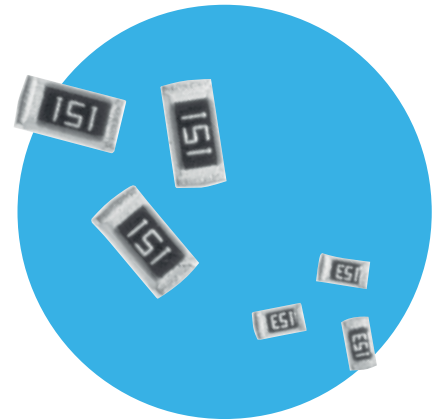


Green Thick-Film Chip Resistors

GWCR Series

- Completely free of Pb and its compounds
- RoHS compliant without exemption
- Sizes 01005 to 2512
- Values 1R0 to 10M



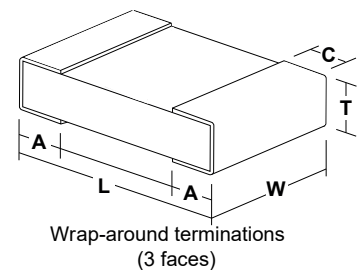
All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

| | | 01005 | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2010 | 2512 |
|-----------------------------|-----------|--|--------------------------------|--|------|-------|------|------|------|------|------|
| Power rating @ 70°C | watts | 0.031 | 0.05 | 0.063 | 0.1 | 0.125 | 0.25 | 0.5 | 0.75 | 1 | |
| Resistance range | ohms | 10R-1M0 | 1R0 – 10M | | | | | | | | |
| Limiting element voltage | volts | 15 | 25 | 50 | 75 | 150 | 200 | | 250 | | |
| TCR | ppm/°C | 10R: ±600, 10R2- 100R: ±400, >100R: ±250 | 1R0 – 10R: ±400, >10R: ±200 | 1R0 – 10R: ±400, 10R2- 100R: ±200, >100R: ±100 | | | | | | | |
| Resistance tolerance | % | ±1 | | | | | | | | | |
| Standard values | | E24 or E96 | | | | | | | | | |
| Ambient temperature range | °C | -55 to 155 | | | | | | | | | |
| Dielectric withstand | volts | N/A | | 100 | 300 | 500 | | | | | |
| Insulation resistance | ohms | N/A | | ≥1G0 | | | | | | | |
| Zero-ohm jumper chip rating | amps | 0.5 | | 1 | | 2 | | | | | |
| Zero-ohm resistance | milliohms | <50 | | | | | | | | | |

Physical Data

| Dimensions (mm) and Weight (mg) | | | | | | |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-----------|
| | L | W | T | C | A | Wt (nom.) |
| 01005 | 0.40 ± 0.02 | 0.2 ± 0.02 | 0.13 ± 0.05 | 0.10 ± 0.05 | 0.10 ± 0.03 | 0.2 |
| 0201 | 0.6 ± 0.03 | 0.30 ± 0.03 | 0.23 ± 0.05 | 0.10 ± 0.05 | 0.15 ± 0.05 | 0.3 |
| 0402 | 1.00 ± 0.10 | 0.50 ± 0.05 | 0.35 ± 0.05 | 0.20 ± 0.10 | 0.25 ± 0.10 | 0.5 |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.45 ± 0.10 | 0.30 ± 0.20 | 0.30 ± 0.20 | 2.2 |
| 0805 | 2.00 ± 0.15 | 1.25 ± 0.15 | 0.55 ± 0.10 | 0.40 ± 0.20 | 0.40 ± 0.20 | 4.7 |
| 1206 | 3.10 ± 0.15 | 1.55 ± 0.15 | 0.55 ± 0.10 | 0.45 ± 0.20 | 0.45 ± 0.20 | 8.5 |
| 1210 | 3.10 ± 0.15 | 2.60 ± 0.20 | 0.55 ± 0.10 | 0.50 ± 0.20 | 0.50 ± 0.20 | 17.2 |
| 1812 | 4.50 ± 0.20 | 3.20 ± 0.20 | 0.55 ± 0.10 | 0.50 ± 0.20 | 0.50 ± 0.20 | 29.5 |
| 2010 | 5.00 ± 0.10 | 2.50 ± 0.10 | 0.55 ± 0.10 | 0.60 ± 0.25 | 0.50 ± 0.20 | 24.8 |
| 2515 | 6.35 ± 0.10 | 3.20 ± 0.10 | 0.55 ± 0.10 | 0.60 ± 0.25 | 0.50 ± 0.20 | 34.3 |



