

# ROYALOHM

**C O N F I D E N T I A L   D O C U M E N T**

SPECIFICATION FOR APPROVAL

**TRELIK**

Description: Resistor Network-SIP RNL Series (Lead Free)

**Royalohm Part no.:**

RNLA04GxxxxB0E (RNL (A-Type) 1/8W +/-2% (4Pins))

Approved by

**Parts corresponding to RoHS Compliant: 2005-Apr.-1**

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| Approved     | Checked            | Prepared       |
|--------------|--------------------|----------------|
| Mr. Jack Lin | Mr. S. Polthanasan | Ms. P. Supatta |

Issue Date: 2015/01/12

| <b>CHANGE NOTIFICATION HISTORY</b> |                        |                              |               |
|------------------------------------|------------------------|------------------------------|---------------|
| <b>Version</b>                     | <b>Date of Version</b> | <b>History</b>               | <b>Remark</b> |
| 1                                  | 2015/01/12             | Resistance Range : 10Ω ~ 1MΩ |               |
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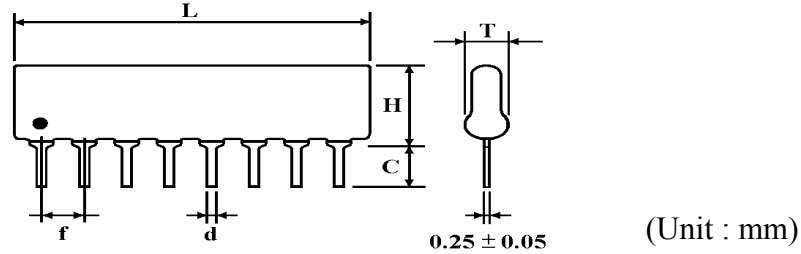
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|-------------------------|---------------------------------|
| <b>Customer: TRELIK</b> | <b>Part No.: RNLA04GxxxxB0E</b> |
|-------------------------|---------------------------------|

1. Scope:

This specification for approval relates to Resistor Network-SIP RNL Series (Lead Free) manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form:



| Type   | L (Max.) | H (Max.) | T (Max.) | $C + 0.5$<br>$- 0.3$ | $d \pm 0.1$ | $f \pm 0.2$ |
|--------|----------|----------|----------|----------------------|-------------|-------------|
| 4 pins | 10.2     | 5.08     | 2.5      | 3.3                  | 0.5         | 2.54        |

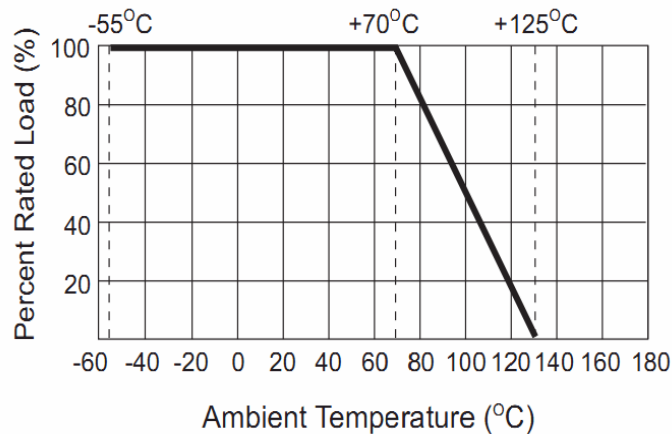
3. Rating

| Power Rating at 70°C | Max. Working Voltage | Max. Overload Voltage | Dielectric With Standing Voltage | Resistance Range | Resistance Tolerance | Operating Temp. Range |
|----------------------|----------------------|-----------------------|----------------------------------|------------------|----------------------|-----------------------|
| A Type :<br>0.125 W  | 100 V                | 150 V                 | 200 V                            | 10Ω ~ 1MΩ        | 2%                   | -55°C --- +125°C      |

3.1 Power rating

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C. For temperature in excess of 70°C, The load shall be derate as shown in figure 1.

