

May-2004



Carbon Film Resistors

CFR series

$\pm 2\%$ & $\pm 5\%$



BRELE International Components, Inc.
1621 West University Parkway
Sarasota, Florida 34243

Ref: Type CFR-Carbon Film Resistor



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- 1. Product: CARBON FILM RESISTORS
(Normal & Miniature Style)
- 2. Product Code: Product code of the carbon film resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value.

Example :

CFR	-12	J	T	J	52	- 100R
Series Name	Size Code	Resistance Tolerance	Packing Style	Temperature Coefficient of Resistance	Special Type	Resistance Value

- 1) Style: CFR SERIES
- 2) Power Rating: -12=1/6W、 25S=1/4WS、 -25=1/4W、 50S=1/2WS、 - 50=1/2W、 1WS=1WS、 100=1W、 2WS=2WS、 200=2W
- 3) Tolerance: G=±2% J=±5%
- 4) Packaging Type: R = Paper Taping Reel
T = Tape on Box Packing
B = Bulk Packing
- 5) T.C.R: J=±350ppm/°C — = ignore
- 6) Special Type: 26 = 26mm、 52=52.4mm、 73=73mm、
PN = PANAsert
AV = AVIsert
- 7) Resistance Value: 1R0、 10R、 100R、 10K、 100K、 330K、 1M0.....




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3. BAND-CODE:



COLOR	1ST BAND	2ND BAND	3RD BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	1Ω	
BROWN	1	1	1	10Ω	±1% (F)
RED	2	2	2	100Ω	±2% (G)
ORANGE	3	3	3	1KΩ	
YELLOW	4	4	4	10KΩ	
GREEN	5	5	5	100KΩ	±0.5% (D)
BLUE	6	6	6	1MΩ	±0.25% (C)
VIOLET	7	7	7	10MΩ	±0.10% (B)
GREY	8	8	8		±0.05%
WHITE	9	9	9		
GOLD				0.1	±5% (J)
SILVER				0.01	±10% (K)

4. ELECTRICAL CHARACTERISTICS

Table I

STYLE	CFR-12	CFR25S	CFR-25	CFR50S	CFR-50	CFR1WS	CFR100	CFR2WS	CFR200
Power Rating at 70°C	1/6W	1/4W		1/2W		1W		2W	
Operating Temp. Range	-55°C to +155°C								
Maximum Working Voltage	150V	200V	250V	300V	350V	400V	500V	500V	500V
Maximum Overload Voltage	300V	400V	500V	600V	700V	800V	1000V	1000V	1000V
Dielectric Withstanding Voltage	300V	400V	500V	500V	500V	700V	1000V	1000V	1000V
Value Range ±2%, ±5%	1Ω~10MΩ								
Temperature Coefficient (by Type)	see FIG. 1								

*Standard resistance is 1Ω~ 10MΩ, below or over this resistance on request.

*Rated Continuous Working Voltage (RCWV)= $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$

FIG. 1 TEMPERATURE COEFFICIENT

STYLE	Max. Value of Temp. Coefficient ppm/°C		
	under 100KΩ	100K to 1MΩ excl.	1MΩ and over
CFR100, CFR200, CFR2WS	±350	+350 -500	+350 -1000
CFR-12, CFR-25, CFR-50, CFR25S, CFR50S, CFR1WS	+350 -500	+350 -700	+350 -1000

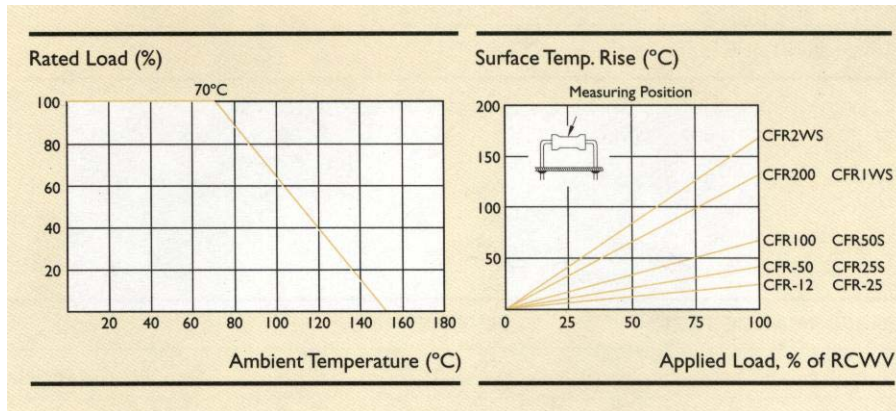


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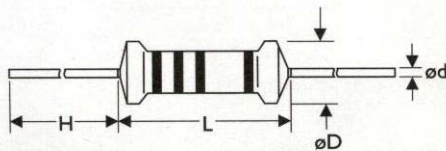


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5. DERATING CURVE & HOT-SPOT TEMPERATURE



6. DIMENSIONS



Unit : mm

STYLE		DIMENSION			
Normal	Miniature	L	øD	H	ød
CFR-12	CFR25S	3.3±0.4	1.8±0.3	28±2.0	0.5±0.05
CFR-25	CFR50S	6.3±0.5	2.3±0.3	28±2.0	0.6±0.05
CFR-50	CFR1WS	9.0±0.5	3.2±0.5	26±2.0	0.6±0.05
CFR100	CFR2WS	11.5±1.0	4.5±0.5	35±2.0	0.8±0.05
CFR200	-	15.5±1.0	5.0±0.5	32±2.0	0.8±0.05

7. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 2.5 times of the rated voltage. (If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes and the change of the resistance value should be within $\pm(0.25\%+0.05\Omega)$ as compared with the value before the test.



