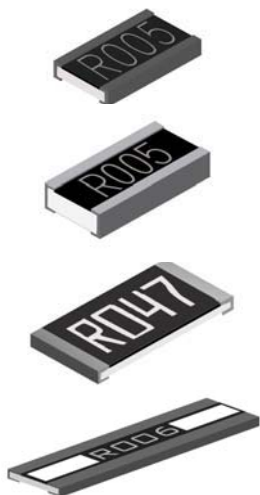


# Current Sensing Chip Resistor – CS Series

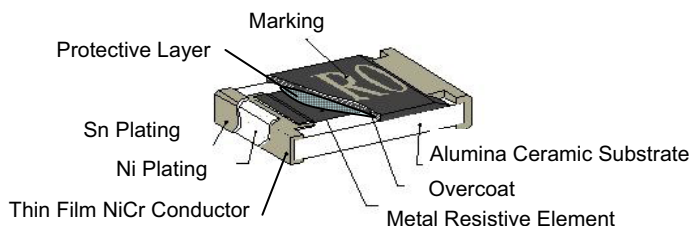
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## Features

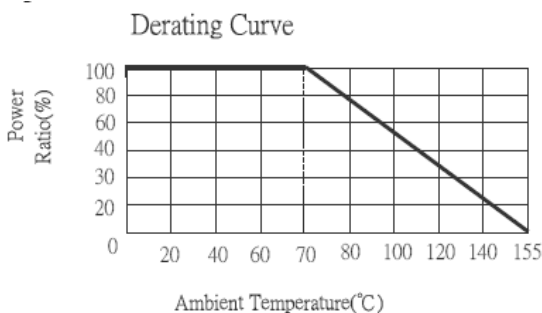
- 3W Rating in 1W size, 1225 Package
- Low TCR from  $\pm 100$  PPM  $\sim \pm 600$  PPM/ $^{\circ}$ C
- Resistance Values from 1 to 1000 m ohms
- High Purity Alumina Substrate for High Power Dissipation

## Construction

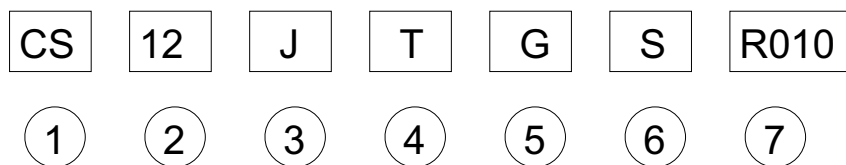


## Applications

- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Application
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver
- Portable Devices (PDA, Cell phone)



## Part Numbering



### ① Product Type

| Product Type | Description                   |
|--------------|-------------------------------|
| CS           | Current Sensing Chip Resistor |

### ② Dimensions (LxW)

| Codes | Dimensions (LxW) | Part Number |
|-------|------------------|-------------|
| CS02  | 1.00x0.50mm      | 0402        |
| CS03  | 1.60x0.80mm      | 0603        |
| CS05  | 2.00x1.25mm      | 0805        |
| CS06  | 3.10x1.55mm      | 1206        |
| CS10  | 5.00x2.50mm      | 2010        |
| CS12  | 6.30x3.10mm      | 2512        |
| CS25  | 3.10x6.30mm      | 1225        |
| CS37  | 3.75x2.00mm      | 3720        |
| CS75  | 7.50x2.00mm      | 7520        |

### ③ Resistance Tolerance

| Codes | Resistance Tolerance |
|-------|----------------------|
| J     | $\pm 5\%$            |
| H     | $\pm 3\%$            |
| G     | $\pm 2\%$            |
| F     | $\pm 1\%$            |

### ④ Packaging

| Codes | Type        |
|-------|-------------|
| T     | Taping Reel |
| B     | Bulk        |

