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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. :

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

OUR ACTION	SIGNATURE
PREPARED By	Jenny Tseng
CHECKED By	Tony Chou
APPROVED By	Byron Tsai

CUSTOMER SIGNATURE FOR
ACCEPTANCE

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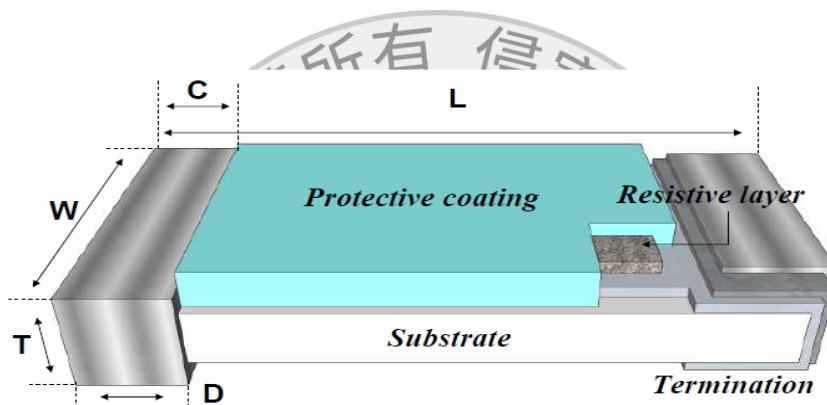
1. Features

- 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



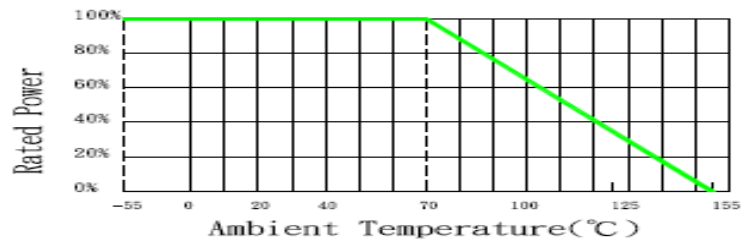
Type	L	W	C	D	T
FCF02	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
FCF03	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
FCF05	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
FCF06	3.10±0.10	1.60±0.10	0.50±0.20	0.50±0.25	0.55±0.10
FCF12	3.10±0.10	2.60±0.15	0.50±0.25	0.50±0.25	0.55±0.10
FCF20	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

Unit : mm



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
						±200	10.2 Ω	10 MΩ	E96
					±5%(J)	±100	1 Ω	10 Ω	E24
						±200	11 Ω	10 MΩ	Jumper
FCF25	2512	1W	250V	500V	±1%(F)	±100	1 Ω	10 Ω	E24
						±200	10.2 Ω	10 MΩ	E96
					±5%(J)	±100	1 Ω	10 Ω	E24
						±200	11 Ω	10 MΩ	Jumper
FCF18	1218	1W	200V	400V	±1%(F)	±100	1 Ω	10 Ω	E24
						±200	10.2 Ω	10 MΩ	E96
					±5%(J)	±100	1 Ω	10 Ω	E24
						±200	11 Ω	10 MΩ	Jumper

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 03 :0603 05 :0805 06 :1206 20 :2010 25 :2512 18 :1218	F : $\pm$ 1% J : $\pm$ 5%	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.

Example :

FCF05FT-1001-G

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

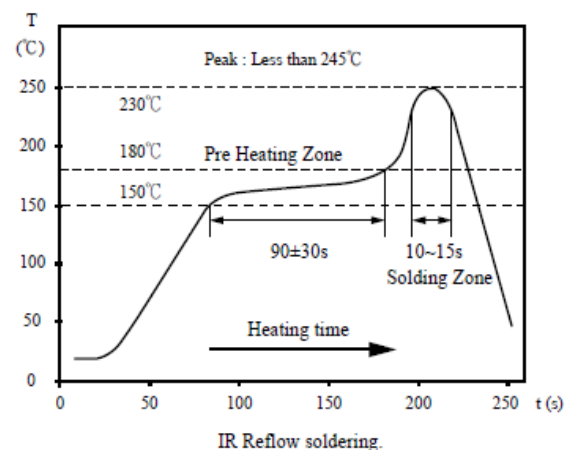
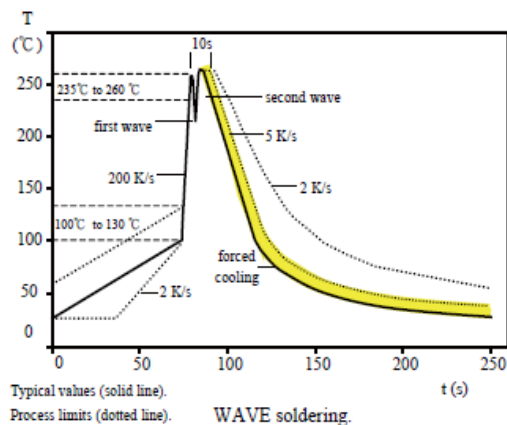
FCF03JT-203_-G

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

7.Marking/Soldering

※ All sizes are no marking.

