



Vishay Intertechnology, Inc.

# *Alternative Energy / Industrial*



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



**Alternative Energy**

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A **WORLD OF SOLUTIONS**



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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 SOLAR ENERGY



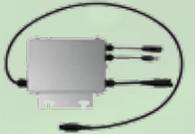
### THE VISHAY ADVANTAGE

- High Working Voltage
- Long Useful Life
- High Reliability
- Safety Approvals
- High Surge Current Capability
- Wide Operating Temperature
- Range-Ruggedized Construction
- and more....

**Main Inverters**  
up to 50 kW



**Micro Inverters**



**PV Storage /  
PV Batteries**



**Junction Boxes**





# Main Inverters up to 50 kW



### RESISTORS

#### Thin Film Mini-MELF Resistors



[MM / SM](#)

- Unrivaled surge handling capability, ultimate stability over lifetime
- AEC-Q200 qualified, approved acc. EN 140401-803, sulfur resistant, GREEN product

### MOSFETs

#### E Series 600 V Power MOSFET



[SiHG47N60E](#)

- High-performance E Series high-voltage technology, maximum  $R_{DS(on)}$  64 mΩ
- Popular TO-247 packaging, maximum continuous current of 47 A

### INDUCTORS

#### Low-Profile, High-Current IHLP® Inductors



[IHLP-5050](#)

- High-current, low-saturation inductor for DC/DC conversion and filtering

### RECTIFIERS

#### High-Voltage Input Rectifier Diodes, 40 A, 60 A up to 1600 V



[40EPSxxPbF / 60EPSxxPbF](#)

- 150 °C maximum operating junction temperature
- Very low forward voltage drop

### CERAMIC CAPACITORS

#### Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage



[MLCC OMD Capacitors](#)

- Polymer termination available for intensive board flex requirements
- 100 % voltage conditioning available up to 630 V<sub>DC</sub> rating (process code “5H”)

### OPTOELECTRONICS

#### Optocoupler with Phototransistor Output and Trigger Current of I<sub>F</sub> = 5 mA



[VOL617A](#)

- High current transfer ratio, and high isolation voltage of 5000 V<sub>RMS</sub>
- Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package

### ESTA POWER CAPACITORS

#### LVAC Power Capacitors



[PhMKP](#)

- Single-phase and 3-phase capacitors
- Conforms to UL 810 and CSA C22.2 standards

### MODULES

#### 3-Level Half-Bridge Inverter Stage, 60 A, 57 A



[VS-EMF050J60U](#)

- Operating frequency 60 kHz to 150 kHz
- UL approved file E78996

### RESISTORS

#### High-Power, High-Current Grid Resistors, 1 kW and Larger



[GRE1](#)

- High active mass with good thermal dissipation
- IP00, IP20, and IP23 rated enclosures available

### MODULES

#### Standard Diodes up to 600 A, up to 2000 V, H/B Configuration in SUPER MAGN-A-PAK



[VSKD270 / VSKD600](#)

- High-current capability, high-voltage (up to 2000 V)
- Industrial standard package SUPER MAGN-A-PAK

### NON-LINEAR RESISTORS

#### NTC Thermistors, Standard Lug Sensors



[NTCALUG01A](#)

- Robust surface temperature sensor
- AEC-Q200 compliant, UL recognized

### FILM CAPACITORS

#### Metallized Polypropylene Film DC-Link Capacitor



[MKP1848](#)

- High-performance DC-Link capacitor with high RMS current capabilities
- Automotive Grade AEC-Q200 compliant

View datasheets for these products  
[www.vishay.com/ref/et3ae1a](http://www.vishay.com/ref/et3ae1a)



# Micro Inverters



**MOSFETs**  
**N-Channel 150 V (D-S) MOSFET**  
[SiR872ADP](#)

- ThunderFET® technology with very low maximum  $R_{DS(on)}$  of 18 mΩ and low gate charge
- Low losses for single-ended switched mode topologies, PowerPAK® SO-8 pkg.



**RESISTORS**  
**Power Metal Strip® Resistors, Low Value (Down to 0.001 Ω), Surface-Mount**  
[WSR](#)

- High power ratings to 5 W in molded 4527 size package
- Molded package with compliant leads that give superior thermal shock resilience



**MOSFETs**  
**E Series 600 V Power MOSFET**  
[SiHB22N60E](#)

- High-performance E Series high-voltage technology, maximum  $R_{DS(on)}$  180 mΩ
- Popular D<sup>2</sup>PAK packaging, maximum continuous current of 21 A



**FILM CAPACITORS**  
**Metallized Polypropylene Film DC-Link Capacitor**  
[MKP1848S](#)

- Slim high-performance DC-Link for low-building-height applications



**CERAMIC CAPACITORS**  
**AC Line Rated Disc Capacitors, Class X1, 760 V<sub>AC</sub>, Class Y1, 500 V<sub>AC</sub>**  
[VY1](#)

- X1 / Y1 safety rating according to IEC 60384-14, 3rd edition
- Highest reliability and lifetime, operating temperature: -40 °C to +125 °C



**ICs**  
**100 V, Integrated Half-Bridge Power Stage**  
[SiC41001](#)

- 75 V input voltage capable with integration of 100 V ThunderFET MOSFETs
- Capable of delivering up to 200 W continuous power



**OPTOELECTRONICS**  
**Optocoupler with Phototransistor Output and Trigger Current of I<sub>F</sub> = 5 mA**  
[VOL617A](#)

- High current transfer ratio, and high isolation voltage of 5000 V<sub>RMS</sub>
- Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package



**TANTALUM CAPACITORS**  
**Solid Tantalum Surface-Mount Chip Capacitors TANTAMOUNT®, Molded Case, Low ESR**  
[TR3](#)

- Molded tantalum capacitor low ESR
- Automation and control, SMPS, motion and drives, telecom infrastructure, networking and multiplexer, general purpose



**DIODES**  
**Surface-Mount TRANSZORB® Transient Voltage Suppressors**  
[SMBJ5.0CA / 1.5SMC540A](#)

- 600 W peak pulse power capability with a 10/1000 μs waveform
- AEC-Q101 qualified



**INDUCTORS**  
**Low-Profile, High-Current IHLP® Inductors**  
[IHLP-6767GZ-5A](#)

- Very high current, low saturation inductor for DC/DC conversion and filtering
- High temperature continuous operation at 155 °C



**CERAMIC CAPACITORS**  
**IEC 60384-14:2005, CAN/CSA/cCSAus, and ANSI/UL CB Certificates**  
[MLCC SMD Safety Capacitor](#)

- Surface-mount design: simpler assembly and reduced board space requirement
- Available in NP0 (C0G) or X7R dielectrics



**NON-LINEAR RESISTORS**  
**VDR Metal Oxide Varistors High Surge**  
[VDRH](#)

- Extended operating temperature to 125 °C
- UL recognized up to 105 °C (selected types)



View datasheets for these products [www.vishay.com/ref/et3ae1b](http://www.vishay.com/ref/et3ae1b)



# PV Storage / PV Batteries



### OPTOELECTRONICS

**Widebody IGBT and MOSFET Driver with High Creepage and Clearance of 10 mm**

[VOW3120](#)

- 10 mm min. external creepage distance, 8000 V max. transient isolation voltage
- 2.5 A peak output current, 45 kV/ $\mu$ s common mode rejection



### RESISTORS

**High-Ohmic / High-Voltage Metal Glaze Leaded Resistors**

[VR37](#)

- UL 1676, VDE 0860, CQC safety approvals
- High pulse loading capability (10 kV)



### CERAMIC CAPACITORS

**Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage**

[MLCC OMD Capacitors](#)

- Polymer termination available for intensive board flex requirements
- 100 % voltage conditioning available up to 630 V<sub>DC</sub> rating (process code "5H")



### RESISTORS

**Power Metal Strip® Battery Shunt Resistor, Very Low Value**

[WSBS](#)

- Extremely low resistance values: 50  $\mu\Omega$  to 1000  $\mu\Omega$
- Low thermal EMF, < 3  $\mu$ V/ $^{\circ}$ C, for accurate current sensing



### FILM CAPACITORS

**Metallized Polypropylene Film DC-Link Capacitor**

[MKP1848S](#)

- Slim high-performance DC-Link for low-building-height applications



### OPTOELECTRONICS

**Widebody 1 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm**

[VOW136](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/ $\mu$ s



### CERAMIC CAPACITORS

**AC Line Rated Disc Capacitors Class X1, 440 V<sub>AC</sub>, Class Y2, 300 V<sub>AC</sub>**

[VY2](#)

- X1 / Y2 safety rating according to IEC 60384-14, 3rd edition
- Highest reliability and lifetime, operating temperature: -40  $^{\circ}$ C to +125  $^{\circ}$ C



### OPTOELECTRONICS

**Photovoltaic MOSFET Driver with Integrated Fast Turn-Off, Solid-State Relay**

[VOM1271](#)

- Drive current from primary side LED; one less external power supply needed
- Isolation test voltage 4500 V<sub>RMS</sub> and integrated turn-off circuitry for high-speed switching



### NON-LINEAR RESISTORS

**SMD 0603, Glass Protected NTC Thermistors**

[NTCS0603E3...](#)

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



### OPTOELECTRONICS

**Widebody 10 MBd High Speed Optocoupler with High Creepage and Clearance of 10 mm**

[VOW2611](#)

- 8000 V max. transient isolation voltage
- Integrated faraday shield provides very high input-to-output noise isolation of 40 kV/ $\mu$ s



### RESISTORS

**Power Metal Strip® Resistors, Very High Power, Low Value, Surface-Mount**

[WSLP](#)

- Very high power rating to 3 W in WSLP0603 to WSLP2512 size packages
- Extremely low resistance values from 0.0005  $\Omega$  to 0.1  $\Omega$  and tolerance of 1 %



### ALUMINUM CAPACITORS

**Aluminum Capacitors, Power, Ultra Long Life, Snap-In**

[159 PUL-SI](#)

- Most popular series; long life snap-in, up to 500 V at 105  $^{\circ}$ C
- Custom made parts based on the need of your application are available on request



View datasheets for these products [www.vishay.com/ref/et3ae1c](http://www.vishay.com/ref/et3ae1c)



# Junction Boxes



<p>RECTIFIERS</p> <p><b>Photovoltaic Solar Cell Protection Schottky Rectifier, Ultra Low <math>V_f = 0.30\text{ V}</math> at <math>I_f = 5.0\text{ A}</math></b></p> <p><a href="#">VSB2045Y</a></p> <ul style="list-style-type: none"> <li>• High junction temperature 230 °C maximum at DC forward current</li> <li>• Trench MOS Schottky technology</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Optocoupler with Photodarlington Output and High CTR of 100 %</b></p> <p><a href="#">SFH619</a></p> <ul style="list-style-type: none"> <li>• High collector emitter voltage, <math>V_{CE0} = 300\text{ V}</math>, high isolation test voltage: <math>5300\text{ V}_{RMS}</math></li> <li>• Standard plastic DIP-4 package</li> </ul>	<p>DIODES</p> <p><b>Surface-Mount TRANSZORB® Transient Voltage Suppressors</b></p> <p><a href="#">SMP TVS</a></p> <ul style="list-style-type: none"> <li>• Meets MSL level 1, per J-STD-020C, LF maximum peak of 260 °C</li> <li>• Very low profile – typical height of 0.65 mm</li> </ul>
<p>CERAMIC CAPACITORS</p> <p><b>AC Line Rated Disc Capacitors, Class X1, 760 <math>V_{AC}</math>, Class Y1, 500 <math>V_{AC}</math></b></p> <p><a href="#">VY1</a></p> <ul style="list-style-type: none"> <li>• X1 / Y1 safety rating according to IEC 60384-14, 3rd edition</li> <li>• Highest reliability and lifetime, operating temperature: -40 °C to +125 °C</li> </ul>	<p>MOSFETs</p> <p><b>P-Channel 30 V (D-S) MOSFET</b></p> <p><a href="#">Si4425DDY</a></p> <ul style="list-style-type: none"> <li>• TrenchFET® technology with low maximum <math>R_{DS(on)}</math> of 9.8 mΩ</li> <li>• Popular SO-8 package</li> </ul>	<p>RESISTORS</p> <p><b>Power Metal Strip® Resistors, Low Value (Down to 0.0005 Ω), Surface-Mount</b></p> <p><a href="#">WSL2512</a></p> <ul style="list-style-type: none"> <li>• Extremely low resistance values from 0.0005 Ω to 0.5 Ω and tolerance of 1 %</li> <li>• High power of 1 W in 2512 size resistor</li> </ul>
<p>MOSFETs</p> <p><b>N-Channel 100 V (D-S) MOSFET</b></p> <p><a href="#">SiR846ADP</a></p> <ul style="list-style-type: none"> <li>• ThunderFET® technology providing maximum <math>R_{DS(on)}</math> of 7.8 mΩ and low gate charge</li> <li>• Efficient high-frequency switching in the PowerPAK® SO-8 package</li> </ul>	<p>RESISTORS</p> <p><b>High-Ohmic / High-Voltage Metal Glaze Leaded Resistors</b></p> <p><a href="#">VR37</a></p> <ul style="list-style-type: none"> <li>• UL 1676, VDE 0860, CQC safety approvals</li> <li>• High pulse loading capability (10 kV)</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Optocoupler with Phototransistor Output and Trigger Current of <math>I_F = 1\text{ mA}</math></b></p> <p><a href="#">VOL618A</a></p> <ul style="list-style-type: none"> <li>• High current transfer ratio, and high isolation voltage of 5000 <math>V_{RMS}</math></li> <li>• Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package</li> </ul>
<p>MOSFETs</p> <p><b>N-Channel 30 V (D-S) MOSFET</b></p> <p><a href="#">SiRA10DP</a></p> <ul style="list-style-type: none"> <li>• TrenchFET Gen IV power MOSFET, 100 % <math>R_g</math> and UIS tested</li> <li>• Low <math>R_{DS(on)}</math></li> </ul>	<p>MELF RESISTORS</p> <p><b>Professional Thin Film MELF Resistors</b></p> <p><a href="#">MMB0207</a></p> <ul style="list-style-type: none"> <li>• Approved according to EN 140401-803, AEC-Q200 qualified</li> <li>• High surge voltage capability</li> </ul>	

View datasheets for these products [www.vishay.com/ref/et3ae1d](http://www.vishay.com/ref/et3ae1d)

# Spotlight on Power Metal Strip® Resistors

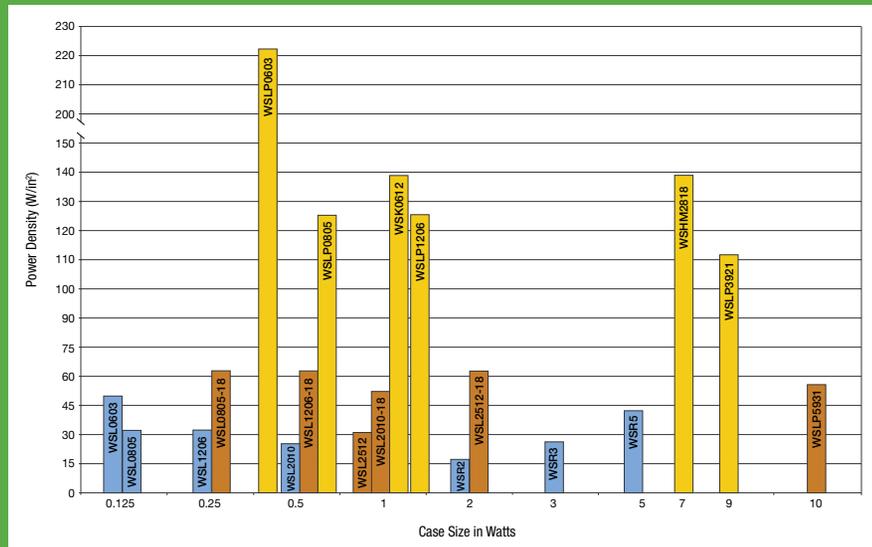
## Combining Low TCR (< 30 ppm/°C), Low Ohmic Values Down to 0.2 mΩ, Tight Tolerance, and High-Temperature Capabilities

Vishay’s Power Metal Strip® current sensing resistors combine superior performance in high-temperature applications with a wide range of package sizes and a choice of resistance values from 0.0002 Ω to 1 Ω. These patented, state-of-the-art products deliver overload capabilities equivalent to wirewound devices and temperature coefficients as low as 30 ppm/°C.

Current sensing Power Metal Strip resistors allow control circuitry to monitor the level of current in a circuit by translating current into a voltage that can be monitored easily. The devices work by resisting the current flow in a circuit to a calibrated level, thus allowing a voltage drop to be detected and monitored by control circuitry. The low resistance values of Power Metal Strip resistors allow this function to be carried out with exceptional efficiency.

### High Power Density (up to 222 W/in<sup>2</sup>, 34.4 W/cm<sup>2</sup>)

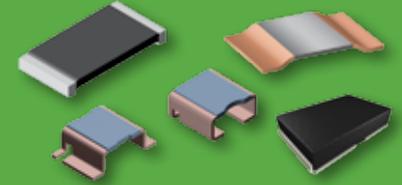
Vishay’s Power Metal Strip resistors have evolved to “High Power” WSL...-18, WSLP, WSR3, WSR5, and WSHM2818 type resistors. Specially selected materials and processing permit these components to attain high power ratings of up to 10 W. The WSL...-18, WSLP, WSR3, WSR5, and WSHM2818 resistors offer a high power-to-package-size ratio while maintaining superior electrical characteristics. These high power ratings enable designers to use smaller PCBs, which in turn increases manufacturing speed and reduces raw material costs.



