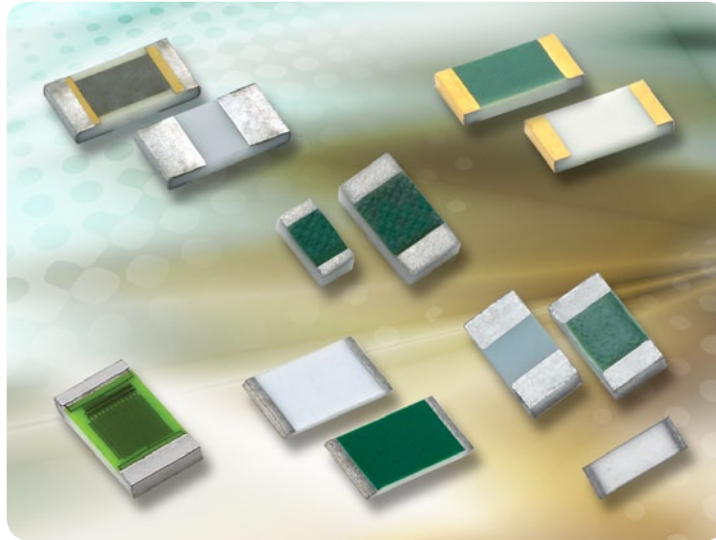


Solutions for a Wide Range of Industries



INTRODUCTION

Vishay Dale Thin Film's chip resistors are manufactured in an ISO 9001 registered facility to ensure the highest quality products. In addition to state of the art manufacturing methods, Vishay employs additional processes to ensure the highest quality and reliability over competitive product offerings. Key features of our resistors include:

- **Special Passivation Method (SPM)** – The majority of our chip resistor series undergo an SPM coating process. SPM is Vishay's proprietary coating blend to add an additional protective layer over the resistive film to prevent corrosion.
- **Moisture Resistant Tantalum Nitride Film** - Our versatile line of chip resistors are also available with tantalum nitride resistive film. Tantalum nitride is a self passivating film with superior moisture resistance characteristics under extremely humid operating conditions.
- **Stable Thin Film Performance** – Our chip resistors typically show established stable thin film performance over an extended period of time and generally outperform competitive products in reliability characteristics.
- **Custom Orders** - In addition to the standard values, custom values are also available.
- **Quick Chip** – Our Quick Chip program is another resource that can be utilized to expedite standard chip orders.

RESOURCES

- For technical questions contact thinfilm@vishay.com

One of the World's Largest Manufacturers of
Discrete Semiconductors and Passive Components





