

# 功率型厚膜片式固定電阻器

HIGH POWER THICK FILM CHIP FIXED RESISTOR

## ■ 功率型厚膜片式固定電阻器

### High Power Thick Film Chip Fixed Resistor

#### ● 特點 Features

- \* 最高功率可達2W  
High power up to 2W
- \* 適于作電流探測用電阻器  
Current detecting resistors for power supply, motor circuits, etc
- \* 符合ROHS指令要求  
Compliant with RoHS directive
- \* 符合無鹵素要求  
Halogen free requirement



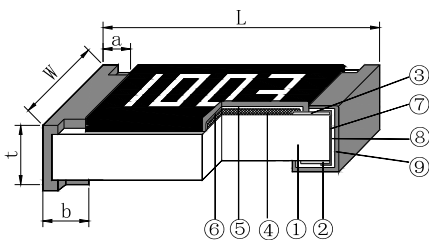
#### ● 應用領域 Application

開關電源、音響設備的過電流保護、電壓調節器、電源轉換器、充電器、汽車引擎控制器、便攜式設備等。  
Switching Power Supply, Over Current Protection in Audio Application, Voltage Regulation Module(VRM)、DC-DC Converter, Charger, Automotive Engine Control, Portable Devices etc.

#### ● 品名構成 Type Designation

|  |                              |                     |                   |                                     |                                |                                 |   |            |                       |                            |                                |
|--|------------------------------|---------------------|-------------------|-------------------------------------|--------------------------------|---------------------------------|---|------------|-----------------------|----------------------------|--------------------------------|
| RP   | G                            | —                   | 06                | M                                   | 1003                           | F                               | T   |            |                       |                            |                                |
| 產品代號<br>Product Code   | 額定功率系列代號<br>Rated Power Code |                     | 型號代號<br>Type Code | 電阻溫度<br>系數系列代號<br>T.C.R Series Code | 電阻值代號<br>Resistance Value Code | 電阻值誤差<br>精度代號<br>Tolerance Code | 包裝方式代號<br>Packaging Style Code  |            |                       |                            |                                |
| 功率型厚膜<br>片式固定<br>電阻器<br>High Power<br>Thick Film<br>Chip Fixed<br>Resistor | 代號<br>Code                   | 額定功率<br>Rated Power | 代號<br>Code        | 型號<br>Type                          | 代號<br>Code                     | T.C.R<br>(ppm/°C)               | 三位數或四位數表示<br>3 digit or 4 digit<br>例如Example:<br>103 = 10kΩ (E-24)<br>1R0 = 1.0Ω (E-24)<br>1003 = 100kΩ (E-96)<br>R47 = 470mΩ<br>R05 = 50mΩ<br>R047 = 47mΩ<br>4M7 = 4.7mΩ | 代號<br>Code | 誤差<br>精度<br>Tolerance | 代號<br>Code                 | 包裝<br>方法<br>Packaging<br>Style |
|  | E                            | 1/8W                | 03                | 0603                                | M                              | ± 500<br>~<br>± 1500            | F   | ± 1%       | T                     | 編帶<br>包裝<br>Tape &<br>Reel |                                |
|  | Q                            | 1/5W                | 05                | 0805                                | L                              | ± 250                           | G   | ± 2%       | C                     | 塑料袋<br>散裝<br>Case          |                                |
|  | F                            | 1/4W                | 06                | 1206                                | K                              | ± 100                           | H   | ± 3%       |                       |                            |                                |
|  | G                            | 1/2W                | 1210              | 1210                                |                                |                                 | J   | ± 5%       |                       |                            |                                |
|  | J                            | 1W                  | 10                | 2010                                |                                |                                 |   |            |                       |                            |                                |
|  | K                            | 1.5W                | 12                | 2512                                |                                |                                 |   |            |                       |                            |                                |
| L  | 2W                           |                     |                   |                                     |                                |                                 |   |            |                       |                            |                                |