### Very High-Power, Surface-Mount Power Metal Strip Current Sensing Resistors

#### FEATURES

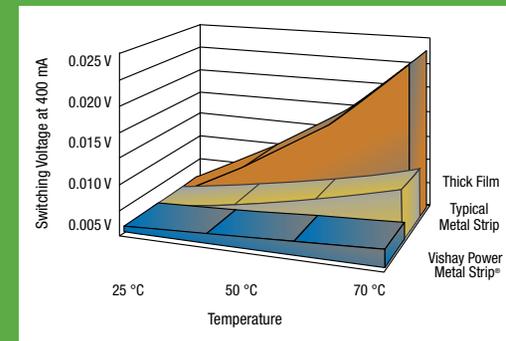
- High power in small case sizes: up to 10 W
- Very low resistance values: 0.0002 Ω to 0.1 Ω
- Tight resistance tolerance: down to ± 0.5 %



### Low Temperature Coefficient of Resistance (TCR) (Down to 30 ppm/°C)

The low TCR of Vishay Power Metal Strip resistors minimizes the resistance change caused by self heating and high-temperature environments.

This chart illustrates voltage of a 30 ppm/°C Vishay Power Metal Strip resistor compared to a typical 100 ppm/°C metal strip and 700 ppm/°C thick film chip.



## Key components for WIND TURBINES



**Main Inverters  
> 250 kW**



**Power  
Filters**



**Pitch  
Controls**



### **THE VISHAY ADVANTAGE**

- Very High Power Density
- High Reliability
- Customized Constructions
- Ruggedized Constructions
- Long Useful Life
- Wide Surge Current Capabilities  
and more...



# Main Inverters > 250 kW



**DIODES**  
**Surface-Mount TRANSZORB® Transient Voltage Suppressors**  
  
[SMP12A](#)  

- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Very low profile – typical height of 1.0 mm

**RESISTORS**  
**Stainless Steel Braking / Crowbar Resistor**  
  
[ULDCR](#)  

- High pulse energy capability up to 3.46 MJ
- Surface temperature increase below 450K for single pulse

**OPTOELECTRONICS**  
**2.5 A Output Current IGBT and MOSFET Driver**  
  
[VO3120](#)  

- 2.5 A peak output current in a DIP or SMD package
- 35 kV/ $\mu$ s common mode rejection and UL, cUL, VDE certified

**RESISTORS**  
**High-Power, High-Current Grid Resistors, 1 kW and Larger**  
  
[GRE1](#)  

- High active mass with good thermal dissipation
- IP00, IP20, and IP23 rated enclosures available

**MODULES**  
**Standard Diodes up to 600 A, up to 2000 V, H/B Configuration in SUPER MAGN-A-PAK**  
  
[VSKD270 / VSKD600](#)  

- High-current capability, high-voltage (up to 2000 V)
- Industrial standard package SUPER MAGN-A-PAK

**ESTA POWER CAPACITORS**  
**Capacitors for Power Electronics (PEC) – Cylindrical**  
  
[HDMKP](#)  

- Low self-inductance
- High current rating

**MOSFETs**  
**E Series 600 V Power MOSFET**  
  
[SiHG47N60E](#)  

- High-performance E Series high-voltage technology, maximum  $R_{DS(on)}$  64 m $\Omega$
- Popular TO-247 packaging, maximum continuous current of 47 A

**RESISTORS**  
**Stainless Steel Power Resistor**  
  
[VSGR](#)  

- High power capability up to 20 kW at 40 °C
- Operating temperature range: -25 °C to +250 °C

**FILM CAPACITORS**  
**Metallized Polypropylene Film Capacitor, Radial Snubber Type**  
  
[MKP386M Snubber](#)  

- IGBT direct mount snubber
- High peak current capabilities for demanding power electronic applications

**RESISTORS**  
**Very High Power Water Cooled Resistor with Multiple Resistive Functions**  
  
[WCR](#)  

- Power up to 2500 W at 60 °C water inlet temperature and 5 l/min
- Possible to have up to 8 resistive functions on the same support

**ESTA POWER CAPACITORS**  
**LVAC Power Capacitors – D Type**  
  
[PhMKDg](#)  

- Self-healing technology
- Compact design for maximum output 56 kvar

**RESISTORS**  
**Power Resistor for Mounting onto a Heatsink, Thick Film Technology**  
  
[LPS 600](#)  

- High power, small 57 mm x 57 mm size, 600 W at 25 °C on heatsink, low weight of 83 g
- Non-inductive down to 1  $\mu$ H, high pulse capability up to 1000 J short pulse

View datasheets for these products  
[www.vishay.com/ref/et3ae2a](http://www.vishay.com/ref/et3ae2a)



# Power Filters



RESISTORS

**Vitreous Wirewound Resistors with Corrugated Ribbon**

[GBS](#)

- High power rating up to 1000 W
- Complete vitreous coating for perfect humidity protection



CERAMIC CAPACITORS

**High-Voltage Ceramic DC Disc Capacitors, Screw Terminal Mounting, 10 kV<sub>DC</sub> to 40 kV<sub>DC</sub>**

[715C](#)

- Ultra-high voltage ratings, low dissipation and excellent voltage stability
- High degree of customization possible



RESISTORS

**Stainless Steel Power Resistor**

[VSGR](#)

- High power capability up to 20 kW at 40 °C
- Operating temperature range: -25 °C to +250 °C



ESTA POWER CAPACITORS

**Capacitors for Power Electronic (PEC) – Cylindrical**

[EMKP](#)

- High RMS current rating
- Internal safety device



RESISTORS

**Metal Film Resistors, Industrial, Precision**

[CME](#)

- Exceptional low noise (~ 0.10 μV/V ) with resistance tolerances down to 0.1 %
- Low voltage coefficient to ± 5 ppm/V



FILM CAPACITORS

**Metallized Polypropylene Film Capacitor, AC Filtering Radial Type**

[MKP1847](#)

- AC filter capacitor with high RMS current capabilities
- Safe design using segmented film



NON-LINEAR RESISTORS

**NTC Thermistors, Standard Lug Sensors**

[NTCALUG01A](#)

- Robust surface temperature sensor
- AEC-Q200 compliant, UL recognized



ESTA POWER CAPACITORS

**LVAC Power Capacitors**

[PhMKP](#)

- Self-healing technology
- Dry or oil-filled version available



RESISTORS

**Metal Oxide Resistors, Special Purpose, High Voltage**

[ROX](#)

- High voltage (up to 45 kV)
- Wide value range (100 Ω to 3 GΩ)



HIGH POWER RESISTORS

**Power Resistor Cooled by Auxiliary Heatsink**

[RCEC 750](#)

- Cold system without external radiation, high power / volume ratio
- Non-inductive



RESISTORS

**Aluminum Housed Compact Wirewound Resistor**

[VACR](#)

- Power rating up to 500 W
- Easy to mount due to rectangular design



RESISTORS

**Power Resistor for Mounting onto a Heatsink, Thick Film Technology**

[LPS Series](#)

- High power, small 57 mm x 57 mm size, up to 1100 W at 25 °C on heatsink, low weight of 83 g
- Non-inductive down to 1 μH, high pulse capability up to 1000 J for short pulse



View datasheets for these products [www.vishay.com/ref/et3ae2b](http://www.vishay.com/ref/et3ae2b)



# Pitch Controls



<p><b>DIODES</b></p> <p><b>Standard Recovery Diodes (Stud Version), 70 A</b></p> <p><a href="#">70HF40</a></p> <ul style="list-style-type: none"> <li>Designed and qualified for industrial level</li> <li>Stud cathode and stud anode versions</li> </ul>	<p><b>OPTOELECTRONICS</b></p> <p><b>Dual Photovoltaic MOSFET Driver Solid-State Relay</b></p> <p><a href="#">VO1263</a></p> <ul style="list-style-type: none"> <li>Two IREDs optically coupled to two photodiode arrays used to drive high-power MOSFETs</li> <li>High open circuit voltage, up to 14.6 V typical, isolation voltage of 5300 V<sub>RMS</sub></li> </ul>	<p><b>MODULES</b></p> <p><b>ADD-A-PAK Generation VII Power Modules, Schottky Rectifier, 200 A</b></p> <p><a href="#">VS-VSKDS409/150</a></p> <ul style="list-style-type: none"> <li>175 °C T<sub>J</sub> operation</li> <li>UL approved file E78996</li> </ul>
<p><b>RESISTORS</b></p> <p><b>Cemented Wirewound Resistors</b></p> <p><a href="#">AC</a></p> <ul style="list-style-type: none"> <li>Non-flammable cement coating, good size-to-power ratio</li> <li>Power: 1 W to 10 W, excellent pulse handling capability, various lead forming options</li> </ul>	<p><b>MOSFETs</b></p> <p><b>P-Channel 200 V Power MOSFET</b></p> <p><a href="#">IRF9640</a></p> <ul style="list-style-type: none"> <li>Rugged planar technology, maximum R<sub>DS(on)</sub> 500 mΩ</li> <li>Popular TO-220 packaging, maximum continuous current of -11 A</li> </ul>	<p><b>NON-LINEAR RESISTORS</b></p> <p><b>NTC Thermistors, Screw Threaded Sensors</b></p> <p><a href="#">NTCASWE3</a></p> <ul style="list-style-type: none"> <li>Screw threaded sensor</li> <li>1500 V insulation voltage</li> </ul>
<p><b>ESTA POWER CAPACITORS</b></p> <p><b>Capacitors for Power Electronics (PEC) – Cylindrical</b></p> <p><a href="#">HDMKP</a></p> <ul style="list-style-type: none"> <li>Low self-inductance</li> <li>High current rating</li> </ul>	<p><b>RESISTORS</b></p> <p><b>Power Metal Strip® Resistors, Low Value (Down to 0.0005 Ω), Surface-Mount</b></p> <p><a href="#">WSL</a></p> <ul style="list-style-type: none"> <li>Extremely low resistance values from 0.0005 Ω to 0.5 Ω and tolerance of 1 %</li> <li>Power Metal Strip all-welded construction offers high pulse capacity</li> </ul>	<p><b>RESISTORS</b></p> <p><b>Axial Vitreous Wirewound Resistors</b></p> <p><a href="#">G200</a></p> <ul style="list-style-type: none"> <li>Power rating up to 17 W</li> <li>Complete vitreous coating for perfect humidity protection</li> </ul>
<p><b>RESISTORS</b></p> <p><b>Wirewound / Metal Film Resistors, Commercial Power, Vertical Mount</b></p> <p><a href="#">CPCG / CPCP / CPCF</a></p> <ul style="list-style-type: none"> <li>High power-to-size ratio, meets / exceeds EIA RS-344 requirements, fireproof</li> <li>PC board space saving vertical design, high thermal conductivity ceramic case</li> </ul>	<p><b>CERAMIC CAPACITORS</b></p> <p><b>Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage</b></p> <p><a href="#">MLCC OMD Capacitors</a></p> <ul style="list-style-type: none"> <li>Polymer termination available for intensive board flex requirements</li> <li>100 % voltage conditioning available up to 630 V<sub>DC</sub> rating (process code “5H”)</li> </ul>	<p><b>RESISTORS</b></p> <p><b>Universal Mount Edgewound Power Wirewound Resistors</b></p> <p><a href="#">EDGU</a></p> <ul style="list-style-type: none"> <li>High current capability</li> <li>Enclosures and mounting frames available</li> </ul>

View datasheets for these products [www.vishay.com/ref/et3ae2c](http://www.vishay.com/ref/et3ae2c)

# Spotlight on Trench PT (L Type) and Trench Field Stop FS (T Type) IGBT Platforms

Vishay uses Trench construction for better current density and easy gate driving. FS IGBTs (T type), when coupled with FRED Pt® Gen 4 diodes, provide optimum and very fast performance at turn-on, reducing losses. Soft turn-off reduces dangerous voltage spikes and requires lighter snubbing, if any. It enables more tolerant design of PCB / bus bars layouts.

Series	Technology	Speed	$BV_{CES}$ (V)	$I_{CE}$ (A)	$V_{CE}$ Typ. (V)	Operating Temp. Maximum (°C)	Die Size X (mm)	Die Size Y (mm)
<a href="#">VS-GC200A060LC/B</a>	PT-TIGBT	L	600	200	1.36	150	21.7	10.3
<a href="#">VS-GC030C060TC/B</a>	FS-TIGBT	T	600	30	1.5	175	3.5	4.3
<a href="#">VS-GC200C060TC/B</a>	FS-TIGBT	T	600	200	1.45	175	9.8	10.3
<a href="#">VS-GC240C060TC/B</a>	FS-TIGBT	T	600	240	1.4	175	12.7	10.3
<a href="#">VS-GC030C065TC/B</a>	FS-TIGBT	T	650	30	1.65	175	3.5	4.3
<a href="#">VS-GC200C065TC/B</a>	FS-TIGBT	T	650	200	1.6	175	9.8	10.3
<a href="#">VS-GC240V065TC/B</a>	FS-TIGBT	T	650	240	1.55	175	12.7	10.3

### APPLICATIONS

- Single- and three-phase motor drives
- Air conditioning controls
- Solar inverters and UPS
- Welding machines and battery charger systems
- Electric vehicles

### FEATURES

- Trench: small IGBT chips with low  $V_{C(on)}$
- Thin wafer: low  $R_{th}$  and ohmic losses
- Spike-free IGBT turn-off
- Combinations with optimized diodes available

$I_c$	L Type Low $V_{CE}$	T Type Motor Drive	T65 Type Motor Derivative	H Type High Speed
4				
6				
8				
12				
20				
30				
50				
75				
100				
150				
200				



## Spotlight on Hyperfast Ultrasoft Recovery Gen 4 FRED Pt<sup>®</sup> Diodes

Optimized to operate in combination with the Vishay new Trench IGBTs, the FRED Pt<sup>®</sup> Gen 4 provides superior performance that combines extreme softness, ultra-low  $V_F$  and low  $I_{RRM}$ . While in the past Vishay had different products that met similar parameters, Vishay's new FRED Pt generation combines all the parameters into one product, thereby raising the trade-off between conduction and switching losses to new standards.



### APPLICATIONS

- Anti-parallel diodes
  - Single and three-phase motor inverters
  - Full- and half-bridge primary-side isolated DC/DC
- Stand-alone
  - Power factor correction (PFC)
  - Boosters and choppers
  - Secondary-side rectification diodes

### FEATURES

- Superior performance that combines extreme softness, ultralow  $V_F$ , and low  $I_{RRM}$
- Smaller chip sizes
- Improved thermal impedance by reduced die thickness

## Key components for SMART GRIDS



### THE VISHAY ADVANTAGE

- Long Useful Life
- High Voltage Capabilities
- Safety Approvals
- High Reliability
- High Surge Current Capabilities
- High Efficiency
- and more...

**Virtual Power Systems**



**Smart Meters**



**Smart Homes**





# Virtual Power Systems



### CERAMIC CAPACITORS

**AC Line Rated Disc Capacitors, Class X1, 760 V<sub>AC</sub>, Class Y1, 500 V<sub>AC</sub>**



[VY1](#)

- X1 / Y1 safety rating according to IEC 60384-14, 3rd edition
- Highest reliability and lifetime, operating temperature: -40 °C to +125 °C

### DIODES

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



[SMP TVS](#)

- Meets MSL level 1, per J-STD-020C, LF maximum peak of 260 °C
- Very low profile – typical height of 0.65 mm

### INDUCTORS

**Low-Profile, High-Current IHLP® Inductors**



[IHLP-5050](#)

- High-current, low-saturation inductor for DC/DC conversion and filtering

### OPTOELECTRONICS

**High-Speed, SPST Normally Open (1 Form A) Solid-State Relay in DIP-6 Package**



[VO14641AT](#)

- Isolation test voltage of 5300 V<sub>RMS</sub>, load voltage of 60 V, DC load current of 2 A
- Can be configured for AC/DC or DC only operation with clean, bounce-free switching

### RESISTORS

**High Pulse Load MELF Resistors**

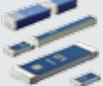


[CMB 0207](#)

- Ultimate surge handling up to 16 kV ESD, 17 kW 1.2 / 50, VDE safety approval
- AEC-Q200 qualified, sulfur resistant, GREEN product

### CERAMIC CAPACITORS

**Standard Reflow Process Assembly, High-Reliability Ceramic-Oxide Body Construction**



[Ceramic Chip Antenna](#)

- Frequency range from 400 HMz to 5 GHz
- Wide operating temperature range: -40 °C to +85 °C

### NON-LINEAR RESISTORS

**SMD 0603, Glass Protected NTC Thermistors**



[NTCS0603](#)

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

### CERAMIC CAPACITORS

**IEC 60384-14:2005, CAN/CSA/cCSAus, and ANSI/UL CB Certificates**



[MLCC SMD Safety Capacitor](#)

- Surface-mount design: simpler assembly and reduced board space requirement
- Available in NP0 (COG) or X7R dielectrics

### RESISTORS

**Power Metal Strip® Resistors, Low Value (Down to 0.0005 Ω), Surface-Mount**



[WSL](#)

- Extremely low resistance values from 0.0005 Ω to 0.5 Ω and tolerance of 1 %
- Power Metal Strip all-welded construction offers high pulse capacity

### ENERGY STORAGE CAPACITORS

**Hybrid Storage Capacitors**

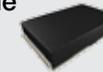


[196 HVC ENYCAP™](#)

- Polarized electrochemical storage capacitor with high capacity and energy density
- No cell balancing necessary, soft and low transient voltage controlled charging

### RESISTORS

**Power Metal Strip® SMD Resistors, High Power (7 W), Low Value (Down to 0.001 Ω)**



[WSHM2818](#)

- Very high power rating of 7 W in small 2818 package
- Very low resistance values, 0.001 Ω to 0.10 Ω, with tolerance of 1 %

### ALUMINUM CAPACITORS

**Aluminum Capacitors, Power, High Ripple Current, Screw Terminals**



[101/102 PHR-ST](#)

- Long life screw-terminal, high ripple current
- Custom made; the perfect aluminum capacitors for your application

View datasheets for these products  
[www.vishay.com/ref/et3ae3a](http://www.vishay.com/ref/et3ae3a)



# Smart Meters



FILM CAPACITORS

**Interference Suppression Film Capacitor, Class X2, MKT 310 V<sub>AC</sub>**  
**High Stability Grade**

[F1772S](#)

- RFI X2 film capacitors for continuous across the line and series impedance app.
- Withstanding 85 °C / 85 % RH for 1000 h at 240 V<sub>AC</sub>



OPTOELECTRONICS

**High-Speed and High-Power Infrared Emitting Diodes with Peak Wavelength of 940 nm**

[VSMB2020X01](#)

- Radiant intensity of 40 mW/sr at I<sub>F</sub> = 100 mA and 15 ns rise and fall time
- Angle of half intensity of ± 12° in surface-mount gullwing and reverse gullwing pkg.



