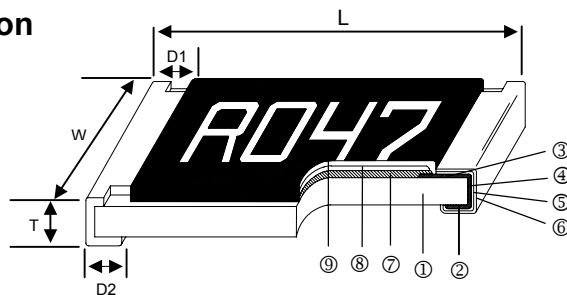


Current Sensing Chip Resistor – CS Series



Construction



① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (Ag/Pd)
② Bottom Electrode (Ag)	⑤ Barrier Layer (Ni)	⑧ Primary Overcoat (Glass)
③ Top Electrode (Ag-Pd)	⑥ External Electrode (Sn)	⑨ Secondary Overcoat (Epoxy)

Features

- 3 Watts power rating in 1 Watt size, 1225 package
- Low TCR of ± 100 PPM/ $^{\circ}$ C
- Resistance values from 1m to 1 ohm
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating

Applications

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

Dimensions

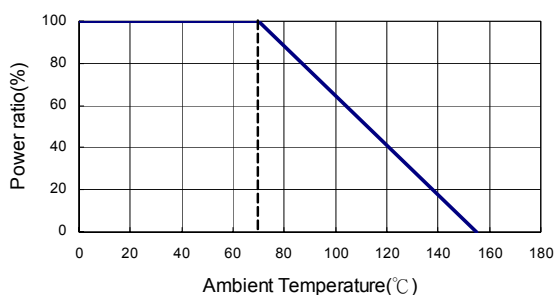
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
CS01	0201	0.60 \pm 0.03	0.30 \pm 0.03	0.23 \pm 0.05	0.12 \pm 0.05	0.15 \pm 0.05	0.18
CS02	0402	1.00 \pm 0.05	0.50 \pm 0.05	0.32 \pm 0.10	0.25 \pm 0.10	0.20 \pm 0.10	0.7
CS03	0603	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	1.99
CS05	0805	2.00 \pm 0.10	1.25 \pm 0.10	0.55 \pm 0.10	0.30 \pm 0.20	0.40 \pm 0.25	5.3
CS06	1206	3.10 \pm 0.10	1.55 \pm 0.10	0.55 \pm 0.10	0.50 \pm 0.30	0.40 \pm 0.25	8.82
CS13	1210	3.10 \pm 0.10	2.60 \pm 0.15	0.55 \pm 0.10	0.50 \pm 0.30	0.50 \pm 0.25	15.5
CS10	2010	5.00 \pm 0.10	2.50 \pm 0.15	0.60 \pm 0.15	0.60 \pm 0.30	0.50 \pm 0.25	27.03
CS12	2512	6.35 \pm 0.10	3.10 \pm 0.15	0.60 \pm 0.10	0.60 \pm 0.30	0.55 \pm 0.25	43.08
CS12 (2W)	2512 10 - 99m Ω	6.35 \pm 0.20	3.15 \pm 0.15	0.74 \pm 0.10	0.60 \pm 0.30	0.55 \pm 0.25	53.08
CS12 (2W)	2512 100 - 1000m Ω	6.35 \pm 0.20	3.15 \pm 0.15	0.74 \pm 0.10	0.60 \pm 0.30	2.10 \pm 0.10	53.08
CS25	1225	3.10 \pm 0.15	6.30 \pm 0.15	0.90 \pm 0.15	0.60 \pm 0.30	0.55 \pm 0.25	64.88
CS37	3720	2.00 \pm 0.20	3.75 \pm 0.20	0.60 \pm 0.10	0.40 \pm 0.20	0.40 \pm 0.20	19.96
CS75	7520	2.00 \pm 0.20	7.50 \pm 0.30	0.60 \pm 0.10	0.40 \pm 0.20	0.40 \pm 0.20	35.71

Part Numbering

CS	06	F	T	G	U	R100	N
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/ $^{\circ}$ C)	Power Rating	Resistance	Marking
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 13: 1210 10: 2010 12: 2512 25: 1225 37: 3720 75: 7520	F: $\pm 1\%$ G: $\pm 2\%$ J: $\pm 5\%$	T: Taping Reel B: Bulk	E: ± 100 F: ± 200 G: ± 300 H: ± 400 J: ± 600 K: ± 150 R: ± 1000	: Standard A: 1.5W Q: 3/4W S: 2W T: 1W U: 1/2W V: 1/4W W: 1/8W	R010: 0.01 Ω R100: 0.1 Ω 1R00: 1 Ω	: Standard N: No Marking W: Wide