THIN/THICK FILM CHIP RESISTORS

Vishay Dale



Performance Specifications

	<u>L-NS</u>	<u>FC</u>	<u>PHP</u>	<u>PLT</u>	<u>PLTT</u>	<u>PTN</u>	<u>PNM</u>	<u>PAT</u>	<u>E/H</u>	<u>P-NS</u>	<u>M-</u>
Description	Industrial Low-Value	Precision High-Frequency	Precision High-Power	Precision Low-TCR	Precision High-Temperature, Low-TCR	Precision Moisture-Resistant	Precision Non-Magnetic	Precision Automotive AEC-Q200 Qualified	Precision QPL MIL-PRF-55342 Qualified	Precision Industrial	Industrial Thick Film Chip Resistor
Resistor Material	Nickel Alloy	Passivated Nichrome	Passivated Nichrome	Passivated Nichrome	Passivated Nichrome	Tantalum Nitride	Tantalum Nitride	Tantalum Nitride	Passivated Nichrome	Passivated Nichrome	Ruthenium
Resistance Range	0.03 Ω to 10 Ω	10 Ω to 1 kΩ	10 Ω to 30 kΩ	100 Ω to 775 kΩ	250 Ω to 3 MΩ	10 Ω to 3 MΩ	10 Ω to 3 MΩ	10 Ω to 3 MΩ	10 Ω to 6.19 MΩ	10 Ω to 6.19 MΩ	10 Ω to 25 MΩ
TCR: Absolute (±ppm/°C)	300 to 500	25 to 100	25 to 100	5	5	25 to 100	25 to 100	25 to 100	25 to 300	10 to 100	100 to 300
Tolerance: Absolute (±%)	1 to 20	0.1 to 5	0.1 to 5	0.01 to 0.1	0.02 to 0.1	0.1 to 5	0.1 to 5	0.1 to 5	0.1 to 10	0.02 to 5	1 to 10
Power Rating (W)	0.125 to 2	0.05 to 0.33	1 to 2.5	0.15 to 0.4	0.25 to 0.40	0.05 to 1	0.05 to 1	0.05 to 1	0.05 to 0.1	0.05 to 1	0.1 to 2
Working Voltage Range (V)	$\sqrt{P \times R}$	30 to 75	100 to 200	75 to 200	75 to 200	75 to 200	75 to 200	75 to 200	40 to 200	75 to 200	25 to 200
Noise (dB)	< - 35	< - 35	< - 30	< - 35	< - 35	< - 30	< - 30	< - 30	< - 25	< - 35	< - 35
Case Size	0505 0603 0705 0805 1005 1010 1206 1505 2208 2010 2512	0402 0603 0805 1005 1206	1206 2512	0603 0705 0805 1206	0805 1206	0402 0502 0505 0603 0705 0805 1005 1010 1206 1505 2208 2010 2512	0402 0502 0505 0603 0705 0805 1005 1010 1206 1505 2208 2010 2512	0402 0603 0805 1206 1505 2208 2010 2512	M55342/ 01 -12 D55342/07 (07 size only)	0402 0502 0505 0603 0705 0805 1005 1010 1206 1505 2208 2010 2512	0402 0502 0504 0505 0603 0705 0805 1005 1010 1206 1505 2208 2010 2512
Operating Temperature (°C)	- 55 to + 125	- 55 to + 125	- 55 to + 125	- 55 to + 125	- 55 to + 215	- 55 to + 125	- 55 to + 125	- 55 to + 125	- 55 to + 125	- 55 to + 125	- 55 to + 125
Storage Temperature (°C)	- 55 to + 150	- 55 to + 150	- 55 to + 150	- 55 to + 150	- 55 to + 230	- 55 to + 150	- 55 to + 150	- 55 to + 150	- 55 to + 150	- 55 to + 150	- 55 to + 150
Lead Term	X	X	X	X		X	X		X	X	X
Lead-Free Term	X	X	X	X		X	X	X		X	X
Gold Term	X	X			X	X				X	