ICs

**28 V, 56 mΩ Load Switch with Programmable Current Limit and Slew Rate Control**

[SiP32419 / SiP32429](#)

- < 1 μs short circuit response time, and 20 % I<sub>LIM</sub> accuracy over temperature
- High-voltage synchronous Buck converters



RESISTORS

**High Surge Axial Cemented Wirewound Resistors**

[Z300-C](#)

- High voltage surge (up to 12 kV) for special version
- Non-flammable cement coating



DIODES

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

[SMAJxx](#)

- 400 W peak pulse power capability with a 10/1000 μs waveform
- AEC-Q101 qualified



INDUCTORS

**High-Current, Surface-Mount Inductors – Non-Shielded**

[IDCP-2218](#)

- Low-cost filtering and DC/DC conversion inductor



MOSFETs

**E Series 600 V Power MOSFET**

[SiHD7N60E](#)

- High performance E Series high-voltage technology, maximum R<sub>DS(on)</sub> 600 mΩ
- Popular DPAK packaging, maximum continuous current of 7 A



OPTOELECTRONICS

**Widebody 10 MBd High-Speed Optocouplers with High Creepage and Clearance of 10 mm**

[VOW2611](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/μs



NON-LINEAR RESISTORS

**VDR Metal Oxide Varistors, High Surge**

[VDRH14 to VDRH20](#)

- Extended operating temperature to 125 °C
- UL recognized up to 105 °C (selected types)



RESISTORS

**Power Metal Strip® Meter Shunt Resistor, Very Low Value (Down to 0.0001 Ω)**

[WSMS](#)

- Power Metal Strip construction offers accuracy for smart meter applications
- Extremely low resistance values: 100 μΩ to 1000 μΩ



RESISTORS

**Thin Film Mini-MELF Resistors**

[MM / SM](#)

- Unrivaled surge handling capability, ultimate stability over lifetime
- AEC-Q200 qualified, approved acc. EN 140401-803, sulfur resistant, GREEN product



CERAMIC CAPACITORS

**Ultra-Stable Dielectric Formulation Low Dissipation Factor (DF)**

[MLCC High Q Capacitors](#)

- Robust design build with wet process and noble metal electrodes



View datasheets for these products [www.vishay.com/ref/et3ae3b](http://www.vishay.com/ref/et3ae3b)



# Smart Homes



### OPTOELECTRONICS

**Single- and Dual-Channel 10 MBd Optocouplers in an SOIC-8 Package**



[VO06xxT](#)

- Integrated optical photodiode IC, isolation voltage of 4000 V<sub>RMS</sub>
- Choice of common mode transient immunity of 15 kV/μs, 5 kV/μs, or 1 kV/μs

### ICs

**Enhanced Performance Quad CMOS Analog Switches**



[DG201B](#)

- Wide ± 22 V supply voltage rating
- Improved charge injection compensation design minimizes switching transients

### CERAMIC CAPACITORS

**AC Line Rated Disc Capacitors Class X1, 440 V<sub>AC</sub>, Class Y2, 300 V<sub>AC</sub>**



[VY2](#)

- X1 / Y2 safety rating according to IEC 60384-14, 3rd edition
- Highest reliability and lifetime, operating temperature: -40 °C to +125 °C

### DIODES

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



[SMCJxx](#)

- Available in unidirectional and bidirectional
- AEC-Q101 qualified

### RESISTORS

**Metal Film Resistors, High Precision, High Stability**



[PTF](#)

- Tolerances to ± 0.01 %
- TCR down to 5 ppm/°C, in temperature range of -20 °C to +85 °C

### INDUCTORS

**Low-Profile, High-Current IHLP® Inductors**



[IHLP-2525](#)

- Compact size, high-current DC/DC conversion and filtering

### CERAMIC CAPACITORS

**Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities**



[MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable termination
- Lead-bearing termination available for hi-rel applications

### DISPLAYS

**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**



[LCD, Color TFT, OLED](#)

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand extensive temperatures and extreme conditions

### RESISTORS

**High-Voltage (up to 0.5 kV) Thick Film Chip Resistors**



[RCV](#)

- High operating voltage (up to 500 V)
- Low resistance drift (maximum 1 %)

### TANTALUM CAPACITORS

**Solid Tantalum Chip Capacitors 298D MICROTAN®, 298W Extended Range MICROTAN**



[298D](#)

- High capacitance in small case sizes including 0603 and 0402 footprint
- Perfect for space-constrained designs

### NON-LINEAR RESISTORS

**NTC Thermistors, Radial Leaded, Standard Precision**



[NTCLE100](#)

- Standard classics series
- Color band coded

### CERAMIC CAPACITORS

**Standard Reflow Process Assembly, High-Reliability Ceramic-Oxide Body Construction**



[Ceramic Chip Antenna](#)

- Frequency range from 400 MHz to 5 GHz
- Wide operating temperature range: -40 °C to +85 °C

View datasheets for these products [www.vishay.com/ref/et3ae3c](http://www.vishay.com/ref/et3ae3c)

## Key components for ENERGY EXPLORATION



### THE VISHAY ADVANTAGE

- Wide Operating Temperature Range
- Long Useful Life
- High Reliability
- Safety Approvals
- High Power Density
- High Surge Current Capability
- Ruggedized Construction and more....

**Oil and Gas  
Prospecting**



**Mining**



**Hydraulic  
Fracturing  
(Fracking)**





# Oil and Gas Prospecting



<p>THYRISTORS</p> <p><b>Phase Control Thyristors (Hockey PUK Version), 1650 A</b></p>  <p><a href="#">ST1200C12K0</a></p> <ul style="list-style-type: none"> <li>• International standard case A-24 (K-PUK)</li> <li>• Metal case with ceramic insulator, designed and approved for industrial applications</li> </ul>	<p>CERAMIC CAPACITORS</p> <p><b>High Operating Temperature Dielectric up to +150 °C</b></p>  <p><a href="#">MLCC X8R Capacitors</a></p> <ul style="list-style-type: none"> <li>• Maintains capacity at high temperature</li> <li>• Robust design build with wet process and noble metal electrode system</li> </ul>	<p>MOSFETs</p> <p><b>Dual N-Channel 1.2 V (G-S) MOSFET</b></p>  <p><a href="#">SiB914DK</a></p> <ul style="list-style-type: none"> <li>• TrenchFET® technology with <math>R_{DS(on)}</math> guaranteed at a low gate voltage of 1.2 V</li> <li>• 1.6 mm x 1.6 mm PowerPAK® SC-75 packaging</li> </ul>
<p>INDUCTORS</p> <p><b>Toroid, High-Current, High-Temperature, Radial Leaded</b></p>  <p><a href="#">TJ5-HT</a></p> <ul style="list-style-type: none"> <li>• High-temp. toroidal inductor available in several sizes and wind inductance range</li> <li>• High temperature continuous operation up to 200 °C</li> </ul>	<p>ICs</p> <p><b>Precision Monolithic Quad SPST CMOS Analog Switches</b></p>  <p><a href="#">DG1411, DG1412, DG1413</a></p> <ul style="list-style-type: none"> <li>• Low and flat switch resistance over a wide voltage range</li> <li>• 50 % lower capacitance and 80 % lower charge injection versus competition</li> </ul>	<p>ESTA POWER CAPACITORS</p> <p><b>HVAC Power Capacitor</b></p>  <p><a href="#">HV Harmonic Filter (AC)</a></p> <ul style="list-style-type: none"> <li>• Harmonic distortion removal</li> <li>• Improved voltage profile of the system</li> </ul>
<p>TANTALUM CAPACITORS</p> <p><b>Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case, HI-TMP®</b></p>  <p><a href="#">TH5</a></p> <ul style="list-style-type: none"> <li>• Very high temperature molded tantalum capacitor HI-TMP – 200 °C</li> <li>• Harsh environment filtering and decoupling</li> </ul>	<p>INDUCTORS</p> <p><b>Low-Profile, High-Current IHLP® Inductors</b></p>  <p><a href="#">IHLP-2525CZ-8A</a></p> <ul style="list-style-type: none"> <li>• Ultra-high-temperature DC/DC conversion and filter inductor applications</li> <li>• Continuous operation up to 180 °C</li> </ul>	<p>RESISTORS</p> <p><b>Universal Mount Edgewound Power Wirewound Resistors</b></p>  <p><a href="#">EDGU</a></p> <ul style="list-style-type: none"> <li>• High current capability</li> <li>• Enclosures and mounting frames available</li> </ul>
<p>RESISTORS</p> <p><b>Thin Film, Center-Tapped Resistor Divider Network</b></p>  <p><a href="#">CTA</a></p> <ul style="list-style-type: none"> <li>• Tight ratio tolerances to <math>\pm 0.1</math> %, wire bondable, center tap feature</li> <li>• Low shunt capacitance &lt; 0.2 pF, excellent stability: <math>\pm 0.025</math> % maximum DR/R</li> </ul>	<p>RESISTORS</p> <p><b>High-Stability, High-Temperature 230 °C Thin Film Wraparound Chip Resistors</b></p>  <p><a href="#">PHT (Sizes 0402 to 2010)</a></p> <ul style="list-style-type: none"> <li>• Operating temp. up to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)</li> <li>• Sulfur resistant, from 10R up to 7.5M, tight tolerance down to 0.05 %</li> </ul>	<p>TANTALUM CAPACITORS</p> <p><b>Wet Tantalum HI-TMP Capacitors Tantalum Case with Glass-to-Tantalum Hermetic Seal</b></p>  <p><a href="#">134D</a></p> <ul style="list-style-type: none"> <li>• Extended capacitance, voltage range 50 V to 125 V, -55 °C to +200 °C operaton</li> <li>• Axial leaded, industry standard case sizes (T1, T2, T3, T4)</li> </ul>

View datasheets for these products [www.vishay.com/ref/et3ae4a](http://www.vishay.com/ref/et3ae4a)



# Mining



**RESISTORS**  
**Molded, 50 mil Pitch, High Temp. (215 °C); Thin Film Surface-Mount, Dual-In-Line Resistor Network**  
[HTRN](#)  

- Multiple resistance offerings with 0.05 % ratio tolerance and 5 ppm/°C tracking
- Ratio stability of 0.1 % at 2000 h, 215 °C at 25 % rated power



**OPTOELECTRONICS**  
**Optocoupler with Phototransistor Output and Trigger Current of I<sub>F</sub> = 1 mA**  
[VOL618A](#)  

- High current transfer ratio, and high isolation voltage of 5000 V<sub>RMS</sub>
- Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package



**TANTALUM CAPACITORS**  
**Wet Tantalum Capacitors Tantalum-Case with Glass-to-Tantalum Hermetic Seal**  
[135D](#)  

- High capacitance, voltage range 6 V to 125 V, -55 °C to +200 °C operation
- Axial-leaded, industry-standard case sizes (T1, T2, T3, T4)



**RESISTORS**  
**High-Power, High-Current Grid Resistors, 1 kW and Larger**  
[GRE1](#)  

- High active mass with good thermal dissipation
- IP00, IP20, and IP23 rated enclosures available



**DIODES**  
**Surface-Mount TRANSZORB® Transient Voltage Suppressors**  
[SMAJ](#)  

- 400 W peak pulse power capability with a 10/1000 μs waveform
- AEC-Q101 qualified



**INDUCTORS**  
**High-Current Through-Hole Inductor, High-Temperature Series**  
[IHTH](#)  

- Composite through-hole design inductor for filtering and DC/DC conversion
- Compact solution to toroidal power inductors



**RESISTORS**  
**Electro-Pyrotechnic Initiator Thin Film Chip Resistor**  
[EPIC](#)  

- Low firing energy down to 50 μJ, fast firing time down to 50 μs
- Standard SMD case 0603, alternative to bridge wire technology



**ESTA POWER CAPACITORS**  
**HVAC Power Capacitor**  
[HV Harmonic Filter \(AC\)](#)  

- Harmonic distortion removal
- Improved voltage profile of the system



**SENSORS**  
**Ten-Turns Servo or Bushing Mount Hall Effect Sensor in Size 09 (22.2 mm)**  
[34 THE](#)  

- Accurate linearity: ± 0.5 %, long life: 50M cycles for servo, 10M for bushing
- All electrical angles available up to 3600°, dedicated to long-life applications



**MOSFETS**  
**N-Channel 100 V (D-S) MOSFET**  
[SiR870ADP](#)  

- Medium-voltage ThunderFET® technology, maximum R<sub>DS(on)</sub> 6.6 mΩ
- Thermally enhanced PowerPAK® SO-8 packaging



**OPTOELECTRONICS**  
**Optocoupler with Phototransistor Output; ATEX Certified for Explosive Environments**  
[CNY65Exi](#)  

- ATEX certificate: PTB 03 ATEX 2033 U, Gas: II (1) G (EX ia) IIC, Dust: II (1) D (EX ia) IIIC
- V<sub>ISO</sub> of 11 600 V<sub>peak</sub> for 1 minute



**RESISTORS**  
**Stainless Steel Medium-Power Resistors**  
[Medium Power Grid Resistors](#)  

- High permanent power dissipation, high pulse energy dissipation
- Rugged construction



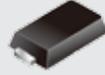
View datasheets for these products  
www.vishay.com/ref/et3ae4b



# Hydraulic Fracturing (Fracking)



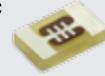
**DIODES**

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

[SMP TVS](#)

- Meets MSL level 1, per J-STD-020C, LF maximum peak of 260 °C
- Very low profile – typical height of 0.65 mm

**RESISTORS**

**Massive Electro-Pyrotechnic Initiator Chip Resistor** 

[MEPIC](#)

- Low firing energy down to 1.5 mJ, fast firing time down to 250 μs
- Standard SMD case 0805, alternative to bridge wire technology, AKLV16 qualification

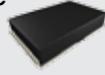
**MODULES**

**ADD-A-PAK Generation VII Power Modules, Schottky Rectifier, 200 A** 

[VS-VSKDS409/150](#)

- 175 °C T<sub>j</sub> operation
- UL approved file E78996

**RESISTORS**

**Power Metal Strip® SMD Resistors, High Power (7 W), Low Value (Down to 0.001 Ω)** 

[WSHM2818](#)

- Very high power rating of 7 W in small 2818 package
- Very low resistance values, 0.001 Ω to 0.10 Ω, with tolerance of 1 %

**MOSFETs**

**E Series 600 V Power MOSFET** 

[SiHG47N60E](#)

- High-performance E Series high-voltage technology, maximum R<sub>DS(on)</sub> 64 mΩ
- Popular TO-247 packaging, maximum continuous current of 47 A

**FILM CAPACITORS**

**Metallized Polypropylene Film DC-Link Capacitor** 

[MKP1848](#)

- High-performance DC-Link capacitor with high RMS current capabilities
- Automotive Grade AEC-Q200 compliant

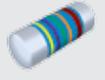
**INDUCTORS**

**Toroid, High-Current, High-Temperature, Radial Leded** 

[TJ3-HT](#)

- High-temp. toroidal inductor available in several sizes and wind inductance range
- High temperature continuous operation up to 200 °C

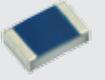
**MELF RESISTORS**

**Professional Thin Film MELF Resistors** 

[MMB0207](#)

- Approved according to EN 140401-803, AEC-Q200 qualified
- High surge voltage capability

**NON-LINEAR RESISTORS**

**Platinum SMD Flat Chip Temperature Sensor** 

[PTS...AT](#)

- Standardized characteristics according to IEC 60751
- Short reaction times down to 2 s (in air)

**RESISTORS**

**Precision Low-TCR, High-Temperature Thin Film Resistor, Surface-Mount Chip** 

[PLTT](#)

- Wide resistance range with 5 ppm/°C TCR tracking and 0.02 % tolerance
- Operation up to 230 °C with 0.5 % stability at 2000 h, 215 °C at 25 % rated power

**RESISTORS**

**High-Stability, High-Temperature 230 °C Thin Film Chip Resistors** 

[PHT / PRAHT / RMKHT / CHPHT](#)

- Operating temp. up to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)
- Sulfur resistant, from 10R up to 7.5M, tight tolerance down to 0.05 %

**TANTALUM CAPACITORS**

**Wet Tantalum Capacitor Assembly** 

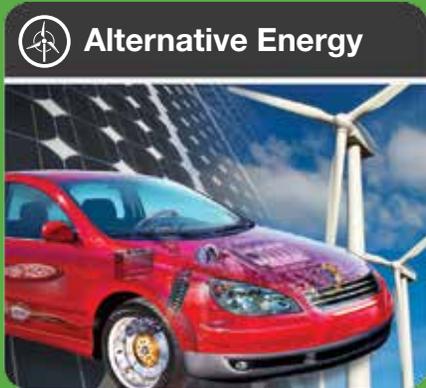
[211D](#)

- High temperature of +200 °C, high vibration
- Standard and custom assemblies

View datasheets for these products [www.vishay.com/ref/et3ae4c](http://www.vishay.com/ref/et3ae4c)

## Virtual Trade Shows

The Vishay website hosts a series of virtual trade shows covering alternative energy, high-temperature, power management, and medical applications. They feature links to product demonstration videos, technical articles, product datasheets, and related information.



