Type CPF Series

Key Features

Thin film precision resistors with TC's to 15ppm and tolerances to 0.05%.

Wide range of case sizes from 0201 to 2512

Suitable for all applications where close accuracy and stability are essential

Terminal finish – electroplated 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

Electrical Characteristics

Chip Size		0201			
Rated Power @70°C		0.03125W			
Resistance Range Ω	Min.	49R9	49R9	49R9	49R9
	Max	4K99	33K	4K99	33K
Tolerance		0.5		1	
Code Letter		D		F	
Selection series		E24 & E96			
Temp. Coefficient (ppm/°C)		25	50	25	50
Code Letter		E	C	E	C
Operating Voltage (Max)		15V			
Max. Overload Voltage		30V			
Operating Temp. Range		-55 ~ +155°C			
Insulation Resistance dry min.		>1000MΩ			
Stability		0.5%			

Chip Size		0402											
Rated Power @70°C		0.063W											
Resistance	Min.	49R9			49R9	10R		49R9	4R7		49R9	4R7	
Range Ω	Max	20K			69K8	255K		69K8	511K		69K8	511K	
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		25V											
Max. Overload Volt.		50V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

Chip Size		0603											
Rated Power @70°C		0.063W											
Resistance	Min.	4R7			4R7	4R7		4R7	1R0		4R7	1R0	
Range Ω	Max	332K			511K	1M0		511K	1M0		511K	1M0	
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		50V											
Max. Overload Volt.		100V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

Chip Size		0805											
Rated Power @70°C		0.1W											
Resistance	Min.	4R7			4R7	4R7		4R7	1R0		4R7	1R0	
Range Ω	Max	1M0			1M0	2M0		1M0	2M0		1M0	2M0	
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		100V											
Max. Overload Volt.		200V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

Chip Size		1206											
Rated Power @70°C		0.125W											
Resistance Range Ω	Min.	4R7			4R7	4R7		4R7	1R0		4R7	1R0	
	Max	1M0			1M0	2M49		1M0	2M49		1M0	2M49	
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		150V											
Max. Overload Volt.		300V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

Chip Size		1210											
Rated Power @70°C		0.25W											
Resistance Range Ω	Min.	4R7			4R7	4R7		4R7	1R0		4R7	1R0	
	Max	1M0			1M0	2M49		1M0	2M49		1M0	2M49	
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		150V											
Max. Overload Volt.		300V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

Chip Size		2010											
Rated Power @70°C		0.25W											
Resistance Range Ω	Min.	4R7			4R7	4R7		4R7	1R0		4R7	1R0	
	Max	1M0			1M0	3M0		1M0	3M0		1M0	3M0	
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		150V											
Max. Overload Volt.		300V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

Chip Size		2512											
Rated Power @70°C		0.5W											
Resistance Range Ω	Min.	4R7			4R7	4R7		4R7		1R0	4R7		1R0
	Max	1M0			1M0	3M0		1M0		3M0	1M0		3M0
Tolerance (%)		0.05			0.1			0.5			1		
Code Letter		A			B			D			F		
Selection series		E24 & E96											
T.C.R. (ppm/°C)		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
Max Operating Volt.		150V											
Max. Overload Volt.		300V											
Op. Temp. Range		-55 ~ +155°C											
Insulation Resistance		>1000MΩ											
Stability		0.5%											

