Data Sheet

Customer:	
Product:	Current Sensing Chip Resistor –CSN Series
Size:	0805/1206/1210/2010/2512
Issued Date:	21-Dec-22
Edition:	REV.A7

RoHS Compliant

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21-Dec-22	21-Dec-22	21-Dec-22		
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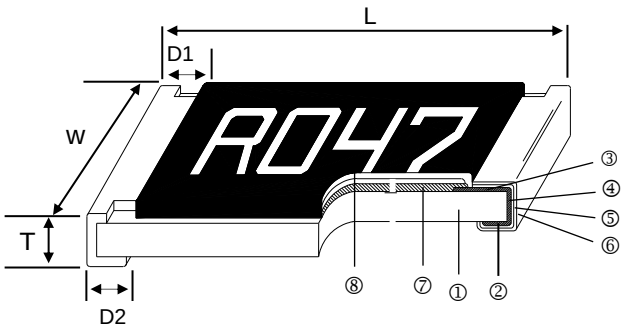
Current Sensing Chip Resistor



■Features

- Resistance values from 10mΩ to 1Ω
- Low TCR
- High purity alumina substrate for high power dissipation
- RoHS Compliance

■Construction



①	Alumina Substrate	④	Edge Electrode	⑦	Resistor Layer
②	Bottom Electrode	⑤	Barrier Layer	⑧	Overcoat
③	Top Electrode	⑥	External Electrode		

■Applications

- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Disk Driver

■Dimensions

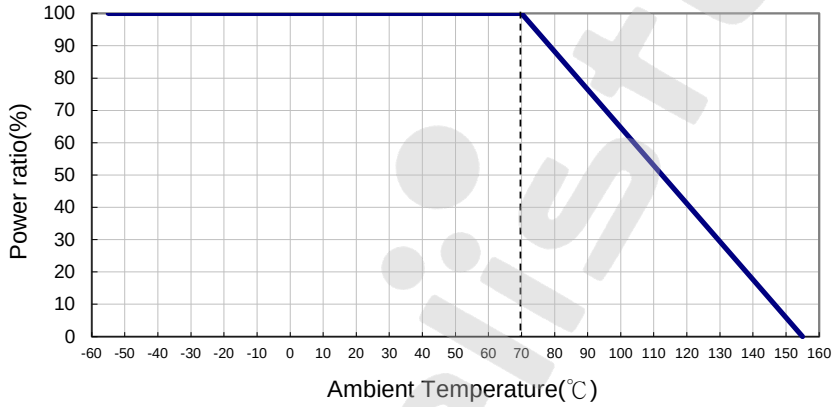
Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight(g) (1000pcs)
CSN05	0805	2.00±0.10	1.25±0.10	0.55±0.10	0.30±0.20	0.40±0.25	4.6
CSN06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.30	0.40±0.25	8.7
CSN13	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.30	0.50±0.25	16.0
CSN10	2010	5.00±0.10	2.50±0.15	0.60±0.15	0.60±0.30	0.50±0.25	23.7
CSN12	2512	6.35±0.10	3.10±0.15	0.60±0.10	0.60±0.30	0.55±0.25	40.0
CSN12 (2W)	2512	6.35±0.10	3.10±0.15	0.74±0.10	0.60±0.30	2.10±0.10	53.6
CSN12 (2W)	*2512 (20-45mΩ)	6.45±0.10	3.25±0.15	0.85±0.10	0.60±0.30	0.60±0.30	65.3

