Type CPF Series

Key Features

- Thin film precision resistors with TC's of 15ppm, 25ppm and 50ppm and tolerances to 0.1%. Applications in measurement, telemetry and for sensing circuits.
- Wide range of case sizes from 0201 to 2512
- CPF chip resistors are suitable for all applications where close accuracy and stability are essential
- Terminal finish - electro-plated 100% matte Sn

Applications

- Communications
- Industrial Controls
- Instrumentation
- Medical

The CPF series is a high stability precision chip resistor range offering various power dissipations relating to a wide range of chip sizes. The CPF series offers TCR's down to 15ppm/°C and resistance tolerances to 0.1%. Standard values are within the IEC 63 E96 and E24 value grids. The CPF has accurate and uniform physical dimensions to facilitate placement.

Characteristics - Electrical

	0201				0402								
Rated Power @ 70°C:	0.03125W				0.063W								
Resistance Range (Ohms) Min:	49R9	49R9	49R9	49R9	49R9	10R	10R	49R9	10R	1R0	49R9	10R	1R0
Max:	5K0	33K	5K0	33K	70K	255K	205K	70K	255K	205K	70K	255K	205K
Tolerance (%):	0.5		1		0.1			0.5			1		
Code letter:	D		F		B			D			F		
Selection Series:	E24 & E96				E24 & E96								
Temp. Coefficient (ppm/°C):	25	50	25	50	15	25	50	15	25	50	15	25	50
Code Letter:	E	C	E	C	D	E	C	D	E	C	D	E	C
Limiting Element Voltage:	15V				25V								
Max. Overload Voltage:	30V				50V								
Operating Temp. Range:	-55 to +155°C				-55 to +155°C								
Climatic Category (°C):	55/125/55				55/125/55								
Insulation Resistance Dry Min:	1000MΩ				1000MΩ								
Stability:	0.5%				0.5%								

	0603									0805								
Rated Power @ 70°C:	0.063W									0.1W								
Resistance Range (Ohms) Min:	4R7	4R7		4R7	2R0		4R7	2R0		4R3	4R7		4R3	1R0		4R3	1R0	
Max:	332K	1M0		332K	1M0		332K	1M0		511K	2M0		511K	2M0		511K	2M0	
Tolerance (%):	0.1			0.5			1			0.1			0.5			1		
Code letter:	B			D			F			B			D			F		
Selection Series:	E24 & E96									E24 & E96								
Temp. Coefficient (ppm/°C):	15	25	50	15	25	50	15	25	50	15	25	50	15	25	50	15	25	50
Code Letter:	D	E	C	D	E	C	D	E	C	D	E	C	D	E	C	D	E	C
Limiting Element Voltage:	50V									100V								
Max. Overload Voltage:	100V									200V								
Operating Temp. Range:	-55 to +155°C									-55 to +155°C								
Climatic Category (°C):	55/125/55									55/125/55								
Insulation Resistance Dry Min:	1000MΩ									1000MΩ								
Stability:	0.5%									0.5%								

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Type CPF Series

		1206									1210								
Rated Power @ 70°C:		0.125W									0.2W								
Resistance Range (Ohms)	**Min:**	4R7	4R7		4R7	1R0		4R7	1R0		4R7	4R7		4R7	1R0		4R7	1R0	
	Max:	1M0	2M5		1M0	2M5		1M0	2M5		1M0	2M5		1M0	2M5		1M0	2M5	
Tolerance (%):		0.1			0.5			1			0.1			0.5			1		
Code letter:		B			D			F			B			D			F		
Selection Series:		E24 & E96									E24 & E96								
Temp. Coefficient (ppm/°C):		15	25	50	15	25	50	15	25	50	15	25	50	15	25	50	15	25	50
Code Letter:		D	E	C	D	E	C	D	E	C	D	E	C	D	E	C	D	E	C
Limiting Element Voltage:		150V									150V								
Max. Overload Voltage:		300V									300V								
Operating Temp. Range:		-55 to +155°C									-55 to +155°C								
Climatic Category (°C):		55/125/55									55/125/55								
Insulation Resistance Dry Min:		1000MΩ									1000MΩ								
Stability:		0.5%									0.5%								

