AUTO GRADE CURRENT SENSING CHIP RESISTOR
- CRS SERIES -

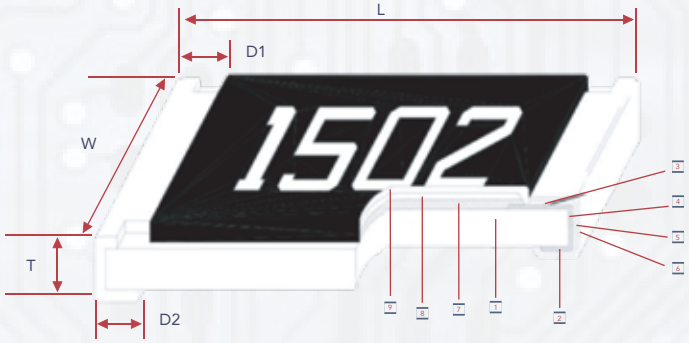
FEATURES

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

APPLICATIONS

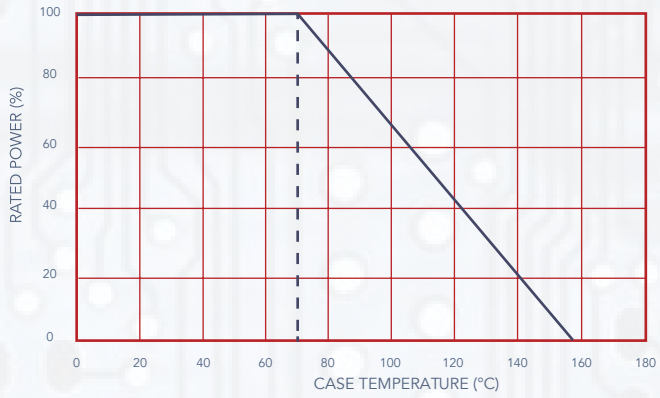
- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adapter
- Automotive Engine Control
- Disk Driver
- Portable Devices (PDA, Cell Phone)

CONSTRUCTION



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

DERATING CURVE



TYPE	SIZE (INCH)	L	W	T	D1	D2	WEIGHT (G) (1000PCS)
CRS02	0201	0.58±0.05	0.29±0.05	0.23±0.05	0.12±0.05	0.15±0.05	0.18
CRS04	0402	1.00±0.05	0.50±0.05	0.32±0.10	0.25±0.10	0.20±0.10	0.7
CRS06	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.99
CRS10	0805	2.00±0.15	1.25±0.15	0.55±0.10		0.40±0.25	5.3
CRS12	1206	3.05±0.15	1.55±0.15		0.50±0.30		8.82
CRS14	1210	3.00±0.15	2.50±0.15			0.50±0.25	15.5
CRS20	2010	5.00±0.20	2.45±0.15	0.60±0.15	0.60±0.30		27.03
CRS25	2512	6.35±0.20	3.15±0.15	0.60±0.10		0.55±0.25	43.08
CRS25 (2W)	2512 10-99mΩ			0.74±0.10			53.08
CRS25 (2W)	2512 100-1000mΩ					2.10±0.10	
CRS21	1225	3.10±0.15	6.30±0.15	0.90±0.15		0.55±0.25	64.88
CRS37	3720	2.00±0.20	3.75±0.20	0.60±0.10	0.40±0.20	0.40±0.20	19.96
CRS75	7520		7.50±0.30				35.71

PART NUMBERING

CRS	12	F	R100	CT	G	U	A
TYPE	DIMENSIONS	RESISTANCE TOLERANCE	RESISTANCE	PACKAGING TYPE	TCR (PPM/°C)	POWER RATING	AUTOMOTIVE GRADE
CRS SERIES	02: 0201 04: 0402 06: 0603 10: 0805 12: 1206 20: 2010 25: 2512 21: 1225 37: 3720 75: 7520	F: ±1% G: ±2% J: ±5%	R010: 0.01Ω R100: 0.1Ω 1R00 1Ω	CT: Taping & Reel	: STANDARD E: ±100 F: ±200 G: ±300 H: ±400 J: ±600 K: ± 150 R: ± 1000	: STANDARD A : 1.5W Q: 3/4W R : 3W S : 2W T : 1W U : 1/2W V : 1/4W W: ± 1000	

