

# 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: 08:0805 12: 1206  
**【3】** Terminals: A:2 terminals , B:4 terminals  
**【4】** Power Rating: D=0.75W, E=0.5W, F=0.25W, 1=1W, 2=2W  
**【5】** Resistance Code: R002: 2mΩ , 1M50: 1.5mΩ  
**【6】** Resistance Precision: D:±0.5%, F:±1%, G:±2%, J: ±5%  
**【7】** Marking Code: 1:No marking 2: Marking

## Electrical Characteristics

Part number	Power Rating at 70°C(W)	Resistance Range (mΩ)	TCR (ppm/°C)	Resistance Tolerance (%)	Rating Current	Operation Temperature Range
MSR12A	1.0	1.5~4	±75	±0.5; ±1.0	(P/R) <sup>1/2</sup>	-55°C~+150°C
		5~20	±50			
MSR08A	0.75	1.5~2	±100			
		3~5	±75			
		6~20	±50			

Note: P=Rating Power ; R=Resistance Value

**Physical Dimensions**

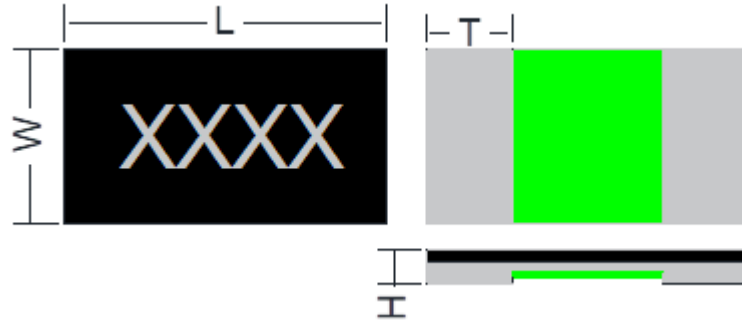


Fig.1

Unit: mm

Part number	L	W	H	T
MSR12A11M50	3.20±0.20	1.60±0.20	Max 0.50	1.10±0.15
MSR12A1R002	3.20±0.20	1.60±0.20	Max 0.40	1.10±0.15
MSR12A1R003	3.20±0.20	1.60±0.20	Max 0.40	0.85±0.15
MSR12A1R004~R005	3.20±0.20	1.60±0.20	Max 0.35	0.85±0.15
MSR12A1R006~R020	3.20±0.20	1.60±0.20	Max 0.35	0.58±0.15

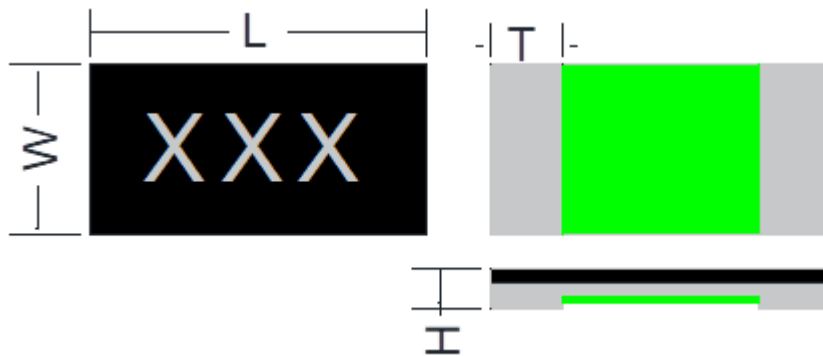


Fig.2

Unit: mm

Part number	L	W	H	T
MSR08AD1M50	2.06±0.20	1.26±0.20	Max 0.50	0.73±0.15
MSR08ADR002	2.06±0.20	1.26±0.20	Max 0.40	0.63±0.15
MSR08ADR003~R004	2.06±0.20	1.26±0.20	Max 0.40	0.43±0.15
MSR08ADR005~R020	2.06±0.20	1.26±0.20	Max 0.35	0.43±0.15

### Marking Instructions

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

a. “R” designates the decimal location in ohms

e.g. 2mΩ : R002; 10mΩ : R010;

b. “m” designates the decimal location in milliohms

e.g. 2.5mΩ : 2m50; 5.5mΩ : 5m50;

