

# Wirewound Resistors, Precision Power, Surface Mount



## FEATURES

- All welded construction
- Molded encapsulation
- Wraparound terminations
- Excellent stability at different environmental conditions
- High power ratings (up to 4 W)
- Available in non-inductive styles ("NI" SPECIAL) with Ayrton-Perry winding (Resistance max. value is one half standard value)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

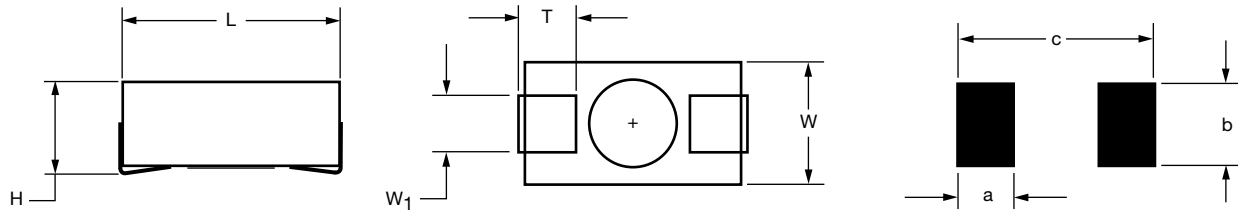


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

| STANDARD ELECTRICAL SPECIFICATIONS |                  |   |                              |                       |                                   |
|------------------------------------|------------------|---|------------------------------|-----------------------|-----------------------------------|
| GLOBAL MODEL                       | HISTORICAL MODEL | POWER RATING<br>$P_{70^\circ\text{C}}$<br>W | RESISTANCE RANGE<br>$\Omega$ | TOLERANCE<br>$\pm \%$ | WEIGHT (TYPICAL)<br>g/1000 PIECES |
| SM-1                               | SM1              | 0.5   | 0.1 to 400                   | 0.1, 0.25, 0.5, 1, 5  | 45                                |
| SM-2                               | SM2              | 1   | 0.1 to 3K                    | 0.1, 0.25, 0.5, 1, 5  | 230                               |
| SM-3                               | SM3              | 3   | 0.1 to 25K                   | 0.1, 0.25, 0.5, 1, 5  | 1360                              |
| SM-4                               | SM4              | 2   | 0.1 to 15K                   | 0.1, 0.25, 0.5, 1, 5  | 680                               |
| SM-5                               | SM5              | 4   | 0.1 to 50K                   | 0.1, 0.25, 0.5, 1, 5  | 2040                              |

| TECHNICAL SPECIFICATIONS        |          |   |
|---------------------------------|----------|---|
| PARAMETER                       | UNIT     | SM RESISTOR CHARACTERISTICS   |
| Temperature Coefficient         | ppm/°C   | $\pm 20 > 10 \Omega$ , $\pm 50 1 \Omega$ to $10 \Omega$ , contact factory for $0.99 \Omega$ and below |
| Dielectric Withstanding Voltage | $V_{AC}$ | 1000  |
| Operating Temperature Range     | °C       | -55 to +275   |
| Maximum Working Voltage         | V        | $(P \times R)^{1/2}$  |

| GLOBAL PART NUMBER INFORMATION  |   |   |   |   |
|---|---|---|---|---|
| Global Part Numbering example: SM-2R4000FE6 (visit <a href="http://www.vishay.net">www.vishay.net</a> SAP parts manual for all options) |   |   |   |   |
| S   | M   | -   | 2   | R   |
| 4   | 0   | 0   | 0   | F   |
| E   | 6   |   |   |   |
| GLOBAL MODEL<br>(4 digits)  | VALUE<br>(5 digits)   | TOLERANCE<br>(1 digit)  | PACKAGING CODE<br>(2 digits)  | SPECIAL<br>(up to 3 digits)   |
| SM-1<br>SM-2<br>SM-3<br>SM-4<br>SM-5  | R = Decimal<br>K = Thousand<br>1R500 = 1.5 $\Omega$<br>4K000 = 4 k $\Omega$ | B = $\pm 0.1 \%$<br>C = $\pm 0.25 \%$<br>D = $\pm 0.5 \%$<br>F = $\pm 1 \%$<br>J = $\pm 5 \%$ | E6 = lead (Pb)-free,<br>7" tape and reel pack<br>E7 = lead (Pb)-free,<br>13" tape and reel pack | (Dash Number)<br>From 1 to 999<br>as applicable<br>NI = Non-inductive |
| Historical Part Number example: SM2-0.4-1%  |   |   |   |   |
| SM2   | 0.4 $\Omega$  | 1 %   |   |   |
| HISTORICAL MODEL  | RESISTANCE VALUE  | TOLERANCE   |   |   |

