

Pulse Withstanding Chip Resistors

Token (PWR) Pulse Withstanding Chip Resistors Provide 50 Percent Increase in Power Dissipation

▶ Preview

As electronic design engineers have increased the power density of their equipment, the demand for smaller surface mount single-chip circuit protection resistors has also increased. Token developed the PWR Series resistors to provide an economical alternative to bulky molded wirewound components or multi-chip solutions while saving both PC board space and manufacturing costs.

To meet the increased demand for the PWR Series resistors, Token has developed a series of pulse withstanding chip resistors with improved power ratings in reduced surface mounted sizes. Designated the PWR Series, the chip resistors deliver up to 50 percent higher power ratings than conventional surface mount resistors - up to 1.5W in a standard 2512 size chip.

Token is able to boost this power rating up to 50 percent through a combination of proprietary power film materials and advanced manufacturing processes. The PWR Series Resistors are available in four standard sizes (0805, 1206, 2010 and 2512) with power ratings from 0.125W to 1.5W, and maximum operating voltage ratings for 100V to 500V. Resistance range is from 10 Ω to 20 M Ω , with tolerance tight to 0.5 percent. The PWR meets restriction of hazardous substances RoHS directive and RoHS compliance.



Along with the increased power ratings, the PWR Series resistors also feature high surge and high voltage ratings, making them extremely stable in demanding surge and pulse environments. The PWR Series chip resistors are specified for use in power supplies, circuit protection devices, portable battery chargers, motor controls and line-powered equipment.

Token will also produce devices outside these specifications to meet specific customer requirements, please contact our sales for more information.

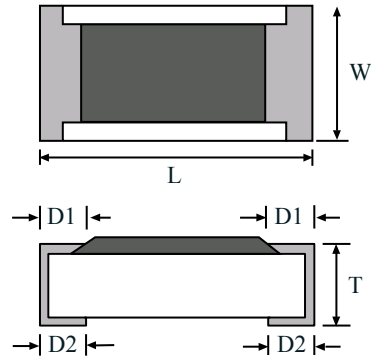
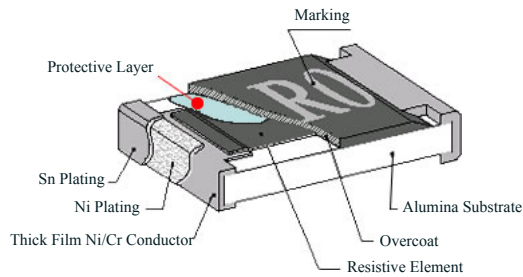
▶ Features

- High Power Rating .
- Tolerance from $\pm 0.5\%$ ~ 5% .
- Improved Working Voltage Ratings.
- Excellent Pulse Withstanding Performance.
- Standard Package sizes of 0805, 1206, 2010, and 2512.

▶ Applications

- Power Supplies, Diagnostic Equipment.
- Industrial Controls, LCD Video Monitors.
- Portable Battery Chargers, Medical Devices.
- Motor Controls and Line-Powered Equipment.
- Metering (Testing/Measurement), Circuit Protection Devices .

► Dimensions (Unit: mm)

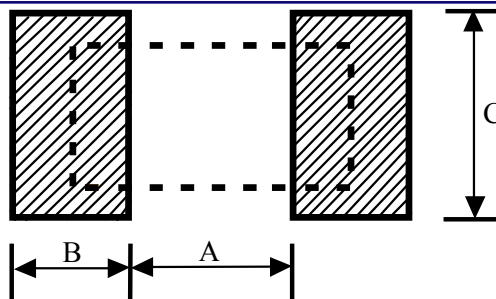


| Codes | L | W | T | D1 | D2 |
|--------------|-----------|-----------|-----------|-----------|-----------|
| PWR05 (0805) | 2.00±0.15 | 1.25±0.15 | 0.55±0.10 | 0.30±0.20 | 0.40±0.25 |
| PWR06 (1206) | 3.05±0.15 | 1.55±0.15 | 0.55±0.10 | 0.50±0.30 | 0.40±0.25 |
| PWR10 (2010) | 5.00±0.20 | 2.45±0.15 | 0.60±0.15 | 0.60±0.30 | 0.50±0.25 |
| PWR12 (2512) | 6.30±0.15 | 3.10±0.15 | 0.55±0.10 | 0.60±0.30 | 0.50±0.25 |

