



MFF Series Metal Foil Four Terminal Low-Resistance Resistor Product Specifications

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Metal Foil Four Terminal Low Resistance Chip Resistor — MFF Series

Application

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

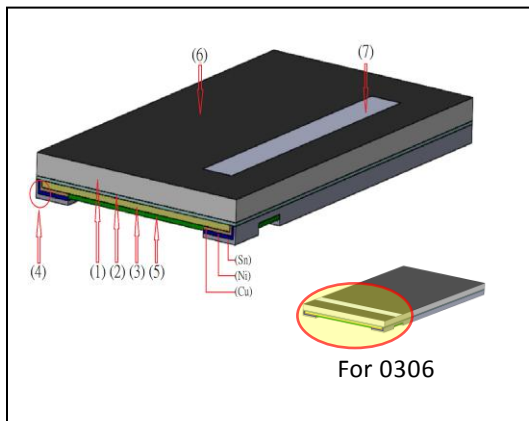
Features

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

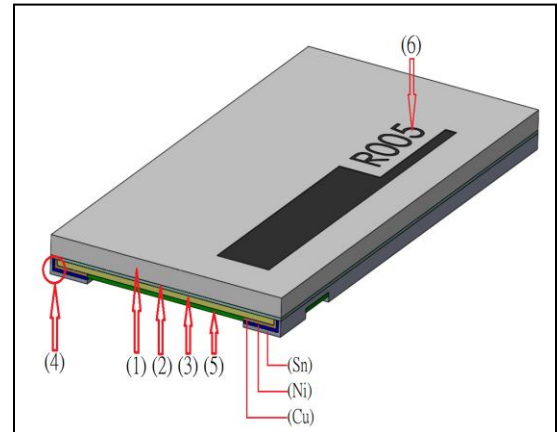
Product structure:

- (1) - Substrate : Alumina Ceramic
- (2) - Adhesive : Epoxy
- (3) - Resistive element : MnCu – alloy
- (4) - Terminal electrode : Cu, Ni, Sn
- (5) - Protective coating : Flame-retardant epoxy, meets UL- 94-V0 requirements(green)
- (6) - Marking coating : Flame-retardant epoxy, meets UL- 94-V0 requirements (black)
- (7) - Marking coating : Flame-retardant epoxy, meets UL- 94-V0 requirements (white)

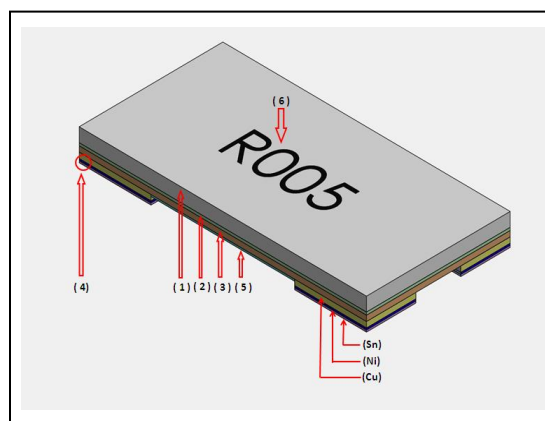
For 0306/0612 Type



For 1225/2139 Type



For 1206 Type

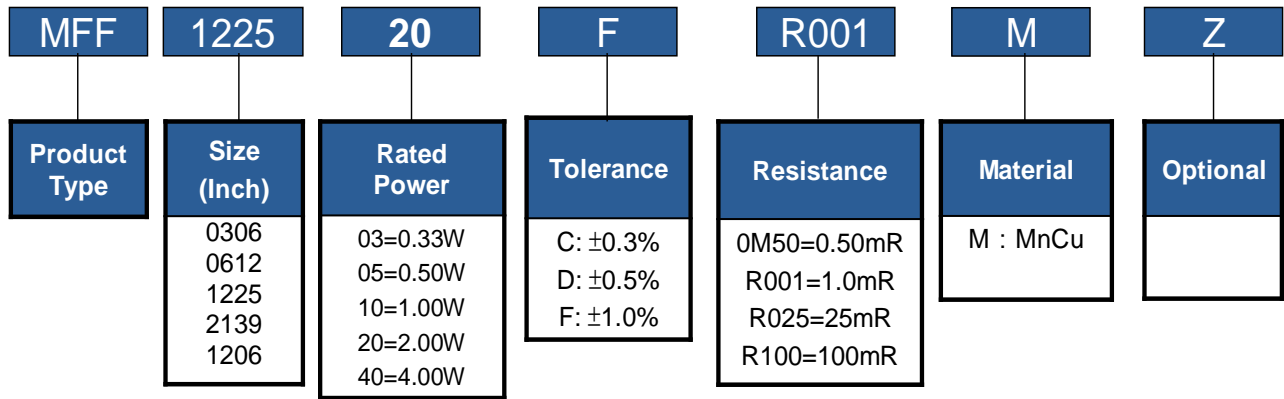




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■ Parts Number Explanation Example:



