

# DATA SHEET

**Product Name** Anti-Sulfurized Thick Film Chip Resistors (Automotive Grade)

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**Part Name** NS01~NS12 Series

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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 Anti-Sulfurized Thick Film Chip Resistors manufactured by UNI-ROYAL.
- 1.2 Superior Anti-Sulfurized
- 1.3 Superior Anti-Surge Voltage performance
- 1.4 Suitable for reflow & wave soldering
- 1.5 Application automobile industry, comply with the relevant provisions of AEC-Q200,NS01:36% power rating under +125°C ; NS02~NS12100% power rating under +125°C

2. Part No. System

Part No. includes 14 codes shown as below:

- 2.1 1st~4th codes: Part name. E.g.: NS01,NS02,NS03,NS05,NS06,NS07,NS10,NS12
- 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, 5<sup>th</sup> code would be "W" and 6<sup>th</sup> code would be a number or letter.

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

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

- 2.4 8<sup>th</sup>~11<sup>th</sup> codes: Resistance Value.

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

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

- 2.4.3 11<sup>th</sup> codes listed as following:

0=10<sup>0</sup>    1=10<sup>1</sup>    2=10<sup>2</sup>    3=10<sup>3</sup>    4=10<sup>4</sup>    5=10<sup>5</sup>    6=10<sup>6</sup>    J=10<sup>-1</sup>    K=10<sup>-2</sup>    L=10<sup>-3</sup>    M=10<sup>-4</sup>

- 2.5 12<sup>th</sup>~14<sup>th</sup> codes.

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

- 2.5.2 13<sup>th</sup> code: Standard Packing Quantity.

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

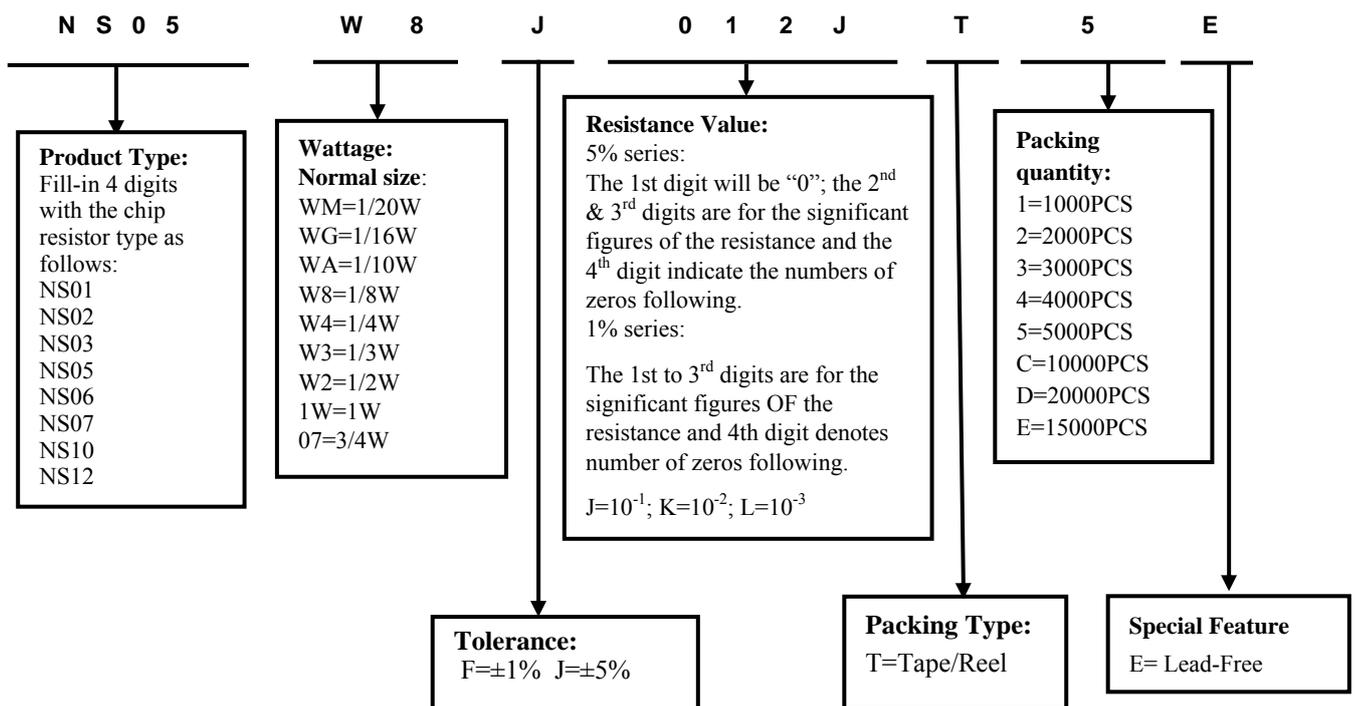
Chip Product: BD=B/B-20000pcs    TC=T/R-10000pcs

- 2.5.3 14<sup>th</sup> code: Special features.

