



製品仕様書 SPECIFICATIONS

客戶名稱：

Customer :

客戶料號：

Part Number :

產品名稱：

金屬皮膜固定電阻器

Product :

Metal Film Fixed Resistor

大益料號：

金屬皮膜固定電阻器系列

Part Number :

RN シリーズ / RN series

RoHS 対応品
RoHS Compliant product
HF 対応品
Halogen Free product

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TAI ELECTRONIC CO.,LTD.

2018/2/6

表單編號: QR-031

| Document No. | Document Name | | Edition |
|---------------|---------------|----------------------------|---------|
| TAI-RN-5006-A | RN series | Metal Film Fixed Resistors | 2018-1 |

Metal Film Fixed Resistors

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1 – Specifications –

1.1 – Scope –

This specification covers the Paint Insulated Fixed Metal Film Resistors.

For resistance values below 10 ohms, it shall only be applied to Nickel Metal Film

1.2 – Type designation –

Types are designated as follows.

| RN | 16 | T2 | 1002 | F |
|---------------------------|---|---|---|---|
| Type | Power Rating | Packaging Forming | Nominal Value of Resistance | Resistance Tolerance |
| RN : Metal Film Resistors | 16:1/6W, 1/8W 25:1/4W 50:1/2W 1W:1W 2W:2W 25S:1/4WS 50S:1/2WS | P : P-Type Bulk T2 : 26m/m Taping T5 : 52m/m Taping | 1853 : 185KΩ 1000 : 100Ω 1001 : 1KΩ 1002 : 10KΩ 1003 : 100KΩ 1004 : 1M | B : 0.1% C : 0.25% D : 0.5% F : 1% |

1.3 – Rating –

The ratings of resistors are described in the following Sections. The rating of each type of resistor is indicated in each associated Tables.

-Table.1 Rating Table-

| Items | Contents | | | | | | |
|--|-------------------------|------|---------------|-------|-------|-------|-------|
| Type | 1/6W | 1/4W | 1/2W | 1/4WS | 1/2WS | 1WS | 2WS |
| Rated Wattage | 1/6W | 1/4W | 1/2W | 1/4W | 1/2W | 1W | 2W |
| Max. Operational Voltage | 250V | 250V | 300V | 250V | 300V | 350V | 350V |
| Max. Overload Voltage | 400V | 500V | 500V | 500V | 500V | 600V | 600V |
| Max. Pulse Voltage | 250V | 300V | 400V | 300V | 400V | 500V | 500V |
| Dielectric Withstanding Voltage | 350V | 500V | 700V | 500V | 700V | 1000V | 1000V |
| Rated Ambient Temperature | 70°C | | | | | | |
| Operating Temperature Range | -55°C to 155°C | | | | | | |
| Resistance Tolerance | Class B ±0.1% | | Class F ±1% | | | | |
| | Class C ±0.25% | | Class D ±0.5% | | | | |
| Resistance Range | 1 Ω ~470K Ω | | | | | | |
| Temperature Coefficient of Resistance. | T.C.R. (ppm/°C) ±100 | | | | | | |

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1.3.1 –Rated Wattage–

Rated Wattage is the maximum continuous power applicable at operating temperature range. However, for the temperature above 70°C, derating should be applied as Fig.1.



-Fig.1 Derating curve-

1.3.2 –Rated Voltage–

The rated voltage is denoted as D.C. or rms A.C. voltage which is calculated according to the following formula. However, it is limited to the maximum applicable voltage.

$$E = \sqrt{P \times R}$$

E: Rated voltage (V)

P: Rated wattage (W)

R: Rated Resistance (Ω)

1.3.3 –Rated Resistance–

- (1). The rated resistance is specified in accordance with the E24 Series Numbers as shown in Table2.
- (2). The manufacturing resistance range is shown in each associated rating Tables.
- (3). The resistance tolerance is shown in each associated rating Tables.

