

RMFR series Metal Foil Low Resistance Resistor

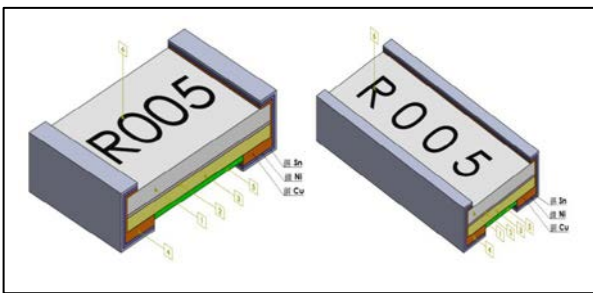
◆ Features

- »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.

◆ Applications

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

◆ Configuration

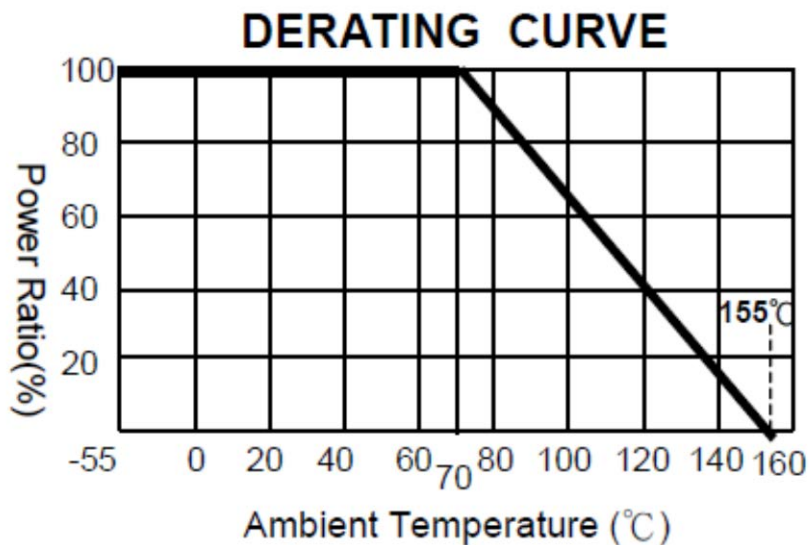


TYPE	RMF
1. Substrate	Alumina Ceramic
2. Adhesive	Epoxy
3. Resistive element	Cu – alloy
4. Terminal electrode	Sn, Ni, Cu
5. Protective coating	Flame-retardant epoxy, meets UL- 94-V0 requirements(green)
6. Marking coating	Flame-retardant epoxy, meets UL- 94-V0 requirements (black)

