

# Carbon Film Fixed Resistors

## Performance Specification

|                                 |                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient         | $\leq 10\Omega$ : $\pm 350\text{PPM}/^\circ\text{C}$<br>$11\Omega \sim 99\text{K}\Omega$ : $0 \sim -450\text{PPM}/^\circ\text{C}$<br>$100\text{K}\Omega \sim 1\text{M}\Omega$ : $0 \sim -700\text{PPM}/^\circ\text{C}$<br>$1.1\text{M}\Omega \sim 10\text{M}\Omega$ : $0 \sim -1500\text{PPM}/^\circ\text{C}$ |
| Short Time Overload             | $\pm(1.0\% + 0.05\Omega)\text{Max}$ , with no evidence of mechanical damage.                                                                                                                                                                                                                                  |
| Insulation Resistance           | Min. 10,000 Mega Ohm                                                                                                                                                                                                                                                                                          |
| Dielectric Withstanding Voltage | No evidence of flashover, mechanical damage, arcing or insulation breakdown.                                                                                                                                                                                                                                  |
| Terminal Strength               | No evidence of mechanical damage.                                                                                                                                                                                                                                                                             |
| Resistance to Soldering Heat    | $\pm(1.0\% + 0.05\Omega)\text{Max}$ , with no evidence of mechanical damage.                                                                                                                                                                                                                                  |
| Solderability                   | Min. 95% coverage.                                                                                                                                                                                                                                                                                            |
| Resistance to Solvent           | No deterioration of protective coating and markings.                                                                                                                                                                                                                                                          |
| Temperature Cycling             | $\pm(1.0\% + 0.05\Omega)\text{Max}$ , with no evidence of mechanical damage.                                                                                                                                                                                                                                  |
| Load Life in Humidity           | Normal type: $<100\text{K}\Omega$ : $\pm(3.0\% + 0.05\Omega)\text{Max}$<br>$\geq 100\text{K}\Omega$ : $\pm(5.0\% + 0.05\Omega)\text{Max}$<br>Non-Flame type: $<100\text{K}\Omega$ : $\pm(5.0\% + 0.05\Omega)\text{Max}$<br>$\geq 100\text{K}\Omega$ : $\pm(10.0\% + 0.05\Omega)\text{Max}$                    |
| Load Life                       | Normal type: $<56\text{K}\Omega$ : $\pm(2.0\% + 0.05\Omega)\text{Max}$<br>$\geq 56\text{K}\Omega$ : $\pm(3.0\% + 0.05\Omega)\text{Max}$<br>Non-Flame type: $<100\text{K}\Omega$ : $\pm(5.0\% + 0.05\Omega)\text{Max}$<br>$\geq 100\text{K}\Omega$ : $\pm(10.0\% + 0.05\Omega)\text{Max}$                      |

## Ordering Procedure: Ex.: CFR 1/4W, +/-5%, 10K $\Omega$ , T/B-5000

|                                                                |   |   |                                                                                                                                                                                                                                                               |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |   |   |                                                                                           |   |   |                                                                                                                                          |   |  |
|----------------------------------------------------------------|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|-------------------------------------------------------------------------------------------|---|---|------------------------------------------------------------------------------------------------------------------------------------------|---|--|
| C                                                              | F | R | 0                                                                                                                                                                                                                                                             | W | 4 | J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0 | 1 | 0                                                                                         | 3 | A | 5                                                                                                                                        | 0 |  |
| Type:<br>CFR = Carbon Film                                     |   |   | Wattage:<br>Normal size<br>W8 = 1/8W<br>W6 = 1/6W<br>W4 = 1/4W<br>W2 = 1/2W<br>1W = 1W<br>2W = 2W<br><br>Small size<br>S4 = 1/4W-S<br>S3 = 1/3W-S<br>S2 = 1/2W-S<br>1S = 1W-S<br>2S = 2W-S<br>3S = 3W-S<br><br>Extra small size<br>U2 = 1/2W-SS<br>1U = 1W-SS |   |   | Resistance Value:<br><ul style="list-style-type: none"> <li>E-24 series:<br/>1<sup>st</sup> digit is "0"<br/>2<sup>nd</sup> &amp; 3<sup>rd</sup> digits are the significant figures of the resistance<br/>4<sup>th</sup> indicates the number of zeros:<br/>"J" ~ 0.1, "K" ~ 0.01<br/><b>Ex.:</b> 4.7<math>\Omega</math> ~ 47J, 4.7K<math>\Omega</math> ~ 472</li> <li>E-96 series:<br/>1<sup>st</sup> to 3<sup>rd</sup> digits are the significant figures of the resistance and the 4<sup>th</sup> digit indicates the number of zeros.<br/><b>Ex.:</b> 1.33K<math>\Omega</math> = 1331</li> </ul> |   |   | Packing Type:<br>A = Tape/Box<br>T = Tape/Reel<br>B = Bulk/Box<br>P = Tape/Box of PT-26mm |   |   | Packing Qty:<br>1 = 1,000 pcs.    2 = 2,000 pcs.<br>4 = 4,000 pcs.    5 = 5,000 pcs.<br>A = 500 pcs.      B = 2,500 pcs.<br>0 = Bulk/Box |   |  |
| Feature:<br>0 = Standard<br>F = Non-Flame<br>I = Non-Inductive |   |   | Tolerance:<br>F = $\pm 1\%$<br>G = $\pm 2\%$<br>J = $\pm 5\%$<br>K = $\pm 10\%$                                                                                                                                                                               |   |   | Additional Information:<br>P = Panasert type<br>1 = Avisert type<br>2 = Avisert type 2<br>3 = Avisert type 3<br>0 = PT-52mm, PT-26mm<br>8 = PT-58mm<br>9 = PT-64mm<br>7 = Lead wire (H) 38mm                                                                                                                                                                                                                                                                                                                                                                                                         |   |   |                                                                                           |   |   |                                                                                                                                          |   |  |



