

## Surface Mounted Resistors

### CR Series

- CECC released products
- 100% high temperature and overload screened versions available for high reliability applications
- Terminations available for wire bonding or soldering
- Available in sizes down to 0503
- Resistance range 1 ohm to 100M ohms
- Tolerances down to 0.1%
- Solder terminations have a nickel barrier layer
- Shorting Links available



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

### Electrical Data

| Commercial                |        | CR0503                            | CR0603 | CR0805     | CR1005 | CR1206 | CR2010   | CR2512 | Notes |                           |
|---------------------------|--------|-----------------------------------|--------|------------|--------|--------|----------|--------|-------|---------------------------|
| Power rating at 70°C      | watts  | 0.063                             | 0.1    | 0.125      | 0.125  | 0.25   | 0.5      | 1.0    |       |                           |
| Resistance range          | ohms   | 1R to 10M                         |        | 1R to 100M |        |        | 1R to 1M |        |       |                           |
| Limiting element voltage  | volts  | 50                                | 75     | 100        | 150    | 200    | 400      | 500    |       |                           |
| TCR -55°C to +155°C       | ppm/°C | <10R: 200, 10R-1M0: 100, >1M0:250 |        |            |        |        |          |        |       |                           |
| Resistance tolerance      | %      | 0.1, 0.25, 0.5, 1, 2, 5           |        |            |        |        |          |        |       | See table of value ranges |
| Ambient temperature range | °C     | -55 to 155                        |        |            |        |        |          |        |       |                           |

| CECC 40401-004 Requirements |        |  |  | CR0805                              |  | CR1206 |  |  |  |                           |
|-----------------------------|--------|--|--|-------------------------------------|--|--------|--|--|--|---------------------------|
| Power rating at 70°C        | watts  |  |  | 0.125                               |  | 0.25   |  |  |  |                           |
| Resistance range            | ohms   |  |  | 1R to 10M                           |  |        |  |  |  |                           |
| Limiting element voltage    | volts  |  |  | 100                                 |  | 200    |  |  |  |                           |
| TCR -55°C to +125°C         | ppm/°C |  |  | <10 ohms 200: 10 to 1M 100: >1M 200 |  |        |  |  |  |                           |
| TCR +20°C to +70°C          | ppm/°C |  |  | <10 ohms 200: 10 to 1M 50: >1M 100  |  |        |  |  |  |                           |
| Resistance tolerance        | %      |  |  | 0.5, 1, 2, 5                        |  |        |  |  |  | See table of value ranges |
| Ambient temperature range   | °C     |  |  | -55 to +125                         |  |        |  |  |  |                           |

| CECC 40401-008 Requirements |        |  | CR0603                            | CR0805 |  | CR1206                  | CR2010   | CR2512   |                           |  |
|-----------------------------|--------|--|-----------------------------------|--------|--|-------------------------|----------|----------|---------------------------|--|
| Power rating at 70°C        | watts  |  | 0.1                               | 0.125  |  | 0.25                    | 0.5      | 1.0      |                           |  |
| Resistance range            | ohms   |  | 1R to 10M                         |        |  | 1R to 10M               | 1R to 1M | 1R to 1M |                           |  |
| Limiting element voltage    | volts  |  | 75                                | 100    |  | 200                     | 400      | 500      |                           |  |
| TCR -55°C to +155°C         | ppm/°C |  | <10R: 200, 10R-1M0: 100, >1M0:250 |        |  |                         |          |          |                           |  |
| Resistance tolerance        | %      |  | 0.5, 1, 2, 5                      |        |  | 0.1, 0.25, 0.5, 1, 2, 5 |          |          | See table of value ranges |  |
| Ambient temperature range   | °C     |  | -55 to 155                        |        |  |                         |          |          |                           |  |

| CECC 40401-003 Requirements |        |  |  | CR0805  |  | CR1206   |  |  |  |                           |
|-----------------------------|--------|--|--|---|--|----------|--|--|--|---------------------------|
| Power rating at 70°C        | watts  |  |  | 0.063   |  | 0.125    |  |  |  |                           |
| Resistance range            | ohms   |  |  | 1R to 3M  |  | 1R to 5M |  |  |  |                           |
| Limiting element voltage    | volts  |  |  | 100   |  | 200      |  |  |  |                           |
| TCR -55°C to +125°C         | ppm/°C |  |  | <5 ohms 500: 5 to 10 ohms 350:<br>10 to 3M ohms 100: >3M ohms 250 |  |          |  |  |  |                           |
| Resistance tolerance        | %      |  |  | 0.25, 0.5, 1, 2, 5  |  |          |  |  |  | See table of value ranges |
| Ambient temperature range   | °C     |  |  | -55 to 125  |  |          |  |  |  |                           |

