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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-E 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

1. Features .....	2
2. Applications.....	2
3. Dimension and construction .....	2
4. Power Derating Curve .....	3
5. Rating .....	4
6. Part Number .....	5
7. Resistance Marking / Soldering .....	5
8. Reliability Performance.....	7
9. Packing .....	8
9.1 Peel Strength of Top Cover Tape.....	8
9.2 Tape Packaging Dimensions.....	8
9.3 Reel Dimensions.....	9
10. Storage / Handling.....	9



### 1. Features

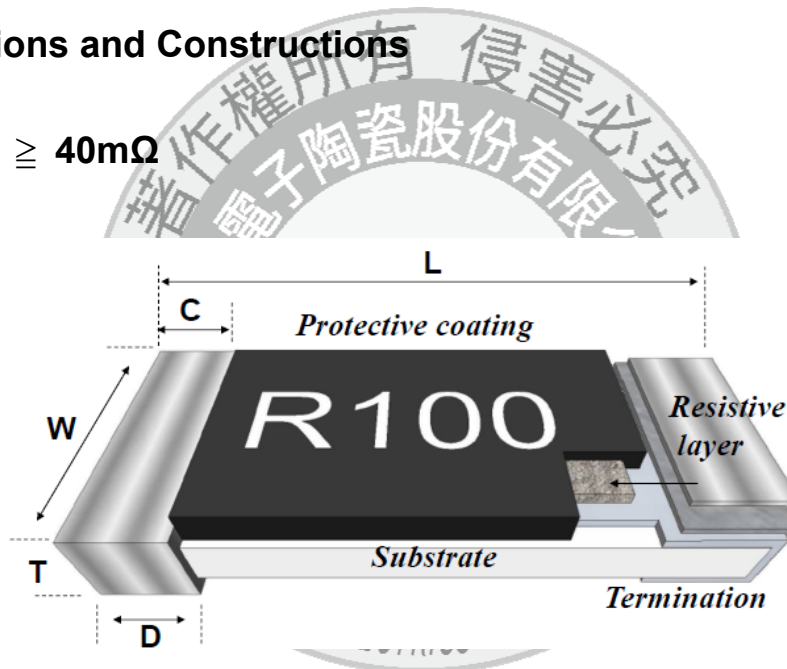
- Low resistance and high precision (1%).
- Excellent reliability and suitable cost.
- Suitable for lead free soldering.
- RoHS compliant & Halogen Free.

### 2. Applications

- Consumer electronics, M/B.
- Battery pack, BTC.
- Notebook, Tablet PC.
- Portable Device, Electronic Equipment.

### 3. Dimensions and Constructions

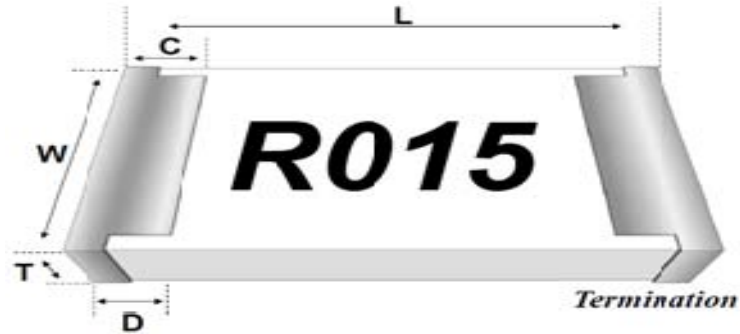
※ R value  $\geq 40m\Omega$



Unit : mm

Type	L	W	C	D	T
FCF06	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±0.25	0.50±0.25	0.55±0.10
FCF12	3.10±0.10	2.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10
FCF20	5.00±0.20	2.50±0.20	0.60±0.25	0.60±0.25	0.60±0.10
FCF25	6.30±0.20	3.10±0.20	0.60±0.25	0.90±0.25	0.60±0.15

