Carbon Film Resistors

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.
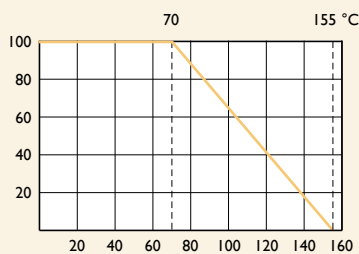
FEATURES

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

DERATING CURVE

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

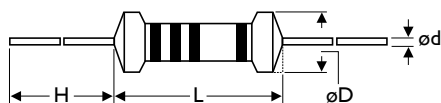## TABLE 1 TEMPERATURE COEFFICIENT

STYLE	TEMP. COEFFICIENT (ppm/°C)		
	under 100KΩ	100KΩ - 1MΩ	1MΩ - 10MΩ
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	H	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	CFR1WS	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	CFR1WS	CFR100	CFR2WS	CFR200	CFR3WS
Power Rating at 70°C	1/6W	1/4W		1/2W		1W		2W		3W
Maximum Working Voltage	150V	200V	250V	300V	350V	400V	500V			
Maximum Overload Voltage	300V	400V	500V	600V	700V	800V	1,000V			
Voltage Proof on Insulation	300V	400V	500V			700V	1,000V			
Resistance Range	1Ω - 10MΩ & 0Ω for E24 series value									
Operating Temp. Range	-55°C to +155°C									
Temperature Coefficient	see Table 1									

Note: Special value is available on request

ENVIRONMENTAL CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD		APPRAISE
Short Time Overload	IEC 60115-1 4.13	2.5 times RCWV for 5 Sec.	±0.75%+0.05Ω
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.	>1,000MΩ
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 10±1 Sec., immersed to a point 3±0.5mm from the body	±1.0%+0.05Ω

Note: RCWV(Rated Continuous Working Voltage) = $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$ or Max. working voltage listed above, whichever less.

Revision: 201304

EXPLANATIONS OF ORDERING CODE

MFR	-12	F	T	F	52-	100R

Code 1 - 3 **Series Name**	Code 4 - 6 **Power Rating**	Code 7 **Tolerance**	Code 8 **Packing Style**	Code 9 **Temperature Coefficient of Resistance**	Code 10 - 12 **Forming Type**	Code 13 - 17 **Resistance Value**
See Index	-05 = ød0.5mm -06 = ød0.6mm -07 = ød0.7mm -08 = ød0.8mm -10 = ød1.0mm -14 = ød1.4mm -12 = 1/6W -25 = 1/4W 25S = 1/4WS -50 = 1/2W 50S = 1/2WS 100 = 1W 1WS = 1WS 200 = 2W 2WS = 2WS 204 = 0.4W 207 = 0.6W 300 = 3W 3WS = 3WS 3WM = 3WM 400 = 4W 500 = 5W 5WS = 5WS 5SS = 5WSS 700 = 7W 7WS = 7WS 10A = 10W 20A = 20W 30A = 30W 40A = 40W 50A = 50W 10S = 10WS 15A = 15W 25A = 25W 10B = 100W 25B = 250W	P = ±0.02 % A = ±0.05 % B = ±0.1 % C = ±0.25% D = ±0.5 % F = ±1 % G = ±2 % J = ±5 % K = ±10 % - = Base on Spec.	T = Tape/Box R = Tape/Reel B = Bulk	- = Base on Spec. A = ±5 ppm/°C B = ±10 ppm/°C C = ±15 ppm/°C S = ± 20ppm/°C D = ±25 ppm/°C E = ±50 ppm/°C F = ±100 ppm/°C G = ±200 ppm/°C H = ±250 ppm/°C I = ±300 ppm/°C J = ±350 ppm/°C	26- = 26mm 52- = 52.4mm 73- = 73mm 81- = 81mm 91- = 91mm F = F Type FK = FK Type FKK = FKK Type FFK = F-form Kink M = M-Type Forming MB = M-form W/flat MT = MT Type Forming MR = MR Type AV = AVIsert PN = PANAsert	0R1 = 0.1 100R = 100 10K = 10,000 10M = 10,000,000

EXCEPTION:

• Cement series:

<Code 8>: Special packing style code

    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: SQP500J**B**-10R

• JPW series:

<Code 13-17>: without resistance value code

    Example: **JPW-06-T-52-**

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CFR0W4J0242A10 CFR0W4J0391A50 CFR0W4J0303A50 CFR0W4J0433A50 CFR03SJ0753AA0 CFR03SJ0470AA0 CF1/6W-20K±5%

T52 CF1/4W-43±5% T52 CFR01SJ0433A10 RD50T5151J RD 1/8W 33K J T/B A1 RD 2WS 3K6 J T/B A1