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

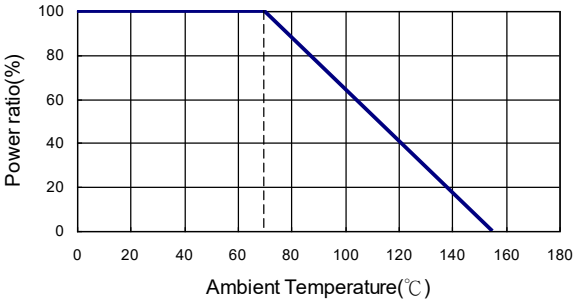
Type	Power Rating @70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR PPM/°C
					±0.05%	±0.1%	±0.25%	±0.5%	±1%	
CPF-A 0402	0.0625W	-55 ~ +155°C	25V	50V	49.9Ω - 10KΩ	49.9Ω - 221KΩ				±25 ±50
CPF-A 0603	0.0625W		50V	100V	10Ω - 49.9KΩ	10Ω -680KΩ				±25 ±50
CPF-A 0805	0.1W		100V	200V	10Ω-100KΩ	10Ω -1MΩ				±25 ±50
CPF-A 1206	0.125W		150V	300V	10Ω-200KΩ	10Ω - 1.5MΩ				±25 ±50
CPF-A 1210	0.25W				10Ω - 499KΩ	10Ω - 1MΩ				±25 ±50
CPF-A 2010					10Ω - 499KΩ	10Ω - 1MΩ				±25 ±50
CPF-A 2521					10Ω - 499KΩ	10Ω - 1MΩ				±25 ±50

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

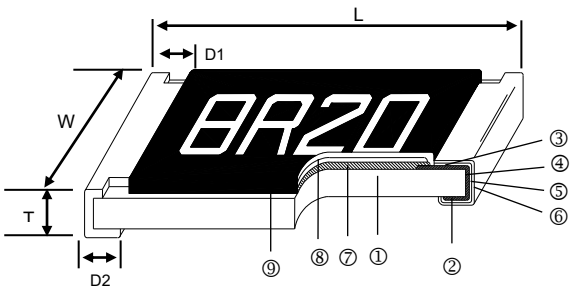
Overload Voltage=2.5*$\sqrt{}$(P*R) or Max. overload voltage listed above, whichever is lower

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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)
CPF-A 0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10	0.54
CPF-A 0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83
CPF-A 0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.20	4.71
CPF-A 1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02
CPF-A 1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.20	10
CPF-A 2010	4.90±0.15	2.40±0.15	0.55±0.10	0.60±0.30	0.50±0.25	23.61
CPF-A 2512	6.30±0.15	3.10±0.15	0.55±0.10	0.60±0.30	0.50±0.25	38.06

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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	ΔR±0.05%	JIS-C-5201-1 4.13 RCWV*2.5 or maximum overload voltage, whichever is lower for 5 seconds
Insulation Resistance	>1000MΩ	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Apply 100vdc for 1 minute
Operational Life	ΔR±0.2%	MIL-STD-202 method 108 Condition D steady state TA=125°C at rated power. Measurement taken 24±4 hours after test conclusion
Biased Humidity	ΔR±0.1%	MIL-STD-202 method 103 1000 hours 85°C 85%RH 10% of operating power
High Temperature Exposure	ΔR±0.2%	MIL-STD-202 method 108 At 155°C for 1000 Hours
Temperature Cycling	ΔR±0.1%	JESD-22 method JA- 104
Bending Strength (Board Flex)	ΔR±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 ±5°C for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	JIS-C-5201-1 4.18 IEC-60115-1 4.18 260 ±5°C for 10 seconds
Terminal Strength	Not Broken	AEC-Q200-006 Force of 1.8kg for 60 seconds.
Mechanical Shock	ΔR±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	ΔR±0.1%	MIL-STD-202 method 204 5 g's for 20 minutes. 12 cycles each of 3 orientations. 10 ~ 2000 Hz
ESD	ΔR±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	ΔR±1%	EIA-997 (condition B) 105 ±2°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*R) or Max. operating voltage listed above, whichever is lower

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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

