

**RoHS
Compliant**



Ratings:

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

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:

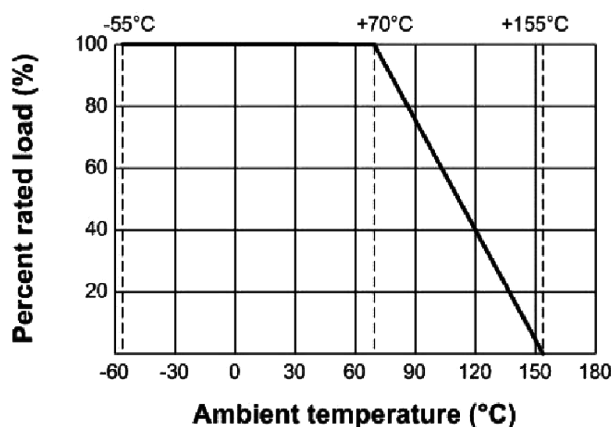
$$RCWV = \sqrt{P \times R}$$

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

P = Power Rating (Watt)

R = Nominal Resistance (Ohm)

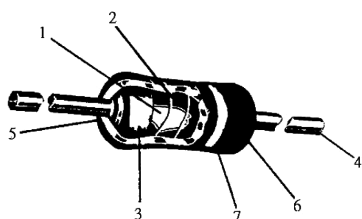
In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value



Nominal resistance :

Effective figures of nominal resistance shall be in accordance with E-24 series

Construction:



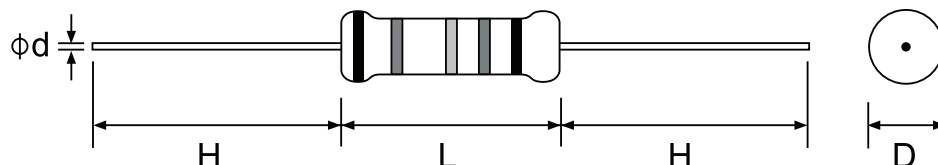
No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Film	Metal Film
3	End Cap	Steel (Tin plated iron surface)
4	Lead Wire	Annealed copper wire coated with tin
5	Joint	By Welding
6	Coating	Insulated epoxy resin (Colour : Sky blue)
7	Colour Code	Epoxy Resin

Characteristics:

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 $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : Resistance value at room temperature (t ₁) R ₂ : Resistance value at room temp. plus 100°C (t ₂)
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	Direct load: Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads Twist test: 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

Characteristics	Limits	Test Methods (JIS C 5201-1)															
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															
Soldering Temperature Reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance. (95 % coverage Min.)	The leads immersed into solder bath to 3.2 to 4.8mm. 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 4.8mm from the body in 350°C ±10°C solder for 3 ± 0.5seconds															
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><tr><th>Step</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>-55°C ± 3°C</td><td>30mins</td></tr><tr><td>2</td><td>Room temp.</td><td>10 to 15mins</td></tr><tr><td>3</td><td>+155°C ± 2°C</td><td>30mins</td></tr><tr><td>4</td><td>Room temp.</td><td>10 to 15 mins</td></tr></table>	Step	Temperature	Time	1	-55°C ± 3°C	30mins	2	Room temp.	10 to 15mins	3	+155°C ± 2°C	30mins	4	Room temp.	10 to 15 mins
Step	Temperature	Time															
1	-55°C ± 3°C	30mins															
2	Room temp.	10 to 15mins															
3	+155°C ± 2°C	30mins															
4	Room temp.	10 to 15 mins															
Vibration	Resistance change rate is ±(1% + 0.05Ω) Max.	55Hz, 3 planes 2hrs each, Total amplitude = 1.5mm															
Load life in Humidity	<table><tr><th>Resistance value</th><th>Δ R/R</th></tr><tr><td>Normal type</td><td>±1.5%</td></tr></table>	Resistance value	Δ R/R	Normal type	±1.5%	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											
Resistance value	Δ R/R																
Normal type	±1.5%																
Load Life	<table><tr><th>Resistance value</th><th>Δ R/R</th></tr><tr><td>Normal type</td><td>±1.5%</td></tr></table>	Resistance value	Δ R/R	Normal type	±1.5%	7.10 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											
Resistance value	Δ R/R																
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															

