

# EFR Enhanced Film Fixed Resistor

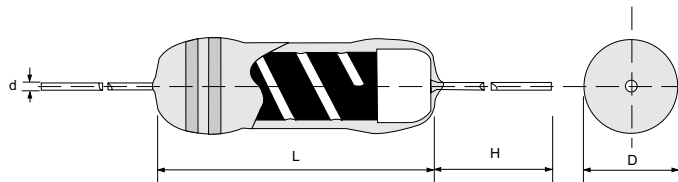
Quality • Reliability  
Cost-Down via Innovation.

## Specifications Per

• IEC 60115-4

## Features

- Flameproof multi-layer coating equivalent to UL 94 V-0
- Flameproof feature equivalent to overload test UL 1412
- High power handling in small size
- Anti-surge capability
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency



## DIMENSIONS

| Type   | Body Length (L, mm) | Body Diameter (D, mm) | Lead Wire Length (H, mm) | Lead Wire Diameter (d, mm) | Net Weight Per 1000Pcs |
|--------|---------------------|-----------------------|--------------------------|----------------------------|------------------------|
| EFR52  | 6.50 ± 1.0          | 2.4 ± 0.2             | 26 ± 3.0                 | 0.55 ± 0.03                | 220 Grams              |
| EFR207 | 6.50 ± 1.0          | 2.4 ± 0.2             | 26 ± 3.0                 | 0.60 ± 0.03                | 220 Grams              |
| EFR101 | 9.00 ± 1.0          | 3.2 ± 0.2             | 28 ± 3.0                 | 0.60 ± 0.03                | 340 Grams              |
| EFR201 | 11.0 ± 1.0          | 4.0 ± 0.5             | 28 ± 3.0                 | 0.70 ± 0.03                | 500 Grams              |
| EFR300 | 15.5 ± 1.0          | 5.5 ± 0.5             | 30 ± 3.0                 | 0.80 ± 0.03                | 1200 Grams             |
| EFR400 | 19.0 ± 1.0          | 6.0 ± 0.5             | 30 ± 3.0                 | 0.80 ± 0.03                | 1600 Grams             |
| EFR500 | 19.0 ± 1.0          | 8.0 ± 0.5             | 30 ± 3.0                 | 0.80 ± 0.03                | 3100 Grams             |

## GENERAL SPECIFICATIONS

| Type   | Power Rating (at 70°C) | Maximum Working Voltage | Maximum Overload Voltage | Minimum Resistance | Maximum Resistance | Resistance Tolerance | Available Resistance Values |
|--------|------------------------|-------------------------|--------------------------|--------------------|--------------------|----------------------|-----------------------------|
| EFR52  | 1/2W                   | 500V                    | 700V                     | 1Ω                 | 1MΩ                | ±1%, ±2%, ±5%        | E-24/E-96                   |
| EFR207 | 1W                     | 500V                    | 800V                     | 1Ω                 | 1MΩ                | ±1%, ±2%, ±5%        | E-24/E-96                   |
| EFR101 | 1W                     | 600V                    | 900V                     | 1Ω                 | 1MΩ                | ±2%, ±5%             | E-24/E-48                   |
| EFR201 | 2W                     | 750V                    | 1000V                    | 1Ω                 | 1MΩ                | ±2%, ±5%             | E-24/E-48                   |
| EFR300 | 3W                     | 800V                    | 1200V                    | 1Ω                 | 560KΩ              | ±2%, ±5%             | E-24/E-48                   |
| EFR400 | 4W                     | 800V                    | 1200V                    | 1Ω                 | 180KΩ              | ±2%, ±5%             | E-24/E-48                   |
| EFR500 | 5W                     | 800V                    | 1200V                    | 1Ω                 | 180KΩ              | ±2%, ±5%             | E-24/E-48                   |

Special sizes, values, and specifications not listed available on special order.

# EFR

## Enhanced Film Fixed Resistor

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### PART NUMBER

Example: EFR101J100KTKZTB2K0

| EFR101 | J                          | 100K                                                                                                                                                                                                       | TKZ                                                                                                                                                                                                                          | TB2K0                                                                                                                                                                                                                                                  |
|--------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type   | Tolerance*                 | Resistance                                                                                                                                                                                                 | TCR                                                                                                                                                                                                                          | Packaging                                                                                                                                                                                                                                              |
|        | F (1%)<br>G (2%)<br>J (5%) | 100KΩ<br><b>4-character code</b><br>containing -<br>3 significant digits<br>1 letter multiplier<br><br><u>OHM MULTIPLIER</u><br>R = 1<br>K = 10 <sup>3</sup><br>M = 10 <sup>6</sup><br>G = 10 <sup>9</sup> | <b>3-character code</b><br><br>TKZ = Default Product<br>Temperature Coefficient.<br><br>Information of typical<br>product temperature<br>coefficient can be found<br>in the Technical Summary<br>section of the datasheet.** | <b>5-character code</b><br><br>TB = Tape Box<br>(pieces per box)<br><u>EFR52/EFR207</u><br>5K0 = 5,000<br><br><u>EFR101</u><br>2K0 = 2,000<br><br><u>EFR201</u><br>1K0 = 1,000<br><br><u>EFR300/400</u><br>500 = 500<br><br><u>EFR500</u><br>400 = 400 |

\* Listed values may not be applicable across the product series/all resistance values. Please check with us before placing order.

