

# DATA SHEET

## MELF CARBON FILM RESISTORS

General Purpose

MCF Series

$\pm 2\%$ ,  $\pm 5\%$

1/6W to 1W

RoHS compliant & Halogen Free



**YAGEO**

Product specification – August 24, 2021 V.0





## APPLICATIONS

- All general purpose applications
- Power applications
- Energy meter

## FEATURES

- MELF, SMD package
- Excellent pulse withstanding capability
- Wide resistance range
- RoHS compliant & halogen-free

## ORDERING INFORMATION

Part number of the MELF carbon film resistor is identified by the series, power rating, tolerance, packing, temperature coefficient and resistance value.

## PART NUMBER

|            |            |          |          |          |             |
|------------|------------|----------|----------|----------|-------------|
| <u>MCF</u> | <u>25S</u> | <u>J</u> | <u>R</u> | <u>-</u> | <u>100R</u> |
| (1)        | (2)        | (3)      | (4)      | (5)      | (6)         |

### (1) SERIES

MCF Series

### (2) POWER RATING

-12 = 1/6W

25S = 1/4W

204 = 0.4W

-25 = 1/4W

50S = 1/2W

207 = 0.6W

-50 = 1/2W

1WS = 1W

### (3) TOLERANCE

G =  $\pm 2\%$

J =  $\pm 5\%$

- = Based on spec.

### (4) PACKAGING

R = Reel Pack

### (5) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

### (6) RESISTANCE VALUE

E24 Series value

Example:

1R = 1 $\Omega$ , 10K = 10,000 $\Omega$ , 1M = 1,000,000 $\Omega$

**DIMENSIONS**

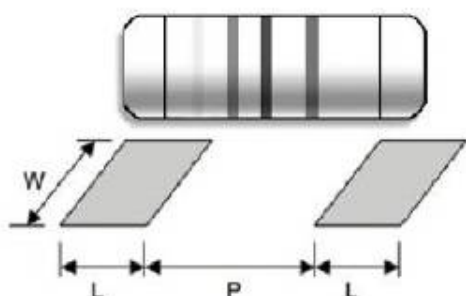
Unit: mm



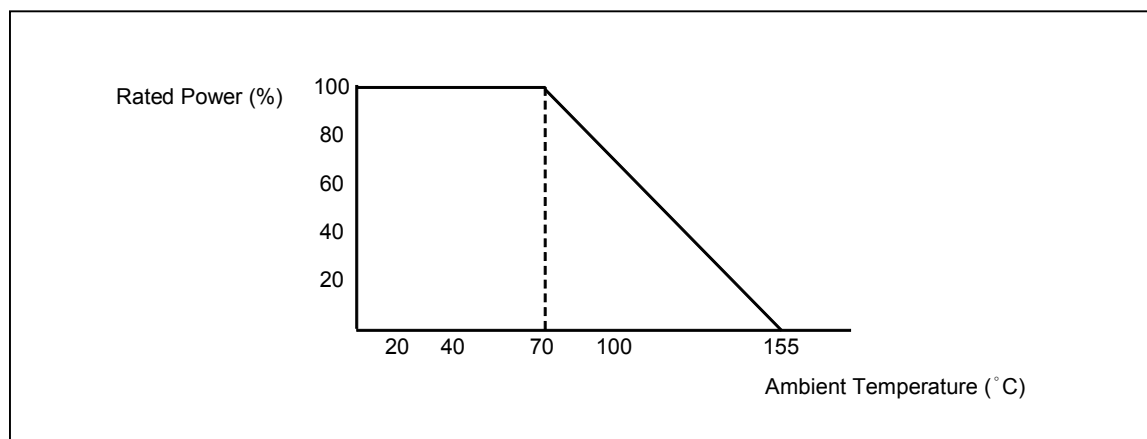
| Normal | Miniature       | L              | D               | C Min. |
|--------|-----------------|----------------|-----------------|--------|
| MCF-12 | MCF25S / MCF204 | $3.50 \pm 0.2$ | $1.40 \pm 0.15$ | 0.5    |
| MCF-25 | MCF50S / MCF207 | $5.90 \pm 0.2$ | $2.20 \pm 0.1$  | 0.5    |
| MCF-50 | MCF1WS          | $8.50 \pm 0.2$ | $3.20 \pm 0.2$  | 0.5    |

**SUGGESTED PAD LAYOUT**

Unit: mm



| Normal | Miniature        | Soldering Mode | L Min. | P             | W Min. |
|--------|------------------|----------------|--------|---------------|--------|
| MCF-12 | MCF25S<br>MCF204 | Reflow         | 1.3    | $1.6 \pm 0.1$ | 1.6    |
|        |                  | Wave           | 1.5    | $1.5 \pm 0.1$ | 1.8    |
| MCF-25 | MCF50S<br>MCF207 | Reflow         | 2.0    | $3.0 \pm 0.1$ | 3.0    |
|        |                  | Wave           | 2.5    | $3.0 \pm 0.1$ | 3.0    |
| MCF-50 | MCF1WS           | Reflow         | 2.3    | $5.5 \pm 0.2$ | 4.0    |
|        |                  | Wave           | 2.8    | $5.5 \pm 0.2$ | 4.0    |

**DERATING CURVE****TABLE I TEMPERATURE COEFFICIENT**

| TYPE                                   | MAX. VALUE OF TEMP. COEFFICIENT PPM/ °C |                     |                     |                    |
|--|---|---------------------|---------------------|--------------------|
| MCF-12, MCF25S, MCF204                 | <b>under 1KΩ</b>                        | <b>1K1Ω – 47KΩ</b>  | <b>51KΩ – 470KΩ</b> | <b>510KΩ – 1MΩ</b> |
|  | 0 ~ -350                                | 0 ~ -600            | 0 ~ -1000           | 0 ~ -1500          |
| MCF-25, MCF50S, MCF207, MCF-50, MCF1WS | <b>under 10KΩ</b>                       | <b>11KΩ – 150KΩ</b> | <b>160KΩ – 1MΩ</b>  |                    |
|  | 0 ~ -350                                | 0 ~ -600            | 0 ~ -1000           |                    |

