



Vishay Intertechnology, Inc.

# Transportation

(Off-Road Equipment)



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





## **Transportation** Off-Road Equipment

Pedal Position Controls	2
Steering Controls	3
Panel Controls	4

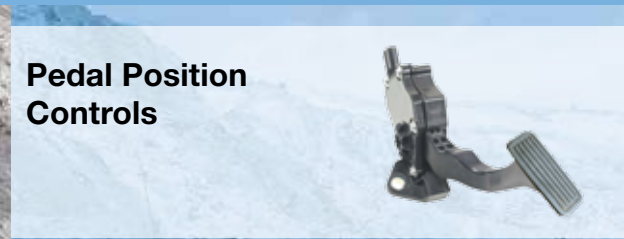
More information on the Engineer's Toolbox, including product datasheet links, can be found at [www.vishay.com/ref/et3](http://www.vishay.com/ref/et3).

For inquiries, please contact your local sales representative.

# Key components for OFF-ROAD EQUIPMENT



**THE VISHAY ADVANTAGE**  
AEC Qualifications  
Robust Design  
High Reliability  
Durability  
Long Life  
and more...





# Pedal Position Controls



OPTOELECTRONICS

**Subminiature Dual-Channel Transmissive Optical Sensor with Deep Slot for Turn-and-Push Encoding**

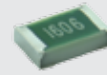


**TCUT1600X01**

- Resolve direction and speed with dual-channel transmissive (interrupter) sensor
- High slot height for turn-and-push sensing

RESISTORS

**High-Stability Thin Film Flat Chip Resistors**



**TNPW e3**

- Excellent overall stability, endurance < 0.05 %, resistance range from 10 Ω to 3 MΩ
- AEC-Q200 qualified, sulfur resistant, halogen-free

SENSORS

**Throttle Position Sensor in Hall Effect Technology, Hollow and D-Shaft Versions**

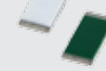


**981 HE**

- Accurate linearity down to ± 0.5 %, hollow and d-shaft versions available
- Spring-loaded types available, dedicated to applications in harsh environments

RESISTORS

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

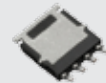


**PAT**

- Moisture-resistant tantalum nitride film and added silicon nitride layer for ESD
- Wide resistance range from 2.5 Ω to 3 MΩ with tolerance down to ± 0.1 %

MOSFETs

**Automotive P-Channel 60 V (D-S) 175 °C MOSFET**



**SQJ461EP-T1-GE3**

- TrenchFET® technology, AEC-Q101 qualified, maximum R<sub>DS(on)</sub> 16 mΩ
- Thermally enhanced PowerPAK® SO-8L packaging

RESISTORS

**Thick Film Surface-Mount Chip Resistors, Wraparound and Extremely Low Value**



**RCWE**

- Low resistance values from 0.01 Ω to 0.976 Ω and tolerance of 1 %
- Thick film construction with 2x power capacity

DIODES

**Surface-Mount PAR® Transient Voltage Suppressors**



**TPSMA**

- AEC-Q101 qualified, T<sub>J</sub> = 185 °C capability suitable for automotive requirements
- 400 W peak pulse power capability with a 10/1000 μs waveform

NON-LINEAR RESISTORS

**SMD 0603, Glass Protected NTC Thermistors**



**NTCS0603**

- Standard series, AEC-Q200 compliant
- Glass protected with soft terminations

CERAMIC CAPACITORS

**AEC-Q200 Qualified, Broad Range of Sizes and Working Voltages, C0G (NP0), X7R, and X8R**



**VJ...31/VJ...34 Automotive MLCC**

- RoHS and GREEN compliant parts available
- AgPd termination available for epoxy bonding



# Steering Controls




**RESISTORS**

**Precision Thin Film Chip Resistor Array, Superior Moisture Resistivity** 

[ACAS...AT](#)

- Arbitrary resistance ratio up to 1:20, superior tracking stability over lifetime
- Relative TCR down to  $\pm 5$  ppm/K (tracking), AEC-Q200 qualified, sulfur resistant


**OPTOELECTRONICS**

**Subminiature Dual-Channel Transmissive Optical Sensor with Phototransistor Outputs** 

[TCUT1350X01](#)

- Resolve direction and speed with dual-channel transmissive (interrupter) sensor
- Wide operating temperature range from  $-40$  °C to  $+125$  °C


**SENSORS**

**Ten-Turns Servo or Bushing Mount Hall Effect Sensor in Size 09 (22.2 mm)** 

[34 THE](#)

- Accurate linearity:  $\pm 0.5$  %, long life: 50M cycles for servo, 10M for bushing
- All electrical angles available up to  $3600^\circ$ , dedicated to long-life applications

**DIODES**

**Small-Signal Zener Diodes** 

[BZX84B6V8](#)

