

Type 3504 Series

Key Features

High thermal conductivity
Aluminum-Nitride substrate.

High Power / Size ratio – 6W in 2512 size.

Thin film power resistors with TCR $\pm 50\text{ppm}/^\circ\text{C}$ and tolerance $\pm 1\%$.

Moisture sensitivity level - MSL1

Applications

Power Supplies

Power

Switching

Braking Systems

Automation Controls



TE are pleased to introduce the new 3504 series. This is a high stability Thin Film Chip Power resistor range offering very high power / size ratio – 6W in 2512 size. The 3504 series offers TCR at $\pm 50\text{ppm}/^\circ\text{C}$ and resistance tolerance at $\pm 1\%$ as standard. Resistance values are within the IEC 63 E96 and E24 value grids. The 3504 resistors have accurate and uniform physical dimensions to facilitate automatic placement methods.

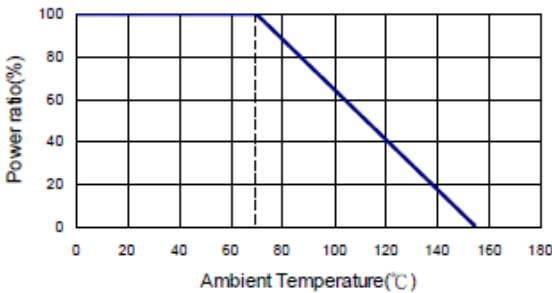
Note: SMD (Surface mount devices) resistors and inductors should be kept in their original packaging to protect them from ESD (Electrostatic Discharge). The full reels can be broken into smaller quantities, without exposing them to ESD, as long as the components are still in the plastic or paper tape. These resistors and inductors should not be removed from the plastic or paper tape unless they are in an ESD protected environment.

Characteristics – Electrical

Power Rating @ 70°C	6.0W
Resistance Range	$50\Omega \sim 30.1\text{K}\Omega$
Temperature Coefficient of resistance	$\pm 50\text{PPM}/^\circ\text{C}$
Max. Operating Voltage	100V
Max Overload Voltage	200V
Operating Temperature Range	$-55^\circ\text{C} \sim 155^\circ\text{C}$

Notes:
Power rating dependant upon mounting by user
Operating Voltage= $\sqrt{P \cdot R}$ or Max. Operating voltage listed above, whichever is lower

Derating Curve



Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (TCR)	As per TCRs specified in Electrical Characteristics tables	MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	$\Delta R \pm 0.5\%$	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 Apply 100VDC for 1 minute
Endurance	$\Delta R \pm 1\%$	MIL-STD-202 Method 108 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\Delta R \pm 0.4\%$	MIL-STD-202 Method 103 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 208 245±5°C for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.2\%$	MIL-STD-202 Method 210 260±5°C for 10 seconds
Low Temperature Operation	$\Delta R \pm 0.2\%$	JIS-C-5201-1 4.36 1 hour, -65°C, followed by 45 minutes of RCWV
High Temperature Exposure	$\Delta R \pm 0.2\%$	MIL-STD-202 Method 108 At +155°C for 1000 hours
Thermal Shock	$\Delta R \pm 0.2\%$	MIL-STD-202F Method 107 -55°C ~ 150°C, 100 cycles

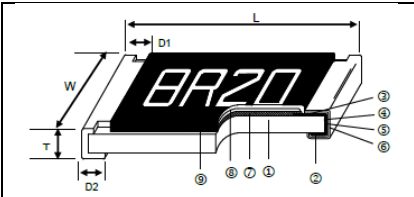
RCWV (Rated continuous working voltage) = $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

Reference Standards: MIL-STD-202, JIS-C 5201

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

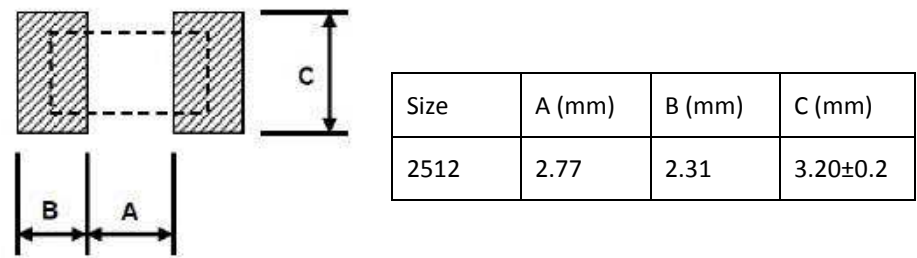
Shelf Life: 2 years from date of production