### ⑤ TCR

| Codes | Type                        |
|-------|-----------------------------|
| E     | $\pm 100$ PPM/ $^{\circ}$ C |
| F     | $\pm 200$ PPM/ $^{\circ}$ C |
| G     | $\pm 300$ PPM/ $^{\circ}$ C |
| H     | $\pm 400$ PPM/ $^{\circ}$ C |
| I     | $\pm 500$ PPM/ $^{\circ}$ C |
| J     | $\pm 600$ PPM/ $^{\circ}$ C |

### ⑥ Power Rating

| Codes | Type     |
|-------|----------|
|       | Standard |
| R     | 3W       |
| S     | 2W       |
| T     | 1W       |
| U     | 1/2W     |
| V     | 1/4W     |
| W     | 1/8W     |
| X     | 1/10W    |
| Y     | 1/16W    |
| Z     | 1/32W    |

### ⑦ Resistance

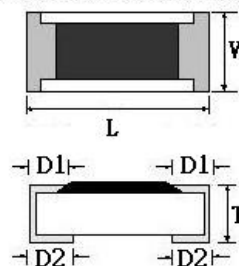
| Codes | Type           |
|-------|----------------|
| R010  | 0.010 $\Omega$ |
| R100  | 0.100 $\Omega$ |
| 1R00  | 1.000 $\Omega$ |

### Dimensions

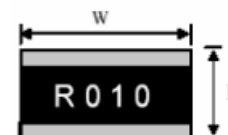
Unit: mm

| Codes | L         | W         | T         | D1        | D2        |
|-------|-----------|-----------|-----------|-----------|-----------|
| CS02  | 1.00±0.05 | 0.50±0.05 | 0.32±0.10 | 0.25±0.10 | 0.20±0.10 |
| CS03  | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 |
| CS05  | 2.00±0.15 | 1.25±0.15 | 0.55±0.10 | 0.30±0.20 | 0.40±0.25 |
| CS06  | 3.05±0.15 | 1.55±0.15 | 0.55±0.10 | 0.50±0.30 | 0.40±0.25 |
| CS10  | 5.00±0.20 | 2.45±0.15 | 0.60±0.15 | 0.60±0.30 | 0.50±0.25 |
| CS12  | 6.35±0.20 | 3.15±0.15 | 0.60±0.10 | 0.60±0.30 | 0.55±0.25 |
| CS25  | 3.10±0.15 | 6.30±0.15 | 0.90±0.15 | 0.60±0.30 | 0.55±0.25 |
| CS37  | 2.00±0.20 | 3.75±0.20 | 0.60±0.10 | 0.40±0.20 | 0.40±0.20 |
| CS75  | 2.00±0.20 | 7.50±0.30 | 0.60±0.10 | 0.40±0.20 | 0.40±0.20 |

0402/0603/0805/1206/2010/2512



1225/3720/7520



### Standard Electrical Specifications

| Item Type   | Power Rating at 70°C | Operating Temp. Range | Resistance Tolerance | Resistance Range | TCR (PPM/°C) |
|-------------|----------------------|-----------------------|----------------------|------------------|--------------|
| CS02 (0402) | 1/16W                | -55 ~ +155°C          | ±1%,±2%,±5%          | 50mΩ~100mΩ       | ±400         |
| CS03 (0603) | 1/10W                |                       |                      | 101mΩ~500mΩ      | ±300         |
|             |                      |                       |                      | 501mΩ~1000mΩ     | ±200         |
|             |                      |                       |                      | 20mΩ~50mΩ        | ±600         |
| CS05 (0805) | 1/8W                 |                       |                      | 51mΩ~100mΩ       | ±400         |
|             |                      |                       |                      | 101 mΩ~500mΩ     | ±300         |
|             |                      |                       |                      | 501mΩ~1000mΩ     | ±200         |
| CS06 (1206) | 1/4W                 |                       |                      | 20mΩ~50mΩ        | ±600         |
|             |                      |                       |                      | 51mΩ~100mΩ       | ±400         |
|             |                      |                       |                      | 101mΩ~500mΩ      | ±300         |
| CS10 (2010) | 3/4W                 | 501mΩ~1000mΩ          | ±200                 |                  |              |
|             |                      | 10mΩ~20mΩ             | ±600                 |                  |              |
|             |                      | 21mΩ~50mΩ             | ±400                 |                  |              |
| CS12 (2512) | 1W                   | 51mΩ~500mΩ            | ±300                 |                  |              |
|             |                      | 501mΩ~1000mΩ          | ±200                 |                  |              |
|             |                      | 3mΩ~10mΩ              | ±450                 |                  |              |
| CS25 (1225) | 3W                   | 11mΩ~19mΩ             | ±300                 |                  |              |
|             |                      | 20mΩ~50mΩ             | ±200                 |                  |              |
|             |                      | 51mΩ~200mΩ            | ±150                 |                  |              |
| CS37 (3720) | 1W                   | 10mΩ~19mΩ             | ±300                 |                  |              |
|             |                      | 20mΩ~500mΩ            | ±150                 |                  |              |
| CS75 (7520) | 2W                   | ±2%,±5%               | 1mΩ~4mΩ              | ±300             |              |
|             |                      | ±1%,±2%,±5%           | 5mΩ~10mΩ             | ±200             |              |
|             |                      |                       | ±1%,±2%,±5%          | 11mΩ~350mΩ       | ±150         |