#### ● 結構 Construction

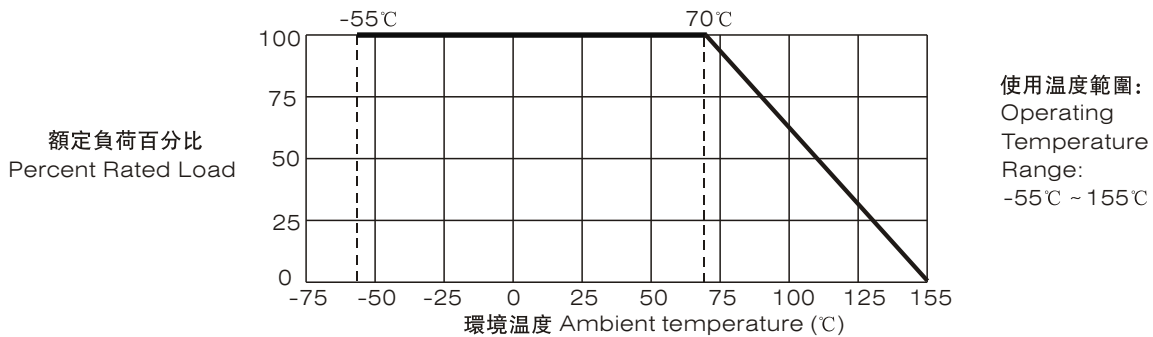


- ① 陶瓷基板 Ceramic Substrate
- ② 背電極 Bottom Electrode
- ③ 面電極 Top Electrode
- ④ 電阻體 Resistor Layer
- ⑤ 一次保護 Primary Overcoat
- ⑥ 二次保護 Secondary Overcoat
- ⑦ 端電極 Edge Electrode
- ⑧ 中間電極 Barrier Layer
- ⑨ 外部電極 External Electrode

### ● 规格尺寸 Dimensions

| 型號 Type | 尺寸 Dimensions(mm) |           |           |           |           |
|---------|-------------------|-----------|-----------|-----------|-----------|
|         | L                 | W         | t         | a         | b         |
| 0603    | 1.60±0.15         | 0.80±0.15 | 0.40±0.10 | 0.30±0.20 | 0.30±0.20 |
| 0805    | 2.00±0.20         | 1.25±0.15 | 0.50±0.10 | 0.30±0.20 | 0.40±0.20 |
| 1206    | 3.20±0.20         | 1.60±0.15 | 0.55±0.10 | 0.50±0.20 | 0.50±0.20 |
| 1210    | 3.20±0.20         | 2.50±0.20 | 0.55±0.10 | 0.50±0.20 | 0.50±0.20 |
| 2010    | 5.00±0.20         | 2.50±0.20 | 0.55±0.10 | 0.60±0.20 | 0.60±0.20 |
| 2512    | 6.40±0.20         | 3.20±0.20 | 0.55±0.10 | 0.60±0.20 | 0.60±0.20 |

### ● 負荷下降曲線 Derating Curve



注：當電阻使用的環境溫度超過70°C時，其額定負荷(額定功率)按上述曲線下降。

Note: For resistors operated in ambient over 70°C, rated load (rated power) shall be derated in accordance with the above figure.

### ● 額定值 Ratings

| 型號 Type | 70°C下額定功率<br>Rating Power at 70°C (W) | 元件極限電壓<br>Limiting Element Voltage (V) | 最大過負荷電壓<br>Max. Overload Voltage (V) | 阻值範圍<br>Resistance Range |
|---------|---------------------------------------|--|--------------------------------------|--------------------------|
| 0603    | 1/8、1/5                               | 50                                     | 100                                  | 0.020Ω ≤ R ≤ 22MΩ        |
| 0805    | 1/4                                   | 150                                    | 300                                  | 0.01Ω ≤ R ≤ 22MΩ         |
| 1206    | 1/2                                   | 200                                    | 400                                  | 0.01Ω ≤ R ≤ 22MΩ         |
| 1210    | 1/2                                   | 200                                    | 400                                  | 0.01Ω ≤ R ≤ 22MΩ         |
| 2010    | 1                                     | 200                                    | 400                                  | 0.01Ω ≤ R ≤ 22MΩ         |
| 2512    | 1.5W、2W                               | 200                                    | 400                                  | 0.0047Ω ≤ R ≤ 1MΩ        |

注Note:

1、電壓為直流或交流有效值。

Voltage of DC or AC RMS value.

2、 $E = \sqrt{P \times R}$  或元件極限電壓兩者中的較小值。

$E = \sqrt{P \times R}$  or Limiting element voltage whichever is lower.

E: 額定電壓 Rated voltage(V)

P: 額定功率 Rated power(W)

R: 標稱阻值 Normal resistance(Ω)

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HIGH POWER THICK FILM CHIP FIXED RESISTOR