		2010									2512								
Rated Power @ 70°C:		0.25W									0.5W								
Resistance Range (Ohms)	**Min:**	4R7	4R7		4R7	1R0		4R7	1R0		4R7	4R7		4R7	1R0		4R7	1R0	
	Max:	1M0	3M0		1M0	3M0		1M0	3M0		1M0	3M0		1M0	3M0		1M0	3M0	
Tolerance (%):		0.1			0.5			1			0.1			0.5			1		
Code letter:		B			D			F			B			D			F		
Selection Series:		E24 & E96									E24 & E96								
Temp. Coefficient (ppm/°C):		15	25	50	15	25	50	15	25	50	15	25	50	15	25	50	15	25	50
Code Letter:		D	E	C	D	E	C	D	E	C	D	E	C	D	E	C	D	E	C
Limiting Element Voltage:		150V									150V								
Max. Overload Voltage:		300V									300V								
Operating Temp. Range:		-55 to +155°C									-55 to +155°C								
Climatic Category (°C):		55/125/55									55/125/55								
Insulation Resistance Dry Min:		1000MΩ									1000MΩ								
Stability:		0.5%									0.5%								

Characteristics - Environmental

Item	Requirement		Test Method
	Tol. ≤ 0.05%	**Tol. > 0.05%**	
Temperature Coefficient of Resistance (TCR):	AS per TCRs specified in value range table on page 1		+25/-55/+25/+125/+25°C
Short Time Overload:	ΔR ±0.05%	ΔR ±0.2%	RCWV* 2.5 or max. overload voltage for 5 seconds
	ΔR ±0.2% for high power rating		
Insulation Resistance:	>1000MΩ		Apply 100VDC for 1 minute
Endurance:	ΔR ±0.05%	ΔR ±0.2%	70 ±2°C, max. working voltage for 1000hrs with 1.5hrs "ON" and 0.5 hrs "OFF"
	>7kΩ ΔR ±0.5%		
	ΔR ±0.5% for high power rating		
Damp Heat with Load:	ΔR ±0.05%	ΔR ±0.3%	40 ±2°C, 90 - 95% R.H. max. working voltage hrs with 1.5hrs "ON" and 0.5hrs "OFF"
	ΔR ±0.5% for high power rating		
Bending Strength:	ΔR ±0.05%	ΔR ±0.2%	Bending amplitude 3mm for 10 seconds
Solderability:	95% min. coverage		245 ±5°C for 3 seconds
Resistance to Soldering Heat:	ΔR ±0.05%	ΔR ±0.2%	260 ±5°C for 10 seconds
Dielectric Withstand Voltage:	By Type		Max. overload voltage for 1 minute
Thermal Shock:	ΔR ±0.05%	ΔR ±0.25%	-55°C to +150°C, 100 cycles
Low Temperature Operation:	ΔR ±0.05%	ΔR ±0.2%	1 hour, -65°C, followed by 45 minutes of RCWV
	ΔR ±0.5% for high power rating		

Reference Standards: MIL-STD-202, JIS-C 5201-1

Storage Temperature: 25±3°C; Humidity < 80%RH

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Marking Codes - Case Sizes 0805 to 2512

IEC 4 Digit Marking

Resistance:	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking Code:	1000	2201	1002	4992	1003

Case Sizes 0603

E24 3 Digit Marking - Example: 101=100Ω 102=1KΩ

E24	10	11	12	13	15	16	18	20	22	24	27	30
	33	36	39	43	47	51	56	62	68	75	82	91

E96 3 Digit Marking - Examples: 14C=13K7Ω, 13C=13K3Ω, 68B=4K99Ω, 68X=49.9Ω

0603 E96 Marking Code Table

Code	E96	Code	E96	Code	E96	Code	E96
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845
19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

