

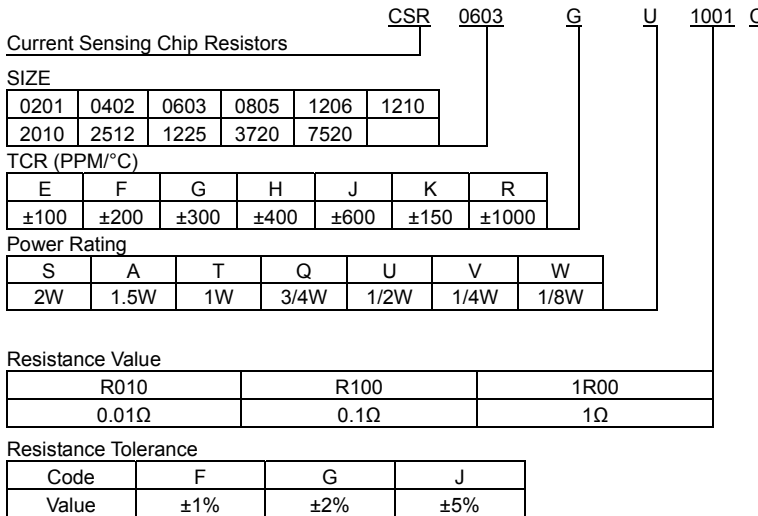


Feature and Applications

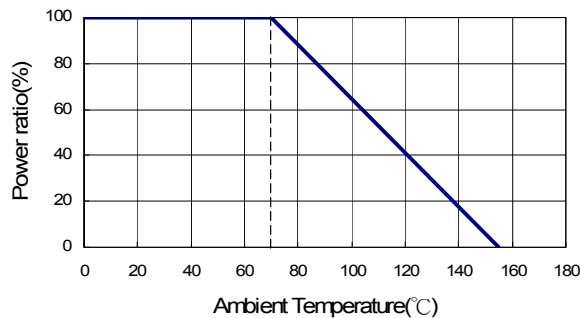
- Low TCR of ± 100 PPM/ $^{\circ}$ C
- Resistance values from 1m to 1 ohm
- 3 Watts power rating in 1 Watt size, 1225 package
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating
- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver



PART NUMBERING SYSTEM



Derating Curve



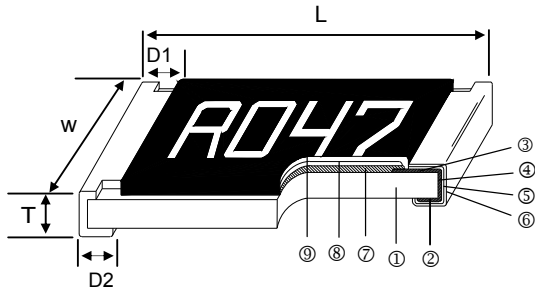
Current Sensing Chip Resistor



CSR Series

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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)

Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
CSR0201	0201	0.60±0.03	0.30±0.03	0.23±0.05	0.12±0.05	0.15±0.05	0.18
CSR0402	0402	1.00±0.05	0.50±0.05	0.32±0.10	0.25±0.10	0.20±0.10	0.7
CSR0603	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.99
CSR0805	0805	2.00±0.10	1.25±0.10	0.55±0.10	0.30±0.20	0.40±0.25	5.3
CSR1206	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.30	0.40±0.25	8.82
CSR1210	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.30	0.50±0.25	15.5
CSR2010	2010	5.00±0.10	2.50±0.15	0.60±0.15	0.60±0.30	0.50±0.25	27.03
CSR2512	2512	6.35±0.10	3.10±0.15	0.60±0.10	0.60±0.30	0.55±0.25	43.08
CSR2512 (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
CSR2512 (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
CSR1225	1225	3.10±0.15	6.30±0.15	0.90±0.15	0.60±0.30	0.55±0.25	64.88
CSR3720	3720	2.00±0.20	3.75±0.20	0.60±0.10	0.40±0.20	0.40±0.20	19.96
CSR7520	7520	2.00±0.20	7.50±0.30	0.60±0.10	0.40±0.20	0.40±0.20	35.71