### High Power Rating Electrical Specifications

| Item Type   | Power Rating at 70°C | Operating Temp. Range | Resistance Tolerance | Resistance Range |
|-------------|----------------------|-----------------------|----------------------|------------------|
| CS05□TV□□□□ | 1/4W                 | -55 ~ +155°C          | ±1%,±2%,±5%          | 100mΩ~1000mΩ     |
| CS06□TU□□□□ | 1/2W                 |                       |                      | 100mΩ~1000mΩ     |
| CS10□TQ□□□□ | 1W                   |                       |                      | 100mΩ~1000mΩ     |
| CS12□TA□□□□ | 1.5W                 |                       |                      | 100mΩ~1000mΩ     |

### Low TCR Electrical Specifications

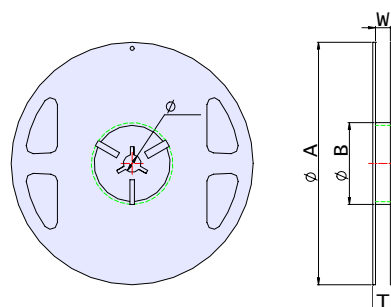
| Item Type   | Power Rating at 70°C | Operating Temp. Range | Resistance Tolerance | Resistance Range | TCR (PPM/°C) |
|-------------|----------------------|-----------------------|----------------------|------------------|--------------|
| CS06□TE□□□□ | 1/4W                 | -55 ~ +155°C          | ±1%                  | 100mΩ~1000mΩ     | ±100         |
| CS10□TE□□□□ | 3/4W                 |                       | ±2%                  | 100mΩ~1000mΩ     | ±100         |
| CS12□TE□□□□ | 1W                   |                       | ±5%                  | 100mΩ~1000mΩ     | ±100         |
| CS75□TE□□□□ | 2 W                  |                       | 1mΩ~5mΩ              | ±100             |              |

Operating Current  $I=\sqrt{(P/R)}$ , Operating Voltage  $V=\sqrt{(P*R)}$

\*Mayloon is capable of manufacturing the optimal spec based on customer's requirement.

**Marking for 0603**

| Code       | Type   |
|------------|--------|
| 1R0        | 1.000Ω |
| R10        | 0.100Ω |
| R01        | 0.010Ω |
| <u>101</u> | 0.101Ω |
| <u>035</u> | 0.035Ω |



