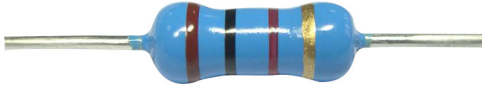


# Metal Film Fixed Resistor



RoHS  
Compliant



## Specifications:

Type	: MCMF
Rated Power	: 0.25W at 70°C
Max. Working Voltage	: 250V
Max. Overload Voltage	: 500V
Dielectric Withstanding Voltage	: 500V
Rated Ambient Temp	: 70°C
Operating Temp. Range	: -55°C to +155°C
Resistance Tolerance	: ±1%
Resistance Range	: 10Ω to 1MΩ

## Power Rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70°C. For temperature in excess of 70°C, the load shall be derated as shown in the below figure.

## Voltage Rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial line frequency and waveform corresponding to the power rating, as determined from the following formula :

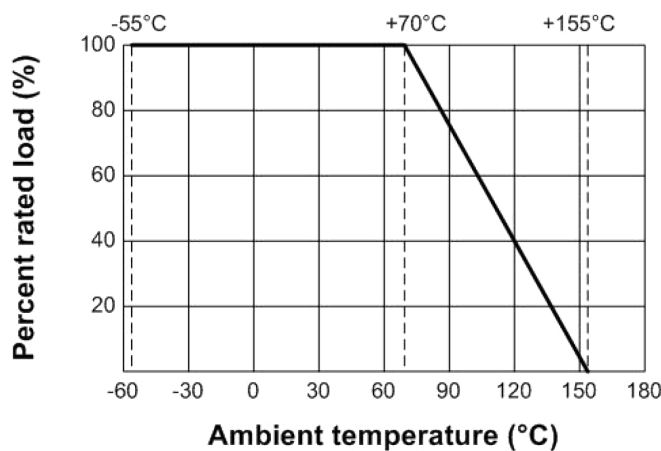
$$RCWV = \sqrt{P \times R}$$

Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (V)

P = Power Rating (W)

R = Nominal Resistance (Ω)

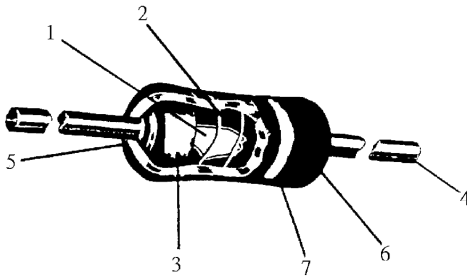
In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.



# Metal Film Fixed Resistor



## Construction



No	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Film	Metal Film
3	End Cap	Steel (Tin plated iron surface)
4	Lead Wire	Annealed copper wire coated with tin
5	Joint	By Welding
6	Coating	Insulated epoxy resin ( Colour : Sky Blue )
7	Colour Code	Epoxy Resin

## Metal Film Fixed Resistors

Characteristics	Limits	Test Methods( JIS C 5201-1 )
DC. resistance	Must be within the specified tolerance	The limit of error of measuring apparatus shall not exceed allowable range or 1% of resistance tolerance
Insulation resistance	Insulation resistance is 10,000MΩ Min.	Resistors shall be clamped in the trough of a 90° metallic V-block or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at DC potential respectively specified in the above list for 60 +10/-0 secs.
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	Resistors shall be clamped in the trough of a 90° metallic V-block or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at AC potential respectively specified in the table 1. for 60 +10/-0 secs.
Temperature coefficient	Within the temperature coefficient specified below :± 50 PPM/°C Max.	Natural resistance change per temp. degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{PPM}/^\circ\text{C})$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100°C (t2)
Short time overload	Resistance change rate is ± (0.5% + 0.05Ω) Max. with no evidence of mechanical damage	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds
Terminal strength	No evidence of mechanical damage	<b>Direct load:</b> Resistance to a 2.5 kgs direct load for 10secs. in the direction of the longitudinal axis of the terminal leads <b>Twist test :</b> Terminal leads shall be bent through 90 ° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations
Solderability	95 % coverage Min.	The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. of solder : 245°C ± 3°C Dwell time in solder : 2 ~ 3 seconds



