

APPROVAL SHEET

Customer Name 深圳市陽和通電子有限公司

Product Name High Quality Anti-Sulfurized Thick Film Chip Resistors

Part Name NQ01~NQ12 Series

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File NO. YHT-01-039
Edition 1

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Ticrom Technology (ShenZhen) Co., Ltd.
Aeon Technology Corporation

Brands *RoyalOhm* *UniOhm*



1. Scope

- 1.1 This specification for approve relates to the High Quality Anti-Sulfurized Thick Film Chip Resistor manufactured by UNI-ROYAL.
- 1.2 AEC-Q200 qualified
- 1.3 Suitable for reflow & wave soldering
- 1.4 Application IPAD,LED lamps, Intelligent home appliances, Medical equipment, kinds of industrial control devices & industrial supplies

2. Part No. System

Part No. includes 14 codes shown as below:

2.1 1st~4th codes: Part name. E.g.: NQ02,NQ03,NQ05,NQ06,NQ07,NQ10,NQ12

2.2 5th~6th codes: Power rating.

| | | | | | | | | | | |
|---------------------|----------------|-----|-----|-----|-----|-----|------|------|------|----|
| E.g.: W=Normal Size | "1~G" = "1~16" | | | | | | | | | |
| Wattage | 1/32 | 3/4 | 1/2 | 1/3 | 1/4 | 1/8 | 1/10 | 1/16 | 1/20 | 1 |
| Normal Size | WH | 07 | W2 | W3 | W4 | W8 | WA | WG | WM | 1W |

If power rating is lower or equal than 1 watt, 5th code would be "W" and 6th code would be a number or letter.

E.g.: WA=1/10W W4=1/4W

2.3 7th code: Tolerance. E.g.: D=±0.5% F=±1% G=±2% J=±5% K= ±10%

2.4 8th~11th codes: Resistance Value.

2.4.1 If value belongs to standard value of ≥5% series, 8th code would be zero, 9th~10th codes are significant figures of the resistance and 11th code is the power of ten.

2.4.2 If value belongs to standard value of ≤2% series, 8th~10th codes are significant figures of the resistance, and 11th code is the power of ten.

2.4.3 11th codes listed as following:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

2.5 12th~14th codes.

2.5.1 12th code: Packaging Type. E.g.: C=Bulk T=Tape/Reel

2.5.2 13th code: Standard Packing Quantity.

4=4000pcs 5=5000pcs C=10000pcs D=20000pcs E=15000pcs

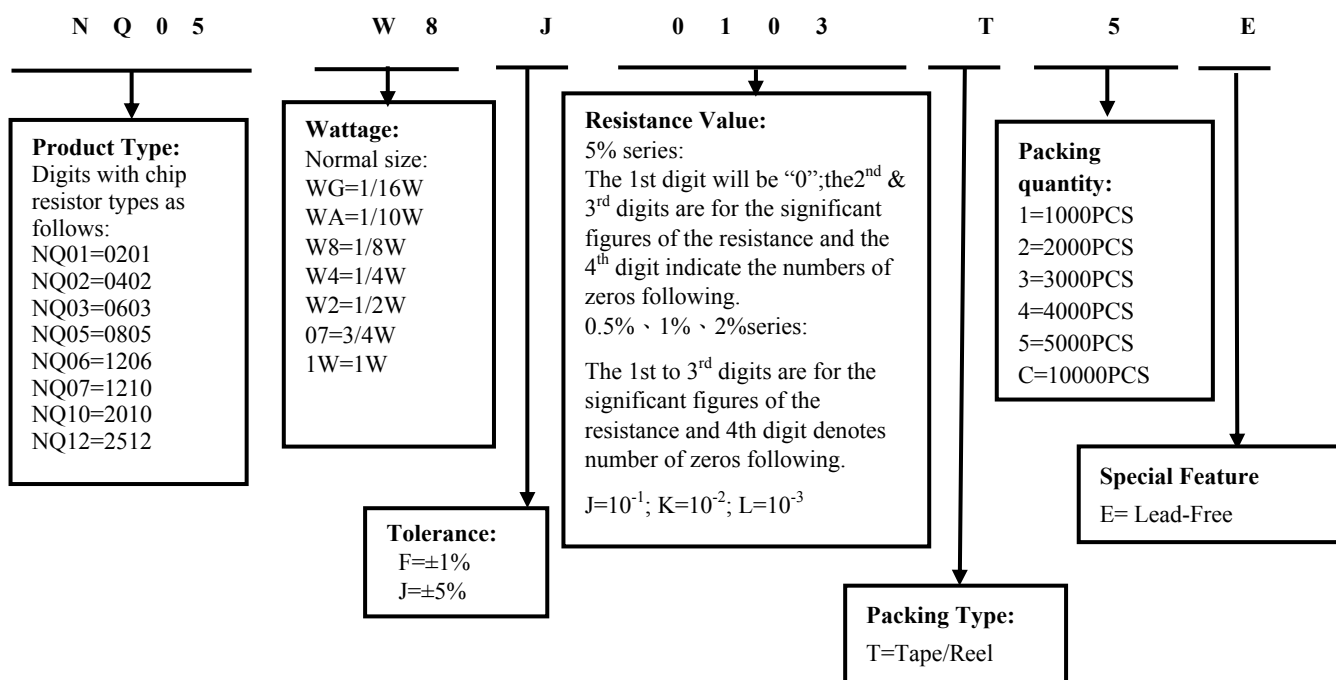
Chip Product: BD=B/B-20000pcs TC=T/R-10000pcs

