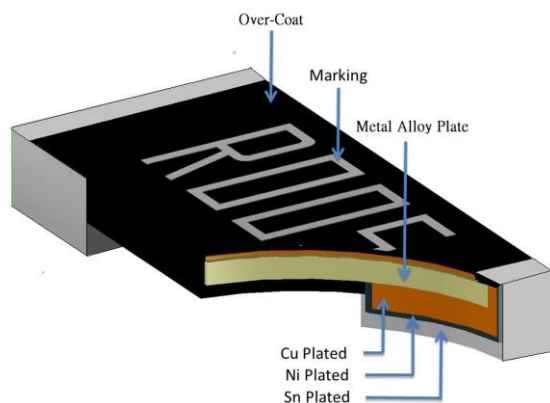




MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No.	S-10-12-05-01
Released Date	2017/11/17
Page No.	1/8

■ Metal Alloy Low Resistance Chip Resistor — MA Series



■ Application

- Entertainment
- Power supply
- Measuring instrument
- Industrial
- Battery management system

■ Features

- Low Resistance / Low TCR
- Excellent long term stability
- RoHs compliant and halogen free.
- Lead free.
- High precision current sensing and voltage division.

■ Parts Number Explanation

■ Example:

MA	2512	15	F	R001	M	Z
Product Type	Size (Inch)	Rated Power	Tolerance	Resistance	Material	Optional
	1206 2010 2512 2725 2728 2817 4527	05=0.50W 0A=0.75W 10=1.00W 15=1.50W 20=2.00W 25=2.50W	F : $\pm 1\%$ G : $\pm 2\%$ J : $\pm 5\%$	0m20=0.2mR 2m50=2.5mR R005=5.0mR R100=100mR 1R00=1000mR	S : MnCuSn M : MnCu F : FeCrAl	



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-01
Released Date 2017/11/17
Page No. 2/8

■ Standard Electrical Specifications

Type	Rating Power at 70℃	T.C.R. (ppm/℃)	Max. Rating Current	Max. Overload Current	Resistance Range (mΩ)		Material	Operating Temperature Range (℃)
					0.5% (D)	1.0% (F) 2.0% (G) 5.0% (J)		
MA1206	0.5W	≒±50	22.36A	44.72A	7~100	1~100	R001 : MnCuSn R002~R010 : MnCu R011~R100 : FeCrAl	- 55 ~ + 170
	0.75W		27.39A	54.77A	7~50	1~50		
	1W		31.62A	63.25A	7~100	1~100		
	1.5W		38.73A	77.46	7~50	1~50		
MA2010	0.75W		27.39A	61.24A	7~100	1~100	R001 : MnCuSn R002~R007 : MnCu R008~R100 : FeCrAl	
	1W		31.62A	70.71A	7~70	1~70		
	1.5W		38.73A	77.46A	7~100	1~100		
MA2512	1W		44.72A	100.00A	7~680	0.5~680	R0005 : MnCuSn R001~R006 : MnCu R007~R680 : FeCrAl	
	2W		63.25A	141.42A	7~450	0.5~450		
	3W		77.46A	134.16A	7~100	0.5~100		
MA2725	4W		126.49A	252.98A	---	0.25~3	R00025 : MnCuSn R0005~R0025 : MnCu R003 : FeCrAl	
MA2728	4W		31.62A	54.77A	7~600	4~600	R004~R600 : FeCrAl	
MA2817	3W		54.77A	109.54A	7~200	1~200.0	R001~R005 : MnCu R006~R200 : FeCrAl	
MA4527	3W		54.77A	94.87A	7~1000	1~1000	R0005 : MnCuSn R001~R005 : MnCu R006~1R : FeCrAl	
	5W		70.71A	122.47A	7~500	1~500.0		



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-01
Released Date 2017/11/17
Page No. 4/8

TYPE	Power Rating	Resistance Range	L	W	H	T1	T2
MA2512	3W	0.5~1mΩ	6.350±0.254	3.050±0.254	0.670±0.254	0.200~1.000	2.200±0.254
		1.5mΩ					2.000±0.254
		2mΩ					1.400±0.254
		2.5~50mΩ					1.100±0.254
		51~100mΩ					
MA2725	4W	0.25mΩ	6.800±0.254	6.350±0.254	0.820±0.254	0.200~1.000	2.300±0.254
		0.5mΩ			0.690±0.254		
		1mΩ			0.690±0.254		1.800±0.254
		1.5~3mΩ			0.610±0.254		
MA2728	4W	4~50mΩ	6.600±0.254	6.700±0.254	0.720±0.254	0.200~1.000	1.200±0.254
		51.0~450mΩ			0.840±0.254		
		451~600mΩ			0.770±0.254		
MA2817	3W	1mΩ	7.100±0.254	4.200±0.254	0.690±0.254	0.200~1.000	1.800±0.254
		2~30mΩ			0.610±0.254		1.500±0.254
		31~100mΩ			0.720±0.254		
		101~130mΩ			0.770±0.254		
		131~200mΩ			0.690±0.254		
MA4527	3W	1~680mΩ	11.300±0.500	6.600±0.500	0.770±0.254	0.200~1.000	2.000±0.254
		681mΩ~1Ω			0.690±0.254		
	5W	1mΩ			0.790±0.254		3.000±0.254
		1.5mΩ			0.840±0.254		2.000±0.254
		2~500mΩ			0.840±0.254		



