

薄膜電流感測貼片電阻

TCS Series
Thin Film Current Sensing Chip Resistor

FEATURE

- ◆ Thin Film Process
- ◆ Very Tight Tolerance from $\pm 0.5\%$ ~ $\pm 1\%$
- ◆ Extremely Low TCR from ± 50 ~ ± 200 PPM/ $^{\circ}$ C
- ◆ Resistance Values from 50m to 999m ohms
- ◆ High Purity Alumina Substrate for High Power Dissipation
- ◆ Products with Pb-free Terminations Meet RoHS Requirements
- ◆ Power Rated: 1/10W ~ 1W.

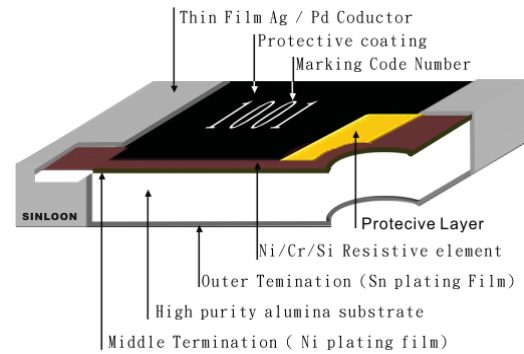
Applications

- ◆ Power Management Applications
- ◆ Switching Power Supply
- ◆ Over Current Protection in Audio Application
- ◆ Voltage Regulation Module (VRM)
- ◆ DC-DC Converter, Battery Pack, Charger, Adaptor
- ◆ Automotive Engine Control
- ◆ Disk Driver
- ◆ Portable Devices (PDA, Cell phone)

FIGURE



CONSTRUCTION



ORDERING INFORMATION

Example: TCS06DDR100

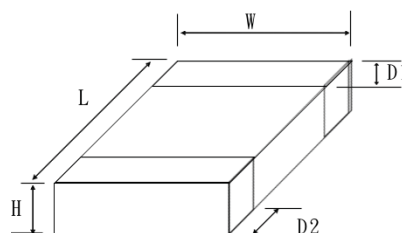
Power	Size	Type	Tolerance	TCR($^{\circ}$ C)	Resistance	Packing
1/10W	0603	TCS03	F = $\pm 1\%$	D= ± 50 ppm	5m=R005 Ω	5K Reel
1/8W	0805	TCS05	D = $\pm 0.5\%$	E= ± 100 ppm	50m=R05 Ω	5K Reel
1/4W	1206	TCS06	C = $\pm 0.25\%$	K= ± 150 ppm	100m=R1 Ω	5K Reel
3/4W	2010	TCS10	B = $\pm 0.1\%$	F= ± 200 ppm	1000m=1 Ω	5K Reel
1W	2512	TCS12			1R = 1R00	4K Reel

Body Marking



DIMENSION

Power	Size	Type	L	W	H	D1	D2
1/10W	0603	TCS03	1.60 \pm 0.10	0.80 \pm 0.10	0.45 \pm 0.10	0.30 \pm 0.20	0.30 \pm 0.20
1/8W	0805	TCS05	2.00 \pm 0.15	1.25 \pm 0.15	0.55 \pm 0.10	0.30 \pm 0.20	0.40 \pm 0.25
1/4W	1206	TCS06	3.05 \pm 0.15	1.55 \pm 0.15	0.55 \pm 0.10	0.50 \pm 0.30	0.40 \pm 0.25
3/4W	2010	TCS10	5.00 \pm 0.20	2.45 \pm 0.15	0.60 \pm 0.15	0.60 \pm 0.30	0.50 \pm 0.25
1W	2512	TCS12	6.35 \pm 0.20	3.15 \pm 0.15	0.60 \pm 0.10	0.60 \pm 0.30	0.55 \pm 0.25



