

## ■ 電流檢測厚膜片式固定電阻器 Current Sensing Thick Film Chip Fixed Resistor

### ● 特點 Features

- \* 阻值範圍: 10mΩ ~ 1000mΩ  
Resistance values from 10m to 1000m Ohm
- \* 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



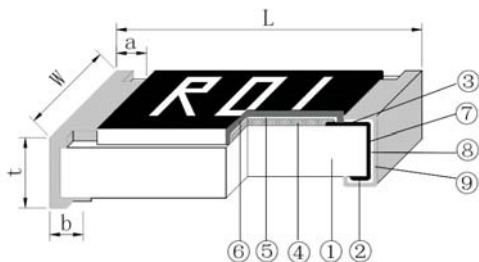
### ● 應用領域 Applications

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、LED燈驅動電源、便携式設備等。  
Switching Power Supply, Over Current Protection in Audio Application, Voltage Regulation, Module(VRM), DC-DC Converter, Charger, LED Lamp Devices, Portable Devices etc.

### ● 品名構成 Type Designation

| RB  | F                           | —                      | 03                 | M          | R200                   | F          | T                 |  |                                       |                   |                                |                         |
|---|-----------------------------|------------------------|--------------------|------------|------------------------|------------|-------------------|--|---------------------------------------|-------------------|--------------------------------|-------------------------|
| 產品代號<br>Product Code  | 額定功率代號<br>Power Rating Code |                        | 封裝尺寸<br>Dimensions |            | 電阻溫度系數代號<br>T.C.R Code |            |                   | 電阻值代號<br>Resistance Value Code   | 阻值誤差精度代號<br>Resistance Tolerance Code |                   | 包裝方式代號<br>Packaging Style Code |                         |
| 電流檢測厚膜片式固定電阻器<br>Current Sensing Thick Film Chip Fixed Resistor | 代號<br>Code                  | 額定功率系列<br>Power rating | 代號<br>Code         | 型號<br>Type | 型號<br>Type             | 代號<br>Code | T.C.R<br>(ppm/°C) | 單位Ω，<br>小數點用R表示；<br>單位mΩ，<br>小數點用M表示；<br>Units:Ω Decimal point should be expressed by "R" ;<br>Units: mΩ Decimal point should be expressed by "M"<br>例如Example:<br>R005=0.005Ω<br>R100=0.100Ω<br>R047=0.047Ω<br>6M50=6.50mΩ<br>0603:<br>V22=0.22Ω<br>R10=0.100Ω<br>5M1=5.1mΩ | 代號<br>Code                            | 誤差精度<br>Tolerance | 代號<br>Code                     | 包裝方法<br>Packaging Style |
|   | C                           | 1/16W                  | 02                 | 0402       | 0402                   | U          | ± 400             |  | F                                     | ± 1%              | T                              | 編帶包裝<br>Tape & Reel     |
|   | D                           | 1/10W                  | 03                 | 0603       | 0603                   | M          | ± 500             |  | G                                     | ± 2%              | C                              | 塑料袋散裝<br>Case           |
|   | E                           | 1/8W                   | 05                 | 0805       | 0805                   | R          | ± 700             |  | H                                     | ± 3%              |                                |                         |
|   | F                           | 1/4W                   | 06                 | 1206       | 1206                   | Q          | ± 800             |  | J                                     | ± 5%              |                                |                         |
|   | R                           | 1/3W                   | 1210               | 1210       | 1210                   | S          | ± 1000            |  |                                       |                   |                                |                         |
|   | H                           | 3/4W                   | 10                 | 2010       | 2010                   | Y          | ± 1500            |  |                                       |                   |                                |                         |
|   | J                           | 1W                     | 12                 | 2512       | 2512                   |            |                   |  |                                       |                   |                                |                         |