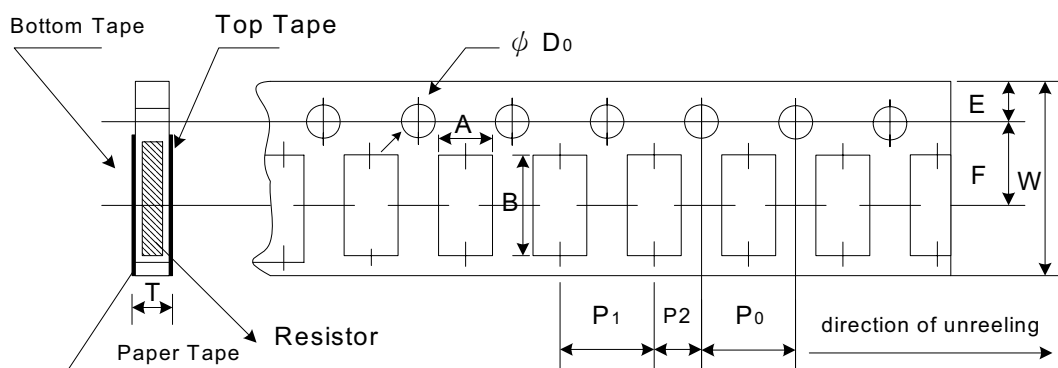
**Packaging**

Packaging Quantity & Reel Specifications

Unit: mm

| Packaging Codes | ΦA    | ΦB       | ΦC        | W          | T         | Paper Tape (EA) | Emboss Plastic Tape (EA) |
|-----------------|-------|----------|-----------|------------|-----------|-----------------|--------------------------|
| CS02            | 178±1 | 60.0+0.5 | 13.0±0.20 | 9.00±0.50  | 12.0±0.15 | 10,000          | -                        |
| CS03            | 178±1 | 60.0+0.5 | 13.0±0.20 | 9.00±0.50  | 12.0±0.15 | 5,000           | -                        |
| CS05            | 178±1 | 60.0+0.5 | 13.0±0.20 | 9.00±0.50  | 12.0±0.15 | 5,000           | -                        |
| CS06            | 178±1 | 60.0+0.5 | 13.0±0.20 | 9.00±0.50  | 12.0±0.15 | 5,000           | -                        |
| CS10            | 178±1 | 60.2±0.5 | 13.0±0.50 | 13.2±1.500 | 16.0±0.20 | -               | 4,000                    |
| CS12            | 178±1 | 60.2±0.5 | 13.0±0.50 | 13.2±1.50  | 16.0±0.20 | -               | 4,000                    |
| CS25            | 178±1 | 60.2±0.5 | 13.0±0.50 | 13.2±1.50  | 16.0±0.20 | -               | 2,000                    |
| CS37            | 178±1 | 60.2±0.5 | 13.0±0.50 | 13.2±1.50  | 16.0±0.20 | -               | 2,000                    |
| CS75            | 178±1 | 60.2±0.5 | 13.0±0.50 | 17.0±0.50  | 19.0±1.00 | -               | 2,000                    |

