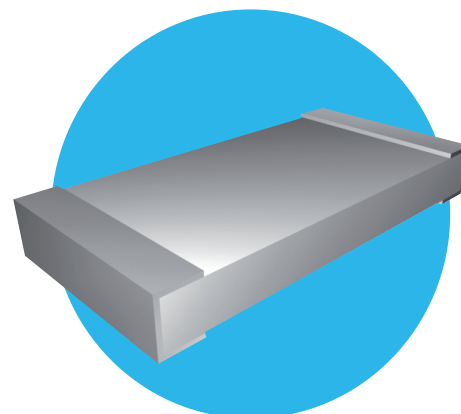


# Pulse Withstanding Chip Resistors

## 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



 All Pb-free parts comply with EU Directive 2011/65/EU (RoHS2)

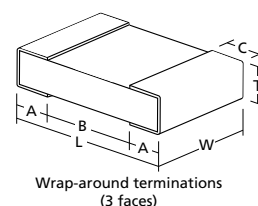
## Electrical Data

| 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 *    | mm²    | 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 |



### 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.

### General Note

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## Performance Data

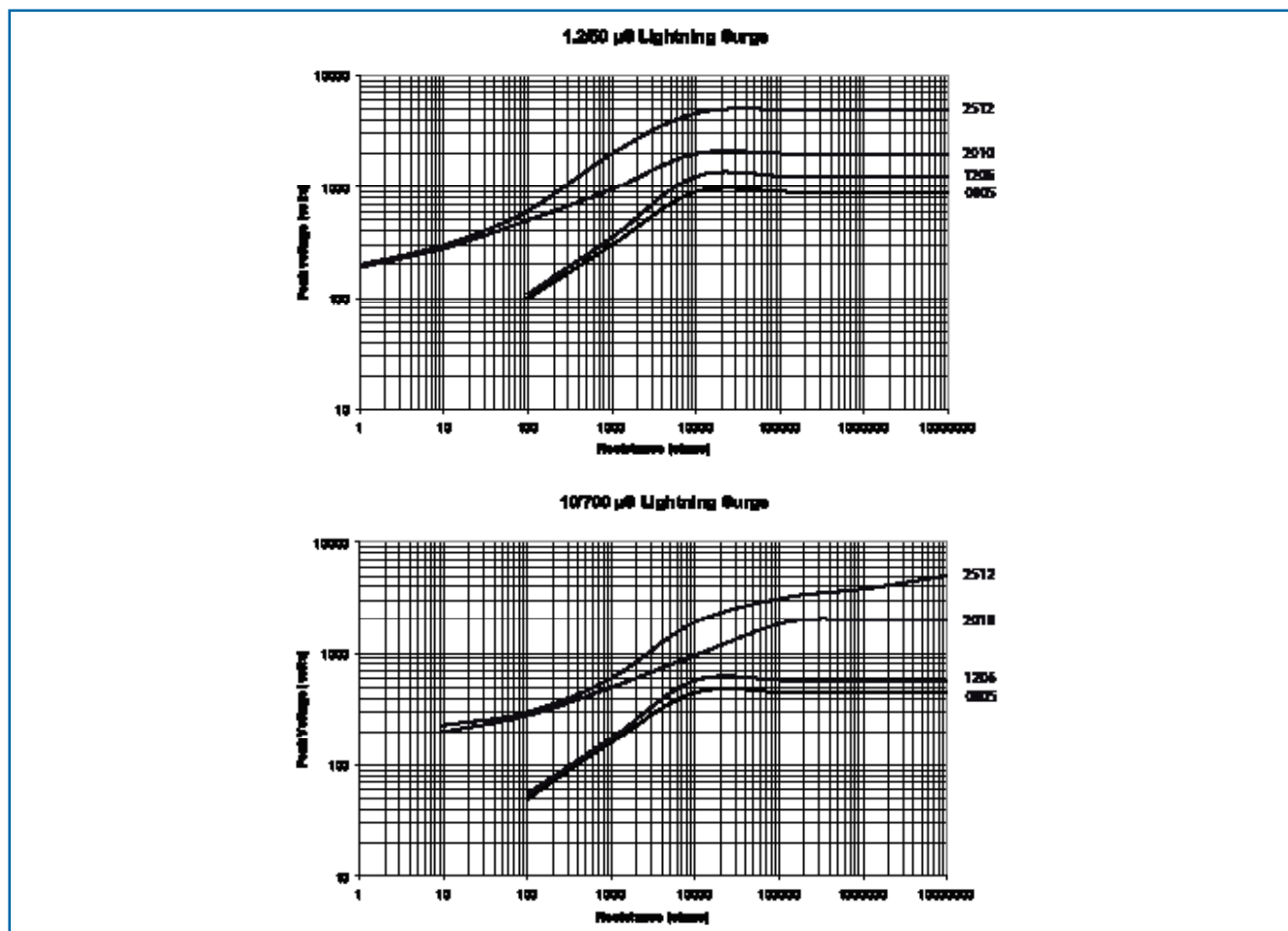
| Size                                                            |              | Maximum       | Typical |
|-----------------------------------------------------------------|--------------|---------------|---------|
| Load at rated power: 1000 hours at 70°C                         | $\Delta R\%$ |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

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 1.2/50 $\mu$ s and 10/700 $\mu$ s pulse shapes. 10 pulses are applied. The limit of acceptance is a shift in resistance of less than 1% from the initial value.