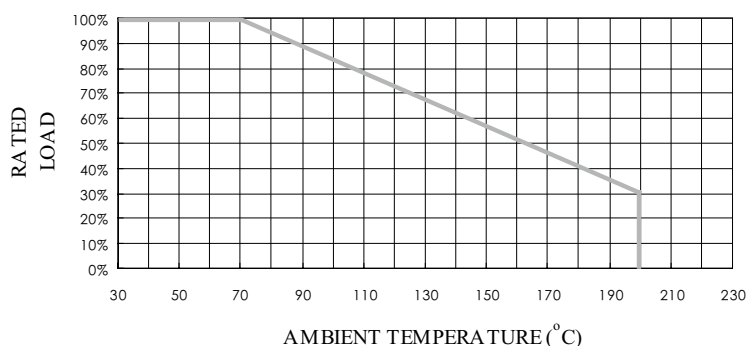
\*\* For the availabilities of non-default temperature coefficient, please check with us. Reference for TCR letter codes can be found in section (4) of Part Number Construction in the Appendices.

### TECHNICAL SUMMARY

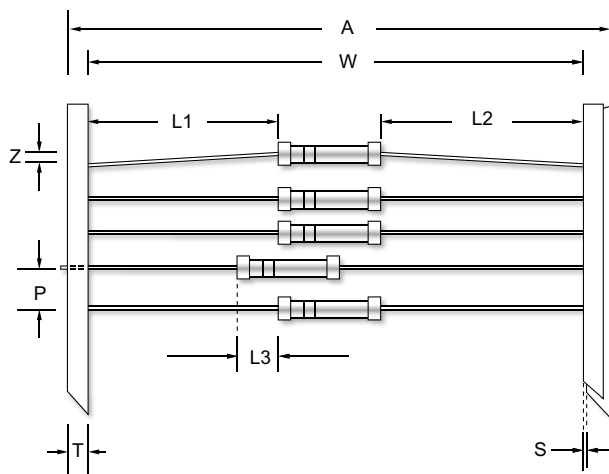
| Characteristics                            | Limits                      |
|--------------------------------------------|-----------------------------|
| Dielectric Withstanding Voltage, VAC or DC | 500                         |
| Temperature Coefficient, PPM / °C*         | ±50, ±100, ±200, ±300, ±500 |
| Operating Temperature Range, °C            | -55~+200                    |
| Insulation Resistance, MΩ                  | 10 <sup>4</sup>             |

\* Not applicable to all resistance values. Please check with us regarding the PPM of specific resistance value(s).

### POWER DERATING CURVE



### TAPING/PACKING SPECIFICATIONS



Unit (mm)

| Type               | A<br>Max. | L1-L2<br>(Max.) | L3<br>(Max.) | P<br>±0.5 | S<br>(Max.) | T<br>±0.5 | W<br>±1.5 | Z<br>(Max.) |
|--------------------|-----------|-----------------|--------------|-----------|-------------|-----------|-----------|-------------|
| EFR52              | 65        | ±1.0            | 0.5          | 5.0       | 0.8         | 6.0       | 52.5      | 1.2         |
| EFR207             | 65        | ±1.0            | 0.5          | 5.0       | 0.8         | 6.0       | 52.5      | 1.2         |
| EFR101             | 65        | ±1.0            | 0.5          | 5.0       | 0.8         | 6.0       | 52.5      | 1.2         |
| EFR201             | 76        | ±1.5            | 1.0          | 10.0      | 0.8         | 6.0       | 63.5      | 1.2         |
| EFR300             | 76        | ±1.5            | 1.0          | 10.0      | 0.8         | 6.0       | 63.5      | 1.2         |
| EFR400             | 76        | ±1.5            | 1.0          | 10.0      | 0.8         | 6.0       | 63.5      | 1.2         |
| EFR500<br>L option | 76        | ±1.5            | 1.0          | 10.0      | 0.8         | 6.0       | 63.5      | 1.2         |
|                    | 95        | ±1.5            | 1.0          | 10.0      | 0.8         | 6.0       | 77        | 1.2         |

### ■ PERFORMANCE SPECIFICATIONS

| Characteristics              | Test Conditions                                                                                                                                         | Limits                                                         |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Short Time Over Load         | <b>IEC 60115-1 4.13</b><br>5 seconds 2.5x rated voltage (not over max. overload voltage)                                                                | ±2%                                                            |
| Load Life In Humidity        | <b>IEC 60115-1 4.24</b><br>56 days rated load (not over max. working voltage) at (40±2)°C and (93±3)% relative humidity                                 | ±1.5%                                                          |
| Load Life 1,000 hours        | <b>IEC 60115-1 4.25.1</b><br>Rated load (not over max. working voltage) with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C                                   | EFR52/207: ±1.5%<br>EFR101/201: ±2.0%<br>EFR300/400/500: ±5.0% |
| Resistance To Soldering Heat | <b>IEC 60115-1 4.18.2</b><br>Leads immersed till 3mm from the body in (260±5)°C solder for 10±1 seconds                                                 | ±1%                                                            |
| Solderability                | <b>IEC 60115-1 4.17.2</b><br>Solder area covered after (235±3)°C / (2±0.2) seconds with flux applied                                                    | 90% Min.                                                       |
| Vibration                    | <b>IEC 60115-1 4.22</b><br>Six hours in each parallel and axial direction with a simple harmonic motion having an amplitude of 0.75mm and 10 to 500 Hz. | ±1%                                                            |
| Thermal Endurance            | <b>IEC 60115-1 4.25.3</b><br>1000 hours at 200°C without load                                                                                           | ±2%                                                            |
| Thermal Shock                | <b>IEC 60115-1 4.19</b><br>-55°C 30minutes, +155°C 30minutes, 5 cycles                                                                                  | ±2%                                                            |
| Terminal Strength            | <b>IEC 60115-1 4.16.2</b><br>2.5kg direct load for 10 seconds in the longitudinal direction of the terminal leads                                       | ±1%                                                            |