Derating Curve



Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
CS01 (0201)		1/20W	-55 ~ +155°C	100 - 149 150 - 500 501 - 1000			±1000 ±600 ±300
CS02 (0402)		1/16W		50 - 100 101 - 500 501 - 1000			±400 ±300 ±200
CS03 (0603)		1/10W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
CS05 (0805)		1/8W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
CS06 (1206)		1/4W		10 - 20 21 - 50 51 - 99 100 - 1000			±600 ±400 ±300 ±200
CS13 (1210)		1/2W					
CS10 (2010)		3/4W					
CS12 (2512)		1W					
CS25 (1225)		3W		3 - 5 6 - 20 21 - 30 31 - 250 251 - 8000			±300 ±200 ±150 ±100 ±200
CS37 (3720)		1W		10 - 19 20 - 500			±300 ±150
CS75 (7520)		2W		—			±300
				1 - 4			±300
				5 - 10 11 - 350			±200 ±150

High Power Rating Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
CS02 (0402)		1/8W	-55 ~ +155°C	51 - 100 101 - 500 501 - 1000			±400 ±300 ±200
CS03 (0603)		1/8W					
CS05 (0805)		1/4W					
CS06 (1206)		1/2W	-55 ~ +155°C	10 - 20 21 - 50 51 - 99 100 - 1000			±600 ±400 ±300 ±200
CS13 (1210)		3/4W					
CS10 (2010)		1W					
CS12 (2512)		1.5W					
CS12 (2512)		2W					

Low TCR Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
CS05 (0805)		1/8W	-55 ~ +155°C	100 - 1000			±100
CS06 (1206)		1/4W		100 - 1000			±100
CS13 (1210)		1/2W		75 - 1000			±100
CS10 (2010)		3/4W		50 - 1000			±100
CS12 (2512)		1W		20 - 1000			±100
CS12 (2512)		2W		50 - 1000			±100
CS37 (3720)		1W		100 - 500			±100
CS75 (7520)		2W		50 - 350			±100

Operating Voltage= $\sqrt{P \cdot R}$; Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$; Operating Current= $\sqrt{P/R}$

■ 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

■ Environmental Characteristics

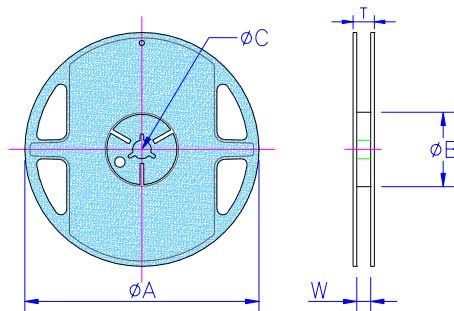
Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	-55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\pm(0.5\%+0.05\Omega)$	RCWV*2.5 or Max. overload voltage for 5 seconds
	$\pm(1.0\%+0.05\Omega)$ for high power rating	
Insulation Resistance	$\geq 10G$	Max. overload voltage for 1 minute
Endurance	$\pm(1.0\%+0.05\Omega)$	70 \pm 2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm(0.5\%+0.05\Omega)$	40 \pm 2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	$\pm(0.5\%+0.05\Omega)$	at +155°C for 1000 hrs
Bending Strength	As Spec.	Bending once for 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage	245 \pm 5°C for 3 seconds
Resistance to Soldering Heat	$\pm(0.5\%+0.05\Omega)$	260 \pm 5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$	260 \pm 5°C for 30 seconds
Rapid Change of Temperature	$\pm(0.5\%+0.05\Omega)$	-55°C to +155°C, 5 cycles

■ Reference Standards: IEC 60115-1, 60068-2-58; JIS-C 5201-1

■ Storage Temperature: 25 \pm 3°C; Humidity < 80%RH

■ Packaging

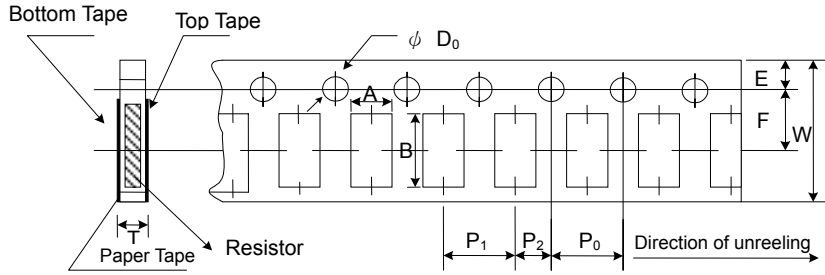
Packaging Quantity & Reel Specifications



