

Tantalum Nitride Thin Film Precision Chip Resistors

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**RoHS
Compliant**

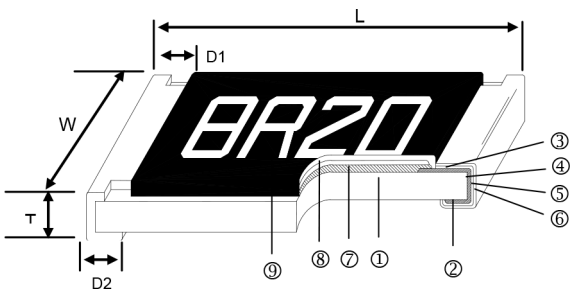


Features

- Tantalum Nitride Thin Film Resistor
- High stability in humid environments
- AEC-Q200 Compliance
- Resistance values from 47 ohm to 240K 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



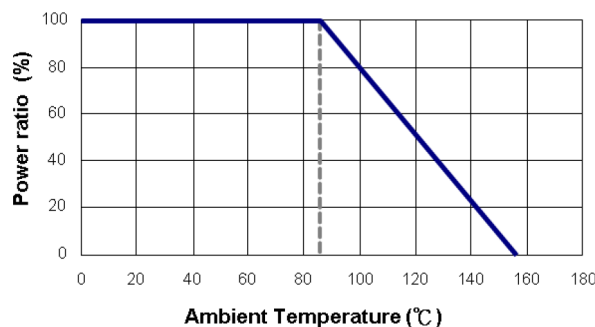
1	Alumina Substrate	4	Edge Electrode	7	Resistor Layer
2	Bottom Electrode	5	Barrier Layer	8	Overcoat
3	Top Electrode	6	External Electrode	9	Marking

Dimensions : Millimetres

Dimensions

Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
0402	1±0.05	0.5±0.05	0.3±0.05	0.2±0.1	0.2±0.1	0.54
0603	1.55±0.1	0.8±0.1	0.45±0.1	0.3±0.2	0.3±0.2	1.83
0805	2±0.15	1.25±0.15	0.55±0.1	0.3±0.2	0.4±0.2	4.71
1206	3.05±0.15	1.55±0.15	0.55±0.1	0.42±0.2	0.35±0.25	9.02

Derating Curve



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Standard Electrical Specifications

Item Type	Power Rating at 85°	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range	TCR(PPM/°C)
					±0.1%	
0402	1/16W	-55 to +155°C	50V	100V	47Ω to 20kΩ	25ppm/°C
0603	1/6W	-55 to +155°C	75V	150V	100Ω to 47kΩ	
0805	1/5W	-55 to +155°C	100V	200V	100Ω to 150kΩ	
1206	1/2W	-55 to +155°C	200V	400V	100Ω to 240kΩ	

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 to +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 TA=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	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.

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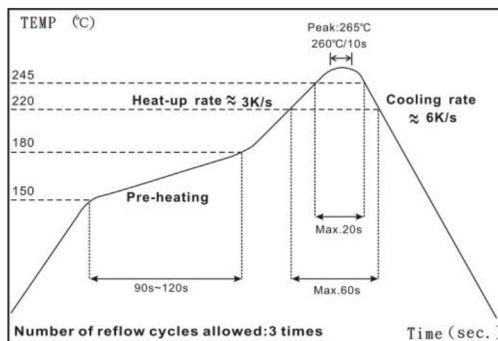
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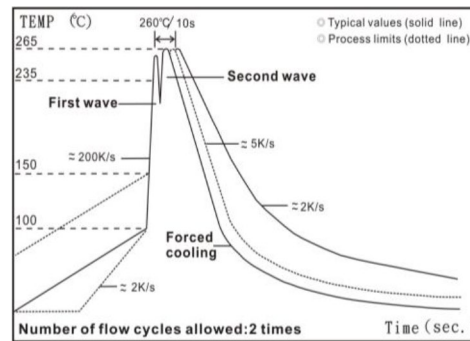
Item	Requirement	Test Method
Vibration	$\Delta R \pm 0.1\%$	MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	$\Delta R \pm 0.1\%$	AEC-Q200-002 Human body model TAR02, TAR03 0.2KV TAR05, TAR06 1KV
Resistance to solvents	Marking Unsmearred	MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Sulfur Test	$\Delta R \pm 1\%$	EIA-977(Conditions B) 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	$\Delta R \pm 0.1\%$	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°C to 28°C; Humidity < 80%RH

Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

Marking



3digit Marking for Example: 14C=13K7Ω 13C=13K3Ω
68B=4K99Ω 68X=49.9Ω

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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 to 1206 4digit marking

Example

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

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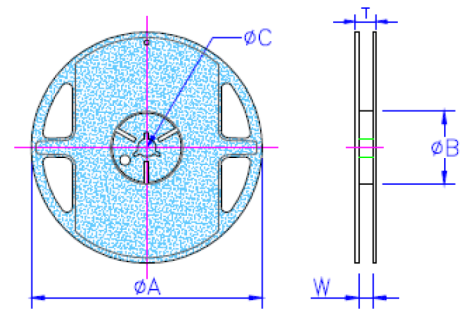
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Packaging

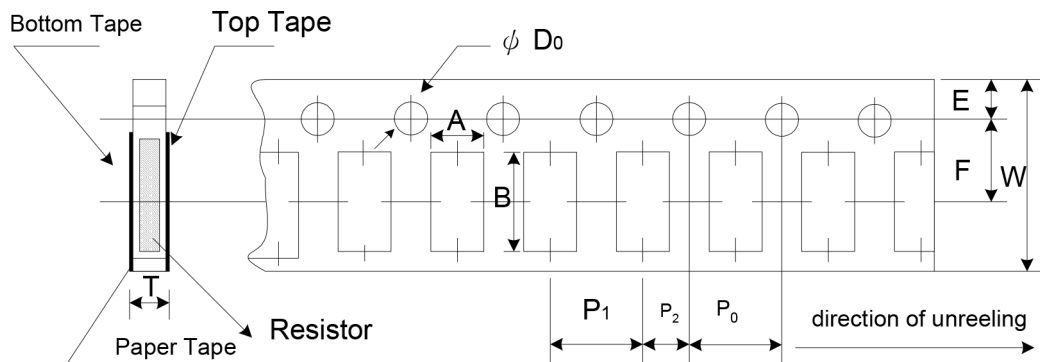
Packing Quantity & Reel Specifications

Dimensions : Millimetres

Type	Ø A	Ø B	Ø C	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
0402	178±1	60+1	13.5±0.7	9.5±1	11.5±1	10,000	-
0603	178±1	60+1	13.5±0.7	9.5±1	11.5±1	5,000	-
0805	178±1	60+1	13.5±0.7	9.5±1	11.5±1	5,000	-
1206	178±1	60+1	13.5±0.7	9.5±1	11.5±1	5,000	-



Paper Tape Specifications



Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
0402	0.7±0.05	1.16±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.1	2±0.05	2±0.05	1.55±0.05	0.4±0.03
0603	1.1±0.05	1.9±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.1	4±0.1	2±0.05	1.55±0.05	0.6±0.03
0805	1.6±0.05	2.37±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.1	4±0.1	2±0.05	1.55±0.05	0.75±0.05
1206	2±0.05	3.55±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.1	4±0.1	2±0.05	1.55±0.05	0.75±0.05

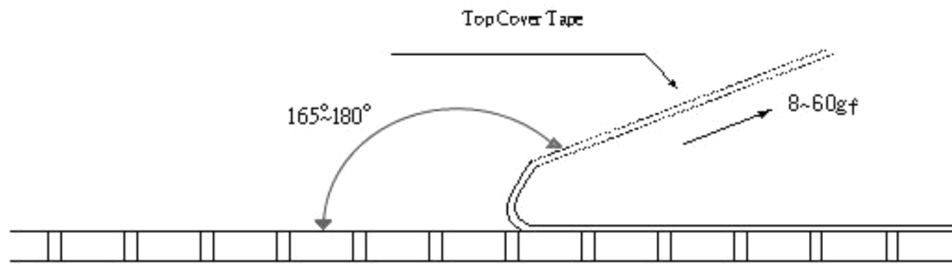
Peel force of top cover tape

The peel speed shall be about 300mm/min±5%

The peel force of top cover tape shall be between 8gf to 60gf

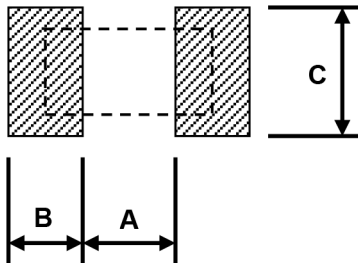
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Dimensions : Millimetres