# Metal Film Fixed Resistor



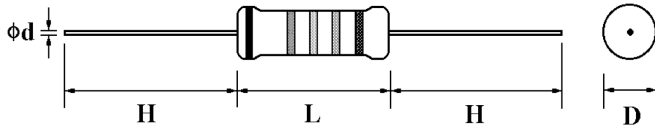
## Metal Film Fixed Resistors

Characteristics	Limits	Test Methods( JIS C 5201-1 )															
Soldering temp. reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance.(95 % coverage Min.)	The leads immersed into solder bath to 3.2 to 4.8 mm. from the body. Permanent resistance change shall be checked. <u>Wave soldering condition: (2 cycles Max.)</u> Pre-heat : 100 ~ 120°C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255°C, 10 sec. (Max.) Peak temp.: 260°C <u>Hand soldering condition:</u> Hand Soldering bit temp. : 380 ± 10°C Dwell time in solder : 3 +1/-0 sec.															
Resistance to soldering heat	Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage	Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in 350°C ± 10°C solder for 3 ± 0.5 seconds															
Temperature cycling	Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty shown below:															
		<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ± 3°C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 ~ 15 mins</td> </tr> <tr> <td>3</td> <td>+155°C ± 2°C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 ~ 15 mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	-55°C ± 3°C	30 mins	2	Room temp.	10 ~ 15 mins	3	+155°C ± 2°C	30 mins	4	Room temp.	10 ~ 15 mins
		Step	Temperature	Time													
		1	-55°C ± 3°C	30 mins													
		2	Room temp.	10 ~ 15 mins													
3	+155°C ± 2°C	30 mins															
4	Room temp.	10 ~ 15 mins															
Vibration	Resistance change rate is ± (1% + 0.05Ω) Max.	55Hz, 3 planes 2hrs each Total amplitude = 1.5mm															
Load life in humidity	<b>Resistance value</b>	Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity test chamber controlled at 40°C ± 2°C and 90 to 95 % relative humidity															
	Normal type		± 1.5 %														
Load life	<b>Resistance value</b>	7.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70°C ± 2°C ambient															
	Normal type		± 1.5 %														
Resistance to solvent	No deterioration of protective coatings and markings	Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic															
Pulse overload	Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage	Resistance change after 10,000 cycles (1 sec. "on" , 25 secs. "off" ) at 4 times RCWV															

# Metal Film Fixed Resistor



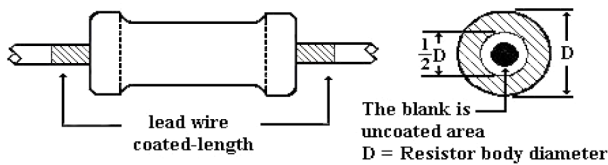
## Dimension



Type	Power Rating	D (Max.)	L (Max.)	d ± 0.05	H ± 3
MCMF	1/4W	2.5mm	6.8mm	0.54mm	28mm

## Painting method

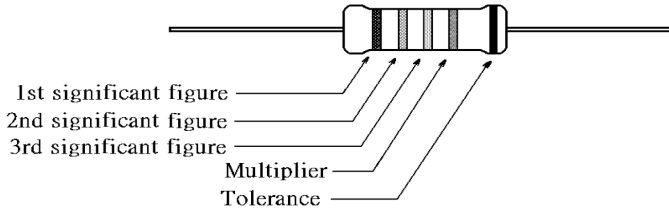
Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the arc angle.



## Marking

### 1. Resistor

Resistors shall be marked with colour coding colours shall be in accordance with JIS C 0802



### 2. Label

Label shall be marked with following items:

1. Type and style
2. Nominal resistance
3. Resistance tolerance
4. Quantity
5. Lot number
6. PPM

## Part Number Table

Description	Part Number
1kΩ Metal Film Fixed Resistor	MCMF0W4BB1001A5
10kΩ Metal Film Fixed Resistor	MCMF0W4BB1002A50
100kΩ Metal Film Fixed Resistor	MCMF0W4BB1003A50
20kΩ Metal Film Fixed Resistor	MCMF0W4BB2002A50
250Ω Metal Film Fixed Resistor	MCMF0W4BB2500A50
5kΩ Metal Film Fixed Resistor	MCMF0W4BB5001A50
50Ω Metal Film Fixed Resistor	MCMF0W4BB500JA50
100Ω Metal Film Fixed Resistor	MCMF0W4FF1000A50
1kΩ Metal Film Fixed Resistor	MCMF0W4FF1001A50
10kΩ Metal Film Fixed Resistor	MCMF0W4FF1002A50
100kΩ Metal Film Fixed Resistor	MCMF0W4FF1003A50
1MΩ Metal Film Fixed Resistor	MCMF0W4FF1004A50

