

FrelTec GmbH

Mathildenstr. 10A
82319 Starnberg
Germany

Low Ohm - Metal Strip Chip Resistor SMD

SMD

SPECIFICATION

Part Number

049	06*	R010*	J*	T05**	D	2
Type	Size	Value	Tolerance	Packing	Power Rating	Number of terminals
049 : SMD Low Ohm Metal Strip Chip Resistor	03 : 0603	The last digit is the multiplier	J : $\pm 5\%$	T05: Paper tape and reel for 5k pcs (7"reel)	G: 1/3W We have 1/3W is this same than 0.33W??	2 : 2 terminals
	05 : 0805	which denotes the number of zero following	G : $\pm 2\%$		H: 1/2W	
	06 : 1206		F : $\pm 1\%$		J: 1W	
	12 : 0612	Example:	D : $\pm 0,5\%$			
		97R6=				
		R100 = 0,1Ohm				
		R050 = 0,05Ohm				
		R001: 0,001Ohm				

All products according to RoHS (2011/65/EU)

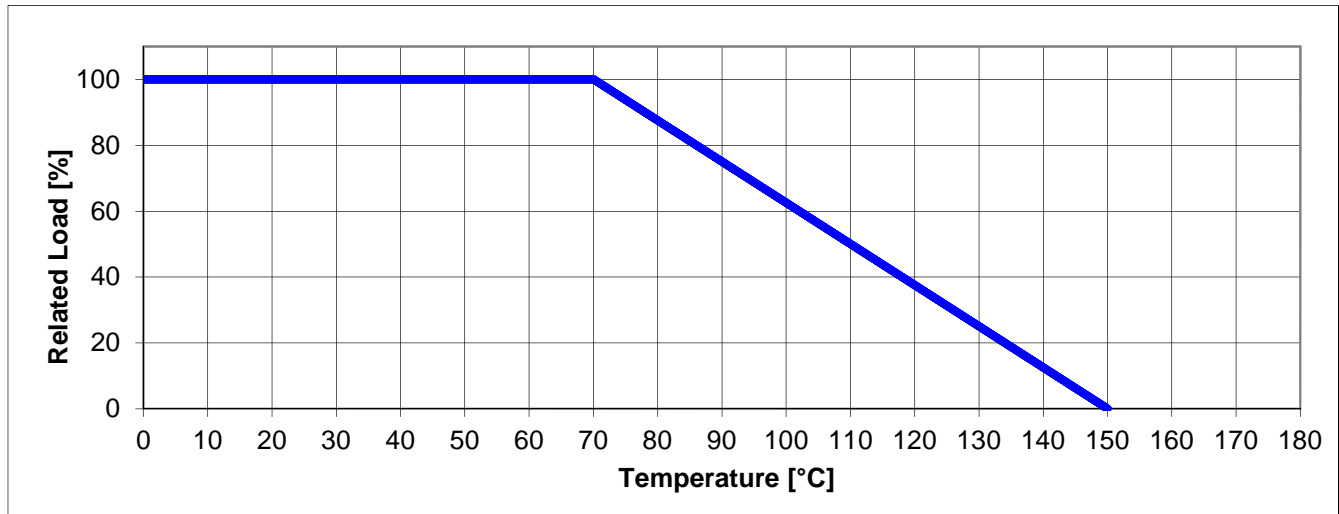
This specification is applicable to lead free and halogen free for LRE series metal alloy low-resistance resistor.

The product is for general purpose but is compliant for AEC-Q200.

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Power Derating Curve

For resistors operated in ambient temperatures above 70 °C , power rating shall be derated in accordance with figure below, Operating Temperature Range : -55°C 150°C

**Current Rating:**

The resistor shall have a DC continuous working current or a RMS(Root Mean Square). AC continuous working current at commercial-line frequency and wave form corresponding to the power rating, as determined from the following.

