

**Metal Film Fixed Resistors
Type RMF Series**

△ Features

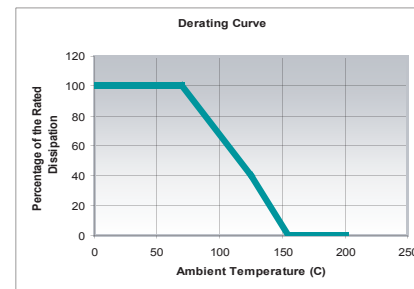
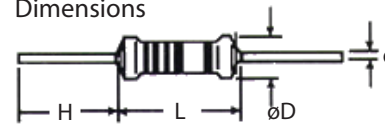
- High aluminum content base material
- Vacuum sputtered by Ni-Cr alloy
- Excellent heat and wet proof special resin for protective coating
- Stable and uniform properties, excellent performance in open air

△ Applications

- Suitable for products for high reliability.
- High-precision medical, telecom and consumer electronic equipment

△ Resistance Range

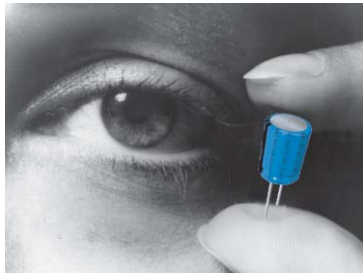
Dimensions



STYLE	POWER RATING (W)	TOLERANCE	TC±25PPM/°C	TC±100PPM/°C TC±50PPM/°C
MF-16	1/8 W	±1%	10Ω ~ 1MΩ	0.1Ω ~ 10MΩ
		±0.5%	100Ω ~ 1MΩ	1Ω ~ 10MΩ
		±0.25%	51.1Ω ~ 470KΩ	51.1Ω ~ 470KΩ
		±0.1%	51.1Ω ~ 470KΩ	51.1Ω ~ 470KΩ
MF-25	1/4 W	±1%	10Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.5%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.25%	10Ω ~ 470KΩ	10Ω ~ 470KΩ
		±0.1%	10Ω ~ 470KΩ	10Ω ~ 470KΩ
MF-51	1/2 W	±1%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.5%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.25%	10Ω ~ 470KΩ	10Ω ~ 470KΩ
		±0.1%	10Ω ~ 470KΩ	10Ω ~ 470KΩ
MF-100	1 W	±1%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.5%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.25%	1Ω ~ 1MΩ	10Ω ~ 470KΩ
		±0.1%	1Ω ~ 1MΩ	10Ω ~ 470KΩ
MF-200	2 W	±1%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.5%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.25%	1Ω ~ 1MΩ	10Ω ~ 470KΩ
		±0.1%	1Ω ~ 1MΩ	10Ω ~ 470KΩ
MF-300	3 W	±1%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.5%	0.1Ω ~ 10MΩ	0.1Ω ~ 10MΩ
		±0.25%	1Ω ~ 1MΩ	1Ω ~ 470KΩ
		±0.1%	1Ω ~ 1MΩ	1Ω ~ 470KΩ

△ Dimensions (mm)

Type	Power Rating (W)	L±0.5	D±0.5	H (Min)	D±0.03	Max. Working V.	Max. Overload V.
RMF-16	1/8W	3.7	1.8	27	0.46	200V	300V
RMF-25	1/4W	6.5	2.5	27	0.58	250V	500V
RMF-51	1/2W	9	3.7	25	0.68	400V	700V
RMF-100	1W	11	4.5	33	0.8	500V	1000V
RMF-200	2W	16	5	33	0.8	750V	1000V
RMF-300	3W	17	6	30	0.8	750V	1000V



Miniature Size Metal Film Fixed Resistors
Type RMF Series

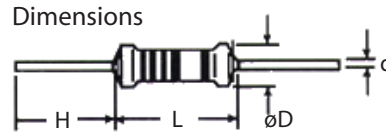
△ Features

- Miniature size for saving PCB assembly
- Vacuum sputtering metal film on high aluminum ceramic rods
- Superior electrical performance, cost comparable to conventional sizes
- Standard tolerance $\pm 1\%$ (2%, 5% Available)

