

## Type CRG Series

### Key Features

- Thick film resistors with a high power to size ratio, ideally suited to industrial and general purpose use. A range from 1 ohm to 10M and tolerances of 1% and 5%. Also including zero ohm links.
- Suitable for most applications, including high frequency operation, owing to the short lead structure and low capacitance.
- Seven Package Sizes
- Terminal finish: Matte Sn



Precious metal terminations are screen printed onto a ceramic base and fired. The resistive element is screen printed and fired and the passivation layer added. Each resistor is trimmed to tolerance by laser. The pre-scribed tile is broken into strips, the end plating is fired on and the strips broken into individual components. Final termination is made by electroplating.

### Characteristics – Electrical

|                            | 0201 |      |      | 0402  |      |      | 0603 |      |      | 0805  |      |      |
|----------------------------|------|------|------|-------|------|------|------|------|------|-------|------|------|
| Rated Power @ 70 °C (W)    | 0.05 |      |      | 0.063 |      |      | 0.1  |      |      | 0.125 |      |      |
| Resistance Range           | 10   | 1    | 11   | 10    | 1    | 11   | 1    | 101  | 1    | 11    | 1    | 11   |
| Ohms                       | 1M0  | 10   | 1M0  | 2M0   | 10   | 3M3  | 100  | 1M0  | 10   | 10M   | 100  | 1M0  |
| Tolerance (%)              | 1    | 5    | 5    | 1     | 5    | 5    | 1    | 1    | 5    | 5     | 1    | 1    |
| Code letter                | F    | J    | J    | F     | J    | J    | F    | F    | J    | J     | F    | F    |
| Selection Series           | E24  | E24  | E24  | E24   | E24  | E24  | E24  | E24  | E24  | E24   | E24  | E24  |
|                            | E96  |      |      | E96   |      |      |      | E96  |      |       | E96  |      |
| Temp. Coefficient (ppm/°C) | ±200 | ±400 | ±200 | ±100  | ±400 | ±200 | ±200 | ±100 | ±200 | ±200  | ±100 | ±400 |

|                            | 1206 |      |      |      | 2010 |      |      |      | 2512 |      |      |      |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Rated Power @ 70 °C (W)    | 0.25 |      |      |      | 0.5  |      |      |      | 1    |      |      |      |
| Resistance Range           | 1    | 101  | 1    | 11   | 1    | 101  | 1    | 11   | 1    | 101  | 1    | 11   |
| Ohms                       | 100  | 1M0  | 10   | 10M  | 100  | 1M0  | 10   | 10M  | 100  | 1M0  | 10   | 10M  |
| Tolerance (%)              | 1    | 1    | 5    | 5    | 1    | 1    | 5    | 5    | 1    | 1    | 5    | 5    |
| Code letter                | F    | F    | J    | J    | F    | F    | J    | J    | F    | F    | J    | J    |
| Selection Series           | E24  | E24  | E24  | E24  | E24  | E24  | E24  | E24  | E24  | E24  | E24  | E24  |
|                            |      | E96  |      |      |      | E96  |      |      |      | E96  |      |      |
| Temp. Coefficient (ppm/°C) | ±200 | ±100 | ±400 | ±200 | ±200 | ±100 | ±400 | ±200 | ±200 | ±100 | ±400 | ±200 |

|                                       | 0201        | 0402 | 0603 | 0805     | 1206 | 2010 | 2512 |
|---------------------------------------|-------------|------|------|----------|------|------|------|
| Working Voltage (V)                   | 25          | 50   | 50   | 150      | 200  | 200  | 200  |
| Max. Overload Voltage (V)             | 50          | 100  | 100  | 300      | 400  | 400  | 400  |
| Operating Temp. Range (°C)            | -55 to +125 |      |      |          |      |      |      |
| Climatic Category (°C)                | 55/125/56   |      |      |          |      |      |      |
| Insulation Resistance Dry Min (Mohms) | 1000        |      |      |          |      |      |      |
| Stability (%)                         | 3           |      |      |          |      |      |      |
| Zerohm (A) Current Max                | 0.5         | 1    | 1    | 2        | 2    | 2    | 2    |
| Resistance Max                        | <50 mOhm    |      |      | <50 mOhm |      |      |      |

