



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
- Back light 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

Item Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					D±(0.5%)	J(±5%) F(±1%)
TCH 0402	0.063 W	100V	200V	±100	-	100Ω≧R≧10MΩ
TCH 0603	0.1 W	350V	500V	±100	-	47Ω≧R<10MΩ
				±200	-	10MΩ≧R≧30MΩ
TCH 0805	0.125 W	400V	800V	±100	100K≧R≧1MΩ	47Ω≧R<10MΩ
				±200	-	10MΩ≧R≧30MΩ
TCH 1206	0.25 W	500V	1000V	±100	100K≧R≧2MΩ	47Ω≧R<10MΩ
				±200	-	10MΩ≧R≧30MΩ
TCH 1210	0.33 W			±100	100K≧R≧1MΩ	47Ω≧R<10MΩ
				±200	-	10MΩ≧R≧30MΩ
TCH 2010	0.5 W			±100	100K≧R≧1MΩ	47Ω≧R<10MΩ
				±200	-	10MΩ≧R≧30MΩ
TCH 2512	1.0 W			±100	43KΩ≧R≧1MΩ	47Ω≧R<10MΩ
				±200	-	10MΩ≧R≧30MΩ

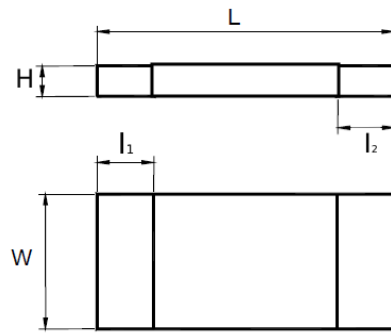
- Functional code: S
- Beyond the above specification also can meet the special requirements. For detail questions, please contact us freely.

■ Super Type Standard Electrical Specifications

Item Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					F(±1%)	J(±5%)
TCH 0603	0.1 W	200V	400V	±100	47Ω≤R≤10MΩ	-
				±200	-	100KΩ≤R≤22MΩ
TCH 0805	0.125 W	400V	800V	±100	47Ω≤R≤10MΩ	-
				±200	-	100KΩ≤R≤22MΩ
TCH 1206	0.25 W	800V	1600V	±100	47Ω≤R≤10MΩ	-
				±200	11MΩ≤R≤22MΩ	47Ω≤R≤100MΩ
TCH 2010	0.5 W	2000V	3000V	±100	47Ω≤R≤10MΩ	-
				±200	11MΩ≤R≤22MΩ	47Ω≤R≤100MΩ
TCH 2512	1.0 W	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.

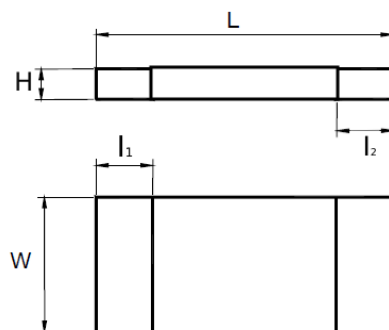
■ Dimension



Standard Type

Unit : mm

Size	L	W	H	l_1	l_2
0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
0603	1.60 ± 0.10	0.80 ± 0.10	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
2512	6.30 ± 0.20	3.20 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20



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

Unit : mm

Size	L	W	H	l_1	l_2
0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
1206	3.10 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.50 ± 0.20	0.50 ± 0.20
2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.10	0.65 ± 0.25	0.60 ± 0.25
2512	6.40 ± 0.20	3.20 ± 0.20	0.60 ± 0.15	0.65 ± 0.25	0.90 ± 0.25

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

Unit : mm

Size	L	W	H	l_1	l_2
0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.40 ± 0.20	0.40 ± 0.20
1206	3.10 ± 0.10	1.60 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.25
2010	5.00 ± 0.20	2.50 ± 0.20	0.60 ± 0.10	0.65 ± 0.25	0.60 ± 0.25
2512	6.40 ± 0.20	3.10 ± 0.20	0.60 ± 0.15	0.60 ± 0.25	1.80 ± 0.25

■ 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

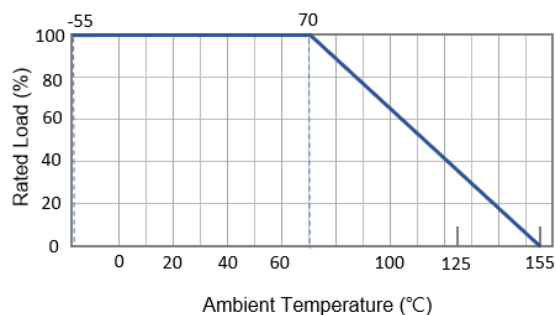
Reservoir Temperature: 260°C, 10s max

Number of times: two times max

■ Performance Characteristics

■ Power Derating Curve

Operating Temperature Range: -55 to +155°C



■ Voltage Rating or Current Rating

Resistance Range: $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

E=Rated voltage(V)

$$E(RCWV)=\sqrt{P \times R}$$

P=Power

rating(W)

R=Nominal

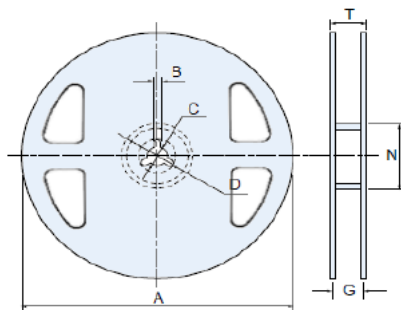
resistance(Ω)

■ Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	IEC-60115-1 4.8	At 25 / -55°C and 25°C /+155°C, 25°C is the reference temperature	As Spec
Short Time Overload	IEC-60115-1 4.13	5 × Rated power for 5 seconds	F: $\Delta R \leq \pm(1\%+0.1\Omega)$ J: $\Delta R \leq \pm(2\%+0.1\Omega)$
Leaching	IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	Individual leaching area 5% Total leaching area ≤ 10%
Resistance to Soldering Heat	AEC-Q200 7.15	Solder dipping 270±5°C for 10 sec. ±1sec.	$\Delta R \leq \pm(1\%+0.1\Omega)$ No mechanical damage.
Temperature Cycling	AEC-Q200 7.4	-55°C to +125°C ,1000 cycles Measurement at 24±4 hours after test conclusion	$\Delta R \leq \pm(1\%+0.1\Omega)$ No mechanical damage.
Damp Heat	IEC 60115-1 4.24	40±2°C with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.	F: $\Delta R \leq \pm(1\%+0.1\Omega)$ J: $\Delta R \leq \pm(3\%+0.1\Omega)$
Load Life	IEC-60115-1 4.25	Rated voltage for 1.5 hours for followed by a pause 0.5 hour at 70±2°C . Cycle repeated 1000 hours.	F: $\Delta R \leq \pm(1\%+0.1\Omega)$ J $\Delta R \leq \pm(3\%+0.1\Omega)$
Insulation Resistance	IEC-60115-1 4.6	Test voltage : 100±15V	Between termination and coating must over 1000MΩ
Board Flex	AEC-Q200 7.21	Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603.	F: $\Delta R \leq \pm(0.5\%+0.05\Omega)$ J: $\Delta R \leq \pm(1\%+0.1\Omega)$ No mechanical damage.
Voltage Coefficient of Resistance (VCR)	IEC 60115-1 4.11	Max. test voltage : 500V VL : 10% RCWV or Max.RCWV VH : 100% RCWV or Max.RCWV	≤ 1MΩ : ±100ppm > 1MΩ : ±200ppm ≥ 10MΩ : ±300ppm
High Temperature Exposure	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 : $\Delta R \leq \pm(1\%+0.05\Omega)$
Moisture Resistance	AEC-Q200 7.6	Test 65°C/80~100%RH/10Cycles. Measurement at 24±2 hours after test conclusion. (t=24hrs/cycle).	$\Delta R \leq \pm(1\%+0.1\Omega)$
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 : $\Delta R \leq \pm(3\%+0.05\Omega)$ VCR within the spec.

Operational Life	AEC-Q200 7.8	Test 1000hr @ TA=125°C at specified rated power.Measurement at 24±2 hours after test conclusion.	J : $\Delta R \leq \pm(5\%+0.1\Omega)$ F : $\Delta R \leq \pm(3\%+0.05\Omega)$ VCR within the spec.
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 7.1 3	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.
Thermal Shock	AEC-Q200 7.16	-55 to 155°C / dwell time 15min/ Max transfer time 20sec/ 300cycles.	J : $\Delta R \leq \pm(1\%+0.1\Omega)$ F : $\Delta R \leq \pm(0.5\%+0.05\Omega)$ No mechanical damage.
ESD	AEC-Q200-002	Test contact min. 1KV.	$\Delta R \leq \pm(1\%+0.1\Omega)$ No mechanical damage.
Solder Ability	AEC-Q200 7.18	a)Baking 155°C 4H, dipping 235°C 5s b)Steam 1H, dipping 215°C 5s c)Steam 1H, dipping 260°C 7s	Over 95%of termination must be covered with solder.
Terminal Strength	AEC-Q200 7.22	Force1Kg for 60 seconds.	No mechanical damage

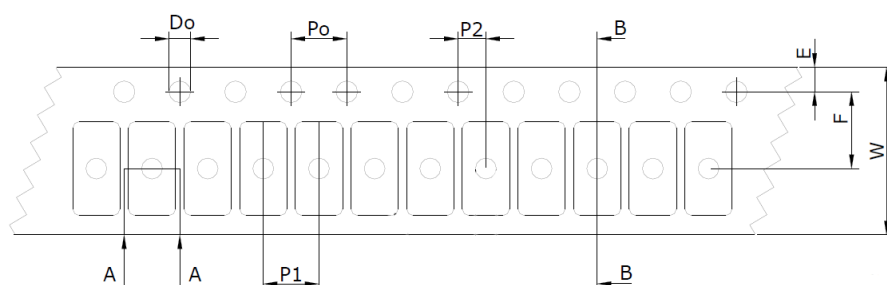
■ Packaging Information



Unit:mm

Unit:mm									
Size	Type		A	N	C	D	B	G	T
0402	7"	10K/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	7"	5K/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	7"	4K/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

Packaging	Size	A	B	W	E	F	P1	P2	D0	P0
Paper Type	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
Embossed Type	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

0603/0805/1206/1210/2010/2512

Resistance	100K Ω
3 digits code	104

■ E24/E96 $\pm 1\%$: 4 digits marking

0805/1206/1210/2010/2512

Resistance	100K Ω
4 digits code	1001

■ E24 $\pm 1\%$: 3 digits marking

0603

Resistance	10M Ω
3 digits code	106

■ E96 $\pm 1\%$: 3 digits marking

■ No marking code for 0402 size