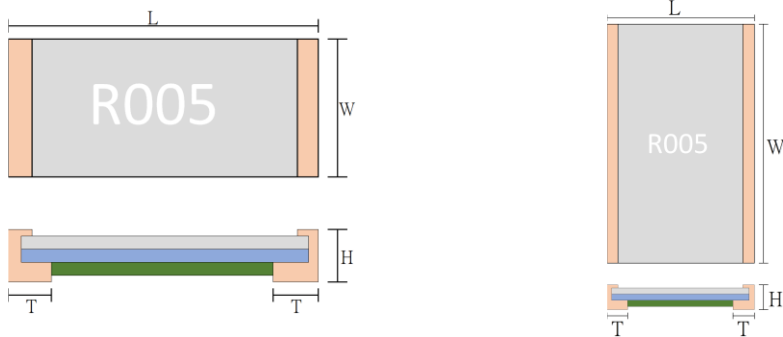
◆ Power Derating Curve

Operating Temperature Range: -55 to +155 deg. C

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below



◆ Dimension



TYPE	Power Rating	Resistance Range	L	W	T	a
RMFR0603	0.5W	5mΩ	1.60±0.25	0.80±0.25	0.65±0.20	0.50±0.20
		6~100mΩ				0.40±0.20
RMFR0805	0.75W	4~270mΩ	2.00±0.25	1.20±0.25	0.65±0.20	0.50±0.20
RMFR1206	1W	4~700mΩ	3.20±0.25	1.60±0.25	0.65±0.20	0.68±0.30
		2~3mΩ				2.10±0.30
RMFR2010	1.5W	4~500mΩ	5.08±0.25	2.54±0.25	0.65±0.20	0.70±0.30
		2mΩ				1.65±0.30
		3mΩ				1.65±0.30
RMFR2512	2W	4~560mΩ	6.40±0.30	3.20±0.30	0.65±0.20	1.05±0.30
RMFR3921	4W	10~50mΩ	11.10±0.30	5.10±0.30	0.65±0.30	2.36±0.30
RMFR4527	5W	10~50mΩ	11.60±1.0	7.10±1.0	0.65±0.30	2.70±0.40
RMFR0508	1W	1~100mΩ	1.35±0.20	2.10±0.20	0.65±0.20	0.43±0.20
		1mΩ				0.50±0.30
RMFR0612	1.5W	2~100mΩ	1.60±0.25	3.20±0.25	0.65±0.20	0.40±0.20
RMFR0815	2W	1~20mΩ	2.20±0.20	3.80±0.20	0.65±0.20	0.61±0.20
RMFR1225	3W	1~100mΩ	3.20±0.30	6.40±0.30	0.65±0.20	0.60±0.20
RMFR2139	5W	1~100mΩ	5.10±0.40	11.10±0.30	0.65±0.30	0.90±0.30

Unit: mm

◆ 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)		
RMFR0603	0.5W	±75	10A	15.81A	—	5~9	—	R005~R050: MnCu	-55°C~155°C
		±50	7.07A	11.18A	10~50		—		
RMFR0805	0.75W	±75	13.69A	21.65A	—	4~9	—	R004~R049: MnCu	
		±50	8.66A	13.69A	10~270		—	R050~R270: Cu Alloy	
RMFR1206	1W	±75	15.81A	25A	—	4~9	—	R004~R049: MnCu	
		±50	10A	15.81A	10~700		—	R050~R700: Cu Alloy	
RMFR2010	1.5W	±100	27.38A	43.30A	—	2~9	—	R002~R500: Cu Alloy	
		±50	12.24A	19.36A	10~500		—		
RMFR2512	2W	±75	31.62A	50A	—	2~9	—	R002~R049: MnCu	
		±50	14.14A	22.36A	10~560		—	R050~R560: Cu Alloy	
RMFR3921	4W	—	—	—	—	—	—	R010~R050: Cu Alloy	
		±50	20A	31.62A	10~50		—		
RMFR4527	5W	—	—	—	—	—	—	R010~R050: Cu Alloy	
		±50	22.36A	35.35A	10~50		—		
RMFR0508	1W	±100	31.62A	50A	—	—	1	R001~R009: MnCu R010~R100: Cu Alloy	
		±100	22.36A	35.35A	—	2~9	—		
		±50	10A	15.81A	10~100		—		
RMFR0612	1.5W	±100	38.72A	61.23A	—	—	1	R001~R009: MnCu R010~R100: Cu Alloy	
		±100	27.38A	43.30A	—	2~9	—		
		±50	12.24A	19.36A	10~100		—		
RMFR0815	2W	±100	44.72A	70.71A	—	—	1	R001~R020: Cu Alloy	
		±100	31.62A	50A	—	2~9	—		
		±50	14.14A	22.36A	10~20		—		
RMFR1020	2W	±100	44.72A	70.71A	—	1~9	—	R001~R009: MnCu	
RMFR1225	3W	±100	54.77A	86.60A	—	1~9	—	R001~R020: MnCu	
		±50	17.32A	27.38A	10~100		—	R021~R100: Cu Alloy	
RMFR2139	5W	±100	70.71A	111.8A	—	1~9	—	R001~R020: MnCu	
		±50	22.36A	35.35A	10~100		—	R021~R100: Cu Alloy	

Operating Current= $\sqrt{P/R}$, Operating Voltage= $\sqrt{P \cdot R}$

All product specification and data are subject to change without notice

◆ Part Number

RMFR	2512	J	T	R002		□	□□
Type	Size	Tolerance	Watt	R Value	TCR (ppm/°C)	Reel Size	Package Quantity
RMFR	0603	F: 1%	T:1W	R002=2mΩ	Blank=Standard	Blank = 7"	(standard package As below)
	0805	J: 5%	S:2W		E: 100ppm	B= 13"	08= 8K per reel
	1206		U:1/2W		D: 50ppm	C= 10"	16= 16K per reel
	2010		Q:3/4W		W: 75ppm		
	2512		V:1.5W				
	3921		R:3W				
	4527		A:4W				
	0508		H:5W				
	0612						
	0815						
	1225						
	2139						

» Standard Package Q'ty for each size is as following.

