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Innovative Service Around the Globe YAGEO

DATA SHEET

CARBON FILM RESISTORS

General Purpose

CFR Series

±2%, ±5%

1/6W to 3W

RoHS compliant & Halogen Free

YAGEO

Product specification – April 3, 2024 V.3



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APPLICATIONS

- All general purpose applications
- Power applications

FEATURES

- AEC-Q200 qualified
- Wide resistance range
- High stability
- PPAP ready (CFR-25/CFR50S)
- RoHS compliant & halogen-free

ORDERING INFORMATION

Part number of the general purpose carbon film resistor are identified by the series, power rating, tolerance, packing, temperature coefficient, forming and resistance value.

PART NUMBER

CFR	200	J	T	-	73-	100R
(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) SERIES NAME

CFR Series

(2) POWER RATING

-12 = 1/6W	-50 = 1/2W	200 = 2W
25S = 1/4W	100 = 1W	3WS = 3W
-25 = 1/4W	2WS = 2W	1WS = 1W
50S = 1/2W		

(3) TOLERANCE

G = ±2%　　J = ±5%

(4) PACKAGING

R = Reel Pack　　B = Bulk

T = Box Pack

(5) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec , please refer to page 4 Table 2 .

(6) FORMING

26- = 26mm
52- = 52.4mm
73- = 73mm
73G = 73mm, Φd≧0.6mm
26A = 26mm, Φd=0.4±0.02mm
26C = 26mm, Φd=0.5±0.02mm
26G = 26mm, Φd≧0.6mm
52A = 52.4mm, Φd=0.4±0.02mm
52B = 52.4mm, Φd=0.45±0.02mm
52C = 52.4mm, Φd=0.5±0.02mm
52G = 52.4mm, Φd≧0.6mm
52H = 52.4mm, non-painting on welding spot

M = M-Type Forming
MT = MT Type Forming
MB = M-form W/flat
FT = FT Type Forming
F = F Type
FK = FK Type
FFK = F-form Kink
FKK = FKK Type
PN = PANAsert
AV = AVIsert
FB-= FB- Type (for -25&50S)

Note:26mm, 52.4mm and 73mm represent dimension A of the axial type, please refer to the category of AXIAL/REEL TAPE SPECIFICATION for the detail.

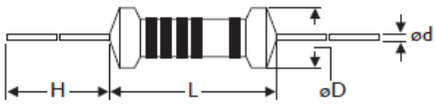
(7) RESISTANCE VALUE

E24 Series
Example:
100R = 100Ω, 10K = 10,000Ω, 1M = 1,000,000Ω

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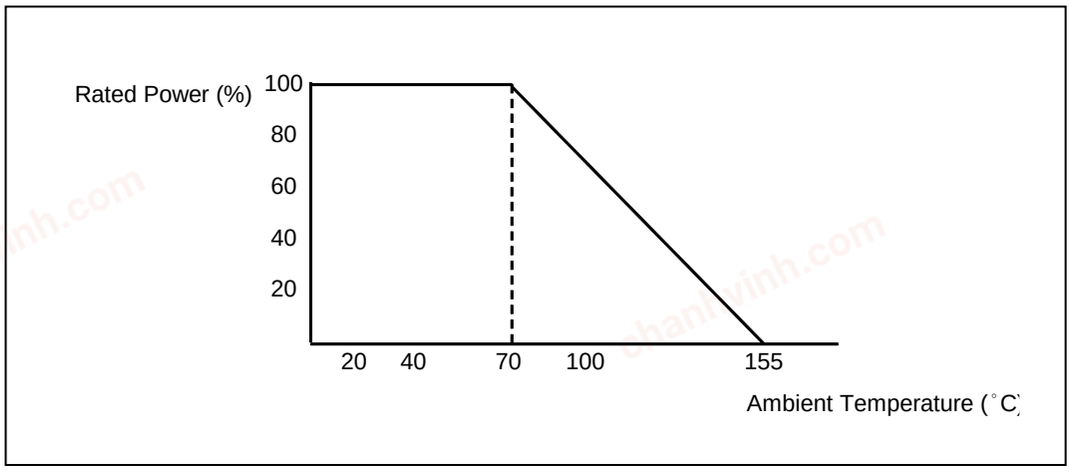
DIMENSIONS

Unit: mm



Normal	Miniature	L	ψD	H	ψd
CFR-12	CFR 25S	3.4 ± 0.3	1.9 ± 0.2	28 ± 2.0	0.45 ± 0.05
CFR -25	CFR 50S	6.3 ± 0.5	2.4 ± 0.2	28 ± 2.0	0.55 ± 0.05
CFR -50	CFR 1WS	9.0 ± 0.5	3.3 ± 0.3	26 ± 2.0	0.55 ± 0.05
CFR 100	CFR 2WS	11.5 ± 1.0	4.5 ± 0.5	35 ± 2.0	0.8 ± 0.05
CFR 200	CFR 3WS	15.5 ± 1.0	5.0 ± 0.5	33 ± 2.0	0.8 ± 0.05

DERATING CURVE



ELECTRICAL CHARACTERISTICS

TABLE 1

CHARACTERISTICS	CFR -12	CFR 25S	CFR -25	CFR 50S	CFR -50	CFR 1WS	CFR 100	CFR 2WS	CFR 200	CFR 3WS
Power Rating at 70 °C	1/6W	1/4W	1/4W	1/2W	1/2W	1W	1W	2W	2W	3W
Maximum Working Voltage	150V	200V	250V	300V	350V	400V	500V	500V	500V	500V
Maximum Overload Voltage	300V	400V	500V	600V	700V	800V	1000V	1000V	1000V	1000V
Voltage Proof on Insulation	300V	400V	500V	500V	500V	700V	1000V	1000V	1000V	1000V
Resistance Range	1Ω ~ 10MΩ for E24 series value									
Operating Temp. Range	- 55°C to +155°C									
Temperature Coefficient	see Table 2									

Note: For resistance value out of above range is by request.

