

## Thin Film MELF Resistors



### FEATURES

- MELF resistor with high power rating
- AEC-Q200 qualified
- Advanced thin film technology
- Pure tin termination on nickel barrier, plated on press fit steel caps
- Compliant to RoHS Directive 2002/95/EC

AUTOMOTIVE GRADE



RoHS COMPLIANT

GREEN (5-2008)\*\*

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL   | POWER RATING <sup>(1)</sup><br>$P_{70}$<br>W | LIMITING ELEMENT VOLTAGE<br>DC or $AC_{RMS}$<br>V | TEMPERATURE COEFFICIENT<br>ppm/K | TOLERANCE<br>% | RESISTANCE RANGE<br>$\Omega$ | E-SERIES |
|---------|--|---|----------------------------------|----------------|------------------------------|----------|
| SMM0207 | 1.0  | 350   | $\pm 50$                         | $\pm 0.5$      | 1R0 to 2M21                  | 24; 96   |
| SMM0207 | 1.0  | 350   | $\pm 50$                         | $\pm 1$        | 1R0 to 10M                   | 24; 96   |
| SMM0207 | 1.0  | 350   | $\pm 100$                        | $\pm 5$        | R16 to R91                   | 24       |

Zero-Ohm-Resistor: OMM0207  $R_{max.} = 10 \text{ m}\Omega$   $I_{max.} = 5 \text{ A}$

**Note**

<sup>(1)</sup> Permissible dissipation depends on the maximum temperature at the solder joint, the component placement density and the substrate material.

### TECHNICAL SPECIFICATIONS

| PARAMETER                                     | UNIT               | SMM0207                            |
|---|--------------------|------------------------------------|
| Power rating $P_{70}$                         | W                  | 1                                  |
| Limiting element voltage, DC or $AC_{RMS}$    | V                  | 350                                |
| Insulation voltage (1 min), DC or $AC_{PEAK}$ | V                  | 500                                |
| Insulation resistance                         | $\Omega$           | $\geq 10^{10}$                     |
| Category temperature range                    | $^{\circ}\text{C}$ | - 55 to + 155                      |
| Failure rate: FIT <sub>observed</sub>         |                    | $\leq 0.1 \times 10^{-9}/\text{h}$ |

**Notes**

- The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature of 155 °C is not exceeded.
- The specification of this product is based on a test board, providing a thermal resistance of approximately 85 K/W.
- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

\*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?999902](http://www.vishay.com/doc?999902)

**DIMENSIONS**



| DIMENSIONS AND MASS |               |                        |                          |                     |            |           |
|---------------------|---------------|------------------------|--------------------------|---------------------|------------|-----------|
| TYPE                | L (mm)        | D <sub>max.</sub> (mm) | L <sub>1</sub> min. (mm) | D <sub>1</sub> (mm) | K (mm)     | MASS (mg) |
| SMM0207<br>OMM0207  | 5.8 + 0/- 0.3 | 2.2                    | 2.6                      | D + 0/- 0.2         | 1.25 ± 0.2 | 77        |

**Notes**

- Color code marking is applied according to IEC 60062 <sup>(1)</sup> in five bands. Each color band appears as a single solid line, voids are permissible if at least 2/3 of the band is visible from each radial angle of view. The last color band for tolerance is approximately 50 % wider than the other bands.
- Zero ohm jumper are marked with one centered black band.

