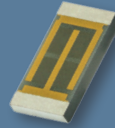




Thin Film Resistors

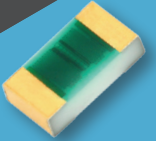
Precision High Power Chip Resistor, Up to 6 W, Aluminum Nitride Substrate

PCAN



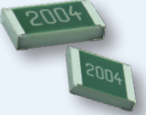
AEC-Q200 Qualified, Moisture-Resistant Chip Resistor, Temperature Up to 250 °C

PATT



High Voltage Precision Thin Film Resistor Up to 1000 V

TNPV e3



High Precision, High Stability Surface-Mount Resistors

P



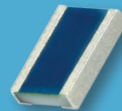
High Temperature Surface-Mount Networks (Up to 230 °C)

PRAHT



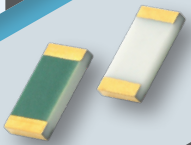
Rated Dissipation P₈₅ Up to 300 mW

MCW 0406 AT



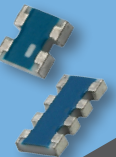
High Temperature Precision Thin Film Resistor, Temperatures Up to 215 °C

PLTT



TCR Tracking and Tolerance Matching of Two Different Resistor Values

ACAS 0606 AT, ACAS 0612 AT





THIN FILM RESISTORS

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Thin Film Chip Resistors									
Series	Type	Sizes	Resistance Range	Power Rating	Maximum Voltage	Tolerance	TCR	Load-Life Stability	Operating Temp. Range
CH	Wraparound / Flip chip	02016 / 0402 / 0603	10 Ω to 500 Ω	30 mW to 125 mW	30 V to 50 V	± 1 % to ± 10 %	± 100 ppm/°C	n/a	-55 °C to +155 °C
	Frequency up to 50 GHz (design kits available)								
FC	Wraparound / Flip chip	0402 to 1206	10 Ω to 1 kΩ	50 mW to 330 mW	30 V to 75 V	± 0.1 % to ± 5 %	± 25 ppm/°C to ± 100 ppm/°C	± 0.02 % (2000 h at P ₇₀)	-55 °C to +155 °C
	Precision high frequency thin film chip resistor up to 20 GHz frequency performance								
IGBR	Bare chip	0202 to 0808	1 Ω to 25 Ω	2 W to 4 W	75 V	± 5 % to ± 25 %	± 200 ppm/°C to ± 500 ppm/°C	± 1 % (1000 h at 200 °C film temperature)	-55 °C to +125 °C
	High power; moisture resistant; back contact thin film resistor								
L	Wraparound	0603 to 2512	1 Ω to 9.99 Ω	125 mW to 2 W	50 V	± 1 % to ± 10 %	± 50 ppm/°C to ± 300 ppm/°C	± 0.5 % (2000 h at P ₇₀)	-55 °C to +155 °C
	Low ohmic value								
MC Precision Professional	Wraparound	0402 to 1206	1 Ω to 10 MΩ	0.063 W to 0.4 W	50 V to 200 V	± 0.1 % to ± 1 %	± 10 ppm/K; ± 15 ppm/K; ± 25 ppm/K; ± 50 ppm/K	Down to ≤ ± 0.05 % (1000 h at P ₇₀)	-55 °C to +155 °C
	Superior overall stability: class 0.1, 0.25, and 0.5; approved to EN 140401-801								
MC AT	Wraparound	0402 to 1206	1 Ω to 10 MΩ	0.13 W to 0.52 W	50 V to 200 V	± 0.05 % to ± 1 %	± 5 ppm/K; ± 10 ppm/K; ± 15 ppm/K; ± 25 ppm/K; ± 50 ppm/K	Down to ≤ ± 0.05 % (1000 h at P ₇₀)	-55 °C to +175 °C
	Approved to EN 140401-801; AEC-Q200 qualified; sulfur resistant								
MC HP	Wraparound	0402 to 0805	1 Ω to 100 kΩ	0.2 W to 0.4 W	50 V to 150 V	± 0.1 % to ± 1 %	± 25 ppm/°C to ± 50 ppm/°C	Down to ≤ ± 0.2 % (1000 h at P ₇₀)	-55 °C to +175 °C
	Enhanced power rating at excellent long term stability; AEC-Q200 qualified								
MCW AT Precision Professional	Wraparound	0406, 0612	1 Ω to 100 kΩ	0.2 W to 1 W	50 V to 75 V	± 0.1 % to ± 1 %	± 15 ppm/K; ± 25 ppm/K; ± 50 ppm/K	Down to ≤ ± 0.1 % (1000 h at P ₇₀)	-55 °C to +175 °C