## Type CRG Series

### Dimensions



| Style | L         | W          | t          | a          | b          |
|-------|-----------|------------|------------|------------|------------|
| 0201  | 0.6 ±0.03 | 0.3 ±0.03  | 0.23 ±0.03 | 0.10 ±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 ±0.1  | 0.8 ±0.15  | 0.45 ±0.1  | 0.3 ±0.2   | 0.3 ±0.1   |
| 0805  | 2.0 ±0.15 | 1.25 ±0.15 | 0.55 ±0.1  | 0.4 ±0.2   | 0.4 ±0.2   |
| 1206  | 3.1 ±0.15 | 1.55 ±0.15 | 0.55 ±0.1  | 0.45 ±0.2  | 0.45 ±0.2  |
| 2010  | 5.0 ±0.1  | 2.5 ±0.15  | 0.55 ±0.1  | 0.6 ±0.25  | 0.5 ±0.2   |
| 2512  | 6.35 ±0.1 | 3.2 ±0.15  | 0.55 ±0.1  | 0.6 ±0.25  | 0.5 ±0.2   |

### Marking Codes - Case Sizes 0805 to 2512

#### IEC 4 Digit Marking

| Resistance   | 100Ω | 2.2KΩ | 10KΩ | 49.9KΩ | 100KΩ |
|--------------|------|-------|------|--------|-------|
| Marking Code | 1000 | 2201  | 1002 | 4992   | 1003  |

#### Case Sizes 0603

##### E24 3 Digit Marking - Example: 101=100Ω 102=1KΩ

| E24 | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|
|     | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |

##### E96 3 Digit Marking - Examples: 14C=13K7Ω, 13C=13K3Ω, 68B=4K99Ω, 68X=49.9Ω

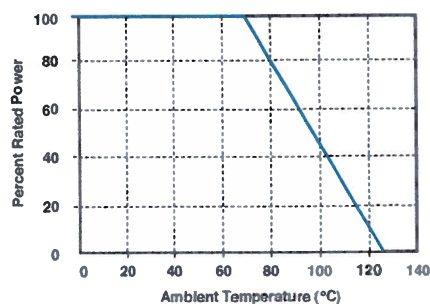


#### 0603 E96 Marking Code Table

| Code       | E96             |                 | Code            | E96             |                 | Code            | E96             |                 | Code             | E96              |                  |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| 01         | 100             |                 | 25              | 178             |                 | 49              | 316             |                 | 73               | 562              |                  |
| 02         | 102             |                 | 26              | 182             |                 | 50              | 324             |                 | 74               | 576              |                  |
| 03         | 105             |                 | 27              | 187             |                 | 51              | 332             |                 | 75               | 590              |                  |
| 04         | 107             |                 | 28              | 191             |                 | 52              | 340             |                 | 76               | 604              |                  |
| 05         | 110             |                 | 29              | 196             |                 | 53              | 348             |                 | 77               | 619              |                  |
| 06         | 113             |                 | 30              | 200             |                 | 54              | 357             |                 | 78               | 634              |                  |
| 07         | 115             |                 | 31              | 205             |                 | 55              | 365             |                 | 79               | 649              |                  |
| 08         | 118             |                 | 32              | 210             |                 | 56              | 374             |                 | 80               | 665              |                  |
| 09         | 121             |                 | 33              | 215             |                 | 57              | 383             |                 | 81               | 681              |                  |
| 10         | 124             |                 | 34              | 221             |                 | 58              | 392             |                 | 82               | 698              |                  |
| 11         | 127             |                 | 35              | 226             |                 | 59              | 402             |                 | 83               | 715              |                  |
| 12         | 130             |                 | 36              | 232             |                 | 60              | 412             |                 | 84               | 732              |                  |
| 13         | 133             |                 | 37              | 237             |                 | 61              | 422             |                 | 85               | 750              |                  |
| 14         | 137             |                 | 38              | 243             |                 | 62              | 432             |                 | 86               | 768              |                  |
| 15         | 140             |                 | 39              | 249             |                 | 63              | 442             |                 | 87               | 787              |                  |
| 16         | 143             |                 | 40              | 255             |                 | 64              | 453             |                 | 88               | 806              |                  |
| 17         | 147             |                 | 41              | 261             |                 | 65              | 464             |                 | 89               | 825              |                  |
| 18         | 150             |                 | 42              | 267             |                 | 66              | 475             |                 | 90               | 845              |                  |
| 19         | 154             |                 | 43              | 274             |                 | 67              | 487             |                 | 91               | 866              |                  |
| 20         | 158             |                 | 44              | 280             |                 | 68              | 499             |                 | 92               | 887              |                  |
| 21         | 162             |                 | 45              | 287             |                 | 69              | 511             |                 | 93               | 909              |                  |
| 22         | 165             |                 | 46              | 294             |                 | 70              | 523             |                 | 94               | 931              |                  |
| 23         | 169             |                 | 47              | 301             |                 | 71              | 536             |                 | 95               | 953              |                  |
| 24         | 174             |                 | 48              | 309             |                 | 72              | 549             |                 | 96               | 976              |                  |
| Code       | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

