

Power Metal Strip® Resistors, Low Value (down to 0.001 Ω), Surface Mount


FEATURES

- Molded high temperature encapsulation
- Ideal for all types of current sensing, voltage division and pulse applications including switching and linear power supplies, instruments, power amplifiers
- Proprietary processing technique produces extremely low resistance values (down to 0.001 Ω)
- All welded construction
- Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- Solderable terminations
- Very low inductance 0.5 nH to 5 nH
- Excellent frequency response to 50 MHz
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 qualified ⁽¹⁾
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912


Notes

- * Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.
- ⁽¹⁾ Flame retardance test may not be applicable to some resistor technologies.

STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | SIZE | POWER RATING $P_{70^\circ\text{C}}$ W | RESISTANCE VALUE RANGE Ω | | WEIGHT (typical) g/1000 pieces |
|--------------|------|---|-----------------------------|--------------|--------------------------------------|
| | | | Tol. ± 0.5 % | Tol. ± 1.0 % | |
| WSR2 | 4527 | 2.0 | 0.005 to 1.0 | 0.001 to 1.0 | 440 |
| WSR3 | 4527 | 3.0 ⁽²⁾ | 0.005 to 0.2 | 0.001 to 0.2 | 440 |

Notes

- Part marking: DALE, model, value, tolerance, date code.
- ⁽²⁾ The WSR3 requires a minimum of 1050 sq. mil. circuit traces connecting to the recommended solder pad.

TECHNICAL SPECIFICATIONS

| PARAMETER | UNIT | WSR2 AND WSR3 RESISTOR CHARACTERISTICS |
|---------------------------------|----------|--|
| Temperature coefficient | ppm/°C | ± 75 for 0.010 Ω to 1.0 Ω; ± 110 for 0.005 Ω to 0.0099 Ω; ± 300 for 0.004 Ω to 0.0049 Ω; ± 450 for 0.003 Ω to 0.0039 Ω; ± 600 for 0.002 Ω to 0.0029 Ω; ± 750 for 0.001 Ω to 0.0019 Ω |
| Element TCR | ppm/°C | < 20 |
| Dielectric withstanding voltage | V_{AC} | > 500 |
| Insulation resistance | Ω | > 10 ⁹ |
| Operating temperature range | °C | - 65 to + 275 |
| Maximum working voltage | V | $(P \times R)^{1/2}$ |

GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: WSR25L000FEA

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| W | S | R | 2 | 5 | L | 0 | 0 | 0 | F | E | A | | |
|---|---|---|---|---|---|---|---|---|---|---|---|--|--|

| GLOBAL MODEL | VALUE | TOLERANCE CODE | PACKAGING CODE | SPECIAL |
|--|---|---|--|---|
| WSR2 WSR3 | L = mΩ* R = Decimal 5L000 = 0.005 Ω R0100 = 0.01 Ω * Use "L" for resistance values < 0.01 Ω | D = ± 0.5 % F = ± 1.0 % J = ± 5.0 % | EA = Lead (Pb)-free, tape/reel EK = Lead (Pb)-free, bulk TA = Tin/lead, tape/reel (R86) BA = Tin/lead, bulk (B43) | (Dash number) (Up to 2 digits) From 1 to 99 as applicable |
| Historical Part Numbering example: WSR2 0.005 Ω 1 % EA | | | | |
| WSR2 | 0.005 Ω | 1 % | EA | |
| HISTORICAL MODEL | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING CODE | |

DIMENSIONS


| MODEL | DIMENSIONS in inches (millimeters) | | | | |
|-------|------------------------------------|----------------|----------------|----------------|----------------|
| | L | H | T | W | W ₁ |
| WSR2 | 0.455 ± 0.032 | 0.095 ± 0.005 | 0.100 ± 0.010 | 0.275 ± 0.005 | 0.215 ± 0.005 |
| WSR3 | (11.56 ± 0.813) | (2.41 ± 0.127) | (2.54 ± 0.254) | (6.98 ± 0.127) | (5.46 ± 0.127) |

| MODEL | SOLDER PAD DIMENSIONS in inches (millimeters) | | |
|-------|---|--------|--------|
| | a | b | l |
| WSR2 | 0.155 | 0.230 | 0.205 |
| WSR3 | (3.94) | (5.84) | (5.21) |

DERATING


| PERFORMANCE | | | |
|---------------------------|--|-------------------------|-------------------------|
| TEST | CONDITIONS OF TEST | TEST LIMITS | |
| | | WSR2 | WSR3 |
| Thermal shock | - 55 °C to + 150 °C, 1000 cycles, 15 min at each extreme | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |
| Short time overload | WSR2: 5 x rated power for 5 s WSR3: 4 x rated power for 5 s | ± (0.5 % + 0.0005 Ω) ΔR | ± (2.0 % + 0.0005 Ω) ΔR |
| Low temperature storage | - 65 °C for 24 h | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |
| High temperature exposure | 1000 h at + 275 °C | ± (1.0 % + 0.0005 Ω) ΔR | ± (1.0 % + 0.0005 Ω) ΔR |
| Bias humidity | + 85 °C, 85 % RH, 10 % bias, 1000 h | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |
| Mechanical shock | 100 g's for 6 ms, 5 pulses | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |
| Vibration | Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |
| Load life | 1000 h at rated power, + 70 °C, 1.5 h "ON", 0.5 h "OFF" | ± (1.0 % + 0.0005 Ω) ΔR | ± (2.0 % + 0.0005 Ω) ΔR |
| Resistance to solder heat | + 260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |
| Moisture resistance | MIL-STD-202, method 106, 0 % power, 7a and 7b not required | ± (0.5 % + 0.0005 Ω) ΔR | ± (0.5 % + 0.0005 Ω) ΔR |

| PACKAGING | | | | |
|---------------|------------------------|------------|-------------|------|
| MODEL | REEL | | | |
| | TAPE WIDTH | DIAMETER | PIECES/REEL | CODE |
| WSR2 and WSR3 | 24 mm/embossed plastic | 330 mm/13" | 1500 | EA |

Note

- Embossed Carrier Tape per EIA-481.



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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

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