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

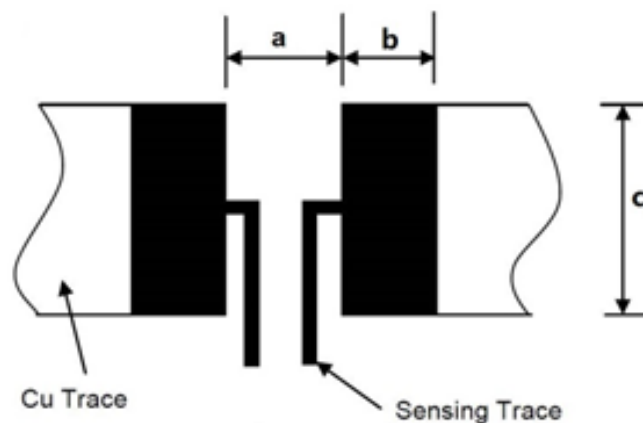
a. “R” designates the decimal location in ohms

e.g. 2mΩ : 002; 10mΩ : 010

b. “m” designates the decimal location in milliohms

e.g. 2.5mΩ : 2m5; 5.5mΩ : 5m5

### Recommended Solder Pad Layout

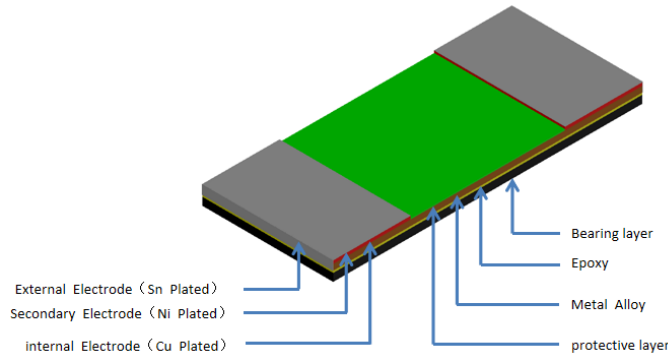


Unit: mm

Part number	a	b	c
MSR12A11M50~R002	0.70	2.00	1.84
MSR12A1R003~R005	1.00	1.85	1.84
MSR12A1R006~R020	1.20	1.75	1.84

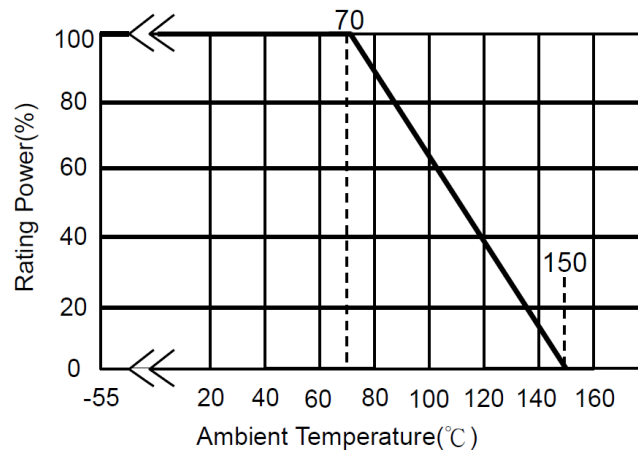
Part number	a	b	c
MSR08AD1M50	0.50	1.65	1.52
MSR08ADR002	0.60	1.55	1.52
MSR08ADR003~R020	0.80	1.45	1.52

## Construction

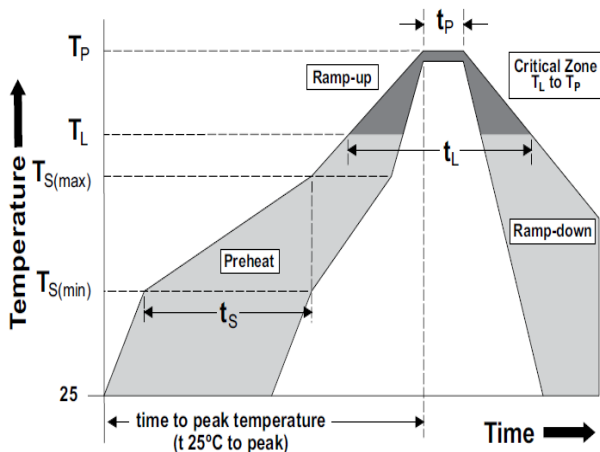


## Power Derating Curve

For resistors operated in ambient temperatures  $70^{\circ}\text{C}$ , 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 $^{\circ}\text{C}$
	- Temperature Max ( $T_{S(\max)}$ )	200 $^{\circ}\text{C}$
	- Time (Min to Max) ( $t_s$ )	60 – 120 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		5 $^{\circ}\text{C}/\text{second}$ max
$T_{S(\max)}$ to $T_L$ - Ramp-up Rate		5 $^{\circ}\text{C}/\text{second}$ max
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217 $^{\circ}\text{C}$
	- Temperature ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_P$ )		260 $^{\circ}\text{C}$
Time within 5 $^{\circ}\text{C}$ of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		5 $^{\circ}\text{C}/\text{second}$ max
Time 25 $^{\circ}\text{C}$ to peak Temperature ( $T_P$ )		8 minutes Max.
Wave Soldering		Not applicable
Hand Soldering		350 $^{\circ}\text{C}$ , 5 seconds max.

