

Type CPF-A Series

Key Features

AEC-Q200

Compliance

Advanced thin film technology

RoHS compliant

Special materials, design, and processing for high sulfur applications

Test proven immunity to humidity, moisture, and sulfur

Moisture sensitivity level - MSL1

Applications

Automotive

Medical

Testing / Measurement

Communication



TE Connectivity are pleased to introduce the sister of our CPF thin film chip resistor, the AEC-Q200 compliant CPF-A series. Supplied on tape and reel for ease of insertion, and available in 7 sizes / power ratings up to 0.5W.

Note: SMD (Surface mount devices) resistors and inductors should be kept in their original packaging to protect them from ESD (Electrostatic Discharge). The full reels can be broken into smaller quantities, without exposing them to ESD, as long as the components are still in the plastic or paper tape. These resistors and inductors should not be removed from the plastic or paper tape unless they are in an ESD protected environment.

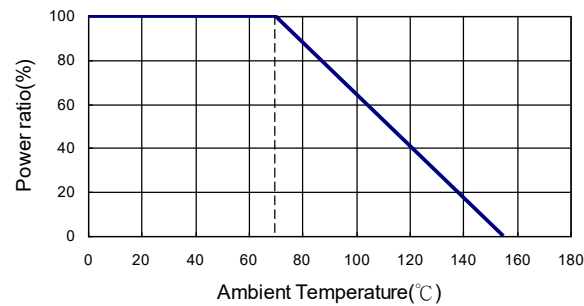
Characteristics – Electrical

Size	Power Rating @70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR PPM/°C
					±0.05%	±0.1%	±0.5%	±1%	
0402	0.0625W	-55 ~ +155°C	25V	50V	49.9Ω - 10KΩ	49.9Ω - .. K Ω			±25 ±50
0603	0.0625W	-55 ~ +155°C	50V	100V	Ω - 9.9 KΩ	Ω - 332KΩ			±25 ±50
0805	0.1W	-55 ~ +155°C	100V	200V	Ω - K Ω	Ω - M Ω			±25 ±50
1206	0.125W	-55 ~ +155°C	150V	300V	Ω - K Ω	Ω - M Ω			±25 ±50
1210	0.25W	-55 ~ +155°C	150V	300V	Ω - 99K Ω	Ω - M Ω			±25 ±50
2010	0.25W	-55 ~ +155°C	150V	300V	Ω - 99K Ω	Ω - M Ω			±25 ±50
2512	0.5W	-55 ~ +155°C	150V	300V	Ω - 99K Ω	Ω - M Ω			±25 ±50

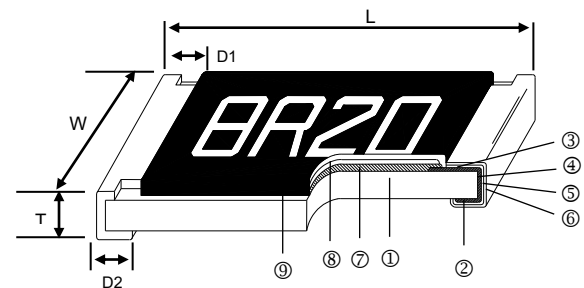
Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower

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-Pd or Cu)	⑥	External Electrode (Sn)	⑨	Marking

Size	L	W	T	D1	D2	Weight (g) (1000pcs)
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