△ Applications

- Suitable for products for high reliability.
- High-precision medical, telecom and consumer electronic equipment

△ Dimensions (mm)



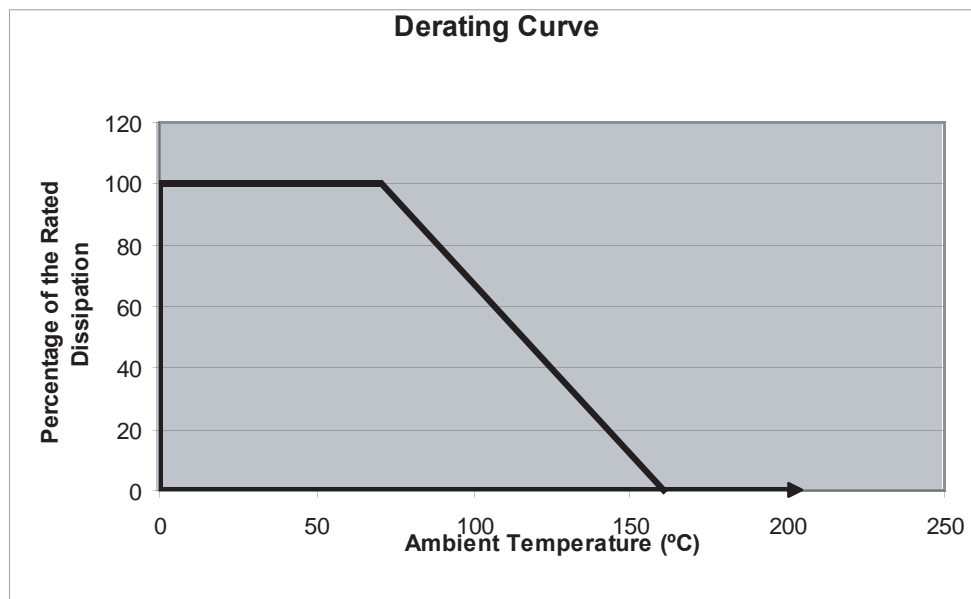
All Liberty Resistors uses the highest quality tin coated copper leads. The leads are rated at the below MAXIMUM soldering temperature and soldering time.

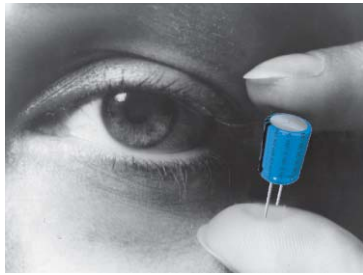
MAXIMUM soldering temperature/time
350°C 3sec
235°C 2min

Type	Power Rating (W)	Small Type	L ± 0.5	D ± 0.5	H(Min)	D ± 0.3	Max. Working V.	Max. Overload V.
RMF-20	1/4W	1/4WS	3.7	1.8	27	0.46	200V	300V
RMF-52	1/2W	1/2WS	6.5	2.5	25	0.58	250V	500V
RMF-101	1W	1WS	9.0	3.7	25	0.68	400V	700V
RMF-201	2W	2WS	11.0	4.5	30	0.80	500V	1000V
RMF-301	3W	3WS	16.0	5.0	30	0.80	750V	1000V
RMF-501	5W	5WS	17.0	6.0	30	0.80	750V	1000V

- Max working voltage determined by $E = PR$, E should not exceed value listed in column above.

