

## ■ 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



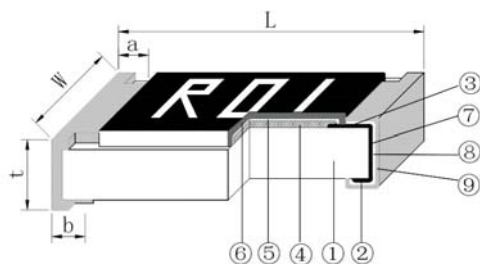
## ● 應用領域 Applications

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<br>測厚膜片式<br>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 expressedby “R” ;<br>Units: mΩDecimal 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<br>0603<br>0805<br>1206<br>1210<br>2010<br>2512 | U           | ± 400             |                                                                                                                                                                                                                                                                             | F           | ± 1%                                  | T           | 編帶包裝<br>Tape & Reel            |  |
|                                                                         | D                           | 1/10W                  | 03                 | 0603       |                                                      | M           | ± 500             |                                                                                                                                                                                                                                                                             | G           | ± 2%                                  |             |                                |  |
|                                                                         | E                           | 1/8W                   | 05                 | 0805       |                                                      | R           | ± 700             |                                                                                                                                                                                                                                                                             | H           | ± 3%                                  | C           | 塑料袋散裝<br>Case                  |  |
|                                                                         | F                           | 1/4W                   | 06                 | 1206       |                                                      | Q           | ± 800             |                                                                                                                                                                                                                                                                             | J           | ± 5%                                  |             |                                |  |
|                                                                         | R                           | 1/3W                   | 1210               | 1210       |                                                      | S           | ± 1000            |                                                                                                                                                                                                                                                                             |             |                                       |             |                                |  |
|                                                                         | H                           | 3/4W                   | 10                 | 2010       |                                                      | Y           | ± 1500            |                                                                                                                                                                                                                                                                             |             |                                       |             |                                |  |
|                                                                         | J                           | 1W                     | 12                 | 2512       |                                                      |             |                   |                                                                                                                                                                                                                                                                             |             |                                       |             |                                |  |

## • 結構 Construction



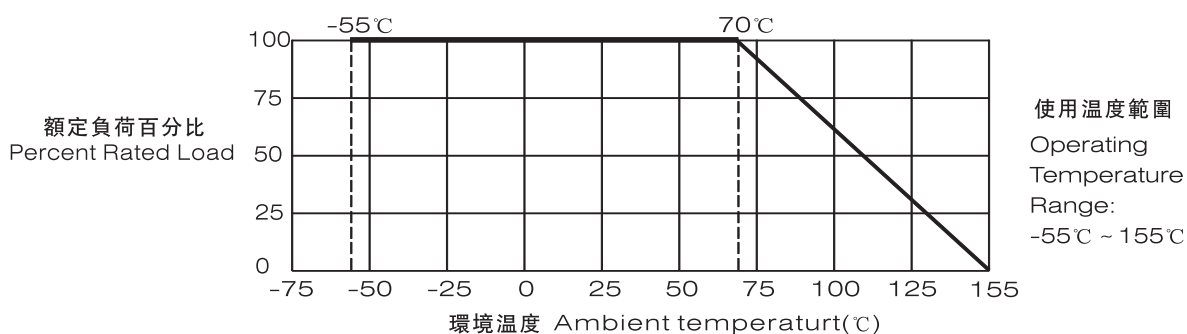
- ① 陶瓷基板 Ceramic Substrate
- ② 背電極 Bottom Electrode
- ③ 面電極 Top Electrode
- ④ 電阻體 Resistor Layer
- ⑤ 一次保護 Primary Overcoat
- ⑥ 二次保護 Secondary Marking
- ⑦ 端電極 Edge Electrode
- ⑧ 中間電極 Barrier Layer
- ⑨ 外部電極 External Electrode

## • 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.

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## ● 額定值 Ratings

| 型 號<br>Type | 70℃下額定功率<br>Rating Power at 70℃<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/℃)                                                |
|-------------|----------------------------------------|-------------------------------------------|---------------------------------------|-----------------------------------------------------------------|------|------|------|------------------------------------------------------------------------|
|             |                                        |                                           |                                       | ± 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℃ ± 5℃ 錫槽，保持3s ± 0.3s.<br>Lead-free solder bath at 245℃ ± 5℃ 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℃ ± 5℃ 錫槽，保持10s ± 1s.<br>Lead-free solder bath at 270℃ ± 5℃ 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℃/-55℃/+20℃/+125℃/+20℃                                                                                             |
| 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℃(30分鐘) ~ 常溫(5分鐘) ~ 155℃(30分鐘) 300個循環。<br>-55℃(30min) ~ normal temperature(5min) ~ 155℃(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℃ ± 2℃, 93% ± 3%RH, 1000h, 額定電壓，通1.5小時/斷0.5小時。<br>40℃ ± 2℃, 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 准<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 .