-Table.2 E-24 Series resistance Value-

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

| | | | |
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2 — Performance —

| No | Item | | Spec. Level | Test method (JIS-C-5724) |
|----|---|-------|--|--|
| 1 | Resistance value | | Within the tolerance | Within the tolerance |
| 2 | Temperature characteristics of resistance | | See rating table | Method 304 (JIS-C-5720) |
| 3 | Short time over load | | Tolerable change within $\pm(0.5\%+0.05\Omega)$ No visual damage Marking be legible | 2.5 Times RCW for 5 SEC.(JIS-C-5720) |
| 4 | Dielectric withstanding voltage. | | Tolerable change within $\pm(0.5\%+0.05\Omega)$ Flash over Burning Insulation damages Should not be observed | V – block (JIS-C-5720) |
| 5 | Terminal strength | Pull | Tolerable change within $\pm(0.5\%+0.05\Omega)$ | 5 pound pull (JIS-C-5202) |
| | | twist | | 3 times twist. (JIS-C-5202) |
| 6 | Resistance to soldering heat | | Tolerable change within $\pm(0.5\%+0.05\Omega)$ | $350\pm 10^{\circ}\text{C}$, (JIS-C-5202) 3.5 ± 0.5 sec |
| 7 | Solderability | | 95% min. coverage | $245\pm 5^{\circ}\text{C}$, 3 ± 0.5 SEC. (JIS-C-5202) |
| 8 | Insulation resistance | | Over 1,000 M Ω | V – block (JIS-C-5202) |
| 9 | Load life | | Tolerable change within $\pm(2\%+0.05\Omega)$ | (JIS-C-5202) 1,000 hours at 70°C |
| 10 | Humidity Load life. | | Tolerable change within $\pm(1.5\%+0.05\Omega)$ | (JIS-C-5202) 1,000 hours at 40°C , 90~95%RH |
| 11 | Pulse Overload | | Resistance Change Rate is $\pm(0.5\%+0.05\Omega)$ Max. | Resistance Change After 1000 Cycles (1 seconds on, 25 seconds off) At 3 Time Rated Voltage(AC) |

| | | | |
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| No | Item | Spec. Level | Test method (JIS-C-5724) |
|----|-----------------------------------|---|---|
| 12 | High temperature storage test | No remarkable abnormalities on appearance. Marking shall be Legible Variation of resistance(5% + 0.1Ω) | In the 155℃ for 1000 hours |
| 13 | Low temperature storage test | No remarkable abnormalities on appearance. Marking shall be Legible Variation of resistance(5% + 0.1Ω) | In the -55℃ for 1000 hours |
| 14 | Temperature humidity storage test | No remarkable abnormalities on appearance. Marking shall be Legible Variation of resistance(5% + 0.1Ω) | In the chamber having temp. 60℃ and relative humidity 90% for 1000 hours |
| 15 | Vibration test | $\Delta R \leq \pm(1\% + 0.05\Omega)$. No mechanical damage be observed & marking be legible | Apply 1.5mm amplitude vibration to three directions perpendicular to each other 2 hours each, total 6 hours. Vibrating frequency is 10Hz-55Hz-10Hz cycle in 1 minute sweeping and repeat cycle. |

3 —Construction, Dimensions—

3.1 —Construction—



| No. | Name | Material | Memo |
|-----|------------------------|---------------------------------|-----------------------|
| 1 | Lead wire | Solder plated copper wire | Welded, electroplated |
| 2 | Ceramic core | Aluminum base | |
| 3 | Conductive film | Ni - Cr | |
| 4 | Cap | Tin plated iron | Pressed capping |
| 5 | Helical cutting groove | | |
| 6 | Medium coat | Phenolic | |
| 7 | Insulation coat | Epoxy (appearance color : blue) | Flame retard |
| 8 | Color code | Epoxy | |

| | | | |
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3.2 —Dimensions—



| P- TYPE | | Dimension (mm) | | | | |
|----------------|----------|----------------|---------|-------|-----|-----------|
| | | L (Max) | D (Max) | d±0.1 | H±3 | A (阻值測量點) |
| RN 1/6W (1/8W) | RN 1/4WS | 4.7 | 2.5 | 0.43 | 27 | 5.5 |
| RN 1/4W | RN 1/2WS | 7.2 | 3.5 | 0.52 | 27 | 5.0 |
| RN 1/2W | RN 1WS | 10.5 | 4.0 | 0.56 | 25 | 3.0 |
| RN 1W | RN 2WS | 12.5 | 5.0 | 0.73 | 30 | 4.0 |
| RN 2W | RN 3WS | 16.5 | 5.5 | 0.73 | 30 | 8.0 |