Figure 1.



**Resistor Network-SIP RNL Series (Lead Free)**

3.2 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating , as determined from the following formula :

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

Where : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

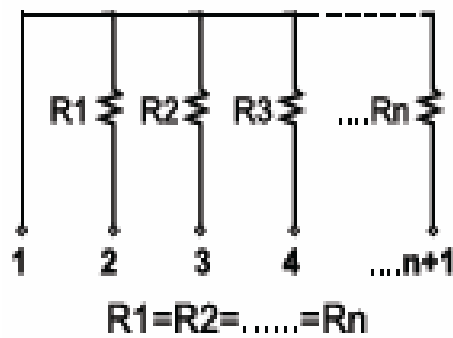
P = Power Rating (watt)

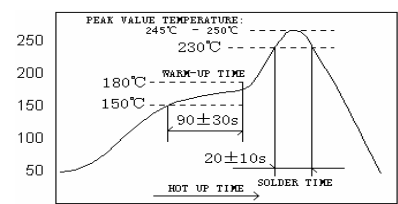
R = Nominal Resistance (ohm)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value

4. Circuits construction :

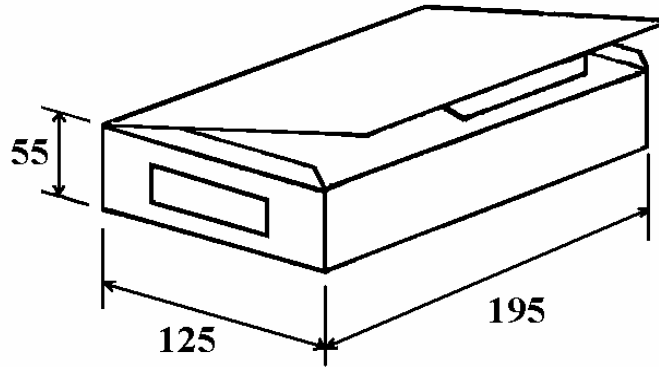
**Type A**



| Resistor Network-SIP RNL Series (Lead Free) |  |  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
|---|--|--|-------------|-------------|------|---|-------------|---------|---|------------|------------|---|--------------|---------|---|------------|------------|
| 5. Characteristics                          |  |  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Characteristics                             | Limits   | Test Methods<br>( JIS C 5201-1 )   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Insulation resistance                       | 10,000MΩ Min   | Apply 100V DC between protective coating and termination for 1 min, then measure (Sub-clause 4.6)  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Dielectric Withstanding Voltage             | No evidence of flashover mechanical damage, arcing or insulation break down.           | Resistors shall be clamped in the trough of a 90° metallic V -block and shall be tested at AC potential respectively specified in the above list for 60 +10/-0 seconds (Sub-clause 4.7)  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Temperature coefficient                     | 50Ω ~ 1MΩ : ± 200 PPM/°C<br><50Ω & >1MΩ : ± 250 PPM/°C                                 | Natural resistance change per temp. degree centigrade.<br>$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R1: Resistance value at room temperature (t1)<br>R2: Resistance value at room temp. plus 100 °C (t2)<br>(Sub-clause 4.8)   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Short time overload                         | Resistance change rate is ± ( 0.5% + 0.1Ω )  | Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Terminal Strength                           | Resistance change rate is ± ( 0.5% + 0.1Ω )  | <b>Direct load :</b><br>Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads (Sub-clause 4.16)   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Solderability                               | 95 % coverage Min.   | Wave Solder:<br>Test temperature of solder:<br>245°C ±3°C dipping time in solder : 2-3 seconds.  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
|   | Go up tin rate bigger than half of end pole.   | Reflow:<br>  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Soldering Heat                              | Resistance change rate is ± ( 0.5% + 0.1Ω )  | Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds. (Sub-clause 4.18)  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Temperature cycling                         | Resistance change rate is ± ( 0.5% + 0.1Ω ) Max. with no evidence of mechanical damage | Resistance change after continuous 5 cycles for duty cycle specified below :   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
|   |  | <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ± 3°C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10~15 mins</td> </tr> <tr> <td>3</td> <td>+155°C ± 2°C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10~15 mins</td> </tr> </tbody> </table> | Step        | Temperature | Time | 1 | -55°C ± 3°C | 30 mins | 2 | Room temp. | 10~15 mins | 3 | +155°C ± 2°C | 30 mins | 4 | Room temp. | 10~15 mins |
|   |  | Step   | Temperature | Time        |      |   |             |         |   |            |            |   |              |         |   |            |            |
|   |  | 1  | -55°C ± 3°C | 30 mins     |      |   |             |         |   |            |            |   |              |         |   |            |            |
|   |  | 2  | Room temp.  | 10~15 mins  |      |   |             |         |   |            |            |   |              |         |   |            |            |
| 3   | +155°C ± 2°C   | 30 mins  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| 4   | Room temp.   | 10~15 mins   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| (Sub-clause 4.19)                           |  |  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
|   |  |  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
|   |  |  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Thermal Shock                               | Resistance change rate is ± ( 0.5% + 0.1Ω )  | Load V, Room Temp , 30 minutes<br>Unload, -55°C, 15 minutes<br>Over 2 hrs. in room temp. before measuring. (Sub-clause 4.21)   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Load life in humidity                       | Resistance change rate is ± ( 3.0% + 0.1Ω )  | Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off" ) at RCWV in a humidity chamber controlled at 40°C ± 2°C and 90 to 95 % relative humidity (Sub-clause 4.24.2.1)  |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |
| Load Life                                   | Resistance change rate is ± ( 3.0% + 0.1Ω )  | Permanent resistance change after 1,000 hours operating at RCWV, with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70°C ± 2°C ambient (Sub-clause 4.25.1)   |             |             |      |   |             |         |   |            |            |   |              |         |   |            |            |