2.5.3 14th code: Special features.

E = Environmental Protection, Lead Free, or Standard type.

3. Ordering Procedure

(Example: NS05 1/8W ±5% 10KΩ T/R-5000)



4. Marking

(1) Normally, the making of NQ01,NQ02 resistors as following



(2) Normally, the making of 0Ω NQ03, 0Ω NQ05, 0Ω NQ06, 0Ω NQ07, 0Ω NQ10, 0Ω NQ12, resistors as following



0 → 0Ω

(3) ±2%,±5%Tolerance:The first two digits are significant figures of resistance and the third denotes number of zeros following



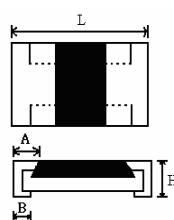
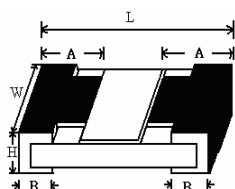
333 → 33KΩ

(4) ±0.5% · ±1% Tolerance: 4 digits, first three digits are significant; fourth digit is number of zeros. Letter r is decimal point.



2701 → 2.7KΩ

5. Dimension



| Type | Dimension(mm) | | | | |
|------|---------------|-----------------|-----------|-----------|-----------|
| | L | W | H | A | B |
| NQ01 | 0.60±0.03 | 0.30±0.03 | 0.23±0.03 | 0.12±0.05 | 0.15±0.05 |
| NQ02 | 1.00±0.10 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 |
| NQ03 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 |
| NQ05 | 2.00±0.15 | 1.25+0.15/-0.10 | 0.55±0.10 | 0.40±0.20 | 0.40±0.20 |
| NQ06 | 3.10±0.15 | 1.55+0.15/-0.10 | 0.55±0.10 | 0.45±0.20 | 0.45±0.20 |
| NQ07 | 3.10±0.10 | 2.60±0.20 | 0.55±0.10 | 0.50±0.25 | 0.50±0.20 |
| NQ10 | 5.00±0.10 | 2.50±0.20 | 0.55±0.10 | 0.60±0.25 | 0.50±0.20 |
| NQ12 | 6.35±0.10 | 3.20±0.20 | 0.55±0.10 | 0.60±0.25 | 0.50±0.20 |

6. Resistance Range

| Type | Power Rating at 70°C | Resistance Range | |
|------|----------------------|------------------|---------|
| | | 1% | 5% |
| NQ01 | 1/20W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ02 | 1/16W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ03 | 1/10W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ05 | 1/8W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ06 | 1/4W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ07 | 1/2W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ10 | 3/4W | 1Ω-10MΩ | 1Ω-10MΩ |
| NQ12 | 1W | 1Ω-10MΩ | 1Ω-10MΩ |

