



ISO14001



ISO/TS16949



244546



245468



REG.-Nr.A759



CQC04001010656

Specification for Approval

Customer : 深圳市立創電子商務有限公司

Product Name : LEAD-FREE CARBON FILM FIXED RESISTORS

Part Name : CFR SERIES $\pm 2\%$ 、 $\pm 5\%$ 、 $\pm 10\%$

Part No. : CFR0**G*****0; CFR0**J*****0;
CFR0**K*****0

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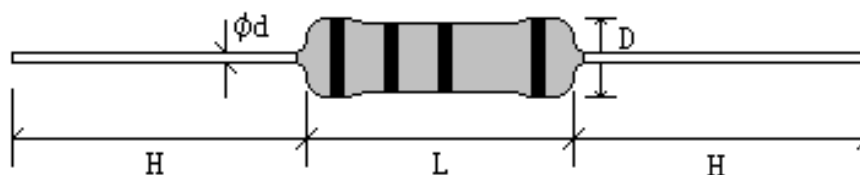


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1.0 Scope:

This specification for approve relates to Lead-Free Carbon Film Fixed Resistors manufactured by UNIOHM.

2.0 Ratings & Dimension:



2.1 Normal size

| Type | Dimension(mm) | | | | Max Working Voltage | Max Overload Voltage | Dielectric Withstanding Voltage | Tolerance | Resistance Range |
|---------|---------------|----------|------------|---------|---------------------|----------------------|---------------------------------|--------------|------------------|
| | D | L | d ±0.05 | H ±3 | | | | | |
| CR 1/8W | 1.9±0.3 | 3.3±0.3 | 0.45 | 28 | 200V | 400V | 400V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 1/4W | 2.2±0.3 | 6.5±1.0 | 0.54 | 28 | 250V | 500V | 500V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 1/2W | 3.0±0.6 | 9.5±1.0 | 0.54 | 28 | 350V | 700V | 700V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 1W | 5.0±0.6 | 15.5±1.0 | 0.70 | 28 | 500V | 1000V | 1000V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 2W | 6.0±0.6 | 17.5±1.0 | 0.75 | 28 | 500V | 1000V | 1000V | ±2%、±5%、±10% | 1Ω~10MΩ |

2.2 Small Size & Extra Small Size

| Type | Dimension(mm) | | | | Max Working Voltage | Max Overload Voltage | Dielectric Withstanding Voltage | Tolerance | Resistance Range |
|-----------|---------------|----------|------------|---------|---------------------|----------------------|---------------------------------|--------------|------------------|
| | D | L | d ±0.05 | H ±3 | | | | | |
| CR 1/4WS | 1.9±0.3 | 3.3±0.3 | 0.45 | 28 | 200V | 400V | 400V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 1/2WSS | 2.2±0.5 | 6.5±1.0 | 0.54 | 28 | 250V | 500V | 250V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 1/2WS | 3.0±0.5 | 9.0±1.0 | 0.54 | 28 | 350V | 700V | 700V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 1WS | 4.0±0.6 | 11.5±1.0 | 0.65 | 28 | 500V | 1000V | 1000V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 2WS | 5.0±0.6 | 15.5±1.0 | 0.70 | 28 | 500V | 1000V | 1000V | ±2%、±5%、±10% | 1Ω~10MΩ |
| CR 3WS | 6.0±0.6 | 17.5±1.0 | 0.75 | 28 | 500V | 1000V | 1000V | ±2%、±5%、±10% | 1Ω~10MΩ |

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3.0 Construction:



| No. | Name | Material |
|-----|------------|--|
| 1 | Basic Body | Rod Type Ceramics |
| 2 | Resistor | Carbon Film |
| 3 | End Cap | Cold steel plated with copper/tin |
| 4 | Lead Wire | Tin solder coated copper wire |
| 5 | Joint | By welding |
| 6 | Coating | (1). Celluloid paint |
| | | (2). Insulated Resin |
| | | Color: Beige(1/8W,1/4WS,1/2WS,1/4W,1/2W,1W,2W) Light Brown(1WS,2WS,3WS) Gray Green(1/2WSS) |
| 7 | Color Code | Epoxy resin |

4.0 Resistor Marked:

Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802



Example:

| CARBON FILM FIXED RESISTORS | |
|-----------------------------|-----------|
| WATT: 1/2WS | VAL: 100Ω |
| Q'TY: 2,000 | TOL: 5% |
| LOT: 1021548 | PPM: |

4.1 Label:

Label shall be marked with following items:

- (1) Type and style
- (2) Nominal resistance
- (3) Resistance tolerance

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- (4) Quantity
- (5) Lot number
- (6) PPM

5.0 Derating Curve:

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derate as shown in figure 1

Figure1



6.0 Voltage rating:

Resistors should have a direct-current (DC) continuous voltage rating and an alternating-current (AC) continuous voltage rating relates to Power Rating, formula shown as below:

$$RCWV = \sqrt{P * R}$$

RCWV: Rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (Volt.)