► Standard Electrical Specifications

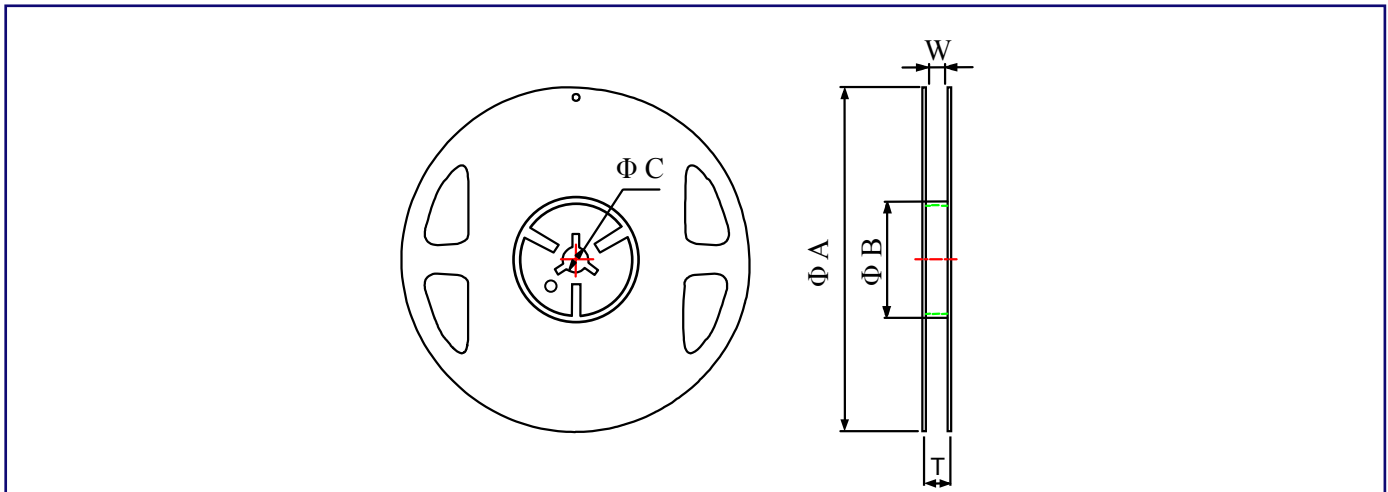
| Type | Power Rating at 70°C | Operating Temp. Range | Max Operating Voltage | Resistance Tolerance | Resistance Range | TCR |
|--------------|----------------------|-----------------------|-----------------------|---|------------------|--------------|
| PWR05 (0805) | 0.125W | -55 ~ +155°C | 150V | ±0.5% ±1.0% ±2.0% ±3.0% ±5.0% | 300Ω~20MΩ | ±100PPM / °C |
| PWR06 (1206) | 0.33W | -55 ~ +155°C | 200V | | 10Ω~299Ω | ±200PPM / °C |
| PWR10 (2010) | 0.75W | -55 ~ +155°C | 400V | ±0.5% ±1.0% ±2.0% ±3.0% ±5.0% | 20.1Ω~10MΩ | ±100PPM / °C |
| PWR12 (2512) | 1.5W | -55 ~ +155°C | 500V | | 10Ω~20Ω | ±200PPM / °C |

► Recommend Land Pattern (Unit: mm)



