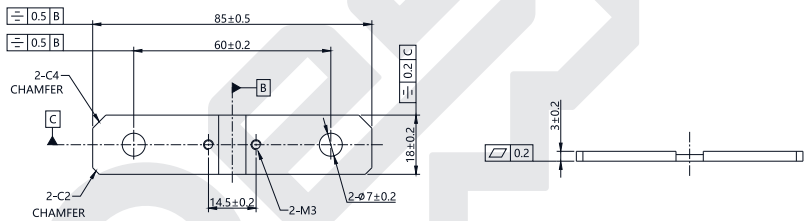
- Battery Management System
- Current Sensing
- Frequency Converter
- UPS
- Motor Control
- Electronic Load Equipment

Dimensions (mm)

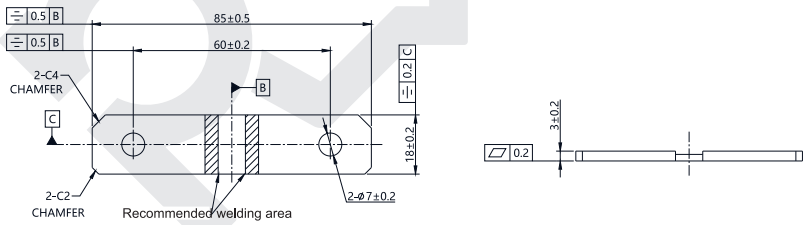
PIN



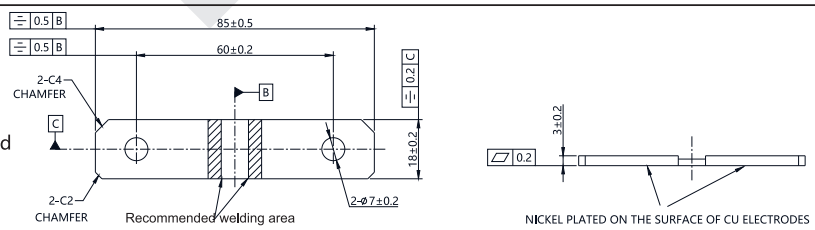
M3

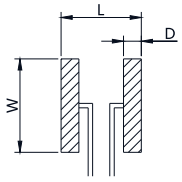


Standard



Standard
Nickel Plated





L	D	W
16.8	4	21

Recommended Solder Pad

Not following the recommended solder pad design may seriously affect the accuracy of current measurement!

ARCS8518-L100

Shunt Resistor

Specifications

Model	Tolerance	Resistance	TCR (+20℃ Ref)	Rated Current	Current Coefficient*	Rated Power	Inductance	Structure	Weight
ARCS8518DL100A9	±0.5%	100μΩ	100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)	600A	<7ppm/A	36W	<3nH (20KHz)	PIN	40g
ARCS8518FL100A9	±1%								
ARCS8518GL100A9	±2%								
ARCS8518JL100A9	±5%								
ARCS8518DL100B9	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					M3	
ARCS8518FL100B9	±1%								
ARCS8518GL100B9	±2%								
ARCS8518JL100B9	±5%								
ARCS8518DL100S9	±0.5%		50ppm/℃ (+20℃~+175℃) 100ppm/℃ (-55℃~+20℃)					Standard	
ARCS8518FL100S9	±1%								
ARCS8518GL100S9	±2%								
ARCS8518JL100S9	±5%								
ARCS8518DL100SN	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Standard Nickel plated*	
ARCS8518FL100SN	±1%								
ARCS8518GL100SN	±2%								
ARCS8518JL100SN	±5%								
ARCS8518DL100S4	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Nickel plated terminal*	
ARCS8518FL100S4	±1%								
ARCS8518GL100S4	±2%								
ARCS8518JL100S4	±5%								

*$(R_1-R_2)/[(I_1-I_2)*R_0]$($R_1$: 2/3 times rated current, 10 min; R_2: 1/10 times rated current, 10 min; R_0: Initial resistance; I_1: 2/3 times rated current; I_2: 1/10 times rated current.)
*Full nickel plating is the whole nickel plating, including the resistive alloy part, can completely prevent resistive alloy part from the oxidation,but the TCR performance is slightly reduced; half nickel plating type is partial nickel plating, the resistive alloy part is not nickel plated but only the copper terminal.

Performance

Test	Test method	Test limits
Thermal Shock	-55°C/+155°C,1000cycles,15minutes each	△ R≤±0.5%
Short-Time Overload	5 times rated power, 5 seconds	△ R≤±0.5%
Low Temp.Storage	-55°C for 24 hours	△ R≤±0.5%
High Temp.Exposure	+170°C for 1000 hours	△ R≤±1.0%
Humidity Resistance	+85°C, 85% RH 0.1 times rated power, 1000 hours	△ R≤±0.5%
Moisture Resistance	100G 6mS, 5 times	△ R≤±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 1minute, X-Y-Z direction, 12 hours	△ R≤±0.5%
Load Life Stability	Rated power, +70°C, 1.5 hours on, 0.5 hours off, 1000 hours	△ R≤±1.0%

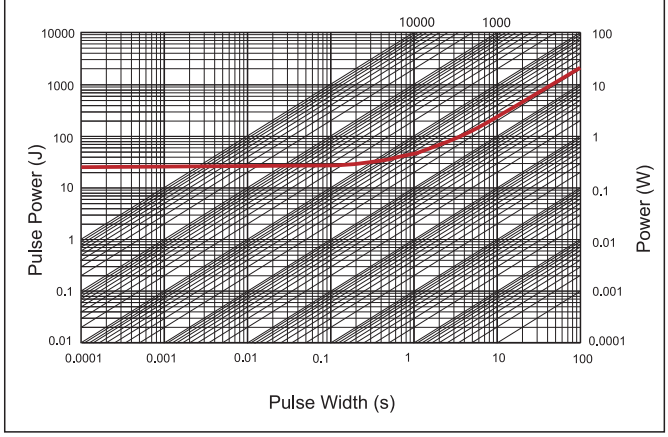
Part Number Information

Example: ARCS8518FL100A9 (ARCS 8518 ±1% 100μΩ PIN)

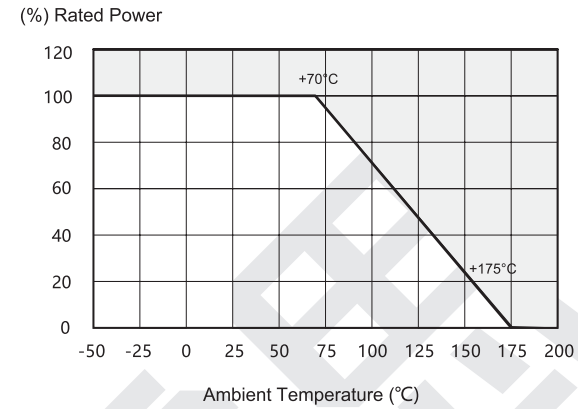
A	R	C	S	8	5	1	8	F	L	1	0	0	A	9

- Series: ARCS
- Size: 8518
- Tolerance: D=±0.5%, F=±1%, G=±2%, J=±5%
- Resistance: L100=100μΩ
- Structure: A=PIN, B=M3 hole, S=Standard
- Packaging: 9=Standard, 0-8=Custom, N= Nickel plated, 4=Nickel plated terminal

Pulse Power



Derating Curve



Safe Storage

(1) The shunt should be stored at a temperature of 5 to 35°C, humidity <60% RH, and the humidity should be kept as low as possible.
(2) The shunt should be protected from direct sunlight.
(3) The shunt should be stored in a clean, dry and free of harmful gases environment (hydrogen chloride, sulfuric acid, hydrogen sulfide).
(4) Wear gloves for installation and storage, to reduce the risk of surface oxidation.
(5) The shunt can be stored for at least 1 year in original package by following above instructions.

Installation Suggestions

The recommended installation torque for the M3 threaded hole is 0.4~0.8 N.m.

Packaging

(1) 15 pcs./PVC tray, with the pin facing downwards.
(2) Pack every 4 trays into a bundle (60pcs).
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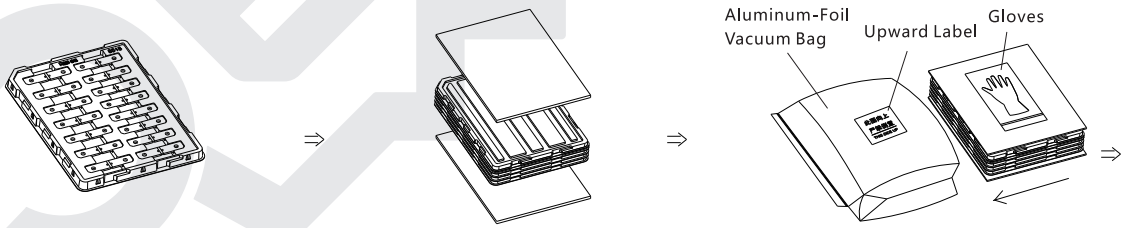

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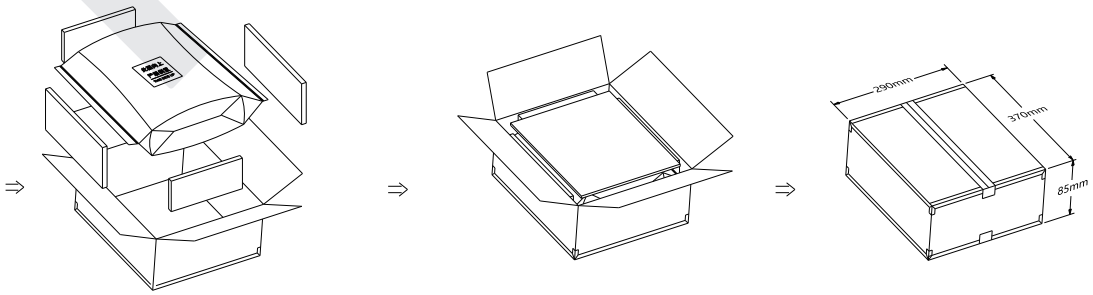

4. Place vacuumed bag into an outer box and place EPE on 4 sides of the bag for protection.

5. Fill the empty space around the bag with EPE.

6. Seal the box with transparent tape.

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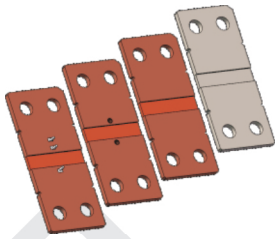


AEC-Q200 compliant

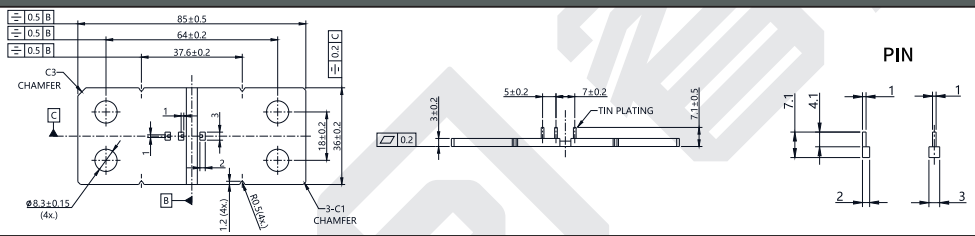
3D Model

Application

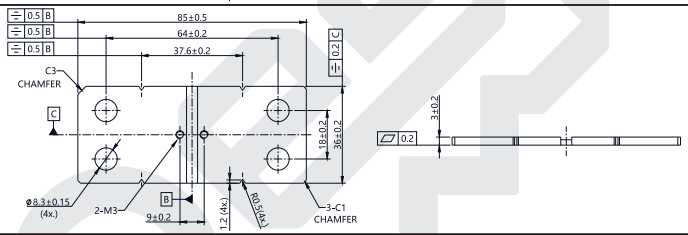
- Battery Management System
- Current Sensing
- Frequency Converter
- UPS
- Motor Control
- Electronic Load Equipment

Dimensions (mm)

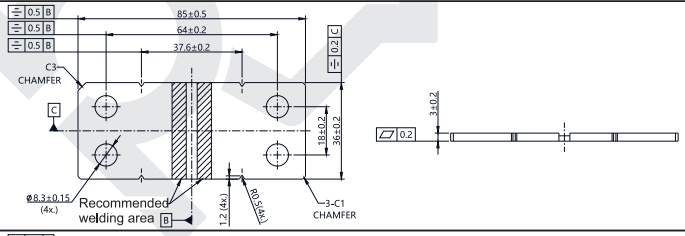
PIN



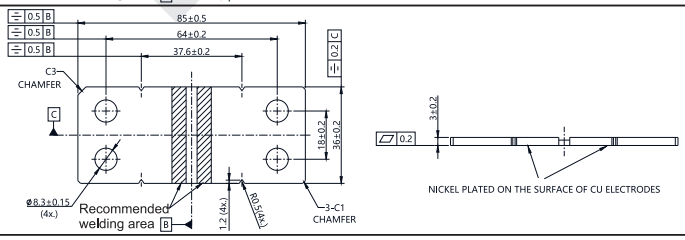
M3

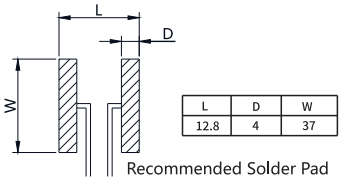


Standard



Standard
Nickel Plated





L	D	W
12.8	4	37

Recommended Solder Pad

Not following the recommended solder pad design may seriously affect the accuracy of current measurement!

Specifications

Model	Tolerance	Resistance	TCR (+20℃ Ref)	Rated Current	Current Coefficient*	Rated Power	Inductance	Structure	Weight
ARCS8536DL025A9	±0.5%	25μΩ	±150ppm/℃ (+20℃~+175℃) ±200ppm/℃ (-55℃~+20℃)	1410A	<10ppm/A	50W	<3nH (20KHz)	PIN	80g
ARCS8536FL025A9	±1%								
ARCS8536GL025A9	±2%								
ARCS8536JL025A9	±5%								
ARCS8536DL025B9	±0.5%		±150ppm/℃ (+20℃~+175℃) ±200ppm/℃ (-55℃~+20℃)					M3	
ARCS8536FL025B9	±1%								
ARCS8536GL025B9	±2%								
ARCS8536JL025B9	±5%								
ARCS8536DL025S9	±0.5%		±100ppm/℃ (+20℃~+175℃) ±150ppm/℃ (-55℃~+20℃)					Standard	
ARCS8536FL025S9	±1%								
ARCS8536GL025S9	±2%								
ARCS8536JL025S9	±5%								
ARCS8536DL025SN	±0.5%		±150ppm/℃ (+20℃~+175℃) ±200ppm/℃ (-55℃~+20℃)					Standard Nickel plated*	
ARCS8536FL025SN	±1%								
ARCS8536GL025SN	±2%								
ARCS8536JL025SN	±5%								
ARCS8536DL025S4	±0.5%		±100ppm/℃ (+20℃~+175℃) ±150ppm/℃ (-55℃~+20℃)					Nickel plated terminal*	
ARCS8536FL025S4	±1%								
ARCS8536GL025S4	±2%								
ARCS8536JL025S4	±5%								

*$(R_1-R_2)/[(I_1-I_2)*R_0]$($R_1$: 2/3 times rated current, 10 min; R_2: 1/10 times rated current, 10 min; R_0: Initial resistance; I_1: 2/3 times rated current; I_2: 1/10 times rated current.)
*Full nickel plating is the whole nickel plating, including the resistive alloy part, can completely prevent resistive alloy part from the oxidation,but the TCR performance is slightly reduced; half nickel plating type is partial nickel plating, the resistive alloy part is not nickel plated but only the copper terminal.

Performance

Test	Test method	Test limits
Thermal Shock	-55°C/+155°C,1000cycles,15minutes each	△ R≤±0.5%
Short-Time Overload	5 times rated power, 5 seconds	△ R≤±0.5%
Low Temp. Storage	-55°C for 24 hours	△ R≤±0.5%
High Temp. Exposure	+170°C for 1000 hours	△ R≤±1.0%
Humidity Resistance	+85°C, 85% RH 0.1 times rated power, 1000 hours	△ R≤±0.5%
Moisture Resistance	100G 6mS, 5 times	△ R≤±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 1minute, X-Y-Z direction, 12 hours	△ R≤±0.5%
Load Life Stability	Rated power, +70°C, 1.5 hours on, 0.5 hours off, 1000 hours	△ R≤±1.0%

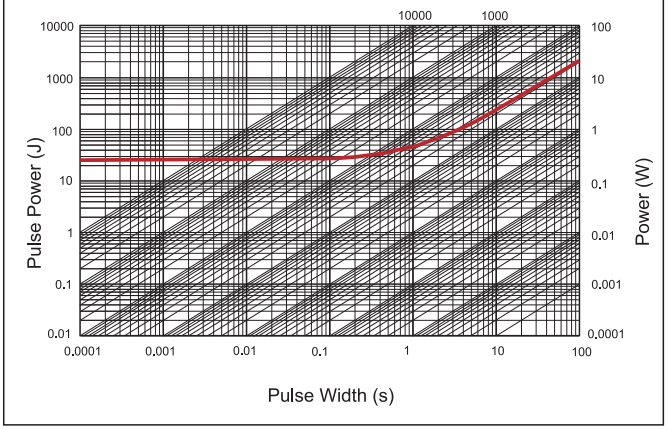
Part Number Information

Example: ARCS8536FL025A9 (ARCS 8536 ±1% 25μΩ PIN)

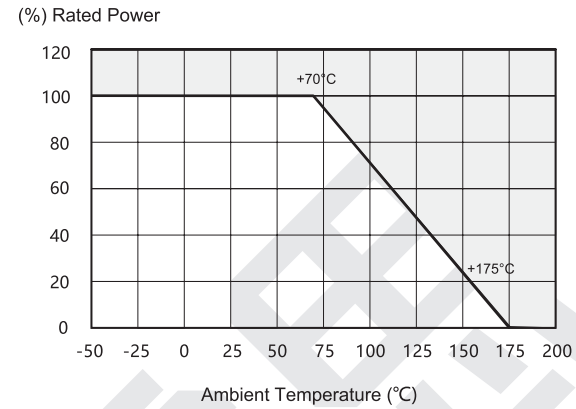
A	R	C	S	8	5	3	6	F	L	0	2	5	A	9

- Series: ARCS
- Size: 8536
- Tolerance: D=±0.5%, F=±1%, G=±2%, J=±5%
- Resistance: L025=25μΩ
- Structure: A=PIN, B=M3 hole, S=Standard
- Packaging: 9=Standard, 0-8=Custom, N= Nickel plated, 4=Nickel plated terminal

Pulse Power



Derating Curve



Safe Storage

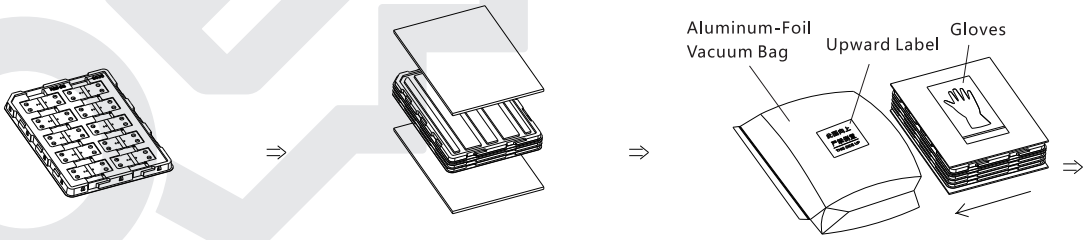
(1) The shunt should be stored at a temperature of +5°C to +35°C, humidity <60% RH, and the humidity should be kept as low as possible.
(2) The shunt should be protected from direct sunlight.
(3) The shunt should be stored in a clean, dry and free of harmful gases environment (hydrogen chloride, sulfuric acid, hydrogen sulfide).
(4) Wear gloves for installation and storage, to reduce the risk of surface oxidation.
(5) The shunt can be stored for at least 1 year in original package by following above instructions.

Installation Suggestions

The recommended installation torque for the M3 threaded hole is 0.4~0.8 N.m.

Packaging

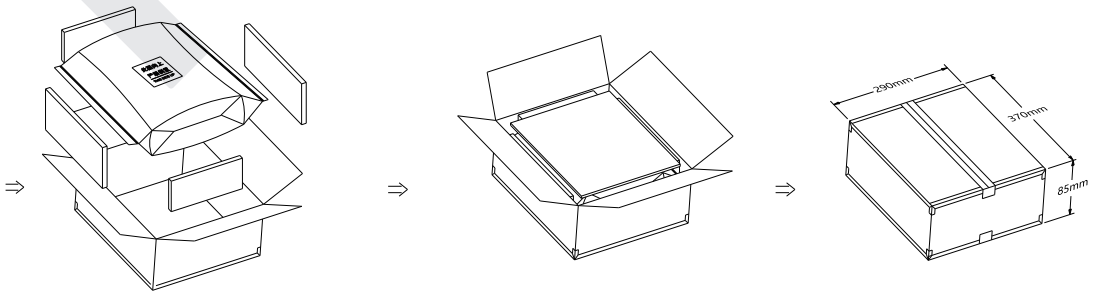
(1) 15 pcs./PVC tray, with the pin facing downwards.
(2) Pack every 4 trays into a bundle (60pcs).
(3) Place each bundle into an aluminum-foil vacuum bag and vacuum seal it.
(4) A pair of PE gloves and a pair of cotton work gloves in each bag.
(5) Product unit weight: 70±5g. Box net weight: 2.1kg. Box gross weight: 3.0kg.
(6) Outer box size: 370×290×85mm.



1. 10 pcs./PVC tray, with the pin facing downwards.

2. 3 trays/bundle (30pcs.) with a cover. Place EPE at the top and bottom.

3. One bundle packs into one aluminum-foil bag, with one PE gloves and one cotton work gloves. Vacuum seal the bag.



4. Place vacuumed bag into an outer box and place EPE on 4 sides of the bag for protection.

5. Fill the empty space around the bag with EPE.

6. Seal the box with transparent tape.

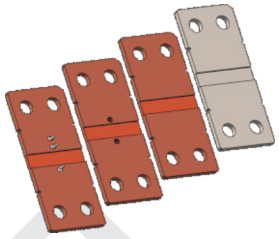
Automotive-Grade Precision Mn-Cu Alloy Shunt
Tightest Tolerance ± 0.5%, Various Structure of Voltage Output
Low thermal EMF & Power Coefficient

Introduction

The ARCS series which targets automotive market can cover from hundreds to thousands of amperes. Due to special alloy materials, the ARCS series has good long-term stability and is capable to withstand pulse current several times, which is higher than the rated current.

Shunt resistance value and surface temperature will keep changing when loaded. The factors that cause the change in resistance include TCR and dimensional change caused by thermal expansion, etc. Shunt resistance tends to be stable when self- heating and heat dissipation reach dynamic balance, but high current coefficient will cause the change of shunt resistance greater than nominal tolerance. The special heat treatment process of the ARCS series make it a low current coefficient with very good compensation characteristics.

Because there is always a distance between the voltage sampling point and the resistor heating center, temperature difference is appeared, so a lower thermal EMF is particularly important. The ARCS series has thermal EMF of less than 0.5μV/℃ to copper, and has little effect on the voltage output of the millivolt level. The flat structure of the ARCS series makes the inductance less than 3nH, which also performs perfect at high frequency applications.



