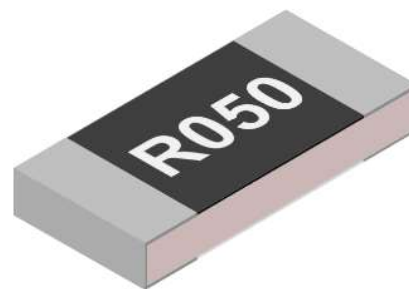


Low-Resistance Metal Film Chip Resistor

MFR ~Series

Description

- Low Resistance / TCR / Inductance(≤ 5 nH)
- Excellent long-term stability
- High precision current sensing
- High power capability
- Halogen free and lead free
- RoHS compliant
- AEC-Q200 compliant



Applications

- Consumer electronics
- Laptops
- Communication devices
- Measuring instrument
- Industrial / Power supply
- Battery pack

Part number

MFR 12 A 1 R002 E

【1】 【2】 【3】 【4】 【5】 【6】

【1】 Series Name: Low-Resistance Metal Film Chip Resistor

【2】 Chip Size: 25:2512, 12: 1206, 08:0805

【3】 Terminals: A:2 terminals , B:4 terminals

【4】 Power Rating: 1=1W, 2=2W, 3 =3W, D=0.75W, E=0.5W, F=0.25W, G=0.125W

【5】 Resistance Code: R680: 680mΩ, 1R50: 1.5Ω

【6】 Resistance Precision: D:±0.5%, F:±1%, E:±2%, G:±5%

Low-Resistance Metal Film Chip Resistor

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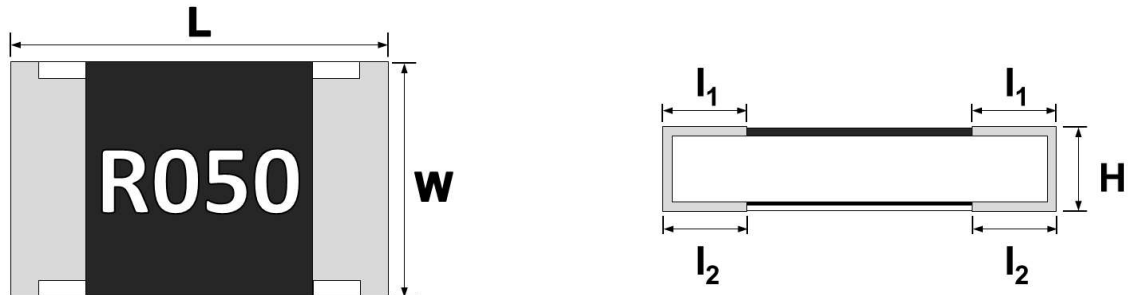
Electrical Characteristics

Part number	Power Rating at 70°C (W)	Resistance Range 0.5%,1.0%,2.0%, 5.0%	TCR (ppm/°C)	Operation Temperature Range
MFR08A	1/8	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	-55°C~+155°C
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
	1/4	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
	1/2	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
MFR12A	1/4	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
	1/2	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
	3/4	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
	1	$39\text{m}\Omega \leq R < 50\text{m}\Omega$	±150	
		$50\text{m}\Omega \leq R < 100\text{m}\Omega$	±100	
		$100\text{m}\Omega \leq R < 10\Omega$	±50	
MFR25A	1	$100\text{m}\Omega \leq R < 10\Omega$	±50	
	2			
	3			

