

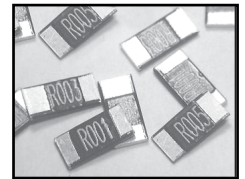
# Current Sensing Chip Resistors

NCSS Series

## FEATURES

- SURFACE MOUNTABLE 0805, 1206, 2010 AND 2512 CASE SIZE
- LOW RESISTANCE METAL STRIP CONSTRUCTION
- PRECISION TOLERANCE ( $\pm 1\%$ )
- TAPED & REEL PACKAGING FOR EASY PICK AND PLACE
- REFLOW COMPATIBLE

**RoHS  
Compliant**  
includes all homogeneous materials



See Part Number System for Details

## SPECIFICATIONS

| Type   | EIA Size | Material<br>(See Note on EMF Characteristics Below) | Power Rating at 70°C | Resistance Tolerance (Code)   | Temperature Coefficient (ppm/°C, +25°C ~ +125°C)        | Resistance Range* | Operating Temperature Range (°C) |
|--------|----------|-----------------------------------------------------|----------------------|-------------------------------|---------------------------------------------------------|-------------------|----------------------------------|
| NCSS10 | 0805     | Mn-Cu                                               | 1/8W (B)             | ±1% (F)<br>±2% (G)<br>±5% (J) | ±100ppm                                                 | 5mΩ ~ 25mΩ        | -55°C ~ +170°C                   |
|        |          |                                                     | 1/4W (A)             |                               |                                                         |                   |                                  |
|        |          |                                                     | 1/2W (S)             |                               |                                                         |                   |                                  |
| NCSS12 | 1206     | Mn-Cu                                               | 1/4W (A)             |                               | 1mΩ = ±200ppm<br>2mΩ ~ 10mΩ = ±100ppm<br>>10mΩ = ±75ppm | 1mΩ ~ 30mΩ        |                                  |
|        |          |                                                     | 1/2W (S)             |                               |                                                         |                   |                                  |
|        |          |                                                     | 1W (C)               |                               |                                                         |                   |                                  |
| NCSS20 | 2010     | Ni-Cu                                               | 1/2W (S)             |                               | 5mΩ ~ 10mΩ = ±100ppm<br>>10mΩ = ±75ppm                  | 5mΩ ~ 50mΩ        |                                  |
|        |          |                                                     | 3/4W (I)             |                               |                                                         |                   |                                  |
|        |          |                                                     | 1W (C)               |                               |                                                         |                   |                                  |
|        |          |                                                     | 1.5W (D)             |                               |                                                         |                   |                                  |
| NCSS25 | 2512     | Ni-Cu                                               | 1W (C)               |                               | 1mΩ = ±275ppm<br>2mΩ ~ 10mΩ = ±100ppm<br>>10mΩ = ±75ppm | 1mΩ ~ 50mΩ        |                                  |
|        |          |                                                     | 1.5W (D)             |                               |                                                         | 1mΩ ~ 15mΩ        |                                  |
|        |          |                                                     | 2W (E)               |                               |                                                         | 1mΩ ~ 10mΩ        |                                  |
| NCSS25 | 2512     | Mn-Cu                                               | 1W (C)               |                               | 1.5mΩ ~ 10mΩ = ±100ppm<br>>10mΩ = ±75ppm                | 1.5mΩ ~ 50mΩ      |                                  |
|        |          |                                                     | 1.5W (D)             |                               |                                                         |                   |                                  |
|        |          |                                                     | 2W (E)               |                               |                                                         |                   |                                  |

\*Contact NIC regarding availability of values not shown

## PART NUMBER SYSTEM

NCSS 25 \* \* R005 TR N F

Series      Case Size Code: 10 = 0805, 12 = 1206, 20 = 2010, 25 = 2512

Tolerance Code: J = 5%, G = 2%, F = 1%

Power Rating Code: 1/8W = B, 1/4W = A, 1/2W = S, 1W = C, 1.5W = D, 2W = E

Resistance Code: See Values Tables

Packaging: TR = Tape & Reel

Material: N = Ni-Cu, Blank = Mn-Cu

RoHS compliant

\*Insert appropriate power rating and tolerance codes,  
Contact NIC regarding availability of other values