### Alternative Energy

Vishay's Alternative Energy Virtual Trade Show highlights the company's components for solar power, hybrid technology, and turbine power applications. Featured products include 1- and 3-phase cylindrical aluminum low-voltage capacitors with a long life expectancy > 130 000 hours for power factor correction; TMBS<sup>®</sup> Trench MOS Barrier Schottky rectifiers in power packages for bypass diode protection in solar cell junction boxes; and AEC-Q101-qualified automotive power MOSFETs with temperature ranges to +175 °C.

### High Temperature

The High Temperature Virtual Trade Show features a wide variety of Vishay's leading resistors, inductors, capacitors, diodes, and power MOSFETs with high temperature ratings. Devices include through-hole power metal film resistors with flameproof coatings; TRANSZORB<sup>®</sup> transient voltage suppressors with a temperature range to +175 °C; and automotive MOSFETs in the halogen-free DPAK and thermally enhanced PowerPAK<sup>®</sup> SO-8 and D<sup>2</sup>PAK.

### Power Management

Components for power conversion, battery management / load switching, and power conditioning / protection can be found in Vishay's Power Management Virtual Trade Show. Highlighted solutions include 600 V and 650 V high-performance Super Junction MOSFETs with low on-resistance; IHLP<sup>®</sup> low-profile, high-current inductors for VRMs and DC/DC converter applications; and Power Metal Strip<sup>®</sup> resistors with tight tolerance for accurate current sensing.

### Medical

For portable diagnostic, implantable, MRI, and medical measurement equipment, Vishay's Medical Virtual Trade Show highlights a wide range of devices. Showcased products include 4 A, 28 V integrated synchronous buck regulators that provide 50 % PCB space savings over discrete solutions; non-magnetic resistors; and infrared transceivers (IrDA<sup>®</sup>) for uploading biometer data to a PC for sharing with a clinician or physician.

Visit [www.vishay.com](http://www.vishay.com) for more information.

# Spotlight on High-Temperature Molded and Wet Tantalum Capacitors

A small selection of our high-temperature molded and wet tantalum devices, see our website for additional device families

Series	Capacitance Range	Voltage Range	Case Size	Features
<b>134D</b> 	10 $\mu$ F to 680 $\mu$ F	50 V to 125 V	C, F, T, K	<ul style="list-style-type: none"> <li>• HI-TMP®</li> <li>• Tantalum case</li> <li>• Hermetic seal</li> <li>• +200 °C operation</li> </ul>
<b>135D</b> 	1.7 $\mu$ F to 2200 $\mu$ F	6 V to 125 V	C, F, T, K	<ul style="list-style-type: none"> <li>• TANTALEX®</li> <li>• Tantalum case</li> <li>• Hermetic seal</li> <li>• +200 °C operation</li> </ul>
<b>TH3 HI-TMP</b> 	0.33 $\mu$ F to 220 $\mu$ F	6.3 V to 50 V	A, B, C, D, E	<ul style="list-style-type: none"> <li>• TANTAMOUNT®</li> <li>• High temperature, +150 °C</li> <li>• AEC-Q200 qualified</li> </ul> 
<b>TH4 HI-TMP</b> 	10 $\mu$ F to 47 $\mu$ F	6.3 V to 16 V	B, C, D	<ul style="list-style-type: none"> <li>• TANTAMOUNT</li> <li>• High temperature, +175 °C</li> <li>• AEC-Q200 qualified</li> </ul> 
<b>TH5 HI-TMP</b> 	4.7 $\mu$ F, 10 $\mu$ F	21 V, 24 V	E	<ul style="list-style-type: none"> <li>• TANTAMOUNT</li> <li>• High temperature, +200 °C</li> </ul>

## Check Out Our FIT Calculator for Vishay Tantalum Capacitors

Vishay's FIT calculator program was developed to follow the calculations defined in MIL-HDBK-217 (revision F). This FIT calculator program enables users to predict the reliability of tantalum capacitors. Vishay customers can input information about applications, ambient temperature, operating voltage, and environmental factors to create multipliers of established failure rates for many military tantalum capacitors types. The failure rates are listed as "FIT" (failures in time) and "MTBF" (mean time between failures).

[www.vishay.com/capacitors/tantalum-reliability-calculator-list/](http://www.vishay.com/capacitors/tantalum-reliability-calculator-list/)

## Wet Tantalum Arrays and Assemblies

- Standard arrays and assemblies
- Custom design assemblies
- Custom case and termination options
- High capacitance and/or high voltage options
- Single or dual ratings
- Dielectric options: aluminum, ceramic, tantalum



### CUSTOM DESIGNS

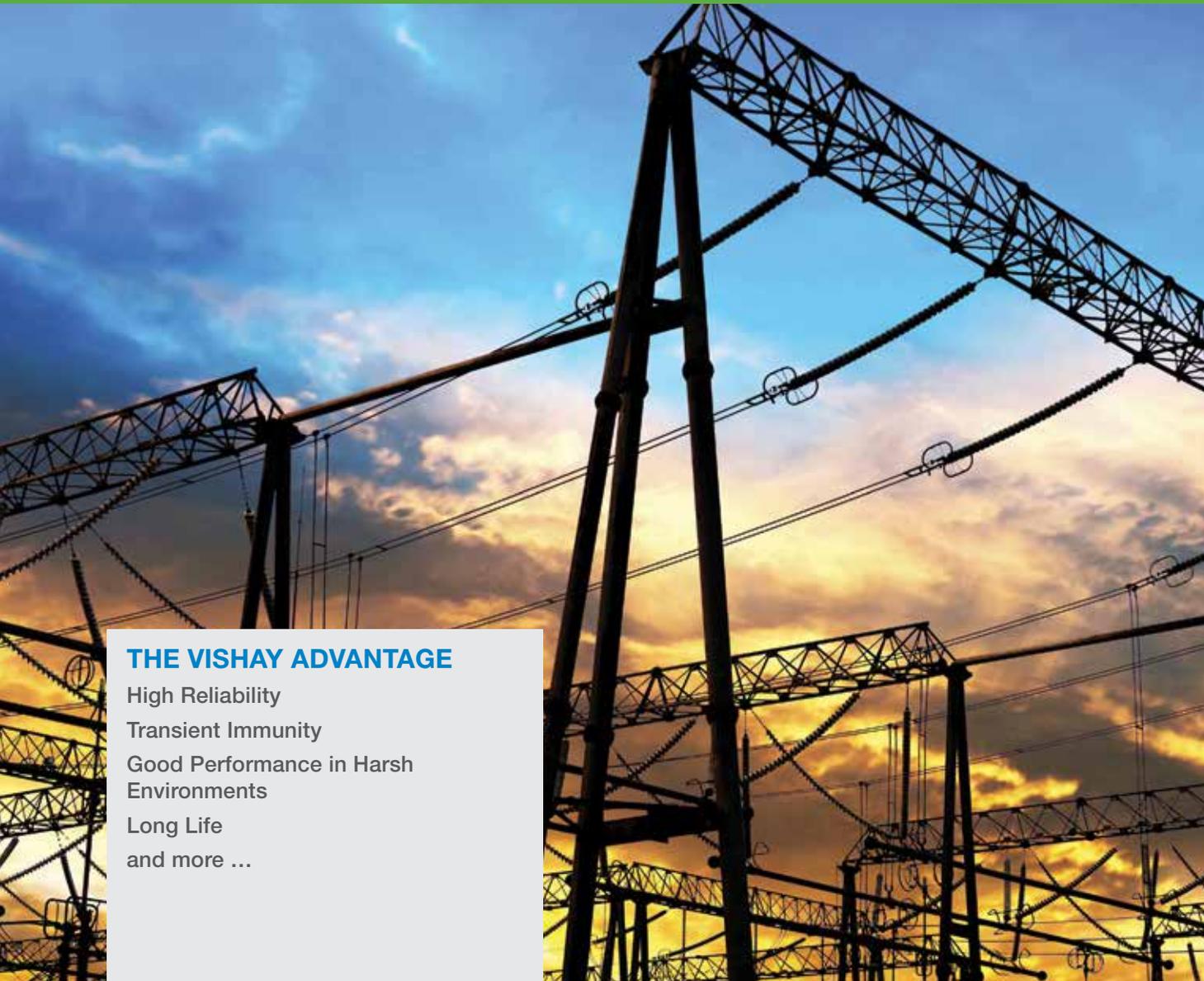
Custom designed capacitor assemblies are an important tool for circuit designers faced with extra high capacitance and/or voltage requirements not met by standard units. In most cases, Vishay capacitor assemblies employ internal sections of wet tantalum capacitors. However, an assembly may utilize solid tantalum, ceramics, and even aluminum internal sections, along with resistors and other components as needed to meet the electrical parameters and performance required. Dual or plural ratings are also available in a single assembly.

Vishay capacitor assemblies have been used in avionics, military and space applications for many years. They are also an important component for oil exploration equipment and other industrial applications.

The capacitor assembly may prove valuable in any application where there are high capacitance/voltage needs and critical space limitations exist, or multiple functions are required in one package.

Because tantalum capacitors can be designed to provide a wide range of parameters, they allow simplified circuit design and a lower cost solution. Reliability depends on the capacitor elements used, while cost reflects both capacitor type picked and quantity required.

# Key components for POWER TRANSMISSION / DISTRIBUTION / GRID QUALITY



**HVDC  
Transmission**



**STATCOM SVC  
(Static VAR  
Compensator)**



**Transformer  
Stations**



**Circuit Breakers**



**Charging Stations /  
Infrastructure  
for Vehicles and  
E-Bikes**



## THE VISHAY ADVANTAGE

- High Reliability
- Transient Immunity
- Good Performance in Harsh Environments
- Long Life
- and more ...



# HVDC Transmission



ESTA POWER CAPACITORS

### Capacitors for Power Electronic (PEC) – Cylindrical



[ACMKP Tubular](#)

- Flexible design up to 3.6 kV<sub>AC</sub>
- Internal safety device

OPTOELECTRONICS

### Widebody 1 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm



[VOW136](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/μs

RESISTORS

### High-Power, High-Current Grid Resistors, 1 kW and Larger



[GRE1](#)

- High active mass with good thermal dissipation
- IP00, IP20, and IP23 rated enclosures available

OPTOELECTRONICS

### Optocoupler with Phototransistor Output with Reinforced, CAT IV Isolation



[CNY66](#)

- Isolation test voltage of 13.9 kV, rated recurring peak voltage V<sub>IORM</sub> of 1450 V<sub>peak</sub>
- For class I - IV at mains voltage up to 600 V and class I - III up to 1000 V

ESTA POWER CAPACITORS

### HVAC Power Capacitor



[MRTB Capacitor](#)

- For high-speed DC switches
- Proven design with high reliability

OPTOELECTRONICS

### Widebody 10 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm



[VOW2611](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input to output noise isolation of 40 kV/μs

RESISTORS

### Aluminum Housed Compact Wirewound Resistor



[VACR](#)

- Power rating up to 500 W
- Easy to mount due to rectangular design

RESISTORS

### Universal Mount Edgewound Power Wirewound Resistors



[EDGU](#)

- High current capability
- Enclosures and mounting frames available

ESTA POWER CAPACITORS

### HVAC Power Capacitor



[HV Harmonic Filter \(AC\)](#)

- For HVDC lines up to 800 kV
- Harmonic distortion removal

RESISTORS

### High-Power Thick Film Resistor with Low Partial Discharge



[RCEC 750](#)

- Partial discharge < 10 pC at 5000 V
- Rated dissipation 750 W at 75 °C

ESTA POWER CAPACITORS

### HVDC Power Capacitor



[HV Harmonic Filter \(DC\)](#)

- For HVDC lines up to 800 kV
- Harmonic distortion removal

RESISTORS

### Very High Power 2500 W, 2000 W, and 1500 W with Multiple Resistive Functions



[WCR](#)

- Power up to 2500 W at 60 °C water inlet temperature and 5 l/min
- Possible to have up to 8 resistive functions on the same support

View datasheets for these products  
[www.vishay.com/ref/et3ae5a](http://www.vishay.com/ref/et3ae5a)

# STATCOM SVC (Static VAR Compensator)



MODULES

**Thyristor / Diode and Thyristor / Thyristor (SUPER MAGN-A-PAK Power Modules), 430 A**



[VS-VSK.430...PbF Series](#)

- UL approved file E78996
- High voltage ratings up to 2000 V

ESTA POWER CAPACITORS

**HVAC Power Capacitor**



[Shunt Capacitor Bank](#)

- Reduced power system losses
- Release power system capacity

RESISTORS

**Vitreous Wirewound Resistors with Corrugated Ribbon**



[GBS](#)

- High power rating up to 1000 W
- Complete vitreous coating for perfect humidity protection

ESTA POWER CAPACITORS

**HVAC Power Capacitor**



[HV Harmonic Filter \(AC\)](#)

- Harmonic distortion removal
- High reliability

RESISTORS

**Power Resistor for Mounting onto a Heatsink, Thick Film Technology**



[LPS](#)

- High power, 57 mm x 57 mm, up to 1100 W at 25 °C on heatsink, low weight of 83 g
- Non-inductive down to 1 μH, high pulse capability up to 1000 J for short pulse

ESTA POWER CAPACITORS

**Capacitors for Power Electronic (PEC) – Rectangular**



[DCMKP Rectangular](#)

- Heavy duty
- Low self-inductance

RESISTORS

**Very High Power Water Cooled Resistor with Multiple Resistive Functions**



[WCR](#)

- Power up to 2500 W at 60 °C water inlet temperature and 5 l/min
- Possible to have up to 8 resistive functions on the same support

View datasheets for these products  
[www.vishay.com/ref/et3ae5b](http://www.vishay.com/ref/et3ae5b)



# Transformer Stations



### RESISTORS

**Wirewound Resistors, Industrial Power, Tubular**



[RBSF](#)

- High-temperature silicone or vitreous enamel coatings
- Designed to meet heavy-duty requirements where space is at a premium

### DISPLAYS

**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**



[LCD, Color TFT, OLED](#)

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand extensive temperatures and extreme conditions

### OPTOELECTRONICS

**Widebody 10 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm**



[VOW2611](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/μs

### ESTA POWER CAPACITORS

**Surge Suppressor Capacitor**



[Surge Suppressor](#)

- Protection against steep-fronted voltage impulses
- Flexible design for indoor or outdoor application

### OPTOELECTRONICS

**Optocoupler with Phototransistor Output with Reinforced, CAT IV Isolation**



[CNY66](#)

- Isolation test voltage of 13.9 kV, rated recurring peak voltage  $V_{IORM}$  of 1450 V<sub>peak</sub>
- For class I - IV at mains voltage up to 600 V and class I - III up to 1000 V

### RESISTORS

**Universal Mount Edgewound Power Wirewound Resistors**



[EDGU](#)

- High current capability
- Enclosures and mounting frames available

### OPTOELECTRONICS

**Widebody 1 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm**



[VOW136](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/μs

### RESISTORS

**High-Power, High-Current Grid Resistors, 1 kW and Larger**



[GRE1](#)

- High active mass with good thermal dissipation
- IP00, IP20, and IP23 rated enclosures available

### ESTA POWER CAPACITORS

**HVAC Power Capacitor**



[Shunt Capacitor Bank](#)

- Reduced power system losses
- Release power system capacity

### RESISTORS

**Stainless Steel Medium-Power Resistors**



[Medium Power Grid Resistors](#)

- High permanent power dissipation, high pulse energy dissipation
- Rugged construction

### HIGH POWER RESISTORS

**Stainless Steel Neutral Ground / Braking / Crowbar Resistor**



[ULDCR](#)

- High pulse energy capability up to 3.46 MJ, surface temperature increase below 450K for single pulse
- Operating temperature: -55 °C to +375 °C, modular system – user expandable

View datasheets for these products  
[www.vishay.com/ref/et3ae5c](http://www.vishay.com/ref/et3ae5c)



# Circuit Breakers



View datasheets for these products  
[www.vishay.com/ref/et3ae5d](http://www.vishay.com/ref/et3ae5d)

