



***Automotive/
Transportation***

Off-Road
Equipment

Pedal Positioning Controls
Steering Controls
Panel Controls

4
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6

The Engineer's Toolbox highlights, by market application, some innovative components Vishay manufactures that help design engineers develop superior end products. We recognize that offering unique component solutions helps improve the performance of next-generation devices, overcome technical barriers, and create new markets.

More information on the Engineer's Toolbox, including product datasheet links, can be found at www.vishay.com/ref/et2. For inquiries, please contact your local sales representative.



Key components for
OFF-ROAD EQUIPMENT



PEDAL POSITION CONTROLS



STEERING CONTROLS



PANEL CONTROLS

THE VISHAY ADVANTAGE

- AEC Qualifications
- Robust Design
- High Reliability
- Durability
- Long Life
- and more...*



PEDAL POSITION CONTROLS

RESISTORS, VARIABLE

981 HE Throttle Position Sensor

Non-Contacting Technology:
Hall Effect

Features

- Accurate linearity down to: $\pm 0.5\%$
- Designed for applications in harsh environments
- Spring-loaded types available



OPTOELECTRONICS

TCUT1300

Compact Transmissive Sensor

Features

- Single- and dual-channel
- Wide gap of 3 mm
- High temperature operation: up to 105 °C
- Compact surface-mount package



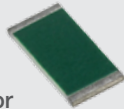
RESISTORS

PAT Automotive Qualified Tantalum Nitride Chip Resistor

Precision Thin Film Chip Resistor

Features

- Moisture-resistant tantalum nitride thin film chip resistor
- Wide resistance range from 10 Ω to 3 M Ω ; tolerance down to 0.1 %
- 0.05 % stability at 2000 h, 70 °C
- AEC-Q200 qualified



RESISTORS, NON-LINEAR

NTCS0603E3

Glass-Protected SMD 0603 NTC Thermistors

Features

- Tolerance on R_{25} down to 1 %, and on $B_{25/85}$ down to 1 %
- High operating temperature: up to 150 °C
- AEC-Q200 qualified



OPTOELECTRONICS

TCNT2000

Reflective Sensor in Miniature SMD Package

Features

- Range from 0.2 mm to 5 mm
- Integrated visible light blocking filter
- Dimensions: 3.4 mm (L) x 2.7 mm (W) x 1.5 mm (H)



RESISTORS

TNPW e3 Series

High-Stability Thin Film Chip Resistors

Features

- Low temperature coefficient and tight tolerances: $\pm 0.1\%$, ± 10 ppm/K
- Excellent overall stability in harsh environmental conditions
- AEC-Q200 qualified, automotive grade
- Case sizes: 0402 to 1210



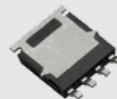
MOSFETs

SQJ461EP-T1-GE3

- 60 V P-Channel PowerPAK[®] SO-8L: 0.016 Ω , 30 A

Features

- AEC-Q101 qualified
- 5 mm x 6 mm, 30 V p-channel for any high-side load switch in automotive
- 175 °C maximum temperature



DIODES

TPSMA

400 W Surface-Mount PAR[®] TVS

Features

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_j = 185$ °C capability; suitable for high-reliability and automotive requirements
- Available in unidirectional polarity only
- 400 W peak pulse power capability with 10/1000 μ s waveform



Vishay Intertechnology's reputation for innovation, reliability, and quality is complemented by a decades-long record of service to the transportation industry.

Key Website Content

AEC-Qualified Products Overview
www.vishay.com/doc?49923

Automotive Grade Products Overview
www.vishay.com/doc?49924

Detailed Applications Information

Diesel ECU and Fuel Injector Drivers
www.vishay.com/applications/automotive/diesel_ecuandfuelinjectordrivers/

Electric Power Steering (EPS)
www.vishay.com/applications/automotive/eps_electricpowersteering/

HID Headlight AFL
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HVAC Climate Control
www.vishay.com/applications/automotive/hvac_climatecontrol/

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Thermal Simulation Tools, Performance Calculators, and SPICE and 3D Models
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View datasheets for these products at
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RESISTORS, VARIABLE

34 THE

Bushing Mount Hall Effect Sensor

Features

- Accurate linearity down to $\pm 0.5\%$
- Very long life: 50 M cycles for servo, 10 M cycles for bushing
- All electrical angles available up to 3600°
- Designed for applications requiring long life



RESISTORS, NON-LINEAR

NTHS0603

SMD NTC 0603 Chip Thermistor

Features

- Tolerance R_{25} down to 1 %
- High-density monolithic construction with glass overcoat
- Wide operating temperature range: - 40 °C to + 125 °C



