

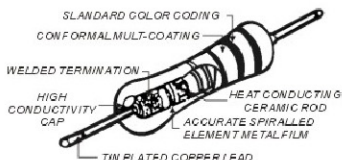
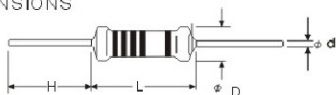
# METAL FILM FIXED RESISTORS

## INTRODUCTION:

MF series is a group of metal film-fixed resistors applying high Aluminum content base material vacuum sputtered by Ni-Cr alloy and excellent heat-and wet-proof special resin for protective coating. Those resistors are manufactured through integrated automatic production system and then have good stable and uniform property. Furthermore, they show excellent performance regardless open in air.

MF系列是一組鋁材經鍍鎳合金真空噴灑及特殊樹脂表被防火、防潮的金屬膜固定電阻。這些電阻由整體自動化系統製造，所以有穩定及均勻品質。而且，即使暴露在空氣中仍有極佳的品質。

## DIMENSIONS



## GENERAL SPECIFICATIONS

MIL STYLE	STYLE	POWER RATING(W)	DIMENSION (mm)				MAX WORKING VOLTAGE	MAX OVERLOAD
			L	D	H(MIN)	d		
RN-50	MF-12	0.125W	3.7 ±0.4	1.8 ±0.2	27	0.46 ±0.02	200	400
RN-50	MF-16	0.125W	3.7 ±0.4	1.8 ±0.2	27	0.46 ±0.02	200	400
RN-55	MF-25	0.25W	6.8 ±0.5	2.5 ±0.2	27	0.58 ±0.02	250	500
RN-60	MF-50	0.5W	9.0 ±1.0	3.5 ±0.5	25	0.68 ±0.02	350	700
RN-65	MF-100	1W	12 ±1.0	4.5 ±0.5	33	0.80 ±0.03	500	1000
RN-70	MF-200	2W	16 ±1.0	5.5 ±0.5	33	0.80 ±0.03	500	1000
RN-75	MF-300	3W	17 ±1.0	6.0 ±0.5	30	0.80 ±0.03	600	1000

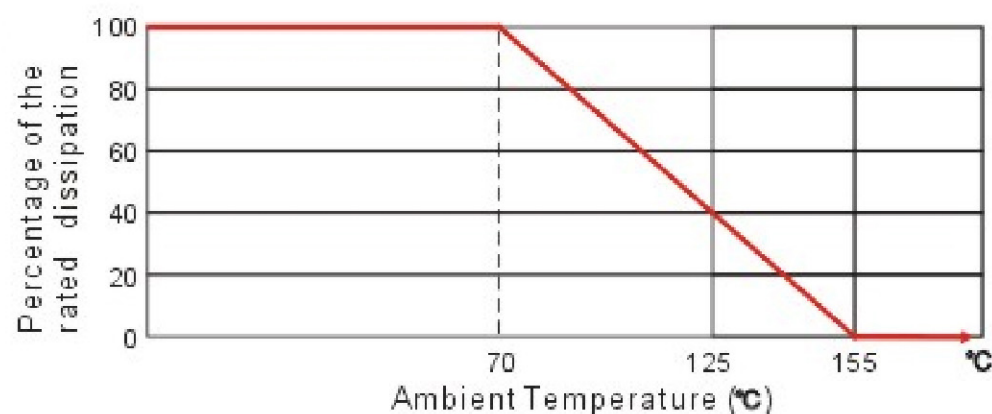
## RESISTANCE RANGE

MIL STYLE	STYLE	TOLERANCE	TC ±25PPM/°C	TC ±100PPM/°C TC ±50PPM/°C
RN-50	MF-12 MF-16	±1%	10Ω~1MΩ	1Ω~10MΩ
		±0.5%	100Ω~1MΩ	51.1Ω~470KΩ
		±0.25%	51.1Ω~470KΩ	
		±0.1%	51.1Ω~470KΩ	
RN-55	MF-25	±1%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.5%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.25%	10Ω~470KΩ	
		±0.1%	10Ω~470KΩ	
RN-60	MF-50	±1%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.5%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.25%	10Ω~470KΩ	
		±0.1%	10Ω~470KΩ	
RN-65	MF-100	±1%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.5%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.25%	10Ω~470KΩ	
		±0.1%	10Ω~470KΩ	
RN-70	MF-200	±1%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.5%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.25%	10Ω~470KΩ	
		±0.1%	10Ω~470KΩ	
RN-75	MF-300	±1%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.5%	0.1Ω~10MΩ	0.1Ω~10MΩ
		±0.25%	10Ω~470KΩ	
		±0.1%	10Ω~470KΩ	