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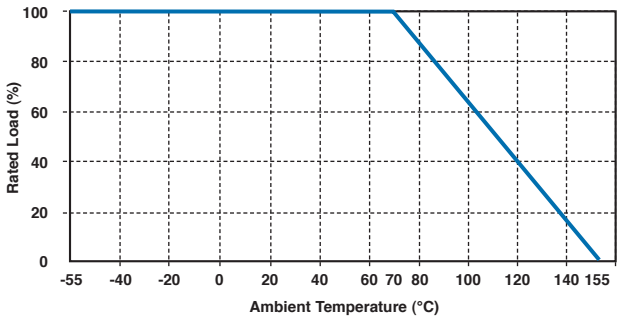
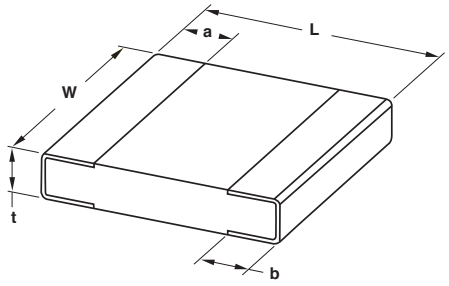
Type CPF Series

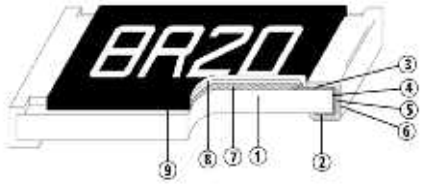
Power Derating Curve



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

Dimensions

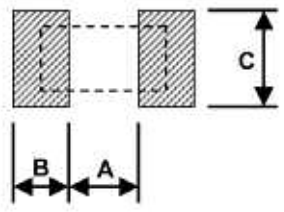




1. Alumina Substrate	4. Edge Electrode (NiCr)	7. Resistor Layer (NiCr)
2. Bottom Electrode (Ag)	5. Barrier Layer (Ni)	8. Overcoat (Epoxy)
3. Top Electrode (Ag-Pd)	6. External Electrode (Sn)	9. Marking

Part Number	L	W	H	a	b	Weight (g) 1000 pieces
CPF0201	0.58 ±0.05	0.29 ±0.05	0.23 ±0.05	0.12 ±0.05	0.15 ±0.05	0.14
CPF0402	1.00 ±0.05	0.50 ±0.05	0.30 ±0.05	0.20 ±0.10	0.20 ±0.10	0.54
CPF0603	1.55 ±0.10	0.80 ±0.10	0.45 ±0.10	0.30 ±0.20	0.30 ±0.20	1.83
CPF0805	2.00 ±0.15	1.25 ±0.15	0.55 ±0.10	0.30 ±0.20	0.40 ±0.25	4.71
CPF1206	3.05 ±0.15	1.55 ±0.15	0.55 ±0.10	0.42 ±0.20	0.35 ±0.25	9.02
CPF1210	3.10 ±0.15	2.40 ±0.15	0.55 ±0.10	0.40 ±0.20	0.55 ±0.25	10.00
CPF2010	4.90 ±0.15	2.40 ±0.15	0.55 ±0.10	0.60 ±0.30	0.50 ±0.25	23.61
CPF2512	6.30 ±0.15	3.10 ±0.15	0.55 ±0.10	0.60 ±0.30	0.50 ±0.25	38.08

Recommend Land Pattern



Type	A	B	C
CPF0201	0.25	0.3	0.40 ±0.2
CPF0402	0.5	0.5	0.60 ±0.2
CPF0603	0.8	1.0	0.90 ±0.2
CPF0805	1.0	1.0	1.35 ±0.2
CPF1206	2.0	1.15	1.70 ±0.2
CPF1210	2.0	1.15	2.50 ±0.2
CPF2010	3.6	1.4	2.50 ±0.2
CPF2512	4.9	1.6	3.10 ±0.2

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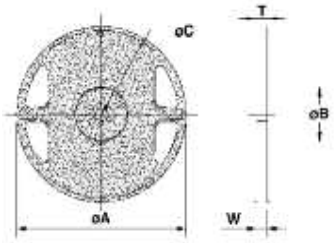
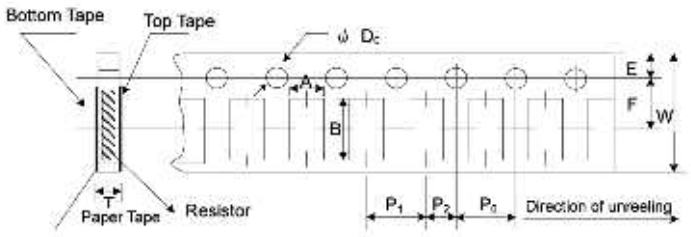
Type CPF Series

