

## Data Sheet

**Customer:**

**Product:** Carbon Film Leaded Resistor — CFR Series

**Sizes.:** 0318/0623/0932/1145/1550

**Issued Date:** 20-Apr-15

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|---------------------|------------------|---------------------|------------------------|---------------------------|
| 20-Apr-15           | 20-Apr-15        | 20-Apr-15           | 20-Apr-15              |                           |
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## Carbon Film Leaded Resistor

### Features

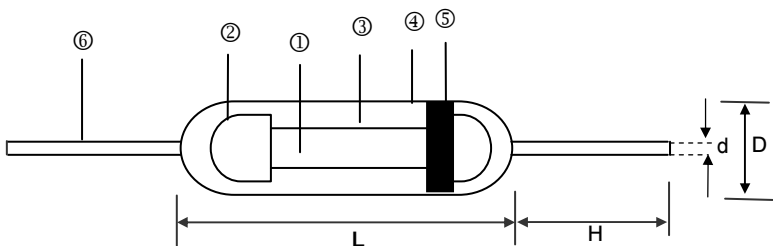
- The most economic industrial investment
- Standard tolerance: +/-5% (available +/-2%)
- Excellent long term stability
- Termination: Standard solder-plated copper lead



### Applications

- Automotive
- Telecommunication
- Medical Equipment

### Construction



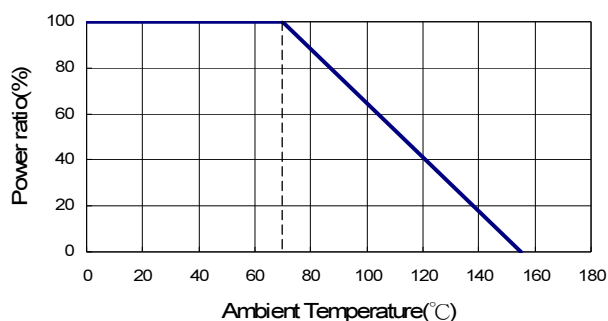
|                    |                                       |
|--------------------|---------------------------------------|
| ① Ceramic Rod      | ④ Non-flame Paint With Sol Vent-proof |
| ② Tinned Iron Caps | ⑤ Color Code                          |
| ③ Carbon Film      | ⑥ Lead Wire                           |

### Dimensions

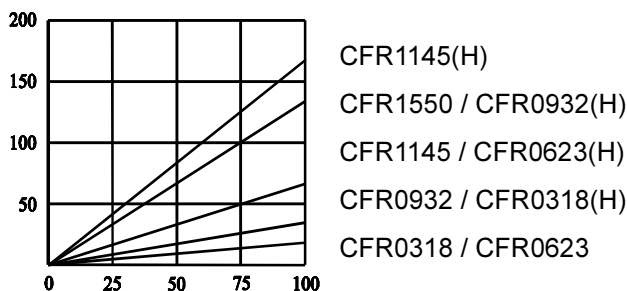
Unit: mm

| Type    | L        | D       | H      | d         | Weight (g) (1000pcs) |
|---------|----------|---------|--------|-----------|----------------------|
| CFR0318 | 3.3±0.4  | 1.8±0.3 | 29±2.0 | 0.41~0.48 | 92                   |
| CFR0623 | 6.3±0.5  | 2.3±0.3 | 28±2.0 | 0.43~0.58 | 155                  |
| CFR0932 | 9.0±0.5  | 3.2±0.5 | 26±2.0 | 0.58~0.68 | 352                  |
| CFR1145 | 11.5±1.0 | 4.5±0.5 | 35±2.0 | 0.68~0.81 | 775                  |
| CFR1550 | 15.5±1.0 | 5.0±0.5 | 32±2.0 | 0.75~0.81 | 1042                 |