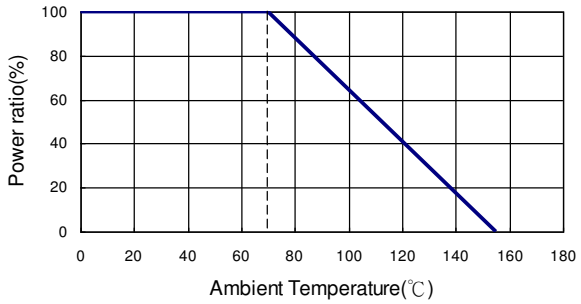
Environmental Characteristics

Item	Requirement		Test Method
	Tol. ≤0.05%	TOL. >0.05%	
Temperature Coefficient of Resistance (TCR)	As per TCRs specified in Electrical Characteristics tables		MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	ΔR±0.05%	ΔR±0.2%	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	>9999 MΩ		MIL-STD-202 Method 302 Apply 100VDC for 1 minute
Endurance	ΔR±0.05%	ΔR±0.2%	MIL-STD-202 Method 108A 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	>7kΩ ΔR±0.5%		
Damp Heat with Load	ΔR±0.05%	ΔR±0.3%	MIL-STD-202 Method 103B 40±2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Bending Strength	ΔR±0.05%	ΔR±0.1%	JIS-C-5201-1 6.1.4 Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		MIL-STD-202 Method 208H 245±5°C for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.1%	MIL-STD-202 Method 210E 260±5°C for 10 seconds
Dielectric Withstand Voltage	By Type		MIL-STD-202 Method 301 Max. overload voltage for 1 minute
Thermal Shock	ΔR±0.05%	ΔR±0.2%	MIL-STD-202 Method 107G -55°C ~150°C, 100 cycles
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	JIS-C-5201-1 7.1 1 hour, -65°C, followed by 45 minutes of RCWV
High Temperature Exposure	ΔR±0.5%		MIL-STD-202 Method 107G At +155°C for 1000 hours

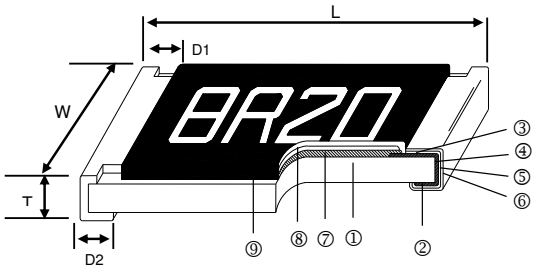
RCWV(Rated continuous working voltage)= √(P*R) or Max. Operating voltage whichever is lower

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

Derating Curve

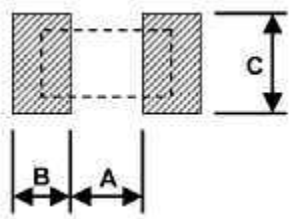


Construction and dimensions



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)	⑥	External Electrode (Sn)	⑨	Marking

Size	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000 Pcs.)
0201	0.58±0.05	0.29±0.05	0.23±0.05	0.12±0.05	0.15±0.05	0.14
0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10	0.54
0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83
0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.20	4.71
1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02
1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	10
2010	4.90±0.15	2.40±0.15	0.55±0.10	0.60±0.30	0.50±0.25	23.61
2512	6.30±0.15	3.10±0.15	0.55±0.10	0.60±0.30	0.50±0.25	38.06



Recommended Land Pattern			
Size	A	B	C
0201	0.25	0.30	0.40±0.2
0402	0.50	0.50	0.60±0.2
0603	0.80	1.00	0.90±0.2
0805	1.00	1.00	1.35±0.2
1206	2.00	1.15	1.70±0.2
1210	2.00	1.15	2.50±0.2
2010	3.60	1.40	2.50±0.2
2512	4.90	1.60	3.10±0.2

Marking

Case sizes 0805 to 2512 IEC 4 Digit Marking:

Resistance	100R (100Ω)	2K2 (2.2kΩ)	10K (10kΩ)	499K (499kΩ)	100K (100kΩ)
Code	1000	2201	1002	4992	1003

Case Size 0603 E24 3 digit marking – Example 101 = 100R 102=1K0

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

Case size 0603 E96 3 digit marking – Examples 14C = 13K7 68B = 4K99 68X = 49R9

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

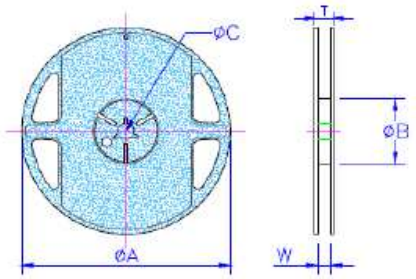
Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

NB For case size 0603 values other than E24 and E96 resistors will be supplied unmarked.