AEC-Q200 compliant

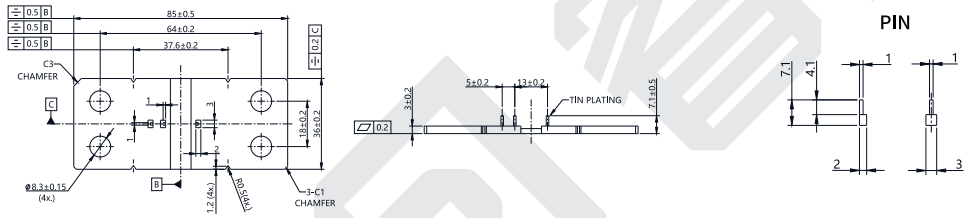
3D Model

Application

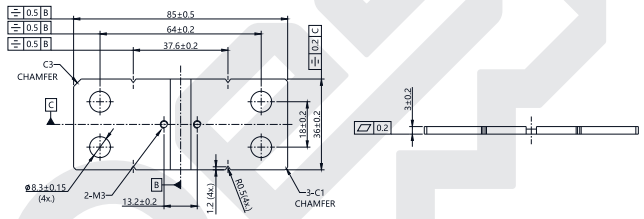
- Battery Management System
- Current Sensing
- Frequency Converter
- UPS
- Motor Control
- Electronic Load Equipment

Dimensions (mm)

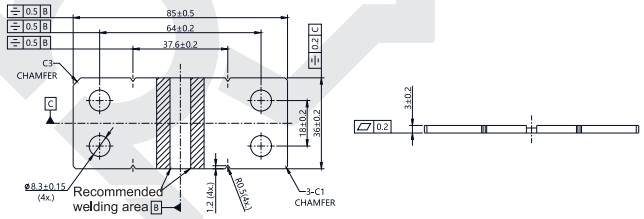
PIN



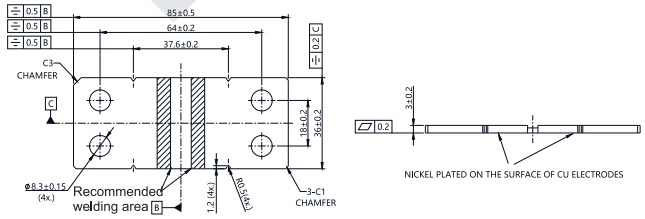
M3

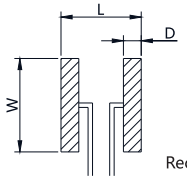


Standard



Standard
Nickel Plated





L	D	W
16.8	4	37

Recommended Solder Pad

Not following the recommended solder pad design may seriously affect the accuracy of current measurement!

ARCS8536-L050

Shunt Resistor

Specifications

Model	Tolerance	Resistance	TCR (+20℃ Ref)	Rated Current	Current Coefficient*	Rated Power	Inductance	Structure	Weight
ARCS8536DL050A9	±0.5%	50μΩ	100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)	1000A	<10ppm/A	50W	<3nH (20KHz)	PIN	80g
ARCS8536FL050A9	±1%								
ARCS8536GL050A9	±2%								
ARCS8536JL050A9	±5%								
ARCS8536DL050B9	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					M3	
ARCS8536FL050B9	±1%								
ARCS8536GL050B9	±2%								
ARCS8536JL050B9	±5%								
ARCS8536DL050S9	±0.5%		50ppm/℃ (20℃~+175℃) 100ppm/℃ (-55℃~+20℃)					Standard	
ARCS8536FL050S9	±1%								
ARCS8536GL050S9	±2%								
ARCS8536JL050 S9	±5%								
ARCS8536DL050SN	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Standard Nickel plated*	
ARCS8536FL050SN	±1%								
ARCS8536GL050SN	±2%								
ARCS8536JL050 SN	±5%								
ARCS8536DL050S4	±0.5%		100ppm/℃ (+20℃~+175℃) 150ppm/℃ (-55℃~+20℃)					Nickel plated terminal*	
ARCS8536FL050S4	±1%								
ARCS8536GL050S4	±2%								
ARCS8536JL050S4	±5%								

*$(R_1-R_2)/[(I_1-I_2)*R_0]$($R_1$: 2/3 times rated current, 10 min; R_2: 1/10 times rated current, 10 min; R_0: Initial resistance; I_1: 2/3 times rated current; I_2: 1/10 times rated current.)
*Full nickel plating is the whole nickel plating, including the resistive alloy part, can completely prevent resistive alloy part from the oxidation,but the TCR performance is slightly reduced; half nickel plating type is partial nickel plating, the resistive alloy part is not nickel plated but only the copper terminal.

Performance

Test	Test method	Test limits
Thermal Shock	-55°C/+155°C,1000cycles,15minutes each	△ R≤±0.5%
Short-Time Overload	5 times rated power, 5 seconds	△ R≤±0.5%
Low Temp. Storage	-55°C for 24 hours	△ R≤±0.5%
High Temp. Exposure	+170°C for 1000 hours	△ R≤±1.0%
Humidity Resistance	+85°C, 85% RH 0.1 times rated power, 1000 hours	△ R≤±0.5%
Moisture Resistance	100G 6mS, 5 times	△ R≤±0.5%
Vibration	Frequency varied 10Hz to 2000Hz in 1minute, X-Y-Z direction, 12 hours	△ R≤±0.5%
Load Life Stability	Rated power, +70°C, 1.5 hours on, 0.5 hours off, 1000 hours	△ R≤±1.0%

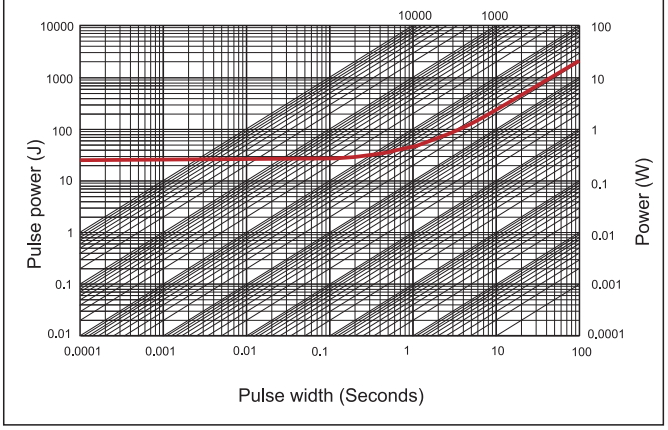
Part Number Information

Example: ARCS8536FL050A9 (ARCS 8536 ±1% 50μΩ PIN)

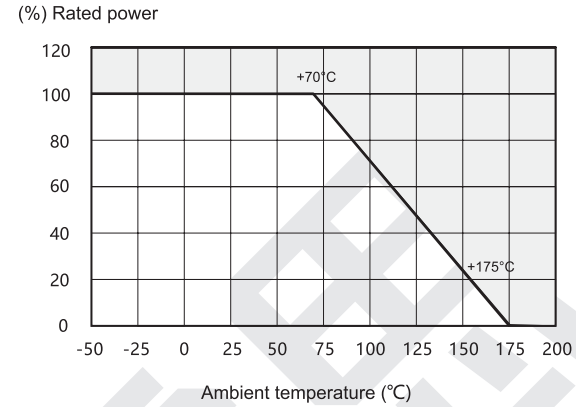
A	R	C	S	8	5	3	6	F	L	0	5	0	A	9

- Series: ARCS
- Size: 8536
- Tolerance: D=±0.5%, F=±1%, G=±2%, J=±5%
- Resistance: L050=50μΩ
- Structure: A=PIN, B=M3 hole, S=Standard
- Packaging: 9=Standard, 0-8=Custom, N= Nickel plated, 4=Nickel plated terminal

Pulse Power



Derating Curve



Safe Storage

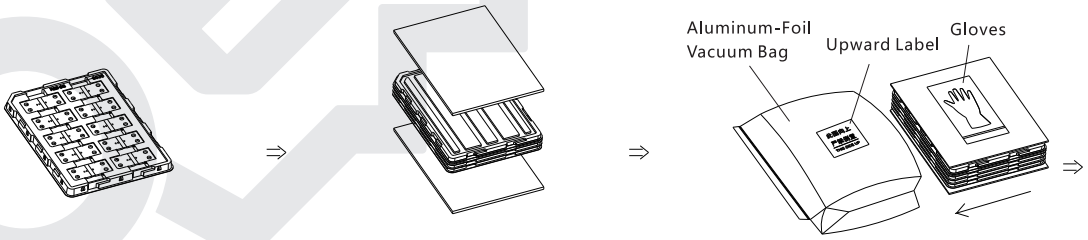
(1) The shunt should be stored at a temperature of +5°C to +35°C, humidity <60% RH, and the humidity should be kept as low as possible.
(2) The shunt should be protected from direct sunlight.
(3) The shunt should be stored in a clean, dry and free of harmful gases environment (hydrogen chloride, sulfuric acid, hydrogen sulfide).
(4) Wear gloves for installation and storage, to reduce the risk of surface oxidation.
(5) The shunt can be stored for at least 1 year in original package by following above instructions.

Installation Suggestions

The recommended installation torque for the M3 threaded hole is 0.4~0.8 N.m.

Packaging

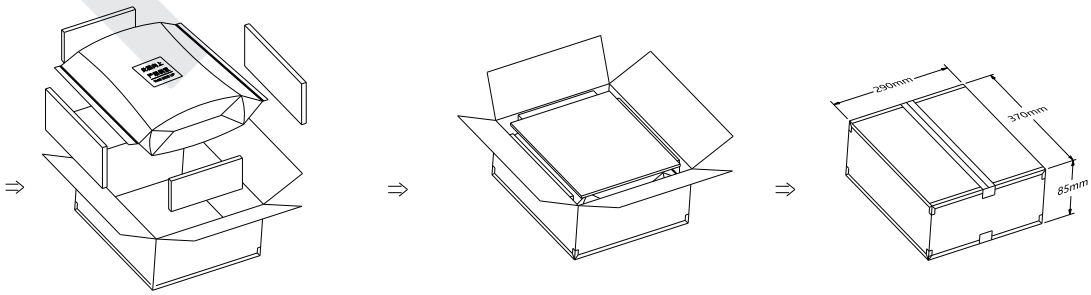
(1) 15 pcs./PVC tray, with the pin facing downwards.
(2) Pack every 4 trays into a bundle (60pcs).
(3) Place each bundle into an aluminum-foil vacuum bag and vacuum seal it.
(4) A pair of PE gloves and a pair of cotton work gloves in each bag.
(5) Product unit weight: 70±5g. Box net weight: 2.1kg. Box gross weight: 3.0kg.
(6) Outer box size: 370×290×85mm.



1. 10 pcs./PVC tray, with the pin facing downwards.

2. 3 trays/bundle (30pcs.) with a cover. Place EPE at the top and bottom.

3. One bundle packs into one aluminum-foil bag, with one PE gloves and one cotton work gloves. Vacuum seal the bag.



4. Place vacuumed bag into an outer box and place EPE on 4 sides of the bag for protection.

5. Fill the empty space around the bag with EPE.

6. Seal the box with transparent tape.

Rated Current

10A~300A

Precision DC Ammeter Shunt

Tolerance

±0.1%

TCR

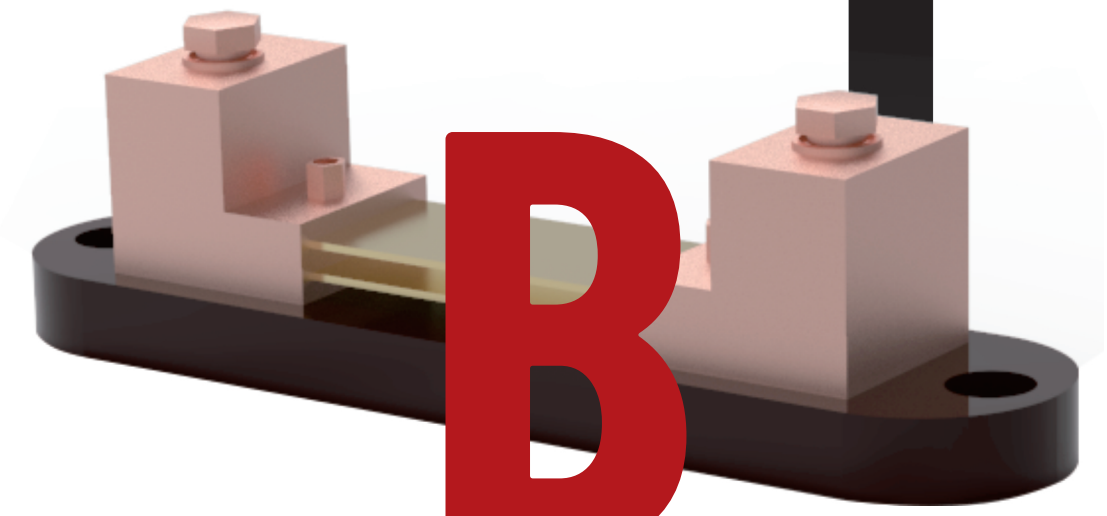
±20ppm/°C

Resistance

0.167mΩ~5mΩ

Output Voltage

50mV~75mV



RTBS

Applications

BMS

Power Equipment

Industrial Control Equipment

RTCS

Precision DC Ammeter Shunt

Applications

BMS

Power Equipment

Industrial Control Equipment

Rated Current

10A~20000A

Tolerance

±0.1%

TCR

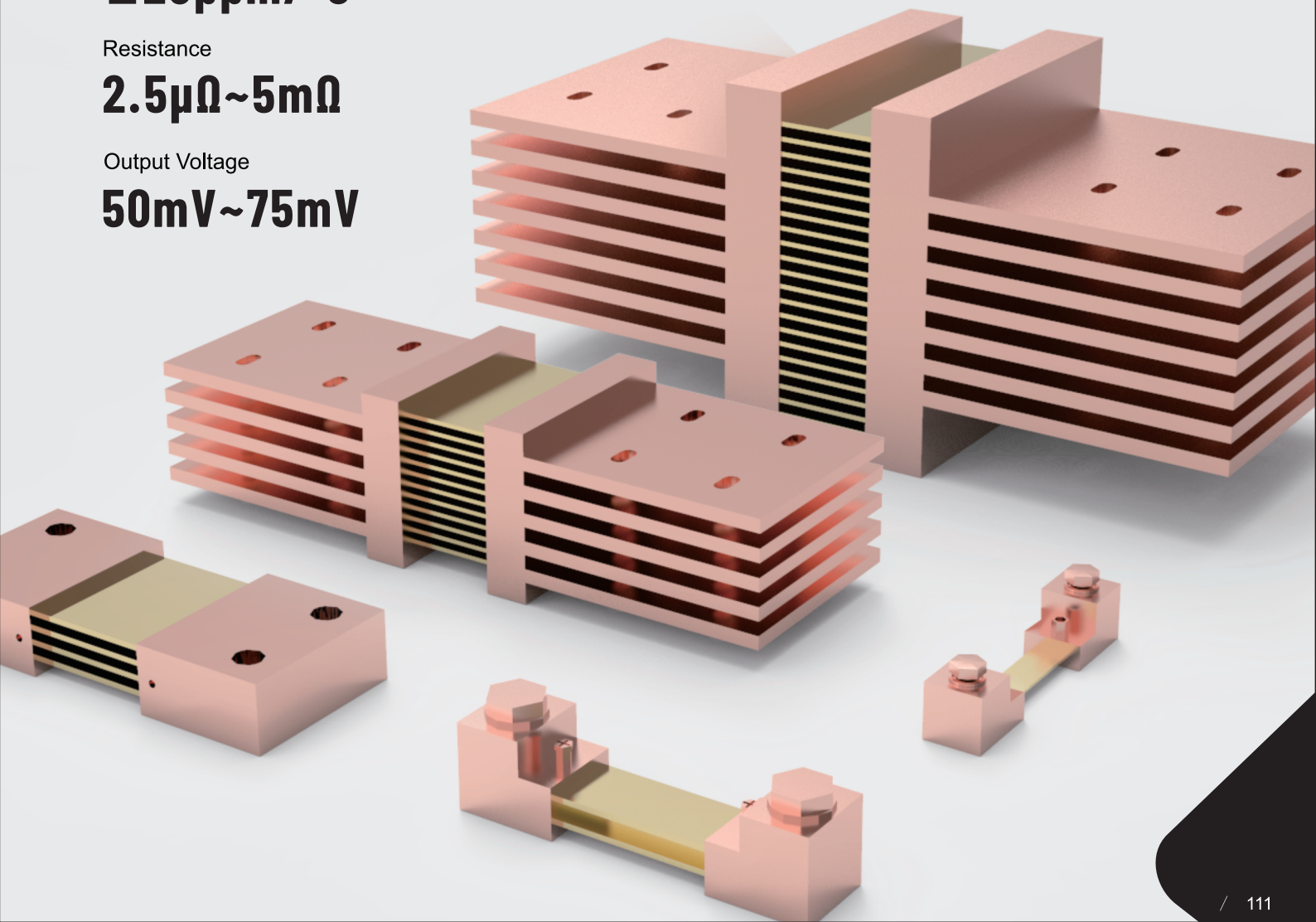
±20ppm/°C

Resistance

2.5μΩ~5mΩ

Output Voltage

50mV~75mV



High Voltage Resistor

Select high voltage and high resistance resistor with high voltage withstanding and high voltage operating.

Due to its unique technology and structure, high voltage and high resistance resistor can withstand large working voltage or large pulse voltage without resistor failure such as electric breakdown or flashover.

Because there are conductive particles and non-conductive particles in the resistor, non-conductive particles are easily activated to form parallel resistor under high voltage environment, resulting in a nonlinear relationship between the voltage and current of the resistor.

C&B Electronics provides thick film technology with low voltage coefficient, low inductance and high reliability.

Characteristics

- Good High Temperature Characteristics and Humidity Resistance
- Non-Inductance Design
- Low VCR
- Low TCR

Applications

- Electric Power
- Medical
- Railway
- EV

Data Sheet No: C08007
Version: V1
Date: 2023/09/17

睿思

HVLR

High Voltage Non-Inductive Resistor

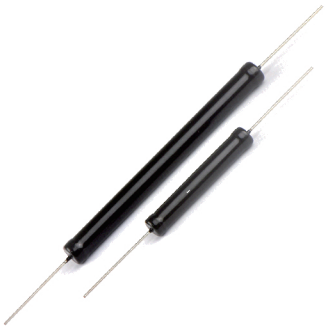
Resistance	1KΩ~1GΩ
Tolerance	±0.1%
TCR	±100ppm/℃
Operating Voltage	48000V$_{max}$

Applications

Medical Equipment
Electrical Equipment
Instrumentation
Automotive Electronics
Testing & Measurement Equipment

Better Solution for Sustainable High End Manufacturing

High Voltage Non-Inductive Resistor
Tight Tolerance, High Voltage, Low VCR and High Reliability



RoHS AEC-Q200 3D

Introduction

HVLR series resistor applies self-developed electronic paste on Al^2O^3 ceramic rod by precise thick-film technology. The TCR of HVLR can reach within ±100ppm/℃ in the temperature range of -25℃~+125℃, with ±0.1% tightest tolerance and 0.01ppm/V VCR.

Voltage coefficient of resistance (VCR) is one of the most critical electrical parameters of high voltage resistor. As electronic paste is made by mixing conductive and non-conductive materials, the non-conductive materials are activated to form a parallel resistance in a high-voltage operation, resulting in the change in the resistance value. The low VCR is mainly determined by the quality of manufacturing and processing of electronic paste. HVLR undergoes 100% high-voltage testing after manufactured to ensure the performance of each resistor under high-voltage conditions.

The core materials and processes of HVLR have been independently controllable. with stable quality and timely delivery. If the standard specifications cannot meet your needs, please contact our sales.

Electrical Parameters

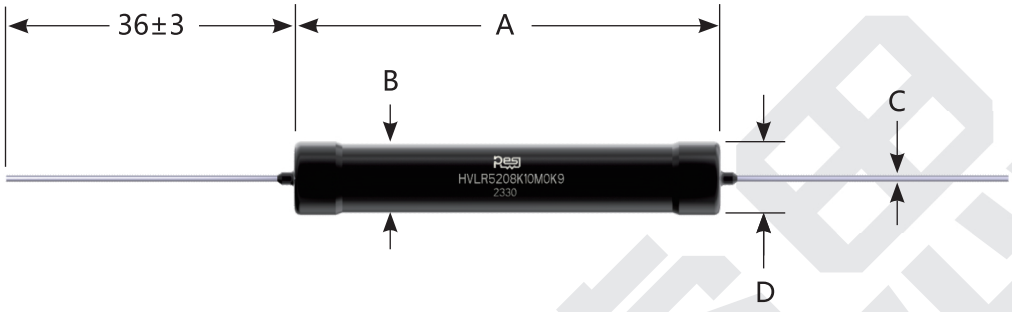
Series	Size	Rated Power (+125℃)	Max. Operating Voltage*	Operating Temperature	TCR ppm/℃	Resistance	Unit Weight g	Tolerance %
HVLR	1505	0.7W	2500V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	1.70±1	±0.1~±10.0
HVLR	1905	1.0W	3500V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	1.93±1	±0.1~±10.0
HVLR	2505	1.2W	5500V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	2.45±1	±0.1~±10.0
HVLR	2408	2.0W	5500V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	5.16±2	±0.1~±10.0
HVLR	3908	3.0W	10000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	7.57±2	±0.1~±10.0
HVLR	5208	5.0W	15000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	9.58±2	±0.1~±10.0
HVLR	7609	7.5W	22500V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	18.60±2	±0.1~±10.0
HVLR	1029	10.0W	32000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	23.63±2	±0.1~±10.0
HVLR	1179	11.0W	35000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	26.24±2	±0.1~±10.0
HVLR	1279	12.0W	40000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	28.56±2	±0.1~±10.0
HVLR	1379	13.0W	45000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	31.64±2	±0.1~±10.0
HVLR	1529	15.0W	48000V	-55℃~+175℃	±100 (-25℃ ~ +125℃,+25℃ ref)	1KΩ~1GΩ	34.34±2	±0.1~±10.0

*The maximum operating voltage should be the smaller one between $U=\sqrt{(P * R)}$ and Umax.

