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SPECIFICATION FOR APPROVAL

DATE :

CUSTOMER : _____

PART NAME : _____ General Purpose Lead Free &. Halogen Free Chip Resistors

CUSTOMER'S DWG. NO. : _____

CUSTOMER'S PART NO. : _____

PDC PART NO. : **FCF-G SERIES APPROVED**

DESCRIPTION. : _____

ACTION	"V"	CUSTOMER'S SIGNATURE	NOTE
RESULT			
FULL APPROVED			
CONDITIONAL APPROVED			
REJECTED			

OUR ACTION	SIGNATURE
PREPARED By	<i>Jenny Tseng</i>
CHECKED By	<i>Tony Chou</i>
APPROVED By	<i>Byron Tsai</i>

CUSTOMER SIGNATURE FOR ACCEPTANCE

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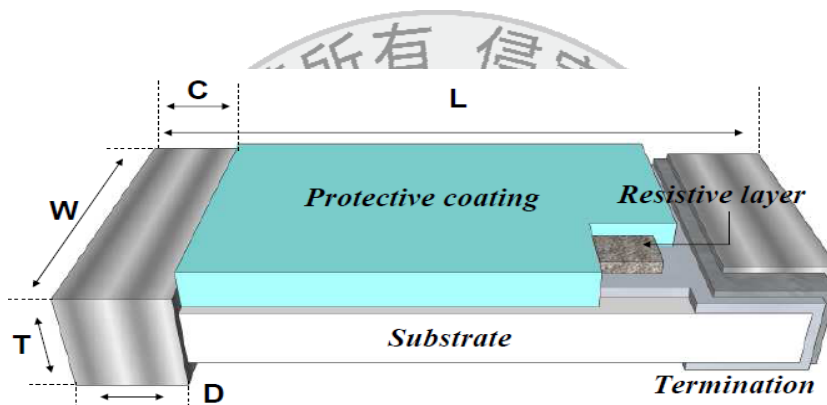
1. Features

- Small size and light weight.
- Suitable for lead free soldering.
- Compatible with wave and reflow soldering.
- RoHS compliant & Halogen free.
- Lead content below 100ppm.

2. Applications

- Mobile phone.
- Digital meter, Consumer electronics, M/B.
- Portable electronics devices.

3. Dimension and Construction

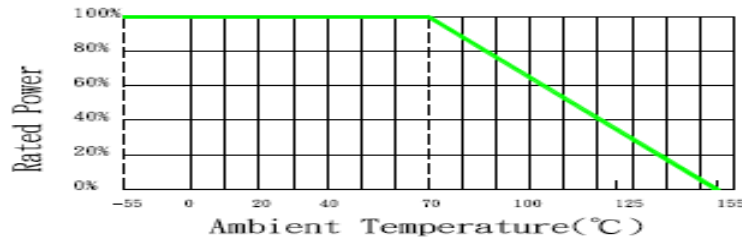


Unit : mm

Type	L	W	C	D	T
FCF02	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
FCF03	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
FCF05	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
FCF06	3.10±0.10	1.60±0.10	0.50±0.20	0.50±0.25	0.55±0.10
FCF12	3.10±0.10	2.60±0.15	0.50±0.25	0.50±0.25	0.55±0.10
FCF20	5.00±0.20	2.50±0.20	0.65±0.25	0.60±0.25	0.55±0.10
FCF25	6.40±0.20	3.20±0.20	0.65±0.25	0.90±0.25	0.60±0.10
FCF18	3.05±0.15	4.60±0.20	0.45±0.25	0.50±0.25	0.55±0.10

4. Power Derating Curve

Operating Temperature Range: -55 to +155 deg.C



5. Rating

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Temperature Coefficient (ppm/°C)	Resistance Range		Standard Resistance Values
							Min.	Max.	
FCF02	0402	1/16W	50V	100V	±1%(F)	-300/+500	1 Ω	10 Ω	E24 E96
						±100	10.2 Ω	976 KΩ	
						±300	1 MΩ	10 MΩ	
					±5%(J)	-300/+500	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	910 KΩ	
						±300	1 MΩ	10 MΩ	
FCF03	0603	1/10W	50V	100V	±1%(F)	-300/+500	1 Ω	10 Ω	E24 E96
						±100	10.2 Ω	976 KΩ	
						±200	1 MΩ	10 MΩ	
					±5%(J)	-300/+500	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	910 KΩ	
						±200	1 MΩ	10 MΩ	
FCF05	0805	1/8W	150V	300V	±1%(F)	-300/+500	1 Ω	10 Ω	E24 E96
						±100	10.2 Ω	976 KΩ	
						±200	1 MΩ	10 MΩ	
					±5%(J)	-300/+500	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	910 KΩ	
						±200	1 MΩ	10 MΩ	

FCF Green series.

