



# 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

### Table of Contents

1. Specifications	-----	3
2. Performance	-----	5
3. Construction & Dimension	-----	6
4. Color Coding Drawing	-----	7
5. Axial Taping Specification	-----	8
6. Dimension of Axial Operation	-----	9
7. Axial Taping Box	-----	10
8. Marking of Packing Box	-----	10
9. Recommend having the tin condition	-----	11
10. Notice	-----	11
11. QC Diagram	-----	12
12. Part Number Table	-----	13

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

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.

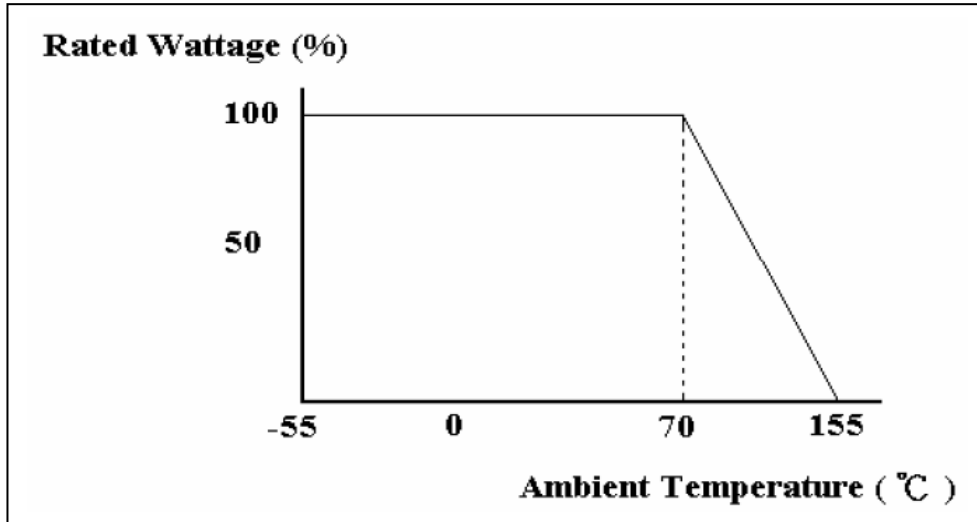
-Table.1 Rating Table-

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						

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

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

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

2 — Performance —

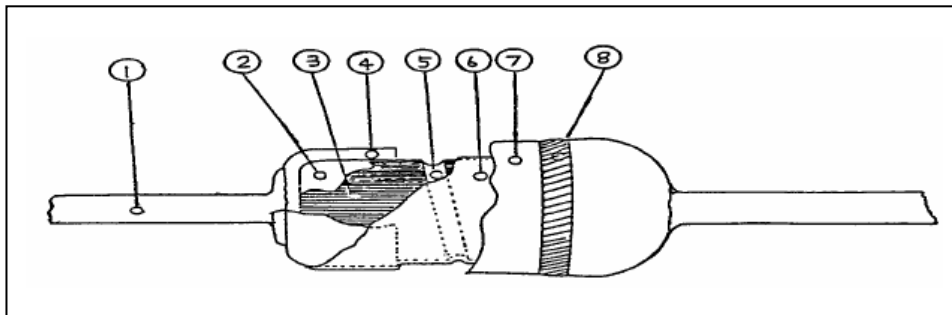
No	Item		Spec. Level	Test method (JIS-C-5724)
1	Resistance value		Within the tolerance	Within the tolerance
2	Temperature characteristics of resistance		See rating table	Method 304 (JIS-C-5720)
3	Short time over load		Tolerable change within $\pm(0.5\%+0.05\Omega)$ No visual damage Marking be legible	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) $3.5\pm 0.5$ sec
7	Solderability		95% min. coverage	$245\pm 5^{\circ}\text{C}$ , $3\pm 0.5$ SEC. (JIS-C-5202)
8	Insulation resistance		Over 1,000 M $\Omega$	V – block (JIS-C-5202)
9	Load life		Tolerable change within $\pm(2\%+0.05\Omega)$	(JIS-C-5202) 1,000 hours at $70^{\circ}\text{C}$
10	Humidity Load life.		Tolerable change within $\pm(1.5\%+0.05\Omega)$	(JIS-C-5202) 1,000 hours at $40^{\circ}\text{C}$ , 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)

