

Data Sheet

Customer :

Product : Current Sensing Chip Resistor –CS Series

Size : 0201/0402/0603/0805/1206/1010/2010/2512
1225/3720/7520

Issued Date : 7-Oct-09

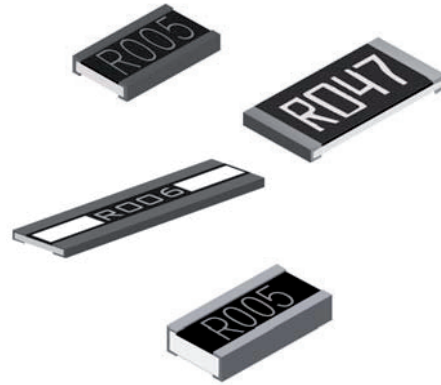
Edition : REV.C1



Current Sensing Chip Resistor (CS Series)

■ Features

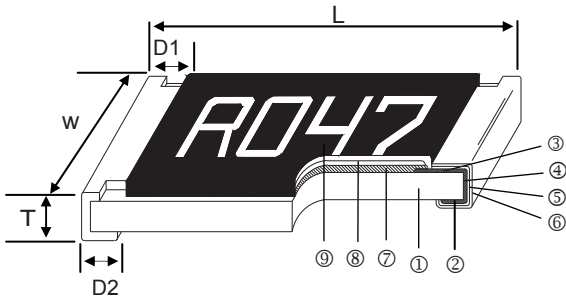
- 3 Watts power rating in 1 Watt size, 1225 package
- Low TCR of ± 100 PPM/°C
- Resistance values from 1m to 1 ohm
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating



■ 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
- Portable Devices (PDA, Cell Phone)

■ Construction



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

■ Dimensions

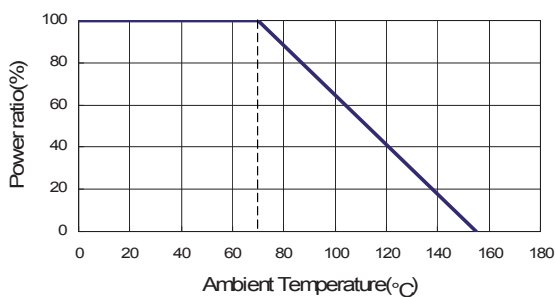
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
CS01	0201	0.58±0.05	0.29±0.05	0.23±0.05	0.12±0.05	0.15±0.05	0.18
CS02	0402	1.00±0.05	0.50±0.05	0.32±0.10	0.25±0.10	0.20±0.10	0.7
CS03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.99
CS05	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25	5.3
CS06	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.50±0.30	0.40±0.25	8.82
CS13	1210	3.00±0.15	2.50±0.15	0.55±0.10	0.50±0.30	0.50±0.25	15.5
CS10	2010	5.00±0.20	2.45±0.15	0.60±0.15	0.60±0.30	0.50±0.25	27.03
CS12	2512	6.35±0.20	3.15±0.15	0.60±0.10	0.60±0.30	0.55±0.25	43.08
CS12 (2W)	2512 10 - 99mΩ	6.35±0.20	3.15±0.15	0.74±0.10	0.60±0.30	0.55±0.25	43.08
CS12 (2W)	2512 100 - 1000mΩ	6.35±0.20	3.15±0.15	0.74±0.10	0.60±0.30	2.70±0.10	43.08
CS25	1225	3.10±0.15	6.30±0.15	0.90±0.15	0.60±0.30	0.55±0.25	53.8
CS37	3720	2.00±0.20	3.75±0.20	0.60±0.10	0.40±0.20	0.40±0.20	19.96
CS75	7520	2.00±0.20	7.50±0.30	0.60±0.10	0.40±0.20	0.40±0.20	35.71

■ Part Numbering

CS	06	F	T	G	U	R100	N
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°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: ±1% G: ±2% J: ±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: 0.01Ω R100: 0.1Ω 1R00: 1Ω	: Standard N: No Marking

