

## 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  
GRADERoHS  
COMPLIANTGREEN  
(5-2008)\*\*

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL                                                                               | POWER RATING <sup>(1)</sup><br>$P_{70}$<br>W | LIMITING ELEMENT<br>VOLTAGE<br>DC or $AC_{RMS}$<br>V | TEMPERATURE<br>COEFFICIENT<br>ppm/K | TOLERANCE<br>% | RESISTANCE<br>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

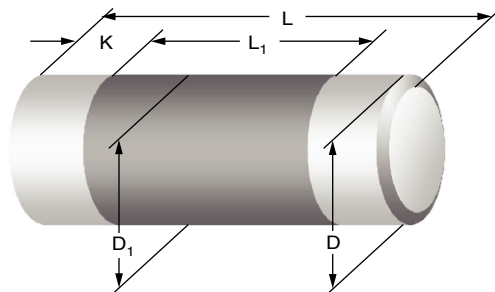
| PARAMETER                                     | UNIT               | SMM0207                            |
|-----------------------------------------------|--------------------|------------------------------------|
| Power rating $P_{70}$                         | W                  | 1                                  |
| 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  $^{\circ}\text{C}$  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?99902](http://www.vishay.com/doc?99902)

## DIMENSIONS



| DIMENSIONS AND MASS |               |                           |                             |                        |            |              |
|---------------------|---------------|---------------------------|-----------------------------|------------------------|------------|--------------|
| TYPE                | L<br>(mm)     | D <sub>max.</sub><br>(mm) | L <sub>1</sub> min.<br>(mm) | D <sub>1</sub><br>(mm) | K<br>(mm)  | MASS<br>(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<br>(mm)      | Y<br>(mm) | X<br>(mm) | Z<br>(mm) | G<br>(mm)        | Y<br>(mm) | X<br>(mm) | Z<br>(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 | B | S | 0 | 0 |

| MODEL              | VERSION     | TCR                                                     | RESISTANCE                                                                                                                                                                                                                                                   | TOLERANCE                                                       | PACKAGING |
|--------------------|-------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------|
| SMM0207<br>OMM0207 | 0 = Neutral | C = $\pm 50$ ppm/K<br>B = $\pm 100$ ppm/K<br>0 = Jumper | 3 digit value<br>1 digit multiplier<br>0000 = Jumper<br>MULTIPLIER<br>7 = $\times 10^{-3}$ 2 = $\times 10^2$<br>8 = $\times 10^{-2}$ 3 = $\times 10^3$<br>9 = $\times 10^{-1}$ 4 = $\times 10^4$<br>0 = $\times 10^0$ 5 = $\times 10^5$<br>1 = $\times 10^1$ | D = $\pm 0.5$ %<br>F = $\pm 1$ %<br>J = $\pm 5$ %<br>0 = Jumper | BP<br>BS  |

Product Description: SMM0207 50 562R 1 % BS

Product Description: OMM0207 0R0 BS

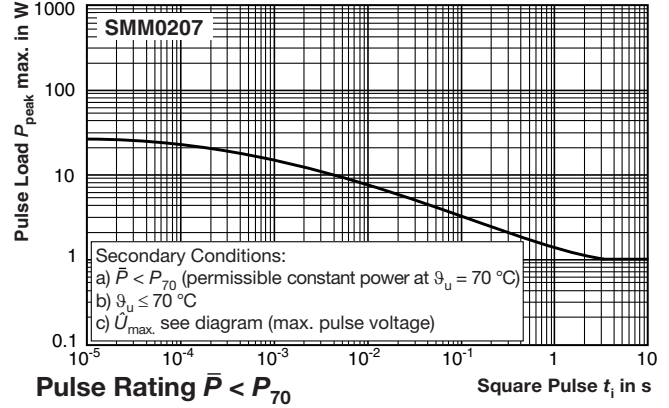
|                    |                                   |                                                               |                                       |           |
|--------------------|-----------------------------------|---------------------------------------------------------------|---------------------------------------|-----------|
| SMM0207            | 50                                | 562R                                                          | 1 %                                   | BS        |
| OMM0207            | -                                 | 0R0                                                           | -                                     | BS        |
| MODEL              | TCR                               | RESISTANCE                                                    | TOLERANCE                             | PACKAGING |
| SMM0207<br>OMM0207 | $\pm 50$ ppm/K<br>$\pm 100$ ppm/K | 100R = 100 $\Omega$<br>2M21 = 2.21 M $\Omega$<br>0R0 = Jumper | $\pm 0.5$ %<br>$\pm 1$ %<br>$\pm 5$ % | BP<br>BS  |

#### Note

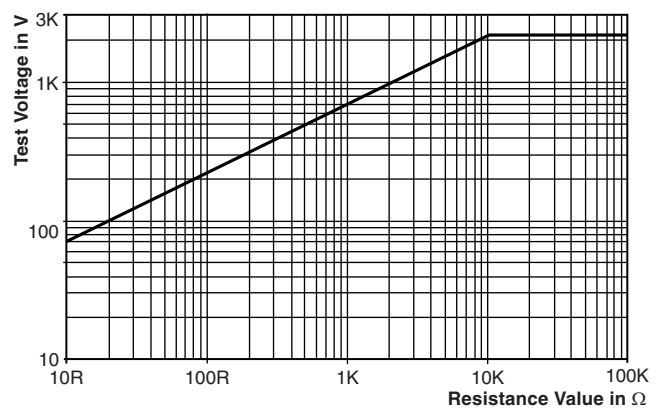
- Products can be ordered using either the PART NUMBER or the PRODUCT DESCRIPTION.

### 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**


1.2/50 acc. EN 60115-1, 4.27



10/700 acc. EN 60115-1, 4.27



### 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 | $\pm (0.25 \% R + 0.05 \Omega)$<br>$\pm (0.5 \% R + 0.05 \Omega)$ |                                |                   | $\pm (0.5 \% R + 0.05 \Omega)$<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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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А