Low-Resistance Metal Film Chip Resistor

MFR ~Series

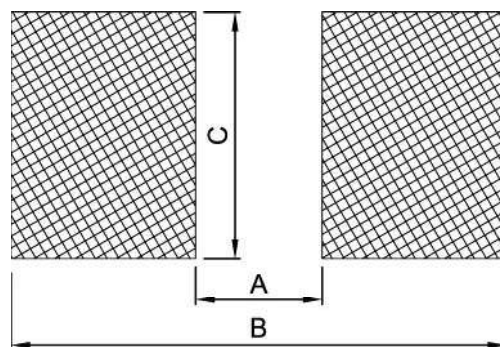
Physical Dimensions



Unit: mm

Part number	L	W	H	l1	l2
MFR08A	2.00±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.40±0.20
MFR12A	3.10±0.10	1.60±0.10	0.55±0.10	0.40±0.20	0.45±0.20
MFR25A	6.30±0.20	3.20±0.20	0.55±0.10	0.65±0.25	0.65±0.25
MFR25A(3W)	6.30±0.20	3.20±0.20	0.70±0.15	0.65±0.25	0.65±0.25

Recommended Solder Pad Layout



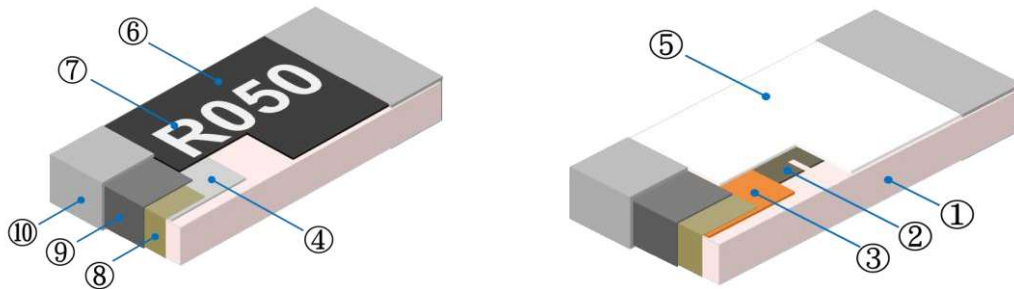
Unit: mm

Part number	A	B	C
MFR08A	1.30	2.90	1.45
MFR12A	2.20	4.20	1.80
MFR25A	4.90	8.10	3.40

Low-Resistance Metal Film Chip Resistor

MFR ~Series

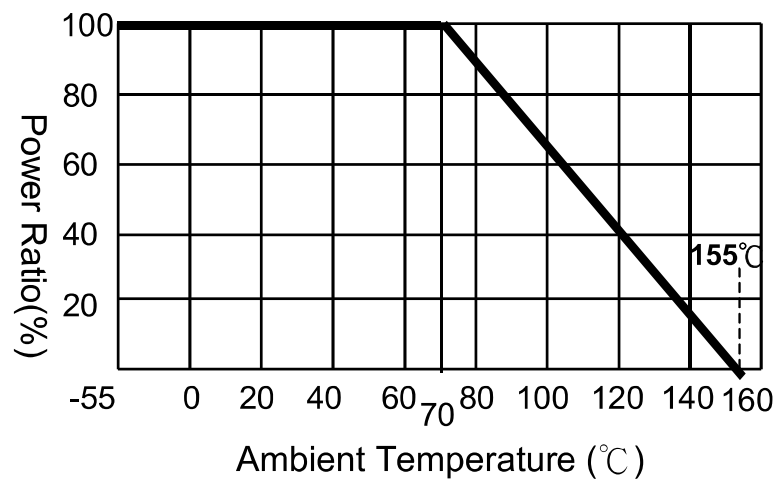
Construction



1	Alumina Substrate
2	Resistive Layer
3	Bottom Inner Electrode (Cu)
4	Top Inner Electrode
5	Bottom Protective Overcoat (White)
6	Top Protective Overcoat
7	Marking
8	Side Inner Electrode
9	Barrier Layer (Ni)
10	Solder coating (Sn)

Power Derating Curve

For resistors operated in ambient temperatures 70°C, power rating shall be derated in according with the curve below:

