

### Application

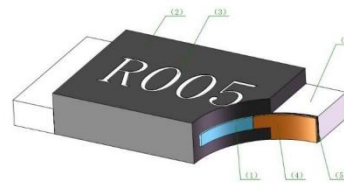
- Instrument and meter
- Power Amplifier
- Notebook, personal computer
- Precision power supply
- Battery Management system
- Electric Power tool

### Features

- Power rating up to 3W
- Electron beam welding process
- Excellent long-term stability
- Non-inductive resistance
- High application temperature range -55 to +170 °C due to special design
- RoHs compliant and halogen free
- AEC-Q200 qualification

### Features

- Resistor body: CuMn7Sn/MnCu/FeCrAl
- Protective Coating : Flame-retardant epoxy
- Marking : Laser Marking
- Terminal electrode : Cu
- Plating layer : Ni
- Plating layer : Sn



### Part Number Explanation

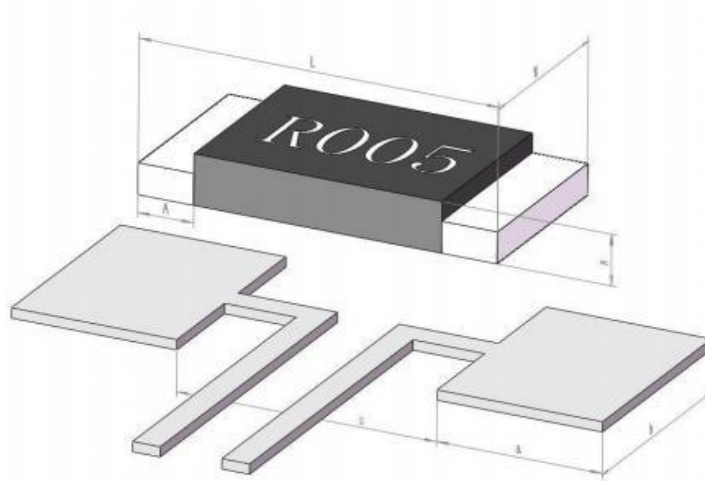
<b>2512</b>	<b>MA</b>	<b>03</b>	<b>F</b>	<b>R001</b>	<b>S</b>
Size (Inch)	Product Type	Rated Power	Tolerance	Resistance	Electrode
2512	MA	02=2W 03=3W	D=±0.5% F=±1% J=±5%	0M50=0.5mΩ R001=1mΩ R010=10mΩ	S=Short electrode L=Long electrode

### Standard Electrical Specifications

Type	Part Number	Rated Power /W	TCR ppm/°C	Resistance /mΩ	Material	Applicable temperature range /°C
2512-2W	2512MA02F0M50L	2	150	0.5	CuMn7Sn	-55~170
	2512MA02FR001L	2	75	1	MnCu	
	2512MA02FR001S	2	75	1	CuMn7Sn	
	2512MA02F1M50S	2	75	1.5	CuMn7Sn	
	2512MA02FR002L	2	75	2	MnCu	
	2512MA02FR002S	2	50	2	MnCu	

**Standard Electrical Specifications**

	2512MA02FR003L	2	75	3	FeCrAl	
	2512MA02FR003S	2	50	3	MnCu	
	2512MA02FR004L	2	75	4	FeCrAl	
	2512MA02FR004S	2	50	4	MnCu	
	2512MA02FR005S	2	50	5	MnCu	
	2512MA02FR006S	2	50	6	FeCrAl	
	2512MA02FR007S	2	50	7	FeCrAl	
	2512MA02FR008S	2	50	8	FeCrAl	
	2512MA02FR009S	2	50	9	FeCrAl	
	2512MA02FR010S	2	50	10	FeCrAl	
	2512MA02FR015S	2	50	15	FeCrAl	
	2512MA02FR020S	2	50	20	FeCrAl	
	2512MA02FR***S	2	50	21-75	FeCrAl	
	2512-3W	2512MA03F0M50L	3	150	0.5	
2512MA03FR001L		3	75	1	MnCu	
2512MA03FR001S		3	75	1	CuMn7Sn	
2512MA03F1M50S		3	75	1.5	CuMn7Sn	
2512MA03FR002L		3	75	2	MnCu	
2512MA03FR002S		3	50	2	MnCu	
2512MA03FR003L		3	75	3	FeCrAl	
2512MA03FR003S		3	50	3	MnCu	
2512MA03FR004L		3	75	4	FeCrAl	
2512MA03FR004S		3	50	4	MnCu	
2512MA03FR005S		3	50	5	MnCu	
2512MA03FR006S		3	50	6	FeCrAl	
2512MA03FR007S		3	50	7	FeCrAl	
2512MA03FR008S		3	50	8	FeCrAl	
2512MA03FR009S		3	50	9	FeCrAl	
2512MA03FR010S		3	50	10	FeCrAl	
2512MA03FR015S		3	50	15	FeCrAl	
2512MA03FR020S		3	50	20	FeCrAl	
2512MA03FR***S	3	50	21-75	FeCrAl		