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Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
CSR0201		1/20W	-55 ~ +155°C	100 - 149 150 - 500 501 - 1000			±1000 ±600 ±300
CSR0402		1/16W		50 - 100 101 - 500 501 - 1000			±400 ±300 ±200
CSR0603		1/10W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
CSR0805		1/8W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
CSR1206		1/4W		10 - 20 21 - 50 51 - 99 100 - 1000			±600 ±400 ±300 ±200
CSR1210		1/2W					
CSR2010		3/4W					
CSR2512		1W					
CSR1225		3W		3 - 5 6 - 20 21 - 30 31 - 250 251 - 8000			±300 ±200 ±150 ±100 ±200
CSR3720		1W		10 - 19 20 - 500			±300 ±150
CSR7520		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%	
CSR0402		1/8W	-55 ~ +155°C	51 - 100 101 - 500 501 - 1000			±400 ±300 ±200
CSR0603		1/8W					
CSR0805		1/4W					
CSR1206		1/2W					
CSR1210		3/4W		10 - 20 21 - 50 51 - 99 100 - 1000			±600 ±400 ±300 ±200
CSR2010		1W					
CSR2512		1.5W					
CSR2512		2W					

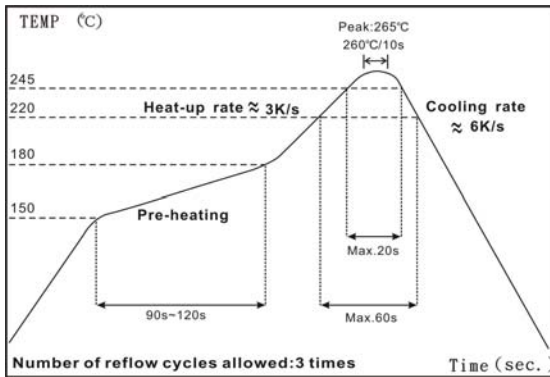


Low TCR Electrical Specifications

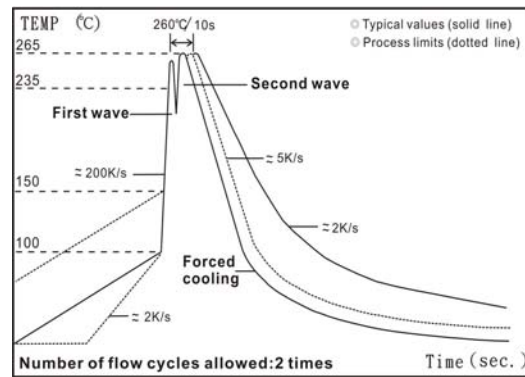
Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
CSR0805		1/8W	-55 ~ +155°C	100 - 1000			±100
CSR1206		1/4W		100 - 1000			±100
CSR1210		1/2W		75 - 1000			±100
CSR2010		3/4W		50 - 1000			±100
CSR2512		1W		20 - 1000			±100
CSR2512		2W		50 - 1000			±100
CSR3720		1W		100 - 500			±100
CSR7520		2W		50 - 350			±100

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

Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

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Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	JIS C 5201-1 4.8 IEC 60115-1 4.8 -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	±(0.5%+0.05Ω)	JIS C 5201-1 4.13 IEC 60115-1 4.13 RCWV*2.5 or Max. overload voltage for 5 seconds
	±(1.0%+0.05Ω) for high power rating	
Insulation Resistance	≥ 10G	JIS C 5201-1 4.6 IEC 60115-1 4.6 Max. overload voltage for 1 minute
Endurance	±(1.0%+0.05Ω)	JIS C 5201-1 4.25 IEC 60115-1 4.25.1 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%+0.05Ω)	JIS C 5201-1 4.24 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)	JIS C 5201-1 4.23.2 IEC 60115-1 2.23.2 at +155°C for 1000 hrs
Bending Strength	As Spec.	JIS C 5201-1 4.33 IEC 60115-1 4.33 Bending once for 5 seconds with 3mm 2010, 2512 sizes: 2 mm
Solderability	95% min. coverage	JIS C 5201-1 4.17 IEC 60115-1 4.17 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	JIS C 5201-1 4.18 IEC 60115-1 4.18 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	JIS C 5201-1 4.7 IEC 60115-1 4.7 1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤ 5% Total leaching area ≤ 10%	JIS C 5201-1 4.18 IEC 60068-2-58 8.2.1 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	JIS C 5201-1 4.19 IEC 60115-1 4.19 -55°C to +155°C, 5 cycles

