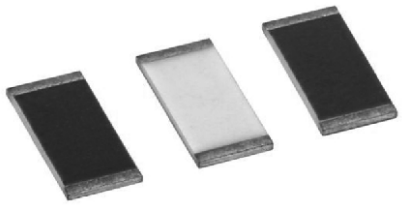
Precision Automotive Thin Film Chip Resistors, AEC-Q200 Qualified, 2 kV ESD Rating



These chip resistors are available in wraparound terminations styles in 8 case sizes. They incorporate self passivated enhanced tantalum nitride resistor film to give superior performance on moisture resistance, electrostatic discharge, voltage coefficient, power handling and resistance stability. The terminations consist of an adhesion layer, a leach resistant nickel barrier, and solder coating (lead (Pb)-free). This product will out-perform all requirements of AEC-Q200.

FEATURES

- Resistance range: 2.5 Ω to 3 MΩ
- AEC-Q200 qualified
- AEC-Q200 ESD rated class 1C (2 kV)
- Laser trimmed to any value
- Moisture resistant to MIL-STD-202, method 202
- Tantalum nitride resistor film on high purity alumina substrate
- 100 % visual inspected per MIL-PRF-55342
- Laser-trimmed tolerances to ± 0.1 %
- Load life stability < 0.05 % at 1000 h at 70 °C
- Very low noise and voltage coefficient (< -30 dB, < 0.1 ppm/V)
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

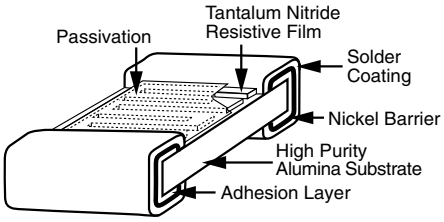
Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

CONSTRUCTION



TYPICAL PERFORMANCE

	ABSOLUTE
TCR	25
TOL.	0.1

STANDARD ELECTRICAL SPECIFICATIONS

TEST	SPECIFICATIONS	CONDITIONS
Material	Tantalum nitride	-
Resistance Range	2.5 Ω to 3 MΩ (1)	-
TCR: Absolute	± 25 ppm/°C to ± 100 ppm/°C	-55 °C to +125 °C
Tolerance: Absolute	± 0.1 % to ± 1.0 %	+25 °C
Stability: Absolute	± 0.05 %	2000 h at 70 °C rated power
Stability: Ratio	Not applicable	-
Voltage Coefficient	Less than 0.1 ppm/V	-
Working Voltage	75 V to 200 V	-
Operating Temperature Range	-55 °C to +155 °C	-
Storage Temperature Range	-55 °C to +155 °C	-
Noise	< -30 dB	-
Shelf Life Stability: Absolute	100 ppm	1 year at 25 °C

Note

(1) Resistance values less than 10 Ω will have TCR ± 100 ppm/°C.

COMPONENT RATINGS

CASE SIZE	POWER RATING (mW)	WORKING VOLTAGE (V)	RESISTANCE RANGE (Ω)
0402	50	75	20 to 51K
0603	150	75	2.5 to 130K
0805	200	100	10 to 301K
1206	400	200	10 to 1M
1505	400	150	10 to 1M
2208	750	150	10 to 1.75M
2010	800	200	10 to 2M
2512	1000	200	10 to 3M

For technical questions, contact: thinfilm@vishay.com

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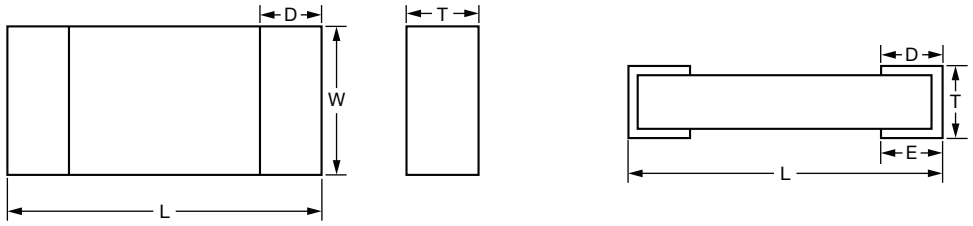
DIMENSIONS in inches

