

### Type 3502 Series

**Key Features** 

2W@70°C in 2010 size package

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°C <b>~</b> 155°C	

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:

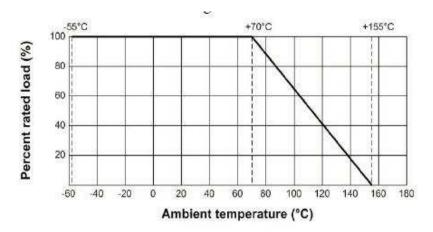
 $RCWV = VP \times R$ 

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

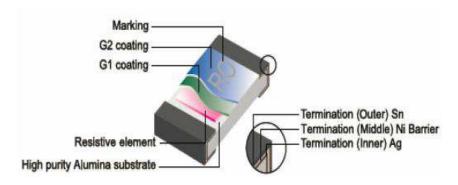


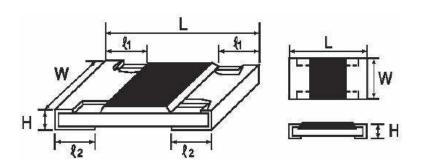
### **Power Rating and Derating**

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:**





Tuno		D	imensions (mn	n)	
Type	L	W	Н	<b>£</b> 1	€2
3502	5.00 ± 0.10	2.50 ± 0.15	1.10 ± 0.10	0.60 ± 0.25	0.50 ± 0.20



## **Performance Specification**

Characteristics	Limits	Toct N	/lethods	
Citatacteristics	LITTILS			
Dialoctrio Mithetera di	No ovidence of flesheries		5201-1)	ah of -
Dielectric Withstanding	No evidence of flashover,	4.7 Clamped in the trough of a		
Voltage	mechanical damage, arcing	90°C metallic v-block and shall b		
	or insulation break down		at ac potential	
			ctively specified in	the type
			-70 seconds	
Temperature	1Ω~10Ω ≤± 200PPM/°C		atural resistance c	
Coefficient	10.1Ω~10MΩ ≤± 100PPM/°C	temp.	degree centigrad	e.
		D.	) D4	
			2-R1 x 106 (I	PPM/°C)
		K1(	t2-t1)	
		R1: R6	esistance value at	room
			erature (T1)	
		R2: R6	esistance value at	room
		temp.	plus 100 °C(T2)	
		Test p	attern: room tem	p. (T1),
		room	temp. +100°C(T2)	
Short Time Overload	Resistance change rate is:	4.13 F	ermanent resista	nce
	± 5% (2.0% + 0.1Ω) Max.	chang	e after the applica	ition of a
	± 1% (1.0% + 0.1Ω) Max.	poten	tial of 2.5 times R	CWV for 5
		secon	ds	
Solderability	95 % coverage Min.	Wave Solder:		
,		Test t	emperature of sol	der:
			±3°C dipping time	
		: 2-3 seconds.  Reflow  FEAR VALUE TEMPERATURE: 245° - 250° - 250°		
				-
		250	230℃	-/
		200	180°C	
		150	150°C	
		100	90±30s	
		50 -	20±10s	
		50	HOT UP TIME SOLDER	TIME
Soldering heat	Resistance change rate is:	4.18 Dip the resistor into a solder		
Soldering near	$\pm$ (1.0%+0.05 $\Omega$ ) Max.		naving a temperat	
	_ (1.070.0.032) Wax.		±3°C and hold it for	
		secon		<u>.</u>
Temperature Cycling	Resistance change rate is:		ds. Resistance change	after
remperature cycling	$\pm 5\%$ (1.0% + 0.1 $\Omega$ ) Max.		nuous 5 cycles for	
	$\pm 1\% (0.5\% + 0.1\Omega)$ Max.			adiy cycle
	= 1/0 (0.5/0 + 0.132) IVIAX.	specified below:		Time
		Step	Temp.	
		2	-55°C ± 3°C	30m
			Room temp.	10~15m
		3	+155°C ± 2°C	30m
		4	Room temp.	10~15m
Humidity	Resistance change rate is:		emporary resistar	
	$\pm 5\% (3.0\% + 0.1\Omega)$ Max.	_	e after 240 hours	•
	± 1% (0.5% + 0.1Ω) Max.		umidity test cham	
			olled at 40±2°C an	d 90-95%
		relativ	e humidity	



### **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** 127ΚΩ

\*For ohmic values below 100  $\Omega$ , letter "R" is for decimal point.

Ex. **49R9** 49.9Ω

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

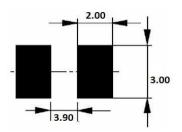
\*For ohmic values below 10  $\Omega$ , letter "R" is for decimal point

Ex. 4.7Ω

### **Soldering**

PCB Plan (mm)

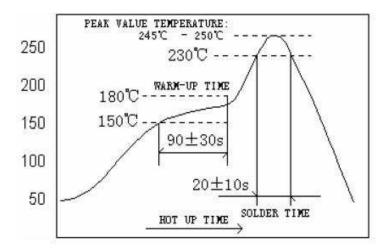
- 4 layers PCB specification:
- 1) Outside 2 layers (Top and Bottom) with copper foil thickness at 2oz.
- 2) Inside 2 layers (Middle layers) with copper foil thickness at 4 oz.





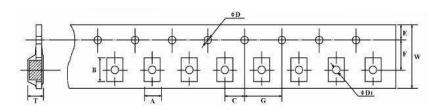
### **Soldering**

Reflow solder profile



### **Packaging**

### **Tape and Reel**

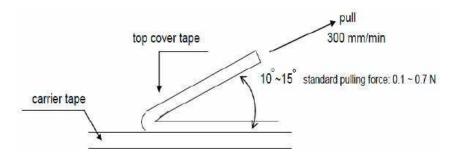


### (mm)

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

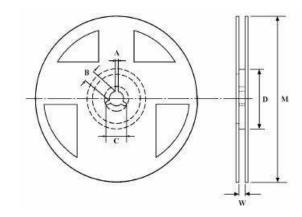
#### **Peeling Strength of Top Cover Tape**

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





#### **Reel Dimensions**



Ī	Qty Reel	A±0.5	B±0.5	C±0.5	D±1	M±2	W±1
I	2000	2.0	13.0	21.0	60.0	178	13.5

#### **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  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  and a relative humidity of  $60\%\text{RH} \pm 10\%\text{RH}$ , 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	T
<b>Common Part</b>	Resistance Value	Tolerance	Pack Style
3502 – 2W 2010 Resistor	1Ω - 1R0 100Ω - 100R 1KΩ - 1K0	F – 1% J – 5%	T- 2000 per reel

# **Mouser Electronics**

**Authorized Distributor** 

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

TE Connectivity: 350212RJT