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

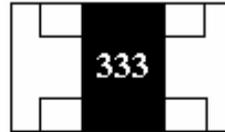
3. Ordering Procedure

(Example: NS05 1/8W ±5% 1.2Ω T/R-5000 )



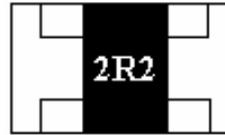
**4. Marking:**

(1) ±5%Tolerance: The first two digits are significant figures of resistance and the third denotes number of zeros following



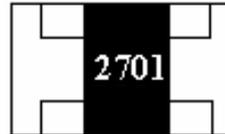
333 → 33KΩ

(2) ±5%Tolerance: Below 10Ω show as following, read alphabet "R" as decimal point.



2R2 → 2.2Ω

(3) ±1% Tolerance: 4 digits, first three digits are significant; forth digit is number of zeros. Letter "R" is decimal point.



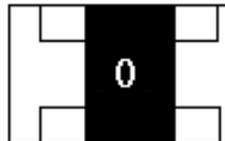
2701 → 2.7KΩ

(4) Normally, the making of NS01, NS02 resistors as following



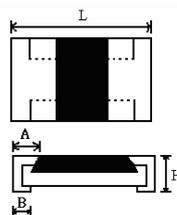
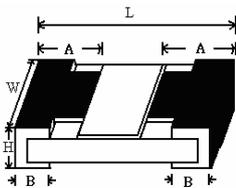
(5) 0Ω Marking:

Normally, the making of 0Ω NS03, 0Ω NS05, 0Ω NS06, 0Ω NS07, 0Ω NS10, 0Ω NS12 resistors as following



0 → 0Ω

**5. Dimension**



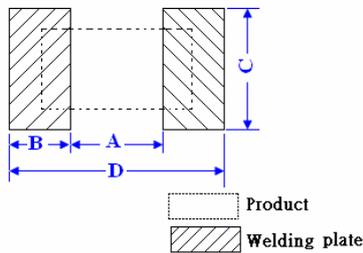
Type	Dimension(mm)				
	L	W	H	A	B
NS01(0201)	0.60±0.03	0.30±0.03	0.23±0.03	0.12±0.05	0.15±0.05
NS02(0402)	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
NS03(0603)	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
NS05(0805)	2.00±0.15	1.25±0.15/-0.10	0.55±0.10	0.40±0.20	0.40±0.20
NS06(1206)	3.10±0.15	1.55±0.15/-0.10	0.55±0.10	0.45±0.20	0.45±0.20
NS07(1210)	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
NS10(2010)	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
NS12(2512)	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	
		1.0%	5.0%
NS01	1/20W	1Ω-10MΩ	1Ω-10MΩ
NS02	1/16W	1Ω-10MΩ	1Ω-10MΩ
NS03	1/10W	1Ω-10MΩ	1Ω-10MΩ
NS05	1/8W	1Ω-10MΩ	1Ω-10MΩ
NS06	1/4W	1Ω-10MΩ	1Ω-10MΩ
NS07	1/3W	1Ω-10MΩ	1Ω-10MΩ
NS10	3/4W	1Ω-10MΩ	1Ω-10MΩ
NS12	1W	1Ω-10MΩ	1Ω-10MΩ