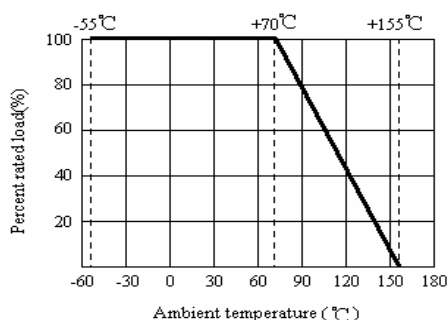
7. Ratings

| Type | Max. Working Voltage | Max. Overload Voltage | Dielectric withstanding Voltage | Resistance Value of Jumper | Rated Current of Jumper | Max. Overload Current of Jumper | Operating Temperature |
|------|----------------------|-----------------------|---------------------------------|----------------------------|-------------------------|---------------------------------|-----------------------|
| NQ01 | 25V | 50V | / | <50mΩ | 0.5A | 1A | -55°C~155°C |
| NQ02 | 50V | 100V | 100V | <50mΩ | 1A | 2A | -55°C~155°C |
| NQ03 | 75V | 150V | 300V | <50mΩ | 1A | 2A | -55°C~155°C |
| NQ05 | 150V | 300V | 500V | <50mΩ | 2A | 5A | -55°C~155°C |
| NQ06 | 200V | 400V | 500V | <50mΩ | 2A | 10A | -55°C~155°C |
| NQ07 | 200V | 500V | 500V | <50mΩ | 2A | 10A | -55°C~155°C |
| NQ10 | 200V | 500V | 500V | <50mΩ | 2A | 10A | -55°C~155°C |
| NQ12 | 200V | 500V | 500V | <50mΩ | 2A | 10A | -55°C~155°C |

8. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derated as shown in figure 1

Figure 1



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:

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

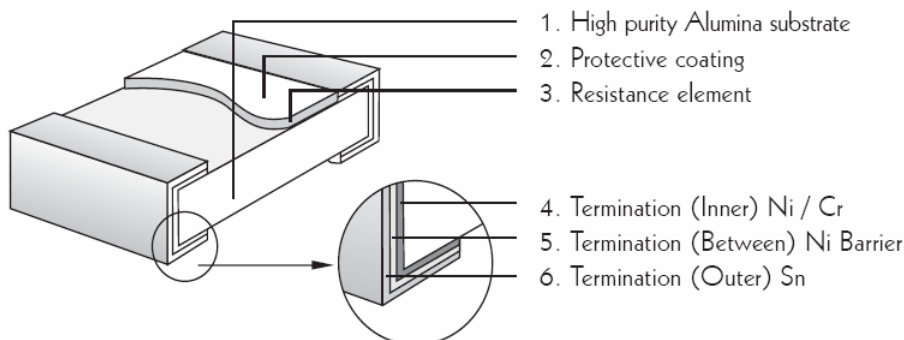
Where: RCWV commercial-line frequency and waveform (Volt.)

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.