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (TCR)	As Spec	JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C~155°C, 25°C is the reference temperature
Short Term Overload	$\Delta R \pm 0.05\%$	JIS-C-5201-1 4.13 RCWV*2.5 or maximum overload voltage, whichever is lower for 5 seconds
Insulation Resistance	$>1000M\Omega$	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Apply 100vdc for 1 minute
Operational Life	$\Delta R \pm 0.2\%$	MIL-STD-202 method 108 Condition D steady state $T_A=125^\circ\text{C}$ at rated power. Measurement taken 24 ± 4 hours after test conclusion
Biased Humidity	$\Delta R \pm 0.1\%$	MIL-STD-202 method 103 1000 hours 85°C 85%RH 10% of operating power
High Temperature Exposure	$\Delta R \pm 0.2\%$	MIL-STD-202 method 108 At 155°C for 1000 Hours
Temperature Cycling	$\Delta R \pm 0.1\%$	JESD-22 method JA- 104
Bending Strength (Board Flex)	$\Delta R \pm 0.1\%$	JIS-C-5201-1 4.33 Bending once for 60 seconds Bending displacement 2010 / 2512 = 2mm Other sizes = 3mm
Solderability	95% min. coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 $245 \pm 5^\circ\text{C}$ for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.05\%$	JIS-C-5201-1 4.18 IEC-60115-1 4.18 $260 \pm 5^\circ\text{C}$ for 10 seconds
Terminal Strength	Not Broken	AEC-Q200-006 Force of 1.8kg for 60 seconds.
Mechanical Shock	$\Delta R \pm 0.1\%$	MIL-STD-202 method 213 Wave Form: Tolerance for half sine shock pulse. Peak value 100g's. Normal duration (D) is 6
Vibration	$\Delta R \pm 0.1\%$	MIL-STD-202 method 204 5 g's for 20 minutes. 12 cycles each of 3 orientations. 10 ~ 2000 Hz
ESD	$\Delta R \pm 0.1\%$	AEC-Q200-002 Human body 2KV
Resistance to Solvents	Marking undamaged	MIL-STD-202 method 215 Add aqueous wash chemical – OKEM Clean or equivalent. Do not use banned solvents.
Sulfur Test	$\Delta R \pm 1\%$	EIA-997 (condition B) $105 \pm 2^\circ\text{C}$ no power rating for 750 hours
Flammability	No ignition of tissue paper or scorching of pinewood board	UL94 V-0 or V-1 are acceptable. No electrical testing required

RCWV (rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower

Marking:

0603 3digit marking for E96



3digit marking for Example: 14C=13K7Ω 13C=13K3Ω

Marking 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

0603 3digit marking for E24

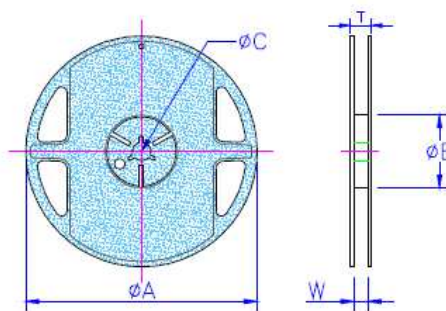
Example: 101=100Ω 102=1KΩ

E24	10	11	12	13	15	16	18	20	22	24	27	30
	33	36	39	43	47	51	56	62	68	75	92	91

0805~2512 4digit marking

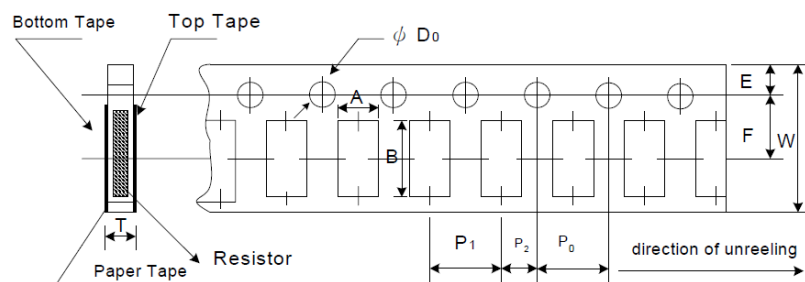
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

Packaging Quantity and reel specifications



Type	ϕA	ϕB	ϕC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
0402	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	9.5 $\pm$ 1.0	11.5 $\pm$ 1.0	1,000 / 5,000	-
0603	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	9.5 $\pm$ 1.0	11.5 $\pm$ 1.0	1,000 / 5,000	-
0805	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	9.5 $\pm$ 1.0	11.5 $\pm$ 1.0	1,000 / 5,000	-
1206	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	9.5 $\pm$ 1.0	11.5 $\pm$ 1.0	1,000 / 5,000	-
1210	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	9.5 $\pm$ 1.0	11.5 $\pm$ 1.0	1,000 / 5,000	-
2010	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	13.5 $\pm$ 1.0	15.5 $\pm$ 1.0	-	4,000
2512	178.0 $\pm$ 1.0	60.0 $\pm$ 1.0	13.5 $\pm$ 0.7	13.5 $\pm$ 1.0	15.5 $\pm$ 1.0	-	4,000