※ R value  $\leq$  39m $\Omega$

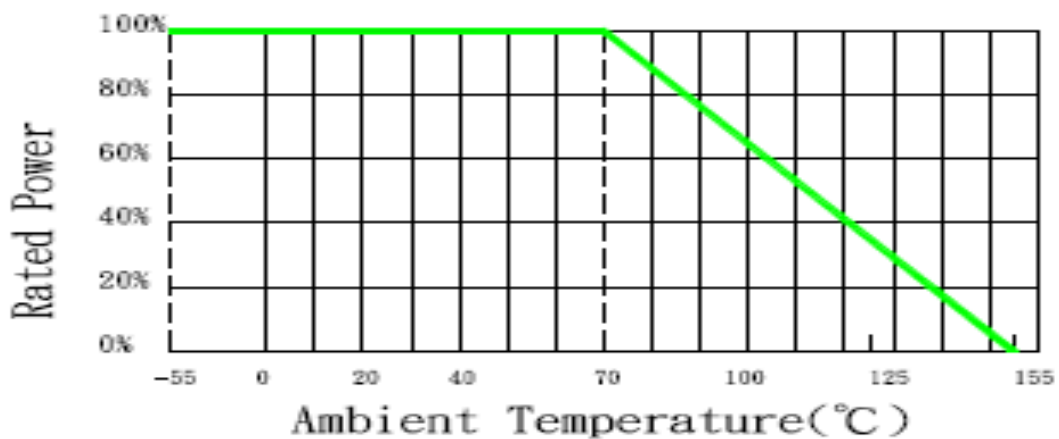


Unit : mm

Type	L	W	C	D	T
FCF05	2.00±0.10	1.25±0.10	0.25±0.20	0.65±0.20	0.60±0.10
FCF06	3.10±0.15	1.60±0.10	0.25±0.20	0.90±0.25	0.55±0.10
FCF12	3.10±0.15	2.60±0.10	0.25±0.25	0.90±0.25	0.60±0.10
FCF20	5.00±0.20	2.50±0.20	0.25±0.25	1.10±0.25	0.60±0.10
FCF25	6.40±0.20	3.10±0.20	0.25±0.25	1.80±0.30	0.60±0.15

#### 4. Power Derating Curve

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



# FCF E code series. (General Purpose) Current Sensing Resistors Thick-film Chip Resistors

## 5. Rating

FCF_E series		Power Rating at 70°C	Max. RCWV (mV)	Max. Overload Voltage (mV)	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance Range (mΩ)		Standard Resistance Values
Type	Size						Min.	Max.	
FCF03_E	0603	1/8W	337	754	±1 ±2、±5	±200	100	910	E-24
						±400	50	99	
FCF05_E	0805	1/4W	477	1067	±1 ±2、±5	±200	100	910	E-24
						±400	50	99	
						±600	22	49	
						±1000	10	20	
FCF06_E	1206	1/3W	551	1232	±1 ±2、±5	±200	100	910	E-24
						±400	50	99	
						±600	22	49	
						±1000	10	20	
FCF12_E	1210	2/3W	779	1742	±1 ±2、±5	±200	100	910	E-24
						±400	50	99	
						±400	22	49	
						±1000	10	20	
FCF20_E	2010	3/4W	826	1847	±1 ±2、±5	±200	100	910	E-24
						±400	50	99	
						±600	22	49	
						±1000	10	20	
FCF25_E	2512	1W	954	2133	±1 ±2、±5	±200	100	910	E-24
						±400	50	99	
						±600	22	49	
						±1000	10	20	

Note :

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

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

2. Special resistance value request please contact factory.

#### 6. Part Number

Type	Size	Tolerance	Packing	Power Code	R Value (GM)	Series Code
<b>FCF</b>	<b>03</b> :0603	<b>F</b> :±1%	<b>Paper Tape :</b> <b>0603.0805.1206</b> <b>1210</b> <b>I</b> : 5Kpcs <b>V</b> : 10Kpcs <b>W</b> : 20Kpcs <b>Plastic Tape :</b> <b>2010.2512</b> <b>P</b> : 4Kpcs <b>X</b> : 8Kpcs <b>Y</b> : 16Kpcs	<b>∩</b> : As Rating	<b>XXXX</b> 4 digit	<b>E</b>
	<b>05</b> :0805	<b>G</b> :±2%				
	<b>06</b> :1206	<b>J</b> :±5%				
	<b>12</b> :1210					
	<b>20</b> :2010					
	<b>25</b> :2512					

Example :

#### FCF06FT-R100E

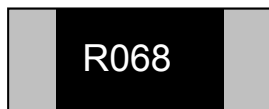
→ 1206 size, tolerance 1%, paper tape, 100mΩ.

