

Data Sheet

Customer : _____

Product :	Tantalum Nitride Thin Film Precision Chip Resistor - TAR Series
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Size:	0402/0603/0805/1206
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Issued Date:	17-May-23
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Edition :	REV A2
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17-May-23	17-May-23	17-May-23		
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Tantalum Nitride Thin Film Precision Chip Resistor (TAR Series)

■Features

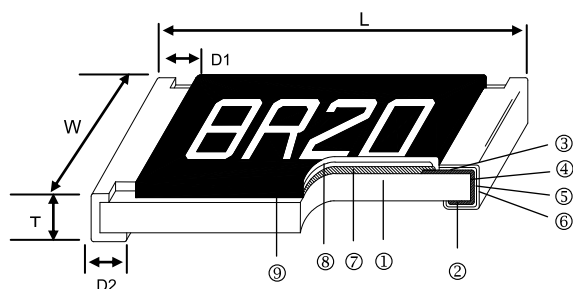
- Tantalum nitride thin film resistor
- High stability in humid environments
- AEC-Q200 Compliance
- Tight tolerance down to $\pm 0.05\%$
- Extremely low TCR down to $\pm 10\text{PPM}/^\circ\text{C}$
- Resistance values from 10 ohm to 1M ohm
- Special materials, design, and processing for high sulfur applications
- Test proven immunity to humidity, moisture, and sulfur



■Applications

- Automotive
- Medical Equipment
- Testing / Measurement Equipment
- Automatic Equipment Controller
- Converters
- Communication Device

■Construction



① Alumina Substrate	④ Edge Electrode	⑦ Resistor Layer
② Bottom Electrode	⑤ Barrier Layer	⑧ Overcoat
③ Top Electrode	⑥ External Electrode	⑨ Marking

■Dimensions

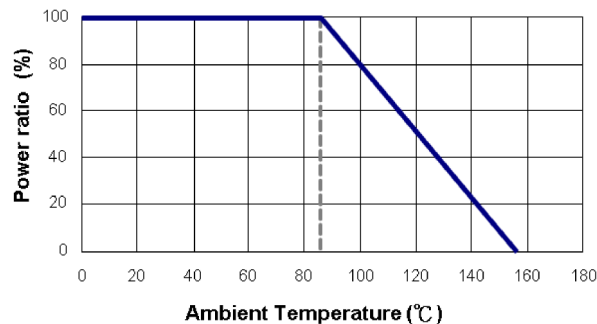
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
TAR02	0402	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.30 $\pm$ 0.05	0.20 $\pm$ 0.10	0.20 $\pm$ 0.10	0.54
TAR03	0603	1.55 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	1.83
TAR05	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.55 $\pm$ 0.10	0.30 $\pm$ 0.20	0.40 $\pm$ 0.20	4.71
TAR06	1206	3.05 $\pm$ 0.15	1.55 $\pm$ 0.15	0.55 $\pm$ 0.10	0.42 $\pm$ 0.20	0.35 $\pm$ 0.25	9.02

■Part Numbering

TAR	03	A	T	C	M	1001	N
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
	02: 0402 03: 0603 05: 0805 06: 1206	A: $\pm 0.05\%$ B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$	T: Taping Reel B: Bulk	B: ± 10 N: ± 15 C: ± 25 D: ± 50	Y: 1/16W M: 1/6W P: 1/5W U: 1/2W	0010: 1 Ω 1001: 1K Ω 1004: 1M Ω	: Standard Marking for E96 / E24 N: No Marking

Derating Curve



Standard Electrical Specifications

Type	Item	Power Rating at 85°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)
						±0.05%	±0.1%	±0.25%	±0.5%	±1%	
TAR02 (0402)		1/16W	-55 ~ +155°C	50V	100V	40Ω – 35KΩ					±10,±15,±25,±50
TAR03 (0603)		1/6W	-55 ~ +155°C	75V	150V	40Ω – 130KΩ					±10,±15,±25,±50
TAR05 (0805)		1/5W	-55 ~ +155°C	100V	200V	10Ω – 350KΩ					±10,±15,±25,±50
TAR06 (1206)		1/2W	-55 ~ +155°C	200V	400V	10Ω – 1MΩ					±10,±15,±25,±50

