

Thin Film Current Sensing Chip Resistor – TCS Series



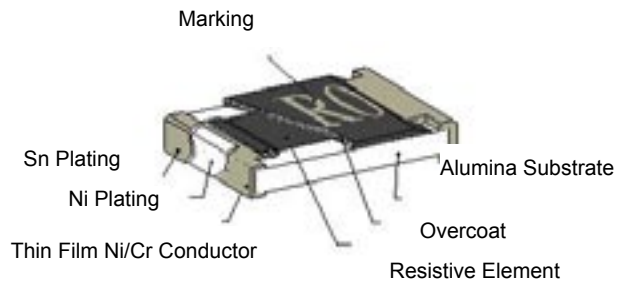
Features

- Thin film process
- High power rating up to 3 Watts in 2512 size
- Tight tolerance down to $\pm 0.5\%$
- Extremely low TCR down to $\pm 50 \text{ PPM}/^\circ\text{C}$
- Resistance values from 50m to 1 ohm
- High purity alumina substrate for high power dissipation

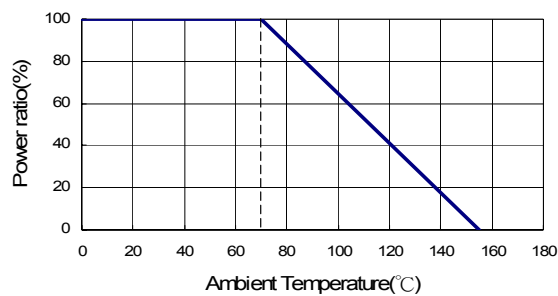
Applications

- 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)

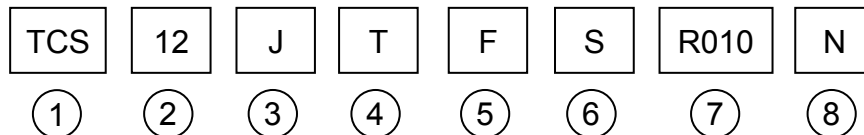
Construction



Derating Curve



Part Numbering



① Product Type

Product Type	Thin Film Current Sensing Chip Resistor
TCS	Thin Film Current Sensing Chip Resistor

② Dimensions (LxW)

Codes	Dimensions (LxW)	0402	0603	0805	1206	2010	2512
TCS02	1.00×0.50mm						
TCS03	1.60×0.80mm						
TCS05	2.00×1.25mm						
TCS06	3.05×1.55mm						
TCS10	5.00×2.45mm						
TCS12	6.30×3.15mm						

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	$\pm 50 \text{ PPM}/^\circ\text{C}$
E	$\pm 100 \text{ PPM}/^\circ\text{C}$
F	$\pm 200 \text{ PPM}/^\circ\text{C}$

⑥ Power Rating

Codes	Type
R	Standard
	3W

⑦ Resistance

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

⑧ Marking

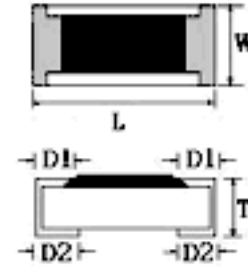
Codes	Type
	Standard Marking*
N	No Marking

*Please consult with us.

Dimensions

Unit: mm

Codes	L	W	T	D1	D2
TCS02	1.00±0.05	0.50±0.05	0.32±0.10	0.25±0.10	0.20±0.10
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°C	Operating Temp. Range	Resistance		TCR (PPM/°C)
			Tolerance	Range (mΩ)	
TCS02 (0402)	1/16W	-55~+155°C	±0.5%	500 ~ 1000	±100
TCS03 (0603)	1/10W		±1.0%	200 ~ 300 301 ~ 1000	±100 ±50
TCS05 (0805)	1/8W		±0.5%	200 ~ 300 301 ~ 1000	±100 ±50
TCS06 (1206)	1/4W		±1.0%	50 ~ 100 101 ~ 300 301 ~ 1000	±200 ±100 ±50
TCS10 (2010)	3/4W		±0.5%	50 ~ 100 101 ~ 300 301 ~ 1000	±200 ±100 ±50
TCS12 (2512)	1W		±1.0%	50 ~ 100 101 ~ 300 301 ~ 1000	±200 ±100 ±50

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

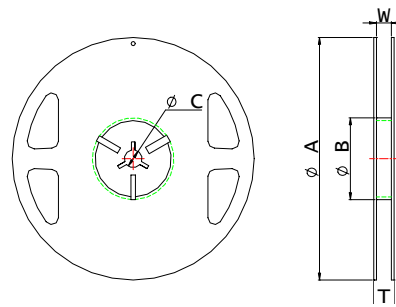
High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Resistance Tolerance	Resistance Range (mΩ)	TCR (PPM/°C)
TCS12 (2512)	3W	-55~+155°C	±1.0%	100 ~ 1000	±100

*Viking is capable of manufacturing the optional spec based on customer's requirement.