Unit: mm

Type	ΦA	ΦB	ΦC	W	T	Paper Tape (EA)	Embossed Plastic Tape (EA)
CS01	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	9.5 \pm 0.1	11.5 \pm 1.0	10,000	-
CS02	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	9.5 \pm 0.1	11.5 \pm 1.0	10,000	-
CS03	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	9.5 \pm 0.1	11.5 \pm 1.0	5,000	-
CS05	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	9.5 \pm 0.1	11.5 \pm 1.0	5,000	-
CS06	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	9.5 \pm 0.1	11.5 \pm 1.0	5,000	-
CS13	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	9.5 \pm 0.1	11.5 \pm 1.0	5,000	-
CS10	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	13.5 \pm 1.0	15.5 \pm 1.0	-	4,000
CS12	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	13.5 \pm 1.0	15.5 \pm 1.0	-	4,000
CS12 (2W)	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	13.5 \pm 1.0	15.5 \pm 1.0	-	2,000
CS25	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	13.5 \pm 1.0	15.5 \pm 1.0	-	2,000
CS37	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	13.5 \pm 1.0	15.5 \pm 1.0	-	2,000
CS75	178.0 \pm 1.0	60.0 + 1.0	13.5 \pm 0.7	17.5 \pm 1.0	19.5 \pm 1.0	-	2,000

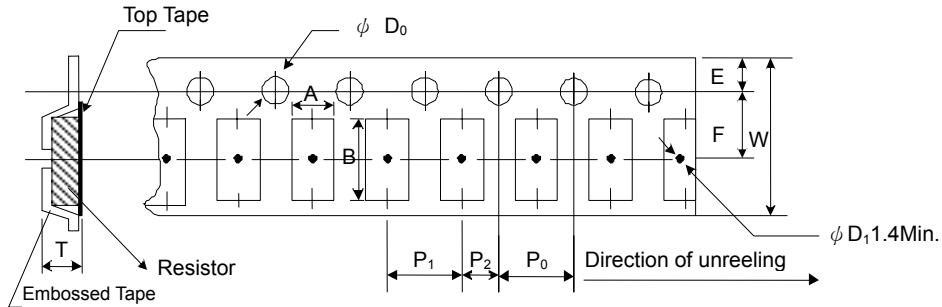
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
CS01	0.38±0.05	0.68±0.05	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.42±0.20
CS02	0.65±0.10	1.15±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
CS03	1.10±0.10	1.90±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
CS05	1.60±0.10	2.40±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CS06	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
CS13	2.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

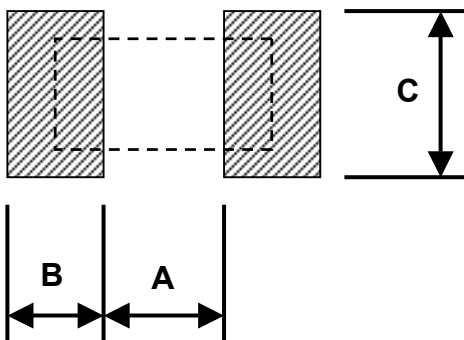
Embossed Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
CS10	2.80±0.10	5.50±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
CS12	3.50±0.10	6.70±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
CS12 (2W)	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55+0.05	1.45±0.20
CS25	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55+0.05	1.45±0.20
CS37	2.50±0.20	4.45±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.20	1.20±0.20
CS75	2.50±0.20	8.30±0.20	16.0±0.30	1.75±0.10	7.8±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.20	1.20±0.20

Recommend Land Pattern



Pad Layout (Except For CS12: High Power Rating Series)

Unit: mm

Type	A	B	C
CS01	0.25	0.30	0.40±0.2
CS02	0.50	0.50	0.60±0.2
CS03	0.80	1.00	0.90±0.2
CS05	1.00	1.00	1.35±0.2
CS06	2.00	1.15	1.70±0.2
CS13	2.00	1.15	2.50±0.2
CS10	3.60	1.40	2.50±0.2
CS12	4.90	1.60	3.10±0.2
CS25	2.00	2.00	6.40±0.2
CS37	1.00	1.80	3.90±0.2
CS75	1.00	1.80	7.60±0.2

Pad Layout (For CS12: High Power Rating Series)

Unit: mm

Type	Resistance Range	A	B	C
CS12	10 - 99mΩ	4.9	1.6	3.1±0.2
CS12	100 - 1000mΩ	1.0	3.55	3.1±0.2