

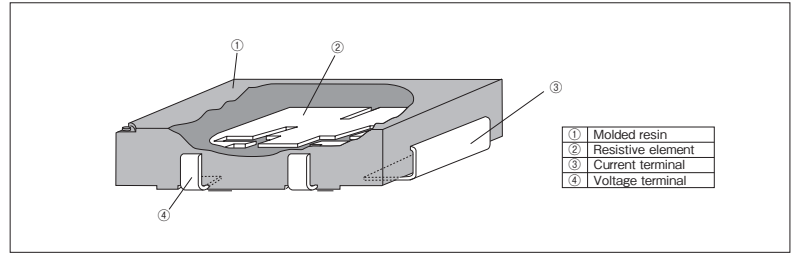
## CSR | Chip Current Sensing Resistors

Current Sensing Resistors



Coating color : Black

### Construction



### Features

- Current sensing chip resistors of 4-terminal construction with current terminals and voltage (KELVIN) terminals.
- Despite ultra low resistance, high resistance accuracy is realized.
- No change in resistance value after soldering to a circuit board, even for D ( $\pm 0.5\%$ ) or F ( $\pm 1.0\%$ ) class.
- Excellent T.C.R. achieved ( $\pm 50 \times 10^{-6}/K$ )
- Flame retardant type resin is used. (UL94 V-0)
- Suitable for reflow, flow and iron solderings.
- Products with lead free termination meet EU-RoHS requirements.

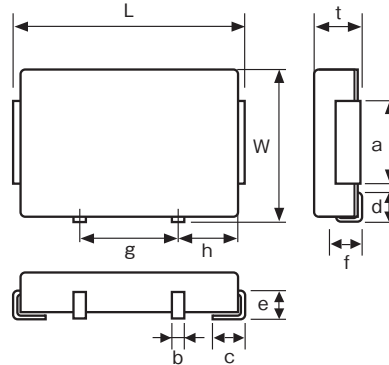
### Applications

- Electric automobiles
- Industrial robots

### Reference Standards

IEC 60115-1  
JIS C 5201-1

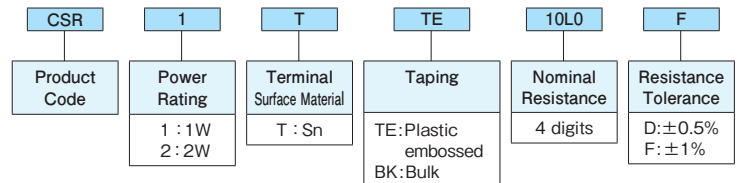
### Dimensions



| Dimensions (mm)             | Type |      |
|-----------------------------|------|------|
|                             | CSR1 | CSR2 |
| L $\pm 0.5$                 | 10.8 | 12.8 |
| W $\pm 0.3$                 | 6.2  | 8.2  |
| t $\pm 0.2$                 | 2.1  | 3.1  |
| a $\pm 0.3$                 | 3.0  | 5.0  |
| b $\pm 0.2$                 | 0.8  | 1.0  |
| c $\pm 0.5$                 | 1.4  | 2.0  |
| d $\pm 0.5$                 | 1.2  | 2.0  |
| e $\pm 0.3$                 | 1.3  | 2.2  |
| f $\pm 0.3$                 | 1.3  | 2.2  |
| g $\pm 0.1$                 | 5.0  | 6.0  |
| h $\pm 0.1$                 | 2.5  | 3.0  |
| Weight (g)<br>Net/1,000pcs. | 320  | 690  |

### Type Designation

Example



| Resistance Value ( $\Omega$ ) | 4 digits  |
|-------------------------------|-----------|
| 5m~8.2m                       | 5L00~8L20 |
| 10m~50m                       | 10L0~50L0 |

Contact us when you have control request for environmental hazardous material other than the substance specified by EU-RoHS.

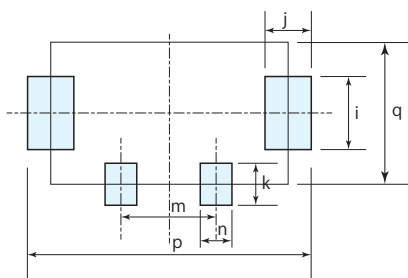
For further information on taping, please refer to APPENDIX C on the back pages.

### Ratings

| Type | Power Rating | Resistance Range ( $\Omega$ ) | Resistance Tolerance            | T.C.R. ( $\times 10^{-6}/K$ ) | Rated Ambient Temp. | Operating Temp. Range | Taping & Q'ty/Reel (pcs) |
|------|--------------|-------------------------------|---------------------------------|-------------------------------|---------------------|-----------------------|--------------------------|
|      |              |                               |                                 |                               |                     |                       | TE                       |
| CSR1 | 1W           | 5m~50m (E12)                  | D: $\pm 0.5\%$ , F: $\pm 1.0\%$ | $\pm 50$                      | +70°C               | -55°C ~ +125°C        | 1,000                    |
| CSR2 | 2W           |                               | F: $\pm 1.0\%$                  |                               |                     |                       |                          |

Rated voltage =  $\sqrt{\text{Power Rating} \times \text{Resistance value}}$ .

