



炬鹿科技有限公司
RIDEE TECH COMPANY LIMITED

Revision Date : 2023 / 08 / 07

APPROVAL SHEET

Product Name : Anti-Sulfur Thick Film Chip Resistor

Part No. : TCS Series

Description : Size 0402~2512

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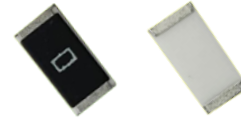
RIDEE TECH COMPANY LIMITED

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

Anti-Sulfur Thick Film Chip Resistor - TCS Series

■ Applications

- Industrial Equipment
- Electronic devices
- Navigation systems
- DC-DC power supplies



■ Features

- All case sizes are available from 0402 to 2512
- AEC-Q200 compliant
- Sulfur-resistant

■ Part Number Explanation

TCS	0603	J	1R00	T	S
Product	Size (Inch)	Tolerance	Resistance	Packaging	Functional
Anti-Sulfur Thick Film Chip Resistor	0402 0603 0805 1206 1210 2010 2512	F= ±1% J= ±5%	1Ω=1R00 10Ω=10R0 1KΩ=1001 1MΩ=1004	T= Tape & Reel	M= Meet AEC-Q200 S= Standard

■ Standard Electrical Specifications

Item Type	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range	
	Standard				F(±1%)	J(±5%)
TCS0402	0.063 W	50V	100V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				-200~+400	0Ω , 1Ω ≤ R ≤ 10Ω	
TCS0603	0.1 W	75V	150V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				-200~+400	0Ω , 1Ω ≤ R ≤ 10Ω	
TCS0805	0.125 W	150V	300V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				-200~+400	0Ω , 1Ω ≤ R ≤ 10Ω	
TCS1206	0.25 W	200V	400V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				-200~+400	0Ω , 1Ω ≤ R ≤ 10Ω	
TCS1210	0.5 W	200V	400V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				-200~+400	0Ω , 1Ω ≤ R ≤ 10Ω	
TCS2010	0.5 W	200V	400V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				±200	0Ω , 1Ω ≤ R ≤ 10Ω	
TCS2512	1 W	250V	500V	±200	1M<R ≤ 10MΩ	
				±100	10Ω<R ≤ 1MΩ	
				±200	0Ω , 1Ω ≤ R ≤ 10Ω	

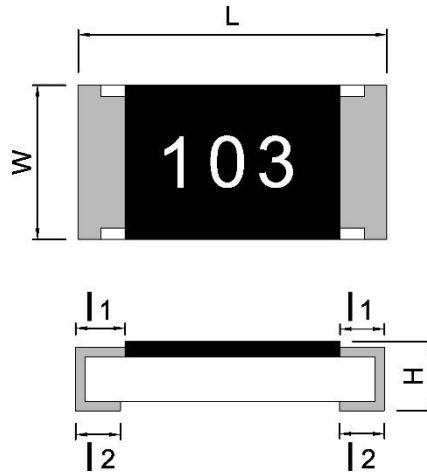
● Operating Temperature Range : -55°C ~ +155°C.

Type	0402	0603	0805	1206	1210	2010	2512
Jumper Resistance Value	0R (50mΩ Max)						
Jumper Rated Current	1A		2A		3A		

● Note : RCWV = (P×R)1/2 or Max. RCWV listed above, whichever is lower.

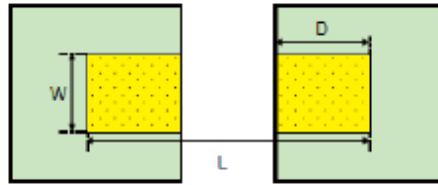
● RCWV : Working Voltage (V) , P : Rated Power (W) , R : Resistance Value (Ω)

■ Type Dimension



SIZE	L	W	H	l ₁	l ₂
0402	1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.25 ± 0.10
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
1210	3.10 ± 0.10	2.60 ± 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	0.60 ± 0.25	0.60 ± 0.25
2512	6.40 ± 0.20	3.20 ± 0.20	0.60 ± 0.15	0.60 ± 0.25	0.90 ± 0.25