Paper Tape Specifications



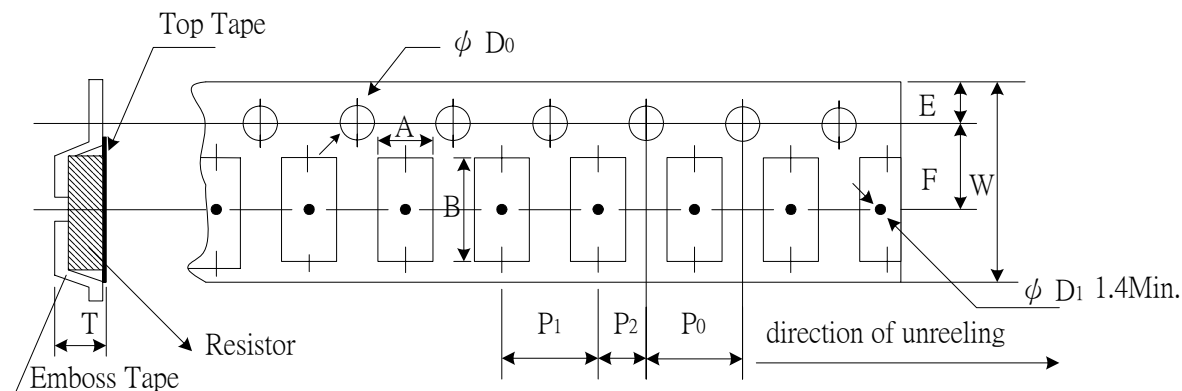
Unit: mm

| Codes | A         | B         | W         | E         | F        | P0        | P1        | P2        | ΦD0       | T         |
|-------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| CS02  | 0.67±0.03 | 1.15±0.03 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10 | 2.00±0.05 | 2.00±0.05 | 1.54±0.03 | 0.40±0.03 |
| CS03  | 1.10±0.05 | 1.90±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.55±0.05 | 0.60±0.03 |
| CS05  | 1.60±0.05 | 2.37±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.55±0.05 | 0.75±0.05 |
| CS06  | 2.00±0.05 | 3.55±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.55±0.05 | 0.75±0.05 |

**Packaging**

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**Emboss Plastic Tape Specifications**



Unit: mm

| Codes | A         | B         | W         | E         | F        | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ΦD <sub>0</sub> | T          |
|-------|-----------|-----------|-----------|-----------|----------|----------------|----------------|----------------|-----------------|------------|
| CS10  | 2.85±0.10 | 5.45±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.00±0.20  |
| CS12  | 3.40±0.10 | 6.65±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.00±0.20  |
| CS25  | 3.40±0.10 | 6.65±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.50±0.10  |
| CS37  | 2.50±0.20 | 4.45±0.20 | 12.0±0.30 | 1.75±0.01 | 5.5±0.05 | 4.00 ±0.05     | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.50 ±0.10 |
| CS75  | 2.50±0.20 | 8.30±0.20 | 16.0±0.30 | 1.75±0.01 | 7.8±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.50 ±0.10 |

**Environmental Characteristics**

| Item                                    | Specification   | Test Method  |
|---|-----------------|--|
| 1 Temperature Coefficient of Resistance | As Spec         | MIL-STD-202F Method 304<br>+25/-55/+25/+125/+25°C  |
| 2 Short Time Overload                   | ±(0.5% + 0.05Ω) | JIS-C-5202-5.5<br>RCWV*2.5 or Max Overloading Voltage<br>5 seconds                                       |
| 3 Dielectric Withstand Voltage          | by Type         | MIL-STD-202F Method 301<br>Apply Max Overload Voltage for 1 minute                                       |
| 4 Insulation Resistance                 | >1000MΩ         | MIL-STD-202F Method 302<br>Apply 100VDC for 1minute  |
| 5 Thermal Shock                         | ±(0.5% + 0.05Ω) | MIL-STD-202F Method 107G<br>-55°C ~ 150°C, 100cycles   |
| 6 Load Life                             | ±(1% + 0.05Ω)   | MIL-STD-202F Method 108A<br>RCWV, 70°C, 1.5 hours on, 0.5 hours off<br>Total 1000~1048 hours             |
| 7 Humidity (Steady State)               | ±(0.5% + 0.05Ω) | MIL-STD-202F Method 103B<br>40°C, 90~95%RH, RCWV 1.5 hours ON,<br>0.5 hours OFF, total 1000 ~ 1048 hours |
| 8 Resistance to Dry Heat                | ±(0.5% + 0.05Ω) | JIS-C-5202-7.2<br>96hours @ +155°C without load  |
| 9 Low Temperature Operation             | ±(0.5% + 0.05Ω) | JIS-C-5202-7.1<br>1hour, -65°C followed by 45 minutes of RCWV  |
| 10 Bending Strength                     | AS SPEC.        | JIS-C-5202-6.1.4<br>Bending Amplitude 3mm for 10 seconds   |
| 11 Solderability                        | 95%min coverage | MIL-STD-202F Method 208H<br>235°C±5°C, 2±0.5 (sec)   |
| 12 Resistance to Soldering Heat         | ±(0.5% + 0.05Ω) | MIL-STD-202F Method 210E<br>260±5°C, 10±1 seconds  |

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