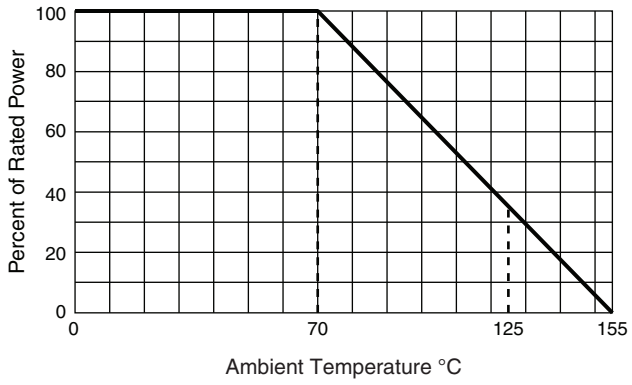


CASE SIZE	L	W	T	D	E
0402	0.042 ± 0.008	0.022 ± 0.005	0.015 ± 0.003	0.010 ± 0.005	0.010 ± 0.005
0603	0.064 ± 0.006	0.032 ± 0.005	0.015 ± 0.003	0.012 ± 0.005	0.015 ± 0.005
0805	0.080 ± 0.006	0.050 ± 0.005	0.015 ± 0.003	0.015 ± 0.005	0.015 ± 0.005
1206	0.126 ± 0.008	0.063 ± 0.005	0.015 ± 0.003	0.020 + 0.005 / - 0.010	0.020 + 0.005 / - 0.010
1505	0.155 ± 0.007	0.050 ± 0.005	0.015 ± 0.003	0.015 ± 0.005	0.015 ± 0.005
2010	0.209 ± 0.009	0.098 ± 0.005	0.015 ± 0.003	0.020 ± 0.005	0.020 ± 0.005
2208	0.230 ± 0.007	0.075 ± 0.005	0.015 ± 0.003	0.020 ± 0.005	0.020 ± 0.005
2512	0.259 ± 0.009	0.124 ± 0.005	0.015 ± 0.003	0.020 ± 0.005	0.020 ± 0.005

ENVIRONMENTAL TESTS (Vishay Performance vs. AEC-Q200 Requirements)

ENVIRONMENTAL TEST		CONDITIONS	LIMITS PER AEC-Q200	TYPICAL VISHAY PERFORMANCE
Resistance Temperature Characteristic		-55 °C to +125 °C	± 50 ppm/°C	± 35 ppm/°C
Max. Ambient Temp. at Rated Wattage			+70 °C	+70 °C
Max. Ambient Temp. at Power Derating			+150 °C	+150 °C
High Temperature Storage	**ΔR**	MIL-STD-202, 108, 1000 h at 125 °C	± 0.1 %	+ 0.016 %
Temperature Cycling	**ΔR**	JESD22, JA-104, 1000 cycles, -55 °C to +125 °C	± 0.15 %	+ 0.013 %
Moisture Resistance	**ΔR**	MIL-STD-202, 106	± 0.20 %	+ 0.0010 %
Biased Humidity	**ΔR**	MIL-STD-202, 103, 1000 h at 85 °C, 85 % RH, 10 % P	± 0.10 %	+ 0.004 %
Life	**ΔR**	MIL-STD-202, 108 at 125 °C, 1000 h	± 0.1 %	+ 0.0220 %
Mechanical Shock	**ΔR**	MIL-STD-202, method 213, condition C	± 0.1 %	+ 0.004 %
Vibration	**ΔR**	MIL-STD-202 method 204, 10 Hz to 2 kHz	± 0.1 %	+ 0.0030 %
Resistance to Soldering Heat	**ΔR**	MIL-STD-202 method 210, condition D	± 0.10 %	+ 0.0150 %
Electrostatic Discharge	**ΔR**	AEC-Q200-002 at 2 kV, human body	± 0.10 %	- 0.032 %
Solderability	**Visual**	J-STD-002, method B and B1	95 %	Acceptable
Terminal Strength	**ΔR**	AEC-Q200-006 at 1 kg for 60 s	± 0.10 %	+ 0.009 %
Flame Retardance	**Visual**	AEC-Q200-001 para 4.0		Acceptable

DERATING CURVE



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GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PAT1206E1002BST1

P	A	T	1	2	0	6	E	1	0	0	2	B	S	T	1

GLOBAL MODEL	CASE SIZE	TCR CHARACTERISTIC	RESISTANCE (1)	TOLERANCE	TERMINATION	PACKAGING
PAT	**0402** **0603** **0805** **1206** **1505** **2010** **2208** **2512**	**E** = ± 25 ppm/°C **H** = ± 50 ppm/°C **K** = ± 100 ppm/°C **L** = ± 200 ppm/°C	The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. "R" designates the decimal point. Example: 10R0 = 10 Ω 1000 = 100 Ω 1002 = 10 kΩ	**B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 % **G** = ± 2.0 % **J** = ± 5.0 %	**S** = wraparound lead (Pb)-free solder w/nickel barrier	TAPE AND REEL **T1** = 1000 min., 1000 mult (2) **TF** = full reel **TS** = 100 min., 1 mult

Notes

(1) Resistance values less than 10 Ω will have TCR ± 100 ppm/°C.

(2) Preferred packaging code

RESISTANCE	TCR (ppm/°C)	TOLERANCE (%)
10 Ω to 1 MΩ	25, 50, 100, 200	0.1, 0.5, 1, 2, 5
5 Ω to 10 Ω	100, 200	1, 2, 5
1.0 Ω to 5 Ω	200	1, 2, 5

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