	Rated dissipation P ₇₀ up to 1 W; AEC-Q200 qualified								
P	Wraparound	0302 to 2512	10 Ω to 86 MΩ	40 mW to 2 W	25 V to 300 V	± 0.01 % to ± 5 %	± 5 ppm/°C to ± 100 ppm/°C	± 0.1 % typical (8000 h at P ₇₀)	-55 °C to +155 °C
	High precision								
PAT	Wraparound	0402 to 2512	2.5 Ω to 3 MΩ	50 mW to 1 W	75 V to 200 V	± 0.1 % to ± 1 %	± 25 ppm/°C to ± 100 ppm/°C	± 0.05 % (2000 h at P ₇₀)	-55 °C to +155 °C
	AEC-Q200 qualified; precision moisture resistant tantalum nitride thin film chip resistor								
PATT	Wraparound	0402 to 1206	1 Ω to 1 MΩ	50 mW to 400 mW	75 V to 200 V	± 0.1 % to ± 1 %	± 25 ppm/°C to ± 200 ppm/°C	± 0.2 % (1000 h at P ₁₃₅)	-55 °C to +250 °C
	AEC-Q200 qualified; moisture resistant tantalum nitride resistive film with operating temperature up to 250 °C								
PCAN PCNM	Wraparound	0603 to 1206, 2512	2 Ω to 1 kΩ	0.5 W to 6 W	75 V to 100 V	± 0.1 % to ± 5 %	± 25 ppm/°C to ± 100 ppm/°C	± 1 % (1000 h at 70 °C)	-55 °C to +155 °C
	Power rating up to 6 W; aluminum nitride substrate for high thermal conductivity; PCNM is non-magnetic version								
PFRR	Wraparound	0402 to 2010	100 Ω to 6 MΩ	50 mW to 500 mW	30 V to 200 V	± 0.05 % to ± 0.1 %	± 10 ppm/°C to ± 25 ppm/°C	± 0.05 % typical (8000 h at P ₇₀)	-55 °C to +155 °C
	ESCC qualified hi-rel components								
PHR	Wraparound	0402 to 2010	10 Ω to 6 MΩ	50 mW to 500 mW	30 V to 150 V	± 0.01 % to ± 0.1 %	± 5 ppm/°C to ± 25 ppm/°C	± 0.02 % typical (2000 h at P ₇₀)	-55 °C to +155 °C
	ESCC qualified hi-rel / high precision components								
PHT	Wraparound	0402 to 2010	10 Ω to 7.5 MΩ	18.9 mW to 200 mW	50 V to 300 V	± 0.01 % to ± 1 %	± 10 ppm/°C to ± 55 ppm/°C	± 0.35 % (2000 h at P ₂₂₀)	-55 °C to +215 °C
	High temperature								
PLT	Wraparound	0603 to 1206	250 Ω to 775 kΩ	150 mW to 400 mW	75 V to 200 V	± 0.01 % to ± 0.1 %	± 5 ppm/°C	± 0.02 % (2000 h at P ₇₀)	-55 °C to +125 °C
	Precision low TCR of 5 ppm/°C with extremely tight tolerance of ± 0.01 %								
PLTT	Wraparound	0603 to 2512	75 Ω to 3 MΩ	0.15 W to 1 W	75 V to 200 V	± 0.02 % to ± 2 %	± 5 ppm/°C	± 0.5 % typical (2000 h at 215 °C) 25 % of P ₇₀	-55 °C to +215 °C
	High temperature precision thin film resistor								
PNM	Wraparound	0402 to 2512	10 Ω to 3 MΩ	50 mW to 1 W	75 V to 200 V	± 0.1 % to ± 1 %	± 25 ppm/°C to ± 100 ppm/°C	± 0.03 % typical (1000 h at P ₇₀)	-55 °C to +155 °C
	Precision non-magnetic thin film chip resistor								
PTN	Wraparound	0402 to 2512	1 Ω to 3 MΩ	50 mW to 2 W	75 V to 200 V	± 0.05 % to ± 1 %	± 10 ppm/°C to ± 100 ppm/°C	± 0.03 % (2000 h at P ₇₀)	-55 °C to +155 °C
	Precision moisture resistant tantalum nitride chip resistor								
PWB	Bare chip	0707	0.3 Ω to 20 KΩ	1 W	200 V	± 0.5 % to ± 10 %	± 50 ppm/°C to ± 250 ppm/°C	± 0.5 % (1000 h at P ₁₂₅)	-55 °C to +125 °C
	High power, moisture resistant tantalum nitride chip resistor								