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Product Highlights

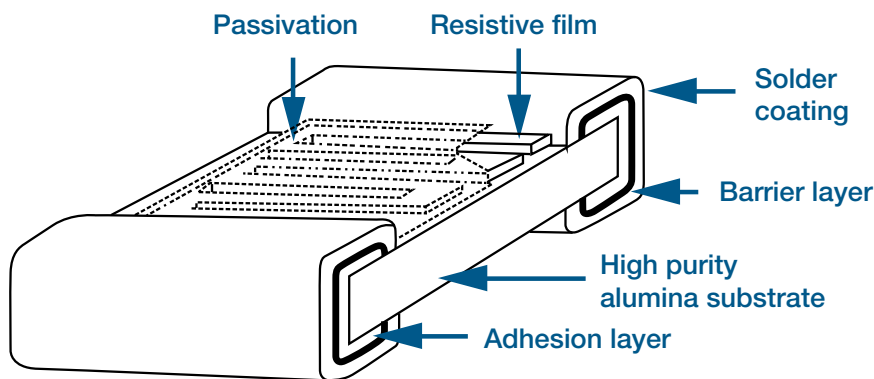
Series Type	Key Features	Applications
L-NS	Moisture resistant nickel alloy film	Current sense circuits
	Small case size	Current limit circuits
	Stable film performance of 0.4 % ΔR at 2000 h at 70 °C	Measurement systems
FC	Small size (20 mm x 40 mm min)	Low-noise amplifiers
	Frequency response up to 20 GHz	High-speed routers
	Tolerances down to 0.1 %	Attenuation circuitry
	Termination solder (lead or lead (Pb)-free), ribbon- or wire bondable	High-frequency line termination
PHP	High power ratings from 1.0 W to 2.5 W	High-precision medical imaging
	Stable film and performance characteristics of 0.1 % ΔR at + 70 °C for 2000 h	Power supply
	Available in the 1206 and 2512 case sizes	Power measurement
	Wide wraparound terminations to enhance heat dissipation	Test and measurement equipment
PLT	Extremely tight tolerance to 0.01 %	Medical
	Low TCR of 5 ppm/°C	Military
	Stable film: 0.02 % ΔR at 2000 h at 70 °C	Industrial
PLTT	Stable film and performance characteristics: < 0.05 % at 2000 h at 215 °C at 25 % rated power	Oil/Gas precision applications
	Extremely low TCR of ± 5 ppm/°C over wide temperature range	Down hole exploration
	Highly suitable for high temperature industrial applications	Automotive under the hood applications
	Tight tolerance to 0.02 %	Aircraft controls
PTN	Moisture resistant tantalum nitride film	Military and aerospace
	High power rating per case size over traditional chip resistors	Industrial/Test and measurement equipment
	Wide resistance range available: 10 Ω to 3 M Ω	Telecommunications
PNM	All non magnetic materials	Medical imaging
	Stable film and performance characteristics: 0.03 % ΔR at 70 °C, 10 000 h	High-end audio equipment
	Tolerances down to 0.1 %	Measurement sensing
PAT	AEC-Q200-compliant	Automotive equipment
	AEC-Q200 ESD-rated Class 1C (2 kV), power rating up to 1 W	Telecommunications
	Moisture-resistant tantalum nitride resistor film on high-purity alumina substrate	Industrial equipment
	Stable film and performance characteristics: < 0.05 % at 2000 h at 70 °C	Test and measurement equipment
E/H MIL-PRF-55342	Established reliability “R” and “T” failure rate level	Military
	Military QPL listed	Aerospace
	Wide resistance range available: 10 Ω to 6.19 M Ω	Radar and satellite systems
P-NS	Wide selection of case sizes	Precision reference
	Wide resistance range available : 10 Ω to 6.19 M Ω	Low-noise instrumentation
	Stable film performance characteristics: 0.05 % ΔR at 10 000 h, + 70 °C	Automated test equipment
M-	High power rating per case size	Military
	Wide resistance range available: 10 Ω to 25 M Ω	Aerospace
	Stable film performance characteristics: 0.15 % ΔR at 2000 h, 70 °C	Industrials

THIN/THICK FILM CHIP RESISTORS

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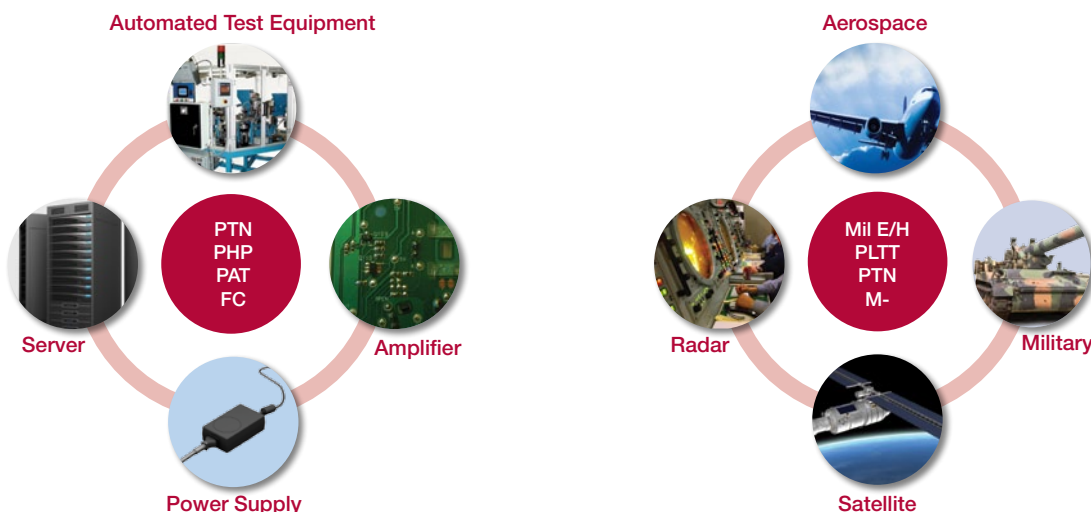
Mechanical Specifications