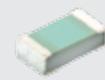
RECTIFIERS  
**Standard Recovery Rectifier High-Voltage Surface-Mount**  
[S07M](#)  

- AEC-Q101 qualified
- Wave and reflow solderable



RESISTORS  
**Professional Thin Film Chip Resistors**  
[MCT0603 1 % 25 ppm/K](#)  

- Best-in-class surge handling capability, excellent overall stability class 0.5
- CECC approved acc. EN 140401-801, sulfur resistant



DIODES  
**Small Signal Zener Diodes**  
[BZX384C](#)  

- AEC-Q101 qualified
- ESD capability according to AEC-Q101



INDUCTORS  
**High-Current, Surface-Mount Inductors – Shielded**  
[IDCS-2512](#)  

- Low-cost filtering and DC/DC conversion inductor



MOSFETs  
**N-Channel 30 V (D-S) MOSFET**  
[SiS402DN](#)  

- TrenchFET® Gen III technology, maximum  $R_{DS(on)}$  6 mΩ
- Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of an SO-8



OPTOELECTRONICS  
**Optocoupler, Power Phototriac**  
[VO2223A](#)  

- Optically coupled phototriac driving a power triac in a DIP-8 package
- Load current of 1 A<sub>RMS</sub> and 5300 V of input-to-output isolation



CERAMIC CAPACITORS  
**Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage**  
[VJ2220Y273KXFAT4X](#)  

- Polymer termination available for intensive board flex requirements
- 100 % voltage conditioning available up to 630 V<sub>DC</sub> rating (process code “5H”)



NON-LINEAR RESISTORS  
**VDR Metal Oxide Varistors High Surge**  
[VDRH.....E](#)  

- Extended operating temperature to 125 °C
- UL recognized up to 105 °C (selected types)



TANTALUM CAPACITORS  
**Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case, Low ESR**  
[TR3D](#)  

- Molded tantalum capacitor, low ESR
- Automation and control, SMPS, motion and drives, telecom infrastructure, networking and multiplexer, general purpose



RESISTORS  
**Thick Film Chip Resistors, High-Voltage**  
[CRHV](#)  

- High-voltage capability (up to 3 kV), with outstanding stability (< 0.5 %)
- Can be customized to meet specific customer needs



CERAMIC CAPACITORS  
**Approved IEC 60384-14**  
[VJ2220 X7R Safety](#)  

- Surface-mount design: simpler assembly and reduced board space requirement
- GREEN compliant products



INDUCTORS  
**Wirewound, Surface-Mount, Molded Inductors**  
[IMC-1812](#)  

- RF Inductor for high density filter applications
- Vertical bobbin construction eliminates cross talk with nearby components





# Charging Stations / Infrastructure for Vehicles and E-Bikes



**NON-LINEAR RESISTORS**

**SMD 0603, Glass Protected NTC Thermistors**

[NTCS0603E3...](#)

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



**DIODES**

**Small-Signal Zener Diodes**

[BZX84C8V2-HE3](#)

- ESD capability acc. to AEC-Q101
- AEC-Q101 qualified



**RESISTORS**

**Thin Film MELF Resistors**

[SMM0207](#)

- Unrivaled surge handling capability, ultimate stability over lifetime
- Automotive Grade quality, halogen-free, GREEN product



**CERAMIC CAPACITORS**

**Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage**

[MLCC OMD Capacitors](#)

- Polymer termination available for intensive board flex requirements
- 100 % voltage conditioning available up to 630 V<sub>DC</sub> rating (process code "5H")



**MODULES**

**EMIPAK-1B PressFit Power Module, Neutral Point Clamp Topology, 30 A**

[EMIPAK1B](#)

- PressFit pins technology
- UL approved file E78996



**FILM CAPACITORS**

**Metallized Polypropylene Film Capacitor, AC Filtering Radial Type**

[MKP1847](#)

- AC filter capacitor with high RMS current capabilities
- Safe design using segmented film



**RECTIFIERS**

**High-Voltage Surface-Mount Schottky Rectifier**

[SS2H10HE3](#)

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified



**INDUCTORS**

**Low-Profile, High-Current IHLP® Inductors**

[IHLP-5050](#)

- High-current, low-saturation inductor for DC/DC conversion and filtering



**OPTOELECTRONICS**

**Widebody IGBT and MOSFET Driver with High Creepage and Clearance of 10 mm**

[VOW3120](#)

- 10 mm min. external creepage distance, 8000 V max. transient isolation voltage
- 2.5 A peak output current, 45 kV/μs common mode rejection



**MOSFETS**

**Automotive N-Channel 40 V (D-S) 175 °C MOSFET**

[SQM200N04-1m1L](#)

- TrenchFET® Gen III technology, maximum R<sub>DS(on)</sub> 1.1 mΩ
- 7-leaded D<sup>2</sup>PAK packaging



**OPTOELECTRONICS**

**Widebody 10 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm**

[VOW2611](#)

- 8000 V max. transient isolation voltage
- Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/μs



**RESISTORS**

**Power Metal Strip® Battery Shunt Resistor, Very Low Value (100 μΩ, 125 μΩ, and 250 μΩ)**

[WSBM](#)

- Includes a molded enclosure, providing easy PCB connection to the shunt resistor
- Extremely low resistance values: 50 μΩ to 1000 μΩ



View datasheets for these products [www.vishay.com/ref/et3ae5e](http://www.vishay.com/ref/et3ae5e)

*Key components for*  
**FACTORY AUTOMATION**



**Motor Drives**



**Testers**



**Control Units**



**THE VISHAY ADVANTAGE**

- Long Useful Life
- Safety Approvals
- Robust Design
- High Peak Pulse Power
- High Precision and Stability
- High Surge Current Capabilities  
and more....

## Motor Drives


**ICs**
**Low Power Consumption Current Mode Controller**

[SiP2802DY](#)

- Pin-for-pin compatible with UCC280X, enhanced performance UC284X
- Advanced architecture
- Enables complete offline and DC/DC designs with few components

**RESISTORS**
**Power Resistor for Mounting onto a Heatsink Thick Film Technology**

[LPS 800](#)

- High power, 57 mm x 57 mm, 800 W at 25 °C on heatsink, low weight of 83 g
- Non-inductive down to 1  $\mu$ H, high pulse capability up to 1000 J short pulse

**RECTIFIERS**
**High-Voltage Ultrafast Rectifiers**

[UGx15xT Series](#)

- Soft recovery characteristics
- AEC-Q101 qualified

**ESTA POWER CAPACITORS**
**Capacitors for Power Electronic (PEC) – Cylindrical**

[EMKP](#)

- High RMS current rating
- Internal safety device

**INDUCTORS**
**Filter Inductors, High-Current, Radial Leaded**

[IHB1](#)

- Conventional high-current vertical bobbin inductor
- Low cost, high-current

**MOSFETs**
**N-Channel 60 V (D-S) 175 °C MOSFET**

[SUM110N06-3M4L](#)

- Classic TrenchFET® technology, maximum  $R_{DS(on)}$  3.4 m $\Omega$
- Popular D<sup>2</sup>PAK packaging

**TANTALUM CAPACITORS**
**Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case**

[293D](#)

- Molded tantalum capacitor, standard industrial grade
- General purpose capacitor

**INDUCTORS**
**Low-Profile, High-Current IHLP® Inductors**

[IHLP-2525CZER100M01](#)

- Compact composite inductor for high-efficiency DC/DC conversion

**RECTIFIERS**
**Single-Phase Single In-Line Bridge Rectifiers**

[GSIB2560](#)

- UL recognition file number E54214
- Solder dip 275 °C maximum 10 s, per JESD 22-B106

**NON-LINEAR RESISTORS**
**NTC Thermistors, Low Thermal Gradient Lug Sensors**

[NTCALUG02...](#)

- Low thermal gradient surface temperature sensor
- High insulation voltage

**MOSFETs**
**E Series 600 V Power MOSFET**

[SiHD7N60E](#)

- High performance E Series high-voltage technology, maximum  $R_{DS(on)}$  600 m $\Omega$
- Popular DPAK packaging, maximum continuous current of 7 A

**RESISTORS**
**Power Metal Strip® Resistors, Low Value (Down to 0.0005  $\Omega$ ), Surface-Mount**

[WSL](#)

- Extremely low resistance values from 0.0005  $\Omega$  to 0.5  $\Omega$  and tolerance of 1 %
- Power Metal Strip all-welded construction offers high pulse capacity

View datasheets for these products  
[www.vishay.com/ref/et3in1a](http://www.vishay.com/ref/et3in1a)

# Testers



**OPTOELECTRONICS**

**High-Speed, SPST Normally Open (1 Form A) Solid-State Relay in DIP-6 Package**



[VO14641AT](#)

- Isolation test voltage of 5300 V<sub>RMS</sub>, load voltage of 60 V, DC load current of 2 A
- Can be configured for AC/DC or DC only operation with clean, bounce-free switching

**MOSFETs**

**P-Channel 40 V (D-S) MOSFET**



[Si2319CDS](#)

- Classic TrenchFET<sup>®</sup> technology, maximum R<sub>DS(on)</sub> 77 mΩ
- Popular SOT-23 packaging

**RESISTORS**

**Power Resistor for Mounting onto a Heatsink, Thick Film Technology**



[LPS 600](#)

- High-power, 57 mm x 57 mm, 600 W at 25 °C on heatsink, low weight of 83 g
- Non-inductive down to 1 μH, high pulse capability up to 1000 J short pulse

**TANTALUM CAPACITORS**

**Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT<sup>®</sup>, Molded Case, Low ESR**



[TR3](#)

- Molded tantalum capacitor, low ESR
- Automation and control, SMPS, motion and drives, telecom infrastructure, networking and multiplexer, general purpose

**DIODES**

**Surface-Mount TRANSZORB<sup>®</sup> Transient Voltage Suppressors**



[SMCJxx](#)

- Available in unidirectional and bidirectional
- AEC-Q101 qualified

**CERAMIC CAPACITORS**

**AC Line Rated Disc Capacitors, Class X1, 760 V<sub>AC</sub>, Class Y1, 500 V<sub>AC</sub>**



[VY1](#)

- X1 / Y1 safety rating according to IEC 60384-14, 3rd edition
- Highest reliability and lifetime, operating temperature: -40 °C to +125 °C

**RECTIFIERS**

**Hyperfast Rectifier, 15 A FRED Pt<sup>®</sup>**



[VS-15ETH06FPPbF](#)

- 175 °C operating junction temperature
- Hyperfast recovery time

**RESISTORS**

**Molded, 50 mil Pitch, Dual-In-Line Thin Film Resistor, Surface-Mount Network**



[ORN](#)

- Multiple divider ratios with resistance values from 33 Ω to 500 kΩ per resistor
- Available in 0.05 % ratio tolerance and 5 ppm/°C TCR tracking

**RESISTORS**

**Professional Thin Film Chip Resistors**



[MCT0603-AT](#)

- Best in class surge handling capability, excellent overall stability class 0.5
- CECC approved acc. EN 140401-801, sulfur resistant

**ICs**

**Precision 8-Channel / Dual 4-Channel CMOS Analog Multiplexers**



[DG508B](#)

- High-precision, low-noise signal switching, 2 pC low charge injection
- Low parasitic capacitance of 18 pF C<sub>D(on)</sub>, low leakage typically of 3 pA

**INDUCTORS**

**Wirewound, Surface-Mount Molded Inductors**



[IMC-1210](#)

- RF Inductor for high density filter applications
- Vertical bobbin construction eliminates cross talk with nearby components

**OPTOELECTRONICS**

**AC and DC Linear Optocoupler with VDE, UL, BSI, FIMKO Certification**



[IL300](#)

- Feedback photodiode compensates for LED's time and temperature characteristics
- Isolation test voltage, 5300 V<sub>RMS</sub> in a DIP or SMD package

View datasheets for these products  
[www.vishay.com/ref/et3in1b](http://www.vishay.com/ref/et3in1b)

## Control Units



<p>MOSFETs</p> <p><b>P-Channel 20 V (D-S) MOSFET</b></p>  <p><a href="#">Si7615ADN</a></p> <ul style="list-style-type: none"> <li>Industry leading p-channel Gen III technology, maximum <math>R_{DS(on)}</math> 4.4 m<math>\Omega</math></li> <li>Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of an SO-8</li> </ul>	<p>INDUCTORS</p> <p><b>Low-Profile, High-Current IHLP® Inductors</b></p>  <p><a href="#">IHLP-2525</a></p> <ul style="list-style-type: none"> <li>Compact size, high-current DC/DC conversion and filtering</li> </ul>	<p>MODULES</p> <p><b>Ultrafast Diode 300 A, 600 V in IAP Package H/B Configuration</b></p>  <p><a href="#">VSKT162/12PbF</a></p> <ul style="list-style-type: none"> <li>UL approved file E78996</li> <li>High surge capability</li> </ul>
<p>RESISTORS</p> <p><b>High-Precision Wraparound – Thin Film Chip Resistors, Sizes 0302 to 2512</b></p>  <p><a href="#">P Series (5 ppm/°C)</a></p> <ul style="list-style-type: none"> <li>Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tolerance down to 0.01 %</li> <li>Sulfur resistant, failure rate E7 level, from 10R up to 200M</li> </ul>	<p>ICs</p> <p><b>8-Channel, Dual 4-Channel, Triple 2-Channel Multiplexers</b></p>  <p><a href="#">DG9451</a></p> <ul style="list-style-type: none"> <li>High-precision, low-noise signal switching, &lt; 0.5 pC low charge injection</li> <li>Low parasitic capacitance of 16 pF <math>C_{D(on)}</math>, low leakage typically of 3 pA</li> </ul>	<p>TANTALUM CAPACITORS</p> <p><b>Solid Tantalum Surface-Mount Chip Capacitors TANTAMOUNT®, Molded Case, HI-TMP®</b></p>  <p><a href="#">TH4</a></p> <ul style="list-style-type: none"> <li>Temperature molded tantalum capacitor HI-TMP – 175 °C</li> <li>Harsh environment, high temperature sensors, decoupling, filtering</li> </ul>
<p>MOSFETs</p> <p><b>N-Channel 1000 V Power MOSFET</b></p>  <p><a href="#">IRFBG20</a></p> <ul style="list-style-type: none"> <li>Rugged planar technology, maximum <math>R_{DS(on)}</math> 11 <math>\Omega</math></li> <li>Popular TO-220 packaging, maximum continuous current of 1.4 A</li> </ul>	<p>FILM CAPACITORS</p> <p><b>Interference Suppression Film Capacitor – Class Y2, Radial MKP 300 V<sub>AC</sub></b></p>  <p><a href="#">MKP338 6</a></p> <ul style="list-style-type: none"> <li>RFI Y2 capacitor for bypass applications</li> </ul>	<p>RESISTORS</p> <p><b>Metal Film Resistors, High-Precision, High-Stability</b></p>  <p><a href="#">PTF</a></p> <ul style="list-style-type: none"> <li>Tolerances to <math>\pm 0.01</math> %</li> <li>TCR down to 5 ppm/°C, in temperature range of -20 °C to +85 °C</li> </ul>
<p>DIODES</p> <p><b>4-Line Bus-Port ESD Protection, Flow-Through Design</b></p>  <p><a href="#">VBUS054CD-FHI</a></p> <ul style="list-style-type: none"> <li>Compact LLP2513-11L package</li> <li>Low leakage current <math>I_R</math>: &lt; 0.1 <math>\mu</math>A, low load capacitance <math>C_D</math> = 0.8 pF</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Optically Isolated 1 Form A Solid-State Relay in a Surface-Mount 4-Pin SOP Package</b></p>  <p><a href="#">VO1400AEFTR</a></p> <ul style="list-style-type: none"> <li>Clean bounce free switching with max. <math>R_{ON}</math> of 5 <math>\Omega</math>, and load voltage of 60 V</li> <li>Load current, AC peak of 100 mA, isolation test voltage 1500 V<sub>RMS</sub></li> </ul>	<p>CERAMIC CAPACITORS</p> <p><b>Standard Reflow Process Assembly, High-Reliability Ceramic-Oxide Body Construction</b></p>  <p><a href="#">Ceramic Chip Antenna</a></p> <ul style="list-style-type: none"> <li>Frequency range from 400 MHz to 5 GHz</li> <li>Wide operating temperature range: -40 °C to +85 °C</li> </ul>

View datasheets for these products  
[www.vishay.com/ref/et3in1c](http://www.vishay.com/ref/et3in1c)

Key components for  
**FABRICATION**



**Welding**



**Cutting**



**3D Printers**



**Melting /  
Forging /  
Hardening**



**THE VISHAY ADVANTAGE**

- Long Useful Life
- Safety Approvals
- High Peak Pulse Power
- High Operating Temperature
- High Surge Current Capability
- and more....