DIODES

BZX84Bxxx

Silicon Planar Small-Signal Zener Diode

Features

- Zener voltages are graded according to the international E 24 standard
- Standard Zener voltage tolerance is $\pm 5\%$; replace "C" with "B" for 2 % tolerance
- AEC-Q101 qualified
- RoHS-compliant



STEERING CONTROLS

RESISTORS

NOMCA

Molded Precision Resistor Network

Features

- Moisture resistant tantalum nitride film
- High stability of 0.05 % at 1000 h, 125 °C
- Tight TCR tracking of 5 ppm/°C
- Ratio tolerance down to 0.05 %



CAPACITORS

VJ...31/VJ...34

AEC-Q200 Qualified Multilayer Ceramic Chip Capacitors

Features

- C0G (NP0), X7R, and X8R dielectric
- Case sizes: 0402 to 1812; voltages up to 3000 V_{DC}
- Operating temperature up to + 175 °C (above + 125 °C derating)
- AgPd termination available for epoxy bonding



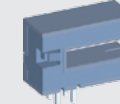
OPTOELECTRONICS

VEMT3700

High-Speed Phototransistor in PLCC2 Package

Features

- Spectral sensitivity from 450 nm to 1080 nm
- Half angle of sensitivity $\pm 60^\circ$
- Collector light current, typical, 0.5 mA with $E_e = 1 \text{ mW/cm}^2$



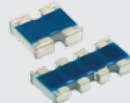
RESISTORS

ACAS 0606 AT, ACAS 0612 AT - Precision

Precision Thin Film Chip Resistor Arrays

Features

- TCR tracking down to 10 ppm/K ($\pm 5 \text{ ppm/K}$)
- Tolerance matching down to 0.1 % ($\pm 0.05\%$)
- AEC-Q200 qualified
- Resistance ratio up to 1:20



CAPACITORS

TP8 Series Automotive Grade MICROTAN®

Ideal for Space-Constrained Applications

Features

- Industry's best volumetric efficiency
- Small case sizes including 0603
- AEC-Q200 qualified



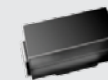
RECTIFIERS

S1G

400 V, 1 A Standard Rectifier in SMA

Features

- Glass-passivated chip technology
- Ideal for automated placement
- Meets MSL level 1
- RoHS-compliant



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PANEL CONTROLS

INDUCTORS

IHLP-1616AB

Low-Profile, High-Current
IHLP® Inductor



Features

- AEC-Q200 qualified
- Shielded construction
- Handles high transient current spikes without saturation
- Ultra-low buzz noise due to composite construction

RECTIFIERS

US1G

400 V, 1 A Ultrafast Rectifier
in SMA



Features

- Glass-passivated chip technology
- Ideal for automated placement
- Meets MSL level 1
- RoHS-compliant

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HID Headlight AFL
www.vishay.com/applications/automotive/hid_headlightafl/

HVAC Climate Control
www.vishay.com/applications/automotive/hvac_climatecontrol/

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RESISTORS

MM_/SMM

Professional Thin Film MELF
Resistors



Features

- AEC-Q200 qualified, automotive grade
- Available from 0R1 to 15M
- TCR down to 25 ppm/K
- Unrivaled pulse load robustness

OPTOELECTRONICS

VLMW41R1T1

White LED in PLCC-2 Package
Based on InGaN Technology



Features

- Typical color temperature: 5500 K
- Luminous intensity of 180 mcd to 450 mcd
- Viewing angle: ± 60°
- Operating temperature from 40 °C to 100 °C

DIODES

3KASMC24

3000 W Surface-Mount PAR® TVS



Features

- Junction passivation optimized design passivated anisotropic rectifier technology
- T_J = 185 °C capability; suitable for high-reliability and automotive requirements
- Available in unidirectional polarity only
- 3000 W peak pulse power capability with a 10/1000 μs waveform

RESISTORS, VARIABLE

P11/PE30

Potentiometers



Features

- 12.5 mm and 19.7 mm single-turn panel controls
- Tested according to CECC 41000 or IEC 60393-1
- RoHS-compliant
- High power and versatile options

OPTOELECTRONICS

TCUT1300X01

Compact Transmissive Sensor



Features

- Dual channel
- Wide gap of 3 mm
- High-temperature operation up to 105 °C
- Compact surface-mount package

THE VISHAY ADVANTAGE

AEC Qualifications

Robust Design

High Reliability

Durability

Long Life

and more...



Vishay Intertechnology, Inc.

BUILD VISHAY

into your **DESIGN**