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TABLE 2 TEMPERATURE COEFFICIENT

TYPE	Temp. Coefficient ppm/°C		
	Under 100KΩ	100K ~ 1MΩ	1M ~ 10MΩ
CFR100, CFR200, CFR2WS CFR3WS	± 350	-500~0	-1500~0
CFR-12 , CFR-25 , CFR-50 CFR25S , CFR50S , CFR1WS	- 500 ~ +350	-700~0	-1500~0

TEST AND REQUIRMENTS

TEST	TEST METHOD	PROCEDURE	APPRAISE
Short Time Overload	IEC 60115-1 4.13	2.5 times RCWV for 5 sec.(Not more than maximum overload voltage)	±0.75%+0.05Ω
Voltage Proof on Insulation	IEC 60115-1 4.7	In V-Block for 60 sec. test voltage as above table	No Breakdown
Temperature Coefficient	IEC 60115-1 4.8	Between -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	245±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(or Umax., whichever less) 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 (or Umax., whichever less)	±3.0%+0.05Ω
Endurance at 70°C	IEC 60115-1 4.25	70±2°C at RCWV(or Umax., whichever less) 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

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Note:.

RCWV (Rated Continuous Working Voltage):

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$V=\sqrt{(P \times R)}$
or max. working voltage whichever is less

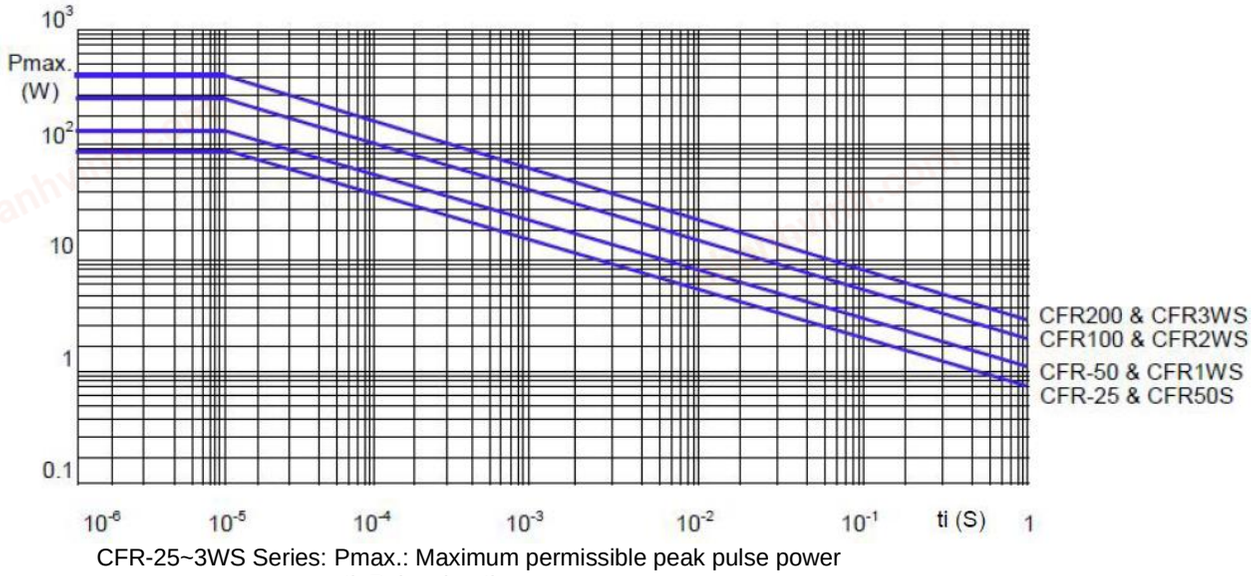
Where

V=Continuous rated DC or
AC (rms) working voltage (V)

P=Rated power (W)

R=Resistance value (Ω)