● 結構 Construction



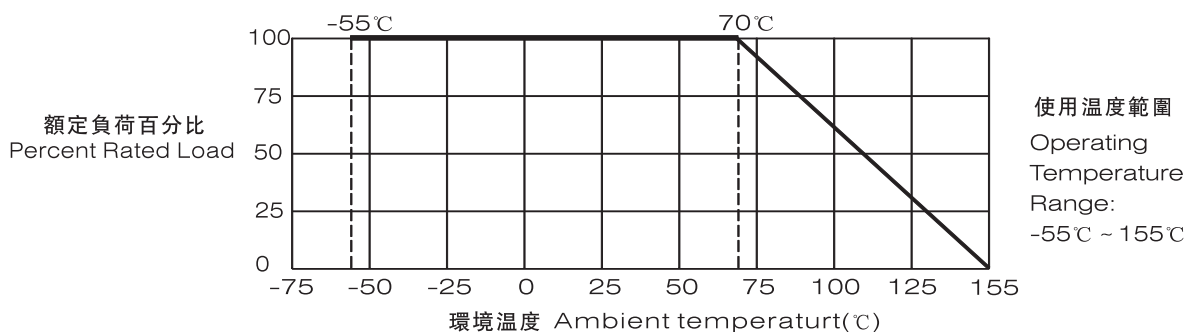
- ① 陶瓷基板 Ceramic Substrate
- ② 背電極 Bottom Electrode
- ③ 面電極 Top Electrode
- ④ 電阻體 Resistor Layer
- ⑤ 一次保護 Primary Overcoat
- ⑥ 二次保護 Secondary Marking
- ⑦ 端電極 Edge Electrode
- ⑧ 中間電極 Barrier Layer
- ⑨ 外部電極 External Electrode

● 規格尺寸 Dimensions

單位 Unit:mm

| 型號 Type | L         | W         | t         | a         | b         |
|---------|-----------|-----------|-----------|-----------|-----------|
| 0402    | 1.00±0.05 | 0.50±0.05 | 0.30±0.05 | 0.20±0.10 | 0.25±0.10 |
| 0603    | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 |
| 0805    | 2.00±0.10 | 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 | 0.40±0.20 | 0.50±0.20 |
| 1210    | 3.20±0.20 | 2.50±0.20 | 0.55±0.10 | 0.40±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    | 6.30±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.

# 電流檢測厚膜片式固定電阻器

Current Sensing 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) | 元件極限電流<br>Limiting Element<br>Current (A) | 最大過負荷電流<br>Max.Overload<br>Current(A) | 阻值範圍<br>Resistance Range<br>(mΩ)                                |      |      |      | 電阻溫度係數<br>T.C.R (PPM/°C)   |
|------------|--|---|---------------------------------------|---|------|------|------|--|
|            |  |   |                                       | ± 1%  | ± 2% | ± 3% | ± 4% |  |
| 0402       | C:1/16                                   | 0.79                                      | 1.98                                  | 100~199<br>200~499<br>500~1000                                  |      |      |      | R: ± 700<br>M: ± 500<br>U: ± 400                                       |
| 0603       | D:1/10                                   | 3.16                                      | 7.91                                  | 10~32.9<br>33~67.9<br>68~99.9<br>100~199<br>200~499<br>500~1000 |      |      |      | Y: ± 1500<br>S: ± 1000<br>Q: ± 800<br>R: ± 700<br>M: ± 500<br>U: ± 400 |
| 0805       | E:1/8                                    | 3.54                                      | 8.84                                  | 10~19.9<br>20~49.9<br>50~99.9<br>100~199<br>200~499<br>500~1000 |      |      |      | Y: ± 1500<br>S: ± 1000<br>Q: ± 800<br>R: ± 700<br>M: ± 500<br>U: ± 400 |
| 1206       | F:1/4                                    | 5   | 12.5                                  |   |      |      |      |  |
| 1210       | R:1/3                                    | 5.77                                      | 14.43                                 |   |      |      |      |  |
| 2010       | H:3/4                                    | 8.66                                      | 21.65                                 |   |      |      |      |  |
| 2512       | J:1                                      | 10  | 25                                    |   |      |      |      |  |

