# Low Value Current Sense Thin Film Chip Resistors

## LCS Series


### Features:

- Thin film technology
- Low values down to R05 (50mΩ)
- Precision to ±0.5% & ±50ppm/°C
- Accurate current sensing in electronic systems

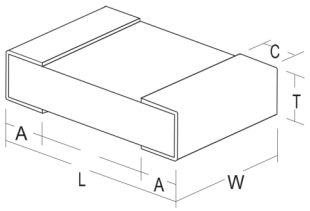
All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

## Electrical Data

| | | LCS0603 | LCS0805 | LCS1206 | LCS2010 | LCS2512 |
|---|---|---|---|---|---|---|
| Power rating at 70°C | W | 0.1 | 0.125 | 0.25 | 0.75 | 1 |
| Resistance range | Ω | R20 – 1R0 | | R05 – 1R0 | | |
| TCR | ppm/°C | R05 – R10: ±200 | | R102-R75: ±100 | >R75: ±50 | |
| Resistance tolerance | % | 0.5, 1 | | ≤ R10: 1<br>>R10: 0.5, 1 | 0.5, 1 | |
| Standard values | | E24 or E96 preferred | | | | |
| Ambient temperature range | °C | -55 to +155 | | | | |

## Physical Data

| Dimensions in mm and weight in mg | | | | | | |
|---|---|---|---|---|---|---|
| | L | W | T max. | A | C | Wt. nom. |
| 0603 | 1.6 ±0.1 | 0.8 ± 0.1 | 0.55 | 0.3 ± 0.2 | 0.3 ± 0.2 | 3 |
| 0805 | 2 ± 0.15 | 1.25 ± 0.15 | 0.65 | 0.4 ± 0.25 | | 6 |
| 1206 | 3.05 ± 0.15 | 1.55 ± 0.15 | | | 0.5 ± 0.3 | 12 |
| 2010 | 5 ± 0.2 | 2.45 ± 0.15 | 0.75 | 0.5 ± 0.25 | 0.6 ± 0.3 | 27 |
| 2512 | 6.35 ± 0.2 | 3.15 ± 0.15 | | 0.55 ± 0.25 | | 50 |




### Construction

A thin-film material is selectively deposited on a 96% alumina substrate together with metallic contacts at each end of the resistor. The unadjusted resistors are heat treated to give the required TCR and stability, then a precisely controlled laser trim process adjusts the resistance value. Protection is applied and wrap-around terminations are added and plated with nickel then tin. Each resistor is measured immediately before packing into tape.

### Terminations

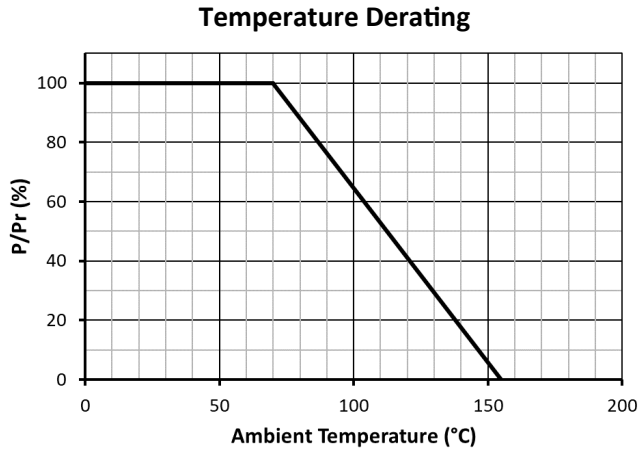
LCS has 100% Sn matte plated wrap-around terminations suitable for soldering.

### Marking

0603 uses three character marking. Larger sizes are marked with up to four characters, e.g. 1Ω is marked 1R0 and 680mΩ is marked R68.

## Performance Data

| Test | Method | | Maximum |
|---|---|---|---|
| Load life | 1000 hours, cyclic load $P_r$ at $T_A$ = 70°C | **±ΔR%** | 1 |
| Short term overload | 6.25 x $P_r$ for 5 s | **±ΔR%** | 1 |
| Temperature rapid change | 100 cycles, -55 to +150°C | **±ΔR%** | 0.5 |
| Damp heat steady state | 1000 hours @ 40°C, 90 - 95%RH | **±ΔR%** | 0.5 |
| Resistance to solder heat | 260 ± 5°C, 10 ± 1s | **±ΔR%** | 0.5 |
| Solderability | 245 ± 5°C, 3s | | ≥95% coverage |
| Insulation resistance | 100$V_{dc}$, 60s | | ≥1G |




### Packaging

LCS resistors are packed in tape which is 8mm wide paper for 0603 to 1206 sizes and 12mm wide plastic for 2010 and 2512 sizes, all on 178mm reels. For full details of tape and reel dimensions see:
https://www.ttelectronics.com/ttelectronics/media/productfiles/applicationnotes/ps001-packing-of-general-purpose-chip-resistors.pdf

## Ordering Procedure

**Example: LCS0603-R20DT5LF** (LCS0603, 200mΩ 0.5%, tape packed 5000/reel, Pb-free)

| L | C | S | 0 | 6 | 0 | 3 | - | R | 2 | 0 | | D | T | 5 | L | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 2 | | | | | 3 | | | | 4 | 5 | | 6 | |

| 1<br>Type | 2<br>Size | 3<br>Value | 4<br>Tolerance | 5<br>Packing | | | 6<br>Termination |
|---|---|---|---|---|---|---|---|
| LCS | 0603 | E24 or E96<br>3/4 characters<br>R = ohms | D = ±0.5% | T5 | 0603, 0805, 1206 | 5000/reel | LF = Pb-free |
| | 0805 | | F = ±1% | T4 | 2010, 2512 | 4000/reel | |
| | 1206 | | | | | | |
| | 2010 | | | | | | |
| | 2512 | | | | | | |