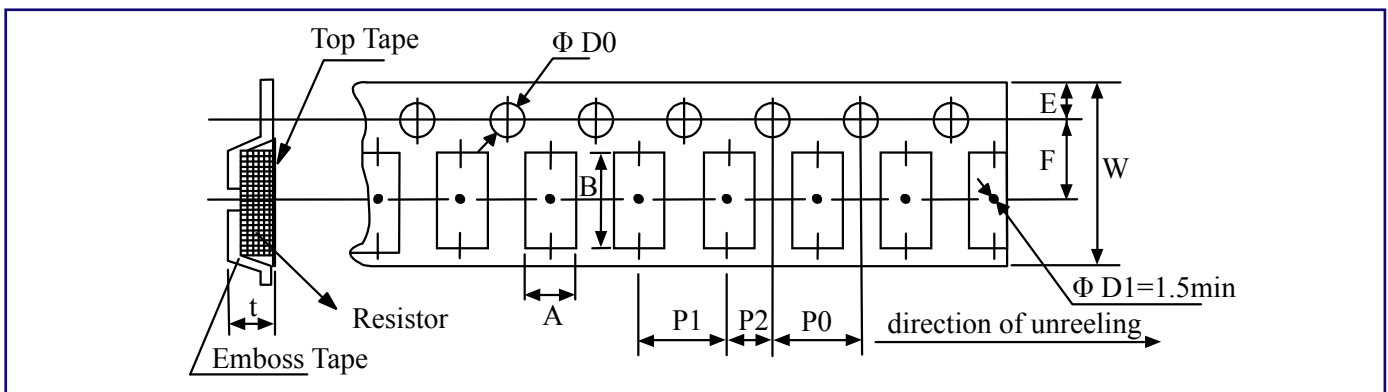
| Codes | A | B | C |
|--------------|------|------|----------|
| PWR05 (0805) | 1.00 | 1.00 | 1.35±0.2 |
| PWR06 (1206) | 2.00 | 1.15 | 1.70±0.2 |
| PWR10 (2010) | 3.60 | 1.40 | 2.50±0.2 |
| PWR12 (2512) | 4.90 | 1.60 | 3.10±0.2 |

► Packaging Quantity & Reel Specifications (Unit: mm)



| Codes | ΦA | ΦB | ΦC | W | T | Paper Tape (PCS) | Emboss Plastic Tape (PCS) |
|--------------|-----------|----------|----------|----------|----------|------------------|---------------------------|
| PWR05 (0805) | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0 | 11.5±1.0 | 5,000 | - |
| PWR06 (1206) | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0 | 11.5±1.0 | 5,000 | - |
| PWR10 (2010) | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 4,000 |
| PWR12 (2512) | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | - | 4,000 |

► Emboss Plastic Tape Specifications (Unit: mm)



| Codes | A±0.10 | B±0.10 | W±0.10 | E±0.10 | F±0.05 | P0±0.05 | P1±0.10 | P2±0.05 | ΦD0±0.10 | T±0.20 |
|--------------|--------|--------|--------|--------|--------|---------|---------|---------|----------|--------|
| PWR10 (2010) | 2.85 | 5.45 | 12.0 | 1.75 | 5.5 | 4.00 | 4.00 | 2.00 | 1.50 | 1.00 |
| PWR12 (2512) | 3.40 | 6.65 | 12.0 | 1.75 | 5.5 | 4.00 | 4.00 | 2.00 | 1.50 | 1.00 |

Application & Soldering Notes

Today's electronic devices are becoming smaller and smaller. The requirement, in particular, for pulse withstand capability is growing due to the need to protect sensitive modern electronic systems.

To meet this demand Token Electronics have designed a Pulse Withstanding Chip Resistor (PWR Series). The enhanced performance of the chips is made possible by the precise use of the best resistance inks and a closely controlled production process.

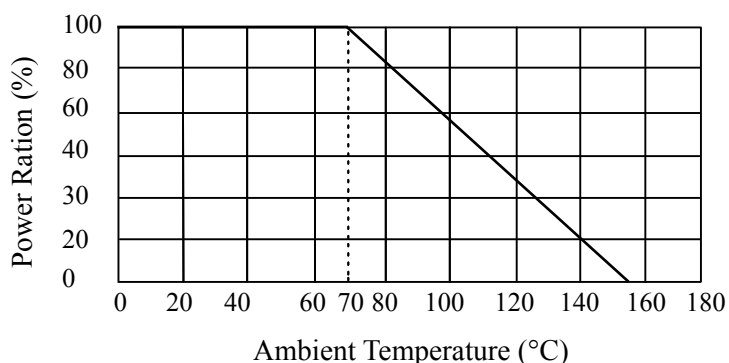
Application Notes:

- Applications vary from line protection for telecommunications to surge withstanding resistors for use in circuit breakers. Details of a typical telecomm and power supply application are given below.
- Telephone lines can be subjected to a large range of voltage disturbances, many of which can damage switching equipment. This has led to the need for circuit protection against both high voltage transients, usually of short duration caused by lightning strikes and overloads of longer duration, due to direct connection to mains power lines.
- These two faults are separated into primary and secondary protection.
 - Primary protection handles the high voltage transients, and is usually located within the exchange.
 - Secondary protection is usually built into the equipment to be protected, and deals with both current and voltage limiting.
- Voltage limiting prevents damage to the equipment and shock hazards, and current limiting prevents damage to wiring.
- To determine the suitability of a PWC series chip resistors for your application refer to the pulse withstanding data as given lighting surge performance using both 1.2/50 μ s and 10/700 μ s pulse shapes.