### Derating Curve



### Hop-Spot Temperature



**Part Numbering**

|              |   |                      |                                      |                 |  |   |  |
|--------------|---|----------------------|--------------------------------------|-----------------|--|---|--|
| CFR          | 0318  | J                    | T                                    | -               | W  | 1001  |  |
| Product Type | Dimensions (LxD)  | Resistance Tolerance | Packaging Code                       | TCR (PPM/C)     | Power Rating   | Resistance  | Special  |
|              | 0318: 3.3x1.8<br>0623: 6.3x2.3<br>0932: 9.0x3.2<br>1145: 11.5x4.5<br>1550: 15.5x5.0 | G: ±2%<br>J: ±5%     | A: Ammo<br>B: Bulk<br>T: Taping Reel | -: No specified | R: 3W<br>S: 2W<br>T: 1W<br>U: 1/2W<br>V: 1/4W<br>W: 1/8W | R500: 0.5Ω<br>0010: 1Ω<br>1000: 100Ω<br>2201: 2200Ω<br>1001: 1KΩ<br>1004: 1MΩ | : Standard<br>MA: MA-type<br>MC: MC-type<br>FA: FA-type<br>FB: FB-type<br>FC: FC-type<br>FD: FD-type |

**Standard Electrical Specifications**

| Type \ Item | Power Rating at 70°C | Operating Temp. Range | Max. Working Voltage | Max. Overload Voltage | Dielectric Withstanding Voltage | Resistance Range |             |
|-------------|----------------------|-----------------------|----------------------|-----------------------|---------------------------------|------------------|-------------|
|             |                      |                       |                      |                       |                                 | ±2%              | ±5%         |
| 0318        | 1/8W                 | -55 ~ +155°C          | 150V                 | 300V                  | 300V                            | —                | 0.1Ω - 22MΩ |
| 0623        | 1/4W                 |                       | 250V                 | 500V                  | 500V                            | 1Ω - 10MΩ        |             |
| 0932        | 1/2W                 |                       | 350V                 | 700V                  | 700V                            | 1Ω - 10MΩ        |             |
| 1145        | 1W                   |                       | 450V                 | 1000V                 | 1000V                           | —                | 0.1Ω - 10MΩ |
| 1550        | 2W                   |                       | 500V                 | 1000V                 | 1000V                           | 1Ω - 10MΩ        |             |

**High Power Rating Electrical Specifications**

| Type \ Item | Power Rating at 70°C | Operating Temp. Range | Max. Working Voltage | Max. Overload Voltage | Dielectric Withstanding Voltage | Resistance Range |             |
|-------------|----------------------|-----------------------|----------------------|-----------------------|---------------------------------|------------------|-------------|
|             |                      |                       |                      |                       |                                 | ±2%              | ±5%         |
| 0318        | 1/4W                 | -55 ~ +155°C          | 200V                 | 400V                  | 400V                            | —                | 1Ω - 10MΩ   |
| 0623        | 1/2W                 |                       | 300V                 | 500V                  | 500V                            | —                | 0.1Ω - 22MΩ |
| 0932        | 1W                   |                       | 400V                 | 800V                  | 800V                            | 1Ω - 10MΩ        |             |
| 1145        | 2W                   |                       | 500V                 | 1000V                 | 1000V                           | —                | 0.1Ω - 10MΩ |
| 1550        | 3W                   |                       | 500V                 | 1000V                 | 1000V                           | 1Ω - 10MΩ        |             |

Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. overload voltage listed above, whichever is lower

**Resistor body color:**

Standard power rating: Light Brown

High power rating 0318 size: Light Brown is available only other sizes: Light Brown or Pink are available.

Please specify which color is acceptable else the light brown is a top priority.