## THERMAL EMF CHARACTERISTICS:

Standard Mn-Cu Construction: Thermal EMF = -1 $\mu\text{V}/^\circ\text{C}$

Low Cost Ni-Cu Construction: Thermal EMF = -40 $\mu\text{V}/^\circ\text{C}$

**RATED CURRENT:**  $I = \sqrt{P/R}$

**EXAMPLE: Part Number NCSS25E\_R001TRNF**

**P = 2W**

**R = 0.001W (1milli-ohm)**

**$I = \sqrt{P/R} = \sqrt{2/0.001} = 44.7\text{A}$**



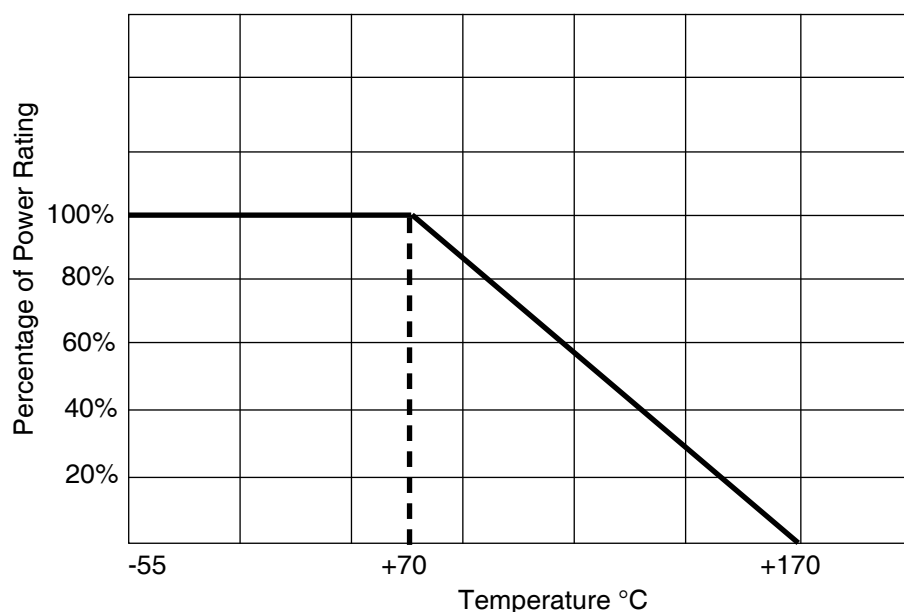
NIC COMPONENTS CORP. www.niccomp.com | www.lowESR.com | www.RFpassives.com | www.SMTmagnetics.com

SPECIFICATIONS ARE SUBJECT TO CHANGE

### ENVIRONMENTAL CHARACTERISTICS

| Item                                  | Specification                              |        |        |        | Test Method                                                                        | Reference Standard                          |
|---------------------------------------|--------------------------------------------|--------|--------|--------|------------------------------------------------------------------------------------|---------------------------------------------|
|                                       | 0805                                       | 1206   | 2010   | 2512   |                                                                                    |                                             |
| Temperature Coefficient of Resistance | Within specified value                     |        |        |        | +25°C ~ +125°C                                                                     | IEC60115-1 4.8<br>JIS-C5201 4.8             |
| Load Life                             | <±1%                                       | <±1%   | <±1%   | <±1%   | 1,000 hours at rated power, +70°C, 1.5 hours ON, 0.5 hours OFF                     | IEC60115-1 4.25.1<br>JIS-C5201 4.25.1       |
| Short Time Overload                   | <±0.5%                                     | <±0.5% | <±0.5% | <±0.5% | 5 x rated power for 5 seconds                                                      | IEC60115-1 4.13<br>JIS-C5201 4.13           |
| Moisture Resistance (no load)         | <±1%                                       | <±1.0% | <±1%   | <±1%   | +85°C, 85% RH, 1000 hours                                                          | IEC60115-1 4.24.2 1a<br>JIS-C5201 4.24.2 1a |
| Temperature Cycling                   | <±0.5%                                     | <±0.5% | <±0.5% | <±0.5% | -55°C & +155°C, 300 cycles, 15 minutes at each temperature                         | IEC60115-1 4.19<br>JIS-C5201 4.19           |
| Resistance to Soldering Heat          | <±0.5%                                     | <±0.5% | <±0.5% | <±0.5% | +260°C ± 5°C for 10 sec. ±1 sec.,<br>Two cycles<br>(20 sec. ±1 sec. for 2512 size) | IEC60115-1 4.18<br>JIS-C5201 4.18           |
| Solderability                         | At least 95% coverage of electrode surface |        |        |        | +245°C ± 5°C, 2 sec. ± 0.5sec.                                                     | IEC60115-1 4.17<br>JIS-C5201 4.17           |
| High Temperature Exposure             | <±1%                                       | <±1%   | <±1%   | <±1%   | +170°C for 1,000 hours                                                             | IEC60115-1 4.23.2<br>JIS-C5201 4.23.2       |
| Low Temperature Storage               | <±0.5%                                     | <±0.5% | <±0.5% | <±0.5% | -55°C for 1,000 hours                                                              | IEC60115-1 4.23.4<br>JIS-C5201 4.23.4       |
| Substrate Bending                     | <±1%                                       | <±0.5% | <±0.5% | <±0.5% | Bending within 2mm                                                                 | IEC60115-1 4.33<br>JIS-C5201 4.33           |
| Insulation Resistance                 | >100MΩ                                     |        |        |        | 100VDC for 1 minute                                                                | IEC60115-1 4.6<br>JIS-C5201 4.6             |