C&B Electronics Shenzhen CO., LTD. | www.resistor.today | resi@cbeureka.com | Tel:0755-83981080/83981010

Dimensions

Unit: mm



Series	Size	Resistance	A	B	C	D
HVLR	1505	1KΩ~1GΩ	15±1.5	5±1.0	0.8±0.1	6.5±1.0
HVLR	1905	1KΩ~1GΩ	19±1.5	5±1.0	0.8±0.1	6.5±1.0
HVLR	2505	1KΩ~1GΩ	25.4±1.5	5±1.0	0.8±0.1	6.5±1.0
HVLR	2408	1KΩ~1GΩ	24±1.5	8±1.0	1.0±0.1	9.5±1.0
HVLR	3908	1KΩ~1GΩ	39±1.5	8±1.0	1.0±0.1	9.5±1.0
HVLR	5208	1KΩ~1GΩ	52±1.5	8±1.0	1.0±0.1	9.5±1.0
HVLR	7609	1KΩ~1GΩ	76±1.5	9±1.0	1.0±0.1	10.5±1.0
HVLR	1029	1KΩ~1GΩ	102±1.5	9±1.0	1.0±0.1	10.5±1.0
HVLR	1179	1KΩ~1GΩ	117±1.5	9±1.0	1.0±0.1	10.5±1.0
HVLR	1279	1KΩ~1GΩ	127±1.5	9±1.0	1.0±0.1	10.5±1.0
HVLR	1379	1KΩ~1GΩ	137±1.5	9±1.0	1.0±0.1	10.5±1.0
HVLR	1529	1KΩ~1GΩ	152±1.5	9±1.0	1.0±0.1	10.5±1.0

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HVLR

High Voltage Non-Inductive Resistor

Performance

Test	Test Method	Standards	Test Results
Voltage Coefficient of Resistance	25 ± 5 ℃, apply 10% rated voltage and 100% rated voltage, load time ≤ 0.5s, interval 5s	MIL-STD-202 Method 309	Typical 0.01ppm/V, Max. 2ppm/V
Voltage Proof	Apply 5000VAC between the lead and the epoxy coating for 60s	IEC 60115-1 4.7	No breakdown or flashover, △R≤±0.5%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+150°C, 15min, 1000 Cycles	MIL-STD-202 Method 107	△R≤±1.0%
Short Time Overload	Apply 5 times rated power for 5s, no more than 1.5 times the max operating voltage	IEC60115-1-2008 4.13	△R≤±0.5%
Bias Humidity	+85°C, 85%RH, load 10% rated power, 1000h measure within 24±4h after the test	MIL-STD-202 Method 103	△R≤±1.0%
High Temperature Storage	+150°C, 1000h, no load	MIL-STD-202 Method 108	△R≤±1.0%
Moisture Resistance	Apply T=24 h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	△R≤±1.0%
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	MIL-STD-202 Method 213	△R≤±0.5%
Vibration	10-2000Hz for 1 min, test in directions of X Y Z for 12h totally	MIL-STD-202 Method 204	△R≤±0.5%
Load Life	Apply rated power for 1000 hours, 1.5h on, 0.5h off (ambient temperature 125℃)	MIL-STD-202 Method 108	△R≤±1.0%
TCR	-25℃ and +125℃, +25℃ Ref.	AEC-Q200 TEST 18 IEC 60115-1 4.8	Within ±100ppm/℃

Part Number Information

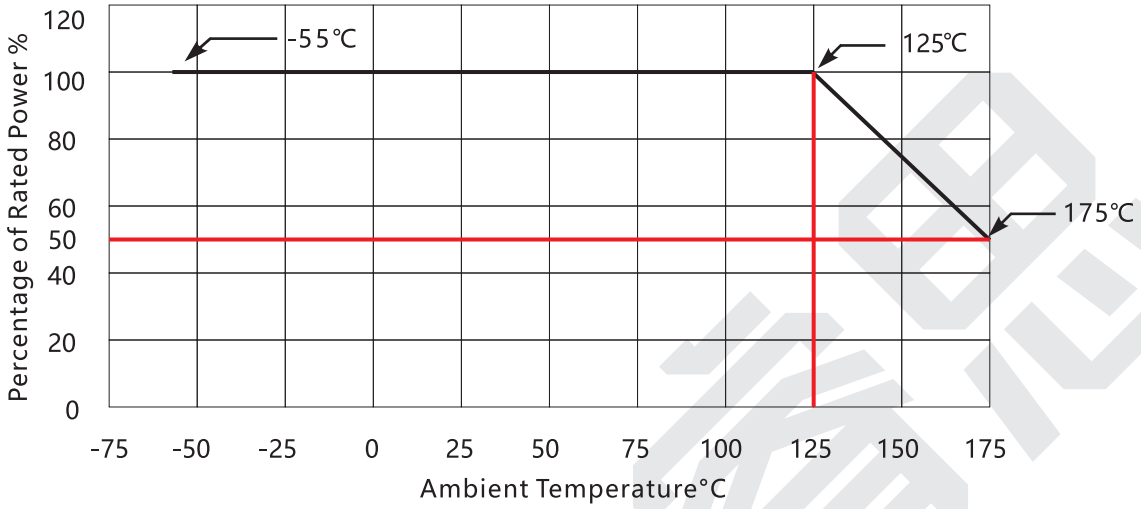
Example: HVLR1505F100MK9(HVLR 1505 ±1% 100MΩ ±100ppm/℃ Standard)

H	V	L	R	1	5	0	5	F	1	0	0	M	K	9

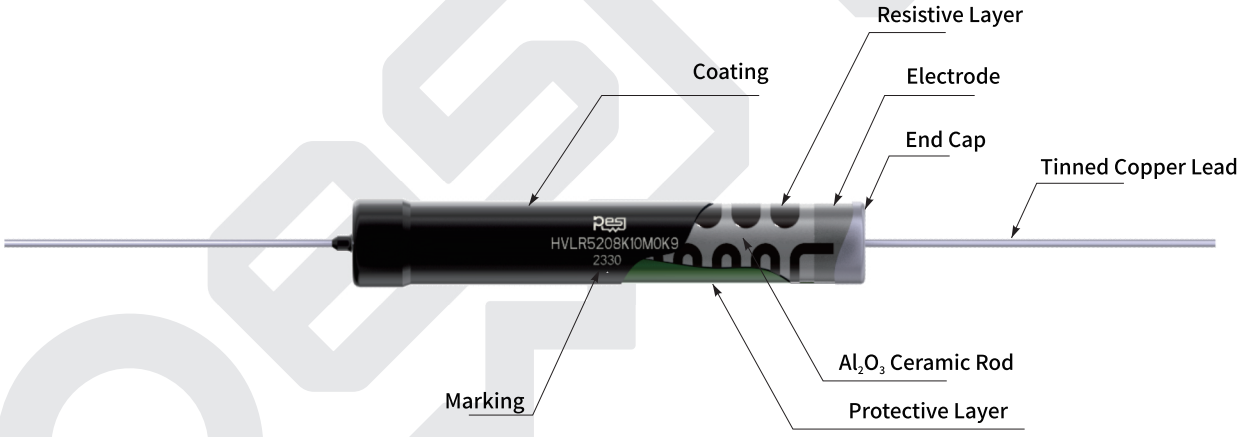
Series	Size		Tolerance	Resistance	TCR	Code
HVLR	1505	7609	B=±0.1%	1K00=1KΩ	K=100ppm/℃	9=Standard
	1905	1029	D=±0.5%	1M00=1MΩ		0-8=Custom
	2505	1179	F=±1.0%	1G00=1GΩ		
	2408	1279	G=±2.0%			
	3908	1379	J=±5.0%			
	5208	1529	K=±10%			

If you need products with smaller or larger dimensions, higher voltage, tighter tolerance, and lower TCR, please contact us for customized development.

Derating Curve



Construction



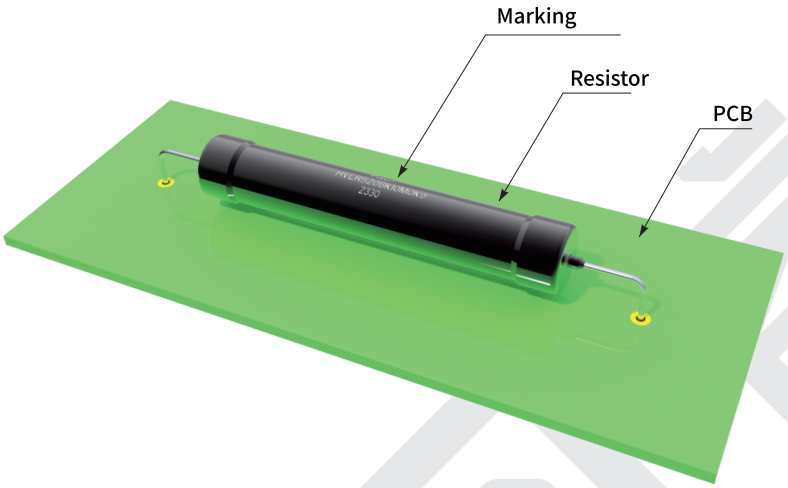
Marking

The first line (four digits) represents brand.
The second line (fifteen digits) represents part number.
The third line (four digits) represents date code.

Size	Illustration	Demonstration
HVLR5208		RESI: Brand HVLR5208K10M0K9: Part Number 2330: Date Code

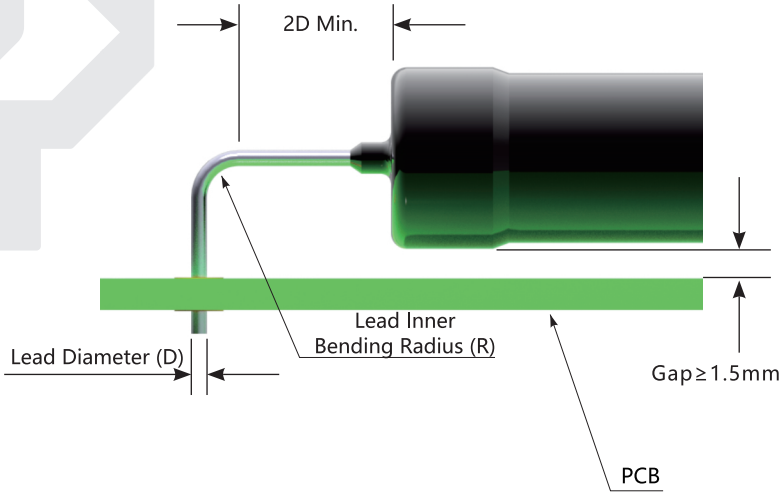
Installation

(1) The following figure shows the HVLR common installation. The resistor should be installed horizontally between two soldering pads and the lengths of the leads at both ends should be consistent.
(2) As shown in the following figure, it is recommended to place the resistor marking facing upwards for reading the product part number and date code.
(3) As shown in the following figure, it is recommended to maintain a gap of ≥ 1.5mm between the resistor and the PCB, because of the high voltage conditions of HVLR.



(4) The minimum inner bending radius of the resistor lead is shown in the following table:

Lead Diameter (D)	Minimum Lead Inner Bending Radius (R)
< 0.6mm	1x Lead Diameter
0.6mm~1.2mm	1.5x Lead Diameter
>1.2mm	2x Lead Diameter



Packing Instructions

Storage Instructions

(1) Resistors should be stored at a temperature of 5 ℃ to 35 ℃, humidity ≤ 60% RH, and the humidity should be kept as low as possible.
(2) Resistors should be protected from direct sunlight.
(3) Resistors should be stored in a clean and dry environment, free of harmful gases (hydrogen chloride, sulfuric acid, hydrogen sulfide, etc).
(4) Installation and storage should be handled carefully to prevent mechanical damage or deformation of the leads of the resistor caused by external impact.
(5) Under the above conditions, resistors can be stored for at least 1 year.

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR1505J1K00K9	1505	±5%	1KΩ	50	±100ppm/℃	0.7W	26V
HVLR1505J2K00K9	1505	±5%	2KΩ	50	±100ppm/℃	0.7W	37V
HVLR1505J5K00K9	1505	±5%	5KΩ	50	±100ppm/℃	0.7W	59V
HVLR1505J10K0K9	1505	±5%	10KΩ	50	±100ppm/℃	0.7W	84V
HVLR1505J20K0K9	1505	±5%	20KΩ	50	±100ppm/℃	0.7W	118V
HVLR1505J50K0K9	1505	±5%	50KΩ	50	±100ppm/℃	0.7W	187V
HVLR1505J100KK9	1505	±5%	100KΩ	50	±100ppm/℃	0.7W	265V
HVLR1505J200KK9	1505	±5%	200KΩ	50	±100ppm/℃	0.7W	374V
HVLR1505J500KK9	1505	±5%	500KΩ	50	±100ppm/℃	0.7W	592V
HVLR1505J1M00K9	1505	±5%	1MΩ	50	±100ppm/℃	0.7W	837V
HVLR1505J2M00K9	1505	±5%	2MΩ	50	±100ppm/℃	0.7W	1183V
HVLR1505J2M50K9	1505	±5%	2.5MΩ	50	±100ppm/℃	0.7W	1323V
HVLR1505J3M00K9	1505	±5%	3MΩ	50	±100ppm/℃	0.7W	1449V
HVLR1505J4M00K9	1505	±5%	4MΩ	50	±100ppm/℃	0.7W	1673V
HVLR1505J5M00K9	1505	±5%	5MΩ	50	±100ppm/℃	0.7W	1871V
HVLR1505J10M0K9	1505	±5%	10MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J20M0K9	1505	±5%	20MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J30M0K9	1505	±5%	30MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J50M0K9	1505	±5%	50MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J100MK9	1505	±5%	100MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J200MK9	1505	±5%	200MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J300MK9	1505	±5%	300MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J500MK9	1505	±5%	500MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505J1G00K9	1505	±5%	1GΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F1K00K9	1505	±1%	1KΩ	50	±100ppm/℃	0.7W	26V
HVLR1505F2K00K9	1505	±1%	2KΩ	50	±100ppm/℃	0.7W	37V
HVLR1505F5K00K9	1505	±1%	5KΩ	50	±100ppm/℃	0.7W	59V
HVLR1505F10K0K9	1505	±1%	10KΩ	50	±100ppm/℃	0.7W	84V
HVLR1505F20K0K9	1505	±1%	20KΩ	50	±100ppm/℃	0.7W	118V
HVLR1505F50K0K9	1505	±1%	50KΩ	50	±100ppm/℃	0.7W	187V
HVLR1505F100KK9	1505	±1%	100KΩ	50	±100ppm/℃	0.7W	265V
HVLR1505F200KK9	1505	±1%	200KΩ	50	±100ppm/℃	0.7W	374V
HVLR1505F500KK9	1505	±1%	500KΩ	50	±100ppm/℃	0.7W	592V
HVLR1505F1M00K9	1505	±1%	1MΩ	50	±100ppm/℃	0.7W	837V
HVLR1505F2M00K9	1505	±1%	2MΩ	50	±100ppm/℃	0.7W	1183V
HVLR1505F2M50K9	1505	±1%	2.5MΩ	50	±100ppm/℃	0.7W	1323V
HVLR1505F3M00K9	1505	±1%	3MΩ	50	±100ppm/℃	0.7W	1449V
HVLR1505F4M00K9	1505	±1%	4MΩ	50	±100ppm/℃	0.7W	1673V
HVLR1505F5M00K9	1505	±1%	5MΩ	50	±100ppm/℃	0.7W	1871V
HVLR1505F10M0K9	1505	±1%	10MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F20M0K9	1505	±1%	20MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F30M0K9	1505	±1%	30MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F50M0K9	1505	±1%	50MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F100MK9	1505	±1%	100MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F200MK9	1505	±1%	200MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F300MK9	1505	±1%	300MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F500MK9	1505	±1%	500MΩ	50	±100ppm/℃	0.7W	2500V
HVLR1505F1G00K9	1505	±1%	1GΩ	50	±100ppm/℃	0.7W	2500V
HVLR1905J1K00K9	1905	±5%	1KΩ	50	±100ppm/℃	1W	32V
HVLR1905J2K00K9	1905	±5%	2KΩ	50	±100ppm/℃	1W	45V
HVLR1905J5K00K9	1905	±5%	5KΩ	50	±100ppm/℃	1W	71V
HVLR1905J10K0K9	1905	±5%	10KΩ	50	±100ppm/℃	1W	100V
HVLR1905J20K0K9	1905	±5%	20KΩ	50	±100ppm/℃	1W	141V
HVLR1905J50K0K9	1905	±5%	50KΩ	50	±100ppm/℃	1W	224V
HVLR1905J100KK9	1905	±5%	100KΩ	50	±100ppm/℃	1W	316V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR1905J200KK9	1905	±5%	200KΩ	50	±100ppm/℃	1W	447V
HVLR1905J500KK9	1905	±5%	500KΩ	50	±100ppm/℃	1W	707V
HVLR1905J1M00K9	1905	±5%	1MΩ	50	±100ppm/℃	1W	1000V
HVLR1905J2M00K9	1905	±5%	2MΩ	50	±100ppm/℃	1W	1414V
HVLR1905J2M50K9	1905	±5%	2.5MΩ	50	±100ppm/℃	1W	1581V
HVLR1905J3M00K9	1905	±5%	3MΩ	50	±100ppm/℃	1W	1732V
HVLR1905J4M00K9	1905	±5%	4MΩ	50	±100ppm/℃	1W	2000V
HVLR1905J5M00K9	1905	±5%	5MΩ	50	±100ppm/℃	1W	2236V
HVLR1905J10M0K9	1905	±5%	10MΩ	50	±100ppm/℃	1W	3162V
HVLR1905J20M0K9	1905	±5%	20MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J30M0K9	1905	±5%	30MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J50M0K9	1905	±5%	50MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J100MK9	1905	±5%	100MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J200MK9	1905	±5%	200MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J300MK9	1905	±5%	300MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J500MK9	1905	±5%	500MΩ	50	±100ppm/℃	1W	3500V
HVLR1905J1G00K9	1905	±5%	1GΩ	50	±100ppm/℃	1W	3500V
HVLR1905F1K00K9	1905	±1%	1KΩ	50	±100ppm/℃	1W	32V
HVLR1905F2K00K9	1905	±1%	2KΩ	50	±100ppm/℃	1W	45V
HVLR1905F5K00K9	1905	±1%	5KΩ	50	±100ppm/℃	1W	71V
HVLR1905F10K0K9	1905	±1%	10KΩ	50	±100ppm/℃	1W	100V
HVLR1905F20K0K9	1905	±1%	20KΩ	50	±100ppm/℃	1W	141V
HVLR1905F50K0K9	1905	±1%	50KΩ	50	±100ppm/℃	1W	224V
HVLR1905F100KK9	1905	±1%	100KΩ	50	±100ppm/℃	1W	316V
HVLR1905F200KK9	1905	±1%	200KΩ	50	±100ppm/℃	1W	447V
HVLR1905F500KK9	1905	±1%	500KΩ	50	±100ppm/℃	1W	707V
HVLR1905F1M00K9	1905	±1%	1MΩ	50	±100ppm/℃	1W	1000V
HVLR1905F2M00K9	1905	±1%	2MΩ	50	±100ppm/℃	1W	1414V
HVLR1905F2M50K9	1905	±1%	2.5MΩ	50	±100ppm/℃	1W	1581V
HVLR1905F3M00K9	1905	±1%	3MΩ	50	±100ppm/℃	1W	1732V
HVLR1905F4M00K9	1905	±1%	4MΩ	50	±100ppm/℃	1W	2000V
HVLR1905F5M00K9	1905	±1%	5MΩ	50	±100ppm/℃	1W	2236V
HVLR1905F10M0K9	1905	±1%	10MΩ	50	±100ppm/℃	1W	3162V
HVLR1905F20M0K9	1905	±1%	20MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F30M0K9	1905	±1%	30MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F50M0K9	1905	±1%	50MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F100MK9	1905	±1%	100MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F200MK9	1905	±1%	200MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F300MK9	1905	±1%	300MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F500MK9	1905	±1%	500MΩ	50	±100ppm/℃	1W	3500V
HVLR1905F1G00K9	1905	±1%	1GΩ	50	±100ppm/℃	1W	3500V
HVLR2505J1K00K9	2505	±5%	1KΩ	50	±100ppm/℃	1.2W	35V
HVLR2505J2K00K9	2505	±5%	2KΩ	50	±100ppm/℃	1.2W	49V
HVLR2505J5K00K9	2505	±5%	5KΩ	50	±100ppm/℃	1.2W	77V
HVLR2505J10K0K9	2505	±5%	10KΩ	50	±100ppm/℃	1.2W	110V
HVLR2505J20K0K9	2505	±5%	20KΩ	50	±100ppm/℃	1.2W	155V
HVLR2505J50K0K9	2505	±5%	50KΩ	50	±100ppm/℃	1.2W	245V
HVLR2505J100KK9	2505	±5%	100KΩ	50	±100ppm/℃	1.2W	346V
HVLR2505J200KK9	2505	±5%	200KΩ	50	±100ppm/℃	1.2W	490V
HVLR2505J500KK9	2505	±5%	500KΩ	50	±100ppm/℃	1.2W	775V
HVLR2505J1M00K9	2505	±5%	1MΩ	50	±100ppm/℃	1.2W	1095V
HVLR2505J2M00K9	2505	±5%	2MΩ	50	±100ppm/℃	1.2W	1549V
HVLR2505J2M50K9	2505	±5%	2.5MΩ	50	±100ppm/℃	1.2W	1732V
HVLR2505J3M00K9	2505	±5%	3MΩ	50	±100ppm/℃	1.2W	1897V
HVLR2505J4M00K9	2505	±5%	4MΩ	50	±100ppm/℃	1.2W	2191V

