

Metal Alloy Short Terminal Resistor

Description

- Metal Alloy Short Terminal Low-Resistance Resistor
- Low thermal EMF
- Low TCR
- Low inductance

Applications

- Battery pack
- Inverter/Converter
- Consumer electronics
- Laptops

Part number

MSR **12** **A** **1** **R002** **F** **1□□**

【1】 **【2】** **【3】** **【4】** **【5】** **【6】** **【7】**

【1】 Series Name: Metal alloy Short terminal Resistor

【2】 Chip Size: 06:0603, 08:0805, 12: 1206

【3】 Terminals: A:2 terminals , B:4 terminals

【4】 Power Rating: E=0.5W, D=0.75W, 1=1W

【5】 Resistance Code: R002: 2mΩ , 1M50: 1.5mΩ

【6】 Resistance Precision: D:±0.5%, F:±1%, G:±2%, J: ±5%

【7】 Internal Code

Electrical Characteristics

Part number	Power Rating at 70°C(W)	Resistance Range (mΩ)	TCR (ppm/°C)	Resistance Tolerance (%)	Rating Current	Operation Temperature Range
MSR12A1R001F2	1	1	±100	±0.5; ±1.0	(P/R)1/2	-55°C ~+150°C
MSR12A11M50~R004F2		1.5~4	±75			
MSR12A1R005~R020F2		5~20	±50			
MSR08ADR001F2	0.75	1	±200			
MSR08AD1M50~R002F2		1.5~2	±100			
MSR08ADR003~R005F2		3~5	±75			
MSR08ADR006~R020F2		6~20	±50			

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MSR ~Series

Part number	Power Rating at 70°C(W)	Resistance Range (mΩ)	TCR (ppm/°C)	Resistance Tolerance (%)	Rating Current	Operation Temperature Range
MSR06AER002~R003F1	0.5	2~3	±150	±0.5; ±1.0	(P/R) ^{1/2}	-55°C ~+150°C
MSR06AER004~R005F1		4~5	±100			
MSR06AER006~R010F1		6~10	±75			
MSR06AER002~R003F2		2~3	±150			
MSR06AER004~R005F2		4~5	±100			
MSR06AER006~R010F2		6~10	±75			

Note: P=Rating Power ; R=Resistance Value

Physical Dimensions

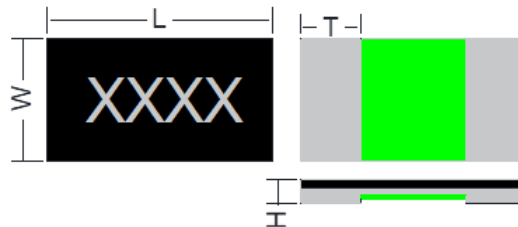


Fig.1

Unit: mm

Part number	L	W	H	T
MSR12A1R001F2	3.20±0.25	1.60±0.25	0.45±0.10	1.15±0.20
MSR12A11M50~R002F2	3.20±0.25	1.60±0.25	0.45±0.10	0.95±0.20
MSR12A1R003F2	3.20±0.20	1.60±0.20	Max 0.45	0.85±0.15
MSR12A1R004~R005F2	3.20±0.20	1.60±0.20	Max 0.40	0.85±0.15
MSR12A1R006~R020F2	3.20±0.20	1.60±0.20	Max 0.40	0.58±0.15

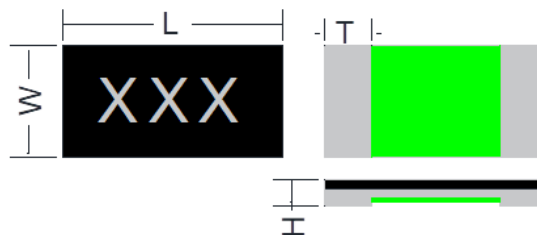


Fig.2

Unit: mm

Part number	L	W	H	T
MSR08ADR001F2	2.06±0.25	1.26±0.25	0.40±0.10	0.63±0.20
MSR08AD1M50~R002F2	2.06±0.25	1.26±0.25	0.40±0.10	0.48±0.20
MSR08ADR003~R004F2	2.06±0.20	1.26±0.20	Max 0.45	0.43±0.15
MSR08ADR005~R020F2	2.06±0.20	1.26±0.20	Max 0.40	0.43±0.15

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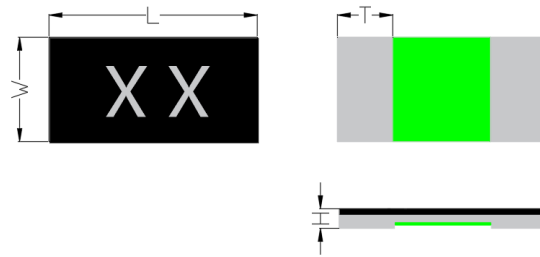