Packaging Quantity & Reel Specifications



Type	øA	øB	øC	W	T	Paper Tape (EA)	Embossed Plastic Tape (EA)
CPF0201	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	9.5 ±1.0	11.5 ±1.0	1000 / 5000	-
CPF0402	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	9.5 ±1.0	11.5 ±1.0	1000 / 5000	-
CPF0603	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	9.5 ±1.0	11.5 ±1.0	1000 / 5000	-
CPF0805	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	9.5 ±1.0	11.5 ±1.0	1000 / 5000	-
CPF1206	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	9.5 ±1.0	11.5 ±1.0	1000 / 5000	-
CPF1210	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	9.5 ±1.0	11.5 ±1.0	1000 / 5000	-
CPF2010	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	4000
CPF2512	178.0 ±1.0	60.0 +1.0	13.5 ±0.7	13.5 ±1.0	15.5 ±1.0	-	4000

Paper Tape Specification



Type	A	B	W	E	F	P_0	P_1	P_2	øD_0	T
CPF0201	0.40 ±0.05	0.70 ±0.05	8.00 ±0.10	1.75 ±0.05	3.5 ±0.05	4.00 ±0.10	2.00 ±0.05	2.00 ±0.05	1.55 ±0.03	0.42 ±0.02
CPF0402	0.70 ±0.05	1.16 ±0.05	8.00 ±0.10	1.75 ±0.05	3.5 ±0.05	4.00 ±0.10	2.00 ±0.05	2.00 ±0.05	1.55 ±0.05	0.40 ±0.03
CPF0603	1.10 ±0.05	1.90 ±0.05	8.00 ±0.10	1.75 ±0.05	3.5 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.55 ±0.05	0.60 ±0.03
CPF0805	1.60 ±0.05	2.37 ±0.05	8.00 ±0.10	1.75 ±0.05	3.5 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.55 ±0.05	0.75 ±0.05
CPF1206	2.00 ±0.05	3.55 ±0.05	8.00 ±0.10	1.75 ±0.05	3.5 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.55 ±0.05	0.75 ±0.05
CPF1210	2.75 ±0.05	3.40 ±0.05	8.00 ±0.10	1.75 ±0.05	3.5 ±0.05	4.00 ±0.05	4.00 ±0.10	2.00 ±0.05	1.60 ±0.10	0.75 ±0.05

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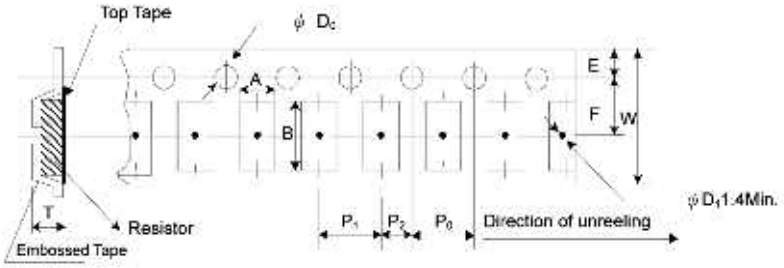
Type CPF Series

Embossed Plastic Tape Specifications



Type	A	B	W	E	F	P_0	P_1	P_2	øD_0	T
CPF2010	2.85 ±0.10	5.45 ±0.10	12.0 ±0.10	1.75 ±0.10	5.5 ±0.05	4.00 ±0.05	4.00 ±0.10	2.00 ±0.05	1.50 +0.10	1.00 ±0.20
CPF2512	3.40 ±0.10	6.65 ±0.10	12.0 ±0.10	1.75 ±0.10	5.5 ±0.05	4.00 ±0.05	4.00 ±0.10	2.00 ±0.05	1.50 +0.10	1.00 ±0.20

How to Order

CPF	0603	B	100R	E	1
Common Part	**Package Size**	**Tolerance**	**Value**	**TCR**	**Packaging**
CPF - Chip precision film resistor	0201 1206 0402 1210 0603 2010 0805 2512	B - ± 0.1% D - ±0.5% F - ± 1%	100R (100 Ohms) 1K0 (1000 Ohms) 100K (100,000 Ohms)	D - 15ppm E - 25ppm C - 50ppm	1 - 1K REEL Blank - 5K REEL