

## Type CFR Series

### Key Features

- Low cost, combined with high reliability, make these components suitable for use in most types of circuits, including audio, communications, measurement and computer applications.
- Premium quality carbon film resistors whose ceramic core has a high alumina content offering power to size ratios not normally associated with carbon film product.
- Available in 5 power ratings from 1 ohm to 10 Mohm. The smallest case size (CFR16) has a full 0.25 W power rating.



The resistive element comprises a thin film of carbon, deposited onto a high thermal conductivity ceramic core. Metal end caps are force fitted to the element prior to spiralling to value. Tinned copper lead wires are welded to the end caps and the components are then coated. One coat of phenolic resin is followed by three coats of epoxy resin. All resistors are tested for value and tolerance.

### Characteristics - Electrical

|  | CFR16      | CFR25      | CFR50       | CFR100     | CFR200     |
|--|------------|------------|-------------|------------|------------|
| <b>Rated Power @ 70 °C (W)</b>                           | 0.25       | 0.33       | 0.5         | 1          | 2          |
| <b>Resistance Range (Ohms)</b>                           |            |            |             |            |            |
| <b>Min</b>   | 1R0        | 1R0        | 1R0         | 1R0        | 1R0        |
| <b>Max</b>   | 4M7        | 10M        | 10M         | 10M        | 10M        |
| <b>Tolerance (%)</b>                                     |            |            | 2           | 5          |            |
| <b>Code letter</b>                                       |            |            | G           | J          |            |
| <b>Temp. Coefficient (ppm/°C)</b>                        |            |            |             |            |            |
| <b>up to 10R</b>   | ±350       | ±350       | ±350        | ±350       | ±350       |
| <b>11R - 99K</b>   | 0 to -450  | 0 to -450  | 0 to -450   | 0 to -450  | 0 to -450  |
| <b>100K - 1M0</b>  | 0 to -700  | 0 to -700  | 0 to -700   | 0 to -700  | 0 to -700  |
| <b>1M1 - 10M</b>   | 0 to -1500 | 0 to -1500 | 0 to -1500  | 0 to -1500 | 0 to -1500 |
| <b>Selection Series</b>                                  |            |            | E24         |            |            |
| <b>Limiting Element Voltage (V)</b>                      | 200        | 250        | 350         | 500        | 500        |
| <b>Max Overload Voltage<sup>1</sup> (V)</b>              | 400        | 500        | 700         | 1000       | 1000       |
| <b>Max Intermittent Overload Voltage<sup>2</sup> (V)</b> | 500        | 700        | 750         | 750        | 750        |
| <b>Operating Temp. Range (°C)</b>                        |            |            | -55 to +155 |            |            |
| <b>Climatic Category (°C)</b>                            |            |            | 55/155/56   |            |            |
| <b>Dielectric Strength (V)</b>                           | 400        | 500        | 700         | 1000       | 1000       |
| <b>Insulation Resistance (Mohms)</b>                     |            |            | 1000        |            |            |

<sup>1</sup>Maximum Overload Voltage is 2.5 times rated voltage up to the specified voltage for 5 seconds.

<sup>2</sup>Maximum Intermittent Overload Voltage is 4 times rated voltage up to the specified voltage for 1 second ON and 25 seconds OFF. >100R ONLY

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### Dimensions



| Style  | L* max. | D max. | d ±0.05 | l      |
|--------|---------|--------|---------|--------|
| CFR16  | 3.5     | 1.85   | 0.45    | 28 ± 3 |
| CFR25  | 6.8     | 2.5    | 0.54    | 28 ± 3 |
| CFR50  | 9.0     | 3.0    | 0.54    | 28 ± 3 |
| CFR100 | 12.0    | 5.0    | 0.70    | 25 ± 3 |
| CFR200 | 16.0    | 5.5    | 0.70    | 28 ± 3 |

\* Length is measured in accordance with IEC 294

### Derating Curve



### Surface Temperature Rise vs Load



### Marking

The resistors are marked with a four colour band code in accordance with IEC 62 on greyish green base color.

### Mounting

The resistors are suitable for processing on automatic insertion equipment and cutting and bending machines.

### Packaging

Carbon film resistors are normally supplied taped in 'ammo' boxes. Other styles may be supplied on request. All tape specifications are in accordance with IEC 286-1.

| Type   | Box Quantity | Std. Tape Spacing | Component Spacing |
|--------|--------------|-------------------|-------------------|
| CFR16  | 5000         | 52                | 5                 |
| CFR25  | 4000         | 52                | 5                 |
| CFR50  | 3000         | 52                | 5                 |
| CFR100 | 1000         | 52                | 10                |
| CFR200 | 500          | 64                | 10                |

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### 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 $\pm(5\% + 0.1 \text{ ohm})$   |
|----------|--|
| 4.23     | Climatic sequence                              |
| 4.24     | Damp heat, steady state                        |
| 4.25.1   | Endurance at 70°C                              |
| 4.25.3   | Endurance at 155°C                             |
| TEST REF | Short Term Tests $\pm(1\% + 0.05 \text{ ohm})$ |
| 4.13     | Overload                                       |
| 4.16     | Robustness of terminations                     |
| 4.18     | Resistance to soldering heat                   |
| 4.19     | Rapid change of temperature                    |
| 4.22     | Vibration                                      |

### How to Order

| CFR                        | 16  | J                    | 100R   |
|----------------------------|---|----------------------|--|
| Common Part                | Size  | Tolerance            | Value  |
| CFR - Carbon Film Resistor | 16 - 0.25 W<br>25 - 0.33 W<br>50 - 0.50 W<br>100 - 1.00 W<br>200 - 2.00 W | G - 2%<br><br>J - 5% | 1 ohm<br>(1 ohms) 1R0<br>1K ohm<br>(1000 ohms) 1K0<br>100K ohm<br>(100000 ohms) 100K<br>1M ohm<br>(1000000 ohms) 1M0 |

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