4 —Color Coding Drawing—



| Color | 1 st NO. | 2 nd NO. | 3 rd NO. | Multipliers | Tolerance |
|--------|---------------------|---------------------|---------------------|------------------|------------|
| Black | 0 | 0 | 0 | 10 ⁰ | |
| Brown | 1 | 1 | 1 | 10 ¹ | F (±1%) |
| Red | 2 | 2 | 2 | 10 ² | G (±2%) |
| Orange | 3 | 3 | 3 | 10 ³ | |
| Yellow | 4 | 4 | 4 | 10 ⁴ | |
| Green | 5 | 5 | 5 | 10 ⁵ | D (±0.5%) |
| Blue | 6 | 6 | 6 | 10 ⁶ | C (±0.25%) |
| Purple | 7 | 7 | 7 | | B (±0.1%) |
| Gray | 8 | 8 | 8 | | |
| White | 9 | 9 | 9 | | |
| Gold | | | | 10 ⁻¹ | J (±5%) |
| Silver | | | | 10 ⁻² | K (±10%) |

| | | | |
|---------------|---------------|----------------------------|---------|
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5 –Axial Taping Specification–

5.1 –Application–

This specification covers axial taping of paint insulated fixed metal film resistors

5.2 –Taping Operation–

5.2.1 Dimensions are shown in Fig 2. and Fig 3.

5.2.2 Tape material

Tapes are paper based press adhesive tapes with the following requirements.

| Width | Thickness | Adhesive Power | Pull Strength | Elongation |
|--------------|---------------|-----------------------|------------------------|------------|
| 6.0 ± 0.5 mm | 0.15 ± 0.05mm | 1700g /25mm wide Min. | 20.4g / 25mm wide Min. | 5% Max. |

5.2.3 Taping Operation

5.2.3.1 Color code orientation is not specified.

5.2.3.2 No drop out is permissible.

5.2.3.3 Adhesion length be min. 3.0mm



-FIG.2 -

5.2.3.4 Tape splicing be done with rein forcing tapes attached from both side.(see Fig. 3)



-FIG.3 -

5.2.3.5 Taping end shall have min. 50mm of leading tape.

5.3 –Taped Packing–

5.3.1 Taped products are folded into packing boxes.(see Fig 4)

5.3.2 Dimensions of boxes are shown in Table 4.

5.3.3 Flap of the box is taped to fix.



-FIG.4 -

| | | | |
|---------------|---------------|----------------------------|---------|
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6 –Dimension of Axial Operation–



-FIG.5 Taping specifications-

-Table.3 Taping dimensions (Axial taping)-

| MARK | Dimension (mm) | | | | | | | |
|------|----------------|-----|-------|-------|------------|-------|-------|-------|
| | A±1 | W±1 | T±0.5 | t-Min | L1-L2(Max) | P±0.5 | Z-Max | L-Max |
| T26 | 38 | 26 | 6.0 | 2.0 | 1.0 | 5.0 | 1.0 | 1.0 |
| T52 | 64 | 52 | 6.0 | 2.0 | 1.0 | 5.0 | 1.0 | 1.0 |
| T63 | 75 | 63 | 6.2 | 2.0 | 1.0 | 5.0 | 1.0 | 1.0 |
| T73 | 86 | 73 | 6.2 | 2.0 | 1.0 | 10.0 | 1.0 | 1.0 |

- (1) Integrated pitch tolerance is $\pm 2\text{mm}/20$ pitches (p) $\pm 1.6\text{mm}/20$ pitches (u).
- (2) Absolute values of difference between 1 and 2.
- (3) Adhesive length of lead wire.
- (4) Tape snaking to tolerance is 0.5mm/300mm.

