

Feature

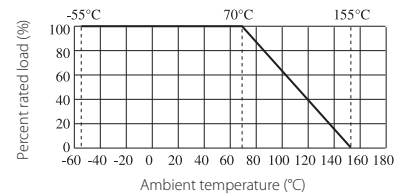
- High quality performance
- Great economy
- Flame Retardant available
- Automatically insertable



Dimension (mm)



Derating Curve



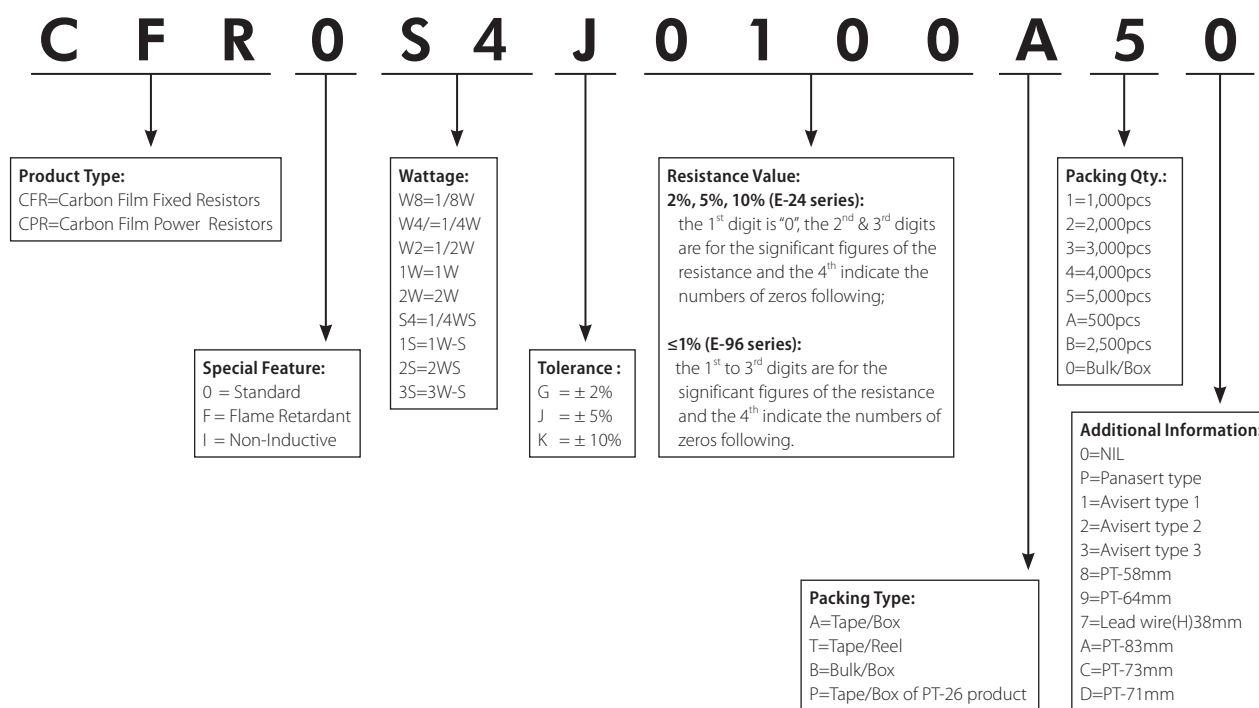
Specification

Part No	Type	Power Rating 70 °C	Dimension (mm)					MAX. Working Voltage	MAX. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Tolerance
			D	L	d ±0.05	H±3	PT					
Ordinary Products												
CFR0W8	CFR-12	1/8W	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V	1Ω~1MΩ	±2% ±5% ±10%
CFR0S4	CFR-25-S	1/4W-S	1.9±0.3	3.3±0.3	0.45	28	52	200V	400V	400V	1Ω~1MΩ	
CFR0W4	CFR-25	1/4W	2.2±0.3	6.5±1.0	0.54	28	52	250V	500V	500V	1Ω~10MΩ	
CFR0W2	CFR-50	1/2W	3.0±0.6	9.5±1.0	0.54	28	52	350V	700V	700V	1Ω~10MΩ	
CFR01S	CFR-100-S	1W-S	4.5±0.6	11.5±1.0	0.70	25	52	500V	1000V	1000V	1Ω~10MΩ	
CFR01W	CFR-100	1W	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V	1Ω~10MΩ	
CFR02S	CFR-200-S	2W-S	5.0±0.6	15.5±1.0	0.70	28	64	500V	1000V	1000V	1Ω~10MΩ	
CFR02W	CFR-200	2W	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V	1Ω~10MΩ	
CFR03S	CFR-300-S	3W-S	6.0±0.6	17.5±1.0	0.75	28	64	500V	1000V	1000V	1Ω~10MΩ	
High Power Products												
CPR0W2	CPR-50	1/2W	2.2±0.5	6.5±1.0	0.54	28	52	300V	500V	700V	3Ω~10MΩ	±2% ±5% ±10%
CPR01W	CPR-100	1W	3.5±0.5	9.5±1.0	0.54	28	52	500V	700V	1000V	3Ω~10MΩ	
CPR02W	CPR-200	2W	4.5±0.5	11.0±1.0	0.70	25	52	500V	1000V	1000V	3Ω~10MΩ	

- Standard E-24 series values in ±5% ±10% & ±20% tolerance
- Standard: Beige color, CFR1WS, CFR2WS, CFR3WS with light brown color, High Power Products with Grey-green
- For any special inquiry such as too Low or too High ohmic values is available case by case.