**Resistor Network-SIP RNL Series (Lead Free)**

6. Packing Specification :



| Bag in box packing (B/B) |                        |                        |                           |
|--------------------------|------------------------|------------------------|---------------------------|
| Pins                     | Quantity Per Bag (Pcs) | Quantity Per Box (Pcs) | Quantity Per Carton (Pcs) |
| 4                        | 500                    | 5,000                  | 75,000                    |

7. Label :

Label shall be marked with following items:

- (1) Part Number
- (2) Circuit
- (3) Power Rating
- (4) Quantity
- (5) Lot number
- (6) Pin
- (7) Nominal resistance
- (8) Resistance tolerance
- (9) Purchase order

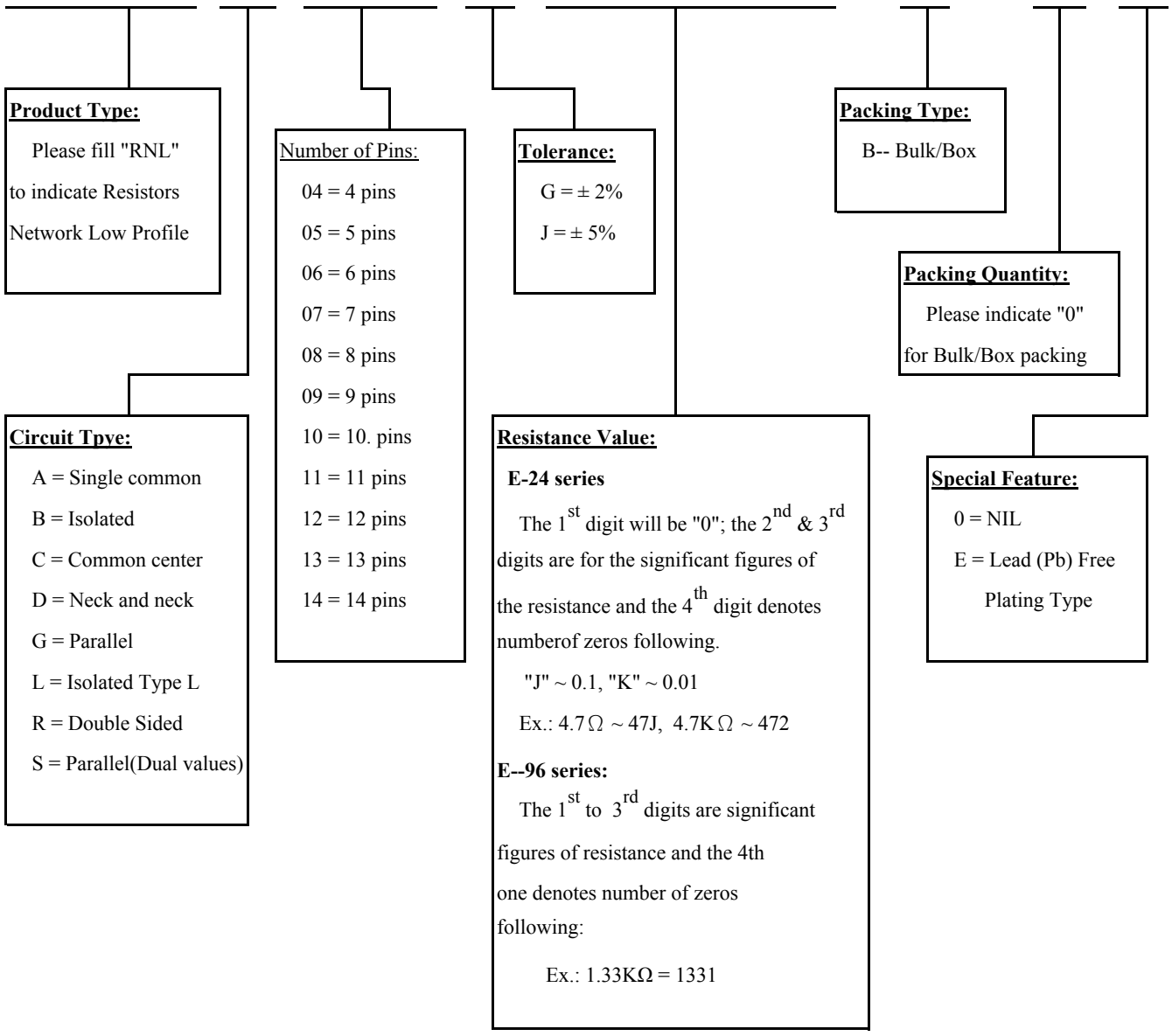
Ex.

|                             |               |      |              |
|-----------------------------|---------------|------|--------------|
| <b>ROYALOHM</b>             |               |      |              |
| <b>RESISTOR NETWORK-SIP</b> |               |      |              |
| P/NO:                       |               |      |              |
| CIRCUIT:                    | <b>A-TYPE</b> | PIN: |              |
| WATT:                       | <b>1/8W</b>   | VAL: | <b>3K3</b>   |
| Q'TY:                       | <b>5,000</b>  | TOL: | <b>± 2 %</b> |
| LOT NO:                     |               | P/O: |              |

## Part Number System

### Explanation of Part Number System ( Resistor Network-SIP RNL Series (Lead Free) ( Dual values))

|          |          |          |          |          |          |          |          |          |           |           |           |           |           |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>13</b> | <b>14</b> |
| R        | N        | L        | A        | 0        | 4        | G        | 0        | 3        | 3         | 2         | B         | 0         | E         |



Sample : RNL 1/8W (A-TYPE) 4pins 2% 3.3KΩ B/B → RNLA04G0332B0E

## **Resistor Network-SIP RNL Series (Lead Free)**

### **Environment Related Substance**

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

### **Storage Condition**

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  and a relative humidity of  $60\%\text{RH} \pm 10\%\text{RH}$

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$ , or  $\text{NO}_2$
2. In direct sunlight