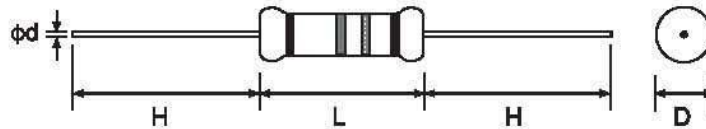
## Carbon Film Fixed Resistors

### Features

- Automatically insertable
- High quality performance
- Non-Flame type available
- Cost effective and commonly used
- Too low or too high values can be supplied on case to case basis



Standard: 2%, 5% 10%—E 24 series  
1%—E 96 series

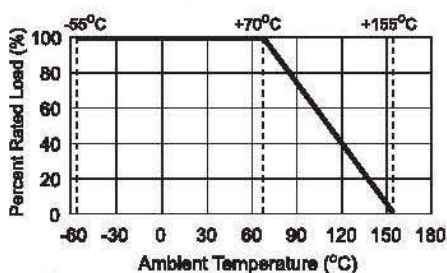


| Part No.           | Style      | Power Rating at 70°C | Dimension (mm) |       |     |                     |    | Resistance Range | Max Working Voltage | Max Overload Voltage | Dielectric Withstanding Voltage | Std Packing Qty |
|--------------------|------------|----------------------|----------------|-------|-----|---------------------|----|------------------|---------------------|----------------------|---------------------------------|-----------------|
|                    |            |                      | D Max          | L Max | H±3 | d±0.05              | PT |                  |                     |                      |                                 |                 |
| <b>Normal size</b> |            |                      |                |       |     |                     |    |                  |                     |                      |                                 |                 |
| CFR0W8             | CFR 12     | 1/8W (0.125W)        | 1.85           | 3.5   | 28  | 0.45                | 52 | 1Ω ~ 1MΩ         | 200                 | 400                  | 400                             | 5,000           |
| CFR0W4             | CFR 25     | 1/4W (0.25W)         | 2.5            | 6.8   | 28  | 0.54 <sup>(1)</sup> | 52 | 1Ω ~ 10MΩ        | 250                 | 500                  | 500                             | 5,000           |
| CFR0W2             | CFR 50     | 1/2W (0.50W)         | 3.5            | 10.0  | 28  | 0.54                | 52 | 1Ω ~ 10MΩ        | 350                 | 700                  | 700                             | 1,000           |
| CFR01W             | CFR 100    | 1W                   | 5.5            | 16.0  | 28  | 0.70                | 64 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 1,000           |
| CFR02W             | CFR 200    | 2W                   | 6.5            | 17.5  | 28  | 0.75                | 64 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 500             |
| <b>Small size</b>  |            |                      |                |       |     |                     |    |                  |                     |                      |                                 |                 |
| CFR0S4             | CFR 25-S   | 1/4W (0.25W)         | 1.85           | 3.5   | 28  | 0.45                | 52 | 1Ω ~ 1MΩ         | 200                 | 400                  | 400                             | 5,000           |
| CFRFU2             | CFR 50-SS  | 1/2W (0.50W)         | 2.5            | 6.8   | 28  | 0.54 <sup>(1)</sup> | 52 | 1Ω ~ 10MΩ        | 250                 | 500                  | 250                             | 5,000           |
| CFR0S2             | CFR 50-S   | 1/2W (0.50W)         | 3.0            | 9.0   | 28  | 0.54                | 52 | 1Ω ~ 10MΩ        | 350                 | 700                  | 700                             | 2,000           |
| CFRF1U             | CFR 100-SS | 1W                   | 3.5            | 10.0  | 28  | 0.54                | 52 | 1Ω ~ 10MΩ        | 350                 | 700                  | 350                             | 1,000           |
| CFR01S             | CFR 100-S  | 1W                   | 5.0            | 12.0  | 25  | 0.70                | 52 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 1,000           |
| CFR02U             | CFR 200-SS | 2W                   | 5.0            | 12.0  | 25  | 0.70                | 52 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 1,000           |
| CFR02S             | CFR 200-S  | 2W                   | 5.5            | 16.0  | 28  | 0.70                | 64 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 1,000           |
| CFR03U             | CFR 300-SS | 3W                   | 5.5            | 16.0  | 28  | 0.70                | 64 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 1,000           |
| CFR03S             | CFR 300-S  | 3W                   | 6.5            | 17.5  | 28  | 0.75                | 64 | 1Ω ~ 10MΩ        | 500                 | 1,000                | 1,000                           | 500             |

