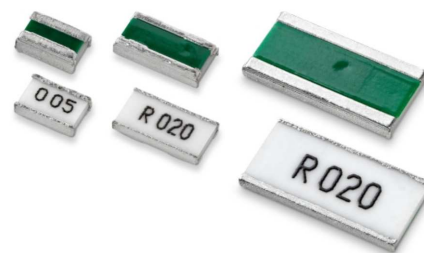


MFR Series

Metal Foil Low Resistance Chip Resistor

- Low Resistance / TCR / EMF (only FOR MnCu) / Inductance
- Excellent long term stability
- RoHS compliant and halogen free.
- Lead free.
- High precision current sensing and voltage division.
- Application : Entertainment, Power supply, Measuring instrument,
Industrial, Battery management system



■ GENERAL SPECIFICATIONS

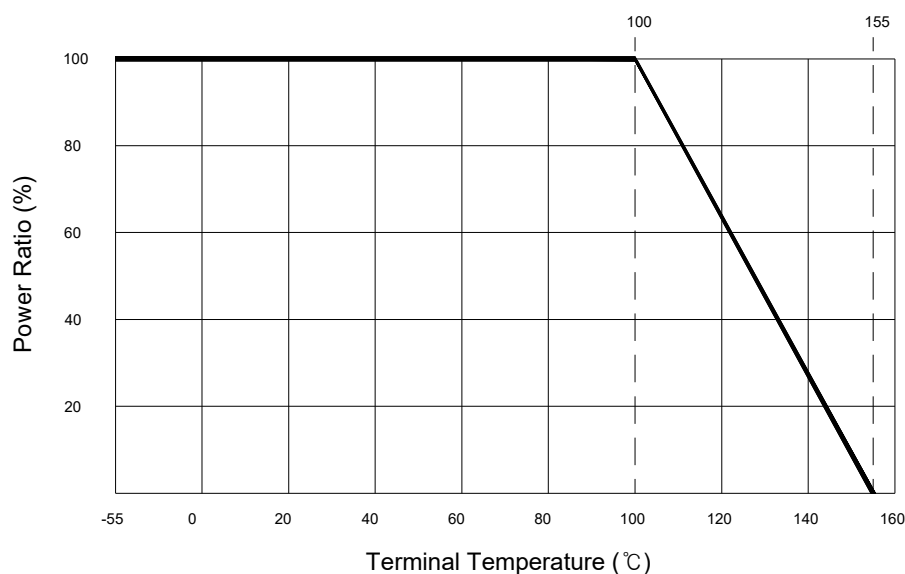
Model	Rating Power	TCR [PPM/℃]	Max. Rating Current	Max. Overload Current	Resistance Range[mΩ]		Material	Operating Temp. Range
					±0.5% (D)	±1.0% (F)		
MFR0603	0.5W	±75	10A	15.81A	-	5~9	R005~R049 : MnCu R050~R100 : Cu Alloy	-55℃ ~155℃
		±50	7.07A	11.18A	10~100			
MFR0805	0.75W	±75	13.69A	21.65A	-	4~9	R004~R049 : MnCu R050~R270 : Cu Alloy	
		±50	8.66A	13.69A	10~270			
MFR1206	1W	±75	15.81A	25A	-	4~9	R004~R049 : MnCu R050~R700 : Cu Alloy	
		±50	10A	15.81A	10~700			
MFR2010	1.5W	±100	27.38A	43.30A	-	2~9	R002~R500 : Cu Alloy	
		±50	12.24A	19.36A	10~500			
MFR2512	2W	±75	31.62A	50A	-	2~9	R002~R049 : MnCu R050~R560 : Cu Alloy	
		±50	14.14A	22.36A	10~560			
MFR3921	4W	±50	20A	31.62A	10~50		R010~R050 : Cu Alloy	
MFR4527	5W	±50	22.36A	35.35A	10~50		R010~R050 : Cu Alloy	
MFR0508	1W	±100	31.62A	50A	-	1~9	R001~R009 : MnCu R010~R100 : Cu Alloy	
		±50	10A	15.81A	10~100			
MFR0612	1.5W	±100	38.72A	61.23A	-	1~9	R001~R009 : MnCu R010~R100 : Cu Alloy	
		±50	12.24A	19.36A	10~100			
MFR0815	2W	±100	44.72A	70.71A	-	1~9	R001~R020 : Cu Alloy	
		±50	14.14A	22.36A	10~20			
MFR1225	3W	±100	54.77A	86.60A	-	1~9	R001~R020 : MnCu R021~R100 : Cu Alloy	
		±50	17.32A	27.38A	10~100			
MFR2139	5W	±100	70.71A	111.8A	-	1~9	R001~R020 : MnCu R021~R100 : Cu Alloy	
		±50	22.36A	35.35A	10~100			



