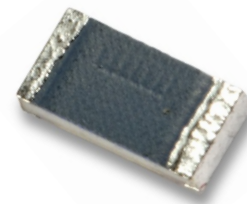


### Features:

- Excellent pulse withstand performance
- Improved working voltage
- Improved power rating
- Anti-sulphur version available



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

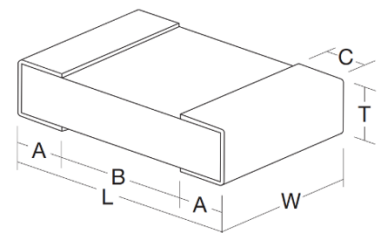
## Electrical Data

|                                                        |                 | PWC0603                                                 | PWC0805 | PWC1206 |     | PWC2010 |     | PWC2512 |     |
|--------------------------------------------------------|-----------------|---------------------------------------------------------|---------|---------|-----|---------|-----|---------|-----|
| Power rating @70°C                                     | W               | 0.125                                                   | 0.25    | 0.33    | 0.5 | 0.75    | 1   | 1.5     | 2   |
| Pad & trace area <sup>1</sup> for full power operation | mm <sup>2</sup> | 30                                                      | 40      | 50      | 125 | 60      | 250 | 100     | 500 |
| Thermal impedance mounted as recommended               | °C/W            | 302                                                     | 220     | 160     | 145 | 80      | 70  | 55      | 40  |
| Limiting element voltage                               | V               | 75                                                      | 150     | 200     |     | 400     |     | 500     |     |
| Resistance range                                       | ohms            | 1R0 to 10M                                              |         |         |     |         |     |         |     |
| Resistance tolerance                                   | %               | <10R: 1, 5,      10R to 1M0: 0.5, 1, 5,      >1M0: 1, 5 |         |         |     |         |     |         |     |
| TCR                                                    | ppm/°C          | <10R: 200,      ≥10R: 100                               |         |         |     |         |     |         |     |
| Ambient temperature range                              | °C              | -55 to +155                                             |         |         |     |         |     |         |     |
| Standard values                                        |                 | E24 & E96 preferred                                     |         |         |     |         |     |         |     |
| Pulse capability                                       |                 | See Pulse Performance Data                              |         |         |     |         |     |         |     |

Note 1: Recommended minimum pad & adjacent trace area for each termination for rated power dissipation on FR4 PCB.

## Physical Data

| Dimensions in mm and weight in mg |           |             |                  |            |                  |            |         |
|-----------------------------------|-----------|-------------|------------------|------------|------------------|------------|---------|
|                                   | L         | W           | T <sub>max</sub> | A          | B <sub>min</sub> | C          | Wt. nom |
| 0603                              | 1.6 ± 0.1 | 0.8 ± 0.1   | 0.55             | 0.3 ± 0.15 | 0.6              | 0.3 ± 0.15 | 2.2     |
| 0805                              | 2 ± 0.15  | 1.25 ± 0.15 | 0.6              |            | 0.9              | 0.3 ± 0.1  | 4.7     |
| 1206                              | 3.2 ± 0.2 | 1.6 ± 0.2   | 0.7              | 0.4 ± 0.2  | 1.7              | 0.4 ± 0.15 | 8.5     |
| 2010                              | 5.1 ± 0.3 | 2.5 ± 0.2   | 0.8              | 0.6 ± 0.3  | 3                | 0.6 ± 0.25 | 36      |
| 2512                              | 6.5 ± 0.3 | 3.2 ± 0.2   |                  |            | 4.4              |            | 55      |



### 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 5R0 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

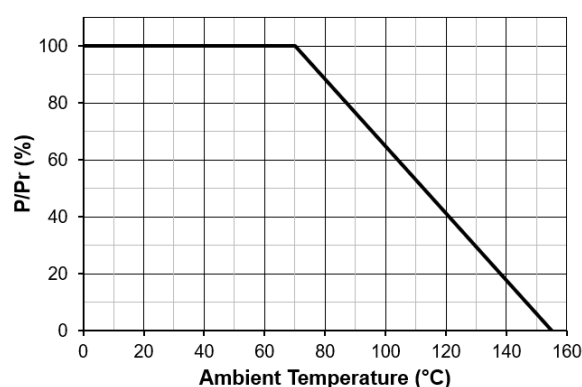
The body protection is resistant to all normal industrial cleaning solvents suitable for printed circuits.