*:Low TCR

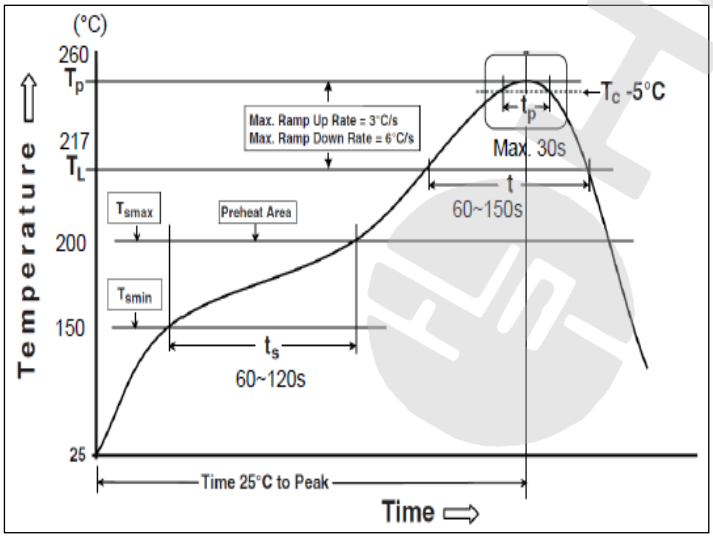
■Part Numbering

CSN	06	F	T	F	V	R100
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance
	05: 0805 06: 1206 13: 1210 10: 2010 12: 2512	F: ±1% G: ±2% J: ±5%	T: Taping Reel	D: ±50 W: ±75 E: ±100 F: ±200 G: ±300 H: ±400 J: ±600	A: 1.5W T: 1W S: 2W Q: 3/4W U: 1/2W V: 1/4W W: 1/8W	R051: 0.051Ω R100: 0.1Ω 1R00: 1Ω

■Derating Curve



■Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (Tsmin) Max Temperature (Tsmax) Preheating time (ts) from (Tsmin to Tsmax)	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to Tp)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217 °C 60-150 seconds
Min. Peak temperature (Tp min)	235°C
Max. Peak temperature (Tp max)	260°C
Time (tp) within 5 °C of the specified classification temperature (Tc)	30 seconds max.
Ramp-down rate (Tp to T_L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

■Standard Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)			TCR (PPM/°C)
				±1% (E24 & E96)※1	±2% (E24)	±5% (E24)	
CSN05 (0805)	1/8W	-55 ~ +155°C	2.5A	20 – 50 51 - 100 102 - 196 200 - 1000	20 - 50 51 - 100 110 - 180 200 - 1000		±600 ±400 ±300 ±200
CSN06 (1206)	1/4W	-55 ~ +155°C	5.0A	10 - 20 22 - 50 51 - 91 100 - 1000	10 - 20 22 - 50 51 - 91 100 - 1000		±600 ±400 ±300 ±200
CSN13 (1210)	1/2W		7.07A				
CSN10 (2010)	3/4W		8.66A				
CSN12 (2512)	1W		10.0A				

■High Power Rating Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)			TCR (PPM/°C)
				±1% (E24 & E96)※1	±2% (E24)	±5% (E24)	
CSN05 (0805)	1/4W	-55 ~ +155°C	2.21A	20 - 50 51 - 100 102 - 196 200 - 1000	20 - 50 51 - 100 110 - 180 200 - 1000		±600 ±400 ±300 ±200
CSN06 (1206)	1/2W		7.07A	10 - 20 22 - 50 51 - 91 100 - 1000	10 - 20 22 - 50 51 - 91 100 -1000		±600 ±400 ±300 ±200
CSN13 (1210)	3/4W		8.66A				
CSN10 (2010)	1W		10.0A				
CSN12 (2512)	1.5W		12.2A				
CSN12 (2512)	*2W		14.1A				

■High Power Rating & Low TCR Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)			TCR (PPM/°C)
				±1% (E24 & E96)※1	±2% (E24)	±5% (E24)	
CSN05 (0805)	1/4W	-55 ~ +155°C	1.58A	100 - 196 200 - 499 500 - 1000	100 - 180 200 - 470 500 - 1000		±100 ±75 ±50
CSN06 (1206)	1/2W		2.58A	75 - 100 102 - 147 150 - 1000	75 - 100 110 - 140 150 - 1000		±100 ±75 ±50
CSN06 (1206)	*1W		3.65A				
CSN13 (1210)	3/4W		3.87A	50 - 147 150 – 1000	50 - 140 150 - 1000		±75 ±50
CSN10 (2010)	1W		4.47A				
CSN12 (2512)	1.5W		5.47A				
CSN12 (2512)	*2W		10A	20 - 47 50 - 147 150 – 1000	20 - 47 50 - 140 150 - 1000		±100 ±75 ±50

