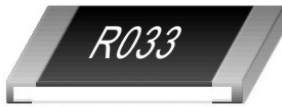


Thin Film Current Sensing Chip Resistor—TCS Series

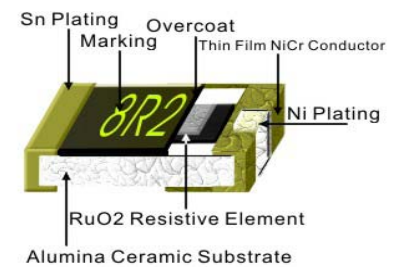
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Features

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

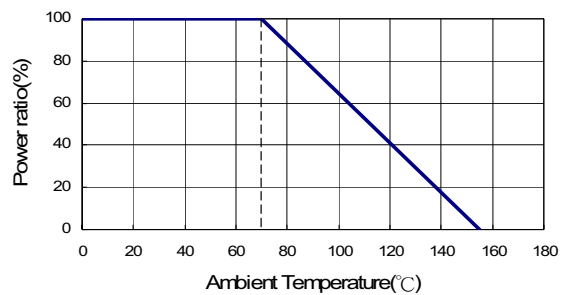
Construction



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)

Derating Curve



Part Numbering

TCS	12	J	T	F	S	R010	N
①	②	③	④	⑤	⑥	⑦	⑧

① Product Type

Product Type	
TCS	Thin Film Current Sensing Chip Resistor

② Dimensions (L×W)

Codes	Dimensions (L×W)	
TCS03	1.60×0.80mm	0603
TCS05	2.00×1.25mm	0805
TCS06	3.10×1.55mm	1206
TCS10	5.00×2.50mm	2010
TCS12	6.30×3.10mm	2512

③ Resistance Tolerance

Codes	Resistance Tolerance
J	$\pm 5\%$
F	$\pm 1\%$
D	$\pm 0.5\%$

④ Packaging

Codes	Type
T	Taping Reel
B	Bulk

⑤ TCR

Codes	Type
D	± 50 PPM/ $^{\circ}\text{C}$
E	± 100 PPM/ $^{\circ}\text{C}$
F	± 200 PPM/ $^{\circ}\text{C}$

⑥ Power Rating

Codes	Type
	Standard
R	3W
S	2W
A	1.5W
T	1W
Q	3/4W
U	1/2W
V	1/4W
W	1/8W
X	1/10W
Y	1/16W
Z	1/32W

⑦ Resistance

Codes	Type
R010	0.010 Ω
R100	0.100 Ω
1R00	1.000 Ω
R100	0.100 Ω

⑧ Marking

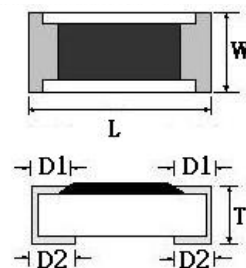
Codes	Type
	Standard Marking*
N	No Marking

*Please consult with us.

Dimensions

Unit: mm

Codes	L	W	T	D1	D2
TCS03	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
TCS05	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25
TCS06	3.05±0.15	1.55±0.15	0.55±0.10	0.50±0.30	0.40±0.25
TCS10	5.00±0.20	2.45±0.15	0.60±0.15	0.60±0.30	0.50±0.25
TCS12	6.35±0.20	3.15±0.15	0.60±0.10	0.60±0.30	0.55±0.25



Standard Electrical Specifications

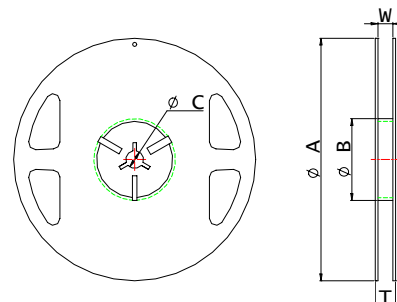
Item Type	Power Rating at 70℃	Operating Temp. Range	Max. Operating Voltage	Max. Overloading Voltage	Resistance Tolerance	Resistance Range	TCR (PPM/℃)
TCS03 (0603)	1/10W	-55 ~ +155℃	100V	200V	±0.5%	200mΩ~300mΩ 301mΩ~999mΩ	±100 ±50
TCS05 (0805)	1/8W		150V	300V	±1.0%	200mΩ~300mΩ 301mΩ~999mΩ	±100 ±50
TCS06 (1206)	1/4W		200V	400V	±1.0%	50mΩ~100mΩ 101mΩ~300mΩ 301mΩ~999mΩ	±200 ±100 ±50
TCS10 (2010)	3/4W		200V	400V	±0.5% ±1.0%	50mΩ~100mΩ 101mΩ~300mΩ 301mΩ~999mΩ	±200 ±100 ±50
TCS12 (2512)	1W		200V	400V		50mΩ~100mΩ 101mΩ~300mΩ 301mΩ~999mΩ	±200 ±100 ±50