## Environmental Characteristics

| Item                            | Requirement  | Test Method  |
|---------------------------------|--|--|
| Short Time Overload             | $\pm(0.75\%+0.05\Omega)$   | <b>JIS-C-5201-1 5.5</b><br>RCWV*2.5 or Max. overload voltage for 5 seconds                                 |
| Insulation Resistance           | $> 1000M\Omega$  | <b>JIS-C-5201-1 5.6</b><br>Apply 100V <sub>DC</sub> for 1 minute   |
| Endurance                       | $\pm(3\%+0.05\Omega)$  | <b>JIS-C-5201-1 7.10</b><br>70 $\pm$ 2°C, Max. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"       |
| Damp Heat with Load             | $\leq 100K\Omega\pm 3\%$<br>$\geq 100K\Omega\pm 5\%$   | <b>JIS-C-5201-1 7.9</b><br>40 $\pm$ 2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Solderability                   | 90% min. Coverage  | <b>JIS-C-5201-1 6.5</b><br>245 $\pm$ 5°C for 3 seconds   |
| Dielectric Withstanding Voltage | By Type  | <b>JIS-C-5201-1 5.7</b><br>Apply Max. Overload Voltage for 1 minute  |
| Temperature Coefficient         | $< 100K\Omega +350ppm\sim-500ppm$<br>$100K\Omega\sim 1M\Omega -0ppm\sim-700ppm$<br>$> 1 M\Omega -0ppm\sim-1500ppm$ | Resistance value at room temperature and room Temperature+100°C  |
| Pulse Overload                  | $\pm(1\%+0.05\Omega)$  | <b>JIS-C-5201-1 5.8</b><br>4 times RCWV for 10000 cycles with 1 second "ON" and 25 seconds "OFF"           |
| Resistance To Solvent           | No deterioration of coatings and markings  | <b>JIS-C-5201-1 6.9</b><br>Trichroethane for 1 min. with ultrasonic  |
| Terminal Strength               | Tensile: $\geq 2.5$ kg   | Direct Load for 10 seconds<br>In the direction off the terminal leads                                      |

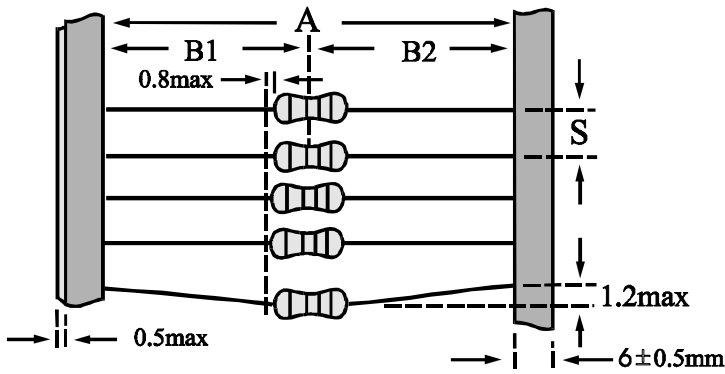
RCWV(Rated continuous working voltage)=  $\sqrt{P \cdot R}$  or Max. Operating voltage whichever is lower

■ **Storage Temperature: 25 $\pm$ 3°C; Humidity < 80%RH**

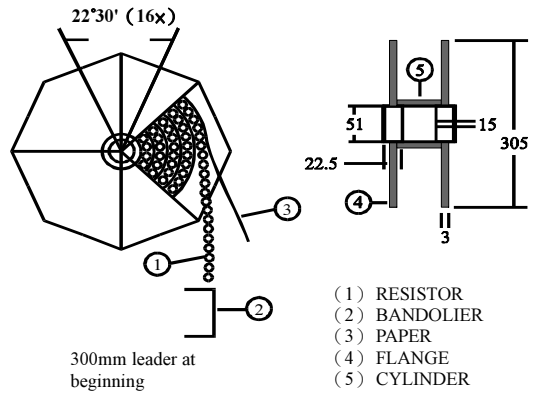
**Taping/Packing Specifications**

**1. Standard Type (Reel & Ammo)**

Packing Methods



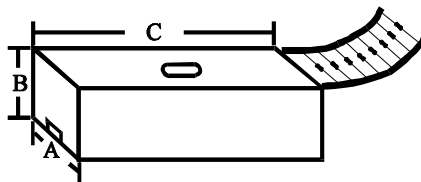
Reel Packing



Unit: mm

| Packaging Type | Packing Methods |           |    | Reel Packing      |       |
|----------------|-----------------|-----------|----|-------------------|-------|
|                | A               | B1-B2 Max | S  | Across Flange (A) | Qty   |
| 0318           | 52+1/-0         | 1.2       | 5  | 72                | 5,000 |
|                | 26+1/-0         | 1.0       |    |                   |       |
| 0623           | 52+1/-0         | 1.2       | 5  | 72                | 5,000 |
|                | 26+1/-0         | 1.0       |    |                   |       |
| 0932           | 52+1/-0         | 1.2       | 5  | 72                | 2,500 |
| 1145           | 52+1/-0         | 1.5       | 5  | 95                | 2,000 |
|                | 73+1/-0         |           |    |                   |       |
| 1550           | 52+1/-0         | 1.5       | 10 | 95                | 1,000 |
|                | 73+1/-0         |           |    |                   |       |

