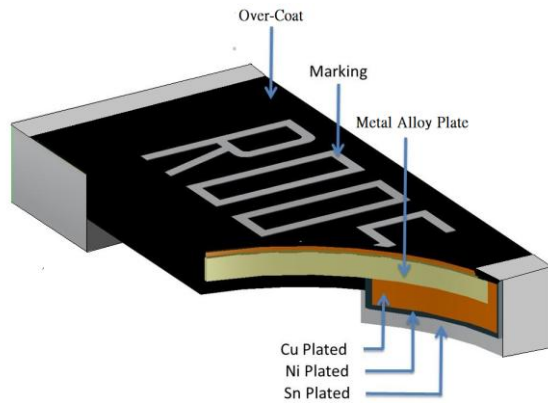


■ Metal Alloy Low Resistance Chip Resistor — MA Series



■ 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.
- ACE-Q200 qualified available.

■ Parts Number Explanation

■ Example:

MA	2512	20	F	R001	M	Z
Product Type	Size (Inch)	Rated Power	Tolerance	Resistance	Material	Optional
	0805 1206 2010 2512 2725 2728 2817 4527	05=0.50W 07=0.75W 10=1.00W 15=1.50W 20=2.00W 30=3.00W 40=4.00W 50=5.00W	F : ±1% G : ±2% J : ±5%	0m20=0.2mR 2m50=2.5mR R005=5.0mR R100=100mR 1R00=1000mR	S : MnCuSn M : MnCu F : FeCrAl	A: For Automotive Electronics



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-04
 Released Date 2018/06/15
 Page No. 2/8

■ Standard Electrical Specifications

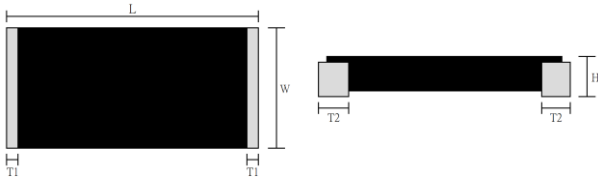
Type	Rating Power at 70°C	T.C.R. (ppm/°C)	Max. Rating Current	Max. Overload Current	Resistance Range (mΩ)			Material	Operating Temperature Range (°C)
					0.5% (D)	1.0% (F) 2.0% (G) 5.0% (J)			
MA0805	0.75W	≤±50	15.81A	31.62A	10~50	3~50	R003~R011 : MnCu R012~R050 : FeCrAl	- 55 ~ + 170	
	1W		18.26A	36.51A	10	3~10			
MA1206	0.5W		22.36A	44.72A	7~100	1~100	R001 : MnCuSn R002~R010 : MnCu R011~R100 : FeCrAl		
	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	R001~R005 : MnCu R006~R200 : FeCrAl		
MA4527	2W	44.72A	77.45A	7~100	1~100	R001~R005 : MnCu R006~1R : FeCrAl			
	3W	54.77A	94.87A	7~1000	1~1000				
	5W	70.71A	122.47A	7~500	1~500				



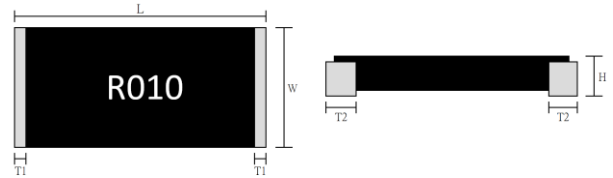
MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No.	S-10-12-05-04
Released Date	2018/06/15
Page No.	3/8

■ Type Dimension



FOR MA0805



FOR MA1206~4527

■ Dimension

Unit : mm

	Power Rating	Resistance Range	L	W	H	T1	T2
MA0805	0.75W	3~50mΩ	2.100±0.254	1.500±0.254	0.320±0.254	0~0.200	0.400±0.254
	1W	3~10mΩ			0.390±0.254		
MA1206	0.5W	1~100mΩ	3.200±0.254	1.650±0.254	0.300±0.254	0~0.200	0.508±0.254
	0.75W	1~50mΩ			0.390±0.254		
	1W	1~2mΩ			0.670±0.254		
		3~100mΩ			0.490±0.254		
	1.5W	1~50mΩ			0.580±0.254		
MA2010	0.75W	1~100 mΩ	5.100±0.254	2.400±0.254	0.310±0.254	0~0.200	0.840±0.254
	1W	1~70mΩ			0.460±0.254		
	1.5W	1~2mΩ			0.670±0.254		
		2.5~30mΩ			0.460±0.254		
		31~100mΩ			0.590±0.254		
MA2512	1W	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		
		2.5~100mΩ			1.100±0.254		
		101~680mΩ			0.850±0.254		
	2W	0.5~1mΩ			0.670±0.254	0.200~1.000	2.200±0.254
		1.5mΩ			2.000±0.254		
		2mΩ			1.400±0.254		
		2.5~100mΩ			1.100±0.254		
		101~450mΩ			0.850±0.254		
					0.610±0.254		0.850±0.254



