

Version:  
December 1, 2022



# (CSM) Current Sensing Metal Chip Resistors

[Web: www.token.com.tw](http://www.token.com.tw)

[Email: rfq@token.com.tw](mailto:rfq@token.com.tw)

**Token Electronics Industry Co., Ltd.**

**Taiwan:** No.137, Sec. 1, Zhongxing Rd., Wugu District,  
New Taipei City, Taiwan. 248012  
Tel: +886 2981 0109 Fax: +886 2988 7487

**China:** 17P, Nanyuan Maple Leaf Bldg., Nanshan Ave.,  
Nanshan Dist., Shenzhen, Guangdong, China. 518054  
Tel: +86 755 26055363



## ▶ Product Introduction

### New Ultra-low Ohmic Chip Resistors for Current Detection in power electronic systems.

#### Features :

- RoHs compliant and halogen free.
- High precision current sensing and voltage division.
- High power rating in small size. Excellent long term stability.
- Metal foil construction low Resistance TCR/Inductance/EMF (only for MnCu).

#### Applications :

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

Current sense resistors are a rapidly evolving technology that focuses on regulating and monitoring power from the power supply to the end equipment.

In addition, current sensing resistors based on Token (CSM) metal alloys are capable of handling higher inrush currents, have better TCR capability, and generally do not suffer from differences in thermal expansion from the PCB. Metal alloy based resistors are a cost-effective solution compared to competing technologies including Hall effect sensors, magnetoresistive sensors and current transformers.



Token (CSM) provides high performance and reliability over the entire operating temperature range, with a small enclosure size and high power rating compared to standard current sense resistors. Resistance value starts at 1mΩ and goes to 700mΩ, applications include switches and DC-DC converters, battery packs, chargers, adapters, overcurrent protection in audio applications, power management applications, LED drivers, motor control, electric Tools and power amplifiers.

Ultra low resistance metal chip resistors (CSM) are SMD devices designed for current sensing circuits in power electronics systems. The metal alloy construction ensures high reliability and high performance with a very low and stable TCR (50ppm, 75ppm, 100ppm) value. The small chip size provides high power ratings from 0.5W to 5W and operates from -55°C to +155°C temperature. Accuracy tolerances are  $\pm 0.5\%$  and  $\pm 1\%$ .

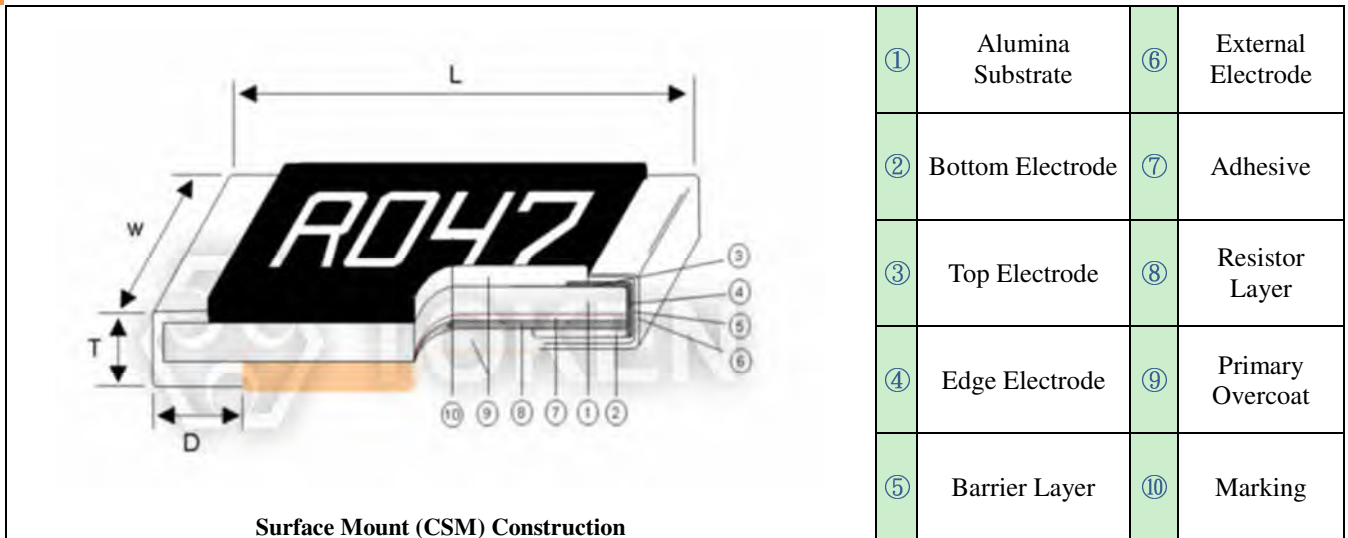
There are many options of popular industry sizes: 0603, 0805, 1206, 2010, 2512, 3921, 4527, 0508, 0612, 0815, 1225, and 2139. 5K pcs per reel in smaller sizes 0603, 0805, 1206, 0508, and 0612. 4K pcs per reel for 2010, 2512, 0815, and 1225. 2K pcs per reel for 2139.

