

APPROVAL SHEET

Product Name : Thick Film Low TCR Chip Resistor
Part No. : TCR
Description : Size 0402~2512



Thick Film Low TCR Chip Resistor — TCR Series

■ Application

- Medical, Precision Equipment, Electric meter
- Converters, Communication devices, Battery
- Measuring instrument, Printer, Smart Phone



■ Features

- Tight tolerance from $\pm 0.1\%$, $\pm 0.25\%$, $\pm 0.5\%$, $\pm 1\%$
- Low T.C.R. $\pm 25\text{ppm}$, $\pm 50\text{ppm}$

■ Parts Number Explanation

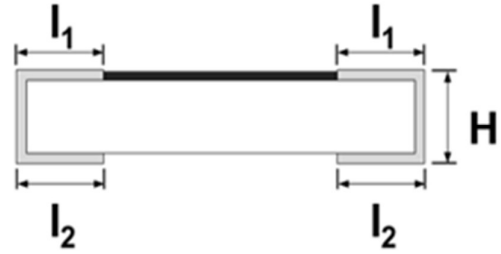
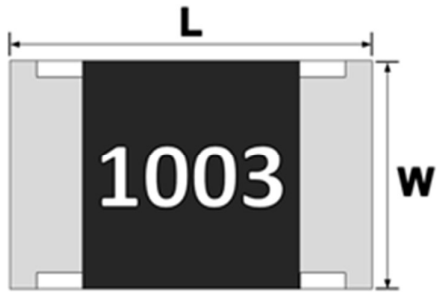
TCR	0603	F	220K	T	25	S
Product	Size (Inch)	Tolerance	Resistance	Packaging	TCR	Functional
Thick Film Low TCR Chip Resistor	0402 0603 0805 1206 1210 2010 2512	B : $\pm 0.1\%$ C : $\pm 0.25\%$ D : $\pm 0.5\%$ F : $\pm 1\%$	1K=1K00 100K=100K 1M=1M00	T : 7" Taped & Reeled	25= TCR $\pm 25\text{ppm}$ 50= TCR $\pm 50\text{ppm}$	S: Standard

Standard Electrical Specifications

Type	Power Rating at 70℃	Max. RCWV	Max. Overload Voltage	Temperature Coefficient (TCR; ppm/℃)	Resistance Range	
					B(±0.1%) C(±0.25%) D(±0.5%) F(±1%)	D(±0.5%) F(±1%)
TCR0402	0.063W	25V	50V	±50	10KΩ≤R≤1MΩ	100Ω≤R<10KΩ
TCR0603	0.1W	75V	150V	±25	100KΩ≤R≤332KΩ	
				±50	100KΩ≤R≤4M7Ω	10Ω≤R<100KΩ
TCR0805	0.125W	150V	300V	±25	100KΩ≤R≤3M32Ω	
				±50	100KΩ≤R≤3M32Ω	10Ω≤R<100KΩ
TCR1206	0.25W	200V	400V	±25	100KΩ≤R≤2M74Ω	
				±50	100KΩ≤R≤2M74Ω	10Ω≤R<100KΩ
TCR1210	0.5W			±25	100KΩ≤R≤1MΩ	
±50				100KΩ≤R≤1MΩ	10Ω≤R<100KΩ	
TCR2010	0.75W			±25	100KΩ≤R≤1MΩ	
±50				100KΩ≤R≤1MΩ	10Ω≤R<100KΩ	
TCR2512	1W			±25	100KΩ≤R≤1MΩ	
				±50	100KΩ≤R≤1MΩ	10Ω≤R<100KΩ

- Functional code: S
- Beyond the above specification also can meet the special requirements. For detail questions, please contact us freely.