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	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*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	>1000 MΩ	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Apply 100V _{DC} for 1 minute
Operational Life	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 108 Condition D Steady State T _A =125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power.
High Temperature Exposure	$\Delta R \pm 0.15\%$	MIL-STD-202 Method 108 at +155°C for 1000 hrs
Temperature Cycling	$\Delta R \pm 0.1\%$ for 125°C $\Delta R \pm 0.2\%$ for 155°C	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles -55°C to +155°C, 1000 cycles
Bending Strength (Board Flex)	$\Delta R \pm 0.1\%$	JIS-C-5201-1 4.33 Bending 2mm for 60 seconds
Solderability	95% min. coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 245±5°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±5°C for 10 seconds

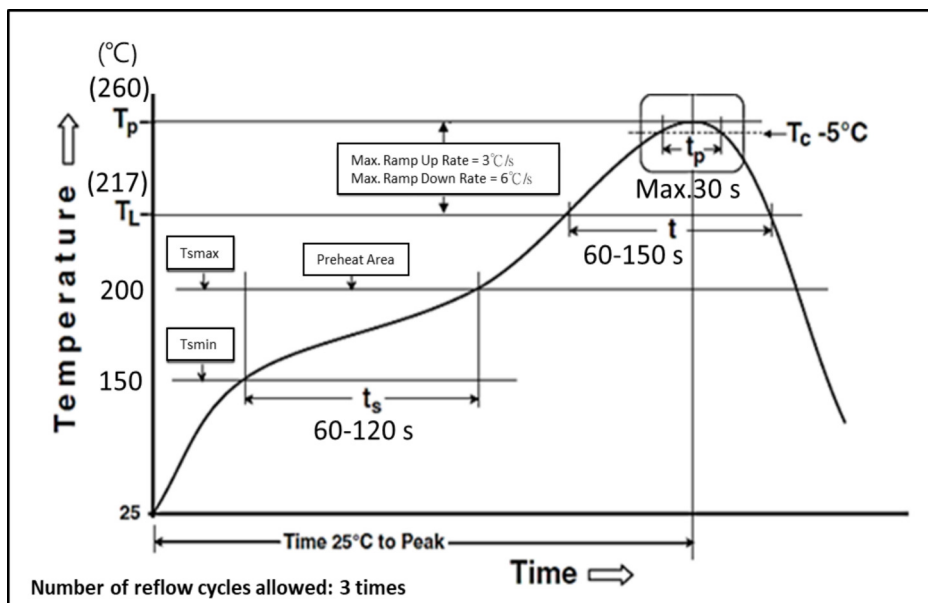
Terminal strength	No broken	AEC-Q200-006 Force of 1kg for 60 seconds.
Mechanical Shock	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	$\Delta R \pm 0.1\%$	AEC-Q200-002 Human body model TAR02、TAR03 0.2KV TAR05、TAR06 1KV
Resistance to solvents	Marking Unsmeared	MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Sulfur Test	$\Delta R \pm 1\%$	ASTM-B-809-95 Modified 105 $\pm$ 2 °C no power rating for 750 hrs.
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.
Endurance	$\Delta R \pm 0.1\%$	IEC60115-1 4.25 1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 85 $\pm$ 2°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°C, 80~100% RH, 10 cycles, 24 hours/cycle

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

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

■ **Shelf Life: 2 years from production date.**

■Soldering Condition(IPC/JEDEC J-STD-020)



Reflow Profiles	
Profile Feature	Pb-Free Assembly
Preheat	
Min. Temperature (T _{smin})	150 °C
Max Temperature (T _{smax})	200 °C
Preheating time (t _s) from (T _{smin} to T _{smax})	60-120 seconds
Ramp-up rate (T _L to T _p)	3 °C/second max.
Liquidous temperature (T _L)	217 °C
Time (t _L) maintained above T _L	60-150 seconds
Min. Peak temperature (T _p min)	235°C
Max. Peak temperature (T _p max)	260°C
Time (t _p) within 5 °C of the specified classification temperature (T _c)	30 seconds max.
Ramp-down rate (T _p to T _L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

■ Marking

0603 3digit marking



3digit marking for Example: 14C=13K7Ω 13C=13K3Ω

68B=4K99Ω 68X=49.9Ω

Marking Table

Code	E96		Code	E96		Code	E96		Code	E96	
01	100		25	178		49	316		73	562	
02	102		26	182		50	324		74	576	
03	105		27	187		51	332		75	590	
04	107		28	191		52	340		76	604	
05	110		29	196		53	348		77	619	
06	113		30	200		54	357		78	634	
07	115		31	205		55	365		79	649	
08	118		32	210		56	374		80	665	
09	121		33	215		57	383		81	681	
10	124		34	221		58	392		82	698	
11	127		35	226		59	402		83	715	
12	130		36	232		60	412		84	732	
13	133		37	237		61	422		85	750	
14	137		38	243		62	432		86	768	
15	140		39	249		63	442		87	787	
16	143		40	255		64	453		88	806	
17	147		41	261		65	464		89	825	
18	150		42	267		66	475		90	845	
19	154		43	274		67	487		91	866	
20	158		44	280		68	499		92	887	
21	162		45	287		69	511		93	909	
22	165		46	294		70	523		94	931	
23	169		47	301		71	536		95	953	
24	174		48	309		72	549		96	976	
Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁻¹	10 ⁻²	10 ⁻³

