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# Type 3503 Series

**Key Features**

**High thermal conductivity Aluminum-Nitride substrate.**

**High Power / Size ratio – 2W in 1206 size.**

**Thin film power resistors with TCR ±50ppm/°C and tolerance ±1%.**




TE are pleased to introduce the new 3503 series. This is a high stability Thin Film Chip Power resistor range offering very high power / size ratio – 2W in 1206 size. The 3503 series offers TCR at ±50ppm/°C and resistance tolerance at ±1% as standard. Resistance values are within the IEC 63 E96 and E24 value grids. The 3503 resistors have accurate and uniform physical dimensions to facilitate automatic placement methods.

**Applications**

**Power Supplies**

**Power Switching**

**Braking Systems**

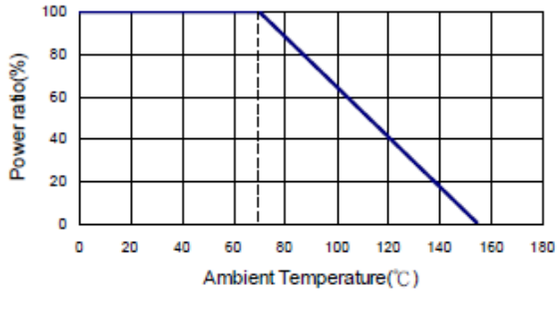
**Automation Controls**

## Characteristics – Electrical

| | |
|---|---|
| Power Rating @ 70°C | 2.0W |
| Resistance Range | 50Ω ~ 30.1KΩ |
| Temperature Coefficient of resistance | ±50PPM/°C |
| Max. Operating Voltage | 100V |
| Max Overload Voltage | 200V |
| Operating Temperature Range | -55°C ~ 155°C |

Notes:
Power rating dependant upon mounting by user
Operating Voltage= √(P*R) or Max. Operating voltage listed above, whichever is lower

## Derating Curve






Dimensions in millimetres unless otherwise specified

Dimensions Shown for reference purposes only. Specifications subject to change

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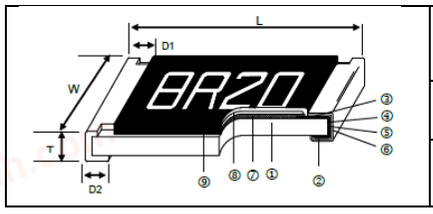


## Environmental Characteristics

| Item | Requirement | Test Method |
|---|---|---|
| Temperature Coefficient of Resistance (TCR) | As per TCRs specified in Electrical Characteristics tables | MIL-STD-202 Method 304<br>+25/-55/+25/+125/+25°C |
| Short Time Overload | ΔR±0.5% | Actual power handling capability is limited by the end user mounting process. As with any high power chip resistor the ability to remove the heat is critical to the overall performance of the device. |
| Insulation Resistance | >9999 MΩ | MIL-STD-202 Method 302<br>Apply 100VDC for 1 minute |
| Endurance | ΔR±1% | MIL-STD-202 Method 108<br>70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Damp Heat with Load | ΔR±0.4% | MIL-STD-202 Method 103<br>40±2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Solderability | 95% min. coverage | MIL-STD-202 Method 208<br>245±5°C for 3 seconds |
| Resistance to Soldering Heat | ΔR±0.2% | MIL-STD-202 Method 210<br>260±5°C for 10 seconds |
| Low Temperature Operation | ΔR±0.2% | JIS-C-5201-1 4.36<br>1 hour, -65°C, followed by 45 minutes of RCWV |
| High Temperature Exposure | ΔR±0.2% | MIL-STD-202 Method 108<br>At +155°C for 1000 hours |
| Thermal Shock | ΔR±0.2% | MIL-STD-202F Method 107<br>-55°C ~150°C, 100 cycles |

RCWV (Rated continuous working voltage)= √(P*R) or Max. Operating voltage whichever is lower
Reference Standards: MIL-STD-202, JIS-C 5201
Storage Temperature: 25±3°C; Humidity < 80%RH
Shelf Life: 2 years from date of production

## Construction and Dimensions




| | | | | | |
|---|---|---|---|---|---|
| ① | Alumina Nitride Substrate | ④ | Edge Electrode | ⑦ | Resistor Layer |
| ② | Bottom Electrode | ⑤ | Barrier Layer | ⑧ | Overcoat |
| ③ | Top Electrode | ⑥ | External Electrode | ⑨ | Marking |

| Size | L (mm) | W (mm) | T (mm) | D1 (mm) | D2 (mm) | Weight (g) 1000 Pcs |
|---|---|---|---|---|---|---|
| 1206 | 3.05±0.20 | 1.55±0.20 | 0.43±0.15 | 0.50±0.15 | 1.20±0.20 | 10.98 |