These tables indicate the CECC specification requirements, and these are met or exceeded by the corresponding CR series product

| Values                       |         | E24 & E96 preferred |     |     |     |     |    |    | Any value to order Mounted on custom designed PCB's |
|------------------------------|---------|---------------------|-----|-----|-----|-----|----|----|---|
| Thermal impedance            | °C/watt | 800                 | 550 | 360 | 290 | 200 | 80 | 70 |   |
| Zero-ohm rating              | A       |                     | 1   | 1.5 |     | 2   | 3  |    |   |
| Zero-ohm residual resistance | mΩ      | <20                 |     |     |     |     |    |    |   |

### 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.

## Physical Data

| Dimensions (mm) & Weight (mg) |          |           |       |               |                |          |     |
|-------------------------------|----------|-----------|-------|---------------|----------------|----------|-----|
| Style                         | L        | W         | T max | Wrap around   |                | C        | Wt  |
|                               |          |           |       | A             | B <sup>1</sup> |          |     |
| 0503                          | 1.25±0.1 | 0.63±.1   | 0.5   | Not available |                | 0.20±0.1 | 1.5 |
| 0603                          | 1.6±0.1  | 0.8±0.1   | 0.55  | 0.3±0.15      | 0.6 min        | 0.3±0.15 | 2.2 |
| 0805                          | 2.0±0.15 | 1.25±0.15 | 0.6   | 0.3±0.15      | 0.9 min        | 0.3±0.1  | 4.7 |
| 1005                          | 2.5±0.2  | 1.25±0.2  | 0.7   | Not available |                | 0.4±0.15 | 6.5 |
| 1206                          | 3.2±0.2  | 1.6±0.2   | 0.7   | 0.4±0.2       | 1.7 min        | 0.4±0.15 | 8.5 |
| 2010                          | 5.1±0.3  | 2.5±0.2   | 0.8   | 0.6±0.3       | 3 min          | 0.6±0.25 | 36  |
| 2512                          | 6.5±0.3  | 3.2±0.2   | 0.8   | 0.6±0.3       | 4.4min         | 0.6±0.25 | 55  |



<sup>1</sup>This dimension determines the number of conductors which may pass under the surface mounted device.

### Construction

Thick film resistor material, overglaze and organic protection are screen printed on a 96% alumina substrate.

### Terminations

Planar (or single-sided) termination is gold and suitable for wire-bonding; wrap-around is suitable for soldering.

### Solderability

Wrap-around terminations have an electroplated nickel barrier and solder coating, this ensures excellent 'leach' resistance properties and solderability. They will withstand immersion in solder at 260°C for 30 seconds.

### Marking

All relevant information recorded on the primary package or reel.

## Performance Data

|   | CECC 40401-008<br>Requirements                         | CECC40401-004<br>Requirements | CECC40401-003<br>Requirements | Actual                                 |               |
|---|--|-------------------------------|-------------------------------|--|---------------|
|   |  |                               |                               | Maximum                                | Typical       |
| Load at rated power: 1000 hours at 70°C ΔR%                           | 2  | 2                             | ≤ 3M3 2<br>>3M3 3             | 2                                      | 0.25          |
| Shelf life: 12 months at room temp. ΔR%                               | -  | -                             | -                             | 0.1                                    | 0.02          |
| Derating from rated power at 70°C                                     | Zero at 155°C  | Zero at 125°C                 | Zero at 125°C                 |  |               |
| Overload ΔR%  | 0603, 0805:1<br>1206:0.5                               | 0.5                           | 2                             | 1                                      | 0.1           |
| Dry Heat: 1000 hours at UCT (125°C for 003 & 004 - 155°C for 008) ΔR% | 2  | 1                             | ≤ 3M3 2<br>>3M3 3             | to 10M 1<br>>10M 2                     | 0.2<br>>10M 1 |
| Long term damp heat ΔR%   | 2  | 2                             | 2                             | 1                                      | 0.25          |
| Temperature rapid change ΔR%  | 0.5  | 0.5                           | 1                             | 0.25                                   | 0.05          |
| Resistance to solder heat ΔR%   | 0.5  | 0.5                           | 2                             | 0.25                                   | 0.05          |
| Voltage proof volts   | 0603:150, 0805:200,<br>1206:300, 2010:400,<br>2512:500 | 0805:200, 1206:300            |                               | 0503:100, 0603:300,<br>All others: 500 |               |