### Performance Data

|                                                |                                               |      | Maximum <sup>1</sup> | Typical |
|------------------------------------------------|-----------------------------------------------|------|----------------------|---------|
| Load at rated power: 1000 hours at 70°C        |                                               |      | 1                    | 0.25    |
| Shelf-life test: 12 months at room temperature |                                               |      | 0.1                  | 0.02    |
| Short-term overload: 6.25 x rated power for 2s |                                               |      | 1                    | 0.1     |
| Dry heat: 1000 hours at 155°C                  |                                               |      | 1                    | 0.2     |
| Long term damp heat                            |                                               |      | 1                    | 0.25    |
| Temperature rapid change                       |                                               |      | 0.25                 | 0.05    |
| Resistance to solder heat                      |                                               |      | 0.25                 | 0.05    |
| Anti-sulphur grade (AS)                        | ASTM-B-809: 1000 hours, 50°C, 91-93%RH        | ±ΔR% | 0.25                 | 0.05    |
| Sulphur-resistant grade (SR)                   | EIA-977: 750 hours, 105°C                     | ±ΔR% | 0.25                 | 0.05    |
|                                                | ASTM-B-809: 1000 hours, 50°C, 91-93%RH        | ±ΔR% | 0.25                 | 0.05    |
|                                                | Modified ASTM-B-809: 1000 hours, 105°C, 85%RH | ±ΔR% | 1                    | 0.25    |
| Voltage proof                                  |                                               |      | 500                  |         |

Note 1: A 0.01Ω addition applies for resistor values <10R.

### Temperature Derating

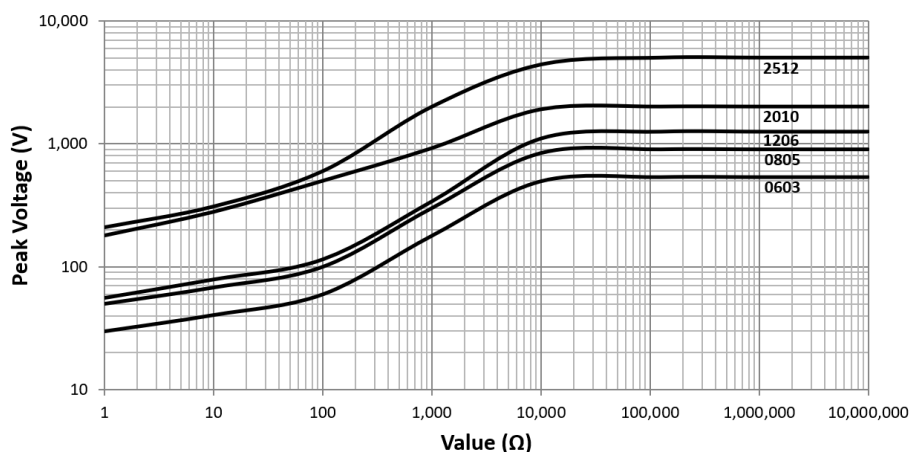


### Pulse Performance Data

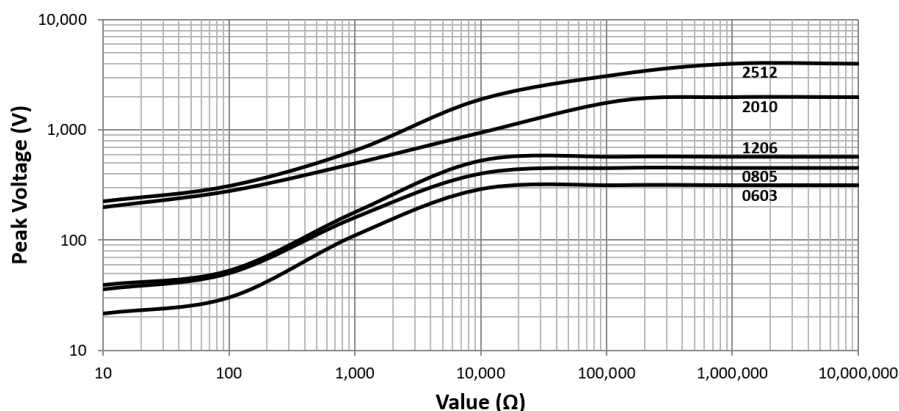
#### Lightning Surge

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.

#### 1.2/50μs Lightning Surge



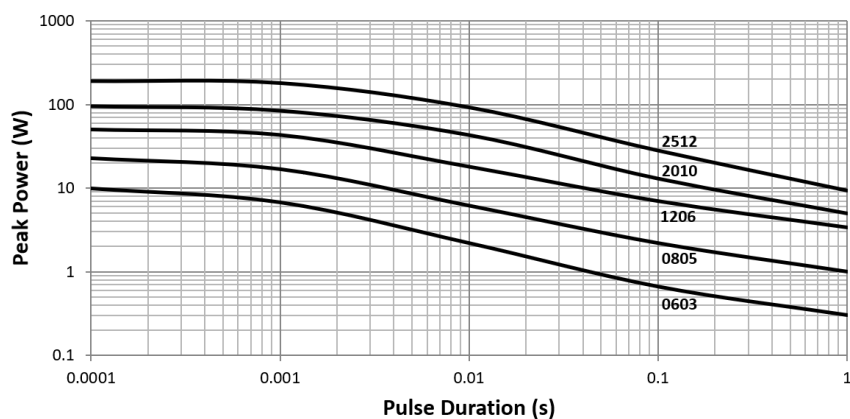
### 10/700µs Lightning Surge



### Single Pulse

50 rectangular pulses are applied at 1 minute intervals to avoid cumulative heating. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