# Welding



<p>RESISTORS</p> <p><b>12.5 mm Modular Panel Potentiometer</b></p>  <p><a href="#">P11P</a></p> <ul style="list-style-type: none"> <li>• High dielectric strength up to 5000 V<sub>RMS</sub>, single turn versatile options</li> <li>• Plastic shaft and bushing, test according to CECC</li> </ul>	<p>MOSFETs</p> <p><b>N-Channel 150 V (D-S) MOSFET</b></p>  <p><a href="#">SUP90N15-18P</a></p> <ul style="list-style-type: none"> <li>• Classic TrenchFET® technology, maximum R<sub>DS(on)</sub> 21 mΩ</li> <li>• Popular TO-220 packaging</li> </ul>	<p>CERAMIC CAPACITORS</p> <p><b>AC Line Rated Disc Capacitors, Class X1, 760 V<sub>AC</sub>, Class Y1, 500 V<sub>AC</sub></b></p>  <p><a href="#">VY1</a></p> <ul style="list-style-type: none"> <li>• X1 / Y1 safety rating according to IEC 60384-14, 3rd edition</li> <li>• Highest reliability and lifetime, operating temperature: -40 °C to +125 °C</li> </ul>
<p>RECTIFIERS</p> <p><b>High Voltage Input Rectifier Diode, 60 A</b></p>  <p><a href="#">60CPH03</a></p> <ul style="list-style-type: none"> <li>• 175 °C operating junction temperature</li> <li>• Hyperfast recovery time</li> </ul>	<p>INDUCTORS</p> <p><b>Filter Inductors, High-Current, Axial Leaded</b></p>  <p><a href="#">IHD3</a></p> <ul style="list-style-type: none"> <li>• Conventional high current axial leaded filter inductor</li> </ul>	<p>MODULES</p> <p><b>Dual INT-A-PAK Low-Profile Half-Bridge, 400 A</b></p>  <p><a href="#">GA400TD60S</a></p> <ul style="list-style-type: none"> <li>• Optimized for hard switching speed DC to 1 kHz</li> <li>• Very low V<sub>CE(on)</sub></li> </ul>
<p>RESISTORS</p> <p><b>Wirewound / Metal Film Resistors, Commercial Power, Axial Leads</b></p>  <p><a href="#">CP</a></p> <ul style="list-style-type: none"> <li>• High power-to-size ratio, meets / exceeds EIA RS-344 requirements, fireproof</li> <li>• High thermal conductivity ceramic case, circuit board standoff option</li> </ul>	<p>DIODES</p> <p><b>Small-Signal Zener Diodes</b></p>  <p><a href="#">1N5255B</a></p> <ul style="list-style-type: none"> <li>• Standard Zener voltage tolerance is ± 5 %</li> <li>• AEC-Q101 qualified</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Widebody IGBT and MOSFET Driver with High Creepage and Clearance of 10 mm</b></p>  <p><a href="#">VOW3120</a></p> <ul style="list-style-type: none"> <li>• 10 mm min. external creepage distance, 8000 V max. transient isolation voltage</li> <li>• 2.5 A peak output current, 45 kV/μs common mode rejection</li> </ul>
<p>MOSFETs</p> <p><b>E Series 650 V Power MOSFET</b></p>  <p><a href="#">SiHP24N65E</a></p> <ul style="list-style-type: none"> <li>• High performance E Series high-voltage technology, maximum R<sub>DS(on)</sub> 145 mΩ</li> <li>• Popular TO-220 packaging, maximum continuous current of 24 A</li> </ul>	<p>ESTA POWER CAPACITORS</p> <p><b>Capacitors for Power Electronic (PEC) – Rectangular</b></p>  <p><a href="#">DCMKP Rectangular</a></p> <ul style="list-style-type: none"> <li>• Heavy duty</li> <li>• Low self-inductance</li> </ul>	<p>RESISTORS</p> <p><b>Wirewound Resistors, Precision Power, Surface-Mount</b></p>  <p><a href="#">WSC4527</a></p> <ul style="list-style-type: none"> <li>• Molded package with compliant leads that give superior thermal shock resilience</li> <li>• All welded wirewound construction provides accuracy and high reliability</li> </ul>

View datasheets for these products  
[www.vishay.com/ref/et3in2a](http://www.vishay.com/ref/et3in2a)

# Cutting



<p>DIODES</p> <p><b>Ultrafast Avalanche Sinterglass Diode</b></p> <p><a href="#">SF1600</a></p> <ul style="list-style-type: none"> <li>• Hermetically sealed axial-led glass</li> <li>• High reverse voltage</li> </ul> 	<p>RESISTORS</p> <p><b>Cemented Wirewound Resistors</b></p> <p><a href="#">AC</a></p> <ul style="list-style-type: none"> <li>• Non-flammable cement coating, good size-to-power ratio</li> <li>• Power: 1 W to 10 W, excellent pulse handling capability, various lead forming options</li> </ul> 	<p>DISPLAYS</p> <p><b>High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions</b></p> <p><a href="#">LCD, Color TFT, OLED</a></p> <ul style="list-style-type: none"> <li>• Standard or customized glass / modules for specific applications and monitoring</li> <li>• Low cost options for LCD / OLED / TFT for industrial applications</li> </ul> 
<p>OPTOELECTRONICS</p> <p><b>2.5 A Output Current IGBT and MOSFET Driver</b></p> <p><a href="#">VO3120</a></p> <ul style="list-style-type: none"> <li>• 2.5 A peak output current in a DIP or SMD package</li> <li>• 35 kV/μs common mode rejection and UL, cUL, VDE certified</li> </ul> 	<p>MODULES</p> <p><b>Ultrafast Diode 300 A, 600 V in IAP Package H/B Configuration</b></p> <p><a href="#">VSKDU300/06</a></p> <ul style="list-style-type: none"> <li>• UL approved file E78996</li> <li>• High surge capability</li> </ul> 	<p>CERAMIC CAPACITORS</p> <p><b>RF Power Plate Capacitors with Contoured Rim, Class 1 Ceramic</b></p> <p><a href="#">PS55</a></p> <ul style="list-style-type: none"> <li>• Class 1 ceramic dielectric featuring extremely low dissipation factors</li> <li>• High power ratings, wide range of capacitance values available</li> </ul> 
<p>MODULES</p> <p><b>FRED Pt<sup>®</sup>, Ultrafast Soft Recovery Diode Module, 400 A</b></p> <p><a href="#">VSUD400CW60</a></p> <ul style="list-style-type: none"> <li>• UL approved file E222165</li> <li>• Specifically designed for HF welding and plasma cutting</li> </ul> 	<p>RESISTORS</p> <p><b>Wirewound Resistors, Industrial Power, Aluminum Housed, Chassis Mount</b></p> <p><a href="#">RH</a></p> <ul style="list-style-type: none"> <li>• High pulse energy capability, high power ratings to 250 W, heatsink mount</li> <li>• All welded construction ideal for harsh environments</li> </ul> 	<p>MODULES</p> <p><b>Buck PFC stage with Hyperfast IGBT and FRED Pt diode</b></p> <p><a href="#">100MT160PBPbF</a></p> <ul style="list-style-type: none"> <li>• Speed 25 kHz to 50 kHz</li> <li>• Very low stray inductance design for high-speed operation</li> </ul> 
<p>OPTOELECTRONICS</p> <p><b>Optocoupler with Phototransistor Output and Trigger Current of <math>I_F = 1</math> mA</b></p> <p><a href="#">VOL618A</a></p> <ul style="list-style-type: none"> <li>• High current transfer ratio, and high isolation voltage of 5000 V<sub>RMS</sub></li> <li>• Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package</li> </ul> 	<p>RESISTORS</p> <p><b>Power Resistor for Mounting onto a Heatsink Thick Film Technology</b></p> <p><a href="#">LPS 800</a></p> <ul style="list-style-type: none"> <li>• High power for small size of 57 mm x 57 mm, 800 W at 25 °C on heatsink, low weight of 83 g</li> <li>• Non-inductive down to 1 μH, high pulse capability up to 1000 J short pulse</li> </ul> 	<p>OPTOELECTRONICS</p> <p><b>Widebody 1 MBd High-Speed Optocoupler with High Creepage and Clearance of 10 mm</b></p> <p><a href="#">VOW136</a></p> <ul style="list-style-type: none"> <li>• 8000 V max. transient isolation voltage</li> <li>• Integrated Faraday shield provides very high input-to-output noise isolation of 40 kV/μs</li> </ul> 

View datasheets for these products  
[www.vishay.com/ref/et3in2b](http://www.vishay.com/ref/et3in2b)

## 3D Printers


**RESISTORS**

**Power Metal Strip® Resistors, Very High Power, Low Value Surface-Mount**



[WSLP0603](#)

- Very high power rating of 0.4 W in small 0603 package
- Extremely low resistance values from 0.01  $\Omega$  to 0.1  $\Omega$  and tolerance of 1 %

**MOSFETs**

**N-Channel 30 V (D-S) MOSFET**



[SiS414DN](#)

- TrenchFET® Gen III technology, maximum  $R_{DS(on)}$  16 m $\Omega$
- Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of an SO-8

**OPTOELECTRONICS**

**AC and DC Linear Optocoupler with VDE, UL, BSI, FIMKO Certification**



[IL300](#)

- Feedback photodiode compensates for LED's time and temperature characteristics
- Isolation test voltage, 5300 V<sub>RMS</sub> in a DIP or SMD package

**ICs**

**10 A microBUCK® SiC402A/B Integrated Buck Regulator with Programmable LDO**



[SiC402A](#)

- Offers a scalable design with 6 A and 15 A parts in the same footprint
- Soft-start, UVP / OVP, OCP, selectable power-saving mode, LDO, PGOOD, OTP

**CERAMIC CAPACITORS**

**IEC 60384-14:2005, CAN/CSA/cCSAus, and ANSI/UL CB Certificates**



[MLCC SMD Safety Capacitor](#)

- Surface-mount design: simpler assembly and reduced board space requirement
- Available in NP0 (C0G) or X7R dielectrics

**NON-LINEAR RESISTORS**

**NTC Thermistors, Low Thermal Gradient Lug Sensors**



[NTCALUG02...](#)

- Low thermal gradient surface temperature sensor
- High insulation voltage

**OPTOELECTRONICS**

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



[TCxT1350X01](#)

- Emitter wavelength: 950 nm, released for high operating temperatures up to 125 °C
- Gap: 3 mm, aperture: 0.3 mm, channel distance (center to center): 0.8 mm

**DISPLAYS**

**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**



[LCD, Color TFT, OLED](#)

- Standard or customized glass / modules for specific applications and monitoring
- Low cost options for LCD / OLED / TFT for industrial applications

**INDUCTORS**

**Low-Profile, High-Current IHLP® Inductors**



[IHLP-2525](#)

- Compact size, high-current DC/DC conversion and filtering

**TANTALUM CAPACITORS**

**Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case**



[293D](#)

- Molded tantalum capacitor, standard industrial grade
- General purpose capacitor

**ICs**

**3.2  $\Omega$ , 8-Channel,  $\pm 15$  V, +12 V,  $\pm 5$  V Precision Multiplexers**



[DG1408](#)

- Low, flat, and highly matched channel resistance over a wide voltage range
- Low parasitics: 121 pF  $C_{D(on)}$ , 20 pC charge injection, and fast signal switching

**ALUMINUM CAPACITORS**

**Aluminum Capacitors, Power Miniaturized General Purpose – Snap-In**



[256 PMG-SI](#)

- Useful life: 2000 h at +105 °C, > 5000 h at +85 °C
- General purpose

View datasheets for these products  
[www.vishay.com/ref/et3in2c](http://www.vishay.com/ref/et3in2c)

# Melting / Forging / Hardening



TANTALUM CAPACITORS

**Wet Tantalum Capacitors, Tantalum-Case with Glass-to-Tantalum Hermetic Seal**



[135D](#)

- High capacitance, voltage range 6 V to 125 V, -55 °C to +200 °C operation
- Axial leaded, industry standard case sizes (T1, T2, T3, T4)

DISPLAYS

**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**



[LCD, Color TFT, OLED](#)

- Standard or customized glass / modules for specific applications and monitoring
- LCD / OLED / TFT displays can withstand extreme industrial conditions

ALUMINUM CAPACITORS

**Aluminum Capacitors, Power, High Ripple Current, Screw Terminals**



[101/102 PHR-ST](#)

- Long life screw-terminal, high ripple current
- Custom made; the perfect aluminum capacitors for your application

CERAMIC CAPACITORS

**Internal Design Reduces Risk of Shorts Caused by Board Flex, High Breakdown Voltage**



[MLCC OMD Capacitors](#)

- Polymer termination available for intensive board flex requirements
- 100 % voltage conditioning available up to 630 V<sub>DC</sub> rating (process code "5H")

RESISTORS

**High-Stability, High-Temperature 230 °C Thin Film Wraparound Chip Resistors**



[PHT \(Sizes 0402 to 2010\)](#)

- Operating temp. up to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)
- Sulfur resistant, from 10R up to 7.5M, tight tolerance down to 0.05 %

OPTOELECTRONICS

**Optocouplers with Phototransistor Output with Reinforced, CAT IV Isolation**



[CNY6x](#)

- Isolation test voltage up to 13.9 kV, rated recurring peak voltage V<sub>IORM</sub> of 1450 V<sub>peak</sub>
- For class I - IV at mains voltage up to 600 V and class I - III up to 1000 V

RESISTORS

**Wirewound, 300 W Liquid Cooled Load Resistor**



[SPR2232](#)

- Element wire precisely wound on insulated copper tubing and welded to terminals
- High-temperature silicone coating, non-inductive winding available

OPTOELECTRONICS

**Photovoltaic MOSFET Driver with Integrated Fast Turn-Off, Solid-State Relay**



[VOM1271](#)

- Drive current from primary side LED; one less external power supply needed
- Isolation test voltage 4500 V<sub>RMS</sub> and integrated turn-off circuitry for high-speed switching

ESTA POWER CAPACITORS

**Medium Frequency Capacitors, Water Cooled**



[Phawo](#)

- Frequency range up to 10 kHz
- Maximum of 8 partial outputs

NON-LINEAR RESISTORS

**NTC Thermistor Sensors – Pipe Type with Fast Time Response**



[NTCLP450E3](#)

- Miniature pipe sensor
- Fast time response vs. industry standards

OPTOELECTRONICS

**Optocoupler, Power Phototriac**



[VO2223A](#)

- Optically coupled phototriac driving a power triac in a DIP-8 package
- Load current of 1 A<sub>RMS</sub> and 5300 V of input to output isolation

NON-LINEAR RESISTORS

**NTC Thermistors**



[NTCAIMME3C90373](#)

- Miniature fluid immersion sensor
- Fast response time < 3 s

View datasheets for these products  
[www.vishay.com/ref/et3in2d](http://www.vishay.com/ref/et3in2d)

# Spotlight on Power Modules

## IGBT Modules

### FEATURES

- Wide range of industry-standard package styles
- Direct mount on heatsink
- Choice of PT, NPT, and Trench IGBT technologies
- Low- $V_{CE(on)}$  IGBT
- Switching frequency from 1 kHz to 150 kHz
- Optimized anti-parallel ultrafast diode with soft recovery characteristics
- Rugged transient performance
- High isolation voltage up to 3500 V
- 100 % lead (Pb)-free and RoHS-compliant
- Low thermal resistance
- Wide operating temperature range (-40 °C to +175 °C)
- UL-approved
- PressFit pins technology now available on selected packages

### OPTIONS

- Short-circuit capability available on many configurations
- Optional SMD integrated thermistor
- Customizable for specific application needs
- Automotive products upon request

### APPLICATIONS

- Industrial high-frequency welding
- Switch mode power supplies
- Uninterruptible power supplies
- Motor drives
- Power factor correction
- Solar inverters

### DIMENSIONS IN MILLIMETERS



## Diode Modules

### FEATURES

- Wide range of industry-standard package styles
- Direct mounting on heatsink
- Choice of rectifier and thyristor technologies
- Optimized high-voltage diode and SCR
- Fast recovery diode modules available
- High isolation voltage (2500 V)
- RoHS-compliant
- Low thermal resistance
- Low- / high-temperature performance (-40 °C to +175 °C)
- UL-approved

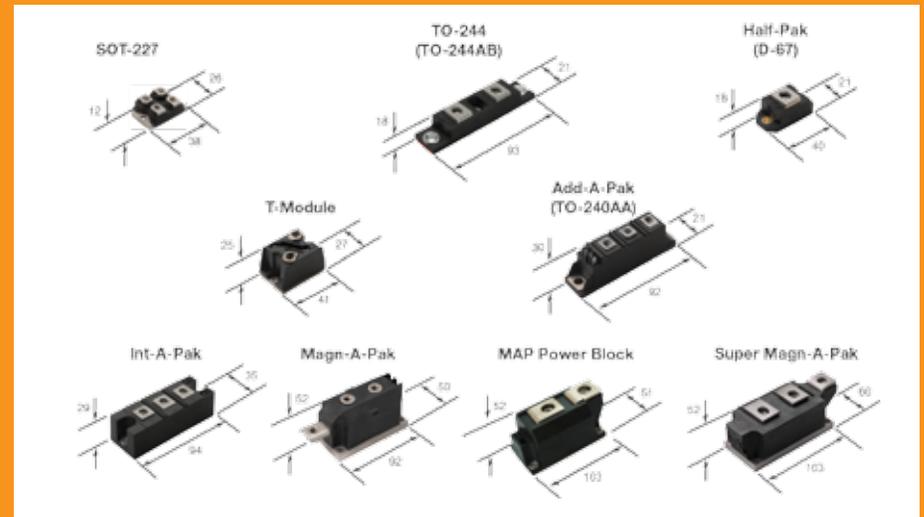
### OPTIONS

- Customizable for specific application needs
- Gate and auxiliary cathode accessories available upon request

### APPLICATIONS

- Single- and three-phase input rectification
- Industrial welding
- Switch mode power supplies
- Motor drives
- UPS
- Anti-parallel thyristors (AC switches)

### DIMENSIONS IN MILLIMETERS



Key components for  
**DETECTION AND INITIAL SAFETY DEVICES**



**Smoke**



**Flame / Fire**



**Gas**



**Heat**



**Water**



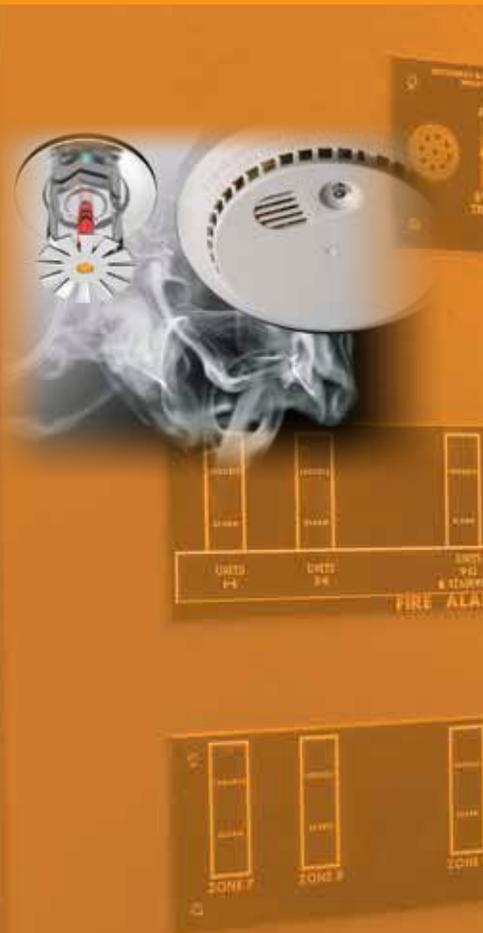
**Radiation**



**THE VISHAY ADVANTAGE**

- Long Useful Life
- High Reliability
- Safety Approvals
- Transient Resistivity
- High Peak Pulse Power
- High Operating Temperature
- High Surge Current Capability and more....

