

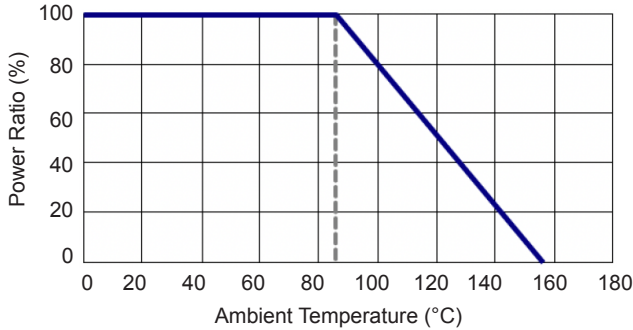


# NTRT Series

## Tantalum Nitride High Precision Thin Film Chip Resistor



**Power Derating Curve:** For operation above 85°C, power rating must be derated according to the following chart:



RCWV (Rated Continuous Working Voltage) =  $\sqrt{P \cdot R}$  or Max. Operating voltage whichever is lower

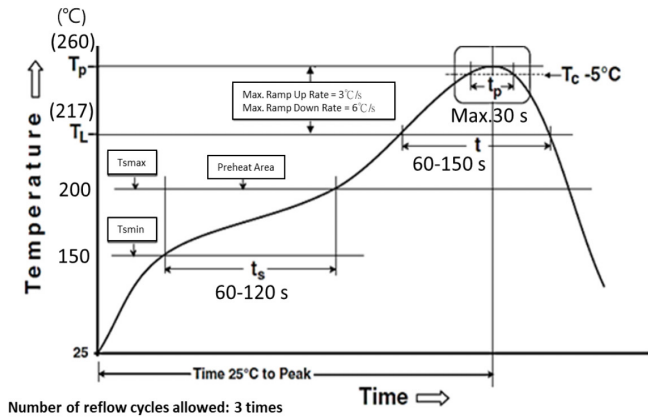
Note \*1 - Maximum allowable continuous Working Voltage for all resistors is the lower of the two values:

Maximum Working Voltage<sup>n</sup> as specified above or:  
 $\sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$

Note \*2 - Maximum Overload Voltage for all resistors is the lower of the two values:

Maximum Overload Voltage<sup>n</sup> as specified above or  
 $2 \times \sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$

### SOLDERING CONDITIONS (IPC/JEDEC J-STD-020)



Pb-Free Assembly	Time
Preheat Temp min (Tsmin)	150°C
Preheat Temp max (Tsmax)	200°C
Preheat time (ts)	60 - 120 seconds
Ramp-up rate (TL to TP)	3°C/second max.
Liquidous temperature (TL)	217°C
Time (tL) maintained above TL	60 - 150 seconds
Peak Temperature min (TP min)	235°C
Peak Temperature max (TP max)	260°C
Time (TP) within 5°C of the specified classification temperature (Tc)	30 seconds max.
Ramp-down rate (TP to TL)	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

### STORAGE CONDITIONS

Storage Temperature: 15 ~28 °C; Humidity < 80%RH

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### ENVIRONMENTAL CHARACTERISTICS