## • 額定值 Ratings

| 型號<br>Type                      | 70°C下額定功率<br>Rating Power at 70°C<br>(W)          | 阻值範圍<br>Resistance Range           | 電阻溫度係數 T.C.R (ppm/°C)         |  | 電阻溫度<br>係數系列代號<br>T.C.R Series<br>Code |
|---------------------------------|---|------------------------------------|-------------------------------|--|--|
|                                 |   |                                    | 標稱阻值允許偏差 Resistance Tolerance |  |  |
|                                 |   |                                    | ±1%、±2%、±3%、±5%               |  |  |
| 0603                            | 1/8W<br>1/5W                                      | $0.020\Omega \leq R < 0.033\Omega$ | ±1500                         |  | M                                      |
|                                 |   | $0.033\Omega \leq R < 0.068\Omega$ | ±1000                         |  |  |
|                                 |   | $0.068\Omega \leq R < 0.1\Omega$   | ±800                          |  |  |
|                                 |   | $0.1\Omega \leq R < 1\Omega$       | ±500                          |  |  |
|                                 |   | $1\Omega < R < 10\Omega$           | ±250                          |  | L                                      |
|                                 |   | $10\Omega \leq R \leq 1M\Omega$    | ±100                          |  | K                                      |
|                                 |   | $1M\Omega < R \leq 10M\Omega$      | ±250                          |  | L                                      |
|                                 |   | $10M\Omega < R \leq 22M\Omega$     | ±500                          |  | M                                      |
| 0805<br>1206<br>1210<br>2010    | 0805: 1/4W<br>1206: 1/2W<br>1210 :1/2W<br>2010:1W | $0.01\Omega \leq R < 0.02\Omega$   | ±1500                         |  | M                                      |
|                                 |   | $0.02\Omega \leq R < 0.05\Omega$   | ±1000                         |  |  |
|                                 |   | $0.05\Omega \leq R < 0.1\Omega$    | ±800                          |  |  |
|                                 |   | $0.1\Omega \leq R < 1\Omega$       | ±500                          |  |  |
|                                 |   | $1\Omega \leq R < 10\Omega$        | ±250                          |  | L                                      |
|                                 |   | $10\Omega \leq R \leq 1M\Omega$    | ±100                          |  | K                                      |
|                                 |   | $1M\Omega < R \leq 10M\Omega$      | ±250                          |  | L                                      |
|                                 |   | $10M\Omega < R \leq 22M\Omega$     | ±500                          |  | M                                      |
| 2512                            | 1.5W  | $0.0047\Omega \leq R < 0.02\Omega$ | ±1500                         |  | M                                      |
|                                 |   | $0.02\Omega \leq R < 0.05\Omega$   | ±1000                         |  |  |
|                                 |   | $0.05\Omega \leq R < 0.1\Omega$    | ±800                          |  |  |
|                                 |   | $0.1\Omega \leq R < 1\Omega$       | ±500                          |  |  |
|                                 |   | $1\Omega \leq R < 10\Omega$        | ±250                          |  | L                                      |
|                                 |   | $10\Omega \leq R < 1M\Omega$       | ±100                          |  | K                                      |
|                                 | 2W  | $0.01\Omega \leq R < 0.02\Omega$   | ±1500                         |  | M                                      |
|                                 |   | $0.02\Omega \leq R < 0.1\Omega$    | ±800                          |  |  |
|                                 |   | $0.1\Omega \leq R < 1\Omega$       | ±500                          |  |  |
|                                 |   | $1\Omega \leq R < 10\Omega$        | ±250                          |  | L                                      |
| $10\Omega \leq R \leq 1M\Omega$ | ±100  |                                    | K                             |  |  |