RoHS Exemption Free (Pb ≤ 100ppm)

Thick-film Lead Free Chip Resistors

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Temperature Coefficient (ppm/°C)	Resistance Range		Standard Resistance Values
							Min.	Max.	
FCF06	1206	1/4W	200V	400V	±1%(F)	-300/+500	1 Ω	10 Ω	E24 E96
						±100	10.2 Ω	976 KΩ	
						±200	1 MΩ	10 MΩ	
					±5%(J)	-300/+500	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	910 KΩ	
						±200	1 MΩ	10 MΩ	
FCF12	1210	1/3W	200V	400V	±1%(F)	-300/+500	1 Ω	10 Ω	E24 E96
						±100	10.2 Ω	976 KΩ	
						±200	1 MΩ	10 MΩ	
					±5%(J)	-300/+500	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	910 KΩ	
						±200	1 MΩ	10 MΩ	
FCF20	2010	1/2W	200V	400V	±1%(F)	±100	1 Ω	10 Ω	E24 E96
						±200	10.2 Ω	10 MΩ	
					±5%(J)	±100	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	10 MΩ	
FCF25	2512	1W	250V	500V	±1%(F)	±100	1 Ω	10 Ω	E24 E96
						±200	10.2 Ω	10 MΩ	
					±5%(J)	±100	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	10 MΩ	
FCF18	1218	1W	200V	400V	±1%(F)	±100	1 Ω	10 Ω	E24 E96
						±200	10.2 Ω	10 MΩ	
					±5%(J)	±100	1 Ω	10 Ω	E24 Jumper
						±200	11 Ω	10 MΩ	

Note : RCWV = $(P \times R)^{1/2}$ or Max. RCWV listed above, whichever is lower.

RCWV : Working Voltage (V) , P : Rated Power (W) , R : Resistance Value (Ω)

Jumper : Max. 50mΩ.

6.Part Number

Type	Size	Tolerance	Packing	Watt	R Value	TCR	Control Code
FCF	02 :0402	F :±1%	Paper Tape : 0402. V : 10Kpcs 0603.0805. 1206.1210. T : 5Kpcs V : 10Kpcs W : 20Kpcs Plastic Tape : 2010.2512 P : 4Kpcs 1218 Q : 3Kpcs	∅: As Rating Info.	XXXX XXX 1%: 4 digits 5%: 3 digits	∅: As Rating Info.	G : Green series.
	03 :0603	J :±5%					
	05 :0805						
	06 :1206						
	20 :2010						
	25 :2512						
	18 :1218						

Example :

FCF05FT-1001-G

→0805 size, tolerance 1%, paper tape, 1/8W, 1 KΩ, Green series.

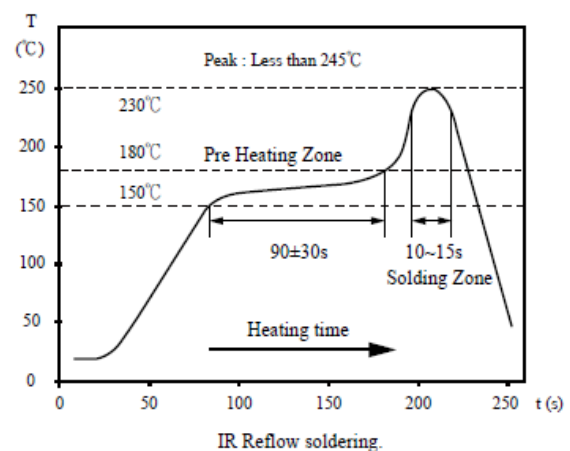
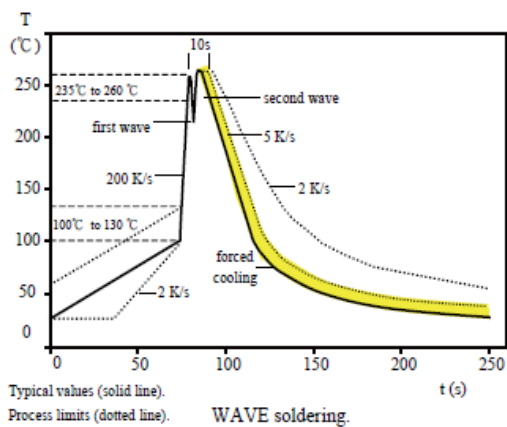
FCF03JT-203_-G

→0603 size, tolerance 5%, paper tape, 1/10W, 20 KΩ, Green series.