■ CHARACTERISTICS

Temperature Coefficient of Resistance	Refer to Ratings	JIS C 5201 4.8 Method $TCR(ppm/^{\circ}C) = \{(R2-R1)/R1(T2-T1)\} \times 10^6$ R1 : Resistance of room temp.(T1), R2 : Resistance of 125°C(T2)
Short Time Overload	$\pm 1.0\% + 0.5m\Omega$	JIS C 5201-1 4.13 Method The number of rated power are as follows : 2.5 times of rated power, Rating power duration : 5 seconds
High Temperature Exposure	$\pm 1.0\% + 0.5m\Omega$	JIS C 5201-1 4.23.2 Method 1,000hrs at +155°C $\pm 2^{\circ}C$
Low Temperature Storage	$\pm 1.0\% + 0.5m\Omega$	JIS C 5201-1 4.23.4 Method 1,000hrs at -55°C $\pm 2^{\circ}C$
Soldering Heat	$\pm 1.0\% + 0.5m\Omega$	JIS C 5201-1 4.18 Method 260°C $\pm 5^{\circ}C$ for 10 ± 1 seconds.
Moisture Load Life	$\pm 2.0\% + 0.5m\Omega$	JIS C 5201-1 4.24 Method T=40°C $\pm 2^{\circ}C$, RH=90~95%, Load with Rated Current 1.5hrs "ON", 0.5hrs "OFF", 1,000hrs.
Temperature Cycling	$\pm 1.0\% + 0.5m\Omega$	JIS C 5201-1 4.19 Method -55°C to +155°C, 100 cycles.
Load Life	$\pm 2.0\% + 0.5m\Omega$	JIS C 5201-1 4.25 Method T=70°C $\pm 2^{\circ}C$, Load with Rated Current 1.5hrs "ON", 0.5hrs "OFF", 1,000hrs.
Solderability	The covered area > 95%	JIS C 5201-1 4.17 Method 245°C $\pm 5^{\circ}C$ for 3 ± 0.5 seconds
Mechanical Shock	$\pm 1.0\% + 0.5m\Omega$	JIS C 5202 6.7 Method A = 100G, t=11ms, 5 times shock.
Substrate Bending	$\pm 1.0\% + 0.5m\Omega$	JIS C 5201-1 4.33 Method Span between fulcrums : 90mm, Bend Width : 2mm

■ DERATING CURVE

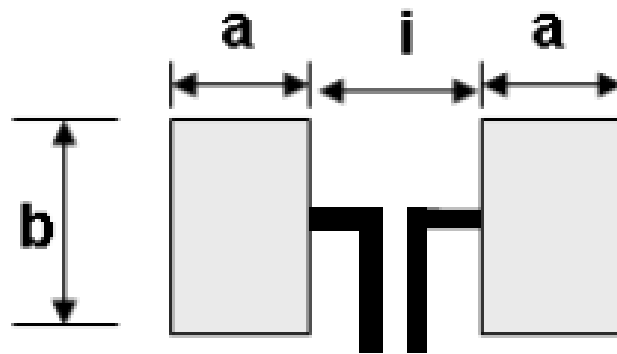


■ DIMENSIONS [mm]