■ 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	±1000			
			150 - 500	±600			
			501 - 1000	±300			
CS02 (0402)	1/16W	-55 ~ +155 C	50 - 100	±400			
			101 - 500	±300			
			501 - 1000	±200			
CS03 (0603)	1/10W	-55 ~ +155 C	20 - 50	±600			
			51 - 100	±400			
			101 - 500	±300			
			501 - 1000	±200			
CS05 (0805)	1/8W	-55 ~ +155 C	20 - 50	±600			
			51 - 100	±400			
			101 - 500	±300			
			501 - 1000	±200			
CS06 (1206)	1/4W	-55 ~ +155 C	10 - 20	±600			
CS13 (1210)	1/2W		21 - 50	±400			
CS10 (2010)	3/4W		51 - 500	±300			
CS12 (2512)	1W		501 - 1000	±200			

CS25 (1225)	3W		3 - 5	±300
			6 - 20	±200
CS37 (3720)	1W		21 - 30	±150
			31 - 250	±100
CS75 (7520)	2W		251 - 8000	±200
			10 - 19	±300
			20 - 500	±150
			-	1 - 4
			5 - 10	±200
			11 - 350	±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 - 100m			±400
CS03 (0603)		1/8W		101 - 500m			±300
CS05 (0805)		1/4W		501 - 1000m			±200
CS06 (1206)		1/2W		10 - 20m			±600
CS13 (1210)		3/4W		21 - 50m			±400
CS10 (2010)		1W		51 - 500m			±300
CS12 (2512)		1.5W		501 - 1000m			±200
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%	
CS06 (1206)		1/4W	-55 ~ +155 C	100 - 1000			±100
CS13 (1210)		1/2W		100 - 1000			±100
CS10 (2010)		3/4W		100 - 1000			±100
CS12 (2512)		1W		20 - 1000			±100
CS37 (3720)		1W		100 - 500			±100
CS75 (7520)		2W		50 - 350			±100

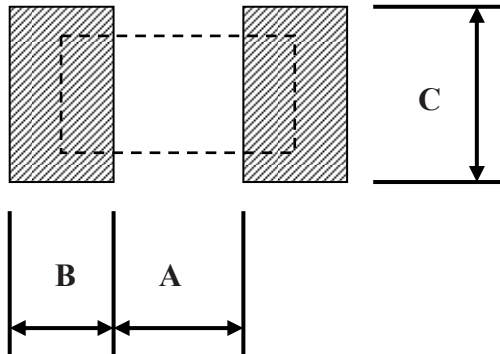
Operating Voltage= $\sqrt{P \cdot R}$; Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$; Operating Current= $\sqrt{P/R}$

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

■ Marking for 0603

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

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	2.5±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

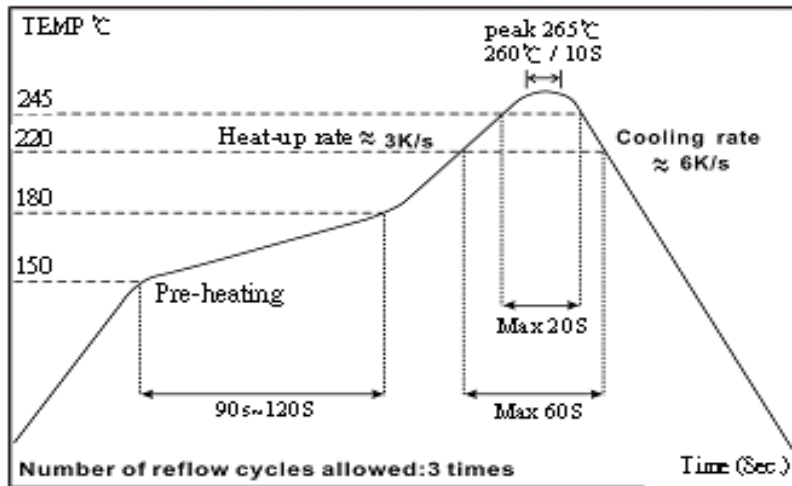
Type	Resistance	A	B	C
CS12	10~99 mΩ	4.9	1.6	3.1±0.2
CS12	100~1000mΩ	1.0	3.55	3.1±0.2

