

## Professional Thin Film Leaded Resistors



### DESCRIPTION

A homogeneous film of metal alloy is deposited on a high grade ceramic body. After a helical groove has been cut in the resistive layer, tinned connecting wires of electrolytic copper are welded to the end-caps. The resistors are coated with lacquer which provides electrical, mechanical, and climatic protection. Four or five color code rings designate the resistance value and tolerance according to **IEC 60062**. Suitable replacements for MRS16 and MRS25 are MBA/SMA 0204 and MBB/SMA 0207 professional.

### FEATURES

- Technology: Metal film
- Professional resistors in small outlines
- Low noise
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compatible to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT

### APPLICATIONS

- All general purpose applications

| TECHNICAL SPECIFICATIONS   |          |                                |                                |
|--|----------|--------------------------------|--------------------------------|
| DESCRIPTION  | UNIT     | MRS16                          | MRS25                          |
| Resistance Range   | $\Omega$ | 4.99 to 1M                     | 1 to 10M                       |
| Resistance Tolerance   | %        | $\pm 1$                        | $\pm 1$                        |
| Resistance Series  |          | E24, E96                       | E24, E96                       |
| Rated Dissipation, $P_{70}$  | W        | 0.4                            | 0.6                            |
| Thermal Resistance ( $R_{th}$ )  | K/W      | 170                            | 150                            |
| Temperature Coefficient  | ppm/K    | $\pm 50$                       | $\pm 50$                       |
| Operating Voltage, $U_{max}$ . AC/DC   | V        | 200                            | 350                            |
| Basic Specifications   |          | IEC 60 115-1                   | IEC 60 115-1                   |
| Climatic Category (IEC 60068-1)  |          | 55/155/56                      | 55/155/56                      |
| Max. Resistance Change for Resistance Range, $\Delta R$ max., after:                                   |          |                                |                                |
| Load (1000 h, $P_{70}$ )   |          | $\pm (0.5 \% R + 0.05 \Omega)$ | $\pm (0.5 \% R + 0.05 \Omega)$ |
| Long Term Damp Heat Test (56 Days):  |          |                                |                                |
| MRS16: $4.99 \Omega \leq R \leq 332 \text{ k}\Omega$ ; MRS25: $1 \Omega \leq R \leq 1 \text{ M}\Omega$ |          | $\pm (0.5 \% R + 0.05 \Omega)$ | $\pm (0.5 \% R + 0.05 \Omega)$ |
| MRS16: $R > 332 \text{ k}\Omega$ ; MRS25: $R > 1 \text{ M}\Omega$                                      |          | $\pm (2 \% R + 0.05 \Omega)$   | $\pm (2 \% R + 0.05 \Omega)$   |
| Soldering (260 °C, 10 s):  |          |                                |                                |
| MRS16: $4.99 \Omega \leq R \leq 332 \text{ k}\Omega$ ; MRS25: $1 \Omega \leq R \leq 1 \text{ M}\Omega$ |          | $\pm (0.1 \% R + 0.05 \Omega)$ | $\pm (0.1 \% R + 0.05 \Omega)$ |
| MRS16: $R > 332 \text{ k}\Omega$ ; MRS25: $R > 1 \text{ M}\Omega$                                      |          | $\pm (0.5 \% R + 0.05 \Omega)$ | $\pm (0.5 \% R + 0.05 \Omega)$ |
| Short Time Overload:   |          |                                |                                |
| MRS16: $4.99 \Omega \leq R \leq 332 \text{ k}\Omega$ ; MRS25: $1 \Omega \leq R \leq 1 \text{ M}\Omega$ |          | $\pm (0.1 \% R + 0.01 \Omega)$ | $\pm (0.1 \% R + 0.01 \Omega)$ |
| MRS16: $R > 332 \text{ k}\Omega$ ; MRS25: $R > 1 \text{ M}\Omega$                                      |          | $\pm (0.5 \% R + 0.05 \Omega)$ | $\pm (0.5 \% R + 0.05 \Omega)$ |

| PACKAGING |             |      |            |      |
|-----------|-------------|------|------------|------|
| MODEL     | REEL        |      | BOX        |      |
|           | PIECES/REEL | CODE | PIECES/BOX | CODE |
| MRS16     | 5000        | RP   | 1000       | C1   |
|           |             |      | 5000       | CT   |
| MRS25     | 5000        | RP   | 1000       | C1   |
|           |             |      | 5000       | CT   |