### ● 特性 Characteristics

| 項目<br>Item   | 標準<br>Specifications   | 測試方法 (IEC 60115-1)<br>Test Methods (IEC 60115-1)  |
|--|--|---|
| 可焊性<br>Solderability                                 | 可焊面積 ≥ 95%<br>95% Cover Min  | IEC 60115-1 4.17<br>245°C ± 5°C 錫槽, 保持 3s ± 0.3s.<br>Lead-free solder bath at 245°C ± 5°C for 3s ± 0.3s.  |
| 耐焊接熱<br>Resistance to Soldering Heat                 | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.05\Omega)$  | IEC 60115-1 4.18<br>270°C ± 5°C 錫槽, 保持 10s ± 1s.<br>Lead-free solder bath at 270°C ± 5°C for 10s ± 1s.  |
| 基板彎曲試驗<br>Substrate Bending Test                     | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.05\Omega)$  | IEC 60115-1 4.33<br>彎曲距離(Bending distance):<br>0603、0805: 5mm; 1206、1210: 4mm; 2010、2512: 2mm<br>保持時間(Duration): 60s ± 5s.  |
| 剪切力試驗<br>Shear Test                                  | 外觀無可見損傷<br>No mechanical damage  | IEC 60115-1 4.32<br>施加力(Applying force): 0603: 5N; 0805: 9N; 1206、1210: 25N;<br>2010、2512: 45N.<br>保持時間(Duration): 10s ± 1s.  |
| 電阻溫度系數<br>T.C.R                                      | 在規定值內<br>Within specified T.C.R  | IEC 60115-1 4.8<br>+20°C/-55°C/+20°C/+125°C/+20°C   |
| 溫度快速變化<br>Rapid Change of Temperature                | 無可見損傷<br>No mechanical damage<br>1%: $\Delta R \leq \pm(1.0\%R + 0.05\Omega)$<br>2%、3%、5%:<br>$\Delta R \leq \pm(2.0\%R + 0.05\Omega)$ | IEC 60115-1 4.19<br>-55°C(30分鐘) ~ 常溫(5分鐘) ~ 155°C(30分鐘), 300個循環。<br>-55°C(30min) ~ normal temperature(5min) ~ 155°C(30min), 300 cycles.   |
| 短時間過負載<br>Short Time Overload                        | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(2.0\%R + 0.05\Omega)$  | IEC 60115-1 4.13<br>2.5倍額定電壓或最大過負荷電壓(取較小值), 持續5秒; (2512型號2W功率產品持續2秒)。<br>2.5 times rated voltage or max. overload voltage whichever is lower for 5s;<br>(2s for 2512 type 2w power series).                     |
| 穩態濕熱<br>Damp Heat Steady State                       | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(3.0\%R + 0.05\Omega)$  | IEC 60115-1 4.24<br>40°C ± 2°C, 93% ± 3%RH, 1000小時, 額定電壓或元件極限電壓(取較小值),<br>通1.5小時/斷0.5小時。<br>40°C ± 2°C, 93% ± 3%RH, 1000h, rated voltage or limiting element<br>voltage whichever is lower for 1.5h ON/0.5h OFF |
| 70°C 耐久性<br>Endurance at 70°C                        | 無可見損傷<br>No mechanical damage<br>1%: $\Delta R \leq \pm(1.0\%R + 0.05\Omega)$<br>2%、3%、5%:<br>$\Delta R \leq \pm(2.0\%R + 0.05\Omega)$ | IEC 60115-1 4.25.1<br>70°C ± 2°C, 1000小時, 額定電壓或元件極限電壓(取較小值), 通1.5小時/斷<br>0.5小時。<br>70°C ± 2°C, 1000h, rated voltage or limiting element voltage<br>whichever is lower for 1.5h ON/0.5h OFF,                     |
| 上限類別溫度耐久性<br>Endurance at Upper Category Temperature | 無可見損傷<br>No mechanical damage<br>1%: $\Delta R \leq \pm(1.0\%R + 0.05\Omega)$<br>2%、3%、5%:<br>$\Delta R \leq \pm(2.0\%R + 0.05\Omega)$ | IEC 60115-1 4.25.3<br>155°C ± 2°C, 1000h  |
| 低溫負載<br>Operation at Low Temperature                 | 無可見損傷<br>No mechanical damage<br>1%: $\Delta R \leq \pm(1.0\%R + 0.05\Omega)$<br>2%、3%、5%:<br>$\Delta R \leq \pm(2.0\%R + 0.05\Omega)$ | IEC 60115-1 4.36<br>-55°C ± 5°C, 無負載1小時, 額定電壓或元件極限電壓(取較小值)45分鐘, 無<br>負載15分鐘。<br>-55°C ± 5°C, 1h without load, rated voltage or limiting element voltage<br>whichever is lower for 45min, 15min without load.    |
| 絕緣電阻<br>Insulation Resistance                        | 1000MΩ Min   | IEC 60115-1 4.6<br>在電極與基片間施加100V ± 15V直流電壓, 保持1分鐘, 然後測絕緣電阻值。<br>Apply DC 100V ± 15V between substrate and terminations for 1min,<br>then check insulation resistance.   |
| 耐電壓<br>Voltage Proof                                 | 無擊穿或飛弧<br>No breakdown or<br>flashover   | IEC 60115-1 4.7<br>在電極與基片間以大約100V/s的速率施加有效值為最大過負荷電壓的交流電<br>壓, 保持60s ± 5s。<br>Apply max. overload voltage of AC RMS at a rate of approximately<br>100V/s between substrate and terminations for 60s ± 5s.        |
| 耐溶劑<br>Solvent Resistance                            | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.05\Omega)$  | IEC 60115-1 4.29<br>異丙醇(IPA), 23°C ± 5°C, 浸10小時。<br>Iso-propyl alcohol (IPA), 23°C ± 5°C, 10h.  |

### ● 包裝 Packaging 包裝方式見83~90頁 Packaging see the 83-90 Page.

### ■ 推薦焊盤尺寸 Recommend Solder Pad Size

- 片式固定電阻器 Chip fixed resistor



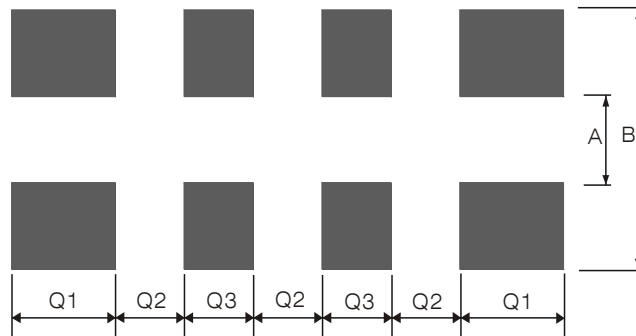
單位 unit: mm

| 厚膜電阻及薄膜電阻<br>Thick Film Resistor and<br>Thin Film Resistor |      |      |      |
|--|------|------|------|
| 型號 Type  | A    | B    | C    |
| 01005  | 0.17 | 0.60 | 0.22 |
| 0201   | 0.23 | 0.84 | 0.38 |
| 0402   | 0.45 | 1.45 | 0.60 |
| 0603   | 0.80 | 2.50 | 0.95 |
| 0805   | 1.05 | 3.25 | 1.40 |
| 1206   | 1.90 | 4.50 | 1.75 |
| 1210   | 2.00 | 4.60 | 2.70 |
| 2010   | 3.50 | 6.50 | 2.70 |
| 2512   | 4.80 | 7.80 | 3.40 |