Soldering Reference :



8. Reliability Performance

Test Item	Specification	Test Method
DC Resistance	F: $\pm 1\%$ J: $\pm 5\%$	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 @ $260^\circ\text{C} \pm 5^\circ\text{C}$ for 10sec. $\pm 1\text{sec.}$
Solder Ability	Over 95% of termination must be covered with solder.	IEC 60115-1, Clause 4.17 After immersing flux, dip in the $235 \pm 5^\circ\text{C}$ 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 $2.5 \times$ Rated voltage for 5 seconds.



PDC



FCF Green series.
RoHS Exemption Free ($Pb \leq 100ppm$)
Thick-film Lead Free Chip Resistors

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. $-55^{\circ}\text{C}(30\text{min}) \rightarrow 25^{\circ}\text{C}(2\sim 3\text{min}) \rightarrow 155^{\circ}\text{C}(30\text{min})$ $\rightarrow 25^{\circ}\text{C}(2\sim 3\text{min})$
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 $40 \pm 2^{\circ}\text{C}$ with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.



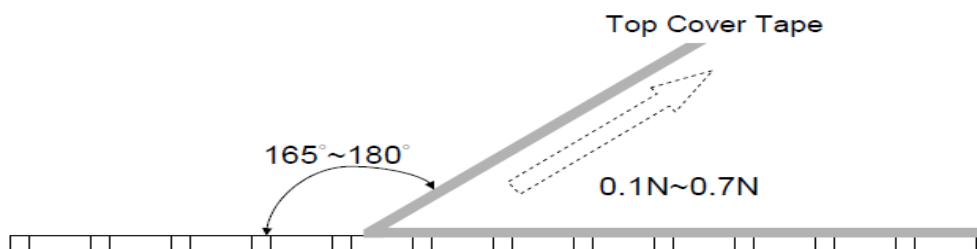
Test Item	Specification	Test Method
Temperature Coefficient of Resistance (TCR)	Within the spec.	IEC 60115-1, Clause 4.8 $T_1 \quad T_2$ Test temperature : $25^{\circ}C \sim -55^{\circ}C$ $25^{\circ}C \sim +155^{\circ}C$ $TCR(ppm/^{\circ}C) = (R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$
Load 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 $70 \pm 2^{\circ}C$. Cycle repeated 1000 hours.
Insulation Resistance	Between termination and coating must over 1000M Ω	IEC 60115-1, Clause 4.6 Test voltage : $100 \pm 15V$

9. PACKAGING

9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

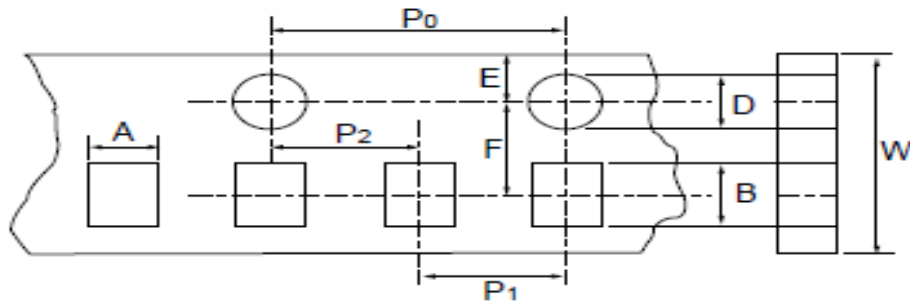
The peel force of top cover tape shall between 0.1 to 0.7N



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9.2 Tape Packaging Dimensions



- Accumulated dimensional tolerance $40 \pm 0.2mm$

unit:mm

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	$1.50 + 0.10 / - 0$

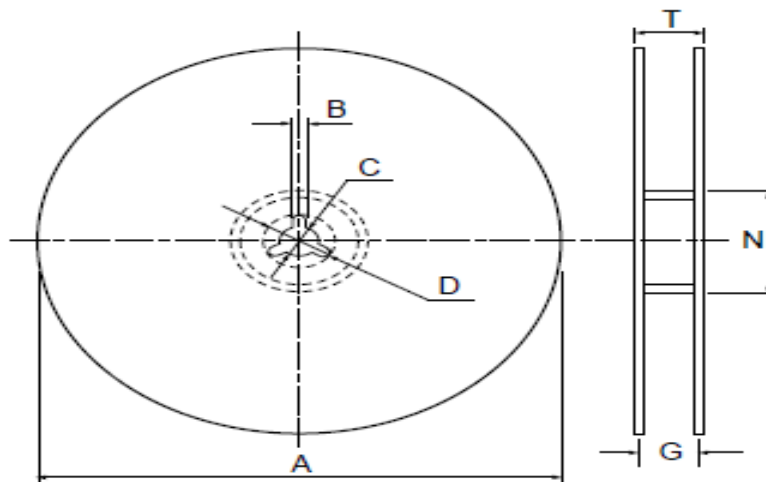
unit : mm



PDC



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		330.0±2.0	100.0±1.0	13.5±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.