MFR0603 / MFR0805 / MFR1206 / MFR2010 / MFR2512 / MFR3921 / MFR4527	MFR0508 / MFR0612 / MFR0815 / MFR1225 / MFR2139

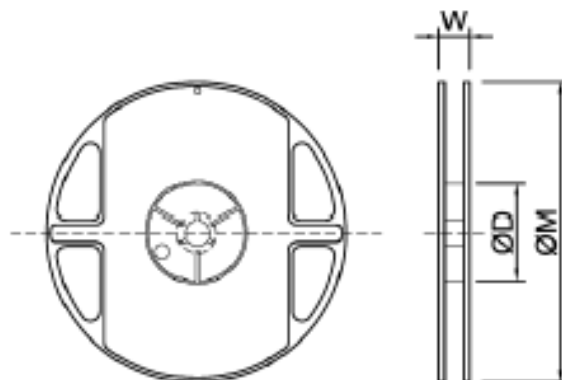
Model	Max. Power Rating	Resistance Range[mΩ]	DIMENSIONS (millimetres)			
			L	W	H	T
MFR0603	0.5W	5	1.60±0.25	0.80±0.25	0.65±0.20	0.50±0.20
		6~100				0.40±0.20
MFR0805	0.75W	4~270	2.00±0.25	1.20±0.25	0.65±0.20	0.50±0.20
MFR1206	1W	4~700	3.20±0.25	1.60±0.25	0.65±0.20	0.68±0.30
MFR2010	1.5W	2~3	5.08±0.25	2.54±0.25	0.65±0.20	2.10±0.30
		4~500				0.70±0.30
MFR2512	2W	2~3	6.40±0.30	3.20±0.30	0.75±0.20	1.65±0.30
		4~560			0.65±0.20	1.05±0.30
MFR3921	4W	10~50	11.10±0.30	5.10±0.30	0.65±0.30	2.36±0.30
MFR4527	5W	10~50	11.60±1.0	7.10±1.0	0.65±0.30	2.70±0.40
MFR0508	1W	1~100	1.35±0.20	2.10±0.20	0.65±0.20	0.43±0.20
MFR0612	1.5W	1	1.60±0.25	3.20±0.25	0.65±0.20	0.50±0.30
		2~100				0.40±0.20
MFR0815	2W	1~20	2.20±0.20	3.80±0.20	0.65±0.20	0.61±0.20
MFR1225	3W	1~100	3.20±0.30	6.40±0.30	0.65±0.20	0.60±0.20
MFR2139	5W	1~100	5.10±0.40	11.10±0.30	0.65±0.20	0.90±0.30

■ Recommend Land Pattern Design

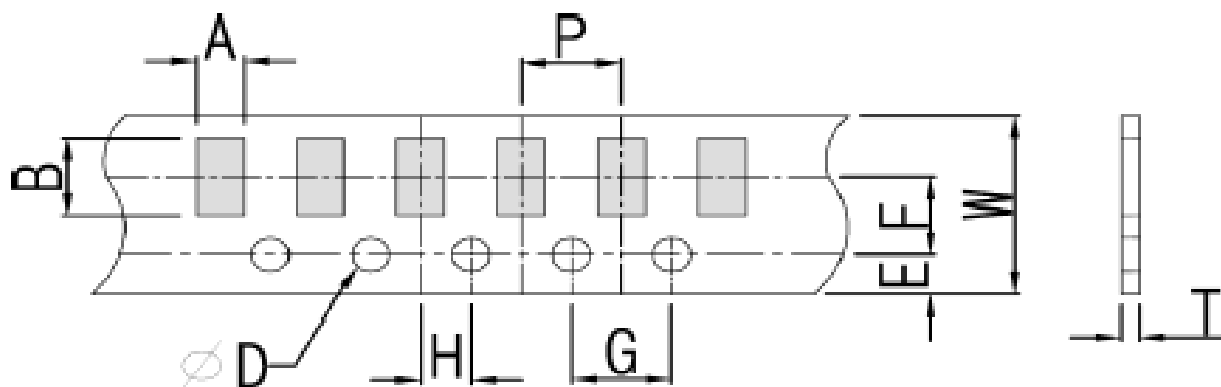


Type	Resistance Range[mΩ]	SOLDER PAD Dimension(millimetres)		
		a	b	i
MFR0603	5	1.35	0.92	0.50
	6~100	1.30	0.92	0.60
MFR0805	4~270	1.40	1.44	0.80
MFR1206	4~700	1.80	1.84	1.20
MFR2010	2~3	3.65	2.88	0.70
	4~500	2.65	2.88	2.70
MFR2512	2~3	3.85	3.57	1.60
	4~560	3.10	3.57	3.10
MFR3921	10~50	4.50	5.75	5.00
MFR4527	10~50	4.65	8.05	5.20
MFR0508	1~100	1.10	2.30	0.60
MFR0612	1	1.35	3.68	0.50
	2~100	1.30	3.68	0.60
MFR0815	1~20	2.40	4.26	0.70
MFR1225	1~100	2.35	7.25	1.40
MFR2139	1~100	2.80	12.65	2.40

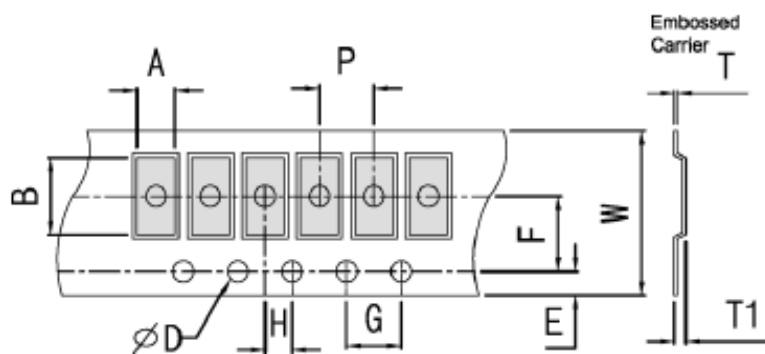
■ PACKAGING



Packaging	Model	ØD	W	ØM
Reel Dimensions	MFR0603 / MFR0805 / MFR1206 / MFR0508 / MFR0612	60±2	9.0±1	178±5
	MFR2010 / MFR2512 / MFR0815 / MFR1225		13±1	
	MFR3921 / MFR4527 / MFR2139		24.5±1	