Description	Part Number
10Ω Metal Film Fixed Resistor	MCMF0W4FF100JA50
10.2kΩ Metal Film Fixed Resistor	MCMF0W4FF1022A50
1.05kΩ Metal Film Fixed Resistor	MCMF0W4FF1051A50
1.07kΩ Metal Film Fixed Resistor	MCMF0W4FF1071A50
110Ω Metal Film Fixed Resistor	MCMF0W4FF1100A50
1.1kΩ Metal Film Fixed Resistor	MCMF0W4FF1101A50
11kΩ Metal Film Fixed Resistor	MCMF0W4FF1102A50
110kΩ Metal Film Fixed Resistor	MCMF0W4FF1103A50
11Ω Metal Film Fixed Resistor	MCMF0W4FF110JA50
113kΩ Metal Film Fixed Resistor	MCMF0W4FF1133A50
11.5kΩ Metal Film Fixed Resistor	MCMF0W4FF1152A50
120Ω Metal Film Fixed Resistor	MCMF0W4FF1200A50



# Metal Film Fixed Resistor



Description	Part Number
1.2kΩ Metal Film Fixed Resistor	MCMF0W4FF1201A50
12kΩ Metal Film Fixed Resistor	MCMF0W4FF1202A50
120kΩ Metal Film Fixed Resistor	MCMF0W4FF1203A50
12Ω Metal Film Fixed Resistor	MCMF0W4FF120JA50
121Ω Metal Film Fixed Resistor	MCMF0W4FF1210A50
1.21kΩ Metal Film Fixed Resistor	MCMF0W4FF1211A50
12.1kΩ Metal Film Fixed Resistor	MCMF0W4FF1212A50
1.24kΩ Metal Film Fixed Resistor	MCMF0W4FF1241A50
130Ω Metal Film Fixed Resistor	MCMF0W4FF1300A50
1.3kΩ Metal Film Fixed Resistor	MCMF0W4FF1301A50
130kΩ Metal Film Fixed Resistor	MCMF0W4FF1303A50
13Ω Metal Film Fixed Resistor	MCMF0W4FF130JA50
13.3kΩ Metal Film Fixed Resistor	MCMF0W4FF1332A50
14Ω Metal Film Fixed Resistor	MCMF0W4FF140JA50
14.7kΩ Metal Film Fixed Resistor	MCMF0W4FF1472A50
150Ω Metal Film Fixed Resistor	MCMF0W4FF1500A50
1.5kΩ Metal Film Fixed Resistor	MCMF0W4FF1501A50
15kΩ Metal Film Fixed Resistor	MCMF0W4FF1502A50
150kΩ Metal Film Fixed Resistor	MCMF0W4FF1503A50
15Ω Metal Film Fixed Resistor	MCMF0W4FF150JA50
160Ω Metal Film Fixed Resistor	MCMF0W4FF1600A50
1.6kΩ Metal Film Fixed Resistor	MCMF0W4FF1601A50
16kΩ Metal Film Fixed Resistor	MCMF0W4FF1602A50
16Ω Metal Film Fixed Resistor	MCMF0W4FF160JA50
1.62kΩ Metal Film Fixed Resistor	MCMF0W4FF1621A50
174Ω Metal Film Fixed Resistor	MCMF0W4FF1740A50
1.74kΩ Metal Film Fixed Resistor	MCMF0W4FF1741A50
174kΩ Metal Film Fixed Resistor	MCMF0W4FF1743A50
178Ω Metal Film Fixed Resistor	MCMF0W4FF1780A50
180Ω Metal Film Fixed Resistor	MCMF0W4FF1800A50
1.8kΩ Metal Film Fixed Resistor	MCMF0W4FF1801A50
18kΩ Metal Film Fixed Resistor	MCMF0W4FF1802A50
180kΩ Metal Film Fixed Resistor	MCMF0W4FF1803A50
18Ω Metal Film Fixed Resistor	MCMF0W4FF180JA50
182Ω Metal Film Fixed Resistor	MCMF0W4FF1820A50
1.82kΩ Metal Film Fixed Resistor	MCMF0W4FF1821A50
196Ω Metal Film Fixed Resistor	MCMF0W4FF1960A50
196kΩ Metal Film Fixed Resistor	MCMF0W4FF1963A50
200Ω Metal Film Fixed Resistor	MCMF0W4FF2000A50

