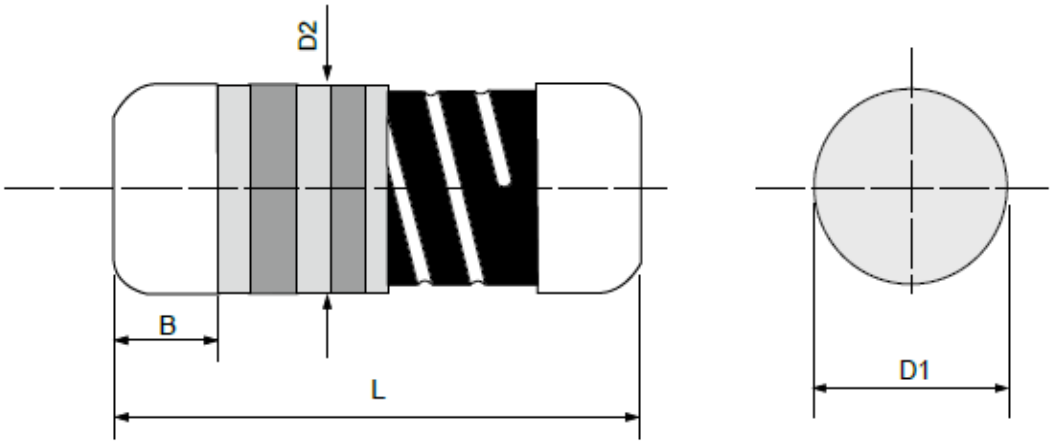
# CM - Carbon Film MELF Resistor

**Specifications Per**

- IEC 60115-1
- MIL-R-226848

**Features**

- SMD enabled structure
- Excellent solderability termination
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency




## ■ DIMENSION

| Type | Body Length (L , mm) | Cap Diameter (D1 , mm) | Body Diameter (D2 , mm) | Soldering Spot (B, mm) | Net Weight Per 1,000 pcs |
|---|---|---|---|---|---|
| CM16 | 3.52 ± 0.15 | 1.35 ± 0.1 | D1 + 0.02/ -0.15 | 0.6 Min. | 17 grams |
| CM204 | 3.52 ± 0.15 | 1.35 ± 0.1 | D1 + 0.02/ -0.15 | 0.6 Min. | 17 grams |
| CM207 | 5.90 ± 0.20 | 2.20 ± 0.1 | D1 + 0.02/ -0.2 | 1.0 Min. | 66 grams |
| CM52 | 5.90 ± 0.20 | 2.20 ± 0.1 | D1 + 0.02/ -0.2 | 1.0 Min. | 66 grams |
| CM101 | 5.90 ± 0.20 | 2.20 ± 0.1 | D1 + 0.02/ -0.2 | 1.0 Min. | 66 grams |
| CM201 | 8.50 ± 0.50 | 3.00 ± 0.2 | D1 + 0.05/ -0.35 | 1.3 Min. | 186 grams |



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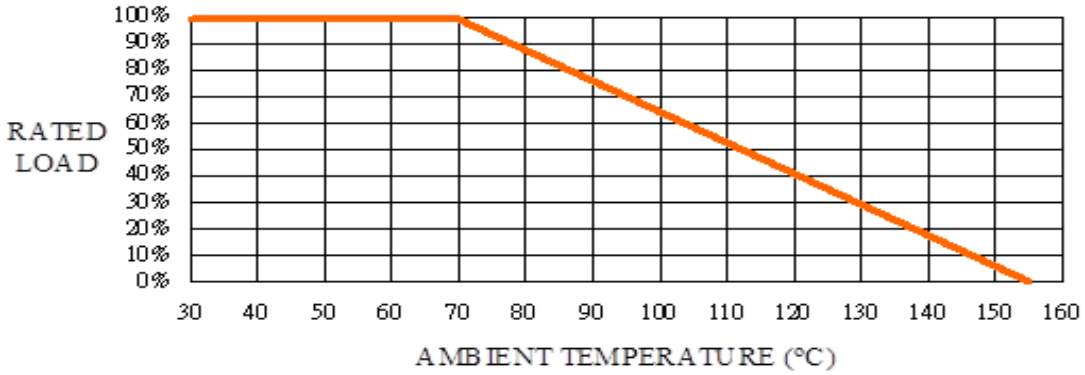
## ■ GENERAL SPECIFICATIONS