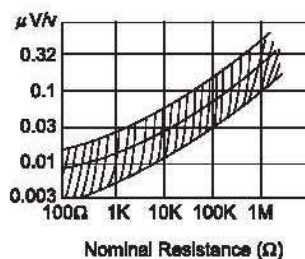
### Note:

- Standard beige base color
- Standard grayish-green base color (Non-flammable coating) for SS
- <sup>(1)</sup> Lead diameter of CFR0W4 & CFRFU2 can be provided in 0.50mm, 0.54mm & 0.60mm
- Ohmic values outside the standard range available on a case to case basis

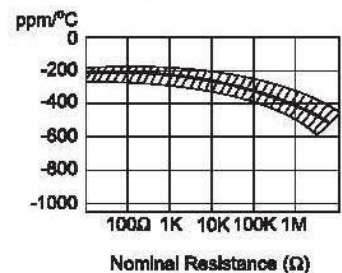
### Derating Curve



### Current Noise

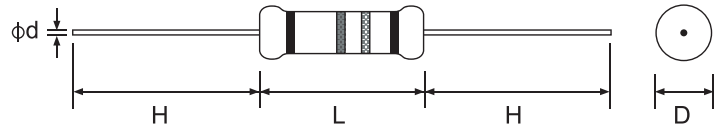


### Temp. Coefficient



## Carbon Film Fixed Resistors

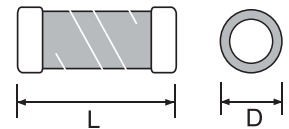
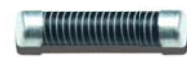
- (1) Copper Plated Steel Lead Wire Type
  - Copper Plated Wire (CP)
  - Tin Plated Copper Steel Lead Wire (CT)



| Part No.        | Style       | Power Rating at 70°C | Dimension (mm) |       |        |       |    | Max Working Voltage | Max Overload Voltage | Dielectric Withstanding Voltage | Resistance Range | Std Packing Qty |
|-----------------|-------------|----------------------|----------------|-------|--------|-------|----|---------------------|----------------------|---------------------------------|------------------|-----------------|
|                 |             |                      | D Max          | L Max | d±0.02 | H±3   | PT |                     |                      |                                 |                  |                 |
| CPxxW8 / CTxxW8 | CP/ CT 12   | 1/8W (0.125W)        | 1.85           | 3.5   | 0.50   | 28    | 52 | 200V                | 400V                 | 400V                            | 1Ω ~ 1MΩ         | 5,000           |
| CPxxW4 / CTxxW4 | CP/ CT 25   | 1/4W (0.25W)         | 2.5            | 6.8   | 0.50   | 28/38 | 52 | 250V                | 500V                 | 500V                            | 1Ω ~ 10MΩ        | 5,000           |
| CPxxS3 / CTxxS3 | CP/ CT 33-S | 1/3W (0.33W)         | 2.5            | 6.8   | 0.50   | 28/38 | 52 | 300V                | 600V                 | 500V                            | 1Ω ~ 10MΩ        | 5,000           |
| CPxxW3 / CTxxW3 | CP/ CT 33   | 1/3W (0.33W)         | 3.0            | 9.0   | 0.50   | 28    | 52 | 300V                | 600V                 | 700V                            | 1Ω ~ 10MΩ        | 2,000           |
| CPxxS2 / CTxxS2 | CP/ CT 50-S | 1/2W (0.5W)          | 3.0            | 9.0   | 0.50   | 28    | 52 | 350V                | 700V                 | 700V                            | 1Ω ~ 10MΩ        | 2,000           |