| | | | |
|---------------|---------------|----------------------------|---------|
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7—Axial Taping Box—



-FIG.6 Packing Box -

-Table.4 Box Dimension-

| Type | | Quantity | H±5 | L±10 | W±5 |
|-----------------------|------------------------|-----------|-----|------|-----|
| RN 1/8W Taping (52mm) | RN 1/4WS Taping (52mm) | 5,000 pcs | 78 | 255 | 80 |
| RN 1/4W Taping (52mm) | RN 1/2WS Taping (52mm) | 5,000 pcs | 110 | 255 | 80 |
| RN 1/2W Taping (52mm) | RN 1WS Taping (52mm) | 2,000 pcs | 88 | 255 | 80 |
| RN 1W Taping (63mm) | RN 2WS Taping (63mm) | 1,000 pcs | 85 | 255 | 87 |
| RN 2W Taping (73mm) | RN 3WS Taping (73mm) | 1,000 pcs | 105 | 255 | 100 |

8—Marking of Packing Box—



-FIG.7 Product label-

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9 Recommend having the tin condition:

9.1. Weld the homework in crest

Whether preheat temperature. 110°C max

Time of preheating: 60sec~120sec

The temperature of the homework / time: 260°C / 10sec 1 second or 5sec two times

(Weld the curve and see and leave pursuing in relevant crests)



-FIG.8 Temperature profile-

9.2. Soldering tin homework of the craft:

Soldering tin temperature: 350°C max

Soldering tin time: 3sec max

10. — Notice —

(1) Storage of resistors

Preferable storage conditions are follows: Temperature range is from 0°C to 30°C and the relative humidity (RH) is less than 65%. High temperature and humidity will change the resistance and cause poor solderability. Storage duration should be less than 2 year for the best performance.

(2) Loading conditions

Resistance change is highly dependent upon the loading conditions, such as temperature and load ratio. For long time stability, the derated conditions shall be applied. The resistor is flameproof, but care should be taken for safety. Safety resistors are available upon inquiry.

(3) Resistor insertion

Cares to be taken at the insertion time in order to prevent from the damages on coating and lead wires. Such a damages will cause the malfunctions. To bend the lead wires and keep an adequate radius is required to prevent the damages from welding points. Soldering heat applied should be minimize

(4) Moisture-proof, damp-proof, and sour-proof, to avoid the sun light directly in a long time.

(5) Open the resistor or box, the resistors cannot expose in the air for a long time. To avoid electrode and lead wire attached the substances or oxidize problem, cause the electrode and lead wire tin-plated NG.

(6) A pile of the resistors, the pressure cannot exceed 7 KG.

(7) When the goods used a adhesive tape or colors, it can use many colors excluding red and yellow color. (except color code).

(8) The components made by TAI have be widely applied in the filed of home appliance, automotive appliance, telecommunication, data...etc..

(9) Specification given herein may be changed at any time without prior notice please confirm TAI before you order or use.

