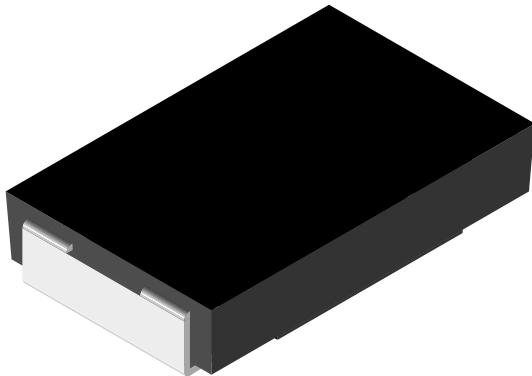


Power Metal Strip® Resistors, Low Value (down to 0.001 Ω), Surface Mount



DESIGN SUPPORT TOOLS

3D
Models Available

 Design Tools Available

[click logo to get started](#)

 AUTOMOTIVE GRADE



e3

RoHS
COMPLIANT

HALOGEN
FREE
Available

GREEN
(S-2008)
Available

FEATURES

- Molded high temperature encapsulation
- All welded construction of the Power Metal Strip® resistors are ideal for all types of current sensing, voltage division and pulse applications
- Proprietary processing technique produces extremely low resistance values (down to 0.001 Ω)
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- 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

- This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details
- Follow link to Overview of Automotive Grade Products for more details: www.vishay.com/doc?49924

(1) Flame retardance test may not be applicable to some resistor technologies

STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | SIZE | POWER RATING $P_{70\text{ °C}}$ W | RESISTANCE VALUE RANGE | | 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 (1) | 0.005 to 0.2 | 0.001 to 0.2 | 440 |

Notes

- Part marking: DALE, model, value, tolerance, date code

(1) 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 x R) ^{1/2} |

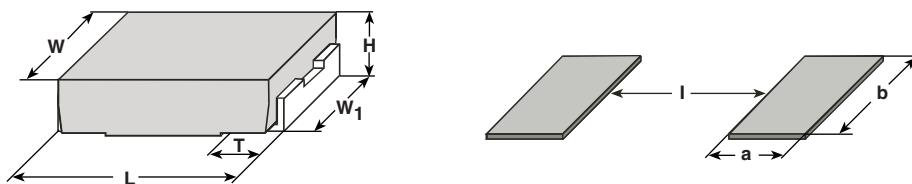
GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: WSR25L000FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

| | | | | | | | | | | | | | |
|--------------|---|---|--|---|---|---|---|---|---|---|---|--|--|
| W | S | R | 2 | 5 | L | 0 | 0 | 0 | F | E | A | | |
| GLOBAL MODEL | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING CODE (1) | 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 | | | | | | | | | |

Note

(1) Packaging code: EB (lead (Pb)-free) and TB (tin / lead) are non-standard packaging codes designating 1000 piece reels. These non-standard packaging codes are identical to our standard EA (lead (Pb)-free) and TA (tin / lead), except that they have a package quantity of 1000 pieces

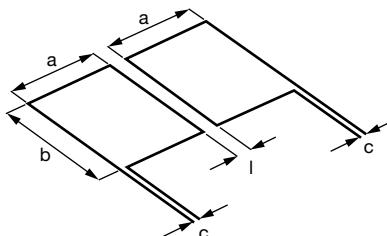
DIMENSIONS in inches (millimeters)

Notes

- 3D models available: www.vishay.com/doc?30336
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

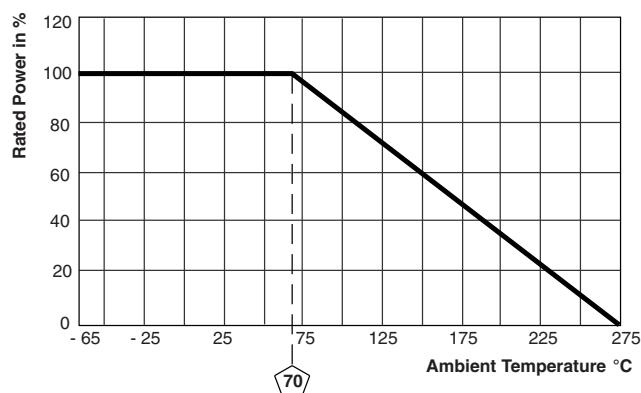
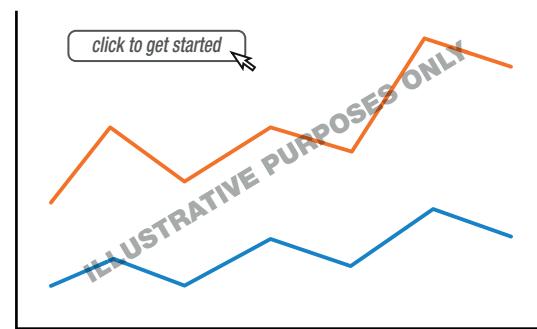
| MODEL | DIMENSIONS | | | | | SOLDER PAD DIMENSIONS | | |
|---------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-----------------------|-----------------|-----------------|
| | L | H | T | W | W ₁ | a | b | I |
| WSR2, WSR3 | 0.455 ± 0.032 (11.56 ± 0.813) | 0.095 ± 0.005 (2.41 ± 0.127) | 0.100 ± 0.010 (2.54 ± 0.254) | 0.275 ± 0.005 (6.98 ± 0.127) | 0.215 ± 0.005 (5.46 ± 0.127) | 0.155 (3.94) | 0.230 (5.84) | 0.205 (5.21) |

Note

- Sensing locations are based on the construction of the part; terminals are wrapped from the outside to underneath. These options place the sensing location nearest the temperature stable resistance element, which minimizes contact resistance and optimizes TCR

TYPICAL SENSING LAYOUT


| a | b | c | I |
|-----------------|-----------------|-----------------|-----------------|
| 0.155 (3.94) | 0.230 (5.84) | 0.020 (0.51) | 0.205 (5.21) |

DERATING

PULSE CAPABILITY

www.vishay.com/resistors/power-metal-strip-calculator

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

| PACKAGING (1) | | | | |
|----------------------|------------------------|-----------------|--------------------|-------------|
| MODEL | REEL | | | |
| | TAPE WIDTH | DIAMETER | PIECES/REEL | CODE |
| WSR2 and WSR3 | 24 mm/embossed plastic | 330 mm/13" | 1500 | EA |

Notes

- Embossed Carrier Tape per EIA-481

(2) Additional packaging details at www.vishay.com/doc?20051

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