Dimensions in millimetres unless otherwise specified

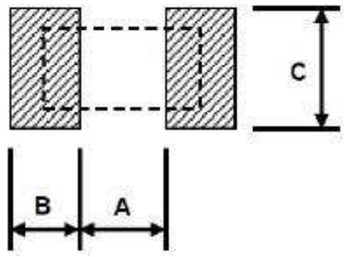
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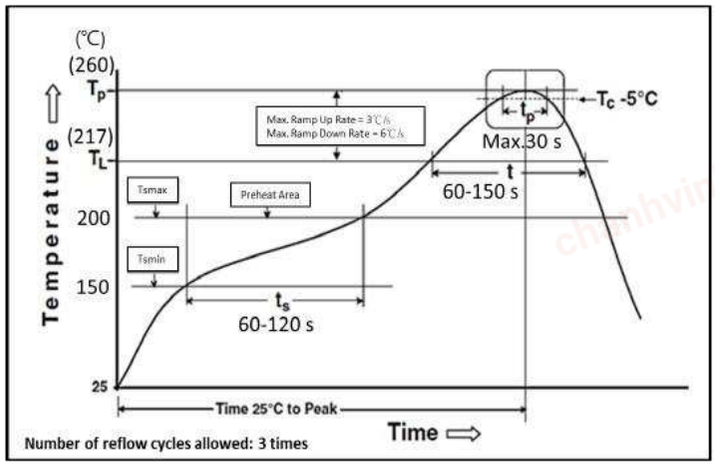
## Recommended PCB Plan




| Size | A (mm) | B (mm) | C (mm) |
|---|---|---|---|
| 1206 | 0.60 | 1.90 | 1.80±0.1 |

NB. Use a PCB with a copper thickness of two ounces

## Solder Profile (IPC/JEDEC J-STD-020




## Marking

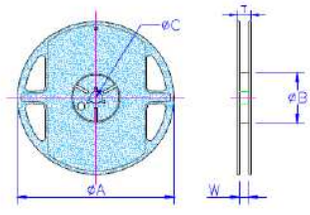
4 digit marking – 3 significant figures plus multiplier

| Resistance | 500Ω | 2.2KΩ | 10KΩ | 12.5KΩ |
|---|---|---|---|---|
| Marking | 5000 | 2201 | 1002 | 1252 |

## Packaging

### Reel Specification

| ØA | ØB | ØC | W | T | Qty |
|---|---|---|---|---|---|
| 178.0 ±1.0 | 60.0 ±1.0 | 13.5 ±0.7 | 9.5 ±1.0 | 11.5 ±1.0 | 1000 5000 |






Dimensions in millimetres unless otherwise specified

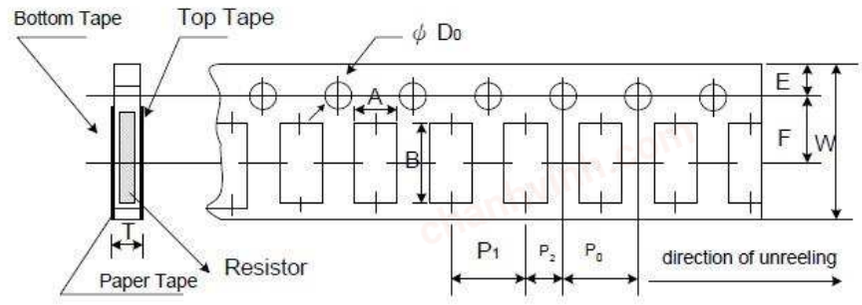
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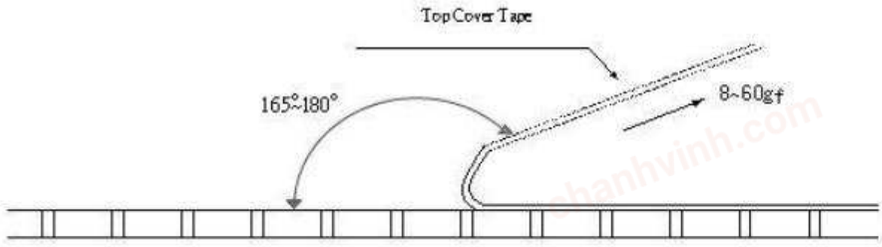


## Paper Tape Specification




| A±0.05 | B±0.05 | W±0.10 | E±0.05 | F±0.05 | $P_0$±0.1 | $P_1$±0.1 | $P_2$±.05 | Ø$D_0$±.05 | T±0.05 |
|---|---|---|---|---|---|---|---|---|---|
| 2.00 | 3.55 | 8.00 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 1.55 | 0.75 |

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 8gf to 60gf




## How to Order

| 3503 | G | 2B | 10K | F | TDF |
|---|---|---|---|---|---|
| **Common Part** | **TCR** | **Size** | **Resistance value** | **Tolerance** | **Packaging** |
| 3503 – High Power Thin Film Chip Resistor | G – 50ppm | 2B - 1206 | 100R - 100Ω<br>1K0 - 1000Ω<br>10K – 10,000Ω | F – 1% | TDF – 1K RL<br>TD – 5K RL |