

## Type 3502 Series

2W@70°C in 2010 size package

**Key Features** 

Suitable for auto placement

Available from distribution

Terminal finish matte sn over ni barrier



TE Connectivity is pleased to introduce this thick film high power device, sister to our popular 3522 series, suitable for auto placement in volume and for most applications. Supplied as standard on 7 inch Reels of 2000 pieces per reel.

## **Characteristics – Electrical**

Power Rating @ 70°C	2W
Resistance Range	1Ω ~ 10ΜΩ
Resistance Tolerance	±1%, ±5%
Temperature Coefficient of Resistance	1Ω~10Ω ≤± 200PPM/°C
(TCR)	10.1Ω~10MΩ ≤± 100PPM/°C
Max. Working Voltage	200V
Max. Overload Voltage	500V
Dielectric Withstanding Voltage	500V
Operating Temperature Range	-55℃ <b>~</b> 155℃

Resistors shall have a rated direct-current (DC) continuous working voltage or a approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial line frequency and waveform corresponding to the power rating, as determined from the following formula :

 $RCWV = \sqrt{P \times R}$ 

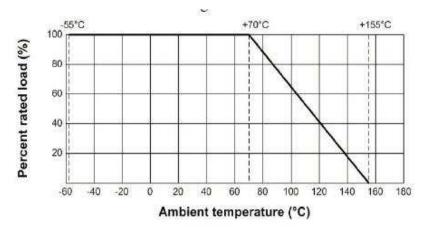
Where the calculated RCWV is greater than the stated Max. Working Voltage, the Max. Working Voltage will apply.

Dimensions in millimetres unless otherwise specified Dimensions Shown for reference purposes only. Specifications subject to change

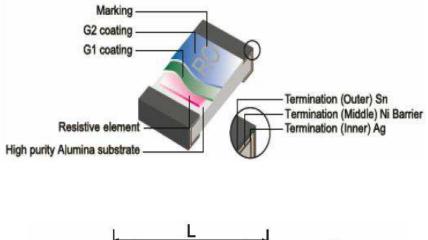


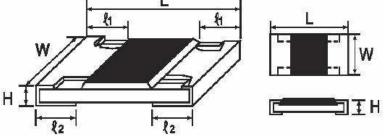
# **Power Rating and Derating**

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70  $^{\circ}\text{C}$ . For temperature in excess of 70  $^{\circ}\text{C}$ , The load shall derate as shown in chart below.



## **Construction and Dimensions:**





Turne	Dimensions (mm)					
Туре	L	W	Н	e1	€2	
3502	5.00 ± 0.10	2.50 ± 0.15	$1.10 \pm 0.10$	0.60 ± 0.25	0.50 ± 0.20	

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# **Performance Specification**

Characteristics	Limits	Test N	/lethods	
		( JIS C 5201-1 )		
Dielectric Withstanding Voltage	No evidence of flashover, mechanical damage, arcing or insulation break down	4.7 Clamped in the trough of a 90°C metallic v-block and shall be tested at ac potential respectively specified in the type		
		for 60-70 seconds		
Temperature Coefficient	1Ω~10Ω ≤± 200PPM/°C 10.1Ω~10ΜΩ ≤± 100PPM/°C	4.8 Natural resistance change per temp. degree centigrade.		
			2-R1 t2-t1) x 106 (	PPM/°C)
		tempe R2: Re temp. Test p	esistance value at erature (T1) esistance value at plus 100 °C(T2) attern: room tem temp. +100°C(T2)	room p. (T1),
Short Time Overload	Resistance change rate is:		ermanent resista	
	± 5% (2.0% + 0.1Ω) Max. ± 1% (1.0% + 0.1Ω) Max.	change after the application of a potential of 2.5 times RCWV for 5 seconds		
Solderability Soldering heat	95 % coverage Min. 95 % coverage Min. Resistance change rate is: ± (1.0%+0.05Ω) Max. Posistance change rate is:	Wave Solder: Test temperature of solder: 245°C ±3°C dipping time in solder : 2-3 seconds. Reflow 250 200 150 150 150 150 150 150 150 1		
Temperature Cycling	Resistance change rate is: ± 5% (1.0% + 0.1Ω) Max. ± 1% (0.5% + 0.1Ω) Max.	4.19 Resistance change after         continuous 5 cycles for duty cycle         specified below:         Step       Temp.		
		1	-55°C ± 3°C	30m
		2	Room temp.	10~15m
		3	+155°C ± 2°C	30m
		4	Room temp.	10~15m
			F	
Humidity	Resistance change rate is: ± 5% (3.0% + 0.1Ω) Max. ± 1% (0.5% + 0.1Ω) Max.	4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40±2°C and 90-95% relative humidity		