11. —QC Diagram—

| Department | | Q.A. | Date | 1998/10/15 | | Dip Resistor | | Amendment | 2001/06/01 | NO. | WI-QC-01 | |
|------------|---------|------------------------|--|---|---|---|---|--|------------|--------------------|----------|--|
| Version | | 2nd | | | | | | | | Page | 1 OF 1 | |
| Flow | | Process | Equipment | Management Item | Related Document | Inspected Frequency | Control Method | Record | | Exceptional Method | | |
| Process | Process | | | | | | | Department | Dept. | Method | | |
| ◇ | ◇ | IQC | Measured Instrument | Dimension Appearance Character | IQC Standard Incoming Standard | 1 time/Lot | MSI/ASQC.Z1.4 I Level | Sampling Record Form Incoming Quality Exceptional Form | QC | Refuse Special | | |
| ○ | ○ | Cutting | Automatic Cutting Machine | Appearance Resistance | Cutting Standard Inspection Standard | 1 time/Lot | Microscope Check Machine | Subpoena | PL1 | Revise | | |
| ◇ | ◇ | Cutting Inspection | 10x Magnifier Check Machine | Appearance Resistance | Produce Control Standard Inspection Standard | 1 time/Lot | Appearance: MSI/ASQC.Z1.4 II Level Character: MSI/ASQC.Z1.4 S-2 Level | Subpoena Over % Resistance Form Quality Exceptional Form | QC | Revise Stop | | |
| ◇ | ◇ | QC: Cutting Inspection | 10x Magnifier Check Machine Electronic Scale | Appearance Resistance | Produce Control Standard Inspection Standard | 1 time/Lot | Appearance:MSI /ASQC.Z1.4 II Level Character: MSI/ASQC.Z1.4 S-2 Level | Subpoena Quality Examine in Cutting Section Form Over % Resistance Form Quality Exceptional Form | QC | Revise Stop | | |
| ○ | ○ | Soldering | Automatic Soldering Machine | Appearance Dimension Tension Diameter Copper Length | Soldering Standard Appearance Check Diagram | 1 time/Lot | Tension Instrument Caliber 10x Magnifier | Subpoena | PL1 | Revise | | |
| ◇ | ◇ | Soldering Inspection | Tension Instrument Caliber 10x Magnifier | Appearance Dimension Tension Diameter Copper Length | Produce Control Standard Inspection Standard | 1 time/Lot | Appearance:MSI /ASQC.Z1.4 II Level Character: MSI/ASQC.Z1.4 S-2 Level | Subpoena Quality Exceptional Form Test Summary | QC | Revise Stop | | |
| ○ | ○ | Coating | Coating Machine | Character Appearance Dimension Resistance | Coating Standard Coating % Standard | 1 time/Lot | Voltage Form Check Machine Model Board Visual Inspection | Subpoena | PL1 | Revise | | |
| ◇ | ◇ | Coating Inspection | Voltage Form Check Machine Thermometer Model Board | Appearance Dimension Resistance | Produce Control Standard Inspection Standard | 1 time/Lot | Appearance:MSI /ASQC.Z1.4 II Level Character: MSI/ASQC.Z1.4 S-2 Level | Subpoena Quality Exceptional Form Test Summary | QC | Revise Stop | | |
| ○ | ○ | Forming | Forming Machine | Appearance Dimension | Forming Standard | 1 time/Lot | Caliber Visual Inspection | Subpoena | PL1 | Revise | | |
| ◇ | ◇ | Forming Inspection | Caliber | Appearance Dimension | Inspection Standard Produce Control Standard | 1 time/Lot | Appearance: MSI/ASQC.Z1.4 II Level Character: MSI/ASQC.Z1.4 S-2 Level | Subpoena Quality Exceptional Form Test Summary | QC | Revise Stop | | |
| ○ | ○ | Packaging | Model Board | Appearance | Packaging Standard | 100% Check | Visual Inspection | Subpoena | PL1 | Revise | | |
| ◇ | ◇ | Packaging Inspection | Caliber | Appearance | Inspection Standard | 1 time/Lot | Appearance: MSI/ASQC.Z1.4 II Level | Subpoena Quality Exceptional Form Test Summary | QC | Revise | | |
| ◇ | ◇ | Final Quality Control | Tension Instrument Caliber Model Board Check Machine | Appearance Dimension Quantity Resistance Tension | Inspection Standard Final Inspection for Goods Standard | Sampling of Character 100% Appearance Check | Appearance 100% Visual Inspection Character: MSI/ASQC.Z1.4 S-3 Level | Subpoena Final Check Quality Exceptional Form | QC | Return Unusable | | |
| ◇ | ◇ | Outgoing Inspection | | Appearance Dimension Quantity | Inspection Standard | 100% Check | Visual Inspection | Test Report Quality Exceptional Form Test Summary | QC | Return | | |

12. —Part Number Table —

| NO. | Customer P/N | TAI P/N | Remark |
|-----|--------------|---------|--------|
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