

信昌電子陶瓷股份有限公司
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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

| | |
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1. Features

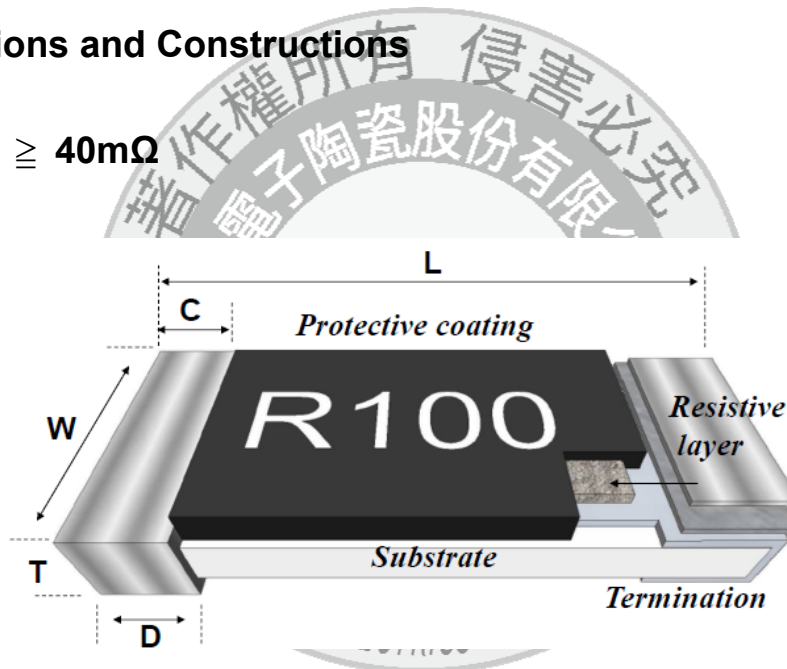
- Low resistance and high precision (1%).
- Excellent reliability and suitable cost.
- Suitable for lead free soldering.
- RoHS compliant & Halogen Free.

2. Applications

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

3. Dimensions and Constructions

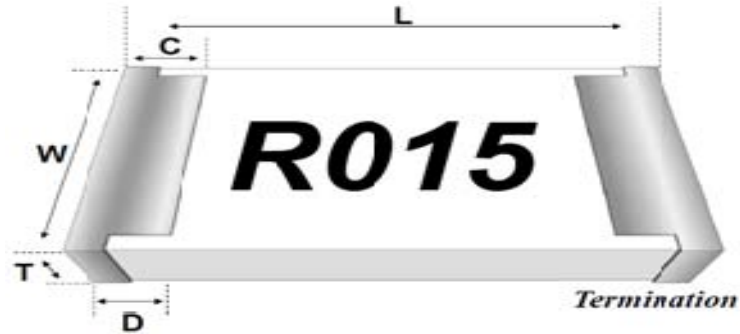
※ R value $\geq 40\text{m}\Omega$



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 Ω

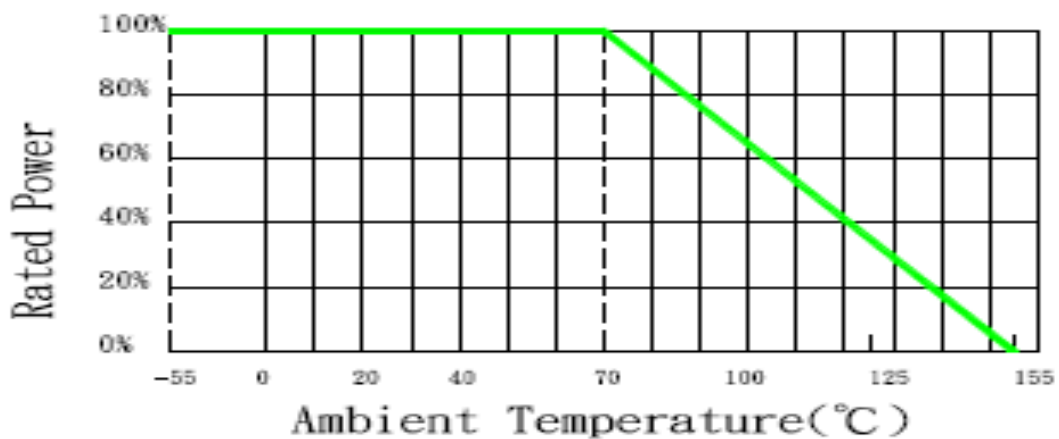


Unit : mm

| 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.