Recommend Land Pattern



Type	A	B	C
0402	0.5	0.5	0.6±0.2
0603	0.8	1	0.9±0.2
0805	1	1	1.35±0.2
1206	2	1.15	1.7±0.2

Part Number Table

Description	Part Number
Precision Chip Resistor, Thin Film, 1/16W, 47R, 0.1%, 0402	MP005049
Precision Chip Resistor, Thin Film, 1/16W, 68R, 0.1%, 0402	MP005050
Precision Chip Resistor, Thin Film, 1/16W, 100R, 0.1%, 0402	MP005051
Precision Chip Resistor, Thin Film, 1/16W, 120R, 0.1%, 0402	MP005052
Precision Chip Resistor, Thin Film, 1/16W, 180R, 0.1%, 0402	MP005053
Precision Chip Resistor, Thin Film, 1/16W, 200R, 0.1%, 0402	MP005054
Precision Chip Resistor, Thin Film, 1/16W, 220R, 0.1%, 0402	MP005055
Precision Chip Resistor, Thin Film, 1/16W, 300R, 0.1%, 0402	MP005056
Precision Chip Resistor, Thin Film, 1/16W, 390R, 0.1%, 0402	MP005057
Precision Chip Resistor, Thin Film, 1/16W, 470R, 0.1%, 0402	MP005058
Precision Chip Resistor, Thin Film, 1/16W, 680R, 0.1%, 0402	MP005059
Precision Chip Resistor, Thin Film, 1/16W, 1K, 0.1%, 0402	MP005060
Precision Chip Resistor, Thin Film, 1/16W, 1K2, 0.1%, 0402	MP005061
Precision Chip Resistor, Thin Film, 1/16W, 1K5, 0.1%, 0402	MP005062
Precision Chip Resistor, Thin Film, 1/16W, 1K8, 0.1%, 0402	MP005063
Precision Chip Resistor, Thin Film, 1/16W, 2K7, 0.1%, 0402	MP005064

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Description	Part Number
Precision Chip Resistor, Thin Film, 1/16W, 4K7, 0.1%, 0402	MP005065
Precision Chip Resistor, Thin Film, 1/16W, 10K, 0.1%, 0402	MP005066
Precision Chip Resistor, Thin Film, 1/16W, 12K, 0.1%, 0402	MP005067
Precision Chip Resistor, Thin Film, 1/16W, 20K, 0.1%, 0402	MP005068
Precision Chip Resistor, Thin Film, 1/6W, 100R, 0.1%, 0603	MP005069
Precision Chip Resistor, Thin Film, 1/6W, 150R, 0.1%, 0603	MP005070
Precision Chip Resistor, Thin Film, 1/6W, 200R, 0.1%, 0603	MP005071
Precision Chip Resistor, Thin Film, 1/6W, 220R, 0.1%, 0603	MP005072
Precision Chip Resistor, Thin Film, 1/6W, 390R, 0.1%, 0603	MP005073
Precision Chip Resistor, Thin Film, 1/6W, 470R, 0.1%, 0603	MP005074
Precision Chip Resistor, Thin Film, 1/6W, 1K, 0.1%, 0603	MP005075
Precision Chip Resistor, Thin Film, 1/6W, 1K2, 0.1%, 0603	MP005076
Precision Chip Resistor, Thin Film, 1/6W, 1K5, 0.1%, 0603	MP005077
Precision Chip Resistor, Thin Film, 1/6W, 1K8, 0.1%, 0603	MP005078
Precision Chip Resistor, Thin Film, 1/6W, 2K, 0.1%, 0603	MP005079
Precision Chip Resistor, Thin Film, 1/6W, 2K4, 0.1%, 0603	MP005080
Precision Chip Resistor, Thin Film, 1/6W, 3K, 0.1%, 0603	MP005081
Precision Chip Resistor, Thin Film, 1/6W, 4K7, 0.1%, 0603	MP005082
Precision Chip Resistor, Thin Film, 1/6W, 10K, 0.1%, 0603	MP005083
Precision Chip Resistor, Thin Film, 1/6W, 12K, 0.1%, 0603	MP005084
Precision Chip Resistor, Thin Film, 1/6W, 20K, 0.1%, 0603	MP005085
Precision Chip Resistor, Thin Film, 1/6W, 30K, 0.1%, 0603	MP005086
Precision Chip Resistor, Thin Film, 1/6W, 33K, 0.1%, 0603	MP005087
Precision Chip Resistor, Thin Film, 1/6W, 47K, 0.1%, 0603	MP005088
Precision Chip Resistor, Thin Film, 1/5W, 100R, 0.1%, 0805	MP005089
Precision Chip Resistor, Thin Film, 1/5W, 220R, 0.1%, 0805	MP005090
Precision Chip Resistor, Thin Film, 1/5W, 470R, 0.1%, 0805	MP005091
Precision Chip Resistor, Thin Film, 1/5W, 1K, 0.1%, 0805	MP005092
Precision Chip Resistor, Thin Film, 1/5W, 1K2, 0.1%, 0805	MP005093
Precision Chip Resistor, Thin Film, 1/5W, 1K5, 0.1%, 0805	MP005094
Precision Chip Resistor, Thin Film, 1/5W, 1K8, 0.1%, 0805	MP005095
Precision Chip Resistor, Thin Film, 1/5W, 2K, 0.1%, 0805	MP005096
Precision Chip Resistor, Thin Film, 1/5W, 2K7, 0.1%, 0805	MP005097
Precision Chip Resistor, Thin Film, 1/5W, 4K7, 0.1%, 0805	MP005098
Precision Chip Resistor, Thin Film, 1/5W, 6K8, 0.1%, 0805	MP005099
Precision Chip Resistor, Thin Film, 1/5W, 10K, 0.1%, 0805	MP005100
Precision Chip Resistor, Thin Film, 1/5W, 12K, 0.1%, 0805	MP005101
Precision Chip Resistor, Thin Film, 1/5W, 15K, 0.1%, 0805	MP005102