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

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—

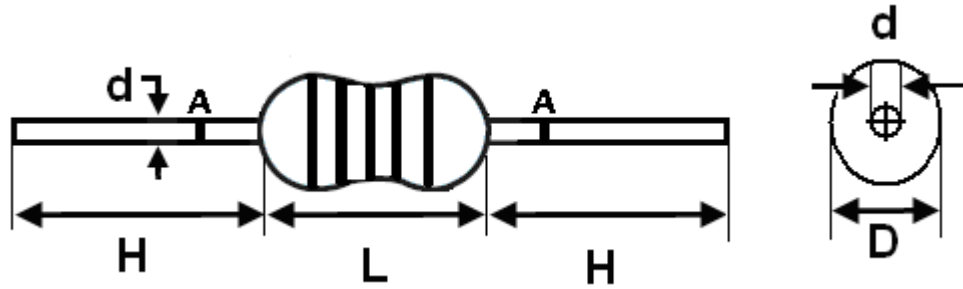
#### 3.1 —Construction—



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	

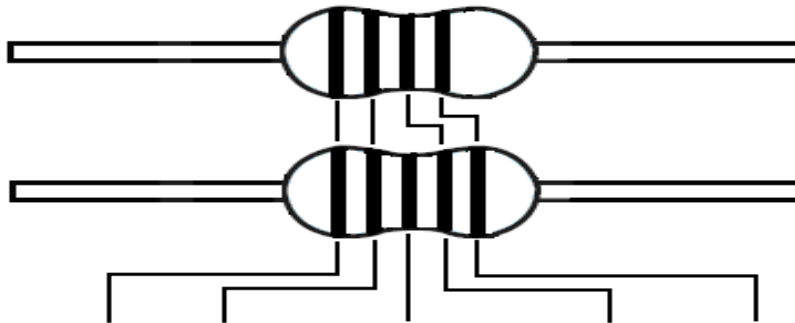
Document No.	Document Name		Edition
TAI-RN-5006-A	RN series	Metal Film Fixed Resistors	2018-1

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



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

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.

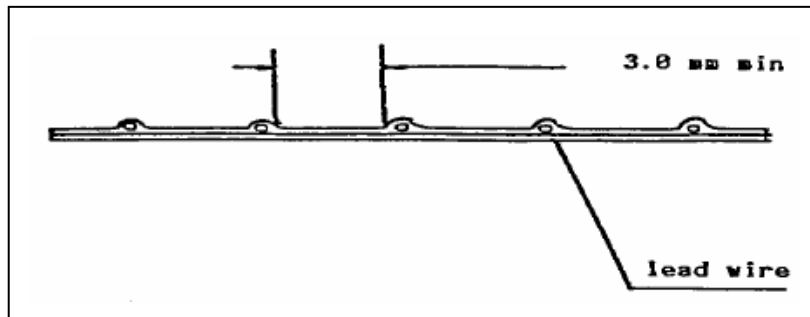
Width	Thickness	Adhesive Power	Pull Strength	Elongation
6.0 ± 0.5 mm	0.15 ± 0.05mm	1700g /25mm wide Min.	20.4g / 25mm wide Min.	5% Max.

5.2.3 Taping Operation

5.2.3.1 Color code orientation is not specified.

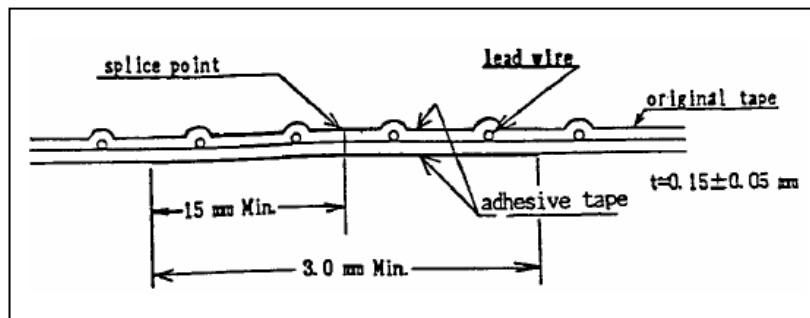
5.2.3.2 No drop out is permissible.