Ultra-low ohmic chip resistors (CSM) for current detection meet RoHS standards and lead-free requirements, please link to Token official website "[Current Sense Resistors](#)". Contact us with your specific needs.



## ► Dimensions

### CSM - Construction & Dimensions



Surface Mount (CSM) Construction

Type	Power Rating at 70°C (W)	Resistance Range (mΩ)	Dimensions (Unit: mm)			
			L	W	T	D
CSM0603	0.5	5	1.60±0.25	0.80±0.25	0.65±0.20	0.50±0.20
		6~100				0.40±0.20
CSM0805	0.75	4~270	2.00±0.25	1.20±0.25	0.65±0.20	0.50±0.20
CSM1206	1	4~700	3.20±0.25	1.60±0.25	0.65±0.20	0.68±0.30
CSM2010	1.5	2~3	5.08±0.25	2.54±0.25	0.65±0.20	2.10±0.30
		4~500				0.70±0.30
CSM2512	2	2	6.40±0.30	3.20±0.30	0.75±0.20	1.65±0.30
		3				1.65±0.30
		4~560				1.05±0.30
CSM3921	4	10~50	11.10±0.30	5.10±0.30	0.65±0.30	2.36±0.30
CSM4527	5	10~50	11.60±1.0	7.10±1.0	0.65±0.30	2.70±0.40
CSM0508	1	1~100	1.35±0.20	2.10±0.20	0.65±0.20	0.43±0.20
CSM0612	1.5	1	1.60±0.25	3.20±0.25	0.65±0.20	0.50±0.30
		2~100				0.40±0.20
CSM0815	2	1~20	2.20±0.20	3.80±0.20	0.65±0.20	0.61±0.20
CSM1225	3	1~100	3.20±0.30	6.40±0.30	0.65±0.20	0.60±0.20
CSM2139	5	1~100	5.10±0.40	11.10±0.30	0.65±0.30	0.90±0.30

## Electrical Characteristics

### CSM - Electrical Characteristics

Type	Max. Rating Power (W)	Max. Rating Current (A)*	Max. Overload Current (A)	Resistance Range (mΩ)*		TCR (ppm/°C)	Material
				D (±0.5%)	F (±1%)		
CSM0603	0.5	10	15.81	-	5~9	±75	R005~R049: MnCu
		7.07	11.18	10~100		±50	R050~R100: Cu Alloy
CSM0805	0.75	13.69	21.65	-	4~9	±75	R004~R049: MnCu
		8.66	13.69	10~270		±50	R050~R270: Cu Alloy
CSM1206	1	15.81	25	-	4~9	±75	R004~R049: MnCu
		10	15.81	10~700		±50	R050~R700: Cu Alloy
CSM2010	1.5	27.38	43.30	-	2~9	±100	R002~R500: Cu Alloy
		12.24	19.36	10~500		±50	
CSM2512	2	31.62	50	-	2~9	±75	R002~R049: MnCu
		14.14	22.36	10~560		±50	R050~R560: Cu Alloy
CSM3921	4	20	31.62	10~50		±50	R010~R050: Cu Alloy
CSM4527	5	22.36	35.35	10~50		±50	R010~R050: Cu Alloy
CSM0508	1	31.62	50	-	1~9	±100	R001~R009: MnCu
		10	15.81	10~100		±50	R010~R100: Cu Alloy
CSM0612	1.5	38.72	61.23	-	1~9	±100	R001~R009: MnCu
		12.24	19.36	10~100		±50	R010~R100: Cu Alloy
CSM0815	2	44.72	70.71	-	1~9	±100	R001~R020: Cu Alloy
		14.14	22.36	10~20		±50	
CSM1225	3	54.77	86.60	-	1~9	±100	R001~R020: MnCu
		17.32	27.38	10~100		±50	R021~R100: Cu Alloy
CSM2139	5	111.80	70.71	-	1~9	±100	R001~R020: MnCu
		22.36	35.35	10~100		±50	R021~R100: Cu Alloy