**Power Derating Curve:** For operation above 70°C, power rating must be derated according to the following chart:



### NCSS10 (0805 CASE SIZE 1/8W, 1/4W and 1/2W) AVAILABLE VALUES (Mn-Cu)

| Part Number     | Resistance Value (mΩ) | Available Power Ratings      | Available Tolerance       | Available TCR |
|-----------------|-----------------------|------------------------------|---------------------------|---------------|
| NCSS10__R005TRF | 5.0                   | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS10__R006TRF | 6.0                   | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS10__R008TRF | 8.0                   | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS10__R009TRF | 9.0                   | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS10__R010TRF | 10                    | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS10__R020TRF | 20                    | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS10__R025TRF | 25                    | 1/8W (B), 1/4W (A), 1/2W (S) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |

### NCSS12 (1206 CASE SIZE 1/4W, 1/2W AND 1W) AVAILABLE VALUES (Mn-Cu)

| Part Number     | Resistance Value (mΩ) | Available Power Ratings    | Available Tolerance       | Available TCR |
|-----------------|-----------------------|----------------------------|---------------------------|---------------|
| NCSS12__R001TRF | 1.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±200ppm       |
| NCSS12__R002TRF | 2.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R003TRF | 3.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R004TRF | 4.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R005TRF | 5.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R006TRF | 6.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R007TRF | 7.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R008TRF | 8.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R009TRF | 9.0                   | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R010TRF | 10                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS12__R012TRF | 12                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS12__R014TRF | 14                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS12__R015TRF | 15                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS12__R020TRF | 20                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS12__R022TRF | 22                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS12__R025TRF | 25                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS12__R030TRF | 30                    | 1/4W (A), 1/2W (S), 1W (C) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |

### NCSS20 (2010 CASE SIZE 1/2W, 3/4W, 1W and 1.5W) AVAILABLE VALUES (Ni-Cu)

| Part Number      | Resistance Value (mΩ) | Available Power Ratings              | Available Tolerance       | Available TCR |
|------------------|-----------------------|--------------------------------------|---------------------------|---------------|
| NCSS20__R005TRNF | 5.0                   | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS20__R006TRNF | 6.0                   | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS20__R010TRNF | 10                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS20__R015TRNF | 15                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS20__R020TRNF | 20                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS20__R022TRNF | 22                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS20__R024TRNF | 24                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS20__R030TRNF | 30                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS20__R050TRNF | 50                    | 1/2W (S), 3/4W (I), 1W (C), 1.5W (D) | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |

### NCSS25 (2512 CASE SIZE 1W, 1.5W and 2W) AVAILABLE VALUES (Ni-Cu)

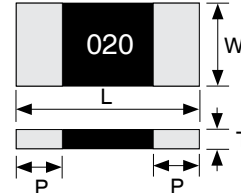
| Part Number        | Resistance Value (mΩ) | Available Power Ratings  | Available Tolerance       | Available TCR |
|--------------------|-----------------------|--------------------------|---------------------------|---------------|
| NCSS25_ _ R001TRNF | 1.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±275ppm       |
| NCSS25_ _ R002TRNF | 2.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R003TRNF | 3.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R004TRNF | 4.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R005TRNF | 5.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R006TRNF | 6.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R007TRNF | 7.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R008TRNF | 8.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R010TRNF | 10                    | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100ppm       |
| NCSS25_ _ R011TRNF | 11                    | 1W (C), 1.5W (D)         | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25_ _ R012TRNF | 12                    | 1W (C), 1.5W (D)         | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25_ _ R015TRNF | 15                    | 1W (C), 1.5W (D)         | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R018TRNF | 18                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R020TRNF | 20                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R025TRNF | 25                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R030TRNF | 30                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R033TRNF | 33                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R035TRNF | 35                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R040TRNF | 40                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R050TRNF | 50                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |

### NCSS25 (1W, 1.5W and 2W 2512 CASE SIZE) AVAILABLE VALUES (Mn-Cu)

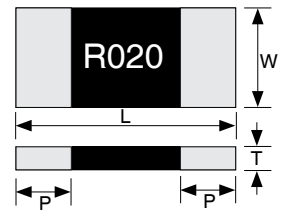
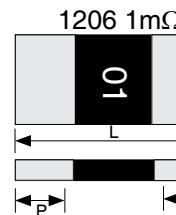
| Part Number        | Resistance Value (mΩ) | Available Power Ratings  | Available Tolerance       | Available TCR |
|--------------------|-----------------------|--------------------------|---------------------------|---------------|
| NCSS25_ _ R0015TRF | 1.5                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100          |
| NCSS25_ _ R005TRF  | 5.0                   | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100          |
| NCSS25_ _ R010TRF  | 10                    | 1W (C), 1.5W (D), 2W (E) | ±1% (F), ±2% (G), ±5% (J) | ±100          |
| NCSS25C _ R020TRF  | 20                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R025TRF  | 25                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R030TRF  | 30                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R040TRF  | 40                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |
| NCSS25C _ R050TRF  | 50                    | 1W (C)                   | ±1% (F), ±2% (G), ±5% (J) | ±75ppm        |

## COMPONENT DIMENSIONS AND PART MARKING

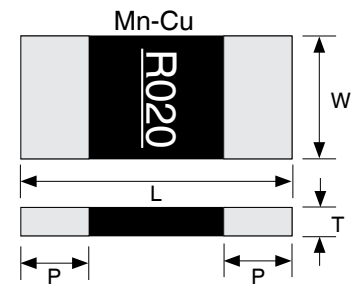
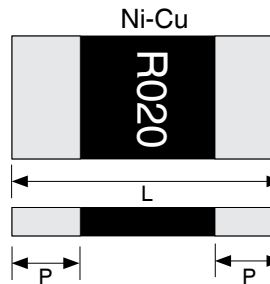
| Case Size | L             | W              | T             | P             |
|-----------|---------------|----------------|---------------|---------------|
| 0805      | $2.0 \pm 0.1$ | $1.25 \pm 0.1$ | $0.6 \pm 0.2$ | $0.4 \pm 0.2$ |



| Case Size | L             | W             | T                                                                                         | P                                                                                        |
|-----------|---------------|---------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1206      | $3.2 \pm 0.2$ | $1.6 \pm 0.2$ | $1\text{m}\Omega = 0.75 \pm 0.2$<br>$2\text{m}\Omega \sim 30\text{m}\Omega \ 0.6 \pm 0.2$ | $1\text{m}\Omega \ 1.1 \pm 0.3$<br>$2\text{m}\Omega \sim 30\text{m}\Omega \ 0.5 \pm 0.3$ |
| 2010      | $5.0 \pm 0.2$ | $2.5 \pm 0.2$ | $0.6 \pm 0.2$                                                                             | $0.6 \pm 0.3$                                                                            |

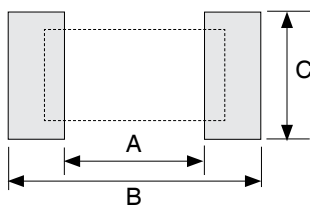


| Case Size | L                        | W             | T             | P             |
|-----------|--------------------------|---------------|---------------|---------------|
| 2512      | $R \leq 3\text{m}\Omega$ | $6.4 \pm 0.2$ | $3.2 \pm 0.2$ | $0.6 \pm 0.2$ |
|           | $R > 3\text{m}\Omega$    |               |               | $0.9 \pm 0.2$ |



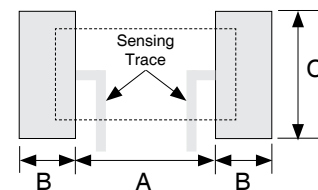
## RECOMMENDED LAND PATTERN DIM. (mm)

| Case Size | A   | B   | C   |
|-----------|-----|-----|-----|
| 0805      | 1.2 | 3.5 | 1.4 |