P: Power Rating (Watt.)

R: Nominal Resistance (Ohm)

Resistors will be burned out if it overload, such as higher than the maximum value of series' RCWV. And we named 2.5 times RCWV is OVERLOAD Voltage.

7.0 Performance Specification:

| Characteristic | Limits | | Test Method (JIS-C-5201& JIS-C-5202) |
|-------------------------|--|--------------------|--|
| | Range | T.C.R. (PPM/°C) | |
| Temperature Coefficient | ≤10Ω | ± 300 | 4.8 natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(T_2 - T_1)} * 10^6 (PPM/°C)$ R1: Resistance value at room temp. (T ₁) R2: Resistance value at room temp.+100°C (T ₂) Test pattern: room temp. (T ₁), room temp. +100°C(T ₂) |
| | 10Ω<R<100KΩ | ± 450 | |
| | 100KΩ≤R≤1MΩ | 0 ~ - 700 | |
| | 1MΩ<R≤10MΩ | 0 ~ - 1500 | |
| Short-time overload | Resistance change rate is: ±(1%+0.05Ω)Max. With no evidence of mechanical damage. | | 4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds. |

| | | | | | | |
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| Insulation resistance | Insulation resistance is: 10,000 MΩ Min. | 4.6 The measuring voltage shall be either (100±15) V DC for resistors with an isolation voltage <500V or (500±50)V DC. for resistors with an isolation voltage ≥500V | | | | | | | | | | | | | | | |
|---------------------------------|---|--|------|-------------|------|---|-------------|---------|---|------------|--------------|---|--------------|---------|---|------------|--------------|
| Dielectric withstanding voltage | No evidence of flashover mechanical damage, arcing or insulation breaks down. | 4.7 Resistors shall be clamped in the trough of a 90°C metallic v-block and shall be tested at AC potential respectively specified in the given list of each product type for 60-70 seconds. | | | | | | | | | | | | | | | |
| Terminal strength | No evidence of mechanical damage | 4.16 direct load: Resistance to a 2.5 Kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations. | | | | | | | | | | | | | | | |
| Resistance to soldering heat | Resistance change rate is: ±(1%+0.05Ω) Max. With no evidence of mechanical damage. | 4.18 permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C±5°C solder for 10±1 seconds. | | | | | | | | | | | | | | | |
| Solderability | 95% coverage Min. | 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder: 245°C ± 3°C Dwell time in solder 2~3 seconds. | | | | | | | | | | | | | | | |
| Temperature Cycling | Resistance change rate is: ±(1%+0.05Ω) max.. With no evidence of mechanical damage. | 4.19 resistance change after continuous five cycles for duty cycle specified below: <table border="1" data-bbox="837 1344 1388 1512"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ± 3°C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 - 15 mins</td> </tr> <tr> <td>3</td> <td>+155°C ± 2°C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 - 15 mins</td> </tr> </tbody> </table> | Step | Temperature | Time | 1 | -55°C ± 3°C | 30 mins | 2 | Room temp. | 10 - 15 mins | 3 | +155°C ± 2°C | 30 mins | 4 | Room temp. | 10 - 15 mins |
| Step | Temperature | Time | | | | | | | | | | | | | | | |
| 1 | -55°C ± 3°C | 30 mins | | | | | | | | | | | | | | | |
| 2 | Room temp. | 10 - 15 mins | | | | | | | | | | | | | | | |
| 3 | +155°C ± 2°C | 30 mins | | | | | | | | | | | | | | | |
| 4 | Room temp. | 10 - 15 mins | | | | | | | | | | | | | | | |
| Load life in humidity | Normal type: ΔR/R ±3% for <100KΩ ±5% for ≥ 100KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; | 7.9 Resistance change after 1,000 hours (1.5 hours "ON", 0.5 hour "OFF") at RCWV in a humidity test chamber controlled at 40°C±2°C and 90 to 95% relative humidity. | | | | | | | | | | | | | | | |
| Load life | Normal type: ΔR/R ±2% for <56KΩ ±3% for ≥56KΩ Flame retardant type: ΔR/R ±5% for <100KΩ; ±10% for ≥100KΩ; | 4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "ON", 0.5 hour "OFF" at 70°C ± 2°C ambient. | | | | | | | | | | | | | | | |