Marking for 0603

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



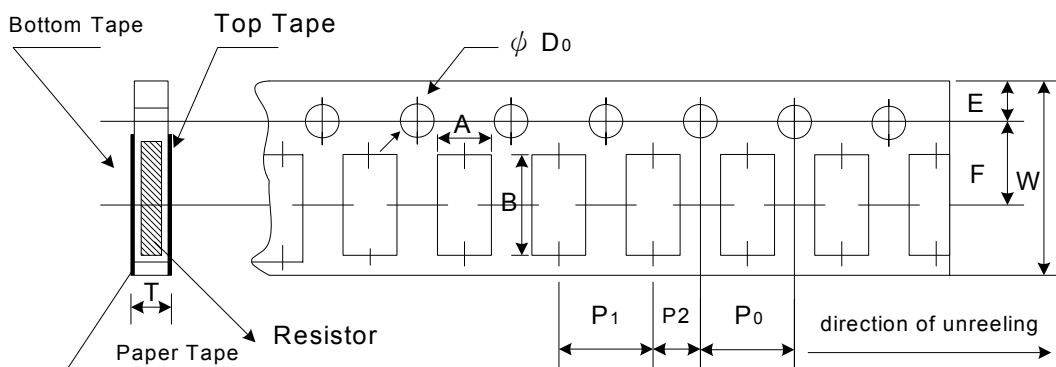
Packaging

Packaging Quantity & Reel Specifications

Unit: mm

Packaging Codes	ΦA	ΦB	ΦC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
TCS02	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	10,000	-
TCS03	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
TCS05	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
TCS06	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
TCS10	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	13.5 ± 1.0	15.5 ± 1.0	-	4,000
TCS12	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	13.5 ± 1.0	15.5 ± 1.0	-	4,000

Paper Tape Specifications

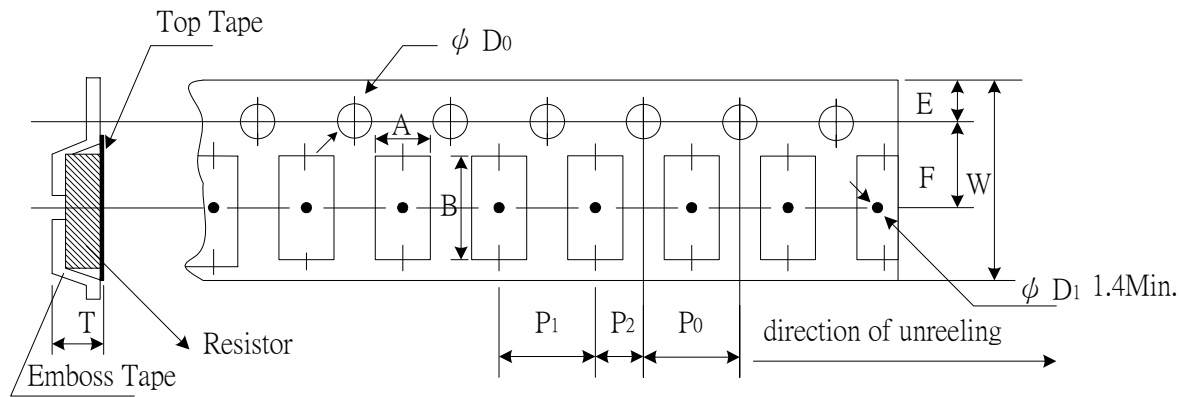


Unit: mm

Codes	A	B	W	E	F	P0	P1	P2	ΦD0	T
TCS02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.10	2.00±0.05	1.55±0.05	0.40±0.03
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



Unit: mm

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 ±1%	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, 3±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