



APPROVAL SHEET

Product Name : High Voltage Chip Resistor

Part No. : TCH Series

Description : Size 0402~2512

For more contact information, please refer to our website: www.rideetech.com

High Voltage Chip Resistor — TCH Series

■ Applications

- Power Supplies, Industrial control system
- Measurement instrument
- Backlight inverter



■ Features

- High voltage up to 4000V
- RoHS compliant & Halogen Free

■ Part Number Explanation

TCH	2010	F	1004	T	S
Product	Size (Inch)	Tolerance	Resistance	Packaging	Functional
High Voltage Chip Resistor	0402 0603 0805 1206 1210 2010 2512	D : $\pm 0.5\%$ F : $\pm 1.0\%$ J : $\pm 5.0\%$	100 Ω =1000 1K Ω =1001 1M Ω =1004	T=Tape & Reel	S= STANDARD TYPE U= SUPER TYPE M= Meet AEC-Q200

Standard Electrical Specifications

Type	Power Rating at 70°C	Max RCWV	Max Overload Voltage	Temperature Coefficient (TCR; ppm/°C)	Resistance Range	
					D(±0.5%)	J(±5%) F(±1%)
TCH0402	0.063W	100V	200V	±100	-	100Ω≤R≤10MΩ
TCH0603	0.1W	350V	500V	±100	-	47Ω≤R<10MΩ
				±200	-	10MΩ≤R≤30MΩ
TCH0805	0.125W	400V	800V	±100	100K≤R≤1MΩ	47Ω≤R<10MΩ
				±200	-	10MΩ≤R≤30MΩ
TCH1206	0.25W	500V	1000V	±100	100K≤R≤2MΩ	47Ω≤R<10MΩ
				±200	-	10MΩ≤R≤30MΩ
TCH1210	0.33W			±100	100K≤R≤1MΩ	47Ω≤R<10MΩ
				±200	-	10MΩ≤R≤30MΩ
TCH2010	0.5W			±100	100K≤R≤1MΩ	47Ω≤R<10MΩ
				±200	-	10MΩ≤R≤30MΩ
TCH2512	1.0W			±100	43KΩ≤R≤1MΩ	47Ω≤R<10MΩ
				±200	-	10MΩ≤R≤30MΩ

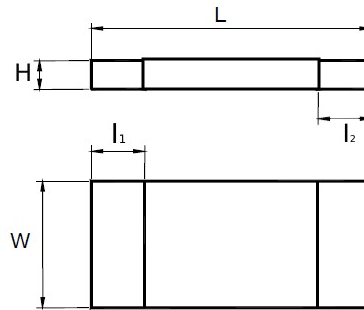
- Functional code: S
- Beyond the above specification also can meet the special requirements. For detail questions, please contact us freely.

Super Type Electrical Specifications

Type	Power Rating at 70°C	Max RCWV	Max Overload Voltage	Temperature Coefficient (TCR; ppm/°C)	Resistance Range	
					F(±1%)	J(±5%)
TCH0603	0.1W	200V	400V	±100	47Ω≤R≤10MΩ	-
				±200	-	100KΩ≤R≤22MΩ
TCH0805	0.125W	400V	800V	±100	47Ω≤R≤10MΩ	-
				±200	-	100KΩ≤R≤22MΩ
TCH1206	0.25W	800V	1600V	±100	47Ω≤R≤10MΩ	-
				±200	11MΩ≤R≤22MΩ	47Ω≤R≤100MΩ
TCH2010	0.5W	2000V	3000V	±100	47Ω≤R≤10MΩ	-
				±200	11MΩ≤R≤22MΩ	47Ω≤R≤100MΩ
TCH 2512	1.0W	3000V	4000V	±100	47Ω≤R≤10MΩ	-
				±200	11MΩ≤R≤22MΩ	47Ω≤R≤100MΩ

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

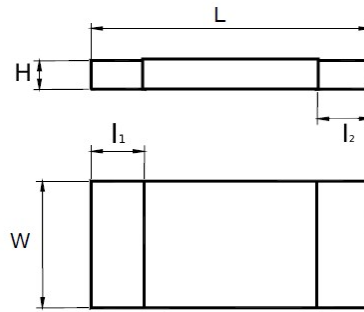
■ Dimension



■ Standard Type

Unit : mm

Type	L	W	l_1	l_2	H
TCH0402	1.00 ± 0.05	0.50 ± 0.05	0.15 ± 0.10	0.20 ± 0.10	0.30 ± 0.05
TCH0603	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.30 ± 0.10	0.40 ± 0.10
TCH0805	2.00 ± 0.10	1.25 ± 0.10	0.30 ± 0.15	0.40 ± 0.15	0.50 ± 0.15
TCH1206	3.05 ± 0.10	1.60 ± 0.10	0.40 ± 0.20	0.50 ± 0.20	0.55 ± 0.15
TCH1210	3.05 ± 0.10	2.50 ± 0.15	0.50 ± 0.20	0.50 ± 0.20	0.55 ± 0.15
TCH2010	5.00 ± 0.20	2.50 ± 0.15	0.60 ± 0.20	0.60 ± 0.20	0.55 ± 0.10
TCH2512	6.30 ± 0.20	3.20 ± 0.15	0.60 ± 0.20	0.60 ± 0.20	0.55 ± 0.10