Item	Requirement	Test Method*
Temperature Coefficient of Resistance	As specified	JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C~ +125°C. 25°C is the reference temperature
Short Time Overload	$\Delta R \pm 0.1\%$	JIS-C-5201-1 4:13 RCWV x 2.5 or Max Overloading Voltage for 5 Seconds
Insulation Resistance	> 1000 M $\Omega$	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Apply 100Vdc for 1 minute
Endurance	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 108 Condition D steady state $T_A = 125^\circ\text{C}$ at derated power. Measurement at 24 $\pm$ hours after test conclusion
Biased Humidity	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 103 1000 hrs 85°C / 85% R.H. 10% of operating power
Bending Strength	$\Delta R \pm 0.1\%$	JIS-C-5201-1 4.33 Bending 2mm for 60 seconds
Solderability	95% Minimum Coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 245°C $\pm 5^\circ\text{C}$ , for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.1\%$	JIS-C-5201-1 4.18 IEC-60115-1 4.18 260°C $\pm 5^\circ\text{C}$ for 10 seconds
Temperature Cycling	$\Delta R \pm 0.1\%$ for 125°C	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles -55°C to +155°C, 1000 cycles
	$\Delta R \pm 0.2\%$ for 155°C	
High Temperature Exposure	$\Delta R \pm 0.15\%$	MIL-STD-202 Method 108 @ +155°C for 1000 hrs
Terminal Strength	Not broken	AEC-Q200-006 Force of 1kg for 60 seconds
Mechanical Shock	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 213 Wave form: tolerance for half sine shock pulse. Peak value is 100 Gs. Normal duration (D) is 6.
Vibration	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 204 5 G's for 20 min., 12 cycles each of 3 orientations, 10 - 2000 Hz
ESD	$\Delta R \pm 0.1\%$	AEC-Q200-002 Human Body Model NTRT04, NTRT06 = 0.2KV NTRT10, NTRT12 = 1KV
Resistance to solvents	Marking not smeared	MIL-STD-202 Method 215 Add Aqueous wash chemical, OKEM Clean or equivalent Do not use banned solvents
Sulfur Test	$\Delta R \pm 0.1\%$	ASTM-B-809-95 Modified 105 $\pm 2^\circ\text{C}$ no power rating for 750 hrs.
Flammability	No ignition of the tissue paper or scorching of pinewood board	UL-94 V-0 or V-1 are acceptable Electrical test not required
Endurance	$\Delta R \pm 0.1\%$	IEC60115-1 4.25 1000 +48/-0 hors, loaded with RCWV or Vmax in chamber controller 85 $\pm 2^\circ\text{C}$ , 1.5 hours on and 0.5 hours off
Moisture resistance	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 106 65 $\pm 2^\circ\text{C}$ , 80 ~ 100% R.H., 10 cycles, 24 hours/cycle

### Performance Passives By Design



## STANDARD E-24 AND E-96 VALUES AND RESISTANCE CODES

E-24		E-96								
Value & Code	Value	Code	Value	Code	Value	Code	Value	Code	Value	Code
10	100	01	102	02	105	03	107	04	110	05
11	110	05	113	06	115	07	118	08	121	09
12	121	09	124	10	127	11	130	12	133	13
13	133	13	137	14	140	15	143	16	147	17
15	147	17	150	18	154	19	158	20	162	21
16	162	21	165	22	169	23	174	24	178	25
18	178	25	182	26	187	27	191	28	196	29
20	196	29	200	30	205	31	210	32	215	33
22	215	33	221	34	226	35	232	36	237	37
24	237	37	243	38	249	39	255	40	261	41
27	261	41	267	42	274	43	280	44	287	45
30	287	45	294	46	301	47	309	48	316	49
33	316	49	324	50	332	51	340	52	348	53
36	348	53	357	54	365	55	374	56	383	57
39	383	57	392	58	402	59	412	60	422	61
43	422	61	432	62	442	63	453	64	464	65
47	464	65	475	66	487	67	499	68	511	69
51	511	69	523	70	536	71	549	72	562	73
56	562	73	576	74	590	75	604	76	619	77
62	619	77	634	78	649	79	665	80	681	81
68	681	81	698	82	715	83	732	84	750	85
75	750	85	768	86	787	87	806	88	825	89
82	825	89	845	90	866	91	887	92	909	93
91	909	93	931	94	953	95	976	96		

### MULTIPLIER CODE

Code	A	B, b	C	D, d	E	F	G	H	X	Y	Z
Multiplier	10 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>

### MARKING IDENTIFIERS

0402 Size	0603 Size	0805 and 1206 Size
No marking on 0402 sizes	<p>3 Digit Marking System: 2 digit value code + 1 digit multiplier code</p> <div style="text-align: center;"> <math>\begin{array}{c} \underline{XX} \quad \underline{X} \\   \qquad   \\ \text{Resistance Code} \quad \text{Multiplier Code} \end{array}</math> </div> <p>E24 0603 Multiplier Code: 10e multiplier E96 0603 Multiplier Code: Per table</p> <p>0603 Marking Examples: 101 = 100 Ω (E24) 13C = 13.3 KΩ (E96) 68B = 4.99 KΩ (E96) 103 = 10 KΩ (E24)</p>	<p>4 Digit Marking System: 3 digit value code + 1 digit multiplier code where "R" denotes a decimal</p> <div style="text-align: center;"> <math>\begin{array}{c} \underline{XXX} \quad \underline{X} \\   \qquad   \\ \text{Resistance Code} \quad \text{Multiplier Code} \end{array}</math> </div> <p>Value Multiplier Code: 10e multiplier</p> <p>Marking Examples: 10R0 = 10 Ω 1332 = 13.3 KΩ 4992 = 49.9 KΩ 1003 = 100 KΩ</p>

