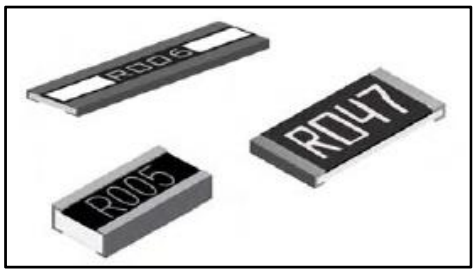
Tel : 82-32-817-4325
Fax : 82-32-817-4329

Resistors And
Resistive Applications

CS
Current Sensing Chip Resistor

RoHS COMPLIANT



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

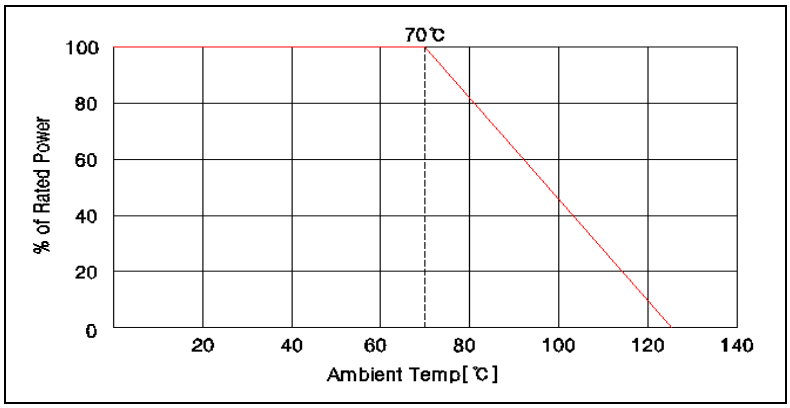
■Applications
- Power Management Applications, Switching Power Supply
- Over Current Protection in Audio Application
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver, Portable Devices (PDA, Cell Phone)

■ CHARACTERISTICS

Temperature Coefficient of Resistance (T.C.R)	As Spec.	+25/-55/+24/+125/+25℃
Short Time Overload	±[0.5%] ±[1%] for high power rating	RCWV*2.5 or Max. overload voltage for 5 sec.
Insulation Resistance	>1000MΩ	Apply 100V_{dc} for 1 minute
Endurance	±[1%]	70±2℃,Max. working voltage for 1000 hours with 1.5 hours ”ON” and 0.5 hours “OFF”
Damp Heat with Load	±[0.5%]	40±2℃, 90~95% R.H. Max. working voltage for 1000 hours With 1.5 hours “ON” and 0.5 hours “OFF”
Dry Heat	±[0.5%]	at +155℃ for 1000 hours
Bending Strength	As Spec.	Bending amplitude 3 mm for 10 sec.
Solderability	95% min. coverage	245±5℃ for 3 sec.
Resistance to Soldering Heat	±[0.5%]	260±5℃ for 10 sec.
Dielectric Withstand Voltage	By Type	Apply Max. Overload Voltage for 1 minute
Thermal Shock	±[0.5%]	-55℃ to +150℃, 100 cycles
Low Temperature Operation	±[0.5%]	1 hour, -65℃ followed by 45 minutes of RCWV

*Reference Standard : MIL-STD-202, JIS-C 5201-1 *Storage Temperature: 25±3℃; Humidity < 80%RH

■ DERATING CURVE



■ Marking for 0603

Codes	Model
1R0	1.000Ω
R10	0.100Ω
R01	0.010Ω
101	0.101Ω
035	0.035Ω

■ GENERAL SPECIFICATIONS

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

■ High Power Rating Electrical Specifications

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

■ Low TCR Electrical Specifications

Model	Power Rating at 70℃	Operating Temp. Range	TCR (PPM/℃)	Resistance Range[mΩ]		
				±1%	±2%	±5%
CS06 (1206)	1/4W	-55 ~ +155℃	±100	100 - 1000		
CS13 (1210)	1/2W					
CS10 (2010)	3/4W					
CS12 (2512)	1W			20 – 1000		
CS37 (3720)	1W			100 – 500		
CS75 (7520)	2W			50 -350		