**Type Dimension**

**Standard Electrical Dimension**

Unit: mm

Type	Resistance Range (mΩ)	Electrode	L	W	H	A
2512-2W	0.5-4	Long	6.4±0.3	3.2±0.3	0.9±0.2	1.9±0.25
2512-2W	1-75	Short	6.4±0.3	3.2±0.3	0.9±0.2	0.8±0.25
2512-3W	0.5-4	Long	6.4±0.3	3.2±0.3	0.9±0.2	1.9±0.25
2512-3W	1-75	Short	6.4±0.3	3.2±0.3	0.9±0.2	0.8±0.25

**PCB-layout proposal**

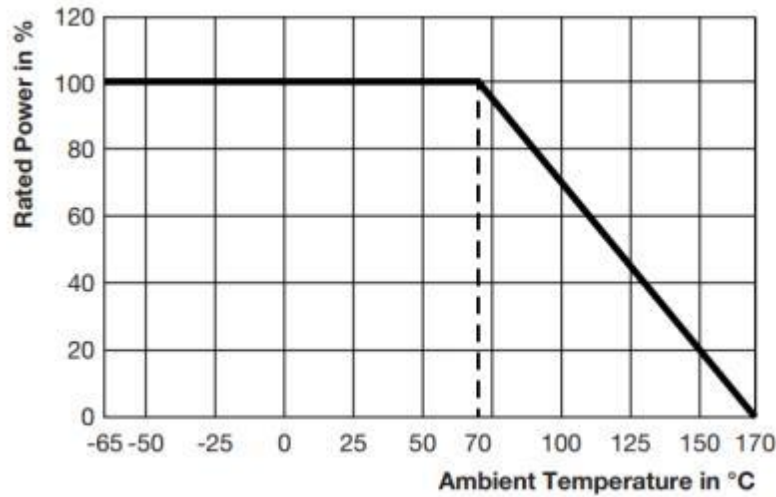
Unit: mm

Type	Resistance Range (mΩ)	Electrode	a	b	c
2512-2W	0.5-4	Long	2.95	3.57	1.50
2512-2W	1-75	Short	2.11	3.57	3.18
2512-3W	0.5-4	Long	2.95	3.57	1.50
2512-3W	1-75	Short	2.11	3.57	3.18

Power Derating Curve

The Operating Temperature Range: -55°C ~+170°C

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below



Rating Current

The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards (paragraph 5), the highest normal rated power is to be used

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

- I= Rating current (A)
- P= Rating Power (W)
- R= Resistance(Ω)

**Reliability Test and Requirement**

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	MIL-STD-202 Method 304	$TCR (ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} \times 106$ R1: resistance at 25°C (T1) R2: resistance at 125°C (T2)	Refer to Electrical Specification
Short Time Overload	JIS C 5201-1 clause 4.13	The number of rated power are as follows: 5 times of rated power Rating power duration: 5secs	±1.0%
High Temperature Exposure	JIS C 5201-1 clause 4.23.2	170°C±2°C for 1000hrs	±1.0%
Solderability	JIS C 5201-1 clause 4.17	245±5°C for 3 ±0.5secs	The covered area >95%
Low Temp. Storage	JIS C 5201-1 clause 4.23.4	-55°C±2°C for 1000hrs	±1.0%
Soldering Heat	MIL-STD-202 Method 210	260±5°C for 10±1 seconds.	±1.0%
Temperature Cycling	JIS C 5201-1 clause 4.19	-55°C to +155°C, 100 cycles	±1.0%
Load Life	MIL-STD-202 Method 108	70°C± 2°C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	±1.0%
Temperature Humidity Bias Test	MIL-STD-202 Method103	+85°C, 85% RH, 10%bias, 1000hours	±0.5%
Mechanical shock	MIL-STD-202 Method 213	100 g'sec ,6 msec, 5puls	±0.5%
Vibration	MIL-STD-202 Method 204	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	±1.0%
Moisture resistance	MIL-STD-202 Method 106	MIL-STD-202,method 106, No power, 7a and 7b not required	±1.0%

