



# Metal Film MELF Resistors (lead-free)

## 1. Scope

These drawings for approval shall be applied to the Metal Film MELF resistors (MFM series) of lead-free manufactured.

## 2. Part Number

Part number of the Metal Film MELF Resistors is identified by the series, size, power rating, tolerance, temperature coefficient, packing, special code and resistance value. The resistors are coated with layers of blue color lacquer.

Ex:

MFM	B	25S	F	C2	R	-	100K
Series Code	Size Code	Power Rating	Resistance Tolerance	T.C.R. (ppm/°C)	Packaging Code	Special Code	Resistance Value
MFM	B = 0204 C = 0207 D = 0309	25S = 0.25WS -50 = 0.5W 50S = 0.5WS -50 = 0.5W	F = ±1% G = ±2% J = ±5%	C1 = ±100 C2 = ±50 C3 = ±25	R=Tape/Reel B=Bulk	Base on Spec.	E 24 & E 196 100R = 100 10K = 10,000 1M = 1,000,000

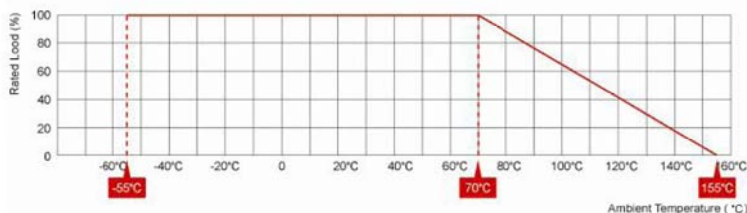
## 3. Specification

Series	Size Code	Power Rating	T.C.R. (x10 <sup>-6</sup> /K)	Resistance Tol. & Range			Max.Working Voltage	Max.Overload Voltage
				F(±1%)	G(±2%)	J(±5%)		
MFMB25S	0204	0.25W	±100	5M11-10M	-	0.1R-0.99R	200V	400V
			±50	1R-5M1	1R-5M1	-		
			±25	100R-560K	-	-		
MFMC-25	0207	0.25W	±100	5M11-10M	-	0.1R-0.99R	250V	500V
			±50	1R-5M1	1R-5M1	-		
			±25	100R-560K	-	-		
MFMC50S	0207	0.5W	±100	5M11-10M	-	0.1R-0.99R	250V	500V
			±50	1R-5M1	1R-5M1	-		
			±25	4R7-560K	-	-		
MFMD-50	0309	0.5W	±100	5M11-10M	-	0.1R-0.99R	350V	700V
			±50	1R-5M1	1R-5M1	-		
			±25	100R-560K	-	-		

Note : Below or over this resistance on request.

## 4. Termination surface material is tin plating.

## 5. Derating Curve

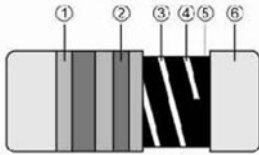


For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the above curve.



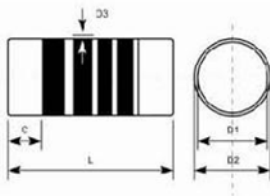
## Metal Film MELF Resistors (lead-free)

### 6. Construction



Item	Material
①	Insulation Coating
②	Marking
③	Cutting Line
④	Ceramic Core
⑤	Resistive Film
⑥	Terminal

### 7. Dimension



Size code	Dimension (mm)				
	L	D1	D2 Max	D3 Max	C Min
B (0204)	3.5±0.2	1.40±0.1	1.55	0.1	0.5
C (0207)	5.9±0.2	2.20±0.1	2.4	0.15	1.0
D (0309)	8.5±0.2	3.20±0.2	3.4	0.3	1.5

### 8. Color Band

COLOR	1st BAND	2nd BAND	3rd BAND	MULTIPLIER
BLACK	0	0	0	1Ω
BROWN	1	1	1	10Ω
RED	2	2	2	100Ω
ORANGE	3	3	3	1KΩ
YELLOW	4	4	4	10KΩ
GREEN	5	5	5	100KΩ
BLUE	6	6	6	1MΩ
VIOLET	7	7	7	10MΩ
GREY	8	8	8	
WHITE	9	9	9	
GOLD				0.1Ω
SILVER				0.01Ω

Note :

The tolerance 1% with 4 bands for E96 & E24 series, the tolerance 5% with 3 bands for E24 series.



