## **Carbon Film Resistors**

# General Type

# Normal & Miniature Style [ CFR Series ]

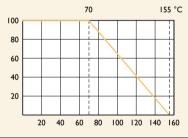
#### **FEATURES**

Rated Load (%)

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.



Ambient Temperature (°C)

#### **TABLE | TEMPERATURE COEFFICIENT**

STYLE	TEMP. COEFFICIENT (ppm/°C)				
	under I00KΩ	100K Ω - 1MΩ	IMΩ - Ι0MΩ		
CFR100, CFR200, CFR2WS, CFR3WS	-350~350	-500~0	-1,500~0		
CFR-12, CFR-25, CFR-50, CFR255, CFR505, CFR1WS	-350~500	-700~0	-1,500~0		

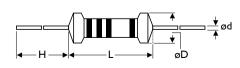
Unit: mm

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	

#### **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.

#### DIMENSIONS



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	1,000V		
Voltage Proof on Insulation	300V	400V	500V			700∨	1,000V		
Resistance Range	ΙΩ - ΙΟΜΩ	IΩ - 10MΩ & 0Ω for E24 series value							
Operating Temp. Range	-55°C to +	-55°C to +155°C							
Temperature Coefficient	see Table 1								

Note: Special value is available on request

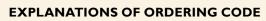
#### **ENVIRONMENTAL CHARACTERISTICS**

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.	>1,000ΜΩ
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	$260\pm3^{\circ}$ C for $10\pm1$ Sec., immersed to a point $3\pm0.5$ mm from the body	±1.0%+0.05Ω

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

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MFR	- 2	F	T	E	52-	IOOR
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 Valu
iee Index	-05 = ød0.5mm	P = ±0.02 %	T = Tape/Box	ficient of Resistance	26- = 26mm	0RI = 0.1
	-06 = ød0.6mm	$A = \pm 0.05 \%$	R = Tape/Reel	- = Base on Spec.	52- = 52.4mm	100R = 100
	-07 = ød0.7mm	$B = \pm 0.1 \%$	B = Bulk	A = ±5 ppm/°C	73- = 73mm	10K = 10,000
	-08 = ød0.8mm	C = ±0.25%		B = ±10 ppm/°C	81- = 81mm	10M = 10,000,00
	-10 = ød1.0mm	D = ±0.5 %		C = ±15 ppm/°C	91- = 91mm	
	-14 = ød1.4mm	F = ±1 %		S = ± 20ppm/°C	F = FType	
	-12 = 1/6W	G = ±2 %		D = ±25 ppm/°C	FK = FKType	
	-25 = 1/4W	J = ±5 %		E = ±50 ppm/°C	FKK = FKK Type	
	25S = 1/4WS	K = ±10 %		$F = \pm 100 \text{ ppm/°C}$	FFK = F-form Kink	
	-50 = 1/2W	- = Base on Spec.		G = ±200 ppm/°C	M = M-Type Forming	
	50S = 1/2WS		]	H = ±250 ppm/°C	MB = M-form W/flat	
	100 = IW			1 = ±300 ppm/°C	MT = MT Type Forming	
	IWS = IWS			J = ±350 ppm/°C	MR = MRType	
	200 = 2VV				AV = AVIsert	
	2WS = 2WS				PN = PANAsert	
	204 = 0.4VV					
	207 = 0.6VV					
	300 = 3VV					
	3WS = 3WS					
	3WM = 3WM					
	400 = 4VV					
	500 = 5VV					
	5WS = 5WS					
	5SS = 5VVSS					
	700 = 7VV					
	7WS = 7WS					
	10A = 10W					
	20A = 20W					
	30A = 30W					
	40A = 40W					
	50A = 50W					
	10S = 10W/S					
	15A = 15W					
	25A = 25W					
	10B = 100VV					
	25B = 250W					

#### 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  $% \mathcal{W}$ 

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: SQP500JB-10R

• JPW series:

<Code 13-17>: without resistance value code

Example: JPW-06-T-52-

## **Mouser Electronics**

Authorized Distributor

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### YAGEO:

CFR-25JR-52-100R CFR-25JR-52-110K CFR-25JR-52-33K CFR-25JR-52-47R CFR-12JR-52-220K CFR-12JR-52-390R CFR-12JR-52-470R CFR-12JR-52-47K CFR-12JR-52-620R CFR-25JR-52-15K CFR-25JR-52-1K2 CFR-25JR-52-20K CFR-25JR-52-33R CFR-25JR-52-470K CFR-25JR-52-56K CFR-50JR-52-1K CFR-50JR-52-2K2 CFR-50JR-52-470R CFR100JR-73-2K4 CFR-25JR-52-1K CFR-50JR-52-220R CFR-25JR-52-1K5 CFR-25JR-52-22R CFR-12JR-52-1M CFR-25JR-52-120K CFR-25JR-52-120R CFR-25JR-52-240R CFR-25JR-52-270R CFR-25JR-52-3K CFR-25JR-52-4R7 CFR-25JR-52-510R CFR-25JR-52-56R CFR-25JR-52-680R CFR-25JR-52-68K CFR-25JR-52-6K8 CFR-25JR-52-75R CFR-25JR-52-820R CFR-25JR-52-82R CFR-25JR-52-8K2 CFR-25JR-52-91R CFR-50JR-52-100R CFR-50JR-52-10K CFR-50JR-52-120R CFR-50JR-52-3K9 CFR-50JR-52-680R CFR-25JR-52-10M CFR-12JB-52-110K CFR-25JB-1K0 CFR-50JR-52-270R CFR-25JR-52-2K2 CFR-12JR-52-39K CFR-25JR-52-470R CFR-25JR-52-220R CFR-25JR-52-390R CFR-12JR-52-100K CFR-25JR-52-5K6 CFR-25JR-52-22K CFR-25JR-52-47K CFR-25JR-52-100K CFR-12JR-52-120K CFR-25JR-52-220K CFR-25JR-52-620R CFR-12JR-52-1K CFR-25JR-52-1K8 CFR-50JR-52-330R CFR-25JR-52-200K CFR-12JR-52-3K9 CFR-25JR-52-10K CFR-25JR-52-2K7 CFR-25JR-52-150K CFR-25JR-52-5K1 CFR-25JR-52-2K CFR-25JR-52-3K3 CFR-25JR-52-3K9 CFR-12JR-52-4K7 CFR-12JR-52-10K CFR-25JR-52-4K7 CFR-25JR-52-330R CFR25SJT-52A4K7 CFR-25JR-52-4M7 CFR-25JR-52-1M CFR-25JR-52-150R CFR-25JR-52-10R CFR-50JB-51R CFR-25JB-52-220R CFR-25JT-52-33R CFR-25JB-52-5R1 CFR-50JR-521K2 CFR-12JB-52-1K8 CFR-50JB-52-2K CFR-25JB-52-1K3 CFR-25JB-52-1K5 CFR-12JB-52-1K CFR-25JB-52-510R CFR-25JB-52-47K CFR-25JB-52-47R CFR-25JB-52-270R CFR-25JB-52-10R CFR-50JB-52-100K CFR-12JB-52-10K