Note: An 0.01 ohm addition to be added to the performance of all resistors <10 ohms

## Value Ranges (ohms)

| Tolerance<br>Size | %         |          |           |           |           |           |
|-------------------|-----------|----------|-----------|-----------|-----------|-----------|
|                   | 5         | 2        | 1         | 0.5       | 0.25      | 0.1       |
| 0503              | 1 to 10M  | 1 to 10M | 10 to 10M | 100 to 1M | N/A       | N/A       |
| 0603              | 1 to 10M  | 1 to 10M | 1 to 10M  | 100 to 1M | N/A       | N/A       |
| 0805              | 1 to 100M | 1 to 50M | 1 to 20M  | 10 to 10M | 100 to 1M | 100 to 1M |
| 1005              | 1 to 100M | 1 to 50M | 1 to 20M  | 10 to 10M | 100 to 1M | 100 to 1M |
| 1206              | 1 to 100M | 1 to 50M | 1 to 25M  | 10 to 10M | 100 to 1M | 100 to 1M |
| 2010              | 1 to 1M   | 1 to 1M  | 1 to 1M   | 10 to 10M | 100 to 1M | N/A       |
| 2512              | 1 to 1M   | 1 to 1M  | 1 to 1M   | 10 to 10M | 100 to 1M | N/A       |

### 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.

CR Series

## Application Notes

### Operating Temperature Range

The chips themselves can operate at a maximum temperature of 155°C (see performance claims above). For soldered chips, the joint temperature should not exceed 110°C. This condition is met when the stated power levels at 70°C are used.

### Mounting

This chip resistor is ideally suited for handling by automatic methods due to its rectangular shape and the small dimensional tolerances. Electrical connection to a ceramic substrate or to a printed circuit board can be made by wire bonding (eg suffix 'G' in CR0805G) or by reflow soldering of wrap-around terminations (eg suffix 'F' in CR0805F).

The 'F' terminations provide good leach properties and ensure reliable contact. Due to the robust construction the resistor chip can be immersed in the solder bath for 30 seconds at 260°C. This enables the resistor to be mounted on one side of a printed circuit board and other wire-leaded components on the other side.

### Packaging

#### Wrap-around Termination

Chip resistors are supplied taped and reeled on standard 8mm tape to IEC 286-3.

### Planar Terminations

Resistor chips are supplied in waffle packs.

## Ordering Procedure

**Example: CR2512F-10KF I** (2512 with solderable wraparound terminations, 10 kilohms ±1%, Pb-free)



| 1    | 2    | 3           |                              | 4                     | 5                       | 6                     |                           |                   |                 |
|------|------|-------------|------------------------------|-----------------------|-------------------------|-----------------------|---------------------------|-------------------|-----------------|
| Type | Size | Termination |                              | Value                 | Tolerance               | Termination & Packing |                           |                   |                 |
| CR   | 0503 | F           | 0603, 0805, 1206, 2010, 2512 | Solderable wraparound | E24 or E96              | B = ±0.1%             | Pb-free solderable (RoHS) |                   |                 |
|      | 0603 |             |                              |                       | 3/4 characters          | C = ±0.25%            | I                         | 0603F             | up to 5000/reel |
|      | 0805 |             |                              |                       | R = ohms                | D = ±0.5%             |                           | 0805F,1206F,2010F | up to 3000/reel |
|      | 1005 |             |                              |                       | K = kilohms             | F = ±1%               |                           | 2512F             | up to 1800/reel |
|      | 1206 |             |                              |                       | M = megohms             | G = ±2%               | SnPb solderable           |                   |                 |
|      | 2010 | G           | All sizes                    | Gold pad planar       |                         | J = ±5%               | 0603F                     | up to 5000/reel   |                 |
|      | 2512 |             |                              |                       | R005J = zero ohm jumper | PB                    | 0805F,1206F,2010F         | up to 3000/reel   |                 |
|      |      |             |                              |                       |                         |                       | 2512F                     | up to 1800/reel   |                 |
|      |      |             |                              |                       |                         |                       | Gold pad planar           |                   |                 |
|      |      |             |                              |                       |                         | I                     | xxxxG                     | Waffle            |                 |

For CECC released product state on order the CECC number. Example: **CR2512F-10KFI CECC40401-008**

### 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.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.