**Marking Format**

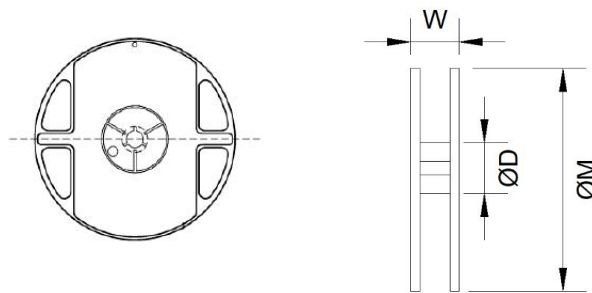
- All type products marking are 4 digits.  
 “R” designates the decimal location in ohms  
 e.g. 1mΩ the product marking is R001.  
 5mΩ the product marking is R005 .  
 10mΩ the product marking is R010.  
 “M” designates the decimal location in milli-ohms  
 e.g. 0.5mΩ the product marking is 0M50.  
 1.5mΩ the product marking is 1M50.  
 2.5mΩ the product marking is 2M50.
- The criteria to distinguishing the mark on the surface of products are that characters can be identified.

**Quantity of Package**

Type	Resistance Value /mΩ	Electrode	Quantity /Pcs
2512-2W	0.5-4	Long	4000
2512-2W	1-75	Short	4000
2512-3W	0.5-4	Long	4000
2512-3W	1-75	Short	4000

**Reel Dimensions**

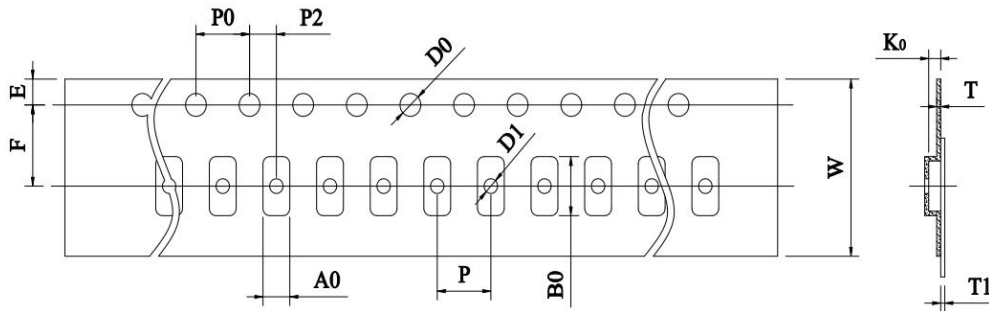
Unit: mm



TYPE	ØD	W	ØM
2512-2W	60.0±2.0	17.0±1.0	178.0±2.0
2512-3W	60.0±2.0	17.0±1.0	178.0±2.0

**Carrier Dimensions**

Unit: mm



MA Series (2512)							
W	12.0±0.3	P0	4.0±0.1	P	4.0±0.1	P2	2.0±0.1
A0	3.4±0.2	B0	6.75±0.2	D0	1.55±0.1	F	5.5±0.1
E	1.75±0.1	T	0.2±0.1	T1	Max 0.1	K0	1.0±0.2

**Peeling Strength of Top Cover Tape**

Peeling Strength : 0.1-1.0N at a peel-off speed of 300 mm/min.

**Storage Requirement**

Temperature : 5~30°C, Humidity : 25%RH~60%RH

Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use.

The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.

When the product is finally discarded, it can be treated as general electronic waste, and raw material compositions of CSR can be referred to MSDS.