#### 7. Marking/Soldering

Resistance value identify :

0805/1206/1210/2010/2512

Top Marking. ( 4 Digits marking to identify the resistance value. )



R068=68mΩ , R120=120mΩ

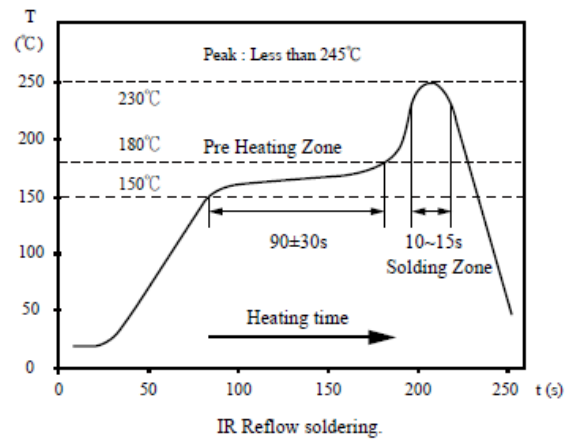
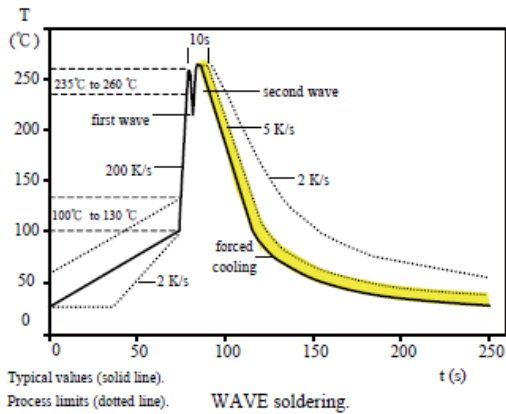
0603

Top Marking. ( 3 Digits marking to identify the resistance value. )



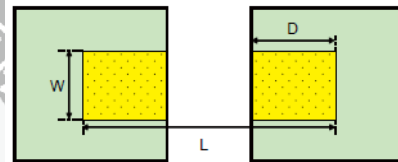
R12=120mΩ , 68M=68mΩ

**Soldering Reference :**



**Recommend Solder Pad Dimensions :**

Type	W	D	L
<b>FCF03</b>	0.90	1.00	3.00
<b>FCF05</b>	1.30	1.15	3.50
<b>FCF06</b>	1.80	1.30	4.70
<b>FCF12</b>	3.00	1.30	4.70
<b>FCF20</b>	3.00	1.50	6.80
<b>FCF25</b>	3.70	1.60	7.60



## 8. Reliability Performance

Test Item	Specification	Test Method
<b>DC Resistance</b>	F : ±1%    G : ±2% J : ±5%	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.5</b> Measure the resistance Value.
<b>Resistance to Solder Heat</b>	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage	<b>IEC 60115-1, Clause 4.18</b> Solder dipping @ 260°C±5°C for 10sec.±1sec.
<b>Solder Ability</b>	Over 95% of termination must be covered with Solder.	<b>IEC 60115-1, Clause 4.17</b> After immersing flux, dip in the 245±2°C molten solder bath for 3±0.5 sec.
<b>Short Time Overload</b>	$\Delta R \leq \pm(2\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(1\% + 0.5m\Omega)$	<b>IEC 60115-1, Clause 4.13</b> 5 × Rated power for 5 seconds
<b>Temperature Coefficient of Resistance (TCR)</b>	Within the spec.	<b>IEC 60115-1, Clause 4.8</b> $T_1$ $T_2$ Test temperature : 25°C ~ 155°C $TCR(ppm/^{\circ}C) = (R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$
<b>Load Life</b>	$\Delta R \leq \pm(3\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(1\% + 0.5m\Omega)$	<b>IEC 60115-1, Clause 4.25</b> Rated voltage for 1.5 hours for followed by a pause 0.5 hour at 70±2°C. Cycle repeated 1000 hours.
<b>Bending strength</b>	$\Delta R \leq \pm(1\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage.	<b>IEC 60115-1 / JIS C 5201-1 , Clause 4.33</b> Resistance variance after bended on the 90mm PCB. Bending width : 3mm for 0603 0805 2mm for 1206 2010 2512
<b>Insulation Resistance</b>	Between termination and coating must over 1000MΩ	<b>IEC 60115-1, Clause 4.6</b> Test voltage : 100±15V