單位 unit: mm

| 合金片式固定電阻<br>Metal Foil Resistor |           |     |     |     |
|---------------------------------|-----------|-----|-----|-----|
| 型號 Type                         | 阻值 (mΩ)   | A   | B   | C   |
| 0603                            | R003~R004 | 0.4 | 2.8 | 1.0 |
|                                 | R005~R030 | 0.6 |     |     |
| 0805                            | R003~R004 | 0.5 | 3.2 | 1.4 |
|                                 | R005~R047 | 0.8 |     |     |
| 1206                            | R003~R004 | 0.8 | 4.4 | 1.8 |
|                                 | R005~R068 | 1.8 |     |     |
| 2010                            | R003~R009 | 1.6 | 6.3 | 2.9 |
|                                 | R010~R100 | 2.7 |     |     |
| 2512                            | R002~R004 | 1.0 | 8.0 | 3.4 |
|                                 | R005~R200 | 3.8 |     |     |

- 厚膜片式網絡電阻器 Thick film chip network resistor



RCMY08 / RCMT08 / RCML08

單位 unit: mm

| 型號 Type | A    | B    | Q1   | Q2   | Q3   |
|---------|------|------|------|------|------|
| RCMY08  | 0.30 | 0.90 | 0.20 | 0.20 | 0.20 |
| RCMT08  | 0.38 | 1.60 | 0.40 | 0.20 | 0.30 |
| RCML08  | 0.80 | 2.70 | 0.60 | 0.40 | 0.40 |

## ■ 包装 Packaging

### ● 紙帶編帶 Paper Taping

適用於01005、0201、0402、RCMY08、RCMT08；  
 For 01005、0201、0402、RCMY08、RCMT08；



單位 unit: mm

| 型號 Type | A         | B         | W         | F         | E         |
|---------|-----------|-----------|-----------|-----------|-----------|
| 01005   | 0.45±0.02 | 0.25±0.02 | 8.00±0.02 | 3.50±0.05 | 1.75±0.05 |
| 0201    | 0.70±0.10 | 0.40±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |
| 0402    | 1.20±0.10 | 0.70±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |
| RCMY08  | 1.57±0.05 | 0.77±0.05 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |
| RCMT08  | 2.20±0.10 | 1.20±0.10 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |

單位 unit: mm

| 型號 Type | P         | P0        | P1        | ΦD0       | T1        | T         |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|
| 01005   | 2.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.55±0.02 | 0.17±0.02 | 0.31±0.02 |
| 0201    | 2.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 0.28±0.04 | 0.42±0.05 |
| 0402    | 2.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | /         | 0.42±0.05 |
| RCMY08  | 2.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | /         | 0.60±0.10 |
| RCMT08  | 2.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | /         | 0.60±0.10 |

適用於0603、0805、1206、1210、RCML08；  
 For 0603、0805、1206、1210、RCML08；



# 片式電阻包裝方式及注意事項

## PACKAGING AND PRECAUTION OF CHIP RESISTOR

單位 unit: mm

| 型號 Type | A               | B               | W               | F               | E               |
|---------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 0603    | $1.85 \pm 0.10$ | $1.10 \pm 0.10$ | $8.00 \pm 0.20$ | $3.50 \pm 0.05$ | $1.75 \pm 0.10$ |
| 0805    | $2.35 \pm 0.10$ | $1.65 \pm 0.10$ | $8.00 \pm 0.20$ | $3.50 \pm 0.05$ | $1.75 \pm 0.10$ |
| 1206    | $3.50 \pm 0.20$ | $1.90 \pm 0.20$ | $8.00 \pm 0.20$ | $3.50 \pm 0.05$ | $1.75 \pm 0.10$ |
| 1210    | $3.50 \pm 0.20$ | $2.80 \pm 0.20$ | $8.00 \pm 0.20$ | $3.50 \pm 0.05$ | $1.75 \pm 0.10$ |
| RCML08  | $3.50 \pm 0.20$ | $1.90 \pm 0.20$ | $8.00 \pm 0.20$ | $3.50 \pm 0.05$ | $1.75 \pm 0.10$ |

單位 unit: mm

| 型號 Type | P               | P0              | P1              | $\Phi D0$       | T  |                                 |
|---------|-----------------|-----------------|-----------------|-----------------|--|---------------------------------|
|         |                 |                 |                 |                 | 厚膜電阻及薄膜電阻<br>Thick Film Resistor and<br>Thin Film Resistor | 合金片式固定電阻<br>Metal Foil Resistor |
| 0603    | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10$ | $0.60 \pm 0.10$  | $0.75 \pm 0.10$                 |
| 0805    | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10$ | $0.75 \pm 0.10$  | $0.95 \pm 0.10$                 |
| 1206    | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10$ | $0.75 \pm 0.10$  | $0.95 \pm 0.10$                 |
| 1210    | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10$ | $0.75 \pm 0.10$  | ---                             |
| RCML08  | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10$ | $0.75 \pm 0.10$  | ---                             |