Operating Voltage=√(P*R) ; Overload Voltage=2.5*√(P*R) ; Operating Current=√(P/R)

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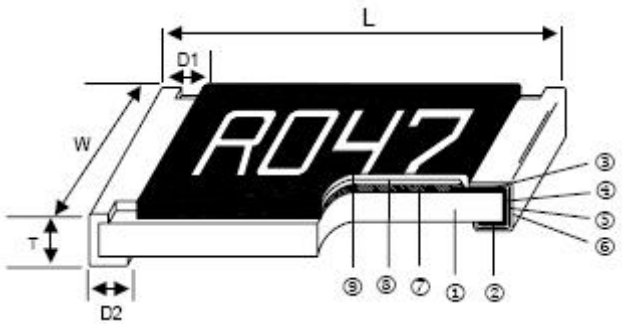
RARA stors And stive Applications

■ DIMENSIONS

Unit : mm



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

Model	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	5.30
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	1216	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	0.600.30	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	53.08
CS12 (2W)	2512 (100 – 1000mΩ)	6.35±0.20	3.15±0.15	0.74±0.10	0.60±0.30	2.10±0.10	53.08
CS25	1225	3.10±0.15	6.30±0.15	0.90±0.15	0.60±0.30	0.55±0.25	64.88
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

■ ORDERING PROCEDURE EXAMPLE

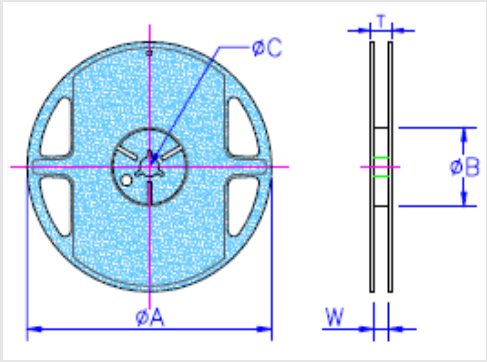
CS 12	F	T	G	U	R100	N
Model #	Resistance Tolerance F:±1% J:±5%	Packing Code T : Taping Reel B : Bulk	TCR(PPM/℃) E:±100 K:±150 F:±200 G:±300 H:±400 J:±600 R:±1000	Power Rating : Standard A : 1.5W Q : 3/4W S : 2W T : 1W U : 1/2W V : 1/4W W : 1/8W	Resistance R010 : 0.01Ω R100 : 0.1Ω 1R00 : 1Ω	Marking : Standard N : No Marking W : Wide

■ Packaging

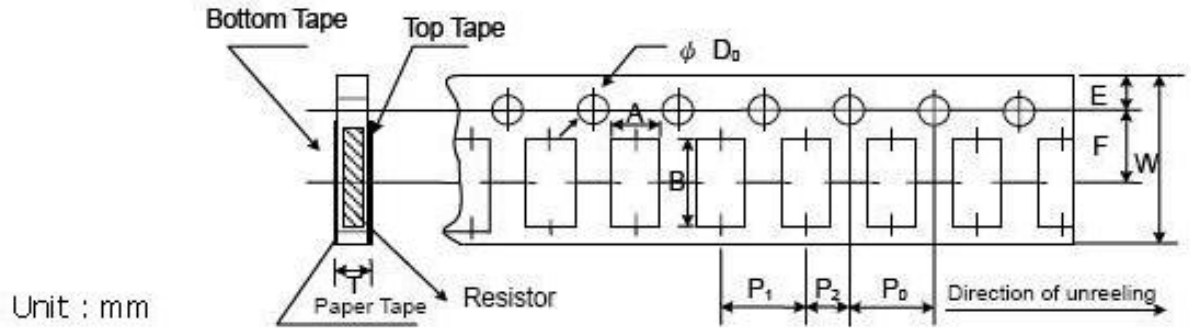
Reel Specification & Packaging Quantity

Unit : mm

Model	ΦA	ΦB	ΦC	W	T
CS01	178.0±1.0	60.0±1.0	13.5±1.0	9.5±1.0	11.5±1.0
CS02					
CS03					
CS05					
CS06					
CS13					
CS10				13.5±1.0	15.5±1.0
CS12					
CS12 (2W)					
CS25					
CS37					
CS75				17.5±1.0	19.5±1.0