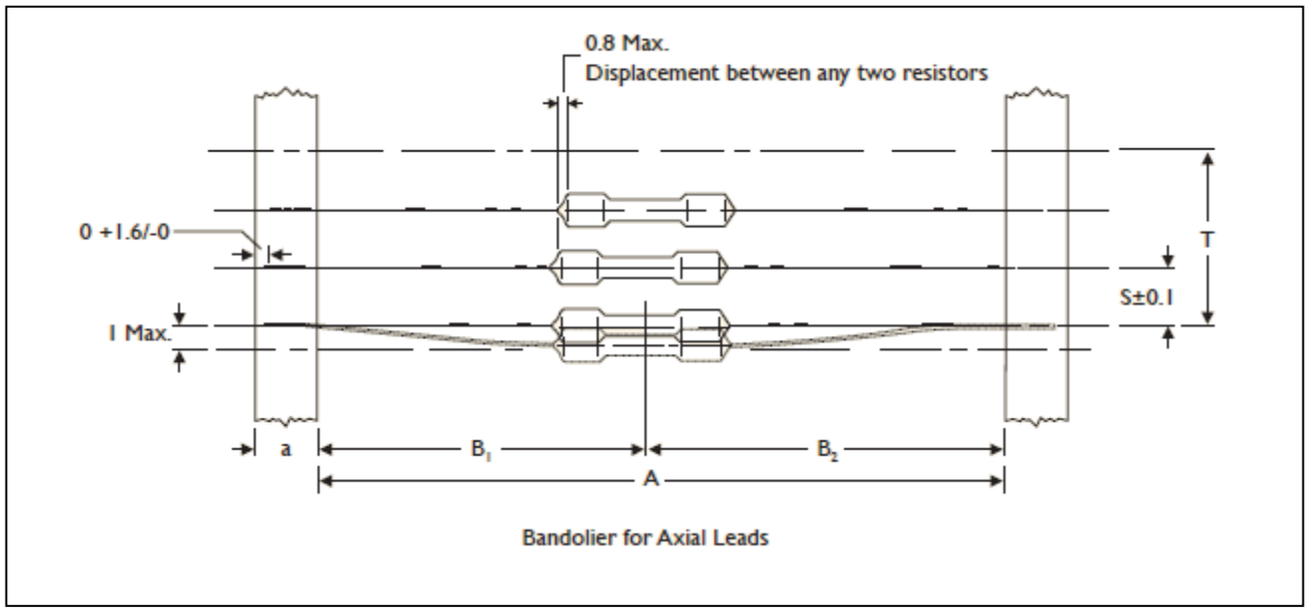
PULSE DIAGRAMS



CFR-25~3WS Series: Pmax.: Maximum permissible peak pulse power
ti: Pulse duration
tp: Pulse repetition time

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AXIAL / REEL TAPE SPECIFICATION



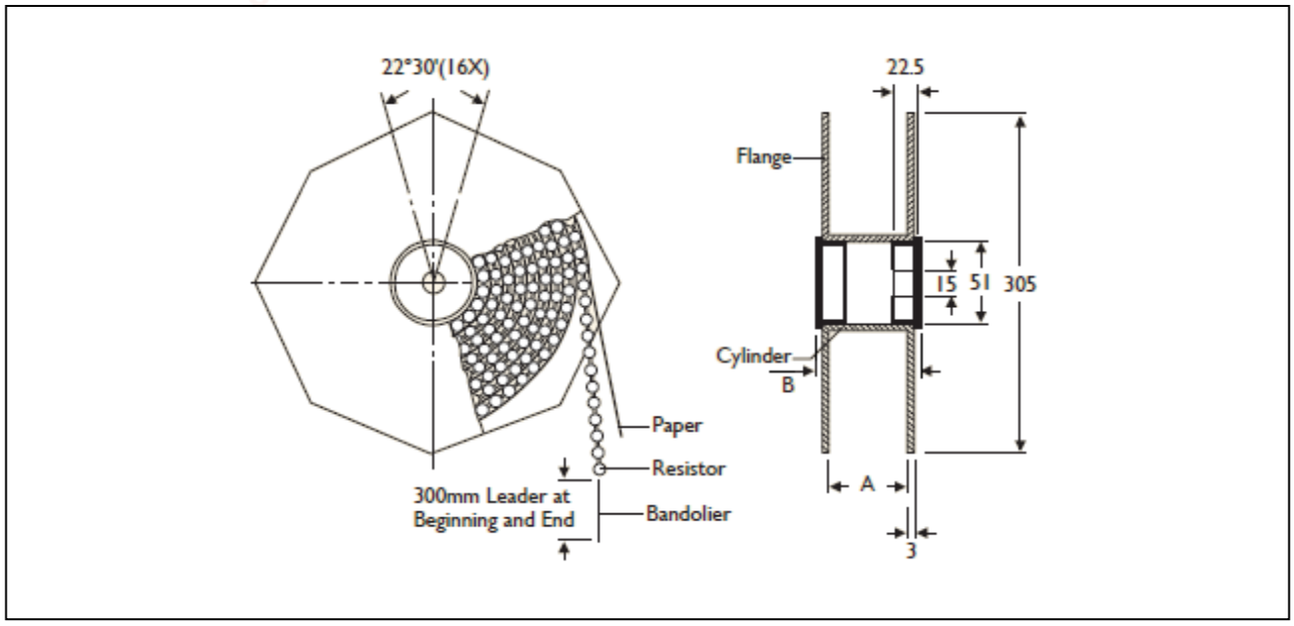
Bandolier for Axial Leads

Unit: mm

Normal	Miniature	a	A	B1-B2 (Max.)	S (spacing)	T (max. deviation of spacing)
CFR-12	CFR25S	6 ± 0.5	52.4 ± 1.5	1.2	5	1 mm per 10 spacing, 0.5 mm per 5 spacing
			26.0 ± 1.5	1.0		
CFR-25	CFR50S	6 ± 0.5	52.4 ± 1.5	1.2	5	
			26.0 ± 1.5	1.0		
CFR-50	CFR1WS	6 ± 0.5	52.4 ± 1.5	1.2	5	
CFR100	CFR2WS	6 ± 0.5	73.0 ± 1.5	1.5	5	
			52.4 ± 1.5	1.2		
CFR200	CFR3WS	6 ± 0.5	73.0 ± 1.5	1.5	10	
			52.4 ± 1.5	1.2		