THIN FILM RESISTORS

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Thin Film Chip Resistors									
Series	Type	Sizes	Resistance Range	Power Rating	Maximum Voltage	Tolerance	TCR	Load-Life Stability	Operating Temp. Range
PWA	Bare chip	0503	0.3 Ω to 1 MΩ	0.5 W	200 V	± 0.1 % to ± 10 %	± 25 ppm/°C to ± 250 ppm/°C	± 0.5 % (1000 h at P_{70})	-55 °C to +125 °C
	High power, moisture resistant tantalum nitride chip resistor								
PVHT	Wraparound	0402 to 2010	35 Ω to 2.5 MΩ	31 mW to 200 mW	50 V to 300 V	± 0.05 % to ± 1 %	± 5 ppm/°C to ± 55 ppm/°C	± 0.8 % (2000 h at P_{220})	-55 °C to +250 °C
	Very high temperature								
RMKHT	Bare chip	20 mm x 20 mm to 213 mm x 102 mm	10 Ω to 7.5 MΩ	5 mW to 200 mW at 215 °C	up to 300 V	± 0.05 % to ± 1 %	± 15 ppm/K; ± 30 ppm/K	± 0.35 % (2000 h at P_{220})	-55 °C to +230 °C
	High temperature wirebondable chip resistor								
SFM	Bare chip	0202	1 Ω to 1 MΩ	0.25 W	100 V	± 0.1 % to ± 5 %	± 25 ppm/°C to ± 250 ppm/°C	± 0.25 % (1000 h at P_{70})	-55 °C to +150 °C
	Precision wirebondable thin film resistor								
MSFM	Bare chip	015015	2.5 Ω to 400 KΩ	0.125 W	100 V	± 0.1 % to ± 5 %	± 25 ppm/°C to ± 250 ppm/°C	± 0.5 % (1000 h at P_{70})	-55 °C to +125 °C
	Mini precision wirebondable thin film resistor								
TNPU e3	Wraparound	0402 to 1206	24.9 Ω to 511 kΩ	0.063 W to 0.25 W	50 V to 200 V	± 0.02 %; ± 0.05 %; ± 0.1 %	± 2 ppm/K; ± 5 ppm/K; ± 10 ppm/K	$\Delta R/R$ max.: ≤ 0.05 % (1000 h at P_{70})	-55 °C to +125 °C
	Low temperature coefficient and tight tolerances (± 0.02 %; ± 5 ppm/K); AEC-Q200 qualified; sulfur resistant								
TNPV e3	Wraparound	0805, 1206, 1210	121 kΩ to 3.01 MΩ	0.2 W to 0.33 W	450 V, 700 V, 1000 V	± 0.1 % to ± 1 %	± 10 ppm/K to ± 50 ppm/K	$\Delta R/R$ max.: ≤ 0.05 % (1000 h at P_{70})	-55 °C to +155 °C
	High voltage precision thin film resistor; AEC-Q200 qualified								
TNPW e3	Wraparound	0201 to 1210	1 Ω to 3.01 MΩ	0.05 W to 0.5 W	25 V to 200 V	± 0.1 % to ± 1 %	± 10 ppm/K to ± 50 ppm/K	$\Delta R/R$ max.: ≤ 0.05 % (1000 h at P_{70})	-55 °C to +155 °C
	Excellent stability ≤ 0.05 % (1000 h rated power at 70 °C); AEC-Q200 qualified (sizes 0402 to 1206); sulfur resistant								