\* Operating Temperature -55°C ~ +155°C



## ► Environmental Characteristics

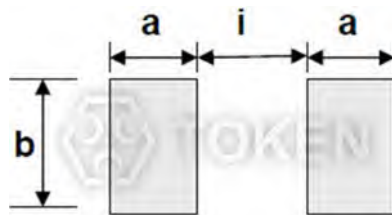
### CSM - Environmental Characteristics

Item	Specification	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	±(1.0% + 0.5mΩ)	JIS-C-5201-1 4.13 IEC 60115-1 4.13 RCWV*2.5 or Max Overloading Voltage 5sec.
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	±(1.0% + 0.5mΩ)	JIS-C-5201-1 4.18 IEC-60115-1 4.18 260±5°C for 10 seconds.
Temperature Cycling	±(1.0% + 0.5mΩ)	JIS-C-5201-1 4.19 IEC-60115-1 4.19 -55°C to +155°C, 100 cycles.
Dry Heat	±(1.0% + 0.5mΩ)	JIS-C-5201-1 4.23 IEC-60115-1 4.23.2 At +155°C for 1000 Hrs.
Damp Heat with Load	±(2.0% + 0.5mΩ)	JIS-C-5201-1 4.24 IEC-60115-1 4.24 40±2°C, 90~95% R.H., load with rated current for 1000 Hrs. with 1.5 Hrs. "ON" and 0.5 Hrs. "OFF".
Endurance	±(2.0% + 0.5mΩ)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 70±2°C, load with rated current for 1000 Hrs. with 1.5 Hrs. "ON" and 0.5 Hrs. "OFF".
Bending Strength	±(1.0% + 0.5mΩ)	JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending once for 5 seconds with 2mm .

## Derating Curve

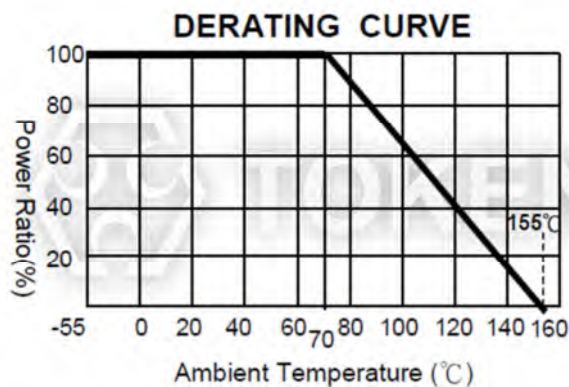
### CSM - Recommend Land Pattern

Type	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions (mm)		
			a	b	i
CSM0603	0.5	5	1.35	0.92	0.50
		6~100	1.30	0.92	0.60
CSM0805	0.75	4~270	1.40	1.44	0.80
CSM1206	1	4~700	1.80	1.84	1.20
CSM2010	1.5	2~3	3.65	2.88	0.70
		4~500	2.65	2.88	2.70
CSM2512	2	2~3	3.85	3.57	1.60
		4~560	3.10	3.57	3.10
CSM3921	4	10~50	4.50	5.75	5.00
CSM4527	5	10~50	4.65	8.05	5.20
CSM0508	1	1~100	1.10	2.30	0.60
CSM0612	1.5	1	1.35	3.68	0.50
		2~100	1.30	3.68	0.60
CSM0815	2	1~20	2.40	4.26	0.70
CSM1225	3	1~100	2.35	7.25	1.40
CSM2139	5	1~100	2.80	12.65	2.40



