



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 indentified 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:

| M F M | B | 2 5 S | F | C 2 | 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 |

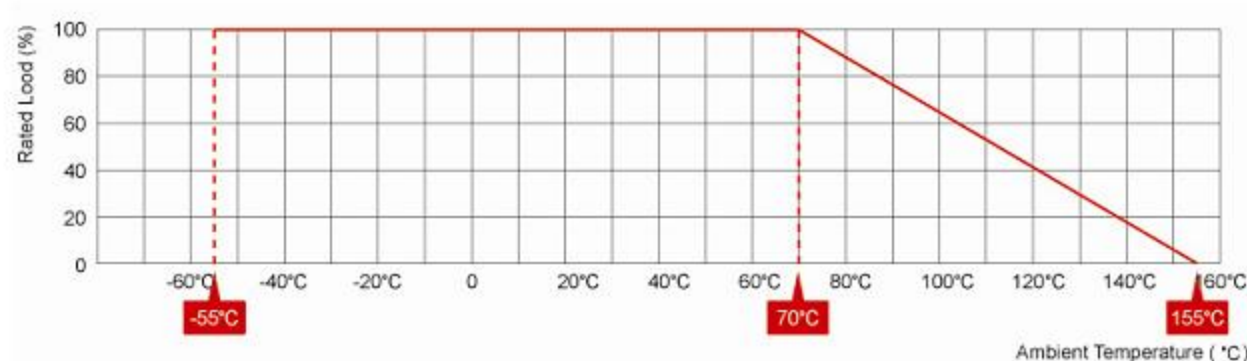
3. Specification

| Series | Size Code | Power Rating | T.C.R ($\times 10^{-6}/K$) | Resistance Tol. & Range | | | Max.Working Voltage | Max.Overload Voltage |
|---------|-----------|--------------|---------------------------------|-------------------------|----------------|----------------|---------------------|----------------------|
| | | | | F($\pm 1\%$) | G($\pm 2\%$) | J($\pm 5\%$) | | |
| 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 | | 0.5W | ± 100 | 5M11-10M | - | 0.1R-0.99R | | |
| | | | ± 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

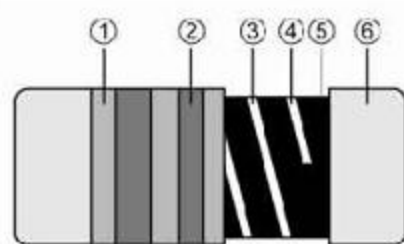


For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the above curve.



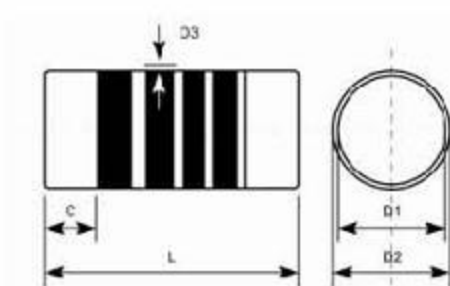
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6. Construction



| Item | Material |
|----------------------|--------------------------------|
| ① Insulation Coating | Epoxy Insulation (Color: Blue) |
| ② Marking | Epoxy Resin |
| ③ Cutting Line | - |
| ④ Ceramic Core | Aluminum Material |
| ⑤ Resistive Film | Metal Film |
| ⑥ Terminal | Terminal Material : Fe/Cu/Sn |

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=√R×P×2.5 , 5 sec. V= Rated Voltage R=Resistance Value P=Power Rating <table><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 Max</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 Max | 300V | 400V | 500V | 700V |
| Size code | 0102 | 0204 | 0207 | 0309 | | | | | | | | | | | | | | |
| Power Rating | 1/8W | 1/4W | 1/2W | 1/2W | | | | | | | | | | | | | | |
| Votage Max | 300V | 400V | 500V | 700V | | | | | | | | | | | | | | |
| 6 | Overload | Within specified tolerance | V=√R×P×3 , 2.5 sec. V= Rated Voltage R=Resistance Value P=Power Rating <table><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 Max</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 Max | 300V | 400V | 500V | 700V |
| Size code | 0102 | 0204 | 0207 | 0309 | | | | | | | | | | | | | | |
| Power Rating | 1/8W | 1/4W | 1/2W | 1/2W | | | | | | | | | | | | | | |
| Votage Max | 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. | | | | | | | | | | | | | | | |



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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 ₁ | P ₀ | P ₂ | A ₀ | B ₀ | K ₀ | 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 | ØA | ØB | ØC | 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 |



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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.

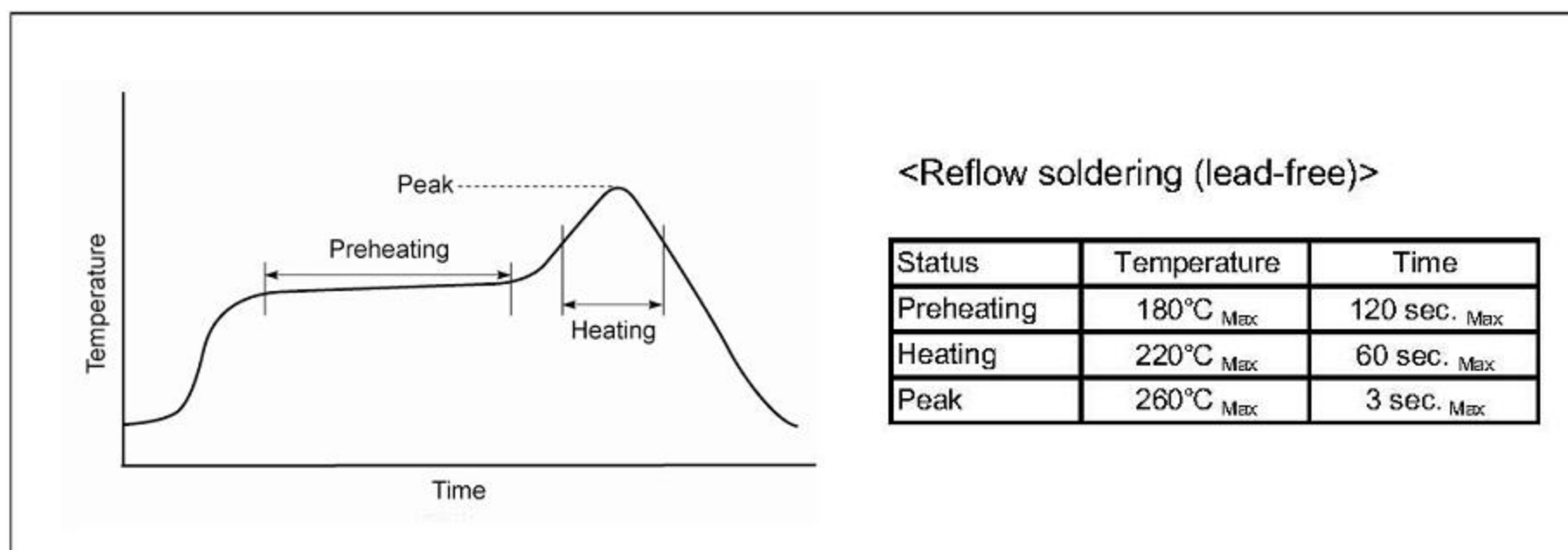
12-5 Please avoid join many resistors in series or parallel when apply high voltage or high electric current.

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_{Max}

Time : 10 sec. Max