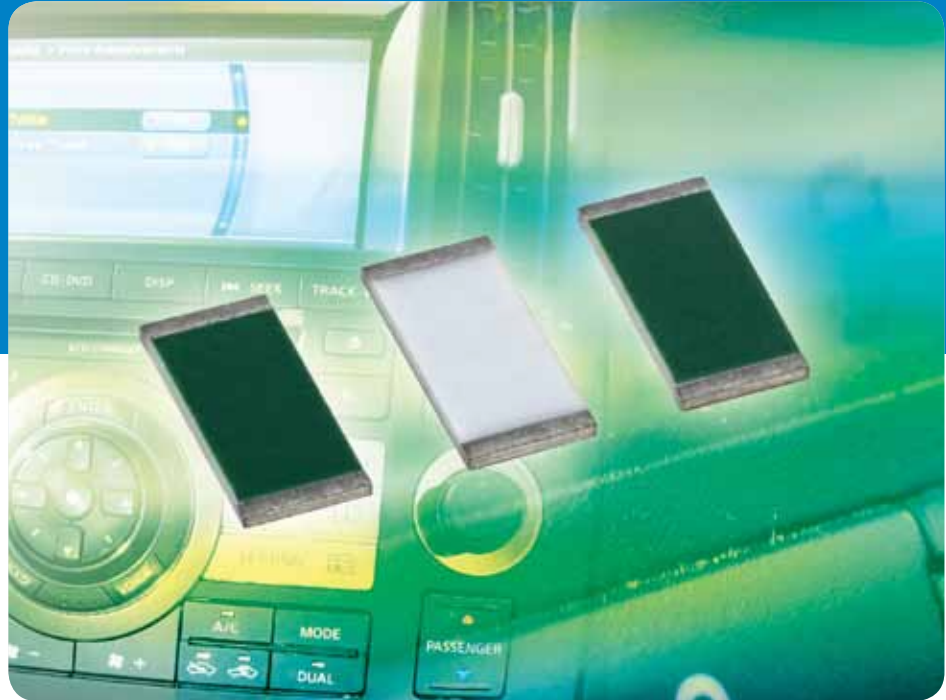




THIN FILM RESISTORS

PAT Series



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

KEY BENEFITS

- Resistance range: 10 Ω to 3 M Ω
- RoHS-compliant
- AEC-Q200-compliant
- AEC-Q200 ESD-rated Class 1C (2 kV)
- Moisture-resistant tantalum nitride resistor film on high-purity alumina substrate
- TCR of ± 25 ppm/ $^{\circ}$ C
- Tolerances to ± 0.1 %
- Stable film and performance characteristics: < 0.05 % at 2000 hours at 70 $^{\circ}$ C
- Power rating to 1 W

APPLICATIONS

- Automotive equipment
- Telecommunications
- Industrial equipment
- Test and measurement equipment

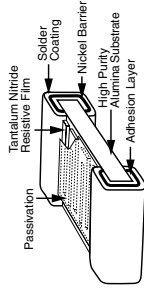
Precision Automotive Thin Film Chip Resistors, AEC-Q200 Qualified, 2 kV ESD Rating


FEATURES

- Resistance range: 10 Ω to 3 MΩ
- AEC-Q200 ESD rated class 1C (2 kV)
- Laser trimmed to any value
- Lead (Pb)-free
- 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)
- Compliant to RoHS directive 2002/95/EC



These chip resistors are available in wraparound terminations styles in 12 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 lead resistant nickel barrier, and solder coating (lead (Pb)-free). This product will out-perform all requirements of AEC-Q200.

CONSTRUCTION

TYPICAL PERFORMANCE

	ABSOLUTE
TCR	25
TOL.	0.1

STANDARD ELECTRICAL SPECIFICATIONS

TEST	SPECIFICATIONS	CONDITIONS
Material	Tantalum nitride	-
Resistance Range	10.0 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: Ratio	± 0.05 %	2000 h at 70 °C rated power
Stability: Coefficient	Not applicable	-
Voltage Coefficient	Less than 0.1 ppm/V	-
Working Voltage	75 V to 200 V	-
Operating Temperature Range	-55 °C to +150 °C	-
Storage Temperature Range	-55 °C to +150 °C	-
Noise	< -30 dB	-
Self Life Stability: Absolute	100 ppm	1 year at 25 °C

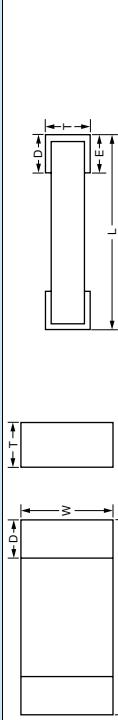
COMPONENT RATINGS

CASE SIZE	POWER RATING (mW)	WORKING VOLTAGE (V)	RESISTANCE RANGE (Ω)
0402	50	75	20 to 35K
0603	150	75	10 to 80K
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

* Pb containing terminations are not RoHS compliant, exemptions may apply
 ** Please see document "Vishay Material Category Policy": www.vishay.com/doc/295952

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For technical questions, contact thinfilm@vishay.com

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 ± 50 ppm/°C	-55 °C to +125 °C	± 50 ppm/°C	± 35 ppm/°C
Max. Ambient Temp. at Rated Wattage	+70 °C	+70 °C	+70 °C
Max. Ambient Temp. at Power Derating	+150 °C	± 0.1 %	+150 °C
High Temperature Storage	MIL-STD-202, 108, 1000 h at 125 °C	± 0.16 %	+0.016 %
Moisture Resistance	JESD22, JA-104, 1000 cycles, -55 °C to +125 °C	± 0.15 %	+0.013 %
Temperature Cycling	MIL-STD-202, 106	± 0.20 %	+0.0010 %
Blasied Humidity	MIL-STD-202, 103, 1000 h at 85 °C, 85 % RH, 10 % P	± 0.10 %	+0.0237 %
Life	MIL-STD-202, 108 at 125 °C, 1000 h	± 0.1 %	+0.0220 %
Mechanical Shock	MIL-STD-202, method 213, condition C	± 0.1 %	+0.0030 %
Vibration	MIL-STD-202, method 204, 10 Hz to 2 kHz	± 0.1 %	+0.0030 %
Resistance to Soldering Heat	MIL-STD-202, 204, condition B	± 0.10 %	+0.0150 %
Electrostatic Discharge	AEC-Q200-002 at 2 kV, human body	± 0.10 %	+0.032 %
Solderability	J-STD-002, method B and B1	95 %	Acceptable
Terminal Strength	AEC-Q200-006 at 1 kg for 60 s	± 0.10 %	+0.012 %
Flame Retardance	AEC-Q200-001 para 4.0	Acceptable	Acceptable

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PAT1206E1002BBT1

P	A	T	1	2	0	6	E	1	0	0	2	B	B	T	1
GLOBAL MODEL	CASE SIZE	TCR	CHARACTERISTIC	RESISTANCE	TOLERANCE	TERMINATION	PACKAGING								
PAT	0402	± 25 ppm/°C	H = ± 50 ppm/°C E = ± 25 ppm/°C K = ± 100 ppm/°C	The first 3 digits are significant figures and the last digit specifies the number of "n" designates the decimal point. Example: 10R0 = 10.0 Ω 10K0 = 10.0 kΩ 100Z = 10.0 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 mm., 1000 mult TF = Full reel TS = 100 mm., 1 mult								

Revision: 30-Nov-09

Build Vishay into your Design