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TAPE ON REEL PACKING



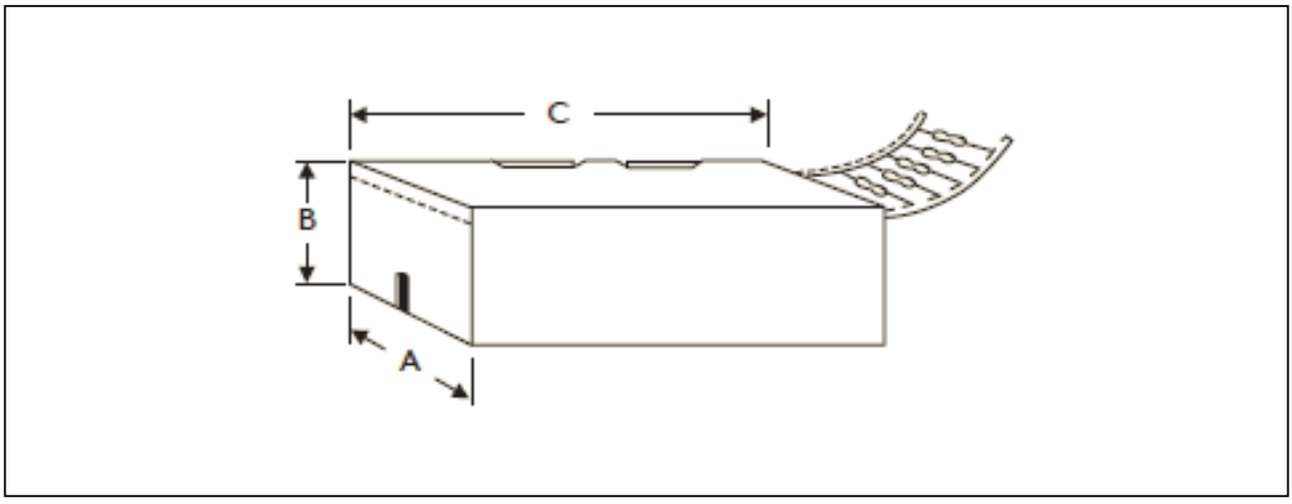
TYPE

Unit: mm/piece

Normal	Miniature	Across Flange(A)	B	Quantity Per Reel
CFR-12	CFR25S	66.5	75.5	5,000
CFR-25	CFR50S	66.5	75.5	5,000
CFR-50	CFR1WS	66.5	75.5	2,500
CFR100	CFR2WS	87	96	2,000
CFR200	CFR3WS	87	96	1,000

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TAPE ON BOX PACKING



Unit: mm/piece

TYPE		DIMENSIONS			
Normal	**Miniature**	**A**	**B**	**C**	**Quantity Per Box**
CFR-12	CFR25S	48	102	255	5,000
CFR-12	CFR25S	81	70	260	5,000
CFR-25	CFR50S	48	102	255	5,000
CFR-25	CFR50S	81	104	260	5,000
CFR-50	CFR1WS	73	45	258	1,000
CFR100	CFR2WS	81	91	260	1,000
CFR100	CFR2WS	103	78	260	1,000
CFR200	CFR3WS	81	91	260	1,000
CFR200	CFR3WS	103	94	260	1,000

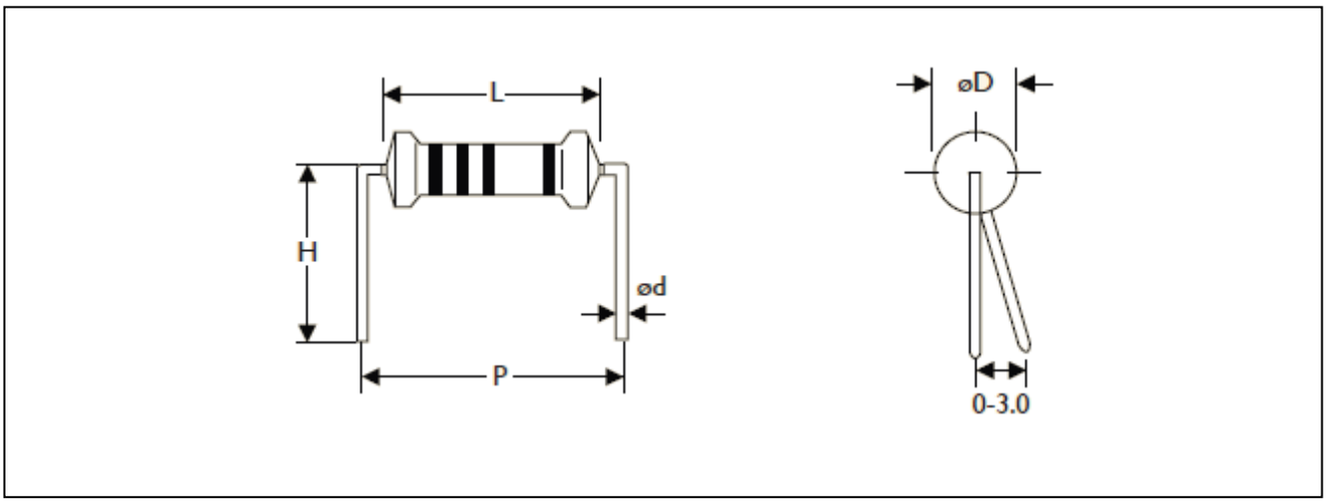
BULK PACKING

Normal	**Miniature**	**Piece/Per Inner Box**	**Bag/Per Inner Box**	**Piece Per Bag**
CFR-12	CFR25S	10,000	10	1,000
CFR-25	CFR50S	10,000	10	1,000
CFR-50	CFR1WS	5,000	5	1,000
CFR-100	CFR2WS	2,000	4	500
CFR200	CFR3WS	1,000	2	500

