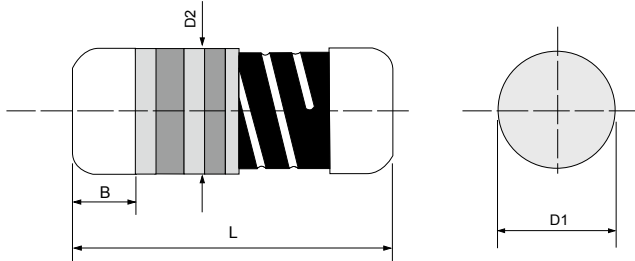


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CSM



## Specifications Per

• IEC 60115-1

## Features

- Low ohmic value
- High power handling with superior reliability and stability
- Conformal multi-layer coating against humidity
- SMD enabled structure with excellent solderability
- Excellent in heat dissipation than chip resistor (Especially suitable for air cooling)
- Stronger mechanical structure to seismic vibration and thermal shock
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency

## DIMENSIONS

Type	Body Length (L, mm)	Cap Diameter (D1, mm)	Body Diameter (D2, mm)	Soldering Spot (B, mm)	Net Weight Per 1000 pcs
CSM204	3.52 ± 0.15	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.	17 grams
CSM101	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.	66 grams
CSM201	8.50 ± 0.50	3.00 ± 0.2	D1+0.05/ -0.35	1.3 Min.	186 grams
CSM301	10.5 ± 0.50	4.00 ± 0.5	D1+0.05/ -0.45	1.6 Min.	446 grams

## GENERAL SPECIFICATIONS

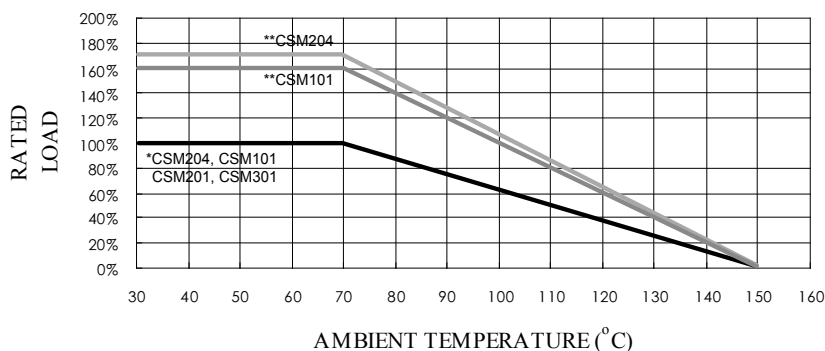
Type	Power Rating (at 70°C)	Up Grade Power Rating*	Maximum Working Voltage**	Maximum Overload Voltage***	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
CSM204	1/2W	0.8W	$\sqrt{P \times R}$	$2.5 \times \sqrt{P \times R}$	10mΩ	510mΩ	±1%~5%	E-24 / E-96
CSM101	1W	1.6W	$\sqrt{P \times R}$	$2.5 \times \sqrt{P \times R}$	10mΩ	510mΩ	±1%~5%	E-24 / E-96
CSM201	2W	-	$\sqrt{P \times R}$	$2.5 \times \sqrt{P \times R}$	10mΩ	510mΩ	±1%~5%	E-24 / E-96
CSM301	3W	-	$\sqrt{P \times R}$	$2.5 \times \sqrt{P \times R}$	10mΩ	510mΩ	±1%~5%	E-24 / E-96

\*Wind Speed : 1m/s Please refer to the Power Derating Curve.

\*\* Rated Continuous Maximum Working Voltage (RCWV) should be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Values}}$

\*\*\* Short-time Overload (STOL) test should be determined from  $STOL = 2.5 \times RCWV$

## POWER DERATING CURVE



\*At 70°C

\*\* Upgrade Power Rating (Wind Speed : 1m/s)

## ■ TECHNICAL SUMMARY

Characteristics	Limits
Dielectric Withstanding Voltage, VAC or VDC	CSM204: 200 CSM101: 500 CSM201, CSM301: 700
Temperature Coefficient, PPM / °C	±50, ±100, ±200, ±300, ±600
Operating Temperature Range, °C	-55 ~ +150
Insulation Resistance, MΩ	>10 <sup>4</sup>
Tin Whisker (JESD201 Temperature Cycling & High Temp. /Humidity Storage), μm	<5
Failure Rate in Time, pcs / 10 <sup>9</sup> device hours	<1.5

\* Not applicable to all resistance values. Please check with us regarding the PPM of specific resistance value(s).

## ■ PART NUMBER

Example: CSM201JR510TKZTR2K5

CSM201	J	R510	TKZ	TR2K5
Type	Tolerance*	Resistance	TCR	Packaging
	F (1%) G (2%) J (5%)	0.51Ω <b>4-character code</b> containing - 3 significant digits 1 letter multiplier  <u>OHM MULTIPLIER</u> R = 1 K = 10 <sup>3</sup> M = 10 <sup>6</sup> G = 10 <sup>9</sup>	<b>3-character code</b>  TKZ = Default Product Temperature Coefficient.  Information of typical product temperature coefficient can be found in the Technical Summary section of the datasheet.**	<b>5-character code</b> TR = Tape Reel (pieces per reel) <u>CSM204</u> 3K0 = 3,000 6K0 = 6,000*** 10K = 10,000*** <u>CSM101</u> 2K0 = 2,000 6K0 = 6,000*** 10K = 10,000*** <u>CSM201</u> 2K5 = 2,500 <u>CSM301</u> 2K0 = 2,000

\* Listed values may not be applicable to all resistance values. Please check with us before placing order.

