

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
- MSL Level 2



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: Max:	4R7	4R7	4R7	2R0	4R7	2R0	4R3	4R7	4R3	1R0	4R3	1R0					
	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		
Code Letter:	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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	1206									1210							
Rated Power @ 70°C:	0.125W									0.2W							
Resistance Range (Ohms) Min: Max:	4R7	4R7	4R7	1R0	4R7	1R0	4R7	4R7	4R7	1R0	4R7	1R0					
	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		
Code Letter:	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
Insulation Resistance:	ΔR ±0.2% for high power rating >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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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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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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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

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