**PATTERN STYLES FOR MELF RESISTORS**



| RECOMMENDED SOLDER PAD DIMENSIONS |                |        |        |        |                  |        |        |        |
|-----------------------------------|----------------|--------|--------|--------|------------------|--------|--------|--------|
| TYPE                              | WAVE SOLDERING |        |        |        | REFLOW SOLDERING |        |        |        |
|                                   | G (mm)         | Y (mm) | X (mm) | Z (mm) | G (mm)           | Y (mm) | X (mm) | Z (mm) |
| SMM0207<br>OMM0207                | 2.4            | 2.3    | 2.6    | 7.0    | 2.6              | 2.0    | 2.4    | 6.6    |

**Notes**

- The given solder pad dimensions reflect the considerations for board design and assembly as outlined e.g. in standards IEC 61188-5-x, or in publication IPC-7351.
- The specified dissipation of 1 W relies on special support from the printed-circuit board in order to achieve the required heat flow. Specification of a particular conductor size is not feasible since its thermal performance depends on a variety of influences from the actual PCB design and from the application environment.



| PART NUMBER AND PRODUCT DESCRIPTION         |                           |   |   |   |           |
|---|---------------------------|---|---|---|-----------|
| Part Number: SMM02070C5620FBS00             |                           |   |   |   |           |
| Part Number: OMM0207000000BS00              |                           |   |   |   |           |
| S   | M                         | M   | 0   | 2   | 0         |
| 7   | 0                         | C   | 5   | 6   | 2         |
| 0   | F                         | B   | S   | 0   | 0         |
| O   | M                         | M   | 0   | 2   | 0         |
| 7   | 0                         | 0   | 0   | 0   | 0         |
| 0   | 0                         | 0   | 0   | 0   | 0         |
| 0   | B                         | S   | 0   | 0   |           |
| MODEL                                       | VERSION                   | TCR   | RESISTANCE  | TOLERANCE   | PACKAGING |
| SMM0207<br>OMM0207                          | 0 = Neutral               | C = ± 50 ppm/K<br>B = ± 100 ppm/K<br>0 = Jumper | 3 digit value<br>1 digit multiplier<br>0000 = Jumper<br>MULTIPLIER<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> | D = ± 0.5 %<br>F = ± 1 %<br>J = ± 5 %<br>0 = Jumper | BP<br>BS  |
| Product Description: SMM0207 50 562R 1 % BS |                           |   |   |   |           |
| Product Description: OMM0207 0R0 BS         |                           |   |   |   |           |
| SMM0207                                     | 50                        | 562R  | 1 %   | BS  |           |
| OMM0207                                     | -                         | 0R0   | -   | BS  |           |
| MODEL                                       | TCR                       | RESISTANCE                                      | TOLERANCE   | PACKAGING   |           |
| SMM0207<br>OMM0207                          | ± 50 ppm/K<br>± 100 ppm/K | 100R = 100 Ω<br>2M21 = 2.21 MΩ<br>0R0 = Jumper  | ± 0.5 %<br>± 1 %<br>± 5 %   | BP<br>BS  |           |

**Note**

- Products can be ordered using either the PART NUMBER or the PRODUCT DESCRIPTION.

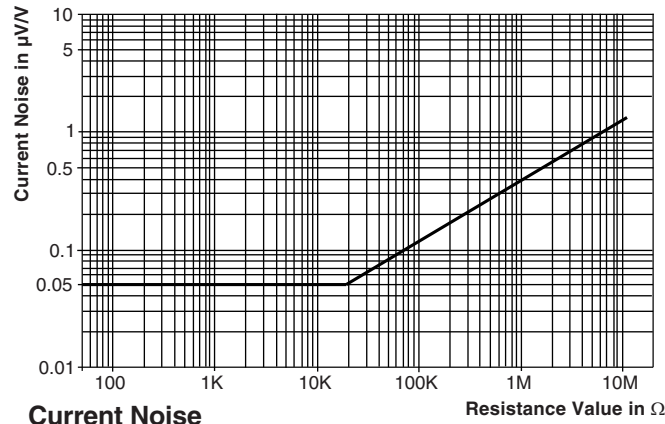
| PACKAGING          |      |          |   |       |       |               |
|--------------------|------|----------|---|-------|-------|---------------|
| TYPE               | CODE | QUANTITY | CARRIER TAPE                                | WIDTH | PITCH | REEL DIAMETER |
| SMM0207<br>OMM0207 | BP   | 1500     | Blister tape<br>acc. IEC 60286-3<br>Type II | 12 mm | 4 mm  | 180 mm/7"     |
|                    | BS   | 7500     |   |       |       | 330 mm/13"    |