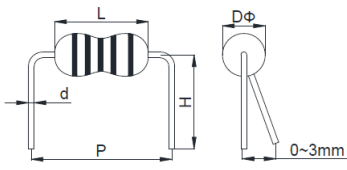
Ammo Packing



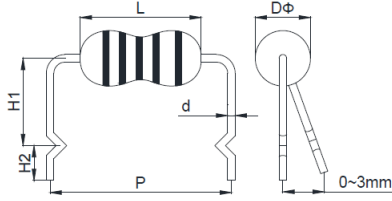
Unit: mm

| Packaging Type | Packing Methods |           |    | Ammo Packing |     |     |       |
|----------------|-----------------|-----------|----|--------------|-----|-----|-------|
|                | A               | B1-B2 Max | S  | A            | B   | C   | Qty   |
| 0318           | 52+1/-0         | 1.2       | 5  | 80           | 75  | 264 | 5,000 |
|                | 26+1/-0         | 1.0       |    |              |     |     |       |
| 0623           | 52+1/-0         | 1.2       | 5  | 80           | 105 | 264 | 5,000 |
|                | 26+1/-0         | 1.0       |    |              |     |     |       |
| 0932           | 52+1/-0         | 1.2       | 5  | 80           | 46  | 264 | 1,000 |
| 1145           | 52+1/-0         | 1.5       | 5  | 103          | 82  | 265 | 1,000 |
|                | 73+1/-0         |           |    |              |     |     |       |
| 1550           | 52+1/-0         | 1.5       | 10 | 103          | 96  | 265 | 1,000 |
|                | 73+1/-0         |           |    |              |     |     |       |

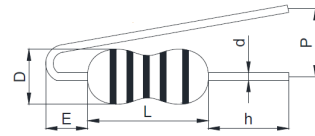
2. Special Type (Bulk)



