

# General Type

Normal & Miniature Style [ CFR Series ]



## **INTRODUCTION**

The CFR Series Carbon Film Resistors are manufactured by coating a homogeneous film of pure carbon on high grade ceramic rods. After a helical groove has been cut in the resistive layer, tinned connecting leads of electrolytic copper are welded to the end-caps. The resistors are coated with layers of tan color lacquer:

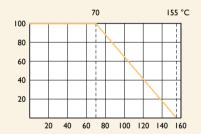
## **FEATURES**

Power Rating	1/6W, 1/4W, 1/2W, 1W, 2W, 3W
Resistance Tolerance	±2%, ±5%
T.C.R.	see Table

# **DERATING CURVE**

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.

Rated Load (%)



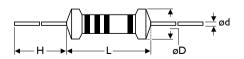
Ambient Temperature (°C)

# **TABLE I TEMPERATURE COEFFICIENT**

STYLE	TEMP. COEFFICIENT (ppm/°C)					
	under Ι00ΚΩ	100K Ω - 1 <b>M</b> Ω	IMΩ - I0MΩ			
CFR100, CFR200, CFR2WS, CFR3WS	-350~350	-500~0	-1,500~0			
CFR-12, CFR-25, CFR-50, CFR25S, CFR50S, CFR1WS	-350~500	-700~0	-1,500~0			

## **DIMENSIONS**

Unit: mm



STYLE		DIMENSION						
Normal	Miniature	L	øD	н	ød			
CFR-12	CFR25S	3.4±0.3	1.9±0.2	28±2.0	0.45±0.05			
CFR-25	CFR50S	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05			
CFR-50	CFRIWS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05			
CFR100	CFR2WS	11.5±1.0	4.5±0.5	35±2.0	0.8±0.05			
CFR200	CFR3WS	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05			

Note:			

# **ELECTRICAL CHARACTERISTICS**

STYLE	CFR-12	CFR25S	CFR-25	CFR50S	CFR-50	CFRIWS	CFRI00	CFR2WS CFR200	CFR3WS
Power Rating at 70°C	1/6W	1/4W		1/2W		IW		2W	3W
Maximum Working Voltage	150V	200V	250V	300V	350V	400V	500V		
Maximum Overload Voltage	300V	400V	500V	600V	700V	800V	I,000V		
Voltage Proof on Insulation	300V	400V	500V			700V	1,000V		
Resistance Range	ΙΩ - ΙΟΜΩ	$I$ Ω - $I$ 0M $\Omega$ & $0$ Ω for E24 series value							
Operating Temp. Range	-55°C to +	-55°C to +155°C							
Temperature Coefficient	see Table I								

Note: Special value is available on request

# **ENVIRONMENTAL CHARACTERISTICS**

PERFORMANCE TEST	TEST METHOD	<b>APPRAISE</b> ±0.75%+0.05Ω	
Short Time Overload	IEC 60115-1 4.13		
Voltage Proof on Insulation	IEC 60115-1 4.7	in V-block for 60 Sec., test voltage by type	By type
Temperature Coefficient	IEC 60115-1 4.8	-55°C to +155°C	By type
Insulation Resistance	IEC 60115-1 4.6	in V-block for 60 Sec.	>1,000ΜΩ
Solderability	IEC 60115-1 4.17	235±5°C for 3±0.5 Sec.	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5±0.5 Min. with ultrasonic	No deterioration of coatings and markings
Robustness of Terminations	IEC 60115-1 4.16	Direct load for 10 Sec. in the direction of the terminal leads	≥2.5kg (24.5N)
Periodic-pulse Overload	IEC 60115-1 4.39	4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec. off)	±1.0%+0.05Ω
Damp Heat Steady State	IEC 60115-1 4.24	40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV	±3.0%+0.05Ω
Endurance at 70°C	IEC 60115-1 4.25	70±2°C at RCWV for 1,000 Hr. (1.5 Hr. on, 0.5 Hr. off)	±3.0%+0.05Ω
Temperature Cycling	IEC 60115-1 4.19	-55°C ⇒ Room Temp. ⇒ +155°C ⇒ Room Temp. (5 cycles)	±1.0%+0.05Ω
Resistance to Soldering Heat	IEC 60115-1 4.18	260±3°C for I0±1 Sec., immersed to a point 3±0.5mm from the body	±1.0%+0.05Ω

### **EXPLANATIONS OF ORDERING CODE**

**52-** $\overline{100}R$ Code I - 3 Code 4 - 6 Code 7 Code 8 Code 9 Code 10 - 12 Code 13 - 17 **Series Name Power Rating Tolerance Packing Style** Temperature Coef-Forming Type Resistance Value ficient of Resistance See Index -05 = ød0.5mm $P = \pm 0.02 \%$ T = Tape/Box26 - 26mm0RI = 0.1R = Tape/Reel - = Base on Spec. -06 = ød0.6mm $A = \pm 0.05 \%$ 52- = 52.4mm 100R = 100-07 = ød0.7mmB = +0.1% $A = \pm 5 \text{ ppm/}^{\circ}\text{C}$ 73 - = 73 mmB = Bulk10K = 10.000 $B = \pm 10 \text{ ppm/}^{\circ}\text{C}$ -08 = ød0.8mmC = +0.25%81 - 81 mm10M = 10,000,000 $C = \pm 15 \text{ ppm/}^{\circ}C$ -10 = ød1.0mm $D = \pm 0.5 \%$ 91 - = 91 mm-14 = ød1.4mm $S = \pm 20ppm/^{\circ}C$ F = ±1 % F = FType $D = \pm 25 \text{ ppm/}^{\circ}C$ -12 = 1/6WFK = FKType $G = \pm 2 \%$  $E = \pm 50 \text{ ppm/}^{\circ}\text{C}$ -25 = 1/4W $1 = \pm 5 \%$ FKK = FKK Type  $F = \pm 100 \text{ ppm/°C}$ 25S = 1/4WSFFK = F-form Kink  $K = \pm 10 \%$  $G = \pm 200 \text{ ppm/}^{\circ}C$ -50 = 1/2W- = Base on Spec M = M-Type Forming  $H = \pm 250 \text{ ppm/°C}$ 50S = 1/2WSMB = M-form W/flat  $I = \pm 300 \text{ ppm/°C}$ 100 = 1 WMT = MT Type Forming IWS = IWS $I = \pm 350 \text{ ppm/°C}$ MR = MRType200 = 2WAV = AVIsertPN = PANAsert 2WS = 2WS204 = 0.4W207 = 0.6W300 = 3W3WS = 3WS3WM = 3WM400 = 4W500 = 5W5WS = 5WS5SS = 5WSS700 = 7W7WS = 7WS10A = 10W20A = 20W30A = 30W40A = 40W50A = 50W10S = 10WS

#### **EXCEPTION:**

## • Cement series:

<Code 8>: Special packing style code

15A = 15W 25A = 25W 10B = 100W25B = 250W

B: Bulk with wirewound or metal oxide sub-assembly for resistance value

W: Bulk with ceramic based wirewound sub-assembly for resistance value

M: Bulk with metal oxide sub-assembly for resistance value

F: Bulk with Fiberglass based wirewound sub-assembly for resistance value

<Code 10-12>: Without forming code

Example: SQP500|B-I0R

## • JPW series:

<Code 13-17>: without resistance value code

Example: JPW-06-T-52-