7.Marking/Soldering

※ All sizes are no marking.

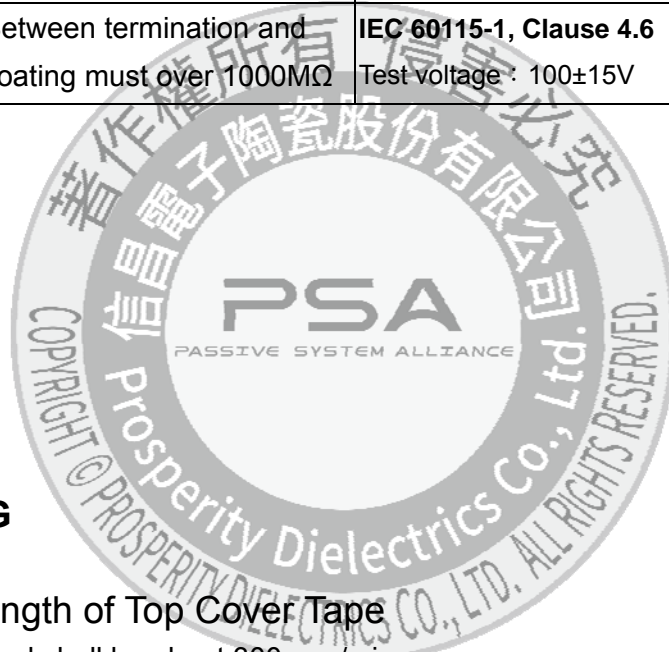
Soldering Reference :



8. Reliability Performance

Test Item	Specification	Test Method
DC Resistance	F:±1% J:±5%	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
Resistance to Solder Heat	2010/2512/1218 : $\Delta R \leq \pm(1\% + 0.05\Omega)$ Other size : F: $\Delta R \leq \pm(0.5\% + 0.1\Omega)$ J: $\Delta R \leq \pm(1\% + 0.1\Omega)$	IEC 60115-1, Clause 4.18 Solder dipping @ 260°C±5°C for 10sec.±1sec.
Solder Ability	Over 95% of termination must be covered with solder.	IEC 60115-1, Clause 4.17 After immersing flux, dip in the 235±5°C molten SAC solder bath for 2±0.5 sec.
Board Flex	2010/2512/1218 : $\Delta R \leq \pm(1\% + 0.05\Omega)$ Other size : F: $\Delta R \leq \pm(0.5\% + 0.1\Omega)$ J: $\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.33 Resistance change after bended on the 90mm PCB, 10sec. 2512/2010/1218:2mm, 0402:5mm, else 3mm.
Short Time Overload	2010/2512/1218 : $\Delta R \leq \pm(2\% + 0.1\Omega)$ Other size : F: $\Delta R \leq \pm(1\% + 0.1\Omega)$ J: $\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.13 2.5 × Rated voltage for 5 seconds.
Temperature Cycle	2010/2512/1218 : $\Delta R \leq \pm(1\% + 0.05\Omega)$ Other size : F: $\Delta R \leq \pm(0.5\% + 0.1\Omega)$ J: $\Delta R \leq \pm(1\% + 0.1\Omega)$	IEC 60115-1, Clause 4.19 Repeat 5 cycles as follow. -55°C (30min)→25°C (2~3min)→155°C (30min) →25°C (2~3min)
Load Life Humidity	2010/2512/1218 : $\Delta R \leq \pm(3\% + 0.1\Omega)$ Other size : F: $\Delta R \leq \pm(1\% + 0.1\Omega)$ J: $\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.24 40±2°C with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.

Test Item	Specification	Test Method
Temperature Coefficient of Resistance (TCR)	Within the spec.	IEC 60115-1, Clause 4.8 $T_1 \quad T_2$ Test temperature : 25°C ~ -55°C 25°C ~ +155°C $TCR(ppm/^{\circ}C) = (R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$
Load Life	2010/2512/1218 : $\Delta R \leq \pm(3\% + 0.1\Omega)$ Other size : F: $\Delta R \leq \pm(1\% + 0.1\Omega)$ J: $\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.25 Rated voltage for 1.5 hours for followed by a pause 0.5 hour at 70±2°C. Cycle repeated 1000 hours.
Insulation Resistance	Between termination and coating must over 1000MΩ	IEC 60115-1, Clause 4.6 Test voltage : 100±15V