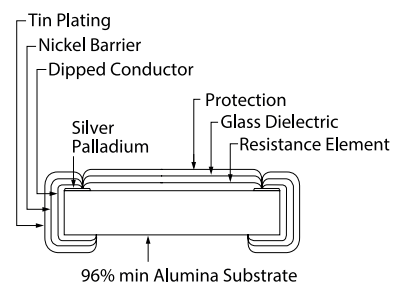
Construction

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 fig1)

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



General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

GWCR Series

Marking

Where size permits, resistors are individually marked with three or four digits. The first two or three digits are the significant figures and the final one defines the number of added zeros. Lower values use "R" as a decimal point. Zero ohm jumpers are marked "0". E96 value 0603 parts are marked with the EIA-96 standard 3-character code. Sizes below 0603 have no marking.

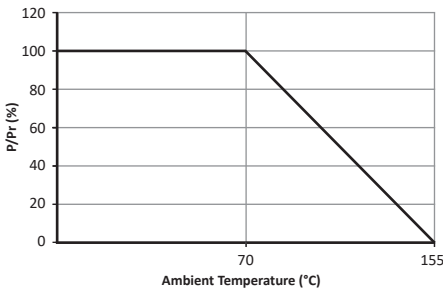
Solvent Resistance

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

Performance Data

| | | 01005 | 0201 | All other sizes |
|--|------|-------|---------------|-----------------|
| Load (1000 hrs @70°C) | ±ΔR% | 3 | 1 | |
| Shelf life (12 months) | ±ΔR% | | 0.2 | |
| Short term overload (6.25x Pr or 2.5x LEV for 5s) | ±ΔR% | 2 | | 1 |
| Climatic category | | | 55 / 155 / 56 | |
| Damp heat (240 hrs @40°C, 90-95%RH) | ±ΔR% | 3 | | 0.5 |
| Damp heat load (1000 hrs @40°C, 90-95%RH) | ±ΔR% | 3 | | 1 |
| Temperature cycle (5 cycles, -55/+155°C) | ±ΔR% | 1 | | 0.5 |
| Resistance to solder heat (260±5°C for 10±1s) | ±ΔR% | | 1 | |
| Board flex (3mm/90mm for 60s) | ±ΔR% | | N/A | 1 |

Derating Curve



Packaging

Sizes 01005 to 1210 are packed in 8mm wide paper tape. Sizes 1812 to 2512 are packed in 12mm plastic tape. All sizes are supplied on 178mm reels.

Ordering Procedure

Example: **GWCR1206-10KFT5** (GWCR1206 at 10 kilohms ±1%, Pb-free)



| 1 Type | 2 Size | 3 Value | 4 Tolerance | 5 Packing | | |
|-----------|-----------|----------------------------|--------------------|------------------|------------------------|-------------|
| GWCR | 01005 | 3/4 characters R = ohms | F = 1% | T20 | 01005 | 20,000/reel |
| | 0201 | | blank for zero ohm | T10 | 0201, 0402 | 10,000/reel |
| | 0402 | K = kilohms | | T5 | 0603, 0805, 1206, 1210 | 5,000/reel |
| | 0603 | M = megohms | T4 | 1812, 2010, 2512 | 4,000/reel | |
| | 0805 | R000 = zero ohm | | | | |
| | 1206 | | | | | |
| | 1210 | | | | | |
| | 1812 | | | | | |
| | 2010 | | | | | |
| | 2512 | | | | | |

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