Packaging	Model	Dimensions [mm]									
		W	P	E	F	ØD	G	H	A	B	T
Carrier Dimensions	MFR0603	8.0±0.30	4.0±0.10	1.75±0.1	3.5±0.1	1.50 (+0.1 -0.0)	4.0±0.1	2.0±0.1	1.18 ±0.20	1.98 ±0.20	0.75 ±0.20
	MFR0805								1.68 ±0.20	2.38 ±0.20	0.87 ±0.20
	MFR0508								2.05 ±0.20	3.65 ±0.20	0.87 ±0.20
	MFR1206										
	MFR0612										

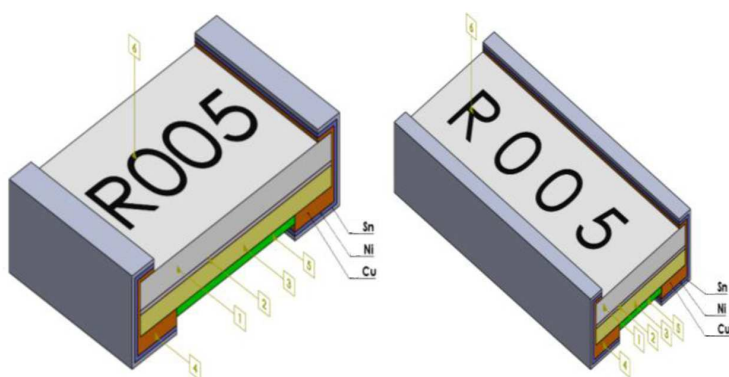


Packaging	Model	Dimensions [mm]										
		W	P	E	F	ØD	G	H	A	B	T1	T
Embossed Dimensions	MFR1508	12.0±0.4	4.0±0.1	1.75±0.1	5.5±0.1	1.50 (+0.1 -0.0)	4.0±0.1	2.0±0.1	2.40 ±0.20	4.10 ±0.20	0.75 ±0.20	0.25 ±0.10
	MFR2010	12.0±0.3	4.0±0.1		5.5±0.1				2.85 ±0.20	5.45 ±0.20	0.80 ±0.20	0.25 ±0.10
	MFR2512	12.0±0.3	4.0±0.1		5.5±0.1				3.40 ±0.20	6.75 ±0.20	1.00 ±0.20	0.25 ±0.10
	MFR1225											
	MFR3921	24.0±0.3	8.0±0.1		11.5±0.1				5.50 ±0.20	11.5 ±0.20	0.90 ±0.20	0.30 ±0.10
	MFR2139											
	MFR4527											

*Packaging Quantity

Type	PCS/Reel
MFR0603 / MFR0805 / MFR0508	5,000
MFR2010 / MFR2512 / MFR1225 / MFR0815	4,000
MFR3921 / MFR2139	2,000
MFR4527	1,000

■ Product structure



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



MARKING FORMAT

0603 type products marking are 2 or 3 digits.	<p>*2digits 10mΩ the product marking is 10. 15mΩ the product marking is 15.</p> <p>*3digits "M" designates the decimal location in milli-ohms 2.5mΩ the product marking is 2M5.</p>
0805 type products marking are 3 or 4 digits.	<p>*3digits 50mΩ the product marking is 050. 500mΩ the product marking is 500.</p> <p>*4digits "R" designates the decimal location in ohms 20mΩ the product marking is R020. "M" designates the decimal location in milli-ohms 5.5mΩ the product marking is 5M50.</p>
1206 and above type products marking are 4 digits.	<p>"R" designates the decimal location in ohms 1mΩ the product marking is R001. "M" designates the decimal location in milli-ohms 5.5mΩ the product marking is 5M50.</p>

ODERING PROCFURE EXAMPLE

MFR	2512	20	F	R005	M
Product Type	Size (inch)	Rated Power	Tolerance	Resistance	Material
	0603 0805 1206 2010 2512 3921 4527 0508 0612 0815 1225 2139	05=0.5W 07=0.75W 10=1.00W 15=1.50W 20=2.00W 30=3.00W 40=4.00W 50=5.00W	D : ±0.5% F : ±1.0%	2M50=2.5mR R005=5.0mR R020=20mR R150=150mR	M : MnCu C : Cu Alloy