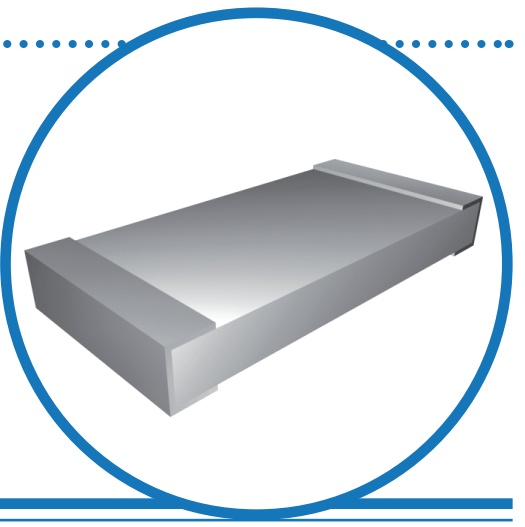
# Pulse Withstanding Chip Resistors

PWC Series

- **Excellent pulse withstand performance**
- **Improved working voltage**
- **Improved power rating**
- **Standard chip sizes (0805 to 2512)**
- **Custom designs available**
- **Anti-sulphur version available**



## Electrical Data

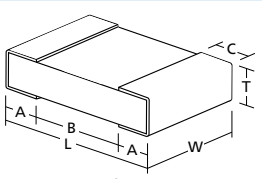
| Size | | 0805 | 1206 | | 2010 | | 2512 | |
|---|---|---|---|---|---|---|---|---|
| Power @70°C | W | 0.25 | 0.33 | 0.5 | 0.75 | 1 | 1.5 | 2 |
| Resistance range | Ohms | 1R0 to 10M | | | | | | |
| Tolerance | % | 10R to 1M: 0.5, All values: 1, 5 | | | | | | |
| LEV | V | 150 | 200 | | 400 | | 500 | |
| TCR | ppm/°C | <10R:200 ≥10R:100 | | | | | | |
| Operating temperature | °C | -55 to +155 | | | | | | |
| Thermal Impedance | °C/W | 220 | 160 | 145 | 80 | 70 | 55 | 40 |
| Pad / trace area * | $mm^2$ | 40 | 50 | 125 | 60 | 250 | 100 | 500 |
| Values | | E96 preferred - other values to special order | | | | | | |
| Pulse Capability | | See graphs – full application note available on request | | | | | | |

*Recommended minimum pad & adjacent trace area for each termination for rated power dissipation on FR4 PCB

## Physical Data

**Dimensions of PWC resistors are given below in mm and weight in g**

| | L | W | T max | A | B | C | Wt. |
|---|---|---|---|---|---|---|---|
| **0805** | 2.0±0.3 | 1.25±0.2 | 0.6 | 0.3±0.15 | 0.9 min | 0.3±0.1 | 0.009 |
| **1206** | 3.2±0.4 | 1.6±0.2 | 0.7 | 0.4±0.2 | 1.7 min | 0.4±0.15 | 0.020 |
| **2010** | 5.1±0.3 | 2.5±0.2 | 0.8 | 0.6±0.3 | 3.0 min | 0.6±0.25 | 0.036 |
| **2512** | 6.5±0.3 | 3.2±0.2 | 0.8 | 0.6±0.3 | 4.4 min | 0.6±0.25 | 0.055 |




Wrap-around terminations
(3 faces)

### Construction

Thick film resistor material, overglaze and organic protection are screen printed on a 96% alumina substrate. Wrap-around terminations have an electroplated nickel barrier and solder coating, this ensures excellent 'leach' resistance properties and solderability.

Note that anti-sulphur version parts below 100R are produced in flip-chip format with the resistor element on the underside.

### Marking

Components are not marked. Reels are marked with type, value, tolerance, date code and quantity.

### Solvent Resistance

The body protection is resistant to all normal industrial cleaning solvents suitable for printed circuits.

# Performance Data

| Size | | Maximum | Typical |
|---|---|---|---|
| Load at rated power: 1000 hours at 70°C | ΔR% | 1 | 0.25 |
| Shelf life test: 12 months at room temperature | ΔR% | 0.1 | 0.02 |
| Derating from rated power at 70°C | | Zero at 155°C | |
| Overload: 6.25 x rated power for 2 seconds | ΔR% | 1 | 0.1 |
| Dry heat: 1000 hours at 155°C | ΔR% | 1 | 0.2 |
| Long term damp heat | ΔR% | 1 | 0.25 |
| Temperature rapid change | ΔR% | 0.25 | 0.05 |
| Resistance to solder heat | ΔR% | 0.25 | 0.05 |
| Resistance to sulphur-bearing gas (AS version only): ASTM-B-809 | | 0.25 | 0.05 |
| Voltage proof | Volts | 500 | |