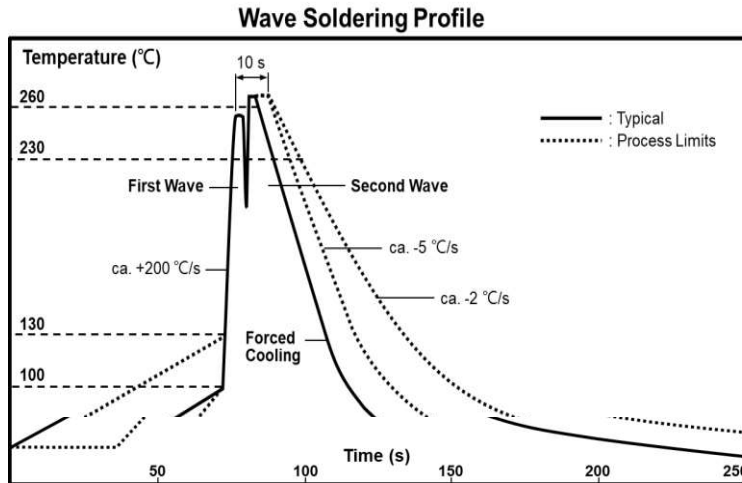


Low-Resistance Metal Film Chip Resistor

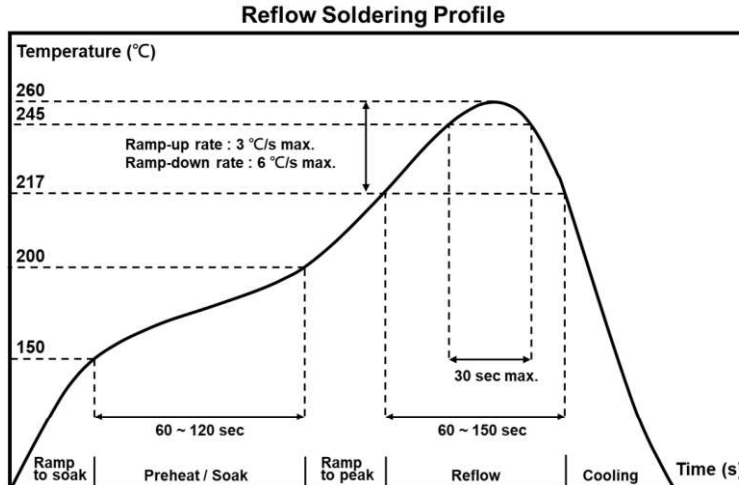
MFR ~Series

Recommended Solder Curve

Wave solder Temperature condition



Solder reflow Temperature condition



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.

Low-Resistance Metal Film Chip Resistor

MFR ~Series

Product Characteristics

Item	Test condition/ Methods	Limited	Standard
Temperature coefficient of resistance	$TCR = (R - R_0) / R_0 (T_2 - T_1) \times 10^6$ R_0 : resistance of room temperature R : resistance of 125°C T_1 : Room temperature T_2 : Temperature at 125°C	Refer to Spec	MIL-STD-202 Method 304
Short time Overload	Standard power: 6.25 times the rated power for 5 seconds High power (2X/4X) and wide terminal type: 5 times the rated power for 5 seconds	$\leq \pm 1.0\%$	JIS-C-5201-1 4.13 IEC-60115-1 4.13
Insulation Resistance	100VDC for 1 minute.	$\geq 10G\Omega$	JIS-C-5201-1 4.6 IEC-60115-1 4.6
Resistance to Solvent	The tested resistor be immersed into isopropyl alcohol of 20~25 °C for 60 secs. Then the resistor is left in the room for 48 hrs.	$\leq \pm 1.0\%$	JIS-C-5201-1 4.29
Resistance to Soldering Heat	260°C $\pm$ 5°C time: 10sec	$\leq \pm 1.0\%$	JIS-C-5201-1 4.18 IEC-60115-1 4.18
Solderability	245°C $\pm$ 5°C time: 3sec	Solder coverage over 95% No Visual damage	IEC60115-1 4.17 JIS-C-5201-1 4.17
Leaching	260°C $\pm$ 5°C time: 30sec	Solder coverage over 95% No Visual damage	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1
Temperature Cycling	-55°C / +155°C, 300 cycles	$\pm 1.0\%$ No Visual damage	JIS-C-5201-1 4.19 IEC-60115-1 4.19
High Temperature	155 $\pm$ 5°C for 1000hours, No power	$\leq \pm 1.0\%$	JIS-C5201-1 4.25 IEC 60068-2-2
Storage Bias Humidity	+85°C, 85% RH, 10% bias, 1000hours	$\leq \pm 0.5\%$	MIL-STD-202 Method 103
Operational life	70°C $\pm$ 2°C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	$\leq \pm 1.0\%$	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1
Damp Heat with Load	40°C $\pm$ 2°C, 90-95% R.H. RCW or Max. 1000 hours, 1.5 hours "ON", 0.5 hours "OFF"	$\leq \pm 1.0\%$	JIS-C-5201-1 4.24 IEC-60115-1 4.24
Bending Strength	Bending once for 5 seconds: 1206 = 3mm 2512 = 2mm 0805 = 5mm	$\pm 1.0\%$ No Visual damage	JIS-C-5201-1 4.33 IEC-60115-1 4.33