### ● 塑料帶編帶 Embossed Taping

適用於2010、2512:

For 2010, 2512:



單位 unit: mm

| 型號 Type | A0              | B0              | W                | F               | E               | t               |
|---------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|
| 2010    | $5.50 \pm 0.15$ | $2.82 \pm 0.15$ | $12.00 \pm 0.10$ | $5.50 \pm 0.10$ | $1.75 \pm 0.10$ | $0.25 \pm 0.05$ |
| 2512    | $6.78 \pm 0.15$ | $3.45 \pm 0.15$ | $12.00 \pm 0.10$ | $5.50 \pm 0.10$ | $1.75 \pm 0.10$ | $0.25 \pm 0.05$ |

單位 unit: mm

| 型號 Type | P               | P0              | P1              | $\Phi D0$            | $\Phi D1$       | K0   |                                    |
|---------|-----------------|-----------------|-----------------|----------------------|-----------------|--|------------------------------------|
|         |                 |                 |                 |                      |                 | 厚膜電阻及薄膜電阻<br>Thick Film Resistor and<br>Thin Film Resistor | 合金片式固定電阻<br>Metal Foil<br>Resistor |
| 2010    | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10 / -0$ | $1.50 \pm 0.10$ | $0.84 \pm 0.10$  | $0.84 \pm 0.10$                    |
| 2512    | $4.00 \pm 0.10$ | $4.00 \pm 0.10$ | $2.00 \pm 0.05$ | $1.50 \pm 0.10 / -0$ | $1.50 \pm 0.10$ | $0.81 \pm 0.10$  | $1.00 \pm 0.10$                    |

● 卷盤 Reel



單位 unit: mm

| 型號 Type   | M       | W        | T        | A       | B        | C        | D        |
|---|---------|----------|----------|---------|----------|----------|----------|
| 01005、0201<br>0402、0603<br>0805、1206<br>1210、RCMY08、<br>RCMT08、RCML08 | 178±2.0 | 9.5±1.0  | 12.5±1.5 | 2.0±0.5 | 13.0±0.5 | 21.0±0.5 | 58.0±2.0 |
| 2010、2512   | 178±2.0 | 13.0±0.5 | 15.5±1.5 | 2.0±0.5 | 13.0±0.5 | 21.0±0.5 | 57.0±2.0 |

● 包裝數量 Packaging Quantity

| 包裝方法<br>Packaging style | 編帶<br>Tape & reel |                                |                                  |              | 塑料袋散裝<br>Case         |  |                      |
|-------------------------|-------------------|--------------------------------|----------------------------------|--------------|-----------------------|--|----------------------|
| 型號 Type                 | 01005             | 0201、0402<br>RCMY08、<br>RCMT08 | 0603、0805<br>1206、1210<br>RCML08 | 2010<br>2512 | 01005<br>0201<br>0402 | 0603、0805<br>1206、<br>RCMY08、RCMT08、<br>RCML08 | 1210<br>2010<br>2512 |
| 數量<br>Quantity(pcs)     | 20000             | 10000                          | 5000                             | 4000         | ≤50000                | ≤10000   | ≤4000                |

■ IEC E-24、E-96系列電阻值代碼對照表

IEC E-24、E-96 Series Resistance Cross-reference List

● E-24 系列 E-24 series( $\times 10^n\Omega$ )

(單位 unit: 0.001 $\Omega$ 、0.01 $\Omega$ 、0.1 $\Omega$ 、1 $\Omega$ 、10 $\Omega$ 、100 $\Omega$ 、1k $\Omega$ 、10k $\Omega$ 、100k $\Omega$ 、1M $\Omega$ 、10M $\Omega$ 、100M $\Omega$ 、1000M $\Omega$ )

|     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| 1.0 | 1.5 | 2.2 | 3.3 | 4.7 | 6.8 |
| 1.1 | 1.6 | 2.4 | 3.6 | 5.1 | 7.5 |
| 1.2 | 1.8 | 2.7 | 3.9 | 5.6 | 8.2 |
| 1.3 | 2.0 | 3.0 | 4.3 | 6.2 | 9.1 |



## 片式電阻包裝方式及注意事項

### PACKAGING AND PRECAUTION OF CHIP RESISTOR

● E-96系列 E-96 series ( $\times 10^n\Omega$ )

(單位unit: 0.001 $\Omega$ , 0.01 $\Omega$ , 0.1 $\Omega$ , 1 $\Omega$ , 10 $\Omega$ , 100 $\Omega$ , 1k $\Omega$ , 10k $\Omega$ , 100k $\Omega$ , 1M $\Omega$ , 10M $\Omega$ , 100M $\Omega$ , 1000M $\Omega$ )