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 -

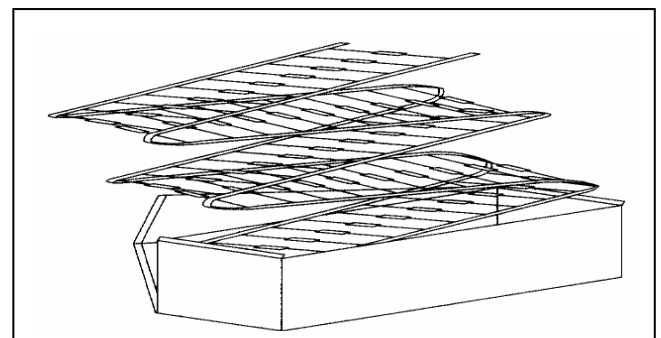
5.2.3.5 Taping end shall have min. 50mm of leading tape.

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.

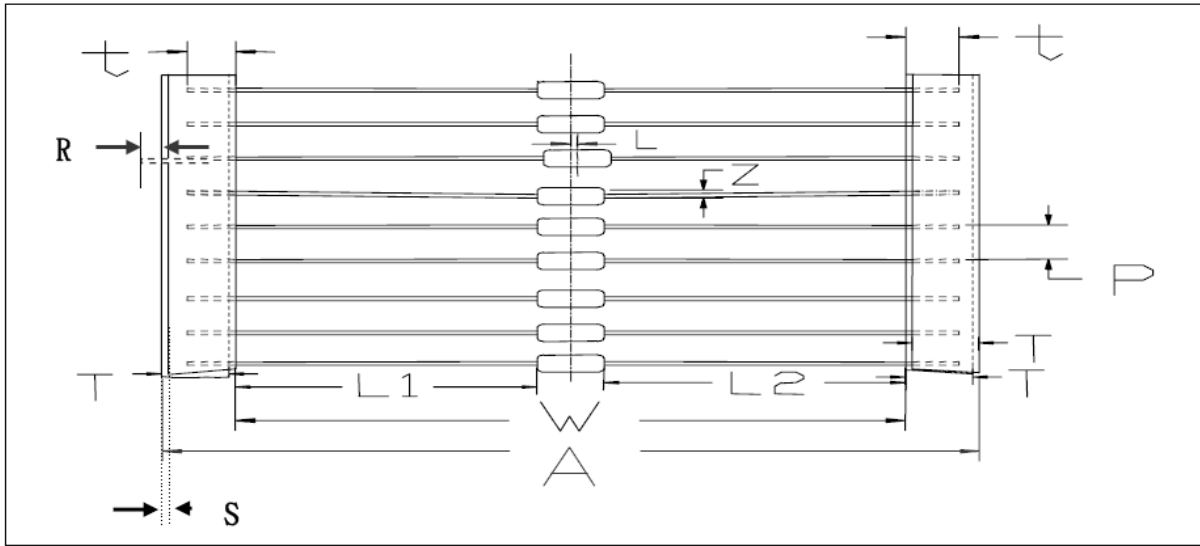
5.3.3 Flap of the box is taped to fix.



-FIG.4 -

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

6 –Dimension of Axial Operation–



-FIG.5 Taping specifications-

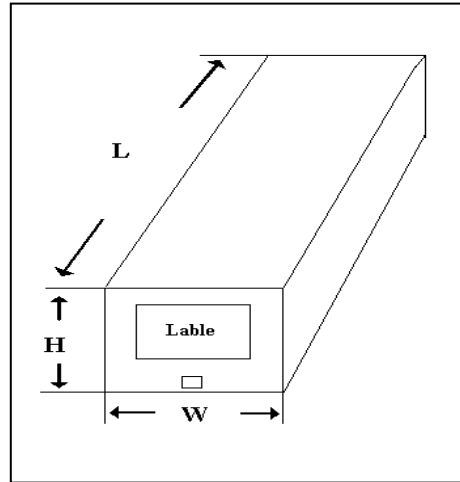
-Table.3 Taping dimensions (Axial taping)-

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.