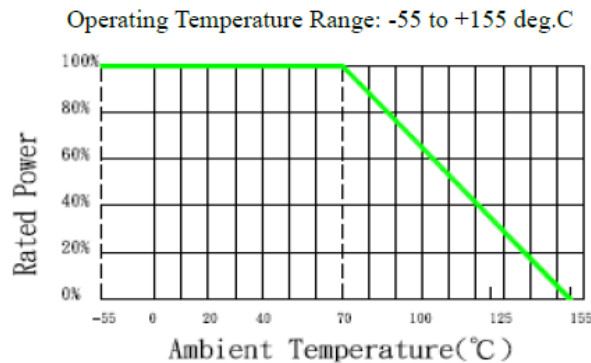
■ Recommend Land Pattern Design (For Reflow Soldering)



Unit: mm

Item \ Type	0402	0603	0805	1206	1210	2010	2512
W	0.60	0.90	1.30	1.80	3.00	3.00	3.70
D	0.50	1.00	1.15	1.30	1.30	1.50	1.60
L	1.50	3.00	3.50	4.70	4.70	6.80	7.60

■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

■ 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:

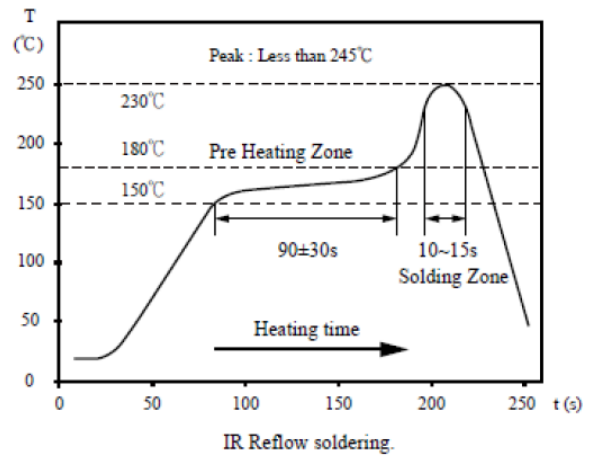
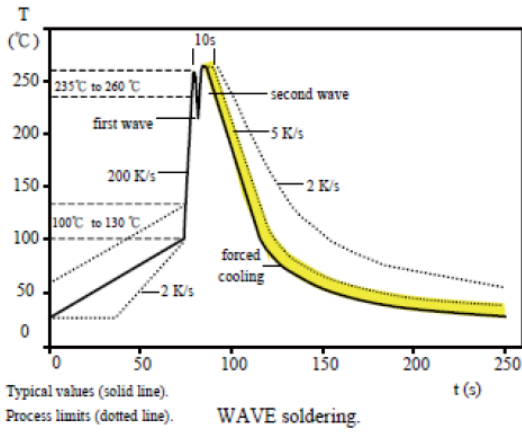
$$E(RCWV) = \sqrt{P \times R}$$

E=Rated voltage(V)
P=Power rating(W)
R=Nominal resistance(Ω)