Layers	<u>L-NS</u>	<u>FC</u>	<u>PLT</u>	<u>PTN</u>	<u>PNM</u>	<u>PAT</u>	<u>P-NS</u>	<u>E/H</u>	<u>M-</u>	<u>PHP</u>
Substrate	High Purity Alumina									
Resistive Film	Nickel Alloy	Passivated Nichrome	Nichrome	Tantalum Nitride	Tantalum Nitride	Tantalum Nitride	Passivated Nichrome	Passivated Nichrome	Ruthenium	Nichrome
Passivation	Epoxy	SPM	Silicon Nitride and SPM	Epoxy	Epoxy	Silicon Nitride and Epoxy	SPM	SPM	Glass	SPM
Barrier	Nickel	Nickel	Nickel	Nickel	Electroless Nickel	Nickel	Nickel	Nickel	Nickel	Nickel
Adhesion Layer	x	Nichrome	Titanium Tungsten	Titanium Tungsten	Titanium Tungsten	Titanium Tungsten	Nichrome	Nichrome	x	Titanium Tungsten
PAD Layer	x	Gold	Gold	Gold	Gold	Gold	Gold	Gold	Ag Pd	Gold



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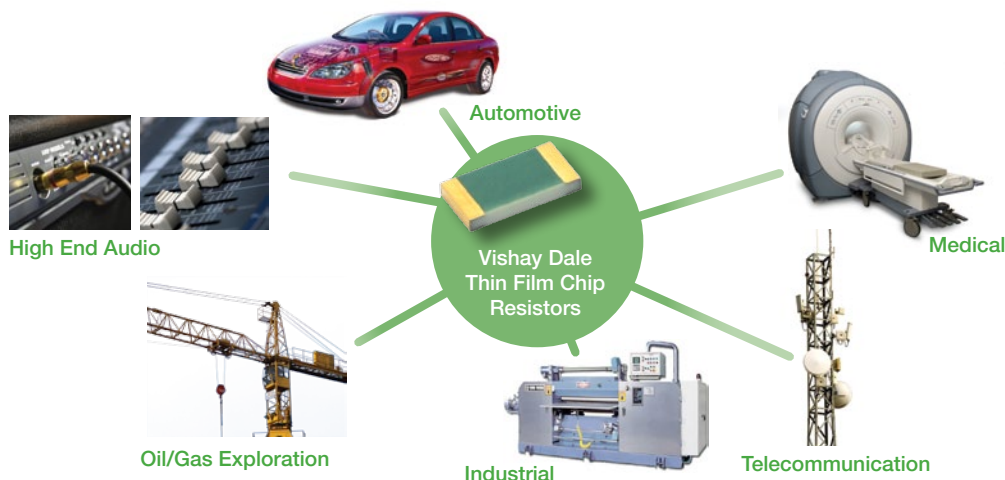


Target Applications

Vishay Dale Thin Film's chip resistors have a track record of providing solutions to a wide range of industries, including military, aerospace, medical, automotive, industrial, and telecommunications. Our broad chip resistor portfolio covers a wide resistance range from 0.03 Ω to 25 M Ω , with exceptionally low TCR and tolerance offerings down to ± 5 ppm/ $^{\circ}\text{C}$ and ± 0.01 % respectively.

Vishay's line of chip resistors are manufactured in an ISO 9001 registered facility to ensure the highest quality products. In addition to state of the art manufacturing methods, Vishay employs additional processes to ensure the highest quality and reliability over competitive product offerings. Key features of our resistors include:

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