

## Metal Film Resistors

# General Type

## Normal & Miniature Style [ MFR Series ]



### INTRODUCTION

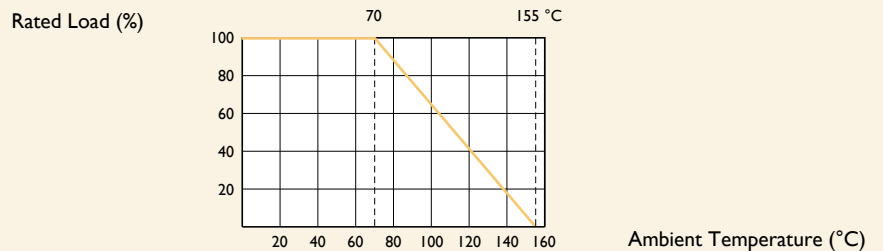
The MFR Series Metal Film Resistors are manufactured using a vacuum sputtering system to deposit multiple layers of mixed metal alloys and passivative materials onto a carefully treated high grade ceramic substrate. After a helical groove has been cut in the resistive layer, tinned connecting leads of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

### 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

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



### DIMENSIONS

Unit: mm



STYLE		DIMENSION			
Normal	Miniature	L	øD	H	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	MFR1WS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05
MFR100	MFR2WS	11.5±1.0	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

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		1W		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			700V	1,000V			
Resistance Range	1Ω - 10MΩ & 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 60115-1 4.13	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.	>10,000MΩ
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±3°C for 10±1 Sec., immersed to a point 3±0.5mm from the body	±0.25%+0.05Ω

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

Revision: 201304



## EXPLANATIONS OF ORDERING CODE

<b>MFR</b>	<b>-12</b>	<b>F</b>	<b>T</b>	<b>F</b>	<b>52-</b>	<b>100R</b>
Code 1 - 3 <b>Series Name</b> See Index	Code 4 - 6 <b>Power Rating</b> -05 = $\varnothing$ d0.5mm -06 = $\varnothing$ d0.6mm -07 = $\varnothing$ d0.7mm -08 = $\varnothing$ d0.8mm -10 = $\varnothing$ d1.0mm -14 = $\varnothing$ d1.4mm -12 = 1/6W -25 = 1/4W 25S = 1/4WS -50 = 1/2W 50S = 1/2WS 100 = 1W 1WS = 1WS 200 = 2W 2WS = 2WS 204 = 0.4W 207 = 0.6W 300 = 3W 3WS = 3WS 3WM = 3WM 400 = 4W 500 = 5W 5WS = 5WS 5SS = 5WSS 700 = 7W 7WS = 7WS 10A = 10W 20A = 20W 30A = 30W 40A = 40W 50A = 50W 10S = 10WS 15A = 15W 25A = 25W 10B = 100W 25B = 250W	Code 7 <b>Tolerance</b> P = $\pm 0.02$ % A = $\pm 0.05$ % B = $\pm 0.1$ % C = $\pm 0.25$ % D = $\pm 0.5$ % F = $\pm 1$ % G = $\pm 2$ % J = $\pm 5$ % K = $\pm 10$ % - = Base on Spec.	Code 8 <b>Packing Style</b> T = Tape/Box R = Tape/Reel B = Bulk	Code 9 <b>Temperature Coefficient of Resistance</b> - = Base on Spec. A = $\pm 5$ ppm/ $^{\circ}$ C B = $\pm 10$ ppm/ $^{\circ}$ C C = $\pm 15$ ppm/ $^{\circ}$ C S = $\pm 20$ ppm/ $^{\circ}$ C D = $\pm 25$ ppm/ $^{\circ}$ C E = $\pm 50$ ppm/ $^{\circ}$ C F = $\pm 100$ ppm/ $^{\circ}$ C G = $\pm 200$ ppm/ $^{\circ}$ C H = $\pm 250$ ppm/ $^{\circ}$ C I = $\pm 300$ ppm/ $^{\circ}$ C J = $\pm 350$ ppm/ $^{\circ}$ C	Code 10 - 12 <b>Forming Type</b> 26- = 26mm 52- = 52.4mm 73- = 73mm 81- = 81mm 91- = 91mm F = F Type FK = FK Type FKK = FKK Type FFK = F-form Kink M = M-Type Forming MB = M-form W/flat MT = MT Type Forming MR = MR Type AV = AVIsert PN = PANAsert	Code 13 - 17 <b>Resistance Value</b> 0R1 = 0.1 100R = 100 10K = 10,000 10M = 10,000,000