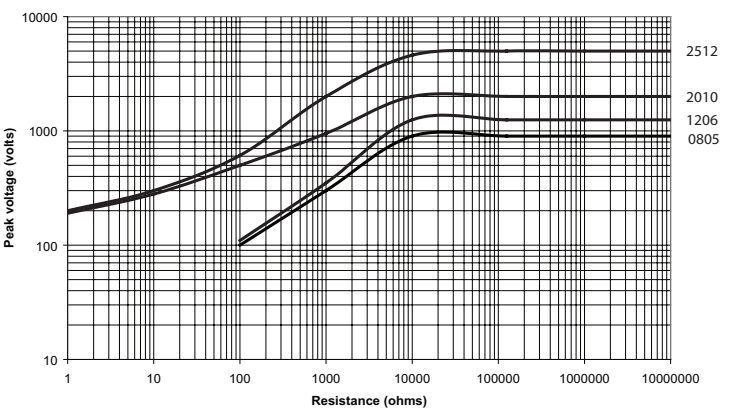
Note: A 0.01 Ohm addition to be added to the performance of all resistors <10 Ohms.

# Pulse Performance Data

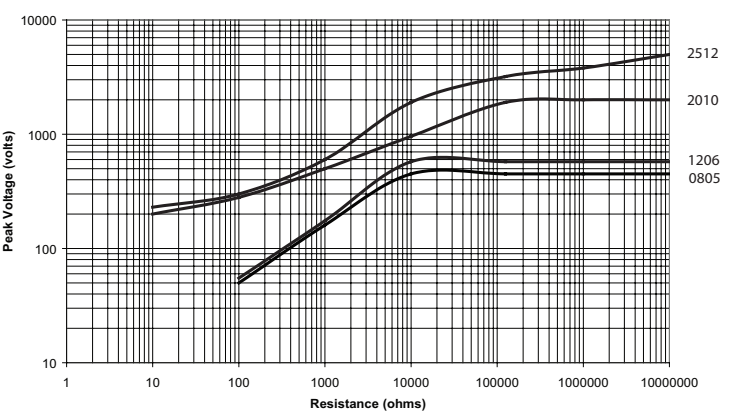
**Lightning Surge**

lightning surge resistors are tested in accordance with IEC 60 115-1 using both 1.2/50µs and 10/700µs pulse shapes. 10 pulses are applied. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

**1.2/50 µS Lightning Surge**




**10/700 µS Lightning Surge**

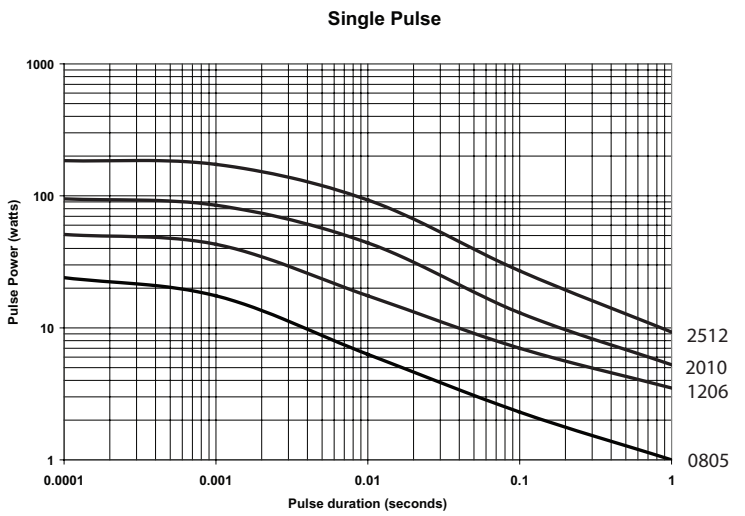



**General Note**

TT electronics reserves the right to make changes in product specification without notice or liability.
All information is subject to TT electronics' own data and is considered accurate at time of going to print.

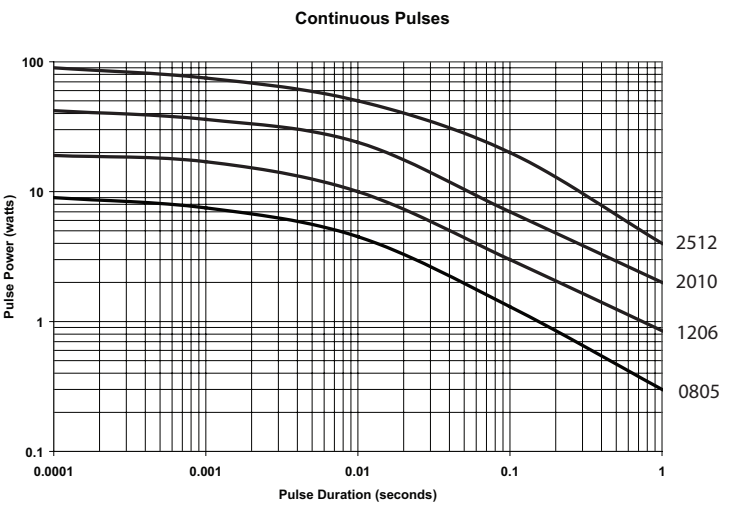
### Single Impulse

The single impulse graph is the result of 50 impulses of rectangular shape applied at one minute intervals. The limit of acceptance was a shift in resistance of less than 1% from the initial value.