## Type CRG Series

### Derating Curve



### Mounting

The resistors are suitable for processing on automatic insertion equipment.

### Marking

#### CRG0805, CRG1206, CRG2010, CRG2512

E24 series resistors are marked with a three digit code.

E96 series resistors are marked with a four digit code.

Zerohm components are marked '0'.

#### CRG0603

E24 5% series are marked with a three digit code.

E24 1% series are marked with a three digit code.

E96 series are marked with the international alphanumeric three character code (available on request).

EXCEPT 10, 11, 13, 15, 20 & 75 decades which are marked as the E24 series.

CRG0201 & CRG0402 series unmarked.

### Performance Characteristics

The evaluation of the performance characteristics is carried out with reference to IECQ specifications QC 400 000 and QC 400 100.

| TEST REF | Long Term Tests $\pm(3\% + 0.1 \text{ ohm})$   |
|----------|------------------------------------------------|
| 4.23     | Climatic sequence                              |
| 4.24     | Damp heat, steady state                        |
| 4.25.1   | Endurance at 70 °C                             |
| 4.25.3   | Endurance at 125 °C                            |
| TEST REF | Short Term Tests $\pm(1\% + 0.05 \text{ ohm})$ |
| 4.13     | Overload                                       |
| 4.32     | Adhesion                                       |
| 4.33     | Bond strength of end face plating              |
| 4.19     | Rapid change of temperature                    |
| 4.18     | Resistance to soldering heat                   |

### Storage

Unopened reels should be stored within a temperature range of +5 °C to +25 °C, separated from any dust, chemicals and solvent based materials. Non-adherence to this procedure could effect the solderability of this product.

### How to Order

| CRG                            | 0603                                         | J                              | 1K0                                                                                                               |
|--------------------------------|----------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Common Part                    | Size                                         | Tolerance                      | Resistance Value                                                                                                  |
| CRG - Thick Film Chip Resistor | 0201<br>0402<br>0603<br>0805<br>1206<br>2512 | F - $\pm 1\%$<br>J - $\pm 5\%$ | 1 ohm<br>(1 ohm) 1R0<br>1K ohm<br>(1000 ohms) 1K<br>100K ohm<br>(100000 ohms) 100K<br>1M ohm<br>(1000000 ohms) 1M |

TE Connectivity, TE connectivity (logo) and TE (logo) are trademarks.

Other logos, product and Company names mentioned herein may be trademarks of their respective owners.

While TE has made every reasonable effort to ensure the accuracy of the information in this datasheet, TE does not guarantee that it is error-free, nor does TE make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. TE reserves the right to make any adjustments to the information contained herein at any time without notice. TE expressly disclaims all implied warranties regarding the information contained herein, including, but not limited to, any implied warranties of merchantability or fitness for a particular purpose. The dimensions in this datasheet are for reference purposes only and are subject to change without notice. Specifications are subject to change without notice. Consult TE for the latest dimensions and design specifications.