

# Current Sensing Metal Chip Resistors

## CSM Series

**multicomp** PRO

**RoHS  
Compliant**



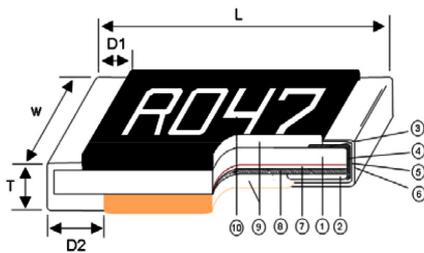
### Features:

- SMD Type designed for automatic insertion
- High power rating in small size
- Low resistance resistor for current detection
- Metal foil construction ensures high reliability and performance with very low and stable TCR
- Designed for current sense circuits in power electronic systems

### Applications

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

### Construction

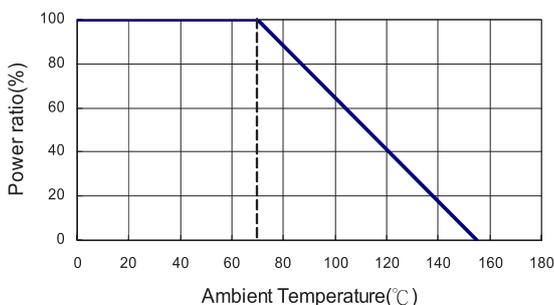


|   |                       |   |                         |    |                          |
|---|-----------------------|---|-------------------------|----|--------------------------|
| 1 | Alumina Substrate     | 5 | Barrier Layer (Ni)      | 9  | Primary Overcoat (Epoxy) |
| 2 | Bottom Electrode (Cu) | 6 | External Electrode (Sn) | 10 | Marking (Epoxy)          |
| 3 | Top Electrode (NiCr)  | 7 | Adhesive (Acrylic)      |    |                          |
| 4 | Edge Electrode (NiCr) | 8 | Resistor Layer (Alloy)  |    |                          |

### Dimensions

| Type    | Size (Inch) | Resistance Range (mΩ) | L          | W          | T          | D1        | D2        |
|---------|-------------|-----------------------|------------|------------|------------|-----------|-----------|
| MCCSM06 | 1206        | 10 - 29               | 3.05 ±0.15 | 1.55 ±0.15 | 0.58 ±0.15 | 0.5 ±0.25 | 0.9 ±0.25 |
|         |             | 30 - 100              | 3.05 ±0.15 | 1.55 ±0.15 | 0.55 ±0.15 | 0.5 ±0.25 | 0.6 ±0.25 |
| MCCSM12 | 2512        | 10 - 29               | 6.3 ±0.2   | 3.15 ±0.2  | 0.58 ±0.15 | 0.6 ±0.3  | 1.8 ±0.3  |
|         |             | 30 - 100              | 6.3 ±0.2   | 3.15 ±0.2  | 0.55 ±0.15 | 0.6 ±0.3  | 1.2 ±0.3  |

### Derating Curve



Newark.com/multicomp-pro  
 Farnell.com/multicomp-pro  
 Element14.com/multicomp-pro

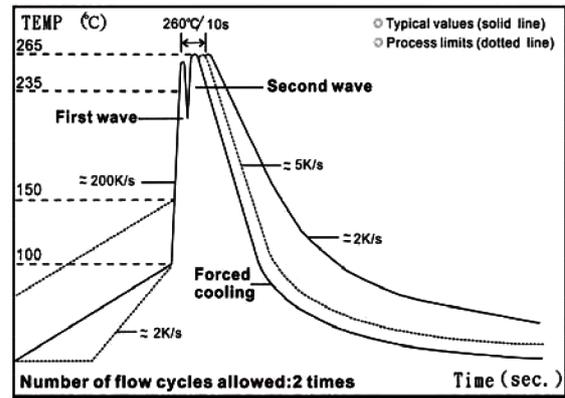
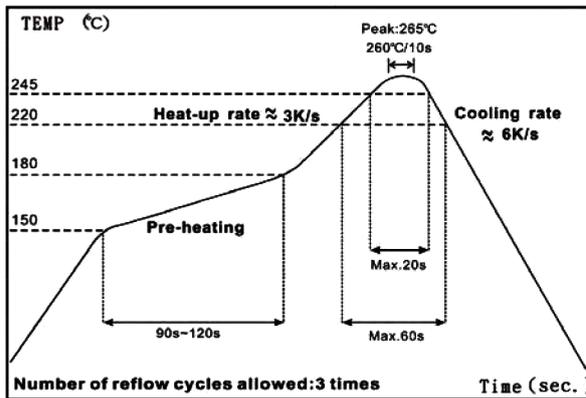
**multicomp** PRO