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### 9. Environmental characteristics

No.	Test Item	Performance Requirements	Test Methods (JIS-C-5201-1)															
1	T.C.R	Within specified T.C.R	+25°C/-55°C and +25°C/+125°C															
2	Solderability	More than 95% of the total area of the electrode part shall be covered with new solder	Temperature of solder: 235±5°C Dipping time: 3±0.5 sec															
3	Resistance to solvent	Epoxy Insulation coating can not be peeled	There are 3 circles, each circle takes 1 min.															
4.	Resistance to soldering heat	Based on the Iron cap loose standard , the change of the resistance value shall be within ±(0.5%+0.05Ω)	Temperature: 260±5°C Dipping time:10±1 sec															
5.	Short time overload	The change of the resistance valueshall be within ±(0.5%+0.05Ω)	$V = \sqrt{R \times P \times 2.5}$ , 5 sec. V= Rated Voltage R=Resistance Value P=Power Rating <table border="1"> <tr> <td>Size code</td> <td>0102</td> <td>0204</td> <td>0207</td> <td>0309</td> </tr> <tr> <td>Power Rating</td> <td>1/8W</td> <td>1/4W</td> <td>1/2W</td> <td>1/2W</td> </tr> <tr> <td>Votage<sub>Max</sub></td> <td>300V</td> <td>400V</td> <td>500V</td> <td>700V</td> </tr> </table>	Size code	0102	0204	0207	0309	Power Rating	1/8W	1/4W	1/2W	1/2W	Votage <sub>Max</sub>	300V	400V	500V	700V
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Power Rating	1/8W	1/4W	1/2W	1/2W														
Votage <sub>Max</sub>	300V	400V	500V	700V														
6	Overload	Within specified tolerance	$V = \sqrt{R \times P \times 3}$ , 2.5 sec. V= Rated Voltage R=Resistance Value P=Power Rating <table border="1"> <tr> <td>Size code</td> <td>0102</td> <td>0204</td> <td>0207</td> <td>0309</td> </tr> <tr> <td>Power Rating</td> <td>1/8W</td> <td>1/4W</td> <td>1/2W</td> <td>1/2W</td> </tr> <tr> <td>Votage<sub>Max</sub></td> <td>300V</td> <td>400V</td> <td>500V</td> <td>700V</td> </tr> </table>	Size code	0102	0204	0207	0309	Power Rating	1/8W	1/4W	1/2W	1/2W	Votage <sub>Max</sub>	300V	400V	500V	700V
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Power Rating	1/8W	1/4W	1/2W	1/2W														
Votage <sub>Max</sub>	300V	400V	500V	700V														
7.	Humidity resistance	The change of the resistance value shall be within ±(1%+0.05Ω)	40°C±2°C, 90%~95% RH, 1.5hr ON / 0.5hr OFF cycle, total test 1000hr.															
8.	Load Life test	The change of the resistance value shall be within ±(3%+0.05Ω)	Constant temperature chamber of 70°C±2°C,DC 1.5hr ON / 0.5hr OFF cycle, applied continuously for 1,000±48hr.															