■ Super Type – R value $\geq 100K\Omega$

Unit : mm

Type	L	W	l ₁	l ₂	H
TCH0603	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	0.45 ± 0.10
TCH0805	2.00 ± 0.10	1.25 ± 0.10	0.40 ± 0.20	0.40 ± 0.20	0.50 ± 0.10
TCH1206	3.10 ± 0.10	1.60 ± 0.10	0.50 ± 0.20	0.50 ± 0.20	0.55 ± 0.10
TCH2010	5.00 ± 0.20	2.50 ± 0.20	0.65 ± 0.25	0.60 ± 0.25	0.60 ± 0.10
TCH2512	6.40 ± 0.20	3.20 ± 0.20	0.65 ± 0.25	0.90 ± 0.25	0.60 ± 0.15

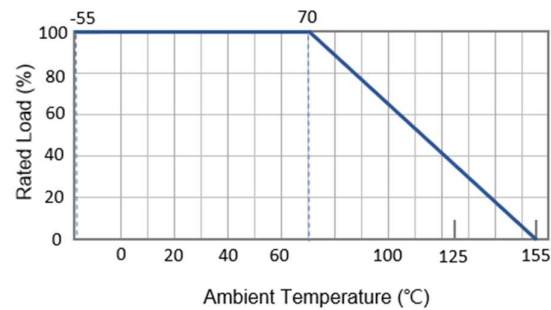
■ Super Type - R value $< 100K\Omega$

Unit : mm

Type	L	W	l ₁	l ₂	H
TCH0603	1.60 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	0.45 ± 0.10
TCH0805	2.00 ± 0.10	1.25 ± 0.10	0.40 ± 0.20	0.40 ± 0.20	0.50 ± 0.10
TCH1206	3.10 ± 0.10	1.60 ± 0.10	0.50 ± 0.25	0.50 ± 0.25	0.55 ± 0.10
TCH2010	5.00 ± 0.20	2.50 ± 0.20	0.65 ± 0.25	0.60 ± 0.25	0.60 ± 0.10
TCH2512	6.40 ± 0.20	3.10 ± 0.20	0.60 ± 0.25	1.80 ± 0.25	0.60 ± 0.15

■ Derating Curve

Operating Temperature Range: -55 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