**Product Characteristics**

Item	Test condition/ Methods	Limited	Standard													
Temperature coefficient of resistance	$TCR = (R - R_0) / R_0 (T_2 - T_1) \times 10^6$ R <sub>0</sub> : resistance of room temperature R: resistance of 125°C T <sub>1</sub> : Room temperature T <sub>2</sub> : Temperature at 125°C	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 border="1"> <thead> <tr> <th>Type</th> <th>Resistance(mΩ)</th> <th>Rated power</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1206</td> <td>1.5 ≤ R ≤ 10</td> <td>4 times</td> </tr> <tr> <td>10 &lt; R ≤ 20</td> <td>3 times</td> </tr> <tr> <td rowspan="2">0805</td> <td>1.5 ≤ R ≤ 10</td> <td>4 times</td> </tr> <tr> <td>10 &lt; R ≤ 20</td> <td>3 times</td> </tr> </tbody> </table>			Type	Resistance(mΩ)	Rated power	1206	1.5 ≤ R ≤ 10	4 times	10 < R ≤ 20	3 times	0805	1.5 ≤ R ≤ 10	4 times	10 < R ≤ 20	3 times
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	1206			1.5 ≤ R ≤ 10	4 times											
10 < R ≤ 20		3 times														
0805	1.5 ≤ R ≤ 10	4 times														
	10 < R ≤ 20	3 times														
Resistance to Soldering Heat	260°C ± 5°C time: 12sec ± 0.5sec	≤±0.5%	MIL-STD-202 Method 210													
Solderability	Temperature of Solder: 245 ± 5°C Dipping time: 3 ± 0.5s	Solder coverage over 95%	IEC60115-1 4.17													
Temperature Cycling	-55°C (15min)/+150°C (15min), 300 cycles	≤±1.0%	MIL-STD-202 Method 107G													
Low temperature Storage	-55°C for 1000hours, No power	≤±1.0%	IEC60115-1 4.23.4													
High Temperature Storage	150°C for 1000hours, No power	≤±1.0%	IEC60115-1 4.25													
Bias Humidity	+85°C, 85% RH, 10%bias, 1000hours	1.5~10mR, ΔR ≤ ±1% 11~20mR, ΔR ≤ ±2%	MIL-STD-202 Method 103													
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°C ± 2°C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	1206: 1.5~9mR, ΔR ≤ ±1% 10~14mR, ΔR ≤ ±3% 15~20mR, ΔR ≤ ±4% 0805: 1.5~10mR, ΔR ≤ ±1% 11~20mR, ΔR ≤ ±3%	MIL-STD-202 Method 108													
Moisture resistance	MIL-STD-202, method 106, No power, 7b not required	≤±0.5%	MIL-STD-202 Method 106													

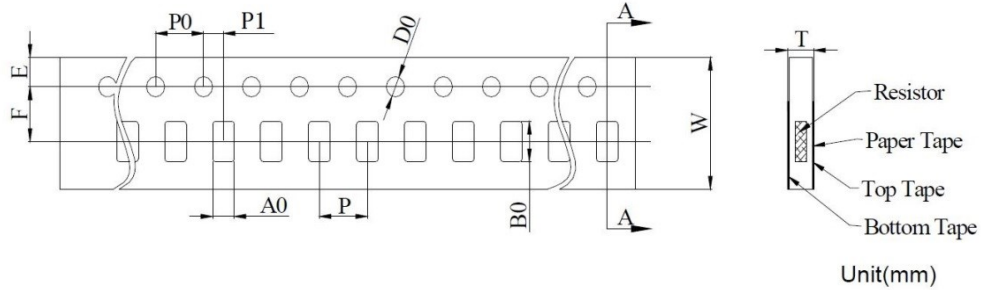
Note : Measurement at 24 ± 4 hours after test conclusion for all reliability tests-parts.

# Metal Alloy Short Terminal Resistor

MSR ~Series

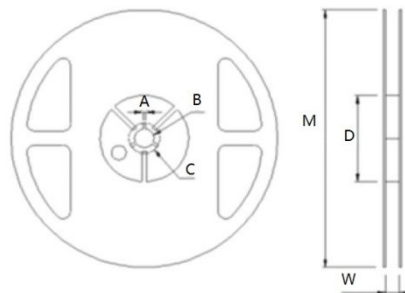
## Packaging

Tape Dimensions



Type	MSR12A	MSR08A
A0	2.00±0.20	1.66±0.20
B0	3.60±0.20	2.46±0.20
E	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05
W	8.00±0.20	8.00±0.20
P0	4.00±0.10	4.00±0.10
P	4.00±0.10	4.00±0.10
P1	2.00±0.05	2.00±0.05
D0	1.50±0.10	1.50±0.10
T	0.55±0.20	0.55±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
Quantity(pcs)	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 Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub> and NO<sub>2</sub>.

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.