MA Series Metal Alloy Low-Resistance Resistor Product Specifications

Document No. S-10-12-05-04
 Released Date 2018/06/15
 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			0.740±0.254		
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	2W	1~100mΩ	11.300±0.500	6.600±0.500	0.670±0.254	0.200~1.000	2.000±0.254
		1~680mΩ			0.770±0.254		
	3W	681mΩ~1Ω			0.690±0.254		3.000±0.254
		1mΩ			0.790±0.254		
	5W	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-10-12-05-04

Released Date 2018/06/15

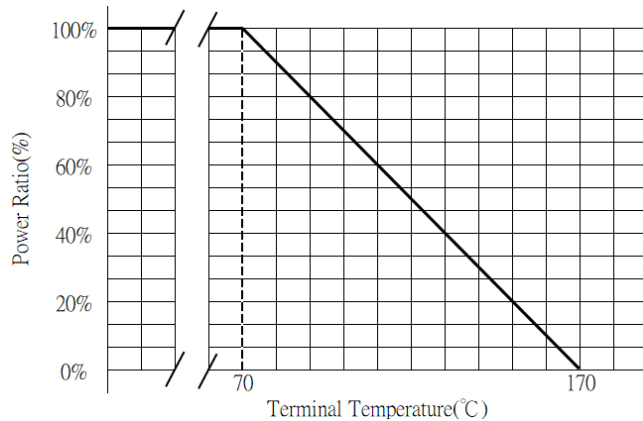
Page No. 5/8

■ 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:

- Without products marking for the MA0805 series.
- 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-10-12-05-04
Released Date	2018/06/15
Page No.	6/8

Reliability Test and Requirement

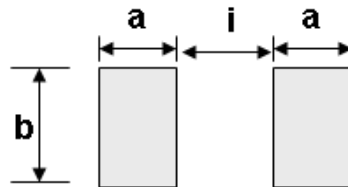
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS C 5201-1 clause 4.8	$\text{T.C.R. (ppm/}^\circ\text{C)} = \frac{(R2-R1)}{R1 (T2-T1)} \times 10^6$ <p>R1: resistance at room temperature (T1) R2: resistance at 150°C (T2)</p>	Refer to Ratings
Short Time Overload	JIS C 5201-1 clause 4.13	<p>The number of rated power are as follows:</p> <ul style="list-style-type: none"> MA0805-0.75W&1W : 4 times of rated power 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 MA4527-2W: 3 times of rated power MA4527-3W: 3 times of rated power MA4527-5W: 3 times of rated power <p>Rating power duration: 5secs</p>	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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, 10%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"	<ul style="list-style-type: none"> 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-10-12-05-04
Released Date	2018/06/15
Page No.	7/8

Recommend Land Pattern Design



Dimension

Unit: mm

TYPE	Resistance Range	a	b	i
MA0805 – 0.75W, 1W	3mΩ~50mΩ	1.80	2.18	0.66
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 – 2W,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

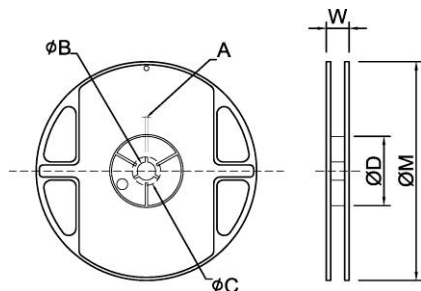
Packing Quantity

TYPE	PCS /Reel
MA0805	5000
MA1206	5000
MA2010	4000
MA2512	4000
MA2725	2000
MA2728	2000
MA2817	1000
MA4527	1000

Appendix For SMD Chip Resistor

Packaging Information

Reel Dimensions

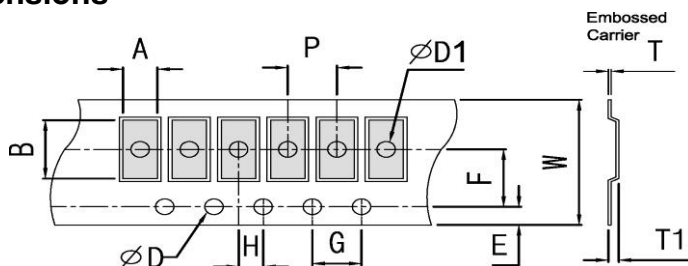


Unit: mm

Dimension

Reel Type / Tape	A	φ B	φ C	φ D	W	φ M
7" reel for 8 mm embossed (for MA0805&1206)	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	φ D	φ D1	G	H	A	Bo	T1	T
MA0805	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	1.70±0.10	2.45±0.10	0.50±0.10	0.20±0.05
MA1206	8.0±0.30	4.0±0.10	1.75±0.10	3.5±0.10		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%