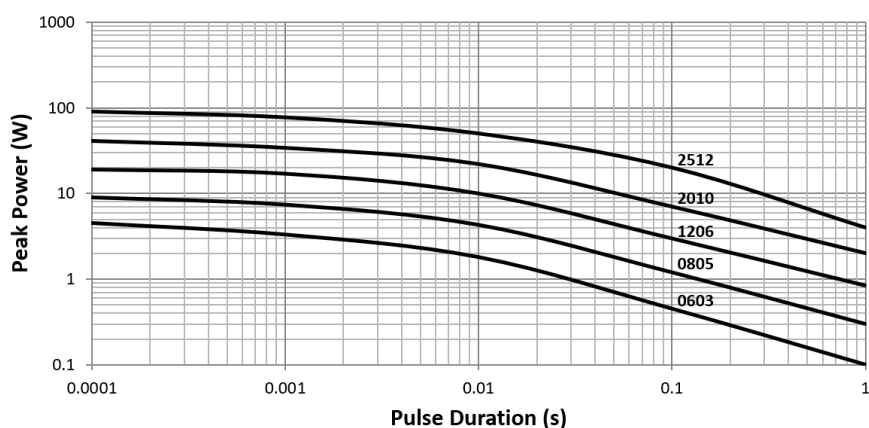
### Single Pulse



### Continuous Pulses

Repetitive rectangular pulses are applied at a frequency which causes the mean power to equal the rated power. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

### Continuous Pulses



### Packaging

0603, 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. For full details of tape and reel dimensions see:  
<https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Application-Note/PS003-Packing-of-Specialist-Chip-Resistors.pdf>.

### 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. Pad and trace area is defined as the total area of the solder pad plus all copper trace within two squares of the edge of the solder pad. Allowance should be made if smaller areas of copper are used.

### Ordering Procedure

**Global Part Number Example: PWC2512-2K0J1** (2512, 2 kilohms  $\pm 5\%$ , Pb-free)

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

| 1      | 2    | 3                          | 4                                                                                      | 5               | 6                              |
|--------|------|----------------------------|----------------------------------------------------------------------------------------|-----------------|--------------------------------|
| Series | Size | Sulphur Grade <sup>1</sup> | Value                                                                                  | Tolerance       | Termination & Packing          |
| PWC    | 0603 | Omit for standard          | E24 = 3/4 characters<br>E96 = 3/4 characters<br>R = ohms<br>K = kilohms<br>M = megohms | D = $\pm 0.5\%$ | I = Pb-free, Standard packing  |
|        | 0805 | AS = Anti-sulphur          |                                                                                        | F = $\pm 1\%$   | PB = SnPb, Standard packing    |
|        | 1206 | SR = Sulphur Resistant     |                                                                                        | J = $\pm 5\%$   | Standard Packing               |
|        | 2010 |                            |                                                                                        |                 | 0603 5000/reel                 |
|        | 2512 |                            |                                                                                        |                 | 0805, 1206, 2010 3000/reel     |
|        |      |                            |                                                                                        |                 | 2512 1800/reel                 |
|        |      |                            |                                                                                        |                 | T1 = Pb-free, 1K reel packing  |
|        |      |                            |                                                                                        |                 | 1K Reel Packing (non-standard) |
|        |      |                            |                                                                                        |                 | All sizes 1000/reel            |

Note 1: For new designs requiring resistance to sulphur-bearing gas, SR grade is preferred.

### Legacy Part Numbers

This product has a legacy part number format for 1206 and larger sizes only. This is still available for ordering, but for new designs use of the Global Part Number is recommended.

**Legacy Part Number Example: PWC-PWC2512LF-2K00-J** (2512, 2 kilohms  $\pm 5\%$ , Pb-free)

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

| 1      | 2     | 3    | 4             | 5                                                                                  | 6               |                      |
|--------|-------|------|---------------|------------------------------------------------------------------------------------|-----------------|----------------------|
| Family | Model | Size | Termination   | Value                                                                              | Tolerance       | Packing              |
| PWC    | PWC   | 1206 | Omit for SnPb | E24 = 4 characters<br>E96 = 4 characters<br>R = ohms<br>K = kilohms<br>M = megohms | D = $\pm 0.5\%$ | Plastic tape         |
|        |       | 2010 | LF = Pb-free  |                                                                                    | F = $\pm 1\%$   | 1206, 2010 3000/reel |
|        |       | 2512 |               |                                                                                    | J = $\pm 5\%$   | 2512 1800/reel       |