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8.0 Explanation of Part No. System:

The standard Part No. includes 14 digits with the following explanation:

8.1 11st ~4th : Product series name

Example: CFR0= Carbon Film Fixed Resistors

8.2 5th~6th:

8.2.1 Power rating.

W=Normal Size; S=Small Size; U=Extra Small Size;

“1”~“G”to denotes“1”~“16”as Hexadecimal:

1/16W~1/2W (<1W)

| Wattage | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | 1/8 | 1/10 | 1/16 |
|------------------|-----|-----|-----|-----|-----|-----|------|------|
| Normal Size | W2 | W3 | W4 | W5 | W6 | W8 | WA | WG |
| Small Size | S2 | S3 | S4 | S5 | S6 | S8 | SA | SG |
| Extra Small Size | U2 | U3 | U4 | U5 | U6 | U8 | UA | UG |

1W~16W (≥1W)

| Wattage | 1 | 2 | 3 | 5 | 7 | 8 | 9 | 10 | 15 |
|------------------|----|----|----|----|----|----|----|----|----|
| Normal Size | 1W | 2W | 3W | 5W | 7W | 8W | 9W | AW | FW |
| Small Size | 1S | 2S | 3S | 5S | 7S | 8S | 9S | AS | FS |
| Extra Small Size | 1U | 2U | 3U | 5U | 7U | 8U | 9U | AU | FU |

8.2.2 For power rating less than 1 watt, the 5th digit will be the letters W, S or U to represent the size required & the 6th digit will be a number or a letter code.

Example: W4=1/4W; S2=1/2W-S.

8.2.3 For power of 1 watt to 16 watt, the 5th digit will be a number or a letter code and the 6th digit will be the letters of W, S or U.

Example: AW=10W; 3S=3W-S

8.3 7th: Resistance Tolerance.

G=±2% J=±5% K=±10%

8.4 8th~11th: Resistance Value

8.4.1 For the standard resistance values of E-24 series, the 8th digit is “0”,the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

8.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵
 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

8.5 12th~14th digits.

8.5.1 12th: Packaging Type

A=Tape/Box (Ammo pack) B=Bulk/Box

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T=Tape/Reel

P=Tape/Box of PT-26 products

8.5.2 13th: Packing Quantity

Packing quantities code:

A=500pcs B=2500pcs 1=1000pcs 2=2000pcs

8.5.3 For the FORMED type products, the 13th & 14th digits are used to denote the forming types of the product with the following letter codes:

MF=M-type with flattened lead wire

F0= F-type

MK= M-type with kinked lead wire

F1= F1-type

ML= M-type with normal lead wire

F2= F2-type

MC= M type with kinked lead and narrow pitch wire

F3= F3-type

8.5.4 14th: Special features of additional information with the following codes:

P=Panaset type

1=Avisert type 1

2=Avisert type 2

3=Avisert type 3

A=Cutting type CO 1/4W-A type

B= Cutting type CO 1/4W-B type

9.0 Ordering Procedure (Example: CFR 1/2W ±5% 100Ω T/B-1000)

C F R 0 W 2 J 0 1 0 1 A 1 0



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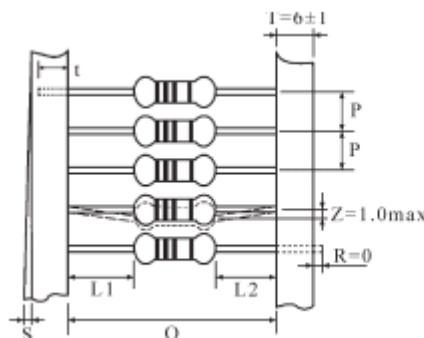
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10.0 Standard Packing:

10.1 Tapes in Box Packing



*L1-L2=1.0 Max.
 ZW: 0
 **S=0.5 Max.
 PT-26: 0.8 Max.

