Alternative Energy
(Smart Grids)
More information on the Engineer's Toolbox, including product datasheet links, can be found at  www.vishay.com/ref/et3.

For inquiries, please contact your local sales representative.
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

**Smart Grids**

## 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<sup>®</sup> 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<sup>®</sup> 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 MHz 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 (C0G) or X7R dielectrics

## RESISTORS

### Power Metal Strip<sup>®</sup> 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<sup>®</sup> 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

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

**Films 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>r</sub> = 100 mA and 15 ns rise and fall time
  - Angle of half intensity of ± 12° in surface-mount gullwing and reverse gullwing pkg.

**Resistors**
- **High Surge Axial Cemented Wirewound Resistors**
  - Z300-C
  - High voltage surge (up to 12 kV) for special version
  - Non-flammable cement coating

**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

**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

**Diodes**
- **Surface-Mount TransZorb<sup>®</sup> Transient Voltage Suppressors**
  - SMAJxx
  - 400 W peak pulse power capability with a 10/1000 µs waveform
  - AEC-Q101 qualified

**VFR Metal Oxide Varistors, High Surge**
- VDR14 to VDR20
  - Extended operating temperature to 125 °C
  - UL recognized up to 105 °C (selected types)

**Resistors**
- **Power Metal Strip<sup>®</sup> 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

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## 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 RMS
- Choice of common mode transient immunity of 15 kV/µs, 5 kV/µs, or 1 kV/µs

**SMART GRIDS**

**OPTOELECTRONICS ICs**

**Enhanced Performance Quad CMOS Analog Switches**

**DG201B**
- Wide ± 22 V supply voltage rating
- Improved charge injection compensation design minimizes switching transients

**DIODES**

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

**SMCJxx**
- Available in unidirectional and bidirectional
- AEC-Q101 qualified

**DIOCES**

**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

**CERAMIC CAPACITORS**

**AC Line Rated Disc Capacitors**

**Class X1, 440 V AC, Class Y2, 300 V AC**

**VY2**
- X1 / Y2 safety rating according to IEC 60384-14, 3rd edition
- Highest reliability and lifetime, operating temperature: -40 °C to +125 °C

**DIODES RESISTORS INDUCTORS**

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

**SMCJxx**
- Available in unidirectional and bidirectional
- AEC-Q101 qualified

**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

**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

**OTHER COMPONENTS**

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

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

**DISPLASYS**

**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**

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**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

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