Precision Thin Film Resistor Networks									
Series	Type	Schematic	Resistance Range	Power Rating	Maximum Voltage	Tolerance	TCR	Load-Life Stability	Operating Temp. Range
ACAS 0606 AT	Wraparound network	0606	47 Ω to 150 kΩ	0.2 W	75 V	Abs. ± 0.1 %, ratio ± 0.05 %	(± 25 / ± 15 / ± 10) ppm/K (abs.), (± 15 / ± 10 / ± 5) ppm/K (trac.)	$\Delta R/R$ max.: ≤ 0.05 % (ratio) (1000 h at P_{70})	-55 °C to +155 °C
	TCR tracking and tolerance matching of two different resistor values								
ACAS 0612 AT	Wraparound network	0612	47 Ω to 150 kΩ	0.4 W	75 V	Abs. ± 0.1 %, ratio ± 0.05 %	(± 25 / ± 15 / ± 10) ppm/K (abs.), (± 15 / ± 10 / ± 5) ppm/K (trac.)	$\Delta R/R$ max.: ≤ 0.05 % (ratio) (1000 h at P_{70})	-55 °C to +155 °C
	TCR tracking and tolerance matching up to four different resistor values								
DFN, DFN Divider	8-pin DFN	Isolated / divider / custom	100 Ω to 100 kΩ (per resistor)	400 mW (package)	100 V	Abs. ± 0.05 %, ratio ± 0.015 %	± 25 ppm/°C (abs.), ± 3 ppm/°C (trac.)	± 0.015 % ratio, 2000 h at 70 °C	-55 °C to +125 °C
	Compact 8-pin DFN-style resistor network								
MORN	QSOP	Isolated / divider / custom	400 Ω to 100 kΩ (per resistor)	200 mW (package)	50 V	Abs. ± 0.05 %, ratio ± 0.01 %	± 25 ppm/°C (abs.), ± 1 ppm/°C (trac.)	± 0.015 % ratio, 2000 h at 70 °C	-55 °C to +125 °C
	Compact 8-pin 25 mil pitch QSOP resistor network								
MPM	SOT-23	Divider	250 Ω to 100 kΩ (per resistor)	200 mW (package)	100 V	Abs. ± 0.05 %, ratio ± 0.01 %	± 25 ppm/°C (abs.), ± 2 ppm/°C (trac.)	± 0.015 % ratio, 2000 h at 70 °C	-55 °C to +125 °C
	SOT-23 resistor divider network								
NOMC	14- and 16-pin SOIC	Isolated / divider / custom	1 kΩ to 100 kΩ (per resistor)	500 mW (package)	100 V	Abs. ± 0.1 %, ratio ± 0.025 %	± 25 ppm/°C (abs.), ± 5 ppm/°C (trac.)	± 0.015 % ratio, 2000 h at 70 °C	-55 °C to +125 °C
	14- and 16-pin 50 mil pitch SOIC resistor network								
ORN, ORN Divider	8-pin SOIC	Isolated / divider / custom	33 Ω to 500 kΩ (per resistor)	400 mW (package)	100 V	Abs. ± 0.05 %, ratio ± 0.01 %	± 25 ppm/°C (abs.), ± 5 ppm/°C (trac.)	± 0.015 % ratio, 2000 h at 70 °C	-55 °C to +125 °C
	8-pin 50 mil pitch SOIC resistor network								
PRA	Wraparound network	073, 074, 100, 135, 182	10 Ω to 2 MΩ	30 mW to 200 mW (per resistor) at 70 °C	20 V to 150 V	Abs. ± 0.1 %, ratio ± 0.01 %	± 10 ppm/°C (abs.), ± 2 ppm/°C (trac.)	$\Delta R/R$ max.: ≤ 0.1 % (abs.) $\Delta R/R$ max.: ≤ 0.02 % (ratio)	-55 °C to +155 °C
	Two to eight resistors; unequal values available								
PRA HT	Wraparound network	100, 135, 182	10 Ω to 2 MΩ	10 mW to 20 mW (per resistor) at 215 °C	50 V to 150 V	Abs. ± 0.1 %, ratio ± 0.05 %	± 10 ppm/°C (abs.), ± 2 ppm/°C (trac.)	$\Delta R/R$ max.: ≤ 0.5 % (abs.) $\Delta R/R$ max.: ≤ 0.25 % (ratio) 1000 h at 215 °C	-55 °C to +215 °C
	TCR tracking and ratio stability for high temperature applications up to 215 °C								



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Thin Film Resistors Provide the Ultimate Performance for Your Requirements

Advantages of Vishay Thin Film Resistors

- Very high temperature products up to 270 °C
- High stability $|\Delta R/R|$ max.: $\leq 0.02\%$
- High precision and low noise
- Sulfur resistant
- High frequency up to 50 GHz

For the Following Applications

- Exploration - down hole drilling
- Automotive - engine, gear box, brake, battery management
- Smart power - inverter, e-meter, grid control
- Industrial - control and measurement systems
- Avionics - flight control computers
- Telecom - base stations, small cells, IoT



Vishay thin film resistors offer outstanding long time performance for analog signal conditioning circuits for automotive, industrial, and smart grid power applications



High temperature resistors and arrays provide high stability in harsh environment such as down hole drilling



Precision thin film resistors and networks provide long-term stability and enhance accuracy of test and measurement equipment

Useful Links

- Resistors for Down Hole Applications www.vishay.com/doc?49025
- Vishay Dale Thin Film Resistors Selector Guide www.vishay.com/doc?49188
- SMD Resistors Selector Guide www.vishay.com/doc?49252

EN9100 certified manufacturing line

GREEN
(5-2008)

HALOGEN FREE

AEC-Q200 QUALIFIED

Approved to EN 140401-801



Sulfur resistant
(per ASTM B809-95 humid vapor test)
(according to ASTM B 809)