# METAL FILM FIXED RESISTORS

Characteristic	Specification	Test Method
		(All resistance measurements should be performed after stabilisation or conditioning periods) .
DC RESISTANCE	Within specified tolerance.	MIL-STD-202 Method 303
TEMPERATURE COEFFICIENT	As buyer requested $\pm 25\text{PPM}/^\circ\text{C}$ , $\pm 100\text{PPM}/^\circ\text{C}$ , $\pm 50\text{PPM}/^\circ\text{C}$	MIL-STD-202 Method 304
DIELECTRIC STRENGTH	No flashover or damage	MIL-STD-202 Method 301 1/8W 300V 1 minute 1/4W 500V 1 minute 1/2W 700V 1 minute 1.2W 750V 1 minute
INSULATION RESISTANCE	at least 1,000M $\Omega$	MIL-STD-202 Method 302 1000V 1 minute
CURRENT NOISE TEST	below 10K $\Omega$ below 0.05 $\mu\text{V/V}$ 10K $\Omega$ ~below 0.1 $\mu\text{V/V}$ below 1M $\Omega$ below 0.2 $\mu\text{V/V}$	MIL-STD-202 Method 308
VIBRATION	$\Delta R$ within $\pm (0.25\% + 0.05\Omega)$	MIL-STD-202 Method 201 10~HZ X.Y.Z. 3 directions 2 hours each
TORMINAL STRENGTH	Lead is not break or loose	MIL-STD-202 Method 211
RESISTANCE TO SOLDERING HEAT	$\Delta R$ within $\pm (0.25\% + 0.05\Omega)$	MIL-STD-202 Method 210 350 $^\circ\text{C}$ , 3 $\pm 0.05$ sec
SOLDERABILITY	At least 95% coverage	MIL-STD-202 Method 208 230 $^\circ\text{C}$ , 5 sec
THERMAL SHOCK	$\Delta R$ within $\pm (0.5\% + 0.05\Omega)$	MIL-STD-202 Method 107 -55 $^\circ\text{C}$ , +155 $^\circ\text{C}$ 5 cycles
SHORT TIME OVERLOAD	$\Delta R$ within $\pm (0.5\% + 0.05\% \Omega)$	MIL-R-10509 Para, 4, 6, 6, 2.5 times rated working voltage, 5 seconds
HUMI DITY	$\Delta R$ within $\pm (1\% + 0.05\Omega)$ NO mechanical damage	MIL-STD-202 Method 103 40 $^\circ\text{C}$ , RH95% 500
LOW TEMPERATURE OPERATION	$\Delta R$ within $\pm (0.5\% + 0.05\Omega)$	MIL-R-10509 Para 4, 6, 5 rated working voltage, at -65 $^\circ\text{C}$ 45 minutes.
LOAD LIFE	$\Delta R$ within $\pm (1\% + 0.05\Omega)$	MIL-STD-202 method 108 Rated working voltage 1.5 hours on, 0.5 hours off for total 1000 hours
RESISTANCE TO SOVENT	Color bands legible No mechanical damage	MIL-STD-202 method 215

## DERATING CURVE



# GENERAL SPECIFICATION OF RESISTORS

E24 E96  
E192

COLOR	1ST BAND	2ND BAND	3RD BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	$10^0$	
BROWN	1	1	1	$10^1$	F ( $\pm 1\%$ )
RED	2	2	2	$10^2$	G ( $\pm 2\%$ )
ORANGE	3	3	3	$10^3$	
YELLOW	4	4	4	$10^4$	
GREEN	5	5	5	$10^5$	D ( $\pm 0.5\%$ )
BLUE	6	6	6	$10^6$	C ( $\pm 0.25\%$ )
VIOLET	7	7	7	$10^7$	B ( $\pm 0.1\%$ )
GRAY	8	8	8		
WHITE	9	9	9	$10^{-9}$	
GOLD				$10^{-1}$	J ( $\pm 5\%$ )
SILVER				$10^{-2}$	K ( $\pm 10\%$ )
PLAIN					M ( $\pm 20\%$ )

## TEMPERATURE COEFFICIENT

UNIT/PPM/°C

SYMBOL	T	E	C	K	J	L	D
T.C.R	$\pm 10$	$\pm 25$	$\pm 50$	$\pm 100$	$\pm 150$	$\pm 200$	+200 -500

## RESISTANCE TOLERANCE

UNIT/%

SYMBOL	A	B	C	D	F	G	J	K	M
RESISTANCE TOLERANCE	$\pm 0.05$	$\pm 0.1$	$\pm 0.25$	$\pm 0.5$	$\pm 1$	$\pm 2$	$\pm 5$	$\pm 10$	$\pm 20$