(CSM) Recommend Land Pattern

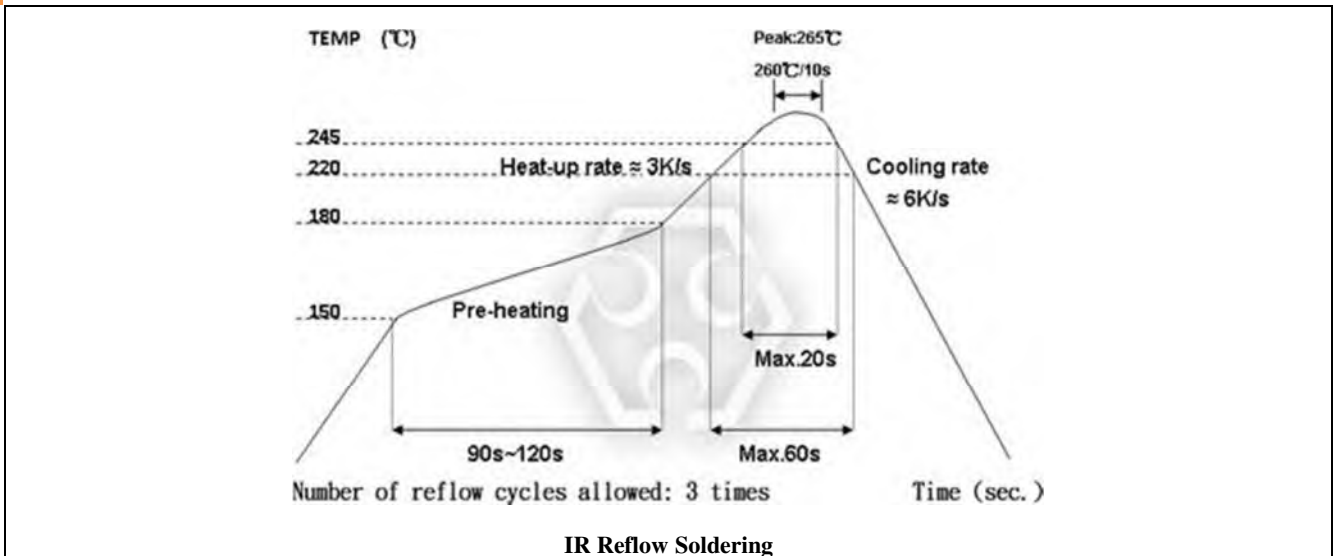
### CSM - Derating Curve



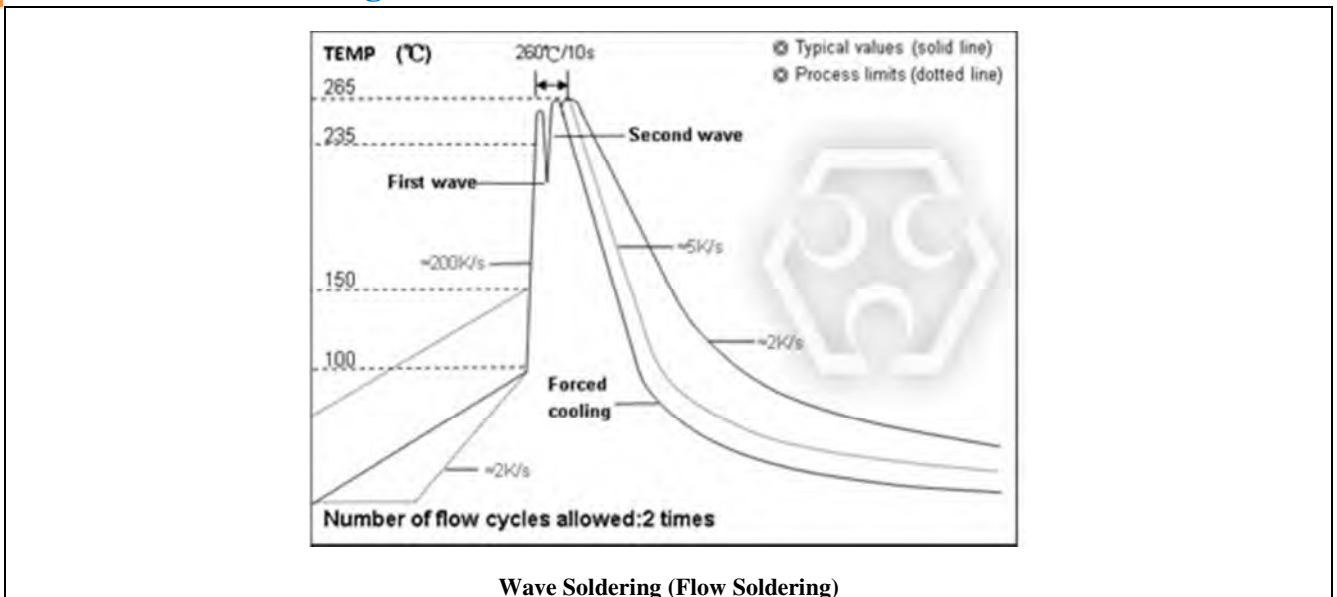
Rated power VS Ambient temperature (Power Derating Curve)

