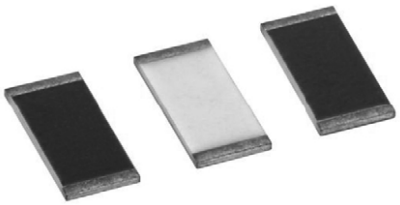
Precision Automotive Thin Film Chip Resistors, AEC-Q200 Qualified, Hi-Rel COTS

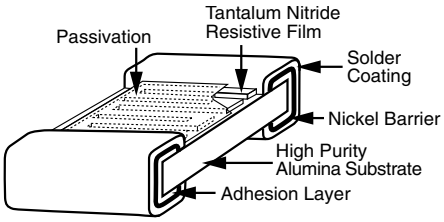


LINKS TO ADDITIONAL RESOURCES

Packages Footprints Product Page

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. Both, lead (Pb)-free solder (standard) and tin / lead solder (non-standard) options are available. This product will out-perform all requirements of AEC-Q200. Additional custom lot screening per MIL-PRF-55342 available upon request. Contact product marketing for an estimate.

CONSTRUCTION



FEATURES

Pb-free Available

RoHS* Available

HALOGEN FREE GREEN (5-2008) Available

- 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
- 2 kV (HBM) ESD rating
- Sn / Pb solder version available
- 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

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

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	-
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

For technical questions, contact: thinfilm@vishay.com

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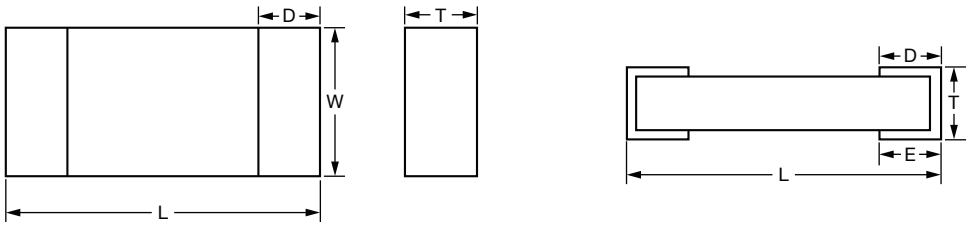
COMPONENT RATINGS

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

DIMENSIONS in inches



CASE SIZE	L	W	T	D	E	WEIGHT (gm)
0402	0.041 ± 0.003	0.022 ± 0.003	0.015 ± 0.003	0.010 ± 0.005	0.010 ± 0.005	0.002
0603	0.064 ± 0.006	0.032 ± 0.005	0.015 ± 0.003	0.012 ± 0.005	0.015 ± 0.005	0.003
0805	0.080 ± 0.006	0.050 ± 0.005	0.015 ± 0.003	0.015 ± 0.005	0.015 ± 0.005	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	0.009
1505	0.155 ± 0.007	0.050 ± 0.005	0.015 ± 0.003	0.015 ± 0.005	0.015 ± 0.005	0.011
2010	0.209 ± 0.009	0.098 ± 0.005	0.015 ± 0.003	0.020 ± 0.005	0.020 ± 0.005	0.022
2208	0.230 ± 0.007	0.075 ± 0.005	0.015 ± 0.003	0.020 ± 0.005	0.020 ± 0.005	0.017
2512	0.259 ± 0.009	0.124 ± 0.005	0.015 ± 0.003	0.020 ± 0.005	0.020 ± 0.005	0.033

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

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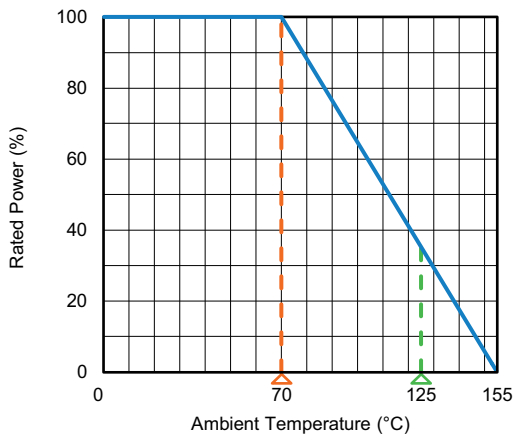
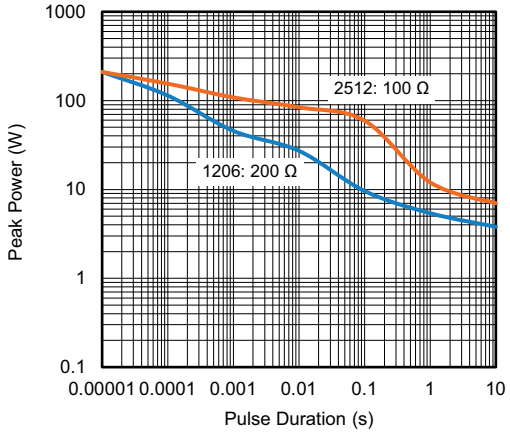
DERATING CURVE



PULSE CURVE



Note

- Test acceptance limit is resistance shift up to 1 %

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	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 **B** = wraparound Sn / Pb w/nickel barrier	BULK **BS** = 100 min., 1 mult. WAFFLE **WS** = 100 min., 1 mult. **W0** = 100 min., 100 mult. **WI** = 100 min., 1 mult. (item single lot date code) **WP** = 100 min., 1 mult. (package unit single lot date code) TAPE AND REEL **T0** = 100 min., 100 mult. **T1** = 1000 min., 1000 mult. **T3** = 300 min., 300 mult. **T5** = 500 min., 500 mult. **TF** = full reel **TS** = 100 min., 1 mult. **TI** = 100 min., 1 mult. (item single lot date code) **TP** = 100 min., 1 mult. (package unit single lot date code)

Note

(1) 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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