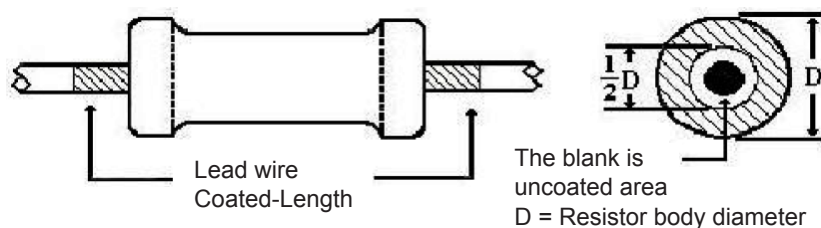
Dimension:



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

Painting method:

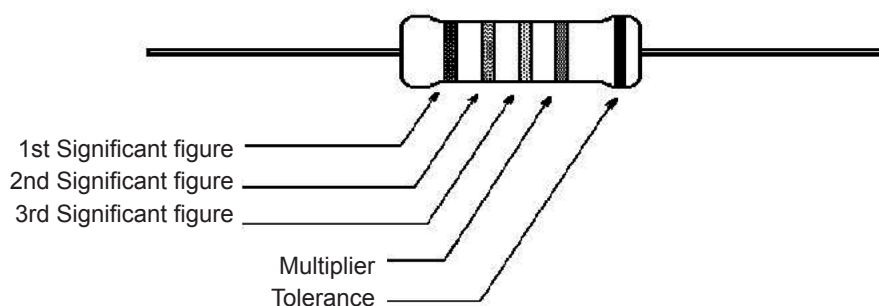
Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover.
The extent should be within 1/2 of the arc angle.



Marking:

Resistor:

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

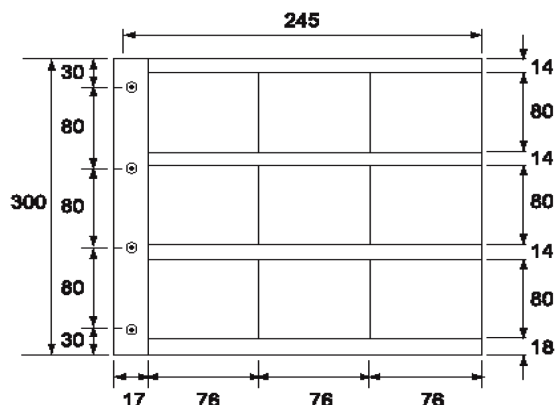


Metal Film Resistor Kit

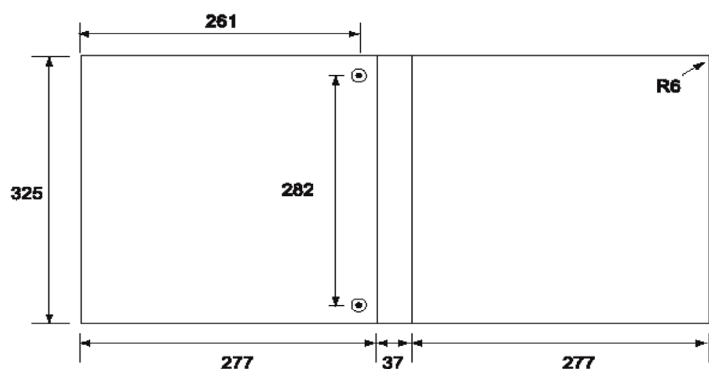
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Kit resistors:

Insert for Chip Kit



Album for Chip Kit:



Dimensions : Millimetres

Chip Kit Resistors:

Product : MF 1/4W 1% 50ppm (2.5x6.8)
E12 Series : (121 Values)
Quantity : 100pcs per value
Total Qty : 12,100pcs.