注 Note:

- 1、電壓為直流或交流有效值。  
Voltage of DC or AC RMS value.
- 2、 $E = \sqrt{P \times R}$   
 $E = \sqrt{P \times R}$   
E: 額定電壓 Rated voltage(V)  
P: 額定功率 Rated power(W)  
R: 標稱阻值 Normal resistance(Ω)

## ● 特性 Characteristics

| 項目<br>Item                               | 標準<br>Specifications  | 測試方法 (IEC60115-1)<br>Test Methods (IEC60115-1)  |
|--|---|---|
| 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<br>Soldering Heat  | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.5m\Omega)$ | 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<br>Bending Test      | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.33<br>彎曲距離(Bending distance):<br>0402、0603、0805:5mm; 1206、1210:4mm; 2010、2512:2mm<br>保持時間(Duration): 60s ± 5s.                  |
| 電阻溫度係數<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<br>Temperature | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.5m\Omega)$ | 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)<br>300 cycles.      |
| 短時間過負載<br>Short Time Overload            | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(1.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.13<br>2.5倍額定電壓, 持續5秒。<br>2.5 times rated voltage for 5s.  |
| 穩態濕熱<br>Damp Heat<br>Steady State        | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm(3.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.24<br>40°C ± 2°C, 93% ± 3%RH, 1000h, 額定電壓, 通1.5小時/斷0.5小時。<br>40°C ± 2°C, 93% ± 3%RH, 1000h, rated voltage for 1.5h ON/0.5h OFF. |

## • 特性 Characteristics

( 續上頁 Continue )

| 項目<br>Item  | 標準<br>Specifications   | 測試方法 (IEC60115-1)<br>Test Methods (IEC60115-1)   |
|---|--|--|
| 剪切力試驗<br>Shear Test                                     | 無可見損傷<br>No mechanical damage  | IEC 60115-1 4.32<br>施加力 (Applying force):0402、0603:5N;0805:9N;1206、1210:25N;<br>2010\2512:45N<br>保持時間(Duration):10s ± 1s   |
| 70℃ 耐久性<br>Endurance at 70℃                             | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm (2.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.25.1<br>70℃ ± 2℃, 1000小時, 額定電壓, 通1.5小時/斷0.5小時。<br>70℃ ± 2℃, 1000h, rated voltage for 1.5h ON/0.5h OFF.   |
| 上限類別溫度耐久性<br>Endurance at Upper<br>Category Temperature | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm (1.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.25.3<br>155℃ ± 2℃, 1000小時<br>155℃ ± 2℃, 1000h  |
| 低溫負載<br>Operation at Low<br>Temperature                 | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm (1.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.36<br>-55℃ ± 5℃, 無負載1小時, 額定電壓45分鐘, 無負載15分鐘。<br>-55℃ ± 5℃, 1h without load, rated voltage for 45min, 15min without<br>load.   |
| 絕緣電阻<br>Insulation<br>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<br>or 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壓,<br>保持60s ± 5s。<br>最大過負荷電壓: 0402、0603: 100V;0805:300V;1206、1210、2010、2512:400V<br>Apply max.overload voltage of AC RMS at a rate of approximately<br>100V/s between substrate and terminations for 60s ± 5s.<br>Max.Overload Voltage (V):0402、0603: 100V;0805:300V;<br>1206、1210、2010、2512:400V |
| 耐溶劑<br>Component Solvent<br>Resistance                  | 無可見損傷<br>No mechanical damage<br>$\Delta R \leq \pm (1.0\%R + 0.5m\Omega)$ | IEC 60115-1 4.29<br>異丙醇 (IPA), 23℃ ± 5℃, 浸10小時。<br>Iso-propyl alcohol (IPA), 23℃ ± 5℃, 10h.  |

## • 包裝 Packaging

包裝方式見附錄105 ~ 113頁      Packaging see the appendix 105-113 Page .

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