Paper Tape Specifications

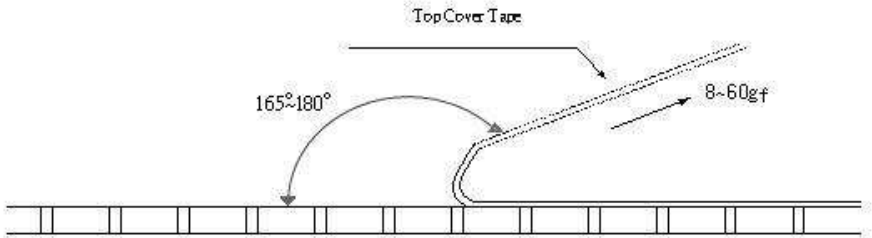


Type	A	B	W	E	F	P ₀	P ₁	P ₂	ϕD_0	T
0402	0.70 $\pm$ 0.05	1.16 $\pm$ 0.0	8.00 $\pm$ 0.10	1.75 $\pm$ 0.05	3.5 $\pm$ 0.05	4.00 $\pm$ 0.10	2.00 $\pm$ 0.05	2.00 $\pm$ 0.05	1.55 $\pm$ 0.05	0.40 $\pm$ 0.03
0603	1.10 $\pm$ 0.05	1.90 $\pm$ 0.0	8.00 $\pm$ 0.10	1.75 $\pm$ 0.05	3.5 $\pm$ 0.05	4.00 $\pm$ 0.10	4.00 $\pm$ 0.10	2.00 $\pm$ 0.05	1.55 $\pm$ 0.05	0.60 $\pm$ 0.03
0805	1.60 $\pm$ 0.05	2.37 $\pm$ 0.0	8.00 $\pm$ 0.10	1.75 $\pm$ 0.05	3.5 $\pm$ 0.05	4.00 $\pm$ 0.10	4.00 $\pm$ 0.10	2.00 $\pm$ 0.05	1.55 $\pm$ 0.05	0.75 $\pm$ 0.05
1206	2.00 $\pm$ 0.05	3.55 $\pm$ 0.0	8.00 $\pm$ 0.10	1.75 $\pm$ 0.05	3.5 $\pm$ 0.05	4.00 $\pm$ 0.10	4.00 $\pm$ 0.10	2.00 $\pm$ 0.05	1.55 $\pm$ 0.05	0.75 $\pm$ 0.05
1210	2.75 $\pm$ 0.05	3.40 $\pm$ 0.0	8.00 $\pm$ 0.10	1.75 $\pm$ 0.05	3.5 $\pm$ 0.05	4.00 $\pm$ 0.05	4.00 $\pm$ 0.10	2.00 $\pm$ 0.05	1.60 $\pm$ 0.10	0.75 $\pm$ 0.05

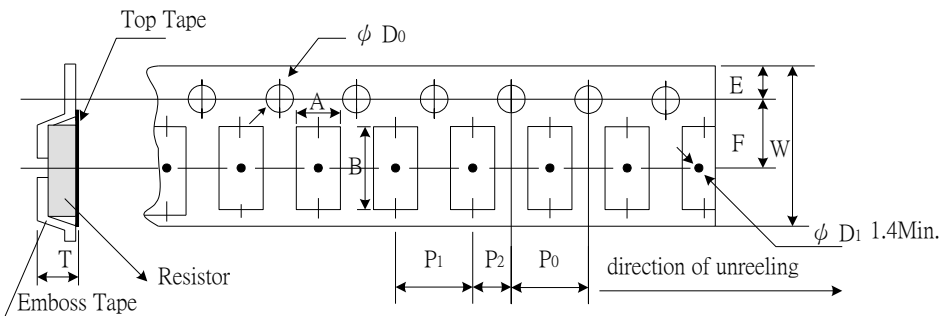
Peel force of top cover tape

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

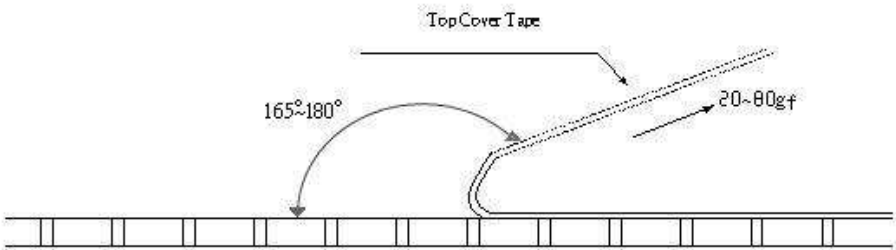


Type	A	B	W	E	F	P ₀	P ₁	P ₂	ØD ₀	T
2010	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
2512	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