**7. Ratings**

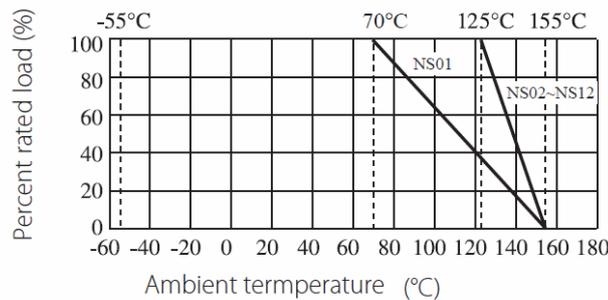
Type	Max. Working Voltage	Max. Overload Voltage	Dielectric withstanding Voltage	Resistance Value of Jumper	Rated Current of Jumper	Max. Overload Current of Jumper	Operating Temperature
NS01	25V	50V	/	<50mΩ	0.5A	1A	-55°C~155°C
NS02	50V	100V	100V	<50mΩ	1A	2A	-55°C~155°C
NS03	75V	150V	300V	<50mΩ	1A	2A	-55°C~155°C
NS05	150V	300V	500V	<50mΩ	2A	5A	-55°C~155°C
NS06	200V	400V	500V	<50mΩ	2A	10A	-55°C~155°C
NS07	200V	500V	500V	<50mΩ	2A	10A	-55°C~155°C
NS10	200V	500V	500V	<50mΩ	2A	10A	-55°C~155°C
NS12	200V	500V	500V	<50mΩ	2A	10A	-55°C~155°C

**8. Recommend the size of welding plate**


Type	Dimension(mm)			
	A	B	C	D
NS01	0.3±0.05	0.35±0.05	0.4±0.05	1.0±0.05
NS02	0.5±0.05	0.5±0.05	0.6±0.05	1.5±0.05
NS03	0.8±0.05	0.8±0.05	0.9±0.05	2.4±0.05
NS05	1.0±0.1	1±0.1	1.4±0.1	3±0.1
NS06	2.0±0.1	1.1±0.1	1.8±0.1	4.2±0.1
NS07	2.0±0.1	1.1±0.1	2.9±0.1	4.2±0.1
NS10	3.6±0.1	1.4±0.1	3±0.1	6.4±0.1
NS12	4.9±0.1	1.35±0.1	3.7±0.1	7.6±0.1

**9. Derating Curve**

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 125°C (NS01 is from -55°C to 70°C). For temperature is in excess of 125°C (NS01 temperature is in excess of 70°C), the load shall be derate as shown in figure :



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.)

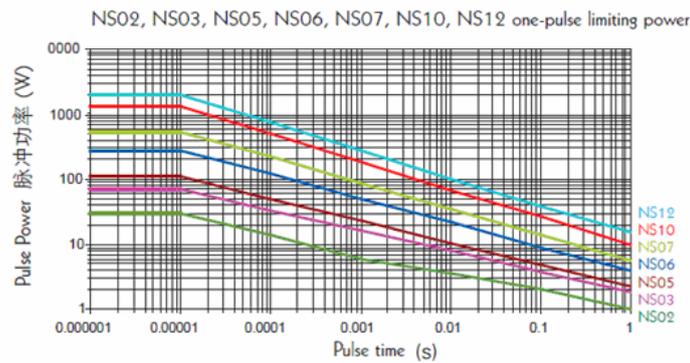
P = power rating (WATT.)

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

**10. Structure**

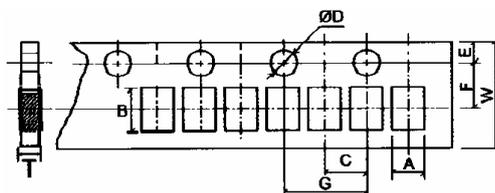
**11. One-pulse Limiting Electric Power**

**12. Performance Specification**

Characteristic	Limits	Ref. Standards	Test Method
Operational life	±5%: ±(3%+0.1Ω)Max. ±1%: ±(1%+0.1Ω)Max.	MIL-STD-202	NS01: 125°C, 36% power ; NS02~NS12: 125°C, 100% power, at RCWV or Max .Working Voltage whichever less, 1000h (1.5 hours “ON”, 0.5 hour “OFF”). Measurement at 24±4hours after test conclusion.
	<100mΩ		Apply to rate current for 0 Ω
Electrical Characterization	1Ω<R≤10 Ω: ±400 ppm/°C 10Ω<R≤100 Ω: ±200 ppm/°C 100Ω<R≤10MΩ: ±100 ppm/°C NS01:10Ω<R≤10M: ±200 ppm/°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	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 Damage	MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship
Physical Dimension	Reference 5. 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