Dimension of T/B (mm)

| TYPE | O | P | W (A)±5 | H (B)±5 | L (C)±5 | Quantity Per Box |
|-----------|------|--------|---------|---------|---------|------------------|
| CR 1/8W | 52±1 | 5±0.3 | 75 | 70 | 255 | 5,000pcs |
| CR 1/4WS | 52±1 | 5±0.3 | 75 | 70 | 255 | 5,000pcs |
| CR 1/4W | 52±1 | 5±0.3 | 75 | 98 | 255 | 5,000pcs |
| CR 1/2WSS | 52±1 | 5±0.3 | 75 | 116 | 255 | 5,000pcs |
| CR 1/2WS | 52±1 | 5±0.3 | 75 | 70 | 255 | 2,000pcs |
| CR 1/2W | 52±1 | 5±0.3 | 75 | 45 | 255 | 1,000pcs |
| CR 1WS | 58±1 | 5±0.3 | 80 | 82 | 255 | 1,000pcs |
| CR 1W | 65±5 | 10±0.5 | 90 | 88 | 255 | 1,000pcs |
| CR 2WS | 65±5 | 10±0.5 | 90 | 88 | 255 | 1,000pcs |
| CR 2W | 65±5 | 10±0.5 | 90 | 88 | 255 | 500pcs |
| CR 3WS | 65±5 | 10±0.5 | 90 | 88 | 255 | 500pcs |

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10.2 Tapes in Reel Packing



Dimension of Reel (mm)

| Type | A | W±5 | H±5 | L±5 | Quantity Per Reel |
|-----------|------|-----|-----|-----|-------------------|
| CR 1/8W | 73±2 | 85 | 295 | 293 | 5,000pcs |
| CR 1/4WS | 73±2 | 85 | 295 | 293 | 5,000pcs |
| CR 1/4W | 73±2 | 85 | 295 | 293 | 5,000pcs |
| CR 1/2WSS | 73±2 | 85 | 295 | 293 | 5,000pcs |
| CR 1/2WS | 73±2 | 85 | 295 | 293 | 4,000pcs |
| CR 1/2W | 73±2 | 85 | 295 | 293 | 4,000pcs |
| CR 1WS | 73±2 | 85 | 295 | 293 | 2,500pcs |
| CR 1W | 80±5 | 95 | 295 | 293 | 1,000pcs |
| CR 2WS | 80±5 | 95 | 295 | 293 | 1,000pcs |
| CR 2W | 80±5 | 95 | 295 | 293 | 1,000pcs |
| CR 3WS | 80±5 | 95 | 295 | 293 | 1,000pcs |

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10.3 Bulk in Box Packing



Dimension of Box (mm)

| Type | A±5 | B±5 | C±5 | Quantity Per Reel |
|-----------|-----|-----|-----|-------------------|
| CR 1/8W | 140 | 80 | 240 | 1,000/20,000pcs |
| CR 1/4WS | 140 | 80 | 240 | 1,000/20,000pcs |
| CR 1/4W | 140 | 80 | 240 | 500/10,000pcs |
| CR 1/2WSS | 140 | 80 | 240 | 250/10,000pcs |
| CR 1/2WS | 140 | 80 | 240 | 500/8,000pcs |
| CR 1/2W | 140 | 80 | 240 | 250/5,000pcs |
| CR 1WS | 140 | 80 | 240 | 100/2,500pcs |
| CR 1W | 140 | 80 | 240 | 100/1,500pcs |
| CR 2WS | 140 | 80 | 240 | 100/1,500pcs |
| CR 2W | 140 | 80 | 240 | 100/1,000pcs |
| CR 3WS | 140 | 80 | 240 | 100/1,000pcs |

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11.0 Precaution for storage/Transportation:

11.1 UNIOHM recommends the storage condition as below:

11.1.1 Temperature: 15°C~35°C.

11.1.2 Humidity: 25%~75%RH.

11.1.3 Those condition recommended are for individual product.

11.1.4 Even under recommended condition, products' solderability will degrade if store more than 1 year.

11.2 Please hold the cartons in correct direction signed on cartons' side during storage and delivery, or else, it will lead the products abnormal to use.

11.3 Resistors' performance and solderability will fail if stored in the following condition:

11.3.1 High electrostatic environment.

11.3.2 Direct sunlight, rain, snow, and so on.

11.3.3 Hold in sea wind or corrosive gases long time, including Cl₂, H₂S, NH₃, SO₂, NO₂, etc.

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