# **Metal Film Resistors**

# General Type

Normal & Miniature Style [MFR Series]

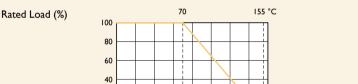
### **FEATURES**

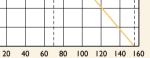
Power Rating	1/6W, 1/4W, 1/2W, 1W, 2W, 3W
Resistance Tolerance	±0.5%, ±1%, ±5%
T.C.R.	±15ppm/°C, ±25ppm/°C, ±50ppm/°C, ±100ppm/°C

### **DERATING CURVE**

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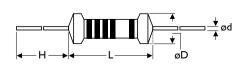
For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.





Ambient Temperature (°C)

DIMENSIONS



STYLE		DIMENSION					
Normal	Miniature	L	øD	н	ød		
MFR-12	MFR25S	3.4±0.3	1.9±0.2	28±2.0	0.45±0.05		
MFR-25	MFR50S	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05		
MFR-50	MFRIWS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05		
MFR100	MFR2WS	.5± .0	4.5±0.5	35±2.0	0.8±0.05		
MFR200	MFR3WS	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05		

# INTRODUCTION

The MFR Series Metal Film Resistors are manufactured using a vacuum sputtering system to deposit multiple layers of mixed metal alloys and passivative materials onto a carefully treated high grade ceramic substrate. After a helical groove has been cut in the resistive layer, tinned connecting leads of electrolytic copper are welded to the end-caps. The resistors are coated with layers of blue color lacquer.



Unit: mm

Note:		

## **ELECTRICAL CHARACTERISTICS**

STYLE	MFR-12	MFR25S	MFR-25	MFR50S	MFR-50	MFRIWS	MFRI00	MFR2WS MFR200	MFR3WS
Power Rating at 70°C	1/6W	1/4W		1/2W		IW		2W	3W
Maximum Working Voltage	200V	_	250V	300V	350V	400V	500V		
Maximum Overload Voltage	400V		500V	600V	700V	800V	1,000V		
Voltage Proof on Insulation	300V	400V	500V			700∨	1,000∨		
Resistance Range	ΙΩ - ΙΟΜΩ	ΠΩ - 10ΜΩ & 0Ω for E24 & E96 series value							
Operating Temp. Range	-55°C to +155°C								
Temperature Coefficient	±15ppm/°C, ±25ppm/°C, ±50ppm/°C, ±100ppm/°C								

Note: Special value is available on request

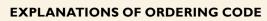
## **ENVIRONMENTAL CHARACTERISTICS**

PERFORMANCE TEST	TEST METHOD		APPRAISE
Short Time Overload	IEC 60115-14.13	2.5 times RCWV for 5 Sec.	±0.25%+0.05Ω
Voltage Proof on Insulation	IEC 60115-1 4.7	in V-block for 60 Sec., test voltage by type	By type
Temperature Coefficient	IEC 60115-1 4.8	-55°C to +155°C	By type
Insulation Resistance	IEC 60115-1 4.6	in V-block for 60 Sec.	>10,000ΜΩ
Solderability	IEC 60115-1 4.17	235±5°C for 3±0.5 Sec.	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5±0.5 Min. with ultrasonic	No deterioration of coatings and markings
Robustness of Terminations	IEC 60115-1 4.16	Direct load for 10 Sec. in the direction of the terminal leads	≥2.5kg (24.5N)
Periodic-pulse Overload	IEC 60115-1 4.39	4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec. off)	±1.0%+0.05Ω
Damp Heat Steady State	IEC 60115-1 4.24	40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV	±1.5%+0.05Ω
Endurance at 70°C	IEC 60115-1 4.25	70±2°C at RCWV for 1,000 Hr. (1.5 Hr. on, 0.5 Hr. off)	±1.5%+0.05Ω
Temperature Cycling	IEC 60115-1 4.19	-55°C ⇔ Room Temp. ⇔ +155°C ⇔ Room Temp. (5 cycles)	±0.75%+0.05Ω
Resistance to Soldering Heat	IEC 60115-1 4.18	260 $\pm$ 3°C for 10 $\pm$ 1 Sec., immersed to a point 3 $\pm$ 0.5mm from the body	±0.25%+0.05Ω

Note: RCWV(Rated Continuous Working Voltage) =  $\sqrt{Power Rating \times Resistance Value}$  or Max. working voltage listed above, whichever less.

Revision: 201304

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MFR	-12	F		F	52-	IOOR
ode I - 3 eries Name	Code 4 - 6 Power Rating	Code 7 Tolerance	Code 8 Packing Style	Code 9 Temperature Coef-	Code 10 - 12 Forming Type	Code 13 - 17 Resistance Valu
ee Index	-05 = ød0.5mm	$P = \pm 0.02 \%$	T = Tape/Box	ficient of Resistance	26- = 26mm	ORI = 0.1
	-06 = ød0.6mm	$A = \pm 0.05 \%$	R = Tape/Reel	- = Base on Spec.	52- = 52,4mm	100R = 100
	-00 = ød0.0mm -07 = ød0.7mm	$B = \pm 0.1 \%$	B = Bulk	$A = \pm 5 \text{ ppm/°C}$	73- = 73mm	100K = 10,000
	-08 = ød0.8mm	$C = \pm 0.25\%$	Buik	$B = \pm 10 \text{ ppm/°C}$	81- = 81mm	10M = 10,000,00
	-10 = ød.0mm	$D = \pm 0.5 \%$		$C = \pm 15 \text{ ppm/°C}$	91- = 91  mm	
	-14 = ød1.4mm	$F = \pm 1.\%$		$S = \pm 20 \text{ppm/°C}$	F = FType	
	-12 = 1/6W	$G = \pm 2\%$		D = ±25 ppm/°C	FK = FK Type	
	-25 = 1/4W	$J = \pm 5 \%$		$E = \pm 50 \text{ ppm/°C}$	FKK = FKK Type	
	25S = 1/4WS	$K = \pm 10\%$		F = ±100 ppm/°C	FFK = F-form Kink	
	-50 = 1/2W	- = Base on Spec.		G = ±200 ppm/°C	M = M-Type Forming	
	50S = 1/2WS	base on spee.		H = ±250 ppm/°C	MB = M-form W/flat	
	100 = 1W			I = ±300 ppm/°C	MT = MT Type Forming	
	WS =  WS			$J = \pm 350 \text{ ppm/°C}$	MR = MRType	
	200 = 2W			,, F.F	AV = AVIsert	
	2WS = 2WS				PN = PANAsert	
	204 = 0.4W					
	207 = 0.6W					
	300 = 3W					
	3WS = 3WS					
	3WM = 3WM					
	400 = 4W					
	500 = 5VV					
	5WS = 5WS					
	555 = 5WSS					
	700 = 7W					
	7WS = 7WS					
	10A = 10W					
	20A = 20W					
	30A = 30W					
	40A = 40W					
	50A = 50W					
	10S = 10WS					
	15A = 15W					
	25A = 25W					
	10B = 100W					

#### EXCEPTION:

#### • Cement series:

<Code 8>: Special packing style code

B: Bulk with wirewound or metal oxide sub-assembly for resistance value W: Bulk with ceramic based wirewound sub-assembly for resistance value  $% \mathcal{W}$ 

M: Bulk with metal oxide sub-assembly for resistance value

F: Bulk with Fiberglass based wirewound sub-assembly for resistance value

<Code 10-12>: Without forming code

Example: SQP500JB-10R

• JPW series:

<Code 13-17>: without resistance value code

Example: JPW-06-T-52-

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