## 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 (R.M.S.) 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 =  $\sqrt{P \cdot R}$  WHERE, E=VOLT, P=WATT, R=OHM. (2) GENERALLY, OVERLOAD VOLTAGE  $E_T = \sqrt{P \cdot R} \times 2.5$ , APPLICATION TIME=5 SECS.  
NOTE /MAX. RATED AND MAX. OVERLOAD VOLTAGE ARE SPECIFIED IN EACH SPECIFICATION, SO IF THE VOLTAGE VALUE 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 OF RESISTOR SHOULD HAVE LARGE REDUNDANCY FROM A VIEW POINT OF RELIABILITY.
- ▲ IT IS NECESSARY THAT THE HANDLING OR WIRING OF RESISTOR TO THE CIRCUIT, IS CAREFULLY AND PLEASE DO NOT INFLICT ANY STRESS TO RESISTOR WITH OVER, HEATING APPLICATION.
- ▲ TO RISE THE RELIABILITY OF RESISTOR, IT IS BETTER TO PRERER RESISTOR WITH UNFORM 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 NO TO HAVE UNREASONABLE DESIGE FROM A POINT OF PRICING OF RESISTOR.
- ▲ GENERALLY, FAILURE OF RESISTOR TAKES A CONCENTRATED TREND IN THE IMPULSE CIRCUIT WITH COMPLICATED PULSE WAVE FORM OF LC CIRCUIT GENERATED HIGH VOLTAGE WITH TRANSIENT PHENOMENA, THEREFORE, IT IS VER YIMP ORTANT FOR DESIGNERS TO CONSIDER. THESE CONDITIONS IN THE CIRCUIT DESIGN, IF THE RESISTOR IS APPLIED IN THESE CIRCUIT.

$\pm 2\%$ $\pm 5\%$	$\pm 1\%$	$\pm 0.5\%$ $\pm 0.1\%$
E24	E96	E192
100	100	100
		101
		102
		104
		105
		106
		107
		108
		109
110	110	110
		111
		113
		114
		115
		117
120	118	118
		120
		121
		123
		124
		124
		126
		127
		129
130	130	130
		133
		133
		137
		138
		140
		140
		143
		143
		145
		147
		149
150	150	150
		152
		154
		156
		158
		160
160	158	160
		162
		164
		165
		169
		172
		174
		178
		178
180	178	180
		182
		184
		187
		189
		191
		193
		196
		198
200	200	200
		203
		205
		208
		210
		211
		215
		218
		221
220	221	221
		223
		226
		229
		232
		234
		237
		240
240	243	243
		246
249	249	249
		252
		255
		258
		261
		264
		267
270		
		274
		277
		280
		284
		287
		291
		294
		298
300	301	301
		305
		309
		312
		316
		320
		324
		328

$\pm 2\%$ $\pm 5\%$	$\pm 1\%$	$\pm 0.5\%$ $\pm 0.1\%$
E24	E96	E192
330		
	332	332
		336
	340	340
		344
	348	348
		352
		357
	357	
360	357	
		361
		365
	365	365
		370
	374	374
		379
		383
	383	383
		388
390	392	392
		397
		402
		407
		412
		417
		422
		427
430	432	432
		437
		442
		448
		453
		459
		464
470	464	464
		470
		475
		481
		487
		493
		499
		505
510	511	511
		517
		523
		530
		536
		543
		548
		556
560	562	562
		569
		576
		583
		590
		597
		604
		612
		619
620	619	619
		626
		634
		642
		649
		657
		665
		673
680	681	681
		690
		698
		706
		715
		723
		732
		741
750	750	750
		759
		768
		777
		787
		796
		806
		816
820	825	825
		835
		845
		856
		866
		876
		887
		898
		909
910	909	909
		920
		931
		942
		953
		965
		976
		988

**EXAMPLE:**

**DESCRIPTION MOR 1W 10K 5%**

**SERIAL NUMBER**



TYPE
METAL OXIDE FILM RESISTORS (MOR)
METAL FILM FIXED RESISTORS (MF)
CARBON FILM FIXED RESISTORS (CR)

SERIES	
12	1/8W
25	1/4W
50	1/2W
100	1W
200	2W
300	3W
500	5W
100S	1W (SMALL SIZE)

PACKAGING	
A	Tape Box
R	Tape Reel
B	Bulk
C	Forming
hor120Ntal Type	

TOLERANCE	
F	±1%
G	±2%
J	±5%
B	±0.1%

RESISTOR VALUE	
E24 Series 5% 3Digits	
2R2	2.2Ω
101	100Ω
103	10k
105	1M

RESISTOR VALUE	
E96 Series 1% 4Digits	
2R20	2.2Ω
1000	100Ω
1002	10K
1004	1M