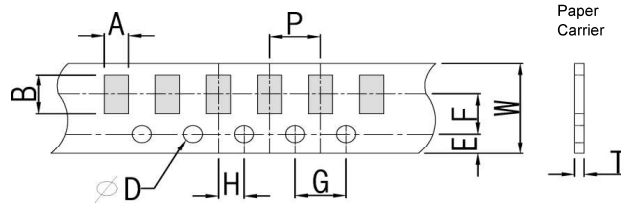
Note : Measurement at 24 $\pm$ 4 hours after test conclusion for all reliability tests-parts.

Low-Resistance Metal Film Chip Resistor

MFR ~Series

Packaging

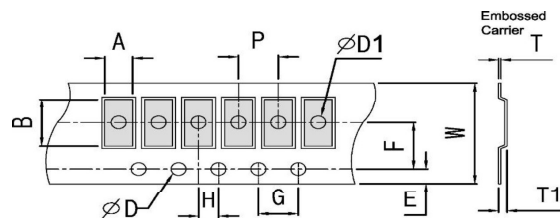
Tape Dimensions



Unit: mm

Type	A	B	W	E	F	G	H	T	D	P
MFR08A	1.55±0.2	2.30±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4±0.1	2±0.05	0.75±0.1	1.5+0.1/-0	4.0±0.1
MFR12A	1.9±0.2	3.05±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4±0.1	2±0.05	0.75±0.1	1.5+0.1/-0	4.0±0.1

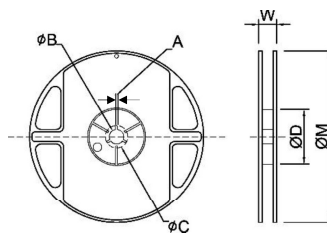
Embossed Dimensions



Unit: mm

Type	A	B	W	E	F	G
MFR25A	3.4±0.2	6.7±0.2	12±0.1	1.75±0.1	5.5±0.05	4±0.1
	H	T	D	D1	T1	P
	2±0.05	0.23±0.1	1.5+0.1/-0	1.5±0.1	0.85±0.15	4±0.1

Reel Dimensions



Unit: mm

Type	SIZE	A	B	C	D	W	M
MFR08A	7 inch reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
MFR12A	7 inch reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	11.5±2.0	178±2.0
MFR25A	7 inch reel	2.0±0.5	13.5±1.0	21±1.0	60.0±1.0	16.0±2.0	178±2.0

Quantity of Package

Type	MFR08A	MFR12A	MFR25A
Quantity(pcs)	5000	5000	4000

Storage

Storage time at the environment temp: 25±5°C and humidity: 60±20% is valid for one year from the date of deliver