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-01

Released Date 2017/11/17

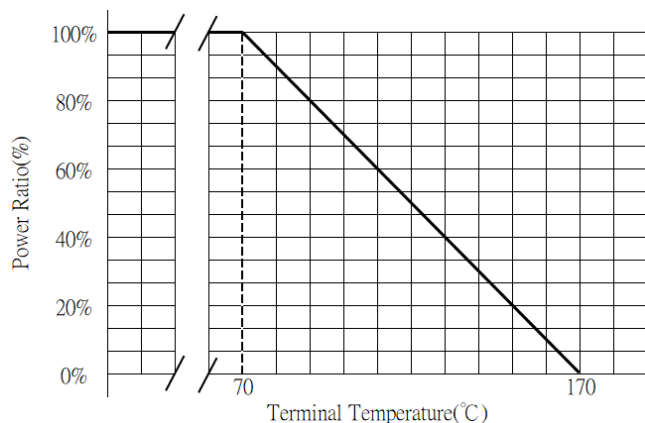
Page No. 5/8

■ Performance Characteristics

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)

■ Marking Format:

- All the other products marking are 4 digits.
- “R” designates the decimal location in ohms
e.g. 1mΩ the product marking is R001.
25mΩ the product marking is R025.
100mΩ the product marking is R100.
- “m” designates the decimal location in milli-ohms
e.g. 0.25mΩ the product marking is 0m25.
0.5mΩ the product marking is 0m50.
5.5mΩ the product marking is 5m50.
25.5mΩ the product marking is 25m5.
- The criteria to distinguishing the mark on the surface of products are that characters can be identified.



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No.	S-10-12-05-01
Released Date	2017/11/17
Page No.	6/8

■ Reliability Test and Requirement

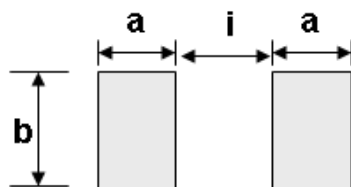
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS C 5201-1 clause 4.8	$\text{T.C.R. (ppm/}^{\circ}\text{C)} = \frac{(R2-R1)}{R1 (T2-T1)} \times 10^6$ R1: resistance at room temperature (T1) R2: resistance at 150°C (T2)	Refer to Ratings
Short Time Overload	JIS C 5201-1 clause 4.13	The number of rated power are as follows: - MA1206-0.5W: 4 times of rated power - MA1206-0.75W: 4 times of rated power - MA1206-1.0W: 4 times of rated power - MA2010-0.75W: 5 times of rated power - MA2010-1W: 5 times of rated power - MA2010-1.5W: 4 times of rated power - MA2512-1W: 5 times of rated power - MA2512-2W: 5 times of rated power - MA2512-3W: 3 times of rated power - MA2725-4W: 4 times of rated power - MA2728-4W: 3 times of rated power - MA2817-3W: 4 times of rated power - MA4527-3W: 3 times of rated power - MA4527-5W: 3 times of rated power Rating power duration: 5secs	- MA4527: $\Delta R/R1 \leq \pm 2.0\%$ - The others: $\Delta R/R1 \leq \pm 0.5\%$
High Temperature Exposure	JIS C 5201-1 clause 4.23.2	1,000hrs at + 170 °C	- MA4527: $\Delta R/R1 \leq \pm 2.0\%$ - The others: $\Delta R/R1 \leq \pm 1.0\%$
Soldering Heat	JIS C 5201-1 clause 4.18	260±5°C for 10 seconds.	$\Delta R/R1 \leq \pm 0.5\%$
Temperature Cycling	JIS C 5201-1 clause 4.19	-55°C to +150°C, 1,000cycles, 15min at each extreme	$\Delta R/R1 \leq \pm 0.5\%$
Bias Humidity	JIS C 5201-1 clause 4.24	1,000hrs@+85°C/85%RH, Bias 1.5hrs "ON", 0.5hrs "OFF"	$\Delta R/R1 \leq \pm 0.5\%$
Load at Rated Power	JIS C 5201-1 clause 4.25	1,000hrs@70 °C, 1.5hrs "ON", 0.5hrs "OFF"	- MA4527: $\Delta R/R1 \leq \pm 2.0\%$ - The others: $\Delta R/R1 \leq \pm 1.0\%$
Solderability	JIS C 5201-1 clause 4.17	245±5°C for 2±0.5secs	>95% coverage



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-01
Released Date 2017/11/17
Page No. 7/8

Recommend Land Pattern Design (For Reflow Soldering)