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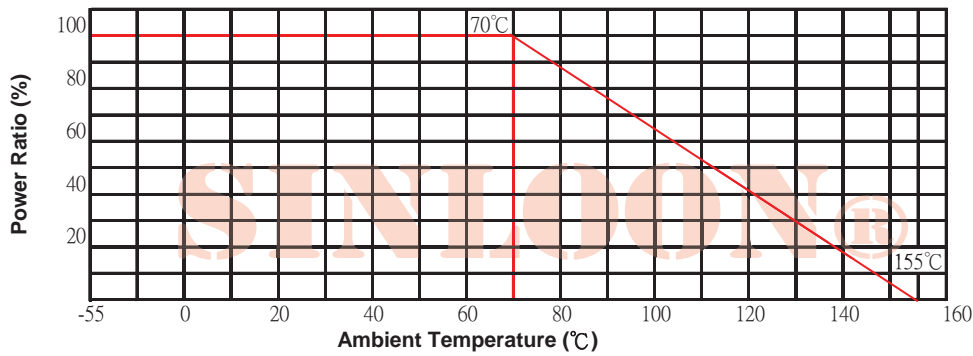
Thin Film Current Sensing Chip Resistor

GENERAL ELECTRICAL SPECIFICATION

Power Rated at 70°C	Size	Type	Maximum Voltage		Resistance Range	Tolerance	T.C.R. (ppm/°C)	Operating Temp.Range
			Operating	Overload				
1/10W	0603	TCS03	100V	200V	200mΩ~300mΩ	±0.5%,±0.1%,	±100	-55°C ~ 155°C
					301mΩ~999mΩ		±50	
1/8W	0805	TCS05	150V	300V	200mΩ~300mΩ	±0.5%,±0.1%,	±600	
					301mΩ~999mΩ		±400	
1/4W	1206	TCS06	200V	400V	50mΩ~100mΩ	±1%	±200	
					101mΩ~300mΩ		±100	
					301 mΩ~999mΩ		±50	
3/4W	2010	TCS10	200V	400V	50mΩ~100mΩ	±0.5%,±0.1%,	±200	
					101mΩ~300mΩ		±100	
					301 mΩ~999mΩ		±50	
1W	2512	TCS12	200V	400V	50mΩ~100mΩ	±0.5%,±0.1%,	±200	
					101mΩ~300mΩ		±100	
					301 mΩ~999mΩ		±50	

Operating Current $I = \sqrt{P/R}$,Voltage $V = \sqrt{P \cdot R}$

POWER DERATING CURVE



In case resistors operating ambient temperature in excess of the temperature range -55°C ~+155°C power ratio will be derated in accordance with the figure as shown on the right.



BELIABILITY TEST

No.	Item	Specification	Test Method
1	Temperature Coefficient of Resistance	As Spec	MIL-STD-202F Method 304 +25/-55/+25/+125/+25°C
2	Short Time Overload	$\pm(0.5\% + 0.05\Omega)$ $\Delta R \pm 1\%$ for high power rating	JIS-C-5202-5.5 RCWV*2.5 or Max Overloading Voltage 5 seconds
3	Dielectric Withstand Voltage	by Type	MIL-STD-202F Method 301 Apply Max Overload Voltage for 1 minute
4	Insulation Resistance	>1000M Ω	MIL-STD-202F Method 302 Apply 100VDC for 1minute
5	Thermal Shock	$\pm(0.5\% + 0.05\Omega)$	MIL-STD-202F Method 107G -55°C ~ 150°C, 100cycles
6	Load Life	$\pm(1\% + 0.05\Omega)$	MIL-STD-202F Method 108A RCWV, 70°C, 1.5 hours on, 0.5 hours off Total 1000~1048 hours
7	Humidity (Steady State)	$\pm(0.5\% + 0.05\Omega)$	MIL-STD-202F Method 103B 40°C , 90~95%RH , RCWV 1.5 hours ON 0.5 hours OFF , total 1000 ~ 1048 hours
8	Resistance to Dry Heat	$\pm(0.5\% + 0.05\Omega)$	JIS-C-5202-7.2 96hours @ +155°C without load
9	Low Temperature Operation	$\pm(0.5\% + 0.05\Omega)$	JIS-C-5202-7.1 1hour, -65°C followed by 45 minutes of RCWV
10	Bending Strength	AS SPEC.	JIS-C-5202-6.1.4 Bending Amplitude 3mm for 10 seconds
11	Solderability	95%min coverage	MIL-STD-202F Method 208H 245°C $\pm 5^\circ\text{C}$, 2 ± 0.5 (sec)
12	Resistance to Soldering Heat	$\pm(0.5\% + 0.05\Omega)$	MIL-STD-202F Method 210E 260 $\pm 5^\circ\text{C}$, 10 ± 1 seconds