0603 3digit marking for E24

Example: 101=100Ω 102=1KΩ

E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
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0805~1206 4digit marking

Example

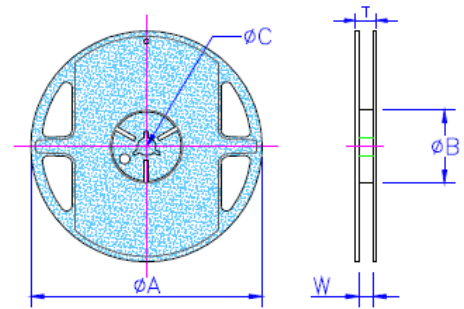
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

Packaging

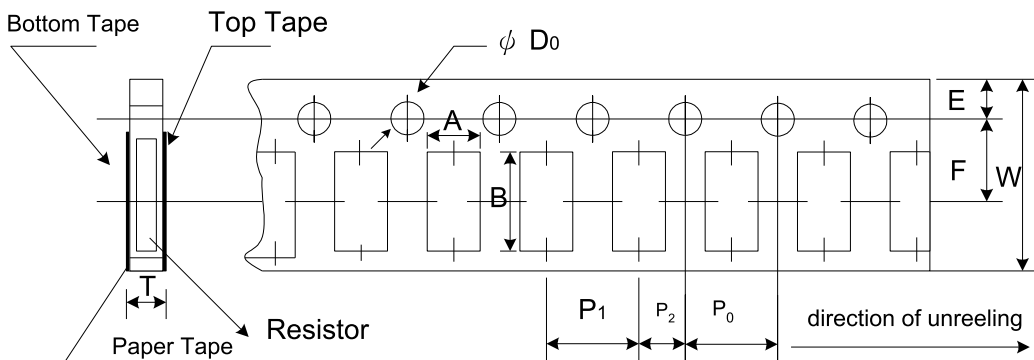
Packing Quantity & Reel Specifications

Unit : mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
TAR02	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
TAR03	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
TAR05	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
TAR06	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-



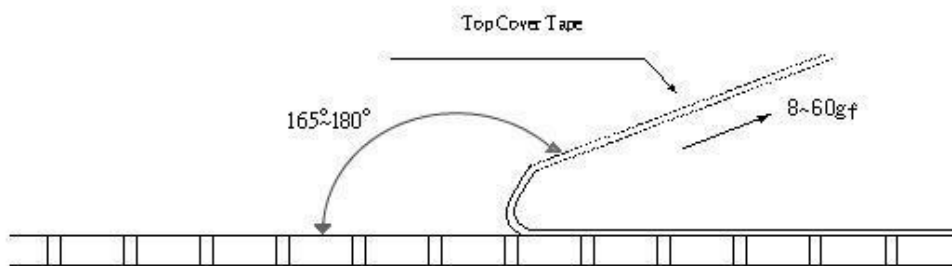
Paper Tape Specifications



Unit: mm

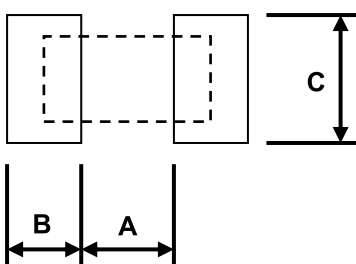
Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
TAR02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
TAR03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
TAR05	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
TAR06	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 8gf to 60gf



Recommend Land Pattern

Unit: mm



Type	A	B	C
TAR02	0.50	0.50	0.60±0.2
TAR03	0.80	1.00	0.90±0.2
TAR05	1.00	1.00	1.35±0.2
TAR06	2.00	1.15	1.70±0.2

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A1	Jan 26 ,2022	-	- Add shelf life description. - Modify IR reflow profile to comply IPC/JEDEC J-STD-020.
Version A2	May 17 ,2023	-	-Modify Test Method for Sulfur Test. - Add Reflow Profiles table.