



LEAN GIMN ENTERPRISE CO., LTD.

Data Sheet

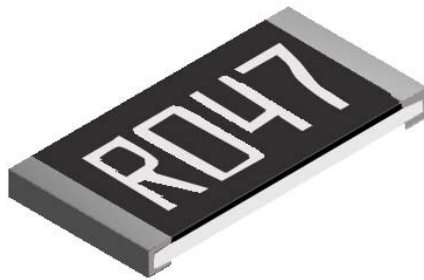
Customer :

Product Type : Thin Film Current Sensing Chip Resistor -TCS

Part No. : TCS series

Issued Date : 23-May-08

Document No TCS Series REV.A6



Produced by (QC)	Checked by (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
23-May-08	23-May-08	23-May-08	23-May-08	
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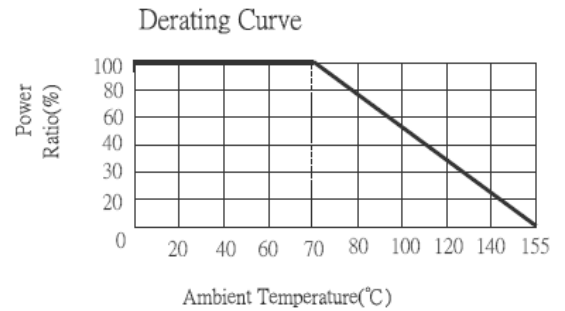
Thin Film Current Sensing Chip Resistor (TCS Series)

1. Scope

This specification applies to all sizes of rectangular-type fixed chip resistors with metal material.

2. 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

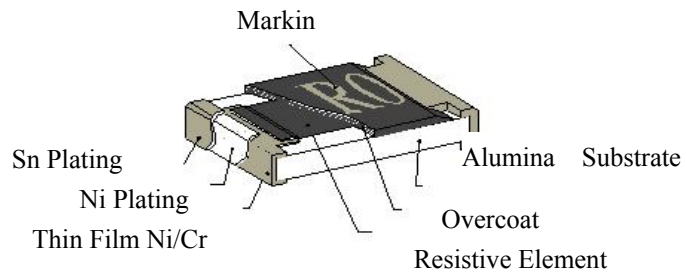
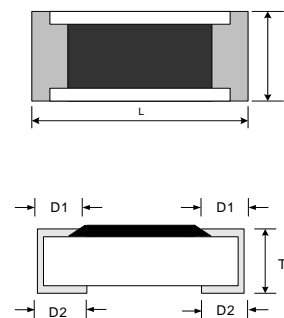


3. Application

- 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)

4-1. Construction

4. Dimensions

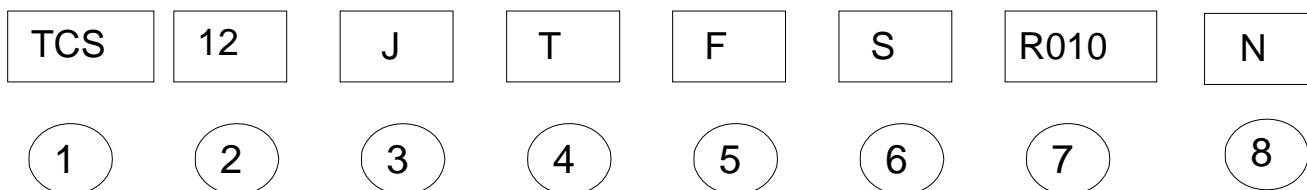


Unit : mm

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



5. Product Identification



(1) Product Type

Product Type	
TCS	Thin Film Current Sensing Chip Resisto

(2) Dimensions(L×W)

Codes	Dimensions (L×W)	EIA
TCS02	1.00 × 0.50mm	0402
TCS03	1.60 × 0.80mm	0603
TCS05	2.00 × 1.25mm	0805
TCS06	3.05 × 1.55mm	1206
TCS10	5.00 × 2.45mm	2010
TCS12	6.35 × 3.15mm	2512

(3) Resistance Tolerance

Codes	Resistance Tolerance
D	±0.5%
F	±1%
J	±5%

(4) Packaging

Codes	Type
T	Taping Reel
B	Bulk

(5) TCR

Codes	Type
D	±50 PPM/°C
E	±100 PPM/°C
F	±200 PPM/°C

(6) Power Rating

Codes	Type
	Standard
R	3W

(7) Resistance

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

(8) Special

Codes	Type
	Standard
N	No Marking

5-1 Resistance codes example

5-1-1 Remark : 0603 3digit marking for Example :

Resistance	1Ω	0.1Ω	0.15Ω	0.01Ω	0.101Ω	0.035Ω
Codes	1R0	R10	R15	R01	<u>101</u>	<u>035</u>

5-1-2 Remark : 0805~2512 4digit marking for Example :