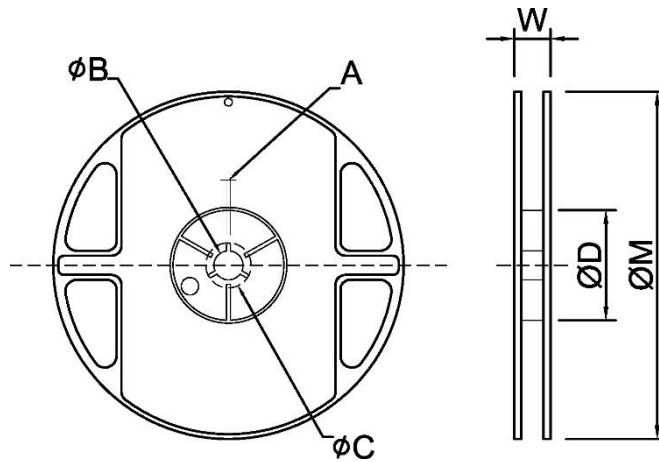
■ Reliability Test and Requirement

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	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	1% : $\pm(0.5\%+0.05\Omega)$ 5% : $\pm(1.0\%+0.1\Omega)$
Leaching	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	AEC-Q200 7.15	Solder dipping @ 270°C \pm 5°C for 10sec. \pm 1sec..	1% : $\pm(0.5\%+0.05\Omega)$ 5% : $\pm(1.0\%+0.1\Omega)$ No mechanical damage.
Insulation Resistance	IEC-60115-1 4.6	Test voltage : 100 \pm 15V	Between termination and coating must over 1000M Ω
Temperature Cycling	AEC-Q200 7.4	1000 Cycles (-55°C to +125°C) Measurement at 24 \pm 4 hours after test conclusion. 30min maximum dwell time at each temperature extreme.	1% : $\pm(0.5\%+0.05\Omega)$ 5% : $\pm(1.0\%+0.10\Omega)$ No mechanical damage.
Biased Humidity	AEC-Q200 7.7	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24 \pm 2 hours after test conclusion.	1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(3.0\%+0.01\Omega)$
High Temperature Exposure (Storage)	AEC-Q200 7.3	1000 hrs. @ T=125°C. Unpowered. Measurement at 24 \pm 2 hours after test conclusion.	1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(3.0\%+0.1\Omega)$
Operational Life	AEC-Q200 7.8	Test 1000hr @ TA=125°C at specified rated power. Measurement at 24 \pm 2 hours after test conclusion.	1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(3.0\%+0.10\Omega)$
External Visual	AEC-Q200 7.9	Inspect device construction, marking and workmanship.	No visual damage and refer Ridee marking code
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. Note: Test from 10-2000 Hz	No mechanical damage
Solderability	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 (SMD)	AEC-Q200 7.22	Force 1 Kg for 60 seconds.	No broken
Board Flex	AEC-Q200 7.21	Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603.0402.	1% : $\pm(0.5\%+0.05\Omega)$ 5% : $\pm(1.0\%+0.1\Omega)$ No mechanical damage.
Anti-sulfur products require	IEC 60068-2-43/42	H2S : 10-1000 ppm , SO2 : 25 \pm 5 ppm , 25 \pm 2°C RH 75%, 720Hrs	$\Delta R \leq \pm (1\% + 0.1\Omega)$ No mechanical damage

■ Soldering Conditions



■ Packaging Information



Dimension

Unit:mm

TYPE	SIZE		A	ψB	ψC	ψD	W	ψM
0402	7"	10K/Reel	2.0±0.5	13.0±0.5	20(Min.)	60±0.5	10.0±1.5	178±2.0
0603 / 0805	7"	5K/Reel	2.0±0.5	13.0±0.5	20(Min.)	60±0.5	10.0±1.5	178±2.0
1206 / 1210								
2010 / 2512	7"	4K/Reel	2.0±0.5	13.0±0.5	20(Min.)	60±0.5	13.8±1.5	178±2.0

■ Marking

Resistance value identify :

E24 $\pm 5\%$: 3 Digits marking to identify the resistance value

0603/0805/1206/2010/2512



$$301 \rightarrow 30 \times 10^1 = 300\Omega$$

E24/E96 $\pm 1\%$: 4 Digits marking to identify the resistance value

0805/1206/2010/2512



$$1542 \rightarrow 154 \times 10^2 = 15.4 \text{ K}\Omega$$

E24 $\pm 1\%$: 3 Digits marking to identify the resistance value

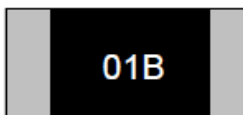
0603



$$222 \rightarrow 22 \times 10^2 = 2.2 \text{ K}\Omega$$

E96 $\pm 1\%$: 3 Digits marking to identify the resistance value

0603



$$01B \rightarrow \text{Refer 0603 marking table} = 1 \text{ K}\Omega$$

No marking of 0402 product.