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Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR2505J5M00K9	2505	±5%	5MΩ	50	±100ppm/℃	1.2W	2449V
HVLR2505J10M0K9	2505	±5%	10MΩ	50	±100ppm/℃	1.2W	3464V
HVLR2505J20M0K9	2505	±5%	20MΩ	50	±100ppm/℃	1.2W	4899V
HVLR2505J30M0K9	2505	±5%	30MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505J50M0K9	2505	±5%	50MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505J100MK9	2505	±5%	100MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505J200MK9	2505	±5%	200MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505J300MK9	2505	±5%	300MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505J500MK9	2505	±5%	500MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505J1G00K9	2505	±5%	1GΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F1K00K9	2505	±1%	1KΩ	50	±100ppm/℃	1.2W	35V
HVLR2505F2K00K9	2505	±1%	2KΩ	50	±100ppm/℃	1.2W	49V
HVLR2505F5K00K9	2505	±1%	5KΩ	50	±100ppm/℃	1.2W	77V
HVLR2505F10K0K9	2505	±1%	10KΩ	50	±100ppm/℃	1.2W	110V
HVLR2505F20K0K9	2505	±1%	20KΩ	50	±100ppm/℃	1.2W	155V
HVLR2505F50K0K9	2505	±1%	50KΩ	50	±100ppm/℃	1.2W	245V
HVLR2505F100KK9	2505	±1%	100KΩ	50	±100ppm/℃	1.2W	346V
HVLR2505F200KK9	2505	±1%	200KΩ	50	±100ppm/℃	1.2W	490V
HVLR2505F500KK9	2505	±1%	500KΩ	50	±100ppm/℃	1.2W	775V
HVLR2505F1M00K9	2505	±1%	1MΩ	50	±100ppm/℃	1.2W	1095V
HVLR2505F2M00K9	2505	±1%	2MΩ	50	±100ppm/℃	1.2W	1549V
HVLR2505F2M50K9	2505	±1%	2.5MΩ	50	±100ppm/℃	1.2W	1732V
HVLR2505F3M00K9	2505	±1%	3MΩ	50	±100ppm/℃	1.2W	1897V
HVLR2505F4M00K9	2505	±1%	4MΩ	50	±100ppm/℃	1.2W	2191V
HVLR2505F5M00K9	2505	±1%	5MΩ	50	±100ppm/℃	1.2W	2449V
HVLR2505F10M0K9	2505	±1%	10MΩ	50	±100ppm/℃	1.2W	3464V
HVLR2505F20M0K9	2505	±1%	20MΩ	50	±100ppm/℃	1.2W	4899V
HVLR2505F30M0K9	2505	±1%	30MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F50M0K9	2505	±1%	50MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F100MK9	2505	±1%	100MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F200MK9	2505	±1%	200MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F300MK9	2505	±1%	300MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F500MK9	2505	±1%	500MΩ	50	±100ppm/℃	1.2W	5500V
HVLR2505F1G00K9	2505	±1%	1GΩ	50	±100ppm/℃	1.2W	5500V
HVLR2408J1K00K9	2408	±5%	1KΩ	50	±100ppm/℃	2W	45V
HVLR2408J2K00K9	2408	±5%	2KΩ	50	±100ppm/℃	2W	63V
HVLR2408J5K00K9	2408	±5%	5KΩ	50	±100ppm/℃	2W	100V
HVLR2408J10K0K9	2408	±5%	10KΩ	50	±100ppm/℃	2W	141V
HVLR2408J20K0K9	2408	±5%	20KΩ	50	±100ppm/℃	2W	200V
HVLR2408J50K0K9	2408	±5%	50KΩ	50	±100ppm/℃	2W	316V
HVLR2408J100KK9	2408	±5%	100KΩ	50	±100ppm/℃	2W	447V
HVLR2408J200KK9	2408	±5%	200KΩ	50	±100ppm/℃	2W	632V
HVLR2408J500KK9	2408	±5%	500KΩ	50	±100ppm/℃	2W	1000V
HVLR2408J1M00K9	2408	±5%	1MΩ	50	±100ppm/℃	2W	1414V
HVLR2408J2M00K9	2408	±5%	2MΩ	50	±100ppm/℃	2W	2000V
HVLR2408J2M50K9	2408	±5%	2.5MΩ	50	±100ppm/℃	2W	2236V
HVLR2408J3M00K9	2408	±5%	3MΩ	50	±100ppm/℃	2W	2449V
HVLR2408J4M00K9	2408	±5%	4MΩ	50	±100ppm/℃	2W	2828V
HVLR2408J5M00K9	2408	±5%	5MΩ	50	±100ppm/℃	2W	3162V
HVLR2408J10M0K9	2408	±5%	10MΩ	50	±100ppm/℃	2W	4472V
HVLR2408J20M0K9	2408	±5%	20MΩ	50	±100ppm/℃	2W	5500V
HVLR2408J30M0K9	2408	±5%	30MΩ	50	±100ppm/℃	2W	5500V
HVLR2408J50M0K9	2408	±5%	50MΩ	50	±100ppm/℃	2W	5500V
HVLR2408J100MK9	2408	±5%	100MΩ	50	±100ppm/℃	2W	5500V
HVLR2408J200MK9	2408	±5%	200MΩ	50	±100ppm/℃	2W	5500V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR2408J300MK9	2408	±5%	300MΩ	50	±100ppm/℃	2W	5500V
HVLR2408J500MK9	2408	±5%	500MΩ	50	±100ppm/℃	2W	5500V
HVLR2408J1G00K9	2408	±5%	1GΩ	50	±100ppm/℃	2W	5500V
HVLR2408F1K00K9	2408	±1%	1KΩ	50	±100ppm/℃	2W	45V
HVLR2408F2K00K9	2408	±1%	2KΩ	50	±100ppm/℃	2W	63V
HVLR2408F5K00K9	2408	±1%	5KΩ	50	±100ppm/℃	2W	100V
HVLR2408F10K0K9	2408	±1%	10KΩ	50	±100ppm/℃	2W	141V
HVLR2408F20K0K9	2408	±1%	20KΩ	50	±100ppm/℃	2W	200V
HVLR2408F50K0K9	2408	±1%	50KΩ	50	±100ppm/℃	2W	316V
HVLR2408F100KK9	2408	±1%	100KΩ	50	±100ppm/℃	2W	447V
HVLR2408F200KK9	2408	±1%	200KΩ	50	±100ppm/℃	2W	632V
HVLR2408F500KK9	2408	±1%	500KΩ	50	±100ppm/℃	2W	1000V
HVLR2408F1M00K9	2408	±1%	1MΩ	50	±100ppm/℃	2W	1414V
HVLR2408F2M00K9	2408	±1%	2MΩ	50	±100ppm/℃	2W	2000V
HVLR2408F2M50K9	2408	±1%	2.5MΩ	50	±100ppm/℃	2W	2236V
HVLR2408F3M00K9	2408	±1%	3MΩ	50	±100ppm/℃	2W	2449V
HVLR2408F4M00K9	2408	±1%	4MΩ	50	±100ppm/℃	2W	2828V
HVLR2408F5M00K9	2408	±1%	5MΩ	50	±100ppm/℃	2W	3162V
HVLR2408F10M0K9	2408	±1%	10MΩ	50	±100ppm/℃	2W	4472V
HVLR2408F20M0K9	2408	±1%	20MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F30M0K9	2408	±1%	30MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F50M0K9	2408	±1%	50MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F100MK9	2408	±1%	100MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F200MK9	2408	±1%	200MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F300MK9	2408	±1%	300MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F500MK9	2408	±1%	500MΩ	50	±100ppm/℃	2W	5500V
HVLR2408F1G00K9	2408	±1%	1GΩ	50	±100ppm/℃	2W	5500V
HVLR3908J1K00K9	3908	±5%	1KΩ	25	±100ppm/℃	3W	55V
HVLR3908J2K00K9	3908	±5%	2KΩ	25	±100ppm/℃	3W	77V
HVLR3908J5K00K9	3908	±5%	5KΩ	25	±100ppm/℃	3W	122V
HVLR3908J10K0K9	3908	±5%	10KΩ	25	±100ppm/℃	3W	173V
HVLR3908J20K0K9	3908	±5%	20KΩ	25	±100ppm/℃	3W	245V
HVLR3908J50K0K9	3908	±5%	50KΩ	25	±100ppm/℃	3W	387V
HVLR3908J100KK9	3908	±5%	100KΩ	25	±100ppm/℃	3W	548V
HVLR3908J200KK9	3908	±5%	200KΩ	25	±100ppm/℃	3W	775V
HVLR3908J500KK9	3908	±5%	500KΩ	25	±100ppm/℃	3W	1225V
HVLR3908J1M00K9	3908	±5%	1MΩ	25	±100ppm/℃	3W	1732V
HVLR3908J2M00K9	3908	±5%	2MΩ	25	±100ppm/℃	3W	2449V
HVLR3908J2M50K9	3908	±5%	2.5MΩ	25	±100ppm/℃	3W	2739V
HVLR3908J3M00K9	3908	±5%	3MΩ	25	±100ppm/℃	3W	3000V
HVLR3908J4M00K9	3908	±5%	4MΩ	25	±100ppm/℃	3W	3464V
HVLR3908J5M00K9	3908	±5%	5MΩ	25	±100ppm/℃	3W	3873V
HVLR3908J10M0K9	3908	±5%	10MΩ	25	±100ppm/℃	3W	5477V
HVLR3908J20M0K9	3908	±5%	20MΩ	25	±100ppm/℃	3W	7746V
HVLR3908J30M0K9	3908	±5%	30MΩ	25	±100ppm/℃	3W	9487V
HVLR3908J50M0K9	3908	±5%	50MΩ	25	±100ppm/℃	3W	10000V
HVLR3908J100MK9	3908	±5%	100MΩ	25	±100ppm/℃	3W	10000V
HVLR3908J200MK9	3908	±5%	200MΩ	25	±100ppm/℃	3W	10000V
HVLR3908J300MK9	3908	±5%	300MΩ	25	±100ppm/℃	3W	10000V
HVLR3908J500MK9	3908	±5%	500MΩ	25	±100ppm/℃	3W	10000V
HVLR3908J1G00K9	3908	±5%	1GΩ	25	±100ppm/℃	3W	10000V
HVLR3908F1K00K9	3908	±1%	1KΩ	25	±100ppm/℃	3W	55V
HVLR3908F2K00K9	3908	±1%	2KΩ	25	±100ppm/℃	3W	77V
HVLR3908F5K00K9	3908	±1%	5KΩ	25	±100ppm/℃	3W	122V
HVLR3908F10K0K9	3908	±1%	10KΩ	25	±100ppm/℃	3W	173V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR3908F20K0K9	3908	±1%	20KΩ	25	±100ppm/℃	3W	245V
HVLR3908F50K0K9	3908	±1%	50KΩ	25	±100ppm/℃	3W	387V
HVLR3908F100KK9	3908	±1%	100KΩ	25	±100ppm/℃	3W	548V
HVLR3908F200KK9	3908	±1%	200KΩ	25	±100ppm/℃	3W	775V
HVLR3908F500KK9	3908	±1%	500KΩ	25	±100ppm/℃	3W	1225V
HVLR3908F1M00K9	3908	±1%	1MΩ	25	±100ppm/℃	3W	1732V
HVLR3908F2M00K9	3908	±1%	2MΩ	25	±100ppm/℃	3W	2449V
HVLR3908F2M50K9	3908	±1%	2.5MΩ	25	±100ppm/℃	3W	2739V
HVLR3908F3M00K9	3908	±1%	3MΩ	25	±100ppm/℃	3W	3000V
HVLR3908F4M00K9	3908	±1%	4MΩ	25	±100ppm/℃	3W	3464V
HVLR3908F5M00K9	3908	±1%	5MΩ	25	±100ppm/℃	3W	3873V
HVLR3908F10M0K9	3908	±1%	10MΩ	25	±100ppm/℃	3W	5477V
HVLR3908F20M0K9	3908	±1%	20MΩ	25	±100ppm/℃	3W	7746V
HVLR3908F30M0K9	3908	±1%	30MΩ	25	±100ppm/℃	3W	9487V
HVLR3908F50M0K9	3908	±1%	50MΩ	25	±100ppm/℃	3W	10000V
HVLR3908F100MK9	3908	±1%	100MΩ	25	±100ppm/℃	3W	10000V
HVLR3908F200MK9	3908	±1%	200MΩ	25	±100ppm/℃	3W	10000V
HVLR3908F300MK9	3908	±1%	300MΩ	25	±100ppm/℃	3W	10000V
HVLR3908F500MK9	3908	±1%	500MΩ	25	±100ppm/℃	3W	10000V
HVLR3908F1G00K9	3908	±1%	1GΩ	25	±100ppm/℃	3W	10000V
HVLR5208J1K00K9	5208	±5%	1KΩ	25	±100ppm/℃	5W	71V
HVLR5208J2K00K9	5208	±5%	2KΩ	25	±100ppm/℃	5W	100V
HVLR5208J5K00K9	5208	±5%	5KΩ	25	±100ppm/℃	5W	158V
HVLR5208J10K0K9	5208	±5%	10KΩ	25	±100ppm/℃	5W	224V
HVLR5208J20K0K9	5208	±5%	20KΩ	25	±100ppm/℃	5W	316V
HVLR5208J50K0K9	5208	±5%	50KΩ	25	±100ppm/℃	5W	500V
HVLR5208J100KK9	5208	±5%	100KΩ	25	±100ppm/℃	5W	707V
HVLR5208J200KK9	5208	±5%	200KΩ	25	±100ppm/℃	5W	1000V
HVLR5208J500KK9	5208	±5%	500KΩ	25	±100ppm/℃	5W	1581V
HVLR5208J1M00K9	5208	±5%	1MΩ	25	±100ppm/℃	5W	2236V
HVLR5208J2M00K9	5208	±5%	2MΩ	25	±100ppm/℃	5W	3162V
HVLR5208J2M50K9	5208	±5%	2.5MΩ	25	±100ppm/℃	5W	3536V
HVLR5208J3M00K9	5208	±5%	3MΩ	25	±100ppm/℃	5W	3873V
HVLR5208J4M00K9	5208	±5%	4MΩ	25	±100ppm/℃	5W	4472V
HVLR5208J5M00K9	5208	±5%	5MΩ	25	±100ppm/℃	5W	5000V
HVLR5208J10M0K9	5208	±5%	10MΩ	25	±100ppm/℃	5W	7071V
HVLR5208J20M0K9	5208	±5%	20MΩ	25	±100ppm/℃	5W	10000V
HVLR5208J30M0K9	5208	±5%	30MΩ	25	±100ppm/℃	5W	12247V
HVLR5208J50M0K9	5208	±5%	50MΩ	25	±100ppm/℃	5W	15000V
HVLR5208J100MK9	5208	±5%	100MΩ	25	±100ppm/℃	5W	15000V
HVLR5208J200MK9	5208	±5%	200MΩ	25	±100ppm/℃	5W	15000V
HVLR5208J300MK9	5208	±5%	300MΩ	25	±100ppm/℃	5W	15000V
HVLR5208J500MK9	5208	±5%	500MΩ	25	±100ppm/℃	5W	15000V
HVLR5208J1G00K9	5208	±5%	1GΩ	25	±100ppm/℃	5W	15000V
HVLR5208F1K00K9	5208	±1%	1KΩ	25	±100ppm/℃	5W	71V
HVLR5208F2K00K9	5208	±1%	2KΩ	25	±100ppm/℃	5W	100V
HVLR5208F5K00K9	5208	±1%	5KΩ	25	±100ppm/℃	5W	158V
HVLR5208F10K0K9	5208	±1%	10KΩ	25	±100ppm/℃	5W	224V
HVLR5208F20K0K9	5208	±1%	20KΩ	25	±100ppm/℃	5W	316V
HVLR5208F50K0K9	5208	±1%	50KΩ	25	±100ppm/℃	5W	500V
HVLR5208F100KK9	5208	±1%	100KΩ	25	±100ppm/℃	5W	707V
HVLR5208F200KK9	5208	±1%	200KΩ	25	±100ppm/℃	5W	1000V
HVLR5208F500KK9	5208	±1%	500KΩ	25	±100ppm/℃	5W	1581V
HVLR5208F1M00K9	5208	±1%	1MΩ	25	±100ppm/℃	5W	2236V
HVLR5208F2M00K9	5208	±1%	2MΩ	25	±100ppm/℃	5W	3162V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR5208F2M50K9	5208	±1%	2.5MΩ	25	±100ppm/℃	5W	3536V
HVLR5208F3M00K9	5208	±1%	3MΩ	25	±100ppm/℃	5W	3873V
HVLR5208F4M00K9	5208	±1%	4MΩ	25	±100ppm/℃	5W	4472V
HVLR5208F5M00K9	5208	±1%	5MΩ	25	±100ppm/℃	5W	5000V
HVLR5208F10M0K9	5208	±1%	10MΩ	25	±100ppm/℃	5W	7071V
HVLR5208F20M0K9	5208	±1%	20MΩ	25	±100ppm/℃	5W	10000V
HVLR5208F30M0K9	5208	±1%	30MΩ	25	±100ppm/℃	5W	12247V
HVLR5208F50M0K9	5208	±1%	50MΩ	25	±100ppm/℃	5W	15000V
HVLR5208F100MK9	5208	±1%	100MΩ	25	±100ppm/℃	5W	15000V
HVLR5208F200MK9	5208	±1%	200MΩ	25	±100ppm/℃	5W	15000V
HVLR5208F300MK9	5208	±1%	300MΩ	25	±100ppm/℃	5W	15000V
HVLR5208F500MK9	5208	±1%	500MΩ	25	±100ppm/℃	5W	15000V
HVLR5208F1G00K9	5208	±1%	1GΩ	25	±100ppm/℃	5W	15000V
HVLR7609J1K00K9	7609	±5%	1KΩ	20	±100ppm/℃	7.5W	87V
HVLR7609J2K00K9	7609	±5%	2KΩ	20	±100ppm/℃	7.5W	122V
HVLR7609J5K00K9	7609	±5%	5KΩ	20	±100ppm/℃	7.5W	194V
HVLR7609J10K0K9	7609	±5%	10KΩ	20	±100ppm/℃	7.5W	274V
HVLR7609J20K0K9	7609	±5%	20KΩ	20	±100ppm/℃	7.5W	387V
HVLR7609J50K0K9	7609	±5%	50KΩ	20	±100ppm/℃	7.5W	612V
HVLR7609J100KK9	7609	±5%	100KΩ	20	±100ppm/℃	7.5W	866V
HVLR7609J200KK9	7609	±5%	200KΩ	20	±100ppm/℃	7.5W	1225V
HVLR7609J500KK9	7609	±5%	500KΩ	20	±100ppm/℃	7.5W	1936V
HVLR7609J1M00K9	7609	±5%	1MΩ	20	±100ppm/℃	7.5W	2739V
HVLR7609J2M00K9	7609	±5%	2MΩ	20	±100ppm/℃	7.5W	3873V
HVLR7609J2M50K9	7609	±5%	2.5MΩ	20	±100ppm/℃	7.5W	4330V
HVLR7609J3M00K9	7609	±5%	3MΩ	20	±100ppm/℃	7.5W	4743V
HVLR7609J4M00K9	7609	±5%	4MΩ	20	±100ppm/℃	7.5W	5477V
HVLR7609J5M00K9	7609	±5%	5MΩ	20	±100ppm/℃	7.5W	6124V
HVLR7609J10M0K9	7609	±5%	10MΩ	20	±100ppm/℃	7.5W	8660V
HVLR7609J20M0K9	7609	±5%	20MΩ	20	±100ppm/℃	7.5W	12247V
HVLR7609J30M0K9	7609	±5%	30MΩ	20	±100ppm/℃	7.5W	15000V
HVLR7609J50M0K9	7609	±5%	50MΩ	20	±100ppm/℃	7.5W	19365V
HVLR7609J100MK9	7609	±5%	100MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609J200MK9	7609	±5%	200MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609J300MK9	7609	±5%	300MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609J500MK9	7609	±5%	500MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609J1G00K9	7609	±5%	1GΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609F1K00K9	7609	±1%	1KΩ	20	±100ppm/℃	7.5W	87V
HVLR7609F2K00K9	7609	±1%	2KΩ	20	±100ppm/℃	7.5W	122V
HVLR7609F5K00K9	7609	±1%	5KΩ	20	±100ppm/℃	7.5W	194V
HVLR7609F10K0K9	7609	±1%	10KΩ	20	±100ppm/℃	7.5W	274V
HVLR7609F20K0K9	7609	±1%	20KΩ	20	±100ppm/℃	7.5W	387V
HVLR7609F50K0K9	7609	±1%	50KΩ	20	±100ppm/℃	7.5W	612V
HVLR7609F100KK9	7609	±1%	100KΩ	20	±100ppm/℃	7.5W	866V
HVLR7609F200KK9	7609	±1%	200KΩ	20	±100ppm/℃	7.5W	1225V
HVLR7609F500KK9	7609	±1%	500KΩ	20	±100ppm/℃	7.5W	1936V
HVLR7609F1M00K9	7609	±1%	1MΩ	20	±100ppm/℃	7.5W	2739V
HVLR7609F2M00K9	7609	±1%	2MΩ	20	±100ppm/℃	7.5W	3873V
HVLR7609F2M50K9	7609	±1%	2.5MΩ	20	±100ppm/℃	7.5W	4330V
HVLR7609F3M00K9	7609	±1%	3MΩ	20	±100ppm/℃	7.5W	4743V
HVLR7609F4M00K9	7609	±1%	4MΩ	20	±100ppm/℃	7.5W	5477V
HVLR7609F5M00K9	7609	±1%	5MΩ	20	±100ppm/℃	7.5W	6124V
HVLR7609F10M0K9	7609	±1%	10MΩ	20	±100ppm/℃	7.5W	8660V
HVLR7609F20M0K9	7609	±1%	20MΩ	20	±100ppm/℃	7.5W	12247V
HVLR7609F30M0K9	7609	±1%	30MΩ	20	±100ppm/℃	7.5W	15000V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR7609F50M0K9	7609	±1%	50MΩ	20	±100ppm/℃	7.5W	19365V
HVLR7609F100MK9	7609	±1%	100MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609F200MK9	7609	±1%	200MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609F300MK9	7609	±1%	300MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609F500MK9	7609	±1%	500MΩ	20	±100ppm/℃	7.5W	22500V
HVLR7609F1G00K9	7609	±1%	1GΩ	20	±100ppm/℃	7.5W	22500V
HVLR1029J1K00K9	1029	±5%	1KΩ	10	±100ppm/℃	10W	100V
HVLR1029J2K00K9	1029	±5%	2KΩ	10	±100ppm/℃	10W	141V
HVLR1029J5K00K9	1029	±5%	5KΩ	10	±100ppm/℃	10W	224V
HVLR1029J10K0K9	1029	±5%	10KΩ	10	±100ppm/℃	10W	316V
HVLR1029J20K0K9	1029	±5%	20KΩ	10	±100ppm/℃	10W	447V
HVLR1029J50K0K9	1029	±5%	50KΩ	10	±100ppm/℃	10W	707V
HVLR1029J100KK9	1029	±5%	100KΩ	10	±100ppm/℃	10W	1000V
HVLR1029J200KK9	1029	±5%	200KΩ	10	±100ppm/℃	10W	1414V
HVLR1029J500KK9	1029	±5%	500KΩ	10	±100ppm/℃	10W	2236V
HVLR1029J1M00K9	1029	±5%	1MΩ	10	±100ppm/℃	10W	3162V
HVLR1029J2M00K9	1029	±5%	2MΩ	10	±100ppm/℃	10W	4472V
HVLR1029J2M50K9	1029	±5%	2.5MΩ	10	±100ppm/℃	10W	5000V
HVLR1029J3M00K9	1029	±5%	3MΩ	10	±100ppm/℃	10W	5477V
HVLR1029J4M00K9	1029	±5%	4MΩ	10	±100ppm/℃	10W	6325V
HVLR1029J5M00K9	1029	±5%	5MΩ	10	±100ppm/℃	10W	7071V
HVLR1029J10M0K9	1029	±5%	10MΩ	10	±100ppm/℃	10W	10000V
HVLR1029J20M0K9	1029	±5%	20MΩ	10	±100ppm/℃	10W	14142V
HVLR1029J30M0K9	1029	±5%	30MΩ	10	±100ppm/℃	10W	17321V
HVLR1029J50M0K9	1029	±5%	50MΩ	10	±100ppm/℃	10W	22361V
HVLR1029J100MK9	1029	±5%	100MΩ	10	±100ppm/℃	10W	31623V
HVLR1029J200MK9	1029	±5%	200MΩ	10	±100ppm/℃	10W	32000V
HVLR1029J300MK9	1029	±5%	300MΩ	10	±100ppm/℃	10W	32000V
HVLR1029J500MK9	1029	±5%	500MΩ	10	±100ppm/℃	10W	32000V
HVLR1029J1G00K9	1029	±5%	1GΩ	10	±100ppm/℃	10W	32000V
HVLR1029F1K00K9	1029	±1%	1KΩ	10	±100ppm/℃	10W	100V
HVLR1029F2K00K9	1029	±1%	2KΩ	10	±100ppm/℃	10W	141V
HVLR1029F5K00K9	1029	±1%	5KΩ	10	±100ppm/℃	10W	224V
HVLR1029F10K0K9	1029	±1%	10KΩ	10	±100ppm/℃	10W	316V
HVLR1029F20K0K9	1029	±1%	20KΩ	10	±100ppm/℃	10W	447V
HVLR1029F50K0K9	1029	±1%	50KΩ	10	±100ppm/℃	10W	707V
HVLR1029F100KK9	1029	±1%	100KΩ	10	±100ppm/℃	10W	1000V
HVLR1029F200KK9	1029	±1%	200KΩ	10	±100ppm/℃	10W	1414V
HVLR1029F500KK9	1029	±1%	500KΩ	10	±100ppm/℃	10W	2236V
HVLR1029F1M00K9	1029	±1%	1MΩ	10	±100ppm/℃	10W	3162V
HVLR1029F2M00K9	1029	±1%	2MΩ	10	±100ppm/℃	10W	4472V
HVLR1029F2M50K9	1029	±1%	2.5MΩ	10	±100ppm/℃	10W	5000V
HVLR1029F3M00K9	1029	±1%	3MΩ	10	±100ppm/℃	10W	5477V
HVLR1029F4M00K9	1029	±1%	4MΩ	10	±100ppm/℃	10W	6325V
HVLR1029F5M00K9	1029	±1%	5MΩ	10	±100ppm/℃	10W	7071V
HVLR1029F10M0K9	1029	±1%	10MΩ	10	±100ppm/℃	10W	10000V
HVLR1029F20M0K9	1029	±1%	20MΩ	10	±100ppm/℃	10W	14142V
HVLR1029F30M0K9	1029	±1%	30MΩ	10	±100ppm/℃	10W	17321V
HVLR1029F50M0K9	1029	±1%	50MΩ	10	±100ppm/℃	10W	22361V
HVLR1029F100MK9	1029	±1%	100MΩ	10	±100ppm/℃	10W	31623V
HVLR1029F200MK9	1029	±1%	200MΩ	10	±100ppm/℃	10W	32000V
HVLR1029F300MK9	1029	±1%	300MΩ	10	±100ppm/℃	10W	32000V
HVLR1029F500MK9	1029	±1%	500MΩ	10	±100ppm/℃	10W	32000V
HVLR1029F1G00K9	1029	±1%	1GΩ	10	±100ppm/℃	10W	32000V
HVLR1179J1K00K9	1179	±5%	1KΩ	5	±100ppm/℃	11W	105V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR1179J2K00K9	1179	±5%	2KΩ	5	±100ppm/℃	11W	148V
HVLR1179J5K00K9	1179	±5%	5KΩ	5	±100ppm/℃	11W	235V
HVLR1179J10K0K9	1179	±5%	10KΩ	5	±100ppm/℃	11W	332V
HVLR1179J20K0K9	1179	±5%	20KΩ	5	±100ppm/℃	11W	469V
HVLR1179J50K0K9	1179	±5%	50KΩ	5	±100ppm/℃	11W	742V
HVLR1179J100KK9	1179	±5%	100KΩ	5	±100ppm/℃	11W	1049V
HVLR1179J200KK9	1179	±5%	200KΩ	5	±100ppm/℃	11W	1483V
HVLR1179J500KK9	1179	±5%	500KΩ	5	±100ppm/℃	11W	2345V
HVLR1179J1M00K9	1179	±5%	1MΩ	5	±100ppm/℃	11W	3317V
HVLR1179J2M00K9	1179	±5%	2MΩ	5	±100ppm/℃	11W	4690V
HVLR1179J2M50K9	1179	±5%	2.5MΩ	5	±100ppm/℃	11W	5244V
HVLR1179J3M00K9	1179	±5%	3MΩ	5	±100ppm/℃	11W	5745V
HVLR1179J4M00K9	1179	±5%	4MΩ	5	±100ppm/℃	11W	6633V
HVLR1179J5M00K9	1179	±5%	5MΩ	5	±100ppm/℃	11W	7416V
HVLR1179J10M0K9	1179	±5%	10MΩ	5	±100ppm/℃	11W	10488V
HVLR1179J20M0K9	1179	±5%	20MΩ	5	±100ppm/℃	11W	14832V
HVLR1179J30M0K9	1179	±5%	30MΩ	5	±100ppm/℃	11W	18166V
HVLR1179J50M0K9	1179	±5%	50MΩ	5	±100ppm/℃	11W	23452V
HVLR1179J100MK9	1179	±5%	100MΩ	5	±100ppm/℃	11W	33166V
HVLR1179J200MK9	1179	±5%	200MΩ	5	±100ppm/℃	11W	35000V
HVLR1179J300MK9	1179	±5%	300MΩ	5	±100ppm/℃	11W	35000V
HVLR1179J500MK9	1179	±5%	500MΩ	5	±100ppm/℃	11W	35000V
HVLR1179J1G00K9	1179	±5%	1GΩ	5	±100ppm/℃	11W	35000V
HVLR1179F1K00K9	1179	±1%	1KΩ	5	±100ppm/℃	11W	105V
HVLR1179F2K00K9	1179	±1%	2KΩ	5	±100ppm/℃	11W	148V
HVLR1179F5K00K9	1179	±1%	5KΩ	5	±100ppm/℃	11W	235V
HVLR1179F10K0K9	1179	±1%	10KΩ	5	±100ppm/℃	11W	332V
HVLR1179F20K0K9	1179	±1%	20KΩ	5	±100ppm/℃	11W	469V
HVLR1179F50K0K9	1179	±1%	50KΩ	5	±100ppm/℃	11W	742V
HVLR1179F100KK9	1179	±1%	100KΩ	5	±100ppm/℃	11W	1049V
HVLR1179F200KK9	1179	±1%	200KΩ	5	±100ppm/℃	11W	1483V
HVLR1179F500KK9	1179	±1%	500KΩ	5	±100ppm/℃	11W	2345V
HVLR1179F1M00K9	1179	±1%	1MΩ	5	±100ppm/℃	11W	3317V
HVLR1179F2M00K9	1179	±1%	2MΩ	5	±100ppm/℃	11W	4690V
HVLR1179F2M50K9	1179	±1%	2.5MΩ	5	±100ppm/℃	11W	5244V
HVLR1179F3M00K9	1179	±1%	3MΩ	5	±100ppm/℃	11W	5745V
HVLR1179F4M00K9	1179	±1%	4MΩ	5	±100ppm/℃	11W	6633V
HVLR1179F5M00K9	1179	±1%	5MΩ	5	±100ppm/℃	11W	7416V
HVLR1179F10M0K9	1179	±1%	10MΩ	5	±100ppm/℃	11W	10488V
HVLR1179F20M0K9	1179	±1%	20MΩ	5	±100ppm/℃	11W	14832V
HVLR1179F30M0K9	1179	±1%	30MΩ	5	±100ppm/℃	11W	18166V
HVLR1179F50M0K9	1179	±1%	50MΩ	5	±100ppm/℃	11W	23452V
HVLR1179F100MK9	1179	±1%	100MΩ	5	±100ppm/℃	11W	33166V
HVLR1179F200MK9	1179	±1%	200MΩ	5	±100ppm/℃	11W	35000V
HVLR1179F300MK9	1179	±1%	300MΩ	5	±100ppm/℃	11W	35000V
HVLR1179F500MK9	1179	±1%	500MΩ	5	±100ppm/℃	11W	35000V
HVLR1179F1G00K9	1179	±1%	1GΩ	5	±100ppm/℃	11W	35000V
HVLR1279J1K00K9	1279	±5%	1KΩ	5	±100ppm/℃	12W	110V
HVLR1279J2K00K9	1279	±5%	2KΩ	5	±100ppm/℃	12W	155V
HVLR1279J5K00K9	1279	±5%	5KΩ	5	±100ppm/℃	12W	245V
HVLR1279J10K0K9	1279	±5%	10KΩ	5	±100ppm/℃	12W	346V
HVLR1279J20K0K9	1279	±5%	20KΩ	5	±100ppm/℃	12W	490V
HVLR1279J50K0K9	1279	±5%	50KΩ	5	±100ppm/℃	12W	775V
HVLR1279J100KK9	1279	±5%	100KΩ	5	±100ppm/℃	12W	1095V
HVLR1279J200KK9	1279	±5%	200KΩ	5	±100ppm/℃	12W	1549V

Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR1279J500KK9	1279	±5%	500KΩ	5	±100ppm/℃	12W	2449V
HVLR1279J1M00K9	1279	±5%	1MΩ	5	±100ppm/℃	12W	3464V
HVLR1279J2M00K9	1279	±5%	2MΩ	5	±100ppm/℃	12W	4899V
HVLR1279J2M50K9	1279	±5%	2.5MΩ	5	±100ppm/℃	12W	5477V
HVLR1279J3M00K9	1279	±5%	3MΩ	5	±100ppm/℃	12W	6000V
HVLR1279J4M00K9	1279	±5%	4MΩ	5	±100ppm/℃	12W	6928V
HVLR1279J5M00K9	1279	±5%	5MΩ	5	±100ppm/℃	12W	7746V
HVLR1279J10M0K9	1279	±5%	10MΩ	5	±100ppm/℃	12W	10954V
HVLR1279J20M0K9	1279	±5%	20MΩ	5	±100ppm/℃	12W	15492V
HVLR1279J30M0K9	1279	±5%	30MΩ	5	±100ppm/℃	12W	18974V
HVLR1279J50M0K9	1279	±5%	50MΩ	5	±100ppm/℃	12W	24495V
HVLR1279J100MK9	1279	±5%	100MΩ	5	±100ppm/℃	12W	34641V
HVLR1279J200MK9	1279	±5%	200MΩ	5	±100ppm/℃	12W	40000V
HVLR1279J300MK9	1279	±5%	300MΩ	5	±100ppm/℃	12W	40000V
HVLR1279J500MK9	1279	±5%	500MΩ	5	±100ppm/℃	12W	40000V
HVLR1279J1G00K9	1279	±5%	1GΩ	5	±100ppm/℃	12W	40000V
HVLR1279F1K00K9	1279	±1%	1KΩ	5	±100ppm/℃	12W	110V
HVLR1279F2K00K9	1279	±1%	2KΩ	5	±100ppm/℃	12W	155V
HVLR1279F5K00K9	1279	±1%	5KΩ	5	±100ppm/℃	12W	245V
HVLR1279F10K0K9	1279	±1%	10KΩ	5	±100ppm/℃	12W	346V
HVLR1279F20K0K9	1279	±1%	20KΩ	5	±100ppm/℃	12W	490V
HVLR1279F50K0K9	1279	±1%	50KΩ	5	±100ppm/℃	12W	775V
HVLR1279F100KK9	1279	±1%	100KΩ	5	±100ppm/℃	12W	1095V
HVLR1279F200KK9	1279	±1%	200KΩ	5	±100ppm/℃	12W	1549V
HVLR1279F500KK9	1279	±1%	500KΩ	5	±100ppm/℃	12W	2449V
HVLR1279F1M00K9	1279	±1%	1MΩ	5	±100ppm/℃	12W	3464V
HVLR1279F2M00K9	1279	±1%	2MΩ	5	±100ppm/℃	12W	4899V
HVLR1279F2M50K9	1279	±1%	2.5MΩ	5	±100ppm/℃	12W	5477V
HVLR1279F3M00K9	1279	±1%	3MΩ	5	±100ppm/℃	12W	6000V
HVLR1279F4M00K9	1279	±1%	4MΩ	5	±100ppm/℃	12W	6928V
HVLR1279F5M00K9	1279	±1%	5MΩ	5	±100ppm/℃	12W	7746V
HVLR1279F10M0K9	1279	±1%	10MΩ	5	±100ppm/℃	12W	10954V
HVLR1279F20M0K9	1279	±1%	20MΩ	5	±100ppm/℃	12W	15492V
HVLR1279F30M0K9	1279	±1%	30MΩ	5	±100ppm/℃	12W	18974V
HVLR1279F50M0K9	1279	±1%	50MΩ	5	±100ppm/℃	12W	24495V
HVLR1279F100MK9	1279	±1%	100MΩ	5	±100ppm/℃	12W	34641V
HVLR1279F200MK9	1279	±1%	200MΩ	5	±100ppm/℃	12W	40000V
HVLR1279F300MK9	1279	±1%	300MΩ	5	±100ppm/℃	12W	40000V
HVLR1279F500MK9	1279	±1%	500MΩ	5	±100ppm/℃	12W	40000V
HVLR1279F1G00K9	1279	±1%	1GΩ	5	±100ppm/℃	12W	40000V
HVLR1379J1K00K9	1379	±5%	1KΩ	5	±100ppm/℃	13W	114V
HVLR1379J2K00K9	1379	±5%	2KΩ	5	±100ppm/℃	13W	161V
HVLR1379J5K00K9	1379	±5%	5KΩ	5	±100ppm/℃	13W	255V
HVLR1379J10K0K9	1379	±5%	10KΩ	5	±100ppm/℃	13W	361V
HVLR1379J20K0K9	1379	±5%	20KΩ	5	±100ppm/℃	13W	510V
HVLR1379J50K0K9	1379	±5%	50KΩ	5	±100ppm/℃	13W	806V
HVLR1379J100KK9	1379	±5%	100KΩ	5	±100ppm/℃	13W	1140V
HVLR1379J200KK9	1379	±5%	200KΩ	5	±100ppm/℃	13W	1612V
HVLR1379J500KK9	1379	±5%	500KΩ	5	±100ppm/℃	13W	2550V
HVLR1379J1M00K9	1379	±5%	1MΩ	5	±100ppm/℃	13W	3606V
HVLR1379J2M00K9	1379	±5%	2MΩ	5	±100ppm/℃	13W	5099V
HVLR1379J2M50K9	1379	±5%	2.5MΩ	5	±100ppm/℃	13W	5701V
HVLR1379J3M00K9	1379	±5%	3MΩ	5	±100ppm/℃	13W	6245V
HVLR1379J4M00K9	1379	±5%	4MΩ	5	±100ppm/℃	13W	7211V
HVLR1379J5M00K9	1379	±5%	5MΩ	5	±100ppm/℃	13W	8062V

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Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR1379J10M0K9	1379	±5%	10MΩ	5	±100ppm/℃	13W	11402V
HVLR1379J20M0K9	1379	±5%	20MΩ	5	±100ppm/℃	13W	16125V
HVLR1379J30M0K9	1379	±5%	30MΩ	5	±100ppm/℃	13W	19748V
HVLR1379J50M0K9	1379	±5%	50MΩ	5	±100ppm/℃	13W	25495V
HVLR1379J100MK9	1379	±5%	100MΩ	5	±100ppm/℃	13W	36056V
HVLR1379J200MK9	1379	±5%	200MΩ	5	±100ppm/℃	13W	45000V
HVLR1379J300MK9	1379	±5%	300MΩ	5	±100ppm/℃	13W	45000V
HVLR1379J500MK9	1379	±5%	500MΩ	5	±100ppm/℃	13W	45000V
HVLR1379J1G00K9	1379	±5%	1GΩ	5	±100ppm/℃	13W	45000V
HVLR1379F1K00K9	1379	±1%	1KΩ	5	±100ppm/℃	13W	114V
HVLR1379F2K00K9	1379	±1%	2KΩ	5	±100ppm/℃	13W	161V
HVLR1379F5K00K9	1379	±1%	5KΩ	5	±100ppm/℃	13W	255V
HVLR1379F10K0K9	1379	±1%	10KΩ	5	±100ppm/℃	13W	361V
HVLR1379F20K0K9	1379	±1%	20KΩ	5	±100ppm/℃	13W	510V
HVLR1379F50K0K9	1379	±1%	50KΩ	5	±100ppm/℃	13W	806V
HVLR1379F100KK9	1379	±1%	100KΩ	5	±100ppm/℃	13W	1140V
HVLR1379F200KK9	1379	±1%	200KΩ	5	±100ppm/℃	13W	1612V
HVLR1379F500KK9	1379	±1%	500KΩ	5	±100ppm/℃	13W	2550V
HVLR1379F1M00K9	1379	±1%	1MΩ	5	±100ppm/℃	13W	3606V
HVLR1379F2M00K9	1379	±1%	2MΩ	5	±100ppm/℃	13W	5099V
HVLR1379F2M50K9	1379	±1%	2.5MΩ	5	±100ppm/℃	13W	5701V
HVLR1379F3M00K9	1379	±1%	3MΩ	5	±100ppm/℃	13W	6245V
HVLR1379F4M00K9	1379	±1%	4MΩ	5	±100ppm/℃	13W	7211V
HVLR1379F5M00K9	1379	±1%	5MΩ	5	±100ppm/℃	13W	8062V
HVLR1379F10M0K9	1379	±1%	10MΩ	5	±100ppm/℃	13W	11402V
HVLR1379F20M0K9	1379	±1%	20MΩ	5	±100ppm/℃	13W	16125V
HVLR1379F30M0K9	1379	±1%	30MΩ	5	±100ppm/℃	13W	19748V
HVLR1379F50M0K9	1379	±1%	50MΩ	5	±100ppm/℃	13W	25495V
HVLR1379F100MK9	1379	±1%	100MΩ	5	±100ppm/℃	13W	36056V
HVLR1379F200MK9	1379	±1%	200MΩ	5	±100ppm/℃	13W	45000V
HVLR1379F300MK9	1379	±1%	300MΩ	5	±100ppm/℃	13W	45000V
HVLR1379F500MK9	1379	±1%	500MΩ	5	±100ppm/℃	13W	45000V
HVLR1379F1G00K9	1379	±1%	1GΩ	5	±100ppm/℃	13W	45000V
HVLR1529J1K00K9	1529	±5%	1KΩ	5	±100ppm/℃	15W	122V
HVLR1529J2K00K9	1529	±5%	2KΩ	5	±100ppm/℃	15W	173V
HVLR1529J5K00K9	1529	±5%	5KΩ	5	±100ppm/℃	15W	274V
HVLR1529J10K0K9	1529	±5%	10KΩ	5	±100ppm/℃	15W	387V
HVLR1529J20K0K9	1529	±5%	20KΩ	5	±100ppm/℃	15W	548V
HVLR1529J50K0K9	1529	±5%	50KΩ	5	±100ppm/℃	15W	866V
HVLR1529J100KK9	1529	±5%	100KΩ	5	±100ppm/℃	15W	1225V
HVLR1529J200KK9	1529	±5%	200KΩ	5	±100ppm/℃	15W	1732V
HVLR1529J500KK9	1529	±5%	500KΩ	5	±100ppm/℃	15W	2739V
HVLR1529J1M00K9	1529	±5%	1MΩ	5	±100ppm/℃	15W	3873V
HVLR1529J2M00K9	1529	±5%	2MΩ	5	±100ppm/℃	15W	5477V
HVLR1529J2M50K9	1529	±5%	2.5MΩ	5	±100ppm/℃	15W	6124V
HVLR1529J3M00K9	1529	±5%	3MΩ	5	±100ppm/℃	15W	6708V
HVLR1529J4M00K9	1529	±5%	4MΩ	5	±100ppm/℃	15W	7746V
HVLR1529J5M00K9	1529	±5%	5MΩ	5	±100ppm/℃	15W	8660V
HVLR1529J10M0K9	1529	±5%	10MΩ	5	±100ppm/℃	15W	12247V
HVLR1529J20M0K9	1529	±5%	20MΩ	5	±100ppm/℃	15W	17321V
HVLR1529J30M0K9	1529	±5%	30MΩ	5	±100ppm/℃	15W	21213V
HVLR1529J50M0K9	1529	±5%	50MΩ	5	±100ppm/℃	15W	27386V
HVLR1529J100MK9	1529	±5%	100MΩ	5	±100ppm/℃	15W	38730V
HVLR1529J200MK9	1529	±5%	200MΩ	5	±100ppm/℃	15W	48000V
HVLR1529J300MK9	1529	±5%	300MΩ	5	±100ppm/℃	15W	48000V

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Popular Part Numbers

Part Number	Size	Tolerance	Resistance	SPQ	TCR	Power	Max. Operating Voltage
HVLR1529J400MK9	1529	±5%	400MΩ	5	±100ppm/℃	15W	48000V
HVLR1529J500MK9	1529	±5%	500MΩ	5	±100ppm/℃	15W	48000V
HVLR1529J1G00K9	1529	±5%	1GΩ	5	±100ppm/℃	15W	48000V
HVLR1529F1K00K9	1529	±1%	1KΩ	5	±100ppm/℃	15W	122V
HVLR1529F2K00K9	1529	±1%	2KΩ	5	±100ppm/℃	15W	173V
HVLR1529F5K00K9	1529	±1%	5KΩ	5	±100ppm/℃	15W	274V
HVLR1529F10K0K9	1529	±1%	10KΩ	5	±100ppm/℃	15W	387V
HVLR1529F20K0K9	1529	±1%	20KΩ	5	±100ppm/℃	15W	548V
HVLR1529F50K0K9	1529	±1%	50KΩ	5	±100ppm/℃	15W	866V
HVLR1529F100KK9	1529	±1%	100KΩ	5	±100ppm/℃	15W	1225V
HVLR1529F200KK9	1529	±1%	200KΩ	5	±100ppm/℃	15W	1732V
HVLR1529F500KK9	1529	±1%	500KΩ	5	±100ppm/℃	15W	2739V
HVLR1529F1M00K9	1529	±1%	1MΩ	5	±100ppm/℃	15W	3873V
HVLR1529F2M00K9	1529	±1%	2MΩ	5	±100ppm/℃	15W	5477V
HVLR1529F2M50K9	1529	±1%	2.5MΩ	5	±100ppm/℃	15W	6124V
HVLR1529F3M00K9	1529	±1%	3MΩ	5	±100ppm/℃	15W	6708V
HVLR1529F4M00K9	1529	±1%	4MΩ	5	±100ppm/℃	15W	7746V
HVLR1529F5M00K9	1529	±1%	5MΩ	5	±100ppm/℃	15W	8660V
HVLR1529F10M0K9	1529	±1%	10MΩ	5	±100ppm/℃	15W	12247V
HVLR1529F20M0K9	1529	±1%	20MΩ	5	±100ppm/℃	15W	17321V
HVLR1529F30M0K9	1529	±1%	30MΩ	5	±100ppm/℃	15W	21213V
HVLR1529F50M0K9	1529	±1%	50MΩ	5	±100ppm/℃	15W	27386V
HVLR1529F100MK9	1529	±1%	100MΩ	5	±100ppm/℃	15W	38730V
HVLR1529F200MK9	1529	±1%	200MΩ	5	±100ppm/℃	15W	48000V
HVLR1529F300MK9	1529	±1%	300MΩ	5	±100ppm/℃	15W	48000V
HVLR1529F400MK9	1529	±1%	400MΩ	5	±100ppm/℃	15W	48000V
HVLR1529F500MK9	1529	±1%	500MΩ	5	±100ppm/℃	15W	48000V
HVLR1529F1G00K9	1529	±1%	1GΩ	5	±100ppm/℃	15W	48000V

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2019.12.13	LWW
V1	Change datasheet to the new template	2023.9.17	LWW

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High Power Resistor

Resistors are passive dissipative components that dissipate power only in the form of heat in the circuit. If heat cannot be dissipated, the accumulated heat inside the resistor will affect the stability of the resistance value or even burn the resistor.

High power resistors are mainly divided into wirewound resistors, thick film resistors and solid ceramic resistors. The common feature is that these all have excellent heat dissipation capability, resulting in high power rating.

They are suitable for all kinds of high power applications.

Characteristics

- High Power
- Good Heat Dissipation
- Various Package Type

Applications

- Electric Power
- Medical
- EV
- Industrial Controls

DataSheet No.: E20004
Version: V0
Date: 2023/05/21

TPAN0220

50W TO-220 Non-Inductive High-Power Resistor

Resistance	0.5Ω~10KΩ
Tolerance	±0.5%
TCR	≤±100ppm/℃
Rated Power	50W

Applications

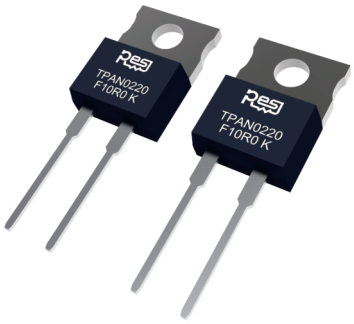
Testing Instrumentation
Industrial Power Equipment
Automotive Electronics
Motor Control & Drive Circuits

Better Solution for Sustainable High End Manufacturing

TPAN0220

50W TO-220 Non-Inductive High-Power Resistor

High Power with Excellent Reliability & Stability



RoHS AEC-Q200 3D

Introduction

TPAN0220 is a TO-220 non-inductive high-power resistor. The TO-220 transistor outline package is a through hole package, commonly used for high-power transistors, small to medium-sized integrated circuits, power resistors, etc.