All resistors smaller than 0603 supplied unmarked.

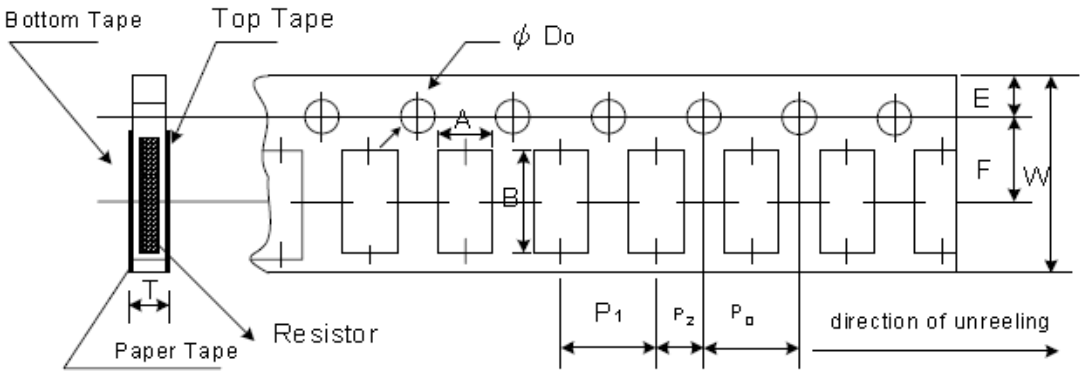
Packaging

Packing Quantity and Reel Specification



Size	ØA ±1.0	ØB ±1.0	ØC ±0.7	W ±1.0	T ±1.0	Paper Tape	Embossed Plastic Tape
0201	178.0	60.0	13.5	9.5	11.5	1000 / 10000	N/A
0402							
0603						1000 / 5000	
0805							
1206							
1210							
2010				13.5	15.5	N/A	4000
2512							

Paper tape Specification

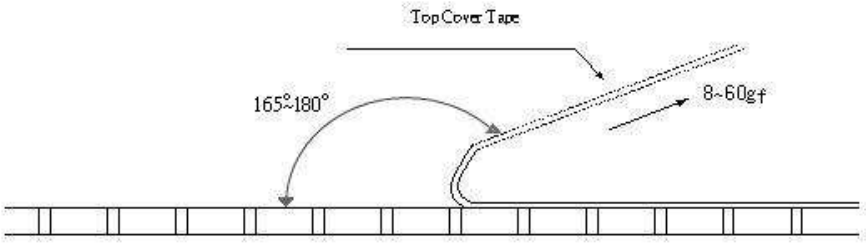


Size	A ±0.05	B ±0.05	W ±0.10	E ±0.05	F ±0.05	P_o	P_1	P_2 ±0.05	ØDo	T
0201	0.40	0.70	8.00	1.75	3.5	4.00 ±0.10	2.00 ±0.05	2.00	1.55 ±0.03	0.42 ±0.02
0402	0.70	1.16							1.55 ±0.05	0.40 ±0.03
0603	1.10	1.90					4.00 ±0.10			0.60 ±0.03
0805	1.60	2.37								0.75 ±0.05
1206	2.00	3.55								
1210	2.75	3.40				4.00 ±0.05			1.60 ±0.10	