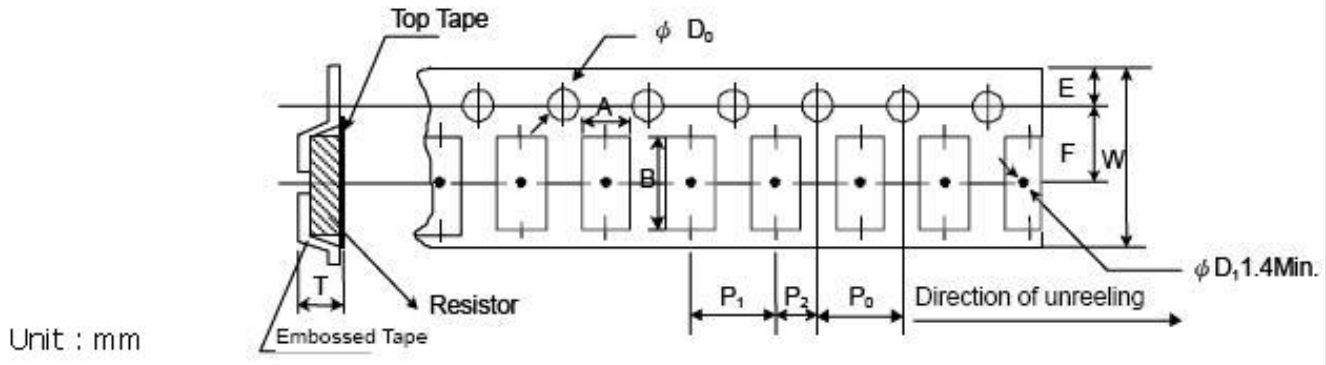


Paper Tape Specifications



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±0.2	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	2.0±0.05	1.50 +0.1/-0.0	0.45±0.20
CS02	0.65±0.10	1.15±0.10								0.45±0.10
CS03	1.10±0.10	1.90±0.10					4.0±0.05			0.70±0.10
CS05	1.60±0.10	2.40±0.20								0.85±0.1
CS06	1.90±0.10	3.50±0.20								
CS13	2.80±0.10	3.50±0.20								

Embossed Plastic Tape Specifications



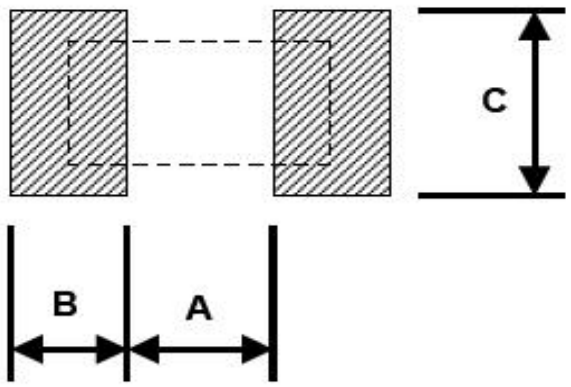
Type	A	B	W	E	F	P_0	P_1	P_2	ΦD_0	T
CS01	0.38±0.05	0.68±0.05	8.0±0.2	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	2.0±0.05	1.50 +0.1/-0.0	0.45±0.20
CS02	0.65±0.10	1.15±0.10								0.45±0.10
CS03	1.10±0.10	1.90±0.10					4.0±0.05			0.70±0.10
CS05	1.60±0.10	2.40±0.20								0.85±0.1
CS06	1.90±0.10	3.50±0.20								
CS13	2.80±0.10	3.50±0.20								

■ Recommend Land Pattern

Unit : mm

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

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



Pad Layout (For CS12 : High Power Rating Series)

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