# Smoke



<p>MOSFETs</p> <p><b>N-Channel 60 V (D-S) MOSFET</b></p> <p><a href="#">2N7002K</a></p> <ul style="list-style-type: none"> <li>TrenchFET® technology, maximum <math>R_{DS(on)}</math> 2 <math>\Omega</math></li> <li>Popular SOT-23 packaging</li> </ul> 	<p>OPTOELECTRONICS</p> <p><b>High-Power Infrared Emitting Diode with Peak Wavelength of 940 nm in a T-1<math>\frac{3}{4}</math> Package</b></p> <p><a href="#">TSAL6100</a></p> <ul style="list-style-type: none"> <li>Typical radiant intensity of 170 mW/sr at <math>I_F = 100</math> mA, 1450 mW/sr at <math>I_F = 1</math> mA</li> <li>Angle of half intensity: <math>\phi = \pm 10^\circ</math></li> </ul> 	<p>DIODES</p> <p><b>Small-Signal Zener Diodes</b></p> <p><a href="#">MMSZ5258</a></p> <ul style="list-style-type: none"> <li>AEC-Q101 qualified</li> <li>ESD capability according to AEC-Q101</li> </ul> 
<p>FUSES</p> <p><b>Thin Film Chip Fuses</b></p> <p><a href="#">MFU0603FF</a></p> <ul style="list-style-type: none"> <li>Very quick acting fuse characteristics</li> <li>Outstanding stability of fusing characteristics</li> </ul> 	<p>OPTOELECTRONICS</p> <p><b>High-Speed and High-Sensitivity PIN Photodiodes in a Miniature SMD Package</b></p> <p><a href="#">VEMD2023X01</a></p> <ul style="list-style-type: none"> <li>Daylight blocking filter matches perfectly with 830 nm to 950 nm IR emitters</li> <li>Angle of half sensitivity of <math>\pm 35^\circ</math> in a gullwing or reverse gullwing package</li> </ul> 	<p>NON-LINEAR RESISTORS</p> <p><b>SMD 0603, Glass Protected NTC Thermistors</b></p> <p><a href="#">NTCS0603</a></p> <ul style="list-style-type: none"> <li>Standard series, AEC-Q200 compliant</li> <li>Glass protected with soft terminations</li> </ul> 
<p>INDUCTORS</p> <p><b>High-Current, Surface-Mount Inductors – Non-Shielded</b></p> <p><a href="#">IDCP-2218</a></p> <ul style="list-style-type: none"> <li>Low cost filtering and DC/DC conversion inductor</li> </ul> 	<p>RESISTORS</p> <p><b>Professional Thin Film Chip Resistors</b></p> <p><a href="#">MCS 0402</a></p> <ul style="list-style-type: none"> <li>Best in class surge handling capability, excellent overall stability class 0.5</li> <li>CECC approved acc. EN 140401-801, sulfur resistant</li> </ul> 	<p>TANTALUM CAPACITORS</p> <p><b>Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case</b></p> <p><a href="#">293D</a></p> <ul style="list-style-type: none"> <li>Molded tantalum capacitor, standard industrial grade</li> <li>General purpose capacitor</li> </ul> 
<p>RESISTORS</p> <p><b>Thick Film Surface-Mount Chip Resistors, Wraparound, Extremely Low Value</b></p> <p><a href="#">RCWE</a></p> <ul style="list-style-type: none"> <li>Low resistance values from 0.01 <math>\Omega</math> to 0.99 <math>\Omega</math> and tolerance of 1 %</li> <li>Thick film construction with 2x power capacity</li> </ul> 	<p>OPTOELECTRONICS</p> <p><b>High-Power SurfLight™ Emitter with 850 nm Peak Wavelength</b></p> <p><a href="#">VSMY2850G</a></p> <ul style="list-style-type: none"> <li>SMD gullwing and reverse gullwing package with dimensions of 2.3 mm x 2.3 mm x 2.8 mm</li> <li>Radiant intensity of 100 mW/sr with angle of half intensity: <math>\phi = \pm 10^\circ</math></li> </ul> 	<p>NON-LINEAR RESISTORS</p> <p><b>VDR Metal Oxide Varistors Standard</b></p> <p><a href="#">VDRS..</a></p> <ul style="list-style-type: none"> <li>Standard over-voltage surge protector</li> <li>UL recognized</li> </ul> 

View datasheets for these products  
[www.vishay.com/ref/et3in3a](http://www.vishay.com/ref/et3in3a)

## Flame / Fire

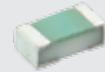
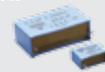


<p>CERAMIC CAPACITORS</p> <p><b>Radial Leaded Multilayer Ceramic Capacitors</b></p>  <p><a href="#">K Series</a></p> <ul style="list-style-type: none"> <li>• High capacitance value in small size</li> <li>• Rated voltages: 50 V, 100 V, 200 V, and 500 V</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>High-Power SurfLight™ Emitter with 850 nm Peak Wavelength</b></p>  <p><a href="#">VSMY2850G</a></p> <ul style="list-style-type: none"> <li>• SMD gullwing and reverse gullwing package with dimensions of 2.3 mm x 2.3 mm x 2.8 mm</li> <li>• Radiant intensity of 100 mW/sr with angle of half intensity: <math>\phi = \pm 10^\circ</math></li> </ul>	<p>CERAMIC CAPACITORS</p> <p><b>Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities</b></p>  <p><a href="#">MLCC RF Capacitors</a></p> <ul style="list-style-type: none"> <li>• Non-magnetic available with copper or epoxy bondable terminations</li> <li>• Lead-bearing terminations available for hi-rel applications</li> </ul>
<p>OPTOELECTRONICS</p> <p><b>PIN Photodiode with High Speed and High Radiant Sensitivity</b></p>  <p><a href="#">BPV22NF</a></p> <ul style="list-style-type: none"> <li>• Daylight blocking filter matched with IR emitters operating at wavelength 870 nm to 950 nm</li> <li>• Large radiant sensitive area of 7.5 mm<sup>2</sup>, angle of half sensitivity: <math>\phi = \pm 60^\circ</math></li> </ul>	<p>DISPLAYS</p> <p><b>High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions</b></p>  <p><a href="#">LCD, Color TFT, OLED</a></p> <ul style="list-style-type: none"> <li>• Standard or customized glass / modules for specific applications and monitoring</li> <li>• Low cost options for LCD / OLED / TFT for industrial applications</li> </ul>	<p>RESISTORS</p> <p><b>Professional Thin Film Chip Resistors</b></p>  <p><a href="#">MCT0603-AT</a></p> <ul style="list-style-type: none"> <li>• Best in class surge handling capability, excellent overall stability class 0.5</li> <li>• CECC approved acc. EN 140401-801, sulfur resistant</li> </ul>
<p>NON-LINEAR RESISTORS</p> <p><b>NTC Thermistors, 2-Point Mini Chip Sensor, Flexible Leads</b></p>  <p><a href="#">NTCLE305E4</a></p> <ul style="list-style-type: none"> <li>• Miniature insulated leads</li> <li>• AEC-Q200 compliant, fast response time for exposed mounting</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Optocoupler with Phototransistor Output and Trigger Current of <math>I_F = 1</math> mA</b></p>  <p><a href="#">VOL618A</a></p> <ul style="list-style-type: none"> <li>• High current transfer ratio, and high isolation voltage of 5000 V<sub>RMS</sub></li> <li>• Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package</li> </ul>	<p>FILM CAPACITORS</p> <p><b>Interference Suppression Film Capacitor, Class X2, MKT 310 V<sub>AC</sub>, High Stability Grade</b></p>  <p><a href="#">F1772S</a></p> <ul style="list-style-type: none"> <li>• RFI X2 film capacitors for continuous across the line and series impedance app.</li> <li>• Withstanding 85 °C / 85 % RH for 1000 h at 240 V<sub>AC</sub></li> </ul>
<p>ICs</p> <p><b>1.0 A Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6 and TDFN4 1.2 mm x 1.6 mm</b></p>  <p><a href="#">SiP32431</a></p> <ul style="list-style-type: none"> <li>• 1.5 V to 5.5 V input voltage range, very low R<sub>DS(on)</sub>, typ. 105 mΩ at 5 V</li> <li>• Slew rate controlled turn-on time: 100 μs, low quiescent current &lt; 1 μA</li> </ul>	<p>TANTALUM CAPACITORS</p> <p><b>vPolyTan™ Solid Tantalum Surface-Mount Chip Capacitors, Molded Case, High-Performance Polymer Type</b></p>  <p><a href="#">T55 Series</a></p> <ul style="list-style-type: none"> <li>• Ultra-low ESR</li> <li>• Moisture sensitivity level 3</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>High Sensitivity PIN Photodiode in Leadless Low-Profile Package</b></p>  <p><a href="#">VEMD5110X01</a></p> <ul style="list-style-type: none"> <li>• 0.8 mm height SMD photodiode featuring a chip with a 7.5 mm<sup>2</sup> sensitive area</li> <li>• Daylight blocking filter matched with IR emitters operating at wavelength 870 nm to 950 nm</li> </ul>

View datasheets for these products  
[www.vishay.com/ref/et3in3b](http://www.vishay.com/ref/et3in3b)

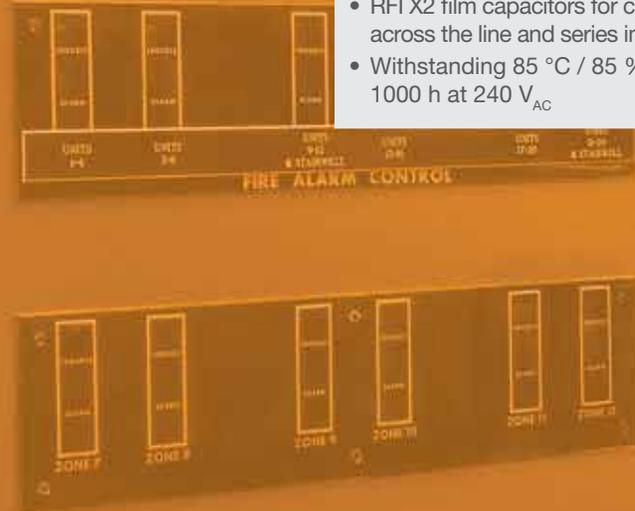
# Gas



<p>RECTIFIERS</p> <p><b>Surface-Mount Glass Passivated Ultrafast Rectifier</b></p>  <p><a href="#">EGF1T</a></p> <ul style="list-style-type: none"> <li>• Avalanche surge energy capability</li> <li>• Low switching losses, high efficiency</li> </ul>	<p>CERAMIC CAPACITORS</p> <p><b>Axial Leaded Multilayer Ceramic Capacitors</b></p>  <p><a href="#">A Series</a></p> <ul style="list-style-type: none"> <li>• High capacitance value in small size</li> <li>• Rated voltages: 50 V, 100 V, 200 V, and 500 V</li> </ul>	<p>ICs</p> <p><b>Enhanced Versions of Vishay's Quad SPST CMOS Analog Switches</b></p>  <p><a href="#">DG444B, DG445B</a></p> <ul style="list-style-type: none"> <li>• Supports single and dual power operation, rail to rail signal switching capable</li> <li>• 10 pA / typical low leakage and 1 pC charge injection</li> </ul>
<p>OPTOELECTRONICS</p> <p><b>Optocoupler with Phototransistor Output and Trigger Current of <math>I_F = 1</math> mA</b></p>  <p><a href="#">VOL618A</a></p> <ul style="list-style-type: none"> <li>• High current transfer ratio, and high isolation voltage of 5000 V<sub>RMS</sub></li> <li>• Operating temp. from -55 °C to +110 °C in a 4-pin LSOP, mini-flat package</li> </ul>	<p>MOSFETs</p> <p><b>N-Channel 600 V Power MOSFET</b></p>  <p><a href="#">IRFR1N60APBF</a></p> <ul style="list-style-type: none"> <li>• Rugged planar technology, maximum <math>R_{DS(on)}</math> 7 <math>\Omega</math></li> <li>• Popular DPAK packaging, maximum continuous current of 1.4 A</li> </ul>	<p>CERAMIC CAPACITORS</p> <p><b>Ultra-Stable Dielectric Formulation, Low Dissipation Factor (DF)</b></p>  <p><a href="#">MLCC High Q Capacitors</a></p> <ul style="list-style-type: none"> <li>• Robust design build with wet process and noble metal electrodes</li> </ul>
<p>RESISTORS</p> <p><b>High-Precision Wraparound Thin Film Chip Resistors</b></p>  <p><a href="#">P0805</a></p> <ul style="list-style-type: none"> <li>• Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tolerance down to 0.01 %</li> <li>• Sulfur resistant, failure rate E7 level, from 10R up to 200M for P series</li> </ul>	<p>FILM CAPACITORS</p> <p><b>Interference Suppression Film Capacitor – Class X2, Axial MKT 253 V<sub>AC</sub></b></p>  <p><a href="#">F1773</a></p> <ul style="list-style-type: none"> <li>• RFI X2 film capacitors for continuous across the line and series impedance apps</li> <li>• Withstanding 85 °C / 85 % RH for 1000 h at 240 V<sub>AC</sub></li> </ul>	<p>RESISTORS</p> <p><b>Professional Thin Film Chip Resistors</b></p>  <p><a href="#">MCS0402...e3</a></p> <ul style="list-style-type: none"> <li>• Best in class surge handling capability, excellent overall stability class 0.5</li> <li>• CECC approved acc. EN 140401-801, sulfur resistant</li> </ul>
<p>MOSFETs</p> <p><b>N-Channel 25 V (D-S) MOSFET</b></p>  <p><a href="#">SiR808DP</a></p> <ul style="list-style-type: none"> <li>• Halogen-free according to IEC 61249-2-21 definition</li> <li>• Optimized for high-side synchronous rectification</li> </ul>	<p>ALUMINUM CAPACITORS</p> <p><b>Double Layer Aluminum Capacitors</b></p>  <p><a href="#">196DLC</a></p> <ul style="list-style-type: none"> <li>• Energy storage for backup of CMOS in all fields of electronics</li> <li>• Unlimited charge and discharge cycle numbers</li> </ul>	<p>FILM CAPACITORS</p> <p><b>Metallized Polypropylene Film Capacitor, Related Document: IEC 60384-16</b></p>  <p><a href="#">MKP1841</a></p> <ul style="list-style-type: none"> <li>• High-voltage, high-current, and high-pulse operations</li> </ul>

View datasheets for these products  
[www.vishay.com/ref/et3in3c](http://www.vishay.com/ref/et3in3c)

# Heat


**RESISTORS**
**Thin Film Mini-MELF Resistors**
[SMM0204...e3](#)


- Unrivaled surge handling capability, ultimate stability over lifetime
- Automotive Grade quality, halogen-free, GREEN product

**FILM CAPACITORS**
**Interference Suppression Film Capacitor, Class X2 MKT 310 V<sub>AC</sub>, High Stability Grade**
[F1772S](#)


- RFI X2 film capacitors for continuous across the line and series impedance apps
- Withstanding 85 °C / 85 % RH for 1000 h at 240 V<sub>AC</sub>

**ICs**
**1.0 A Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6 and TDFN4 1.2 mm x 1.6 mm**
[SiP32431](#)

- Industry's lowest operating current (only 50 pA)
- Ideal for battery operated equipment

**OPTOELECTRONICS**
**Optocoupler with Phototransistor Output; ATEX Certified for Explosive Environments**

[CNY65Exi](#)