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

6. Part Number

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

Example :

FCF06FT-R100E

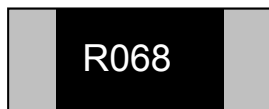
→ 1206 size, tolerance 1%, paper tape, 100mΩ.

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

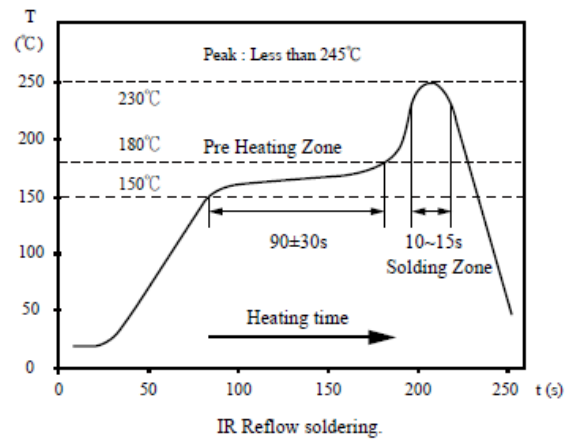
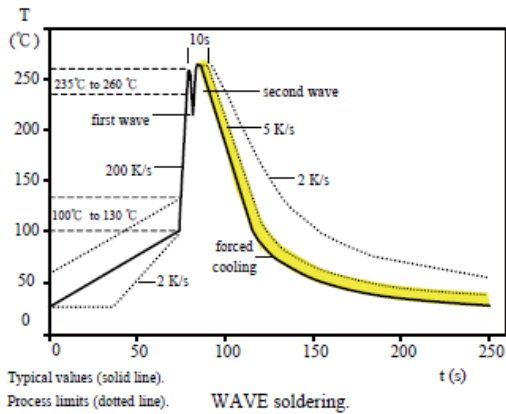
0603

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



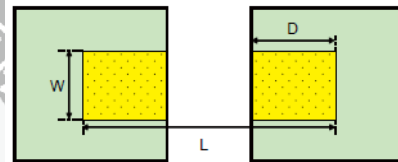
R12=120mΩ , 68M=68mΩ

Soldering Reference :



Recommend Solder Pad Dimensions :

| Type | W | D | L |
|--------------|------|------|------|
| FCF03 | 0.90 | 1.00 | 3.00 |
| FCF05 | 1.30 | 1.15 | 3.50 |
| FCF06 | 1.80 | 1.30 | 4.70 |
| FCF12 | 3.00 | 1.30 | 4.70 |
| FCF20 | 3.00 | 1.50 | 6.80 |
| FCF25 | 3.70 | 1.60 | 7.60 |