## Soldering

### CSM - Reflow Soldering



### CSM - Wave Soldering



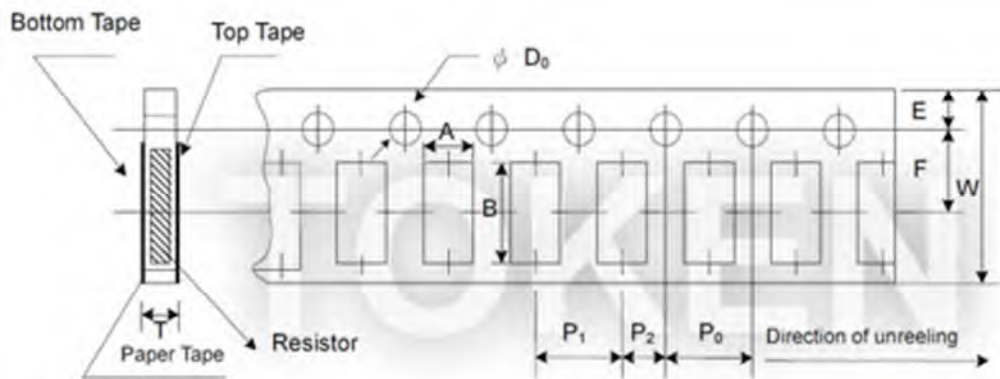
**Remark :**

- Time of IR reflow soldering at maximum temperature point 260°C :10s.
- Time of wave soldering at maximum temperature point 260°C :10s.
- Time of soldering iron at maximum temperature point 410°C :5s.

## ► Packaging

### CSM - Paper Tape Specifications

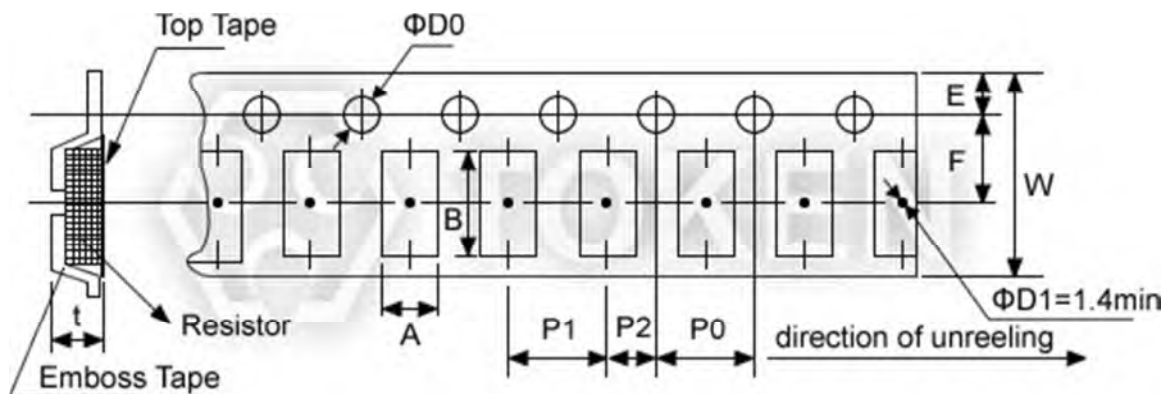
Type	A(mm)	B(mm)	W(mm)	E(mm)	F(mm)	P0(mm)	P1(mm)	P2(mm)	ΦD0(mm)	T(mm)
CSM0603	1.18±0.20	1.98±0.20	8.00±0.30	1.75±0.10	3.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.75±0.20
CSM0805	1.68±0.20	2.38±0.20	8.00±0.30	1.75±0.10	3.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.87±0.20
CSM0508	1.68±0.20	2.38±0.20	8.00±0.30	1.75±0.10	3.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.87±0.20
CSM1206	2.05±0.20	3.65±0.20	8.00±0.30	1.75±0.10	3.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.87±0.20
CSM0612	2.05±0.20	3.65±0.20	8.00±0.30	1.75±0.10	3.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.87±0.20