Dimension

Unit: mm

TYPE	Resistance Range	a	b	i
MA1206 – 0.5W, 1W	1mΩ~100mΩ	1.60	2.18	0.66
MA2010 –1W,1.5W	1mΩ~3mΩ	2.29	2.92	1.22
	3.1mΩ~100mΩ	2.29	2.92	2.41
MA2512 -1W, 2W, 3W	0.5mΩ~1.5mΩ	3.05	3.68	1.27
	2mΩ~3.5mΩ	2.11	3.68	3.18
	3.6mΩ~680mΩ	1.90	3.68	3.50
MA2725 - 4W	0.25mΩ~0.5mΩ	3.18	6.86	1.32
	1mΩ~3mΩ	2.34	6.86	3.00
MA2728 - 4W	4mΩ~600mΩ	2.75	7.82	3.51
MA2817 – 3W	1mΩ~3mΩ	2.75	7.82	3.51
	3.5mΩ~200mΩ	2.45	7.82	3.11
MA4527 – 3W,5W	1mΩ~3mΩ	4.50	8.74	4.50
	3.5mΩ~100mΩ	3.40	8.74	6.43
	101mΩ~1Ω	2.93	8.74	7.63

Packing Quantity

TYPE	PCS /Reel
MA1206	5000
MA2010	4000
MA2512	4000
MA2725	2000
MA2728	2000
MA2817	1000
MA4527	1000



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-01

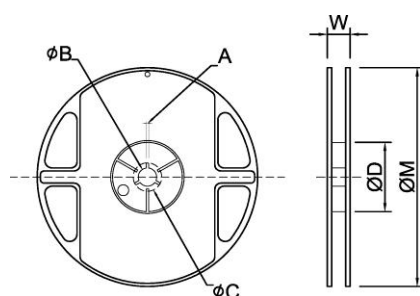
Released Date 2017/11/17

Page No. 8/8

Appendix For SMD Chip Resistor

Packaging Information

Reel Dimensions

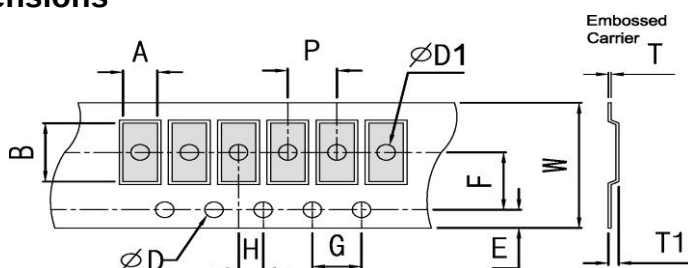


Unit: mm

Dimension

Reel Type / Tape	A	ϕB	ϕC	ϕD	W	ϕM
7" reel for 8 mm embossed (for MA1206 only)	2.0±0.5	13.2±0.5	17.7±0.5	60.0±0.5	12.0±0.5	178±1.0
7" reel for 12 mm embossed	2.5±0.5	13.5±0.5	17.7±0.5	60.0±0.5	16.2±0.5	178±1.0
7" reel for 24 mm embossed	2.0±0.5	13.2±0.5	17.7±0.5	60.0±0.5	24.4±2.0	178±1.0

Embossed Dimensions



Unit: mm

Dimension

Item	W	P	E	F	ϕD	$\phi D1$	G	H	A	B ₀	T ₁	T
MA1206	8.0±0.30	4.0±0.10	1.75±0.10	3.5±0.10	1.50 ^{+0.1} ₀	1.0±0.10	4.0±0.10	2.0±0.10	2.03±0.10	3.55±0.10	0.70±0.10	0.20±0.05
MA2010	12.0±0.30	4.0±0.10	1.75±0.10	5.5±0.10		1.55±0.10	4.0±0.10	2.0±0.10	2.85±0.10	5.55±0.10	0.82±0.10	0.25±0.05
MA2512	12.0±0.30	4.0±0.10	1.75±0.10	5.5±0.10		1.55±0.10	4.0±0.10	2.0±0.10	3.50±0.10	6.75±0.10	0.90±0.10	0.20±0.05
MA2725	12.0±0.30	8.0±0.10	1.75±0.10	5.5±0.10		1.55±0.10	4.0±0.10	2.0±0.10	6.81±0.10	7.16±0.10	1.05±0.10	0.25±0.05
MA2728	12.0±0.30	8.0±0.10	1.75±0.10	5.5±0.10		1.55±0.10	4.0±0.10	2.0±0.10	7.10±0.10	7.05±0.10	0.95±0.10	0.20±0.05
MA2817	12.0±0.30	8.0±0.10	1.75±0.10	5.5±0.10		1.55±0.10	4.0±0.10	2.0±0.10	4.60±0.10	7.50±0.10	1.20±0.10	0.25±0.05
MA4527	24.0±0.30	12.0±0.10	1.75±0.10	11.5±0.10		1.50±0.10	4.0±0.10	2.0±0.10	7.38±0.10	12.0±0.10	1.05±0.10	0.30±0.10

Storage Temperature

Temperature : 25±5°C, Humidity : 60±20%