■ Dimension



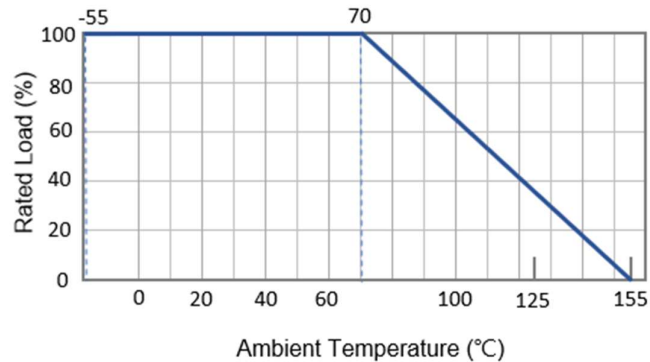
Unit : mm

Type	L	W	l_1	l_2	H
TCR0402	1.00 ± 0.10	0.50 ± 0.05	0.15 ± 0.10	0.20 ± 0.10	0.30 ± 0.05
TCR0603	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	0.45 ± 0.10
TCR0805	2.00 ± 0.10	1.25 ± 0.10	0.40 ± 0.20	0.40 ± 0.20	0.50 ± 0.10
TCR1206	3.10 ± 0.10	1.60 ± 0.10	0.50 ± 0.25	0.50 ± 0.25	0.55 ± 0.10
TCR1210	3.10 ± 0.10	2.60 ± 0.10	0.50 ± 0.25	0.50 ± 0.25	0.55 ± 0.10
TCR2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.25	0.60 ± 0.25	0.60 ± 0.10
TCR2512	6.30 ± 0.20	3.10 ± 0.20	0.60 ± 0.25	0.90 ± 0.25	0.60 ± 0.15



■ Derating Curve

Operating Temperature Range: -55°C to +155°C



■ Voltage Rating or Current Rating

The direct or alternating voltage for the rated power can be calculated from the following formula but must not exceed the maximum voltage.

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

V=Rated Voltage(V)

P=Rated Power(W)

R=Rated Resistance(Ω)

■ Recommended Customer Soldering Parameters

■ Recommended IR Reflow Soldering Conditions

Preliminary heating: 150°C~180°C, 120s max

Soldering: 220°C, 60s max

Peak temperature: 245°C, 15s max

■ Recommended WAVE Soldering Conditions

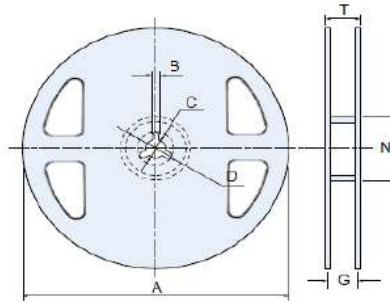
Reservoir Temperature: 260°C, 10s max

Number of times: two times max

■ Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C /+155°C, 25°C is the reference temperature	Refer to Ratings
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	$\pm(1.0\%+0.05\Omega)$
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260 $\pm$ 5°C for 30 seconds.	Individual leaching area $\leq$ 5% Total leaching area $\leq$ 10%
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260 $\pm$ 5°C for 10 seconds.	$\pm(0.5\%+0.05\Omega)$
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 5 cycles	$\pm(0.5\%+0.05\Omega)$
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	$\pm(0.5\%+0.05\Omega)$
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40 $\pm$ 2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" .	$\pm(1.0\%+0.05\Omega)$
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70 $\pm$ 2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	$\pm(1.0\%+0.05\Omega)$
Insulation esistance	JJIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	$\geq 10G\Omega$
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D : 0402 、 0603 、0805=5mm 1206 、1210=3mm 2010 、2512=2mm	$\pm(1.0\%+0.05\Omega)$

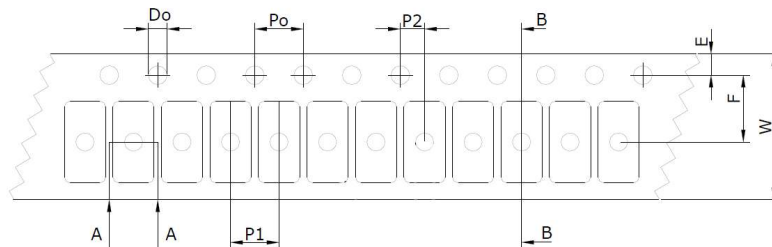
■ Packaging Information



Unit: mm

Size	Packaging Q'ty	A	N	C	D	B	G	T
0402	10Kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(min)	2.0±0.5	10.0±1.5	14.9 max
0603 0805 1206 1210	5kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
2010 2512	4kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.

■ Tapping Specification



Unit : mm

Size	A	B	W	F	E	P1	P2	P0	D
0402	0.70±0.10	1.20±0.10	8.00±0.30	1.75±0.10	3.50±0.05	2.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
0603	1.10±0.20	1.90±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
0805	1.65±0.20	2.40±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1206	2.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1210	3.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
2010	2.80±0.20	5.50±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
2512	3.50±0.20	6.70±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0



■ Marking

E24 / E96 $\pm 1\%$: 4 digits marking

Resistance	120K Ω	121K Ω
4 digits code	1203	1213

E24 5% : 3 digits marking

Resistance	120K Ω
3 digits code	124