Soldering Notes:

- Electrical connection to a ceramic substrate or to a printed circuit board can be made by reflow or wave soldering of wrap-around terminations.
- Wrap-around terminations provide good leach properties and ensure reliable contact.
- Due to the robust construction, the PWR can be immersed in the solder bath for 30 seconds at 260°C.
- This enables the resistor to be mounted on one side of a printed circuit board and wire-leaded components applied on the other side.
- PWR 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.

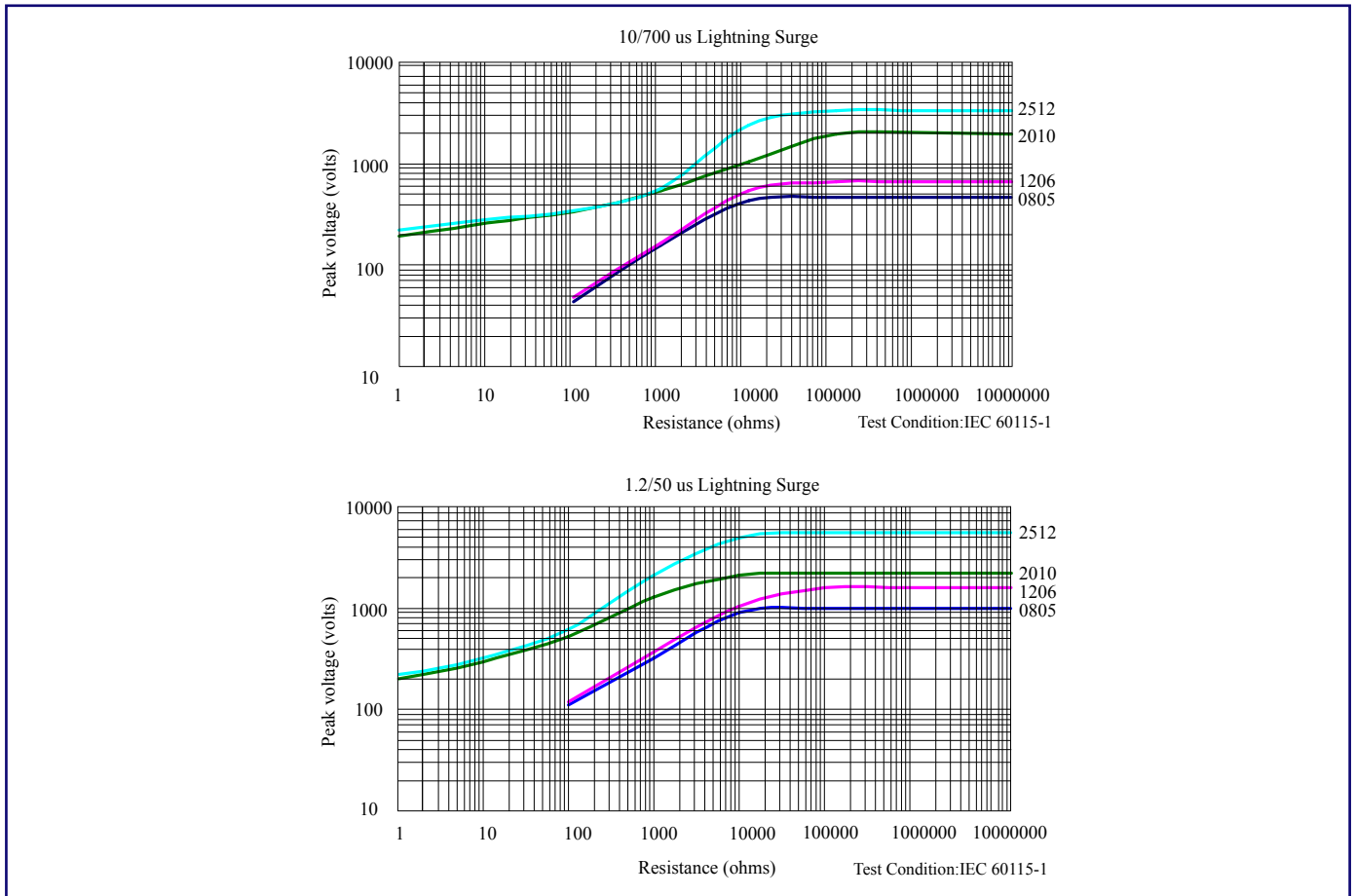
Environmental Characteristics



| Test Item | Specification | Test Method |
|---------------------------------------|------------------|--|
| Short Time Overload | ±0.5% | JIS-C-5202-5.5 RCWV*2.5 or Max Overloading Voltage, 5 seconds |
| Thermal Shock | ±0.5% | MIL-STD-202F Method 107G -55°C~150°C, 100 cycles |
| Temperature Coefficient of Resistance | As Spec. | MIL-STD-202F Method 304 +25/-55/+25/+125/+25°C |
| Load Life | ±1% | MIL-STD-202F Method 108A RCWV, 70°C, 1.5 hours ON, 0.5 hours OFF, total 1000~1048 hours |
| Humidity (Steady State) | ±0.5% | MIL-STD-202F Method 103B 40°C, 90~95%RH, RCWV 1.5 hours ON, 0.5 hours OFF, total 1000~1048 hours |
| Resistance to Dry Heat | ±0.5% | JIS-C-5202-7.2 96 hours @ +155°C without load |
| Low Temperature Operation | ±0.5% | JIS-C-5202-7.1 1hour,-65°C followed by 45 minutes of RCWV |
| Bending Strength | As Spec. | JIS-C-5202-6.1.4 Bending Amplitude 3mm for 10 seconds |
| Resistance to Soldering Heat | ±0.5% | MIL-STD-202F Method 210E 260±5°C, 10±1seconds |