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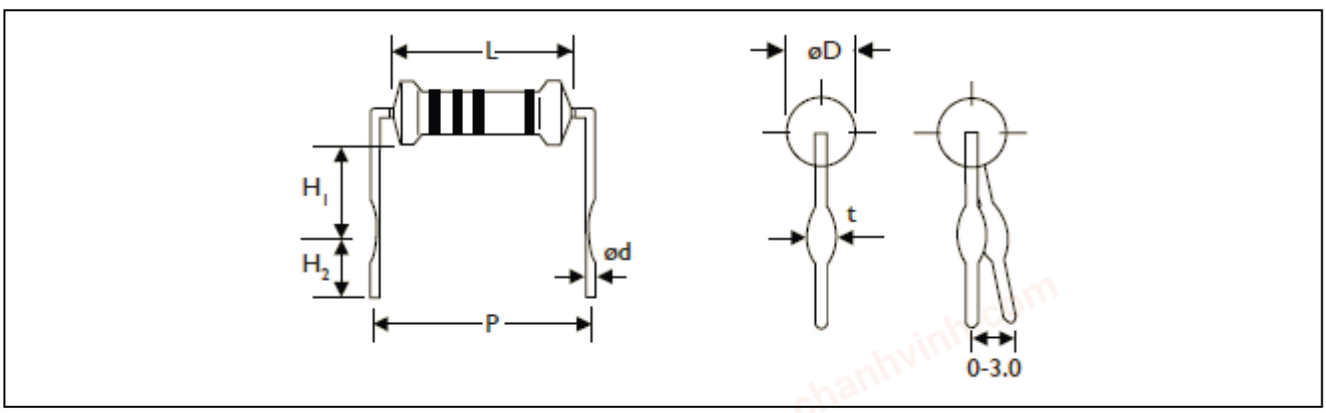
FORMING

M TYPE



TYPE DIMENSIONS Unit: mm

Normal	Miniature	L	ψD	ψd	P	H
CFR-12	CFR25S	3.4± 0.3	1.9 ± 0.2	0.45 ± 0.05	6.0 ± 1	10.0 ±1
CFR-25	CFR50S	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1	10.0 ± 1
CFR-50	CFR1WS	9.0 ± 0.5	3.3± 0.3	0.55 ± 0.05	12.5 ± 1	10.0 ± 1
CFR100	CFR2WS	11.5 ± 1.0	4.5 ± 0.5	0.8 ± 0.05	15.0 ± 1	12.5 ± 1
CFR200	CFR3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	15.0 ± 1