Fig.3

Unit: mm

Part number	L	W	H	T
MSR06AER002F2	1.60 ± 0.20	0.80 ± 0.20	0.45 ± 0.10	0.50 ± 0.15
MSR06AER003~R004F2	1.60 ± 0.20	0.80 ± 0.20	0.35 ± 0.10	0.45 ± 0.15
MSR06AER005~R010F2	1.60 ± 0.20	0.80 ± 0.20	0.30 ± 0.10	0.35 ± 0.15

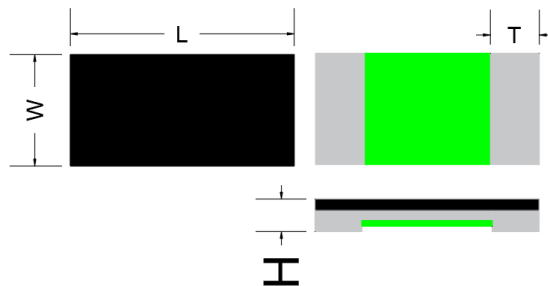


Fig.4

Unit: mm

Part number	L	W	H	T
MSR06AER002F1	1.60 ± 0.20	0.80 ± 0.20	0.45 ± 0.10	0.50 ± 0.15
MSR06AER003~R004F1	1.60 ± 0.20	0.80 ± 0.20	0.35 ± 0.10	0.45 ± 0.15
MSR06AER005~R010F1	1.60 ± 0.20	0.80 ± 0.20	0.30 ± 0.10	0.35 ± 0.15

Marking Instructions

MSR12A is marked with four digit(Ref to Fig.1). We have two different ways of marking:

- "R" designates the decimal location in ohms
e.g. $2\text{m}\Omega$: R002; $10\text{m}\Omega$: R010;
- "m" designates the decimal location in milliohms
e.g. $2.5\text{m}\Omega$: 2m50; $5.5\text{m}\Omega$: 5m50;

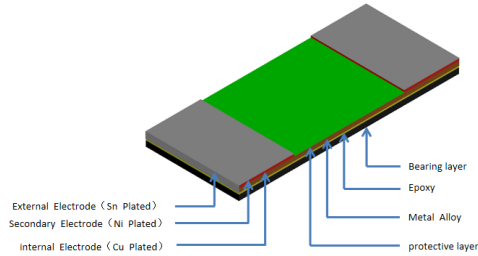
MSR08A is marked with three digit(Ref to Fig.2). We have two different ways of marking:

- "R" designates the decimal location in ohms
e.g. $2\text{m}\Omega$: 002; $10\text{m}\Omega$: 010
- "m" designates the decimal location in milliohms
e.g. $2.5\text{m}\Omega$: 2m5; $5.5\text{m}\Omega$: 5m5

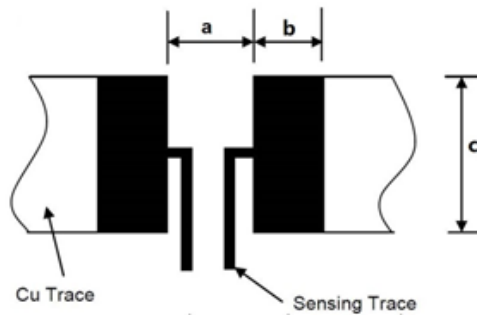
MSR06A is marked with two digit(Ref to Fig.3)