I= Rated Current [A]

P= Power rating [W]

R= Nominal resistance [Ω]

$$I = \sqrt{P/R}$$

049 Series

Standard Electrical Specifications

	Number of Terminals	Max. Rating Power	Max. Rating current	Max. Over-loaded Current	Operating Temp. Range	TCR (ppm/°C)	Resistance Range [mΩ]	
							D(±0,5%)	F(±1%), G(±2%), J(±5%)
04903	2	0,33W	8,1A	16,2A	-55°C ~ +150°C	≤ ±50	-	5≤R≤68
04905		0,5W	12,9A	25,8A		≤ ±100	-	3≤R<5
04906		0,5W	11,2A	22,4A		≤ ±50	-	5≤R≤50
		1W	15,8A	31,6A		≤ ±50	10≤R≤75	4≤R≤75
04912		1W	31,6A	63,2A		≤ ±125	-	1≤R<2
	≤ ±50				-	2≤R≤16		

Resistance Marking

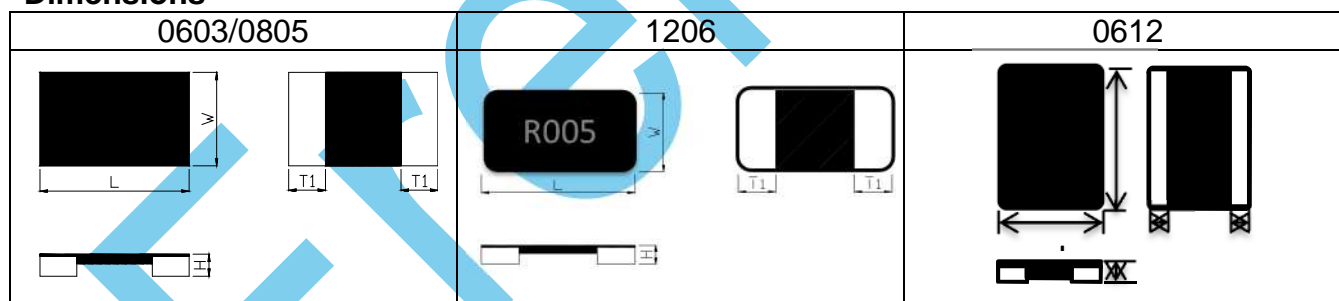
All is 4 digit marking, 0603 and 0805 no marking
 "R" designates the decimal location in ohms, e.g.

- For 4mΩ the product marking is R004;
- For 25mΩ the product marking is R025;

Plating Thickness:

Ni: ≥2μm
 Sn(Tin): ≥3μm
 Sn(Tin): Matte Sn

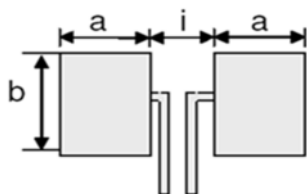
Dimensions



Type	Maximum Power Rating [W]	Resistance Range [mΩ]	Dimensions - in inches (millimeters)			
			L [mm]	W [mm]	H [mm]	T1 [mm]
0603	0,33	5 to 50	1,60±0,20	0,80±0,20	0,30+0,05/-0,10	0,30±0,15
0805	0,5	3 to 50	2,032±0,20	1,270±0,20	0,30+0,05/-0,10	0,35±0,20
1206	0,5	4 to 50	3,20±0,20	1,60±0,20	0,40±0,20	0,35±0,20
	1					
0612	1	1 to 16	1,60±0,20	3,20±0,20	0,30+,05/-,010	0,30±0,15

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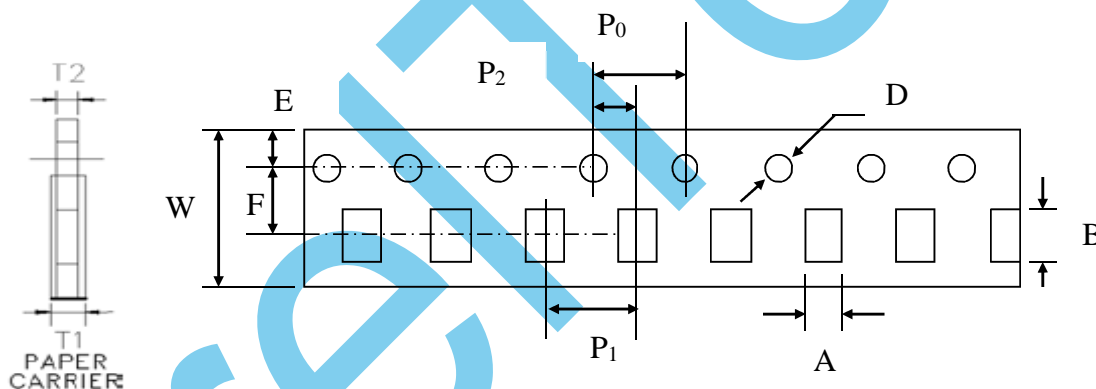
Recommended land pattern