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RoHS Pb HF

STANDARD ELECTRICAL SPECIFICATIONS

TYPE	ITEM	POWER RATING AT 70°C	OPERATING TEMP RANGE	RESISTANCE RANGE (mΩ) ±1%	RESISTANCE RANGE (mΩ) ±2%	RESISTANCE RANGE (mΩ) ±5%	T.C.R. (PPM / °C)
CRS02	0201	1/20W	-55~+155°C	100 - 149 150 - 500 501 - 1000			±1000 ±600 ±300
CRS04	0402	1/16W		50 - 100 101 - 500 501 - 1000			±400 ±300 ±200
CRS06	0603	1/10W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
CRS10	0805	1/8W					
CRS12	1206	1/4W		10 - 20 21 - 50 51 - 99 100 - 1000			
CRS14	1210	1/2W					
CRS20	2010	3/4W					
CRS25	2512	1W					
CRS21	1225	3W		3 - 5 6 - 20 21 - 30 31 - 250 251 - 8000			±300 ±200 ±150 ±100 ±200
CRS37	3720	1W		10 - 19 20 - 500			±300 ±150
CRS75	7520	2W		-	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) ±1%	RESISTANCE RANGE (mΩ) ±2%	RESISTANCE RANGE (mΩ) ±5%	T.C.R. (PPM / °C)
CRS06	0603	1/8W	-55~+155°C	51 - 100 101 - 500 501 - 1000			±400 ±300 ±200
CRS10	0805	1/4W					
CRS12	1206	1/2W		10 - 20 21 - 50 51 - 99 100 - 1000			±600 ±400 ±300 ±200
CRS14	1210	3/4W					
CRS20	2010	1W					
CRS25	2512	1.5W					
CRS25	2512	2W					

LOW TCR ELECTRICAL SPECIFICATIONS

TYPE	ITEM	POWER RATING AT 70°C	OPERATING TEMP RANGE	RESISTANCE RANGE (mΩ) ±1%	RESISTANCE RANGE (mΩ) ±2%	RESISTANCE RANGE (mΩ) ±5%	T.C.R. (PPM / °C)
CRS12	1206	1/4W	-55~+155°C	100 - 1000			±100
CRS14	1210	1/2W					
CRS20	2010	3/4W					
CRS25	2512	1W		20 - 1000			
CRS37	3720			100 - 500			
CRS75	7520	2W		50 - 350			

Operating Voltage - $\sqrt{(P*R)}$; Overload Voltage - $2.5*\sqrt{(P*R)}$; Operating Current - $\sqrt{(P*R)}$

Cal-Chip is capable of manufacturing the optional spec based on customer's requirement.

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MARKING FOR 0603

CODES	TYPE
1R0	1.000Ω
R10	0.100Ω
R01	0.010Ω
101	0.101Ω
035	0.035Ω

ENVIRONMENTAL CHARACTERISTICS

ITEMS	REQUIREMENT	TEST METHOD
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	+25°C/-55/+25/+125/+25°C
Short Time Overload	±0.5 ΔR±1% for high power rating	RCWV*2.5 or Max. overload voltage for 5 seconds
Insulation Resistance	≥1000MΩ	Apply 100V_{DC} for 1 minute
Endurance	±1	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%	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%	at +155°C for 1000 hrs
Bending Strength	As Spec.	Bending amplitude 3mm for 10 seconds
Solderability	95% coverage Min.	245±5°C for 3 seconds
Resistance to Soldering Heat	0.5%	260±5°C for 10 seconds
Dielectric Withstand Voltage	By Type	Apply Max. Overload Voltage for 1 minute
Thermal Shock	±0.5%	-55°C ~150°C, 100 cycles
Low Temperature Operation	±0.5%	1 hour, -65°C followed by 45 minutes of RCWV

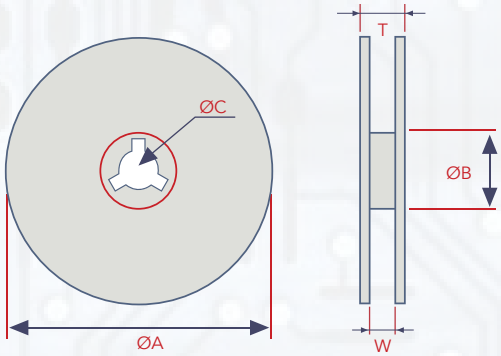
Reference Standards: MIL-STD-202, JIS-C 5201-1
Storage Temperature: 25±3°C: Humidity <80%RH