△ Derating Curve



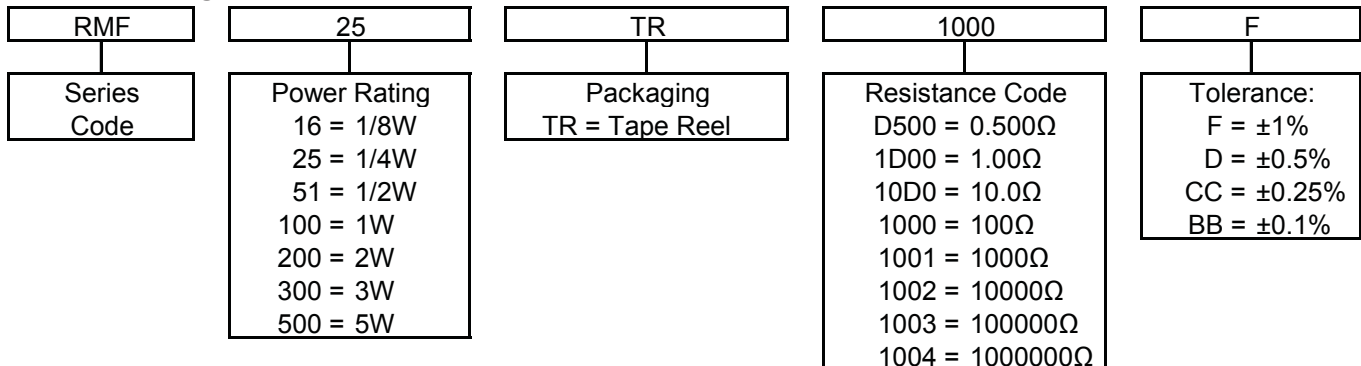


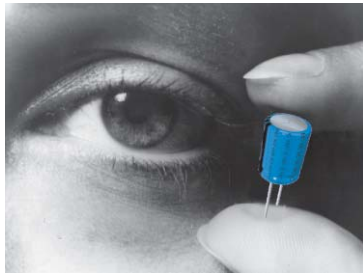
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Δ Characteristics

Requirements	Characteristics	Remarks
Temperature Coefficient	±50ppm	10 -6/K
		MIL-STD-202
		Method 304
Thermal Resistance	140 K/W	
Life Stability at 70°C at 1000Hr Max Resistance Change	0.5%	K Most Umax 1.5 Hr On
		0.5 Hr Off
Dielectric Withstanding Voltage	300 Vrms for MF25S	
	500 Vrms for MF50S	
Insulation Resistance	>1000 MΩ	100VDC
Damp Heat Steady State	±0.5%	56 days at 40°C and 93% Relative Humidity at a Voltage of 0.1 Times Rated Voltage, Max 16 volts
Short Time Overload	ΔR ±0.25%	2.5 Times Rated Voltage at Most 2 Times Limiting Element Voltage (UMax)
Moisture Resistance	± 0.5%	
Resistance to Soldering Heat	± 0.25%	350 ± 5°C to 6mm Distance from the resistance body in 3 secs.
Temperature Cycling	± 0.5%	-65°C to +155°C
Low Temperature Operation	± 0.25%	High Frequency 10-500Hz
Vibration	± 0.25%	-65°C
Current Noise	Up to 1MΩ ≤0.5 μV/V	-5dB
Solderability	>95% Coverage	Dipping in 235-5dBC Solder Bath for 2.5 secs.
Resistance to Solvents	No Failure to Top Coating and Color Code	

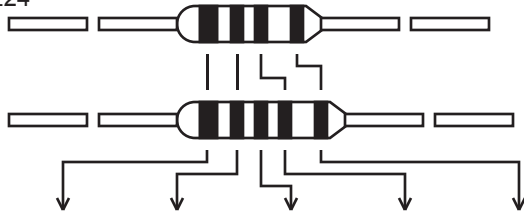
Δ Part Numbering





General Specification of Resistors

E6, E12, E24
E24, E96



Color	1st Band	2nd Band	3rd Band	Multiplier	Tolerance
Black	0	0	0	100	
Brown	1	1	1	101	F(±1%)
Red	2	2	2	102	G(±2%)
Orange	3	3	3	103	
Yellow	4	4	4	104	
Green	5	5	5	105	D(±0.5%)
Blue	6	6	6	106	C(±0.25%)
Violet	7	7	7	107	B(±0.1%)
Gray	8	8	8		
White	9	9	9	10-3	
Gold				10-1	J(±5%)
Silver				10-2	K(±10%)
Plain					M(±20%)

