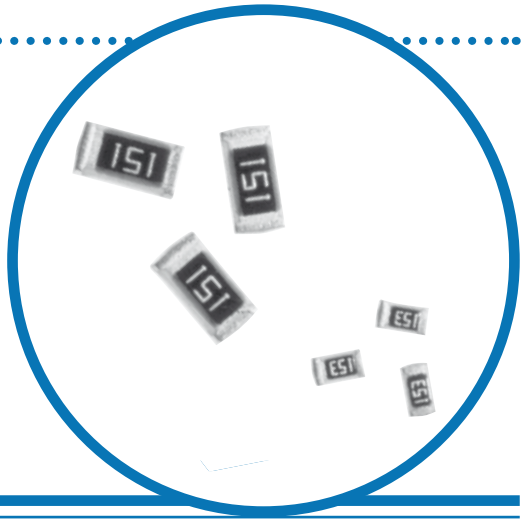
# General Purpose Surface Mounted Resistors

WCR Series

- **Excellent reliability**
- **Wide range of sizes and ohmic values**
- **Wrap around terminations**
- **Inner electrode protection**
- **AEC-Q200 grade available**



## Electrical Data

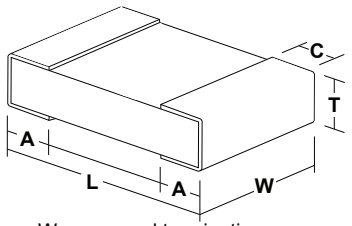
| | | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 2010 | 2512 |
|---|---|---|---|---|---|---|---|---|---|
| Power rating @ 70°C | watts | 0.05 | 0.063 | 0.1 | 0.125 | 0.25 | 0.25 | 0.5 | 1.0 |
| Resistance range | ohms | 10R to 1M0 | 1R0 to 1M0 | 1R0 to 10M | | | | | |
| Limiting element votage | volts | 25 | 50 | | 150 | 200 | | | |
| TCR* | ppm/°C | 250 | 100 | | | | | 200 | |
| Resistance Tolerance | % | 1 | | | | | | | |
| Standard values | | E24 or E96 | | | | | | | |
| Ambient temperature range | °C | -55 to 155 | | | | | | | |
| Zero-ohm Jumper Chip Rating | amps | 0.5 | 1 | | 1.5 | 2 | | | |
| Zero-ohm Jumper Chip Resistance | milliohms | <50 | | | | | | | |

* Notes – TCR for low values 1R to 10R: -400 to +600ppm/°C, 11R to 100R: ±200ppm/°C
TCR for high values 3M3 to 10M: ±300ppm/°

## Physical Data

**Dimensions (mm)**

| Style | L | W | T | C | A |
|---|---|---|---|---|---|
| **0201** | 0.6 ± 0.03 | 0.3 ± 0.03 | 0.23 ± 0.03 | 0.12 ± 0.05 | 0.15 ± 0.05 |
| **0402** | 1.0 ± 0.1 | 0.5 ± 0.05 | 0.35 ± 0.05 | 0.2 ± 0.1 | 0.25 ± 0.1 |
| **0603** | 1.6 ± 0.15 | 0.8 ± 0.15 | 0.5 ± 0.15 | 0.25 ± 0.2 | 0.25 ± 0.2 |
| **0805** | 2.0 ± 0.2 | 1.25+ 0.2 -0.1 | 0.5 + 0.15 -0.10 | 0.4 ± 0.2 | 0.4 ± 0.2 |
| **1206** | 3.2 +0.1 -0.25 | 1.6 + 0.1 -0.15 | 0.55 +0.15 -0.1 | 0.5 + 0.2-0.25 | 0.5+ 0.2 -0.25 |
| **1210** | 3.2 + 0.1 -0.2 | 2.6 ± 0.15 | 0.55 +0.15 -0.1 | 0.5 ± 0.25 | 0.5 ± 0.2 |
| **2010** | 5.0 ± 0.15 | 2.5 ± 0.15 | 0.56 ± 0.15 | 0.60 ± 0.25 | 0.60 ± 0.25 |
| **2512** | 6.3 ± 0.15 | 3.2 ± 0.15 | 0.56 ± 0.15 | 0.60 ± 0.25 | 1.2 ± 0.85 |



Wrap-around terminations
(3 faces)

### Construction

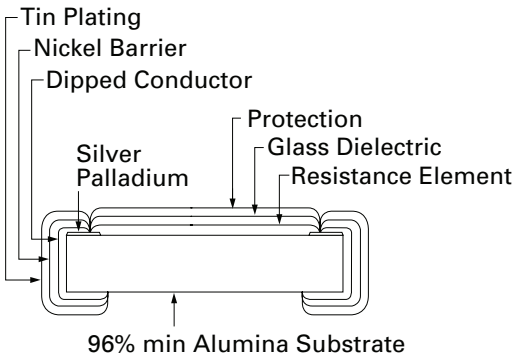
The chips have a high alumina substrate (96% minimum) with a ruthenium oxide resistance element and silver palladium, nickel and tin plated terminations. A glazed protection coat is applied to the resistive element (See Fig.1)

### Terminations

**Solderability** The terminations meet the requirements of IEC 115-1, Clause 4.17.3.2.

**Strength** The terminations meet requirements of IEC 68.2.21.

Figure 1



## Marking

All resistors are individually marked with 3 digits. The first two digits are the significant figures and the third defines the number of added zeros. Jumpers are marked 000. Types 0201 and 0402 have no marking.