■ Standard Electrical Specifications

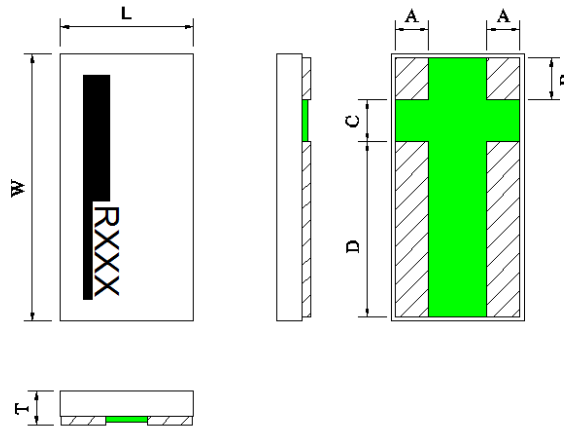
Type	Rating Power at 70°C	T.C.R. (ppm/°C)	Max. Rating Current	Max. Overload Current	Resistance Range (mΩ)			Material	Operating Temperature Range (°C)
					0.3% (C)	0.5% (D)	1.0% (F)		
MFF0306	0.33W	±100	18.16A	28.72A	—		1~4	MnCu	-55°C~155°C
		±50	8.12A	12.84A	—		5~25		
MFF0612	1W	±150	44.72A	70.71A	—		0.5~0.75		
		±100	31.62A	50A	—		1~4		
MFF1225	2W	±50	14.14A	22.36A	—	5~25			
		±100	44.72A	70.71A	—		1~4		
MFF2139	4W	±50	20A	31.62A	—	5~25			
		±100	63.24A	100A	—		1~4		
MFF1206	0.5W	±100	31.62A	50A	—		0.5		
		±75	22.36A	35.35A	—	1~5			
		±50	9.12A	14.43A	—	6~9			
		±30	7.07A	11.18A	10~100		—		



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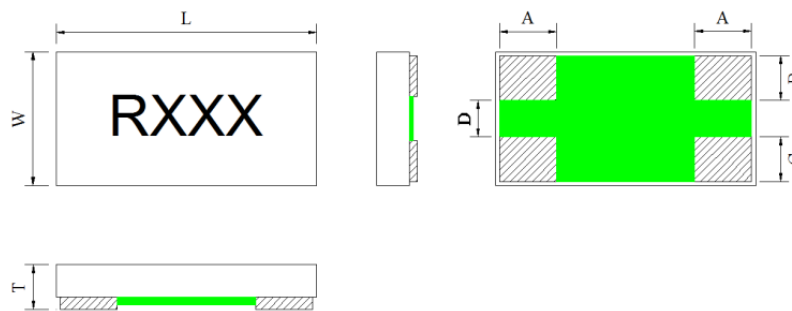
■ Type Dimension



■ Dimension

Unit : mm

	Power Rating	Resistance Range	W	L	A	B	C	D	T
MFF0306	0.33W	1~25mΩ	1.60±0.20	0.80±0.15	0.18±0.10	0.23±0.10	0.40±0.10	0.93±0.20	0.55±0.10
MFF0612	1W	0.5~25mΩ	3.20±0.20	1.60±0.20	0.41±0.20	0.46±0.20	0.50±0.20	2.16±0.20	0.50±0.20
MFF1225	2W	1~25mΩ	6.40±0.20	3.20±0.20	0.50±0.20	0.62±0.20	0.50±0.20	5.12±0.20	0.60±0.20
MFF2139	4W	1~25mΩ	11.0±0.30	5.00±0.30	0.70±0.20	1.40±0.20	1.05±0.20	8.50±0.30	0.60±0.20



■ Dimension

Unit : mm

	Power Rating	Resistance Range	W	L	A	B	C	D	T
MFF1206	0.5W	0.5~100mΩ	1.60±0.20	3.20±0.20	0.60±0.20	0.55±0.20	0.55±0.20	0.50±0.20	0.60±0.20



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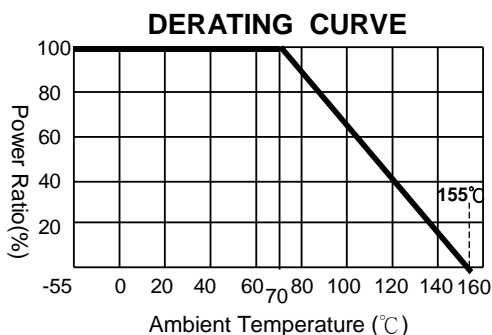
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Performance Characteristics