Paper Tape Specifications

### Embossed Plastic Tape Specifications

Type	A(mm)	B(mm)	W(mm)	E(mm)	F(mm)	P0(mm)	P1(mm)	P2(mm)	ΦD0(mm)	T(mm)
CSM1508	2.40±0.20	4.10±0.20	12.0±0.30	1.75±0.10	5.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.75±0.20
CSM2010	2.85±0.20	5.45±0.20	12.0±0.30	1.75±0.10	5.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	0.80±0.20
CSM2512	3.40±0.20	6.75±0.20	12.0±0.30	1.75±0.10	5.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	1.00±0.20
CSM1225	3.40±0.20	6.75±0.20	12.0±0.30	1.75±0.10	5.50±0.10	4.0±0.10	4.00±0.10	2.00±0.10	1.50+0.1,-0	1.00±0.20
CSM3921	5.50±0.20	11.5±0.20	24.0±0.30	1.75±0.10	11.5±0.10	4.0±0.10	8.00±0.10	2.00±0.10	1.50+0.1,-0	0.90±0.20
CSM2139	5.50±0.20	11.5±0.20	24.0±0.30	1.75±0.10	11.5±0.10	4.0±0.10	8.00±0.10	2.00±0.10	1.50+0.1,-0	0.90±0.20
CSM4527	7.50±0.20	12.0±0.20	24.0±0.30	1.75±0.10	11.5±0.10	4.0±0.10	12.0±0.10	2.00±0.10	1.50+0.1,-0	0.90±0.20

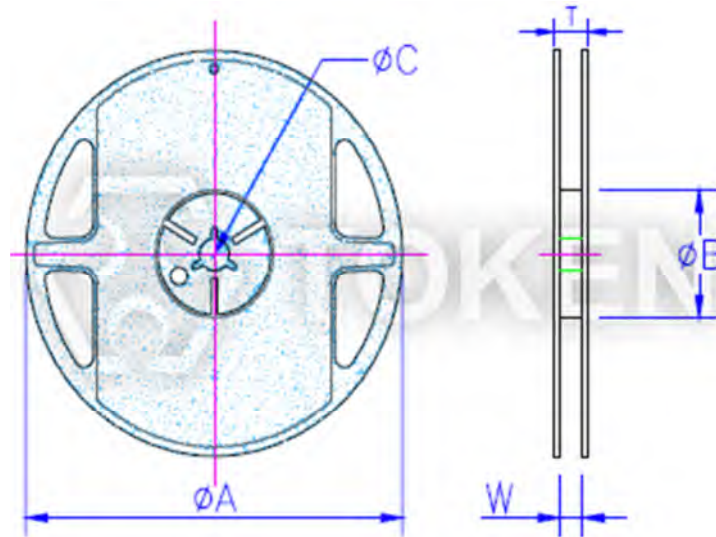


Paper Tape Specifications



## Reel Specifications and Packaging Quantity

Type	Packaging Quantity	Tape width	Reel Diameter	ΦA(mm)	ΦB(mm)	ΦC(mm)	W(mm)	T(mm)
CSM0603	5000Pcs	8mm	7inch	178±5.0	60±2.0	13.0±1.0	9.0±1.0	11.4±1.0
CSM0805	5000Pcs	8mm	7inch	178±5.0	60±2.0	13.0±1.0	9.0±1.0	11.4±1.0
CSM1206	5000Pcs	8mm	7inch	178±5.0	60±2.0	13.0±1.0	9.0±1.0	11.4±1.0
CSM2010	4000Pcs	12mm	7inch	178±5.0	60±2.0	13.0±1.0	13.0±1.0	15.5±1.0
CSM2512	4000Pcs	12mm	7inch	178±5.0	60±2.0	13.0±1.0	13.0±1.0	15.5±1.0
CSM3921	2000Pcs	24mm	7inch	178±5.0	60±2.0	13.0±1.0	24.5±1.0	26.5±1.0
CSM4527	1000Pcs	24mm	7inch	178±5.0	60±2.0	13.0±1.0	24.5±1.0	26.5±1.0
CSM0508	5000Pcs	8mm	7inch	178±5.0	60±2.0	13.0±1.0	9.0±1.0	11.4±1.0
CSM0612	5000Pcs	8mm	7inch	178±5.0	60±2.0	13.0±1.0	9.0±1.0	11.4±1.0
CSM0815	4000Pcs	12mm	7inch	178±5.0	60±2.0	13.0±1.0	13.0±1.0	15.5±1.0
CSM1225	4000Pcs	12mm	7inch	178±5.0	60±2.0	13.0±1.0	13.0±1.0	15.5±1.0
CSM2139	2000Pcs	24mm	7inch	178±5.0	60±2.0	13.0±1.0	24.5±1.0	26.5±1.0