### 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

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-**

# Mouser Electronics

Authorized Distributor

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## Yageo:

[MFR-25FTE52-4K7](#) [MFR-25FBF52-698K](#) [MFR-25FBF52-90K9](#) [MFR-25FTE52-51R](#) [MFR-25FBF52-23R2](#) [MFR-25FBF52-23R7](#) [MFR-25FBF52-240K](#) [MFR-25FBF52-240R](#) [MFR-25FBF52-243K](#) [MFR-25FBF52-243R](#) [MFR-25FBF52-249K](#) [MFR-25FBF52-249R](#) [MFR-25FBF52-24K](#) [MFR-25FBF52-24K3](#) [MFR-25FBF52-24K9](#) [MFR-25FBF52-24R](#) [MFR-25FBF52-24R3](#) [MFR-25FBF52-24R9](#) [MFR-25FBF52-255K](#) [MFR-25FBF52-255R](#) [MFR-25FBF52-25K5](#) [MFR-25FBF52-25R5](#) [MFR-25FBF52-261K](#) [MFR-25FBF52-261R](#) [MFR-25FBF52-267K](#) [MFR-25FBF52-267R](#) [MFR-25FBF52-26K1](#) [MFR-25FBF52-26K7](#) [MFR-25FBF52-26R1](#) [MFR-25FBF52-26R7](#) [MFR-25FBF52-270K](#) [MFR-25FBF52-270R](#) [MFR-25FBF52-274K](#) [MFR-25FBF52-274R](#) [MFR-25FBF52-27K](#) [MFR-25FBF52-27K4](#) [MFR-25FBF52-27R](#) [MFR-25FBF52-27R4](#) [MFR-25FBF52-280K](#) [MFR-25FBF52-280R](#) [MFR-25FBF52-287K](#) [MFR-25FBF52-287R](#) [MFR-25FBF52-28K](#) [MFR-25FBF52-28K7](#) [MFR-25FBF52-28R](#) [MFR-25FBF52-28R7](#) [MFR-25FBF52-294K](#) [MFR-25FBF52-294R](#) [MFR-25FBF52-29K4](#) [MFR-25FBF52-29R4](#) [MFR-25FBF52-2K](#) [MFR-25FBF52-2K05](#) [MFR-25FBF52-2K1](#) [MFR-25FBF52-2K15](#) [MFR-25FBF52-2K2](#) [MFR-25FBF52-2K21](#) [MFR-25FBF52-2K26](#) [MFR-25FBF52-2K32](#) [MFR-25FBF52-2K37](#) [MFR-25FBF52-2K4](#) [MFR-25FBF52-2K43](#) [MFR-25FBF52-2K49](#) [MFR-25FBF52-2K55](#) [MFR-25FBF52-2K61](#) [MFR-25FBF52-2K67](#) [MFR-25FBF52-2K7](#) [MFR-25FBF52-2K74](#) [MFR-25FBF52-2K8](#) [MFR-25FBF52-2K87](#) [MFR-25FBF52-2K94](#) [MFR-25FBF52-2M](#) [MFR-25FBF52-2M2](#) [MFR-25FBF52-2M26](#) [MFR-25FBF52-2M32](#) [MFR-25FBF52-2M43](#) [MFR-25FBF52-2M49](#) [MFR-25FBF52-2M55](#) [MFR-25FBF52-2M7](#) [MFR-25FBF52-2M74](#) [MFR-25FBF52-2M8](#) [MFR-25FBF52-2M87](#) [MFR-25FBF52-2R](#) [MFR-25FBF52-2R1](#) [MFR-25FBF52-300K](#) [MFR-25FBF52-300R](#) [MFR-25FBF52-301K](#) [MFR-25FBF52-301R](#) [MFR-25FBF52-309K](#) [MFR-25FBF52-309R](#) [MFR-25FBF52-30K](#) [MFR-25FBF52-30K1](#) [MFR-25FBF52-30K9](#) [MFR-25FBF52-30R](#) [MFR-25FBF52-30R1](#) [MFR-25FBF52-30R9](#) [MFR-25FBF52-316K](#) [MFR-25FBF52-316R](#) [MFR-25FBF52-31K6](#) [MFR-25FBF52-31R6](#) [MFR-25FBF52-324K](#)