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	MIL-STD-202F Method 304 +25/-55/+25/+125/+25 C
Short Time Overload	±0.5%	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage for 5 seconds
	ΔR±1% for high power rating	
Insulation Resistance	>1000MΩ	MIL-STD-202F Method 302 Apply 100V _{DC} for 1 minute
Endurance	±1%	MIL-STD-202F Method 108A 70 2 C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±0.5%	MIL-STD-202F Method 103B 40 2 C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±0.5%	JIS-C-5201-1 7.2 at +155 C for 1000 hrs
Bending Strength	As Spec.	JIS-C-5201-1 6.1.4 Bending amplitude 3mm for 10 seconds
Solderability	95% min. coverage	MIL-STD-202F Method 208H 245 5 C for 3 seconds
Resistance to Soldering Heat	±0.5%	MIL-STD-202F Method 210E 260±5 C for 10 seconds
Dielectric Withstand Voltage	By Type	MIL-STD-202F Method 301 Apply Max. Overload Voltage for 1 minute
Thermal Shock	±0.5%	MIL-STD-202F Method 107G -55 C ~150 C, 100 cycles
Low Temperature Operation	±0.5%	JIS-C-5201-1 7.1 1 hour, -65 C followed by 45 minutes of RCWV

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

Reflow

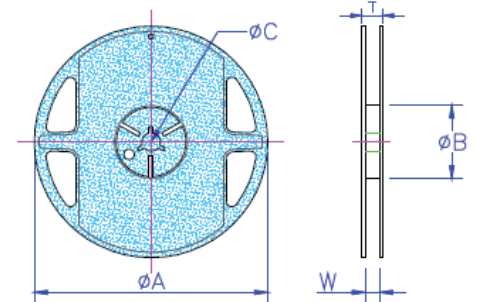


Packaging

Packaging Quantity & Reel Specifications

Unit :mm

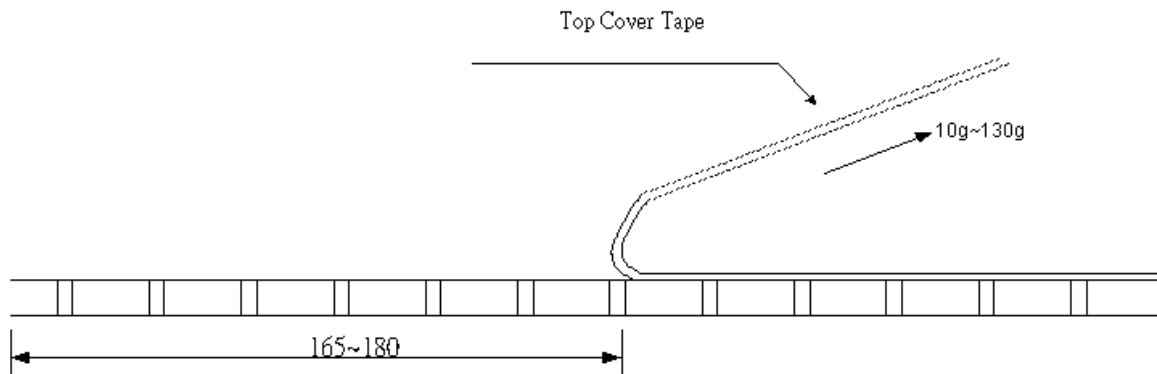
Type	ψA	ΦB	ψC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
CS01	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	
CS02	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
CS03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CS05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CS06	178.0±1.0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



Paper Tape Specifications

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ψD ₀	T
CS10	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
CS12	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
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±0.01	5.5±0.05	4.00 ±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.50 ±0.10
CS75	2.50±0.20	8.30±0.20	16.0±0.30	1.75±0.01	7.8±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.50 ±0.10

- 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 10g and 130g



CS25 (1225)	3W		3 - 5	±300
			6 - 20	±200
CS37 (3720)	1W		21 - 30	±150
			31 - 250	±100
CS75 (7520)	2W		251 - 8000	±200
			10 - 19	±300
			20 - 500	±150
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