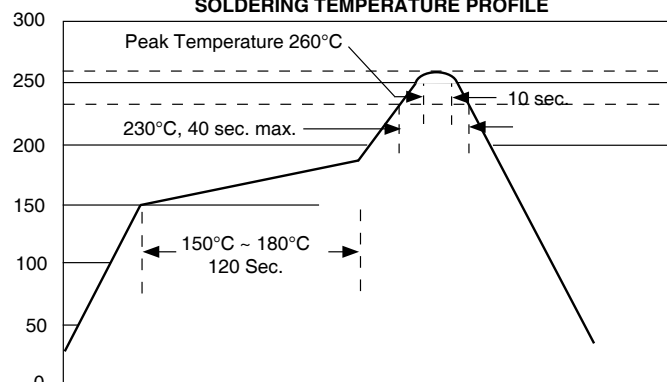


## RECOMMENDED LAND PATTERN DIM. (mm)

| Case Size | A                                       | B   | C   |
|-----------|-----------------------------------------|-----|-----|
| 1206      | $1\text{m}\Omega$                       | 1.0 | 2.3 |
|           | $2\text{m}\Omega \sim 30\text{m}\Omega$ | 1.6 | 1.7 |
| 2010      |                                         | 3.5 | 1.5 |
| 2512      | $1\text{m}\Omega \sim 3\text{m}\Omega$  | 1.3 | 3.1 |
|           | $4\text{m}\Omega \sim 50\text{m}\Omega$ | 4.1 | 2.1 |

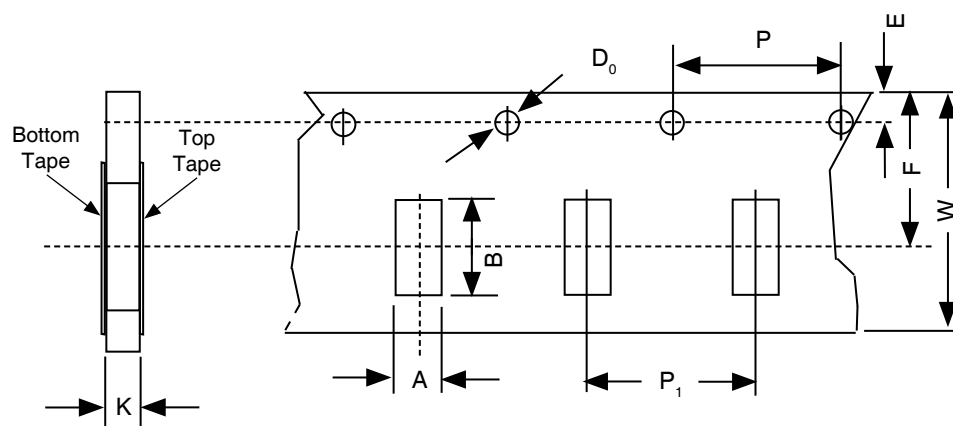


## RECOMMENDED REFLOW SOLDERING TEMPERATURE PROFILE



### PAPER TAPE DIMENSIONS (mm)

| Case Size | A          | B         | K          | P         | P <sub>1</sub> | E          | F          | D <sub>0</sub>         | W         | Quantity per Reel |
|-----------|------------|-----------|------------|-----------|----------------|------------|------------|------------------------|-----------|-------------------|
| 0805      | 1.6 ± 0.15 | 2.4 ± 0.2 | 0.84 ± 0.1 | 4.0 ± 0.1 | 4.0 ± 0.1      | 1.75 ± 0.1 | 3.5 ± 0.05 | 1.5 <sup>+0.1/-0</sup> | 8.0 ± 0.2 | 5,000             |
| 1206      | 2.0 ± 0.15 | 3.6 ± 0.2 | 0.84 ± 0.1 | 4.0 ± 0.1 | 4.0 ± 0.1      | 1.75 ± 0.1 | 3.5 ± 0.05 | 1.5 <sup>+0.1/-0</sup> | 8.0 ± 0.2 | 5,000             |



### EMBOSED PLASTIC TAPE DIMENSIONS (mm)

| Case Size | A                         | B         | K           | P          | P <sub>1</sub> | E          | F          | D <sub>0</sub>         | D <sub>1</sub> | W          | Quantity per Reel |
|-----------|---------------------------|-----------|-------------|------------|----------------|------------|------------|------------------------|----------------|------------|-------------------|
| 2010      | 2.8 ± 0.2                 | 5.3 ± 0.2 | 0.85 ± 0.15 | 4.0 ± 0.05 | 4.0 ± 0.1      | 1.75 ± 0.1 | 5.5 ± 0.05 | 1.5 ± 0.1              | 1.5 min.       | 12.0 ± 0.2 | 4,000             |
| 2512      | 3.6 <sup>+0.2/-0.18</sup> | 6.9 ± 0.2 | 0.85 ± 0.15 | 4.0 ± 0.05 | 4.0 ± 0.1      | 1.75 ± 0.1 | 5.5 ± 0.05 | 1.5 <sup>+0.1/-0</sup> | 1.5 min.       | 12.0 ± 0.2 | 4,000             |