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Description	Part Number
Precision Chip Resistor, Thin Film, 1/5W, 20K, 0.1%, 0805	MP005103
Precision Chip Resistor, Thin Film, 1/5W, 30K, 0.1%, 0805	MP005104
Precision Chip Resistor, Thin Film, 1/5W, 47K, 0.1%, 0805	MP005105
Precision Chip Resistor, Thin Film, 1/5W, 100K, 0.1%, 0805	MP005106
Precision Chip Resistor, Thin Film, 1/5W, 120K, 0.1%, 0805	MP005107
Precision Chip Resistor, Thin Film, 1/5W, 150K, 0.1%, 0805	MP005108
Precision Chip Resistor, Thin Film, 1/2W, 100R, 0.1%, 1206	MP005109
Precision Chip Resistor, Thin Film, 1/2W, 200R, 0.1%, 1206	MP005110
Precision Chip Resistor, Thin Film, 1/2W, 1K, 0.1%, 1206	MP005111
Precision Chip Resistor, Thin Film, 1/2W, 1K2, 0.1%, 1206	MP005112
Precision Chip Resistor, Thin Film, 1/2W, 2K, 0.1%, 1206	MP005113
Precision Chip Resistor, Thin Film, 1/2W, 2K7, 0.1%, 1206	MP005114
Precision Chip Resistor, Thin Film, 1/2W, 10K, 0.1%, 1206	MP005115
Precision Chip Resistor, Thin Film, 1/2W, 12K, 0.1%, 1206	MP005116
Precision Chip Resistor, Thin Film, 1/2W, 15K, 0.1%, 1206	MP005117
Precision Chip Resistor, Thin Film, 1/2W, 20K, 0.1%, 1206	MP005118
Precision Chip Resistor, Thin Film, 1/2W, 27K, 0.1%, 1206	MP005119
Precision Chip Resistor, Thin Film, 1/2W, 30K, 0.1%, 1206	MP005120
Precision Chip Resistor, Thin Film, 1/2W, 47K, 0.1%, 1206	MP005121
Precision Chip Resistor, Thin Film, 1/2W, 68K, 0.1%, 1206	MP005122
Precision Chip Resistor, Thin Film, 1/2W, 100K, 0.1%, 1206	MP005123
Precision Chip Resistor, Thin Film, 1/2W, 120K, 0.1%, 1206	MP005124
Precision Chip Resistor, Thin Film, 1/2W, 150K, 0.1%, 1206	MP005125
Precision Chip Resistor, Thin Film, 1/2W, 180K, 0.1%, 1206	MP005126
Precision Chip Resistor, Thin Film, 1/2W, 200K, 0.1%, 1206	MP005127
Precision Chip Resistor, Thin Film, 1/2W, 240K, 0.1%, 1206	MP005128

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