NO.	Value
1	10R
2	11R
3	12R
4	13R
5	15R
6	16R
7	18R
8	20R
9	22R
10	24R
11	27R
12	30R
13	33R
14	36R
15	39R
16	43R
17	47R
18	51R
19	56R

NO.	Value
20	62R
21	68R
22	75R
23	82R
24	91R
25	100R
26	110R
27	120R
28	130R
29	150R
30	160R
31	180R
32	200R
33	220R
34	240R
35	270R
36	300R
37	330R
38	360R

NO.	Value
39	390R
40	430R
41	470R
42	510R
43	560R
44	620R
45	680R
46	750R
47	820R
48	910R
49	1K
50	1K1
51	1K2
52	1K3
53	1K5
54	1K6
55	1K8
56	2K
57	2K2

NO.	Value
58	2K4
59	2K7
60	3K
61	3K3
62	3K6
63	3K9
64	4K3
65	4K7
66	5K1
67	5K6
68	6K2
69	6K8
70	7K5
71	8K2
72	9K1
73	10K
74	11K
75	12K
76	13K

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Metal Film Resistor Kit

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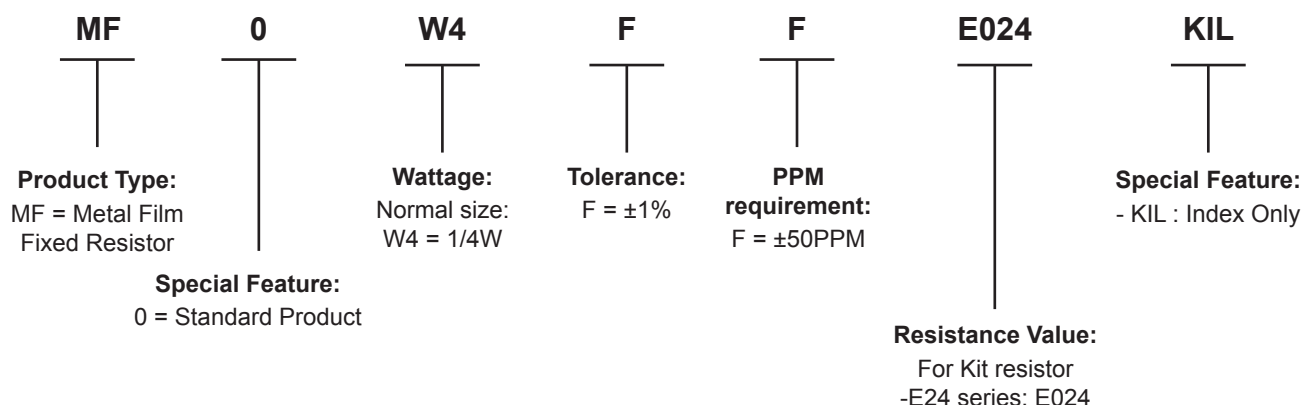
NO.	Value
77	15K
78	16K
79	18K
80	20K
81	22K
82	24K
83	27K
84	30K
85	33K
86	36K
87	39K
88	43K
89	47K

NO.	Value
90	51K
91	56K
92	62K
93	68K
94	75K
95	82K
96	91K
97	100K
98	110K
99	120K
100	130K
101	150K
102	160K

NO.	Value
103	180K
104	200K
105	220K
106	240K
107	270K
108	300K
109	330K
110	360K
111	390K
112	430K
113	470K
114	510K
115	560K

NO.	Value
116	620K
117	680K
118	750K
119	820K
120	910K
121	1M

Explanation of Part Number



Part Number Table

Description	Part Number
Resistor, Kit, 0.25W, 1%, E-24	MF0W4FFE024KIL

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