Description	Part Number
2kΩ Metal Film Fixed Resistor	MCMF0W4FF2001A50
20kΩ Metal Film Fixed Resistor	MCMF0W4FF2002A50
200kΩ Metal Film Fixed Resistor	MCMF0W4FF2003A50
20Ω Metal Film Fixed Resistor	MCMF0W4FF200JA50
20.5kΩ Metal Film Fixed Resistor	MCMF0W4FF2052A50
205kΩ Metal Film Fixed Resistor	MCMF0W4FF2053A50
2.1kΩ Metal Film Fixed Resistor	MCMF0W4FF2101A50
210kΩ Metal Film Fixed Resistor	MCMF0W4FF2103A50
215kΩ Metal Film Fixed Resistor	MCMF0W4FF2153A50
220Ω Metal Film Fixed Resistor	MCMF0W4FF2200A50
2.2kΩ Metal Film Fixed Resistor	MCMF0W4FF2201A50
22kΩ Metal Film Fixed Resistor	MCMF0W4FF2202A50
220kΩ Metal Film Fixed Resistor	MCMF0W4FF2203A50
22Ω Metal Film Fixed Resistor	MCMF0W4FF220JA50
2.21kΩ Metal Film Fixed Resistor	MCMF0W4FF2211A50
226kΩ Metal Film Fixed Resistor	MCMF0W4FF2263A50
237Ω Metal Film Fixed Resistor	MCMF0W4FF2370A50
240Ω Metal Film Fixed Resistor	MCMF0W4FF2400A50
2.4kΩ Metal Film Fixed Resistor	MCMF0W4FF2401A50
24kΩ Metal Film Fixed Resistor	MCMF0W4FF2402A50
240kΩ Metal Film Fixed Resistor	MCMF0W4FF2403A50
24Ω Metal Film Fixed Resistor	MCMF0W4FF240JA50
249Ω Metal Film Fixed Resistor	MCMF0W4FF2490A50
2.49kΩ Metal Film Fixed Resistor	MCMF0W4FF2491A50
24.9kΩ Metal Film Fixed Resistor	MCMF0W4FF2492A50
249kΩ Metal Film Fixed Resistor	MCMF0W4FF2493A50
24.9Ω Metal Film Fixed Resistor	MCMF0W4FF249JA50
261kΩ Metal Film Fixed Resistor	MCMF0W4FF2613A50
270Ω Metal Film Fixed Resistor	MCMF0W4FF2700A50
2.7kΩ Metal Film Fixed Resistor	MCMF0W4FF2701A50
27kΩ Metal Film Fixed Resistor	MCMF0W4FF2702A50
270kΩ Metal Film Fixed Resistor	MCMF0W4FF2703A50
27Ω Metal Film Fixed Resistor	MCMF0W4FF270JA50
274Ω Metal Film Fixed Resistor	MCMF0W4FF2740A50
2.74kΩ Metal Film Fixed Resistor	MCMF0W4FF2741A50
27.4kΩ Metal Film Fixed Resistor	MCMF0W4FF2742A50
28.7kΩ Metal Film Fixed Resistor	MCMF0W4FF2872A50
294Ω Metal Film Fixed Resistor	MCMF0W4FF2940A50
294kΩ Metal Film Fixed Resistor	MCMF0W4FF2943A50

# Metal Film Fixed Resistor



Description	Part Number
29.4Ω Metal Film Fixed Resistor	MCMF0W4FF294JA50
300Ω Metal Film Fixed Resistor	MCMF0W4FF3000A50
3kΩ Metal Film Fixed Resistor	MCMF0W4FF3001A50
30kΩ Metal Film Fixed Resistor	MCMF0W4FF3002A50
300kΩ Metal Film Fixed Resistor	MCMF0W4FF3003A50
30Ω Metal Film Fixed Resistor	MCMF0W4FF300JA50
301Ω Metal Film Fixed Resistor	MCMF0W4FF3010A50
3.01kΩ Metal Film Fixed Resistor	MCMF0W4FF3011A50
30.1kΩ Metal Film Fixed Resistor	MCMF0W4FF3012A50
301kΩ Metal Film Fixed Resistor	MCMF0W4FF3013A50
3.09kΩ Metal Film Fixed Resistor	MCMF0W4FF3091A50
309kΩ Metal Film Fixed Resistor	MCMF0W4FF3093A50
324kΩ Metal Film Fixed Resistor	MCMF0W4FF3243A50
330Ω Metal Film Fixed Resistor	MCMF0W4FF3300A50
3.3kΩ Metal Film Fixed Resistor	MCMF0W4FF3301A50
33kΩ Metal Film Fixed Resistor	MCMF0W4FF3302A50
330kΩ Metal Film Fixed Resistor	MCMF0W4FF3303A50
33Ω Metal Film Fixed Resistor	MCMF0W4FF330JA50
3.32kΩ Metal Film Fixed Resistor	MCMF0W4FF3321A50
33.2kΩ Metal Film Fixed Resistor	MCMF0W4FF3322A50
33.2Ω Metal Film Fixed Resistor	MCMF0W4FF332JA50
35.7kΩ Metal Film Fixed Resistor	MCMF0W4FF3572A50
360Ω Metal Film Fixed Resistor	MCMF0W4FF3600A50
36kΩ Metal Film Fixed Resistor	MCMF0W4FF3602A50
36Ω Metal Film Fixed Resistor	MCMF0W4FF360JA50
3.65kΩ Metal Film Fixed Resistor	MCMF0W4FF3651A50
36.5kΩ Metal Film Fixed Resistor	MCMF0W4FF3652A50
365kΩ Metal Film Fixed Resistor	MCMF0W4FF3653A50
374Ω Metal Film Fixed Resistor	MCMF0W4FF3740A50
374kΩ Metal Film Fixed Resistor	MCMF0W4FF3743A50
37.4Ω Metal Film Fixed Resistor	MCMF0W4FF374JA50
383Ω Metal Film Fixed Resistor	MCMF0W4FF3830A50
38.3Ω Metal Film Fixed Resistor	MCMF0W4FF383JA50
390Ω Metal Film Fixed Resistor	MCMF0W4FF3900A50
3.9kΩ Metal Film Fixed Resistor	MCMF0W4FF3901A50
39kΩ Metal Film Fixed Resistor	MCMF0W4FF3902A50
390kΩ Metal Film Fixed Resistor	MCMF0W4FF3903A50
39Ω Metal Film Fixed Resistor	MCMF0W4FF390JA50
392Ω Metal Film Fixed Resistor	MCMF0W4FF3920A50