Symbol	T	E	C	K	J	L	D
T.C.R.	±10	±25	±50	±100	±150	±200	+200 -500

Symbol	A	B	C	D	F	G	J	K	M
Resistance Tolerance	±0.05	±0.1	±0.25	±.05	±1	±2	±5	±10	±20

Δ How to Apply Resistors Correctly

- The characteristics of resistor have relations to temperature moisture and voltage.
- The rating of resistor is specified on the basis of temperature.
- The power rating of resistor is all specified with a direct-current. (D.C.) continuous working voltage or sine-wave root-mean-square (RMS) continuous working voltage at commercial-line frequency.
- The tests regarding characteristics of resistor is principally specified on the basis of moisture.
- Maximum rated voltage and maximum overload voltage are limited for each style of resistor, (1) Generally, rated voltage $E=\sqrt{PR}$ where E=volt, P=watt, R=ohm. (2) Generally, overload voltage $ET=\sqrt{PR} \times 2.5$, application time=5secs.
- NOTE: Max Rated and Max Overload Voltage are specified in each specification, so if the voltage valued computed, is over than specified voltage value, the specified value should be applied to resistor.
- In the complicated or high density circuit, it is recommended that the wattage or OHMIC values or resistor should have a large redundancy from a view point of reliability.
- It is necessary that the handling or wiring of resistor to the circuit is careful and please do not apply any stress to the resistor by over heating.
- To rise the reliability of resistor, it is better to prefer resistor with uniform quality than taking resistor met with severe specification.
- To rise the stability of resistor, it is very important to take resistor met with circuit conditions and is also economical not to have unreasonable design from point of pricing resistor.
- Generally, failure of resistor takes a concentrated trend in the impulse circuit with complicated pulse wave form or LC circuit generated high voltage with transient phenomena, therefore, it is very important for designers to consider these conditions in the circuit design, if the resistor is applied in these circuits.

±2% E24	±5% E48	±1% E96	±0.5% E192	±2% E24	±5% E48	±1% E96	±0.5% E192
100	100	100	100	330			
		102	102		332	332	332
		105	105				336
			106		348	348	340
		107	107				344
			109				348
		110	110	360		357	352
			111				357
		113	113		365	365	361
		114	114				365
		115	115				370
			117				374
		118	118		383	383	379
		120	120				383
		121	121	390		392	388
			123				392
		124	124				397
			126		402	402	402
		127	127				407
			129				412
		130	130		422	422	417
			132				422
		133	133				427
			135				
		137	137	430		432	432
			138				437
		140	140		442	442	442
			142				448
		143	143			453	453
			145				459
		147	147		464	464	464
			149				470
		150	150	470		475	475
			152				481
		154	154		487	487	487
			156				493
		158	158			499	499
			160				505
		162	162	510			
			164				511
		165	165		511	511	517
			167				523
		169	169		536	536	530
			172				536
		174	174				542
			176				549
		178	178			549	556
			180		560	562	562
		182	182				569
			184				576
		187	187				583
			189				590
		191	191		590	590	597
			193				604
		196	196			604	612
			198				612
		200	200	200	619	619	619
			203				626
		205	205		620	619	634
			208				642
		210	210			634	649
			213			649	649
		215	215				657
			218			665	665
							673
		221	221		680		
			223				681
		226	226			681	690
			229				698
		232	232			698	706
			234			715	715
		237	237				723
			240				732
		243	243				741
			246		750	750	750
		249	249				759
			252				768
		255	255				777
			258			787	787
		261	261				796
			264				806
		267	267			806	816
		271	271		820		825
		274	274			825	825
			277				845
		280	280				856
			284			866	866
		287	287				876
			291			887	887
		294	294				898
			298				909
		301	301		910	909	920
			305				931
		309	309			931	942
			312				953
		316	316			953	965
			320				976
		324	324			976	988
			328				