Power Derating Curve

The Operating Temperature Range: -55°C ~+155°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)

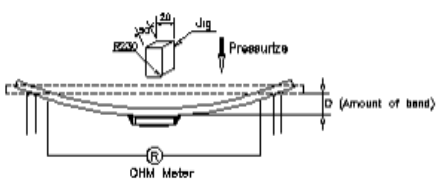
Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS C 5201-1 clause 4.8	$\text{T.C.R. (ppm/°C)} = \frac{(R2-R1)}{R1(T2-T1)} \times 10^6$ R1: resistance at room temperature (T1) R2: resistance at 125°C (T2)	Refer to Ratings
Short Time Overload	JIS C 5201-1 clause 4.13	The number of rated power are as follows: 2.5 times of rated power Rating power duration: 5secs	±1.0%+0.5mΩ
High Temperature Exposure	JIS C 5201-1 clause 4.23.2	1,000hrs at + 155 °C±2°C	±1.0%+0.5mΩ
Low Temp. Storage	JIS C 5201-1 clause 4.23.4	1,000hrs at -55 °C±2°C	±1.0%+0.5mΩ
Soldering Heat	JIS C 5201-1 clause 4.18	260±5°C for 10±1 seconds.	±1.0%+0.5mΩ
Moisture Load Life	JIS C 5201-1 clause 4.24	T=40±2°C,RH=90~95%,Load with Rated Current 1.5hrs "ON", 0.5hrs "OFF", 1000h	±2.0%+0.5mΩ



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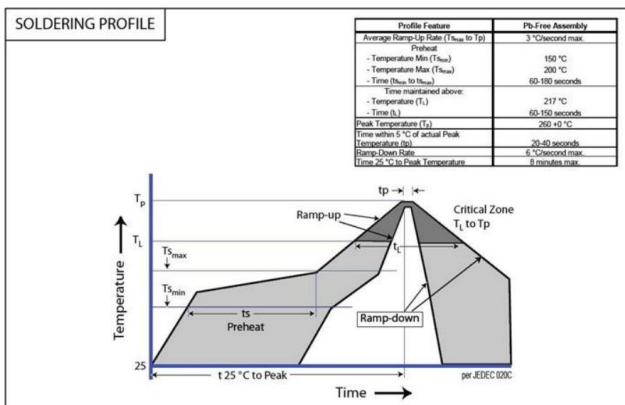
Temperature Cycling	JIS C 5201-1 clause 4.19	-55°C to +155°C, 100 cycles	±1.0%+0.5mΩ
Load Life	JIS C 5201-1 clause 4.25	T=70±2°C, Load with Rated Current 1.5hrs "ON", 0.5hrs "OFF", 1000h	±2.0%+0.5mΩ
Solderability	JIS C 5201-1 clause 4.17	245±5°C for 3±0.5secs	The covered area >95%
Mechanical Shock	JIS C 5202 clause 6.7	a =50G , t =11ms, 5 times shock	±1.0%+0.5mΩ
Substrate Bending	JIS-C5201-1 clause 4.33	Span between fulcrums : 90mm Bend Width : 2mm 	±1.0%+0.5mΩ

■ Marking Format:

- 0306/0612 type products no marking.
Other requirements can be contact with the business staff
- 1225/2139/1206 type products marking are 4 digits.
"R" designates the decimal location in ohms
e.g. 1mΩ the product marking is R001.
20mΩ the product marking is R020.
"M" designates the decimal location in milli-ohms
e.g. 0.5mΩ the product marking is 0M50.
- The criteria to distinguishing the mark on the surface of products are that characters can be identified.

● Recommended Customer Soldering Parameters

■ Solder reflow Temperature condition





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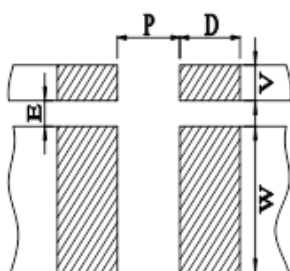
■ Rework temperature (hot air equipment) : 350°C, 3~5seconds