## Standard Electrical Specifications

| Type           | Item | Power Rating at 70°C | Operating Temp. Range | Resistance Range (mΩ) |     |     | TCR (PPM/°C) |
|----------------|------|----------------------|-----------------------|-----------------------|-----|-----|--------------|
|                |      |                      |                       | ±1%                   | ±2% | ±5% |              |
| MCCSM06 (1206) |      | 1/2W                 | -55°C to +155°C       | 10 - 19               |     |     | ±100         |
|                |      |                      |                       | 20 - 100              |     |     | ±50<br>±100  |
| MCCSM12 (2512) |      | 1W                   | -55°C to +155°C       | 10 - 19               |     |     | ±100         |
|                |      |                      |                       | 20 - 100              |     |     | ±50<br>±100  |

Operating Voltage= $\sqrt{P \cdot R}$  ; Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  ; Operating Current= $\sqrt{P/R}$

## Soldering Condition



IR Reflow Soldering

Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

## Environmental Characteristics

| Item                                           | Requirement             | Test Method                                                                                   |
|------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec.                | -55°C to +125°C, 25°C is the reference temperature                                            |
| Short Time Overload                            | $\pm(0.5\%+0.05\Omega)$ | 5 X Rated Power for 5 seconds                                                                 |
| Insulation Resistance                          | $\geq 10G$              | Max. overload voltage for 1 minute                                                            |
| Endurance                                      | $\pm(1.0\%+0.05\Omega)$ | 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"                 |
| Damp Heat with Load                            | $\pm(1.0\%+0.05\Omega)$ | 40±2°C, 90 to 95% R.H. Max. working voltage for 1,000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |

## Environmental Characteristics

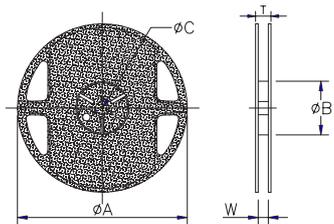
| Item                         | Requirement                                                            | Test Method                                                             |
|------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Dry Heat                     | $\pm(0.5\%+0.05\Omega)$                                                | at +155°C for 1,000 hrs                                                 |
| Bending Strength             | As Spec.                                                               | Bending once for 5 seconds<br>2010, 2512 sizes: 2mm    Other sizes: 3mm |
| Solderability                | 95% min. coverage                                                      | 245±5°C for 3 seconds                                                   |
| Resistance to Soldering Heat | $\pm(0.5\%+0.05\Omega)$                                                | 260±5°C for 10 seconds                                                  |
| Voltage Proof                | No breakdown or flashover                                              | 1.42 times RCWV (RMS) for 1 minute                                      |
| Leaching                     | Individual leaching area $\leq 5\%$<br>Total leaching area $\leq 10\%$ | 260±5°C for 30 seconds                                                  |
| Rapid Change of Temperature  | $\pm(0.5\%+0.05\Omega)$                                                | -55°C to +155°C, 5 cycles                                               |

Reference Standards : IEC 60115-1, 60068-2-58; JIS-C 5201-1

Storage Temperature : 25 ±3°C; Humidity < 80%RH

## Packaging

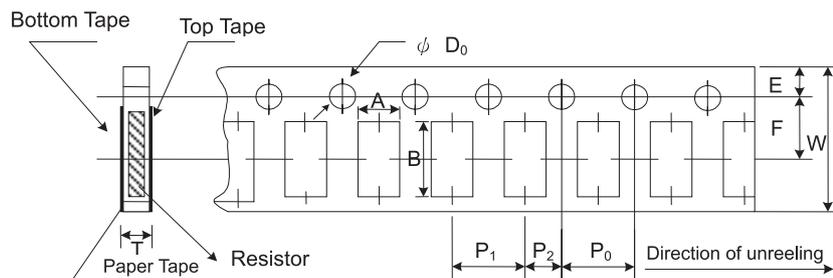
Packaging Quantity & Reel Specifications



| Type    | ΦA     | ΦB    | ΦC        | W        | T       | Paper Tape (EA) | Emboss Plastic Tape (EA) |
|---------|--------|-------|-----------|----------|---------|-----------------|--------------------------|
| MCCSM06 | 178 ±1 | 60 +1 | 13.5 ±0.7 | 9.5 ±0.1 | 11.5 ±1 | 5,000           | -                        |
| MCCSM12 | 178 ±1 | 60 +1 | 13.5 ±0.7 | 13.5 ±1  | 15.5 ±1 | -               | 4,000                    |