The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less

9. Structure



10. Performance Specification

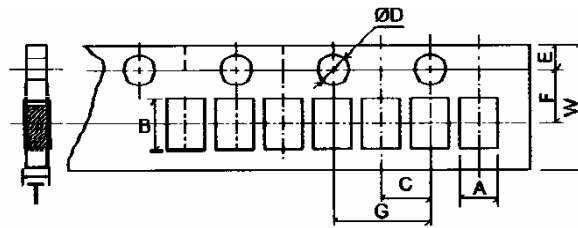
| Characteristic | Limits | Ref. Standards | Test Method |
|-------------------------------------|---|-------------------------|--|
| Operational life | ±5%: ±(3%+0.1Ω)Max. ±1%: ±(1%+0.1Ω)Max. | MIL-STD-202 | 1,000 hours at 125°C, 36% power, derated voltage applied for 1.5 hours on, 0.5 hour off, Measurement at 24±4 hours after test conclusion. |
| | <100mΩ | | Apply to rate current for 0 Ω |
| Electrical Characterization | 1Ω ≦ R ≦ 10Ω: ±400PPM/°C 10Ω < R ≦ 100Ω: ±200PPM/°C 100Ω < R ≦ 10MΩ: ±100PPM/°C NS01: 10Ω < R ≦ 10MΩ: ±200PPM/°C | User Spec | Parametrically test per lot and sample size requirements, summary to show Min, Max, Mean and Standard deviation at room as well as Min and Max operating temperatures. |
| Short-time overload | ±1%: ±(1%+0.1Ω)Max. ±5%: ±(2%+0.1Ω) Max. | JIS-C-5201 & JIS-C-5202 | 4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max. Overload Voltage whichever less for 5 seconds.. |
| | <50mΩ | | Apply max Overload current for 0Ω |
| External Visual | No Mechanical Pamage | MIL-STD-883 Method 2009 | Electrical test not required. Inspect device construction, marking and workmanship |
| Physical Dimension | Reference 2.0 Dimension Standards | JESD22 MH Method JB-100 | Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical test not required. |
| Resistance to Solvent | Marking Unsmearred | MIL-STD-202 Method 215 | Note: Add Aqueous wash chemical – OKEM Clean or equivalent. Do not use banned solvents. |
| Terminal Strength | Not broken | JIS-C-6429 | Force of 1.8kg for 60 seconds. |
| High Temperature Exposure (Storage) | ±(1%+0.1Ω)Max. | MIL-STD-202 Method 108 | 1000hrs. @T=155°C. Unpowered. Measurement at 24±2 hours after test conclusion. |
| | <50mΩ | | Apply to rate current for 0 Ω |
| Temperature Cycling | ±(1%+0.1Ω)Max. | JESD22 Method JA-104 | 1000 Cycles (-55°C to +155°C). Measurement at 24±2 hours after test conclusion. |
| | <50mΩ | | Apply to rate current for 0 Ω |
| Mechanical Shock | ±(1%+0.1Ω)Max. | MIL-STD-202 Method 213 | Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6ms, velocity 12.3ft/s 100Hz. |
| Vibration | ±(1%+0.1Ω)Max. | MIL-STD-202 Method 204 | 5g's for 20 min., 12cycle each of 3 orientations. Note: Use 8''*5''PCB. 031'' thick 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2' from any secure point. Test from 10-2000Hz. |
| Solderability | 95% coverage Min. | J-STD-002 | For both leaded & SMD. Electrical test not required. Magnification 50X. Conditions: a) Method B 4hrs at 155°C dry heat, the dip in bath with 245°C, 5s. b) Method D: at 260°C, 60s. |
| Flammability | No ignition of the tissue paper or scorching or the pinewood board | UL-94 | V-0 or V-1 are acceptable. Electrical test not required. |
| Board Flex | ±(1%+0.05Ω)Max. | JIS-C-6429 | 3mm (Min.), 60s |
| | <50mΩ | | Apply to rate current for 0 Ω |
| Flame Retardance | No flame | AEC-Q200-001 | Temperature sensing at 500°C, Voltage power subjected to 32VDC current clamped up to 500VDC and decreased in 1.0VDC/hour. |
| Resistance to Soldering Heat | ±(1%+0.05Ω)Max. | MIL-STD-202 Method 210 | Condition B No per-heat of samples. Note: Single Wave Solder-Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. |
| | <50mΩ | | Apply to rate current for 0 Ω |

* Sulfuration test: Soaked in industrial oil with sulfur substance 3.5% contained 105°C ±3°C 500h

