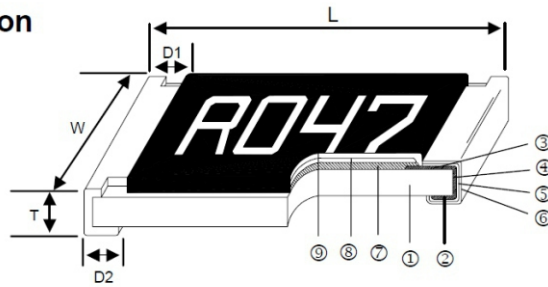




# Current Sensing Chip Resistor

## 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  $\pm 100$  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

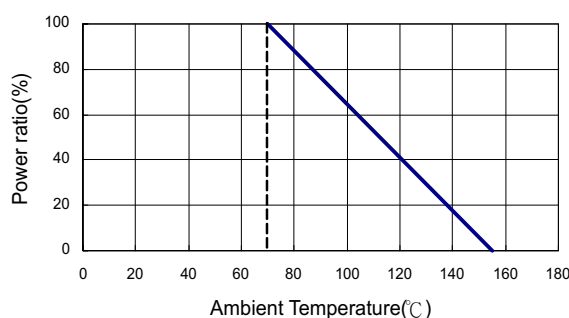
Unit:mm

Type	Size	L	W	T	D1	D2	Weight (g) (1000pcs)
CCS01	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
CCS02	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
CCS03	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
CCS05	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
CCS06	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
CCS13	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
CCS10	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
CCS12	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
CCS12 (2W)	2512 10-99m $\Omega$	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
CCS01 (2W)	0201 100-1000m $\Omega$	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
CCS25	1225	3.10 $\pm$ 0.15	6.30 $\pm$ 0.15	0.90 $\pm$ 0.15	0.60 $\pm$ 0.30	0.80 $\pm$ 0.25	64.88
CCS37	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
CCS75	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

CCS	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: $\pm 100$ F: $\pm 200$ G: $\pm 300$ H: $\pm 400$ J: $\pm 600$ K: $\pm 150$ R: $\pm 1000$	: Standard A: 1.5W Q: 3/4W S: 2W T: 1W U: 1/2W V: 1/4W P: 1/5W W: 1/8W	R010: 0.01 $\Omega$ R100: 0.1 $\Omega$ 1R00: 1 $\Omega$	: Standard N: No Marking W: Wide

## Derating Curve





## Current Sensing Chip Resistor

### Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
	CCS01 (0201)	1/20W	-55 ~ +155 °C	100 - 149 150 - 500 501 - 1000			±1000 ±600 ±300
	CCS02 (0402)	1/16W		50 - 100 101 - 500 501 - 1000			±400 ±300 ±200
	CCS03 (0603)	1/10W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
	CCS05 (0805)	1/8W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
	CCS06 (1206)	1/4W		10 - 20 21 - 50			±600 ±400
	CCS13 (1210)	1/2W		51 - 99			±300
	CCS10 (2010)	3/4W		100 - 1000			±200
	CCS12 (2512)	1W		3 - 5 6 - 20 21 - 30 31 - 8000			±300 ±200 ±150 ±100
	CCS25 (1225)	3W		10 - 19 20 - 500			±300 ±150
	CCS37 (3720)	1W		-			±300
	CCS75 (7520)	2W		1 - 4 5 - 10 11 - 350			±300 ±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%	
	CCS02 (0402)	1/8W	-55 ~ +155 °C	51 - 100 101 - 500 501 - 1000			±400 ±300 ±200
	CCS03 (0603)	1/8W 1/5W					
	CCS05 (0805)	1/4W					
	CCS06 (1206)	1/2W	-55 ~ +155 °C	10 - 20 21 - 50 51 - 99 100 - 1000			±600 ±400 ±300 ±200
	CCS13 (1210)	3/4W					
	CCS10 (2010)	1W					
	CCS12 (2512)	1.5W					
	CCS12 (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%	
	CCS05 (0805)	1/8W	-55 ~ +155 °C	100 - 1000			±100
	CCS06 (1206)	1/4W		100 - 1000			±100
	CCS13 (1210)	1/2W		75 - 1000			±100
	CCS10 (2010)	3/4W		50 - 1000			±100
	CCS12 (2512)	1W		20 - 1000			±100
	CCS12 (2512)	2W		50 - 1000			±100
	CCS37 (3720)	1W		100 - 500			±100
	CCS75 (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  $\pm$ s requirement.