PACKAGING

- Packaging Quantity & Reel Specifications

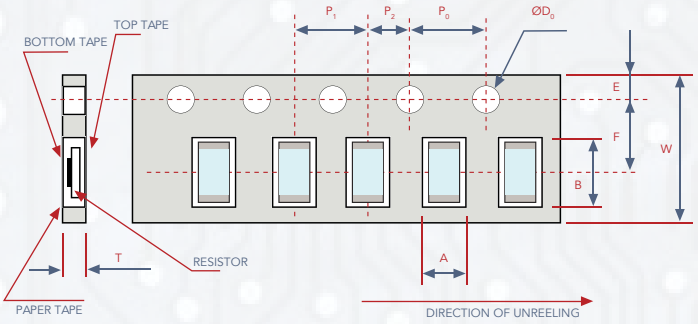
UNIT: MM

TYPE	ØA	ØB	ØC	W	T	PAPER TAPE (EA)	EMBOSSED PLASTIC TAPE (EA)
CRS02	178.0 ± 1.0	60.0 ± 1.0	13.5 ± 0.7	9.5 ± 0.1	11.5 ± 1.0	10,000	-
CRS04							-
CRS06						5,000	-
CRS10							-
CRS12							-
CRS14							-
CRS20				13.5 ± 1.0	15.5 ± 1.0	-	4,000
CRS25						-	
CRS25 (2W)						-	2,000
CRS21						-	
CRS37						-	
CRS75				17.5 ± 1.0	19.5 ± 1.0	-	



PACKAGING

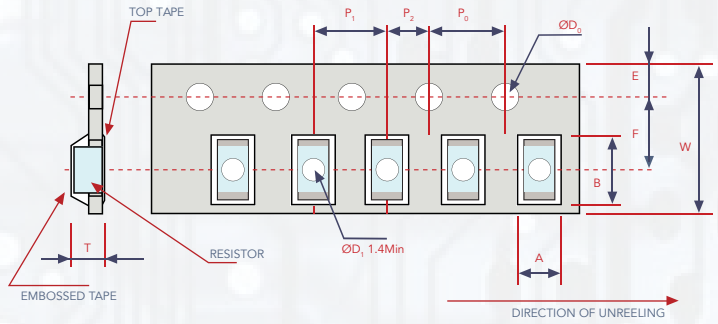
- Paper Tape Specifications



UNIT: MM

TYPE	A	B	W	E	F	P_0	P_1	P_2	$ØD_0$	T
CRS02	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
CRS04	0.65 ± 0.10	1.15 ± 0.10								0.45 ± 0.20
CRS06	1.10 ± 0.10	1.90 ± 0.10					4.00 ± 0.05			0.70 ± 0.10
CRS10	1.60 ± 0.10	2.40 + 0.20								
CRS12	1.90 ± 0.10	3.50 ± 0.20								0.85 ± 0.10
CRS14	2.80 ± 0.10									

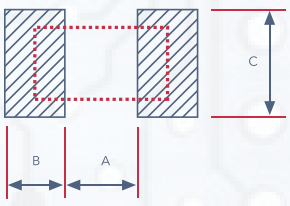
- Embossed Plastic Tape Specifications



UNIT: MM

TYPE	A	B	W	E	F	P_0	P_1	P_2	$ØD_0$	T
CRS14	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
CRS25	3.40 ± 0.10	6.65 ± 0.10								
CRS25 (2W)	3.38 ± 0.10	6.68 ± 0.10	12.0 ± 0.30		5.5 ± 0.10	4.00 ± 0.10			1.55 + 0.05	1.45 ± 0.20
CRS21										
CRS37	2.50 ± 0.20	4.45 ± 0.20			5.5 ± 0.05	4.00 ± 0.05			1.50 + 0.20	1.20 ± 0.20
CRS75		8.30 ± 0.20	16.0 ± 0.30		7.8 ± 0.05					

RECOMMEND LAND PATTERN



- Pad Layout (Except for CRS25: High Power Rating Series)

TYPE	A	B	C
CRS02	0.25	0.30	0.40 ± 0.2
CRS04	0.50	0.50	0.60 ± 0.2
CRS06	0.80	1.00	0.90 ± 0.2
CRS10	1.00	1.00	1.35 ± 0.2
CRS12	2.00	1.15	1.70 ± 0.2
CRS14	2.00	1.15	2.50 ± 0.2
CRS20	3.60	1.40	2.50 ± 0.2
CRS25	4.90	1.60	3.10 ± 0.2
CRS21	2.00	2.00	6.40 ± 0.2
CRS37	1.00	1.80	3.90 ± 0.2
CRS75	1.00	1.80	7.60 ± 0.2

- Pad Layout (For CRS25: High Power Rating Series)

TYPE	RESISTANCE RANGE	A	B	C
CRS25	10 - 99mΩ	4.9	1.6	3.1 ± 0.2
CRS25	100 - 1000mΩ	1.0	3.55	3.1 ± 0.2

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