*: Ultra High Power

※1: The nominal resistance value for less than 100mΩ is in E-24 series, other requirement of resistance value please contact our sales office.

■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** At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature Low TCR: At 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(0.5%+0.05Ω) ±(1.0%+0.05Ω) For ≦50mR & all High power、Ultra High Power	**JIS C 5201-1 4.13** **IEC 60115-1 4.13** RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
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) ±(2.0%+0.05Ω) For ≦50mΩ & all High power、Ultra High Power。	**JIS-C-5201-1 4.25** **IEC-60115-1 4.25.1** 70±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Damp Heat with Load	±(0.5%+0.05Ω) ±(1.0%+0.05Ω) For ≦50mΩ & all High power、Ultra High Power。	**JIS-C-5201-1 4.24** **IEC-60115-1 4.24** 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Dry Heat	±(1.0%+0.05Ω) ±(2.0%+0.05Ω) For ≦50mΩ & all High power、Ultra High Power。	**JIS-C-5201-1 4.23** **IEC-60115-1 4.23.2** at +155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	**JIS-C-5201-1 4.33** **IEC-60115-1 4.33** Bending once for 60 seconds with 3mm 2010, 2512 sizes: 2mm
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 Max. Operating Voltage for 1 minute CSN05:300V CSN06/13/10:400V; CSN12:500V
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

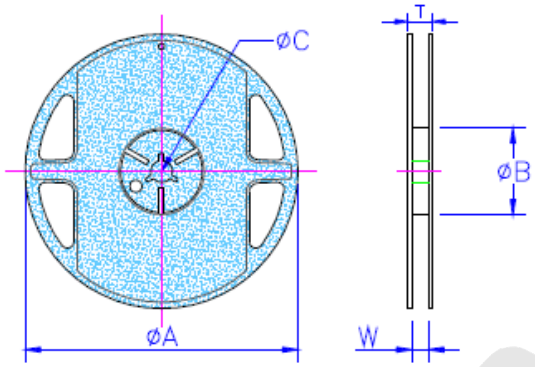
RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