### Continuous Load Due to Repetitive Pulses

The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70°C. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value

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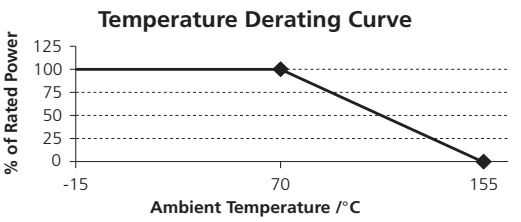
# Thermal Performance Data




# Packaging

0805 and 1206 resistors are supplied on 8mm carrier tape and 2010 and 2512 resistors are supplied on 12mm carrier tape, all on 7 inch reels as per IEC 286-3.

# Application Note

PWC resistors themselves can operate at a maximum temperature of 155°C. For soldered resistors, the joint temperature should not exceed 110°C. This condition is met when the stated power levels at 70°C and recommended pad and trace areas are used. Allowance should be made if smaller areas of copper are used.

A full Application Note on the PWC Series is available.

# Ordering Procedure

This product has two valid part numbers:

**European (Welwyn) Part Number: PWC2512-2K0JI** (2512, 2 kilohms ±5%, Pb-free)

| P | W | C | 2 | 5 | 1 | 2 | | | - | 2 | K | 0 | J | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 2 | | | | 3 | | | 4 | | | 5 | 6 | |

| 1<br>Type | 2<br>Size | 3<br>Anti-Sulphur | 4<br>Value | 5<br>Tolerance | 6<br>Termination & Packing | |
|---|---|---|---|---|---|---|
| PWC | 0805 | Omit for standard | E24 = 3/4 characters | D = ±0.5% | I = RoHS & Standard,<br>PB = SnPb & Standard | |
| | 1206 | AS = Anti-sulphur | E96 = 3/4 characters | F = ±1% | 0805, 1206, 2010 | 3000/reel |
| | 2010 | | R = ohms | J = ±5% | | |
| | 2512 | | K = kilohms | | 2512 | 1800/reel |
| | | | M = megohms | | T1 = RoHS & Non-Standard | |
| | | | | | All sizes | 1000/reel |

**USA (IRC) Part Number: PWC-PWC2512LF-2001JELT** (2512, 2 kilohms ±5%, Pb-free)

| P | W | C | - | P | W | C | 2 | 5 | 1 | 2 | L | F | 2 | 0 | 0 | 1 | J | E | L | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 2 | | | 3 | | | | 4 | | 5 | | | | 6 | 7 | | |

| 1<br>Family | 2<br>Model | 3<br>Size | 4<br>Termination | 5<br>Value | 6<br>Tolerance | 7<br>Packing | |
|---|---|---|---|---|---|---|---|
| PWC | PWC | 0805 | Omit for SnPb | 3 digits + multiplier | D = ±0.5% | ELT = Plastic tape | |
| | | 1206 | LF = Pb-free | R = ohms for values <100 ohms | F = ±1% | 0805, 1206, 2010 | 3000/reel |
| | | 2010 | | | J = ±5% | | |
| | | 2512 | | | | 2512 | 1800/reel |

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## TT electronics:

PWC2512-1R3JI PWC1206-2K2JI

## Welwyn Components:

PWC2010-100RJI PWC2010-22RJI PWC2010-33RJI PWC2010-470RJI PWC2010-47RJI PWC2512-10KJI PWC2512-10RJI PWC2512-150RJI PWC2512-15RJI PWC2512-1K0JI PWC2512-1K5JI PWC2512-22KJI PWC2512-33RJI PWC2512-47KJI PWC2512-47RJI PWC2512-4K7JI PWC2512-6K8JI PWC2512-68RJI PWC2512-68KJI PWC2512-680RJI PWC2512-470RJI PWC2512-3K3JI PWC2512-33KJI PWC2512-330RJI PWC2512-2K2JI PWC2512-22RJI PWC2512-220RJI PWC2512-100RJI PWC2512-100KJI PWC2010-68RJI PWC2010-680RJI PWC2010-220RJI PWC2010-1K5JI PWC2010-1K0JI PWC2010-15RJI PWC2010-150RJI PWC2010-10RJI PWC2010-100KJI PWC2010-10KJI PWC2010-15KJI PWC2010-22KJI PWC2010-33KJI PWC2010-47KJI PWC2010-4K7JI PWC2010-68KJI PWC2010-6K8JI PWC2512-15KJI