Description	Part Number
3.92kΩ Metal Film Fixed Resistor	MCMF0W4FF3921A50
39.2kΩ Metal Film Fixed Resistor	MCMF0W4FF3922A50
39.2Ω Metal Film Fixed Resistor	MCMF0W4FF392JA50
402Ω Metal Film Fixed Resistor	MCMF0W4FF4020A50
40.2kΩ Metal Film Fixed Resistor	MCMF0W4FF4022A50
402kΩ Metal Film Fixed Resistor	MCMF0W4FF4023A50
40.2Ω Metal Film Fixed Resistor	MCMF0W4FF402JA50
4.22kΩ Metal Film Fixed Resistor	MCMF0W4FF4221A50
430Ω Metal Film Fixed Resistor	MCMF0W4FF4300A50
4.3kΩ Metal Film Fixed Resistor	MCMF0W4FF4301A50
430kΩ Metal Film Fixed Resistor	MCMF0W4FF4303A50
43Ω Metal Film Fixed Resistor	MCMF0W4FF430JA50
4.32kΩ Metal Film Fixed Resistor	MCMF0W4FF4321A50
43.2kΩ Metal Film Fixed Resistor	MCMF0W4FF4322A50
4.42kΩ Metal Film Fixed Resistor	MCMF0W4FF4421A50
4.53kΩ Metal Film Fixed Resistor	MCMF0W4FF4531A50
464Ω Metal Film Fixed Resistor	MCMF0W4FF4640A50
4.64kΩ Metal Film Fixed Resistor	MCMF0W4FF4641A50
470Ω Metal Film Fixed Resistor	MCMF0W4FF4700A50
4.7kΩ Metal Film Fixed Resistor	MCMF0W4FF4701A50
47kΩ Metal Film Fixed Resistor	MCMF0W4FF4702A50
470kΩ Metal Film Fixed Resistor	MCMF0W4FF4703A50
47Ω Metal Film Fixed Resistor	MCMF0W4FF470JA50
475Ω Metal Film Fixed Resistor	MCMF0W4FF4750A50
4.75kΩ Metal Film Fixed Resistor	MCMF0W4FF4751A50
47.5kΩ Metal Film Fixed Resistor	MCMF0W4FF4752A50
475kΩ Metal Film Fixed Resistor	MCMF0W4FF4753A50
47.5Ω Metal Film Fixed Resistor	MCMF0W4FF475JA50
4.87kΩ Metal Film Fixed Resistor	MCMF0W4FF4871A50
499Ω Metal Film Fixed Resistor	MCMF0W4FF4990A50
4.99kΩ Metal Film Fixed Resistor	MCMF0W4FF4991A50
49.9kΩ Metal Film Fixed Resistor	MCMF0W4FF4992A50
499kΩ Metal Film Fixed Resistor	MCMF0W4FF4993A50
49.9Ω Metal Film Fixed Resistor	MCMF0W4FF499JA50
510Ω Metal Film Fixed Resistor	MCMF0W4FF5100A50
5.1kΩ Metal Film Fixed Resistor	MCMF0W4FF5101A50
51kΩ Metal Film Fixed Resistor	MCMF0W4FF5102A50
510kΩ Metal Film Fixed Resistor	MCMF0W4FF5103A50
51Ω Metal Film Fixed Resistor	MCMF0W4FF510JA50