Resistance	1Ω	0.1Ω	0.05Ω	0.015Ω	0.01Ω
Codes	1R00	R100	R050	R015	R010

6. Specifications

Standard Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Resistance Tolerance	Resistance Range	TCR (PPM/°C)
TCS02 (0402)	1/16W	-55 ~ +155°C	±0.5% ±1.0%	500mΩ~1Ω	±100 ±50
TCS03 (0603)	1/10W		±0.5% ±1.0%	200mΩ~300mΩ 301mΩ~1Ω	±100 ±50
TCS05 (0805)	1/8W			200mΩ~300mΩ 301mΩ~1Ω	±100 ±50
TCS06 (1206)	1/4W		±1.0%	50mΩ~100mΩ	±200
			±0.5% ±1.0%	101mΩ~300mΩ 301mΩ~1Ω	±100 ±50
TCS10 (2010)	3/4W			50mΩ~100mΩ 101mΩ~300mΩ 301mΩ~1Ω	±200 ±100 ±50
TCS12 (2512)	1W			50mΩ~100mΩ 101mΩ~300mΩ 301mΩ~1Ω	±200 ±100 ±50

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

High Power Rating Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Resistance Tolerance	Resistance Range	TCR (PPM/°C)
TCS12 (2512)	3W	-55°C ~ +155°C	±1.0%	100mΩ ~ 1Ω	±100

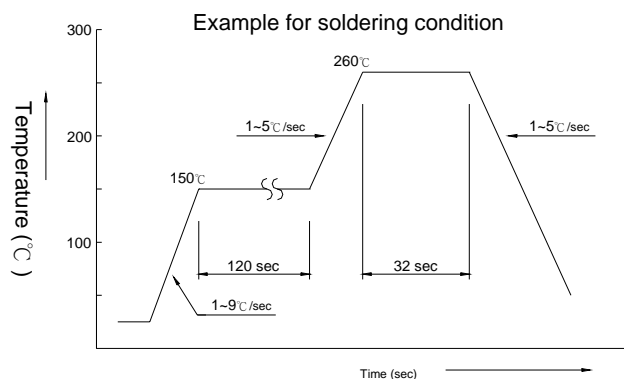
***We are capable to manufacture the optional spec based on customer's requirement.**

7. Electrical Characteristics

Item	Specification	Test Method
1	Temperature Coefficient of Resistance	As Spec
2	Short Time Overload	$\pm 1\%$
3	Dielectric Withstand Voltage	by Type
4	Insulation Resistance	$>1000M\Omega$
5	Thermal Shock	$\pm 0.5\%$
6	Load Life	$\pm 0.5\%$
7	Humidity (Steady State)	$\pm 0.5\%$
8	Resistance to Dry Heat	$\pm 0.5\%$
9	Low Temperature Operation	$\pm 0.5\%$
10	Bending Strength	AS SPEC.
11	Solderability	95%min coverage
12	Resistance to Soldering Heat	$\pm 0.5\%$

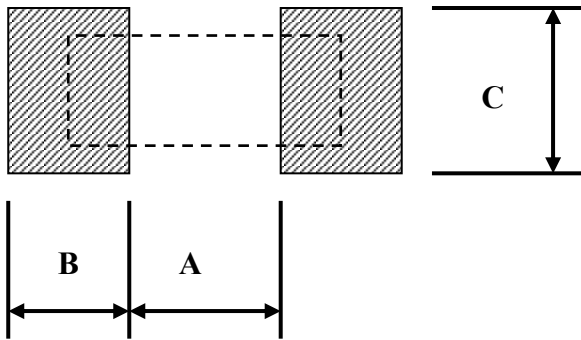
* Storage Temperature : $25\pm 3^{\circ}C$; Humidity $<80\%RH$

8. Reflow



Solder : Sn96.5/Ag3/Cu0.5

9. Recommend Land Pattern

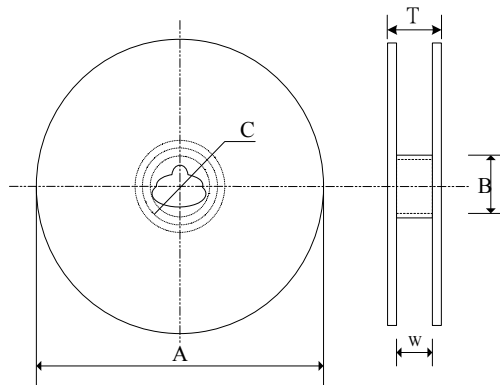


Unit : mm

Codes	A	B	C
TCS02	0.50	0.50	0.60±0.2
TCS03	0.80	1.00	0.90±0.2
TCS05	1.00	1.00	1.35±0.2
TCS06	2.00	1.15	1.70±0.2
TCS10	3.60	1.40	2.50±0.2
TCS12	4.90	1.60	3.10±0.2