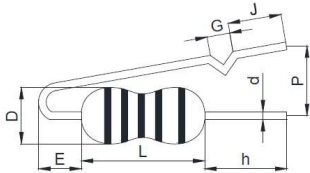
MA Type



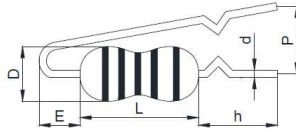
MC Type



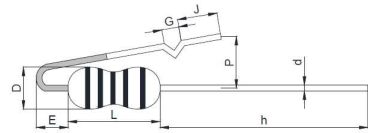
FA Type



FB Type



FC Type

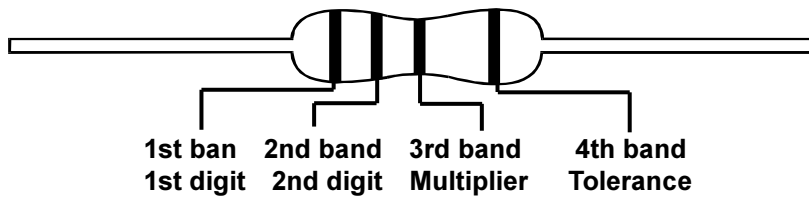


FD Type

Unit: mm

| Codes | Type | P      | H /H1/h | H2/G    | J   | D       | L        | d         | E   |
|-------|------|--------|---------|---------|-----|---------|----------|-----------|-----|
| 0318  | MA   | 5±1    | 8.0±1   | -       | -   | 1.8±0.3 | 3.3±0.4  | 0.45±0.03 | -   |
| 0623  | MA   | 10±1   | 10.0±1  | -       | -   | 2.3±0.3 | 6.3±0.5  | 0.55±0.03 | -   |
|       | MC   | 10±1   | 5.0±1   | 6.0±2   | -   | 2.3±0.3 | 6.3±0.5  | 0.55±0.03 | -   |
|       | FA   | 5~15   | 5.0±2   | -       | -   | 2.3±0.3 | 6.3±0.5  | 0.55±0.03 | 3±1 |
|       | FB   | 5~15   | 4.0±2   | 3.0±0.5 | -   | 2.3±0.3 | 6.3±0.5  | 0.55±0.03 | 3±1 |
|       | FD   | 5~15   | 27.0±2  | 3.0±0.5 | 3±1 | 2.3±0.3 | 6.3±0.5  | 0.55±0.03 | 3±1 |
| 0932  | MA   | 12.5±1 | 10.0±1  | -       | -   | 3.2±0.5 | 9.0±0.5  | 0.65±0.03 | -   |
|       | MC   | 12.5±1 | 5.0±1   | 4.0±2   | -   | 3.2±0.5 | 9.0±0.5  | 0.65±0.03 | -   |
|       | FA   | 5~15   | 5.0±2   | -       | -   | 3.2±0.5 | 9.0±0.5  | 0.65±0.03 | 3±1 |
|       | FB   | 5~15   | 4.0±2   | 3.0±0.5 | 3±1 | 3.2±0.5 | 9.0±0.5  | 0.65±0.03 | 3±1 |
|       | FC   | 5~15   | 10.0±3  | -       | -   | 3.2±0.5 | 9.0±0.5  | 0.65±0.03 | -   |
| 1145  | MA   | 15±1   | 12.5±1  | -       | -   | 4.5±0.5 | 11.5±1.0 | 0.78±0.03 | -   |
|       | MC   | 15±1   | 8.0±1   | 6.0±1.0 | -   | 4.5±0.5 | 11.5±1.0 | 0.78±0.03 | -   |
|       | FA   | 5~15   | 5.0±2   | -       | -   | 4.5±0.5 | 11.5±1.0 | 0.78±0.03 | 3±1 |
|       | FB   | 5~15   | 4.0±2   | 3.0±0.5 | 3±1 | 4.5±0.5 | 11.5±1.0 | 0.78±0.03 | 3±1 |
|       | FC   | 5~15   | 10.0±3  | -       | -   | 4.5±0.5 | 11.5±1.0 | 0.78±0.03 | -   |
| 1550  | MA   | 20±1   | 15.0±1  | -       | -   | 5.0±0.5 | 15.5±1.0 | 0.78±0.03 | -   |
|       | MC   | 20±1   | 12.0±1  | 5.0±1.0 | -   | 5.0±0.5 | 15.5±1.0 | 0.78±0.03 | -   |
|       | FA   | 5~15   | 5.0±2   | -       | -   | 5.0±0.5 | 15.5±1.0 | 0.78±0.03 | 3±1 |
|       | FB   | 5~15   | 4.0±2   | 3.0±0.5 | 3±1 | 5.0±0.5 | 15.5±1.0 | 0.78±0.03 | 3±1 |
|       | FC   | 5~15   | 10.0±3  | -       | -   | 5.0±0.5 | 15.5±1.0 | 0.78±0.03 | -   |

■ Marking & Resistance Tolerance



|     |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ±2% | E-24 | 1.0 | 1.1 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 3.9 | 4.3 | 4.7 | 5.1 | 5.6 | 6.2 | 6.8 | 7.5 | 8.2 | 9.1 |
| ±5% |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

| Color   | Digit | Multiplier       | Tolerance |   |
|---------|-------|------------------|-----------|---|
| Without | -     | -                | -         | - |
| Silver  | -     | 10 <sup>-2</sup> | -         | - |
| Gold    | -     | 10 <sup>-1</sup> | ±5.0%     | J |
| Black   | 0     | 10 <sup>0</sup>  | -         | - |
| Brown   | 1     | 10 <sup>1</sup>  | -         | - |
| Red     | 2     | 10 <sup>2</sup>  | ±2.0%     | G |
| Orange  | 3     | 10 <sup>3</sup>  | -         | - |
| Yellow  | 4     | 10 <sup>4</sup>  | -         | - |
| Green   | 5     | 10 <sup>5</sup>  | -         | - |
| Blue    | 6     | 10 <sup>6</sup>  | -         | - |
| Violet  | 7     | 10 <sup>7</sup>  | -         | - |
| Grey    | 8     | 10 <sup>8</sup>  | -         | - |
| White   | 9     | 10 <sup>9</sup>  | -         | - |