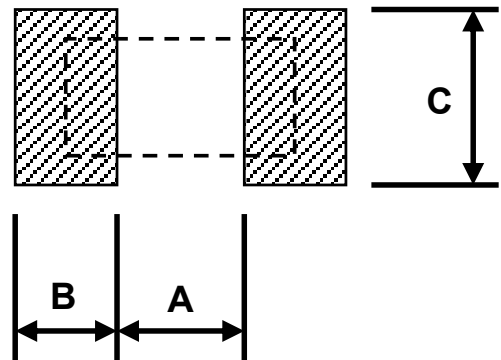
Peel force of top cover tape

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

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



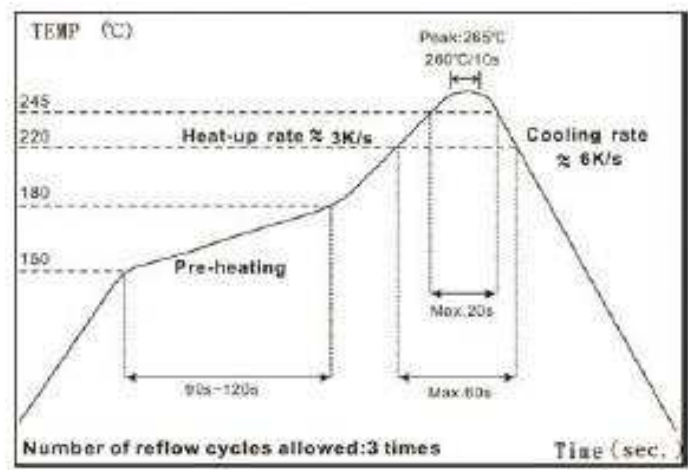
Recommended Land Pattern



Type	A	B	C
0402	0.50	0.50	0.60±0.2
0603	0.80	1.00	0.90±0.2
AR05	1.00	1.00	1.35±0.2
AR06	2.00	1.15	1.70±0.2
AR13	2.00	1.15	2.50±0.2
AR10	3.60	1.40	2.50±0.2
AR12	4.90	1.60	3.10±0.2

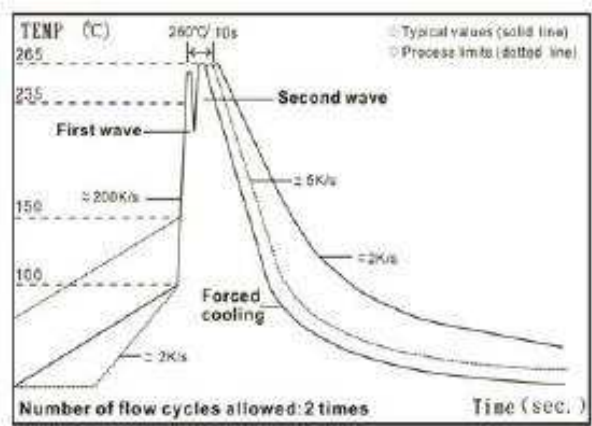
Solder Profile

IR Reflow Soldering



Time of IR reflow soldering at maximum temperature point 260°C : 10s

Wave Soldering (Flow Soldering)



Time of wave soldering at maximum temperature point 260°C : 10s

Hand Soldering

Time of soldering iron at maximum temperature point 410°C : 5s

How To Order

CPF-A	0805		B	1K0	E	1
Common Part	Package Size		Tolerance	Value	TCR	Packagin g
CPF-A Automotive Grade precision chip resistor	0402	1206	B - ±0.1%	100R - 100Ω	E - 25PPM	1 – 1K
	0603	1210	D - ±0.5%	1K0 -	C - 50PPM	REEL
	0805	2010	F - ±1%	1000Ω		Blank –
		2512		10K – , 000Ω		5K REEL