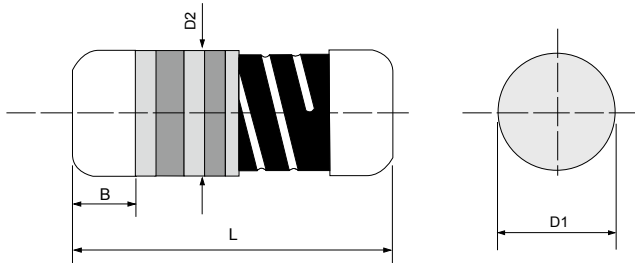


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Specifications Per

• 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
- HeatSinker™ technology for better heat dissipation
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency

DIMENSIONS

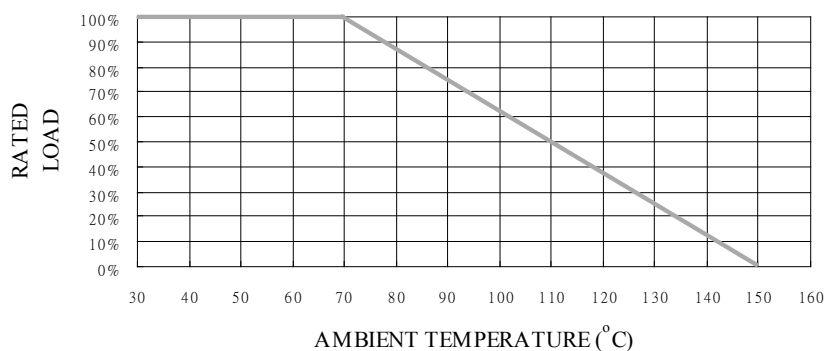
| Type | Body Length (L, mm) | Cap Diameter (D1, mm) | Body Diameter (D2, mm) | Soldering Spot (B, mm) | Net Weight Per 1000 pcs |
|--------|---------------------|-----------------------|------------------------|------------------------|-------------------------|
| CSM204 | 3.52 ± 0.15 | 1.35 ± 0.1 | D1+0.02/ -0.15 | 0.6 Min. | 17 grams |
| CSM52 | 5.90 ± 0.20 | 2.20 ± 0.1 | D1+0.02/ -0.2 | 1.0 Min. | 66 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) | Maximum Working Voltage | Maximum Overload Voltage | Minimum Resistance | Maximum Resistance | Resistance Tolerance | Available Resistance Values |
|--------|------------------------|-------------------------|--------------------------|--------------------|--------------------|----------------------|-----------------------------|
| CSM204 | 1/4W | 200V | 400V | 10mΩ | 510mΩ | ±1%~5% | E-24 / E-96 |
| CSM52 | 1/2W | 250V | 500V | 10mΩ | 510mΩ | ±1%~5% | E-24 / E-96 |
| CSM101 | 1W | 250V | 500V | 10mΩ | 510mΩ | ±1%~5% | E-24 / E-96 |
| CSM201 | 2W | 300V | 600V | 10mΩ | 510mΩ | ±1%~5% | E-24 / E-96 |
| CSM301 | 3W | 350V | 700V | 10mΩ | 510mΩ | ±1%~5% | E-24 / E-96 |

Special sizes, values, and specifications not listed available on special order

POWER DERATING CURVE



TECHNICAL SUMMARY

| Characteristics | Limits |
|--|--|
| Dielectric Withstanding Voltage, VAC or VDC | CSM204: 200 CSM52, CSM101: 500 CSM201, CSM301: 700 |
| Temperature Coefficient, PPM / °C | ±50, ±100, ±200, ±300, ±600 |
| Operating Temperature Range, °C | -55 ~ +150 |
| Insulation Resistance, MΩ | >10 ⁴ |
| Tin Whisker (JESD201 Temperature Cycling & High Temp. /Humidity Storage), μm | <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 4-character code containing - 3 significant digits 1 letter multiplier <u>OHM MULTIPLIER</u> R = 1 K = 10 ³ M = 10 ⁶ G = 10 ⁹ | 3-character code TKZ = Default Product Temperature Coefficient. Information of typical product temperature coefficient can be found in the Technical Summary section of the datasheet.** | 5-character code TR = Tape Reel (pieces per reel) <u>CSM204</u> 3K0 = 3,000 6K0 = 6,000*** 10K = 10,000*** <u>CSM52/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.

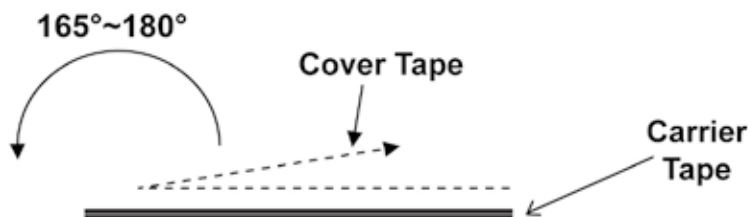
** For the availabilities of non-default temperature coefficient, please check with us. Reference for TCR letter codes can be found in section (4) of Part Number Construction in the Appendices.

*** upon request

COVER TAPE PEELING SPECIFICATION

Recommended peeling force:

CSM204, CSM52, CSM101: 50±5gf CSM201, CSM301: 70±10gf



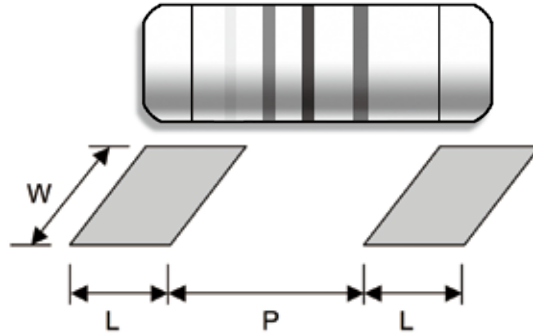
■ PERFORMANCE SPECIFICATIONS

| Characteristics | Test Conditions | Limits |
|--|---|-----------------------------|
| Short Time Overload | IEC 60115-1 4.13 2 seconds 2.5x rated voltage (not over max. overload voltage) | ±1%, 2%: ±0.75% ±5%: ±2% |
| Load Life 1,000 hours | IEC 60115-1 4.25.1 Rated load (not over max. working voltage) with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C | ±3% |
| Load Life In Humidity | IEC 60115-1 4.24 56 days rated load (not over max. working voltage) at 40°C and (93±3)% relative humidity | ±3% |
| Periodic Electric Overload | IEC 60115-1 4.39 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 | IEC 60115-1 4.18.2 Dip the resistor into a solder bath measured (260±5)°C and hold it for 10±1 seconds | ±1% |
| Solderability | IEC 60115-1 4.17.2 Solder area covered after (235±3)°C/(2±0.2) seconds with flux applied | 95% min |
| Thermal Endurance | IEC 60115-1 4.25.3 1000 hours at 150°C without load | ±1% |
| Thermal Shock | IEC 60115-1 4.19 -55°C 30minutes, +150°C 30minutes, 5 cycles | ±2% |
| Single pulse high voltage overload | IEC 60115-1 4.27 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) | IEC 60115-1 4.38 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 | IEC 60115-1 4.23 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 | IEC 60115-1 4.22 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 | IEC 60115-1 4.33 Pressing depth 2mm, 3 times | ± 0.5% |
| Flammability | IEC 60115-1 4.35 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 |
| CSM52 | Reflow | 2.0 | 3.0 ± 0.1 | 3.0 |
| | Wave | 2.5 | 3.0 ± 0.1 | 3.0 |
| 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