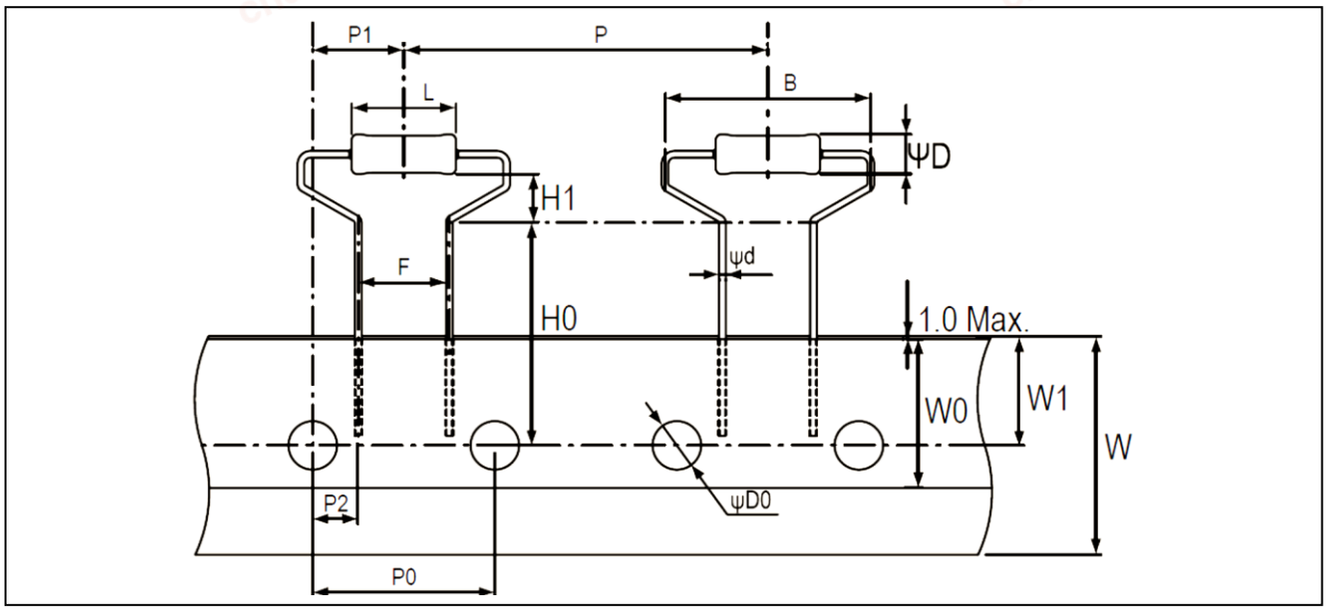
MB TYPE

TYPE DIMENSIONS Unit: mm

Normal	Miniature	L	ψD	ψd	P	H1	H2	t
CFR-25	CFR50S	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2
CFR-50	-	9.0 ± 0.5	3.3± 0.3	0.55 ± 0.05	12.5 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2
-	CFR1WS	9.0 ± 0.5	3.3± 0.3	0.8 ± 0.05	12.5 ± 1	6.0 ± 1	5.0 ± 1	1.4 ± 0.2
CFR100	CFR2WS	11.5 ± 1.0	4.5± 0.5	0.8 ± 0.05	15.0 ± 1	6.0 ± 1	5.0 ± 1	1.4 ± 0.2
CFR200	CFR3WS	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	10.0 ± 1	5.0 ± 1	1.4 ± 0.2

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MHA TYPE

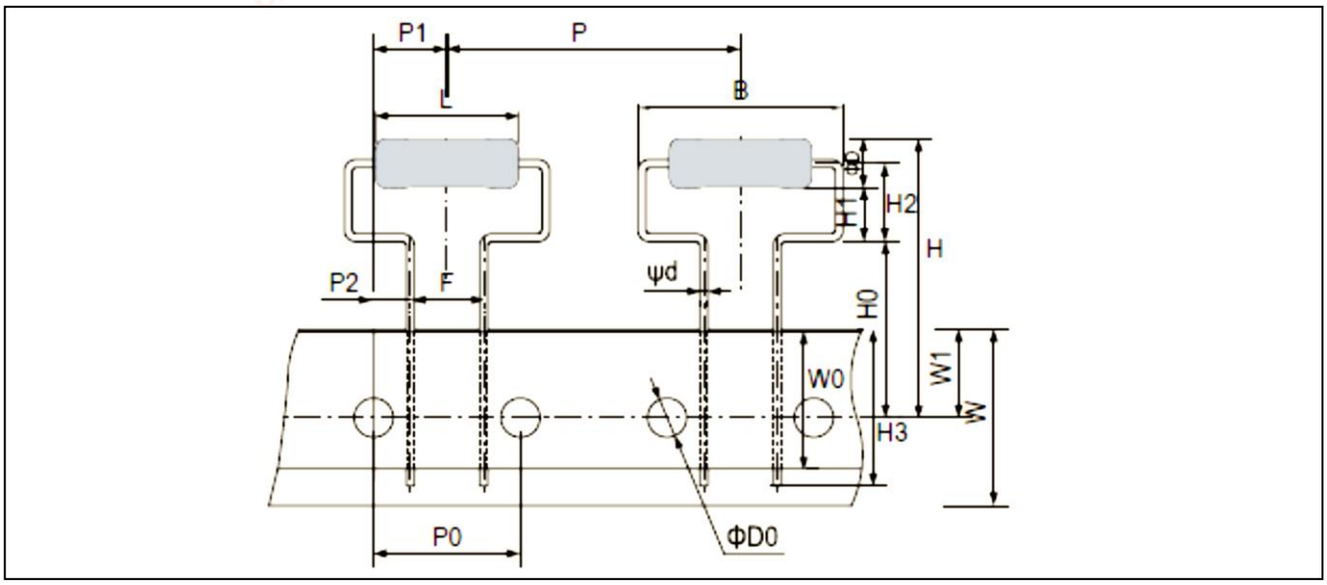


TYPE DIMENSIONS Unit: mm

Normal	Miniature	L	ψD	ψd	B	H0	HI	P	P0
		9.0±0.5	3.3±0.3	0.55±0.05	17.5Max	19.0±1.0	4.0±1.0	30.0±1.0	15.0±0.3
CFR-50	CFR1WS	**P1**	**P2**	**F**	**W**	**W0**	**W1**	**ΨD0**	
		7.5±1.0	3.75±0.5	7.5±0.5	18.0±0.5	5.0Min	9.0±0.5	4.0±0.2	

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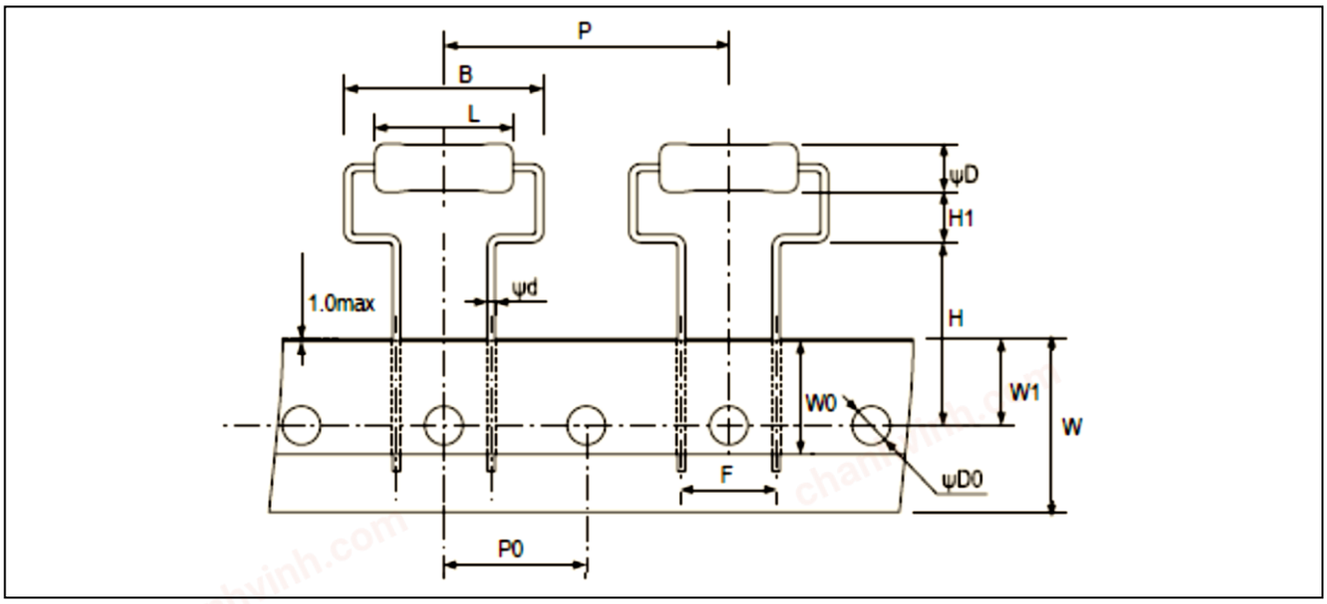
MHB TYPE