The rated power of TPAN0220 series is 50W. TPAN0220 adopts a flange for its better heat dissipation to balance the thermal characteristics of the circuit. It is usually designed for current measurement, energy absorption, discharge, RC absorption, high-speed switching, high-frequency transmission circuits, voltage regulation, constant power loads, and low-energy pulse loads. Its industry applications include industrial lasers, welding equipment, testing equipment, instrumentation, UPS, automobiles, switching power supplies, etc.

TPAN0220 series high-power molded resistor has excellent long-term stability, low TCR, high heat dissipation, low thermal resistance and low current noise, applying for a wide range. From raw materials, core production equipment, to process technology, TPAN0220 production is independent and controllable and achieves stable quality and timely delivery.

Electrical Parameters

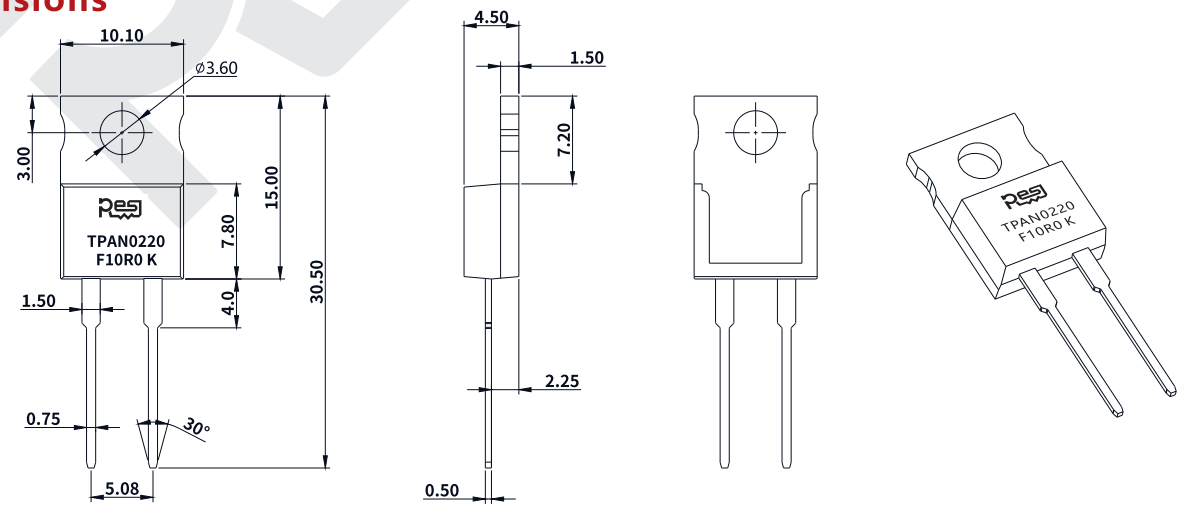
Series	Resistance Ω	TCR ppm/℃	Tolerance %	Max. Operating Voltage*(1)	Rated Power*(2) With Heat Sink. Flange ≤ 25℃	Without Heat Sink	Operating Temperature
TPAN0220	0.5≤R≤10K	±100	±0.5, ±1, ±5	500V	50W	2.5W	-55~+150℃

*(1) According to P=UI, combined with power and the maximum operating voltage, calculate the maximum current value (P and U whichever is less).
*(2) If the actual operating power is greater than 2.5W, it must be used with a heat sink. The recommended heat sink and installation method refer to pages 5 and 6.

Galvanic Isolation	Insulation Resistance	Thermal Resistance	Inductance	E-Series Value	Technology	Housing	Unit Weight
2000VAC	≥10^4MΩ	2.1℃/W	≤0.1μH	E24	Thick Film	Epoxy Molded	2.2±0.5g

Dimensions

Unit: mm



Note: The above dimensional tolerance is ±0.3mm.

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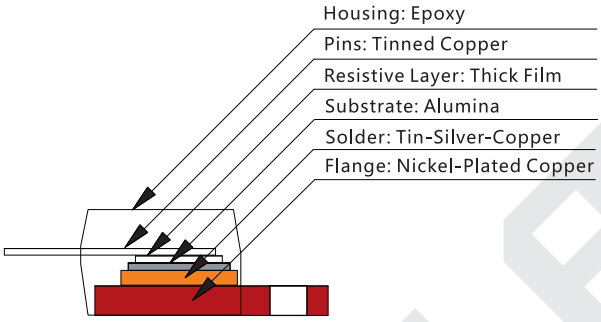
TPAN0220

50W TO-220 Non-Inductive High-Power Resistor

Construction



Marking

The first line (four digits) represents brand.
The second line (eight digits) represents product series and package.
The third line (six digits) represents tolerance, resistance and TCR.

Series	Illustration	E-Series Value	Demonstration
TPAN0220		E24	RESI: Brand TPAN0220: Series & Package F: Tolerance 10R0: Resistance K: TCR

Part Number Information

Example: TPAN0220F10R0K9 (TPAN 0220 Series ±1% 10Ω ±100ppm/°C Standard)

T	P	A	N	0	2	2	0	F	1	0	R	0	K	9

Series	Package	Tolerance	Resistance	TCR	Code
TPAN	0220	D=±0.5% F=±1% J=±5%	R500=0.5Ω 10R0=10Ω 1K00=1KΩ 10K0=10KΩ	K=±100ppm/℃	9=Standard 0-8=Custom

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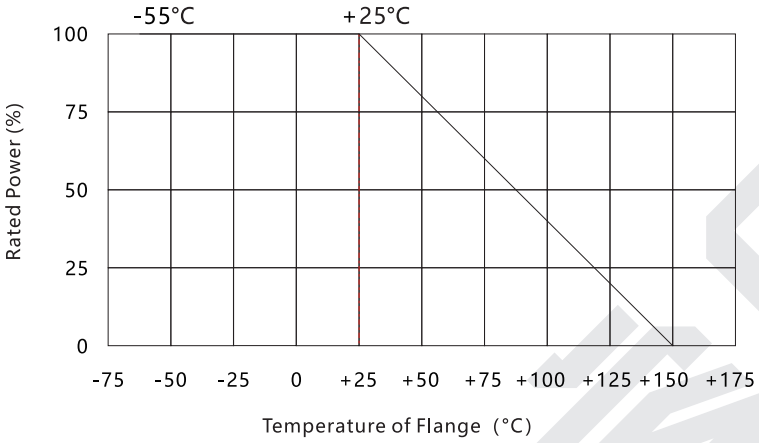
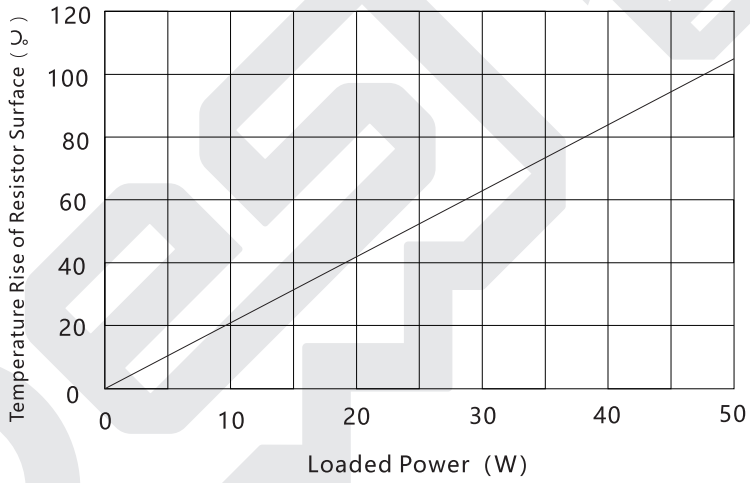
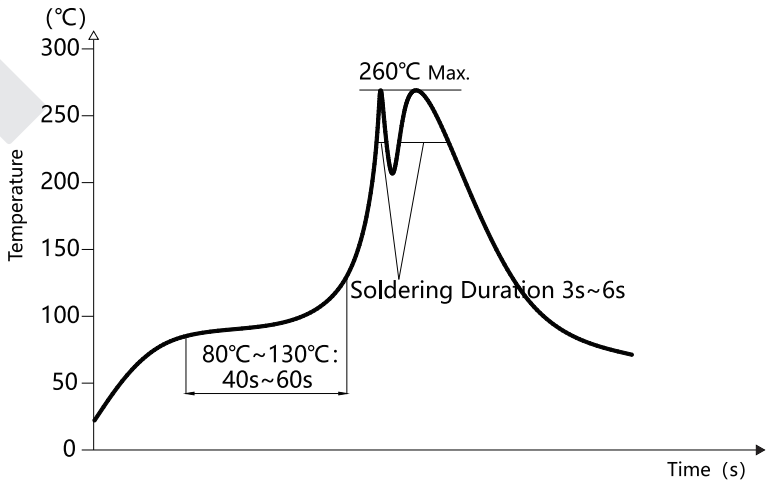
Derating Curve



Power - Temperature Rise Curve



Suggested Lead-Free Wave Soldering Curve



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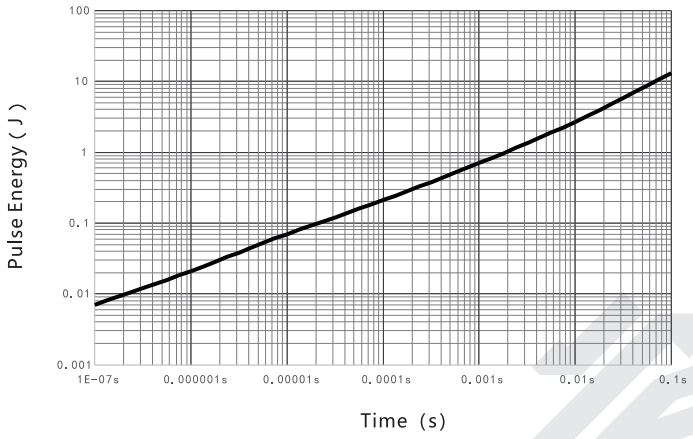
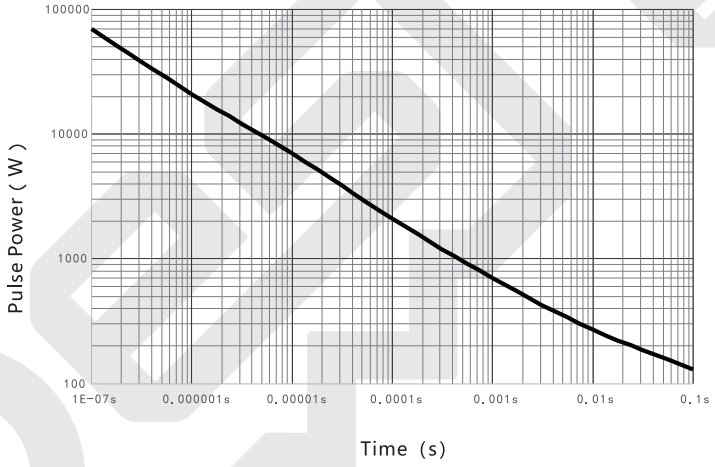
Pulse Energy Curve



Pulse Power Curve



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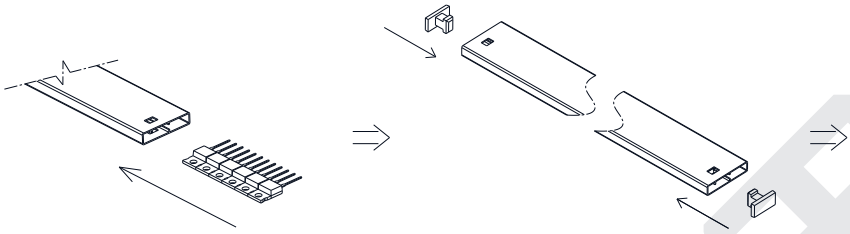
Performance

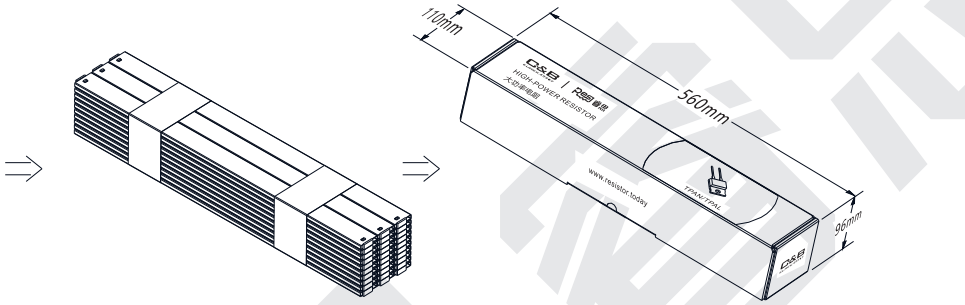
Test	Test Method	Standards	Test Limits
High Temperature Storage	1000h@+150°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	▵R≤±1%
Bias Humidity	+85°C, 85%RH, powered 10% rated power for 1000h. Inspect within 24±4 hours after the test	AEC-Q200 TEST 7 MIL-STD-202 Method 103	▵R±≤0.5%
Load Life	+25℃, 1000h, rated power, not exceeding maximum operating voltage, 90 min on, 30 min off	AEC-Q200 TEST 8 MIL-STD-202 Method 108	▵R≤±1%
Resistance to Solvent	Immerse in IPA at 20 ℃~25 ℃, hold for 5 min	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	▵R≤±0.25%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	▵R≤±0.25%
Resistance to Solder Heat	+270°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	▵R≤±0.25%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+150°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	▵R≤±0.5%
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage
TCR	-55℃ and +125℃, +20℃ Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Within the nominal value range
Flammability	Flame the sample for 10 seconds, twice	AEC-Q200 TEST 20 UL-94 V-0 or V-1 is acceptable and does not require electrical testing	Incomplete burnout, thin pad paper not ignited, pine board not charred
Terminal Strength	Apply force 2.5N.M for 60s	AEC-Q200 TEST 22 AEC-Q200-006	▵R≤±0.2%
Withstand Voltage	Apply an effective 2000VAC between the terminal and flange for 60 seconds	IEC 60115-1 4.7	No breakdown or flashover, ▵R≤±0.25%
Short Time Overload	2x rated power for 5 s, not exceeding 1.5x maximum operating voltage	IEC 60115-1 4.13	▵R≤±0.5%
Low Temperature Operation	-55 ℃, unpowered for 1 h, powered rated voltage for 15 min, unpowered for 15 min	IEC 60115-1 4.36	▵R≤±0.5%

Packaging



1. 50 pcs./tube.

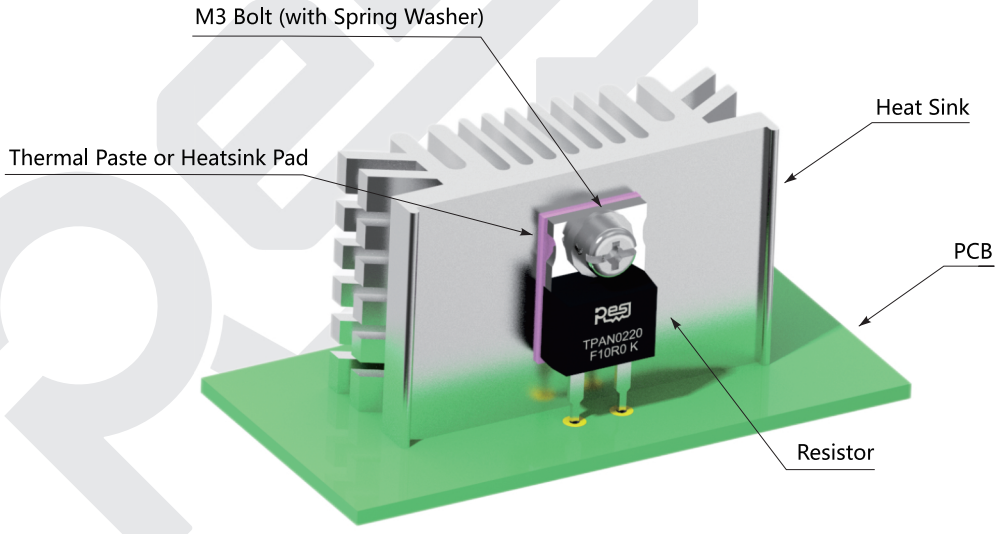
2. Install rubber plugs at both ends.



3. Pack every 30 tubes into a bundle.

4. The bundle box size is 560*110*96 mm

Installation



(1) The general installation of TO220 resistors is shown in the figure above. For good thermal conductivity, thermal paste or heatsink pads must be used at the contact position between the bottom of the resistor flange and the heat sink, to ensure contact area for heat dissipation.

(2) The bolt connecting the flange with the heat sink should be of a specification with spring washers to prevent looseness and sliding during long-term use, which may cause gaps and affect the thermal conductivity.

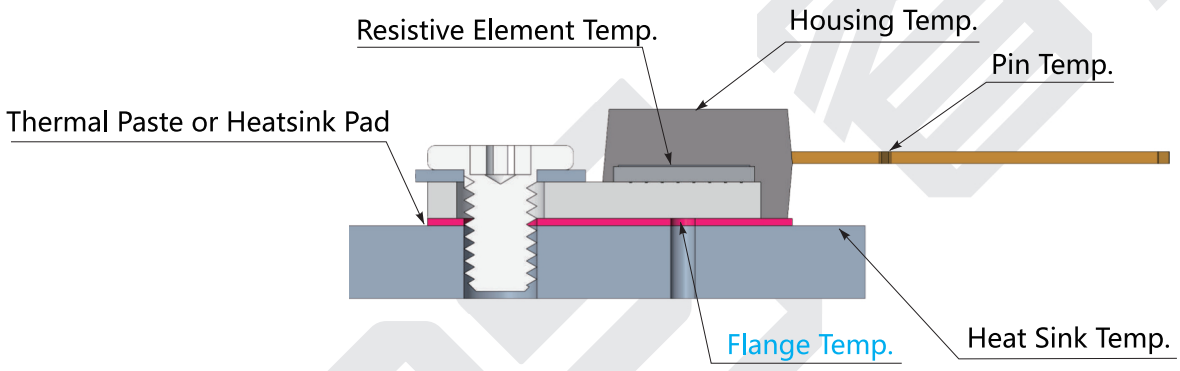
(3) The recommended torque is no greater than 0.9N.m, to avoid cracks or warping deformation of the product caused by excessive torque.

(4) For full power application, it is necessary to refer to the derating curve diagram and ensure that the temperature of the bottom flange is ≤ 25 ℃ by using water cooling or oil cooling to ensure the load life and reliability of the resistor.

Statement of Rated Power and Temperature

The maximum rated power of TPAN0220 series high-power resistor is 50W, which is based on 25 ℃ operating ambient temperature of the flange. The temperature measurement point is in the center of the back of the flange, which is below the resistive element. The temperature of the resistor flange is different from the temperature of the housing, pin or ambient temperature. The heat dissipation effect of the resistor can be reflected by the flange temperature. Heat dissipation effect is a crucial factor.When equipment or resistor fails, please investigate the heat dissipation of the resistor first. If the flange is overtemperature, it usually indicates that the heat dissipation effect has not achieved the conditions specified in the datasheet, which means the installation of the heat sink or the heat dissipation capacity of the applied heat sink does not meet the requirements. Long-term use can lead to drift of the resistance, thereby reducing the load life of the resistor. When using resistors, it is recommended to apply appropriate thermal design, calculation, and temperature measurement or finite element analysis to verify the feasibility of the design and avoid resistor failure due to poor heat dissipation.

Temperature Diagram of Product Assembly



Heat Sink Selection

Users must choose a suitable heat sink based on the usage conditions of the resistors (e.g. power, ambient temperature, etc.). The maximum operating temperature of TPAN0220 series is 150 ℃. TPAN0220 power calculation is as follows:

$$P = \frac{\Delta T}{R_{TH\ (j-c)} + R_{TH\ (c-h)} + R_{TH\ (h-a)}}$$

P: The operating power of the resistor;

ΔT: The difference of the maximum operating temperature of the resistor and the ambient temperature;

$R_{TH\ (j-c)}$: The thermal resistance between the resistive layer and the outer part of the resistor, i.e. the thermal resistance of the resistor;

$R_{TH\ (c-h)}$: The thermal resistance between the outer part of the resistor and the upper part of the heat sink, i.e. the thermal resistance at the contact interface;

$R_{TH\ (h-a)}$: The thermal resistance of the heat sink.

Example:

$R_{TH\ (h-a)}$: Determine an operating power of 15W and an ambient temperature of +25 ℃ for TPAN0200;

Referring to the datasheet, the thermal resistance $R_{TH\ (j-c)}$ of TPAN0200 series is 2.1 ℃/W;

The calculation is as follows:

ΔT=150℃-25℃=125℃

$R_{TH\ (j-c)} + R_{TH\ (c-h)} + R_{TH\ (h-a)} = \Delta T/P$=8.33℃/W

$R_{TH\ (c-h)} + R_{TH\ (h-a)}$ =8.33-2.1=6.23℃/W

The thermal resistance at the contact interface, $R_{TH\ (c-h)}$, can be concluded, based on the operating condition. If $R_{TH\ (c-h)}$ is 1 ℃/W, a heat sink with $R_{TH\ (h-a)}$ less than 5.23 ℃/W is needed.