8. Reliability Performance

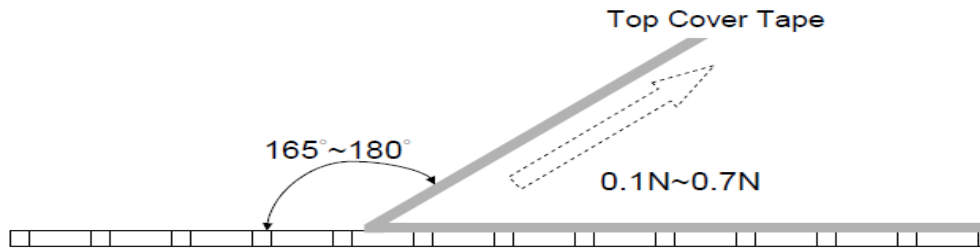
| Test Item | Specification | Test Method |
|--|---|--|
| DC Resistance | F : ±1% G : ±2% J : ±5% | IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value. |
| Resistance to Solder Heat | $\Delta R \leq \pm(1\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage | 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 245±2°C molten solder bath for 3±0.5 sec. |
| Short Time Overload | $\Delta R \leq \pm(2\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(1\% + 0.5m\Omega)$ | IEC 60115-1, Clause 4.13 5 × Rated power for 5 seconds |
| Temperature Coefficient of Resistance (TCR) | Within the spec. | IEC 60115-1, Clause 4.8 T_1 T_2 Test temperature : 25°C ~ 155°C $TCR(ppm/^{\circ}C) = (R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$ |
| Load Life | $\Delta R \leq \pm(3\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(1\% + 0.5m\Omega)$ | 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. |
| Bending strength | $\Delta R \leq \pm(1\% + 0.5m\Omega)$ F : $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage. | IEC 60115-1 / JIS C 5201-1 , Clause 4.33 Resistance variance after bended on the 90mm PCB. Bending width : 3mm for 0603 0805 2mm for 1206 2010 2512 |
| Insulation Resistance | Between termination and coating must over 1000MΩ | IEC 60115-1, Clause 4.6 Test voltage : 100±15V |

9. PACKAGING

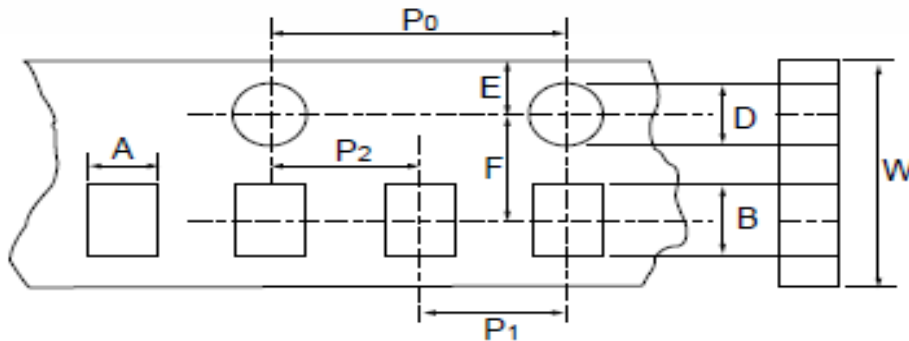
9.1 Peel Strength of Top Cover Tape

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

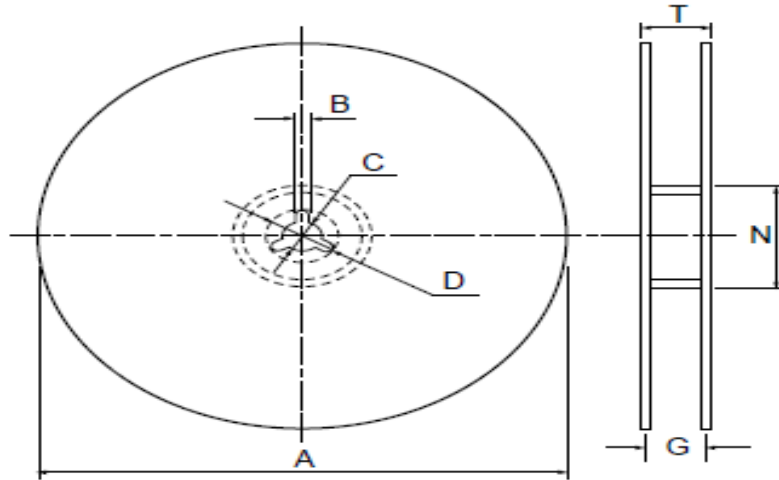


- Accumulated dimensional tolerance $40 \pm 0.2 \text{mm}$

| Size | A | B | W | F | E | P ₁ | P ₂ | P ₀ | 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.

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