TYPE DIMENSIONS Unit: mm

Normal	Miniature	L	ψD	ψd	B	H	H0	HI	H2	H3
		15.5±1.0	5.0±0.5	0.8±0.05	21.0Max.	30Max.	18.0±1.0	5.5(Ref.)	8.0±1.5	16Max.
CFR200	CFR3WS	**P**	**P0**	**PI**	**P2**	**F**	**W**	**W0**	**W1**	**ΨD0**
		30.0±1.0	15.0±0.3	7.5±1.0	3.75±0.8	7.5±0.5	18.0±0.5	5.0Min.	9.0±0.5	4.0±0.3

MHC TYPE

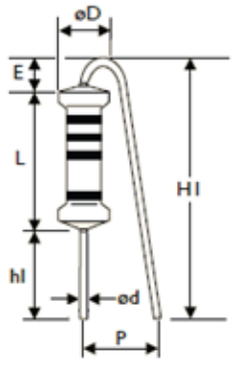


TYPE DIMENSIONS Unit: mm

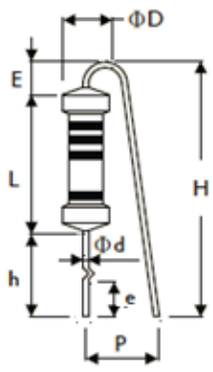
Normal	Miniature	L	ψD	ψd	B	H	HI	P	P0
		15.5±1.0	5.0±0.5	0.8±0.05	21.0Max.	19.0±1.0	5.25±1.0	30.0±1.0	15.0±0.3
CFR200	CFR3WS	**F**	**W**	**W0**	**W1**	**ΨD0**			
		10.0±0.5	18.0±0.5	5.0Min.	9.0±0.5	4.0±0.2			

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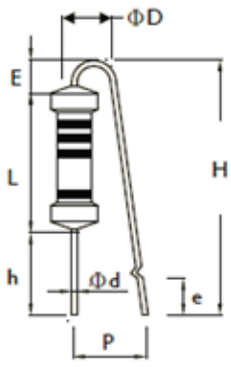
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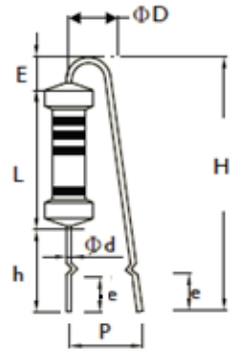
FK TYPE



FFK TYPE



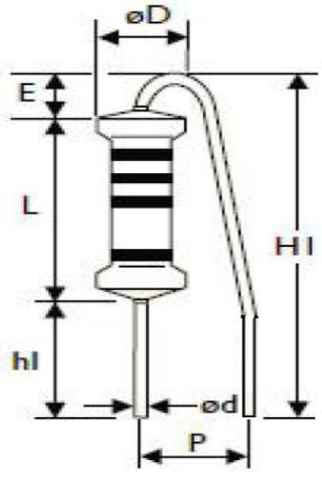
FKK TYPE



TYPE DIMENSIONS Unit: mm

Normal	Miniature	L	ψD	ψd	P	h	H Max.	hl	Hl Max.	E Max.	e
CFR-50	CFR1WS	9.0±0.5	3.3±0.3	0.55±0.05	6±1	8±1	22	5±1	18.5	3.5	3.5±1
CFR100	CFR2WS	11.5±1	4.5±0.5	0.8±0.05	6±1	8±1	24	5±1	20	3.5	3.5±1
CFR200	CFR3WS	15.5±1	5.0±0.5	0.8±0.05	8±1	8±1	28	5± 1	25	3.5	3.5±1

FB- TYPE (for -25&50S)

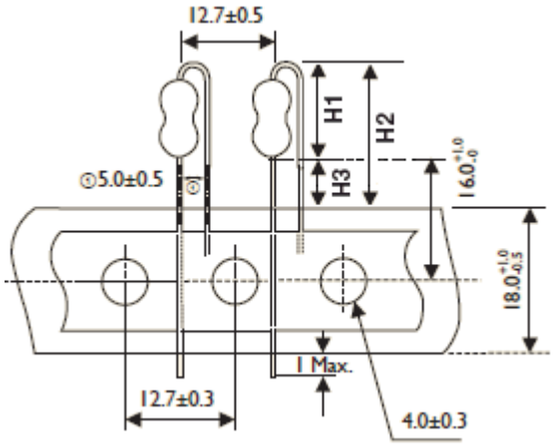


TYPE DIMENSIONS Unit: mm

Normal	Miniature	L	ψD	ψd	P	hl	Hl	E Max.
CFR-25	CFR50S	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	6±1	5.5±0.5	13.5±0.5	3.5