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

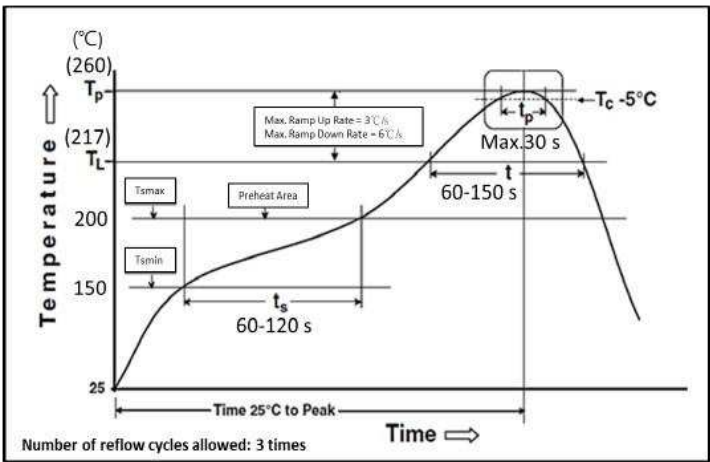
Size	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) 1000 Pcs
2512	6.30±0.20	3.10±0.20	0.43±0.15	0.70±0.25	1.60±0.25	42.32

Recommended PCB Plan



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

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



Marking

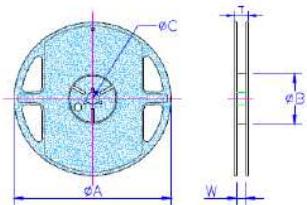
4 digit marking – 3 significant figures plus multiplier

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

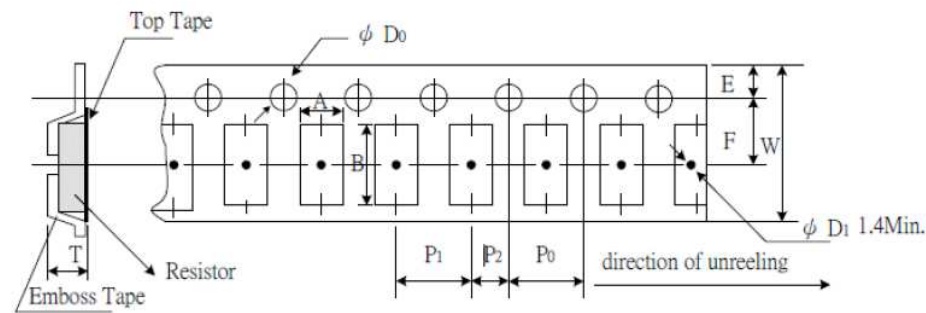
Packaging

Reel Specification

∅A	∅B	∅C	W	T	Qty
178.0	60.0	13.5	13.5	15.5	1000
±1.0	±1.0	±0.7	±1.0	±1.0	4000

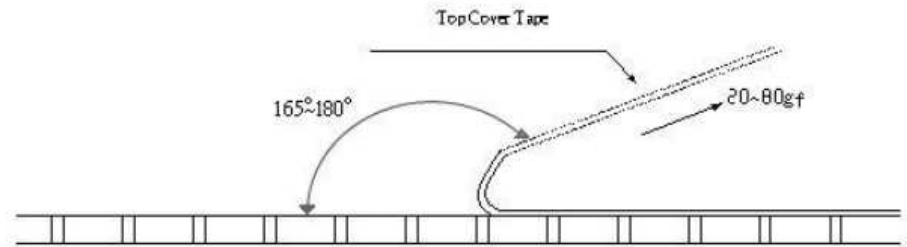


Emboss Plastic Tape Specification



$A \pm 0.10$	$B \pm 0.10$	$W \pm 0.10$	$E \pm 0.10$	$F \pm 0.05$	$P_0 \pm 0.10$	$P_1 \pm 0.10$	$P_2 \pm 0.05$	$\phi D_0 \pm 0.10$	$T \pm 0.20$
3.40	6.65	12.00	1.75	5.50	4.00	4.00	2.00	1.50	1.00

- Peel force of top cover tape
- The peel speed shall be about 300mm/min \pm 5%
- The peel force of top cover tape shall be between 20gf to 80gf



How to Order

3504	G	3A	10K	F	TDF
Common Part	TCR	Size	Resistance value	Tolerance	Packaging
3504 – High Power Thin Film Chip Resistor	G – 50ppm	3A - 2512	100R - 100 Ω 1K0 - 1000 Ω 10K - 10,000 Ω	F – 1%	TDF – 1K RL TD – 5K RL