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

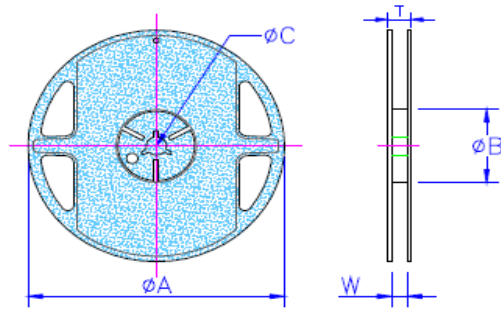
Current Sensing Chip Resistor



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Packaging

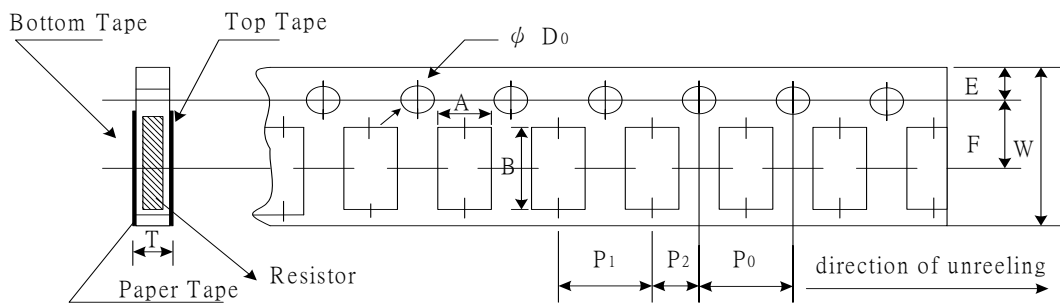


Packaging Quantity & Reel Specifications

Unit :mm

Type	ψA	ΦB	ψC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
CSR0201	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	
CSR0402	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
CSR0603	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CSR0805	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CSR1206	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CSR1210	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	
CSR2010	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
CSR2512	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
CSR2512 (2W)	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
CSR1225	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
CSR3720	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
CSR7520	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



Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ΦD_0	T
CSR0201	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
CSR0402	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
CSR0603	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
CSR0805	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
CSR1206	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
CSR1210	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

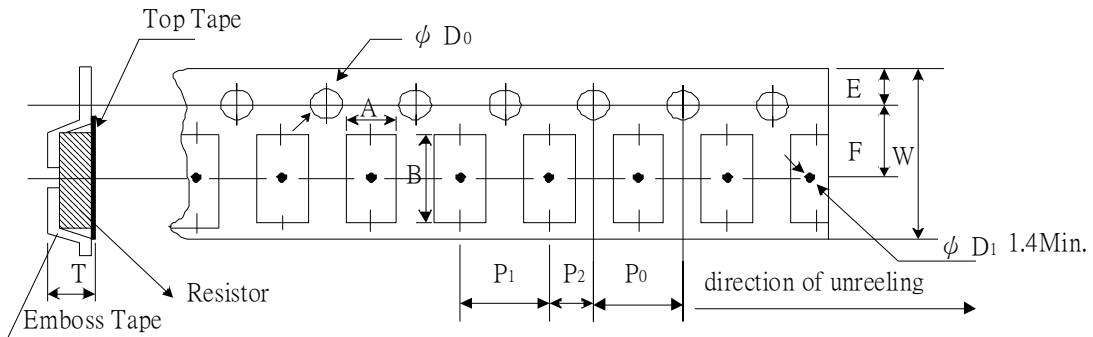
Current Sensing Chip Resistor



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Emboss Plastic Tape Specifications

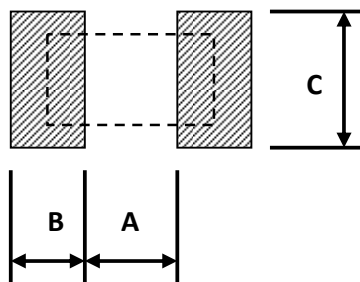


Type	A	B	W	E	F	P ₀	P ₁	P ₂	φD ₀	T
CSR2010	2.80±0.10	5.50±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
CSR2512	3.50±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
CSR2512 (2W)	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	1.45±0.20
CSR1225	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
CSR3720	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±0.10	1.20±0.20
CSR7520	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±0.10	1.20±0.20

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 CSR2512: High Power Rating Series)

Unit : mm

Type	A	B	C
CSR0201	0.25	0.30	0.40±0.2
CSR0402	0.50	0.50	0.60±0.2
CSR0603	0.80	1.00	0.90±0.2
CSR0805	1.00	1.00	1.35±0.2
CSR1206	2.00	1.15	1.70±0.2
CSR1210	2.00	1.15	2.50±0.2
CSR2010	3.60	1.40	2.50±0.2
CSR2512	4.90	1.60	3.10±0.2
CSR1225	2.00	2.00	6.40±0.2
CSR3720	1.00	1.80	3.90±0.2
CSR7520	1.00	1.80	7.60±0.2

Pad Layout (For CSR2512: High Power Rating Series)

Unit : mm

Type	Resistance	A	B	C
CSR2512	10~99 mΩ	4.9	1.6	3.1±0.2
CSR2512	100~1000mΩ	1.0	3.55	3.1±0.2