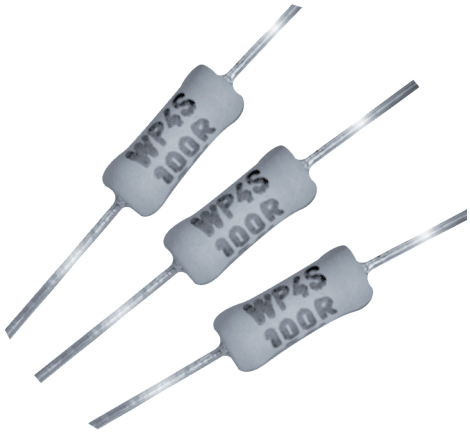
# Compact Flameproof Power Wirewound Resistors




## WP-S Series

- Small size for power rating
- Enhanced pulse handling capability
- Flameproof protection
- Surface mount ZI-form option
- RoHS compliant with Pb-free terminations

All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

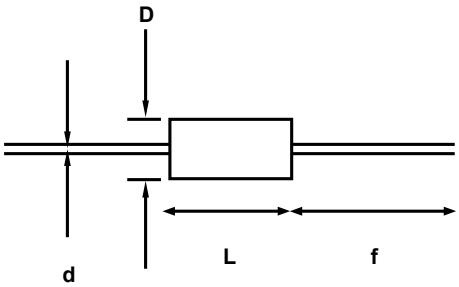
## Electrical Data

| | | WP1S | WP2S / WPP2R | WP25S | WP3S | WP4S | WP5S |
|---|---|---|---|---|---|---|---|
| Power rating at 25 °C | watts | 1 | 2 | 2.5 | 3 | 4 | 5 |
| 5s overload rating at 25°C | watts | 5 | 10 | 12.5 | 15 | 20 | 25 |
| Short pulse performance | | See Pulse Performance graphs | | | | | |
| Resistance range | ohms | R068 to 430R | R05 to 900R | R05 to 900R | R01 to 2K2 | R01 to 10K | R015 to 6K8 |
| Limiting element voltage | volts | 50 | 50 | 75 | 100 | 100 | 150 |
| TCR | ppm/°C | <1R: 350 ≥1R: 200 | | | | | |
| Isolation Voltage | volts | 250 | | | 350 | 500 | |
| Resistance Tolerance | % | <20R: 5 ≥20R: 1, 2, 5 | | | | <R10: 5 ≥R10: 1, 2, 5 | <20R: 5 ≥20R: 1, 2, 5 |
| Standard Values | | E24 preferred | | | | | |
| Thermal Impedance | °C/watt | 140 | 110 | 90 | 82 | 62 | 54 |
| Ambient temperature range | °C | -55 to +200 | | | | | |

## Physical Data

**Dimensions (mm) & Weight (g)**

| Type | L max | D max | f min | d nom | PCB mount centres | Min bend radius | Wt. nom |
|---|---|---|---|---|---|---|---|
| WP1S | 6.2 | 2.8 | 21.20 | 0.6 | 10.20 | 0.6 | 0.22 |
| WP2S | 9.0 | 3.6 | 19.80 | 0.8 | 12.70 | 1.2 | 0.50 |
| WP25S | 12.5 | 4.5 | 17.80 | | 18.40 | | 0.50 |
| WP3S | 14.5 | 5.2 (Note 1) | 24.55 | | 20.30 | | 1.10 |
| WP4S | 13 | 5.6 (Note 2) | 22.75 | | 18.90 | | 1.00 |
| WP5S | 16.5 | 7.0 (Note 3) | 23.55 | | 22.86 | | 1.75 |




Note 1: 5.4 for values ≤0R1 Note 2: 5.8 for values ≤0R1 Note 3: 7.2 for values ≤0R1

## Construction

A high purity ceramic substrate is assembled with interference fit end caps to which are welded the terminations. The resistive element is wound on the substrate and welded to the caps. Flameproof silicone cement coating is applied prior to marking with indelible ink. The components are then leadformed if required and packed.

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## Terminations

| | |
|---|---|
| Material: | Hot tin dipped copper wire |
| Strength: | The terminations meet the requirements of IEC 68.2.21 |
| Solderability: | The terminations meet the requirements of IEC 115-1 Clause 4.17.3.2 |

## Marking

WP1S, WP2S, WPP2R, WP25S and WP3S resistors R10 and above are marked with four or five colour bands in conformance. with IEC62. below R10 are marked with three bands (two digits indicating value in milliohms, and tolerance); there is no multiplier band. WP4S and WP5S resistors are legend marked with type reference, resistance value and tolerance.

## Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

## Flammability

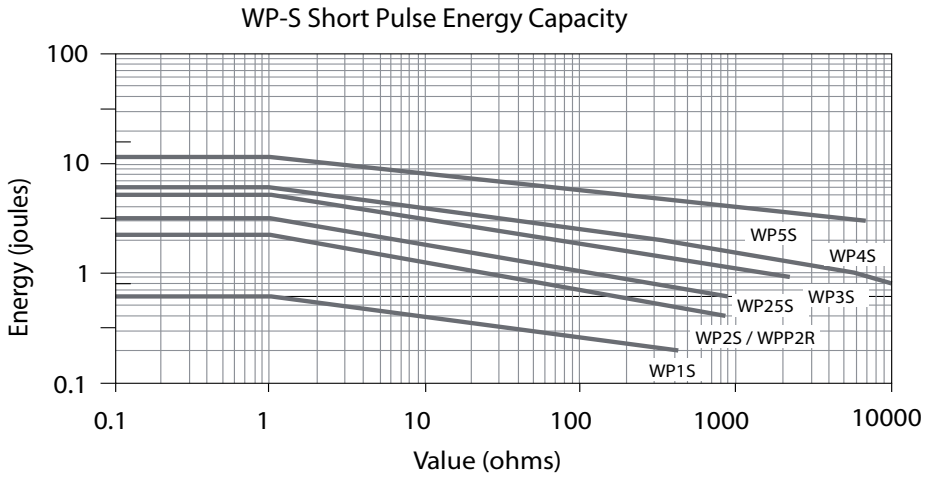
The resistor coating will not burn or emit incandescent particles under any condition of applied temperature or power overload.

## Performance Data

| | | Maximum | Typical Change |
|---|---|---|---|
| Load at rated power: 1000hrs @ 25°C | ΔR% | 5 +0.001Ω | 3 |
| Dry heat: 1000hrs @ 200°C | ΔR% | 5 +0.001Ω | 3 |
| Short term overload (5 x Pr for 5s) | ΔR% | 5 +0.001Ω | 1 |
| Derating from rated power @25°C | | Zero at 280°C | |
| Climatic | ΔR% | 5 +0.001Ω | 2 |
| Climatic category | | 55/200/56 | |
| TRC & Vibration | ΔR% | 5 +0.001Ω | 1 |
| Robustness & solder heat | ΔR% | 5 +0.001Ω | 1 |
| Long term damp heat (56 days) | ΔR% | 5 +0.001Ω | 1 |

## Pulse Performance

The pulse energy capacity limits in the graph below relate to pulses below 100ms duration, low mean power dissipation and at 25°C.

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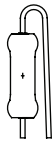
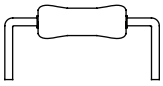
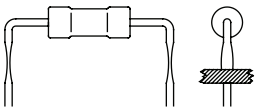
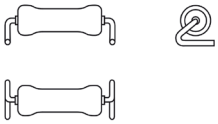
# Application Notes

1. If the resistors are to dissipate full rated power, it is recommended that the terminations should not be soldered closer than 4mm from the body.

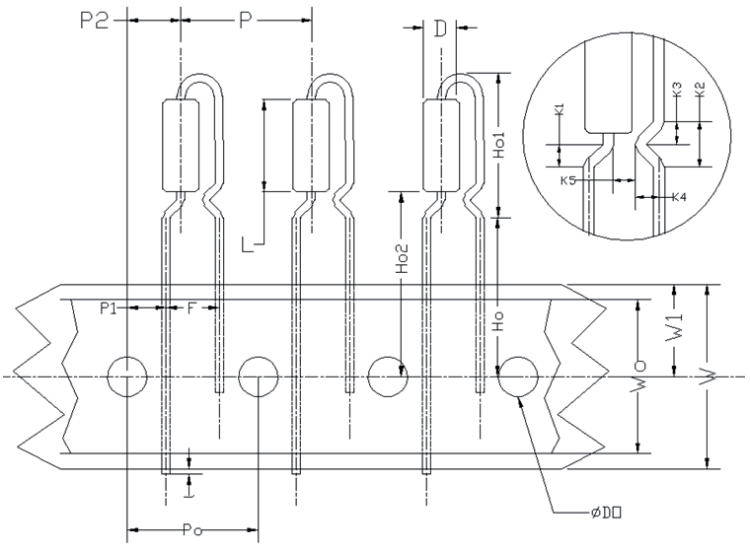
2. Due to operating temperature limits imposed by some PCB materials, derating may be necessary. An estimate of the temperature rise to be expected at the center of the body can be calculated using the thermal impedance figures given under Electrical Data.