E96 1% components that can not be marked with 4 digits will be marked with a standard 3 digit code. Details can be supplied upon request.

## Solvent Resistance

The protective epoxy lacquer and marking are resistant to all normal industrial cleaning fluids suitable for printed circuits.

Table 1

| Resistance value ohms | Noise dB |
|---|---|
| ≤100R | -10 |
| >100R, ≤10K | 0 |
| >10K, ≤100K | +15 |
| >100K, ≤1M0 | +20 |
| >1M0 | +30 |

# Performance Data

| | | Maximum Change | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **0201** | **0402** | **0603** | **0805** | **1206** | **1210** | **2010** | **2512** |
| Load: 1000 hrs at 70°C | ΔR% | 10R-100K : 1<br>>100K : 2 | 4R7-100K : 1<br>>100K : 2 | 1R-100K : 1<br>>100K : 2 | 1R-100K : 1<br>>100K : 2 | 1R-100K : 1<br>>100K : 2 | 1R-100K : 1<br>>100K : 2 | 1R-100K : 1<br>>100K : 2 | 3% + 0.1R |
| Shelf life: 12 months at room temp. | ΔR% | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Derate linearly to zero from 70°C | | zero @ 125 °C | | | | | | | |
| Short term overload (6.25 x rated power) | ΔR% | 2 | 2 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 5 |
| Max voltage | volts | 50 | 100 | 100 | 200 | 400 | 400 | 400 | 400 |
| Climatic | ΔR% | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Climatic Catagory | | 55/125/56 | | | | | | | |
| Long term damp heat | ΔR% | 1 | | | | | | | |
| Temperature rapid change | ΔR% | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Resistance to solder heat | ΔR% | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Vibration and bump | ΔR% | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Noise | | see table 1 | | | | | | | |
| Insulation resistance | ohms | | > 1G | | | | | | |
| Voltage proof | volts | | 100 | 300 | 500 | 500 | 500 | 500 | 500 |

## Packaging

All chips are tape mounted and supplied on standard 8mm tape reel, as IEC publication 286-3.
180mm (7 inch) reel is standard
250mm (10 inch) reel carrying double the standard quantity can be supplied by agreement.

## Chip Resistor Labstock For Designers

WCR chip resistors are available in a special package of the most popular sizes containing 50 each of the E24 values.
Please contact the sales desk for full details of this excellent solution for designers and your prototype build requirements.

# Ordering Procedure

This product has two valid part numbers:

**European (Welwyn) Part Number: WCR1206-10KFI** (1206, 10 kilohms ±1%, Pb-free)

| W | C | R | 1 | 2 | 0 | 6 | - | 1 | 0 | K | F | I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 2 | | | | | 3 | | | 4 | 5 |

| 1<br>Type | 2<br>Size | 3<br>Value[1] | 4<br>Tolerance[1] | 5<br>Grade / Packing | |
|---|---|---|---|---|---|
| WCR | 0201 | E24 = 3 characters | F = ±1% | I = Standard | |
| | 0402 | E96 = 4 characters | | A = AEC-Q200 grade[2] | |
| | 0603 | R = ohms | | Both grades use standard packing as follows: | |
| | 0805 | K = kilohms | | 0201 | 20000/reel |
| | 1206 | M = megohms | | 0402 | 10000/reel |
| | 1210 | | | 0603, 0805, 1206, 1210 | 5000/reel |
| | 2010 | | | 2010, 2512 | 4000/reel |
| | 2512 | | | | |

Note 1: For zero ohm jumper chips use the dummy value & tolerance code **R005J**

Note 2: AEC-Q200 grade on resistor chips is not available in 0201 size, and on zero ohm jumper chips it is not available in 0201, 0402 or 2512 sizes

**USA (IRC) Part Number: WCR-WCR1206LF-1002FPLT** (1206, 10 kilohms ±1%, Pb-free)

| W | C | R | - | W | C | R | 1 | 2 | 0 | 6 | L | F | 1 | 0 | 0 | 2 | F | P | L | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 2 | | | 3 | | | | 4 | | 5 | | | | 6 | 7 | | |

| 1<br>Family | 2<br>Model | 3<br>Size | 4<br>Termination | 5<br>Value | 6<br>Tolerance | 7<br>Packing | |
|---|---|---|---|---|---|---|---|
| WCR | WCR | 0201 | LF = Pb-free | 3 digits + multiplier | F = ±1% | PLT = Paper Tape | |
| | | 0402 | | R = ohms for values <100 ohms | | 0201 | 20000/reel |
| | | 0603 | | | | 0402 | 10000/reel |
| | | 0805 | | | | 0603, 0805, 1206, 1210 | 5000/reel |
| | | 1206 | | | | 2010 | 4000/reel |
| | | 1210 | | | | ELT = Plastic Tape | |
| | | 2010 | | | | 2512 | 4000/reel |
| | | 2512 | | | | | |