Performance Specification

Temperature coefficient	$\leq 10\ \Omega$: $\pm 300\text{PPM}/^\circ\text{C}$
	11 Ω ~99k Ω : $\pm 450\text{PPM}/^\circ\text{C}$
	100k Ω ~1M Ω : 0~700PPM/ $^\circ\text{C}$
	1.1M Ω ~10M Ω : 0~1500PPM/ $^\circ\text{C}$
Short-time Overload	CFR Products: $\Delta R/R \leq \pm(1\%+0.05\ \Omega)$
	CPR Products: $\Delta R/R \leq \pm(0.75\%+0.05\ \Omega)$
Dielectric withstanding voltage	With no evidence of flashover,mechanical damage,arcing or insulation breakdown
Terminal strength	No evidence of mechanical damage
Soldering heat	$\Delta R/R \leq \pm(1\%+0.05\ \Omega)$ with no evidence of mechanical damage
Solderability	Coverage must be over 95%.
Resistance to solvent	No deterioration of protective coating and markings
Rapid change of temperature	$\Delta R/R \leq \pm(1\%+0.05\ \Omega)$
	with no evidence of mechanical damage
Load life in humidity	CFR Ordinary Products: $\Delta R/R \pm 3\%$ for $< 100\text{k}\Omega$, $\pm 5\%$ for $\geq 100\text{k}\Omega$
	CFR Flame retardant type: $\Delta R/R \pm 5\%$ for $< 100\text{k}\Omega$, $\pm 10\%$ for $\geq 100\text{k}\Omega$
	High Power Products: $\Delta R/R \pm (3\%+0.05\ \Omega)$
Load life	CFR Ordinary Products: $\Delta R/R \pm 2\%$ for $< 56\text{k}\Omega$, $\pm 3\%$ for $\geq 56\text{k}\Omega$
	CFR Flame retardant type: $\Delta R/R \pm 5\%$ for $< 100\text{k}\Omega$, $\pm 10\%$ for $\geq 100\text{k}\Omega$
	High Power Products: $\Delta R/R \pm (3\%+0.05\ \Omega)$

Ordering Procedure (Example: CFR 1/4WS 5% 10 Ω T/B-5000)

Remark: For more details, please check page 135, Part No. System

1	2	3	4	5	6	7	8	9	10	11	12	13	14
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The standard Part No. includes 14 digits with the following explanation:

1. 1st~4th digits:
 - a) This is to indicate the SMD Resistor size. Example: 1206, TC05 or HV03;
 - b) For Resistor Network & Coated type, the 1st~3rd digits are to indicate the product type and the 4th digit is the special feature. Example: RNLA = Resistor Network Circuit A type; CFRF = Carbon Film Fixed Resistors Non-Flame type; MORI = Metal Oxide Film Fixed Resistor Non-Inductive type.
 - c) For Cement Fixed Resistors, these 4 digits are to indicate the product type but if the product type has only 3 digits, the 4th digit will be "0". Example: PRW0=PRW type; PRWC=PRWC type.
2. 5th~6th digits:
 - a) This is to indicate the wattage or power rating. To distinguish the sizes and the numbers, the following codes are used, and please refer to the following chart for details: W = Normal Size; S = Small Size; U = Ultra 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	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16
Normal Size	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF	WG
Small Size	S2	S3	S4	S5	S6	S7	S8	S9	SA	SB	SC	SD	SE	SF	SG
Ultra Small Size	U2	U3	U4	U5	U6	U7	U8	U9	UA	UB	UC	UD	UE	UF	UG

1W ~ 16W (≥1W)

Wattage	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Normal Size	1W	2W	3W	4W	5W	6W	7W	8W	9W	AW	BW	CW	DW	EW	FW	GW
Small Size	1S	2S	3S	4S	5S	6S	7S	8S	9S	AS	BS	CS	DS	ES	FS	GS
Ultra Small Size	1U	2U	3U	4U	5U	6U	7U	8U	9U	AU	BU	CU	DU	EU	FU	GU

- b) For power rating less than 1W, 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: WA = 1/10W; U2 = 1/2W-SS
- c) For power rating of 1W to 16W, 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.
- d) For power rating between 20W to 99W, the 5th & 6th digits will show the whole numbers of the power rating itself. Example: 20 = 20W; 75 = 75W.
- e) For power rating of 100W & over, the 5th & 6th digits will be indicated with "00" and the actual wattage being indicated at the last 3 digits (12th~14th) of the Part No.
- f) For special power ratings, the following codes are to be used:

1). WH = 1/32W (10P8 Chip Network)	2). 07 = 3/4WS (Chip 2010 size)
3). 04 = 0.4W-SS (0.4 watt Ultra Small size)	4). 06 = 0.6W-S (0.6 watt Small size)
5). 2A = 2.5W 6). 6A = 6.5W 7). WK = 2/3W	8). 1A = 1.5W 9). 1.25W = 1Q
- g) For Resistor Network, since the power rating is fixed as 1/8W for A circuit & 1/5W for B circuit, the 5th & 6th digit is to be used to denote the number of pins required. Example: 09 = 9pins; 12 = 12pins.
- h) For Jumper Wires the 5th & 6th digits will be indicated with "00".
- i) For Thin Film Chip Resistors, these 2 digits will be used to indicate the requested Temperature coefficient:

1). 05 = 5PPM	2). 10 = 10PPM	3). 15 = 15PPM	4). 25 = 25PPM	5). 50 = 50PPM
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3. The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance. As for Metal Film Fixed Resistor products, it is also to denote the standard PPM as follows:

B = ±0.1% (15PPM)	G = ±2% (100PPM)	W = ±0.05%
C = ±0.25% (25PPM)	J = ±5% (200PPM)	L = ±0.01%
D = ±0.5% (50PPM)	K = ±10%	
F = ±1% (50PPM)		

Remark: if it is not one of the above standard "tolerance-TCR", the requirement should be clearly stated when placing order.
Example: ±1% (25PPM), the 7th digit still shows "F" but separately note the requirement of "25PPM"

4. The 8th to 11th digits is to denote the Resistance Value:

- For the standard resistance values of E-24 series in 5% & 10% tolerance, 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
- For the standard resistance values of E-96 series in $\leq 2\%$ tolerance, the 8th digit to the 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following.
- For the code to the significant figures to E-24 & E-96 series, please refer to page 170 & 171 of the standards Resistance Value list.
- The following numbers and the letter codes is to be used to indicate the number of zeros in the 11th digit:

0 = 10^0	1 = 10^1	2 = 10^2	3 = 10^3	4 = 10^4	5 = 10^5	6 = 10^6
J = 10^{-1}	K = 10^{-2}	L = 10^{-3}	M = 10^{-4}	N = 10^{-5}	P = 10^{-6}	

- For Cement Resistors the 8th digit will be coded with "W" or "P" to denote Wire-wound type or Power Film type respectively of the Cement Fixed Resistor product. The 9th to 11th please refer to point 4.a

Example:

E-24 series

0120 = 12 ohm
0123 = 12K ohm
012J = 1.2 ohm

E-96 series

1210 = 121 ohm
1302 = 13K ohm
196J = 19.6 ohm

Cement Resistors

W120 = 12 ohm Wire-wound type
W12J = 1.2 ohm Wire-wound type
P273 = 27 kohm Power Film type

5. The 12th, 13th & 14th digits:

- The 12th digit is to denote the Packaging type with the following codes:
A = Tape / Box (Ammono Pack) C = Bulk in Cassette (for Chip product)
B = Bulk / Box T = Tape / Reel P = Tape / Box of PT-26 product
- The 13th digit is normally to indicate the Packing Quantity of Tape/Box or Tape/Reel packaging types. Except for Chip products Bulk packing, this digit should be filled "0" or other products with "Bulk/Box packaging requirement. The following letter codes is to be used for some packaging quantities.

A = 500pcs	B = 2,500pcs	C = 10,000pcs	N = 12,500pcs	E = 15,000pcs
D = 20,000pcs	G = 25,000pcs	L = 45,000pcs	H = 50,000pcs	J = 60,000pcs

Example:

CHIP product

TD = T/R-20,000
TE = T/R-15,000
T4 = T/R-4,000

Other products

A5 = T/B-5,000
TB = T/R-2,500
B0 = B/B

- For the Forming 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 wire	F3 = F3 type

- For power rating over 100watt, the 12th to the 14th digits are to denote the actual wattage of the products:

Example: 100 = 100watt 150 = 150watt 225 = 225watt

- For some products, the 14th digit alone can use to denote special features or additional information with the following codes:

P = Panasert type	1 = Avisert 1 type	2 = Avisert 2 type
3 = Avisert 3 type	A = CO 1/4W - A type	B = CO 1/4W - B type

E = used to denote the "Environment Protection, lead Free type" of SMD category resistors (now, this became the Standard type of SMD)

- For some products, the 14th digit alone can use to denote special features or additional information with the following codes:

B=1/32W	C=1/16W	F=1/10W	G=1/8W	H=1/6W	J=1/4W	K=1/3W	M=1/2W
N=3/4W	P=1W	S=Special					