3. WP-S resistors can also be supplied with radial, goalpost or lancet pre-formed leads- see https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/ApplicationNotes/TN008-resistors-Leadform-Capability.pdf. WP2S, WP3S, WP4S and WP5S are also available in an SMD format with ZI formed leads and packed in blister tape- see https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Resistors/Datasheets/ZI-form.pdf.

| Hairpin | Goalpost | Lancet | ZI-form |
|---|---|---|---|
|  |  |  |  |

Also a 2W and 3W radial taped version is available as shown below

| Radial Taped Dimensions (mm) | | | |
|---|---|---|---|
| Dimension | Notation | WPP2R* | WP3SR |
| Component body length | L | 10.0 Max | 14.5 Max |
| Component body diameter | D | 4.0 Max | 5.2 Max |
| Terminal lead diameter | d | 0.8 Nom | |
| Component pitch | P | 12.7±0.5 | 12.7±1.0 |
| Hole pitch | Po | 12.7±0.2 | 12.7±0.3 |
| Component to hole offset | P1 | 3.85±0.3 | 3.85±0.7 |
| | P2 | 5.85±0.5 | 6.35±1.3 |
| Lead pitch | F | 5.0 +0.75 -0.34 | 5.0±1.0 |
| Width of backing strip | W | 18.0±0.3 | 18.0±1.0 |
| Position of hole | W1 | 9.0±0.25 | 9.0±0.5 |
| Diameter of hole | Do | 4.0±0.3 | |
| Height to lead form | Ho | 16.0±0.3 | 17.0±1.0 |
| Height from lead form | Ho1 | 17.0 Max | 23.0 Max |
| Height to resistor | Ho2 | 18.0 Min | |
| Width of adhesive tape | W0 | 15.0±0.5 | |
| Length of protrusion | l | <2.5 | |
| Form dimensions | K1 | 2.0±0.3 | |
| | K2 | 3.0±0.5 | |
| | K3 | 1.5±0.25 | |
| | K4 | 1.0±0.2 | |
| | K5 | -- | 2.0 Min |




*Although body dimensions differ slightly, WPP2R Performance and Electrical Data are identical to those of WP2S

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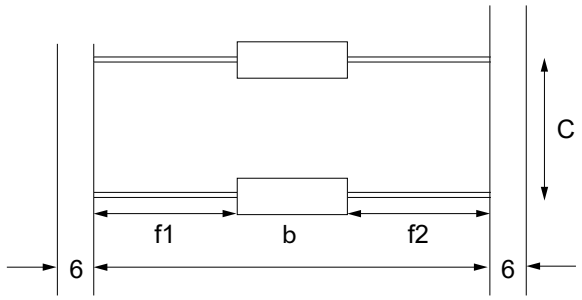
# Packaging

The standard packaging for WP-S is taped. The critical dimensions are shown in Figure 1. The component wires will not protrude beyond the outside edge of the tapes. Taped product is then packed into boxes or onto reels; see Ordering Procedure for details. Alternative packaging is available by request. Pre-formed resistors are supplied loose packed in plastic bags or boxes.

| Dimensions (mm) | b | c |
|---|---|---|
| WP1S | 52 | 5 |
| WP2S | 52 | 5 |
| WP25S | 52 | 5 |
| WP3S | 67 | 10 |
| WP4S | 63 | 10 |
| WP5S | 63 | 10 |

**Figure 1**




Body location f1 - f2 ≤ 1.4mm

# Ordering Procedure

**Example: WP2S-680RJA25** (WP2S, 680 ohms ±5%, Pb-free)

| W | P | 2 | S | | - | 6 | 8 | 0 | R | J | A | 2 | 5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | 2 | | | | 3 | 4 | | | |

| 1 Type | 2 Value | 3 Tolerance | 4 Termination & Packing | | | | |
|---|---|---|---|---|---|---|---|
| WP1S | 3/4 characters | F = ±1% | A5 | WP1S | Pb-free (RoHS) | Ammo pack | 5000/box |
| WP2S | R = ohms | G = ±2% | A25 | WP2S | | | 2500/box |
| WP25S | K = kilohms | J = ±5% | A15 | WP25S | | | 1500/box |
| WP3S | | | A1 | WP3S, WP4S | | | 1000/box |
| WP4S | | | T075 | WP5S | | Tape & reel | 750/reel |
| WP5S | | | PB | All sizes | SnPb finish | Packing as for Pb-free | |

**Example: WPP2R-680RJT15** (WPP2R radially formed & taped, 680 ohms ±5%, Pb-free)

| W | P | P | 2 | R | - | 6 | 8 | 0 | R | J | T | 1 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 2 | | 3 | | | 4 | 5 | | | |

| 1 Type | 2 Leadforming | 3 Value | 4 Tolerance | 5 Packing | | | |
|---|---|---|---|---|---|---|---|
| WPP2 | R = Radial taped | 3/4 characters R = ohms K = kilohms | F = ±1% | T15 | WPP2R | Tape & reel | 1500/reel |
| WP3S | | | G = ±2% | A2 | WP3SR | Ammo pack | 2000/box |
| | | | J = ±5% | T1 | | Tape & reel | 1000/reel |

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