- e.g. $2\text{m}\Omega$: 02; $10\text{m}\Omega$: 10

Construction



Recommended Solder Pad Layout



Unit: mm

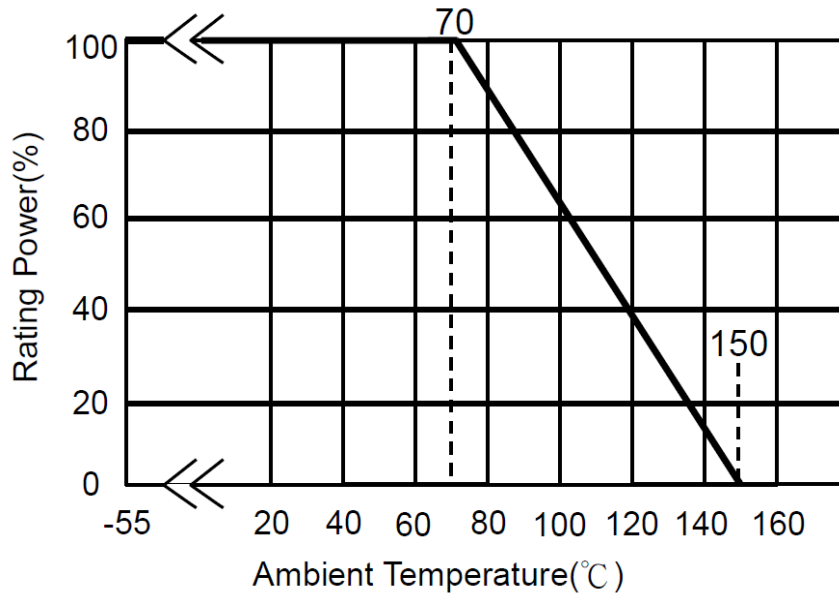
Part number	a	b	c
MSR12A1R001~R002F2	0.90	1.95	1.74
MSR12A1R003~R005F2	1.00	1.85	1.74
MSR12A1R006~R020F2	1.20	1.75	1.74

Part number	a	b	c
MSR08ADR001~R020F2	0.80	1.45	1.40

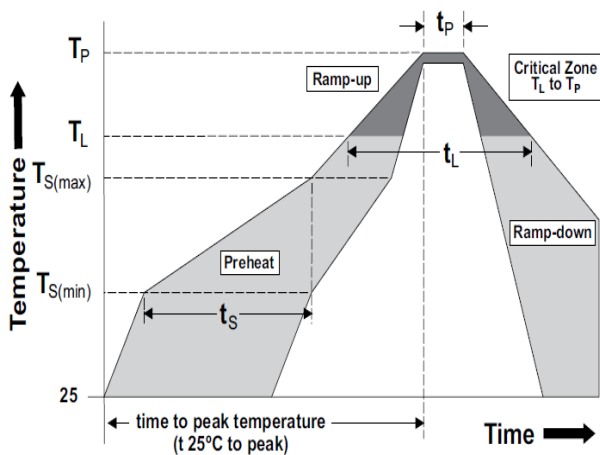
Part number	a	b	c
MSR06AER002F2	0.50	1.35	0.92
MSR06AER003~R010F2	0.60	1.30	0.92
MSR06AER002F1	0.50	1.35	0.92
MSR06AER003~R010F1	0.60	1.30	0.92

Power Derating Curve

For resistors operated in ambient temperatures 70°C , power rating shall be derated in according with the curve below:



Recommended Solder Curve



Reflow Condition		Pb – Free assembly
Pre heat	- Temperature Min ($T_{S(min)}$)	150°C
	- Temperature Max ($T_{S(max)}$)	200°C
	- Time (Min to Max) (t_s)	60 – 120 secs
Average ramp up rate (Liquidus Temp (T_L) to peak)		$5^{\circ}\text{C/second max}$
$T_{S(max)}$ to T_L - Ramp-up Rate		$5^{\circ}\text{C/second max}$
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_P)		260°C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		$5^{\circ}\text{C/second max}$
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Wave Soldering		Not applicable
Hand Soldering		350°C , 5 seconds max.