Popular Part Numbers

Part Number	Package	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
TPAN0220DR500K9	TO-220	±0.5%	0.5Ω	±100ppm/℃	50W	500V
TPAN0220D1R00K9	TO-220	±0.5%	1Ω	±100ppm/℃	50W	500V
TPAN0220D1R50K9	TO-220	±0.5%	1.5Ω	±100ppm/℃	50W	500V
TPAN0220D2R00K9	TO-220	±0.5%	2Ω	±100ppm/℃	50W	500V
TPAN0220D3R00K9	TO-220	±0.5%	3Ω	±100ppm/℃	50W	500V
TPAN0220D3R30K9	TO-220	±0.5%	3.3Ω	±100ppm/℃	50W	500V
TPAN0220D3R90K9	TO-220	±0.5%	3.9Ω	±100ppm/℃	50W	500V
TPAN0220D4R00K9	TO-220	±0.5%	4Ω	±100ppm/℃	50W	500V
TPAN0220D4R70K9	TO-220	±0.5%	4.7Ω	±100ppm/℃	50W	500V
TPAN0220D5R00K9	TO-220	±0.5%	5Ω	±100ppm/℃	50W	500V
TPAN0220D5R10K9	TO-220	±0.5%	5.1Ω	±100ppm/℃	50W	500V
TPAN0220D5R60K9	TO-220	±0.5%	5.6Ω	±100ppm/℃	50W	500V
TPAN0220D6R80K9	TO-220	±0.5%	6.8Ω	±100ppm/℃	50W	500V
TPAN0220D7R50K9	TO-220	±0.5%	7.5Ω	±100ppm/℃	50W	500V
TPAN0220D10R0K9	TO-220	±0.5%	10Ω	±100ppm/℃	50W	500V
TPAN0220D15R0K9	TO-220	±0.5%	15Ω	±100ppm/℃	50W	500V
TPAN0220D20R0K9	TO-220	±0.5%	20Ω	±100ppm/℃	50W	500V
TPAN0220D25R0K9	TO-220	±0.5%	25Ω	±100ppm/℃	50W	500V
TPAN0220D33R0K9	TO-220	±0.5%	33Ω	±100ppm/℃	50W	500V
TPAN0220D47R0K9	TO-220	±0.5%	47Ω	±100ppm/℃	50W	500V
TPAN0220D50R0K9	TO-220	±0.5%	50Ω	±100ppm/℃	50W	500V
TPAN0220D100RK9	TO-220	±0.5%	100Ω	±100ppm/℃	50W	500V
TPAN0220D200RK9	TO-220	±0.5%	200Ω	±100ppm/℃	50W	500V
TPAN0220D500RK9	TO-220	±0.5%	500Ω	±100ppm/℃	50W	500V
TPAN0220D1K00K9	TO-220	±0.5%	1KΩ	±100ppm/℃	50W	500V
TPAN0220D2K00K9	TO-220	±0.5%	2KΩ	±100ppm/℃	50W	500V
TPAN0220D5K00K9	TO-220	±0.5%	5KΩ	±100ppm/℃	50W	500V
TPAN0220D10K0K9	TO-220	±0.5%	10KΩ	±100ppm/℃	50W	500V
TPAN0220FR500K9	TO-220	±1%	0.5Ω	±100ppm/℃	50W	500V
TPAN0220F1R00K9	TO-220	±1%	1Ω	±100ppm/℃	50W	500V
TPAN0220F1R50K9	TO-220	±1%	1.5Ω	±100ppm/℃	50W	500V
TPAN0220F2R00K9	TO-220	±1%	2Ω	±100ppm/℃	50W	500V
TPAN0220F3R00K9	TO-220	±1%	3Ω	±100ppm/℃	50W	500V
TPAN0220F3R30K9	TO-220	±1%	3.3Ω	±100ppm/℃	50W	500V
TPAN0220F3R90K9	TO-220	±1%	3.9Ω	±100ppm/℃	50W	500V
TPAN0220F4R00K9	TO-220	±1%	4Ω	±100ppm/℃	50W	500V
TPAN0220F4R70K9	TO-220	±1%	4.7Ω	±100ppm/℃	50W	500V
TPAN0220F5R00K9	TO-220	±1%	5Ω	±100ppm/℃	50W	500V
TPAN0220F5R10K9	TO-220	±1%	5.1Ω	±100ppm/℃	50W	500V
TPAN0220F5R60K9	TO-220	±1%	5.6Ω	±100ppm/℃	50W	500V
TPAN0220F6R80K9	TO-220	±1%	6.8Ω	±100ppm/℃	50W	500V
TPAN0220F7R50K9	TO-220	±1%	7.5Ω	±100ppm/℃	50W	500V
TPAN0220F10R0K9	TO-220	±1%	10Ω	±100ppm/℃	50W	500V
TPAN0220F15R0K9	TO-220	±1%	15Ω	±100ppm/℃	50W	500V
TPAN0220F20R0K9	TO-220	±1%	20Ω	±100ppm/℃	50W	500V
TPAN0220F25R0K9	TO-220	±1%	25Ω	±100ppm/℃	50W	500V
TPAN0220F33R0K9	TO-220	±1%	33Ω	±100ppm/℃	50W	500V
TPAN0220F47R0K9	TO-220	±1%	47Ω	±100ppm/℃	50W	500V
TPAN0220F50R0K9	TO-220	±1%	50Ω	±100ppm/℃	50W	500V
TPAN0220F100RK9	TO-220	±1%	100Ω	±100ppm/℃	50W	500V
TPAN0220F200RK9	TO-220	±1%	200Ω	±100ppm/℃	50W	500V

TPAN0220

50W TO-220 Non-Inductive High-Power Resistor

Popular Part Numbers

Part Number	Package	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
TPAN0220F500RK9	TO-220	±1%	500Ω	±100ppm/℃	50W	500V
TPAN0220F1K00K9	TO-220	±1%	1KΩ	±100ppm/℃	50W	500V
TPAN0220F2K00K9	TO-220	±1%	2KΩ	±100ppm/℃	50W	500V
TPAN0220F5K00K9	TO-220	±1%	5KΩ	±100ppm/℃	50W	500V
TPAN0220F10K0K9	TO-220	±1%	10KΩ	±100ppm/℃	50W	500V
TPAN0220JR500K9	TO-220	±5%	0.5Ω	±100ppm/℃	50W	500V
TPAN0220J1R00K9	TO-220	±5%	1Ω	±100ppm/℃	50W	500V
TPAN0220J1R50K9	TO-220	±5%	1.5Ω	±100ppm/℃	50W	500V
TPAN0220J2R00K9	TO-220	±5%	2Ω	±100ppm/℃	50W	500V
TPAN0220J3R00K9	TO-220	±5%	3Ω	±100ppm/℃	50W	500V
TPAN0220J3R30K9	TO-220	±5%	3.3Ω	±100ppm/℃	50W	500V
TPAN0220J3R90K9	TO-220	±5%	3.9Ω	±100ppm/℃	50W	500V
TPAN0220J4R00K9	TO-220	±5%	4Ω	±100ppm/℃	50W	500V
TPAN0220J4R70K9	TO-220	±5%	4.7Ω	±100ppm/℃	50W	500V
TPAN0220J5R00K9	TO-220	±5%	5Ω	±100ppm/℃	50W	500V
TPAN0220J5R10K9	TO-220	±5%	5.1Ω	±100ppm/℃	50W	500V
TPAN0220J5R60K9	TO-220	±5%	5.6Ω	±100ppm/℃	50W	500V
TPAN0220J6R80K9	TO-220	±5%	6.8Ω	±100ppm/℃	50W	500V
TPAN0220J7R50K9	TO-220	±5%	7.5Ω	±100ppm/℃	50W	500V
TPAN0220J10R0K9	TO-220	±5%	10Ω	±100ppm/℃	50W	500V
TPAN0220J15R0K9	TO-220	±5%	15Ω	±100ppm/℃	50W	500V
TPAN0220J20R0K9	TO-220	±5%	20Ω	±100ppm/℃	50W	500V
TPAN0220J25R0K9	TO-220	±5%	25Ω	±100ppm/℃	50W	500V
TPAN0220J33R0K9	TO-220	±5%	33Ω	±100ppm/℃	50W	500V
TPAN0220J47R0K9	TO-220	±5%	47Ω	±100ppm/℃	50W	500V
TPAN0220J50R0K9	TO-220	±5%	50Ω	±100ppm/℃	50W	500V
TPAN0220J100RK9	TO-220	±5%	100Ω	±100ppm/℃	50W	500V
TPAN0220J200RK9	TO-220	±5%	200Ω	±100ppm/℃	50W	500V
TPAN0220J500RK9	TO-220	±5%	500Ω	±100ppm/℃	50W	500V
TPAN0220J1K00K9	TO-220	±5%	1KΩ	±100ppm/℃	50W	500V
TPAN0220J2K00K9	TO-220	±5%	2KΩ	±100ppm/℃	50W	500V
TPAN0220J5K00K9	TO-220	±5%	5KΩ	±100ppm/℃	50W	500V
TPAN0220J10K0K9	TO-220	±5%	10KΩ	±100ppm/℃	50W	500V

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023.5.21	LWW

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DataSheet No.: E20003
Version: V0
Date: 2023/05/21

TPAL0220

35W TO-220 Non-Inductive High-Power Resistor

Resistance	0.5Ω~10KΩ
Tolerance	±0.5%
TCR 深圳市开步电子有限公司	≤±100ppm/℃
Rated Power	35W

Applications

Testing Instrumentation
Industrial Power Equipment
Automotive Electronics
Motor Control & Drive Circuits

Better Solution for Sustainable High End Manufacturing

TPAL0220

35W TO-220 Non-Inductive High-Power Resistor

High Power with Excellent Reliability & Stability

RoHS AEC-Q200 3D

Introduction

TPAL0220 is a TO-220 non-inductive high-power resistor. The TO-220 transistor outline package is a through hole package, commonly used for high-power transistors, small to medium-sized integrated circuits, power resistors, etc.

The rated power of TPAN0220 series is 35W. TPAL0220 adopts a flange for its better heat dissipation to balance the thermal characteristics of the circuit. It is usually designed for current measurement, energy absorption, discharge, RC absorption, high-speed switching, high-frequency transmission circuits, voltage regulation, constant power loads, and low-energy pulse loads. Its industry applications include industrial lasers, welding equipment, testing equipment, instrumentation, UPS, automobiles, switching power supplies, etc.

TPAL0220 series high-power molded resistor has excellent long-term stability, low TCR, high heat dissipation, low thermal resistance and low current noise, applying for a wide range. From raw materials, core production equipment, to process technology, TPAL0220 production is independent and controllable and achieves stable quality and timely delivery.

Electrical Parameters

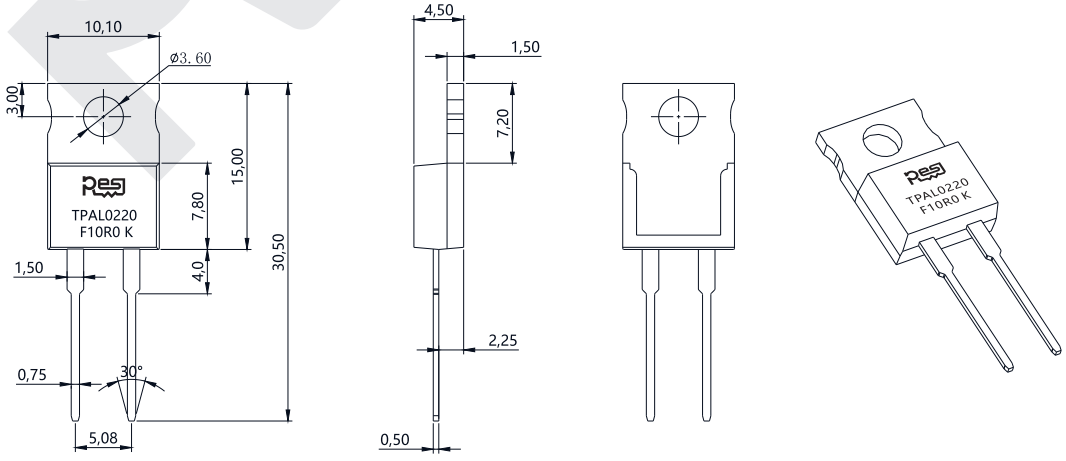
Series	Resistance Ω	TCR ppm/℃	Tolerance %	Max. Operating Voltage*(1)	Rated Power*(2) With Heat Sink. Flange ≤ 25℃	Without Heat Sink	Operating Temperature
TPAL0220	0.5≤R≤10K	±100	±0.5, ±1, ±5	500V	35W	2.25W	-55~+150℃

*(1) According to P=UI, combined with power and the maximum operating voltage, calculate the maximum current value (P and U whichever is less).
*(2) If the actual operating power is greater than 2.25W, it must be used with a heat sink. The recommended heat sink and installation method refer to pages 5 and 6.

Galvanic Isolation	Insulation Resistance	Thermal Resistance	Inductance	E-Series Value	Technology	Housing	Unit Weight
2000VAC	≥10^4MΩ	3℃/W	≤0.1μH	E24	Thick Film	Epoxy Molded	2.2±0.5g

Dimensions

Unit: mm



Note: The above dimensional tolerance is ± 0.3mm.

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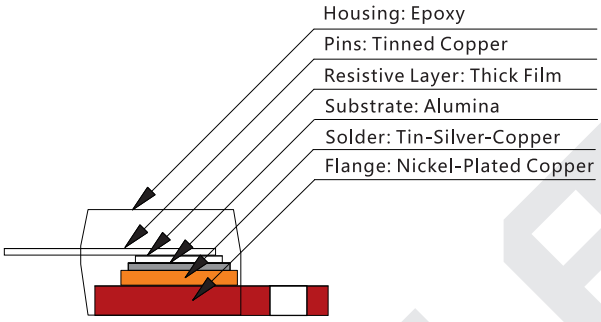
TPAL0220

35W TO-220 Non-Inductive High-Power Resistor

Construction



Marking

The first line (four digits) represents brand.
The second line (eight digits) represents product series and package.
The third line (six digits) represents tolerance, resistance and TCR.

Series	Illustration	E-Series Value	Demonstration
TPAL0220		E24	RESI: Brand TPAL0220: Series & Package F: Tolerance 10R0: Resistance K: TCR

Part Number Information

Example: TPAL0220F10R0K9 (TPAL 0220 Series ±1% 10Ω ±100ppm/°C Standard)

T	P	A	L	0	2	2	0	F	1	0	R	0	K	9

Series	Package	Tolerance	Resistance	TCR	Code
TPAL	0220	D=±0.5% F=±1% J=±5%	R500=0.5Ω 10R0=10Ω 1K00=1KΩ 10K0=10KΩ	K=±100ppm/℃	9=Standard 0-8=Custom

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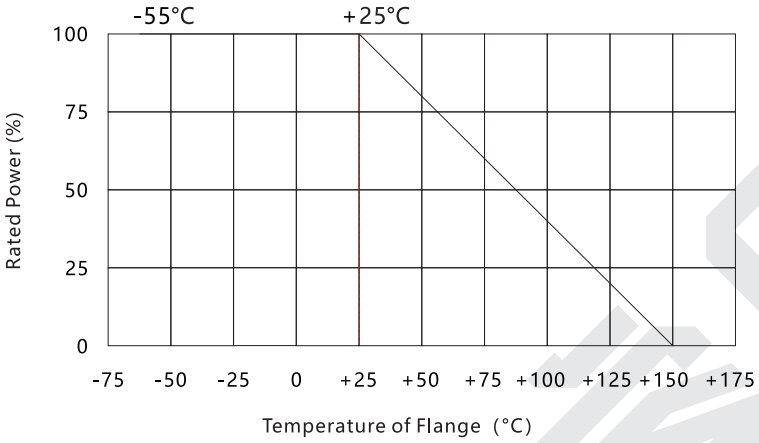
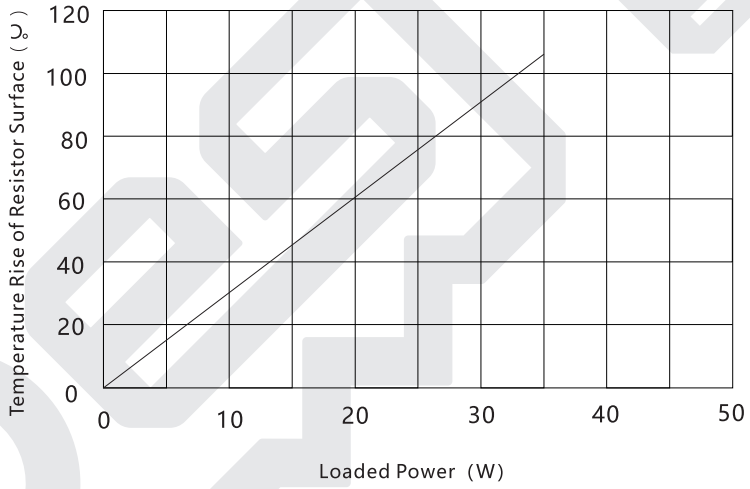
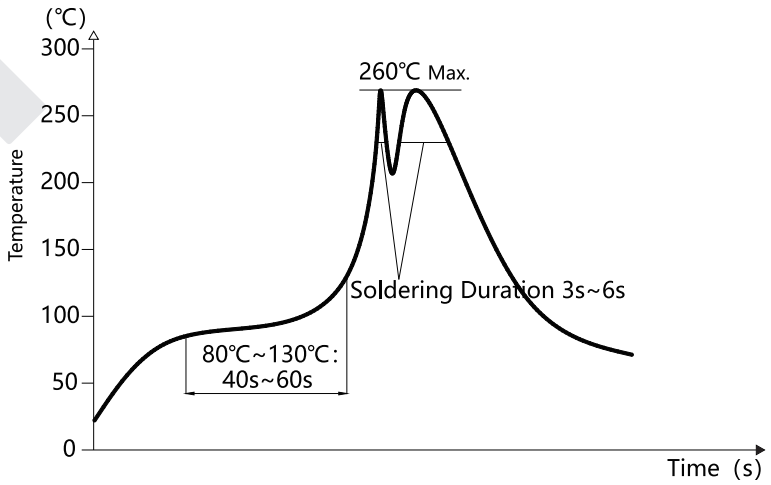
Derating Curve



Power - Temperature Rise Curve



Suggested Lead-Free Wave Soldering Curve



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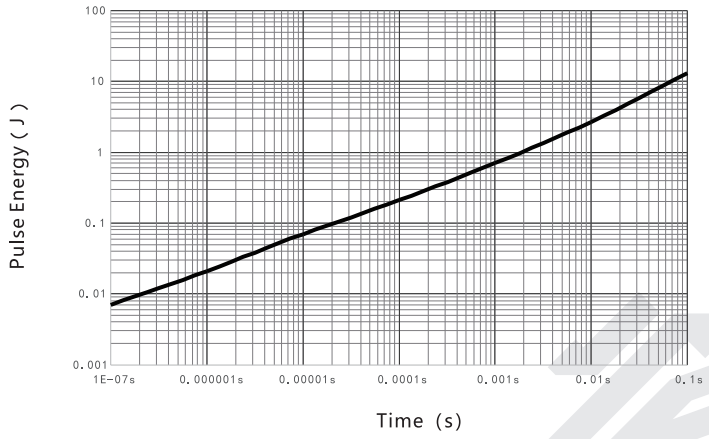
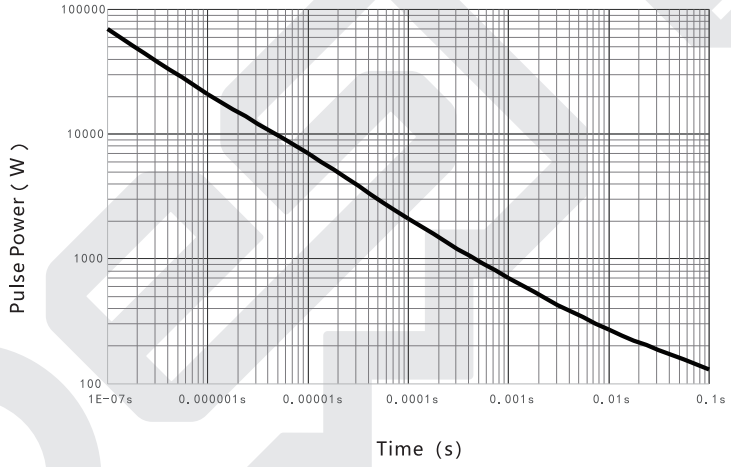
Pulse Energy Curve



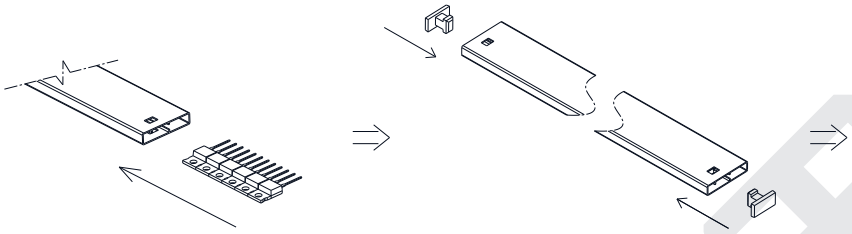
Pulse Power Curve



Performance

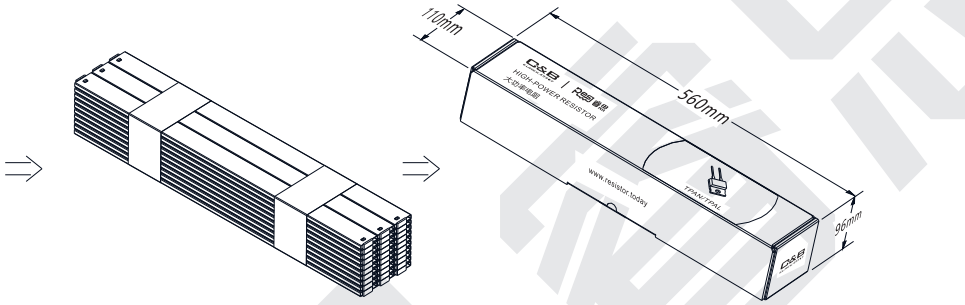
Test	Test Method	Standards	Test Limits
High Temperature Storage	1000h@+150°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	▵R≤±1%
Bias Humidity	+85°C, 85%RH, powered 10% rated power for 1000h. Inspect within 24±4 hours after the test	AEC-Q200 TEST 7 MIL-STD-202 Method 103	▵R±≤0.5%
Load Life	+25℃, 1000h, rated power, not exceeding maximum operating voltage, 90 min on, 30 min off	AEC-Q200 TEST 8 MIL-STD-202 Method 108	▵R≤±1%
Resistance to Solvent	Immerse in IPA at 20 ℃~25 ℃, hold for 5 min	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage
Mechanical Shock	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3 times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	▵R≤±0.25%
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X Y Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	▵R≤±0.25%
Resistance to Solder Heat	+270°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	▵R≤±0.25%
Thermal Shock	-55°C, 15min~ambient temperature<20s~+150°C, 15min, 1000 cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	▵R≤±0.5%
Solderability	+245°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage
TCR	-55℃ and +125℃, +20℃ Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Within the nominal value range
Flammability	Flame the sample for 10 seconds, twice	AEC-Q200 TEST 20 UL-94 V-0 or V-1 is acceptable and does not require electrical testing	Incomplete burnout, thin pad paper not ignited, pine board not charred
Terminal Strength	Apply force 2.5N.M for 60s	AEC-Q200 TEST 22 AEC-Q200-006	▵R≤±0.2%
Withstand Voltage	Apply an effective 2000VAC between the terminal and flange for 60 seconds	IEC 60115-1 4.7	No breakdown or flashover, ▵R≤±0.25%
Short Time Overload	2x rated power for 5 s, not exceeding 1.5x maximum operating voltage	IEC 60115-1 4.13	▵R≤±0.5%
Low Temperature Operation	-55 ℃, unpowered for 1 h, powered rated voltage for 15 min, unpowered for 15 min	IEC 60115-1 4.36	▵R≤±0.5%

Packaging



1. 50 pcs./tube.

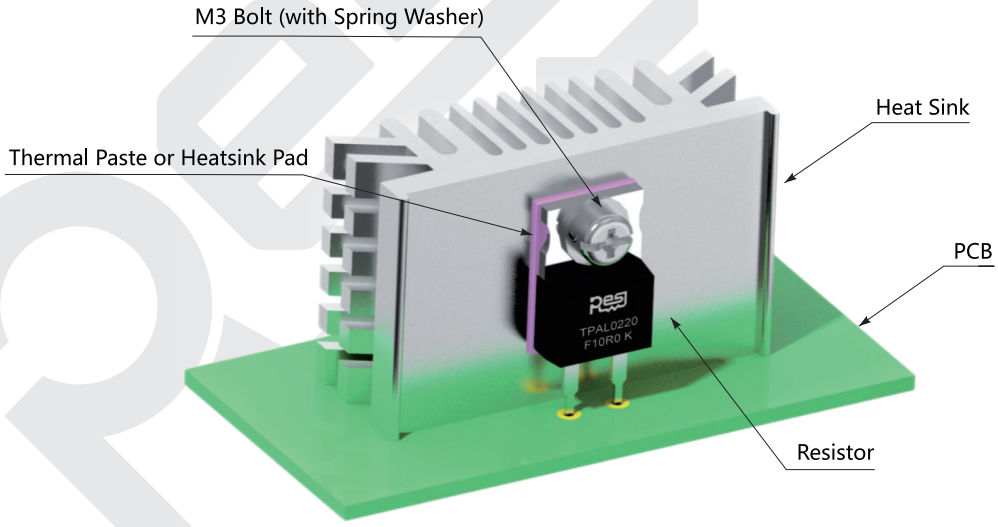
2. Install rubber plugs at both ends.