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



Marking for 0603

Codes	Type
1R0	1.000Ω
R10	0.100Ω
R01	0.010Ω
<u>101</u>	0.101Ω
<u>035</u>	0.035Ω



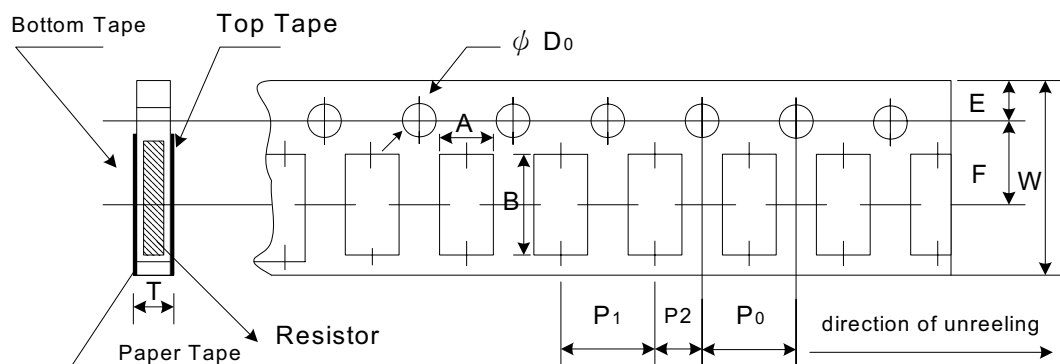
Packaging

Packaging Quantity & Reel Specifications

Unit: mm

Packaging Codes	ΦA	ΦB	ΦC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
TCS03	178±1	60.0±0.5	13.0±0.20	9.00±0.50	12.0±0.15	5,000	-
TCS05	178±1	60.0±0.5	13.0±0.20	9.00±0.50	12.0±0.15	5,000	-
TCS06	178±1	60.0±0.5	13.0±0.20	9.00±0.50	12.0±0.15	5,000	-
TCS10	178±1	60.2±0.5	13.0±0.50	13.2±1.500	16.0±0.20	-	4,000
TCS12	178±1	60.2±0.5	13.0±0.50	13.2±1.50	16.0±0.20	-	4,000

Paper Tape Specifications

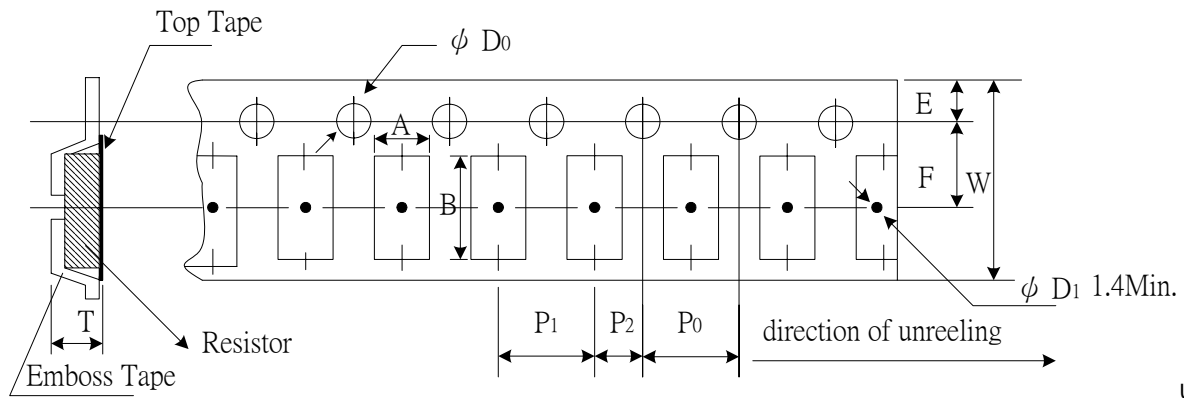


Unit: mm

Codes	A	B	W	E	F	P0	P1	P2	ΦD0	T
TCS03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
TCS05	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
TCS06	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05

Packaging

Emboss Plastic Tape Specifications



Codes	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
TCS10	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
TCS12	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

Environmental Characteristics

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	±0.5%	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	>1000MΩ	MIL-STD-202F Method 302 Apply 100VDC for 1minute
5	Thermal Shock	±0.5%	MIL-STD-202F Method 107G -55°C ~ 150°C, 100cycles
6	Load Life	±1%	MIL-STD-202F Method 108A RCWV, 70°C, 1.5 hours on, 0.5 hours off Total 1000~1048 hours
7	Humidity (Steady State)	±0.5%	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	±0.5%	JIS-C-5202-7.2 96hours @ +155°C without load
9	Low Temperature Operation	±0.5%	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±5°C, 2±0.5 (sec)
12	Resistance to Soldering Heat	±0.5%	MIL-STD-202F Method 210E 260±5°C, 10±1 seconds

* Storage Temperature :25±3°C ; Humidity <80%RH