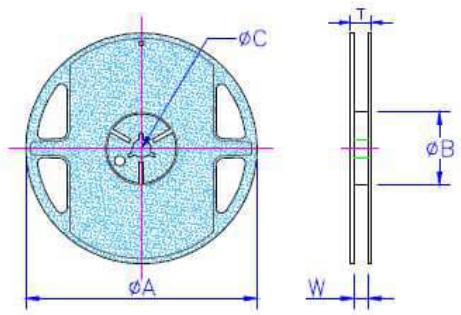
E24	10	11	12	13	15	16	18	20	22	24	27	30
	33	36	39	43	47	51	56	62	68	75	92	91

0805~2512 4digit marking

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

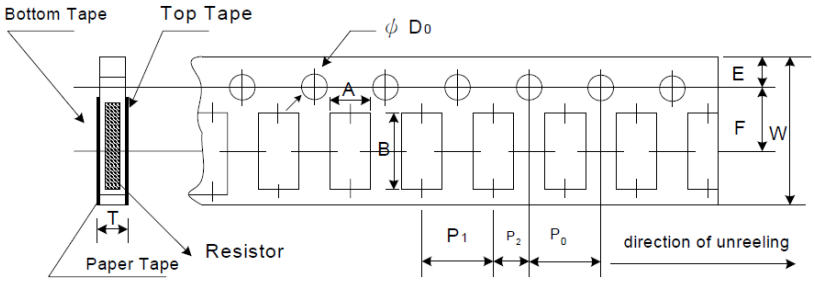
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Packaging Quantity and reel specifications



Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Embossed Plastic Tape (EA)
CPF-A 0402	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	1,000 / 5,000	-
CPF-A 0603	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	1,000 / 5,000	-
CPF-A 0805	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	1,000 / 5,000	-
CPF-A 1206	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	1,000 / 5,000	-
CPF-A 1210	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	1,000 / 5,000	-
CPF-A 2010	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	15.5±1.0	-	4,000
CPF-A 2512	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	15.5±1.0	-	4,000

Paper Tape Specifications



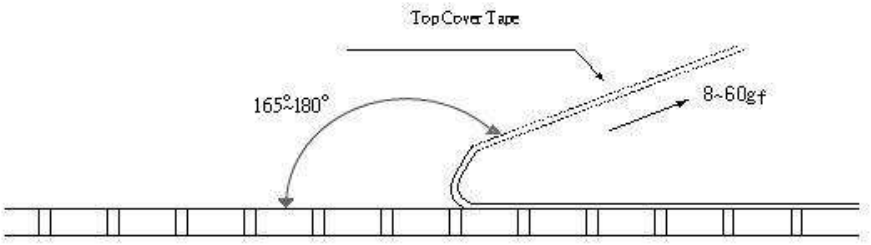
Type	A	B	W	E	F	P_0	P_1	P_2	ΦD0	T
CPF-A 0402	0.70±0.05	1.16±0.0	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
CPF-A 0603	1.10±0.05	1.90±0.0	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.60±0.03
CPF-A 0805	1.60±0.05	2.37±0.0	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.75±0.05
CPF-A 1206	2.10±0.05	3.55±0.0	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	0.75±0.05
CPF-A 1210	2.75±0.05	3.40±0.0	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.60±0.10	0.75±0.05

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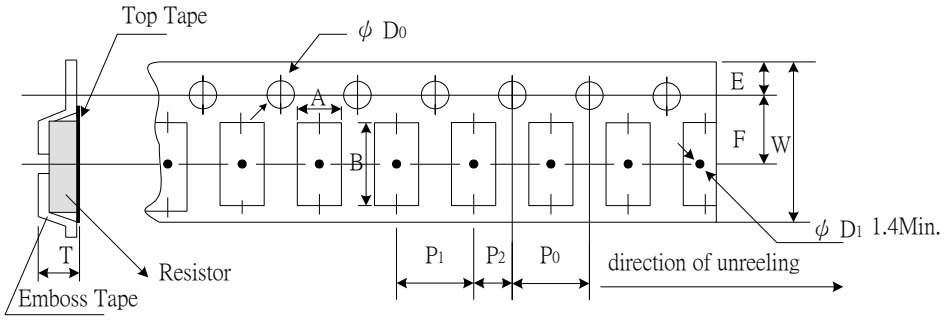
Peel force of top cover tape