3. Pack every 30 tubes into a bundle.

4. The bundle box size is 560*110*96 mm

Installation



(1) The general installation of TO220 resistors is shown in the figure above. For good thermal conductivity, thermal paste or heatsink pads must be used at the contact position between the bottom of the resistor flange and the heat sink, to ensure contact area for heat dissipation.

(2) The bolt connecting the flange with the heat sink should be of a specification with spring washers to prevent looseness and sliding during long-term use, which may cause gaps and affect the thermal conductivity.

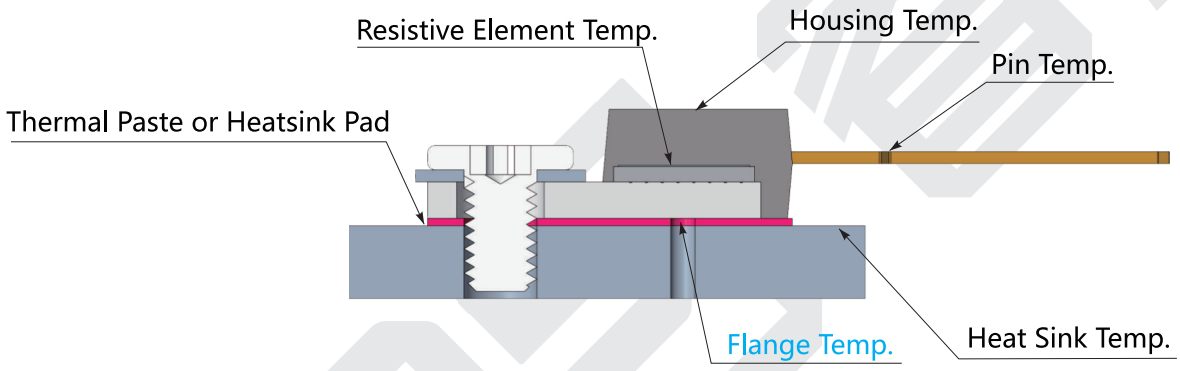
(3) The recommended torque is no greater than 0.9N.m, to avoid cracks or warping deformation of the product caused by excessive torque.

(4) For full power application, it is necessary to refer to the derating curve diagram and ensure that the temperature of the bottom flange is ≤ 25 ℃ by using water cooling or oil cooling to ensure the load life and reliability of the resistor.

Statement of Rated Power and Temperature

The maximum rated power of TPAL0220 series high-power resistor is 35W, which is based on 25 ℃ operating ambient temperature of the flange. The temperature measurement point is in the center of the back of the flange, which is below the resistive element. The temperature of the resistor flange is different from the temperature of the housing, pin or ambient temperature. The heat dissipation effect of the resistor can be reflected by the flange temperature. Heat dissipation effect is a crucial factor. When equipment or resistor fails, please investigate the heat dissipation of the resistor first. If the flange is overtemperature, it usually indicates that the heat dissipation effect has not achieved the conditions specified in the datasheet, which means the installation of the heat sink or the heat dissipation capacity of the applied heat sink does not meet the requirements. Long-term use can lead to drift of the resistance, thereby reducing the load life of the resistor. When using resistors, it is recommended to apply appropriate thermal design, calculation, and temperature measurement or finite element analysis to verify the feasibility of the design and avoid resistor failure due to poor heat dissipation.

Temperature Diagram of Product Assembly



Heat Sink Selection

Users must choose a suitable heat sink based on the usage conditions of the resistors (e.g. power, ambient temperature, etc.). The maximum operating temperature of TPAL0220 series is 150 ℃. TPAL0220 power calculation is as follows:

$$P = \frac{\Delta T}{R_{TH\ (j-c)} + R_{TH\ (c-h)} + R_{TH\ (h-a)}}$$

P: The operating power of the resistor;

ΔT: The difference of the maximum operating temperature of the resistor and the ambient temperature;

$R_{TH\ (j-c)}$: The thermal resistance between the resistive layer and the outer part of the resistor, i.e. the thermal resistance of the resistor;

$R_{TH\ (c-h)}$: The thermal resistance between the outer part of the resistor and the upper part of the heat sink, i.e. the thermal resistance at the contact interface;

$R_{TH\ (h-a)}$:The thermal resistance of the heat sink.

Example:

$R_{TH\ (h-a)}$: Determine an operating power of 15W and an ambient temperature of +25 ℃ for TPAL0200;

Referring to the datasheet, the thermal resistance $R_{TH\ (j-c)}$ of TPAL0200 series is 3 ℃/W;

The calculation is as follows:

ΔT=150℃-25℃=125℃

$R_{TH\ (j-c)} + R_{TH\ (c-h)} + R_{TH\ (h-a)} = \Delta T/P$=8.33℃/W

$R_{TH\ (c-h)} + R_{TH\ (h-a)}$ =8.33-3=5.33℃/W

The thermal resistance at the contact interface, $R_{TH\ (c-h)}$, can be concluded, based on the operating condition. If $R_{TH\ (c-h)}$ is 1 ℃/W, a heat sink with $R_{TH\ (h-a)}$ less than 4.33 ℃/W is needed.

Popular Part Numbers

Part Number	Package	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
TPAL0220DR500K9	TO-220	±0.5%	0.5Ω	±100ppm/℃	35W	500V
TPAL0220D1R00K9	TO-220	±0.5%	1Ω	±100ppm/℃	35W	500V
TPAL0220D1R50K9	TO-220	±0.5%	1.5Ω	±100ppm/℃	35W	500V
TPAL0220D2R00K9	TO-220	±0.5%	2Ω	±100ppm/℃	35W	500V
TPAL0220D3R00K9	TO-220	±0.5%	3Ω	±100ppm/℃	35W	500V
TPAL0220D3R30K9	TO-220	±0.5%	3.3Ω	±100ppm/℃	35W	500V
TPAL0220D3R90K9	TO-220	±0.5%	3.9Ω	±100ppm/℃	35W	500V
TPAL0220D4R00K9	TO-220	±0.5%	4Ω	±100ppm/℃	35W	500V
TPAL0220D4R70K9	TO-220	±0.5%	4.7Ω	±100ppm/℃	35W	500V
TPAL0220D5R00K9	TO-220	±0.5%	5Ω	±100ppm/℃	35W	500V
TPAL0220D5R10K9	TO-220	±0.5%	5.1Ω	±100ppm/℃	35W	500V
TPAL0220D5R60K9	TO-220	±0.5%	5.6Ω	±100ppm/℃	35W	500V
TPAL0220D6R80K9	TO-220	±0.5%	6.8Ω	±100ppm/℃	35W	500V
TPAL0220D7R50K9	TO-220	±0.5%	7.5Ω	±100ppm/℃	35W	500V
TPAL0220D10R0K9	TO-220	±0.5%	10Ω	±100ppm/℃	35W	500V
TPAL0220D15R0K9	TO-220	±0.5%	15Ω	±100ppm/℃	35W	500V
TPAL0220D20R0K9	TO-220	±0.5%	20Ω	±100ppm/℃	35W	500V
TPAL0220D25R0K9	TO-220	±0.5%	25Ω	±100ppm/℃	35W	500V
TPAL0220D33R0K9	TO-220	±0.5%	33Ω	±100ppm/℃	35W	500V
TPAL0220D47R0K9	TO-220	±0.5%	47Ω	±100ppm/℃	35W	500V
TPAL0220D50R0K9	TO-220	±0.5%	50Ω	±100ppm/℃	35W	500V
TPAL0220D100RK9	TO-220	±0.5%	100Ω	±100ppm/℃	35W	500V
TPAL0220D200RK9	TO-220	±0.5%	200Ω	±100ppm/℃	35W	500V
TPAL0220D500RK9	TO-220	±0.5%	500Ω	±100ppm/℃	35W	500V
TPAL0220D1K00K9	TO-220	±0.5%	1KΩ	±100ppm/℃	35W	500V
TPAL0220D2K00K9	TO-220	±0.5%	2KΩ	±100ppm/℃	35W	500V
TPAL0220D5K00K9	TO-220	±0.5%	5KΩ	±100ppm/℃	35W	500V
TPAL0220D10K0K9	TO-220	±0.5%	10KΩ	±100ppm/℃	35W	500V
TPAL0220FR500K9	TO-220	±1%	0.5Ω	±100ppm/℃	35W	500V
TPAL0220F1R00K9	TO-220	±1%	1Ω	±100ppm/℃	35W	500V
TPAL0220F1R50K9	TO-220	±1%	1.5Ω	±100ppm/℃	35W	500V
TPAL0220F2R00K9	TO-220	±1%	2Ω	±100ppm/℃	35W	500V
TPAL0220F3R00K9	TO-220	±1%	3Ω	±100ppm/℃	35W	500V
TPAL0220F3R30K9	TO-220	±1%	3.3Ω	±100ppm/℃	35W	500V
TPAL0220F3R90K9	TO-220	±1%	3.9Ω	±100ppm/℃	35W	500V
TPAL0220F4R00K9	TO-220	±1%	4Ω	±100ppm/℃	35W	500V
TPAL0220F4R70K9	TO-220	±1%	4.7Ω	±100ppm/℃	35W	500V
TPAL0220F5R00K9	TO-220	±1%	5Ω	±100ppm/℃	35W	500V
TPAL0220F5R10K9	TO-220	±1%	5.1Ω	±100ppm/℃	35W	500V
TPAL0220F5R60K9	TO-220	±1%	5.6Ω	±100ppm/℃	35W	500V
TPAL0220F6R80K9	TO-220	±1%	6.8Ω	±100ppm/℃	35W	500V
TPAL0220F7R50K9	TO-220	±1%	7.5Ω	±100ppm/℃	35W	500V
TPAL0220F10R0K9	TO-220	±1%	10Ω	±100ppm/℃	35W	500V
TPAL0220F15R0K9	TO-220	±1%	15Ω	±100ppm/℃	35W	500V
TPAL0220F20R0K9	TO-220	±1%	20Ω	±100ppm/℃	35W	500V
TPAL0220F25R0K9	TO-220	±1%	25Ω	±100ppm/℃	35W	500V
TPAL0220F33R0K9	TO-220	±1%	33Ω	±100ppm/℃	35W	500V
TPAL0220F47R0K9	TO-220	±1%	47Ω	±100ppm/℃	35W	500V
TPAL0220F50R0K9	TO-220	±1%	50Ω	±100ppm/℃	35W	500V
TPAL0220F100RK9	TO-220	±1%	100Ω	±100ppm/℃	35W	500V
TPAL0220F200RK9	TO-220	±1%	200Ω	±100ppm/℃	35W	500V

TPAL0220

35W TO-220 Non-Inductive High-Power Resistor

Popular Part Numbers

Part Number	Package	Tolerance	Resistance	TCR	Power	Max. Operating Voltage
TPAL0220F500RK9	TO-220	±1%	500Ω	±100ppm/℃	35W	500V
TPAL0220F1K00K9	TO-220	±1%	1KΩ	±100ppm/℃	35W	500V
TPAL0220F2K00K9	TO-220	±1%	2KΩ	±100ppm/℃	35W	500V
TPAL0220F5K00K9	TO-220	±1%	5KΩ	±100ppm/℃	35W	500V
TPAL0220F10K0K9	TO-220	±1%	10KΩ	±100ppm/℃	35W	500V
TPAL0220JR500K9	TO-220	±5%	0.5Ω	±100ppm/℃	35W	500V
TPAL0220J1R00K9	TO-220	±5%	1Ω	±100ppm/℃	35W	500V
TPAL0220J1R50K9	TO-220	±5%	1.5Ω	±100ppm/℃	35W	500V
TPAL0220J2R00K9	TO-220	±5%	2Ω	±100ppm/℃	35W	500V
TPAL0220J3R00K9	TO-220	±5%	3Ω	±100ppm/℃	35W	500V
TPAL0220J3R30K9	TO-220	±5%	3.3Ω	±100ppm/℃	35W	500V
TPAL0220J3R90K9	TO-220	±5%	3.9Ω	±100ppm/℃	35W	500V
TPAL0220J4R00K9	TO-220	±5%	4Ω	±100ppm/℃	35W	500V
TPAL0220J4R70K9	TO-220	±5%	4.7Ω	±100ppm/℃	35W	500V
TPAL0220J5R00K9	TO-220	±5%	5Ω	±100ppm/℃	35W	500V
TPAL0220J5R10K9	TO-220	±5%	5.1Ω	±100ppm/℃	35W	500V
TPAL0220J5R60K9	TO-220	±5%	5.6Ω	±100ppm/℃	35W	500V
TPAL0220J6R80K9	TO-220	±5%	6.8Ω	±100ppm/℃	35W	500V
TPAL0220J7R50K9	TO-220	±5%	7.5Ω	±100ppm/℃	35W	500V
TPAL0220J10R0K9	TO-220	±5%	10Ω	±100ppm/℃	35W	500V
TPAL0220J15R0K9	TO-220	±5%	15Ω	±100ppm/℃	35W	500V
TPAL0220J20R0K9	TO-220	±5%	20Ω	±100ppm/℃	35W	500V
TPAL0220J25R0K9	TO-220	±5%	25Ω	±100ppm/℃	35W	500V
TPAL0220J33R0K9	TO-220	±5%	33Ω	±100ppm/℃	35W	500V
TPAL0220J47R0K9	TO-220	±5%	47Ω	±100ppm/℃	35W	500V
TPAL0220J50R0K9	TO-220	±5%	50Ω	±100ppm/℃	35W	500V
TPAL0220J100RK9	TO-220	±5%	100Ω	±100ppm/℃	35W	500V
TPAL0220J200RK9	TO-220	±5%	200Ω	±100ppm/℃	35W	500V
TPAL0220J500RK9	TO-220	±5%	500Ω	±100ppm/℃	35W	500V
TPAL0220J1K00K9	TO-220	±5%	1KΩ	±100ppm/℃	35W	500V
TPAL0220J2K00K9	TO-220	±5%	2KΩ	±100ppm/℃	35W	500V
TPAL0220J5K00K9	TO-220	±5%	5KΩ	±100ppm/℃	35W	500V
TPAL0220J10K0K9	TO-220	±5%	10KΩ	±100ppm/℃	35W	500V

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023.5.21	LWW

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Wirewound Resistor

Wirewound resistors are fixed resistors made of an insulating core wound by resistive wires. The conductive wire is usually made from nickel-chromium, manganese copper and other alloys, the insulating core is usually made from alumina ceramics, and the coating materials are mainly insulating varnish, silicone resin, ceramic and aluminium housing.

Most precision wirewound resistors are encapsulated in silicone resin, as high temperature sintering process is not needed, so there is no effect on the electrical parameter.

Wirewound resistors usually have one layer of conductive wire wound around the core, but a single layer wire will create inductance in AC condition, so bi-directional winding is often used in AC condition to achieve non-inductance.

Characteristics

- Excellent Stability
- High Load Capacity
- Excellent Insulation Ability
- High Power
- Good Heat Dissipation

Applications

- EV
- Electric Power
- Robots
- Industrial Controls
- Railway

Data Sheet No.: E16016
Version: V0
Date: 2023/4/27

睿思

PWWR

Silicone Cement Coating Leaded High Power Wirewound Resistor

Resistance	0.24Ω-20KΩ
Tolerance	±1%
TCR	+100ppm/K
Rated Power	16W

Applications

Precision Instrumentation
Semiconductor Testing Equipment
Medical Equipment
Capacitor Charging & Discharging

Better Solution for Sustainable High End Manufacturing

睿思

PWWR

Silicone Cement Coating Leaded High Power Wirewound Resistor

Wide Operating Temperature Range
High Reliability, Strong Overload Capability

Introduction

PWWR series adopts two different diameter specifications of alumina ceramic cores, providing higher rated power than traditional axial wirewound through-hole resistor. High quality winding wire combined with specialized coating materials and processes enables PWWR to operate at higher temperature and have greater overload capacity.

The general axial through-hole wirewound resistor operates under rated power of up to 10W and maximum operating temperature of +270 ℃. PWWR series effectively improves the rated power and overload capacity by increasing the length and diameter of the ceramic core, while using high-quality resistive wire and insulation coating. At an ambient temperature of +70 ℃, the rated power is 13.5W and 16W, respectively, and the surface of the resistor can withstand high temperatures up to +350 ℃ and +370 ℃.

Electrical Parameters

Size	Rated Power (+70℃)	Operating Temperature	E-Series Value	TCR ppm/K	Resistance Ω	Tolerance %
PWWR0013	13.5W	-55℃~+350℃	E24	+100	0.24≤R≤20K	±1, ±2, ±5, ±10
PWWR0016	16W	-55℃~+370℃	E24	+100	0.33≤R≤20K	±1, ±2, ±5, ±10

Dimensions & Packaging

Unit: mm

Size	L	D	d	F	Packaging	Quantity Per Bulk	Net Weight
PWWR0013	49.5±0.5	9.5±0.5	0.8±0.03	30.0+3.0	Bulk	50pcs	6.5g
PWWR0016	51.5±0.5	11.5±0.5	1.0±0.03	30.0+3.0	Bulk	30pcs	13g

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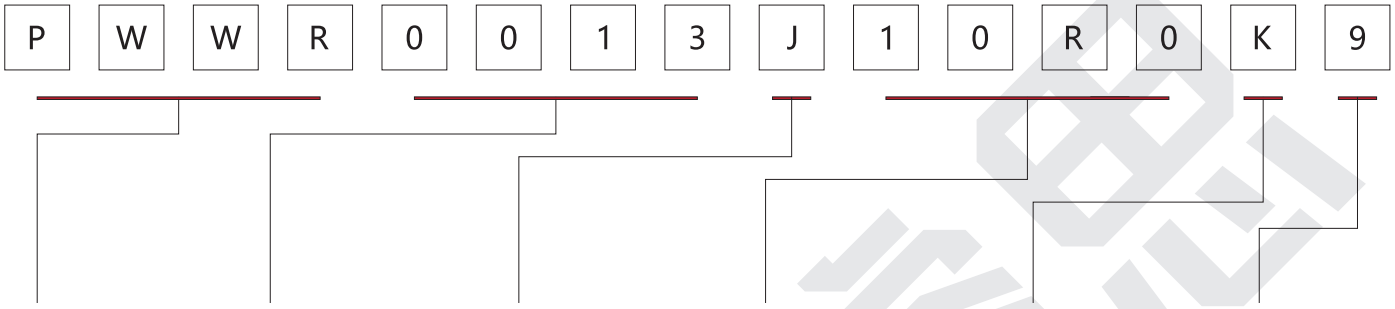
PWWR

Silicone Cement Coating Leaded High Power Wirewound Resistor

Part Number Information

Example: PWWR0013J10R0K9 (PWWR 0013 ±5% 10Ω +100ppm/K Standard)



Series	Power	Tolerance	Resistance	TCR	Code
PWWR	0013=13.5W 0016=16W	F=±1.0% G=±2.0% J=±5.0% K=±10.0%	R240=0.24Ω 1R00=1Ω 1K00=1000Ω 20K0=20000Ω	K=+100ppm/K	9=Standard 0-8=Custom

For more options of resistance, tolerance and TCR, please contact us.

Performance

Test	Test Method	Standards	Test Limits
Moisture Resistance	40±2℃. 90~95%RH for 500hours	GB/T5729 4.24	ΔR≤± (3%R+0.05Ω) No mechanical damage. Clear marking
Load Life	100% rated power. Load 90 min/ON 30 min/OFF. 500hours	GB/T5729 4.25.2	ΔR≤± (5%R±0.05Ω) No mechanical damage. Clear marking
Short Time Overload	5 times rated power, 5s	GB/T5729 4.14	ΔR≤± (2%R+0.05Ω) No mechanical damage
Vibration	10~55Hz. 1min/cycle. 1.5mm wide in the three directions. Keeping 2 hours in each direction	GB/T5729 4.22	ΔR≤± (1%R+0.05Ω) No mechanical damage
Resistance to Solder Heat	350℃ for 10s (Tin Plating)	GB/T5729 4.18	ΔR≤± (1%R+0.05Ω) No mechanical damage
Solderability	275℃ for 5s (Tin Plating)	GB/T5729 4.17	90% coverage min.
Terminal Strength	Axial force 20N for 10s	GB/T5729 4.16	Lead wire no breaking or no loosening of termination
Body Strength	Vertical force 40N for 30s	GB/T5729 4.15	No mechanical damage

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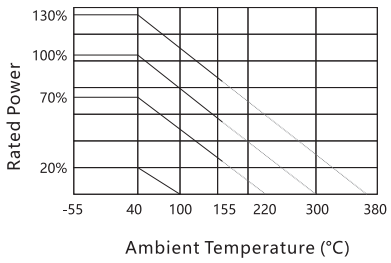
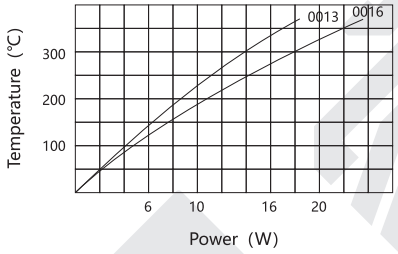
Derating Curve



Overtemperature Curve



Marking

The first line (four digits) represents brand.
The second line (fifteen digits) represents part number.
The third line (four digits) represents date code.

Illustration

RESI（Brand）、PWWR0013F1R00K9（Part Number）、2316（Date Code. Week 16 of 2023）

常备型号

Part Number	Power	Tolerance	Resistance	TCR
PWWR0013F1R00K9	13.5W	±1%	1Ω	+100ppm/K
PWWR0013F2R00K9	13.5W	±1%	2Ω	+100ppm/K
PWWR0013F5R00K9	13.5W	±1%	5Ω	+100ppm/K
PWWR0013F10R0K9	13.5W	±1%	10Ω	+100ppm/K
PWWR0013F20R0K9	13.5W	±1%	20Ω	+100ppm/K
PWWR0013F50R0K9	13.5W	±1%	50Ω	+100ppm/K
PWWR0013F100RK9	13.5W	±1%	100Ω	+100ppm/K
PWWR0013F1K00K9	13.5W	±1%	1KΩ	+100ppm/K
PWWR0016FR500K9	16W	±1%	0.5Ω	+100ppm/K
PWWR0016F1R00K9	16W	±1%	1Ω	+100ppm/K
PWWR0016F2R00K9	16W	±1%	2Ω	+100ppm/K
PWWR0016F5R00K9	16W	±1%	5Ω	+100ppm/K
PWWR0016F10R0K9	16W	±1%	10Ω	+100ppm/K
PWWR0016F20R0K9	16W	±1%	20Ω	+100ppm/K
PWWR0016F50R0K9	16W	±1%	50Ω	+100ppm/K
PWWR0016F100RK9	16W	±1%	100Ω	+100ppm/K
PWWR0016F1K00K9	16W	±1%	1KΩ	+100ppm/K

Revision

Version	Revised Content	Date	Approver
V0	Initial Issue	2023/04/27	LFY

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