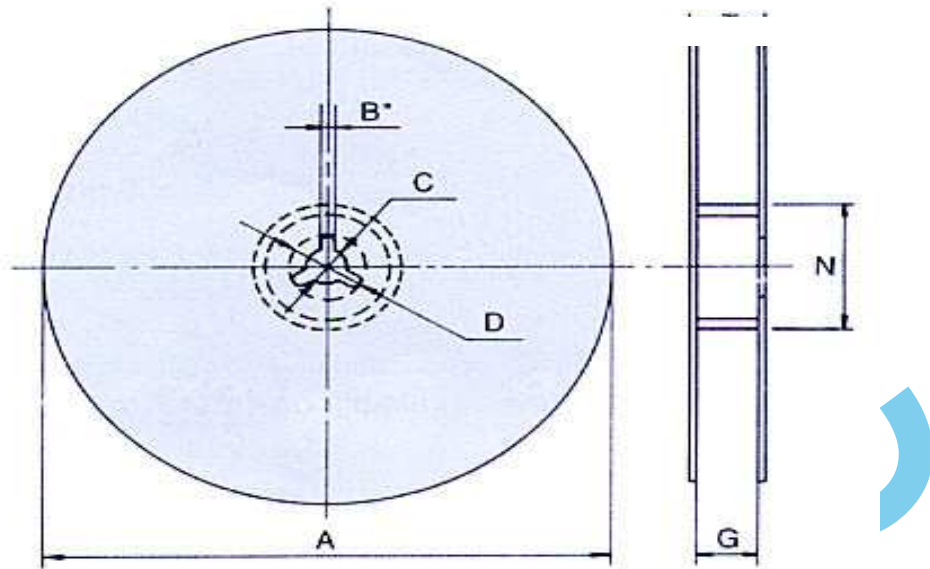
Type	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in millimeters		
			a	b	i
0603	0,33	5 to 50	1,00	1,27	0,50
0805	0,5	3 to 50	1,80	2,18	0,66
1206	0,5	4 to 50	1,65	2,18	1,00
	1				
0612	1	1 to 16	1,00	3,50	0,50

SPECIFICATION

Tape And Reel Package



Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD	T ₁	T ₂
0603	1,00±0,10	1,80±0,10	8,0±0,20	1,75±0,10	3,5±0,05	4,0±0,10	4,0±0,10	2,0±0,10	1,50+0,1/-0	0,40+0,2/-0	0,40±0,05
0805	1,55±0,10	2,30±0,10	8,0±0,20	1,75±0,10	3,5±0,05	4,0±0,10	4,0±0,10	2,0±0,10	1,50+0,1/-0	0,40+0,2/-0	0,40±0,05
1206	1,90±0,20	3,50±0,20	8,0±0,20	1,75±0,10	3,5±0,05	4,0±0,10	4,0±0,10	2,0±0,10	1,50+0,1/-0	0,60+0,2/-0	0,60±0,05
0612	1,90±0,20	3,50±0,20	8,0±0,20	1,75±0,10	3,5±0,05	4,0±0,10	4,0±0,10	2,0±0,10	1,50+0,1/-0	0,60+0,2/-0	0,60±0,05