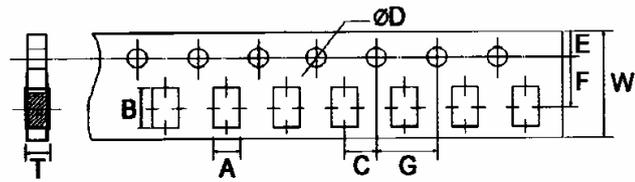
Biased Humidity	±5%: ±(3%+0.1Ω)Max. ±1%: ±(1%+0.1Ω)max.	MIL-STD-202 Method 103	1000 hours 85°C,85%RH. Note: Specified conditions: 10% of operating power. Measurement at 24±2 hours after test conclusion.
	<100mΩ		Apply to rate current for 0 Ω
Mechanical Shock	±(1%+0.1Ω)Max.	MIL-STD-202 Method 213	Wave 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.
ESD	±(1%+0.1Ω)Max.	AEC-Q200-002	With the electrometer in direct contact with the discharge tip, verify the voltage setting at levels of ±500V,±1KV, ±2KV, ±4KV, ±8KV, The electrometer reading shall be within ±10% for voltages from 500V to ≅800V.
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	$\Delta R \leq \pm(5\%+0.1\Omega)$	/	Soaked in industrial oil with sulfur substance 3.5% contained 105°C ±3°C 500H

### 13. Packing of Surface Mount Resistors

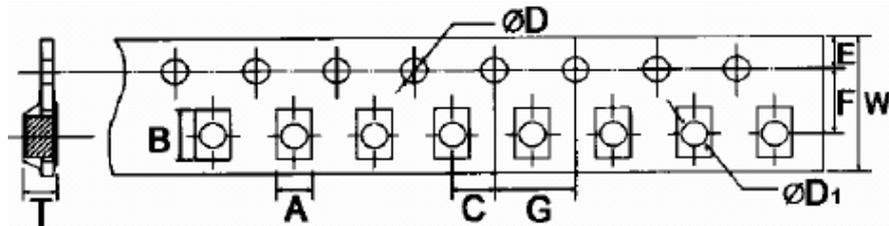
#### 13.1 Dimension of Paper Taping :(Unit: mm)



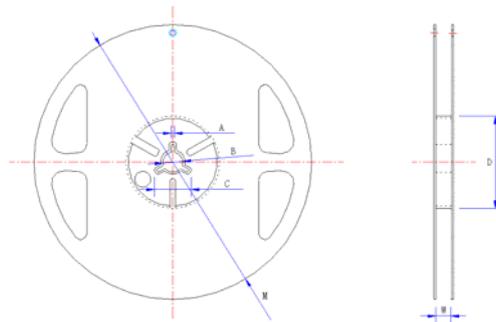
Type	A	B	C ±0.05	+0.1 ΦD -0	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T
NS01	0.40±0.05	0.70±0.05	2.0	1.5	1.75	3.50	4.0	8.0	0.42±0.1
NS02	0.65 ±0.1	1.2±0.1	2.0	1.5	1.75	3.5	4.0	8.0	0.42±0.05



Type	A ±0.2	B ±0.2	C ±0.05	+0.1 ØD -0	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T ±0.1
NS03	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
NS05	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
NS06	2.00	3.60	2.0	1.5	1.75	3.5	4.0	8.0	0.81
NS07	2.80	3.50	2.0	1.5	1.75	3.5	4.0	8.0	0.75

**13.2 Dimension of Embossed Taping: (Unit: mm)**


Type	A ±0.2	B ±0.2	C ±0.05	+0.1 ØD -0	+0.25 ØD1 -0	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T ±0.1
NS10	2.90	5.60	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00
NS12	3.50	6.70	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00

**13.3 Dimension of Reel : (Unit: mm)**


Type	Taping	Qty/Reel	A ±0.5	B ±0.5	C ±0.5	D ±1	M ±2	W ±1
NS01	Paper	15,000pcs	2.0	13.0	21.0	60.0	178	10
NS02	Paper	10,000pcs	2.0	13.0	21.0	60.0	178	10
NS03	Paper	5,000pcs	2.0	13.0	21.0	60.0	178	10
NS05	Paper	5,000pcs	2.0	13.0	21.0	60.0	178	10
NS06	Paper	5,000pcs	2.0	13.0	21.0	60.0	178	10
NS07	Paper	5,000pcs	2.0	13.0	21.0	60.0	178	10
NS10	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178	13.8
NS12	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178	13.8



**14. Note**

14.1 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.

14.2 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.

14.3 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.

**15. Record**

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~8	Mar.20, 2018	Chen Haiyan	Chen Nana
2	Modify NS01 packing quantity	8	Jun.06, 2018	Chen Haiyan	Chen Nana

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