

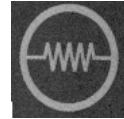
Approval Sheet
for
Metal Film Resistors
MF0 series
 $\pm 1\%$

YAGEO CORPORATION

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1. PRODUCT:

METAL FILM RESISTORS

2. PART NUMBER:

Part number of the metal film resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value.

Example :

| | | | | | | |
|-------------|--------------|----------------------|---------------|---------------------------------------|--------------|------------------|
| MF0 | 207 | F | T | E | 52- | 100R |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Series Name | Power Rating | Resistance Tolerance | Packing Style | Temperature Coefficient of Resistance | Special Type | Resistance Value |

(1) Style: MFR SERIES

(2) Power Rating : 204 = 0.4W · 207 = 0.6W

(3) Tolerance : B=±0.1% C=±0.25% D=±0.5% F=±1%

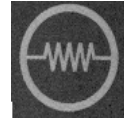
(4) Packaging Type: R=Paper Taping Reel
T=Tape on Box Packing
B=Bulk Packing

(5) Temperature Coefficient : C= ±15PPM D= ±25PPM E = ±50PPM

(6) Special Type : 26- = 26mm
52- = 52.4mm
M = M-Type Forming for Bulk
MT = M-Type Forming for Taping (Rated 0204 size only)
FT = F-Type Forming for Taping (Rated 0207 size only)
PN = PANAsert (Rated 0207 size only)
AV = AvIsert (Rated 0207 size only)

(7) Resistance Value : E24 & E96 Series (for±1%)

Example : 1R · 10R · 100R · 10K · 100K · 330K · 1M.....



3. BAND-CODE:

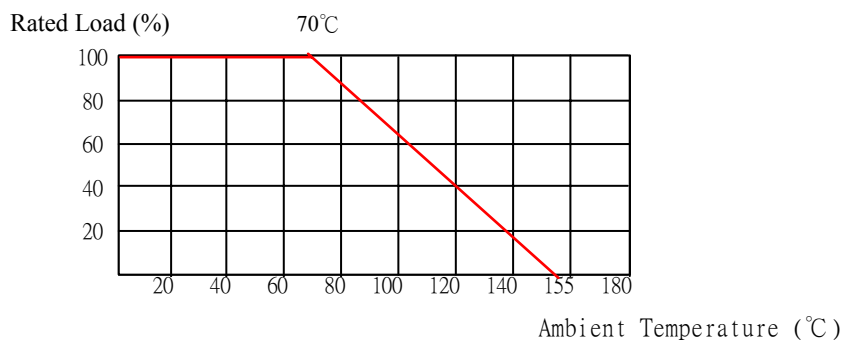
| COLOR | 1ST BAND | 2ND BAND | 3RD BAND | MULTIPLIER | TOLERANCE |
|--------|----------|----------|----------|------------|----------------|
| BLACK | 0 | 0 | 0 | 1Ω | |
| BROWN | 1 | 1 | 1 | 10Ω | ± 1 % (F) |
| RED | 2 | 2 | 2 | 100Ω | |
| ORANGE | 3 | 3 | 3 | 1KΩ | |
| YELLOW | 4 | 4 | 4 | 10KΩ | |
| GREEN | 5 | 5 | 5 | 100K | ± 0.5 % (D) |
| BLUE | 6 | 6 | 6 | 1MΩ | ± 0.25 % (C) |
| VIOLET | 7 | 7 | 7 | 10MΩ | ± 0.1 % (B) |
| GREY | 8 | 8 | 8 | | |
| WHITE | 9 | 9 | 9 | | |
| GOLD | | | | 0.1Ω | |
| SILVER | | | | 0.01Ω | |