| Type | Power Rating ( at 70℃ ) | Maximum Working Voltage | Maximum Overload Voltage | Minimum Resistance | Maximum Resistance | Resistance Tolerance | Available Resistance Value |
|---|---|---|---|---|---|---|---|
| CM16 | 1/6W | 200V | 300V | 0.51Ω | 1MΩ | ±5% | E-24 |
| CM204 | 1/4W | 200V | 300V | 0.51Ω | 1MΩ | ±5% | E-24 |
| CM207 | 1/3W | 200V | 300V | 0.51Ω | 1MΩ | ±5% | E-24 |
| CM52 | 1/2W | 350V | 600V | 0.51Ω | 10MΩ | ±5% | E-24 |
| CM101 | 1W | 350V | 600V | 0.51Ω | 10MΩ | ±5% | E-24 |
| CM201 | 2W | 350V | 700V | 0.51Ω | 10MΩ | ±5% | E-24 |

***For zero ohm jumper, please see ZMM series. For 10m~510mΩ please see CMS series.***

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

## ■ POWER DERATING CURVE




## ■ TECHNICAL SUMMARY

| Characteristics | Limits | | | |
|---|---|---|---|---|
| Dielectric Withstanding Voltage, VAC or DC | CM16 | | 200 | |
| | CM204 | | 200 | |
| | CM207 | | 500 | |
| | CM52 | | 500 | |
| | CM101 | | 500 | |
| | CM201 | | 700 | |
| Temperature Coefficient, PPM / ℃ | **CM6 & CM204** | | **CM207/ CM52/ CM101/ CM201** | |
| | 1Ω~33K | ±300 | 1Ω~33K | ±300 |
| | 33K~330K | -500 | 33K~330K | -500 |
| | 330K~470K | -700 | 330K~470K | -700 |
| | 470K~910K | -1000 | 470K~1M | -1000 |
| | Over 910K | -1500 | Over 1M | -1500 |
| Operating Temperature Range, ℃ | -55 ~ +155 | | | |
| Insulation Resistance, MΩ | $>10^4$ | | | |
| Tin Whisker (JESD201 Temperature Cycling & High Temp. /Humidity Storage), μm | <5 | | | |



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## ■ PART NUMBER

Example：CM204J10K0TKZTR3K0

| CM204 | J | 10K0 | TKZ | TR3K0 |
|---|---|---|---|---|
| Type | Tolerance | Resistance | TC | Packaging |
| | J (5%) | 10KΩ<br>**4-character code**<br>containing -<br>3 significant digits<br>1 letter multiplier<br><br>OHM MULTIPLIER<br>R = 1<br>K = $10^3$<br>M = $10^6$<br>G = $10^9$ | **3-character code**<br><br>TKZ = Default Product Temperature Coefficient.<br><br>Information of typical product temperature coefficient can be found in the Technical Summary section of datasheet. | **5-character code**<br><br>TR = Tape Reel<br><br>(pieces per reel)<br>CM16/CM204<br>3K0 = 3,000<br>6K0 = 6,000<br>10K = 10,000<br><br>CM207/CM52<br>CM101<br>2K0 = 2,000<br>6K0 = 6,000<br>10K = 10,000<br><br>CM201<br>2K5 = 2,500 |

## ■ PERFORMANCE SPECIFICATIONS

| Tests Characteristics | Test Conditions | Limits |
|---|---|---|
| Short Time Overload | **IEC 60115-1 4.13**<br>5 seconds 2.5x rated voltage (not over max. overload voltage) | ± 1% |
| Load Life In Humidity | **IEC 60115-1 4.24**<br>56 days rated load (not over max. working voltage) at (40±2)℃ and (93±3)% relative humidity | ± 5% |
| Load Life 1,000 hours | **IEC 60115-1 4.25.1**<br>Rated load (not over max. working voltage) )with 1.5 hours ON, 0.5 hours OFF, at (70±2)℃ | ± 3% |
| Periodic Electric Overload | **IEC 60115-1 4.37**<br>3.9x rated voltage (not over max. overload voltage) with 0.1s ON, 2.5s OFF for 1,000 cycles | ± 2% |
| Resistance To Soldering Heat | **IEC 60115-1 4.18.2**<br>Dip the resistor into a solder bath having a temperature of (260±5)℃ and hold it for a 10±1 seconds | ± 1% |
| Solderability | **IEC 60115-1 4.17.2**<br>Solder area covered after (235±3)℃/ (2±0.2) seconds with flux applied | 95% Min. |
| Vibration | **IEC 60115-1 4.22**<br>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% |
| Thermal Endurance | **IEC 60115-1 4.25.3**<br>1,000 hours at 155℃ without load | ± 1% |
| Thermal Shock | **IEC 60115-1 4.19**<br>-55℃ 30minutes, +155℃ 30 minutes, 5 cycles | ± 1% |
| Single pulse high voltage overload | **IEC 60115-1 4.27**<br>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**<br>3 positive & 3 negative discharges with 2KV for CM16, CM204 or 4KV for CM207, CM52, CM101, CM201 (For continuo us surge application please see Surge Performance paragraph) | ± 5% |