**FUNCTIONAL PERFORMANCE**





Non-Linearity



Current Noise

**TEST PROCEDURES AND REQUIREMENTS**

| TEST   | CONDITIONS OF TEST  | REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ ) |                                 |                                |  |
|--|---|--|---------------------------------|--------------------------------|--|
|  |   | STABILITY CLASS 0.25                           | STABILITY CLASS 0.5             | STABILITY CLASS 1              | STABILITY CLASS 2  |
|  |   | 10 $\Omega$ to 1 M $\Omega$                    | 1 $\Omega$ to 10 $\Omega$       | < 1 $\Omega$                   | > 1 M $\Omega$   |
| Endurance test at 70 °C<br>IEC 60115-1, 4.25.1   | $U = \sqrt{P_{70} \times R} \leq U_{max.}$ ;<br>1.5 h "on", 0.5 h "off"<br>at 70 °C, 1000 h<br>at 70 °C, 8000 h | $\pm (0.25 \% R + 0.05 \Omega)$                |                                 |                                | $\pm (0.5 \% R + 0.05 \Omega)$<br>$\pm (1.0 \% R + 0.05 \Omega)$ |
| Endurance at UCT<br>IEC 60115-1, 4.25.3  | at 125 °C, 1000 h   | $\pm (0.25 \% R + 0.05 \Omega)$                |                                 |                                | $\pm (0.5 \% R + 0.05 \Omega)$                                   |
| Damp heat steady state<br>40 °C/93 % RH<br>IEC 60115-1, 4.24 and<br>IEC 60068-2-78     | 56 days;<br>$U = 0.1 \times \sqrt{P_{70} \times R}$ ;<br>$U_{max.} = 20 V$                                      | $\pm (0.25 \% R + 0.05 \Omega)$                |                                 | $\pm (0.5 \% R + 0.05 \Omega)$ |  |
| Damp heat steady state<br>accelerated 85 °C/85 % RH                                    | 1000 h;<br>$U = 0.3 \times \sqrt{P_{70} \times R}$ ;<br>$U_{max.} = 40 V$                                       |  | $\pm (1.0 \% R + 0.05 \Omega)$  |                                | $\pm (2.0 \% R + 0.05 \Omega)$                                   |
| Rapid change of temperature;<br>1000 cycles<br>IEC 60115-1, 4.19 and<br>IEC 60068-2-14 | 30 min at LCT;<br>30 min at UCT;<br>LCT = - 55 °C;<br>UCT = 125 °C  |  | $\pm (0.25 \% R + 0.05 \Omega)$ |                                |  |
| Overload test<br>IEC 60115-1, 4.13   | $U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$ ;<br>5 s   |  | $\pm (0.05 \% + 0.01 \Omega/R)$ |                                | $\pm (0.1 \% R + 0.05 \Omega)$                                   |
| Electrostatic discharge (HBM)<br>IEC 60340-3-1   | 3 positive + 3 negative<br>discharges 4 kV  |  | $\pm (0.5 \% R + 0.05 \Omega)$  |                                |  |
| Resistance to soldering heat<br>IEC 60115-1, 4.18.2 and<br>IEC 60068-2-58              | Solder bath method<br>(260 $\pm$ 5) °C;<br>10 s   | $\pm (0.05 \% R + 0.01 \Omega)$                |                                 | $\pm (0.1 \% R + 0.05 \Omega)$ |  |

**APPLICABLE SPECIFICATIONS**

- EN 60115-1                      Generic specification
- EN 140400                      Sectional specification
- EN 140401-803                Detail specification
- IEC 60068-2-x                Variety of environmental test procedures
- IEC 60286-3                    Packaging of SMD components



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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.