4. ELECTRICAL CHARACTERISTICS

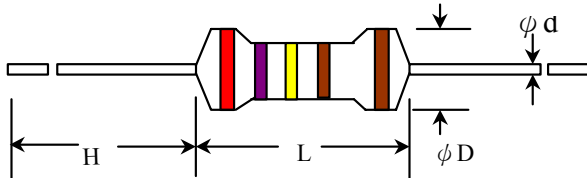
| STYLE | MF0204 | MF0207 |
|---------------------------------|--|--------|
| Power Rating at 70 °C | 0.4W | 0.6W |
| Maximum Working Voltage | 200V | 300V |
| Maximum Overload Voltage | 400V | 600V |
| Dielectric Withstanding Voltage | 300V | 500V |
| Operating Temp. Range | - 55 °C to + 155 °C | |
| Standard Value Range | 1 0Ω ~ 1 MΩ for E24 & R96 series value | |
| Minimum Value Range | 1 Ω | 0.2 Ω |
| Temperature Coefficient | ±50 ppm /°C | |

* Standard resistance is 10Ω~ 1MΩ, below or over this resistance on request.

5. DERATING CURVE



6. DIMENSIONS



Unit : mm

| STYLE | L | φD | H | φd |
|--------|---------|---------|--------|----------|
| MF0204 | 3.4±0.3 | 1.9±0.2 | 28±2.0 | 0.5±0.05 |
| MF0207 | 6.3±0.5 | 2.4±0.2 | 28±2.0 | 0.6±0.05 |

7. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 2.5 times of the rated voltage. (If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes

$$\text{Short Time Overload Voltage} = 2.5 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within $\pm 0.25 \% + 0.05 \Omega$

(2) Dielectric Withstanding Voltage

The resistor is placed on the metal V Block. Apply a Table I dielectric withstanding between the terminals connected together with the block for about 60 seconds.
The resistor shall be able to withstand without breakdown or flashover.

(3) Temperature Coefficient Test

Test of resistors above room temperature $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.
The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

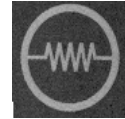
R₀ = Resistance value at the room temperature

t = The testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply test terminal on lead and resistor body.
The test resistance should be high than 10,000M ohm.



(5) Solderability

Immerse the specimen into the solder pot at 235 ± 5 °C for 5 ± 0.5 seconds.
At least 95% solder coverage on the termination.

(6) Resistance to Solvent

The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 1 minutes.
The specimen is no deterioration of coatings and color code.

(7) Terminal Strength

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reacheds 5 pounds ◦
The load shall be held for 10 seconds. The load of weight shall be ≥ 2.5 kg (24.5N).

(8) Pulse Overload

Apply 4 times of rated voltage to the specimen at the 1 second on and 25 seconds off cycle, subjected to voltage application cycles specified in 10,000 time ◦
The change of the resistance value shall be within $\pm 1.0\% + 0.05 \Omega$

(9) Load Life in Humidity

Place the specimen in a test chamber at 40 ± 2 °C and 90 ~ 95 % relative humidity. Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1,000 hours
The change of the resistance value shall be within $\pm 1.5\% + 0.05 \Omega$

(10) Load Life Test

Placed in the constant temperature chamber of 70 ± 3 °C the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value ◦
The change of the resistance value shall be within $\pm 1.5\% + 0.05 \Omega$.
There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(11) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour ◦

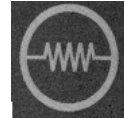
Temperature Cycling Conditions:

| Step | Temperature(°C) | Time (minute) |
|------|-----------------|---------------|
| 1 | -55 ± 3 | 30 |
| 2 | 25 ± 3 | 2 ~ 3 |
| 3 | 155 ± 3 | 30 |
| 4 | 25 ± 3 | 2 ~ 3 |

The change of the resistance value shall be within $\pm 0.75\% + 0.05 \Omega$
After the test the resistor shall be free from the electrical or mechanical damage.