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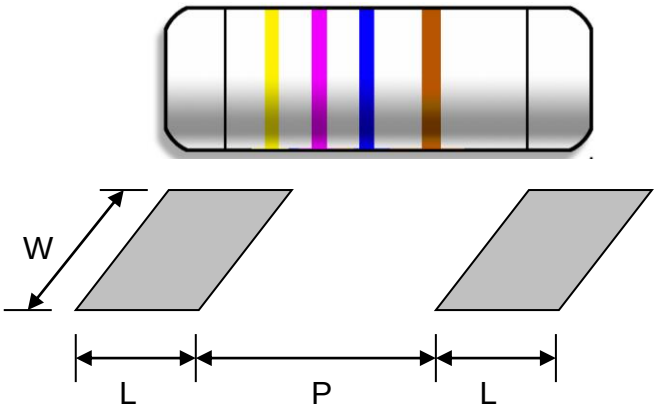
| | | |
|---|---|---|
| Climatic test | **IEC 60115-1 4.23**<br>**4.23.2 - dry heat:** 16 hours 155℃<br>**4.23.3 - damp heat:** 24 hours 55℃ with 95% relative humidity<br>**4.23.4 - cold:** 2 hours -55℃<br>**4.23.5 - negative air pressure:** 2 hour 8.5KPa at (25±10)℃<br>**4.23.6 - damp heat cyclic:** 5 days 55℃ with 95% relative humidity<br>**4.23.7 - DC load:** rated voltage at -55℃ and 155℃ each **1 Min.** | ± 2% |
| Bending test | **IEC 60115-1 4.33**<br>Pressing depth 2mm, 3 times | ± 0.25% |
| Flammability | **IEC 60115-1 4.35**<br>Needle flame test 10s | No burning after 30s |

## ■ SUGGESTED PAD LAYOUT




| Type | Soldering mode | Pad Length (L, mm, min.) | Pad Spacing (P, mm) | Pad Width (W, mm, min.) |
|---|---|---|---|---|
| CM16 | Reflow | 1.3 | 1.6 ± 0.1 | 1.6 |
| | Wave | 1.5 | 1.5 ± 0.1 | 1.8 |
| CM204 | Reflow | 1.3 | 1.6 ± 0.1 | 1.6 |
| | Wave | 1.5 | 1.5 ± 0.1 | 1.8 |
| CM207 | Reflow | 2.0 | 3.0 ± 0.1 | 3.0 |
| | Wave | 2.5 | 3.0 ± 0.1 | 3.0 |
| CM52 | Reflow | 2.0 | 3.0 ± 0.1 | 3.0 |
| | Wave | 2.5 | 3.0 ± 0.1 | 3.0 |
| CM101 | Reflow | 2.0 | 3.0 ± 0.1 | 3.0 |
| | Wave | 2.5 | 3.0 ± 0.1 | 3.0 |
| CM201 | Reflow | 3.0 | 4.9 ± 0.3 | 3.7 |
| | Wave | 3.5 | 4.8 ± 0.3 | 4.0 |

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



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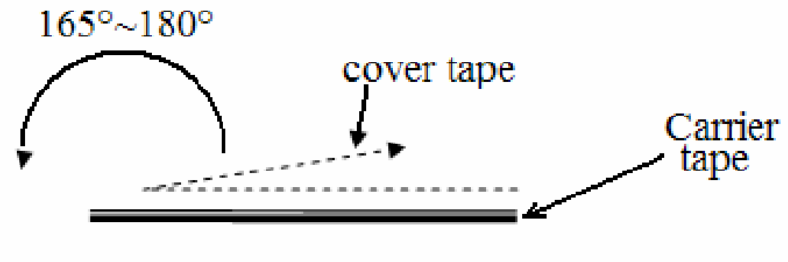
## ■ COVER TAPE PEELING SPECIFICATION

Recommended peeling force:

CM16, CM204, CM207, CM52, CM101: 50±5gf

CM201: 70±10gf



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