Product Characteristics

Item	Test condition/ Methods	Limited	Standard																
Temperature coefficient of resistance	TCR =(R-R ₀)/R ₀ (T2-T1)X 10 ⁶ R ₀ : resistance of room temperature R: resistance of 125℃ T1: Room temperature T2: Temperature at 125℃	Refer to Spec	MIL-STD-202 Method 304																
Short time Overload	Applied Overload for 5 seconds , then measure its resistance variance rate. (Test condition refer to below):	≤±1.0%	IEC60115-1 4.13																
	<table><tr><td>Type</td><td>Resistance(mΩ)</td><td>Rated power</td></tr><tr><td rowspan="2">1206</td><td>1≤R≤10</td><td>4 times</td></tr><tr><td>10 < R≤20</td><td>3 times</td></tr><tr><td rowspan="2">0805</td><td>1≤R≤10</td><td>4 times</td></tr><tr><td>10 < R≤20</td><td>3 times</td></tr><tr><td>0603</td><td>2≤R≤10</td><td>4 times</td></tr></table>			Type	Resistance(mΩ)	Rated power	1206	1≤R≤10	4 times	10 < R≤20	3 times	0805	1≤R≤10	4 times	10 < R≤20	3 times	0603	2≤R≤10	4 times
	Type			Resistance(mΩ)	Rated power														
	1206			1≤R≤10	4 times														
				10 < R≤20	3 times														
	0805			1≤R≤10	4 times														
10 < R≤20		3 times																	
0603	2≤R≤10	4 times																	
Resistance to Soldering Heat	260℃± 5℃ time: 12sec± 0.5sec	≤±0.5%	MIL-STD-202 Method 210																
Solderability	Temperature of Solder: 245±5℃ Dipping time:3±0.5s	Solder coverage over 95%	IEC60115-1 4.17																
Temperature Cycling	-55℃ (15min)/+150℃ (15min), 300 cycles	≤±1.0%	MIL-STD-202 Method107G																
Low temperature Storage	-55℃ for 1000hours, No power	≤±1.0%	IEC60115-1 4.23.4																
High Temperature Storage	150℃ for 1000hours, No power	≤±1.0%	IEC60115-1 4.25																
Bias Humidity	+85℃, 85% RH, 10%bias, 1000hours	1~10mR,△R≤±1% 11~20mR,△R≤±2%	MIL-STD-202 Method103																
Vibration	5g's for 20 minutes 12 cycles each of 3 orientations. Test from 10 Hz - 2000 Hz	≤±0.5%	MIL-STD-202 Method 204																
Operational life	70℃± 2℃, 1000 hours, at rated power 1.5 hours “ON”, 0.5 hours “OFF”	1206: 1~9mR , △R≤±1% 10~14mR , △R≤±3% 15~20mR , △R≤±4% 0805: 1~10mR,△R≤±1% 11~20mR,△R≤±3% 0603: 2~10mR,△R≤±1%	MIL-STD-202 Method 108																
Moisture resistance	MIL-STD-202,method106, No power, 7b not required	≤±0.5%	MIL-STD-202 Method 106																

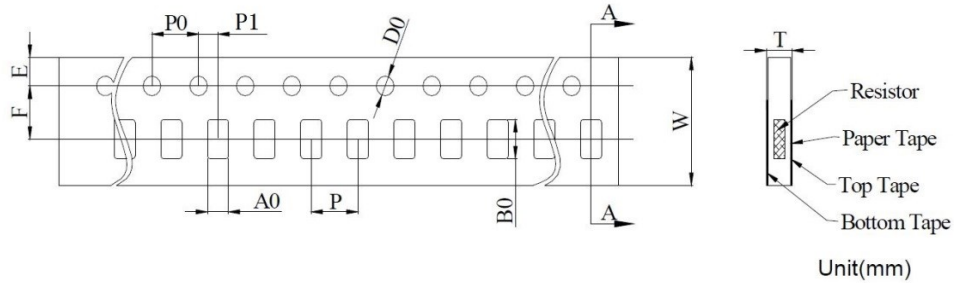
Note : Measurement at 24±4 hours after test conclusion for all reliability tests-parts.

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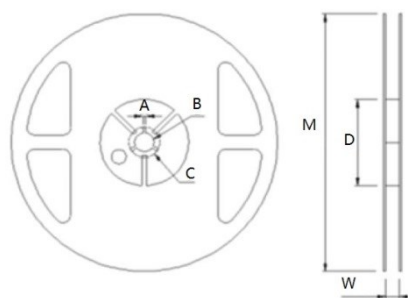
Packaging

Tape Dimensions



Type	A0	B0	E	F	W
MSR12A	2.00±0.20	3.60±0.20	1.75±0.10	3.50±0.05	8.00±0.20
	P0	P	P1	D0	T
	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.55±0.20
Type	A0	B0	E	F	W
MSR08A	1.66±0.20	2.46±0.20	1.75±0.10	3.50±0.05	8.00±0.20
	P0	P	P1	D0	T
	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.55±0.20
Type	A0	B0	E	F	W
MSR06A	1.00±0.20	1.80±0.20	1.75±0.10	3.50±0.05	8.00±0.20
	P0	P	P1	D0	T
	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.10	0.60±0.20

Reel Dimensions



Unit: mm

Type	M	W	A	B	C	D
7 inch reel	178.0±2.0	8.4+0.5/-0	2.0±0.5	13.2±0.5	17.70±0.5	60.0±1.0

Quantity of Package

Type	MSR12A	MSR08A	MSR06A
Quantity(pcs)	5000	5000	5000

Storage

The temperature condition must be controlled less than 40°C, The R.H. must be controlled less than 75%. Store in accordance with this requirement, and the validity period is two years after the date of manufacture.

Please avoid the mentioned harsh environment below when storing to ensure product performance and its' weldability. Places exposed to sea breeze or other corrosive gas, such as Cl₂, H₂S, NH₃, SO₂ and NO₂.

When the product is moved and stored, please ensure the correct orientation of the box. Do not drop or squeeze the box. Otherwise, the electrode or the body of the product may be damaged.