| Solderability | 95% min coverage | MIL-STD-202F Method 208H 245°C±5°C, 3±0.5(sec) |
| Dielectric Withstand Voltage | As Spec. | MIL-STD-202F Method 301 Apply Max Overload Voltage for 1 minute |
| Insulation Resistance | >1000MΩ | MIL-STD-202F Method 302 Apply 100VDC for 1minute |

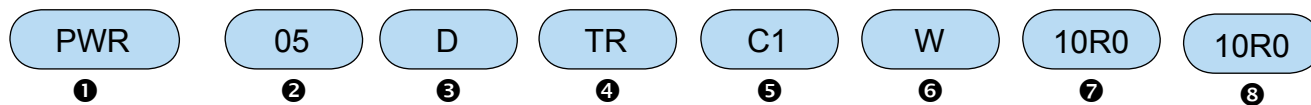
Note: Storage Temperature: 25±3°C; Humidity: <80%RH

Lightning Surge



Note: Lightning Surge Resistors are tested in accordance with IEC 60 115-1 using both 1.2/50us and 10/700 pulse.shapes. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

How to Order



1 Product Type

2 Dimensions(L×W)

| Code | Dimensions(L×W) | EIA |
|------|-----------------|------|
| 05 | 2.00×1.25mm | 0805 |
| 06 | 3.05×1.55mm | 1206 |
| 10 | 5.00×2.45mm | 2010 |
| 12 | 6.30×3.10mm | 2512 |

3 Resistance Tolerance

| Code | Resistance Tolerance |
|------|----------------------|
| D | ±0.50% |
| F | ±1% |
| G | ±2% |
| H | ±3% |
| J | ±5% |

4 Packaging

| Code | Packaging |
|------|-------------|
| TR | Taping Reel |
| P | Bulk |

5 TCR

| Code | TCR |
|------|---------|
| C1 | ±100ppm |
| C | ±200ppm |

6 Power Rating

| Code | Power Rating |
|------|--------------|
| A | 1.5W |
| O | 1/3W |
| Q | 3/4W |
| T | 1W |
| U | 1/2W |
| V | 1/4W |
| W | 1/8W |

7 Resistance

| Code | Resistance |
|------|------------|
| 1000 | 100Ω |
| 2201 | 2200Ω |
| 1002 | 10000Ω |
| 1003 | 100000Ω |

8 Marking

| Code | Marking |
|------|------------------------------|
| | Standard Marking for E96/E24 |
| N | No Marking |