## Current Sensing Chip Resistor

### ■ 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	±(0.5%+0.05Ω)	RCWV*2.5 or Max. overload voltage for 5 seconds
	±(1.0%+0.05Ω) for high power rating	
Insulation Resistance	≥ 10G	Max. overload voltage for 1 minute
Endurance	±(1.0%+0.05Ω)	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%+0.05Ω)	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%+0.05Ω)	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±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤ 5% Total leaching area ≤ 10%	260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	-55°C to +155°C, 5 cycles

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

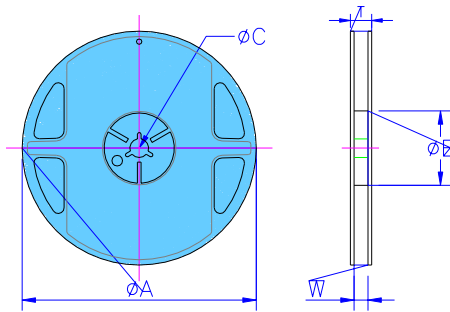
■ Storage Temperature: 25±3°C; Humidity < 80%RH



# Current Sensing Chip Resistor

## ■ Packaging

### Packaging Quantity & Reel Specifications



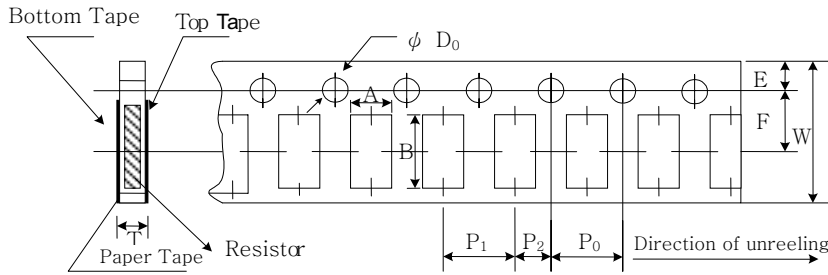
Unit:mm

Type	$\Phi A$	$\Phi B$	$\Phi C$	W	T	Paper Tape (EA)	Embossed Plastic Tape (EA)
CCS01	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	9.5 ±0.1	11.5 ±1.0	10,000	-
CCS02	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	9.5 ±0.1	11.5 ±1.0	10,000	-
CCS03	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	9.5 ±0.1	11.5 ±1.0	5,000	-
CCS05	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	9.5 ±0.1	11.5 ±1.0	5,000	-
CCS06	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	9.5 ±0.1	11.5 ±1.0	5,000	-
CCS13	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	9.5 ±0.1	11.5 ±1.0	5,000	-
CCS10	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	4,000
CCS12	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	4,000
CCS12 (2W)	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	2,000
CCS25	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	2,000
CCS37	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	2,000
CCS75	178.0 ±1.0	60.0 + 1.0	13.5 ±0.7	17.5 ±1.0	19.5 ±1.0	-	2,000



# Current Sensing Chip Resistor

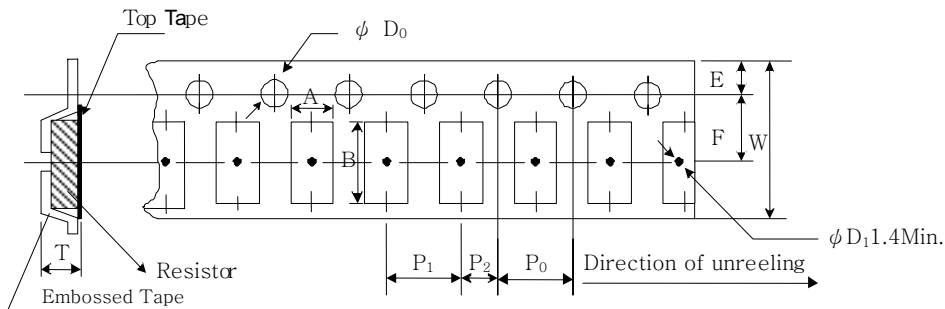
## Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ΦD0	T
CCS01	0.38±0.05	0.68±0.5	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
CCS02	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
CCS03	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
CCS05	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
CCS06	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
CCS13	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

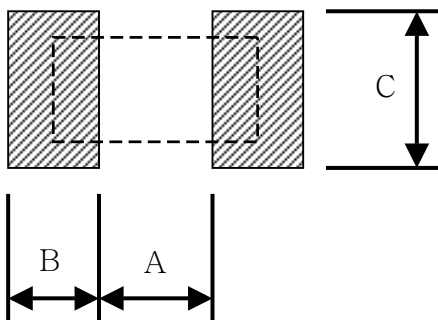
## Embossed Plastic Tape Specifications



Type	A	B	W	E	F	P0	P1	P2	ΦD0	T
CCS10	0.28±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+0.1	1.00±0.20
SSC12	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+0.1	1.00±0.20
CCS12(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
CCS25	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
CCS37	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+0.1	1.20±0.20
CCS75	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+0.1	1.20±0.20

## Recommend Land Pattern

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



Type	A	B	C
CCS01	0.25	0.30	0.40±0.2
CCS02	0.5	0.50	0.60±0.2
CCS03	0.8	1.00	0.90±0.2
CCS05	1.00	1.00	1.35±0.2
CCS06	2.00	1.15	1.70±0.2
CCS13	2.00	1.15	2.50±0.2
CCS10	3.60	1.40	2.50±0.2
CCS12	4.90	1.60	3.10±0.2
CCS25	2.00	2.00	6.40±0.2
CCS37	1.00	1.80	3.90±0.2
CCS75	1.00	1.80	7.60±0.2

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

Type	Resistance Range	A	C	C
CCS12	10-99mΩ	4.90	1.6	3.1±0.2
CCS12	100-1000mΩ	1.00	3.55	3.1±0.2