- ATEX certificate: PTB 03 ATEX 2033 U, Gas: II (1) G (EX ia) IIC, Dust: II (1) D (EX ia) IIIC
- V<sub>ISO</sub> of 11 600 V<sub>peak</sub> for 1 minute

**CERAMIC CAPACITORS**
**IEC 60384-14:2005, CAN/CSA/cCSAus, and ANSI/UL CB Certificates**

[MLCC SMD Safety Capacitor](#)

- Surface-mount design: simpler assembly and reduced board space requirement
- Available in NP0 (C0G) or X7R dielectrics

**RESISTORS**
**High-Stability, High-Temperature 230 °C Thin Film Wraparound Chip Resistors**

[PHT \(Sizes 0402 to 2010\)](#)

- Operating temp. up to 215 °C, low TCR down to 15 ppm/°C (-55 °C to +215 °C)
- Sulfur resistant, from 10R up to 7.5M, tight tolerance down to 0.05 %

# Water



ICs

**1.8 V to 5.5 V, 4 W  
Dual SPST Switches**

[DG721](#)

- High precision, low-noise signal switching
- Low leakage, charge injection, and parasitic capacitance



CERAMIC CAPACITORS

**Standard Reflow Process Assembly,  
High-Reliability Ceramic-Oxide  
Body Construction**

[Ceramic Chip Antenna](#)

- Frequency range from 400 MHz to 5 GHz
- Wide operating temperature range: -40 °C to +85 °C



RESISTORS

**Professional Thin Film  
Chip Resistors**

[MCT0603...e3](#)

- Best in class surge handling capability, excellent overall stability class 0.5
- CECC approved acc. EN 140401-801, sulfur resistant

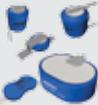


ENERGY STORAGE CAPACITORS

**Hybrid Storage  
Capacitors**

[196 HVC ENYCAP™](#)

- Power back up for memory controller, industrial PC, real time clock
- Storage device for energy harvesting, emergency light and micro power supplies



DISPLAYS

**High-Quality Displays Offer  
Excellent Human-to-Machine  
Interface Solutions**

[LCD, Color TFT, OLED](#)

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand extensive temperatures and extreme conditions

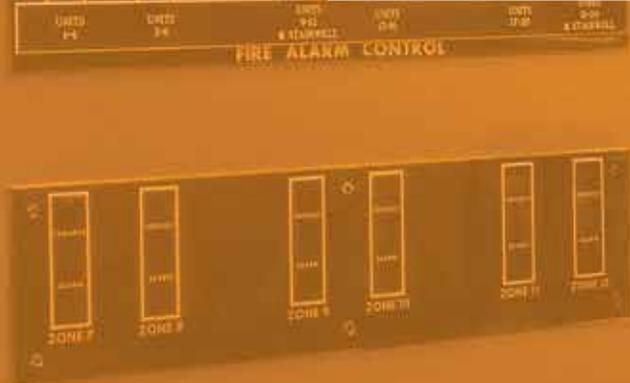


FILM CAPACITORS

**Interference Suppression Film  
Capacitor – Class X2,  
Axial MKT 253 V<sub>AC</sub>**

[F1773](#)

- RFI X2 film capacitors for continuous across the line and series impedance apps
- Withstanding 85 °C / 85 % RH for 1000 h at 240 V<sub>AC</sub>

View datasheets for these products  
[www.vishay.com/ref/et3in3e](http://www.vishay.com/ref/et3in3e)

# Radiation



<p>RESISTORS</p> <p><b>High-Stability Thin Film Flat Chip Resistors</b></p>  <p><a href="#">TNPW...e3</a></p> <ul style="list-style-type: none"> <li>• Excellent overall stability, endurance &lt; 0.05 %, resistance range from 10R to 3M</li> <li>• AEC-Q200 qualified, sulfur resistant, halogen-free</li> </ul>	<p>MOSFETs</p> <p><b>Dual P-Channel 30 V (D-S) MOSFET</b></p>  <p><a href="#">Si4925DDY</a></p> <ul style="list-style-type: none"> <li>• TrenchFET® technology providing two p-channel devices with maximum <math>R_{DS(on)}</math> of 29 m<math>\Omega</math></li> <li>• Proven dual SO-8 package</li> </ul>	<p>TANTALUM CAPACITORS</p> <p><b>Solid-Electrolyte TANTALEX® Capacitors, Axial-Leaded, Molded Case</b></p>  <p><a href="#">173D</a></p> <ul style="list-style-type: none"> <li>• Miniature axial leaded solid tantalum capacitors in 5 case sizes</li> <li>• Laser marked molded flame retardant case</li> </ul>
<p>DISPLAYS</p> <p><b>High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions</b></p>  <p><a href="#">LCD, Color TFT, OLED</a></p> <ul style="list-style-type: none"> <li>• Standard or customized glass / modules for specific applications and monitoring</li> <li>• Can withstand extensive temperatures and extreme conditions</li> </ul>	<p>RESISTORS</p> <p><b>Conformal, Single In-Line Thin Film Resistor, Through-Hole Network (Standard)</b></p>  <p><a href="#">VTF</a></p> <ul style="list-style-type: none"> <li>• 3 to 10-pin SIP configuration available with resistance values up to 2 M<math>\Omega</math></li> <li>• Custom networks, schematics avail. with tracking down to 2 ppm/°C, ratio tol. 0.02 %</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Infrared Transceiver with Data Rate up to 115.2 kbit/s</b></p>  <p><a href="#">TFBS4711</a></p> <ul style="list-style-type: none"> <li>• Small package (H x L x W): 1.9 mm x 3 mm x 6 mm and transmit range of 1 meter</li> <li>• Idle current: 70 <math>\mu</math>A, shutdown current: 10 nA, operates from 2.4 V to 5.5 V</li> </ul>
<p>FILM CAPACITORS</p> <p><b>Interference Suppression Film Capacitor, Class X2 MKT 310 V<sub>AC</sub> High Stability Grade</b></p>  <p><a href="#">F1772S</a></p> <ul style="list-style-type: none"> <li>• RFI X2 film capacitors for continuous across the line and series impedance apps</li> <li>• Withstanding 85 °C / 85 % RH for 1000 h at 240 V<sub>AC</sub></li> </ul>	<p>INDUCTORS</p> <p><b>Inductors, Commercial, Molded, Shielded, Axial Leaded</b></p>  <p><a href="#">IMS05</a></p> <ul style="list-style-type: none"> <li>• Shielded axial RF inductor for high-frequency filtering</li> </ul>	<p>RESISTORS</p> <p><b>High-Precision Wraparound, Thin Film Chip Resistors</b></p>  <p><a href="#">P0805</a></p> <ul style="list-style-type: none"> <li>• Low TCR down to 5 ppm/°C (-55 °C to +155 °C), tight tolerance down to 0.01 %</li> <li>• Sulfur resistant, failure rate E7 level, from 10R up to 200M for P series</li> </ul>



## Key components for SURVEILLANCE SYSTEMS



### Cameras / CCTV



### Access Control Systems / Door and Gate Openers



### Biometrics



### RFID



### THE VISHAY ADVANTAGE

- Long Life
- High Reliability
- Safety Approvals
- High Power Density
- Ruggedized Construction

## Cameras / CCTV



<p>NON-LINEAR RESISTORS</p> <p><b>SMD 0402, Glass Protected NTC Thermistors</b></p>  <p><a href="#">NTCS0402</a></p> <ul style="list-style-type: none"> <li>• Standard series, AEC-Q200 compliant</li> <li>• Glass protected with soft terminations</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>High-Power SurfLight™ Emitter with 850 nm Peak Wavelength</b></p>  <p><a href="#">VSMY7850X01</a></p> <ul style="list-style-type: none"> <li>• Wavelength matches CMOS-based camera systems for vision systems</li> <li>• 170 mW/sr intensity at 1 A forward current, 780 mW/sr at 5 A forward current</li> </ul>	<p>FILM CAPACITORS</p> <p><b>DC Film Capacitors, MKT Axial Type</b></p>  <p><a href="#">MKT1813</a></p> <ul style="list-style-type: none"> <li>• General purpose MKT film capacitor</li> <li>• Axial construction for low building height applications</li> </ul>
<p>INDUCTORS</p> <p><b>Low-Profile, High-Current Inductors</b></p>  <p><a href="#">IFSC111AZER3RM01</a></p> <ul style="list-style-type: none"> <li>• Very small power inductor for low current DC/DC conversion and filtering</li> </ul>	<p>DIODES</p> <p><b>Small-Signal Zener Diodes</b></p>  <p><a href="#">BZX84C18-E3-08</a></p> <ul style="list-style-type: none"> <li>• AEC-Q101 qualified</li> <li>• Silicon planar Zener diodes</li> </ul>	<p>NON-LINEAR RESISTORS</p> <p><b>SMD 0603, Glass Protected NTC Thermistors</b></p>  <p><a href="#">NTCS0603</a></p> <ul style="list-style-type: none"> <li>• Standard series, AEC-Q200 compliant</li> <li>• Glass protected with soft terminations</li> </ul>
<p>MOSFETs</p> <p><b>Dual P-Channel 40 V (D-S) MOSFET</b></p>  <p><a href="#">Si7905DN</a></p> <ul style="list-style-type: none"> <li>• TrenchFET® technology providing two p-channel devices with maximum <math>R_{DS(on)}</math> of 60 mΩ</li> <li>• Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of an SO-8</li> </ul>	<p>TANTALUM CAPACITORS</p> <p><b>Solid Tantalum Surface-Mount Chip Capacitors, TANTAMOUNT®, Molded Case</b></p>  <p><a href="#">293D</a></p> <ul style="list-style-type: none"> <li>• Molded tantalum capacitor, standard industrial grade</li> <li>• General purpose capacitor</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>High-Power SurfLight™ Emitter with 850 nm Peak Wavelength</b></p>  <p><a href="#">VSMY98545</a></p> <ul style="list-style-type: none"> <li>• Radiant intensity of 350 mW/sr at 1 A and 1600 mW/sr at 5 A pulsed</li> <li>• Radiant power of 660 mW in a 3.85 mm x 3.85 mm x 2.24 mm package</li> </ul>
<p>RECTIFIERS</p> <p><b>Surface-Mount Schottky Barrier Rectifiers</b></p>  <p><a href="#">MSS1P4</a></p> <ul style="list-style-type: none"> <li>• AEC-Q101 qualified</li> <li>• Very low profile – typical height of 0.65 mm</li> </ul>	<p>OPTOELECTRONICS</p> <p><b>Optocoupler with Phototransistor Output and Trigger Current of <math>I_F = 1</math> mA</b></p>  <p><a href="#">VOS618A</a></p> <ul style="list-style-type: none"> <li>• High current transfer ratio, and high isolation voltage of 3750 V<sub>RMS</sub></li> <li>• Operating temp. from -55 °C to +110 °C in SSOP-4, half pitch, mini-flat package</li> </ul>	<p>DISPLAYS</p> <p><b>High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions</b></p>  <p><a href="#">LCD, Color TFT, OLED</a></p> <ul style="list-style-type: none"> <li>• Standard or customized glass / modules for specific applications and monitoring</li> <li>• Color TFT for clarity</li> </ul>

View datasheets for these products  
[www.vishay.com/ref/et3in4a](http://www.vishay.com/ref/et3in4a)

## Access Control Systems / Door and Gate Openers



OPTOELECTRONICS

**Fixed Gain IR Receiver for Light Barriers up to 30 Meters**



[TSSP4038](#)

- Detection level does not change when ambient light or strong IR noise is applied
- Internal filter for 38 kHz IR signals with integrated signal processing

CERAMIC CAPACITORS

**Body Sizes: 0402 to 3838, Excellent Power Handling Capabilities**



[MLCC RF Capacitors](#)

- Non-magnetic available with copper or epoxy bondable termination
- Lead-bearing termination available for hi-rel applications

OPTOELECTRONICS

**Optocoupler with Low Input Current and Phototransistor Output in an SOP-4 Package**



[VOM618A](#)

- High current transfer ratio, and high isolation voltage of 3750 V<sub>RMS</sub>
- Operating temperature from -55 °C to +110 °C in a SOP-4 package

ENERGY STORAGE CAPACITORS

**Hybrid Storage Capacitors**



[196 HVC ENYCAP™](#)

- Polarized electrochemical storage capacitor with high capacity and energy density
- No cell balancing necessary, soft and low transient voltage controlled charging

TANTALUM CAPACITORS

**vPolyTan™ Solid Tantalum Surface-Mount Chip Capacitors, Molded Case, High-Performance Polymer Type**



[T55 Series](#)

- Ultra-low ESR, molded case available in 5 case codes
- Moisture sensitivity level 3

DISPLAYS

**High-Quality Displays Offer Excellent Human-to-Machine Interface Solutions**



[LCD, Color TFT, OLED](#)

- Standard or customized glass / modules for specific applications and monitoring
- Can withstand extensive temperatures and extreme conditions

## Biometrics



### CERAMIC CAPACITORS

**Ultra-Stable Dielectric Formulation, Low Dissipation Factor (DF)**



[MLCC High Q Capacitors](#)

- Robust design build with wet process and noble metal electrodes

### ICs

**1.0 A Slew Rate Controlled Load Switch with Reverse Blocking in SC70-6, and TDFN4**



[SiP32431](#)

- Industry's lowest operating current (only 50 pA)
- Ideal for battery operated equipment

### INDUCTORS

**Low-Profile, High-Current IHLP® Inductors**



[IHLP-2020CZER4R7M01](#)

- Compact composite inductor for high-efficiency DC/DC conversion
- High frequency operation out to 5 MHz, excellent saturation

### OPTOELECTRONICS

**High-Power SurfLight™ Emitter with 850 nm Peak Wavelength**



[VSMY98545](#)

- Radiant intensity of 350 mW/sr at 1 A and 1600 mW/sr at 5 A pulsed
- Radiant power of 660 mW in a 3.85 mm x 3.85 mm x 2.24 mm package

### OPTOELECTRONICS

**Infrared Transceiver with Data Rate up to 115.2 kbit/s**



[TFBS4711](#)

- Small package (H x L x W): 1.9 mm x 3 mm x 6 mm and transmit range of 1 meter
- Idle current: 70  $\mu$ A, shutdown current: 10 nA, operates from 2.4 V to 5.5 V

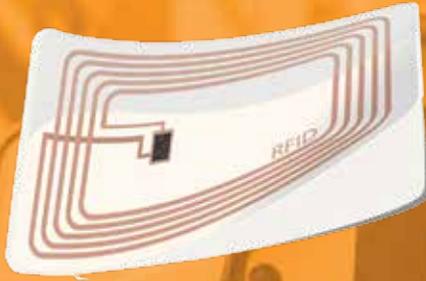
### OPTOELECTRONICS

**High-Power SurfLight™ Emitter with 850 nm Peak Wavelength**



[VSMY7850X01](#)

- Wavelength matches CMOS-based camera systems for vision systems
- 170 mW/sr intensity at 1 A forward current, 780 mW/sr at 5 A forward current

**RFID**


## MOSFETs

**P-Channel 20 V (D-S) MOSFET**

[SiS407ADN](#)

- Industry leading p-channel Gen III technology, maximum  $R_{DS(on)}$  9 m $\Omega$
- Thermally enhanced PowerPAK® 1212-8 is 1/3 the size of an SO-8

## INDUCTORS

**Low-Profile, High-Current IHLP® Inductors**

[IHLP-2020ABER2R2M01](#)

- Compact composite inductor for high-efficiency DC/DC conversion
- High frequency operation out to 5 MHz, excellent saturation

## OPTOELECTRONICS

**High Radiant Power and High-Speed 890 nm Infrared Emitter**

[VSMF2890RGX01](#)

- Radiant intensity up to 350 mW/sr with  $I_F$  up to 1 A, 30 ns rise and fall time
- Angle of half intensity:  $\phi = \pm 12^\circ$  in gullwing or reverse gullwing package

## CERAMIC CAPACITORS

**Standard Reflow Process Assembly, High-Reliability Ceramic-Oxide Body Construction**

[VJ5601M868MXBSR](#)

- Frequency angle from 400 MHz to 5 GHz
- Wide operating temperature range: -40 °C to +85 °C

## OPTOELECTRONICS

**High Radiant Power and High-Speed 850 nm Infrared Emitter**

[VSMG3700GS08](#)

- Radiant intensity up to 100 mW/sr with  $I_F$  up to 1 A, 20 ns rise time, 13 ns fall time
- Angle of half intensity:  $\phi = \pm 60^\circ$  in PLCC2 package

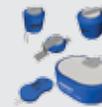
## CERAMIC CAPACITORS

**Standard Reflow Process Assembly, High-Reliability Ceramic-Oxide Body Construction**

[Ceramic Chip Antenna](#)

- Frequency range from 400 MHz to 5 GHz
- Wide operating temperature range: -40 °C to +85 °C

## ENERGY STORAGE CAPACITORS

**Hybrid Storage Capacitors**

[196 HVC ENYCAP™](#)

- Power back up for memory controller, industrial PC, real time clock
- Storage device for energy harvesting, emergency light and micro power supplies

## NON-LINEAR RESISTORS

**NTC Thermistors, 2-Point Micro Chip Sensor Insulated Leads**

[NTCLE305E4...](#)

- Miniature insulated leads
- AEC-Q200 compliant, fast response time for exposed mounting





Vishay Intertechnology, Inc.



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