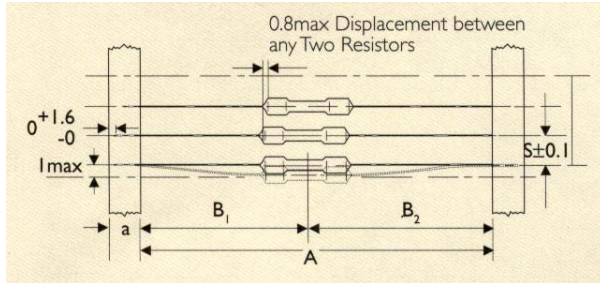
(12) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at 350 ± 10 °C for 3 ± 0.5 seconds up to 2 ~ 2.5 mm.
The change of the resistance value shall be within $\pm 0.25\% + 0.05 \Omega$



8. PACKING METHODS

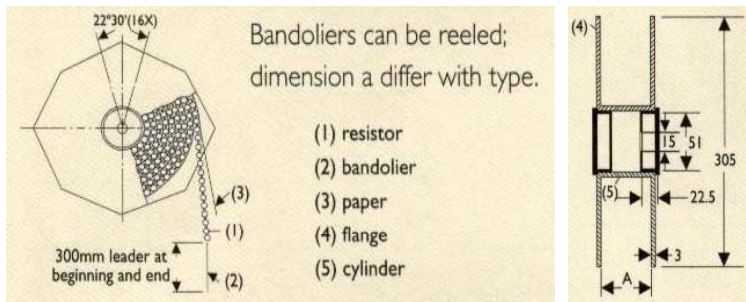
Bandolier for Axial leads



Unit: : mm

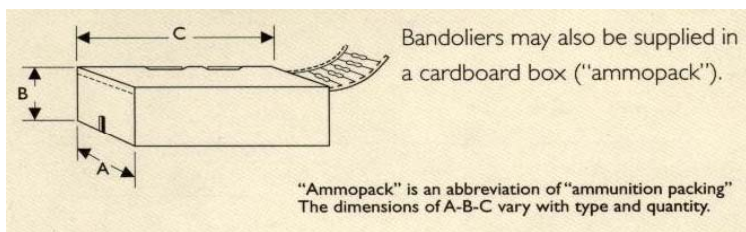
| STYLE | a | A | B1-B2 | S (spacing) | T (max. deviation of spacing) |
|--------|---------|------------|-------|-------------|-------------------------------|
| MF0204 | 6 ± 0.5 | 52.4 ± 1.0 | 1.0 | 5 | 0.5 mm per 5 spacing |
| | | 26.0 ± 1.0 | 1.0 | | |
| MF0207 | 6 ± 0.5 | 52.4 ± 1.0 | 1.0 | 5 | 1 mm per 10 spacing |
| | | 26.0 ± 1.0 | 1.0 | | |

9. TAPE ON REEL PACKING



| STYLE | ACROSS FLANGE (A) | Qty per reel |
|--------|-------------------|--------------|
| MF0204 | 72 | 5,000 |
| MF0207 | 72 | 5,000 |

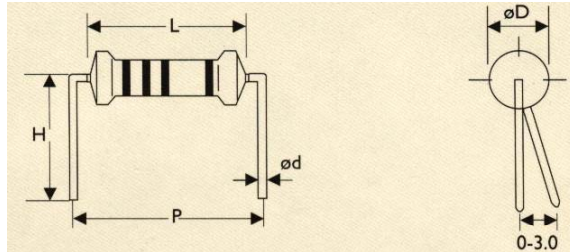
10. TAPE ON BOX PACKING



| STYLE | Standard Lead Length | | | Short Lead Length | | | Qty per box |
|--------|----------------------|-------|-------|-------------------|-------|-------|-------------|
| | W (A) | H (B) | L (C) | W (A) | H (B) | L (C) | |
| MF0204 | 81 | 70 | 260 | 48 | 102 | 255 | 5,000 |
| MF0207 | 81 | 104 | 260 | 48 | 102 | 255 | 5,000 |