Unit: mm

## Paper Tape Specifications



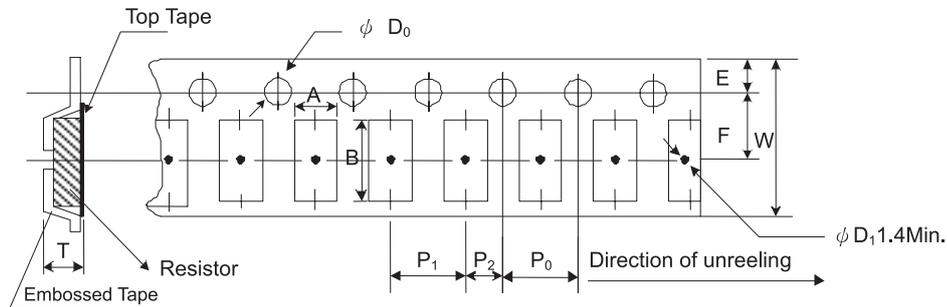
| Type    | A        | B        | W      | E         | F         | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ΦD <sub>0</sub> | T         |
|---------|----------|----------|--------|-----------|-----------|----------------|----------------|----------------|-----------------|-----------|
| MCCSM06 | 1.9 ±0.1 | 3.5 ±0.2 | 8 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1         | 4 ±0.05        | 2 ±0.05        | 1.5 +0.1,-0     | 0.85 ±0.1 |

Unit: mm

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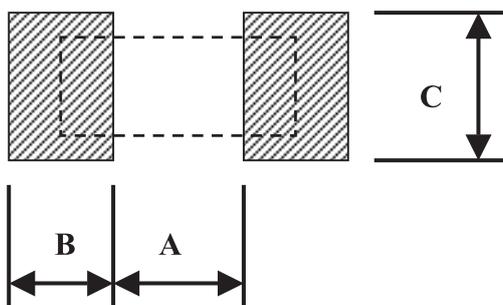
## Embossed Plastic Tape Specifications



| Type    | A        | B        | W       | E         | F        | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ΦD <sub>0</sub> | T      |
|---------|----------|----------|---------|-----------|----------|----------------|----------------|----------------|-----------------|--------|
| MCCSM12 | 3.5 ±0.1 | 6.7 ±0.1 | 12 ±0.1 | 1.75 ±0.1 | 5.5±0.05 | 4 ±0.05        | 4 ±0.1         | 2 ±0.05        | 1.5 +0.1        | 1 ±0.2 |

Unit: mm

## Recommend Land Pattern



| Type     | Resistance Range | A   | B    | C   |
|----------|------------------|-----|------|-----|
| MCCSM06  | 10-29mΩ          | 0.9 | 1.7  | 1.7 |
|          | 30-100mΩ         | 1.5 | 1.4  | 1.7 |
| MC CSM12 | 10-29mΩ          | 2.3 | 2.9  | 3.1 |
|          | 30-100mΩ         | 3.6 | 2.25 | 3.1 |

Unit: mm

## Part Number Table

| Description                              | Part Number     |
|------------------------------------------|-----------------|
| Resistor, current sense, 0R022, 0.5W, 1% | MCCSM06FTDUR022 |
| Resistor, current sense, 0R033, 0.5W, 1% | MCCSM06FTDUR033 |
| Resistor, current sense, 0R047, 0.5W, 1% | MCCSM06FTDUR047 |
| Resistor, current sense, 0R068, 0.5W, 1% | MCCSM06FTDUR068 |
| Resistor, current sense, 0R033, 1W, 1%   | MCCSM12FTDTR033 |
| Resistor, current sense, 0R047, 1W, 1%   | MCCSM12FTDTR047 |
| Resistor, current sense, 0R022, 1W, 1%   | MCCSM12FTDTR022 |
| Resistor, current sense, 0R051, 1W, 1%   | MCCSM12FTDTR051 |
| Resistor, current sense, 0R068, 1W, 1%   | MCCSM12FTDTR068 |
| Resistor, current sense, 0R075, 1W, 1%   | MCCSM12FTDTR075 |

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