**ELECTRICAL CHARACTERISTICS**

| CHARACTERISTICS             | MCF-12                              | MCF25S | MCF204 | MCF-25 | MCF50S | MCF207 | MCF-50 | MCF1WS |
|-----------------------------|-------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Power Rating at 70 °C       | 1/6W                                | 1/4W   | 0.4W   | 1/4W   | 1/2W   | 0.6W   | 1/2W   | 1W     |
| Maximum Working Voltage     | 200V                                | 250V   | 250V   | 300V   | 300V   | 300V   | 350V   | 350V   |
| Maximum Overload Voltage    | 400V                                | 500V   | 500V   | 600V   | 600V   | 600V   | 700V   | 700V   |
| Voltage Proof on Insulation | 200V                                | 200V   | 200V   | 500V   | 500V   | 500V   | 700V   | 700V   |
| Resistance Range            | 10Ω ~ 1MΩ & 0Ω for E24 series value |        |        |        |        |        |        |        |
| Operating Temp. Range       | - 55°C to +155°C                    |        |        |        |        |        |        |        |
| Temperature Coefficient     | see Table I                         |        |        |        |        |        |        |        |

Note: For resistance value out of above range is by request.

**TEST AND REQUIREMENTS**

| TEST                          | TEST METHOD      | PROCEDURE   | APPRAISE                                  |
|-------------------------------|------------------|---|---|
| Short Time Overload           | IEC 60115-1 4.13 | 2.5 times RCWV for 5 sec.(Not more than maximum overload voltage)             | ±1.0%+0.05Ω                               |
| Voltage Proof on Insulation   | IEC 60115-1 4.7  | In V-Block for 60 sec. test voltage as above table                            | No Breakdown                              |
| Temperature Coefficient       | IEC 60115-1 4.8  | Between -55°C to +155°C   | By Type                                   |
| Insulation Resistance         | IEC 60115-1 4.6  | In V-Block for 60 sec.  | >10,000MΩ                                 |
| Solderability                 | IEC 60115-1 4.17 | 245±5°C for 3±0.5 Sec.  | 95% Min. coverage                         |
| Solvent Resistance of Marking | IEC 60115-1 4.30 | IPA for 5±0.5 Min. with ultrasonic  | No deterioration of coatings and markings |
| Periodic-pulse Overload       | IEC 60115-1 4.39 | 4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec.off)                            | ±1.0%+0.05Ω                               |
| Damp Heat Steady State        | IEC 60115-1 4.24 | 40±2°C,90-95% RH for 56 days, loaded with 0.1 times RCWV                      | ±5.0%+0.05Ω                               |
| Endurance at 70°C             | IEC 60115-1 4.25 | 70±2°C at RCWV(or Umax., whichever less) for 1,000 Hr.(1.5 Hr.on,0.5 Hr. off) | ±3.0%+0.05Ω                               |
| Temperature Cycling           | IEC 60115-1 4.19 | ➔ -55°C ➔ Room Temp. ➔ +155°C Room Temp.(5 cycles)                            | ±0.75%+0.05Ω                              |
| Resistance to Soldering Heat  | IEC 60115-1 4.18 | 260±3°C for 10±1 Sec., immersed to a point 3±0.5mm from the body              | ±1.0%+0.05Ω                               |

Note:

**RCWV (Rated Continuous Working Voltage ):**

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V=\sqrt{(P \times R)}$$

or max. working voltage whichever is less

Where

V=Continuous rated DC or  
AC (rms) working voltage (V)

P=Rated power (W)

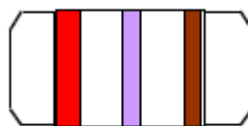
R=Resistance value ( $\Omega$ )

**PACKING**

| TYPE   |                  |           | Unit: piece       |
|--------|------------------|-----------|-------------------|
| Normal | Miniature        | Packaging | Quantity Per Reel |
| MCF-12 | MCF25S<br>MCF204 | 7"        | 3,000             |
| MCF-25 | MCF50S<br>MCF207 | 7"        | 2,000             |
| MCF-50 | MCF1WS           | 13"       | 2,500             |

**MARKING**

3-BAND-CODE

 $\pm 2\%$ ,  $\pm 5\%$ 

| COLOR  | 1st BAND | 2nd BAND | MULTIPLIER      |
|--------|----------|----------|-----------------|
| BLACK  | 0        | 0        | 1 $\Omega$      |
| BROWN  | 1        | 1        | 10 $\Omega$     |
| RED    | 2        | 2        | 100 $\Omega$    |
| ORANGE | 3        | 3        | 1K $\Omega$     |
| YELLOW | 4        | 4        | 10K $\Omega$    |
| GREEN  | 5        | 5        | 100K            |
| BLUE   | 6        | 6        | 1M $\Omega$     |
| VIOLET | 7        | 7        | 10M $\Omega$    |
| GREY   | 8        | 8        | 0.001 $\Omega$  |
| WHITE  | 9        | 9        | 0.0001 $\Omega$ |
| GOLD   |          |          | 0.1 $\Omega$    |
| SILVER |          |          | 0.01 $\Omega$   |

**REVISION HISTORY**

| REVISION  | DATE         | CHANGE NOTIFICATION | DESCRIPTION                         |
|-----------|--------------|---------------------|-------------------------------------|
| Version 0 | Aug. 2, 2021 | -                   | - First issue of this specification |

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