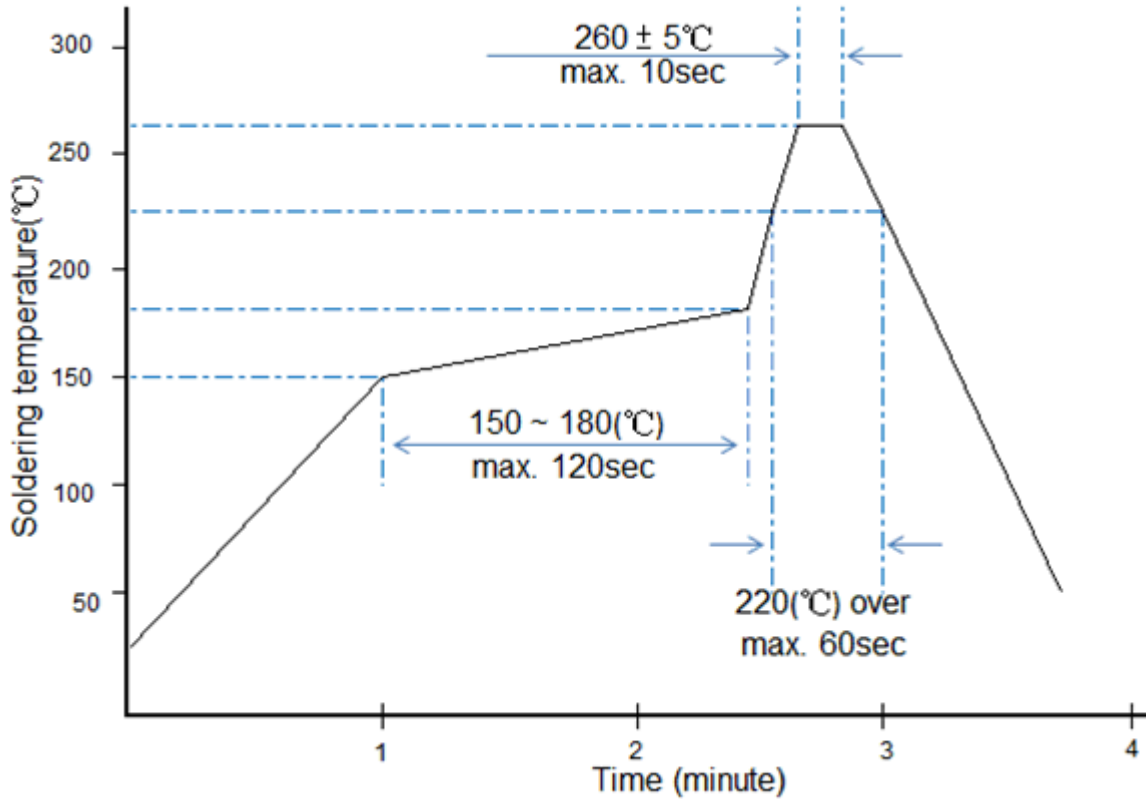


Symbol	Reel Type / Tape	A	N	C	D	B	G
Dimension	7" reel for 8 mm Tape	178±2,0	60,0±1,0	13,2±0,5	17,7±0,5	2,0±0,5	12±0,5

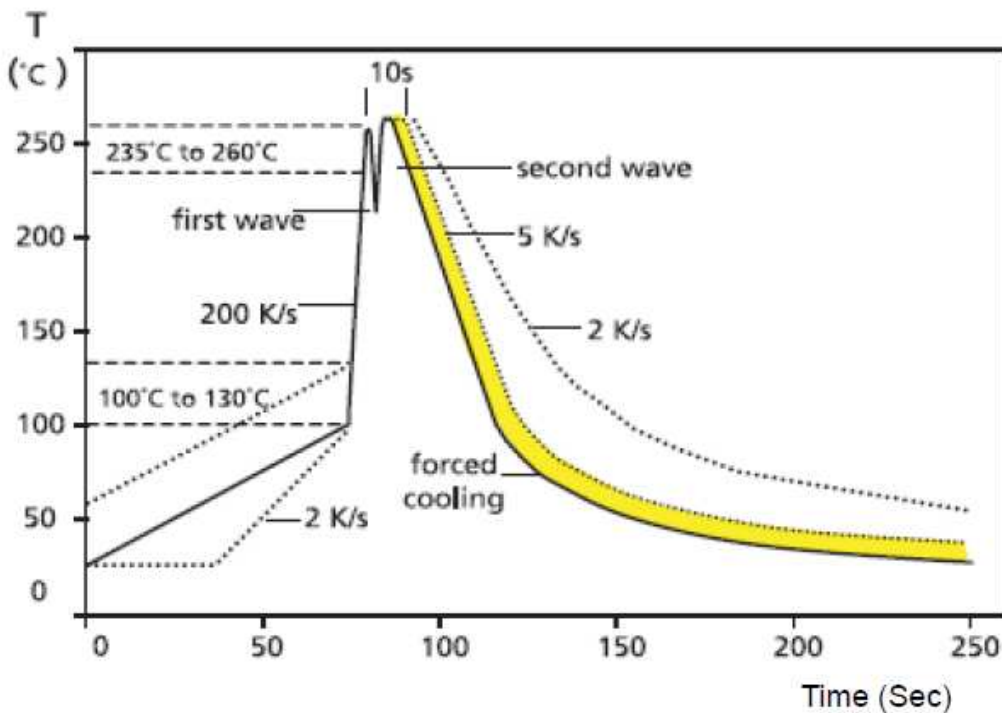
Stock period

The Temperature condition must be controlled at 25 ± 5 °C, the R.H. must be controlled at $60 \pm 15\%$. The stock can maintain quality level in two years.