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 1.00 | 1.33 | 1.78 | 2.37 | 3.16 | 4.22 | 5.62 | 7.50 |
| 1.02 | 1.37 | 1.82 | 2.43 | 3.24 | 4.32 | 5.76 | 7.68 |
| 1.05 | 1.40 | 1.87 | 2.49 | 3.32 | 4.42 | 5.90 | 7.87 |
| 1.07 | 1.43 | 1.91 | 2.55 | 3.40 | 4.53 | 6.04 | 8.06 |
| 1.10 | 1.47 | 1.96 | 2.61 | 3.48 | 4.64 | 6.19 | 8.25 |
| 1.13 | 1.50 | 2.00 | 2.67 | 3.57 | 4.75 | 6.34 | 8.45 |
| 1.15 | 1.54 | 2.05 | 2.74 | 3.65 | 4.87 | 6.49 | 8.66 |
| 1.18 | 1.58 | 2.10 | 2.80 | 3.74 | 4.99 | 6.65 | 8.87 |
| 1.21 | 1.62 | 2.15 | 2.87 | 3.83 | 5.11 | 6.81 | 9.09 |
| 1.24 | 1.65 | 2.21 | 2.94 | 3.92 | 5.23 | 6.98 | 9.31 |
| 1.27 | 1.69 | 2.26 | 3.01 | 4.02 | 5.36 | 7.15 | 9.53 |
| 1.30 | 1.74 | 2.32 | 3.09 | 4.12 | 5.49 | 7.32 | 9.76 |

● E-96系列0603型號《乘數代碼對照表》及《電阻值代碼對照表》

E-96 series(0603) 《multiplied Cross-reference List》 and 《Resistance Cross-reference List》

| 乘數multiplied | $\times 10^0$ | $\times 10^1$ | $\times 10^2$ | $\times 10^3$ | $\times 10^4$ | $\times 10^5$ | $\times 10^6$ | $\times 10^7$ | $\times 10^{-1}$ | $\times 10^{-2}$ | $\times 10^{-3}$ |
|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|------------------|------------------|
| 代碼 code      | A             | B             | C             | D             | E             | F             | G             | H             | X                | Y                | Z                |

| 代號 Code | E-96系列電阻 E-96 resistance | 代號 Code | E-96系列電阻 E-96 resistance | 代號 Code | E-96系列電阻 E-96 resistance | 代號 Code | E-96系列電阻 E-96 resistance |
|---------|--------------------------|---------|--------------------------|---------|--------------------------|---------|--------------------------|
| 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                      |

## ■ 厚膜电阻阻值代码及标记规则

### Description for Resistance Value Code and Marking of Thick Film Chip Resistor

- 阻值代码 Resistance Value Code

所有厚膜电阻的阻值代码与其标记是相对应的。

All the resistance value code of thick film chip resistor is corresponding with the marking .

- 标记 Marking

- \* E-24系列(0603、±5%): 采用三位数字表示, 前二位表示电阻值有效数字, 第三位表示乘以10的次方数。

E-24 series: Express resistance value on the glass side with three digits, the first two digits should be significant and the third one denote number of zeros.

例 For example:  → 10KΩ  → 33Ω

- \* E-24系列(0603、±1%&±0.5%): 在三位数字标记下方增加下横线识别。

E-24 series(0603、±1%&±0.5%): One short bar under marking letter.

例 For example: 

- \* E-96系列和E24系列(±1%&±0.5%):

▲0805、1206、1210、2010、2512、4R02、4R03采用四位数字表示, 前三位表示电阻值有效数字, 第四位表示乘以10的次方数。

E-96 series & E-24 series: For the dimension type of 0805、1206、1210、2010、2512、4R02、4R03 express the resistance value with four digits, the first three digits are significant figures and the fourth denotes the number of zeros.

例 For example:  → 100KΩ  → 133Ω

- \* E-96系列:

▲0603用三位代码表示, 前二位表示E-96系列阻值代码, 后一位字母表示乘数代码(见表三和表四)。

For the dimension type of 0603, express the resistance value with three code, the first two digit code denote the resistance of E-96 series, and the third code of letter denote the multiplier (see the table three and four).

例 For example:  → 2MΩ

- \* 小数点以“R”表示 The decimal point should be expressed by “R” .

例 For example:  → 5.6Ω  → 1Ω

- \* 跨接电阻以“0”表示 The jumper should be expressed by “0”

例 For example:  → 0Ω  → 0Ω

- \* 01005、0201、0402 不作标记 For the dimension type of 01005、0201、0402 there is no mark on the glass side.

例 For example: 

- \* 非IEC标准系列的电阻值标记表示方法: 一般以最接近IEC E24系列标称阻值的标记表示方法。

For the resistance which don't belong to IEC serial, use the resistance of IEC serial which is most close to the required resistance of non-IEC serial for replacement.