## (2) Cutting (CO) Type

| Part No.  | Style   | Power Rating at 70°C | Dimension (mm)                        |                                       | Resistance Range |
|-----------|---------|----------------------|---------------------------------------|---------------------------------------|------------------|
|           |         |                      | D                                     | L                                     |                  |
| CO...W8   | CO 12   | 1/8W (0.125W)        | 1.6 <sup>+0.10</sup> <sub>-0.00</sub> | 3.2±0.1                               | 1Ω ~ 10MΩ        |
| CO...W4   | CO 25   | 1/4W (0.25W)         | 2.1 <sup>+0.09</sup> <sub>-0.00</sub> | 5.6 <sup>+0.10</sup> <sub>-0.20</sub> | 1Ω ~ 10MΩ        |
| CO...W4-A | CO 25-A | 1/4W (0.25W)         | 2.1 <sup>+0.09</sup> <sub>-0.00</sub> | 5.9 <sup>+0.10</sup> <sub>-0.15</sub> | 1Ω ~ 10MΩ        |
| CO...W4-B | CO 25-B | 1/4W (0.25W)         | 2.1 <sup>+0.09</sup> <sub>-0.00</sub> | 6.4 <sup>+0.10</sup> <sub>-0.15</sub> | 1Ω ~ 10MΩ        |



Cutting type resistors are produced without lead-wire and without coating  
 \*Cap plated : 1.Tin plated (ROYALOHM std.)

### Ordering Procedure: Ex.: CPO 1/4W, +/-5%, 10Ω, T/B-5000

|                                           |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                   |                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                    |                                                                                                                                                                                                |                                                                                                                                                                           |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>C P O 0 W 4 J 0 1 0 0 A 5 0</b></p> | <p><b>Type:</b><br/> <b>CPO</b> = Copper plated lead wire (H=28mm)<br/> <b>CPL</b> = Coppler plated lead wire (H=38mm)<br/> <b>CTO</b> = Tin plated copper steel lead wire (H=38mm)<br/> <b>CTL</b> = Tin plated copper steel lead wire (H=38mm)<br/> <b>COT</b>= Cutting Type (Tin-Plated Cap)</p> | <p><b>Wattage:</b><br/>                 Normal<br/>                 W8 = 1/8W<br/>                 W4 = 1/4W<br/>                 W3 = 1/3W<br/><br/>                 Small<br/>                 S2 = 1/2W-S<br/>                 S3 = 1/3W-S</p> | <p><b>Tolerance:</b><br/>                 G = ±2%<br/>                 J = ±5%<br/>                 K = ±10%</p> | <p><b>Resistance Value:</b></p> <ul style="list-style-type: none"> <li>E-24 series:<br/>                     1<sup>st</sup> digit is "0"<br/>                     2<sup>nd</sup> &amp; 3<sup>rd</sup> digits are the significant figures of the resistance<br/>                     4<sup>th</sup> digit indicates the number of zeros: "J" ~ 0.1, "K" ~ 0.01<br/>                     Ex.: 4.7Ω ~ 47J, 4.7KΩ ~ 47Z</li> </ul> | <p><b>Packing Type:</b><br/>                 A = Tape/Box<br/>                 T = Tape/Reel<br/>                 B = Bulk/Box</p> | <p><b>Packing Qty:</b><br/>                 1 = 1,000 pcs. 2 = 2,000 pcs. 4 = 4,000 pcs.<br/>                 5 = 5,000 pcs. A = 500 pcs. B = 2,500 pcs.<br/>                 0 = Bulk/Box</p> | <p><b>Additional Information:</b><br/>                 0 = CP/CT Type<br/>                 A = Cutting type (CO-25-A)<br/>                 B = Cutting type (CO-25-B)</p> |
|                                           | <p><b>Feature:</b><br/>                 0 = Standard<br/>                 F = Non-Flame<br/>                 I = Non-Inductive</p>                                                                                                                                                                  |                                                                                                                                                                                                                                                   |                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                    |                                                                                                                                                                                                |                                                                                                                                                                           |