11. SPECIAL TYPE (FORMING DIMENSIONS)

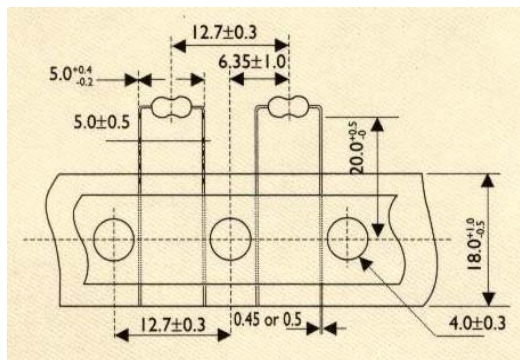
M TYPE Forming for Bulk



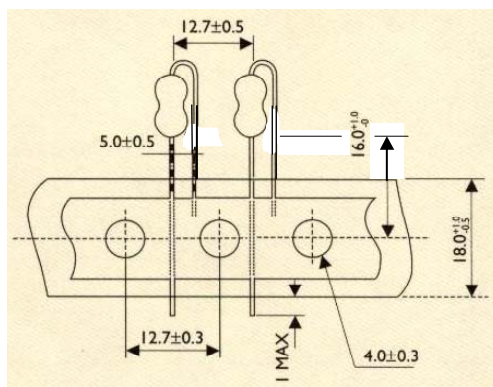
UNIT : mm

| STYLE | L | ϕD | ϕd | P | H |
|--------|---------------|---------------|----------------|--------------|--------------|
| MF0204 | 3.4 ± 0.3 | 1.9 ± 0.2 | 0.5 ± 0.05 | 6.0 ± 1 | 10.0 ± 1 |
| MF0207 | 6.3 ± 0.5 | 2.4 ± 0.2 | 0.6 ± 0.05 | 10.0 ± 1 | 10.0 ± 1 |

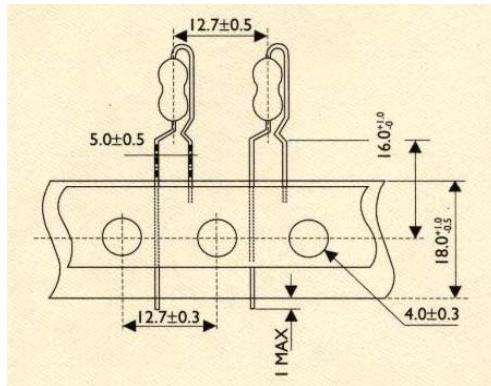
MT Type Forming for Taping (Rated 0204 size only)



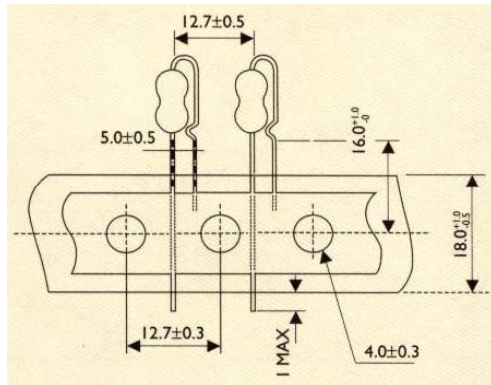
FT Type Forming for Taping (Rated 0207 size only)



PN Type Forming for Taping (Rated 0207 size only)



AV Type Forming for Taping (Rated 0207 size only)

**12. Plant Address**

- A. Taiwan Hsin Tien Plant
1F, No.5, Lane 560, Chung Cheng Road,
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Fax. 886-2-2218-2138
- B. China Dongguan Plant
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Tangxia Zhen, Dongguan, Guangdong, China
(廣東省東莞市塘廈鎮高麗工業區高麗路 7-1 號)
Tel. 86-769-772 0275
Fax. 86-769-772 0295
- C. China MuDu Plant
No.158, Fengjiang Road, No.1 Building of NanBangIND.Zone,
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