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(2) Dielectric Withstanding Voltage

The resistor is placed on the metal V Block. Apply a Table I dielectric withstanding between the terminals connected together with the block for about 60 seconds. The resistor shall be able to withstand without breakdown or flashover.

(3) Temperature Coefficient Test

Test of resistors above room temperature 125°C to 130°C (Testing Temperature) at the constant temperature silicon plate for over 4 to 5 minutes. Then measure the resistance. The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R₀ = Resistance value at the room temperature

t = The testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply test terminal on lead and resistor body. The test resistance should be high than 10,000M ohm.

(5) Solderability

Immerse the specimen into the solder pot at 230±5°C for 5±0.5 seconds. At least 95% solder coverage on the termination.



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(6) Resistance to Solvent

The specimen into the appropriate solvent of Methyleme Chloride condition of ultrasonic machine for 1 minutes. The specimen is no deterioration of coatings and color code.

(7) Terminal Strength

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reacheds 5 pounds. The load shall be held for 10 seconds. The load of weight shall be $\geq 2.5\text{kg}(24.5\text{N})$.

(8) Pulse Overload

Apply 4 times of rated voltage to the specimen at the 1 second on and 25 seconds off cycle, subjected to voltage application cycles specified in 10000. The change of the resistance value shall be within $\pm(2\%+0.05\Omega)$.

(9) Load Life in Humidity

Place the specimen in a test chamber at $40\pm 2^\circ\text{C}$ and 90~95% relative humidity. Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1000 hours. The change of the resistance value shall be within $\pm(1.5\%+0.05\Omega)$.



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(10) Load Life Test

Placed in the constant temperature chamber of $70\pm 3^{\circ}\text{C}$ the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for $1000+48/-0$ hours then left at no-load for 1hour, the change of the resistance value measured at this time to the value before the test shall be within $\pm(1.5\%+0.05\Omega)$. There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(11) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour, the change shall be within $\pm(1\%+0.05\Omega)$. After the test the resistor shall be free from the electrical or mechanical damage.

Temperature Cycling Conditions:

Step	Temperature($^{\circ}\text{C}$)	Time (minute)
1	+25+10 -5	10 to15
2	-65+0 -3	30
3	+25+10 -5	10 to15
4	+150+3 -0	30



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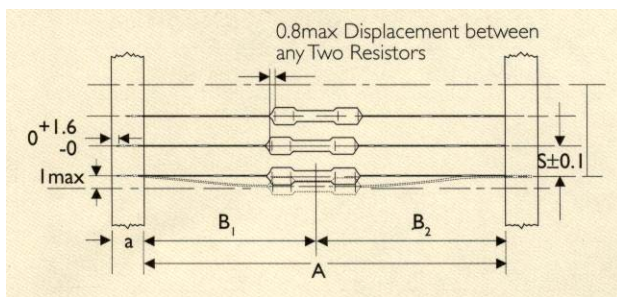
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(12) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at $350 \pm 10^\circ\text{C}$ for 3 ± 0.5 seconds up to 3 mm. The change of the resistance value shall be within $\pm(1\% + 0.05\Omega)$.

8. Packing Methods

Bandolier for Axial leads - The resistors are supplied on bandolier, either 1000 resistors in ammo-pack or 5000 resistors on reel.



STYLE		DIMENSIONS					Unit : mm
Normal	Miniature	a	A	B1-B2	S(spacing)	T(max. deviation of spacing)	
TYPE-12	TYPE25S	6 ± 0.5	52.5 ± 1.5 26.0 ± 1.5	1.2	5		
TYPE-25	TYPE50S	6 ± 0.5	52.5 ± 1.5 26.0 ± 1.5	1.2 1.0	5		
TYPE-50	TYPE1WS	6 ± 0.5	52.5 ± 1.5	1.2	5	1 mm Per 10 Spacings, 0.5mm Per 5 Spacings	
TYPE100	TYPE2WS	6 ± 0.5	73.0 ± 1.5 52.5 ± 1.5	1.5	5		
TYPE200	-	6 ± 0.5	73.0 ± 1.5 52.5 ± 1.5	1.5	10		



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9. Tape on Reel and Tape in Box Packaging

TAPE ON REEL PACKING

Bandoliers can be reeled; dimension a differ with type.

(1) resistor
(2) bandolier
(3) paper
(4) flange
(5) cylinder

TAPE ON BOX PACKING

Bandoliers may also be supplied in a cardboard box ("ammopack").

"Ammopack" is an abbreviation of "ammunition packing". The dimensions of A-B-C vary with type and quantity.

STYLE		TAPE ON REEL		TAPE ON BOX			
Normal	Miniature	ACROSS FLANGE(A)	QTY PER REEL	W(A)	H(B)	L(C)	QTY PER BOX
TYPE-12	TYPE25S	72	5,000	78	20	264	2,000/5,000
TYPE-25	TYPE50S	48/72	5,000	78	20	264	1,000/5,000
TYPE-50	TYPE1WS	72	2,500	78	46	264	1,000
TYPE100	TYPE2WS	95	2,000	103	70	265	1,000
TYPE200	-	95	1,000	103	85	265	1,000

Unit : mm/pcs

10. Special Type (Forming dimensions)

MT Type Forming for Taping

(Rated Watts 1/6W size only)

PN Type Forming for Taping

(Rated Watts 1/4W size only)

AV Type Forming for Taping

(Rated Watts 1/4W size only)