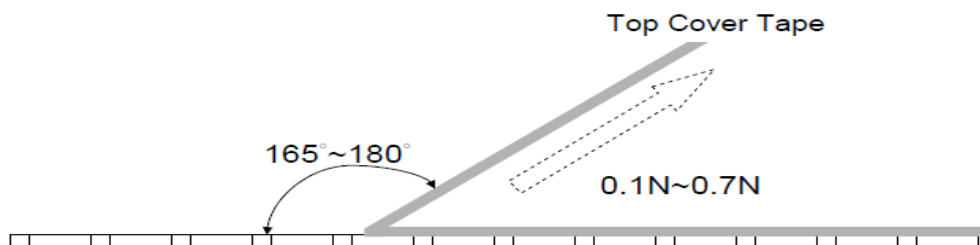


9. PACKAGING

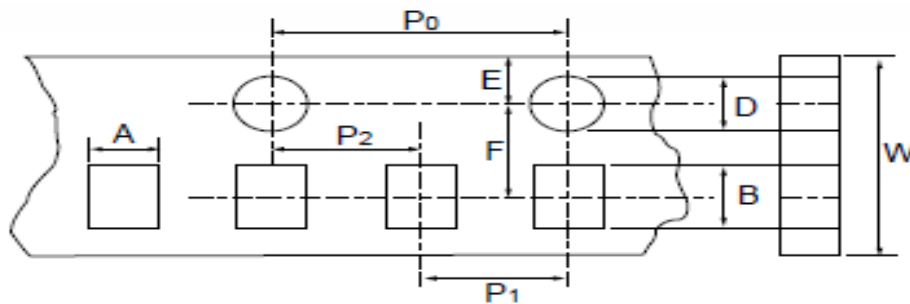
9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

The peel force of top cover tape shall between 0.1 to 0.7N



9.2 Tape Packaging Dimensions



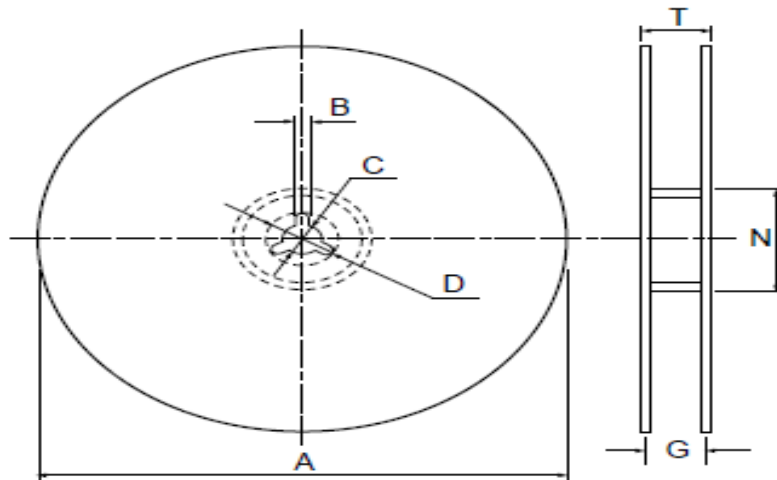
• Accumulated dimensional tolerance $40 \pm 0.2mm$

Size	A	B	W	F	E	P1	P2	P0	D
0402	0.70 ± 0.10	1.20 ± 0.10	8.00 ± 0.30	3.50 ± 0.20	1.75 ± 0.10	2.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
0603	1.10 ± 0.20	1.90 ± 0.20	8.00 ± 0.30	3.50 ± 0.20	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
0805	1.65 ± 0.20	2.40 ± 0.20	8.00 ± 0.30	3.50 ± 0.20	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
1206	2.00 ± 0.20	3.60 ± 0.20	8.00 ± 0.30	3.50 ± 0.20	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
1210	3.00 ± 0.20	3.60 ± 0.20	8.00 ± 0.30	3.50 ± 0.20	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
2010	2.80 ± 0.20	5.50 ± 0.20	12.00 ± 0.30	5.50 ± 0.10	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
2512	3.50 ± 0.20	6.90 ± 0.20	12.00 ± 0.30	5.50 ± 0.10	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
1218	3.55 ± 0.30	4.90 ± 0.20	12.00 ± 0.30	5.50 ± 0.10	1.75 ± 0.10	8.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$

unit:mm

unit : mm

9.3 Reel Dimensions



unit:mm

Size	Packaging Q'ty	A	N	C	D	B	G	T
0402	10kpcs/Reel	254.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	20kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
0603	5kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
0805	10kpcs/Reel	254.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
1206		330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
1210	20kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
2010	4kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.
2512		178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.
1218	3kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.

10. Storage & Handling

... Products are recommended to be used up within one year as ensured shelf life.

Check solder ability in case shelf life extension is needed.

... To store products with following condition:

Temperature: 5 to 40°C ; Humidity: 20 to 70% relative humidity.

※ All product specification and data are subject to change without notice.