■ **Storage Temperature: 15~28°C; Humidity < 80%RH**

■ **Shelf Life: 2 years from production date.**

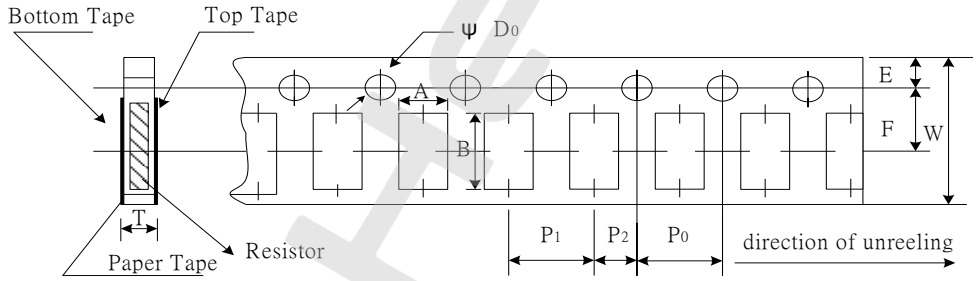
■Packaging

Packaging Quantity & Reel Specifications



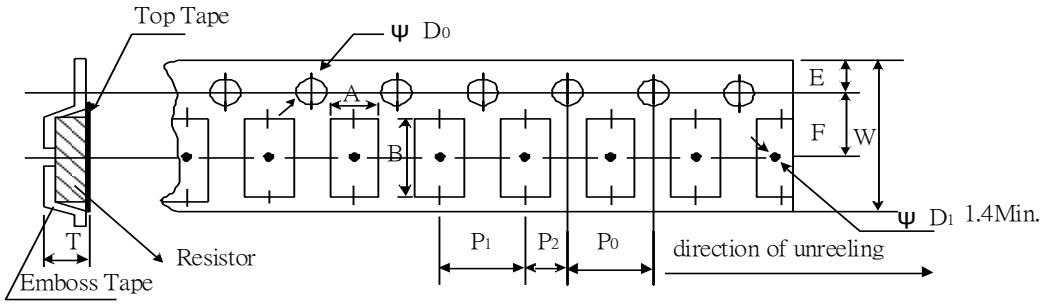
Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
CSN05 CSN06 CSN13	Paper	5K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
CSN10 CSN12	Embossed	4K	12mm	7 inch	178.5±1.5	60+1/-0	13.0±0.5	13.0±0.5	15.5±0.5
CSN12(2W)	Embossed	2K	12mm	7 inch	178.5±1.5	60+1/-0	13.0±0.5	13.0±0.5	15.5±0.5

Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P0 (mm)	P1 (mm)	P2 (mm)	ΦD0 (mm)	T (mm)
CSN05	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
CSN06	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
CSN13	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

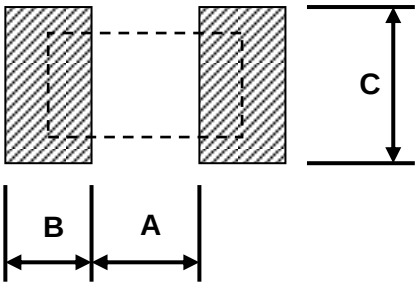
Emboss Plastic Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
CSN10	2.80±0.10	5.40±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	1.00±0.20
CSN12	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
CSN12 (2W)	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.50±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55+0.05	1.45±0.20
*CSN12 (2W) (20-45mΩ)	3.55±0.10	6.75±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	1.45±0.20

* Low TCR

■Recommend Land Pattern



Pad Layout (Except For CSN12: Ultra High Power Rating & Low TCR Series)

Type	A (mm)	B (mm)	C (mm)
CSN05	1.00	1.00	1.35±0.2
CSN06	2.00	1.15	1.70±0.2
CSN13	2.00	1.15	2.50±0.2
CSN10	3.60	1.40	2.50±0.2
CSN12	4.90	1.60	3.20±0.2
CSN12(2W)	1.00	3.55	3.20±0.2

Pad Layout (For CSN12: Ultra High Power Rating & Low TCR Series)

Type	Resistance Range	A (mm)	B (mm)	C (mm)
CSN12(2W)	46-1000mΩ	1.00	3.55	3.20±0.2
	20-45mΩ	4.90	1.60	3.20±0.2

■Marking

1%, 5% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

Resistance	10mΩ	51mΩ	75mΩ	100mΩ	549mΩ
Marking	R010	R051	R075	R100	R549

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Jun 28, 2021	-	- New product release
Version A1	Nov 15, 2021	-	- Increase the shelf life description
Version A2	Jan 03, 2022	-	- Resistance expansion / Add ultra-high power specifications / Modify reliability test specifications
Version A3	Jan 17, 2022		- Resistance expansion
Version A4	Feb 15, 2022	-	- Derating Curve changes the temperature range
Version A5	Mar 04, 2022	-	- Add Low TCR: 50ppm & 75ppm & 100ppm specification
Version A6	Jun 15, 2022	-	- Modify Soldering Condition - Modify CSN12 2W Dimensions - Add CSN12 2W Packaging and Land Pattern
Version A7	Dec 21, 2022	-	- Add CSN12 High Power Rating & Low TCR 20mR~47mR specifications