■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

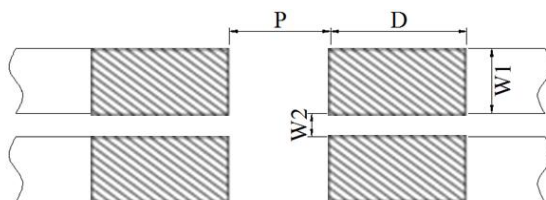
■ Recommend Land Pattern Design



■ Dimension

Unit: mm

TYPE	Resistance Range	P	W	D	V	E
MFF0306 – 0.33W	1mΩ~25mΩ	0.35	1.30	0.40	0.40	0.20
MFF0612 – 1W	0.5mΩ~25mΩ	0.762	2.29	1.014	0.762	0.381
MFF1225 – 2W	1mΩ~25mΩ	2.00	5.10	1.00	0.70	0.50
MFF2139– 4W	1mΩ~25mΩ	3.30	8.90	1.50	1.70	0.80



■ Dimension

Unit: mm

TYPE	Resistance Range	P	D	W1	W2
MFF1206 – 0.5W	0.5mΩ~100mΩ	1.20	1.80	1.10	0.30



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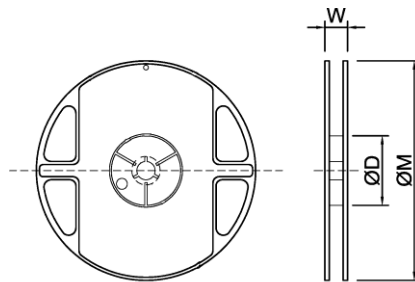
■ **Packing Quantity**

TYPE	PCS /Reel
MFF0306	5000
MFF0612 / MFF1206	5000
MFF1225	4000
MFF2139	2000

■ **Appendix For SMD Chip Resistor**

● **Packaging Information**

■ **Reel Dimensions**



■ **Dimension**

Unit: mm

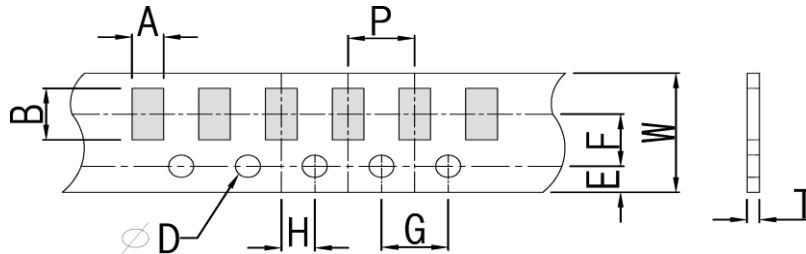
Type	ϕ D	W	ϕ M
MFF0306	60±2	9.0±1	178±5
MFF0612 / MFF1206		9.0±1	
MFF1225		13.0±1	
MFF2139		24.5±1	



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Paper tape Dimensions

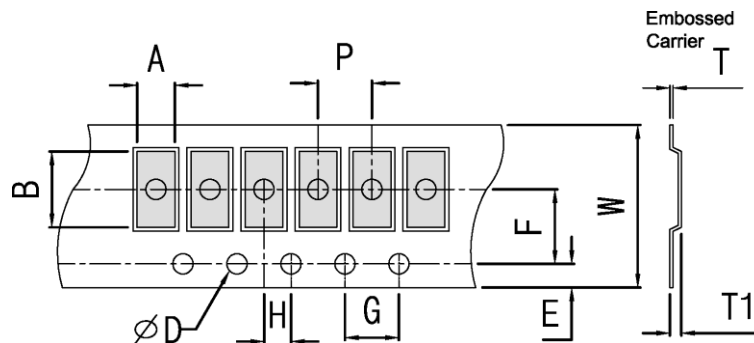


Dimension

Unit: mm

Item	W	P	E	F	ϕD	G	H	A	B	T
MFF0306	8.0±0.30	4.0±0.10	1.75±0.10	3.5±0.10	1.50 ^{+0.1} ₀	4.0±0.10	2.0±0.10	1.18±0.20	1.98±0.20	0.75±0.20

Embossed Dimensions



Dimension

Unit: mm

Item	W	P	E	F	ϕD	G	H	A	B	T1	T
MFF0612 / MFF1206	8.0±0.30	4.0±0.10	1.75±0.10	3.50±0.10	1.50 ^{+0.1} ₀	4.0±0.10	2.0±0.10	2.05±0.20	3.65±0.20	0.85±0.20	0.20±0.10
MFF1225	12.0±0.30	4.0±0.10		5.5±0.10				3.40±0.20	6.75±0.20	1.00±0.20	0.25±0.10
MFF2139	24.0±0.30	8.0±0.10		11.50±0.10				5.50±0.20	11.50±0.20	0.90±0.20	0.30±0.10

Peeling Strength of Seal Tape

Peeling Strength: 0.1 – 1.0N (10 - 100gf)

Storage Temperature

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