TYPE	Standard Package Q'ty
RMFR0603	5000
RMFR0805 /0508	5000
RMFR1206 /0612	5000
RMFR2010	4000
RMFR2512 / 1225	4000
RMFR0815	4000
RMFR3921/ 2139	2000
RMFR4527	1000

◆ Specification

Specification and Test Methods

TEST ITEM	SPECIFICATON	TEST METHOD
Short Time Overload	±1.0%+0.5mΩ	IEC 60115-1 / 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
Solderability	Over 95% of termination must be covered with Solder	IEC 60115-1 / JIS C 5201-1 , Clause 4.17 245±5°C for 3±0.5secs
Resistance to Solder Heat	ΔR ≤ ± (1% + 0.5mΩ) No mechanical damage	IEC 60115-1/JIS C 5201-1 , Clause 4.18 260±5°C for 10±1 seconds.
Load Life Humidity	ΔR ≤ ± (2% + 0.5mΩ)	IEC 60115-1 / 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
Temperature Coefficient of Resistance (TCR)	Refer to Ratings	IEC 60115-1 / JIS C 5201-1 , Clause 4.8 Test temperature : 25°C(T1) → -55°C(T2) 25°C(T1) → +125°C(T2) $TCR(ppm/^{\circ}C) = \frac{R2 - R1}{R1} \times \frac{1}{T2 - T1} \times 10^6$ T1: 25°C T2: Test temperature R1: Resistance at reference temperature (T1) R2: Resistance at test temperature (T2)
Load Life	ΔR ≤ ± (2% + 0.5mΩ)	IEC 60115-1 / JIS C 5201-1 , Clause 4.25 T=70±2 °C, Load with Rated Current 1.5hrs "ON", 0.5hrs "OFF" , 1000h
Temperature Cycle	ΔR ≤ ± (1% + 0.5mΩ) No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.19 -55°C to +155°C, 100 cycles
Bending Strength	ΔR ≤ ± (1% + 0.5mΩ) No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.33 Resistance changes after bended on the 90mm PCB. Bend :2mm
High Temperature Exposure	±1.0%+0.5mΩ	JIS C 5201-1 clause 4.23.2 1,000hrs at + 155 °C±2°C
Low Temp. Storage	±1.0%+0.5mΩ	JIS C 5201-1 clause 4.23.4 1,000hrs at -55 °C±2°C

Mechanical Shock

$\pm 1.0\% + 0.5m\Omega$

JIS C 5202 clause 6.7

a = 100G , t = 11ms, 5 times shock

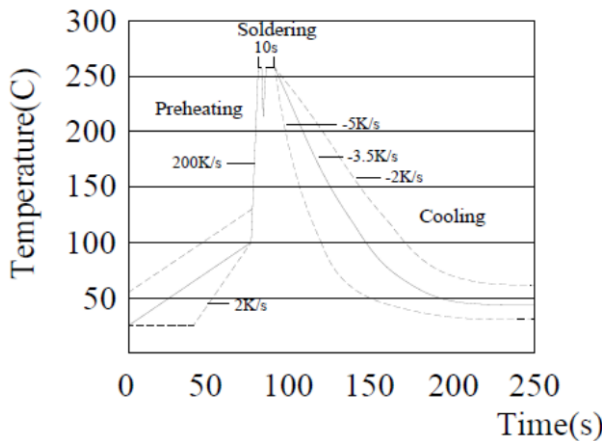
◆ Recommended Customer Soldering Parameters

Wave solder Temperature condition

Preheating : 100°C~130°C, max.100 sec.

Soldering: 250°C~265°C max. 10 sec.

Maximum temperature : 260±5°C, max. 10sec.

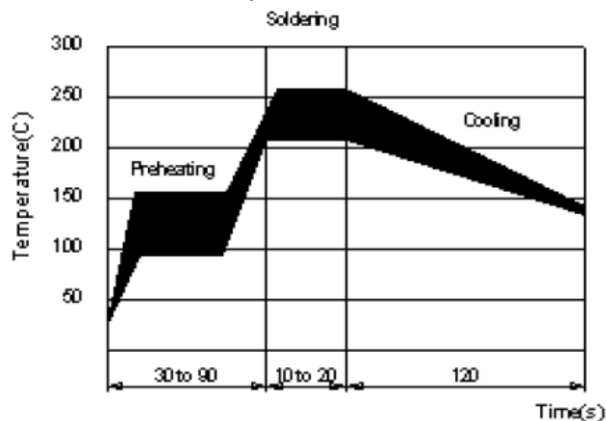


Solder reflow Temperature condition

Preheating : 145 ± 15 °C, max. 20sec.