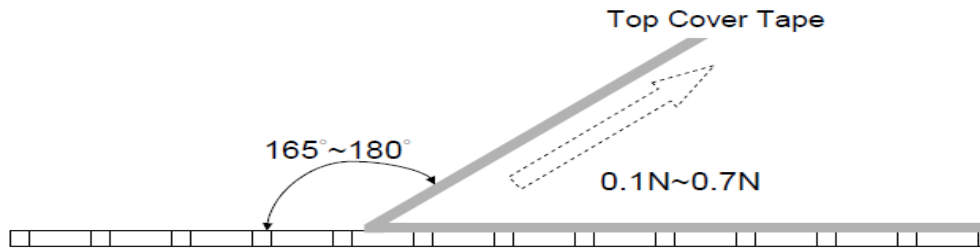


## 9. PACKAGING

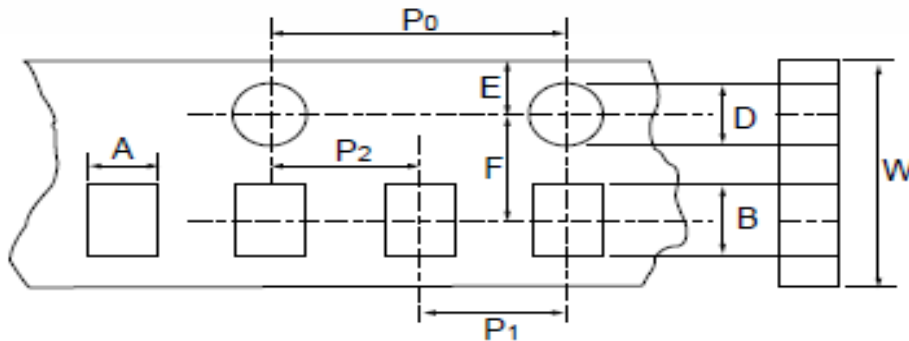
### 9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

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



### 9.2 Tape Packaging Dimensions

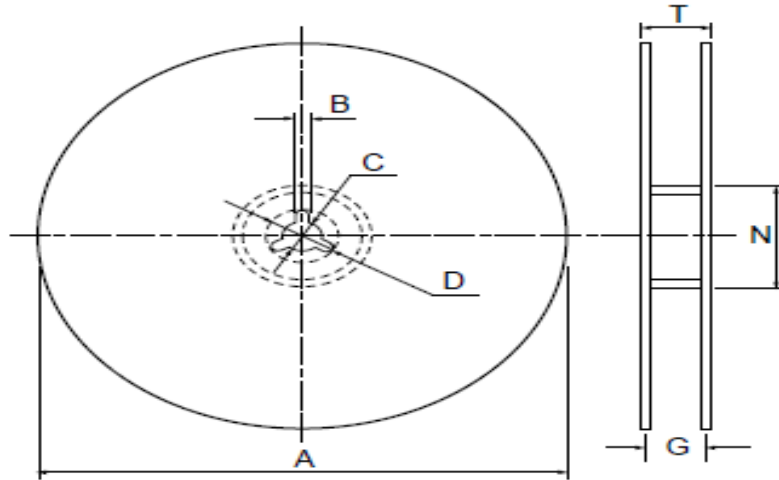


- Accumulated dimensional tolerance  $40 \pm 0.2 \text{mm}$

Size	A	B	W	F	E	P1	P2	P0	D
0603	1.10±0.20	1.90±0.20	8.00±0.30	3.50±0.05	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±0.05	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±0.05	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±0.05	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±0.05	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	6.70±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0

unit:mm

### 9.3 Reel Dimensions



unit:mm

Size	Packaging Q'ty	A	N	C	D	B	G	T
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 2512	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.
	8kpcs/Reel	254.0±2.0	100.0±0.5	13.5±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.
	16kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.

## 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.