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

7—Axial Taping Box—

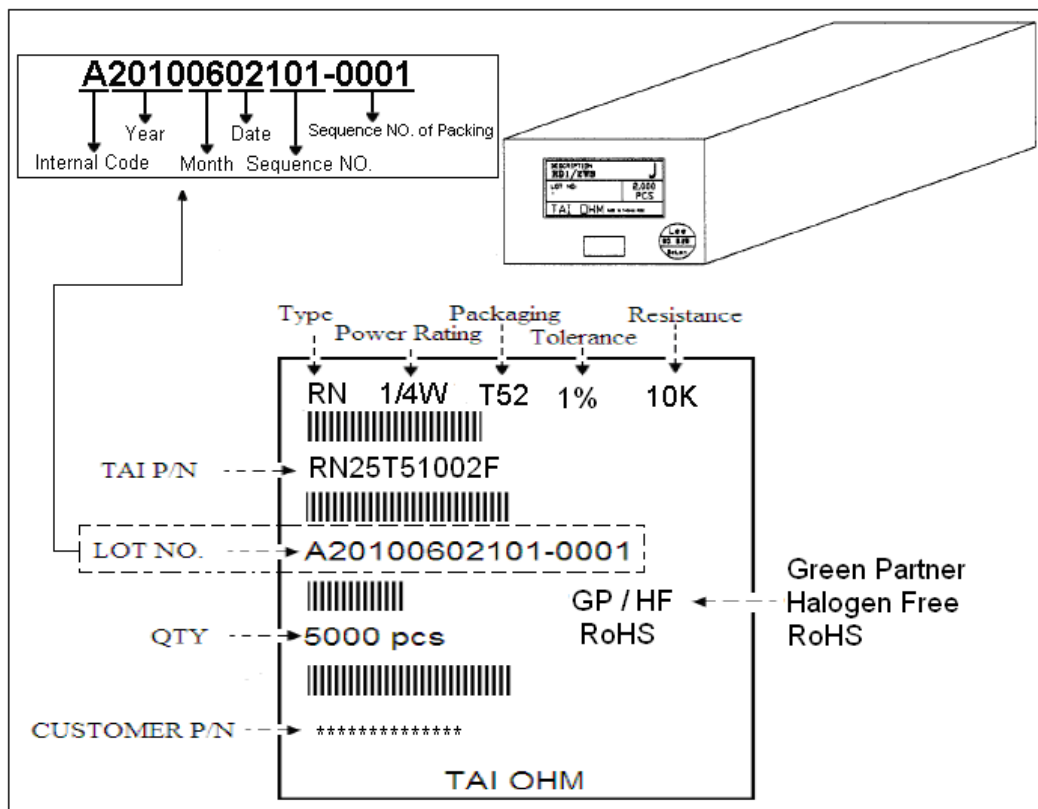


-FIG.6 Packing Box -

-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-

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

9 Recommend having the tin condition:

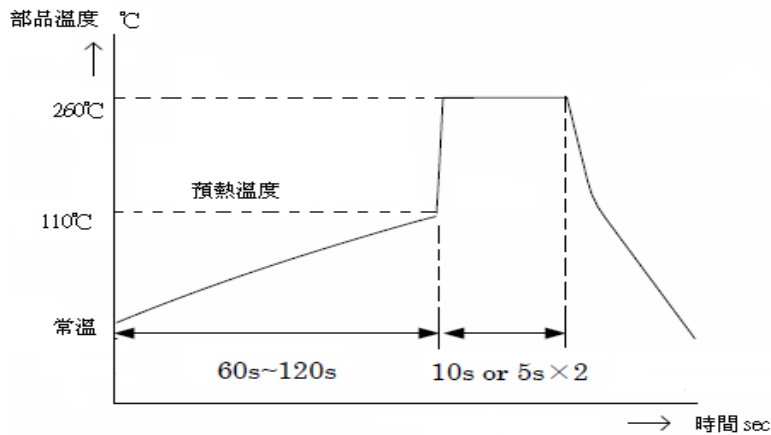
9.1. Weld the homework in crest

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 —

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