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

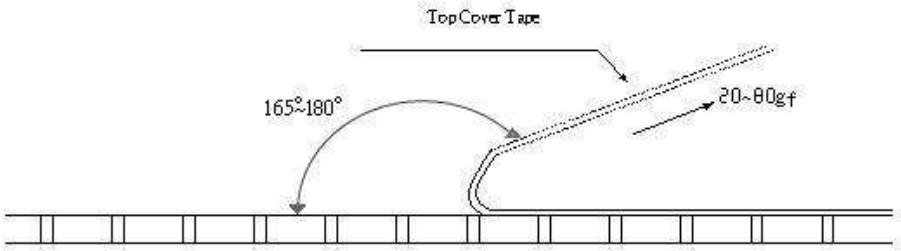


Type	A	B	W	E	F	P0	P1	P2	ΦD0	T
CPF-A 2010	2.85±0.10	5.45±0.10	12.00±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
CPF-A 2512	3.40±0.10	6.65±0.10	12.00±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

Peel force of top cover tape

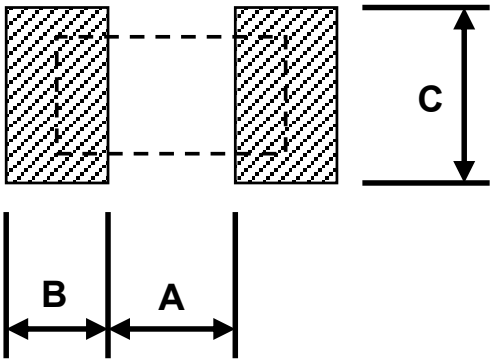
The peel speed shall be about 300mm/min±5%

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



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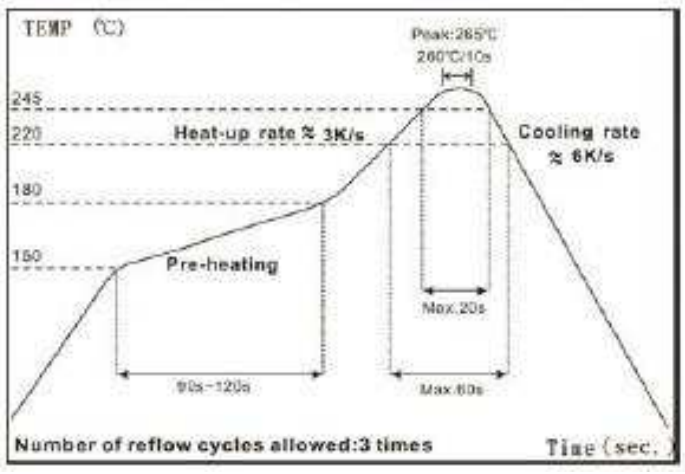
Recommended Land Pattern



Type	A	B	C
CPF-A 0402	0.50	0.50	0.60±0.2
CPF-A 0603	0.80	1.00	0.90±0.2
CPF-A 0805	1.00	1.00	1.35±0.2
CPF-A 1206	2.00	1.15	1.70±0.2
CPF-A 1210	2.00	1.15	2.50±0.2
CPF-A 2010	3.60	1.40	2.50±0.2
CPF-A 2512	4.90	1.60	3.10±0.2

Solder Profile

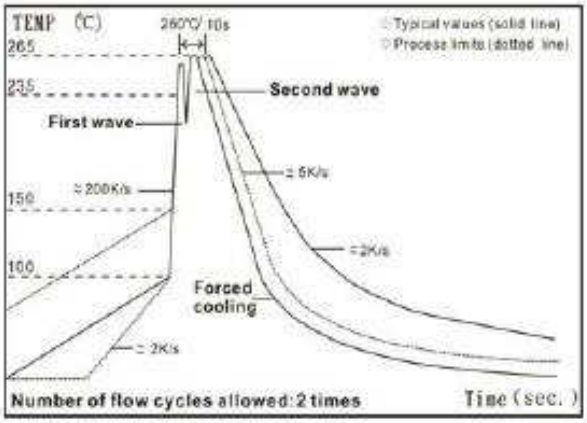
IR Reflow Soldering



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

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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

Common Part	Size	Tolerance	Value	TCR	Packaging
CPF-A Automotive Grade Precision chip Resistor	0402	B - ±0.1% D - ±0.5% F - ±1%	100R - 100Ω 1K0 - 1000Ω 10K - 1000Ω	E - 25PPM C - 50PPM	1 - 1K Reel Blank - 5K Reel
	0603				
	0805				
	1206				
	1210				
	2010				
	2512				

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