## Metal Film MELF Resistors (lead-free)

### 10. Standard Packing Quantity

Size code	Tape/Reel Q'ty (pcs)			Bulk Q'ty (pcs)	Weight (g)	
	Reel	Case	Carton	Bag	Reel/pc	Net/Kpcs
B (0204)	3,000	15,000	180,000	5,000	390.5	18
C (0207)	2,000	8,000	96,000	5,000	383.5	155
D (0309)	2,500	2,500	15,000	5,000	2,505	160

### 11. Embossed Taping & Tape/Reel dimension

#### ▼ Embossed taping dimension

Type	W	P	E	F	D	D <sub>1</sub>	P <sub>0</sub>	P <sub>2</sub>	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	t
0204	8±0.1	4±0.1	1.75±0.1	3.5±0.05	1.5±0.1	1.0±0.1	4±0.1	2±0.1	1.6±0.1	3.70±0.1	1.65±0.1	0.22±0.05
0207	12±0.1	4±0.1	1.75±0.1	5.5±0.05	1.5±0.1	1.5±0.1	4±0.1	2±0.1	2.4±0.1	6.05±0.1	2.50±0.1	0.30±0.05
0309	16±0.1	8±0.1	1.75±0.1	7.5±0.10	1.5±0.1	1.5±0.1	4±0.1	2±0.1	3.5±0.1	8.85±0.1	3.50±0.1	0.35±0.05

#### ▼ Tape/Reel dimension

Type	∅A	∅B	∅C	W	T
0204	178±1	60.0±0.5	13.0±0.2	9.0±0.5	12.0±0.15
0207	178±1	60.0±0.5	13.0±0.5	13.2±0.5	16.0±0.20
0309	330±1	100±1.0	13.0±0.5	17.0±0.5	21.5±0.20



## Metal Film MELF Resistors (lead-free)

### 12. Caution

#### 12-1 Storage and usage method

12-2 Humidity gives damage to cap solderability, therefore, please keep environment.

Temperature : +5°C~+40°C

Humidity : 55%~75%RH

Storage limited : 12 months

12-3 Please follow the instruction to keep the material when it is unpacked.

12-4 When ambient temperature exceeds a rated ambient temperature, the resistance shall be applied on the derating curve by derating the load power.

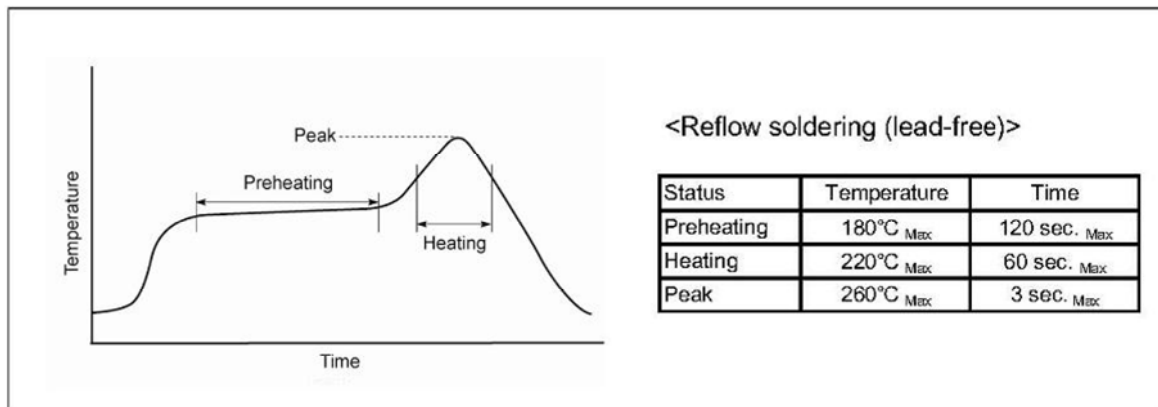
12-5 Please avoid join many resistors in series or parallel when apply high voltage or high electric current.

12-6 Molding products by using resin might bring out resistance value change. Please keep away from Molding.

12-7 This products meet the RoHS Compliant.

### 13. Soldering : We recommend the following condition to keep products performance.

#### 13-1 Conditions for reflow



#### 13-2 Flow soldering (lead-free)

Temperature : 260°C<sub>Max</sub>

Time : 10 sec. <sub>Max</sub>

### 14 Applications

Telecommunication

Medical Equipment

Measurement/Testing Equipment