# NTRT Series

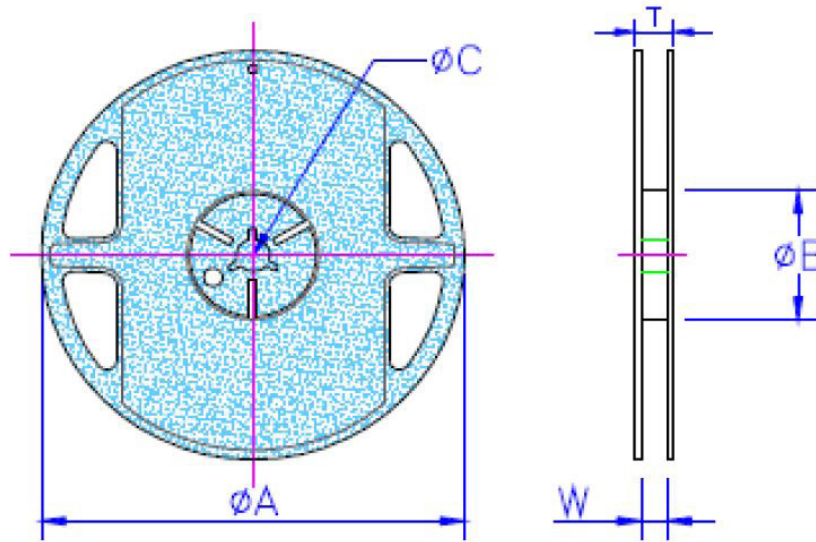
Tantalum Nitride High Precision  
Thin Film Chip Resistor



## TAPING SPECIFICATIONS

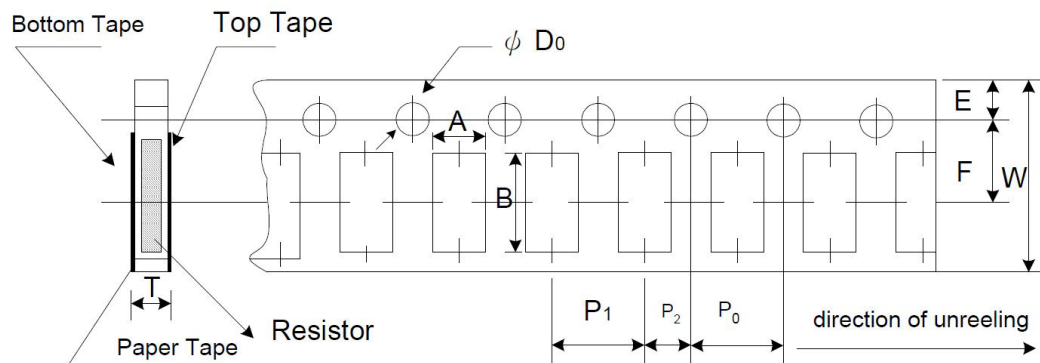
Type	EIA Size	A	B	C	W	T	Paper Tape (EA)
NTRT04	0402	1.78 ±1.0	60.0±1.0	13.5 ±0.7	9.5 ± 1.0	11.5 ±1.0	10,000
NTRT06	0603						5,000
NTRT10	0805						5,000
NTRT12	1206						5,000

## REEL DIMENSIONS (mm)



## PAPER TAPE DIMENSIONS (mm)

Type	EIA Size	A	B	D	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	W	T
NTRT04	0402	0.66 ± 0.06	1.18 ± 0.06	1.55 ± 0.05	1.75 ± 0.10	3.5 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	8.00 ± 0.20	0.60 ± 0.03
NTRT06	0603	1.10 ± 0.05	1.90 ± 0.05	1.55 ± 0.05	1.75 ± 0.05	3.5 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 ± 0.10	0.60 ± 0.03
NTRT10	0805	1.60 ± 0.05	2.37 ± 0.05	1.55 ± 0.05	1.75 ± 0.05	3.5 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 ± 0.10	0.75 ± 0.05
NTRT12	1206	2.00 ± 0.05	3.55 ± 0.05	1.55 ± 0.05	1.75 ± 0.05	3.5 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 ± 0.10	0.75 ± 0.05



Unit: mm

## Performance Passives By Design

NIC Components Corp.  
100 Baylis Road. Melville, NY 11747

Last Updated 11/28/2023. Specification subject to change without notice. Please check web site for latest information.

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