10. Packaging

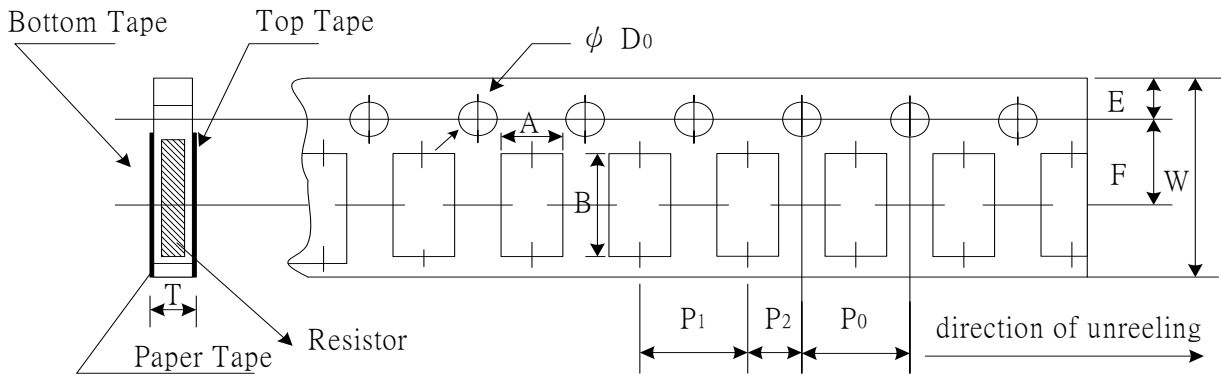
10-1-1 Packaging Quantity & Reel Specifications



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±1.00	15.5±1.0	-	4,000
TCS12	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.00	15.5±1.0	-	4,000

10-1-2 Paper Tape Specifications



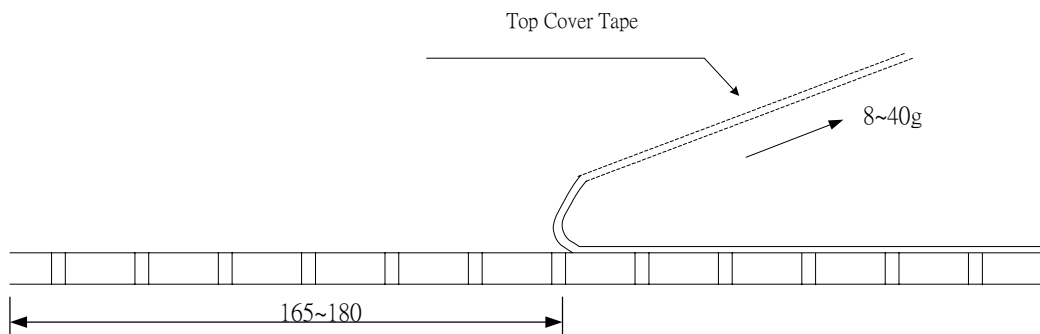
Unit: mm

Codes	A	B	W	E	F	P0	P1	P2	ϕ D0	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±0.05	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

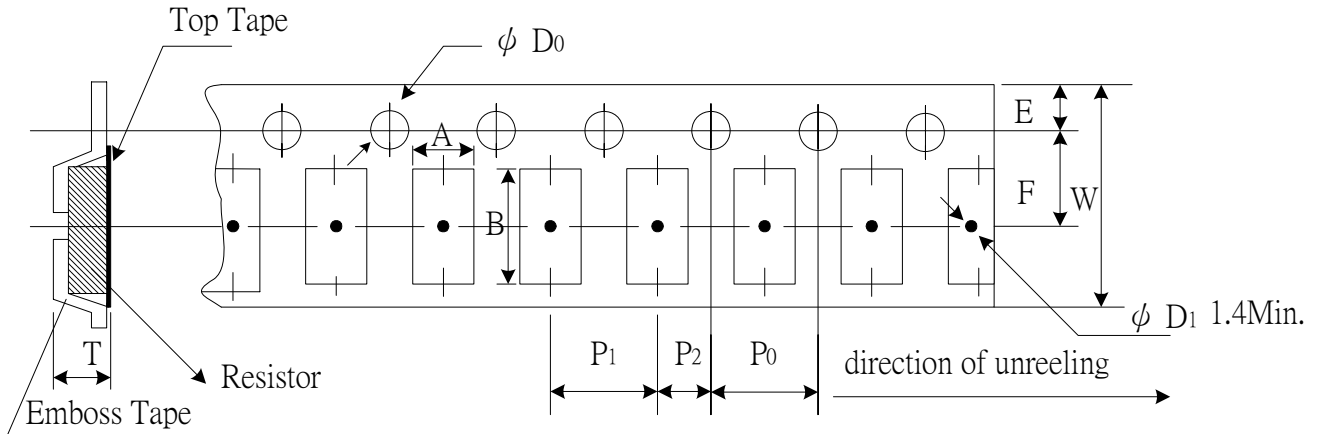
Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 8 and 40g



10-1-3 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

Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 20 and 80g