**DIMENSIONS**


| <b>DIMENSIONS</b> (Leaded Resistor Types, Mass and Relevant Physical Dimensions) |                        |                        |                        |                        |           |
|--|------------------------|------------------------|------------------------|------------------------|-----------|
| TYPE   | D <sub>max.</sub> (mm) | L <sub>max.</sub> (mm) | d <sub>nom.</sub> (mm) | M <sub>min.</sub> (mm) | MASS (mg) |
| MRS16  | 1.6                    | 3.6                    | 0.5                    | 5.0                    | 125       |
| MRS25  | 2.5                    | 6.5                    | 0.6                    | 10.0                   | 220       |

| <b>PART NUMBER AND PRODUCT DESCRIPTION</b>       |                               |                              |   |                            |                               |  |   |
|--|-------------------------------|------------------------------|---|----------------------------|-------------------------------|--|---|
| <b>PART NUMBER: MRS16000C5119FCT00</b>           |                               |                              |   |                            |                               |  |   |
| M  | R                             | S                            | 1   | 6                          | 0                             | 0                                      |   |
| 0  | 0                             | 0                            | C   | 5                          | 1                             | 1                                      |   |
| 9  | F                             | C                            | T   | 0                          | 0                             |  |   |
| <b>MODEL/SIZE</b><br>MRS1600<br>MRS2500          | <b>VARIANT</b><br>0 = Neutral | <b>TCR</b><br>C = ± 50 ppm/K | <b>VALUE</b><br>3 digit value<br>1 digit multiplier<br>MULTIPLIER<br><br>7 = *10 <sup>-3</sup> 2 = *10 <sup>2</sup><br>8 = *10 <sup>-2</sup> 3 = *10 <sup>3</sup><br>9 = *10 <sup>-1</sup> 4 = *10 <sup>4</sup><br>0 = *10 <sup>0</sup> 5 = *10 <sup>5</sup><br>1 = *10 <sup>1</sup> 6 = *10 <sup>6</sup> |                            | <b>TOLERANCE</b><br>F = ± 1 % | <b>PACKAGING (1)</b><br>RP<br>CT<br>C1 | <b>SPECIAL</b><br>Up to 2 digits<br>00 = Standard |
| <b>PRODUCT DESCRIPTION: MRS16 50 1 % CT 51R1</b> |                               |                              |   |                            |                               |  |   |
| MRS16  | 50                            | 1 %                          | CT  | 51R1                       |                               |  |   |
| MODEL/SIZE                                       | TCR                           | TOLERANCE                    | PACKAGING (1)   | RESISTANCE VALUE           |                               |  |   |
| MRS16<br>MRS25                                   | ± 50 ppm/K                    | ± 1 %                        | RP<br>CT<br>C1  | 51R1 = 51.1 Ω<br>1K = 1 kΩ |                               |  |   |

**Notes**

- The PART NUMBER is shown to facilitate the introduction of a unified part numbering system for ordering products
- (1) Please refer packaging table

**12NC INFORMATION FOR HISTORICAL CODING REFERENCE**

- The resistors have a 12 digit numeric code starting with 2322 15.
- The subsequent 2 digits indicate the resistor type and packaging; see the 12NC Ordering Code table.
- The remaining 4 digits indicate the resistance value:
  - The first 3 digits indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with the 12NC Indicating Resistance Decade table.

**Last Digit of 12NC Indicating Resistance Decade**

| RESISTANCE DECADE | LAST DIGIT |
|-------------------|------------|
| 1 Ω to 9.76 Ω     | 8          |
| 10 Ω to 97.6 Ω    | 9          |
| 100 Ω to 976 Ω    | 1          |
| 1 kΩ to 9.76 kΩ   | 2          |
| 10 kΩ to 97.6 kΩ  | 3          |
| 100 kΩ to 976 kΩ  | 4          |
| 1 MΩ to 9.76 MΩ   | 5          |
| 10 MΩ             | 6          |

**12NC Example**

The 12NC of a MRS16 resistor with value 750 Ω, supplied on a bandolier of 1000 units in ammpack is: 2322 157 17501.

| <b>12NC</b> (Resistors Type and Packaging) |                       |            |                   |
|--|-----------------------|------------|-------------------|
| TYPE                                       | 2322 15. ....         |            |                   |
|  | BANDOLIER IN AMMOPACK |            | BANDOLIER ON REEL |
|  | 1000 UNITS            | 5000 UNITS | 5000 UNITS        |
| MRS16                                      | 7 1....               | 7 2....    | 7 3....           |
| MRS25                                      | 6 1....               | 6 2....    | 6 3....           |



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