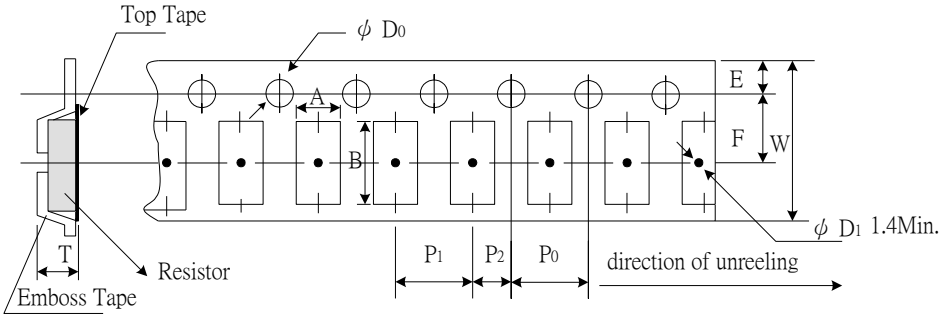
Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 8gf to 60gf



Embossed Plastic Tape Specifications

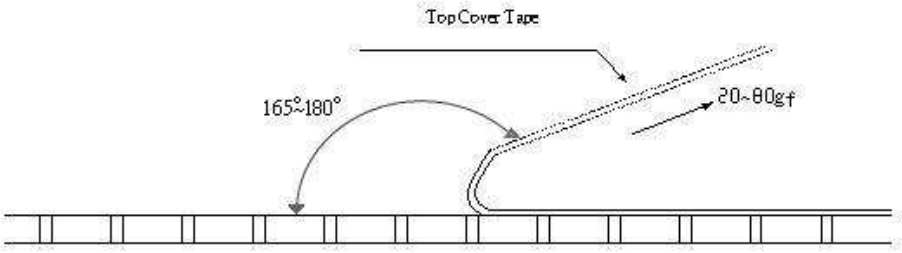


Type	A	B	W	E	F	P_0	P_1	P_2	$ØD_0$	T
2010	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20
2512	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20

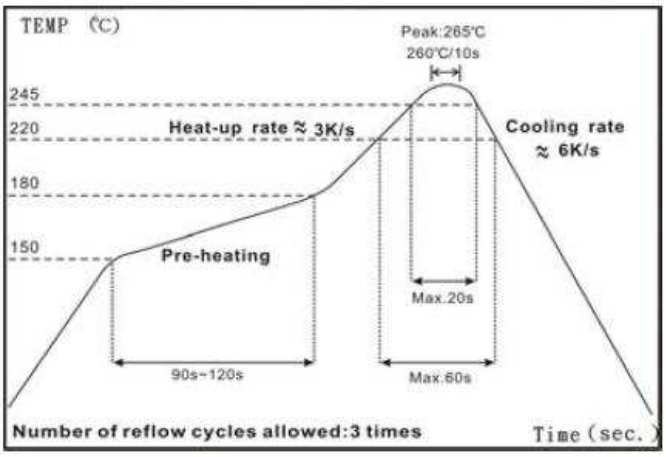
Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 20gf to 80g