* Storage Temperature :25 $\pm 3^\circ\text{C}$; Humidity <80%RH

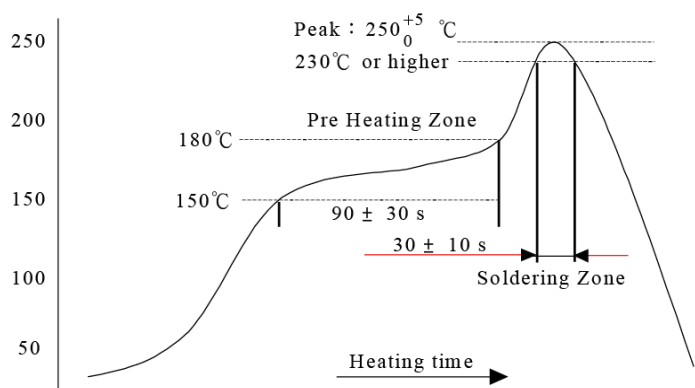
VOLTAGE RATING OR CURRENT RATING

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:

$$E = \sqrt{R \times P} \quad P = \text{Power rating (W)} \quad R = \text{Nominal resistance } (\Omega)$$

SOLDERING PROFILE





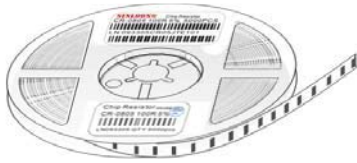
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PACKAGE SPECIFICATION

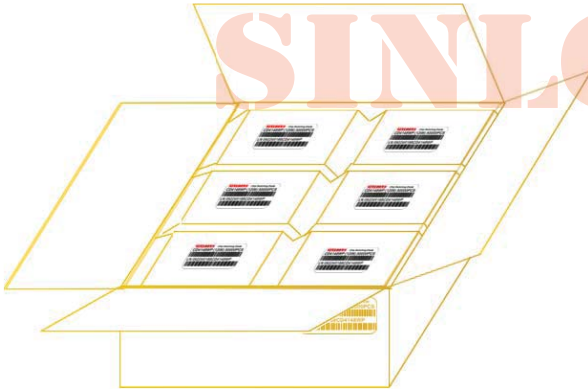
Power	Size	Type	Quantity(ea)			
			Paper Reel Tape	In Box	Carton	
1/10W	0603	TCS03	5,000 Pcs 7" Reel	50K pcs	300K pcs	 品質承諾標誌 QUALITY COMMITMENT
1/8W	0805	TCS05	5,000 Pcs 7" Reel	50K pcs	300K pcs	
1/4W	1206	TCS06	5,000 Pcs 7" Reel	50K pcs	300K pcs	
3/4W	2010	TCS10	5,000 Pcs 7" Reel	50K pcs	300K pcs	
1W	2512	TCS12	4,000 Pcs 7" Reel	40K pcs	240K pcs	



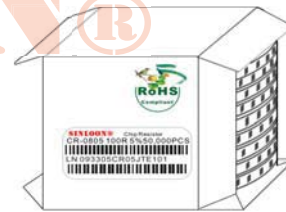
Paper Reel Tape



Reel Tape Label



Carton Pack



In Box



品質承諾標誌
Quality Commitment