Reel Dimensions

## Order Codes

### Order Codes (CSM)

CSM	0603		F	TR		D	U	R015		M		
Product Type	Dimensions (L×W)(mm)		Resistance Tolerance (%)	Package		TCR (PPM/°C)	Power Rating(W)		Resistance (Ω)		Marking	
CSM	0603	1.60x0.80	D ±0.5%	TR	Taping Reel	D ±50 PPM/°C	W	1/8W	R015	0.015Ω	M	MnCu
	0805	2.00x1.20	F ±1%			W ±75 PPM/°C	V	1/4W	R050	0.05Ω	C	Cu Alloy
	1206	3.20x1.60				E ±100 PPM/°C	O	1/3W	R010	0.01Ω		
	2010	5.08x2.54					U	1/2W				
	2512	6.40x3.20					Q	3/4W				
	3921	11.10x5.10					T	1W				
	4527	11.60x7.10					A	1.5W				
	0508	1.35x2.10					S	2W				
	0612	1.60x3.20					R	3W				
	0815	2.20x3.80					4	4W				
	1225	3.20x6.40					5	5W				
	2139	5.10x11.10										



## ► General Information

### Applications of Current Detecting Components

Token's TCS and CS Series unique form factor provides automotive designers with several advantages. Both TCS and CS Series are ideal for applications involving window lift motors, fuel pump systems, seat belt pretensioners, and pulsewidth modulator feedback.

The wider resistive element and lower resistance enables higher current to pass through the device. Token's LRC ultra low ohmic metal strip chip series provides the inherent ability to flex slightly and offers stress relief during extreme temperature cycling on typical or metal substrates. This LRC series is suitable for switch power supply applications (DC-DC Converter, Charger, Adaptor) and power management of monitor.

The open air design of bare element resistor LRA and LRB Series provide a far cooler operation by allowing more air flow under the resistive element to keep excess heat from being transmitted to the PC board. They are suitable for high power AC/DC detection of power supply circuit.

Token axial moulded BWL series provides power rating up to 10 watts and lower resistance 0.005Ω, is ideal for all types of current sensing applications including switching and linear power supplies, instruments and power amplifiers..

### Your Current Options - Token Current Sense

As the world becomes more and more technology-driven, the uses for current sensing components will continue to increase. The need for even lower resistance value ranges is already becoming evident, as is the need for these resistors to handle more power. The industry-wide trend is the emergence of smaller and smaller products.

Token Electronics offers a wide variety of current sensing products from the industry to military standards, such as current sense in Thin-Film / Thick-Film Technology, Bare Element Resistors, and Open Air Shunts. This enables Token to present an astounding number of possible solutions for any circuit design needs.

### Cross reference - Current-Sensing Chips

Token	Yageo	Vishay	Rohm	KOA	Cyntec	TT/IRC	Susumu	Features
CS	RL/PT	D..LR/ CRCW,RCWE	UCR	SR73/ UR73	RLT	LRC, LRF, LVC	RLT	Thick Film
LRC, LRP, LRM, LRE, LREA, CSM	PR/PE	WSL/WSLP	PMR/PML	TLR	RLT	ULR, LVC	KRL, RL	Metal Alloy
CS02	PT0402	RCWE0402	UCR01	SR731E	RLT0510	LVC0402	RLT0510	Thick Film
CSM, LRE, LREA	PE0603	WSL0603	PMR03	-	RL0816	-	-	Metal Foil
CSM, LRE, LREA	PE0805	WSL0805	PMR10	-	RL1220	-	-	Metal Foil
CSM, LRE, LREA	PE4527	WSR2/3/5	-	SL2/ SLN2	-	-	-	Metal Alloy