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# **Performance Specification (Cont.)**

Characteristics	Limits	Test Methods
		( JIS C 5201-1 )
Load life in humidity	Resistance change rate is:	7.9 Resistance change after 1,000
	± 5% (3.0% + 0.1Ω) Max.	hours (1.5 hours "on", 0.5 hour
	± 1% (1.0% + 0.1Ω) Max.	"off" ) at RCWV in a humidity
		chamber controlled at 40°C ± 2°C
		and 90 to 95 % relative humidity
Load Life	Resistance change rate is:	4.25.1 Permanent resistance
	± 5% (3.0% + 0.1Ω) Max.	change after 1,000 hours
	± 1% (1.0% + 0.1Ω) Max.	operating at RCWV, with duty
		cycle of (1.5 hours "on", 0.5 hour
		"off") at 70°C ± 2°C ambient
Terminal bending	Resistance change rate is:	4.33 Twist of Test Board:
	± (1.0% + 0.05Ω) Max.	Y/X = 3/90 mm for 60 seconds

## Marking

A. 4 digit marking for E-96 series:

\*The first 3 digits are significant figures of resistance and the 4th digit denoted number of zeros.

Ex.**1273**127KΩ\*For ohmic values below 100 Ω, letter "R" is for decimal point.

Ex.	49R9	49.9Ω
	45115	

B. 3 digit marking for E-24 series:

\*The first 2 digits are significant figures of resistance and the 3rd digit denoted number of zeros

 Ex.
 **124** 120KΩ

 \*For ohmic values below 10 Ω, letter "R" is for decimal point

Ex. **4R7** 



2.00

## Soldering

PCB Plan (mm)

4 layers PCB specification:
1) Outside 2 layers (Top and Bottom)
with copper foil thickness at 2oz.
2) Inside 2 layers (Middle layers)
with copper foil thickness at 4 oz.

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For Email, phone or live chat, go to: www.te.com/help

3.00



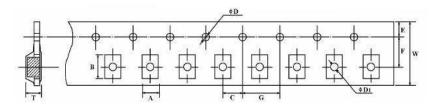
## Soldering

Reflow solder profile



# Packaging

## **Tape and Reel**



#### (mm)

A ±0.1	B ±0.1	C±0.15	ØD+0.1 -0	E±0.1	F±0.15	G ±0.1	W ±0.3	ØD1 ±0.1	T ± 0.1
2.65	5.25	2.0	1.5	1.75	5.5	4.0	12	1.0	1.35

#### Peeling Strength of Top Cover Tape

Test Condition: 0.1 to 0.7 N at a peel-off speed of 300 mm / min.

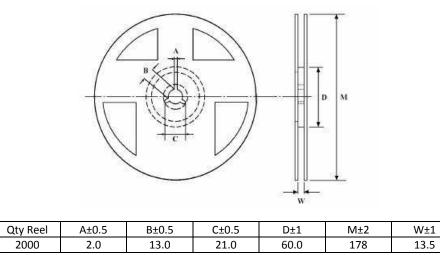


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### **Reel Dimensions**



#### **Environment Related Substance**

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

#### **Storage Condition**

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of  $25^{\circ}C \pm 10^{\circ}C$  and a relative humidity of 60%RH  $\pm 10\%$ RH, chemical and dust free atmosphere.

Even within the above guarantee periods, do not store these products in the following conditions:

1. In salty air or in air with a high concentration of corrosive gas, such as Cl2, H2S, NH3, SO2, or NO2

2. In direct sunlight

### **How To Order**

3502	1R0	F	Т
Common Part	Resistance Value	Tolerance	Pack Style
3502 – 2W 2010 Resistor	1Ω - 1R0 100Ω - 100R 1KΩ - 1K0	F — 1% J — 5%	T- 2000 per reel

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# **Mouser Electronics**

Authorized Distributor

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TE Connectivity: 35023M3FT