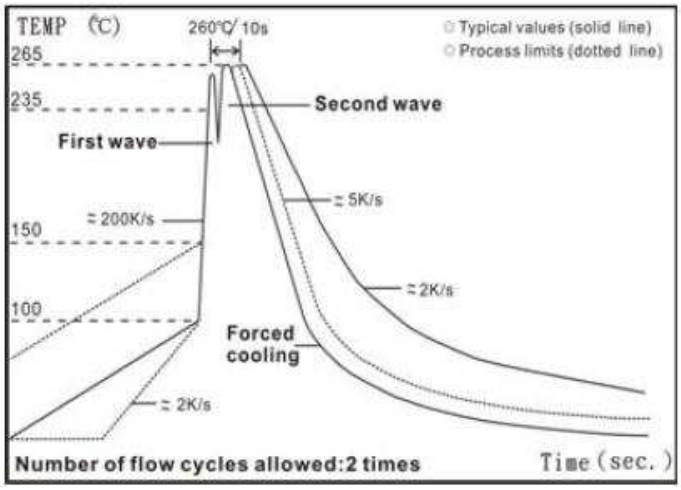


Reflow Solder Profile



Time of Reflow soldering at maximum temperature point 260°C = 10s

Wave Solder Profile



Time of Wave soldering at maximum temperature point 260°C = 10s

Time of Soldering Iron at maximum temperature point 410°C = 5s

How To Order

CPF	0603	B	100R	E	1
Common Part	**Package Size**	**Tolerance**	**Value**	**TCR**	**Packaging**
CPF - precision thin film chip resistor	0201 1206 0402 1210 0603 2010 0805 2512	B - ±0.1% D - ±0.5% F - ±1%	100R - 100Ω 1K0 - 1000Ω 10K – 10,000Ω	D – 15PPM E - 25PPM C - 50PPM	1 – 1K REEL Blank – standard reel 0201 0402 - 10K 0603 0805 1206 1210 – 5K 2010 2512 - 4K

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

TE Connectivity:

CPF0603B43KE1 CPF0603B237KE1 CPF0603B261KE1 CPF0603B287KE1 CPF0603F1K27C1 CPF0603F14K3C1 CPF0603B1K2E1 CPF0603B787RE1 CPF0603B143KE1 CPF0603B158KE1 CPF0603F8K25C1 CPF0603B3K32E CPF0603B6R81E1 CPF0603F11KC1 CPF0603F130KC1 CPF0603B6K8E1 CPF0603B18KE1 CPF0603B27KE1 CPF0603B12R7E1 CPF0603F15R4C1 CPF0603F1K82C1 CPF0603F18K7C1 CPF0603F19K6C1 CPF0603F20K5C1 CPF0603B187RE1 CPF0603B2K61E1 CPF0603B36K5E1 CPF0603F17R8C1 CPF0603F2K0C1 CPF0603F2K1C1 CPF0603F243KC1 CPF0603F267KC1 CPF0603B30RE1 CPF0603B357RE1 CPF0603F2R55C1 CPF0603F34KC1 CPF0603F37K4C1 CPF0603F39K2C1 CPF0603F383KC1 CPF0603B680KE1 CPF0603B200KE1 CPF0603B18R7E1 CPF0603B243RE1 CPF0603F24R9C1 CPF0603F26R1C1 CPF0603F27K4C1 CPF0603F30K9C1 CPF0603B34R8E1 CPF0603B383RE1 CPF0603F34R8C1 CPF0603F4K12C1 CPF0603F4K53C1 CPF0603F52R3C1 CPF0603B649RE1 CPF0603B133KE1 CPF0603B137KE1 CPF0603F5R62C1 CPF0603B750RE1 CPF0603B73R2E1 CPF0603F8R06C1 CPF0603F75RC1 CPF0603F787RC1 CPF0603F931RC1 CPF0603F9K09C1 CPF0603B2K7E1 CPF0603B6R34E1 CPF0603B1K13E1 CPF0603B187KE1 CPF0603B205KE1 CPF0603B5K1E1 CPF0603B105RE1 CPF0603B137RE1 CPF0603B1K37E1 CPF0603B1K58E1 CPF0603B274KE1 CPF0603F10R7C1 CPF0603F16K2C1 CPF0603B23K7E1 CPF0603B24K9E1 CPF0603F1K74C1 CPF0603B82KE1 CPF0603B21RE1 CPF0603B10K7E CPF0603B26R7E1 CPF0603B332RE1 CPF0603B4K53E1 CPF0603B53K6E1 CPF0603B59KE1 CPF0603F309RC1 CPF0603B23R2E1 CPF0603F3K01C1 CPF0603F29K4C1 CPF0603F3R48C1 CPF0603F374RC1 CPF0603F47K5C1 CPF0603B45R3E1 CPF0603B562RE1 CPF0603F4R02C1 CPF0603F4R99C1 CPF0603F45R3C1