- ESD capability according to AEC-Q101
- The Zener voltages are graded according to the international E24 standard


**RESISTORS**

**Molded, 50 mil Pitch, Dual-In-Line Thin Film Resistor Network, Precision Automotive** 

[NOMCA](#)

- Tantalum nitride resistive film for superior moisture protection
- Excellent long term ratio stability  $\pm 0.015$  % for 1000 h at  $125$  °C

**ALUMINUM CAPACITORS**

**Advanced Temperature Range Up to  $150$  °C** 

[160 CLA](#)

- High ripple current: up to 1.4 A at  $150$  °C / 100 kHz
- Useful life up to 2000 h at  $150$  °C


**TANTALUM CAPACITORS**

**Solid Tantalum Chip Capacitors, High CV Leadframeless Molded, Automotive Grade** 

[TP8](#)

- Smallest AEC-Q200-qualified tantalum capacitor with case sizes as small as 0603
- Perfect for space-constrained designs


**RECTIFIERS**

**Surface-Mount Glass Passivated Rectifier** 

[S1G](#)

- Glass passivated diode technology
- AEC-Q101 qualified

**NON-LINEAR RESISTORS**

**NTC Thermistors, SMD 0402, 0603, 0805, and 1206 Chip** 

[NTHS...](#)

- Standard series
- Glass protected

**RESISTORS**

**Lead (Pb)-Bearing High-Stability Thin Film Chip Resistors** 

[TNPW](#)


- Excellent overall stability, endurance  $< 0.05$  %, resistance range from  $10 \Omega$  to  $3 M\Omega$
- SnPb plating with Pb content  $> 6$  %, TCR down to 10 ppm/K, tol. down to 0.1 %

View datasheets for these products  
[www.vishay.com/ref/et3tr1b](http://www.vishay.com/ref/et3tr1b)




# Panel Controls




RECTIFIERS  
**Surface-Mount Ultrafast Rectifier**  
  
[US1G](#)  

- High forward surge capability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C

ALUMINUM CAPACITORS  
**Aluminum Capacitors SMD (Chip), High Temperature, Low Impedance**  
  
[146 CTI](#)  


- High temperature up to 125 °C, long life, low impedance, high ripple current
- Soldering according to JEDEC-J-STD-020

OPTOELECTRONICS  
**Standard SMD LED PLCC-2**  
  
[VLMW41R1T1](#)  


- Luminous intensity up to 355 mcd with typical color temperature of 5000 K
- White color coordinates of 0.345 (X), 0.352 (Y) with a 120° viewing angle

RESISTORS  
**Thin Film Mini-MELF Resistors**  
  
[SMM0204](#)  


- Unrivaled surge handling capability, ultimate stability over lifetime
- AEC-Q200 qualified, sulfur resistant, GREEN product

DIODES  
**Surface-Mount PAR® Transient Voltage Suppressors**  
  
[3KASMC24](#)  


- AEC-Q101 qualified, T<sub>j</sub> = 185 °C capability suitable for automotive requirement
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C

INDUCTORS  
**Low-Profile, High-Current IHLP® Inductors**  
  
[IHLP-1616AB](#)  


- Extremely small, high-current inductors for DC/DC conversion
- High-efficiency, high-frequency operation

DISPLAYS  
**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**  
  
[LCD, OLED, Color TFT](#)  

- Selection of transfective LCD, sunlight-readable OLED, and high-brightness color TFT
- High-visibility displays for use in the transportation industry

RESISTORS  
**Long-Life Cermet Potentiometer**  
  
[P11L](#)  


- Long life 2M cycles 12.5 mm square single-turn panel control, versatile options
- Compliant to RoHS, tested according to CECC, value added and custom designs available

OPTOELECTRONICS  
**Subminiature Dual-Channel Transmissive Optical Sensor with Deep Slot for Turn-and-Push Encoding**  
  
[TCUT1600X01](#)  

- Resolve direction and speed with dual-channel transmissive (interrupter) sensor
- High slot height for turn-and-push sensing

CERAMIC CAPACITORS  
**AEC-Q200 Qualified, Broad Range of Sizes and Working Voltages, C0G (NP0), X7R, and X8R**  
  
[VJ....31/VJ....34 Automotive MLCC](#)  

- RoHS and GREEN compliant parts available
- AgPd termination available for epoxy bonding

RESISTORS  
**Fully Sealed Panel Potentiometer, Military and Professional Grades**  
  
[PE30](#)  

- Robust 2 W, 19.7 mm axial single-turn panel control
- Compliant to RoHS, tested according to CECC, value added and custom designs available

View datasheets for these products  
www.vishay.com/ref/et3tr1c





Vishay Intertechnology, Inc.



A *WORLD OF*  
*SOLUTIONS*