**DIMENSIONS** in inches [millimeters]


| GLOBAL MODEL | DIMENSIONS in inches [millimeters] |                          |                          |                           |                          | SOLDER PAD DIMENSIONS    |                          |                          |
|--------------|------------------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|              | $L \pm 0.015$<br>[0.381]           | $W \pm 0.015$<br>[0.381] | $H \pm 0.015$<br>[0.381] | $W1 \pm 0.015$<br>[0.381] | $T \pm 0.015$<br>[0.381] | $a \pm 0.015$<br>[0.381] | $b \pm 0.015$<br>[0.381] | $c \pm 0.015$<br>[0.381] |
| SM-1         | 0.190 [4.83]                       | 0.130 [3.30]             | 0.110 [2.79]             | 0.060 [1.52]              | 0.040 [1.02]             | 0.062 [1.57]             | 0.100 [2.54]             | 0.250 [6.35]             |
| SM-2         | 0.260 [6.60]                       | 0.155 [3.94]             | 0.125 [3.18]             | 0.070 [1.78]              | 0.070 [1.78]             | 0.096 [2.44]             | 0.112 [2.84]             | 0.337 [8.56]             |
| SM-3         | 0.625 [15.88]                      | 0.270 [6.86]             | 0.250 [6.35]             | 0.120 [3.05]              | 0.135 [3.43]             | 0.200 [5.08]             | 0.150 [3.81]             | 0.700 [17.78]            |
| SM-4         | 0.450 [11.43]                      | 0.250 [6.35]             | 0.180 [4.57]             | 0.120 [3.05]              | 0.100 [2.54]             | 0.155 [3.94]             | 0.230 [5.84]             | 0.540 [13.72]            |
| SM-5         | 0.820 [20.83]                      | 0.295 [7.49]             | 0.305 [7.75]             | 0.150 [3.81]              | 0.190 [4.83]             | 0.220 [5.59]             | 0.250 [6.35]             | 0.900 [22.86]            |

**MATERIAL SPECIFICATIONS**
**Element:** copper-nickel alloy

**Encapsulation:** molded epoxy

**Core:** ceramic

**Terminal:** matte tin

**Part Marking:** HEI, model, value, tolerance, date code

**Note**

- Due to resistor size limitations some resistors will have minimal information marked on parts

**DERATING**


| PERFORMANCE               |  |                  |
|---------------------------|--|------------------|
| TEST                      | CONDITIONS OF TEST                                     | TEST LIMITS      |
| Thermal Shock             | -55 °C to +150 °C, 1000 cycles, 15 min at each extreme | ± 0.5 % + 0.05 Ω |
| Short Time Overload       | 5x rated power for 5 s                                 | ± 0.5 % + 0.05 Ω |
| Low Temperature Storage   | -55 °C for 24 h  | ± 0.5 % + 0.05 Ω |
| Load Life                 | 1000 h at rated power, +70 °C, 1.5 h "ON", 0.5 h "OFF" | ± 1.0 % + 0.05 Ω |
| Resistance to Solder Heat | MIL-STD 202; 260 °C, 10 s                              | ± 0.5 % + 0.05 Ω |
| Moisture Resistance       | Per MIL-STD 202  | ± 1.0 % + 0.05 Ω |

| PACKAGING |                        |            |             |              |
|-----------|------------------------|------------|-------------|--------------|
| MODEL     | REEL                   |            |             |              |
|           | TAPE WIDTH             | DIAMETER   | PIECES/REEL | PACKAGE CODE |
| SM-1      | 12 mm/embossed plastic | 178 mm/7"  | 650         | E6           |
|           |                        | 330 mm/13" | 3000        | E7           |
| SM-2      | 16 mm/embossed plastic | 178 mm/7"  | 600         | E6           |
|           |                        | 330 mm/13" | 2000        | E7           |
| SM-3      | 24 mm/embossed plastic | 178 mm/7"  | 125         | E6           |
|           |                        | 330 mm/13" | 500         | E7           |
| SM-4      | 24 mm/embossed plastic | 178 mm/7"  | 250         | E6           |
|           |                        | 330 mm/13" | 1000        | E7           |
| SM-5      | 32 mm/embossed plastic | 178 mm/7"  | 180         | E6           |
|           |                        | 330 mm/13" | 500         | E7           |



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