- \* 客户对标记有特殊要求时, 则按照协商的结果印刷标记。

To get agreement by both party if there special requirement for the marking.

### ■ 薄膜電阻阻值代碼及標記規則

#### Description for Resistance Value Code and Marking of Thin Film Chip Resistor

- 阻值代碼 Resistance Value Code

所有薄膜電阻包括 0201、0402、0603、0805、1206、1210、2010、2512 統一採用四位數阻值代碼表示。  
All resistance value code of thin film chip resistor, including 0201、0402、0603、0805、1206、1210、2010、2512 size used four digits.

例 Example

TD03G4701BT

四位數代號表示，如：4701=4.7KΩ；1R50=1.5Ω

To use four digits code represent resistance value,

例 Example 4701=4.7KΩ；1R50=1.5Ω

- 標記 Marking

- \* 當阻值同時存在于E24和E96系列時，優先採用E96系列。

When resistance value belongs to E24 as well as E96 series, we suggest preferentially use E96 series.

例 Example 10K=1002, ≠103

- \* 0805、1206、1210、2010、2512標記 Marking for 0805、1206、1210、2010、2512 Size Resistor

▲ 0805、1206、1210、2010、2512 印刷四位數字代碼；

For 0805、1206、1210、2010、2512 size resistor, express the resistance value with four digits code;

例 Example



- \* 0603標記 Marking for 0603 Size Resistor

▲ 0603-E96系列：印刷三位字母代碼；

For resistance value belongs to E96 series, express the resistance value with three digits code.

例 Example



▲ 0603-E24系列：印刷三位數字代碼，

For resistance value belongs to E24 series, express the resistance value with three digits code.

例 Example



- \* ▲ 小數點以"R"表示 The decimal point should be expressed by"R" .

例 Example



- \* 0201、0402：不作標記 For the dimension type of 0201、0402 there is no mark on the glass side.

例 Example



## ■ 片式電阻器使用說明 Chip Resistor Instructions for Use

### ● 本產品在以下特殊環境下應用，性能可能會受到影響：

- 1、在各種類型的液體，包括水、油、化學品、有機溶劑的使用。
- 2、在戶外直接暴露在陽光的地方，或在灰塵多的地方使用。
- 3、在產品暴露的地方，有海風或腐蝕性氣體，包括氯氣、硫化氫、氨氣、二氧化硫、二氧化氮等。
- 4、在產品暴露于靜電或電磁波的地方使用。
- 5、在產生熱量的部件、塑料綫，或其他易燃物品附近使用。
- 6、在用樹脂或其他塗層材料密封產品的情況下使用。
- 7、焊接后使用不潔焊料或使用水或水溶性清洗劑清洗產品。

### ● Application of the products in a special environment can deteriorate product performance:

- 1、Use in various types of liquid, including water, oils, chemicals, and organic solvents.
- 2、Use outdoors where the products are exposed to direct sunlight, or in dusty places.
- 3、Use in places where the products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub> etc.
- 4、Use in places where the products are exposed to static electricity or electromagnetic waves.
- 5、Use in proximity to heat-producing components, plastic cords, or other flammable items.
- 6、Use involving sealing or coating the products with resin or other coating materials.
- 7、Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering.

### ● 產品使用注意事項

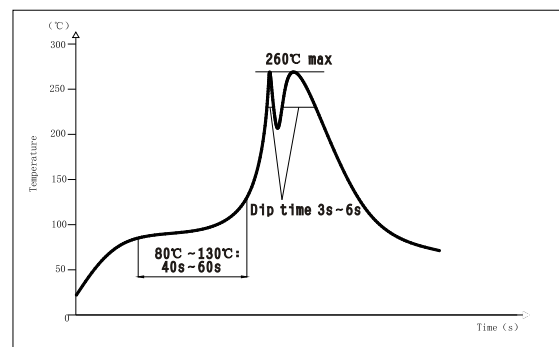
- 1、避免采用超過正常額定功率的功率，超過額定功率的穩態負載條件下可能會對產品性能和可靠性產生負面影響。
- 2、用鑷子拿起產品時要小心，有可能會將保護或電阻體夾碎。
- 3、手動安裝產品時，烙鐵頭勿觸碰產品。
- 4、貯存條件: 溫度5℃ ~ 30℃，相對濕度30% ~ 70%。

### ● Precautions on use of products

- 1、Avoid applying power exceeding normal rated power, exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- 2、Be careful when pick up the products with tweezers. There may be a care that the overcoat and / or the body can be chipped.
- 3、Soldering tip shall not touch the product when install product manually.
- 4、Storage conditions: T: 5℃ ~ 30℃, RH: 30% ~ 70%.

## ■ 焊接 Soldering

- 推薦的回流焊曲綫 Recommended reflow profile
- 推薦的波峰焊曲綫 Recommended wave solder profile



- 推薦的焊膏類型 Recommended solder alloy: 96.5Sn/3.0Ag/0.5Cu

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