Soldering : min. 220 °C, max. 60 sec.

Maximum temperature : 260±5 °C, max. 10sec.



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

◆ Recommended Customer Soldering Parameters Recommended reflow methods

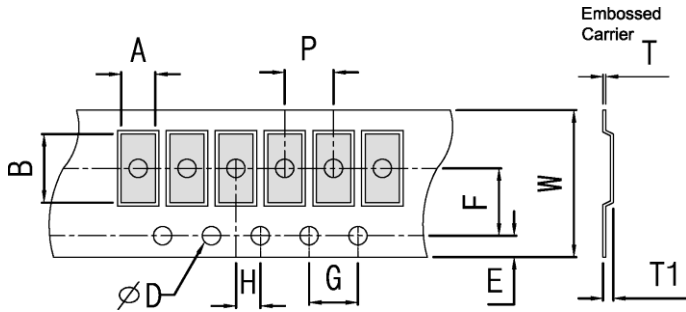
IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not

meet the performance requirements.

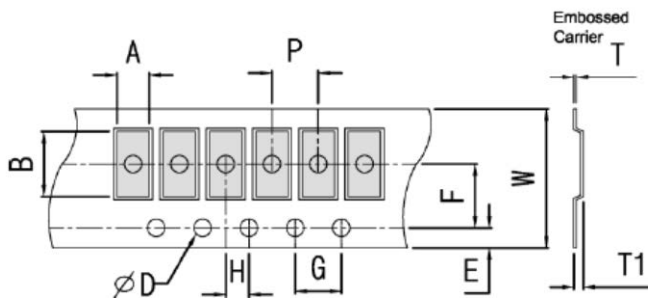
◆ Packing

Unit: mm



Item	W	P	E	F	ϕD	G	H	A	Bo	T
0603	8.0±0.30	4.0±0.10	1.75±0.10	3.5±0.10	1.5±8.1	4.0±0.10	2.0±0.10	1.18±0.20	1.98±0.20	0.75±0.20
0805								1.68±0.20	2.38±0.20	0.87±0.20
0508								2.05±0.20	3.65±0.20	0.87±0.10
1206										
0612										

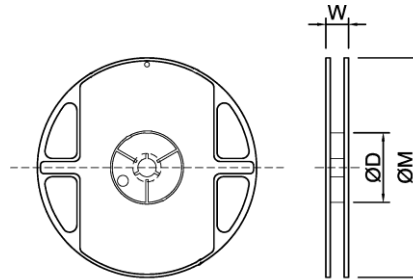
Embossed Dimensions



Item	W	P	E	F	ϕD	G	H	A	Bo	T1	T
1508	12.0±0.40	4.0±0.10	1.75±0.10	5.5±0.10	1.5±8.1	4.0±0.10	2.0±0.10	2.40±0.20	4.10±0.20	0.75±0.20	0.25±0.10
2010	12.0±0.30	4.0±0.10	1.75±0.10	5.5±0.10		4.0±0.10	2.0±0.10	2.85±0.20	5.45±0.20	0.80±0.20	0.25±0.10
2512	12.0±0.30	4.0±0.10	1.75±0.10	5.5±0.10		4.0±0.10	2.0±0.10	3.40±0.20	6.75±0.20	1.00±0.20	0.25±0.10
1225						4.0±0.10	2.0±0.10	5.50±0.20	11.5±0.20	0.90±0.20	0.30±0.10
3921	24.0±0.30	8.0±0.10	1.75±0.10	11.5±0.10		4.0±0.10	2.0±0.10	5.50±0.20	11.5±0.20	0.90±0.20	0.30±0.10
2139											

4527	24.0±0.30	12.0±0.10	1.75±0.10	11.5±0.10		4.0±0.10	2.0±0.10	7.50±0.20	12.0±0.20	0.90±0.20	0.30±0.10
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Reel Dimensions



Type	ψD	W	ψM
0603 / 0805 / 1206 / 0508 / 0612	60±2	9.0±1	178±5
2010 / 2512 / 0815 / 1225		13±1	
3921 / 4527 / 2139		24.5±1	

Unit: mm