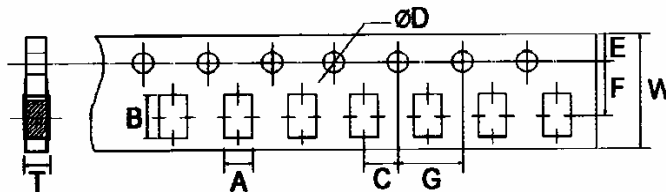
$\Delta R \leq \pm(5\%+0.1\Omega)$

11. Packing of Surface Mount Resistors

11.1 Dimension of Paper Taping :(Unit: mm)

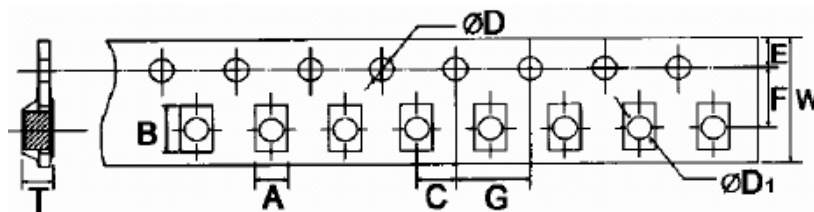


| Type | A | B | C ±0.05 | +0.1 ΦD -0 | E ±0.1 | F ±0.05 | G ±0.1 | W ±0.2 | T |
|------|-----------|-----------|------------|------------------|-----------|------------|-----------|-----------|-----------|
| NQ01 | 0.40±0.05 | 0.70±0.05 | 2.0 | 1.5 | 1.75 | 3.50 | 4.0 | 8.0 | 0.42±0.1 |
| NQ02 | 0.65 ±0.1 | 1.2±0.1 | 2.0 | 1.5 | 1.75 | 3.5 | 4.0 | 8.0 | 0.42±0.05 |



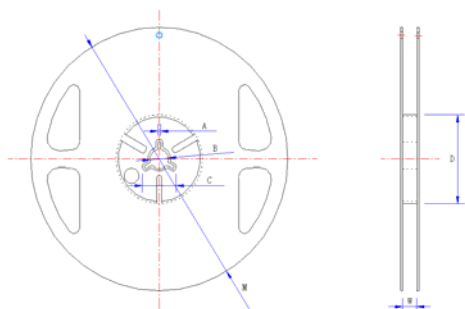
| Type | A ±0.2 | B ±0.2 | C ±0.05 | +0.1 ΦD -0 | E ±0.1 | F ±0.05 | G ±0.1 | W ±0.2 | T ±0.1 |
|------|-----------|-----------|------------|------------------|-----------|------------|-----------|-----------|-----------|
| NQ03 | 1.10 | 1.90 | 2.0 | 1.5 | 1.75 | 3.5 | 4.0 | 8.0 | 0.67 |
| NQ05 | 1.65 | 2.40 | 2.0 | 1.5 | 1.75 | 3.5 | 4.0 | 8.0 | 0.81 |
| NQ06 | 2.00 | 3.60 | 2.0 | 1.5 | 1.75 | 3.5 | 4.0 | 8.0 | 0.81 |
| NQ07 | 2.80 | 3.50 | 2.0 | 1.5 | 1.75 | 3.5 | 4.0 | 8.0 | 0.75 |

11.2 Dimension of Embossed Taping:



| Type | A ±0.2 | B ±0.2 | C ±0.05 | + 0.1 ΦD - 0 | +0.25 ΦD1 -0 | E ±0.1 | F ±0.05 | G ±0.1 | W ±0.2 | T ±0.1 |
|------|-----------|-----------|------------|--------------------|--------------------|-----------|------------|-----------|-----------|-----------|
| NQ10 | 2.90 | 5.60 | 2.00 | 1.50 | 1.50 | 1.75 | 5.50 | 4.00 | 12.00 | 1.00 |
| NQ12 | 3.50 | 6.70 | 2.00 | 1.50 | 1.50 | 1.75 | 5.50 | 4.00 | 12.00 | 1.00 |

11.3 Dimension of Reel : Unit: mm



| Type | Taping | Qty/Reel | A ±0.5 | B ±0.5 | C ±0.5 | D ±1 | M ±2 | W ±1 |
|------|----------|-----------|-----------|-----------|-----------|---------|---------|---------|
| NQ01 | Paper | 10,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 10 |
| NQ02 | Paper | 10,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 10 |
| NQ03 | Paper | 5,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 10 |
| NQ05 | Paper | 5,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 10 |
| NQ06 | Paper | 5,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 10 |
| NQ07 | Paper | 5,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 10 |
| NQ10 | Embossed | 4,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 13.8 |
| NQ12 | Embossed | 4,000pcs | 2.0 | 13.0 | 21.0 | 60.0 | 178 | 13.8 |

12. Note

- 12.1. UNI-ROYAL recommend the storage condition temperature: 15°C~35°C, humidity :25%~75%.
 (Put condition for individual product).Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old.
 (Put condition for each product) may be degraded.
- 12.2. Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.
 Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
- 12.3. Product performance and soldered connections may deteriorate if the products are stored in the following places:
 - a. Storage in high Electrostatic.
 - b. Storage in direct sunshine 、rain and snow or condensation.

13. Record

| Version | Description of amendment | Page | Date | Amended by | Checked by |
|---------|--------------------------|------|------|------------|------------|
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