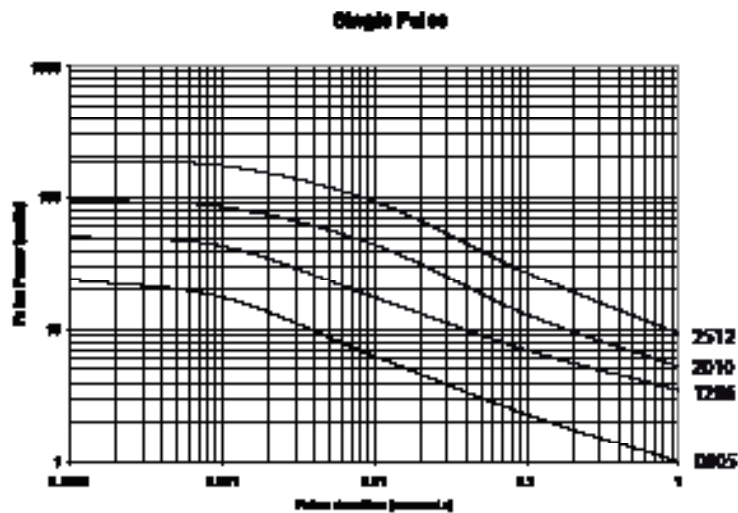
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## PWC Series

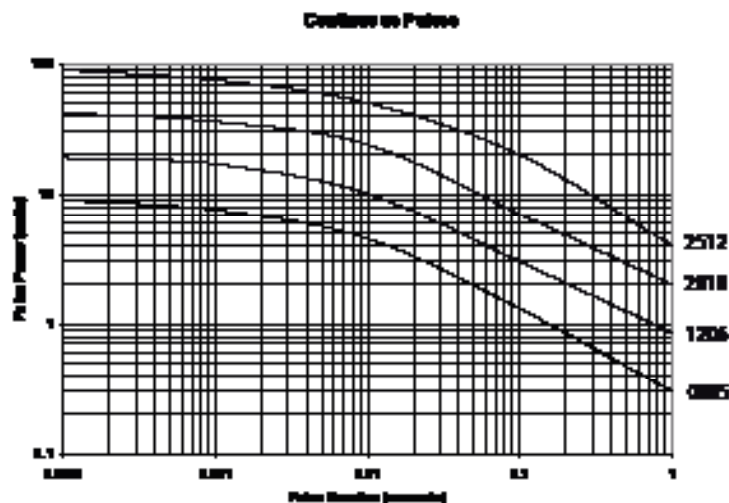
### Single Impulse

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

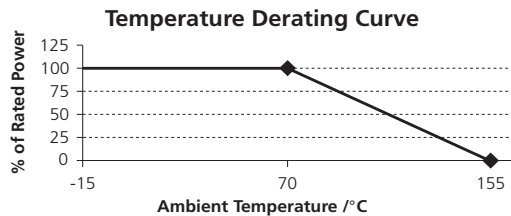
The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70°C. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value



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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  $\pm 5\%$ , 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 = $\pm 0.5\%$ | I = RoHS & Standard,<br>PB = SnPb & Standard |
|           | 1206      | AS = Anti-sulphur | E96 = 3/4 characters | F = $\pm 1\%$   | 0805, 1206,<br>2010                          |
|           | 2010      |                   | R = ohms             | J = $\pm 5\%$   | 3000/reel                                    |
|           | 2512      |                   | K = kilohms          |                 | 2512                                         |
|           |           |                   | M = megohms          |                 | 1800/reel                                    |
|           |           |                   |                      |                 | T1 = RoHS &<br>Non-Standard                  |
|           |           |                   |                      |                 | All sizes                                    |
|           |           |                   |                      |                 | 1000/reel                                    |

**USA (IRC) Part Number: PWC-PWC2512LF-2001JELT** (2512, 2 kilohms  $\pm 5\%$ , 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 = $\pm 0.5\%$ | ELT = Plastic tape  |
|             |            | 1206      | LF = Pb-free     | R = ohms for<br>values <100 ohms | F = $\pm 1\%$   | 0805, 1206,<br>2010 |
|             |            | 2010      |                  |                                  | J = $\pm 5\%$   | 3000/reel           |
|             |            | 2512      |                  |                                  |                 | 2512                |
|             |            |           |                  |                                  |                 | 1800/reel           |

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