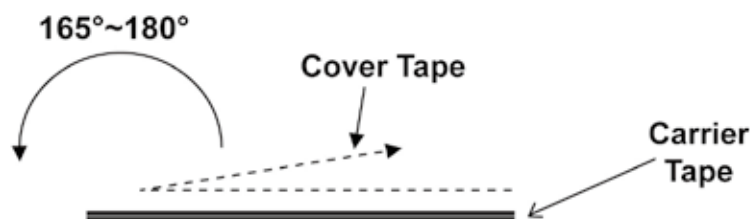
\*\* For the availabilities of non-default temperature coefficient, please check with us. Reference for TCR letter codes can be found in section (4) of Part Number Construction in the Appendices.

\*\*\* upon request

## ■ COVER TAPE PEELING SPECIFICATION

Recommended peeling force:

CSM204, CSM101: 50±5gf    CSM201, CSM301: 70±10gf

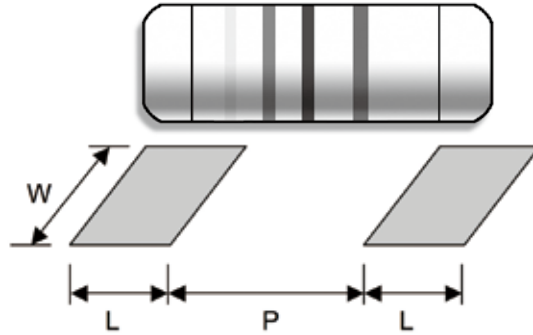


### ■ PERFORMANCE SPECIFICATIONS

Characteristics	Test Conditions	Limits
Short Time Overload	<b>IEC 60115-1 4.13</b> 2 seconds 2.5x rated voltage (not over max. overload voltage)	±1%, 2%: ±0.75% ±5%: ±2%
Load Life	<b>IEC 60115-1 4.25.1</b> Rated load (not over max. working voltage) 1,000 hours with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C	±3%
Load Life In Humidity	<b>IEC 60115-1 4.24</b> 56 days rated load (not over max. working voltage) at 40°C and (93±3)% relative humidity	±3%
Periodic Electric Overload	<b>IEC 60115-1 4.39</b> 3.9x rated voltage (not over max. overload voltage) with 0.1s ON, 2.5s OFF for 1,000 cycles	±5%
Resistance To Soldering Heat	<b>IEC 60115-1 4.18.2</b> Dip the resistor into a solder bath measured (260±5)°C and hold it for 10±1 seconds	±1%
Solderability	<b>IEC 60115-1 4.17.2</b> Solder area covered after (235±3)°C/(2±0.2) seconds with flux applied	95% min.coverage
Thermal Endurance	<b>IEC 60115-1 4.25.3</b> 1000 hours at 150°C without load	±1%
Thermal Shock	<b>IEC 60115-1 4.19</b> -55°C 30minutes, +150°C 30minutes, 5 cycles	±2%
Single pulse high voltage overload	<b>IEC 60115-1 4.27</b> 10 pulses of 10/700µs at 10x rated voltage (not over max. overload voltage) with interval of 60 sec.	± 2%
Electrostatic discharge (Human body model)	<b>IEC 60115-1 4.38</b> 3 positive & 3 negative discharges with 2KV for CSM204 or 4KV for CSM52, CSM101, CSM201, CSM301 ( For continuous surge application please see Surge Performance paragraph )	± 5%
Climatic test	<b>IEC 60115-1 4.23</b> 4.23.2 - dry heat: 16 hours 150°C 4.23.3 - damp heat: 24 hours 55°C with 95% relative humidity 4.23.4 - cold: 2 hours -55°C 4.23.5 - negative air pressure: 2 hour 8.5KPa at (25±10)°C 4.23.6 - damp heat cyclic: 5 days 55°C with 95% relative humidity 4.23.7 - DC load: rated voltage at -55°C and 150°C each 1 Min.	± 2%
Vibration	<b>IEC 60115-1 4.22</b> Six hours in each parallel and axial direction with a simple harmonic motion having an amplitude of 1.52mm and 10 to 2,000 Hz.	±1%
Bending test	<b>IEC 60115-1 4.33</b> Pressing depth 2mm, 3 times	± 0.5%
Flammability	<b>IEC 60115-1 4.35</b> Needle flame test 10s	No burning after 30s

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■ SUGGESTED PAD LAYOUT



Type	Soldering Mode	Pad Length (L, mm, Min.)	Pad Spacing (P, mm)	Pad Width (W, mm, Min.)
CSM204	Reflow	1.3	1.6 ± 0.1	1.6
	Wave	1.5	1.5 ± 0.1	1.8
CSM101	Reflow	2.0	3.0 ± 0.1	3.0
	Wave	2.5	3.0 ± 0.1	3.0
CSM201	Reflow	3.0	4.9 ± 0.3	3.7
	Wave	3.5	4.8 ± 0.3	4.0
CSM301	Reflow	4.0	6.2 ± 0.4	5.0
	Wave	4.5	6.0 ± 0.4	5.0

For better heat dissipation / lower heat resistance, increase W & L.

■ SUGGESTED PAD LAYOUT FOR KELVIN (4-WIRE) SENSING