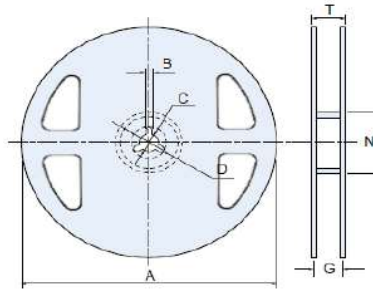
Number of times: two times max

■ Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
High Temperature Exposure (Storage)	AEC-Q200 7.3	1000 hrs. @ T=125°C. Unpowered. Measurement at 24 ±2 hours after test conclusion.	J : $\Delta R \leq \pm(3\%+0.1\Omega)$ F: $\Delta R \leq \pm(1\%+0.05\Omega)$
Temperature Cycling	AEC-Q200 7.4	1000 Cycles (-55°C to +125°C). Measurement at 24±2 hours after test conclusion.	$\Delta R \leq \pm(1\%+0.01\Omega)$ No mechanical damage.
Moisture Resistance	AEC-Q200 7.6	Test 65°C/80~100%RH/10Cycles. Measurement at 24±2 hours after test conclusion. (t=24hrs/cycle).	$\Delta R \leq \pm(1\%+0.01\Omega)$
Biased Humidity	AEC-Q200 7.7	1000 hours 85°C/85%RH. 10% of operating power. Measurement at 24 ±2 hours after test conclusion.	J : $\Delta R \leq \pm(5\%+0.1\Omega)$ F: $\Delta R \leq \pm(3\%+0.05\Omega)$
Operational Life	AEC-Q200 7.8	Test 1000hr @ T=125°C at specified rated power. Measurement at 24±2 hours after test conclusion.	J : $\Delta R \leq \pm(5\%+0.1\Omega)$ F: $\Delta R \leq \pm(3\%+0.05\Omega)$
External Visual	AEC-Q200 7.9	Inspect device construction, marking and workmanship.	No visual damage and refer Ridee marking code.
Physical Dimension	AEC-Q200 7.10	Verify physical dimensions to the applicable device detail specification.	Within the spec.
Mechanical Shock	AEC-Q200 7.13	Test Peak value:100g's,Wave:Hail-sine, Duration:6ms,Velocity:12.3ft/sec.	Within product specification tolerance and no visible damage.
Vibration	AEC-Q200 7.14	5 g's for 20 min., 12 cycles each of 3 orientations. Test from 10-2000 Hz.	No mechanical damage.
Resistance to Soldering Heat	AEC-Q200 7.15	270°C±5°C for 10sec.±1sec.	$\Delta R \leq \pm(1\%+0.01\Omega)$ No mechanical damage.
Thermal Shock	AEC-Q200 7.16	-55 to 155°C/ dwell time 15min/ Max transfer time 20sec/ 300cycles.	J : $\Delta R \leq \pm(5\%+0.1\Omega)$ F: $\Delta R \leq \pm(3\%+0.05\Omega)$ No mechanical damage.
ESD	AEC-Q200-002	Test contact min. 1KV.	$\Delta R \leq \pm 1\%$ No mechanical damage.
Solderability	AEC-Q200 7.18	a) Baking 155°C4H, dipping 235°C5s b) Steam 1H, dipping 215°C5s c) Steam 1H, dipping 260°C7s	Over 95% of termination must be covered with solder.
Flammability	AEC-Q200 7.20	UL-94 V-0 or V-1 are acceptable	Refer UL-94.

Bending Strength	AEC-Q200 7.21	Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603.	J : $\Delta R \leq \pm(1\%+0.1\Omega)$ F : $\Delta R \leq \pm(0.5\%+0.05\Omega)$ No mechanical damage.
Terminal Strength	AEC-Q200 7.22	Force 1Kg for 60 seconds	No mechanical damage
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	5 × Rated power for 5 seconds	J : $\Delta R \leq \pm(2\%+0.1\Omega)$ F : $\Delta R \leq \pm(1\%+0.1\Omega)$
Damp Heat	JIS-C-5201-1 4.24 IEC-60115-1 4.24	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.	J : $\Delta R \leq \pm(3\%+0.1\Omega)$ F : $\Delta R \leq \pm(1\%+0.1\Omega)$

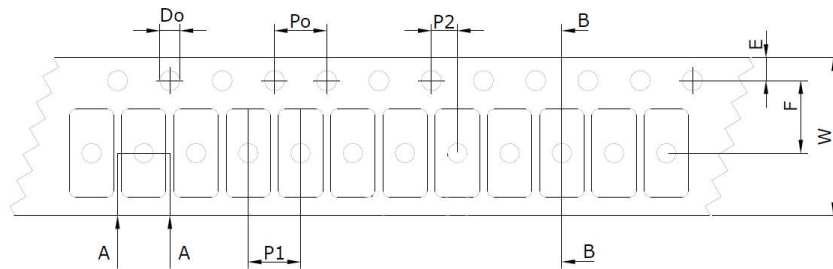
■ Packaging Information



Unit : mm

Size	Packaging Q'ty	A	N	C	D	B	G	T
0402	10Kpcs/Reel	178±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	10.0±1.5	14.9 max
0603 0805 1206 1210	5Kpcs/Reel	178±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	10.0±1.5	14.9 max
2010 2512	4Kpcs/Reel	178±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	13.8±1.5	16.7 max.

■ Tapping Specification



Unit : mm

Size	A	B	W	E	F	P1	P2	D0	P0
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	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
0805	1.65±0.20	2.40±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
1206	2.00±0.20	3.60±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
1210	3.00±0.20	3.60±0.20	8.00±0.30	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
2010	2.80±0.20	5.50±0.20	12.00±0.30	1.75±0.10	5.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10
2512	3.50±0.20	6.70±0.20	12.00±0.30	1.75±0.10	5.50±0.05	4.00±0.10	2.00±0.05	1.50+0.10/-0	4.00±0.10

■ Marking

R value $\geq 100\text{K}\Omega$, Overcoating Color is “ Red “.

R value $< 100\text{K}\Omega$, Overcoating Color is “ Black “

E24 $\pm 5\%$: 3 digits marking for 0603/0805/1206/1210/2010/2512

Resistance	100K Ω
3 digits code	104

E24/E96 $\pm 1\%$: 4 digits marking for 0805/1206/1210/2010/2512

Resistance	100K Ω
4 digits code	1001

E24 $\pm 1\%$: 3 digits marking for 0603

Resistance	10M Ω
3 digits code	106

E96 $\pm 1\%$: 3 digits marking

No marking code for 0402 size