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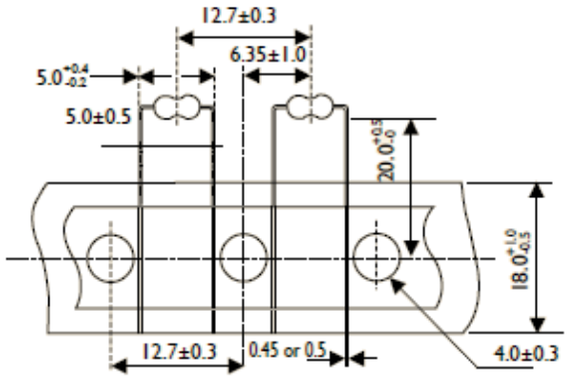
FT TYPE (Taping Pack)



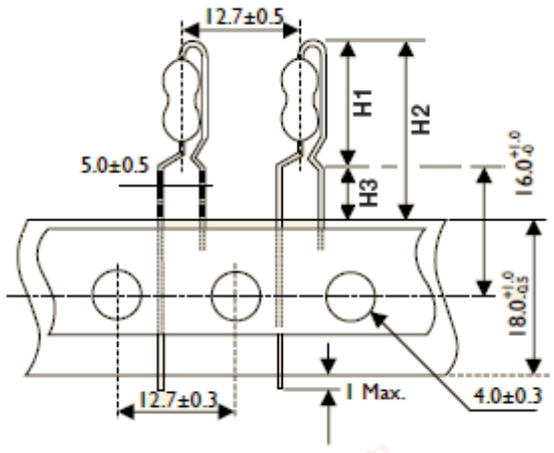
TYPE		DIMENSIONS		Unit: mm
Normal	**Miniature**	**H1 Max.**	**H2 Max.**	**H3 Max.**
CFR-25	CFR50S	10	18.5	8.5
CFR-50	CFR1WS	13	21.5	8.5
CFR100	CFR2WS	16	24.5	8.5

MT TYPE (Taping Pack)

Rated Watts : 1/6W,1/4WS

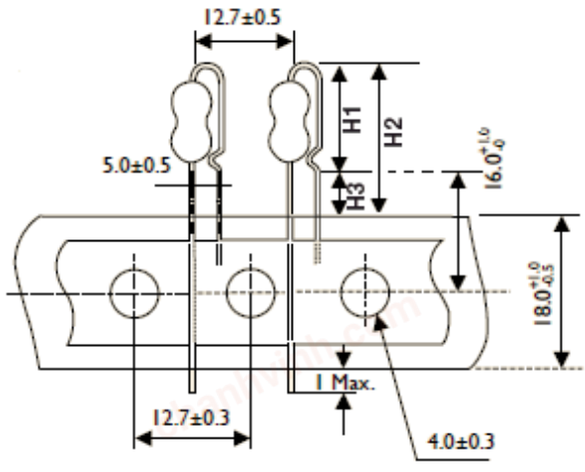


PN TYPE (Taping Pack)



TYPE		DIMENSIONS		Unit: mm
Normal	**Miniature**	**H1 Max.**	**H2 Max.**	**H3 Max.**
CFR-25	CFR50S	13	21.5	8.5
CFR-50	CFR1WS	17	25.5	8.5
CFR100	CFR2WS	19	27.5	8.5

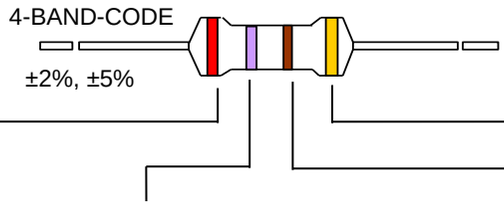
AV TYPE (Taping Pack)



TYPE		DIMENSIONS		Unit: mm
Normal	**Miniature**	**H1 Max.**	**H2 Max.**	**H3 Max.**
CFR-25	CFR50S	11.5	20	8.5
CFR-50	CFR1WS	14.5	23	8.5
CFR100	CFR2WS	17.5	26	8.5

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MARKING



COLOR	1st BAND	2nd BAND	3rd BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	1Ω	
BROWN	1	1	1	10Ω	
RED	2	2	2	100Ω	± 2% (G)
ORANGE	3	3	3	1KΩ	
YELLOW	4	4	4	10KΩ	
GREEN	5	5	5	100K	
BLUE	6	6	6	1MΩ	
VIOLET	7	7	7	10MΩ	
GREY	8	8	8	0.001Ω	
WHITE	9	9	9	0.0001Ω	
GOLD				0.1Ω	± 5 % (J)
SILVER				0.01Ω	

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REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Apr.2, 2024	-	- Added forming code description for part number
Version 2	Aug.31, 2023	-	- Updated legal disclaimer and footer versions numbers
Version 1	Aug.31, 2021	-	- Add FB- forming code to -25&50S
Version 0	Aug.2, 2021	-	- First issue of this specification

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