Recommended IR Reflow Soldering Profile



Recommended double-wave Soldering Profile



Typical values (solid line)
 Process limits (dotted line)

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Reliability Test

Electrical Performance Test

ITEM	SPECIFICATION	TEST METHOD												
	Resistor													
Short time Overload	$\leq \pm 0,5\%$	<p>JIS C 5201-1 4.13 Applied Overload for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Overload condition refer to below):</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Power (W)</th> <th>Nr. of rated power</th> </tr> </thead> <tbody> <tr> <td>0603</td> <td>0,33</td> <td rowspan="4">4 times</td> </tr> <tr> <td>0805</td> <td>0,5</td> </tr> <tr> <td>1206</td> <td>1</td> </tr> <tr> <td>0612</td> <td>1</td> </tr> </tbody> </table>	Type	Power (W)	Nr. of rated power	0603	0,33	4 times	0805	0,5	1206	1	0612	1
	Type		Power (W)	Nr. of rated power										
0603	0,33	4 times												
0805	0,5													
1206	1													
0612	1													
	No evidence of mechanical damage													
Temperature Coefficient of Resistance (TCR)	Refer to general specification above	<p>JIS C 5201-1 4.8 R1: Resistance at room temperature R2: Resistance 150°C T1: Room temperature T2: Temperature 150°C</p> $TCR(ppm/^{\circ}C) = \frac{R2 - R1}{R1} \cdot \frac{1}{T2 - T1} \cdot 10^6$												
Insulation Resistance	$\geq 1000M\Omega$	<p>JIS C 5201-1 4.6 Put the resistor in the fixture, add 100 VDC in +, - terminal for 60 s then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material.</p>												
Dielectric Withstand Voltage	No short or burned on the appearance.	<p>JIS C 5201-1 4.7 Applied 500VAC for 1 minute, and Limit surge current 50 mA (max.)</p>												

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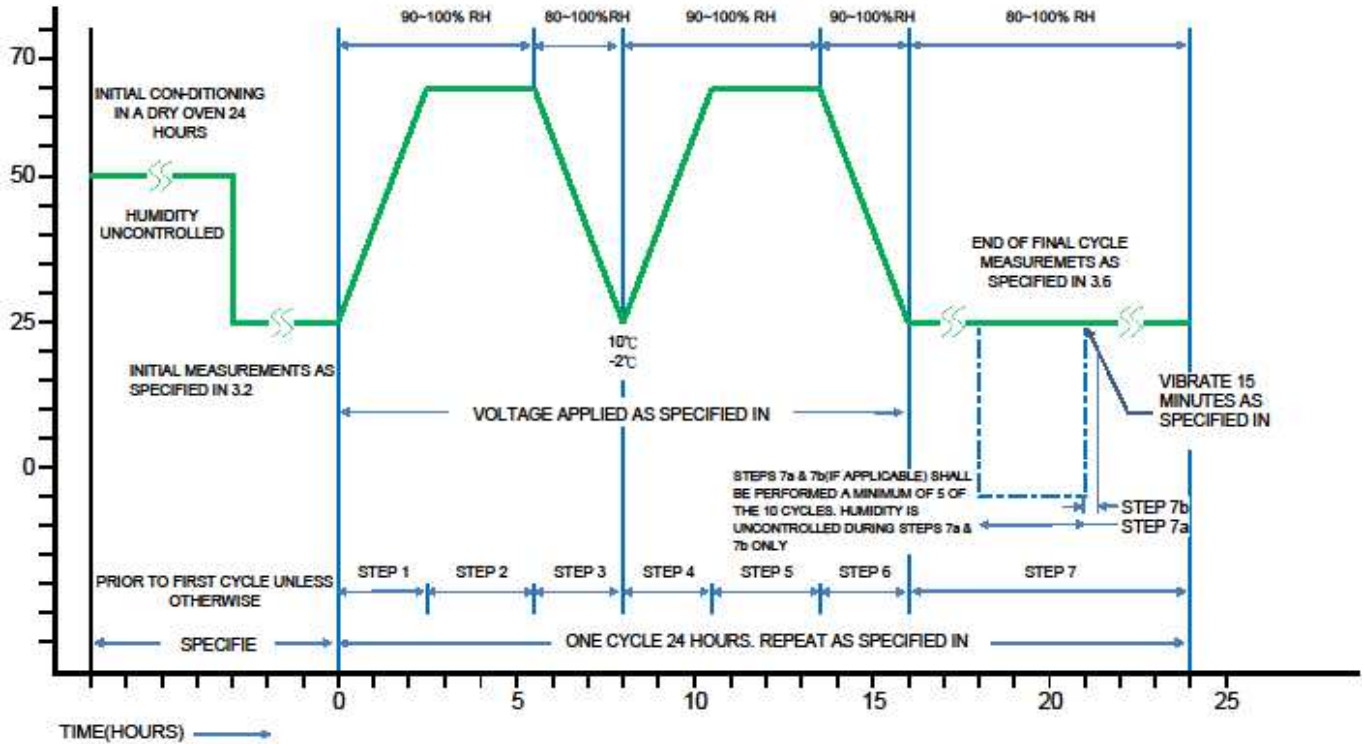
Mechanical Performance Test

