

**Thick Film Chip Resistor - Trimmable
Type TCR Series**

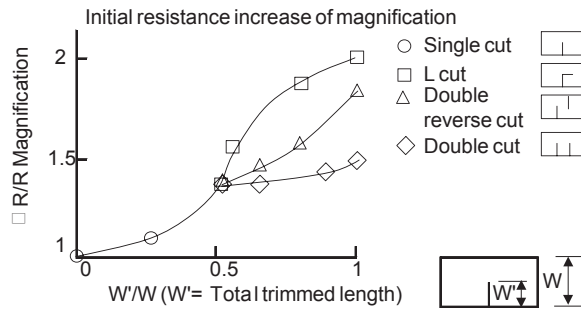
Δ Features

- Resistance and protection film designed for YAG Laser Trimming
- Available for fine tuning of the resistance value to obtain optimal circuit signals.
- Suitable for lead free soldering.
- Compatible with flow and reflow soldering.

Δ Applications

- Tuner
- Mobile Phone
- Smoke Detector
- Portable Measuring Equipment
- Photo Sensor

Δ Resistance Rising Rate



Trimming shall be performed by laser. The maximum rising resistance equals to two times of the initial and the differences will depend on trimming type as shown at the left.

Δ Rating

Type	Size	Power Rating at 70 °C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/ °C)	Resistance Range		Standard Resistance Values
							Min.	Max.	
	0603	1/10W	50V	100V					
	0805	1/8W	150V	300V					
	1206	1/4W	200V	400V	0~ -30%(X)	± 100	100 Ω	1M Ω	E-24
	2010	1/2W	200V	400V	0~ -20%(Y)				
	2512	1W	200V	400V					

Δ How to Order

Part Number

example	TCR	0603	T	X	123	LF
	Type	Size	Packing	Tolerance	Resistance Value	
	TCR	0603	T: Tape	X: 0%~-30%	123 = 12x10 ³	LF = Lead Free
		0805		Y: 0%~-20%	= 12k Ω	
		1206				
		2010				
		2512				

Surface Mount Resistors



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△ Specifications and Test Methods

ITEM	SPECIFICATION	TEST METHOD
DC Resistance	X :0~ -30% , Y :0~ -20%	IEC 60115-1 4.5 / JIS C 5202 5.1 Measure the resistance value.
Short time Overload	$\Delta R \leq \pm (2\% + 0.1 \Omega)$	IEC 60115-1 4.13 / JIS C 5202 5.5 2.5X Rated voltage or Max. Overload Voltage for 5 sec. measure resistance after 30 minutes
Solderability	Over 95% of termination must be covered with solder	IEC 60115-1 4.17 / JIS C 5202 6.5 After immersing flux, dip in the $245 \pm 2^\circ\text{C}$ molten solder bath for 3 ± 0.5 sec.
Resistance to Solder Heat	$\Delta R \leq \pm (1\% + 0.1 \Omega)$ No mechanical damage	IEC 60115-1 4.18 / JIS C 5202 6.4 With $260 \pm 5^\circ\text{C}$ for 10 ± 1 sec.
Temperature Coefficient of Resistance (TCR)	$\pm 100\text{ppm}/^\circ\text{C}$	IEC 60115-1 4.8.4.2 / JIS C 5202 5.2 Test temperature : $25^\circ\text{C}(T1) \rightarrow -55^\circ\text{C}(T2)$ $25^\circ\text{C}(T1) \rightarrow 125^\circ\text{C}(T2)$ $\text{TCR (ppm}/^\circ\text{C)} = \frac{R2-R1}{R1} \times \frac{1}{T2-T1} \times 10^6$ T1: 25°C T2: Test temperature R1: Resistance at reference temperature (T1) R2: Resistance at test temperature (T2)
Load Life Humidity	$\Delta R \leq \pm (3\% + 0.1 \Omega)$	IEC 60115-1 4.24.2 / JIS C 5202 7.9 Maintain the temperature of the resistor at $40 \pm 2^\circ\text{C}$ and 90~95% R.H. with the rated voltage applied. Cycle ON for 1.5 hours and OFF for 0.5 hour for 1000+48/-0 hours. After 1~4 hour, measure the resistance value.
Load Life	$\Delta R \leq \pm (3\% + 0.1 \Omega)$	IEC 60115-1 4.25.1 / JIS C 5202 7.10 Permanent resistance change after 1000+48/-0 hours (1.5 hours ON , 0.5 hour OFF) at RCWV or Max. Keep the resistor at $70 \pm 2^\circ\text{C}$ ambient
Intermittent Overload	$\Delta R \leq \pm (5\% + 0.1 \Omega)$ No mechanical damage	JIS C 5202 5.8 4.0 x Rated voltage (Max. Overload Voltage) 1 sec ON, 25 sec OFF, test 10,000 cycles
Temperature Cycle	$\Delta R \leq \pm (1\% + 0.1 \Omega)$ No mechanical damage	IEC 60115-1 4.19 / JIS C 5202 7.4 Repeat 5 cycles as follows $-55^\circ\text{C}(30 \text{ min.}) \sim +25^\circ\text{C}(2\sim3 \text{ min.})$ $+125^\circ\text{C}(30 \text{ min.}) \sim +25^\circ\text{C}(2\sim3 \text{ min.})$
Insulation Resistance	Between termination and coating must be over 1000M Ω	IEC 60115-1 4.6.1.1 / JIS C 5202 5.6 Test voltage: $100 \pm 15\text{V}$
Bending Strength	$\Delta R \leq \pm (1\% + 0.1 \Omega)$ No mechanical damage	IEC 60115-1 4.33 Resistance change after bended on the 90mm PCB. Bend: 3mm for 0603 , 0805 2mm for 1206 , 2010 , 2512

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