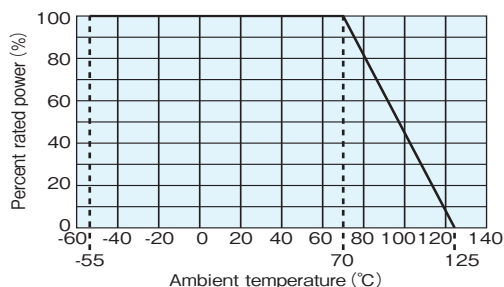
### Recommended Pad Dimensions



| Type | Dimensions (mm) |     |     |     |     |      |     |
|------|-----------------|-----|-----|-----|-----|------|-----|
|      | i               | j   | k   | m   | n   | p    | q   |
| CSR1 | 3.0             | 2.0 | 2.0 | 5.0 | 1.6 | 12.0 | 6.0 |
| CSR2 | 5.3             | 2.3 | 3.2 | 6.0 | 2.2 | 14.3 | 8.0 |

\*These pad dimensions are only for standard pattern and the characteristics are not guaranteed, which you are suggested to confirm before use.

## Derating Curve



For resistors operated at an ambient temperature of 70°C or higher, the power shall be derated in accordance with the above derating curve.

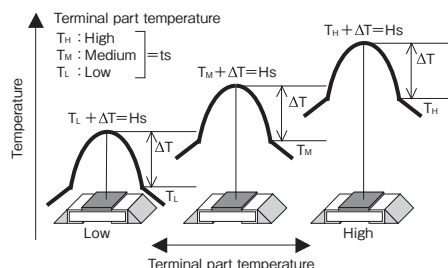
## Thermal Resistance

| Type | Resistance (Ω) | Rth (°C/W) |
|------|----------------|------------|
| CSR1 | 20m            | 42         |
| CSR2 | 20m            | 30         |

$$R_{th} = (H_s - t_s) / \text{Power}$$

Regarding the temperature rise, the value of the temperature varies per conditions and board for use since the temperature is measured under our measuring conditions. Please refer to us before use.

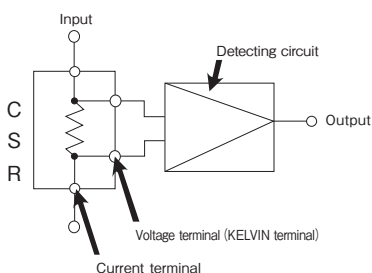
The temperature of the resistor will increase the same  $\Delta T$  from the standard terminal part temperature regardless of the ambient temperature when the same power is applied. This is because there is hardly any heat dissipation from the resistor surface to the ambient air.



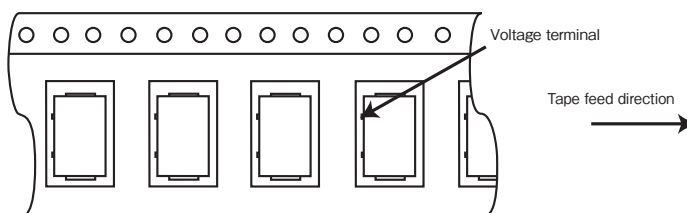
## Performance

| Test Items                   | Performance Requirements $\Delta R \pm \%$ |         | Test Methods  |
|------------------------------|--|---------|---|
|                              | Limit                                      | Typical |   |
| Resistance                   | Within specified tolerance                 | —       | 25°C  |
| T.C.R.                       | Within specified T.C.R.                    | —       | +25°C/+125°C  |
| Overload (Short time)        | 1  | 1       | Rated power $\times 5$ for 5s   |
| Resistance to soldering heat | 1  | 1       | 260°C $\pm 5^\circ\text{C}$ , 10s $\pm 1$ s                             |
| Rapid change of temperature  | 1  | 0.5     | -55°C (30min.) / +125°C (30min.) 500 cycles                             |
| Moisture resistance          | 2  | 0.5     | 40°C $\pm 2^\circ\text{C}$ , 90%~95%RH, 1000h<br>1.5h ON/0.5h OFF cycle |
| Endurance at 70°C            | 1  | 0.5     | 70°C $\pm 2^\circ\text{C}$ , 1000h<br>1.5h ON/0.5h OFF cycle            |
| Low temperature exposure     | 0.5  | 0.25    | -55°C, 1h   |
| High temperature exposure    | 0.5  | 0.25    | +125°C, 100h  |

## Example For Circuit



## Taping Direction



## Precautions for Use

- In case of using the low ohm resistors as shunt resistors, please lay out a pattern considering the electromagnetic induction with surrounding inductors.