ITEM	SPECIFICATION	TEST METHOD
	Resistor	
Resistance to Solder Heat	$\leq \pm 0,5\%$	JIS-C5201-1 4.18 The tested resistor be immersed 25 mm/sec into molten solder of $260\pm 5^\circ\text{C}$ for $10\pm 1\text{s}$. Then the resistor is left in the room for 1 h, and measured its resistance variance rate.
	No evidence of mechanical damage.	
Vibration	$\leq \pm 0,5\%$	JIS-C5201-1 4.22 The resistor shall be mounted by its terminal leads to the supporting terminals on the solid table. The entire frequency range: from 10Hz to 55Hz and return to 10Hz, shall be transferred in 1 min. Amplitude :1,5mm This motion shall be applied for a period of 4 h in each 3 mutually perpendicular directions (a total of 12 h)
	No evidence of mechanical damage.	
Resistance to solvent	$\leq \pm 0,5\%$	JIS-C5201-1 4.29 The tested resistor be immersed into isopropyl alcohol of $20\sim 25^\circ\text{C}$ for 60s, then the resistor is left in the room for 48 hrs.
	No evidence of mechanical damage.	
Solder-ability	Solder coverage over 95%	JIS-C5201-1 4.17 Add flux into tested resistors, immersion into solder bath in temperature $245\pm 5^\circ\text{C}$ for $3\pm 0,5\text{s}$

Operational Life Endurance:

ITEM	SPECIFICATION	TEST METHOD
	Resistor	
Load Life	$\leq \pm 1,0\%$	JIS-C5201-1 4.25 Put the tested resistor in chamber under temperature $70\pm 2^\circ\text{C}$ and load the rated current for 90 min on 30 min off, total 1000 h. Then leaving the tested resistor in room temperature for 60 min, and measure its resistance variance rate.
	No evidence of mechanical damage.	

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Environmental Test

ITEM	SPECIFICATION	TEST METHOD	
	Resistor		
Low Temperature Exposure (Storage)	$\leq \pm 0,5\%$	JIS-C5201-1 4.23.4 Put the tested resistor in chamber under temperature $-55\pm 2^{\circ}\text{C}$ for 1000 h. Then leaving the tested resistor in room temperature for 60 min, and measure its resistance variance rate.	
	No evidence of mechanical damage.		
High Temperature Exposure (Storage)	$\leq \pm 1,0\%$	JIS-C5201-1 4.23.2 Put tested resistor in chamber under temperature $150\pm 5^{\circ}\text{C}$ for 1000 h. Then leaving the tested resistor in room temperature for 60 min, and measure its resistance variance rate.	
	No evidence of mechanical damage.		
Moisture Resistance (Climatic Sequence)	$\leq \pm 0,5\%$	MIL-STD 202 Method 106 Put the tested resistor in chamber and subject to 10 cycles of damp heat and without power. Each one of which consists of the steps 1 to 7. Then leaving the tested resistor in room temperature for 24 h, and measure its resistance variance rate.	
	No evidence of mechanical damage.		
Bias Humidity	$\leq \pm 1,0\%$	JIS-C5201-1 4.24 Put the tested resistor in chamber under $85\pm 5^{\circ}\text{C}$ and $85\pm 5\%\text{RH}$ with 10% bias and load the rated current for 90 min on, 30 min off, total 1000 h. Then leaving the tested resistor in room temperature for 60 min, and measure its resistance variance rate.	
	No evidence of mechanical damage.		
Temperature Cycling (Rapid Temperature Change)	$\leq \pm 0,5\%$	JIS-C5201-1 4.19 Put the tested resistor in the chamber under the temperature cycling which shown in the following table shall be repeated 1000 times consecutively. Then leaving the tested resistor in the room temperature for 60 min, and measure its resistance variance rate.	
	No evidence of mechanical damage.		Testing Condition
			Lowest Temperature
		Highest Temperature	$150 +10/-0^{\circ}\text{C}$

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