

## Power Products Article Archive

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**Automotive Boost Controller Shrinks Class-D Audio Amplifier**, *Analog Devices' MAX25203 boost controller*

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**Source-Down Power MOSFET Package Now Available For More Devices**, *Infineon Technologies' OptiMOS Source-Down power MOSFETs*

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**Silicon-Based ACF Reference Design Challenges GaN-Based Chargers**, *Silanna Semiconductor's active clamp flyback-based reference design for 33-W 1C fast chargers*

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**Fast Recovery Epitaxial Diodes Support Higher Current Applications**, *Taiwan Semiconductor's PUUPxxH family of fast recovery epitaxial diodes*

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**Third-Gen SiC MOSFETs Enhance Performance For EVs**, *STMicroelectronics' third-generation STPOWER SiC MOSFETs*

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### February 2022:

**A 2-kW Bidirectional Converter Reference Design Board With High Efficiency**, *Efficient Power Conversion's EPC9170 demo board*

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**Smart Gate Driver With SPI Protects 48-V Battery Systems In Mild Hybrids**, *Infineon Technologies' 2ED4820-EM EiceDRIVER gate driver*

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**CAD Models Are Now Available For Entire Semiconductor Product Line,** Taiwan Semiconductor's and SnapEDA's library of CAD models

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**Switcher ICs With 1700-V SiC MOSFET Simplify EV Power Supply Design,** Power Integrations' INN3947CQ-TL and INN3949CQ-TL power supply ICs

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**Demo Boards Ease Transition From Rad Hard Si MOSFETs To GaN Devices,** EPC Space's EPC7C001, EPC7C002, EPC7C003 low-side driver demo boards, EPC7C005 half-bridge output demo board, and EPC7C006 three-phase motor demo board

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**High PSRR LDO With Soft Start Powers Automotive Sensor Systems,** Nisshinbo Micro Devices' NR1640 series LDO regulator

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**Dual Gate Drivers For SiC And IGBT Switching,** STMicroelectronics' dual-channel galvanically-isolated gate drivers for IGBTs (STGAP2HD) and SiC MOSFETs (STGAP2SICD)

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**Buck Converter Reduces Space In Multi-Cell Battery Applications,** Analog Devices' MAX77540 buck converter

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**100-V Gate Driver Raises Efficiency, Saves Space,** Diodes' DGD0579U high-side and low-side gate driver

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### March 2022:

**40-V Bidirectional GaN HEMT Brings GaN Into Phone Handsets,** Innoscience Technology's INN40W08 GaN-on-Si e-mode HEMT

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**Battery Design Software Eases Drawing Of Custom Battery Configurations,** Voltplex Energy's Voltx.ai battery design software

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**Inverter Reference Design Delivers Premium Motor Performance At Low Cost,** Efficient Power Conversion's EPC9167 inverter reference design

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**Wet Electrolytic Tantalum Capacitors Deliver Higher CV/cc At 200°C And 125 V**, KYOCERA AVX's 470- $\mu$ F TWA-Y series capacitor

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**All-Silicon, 65-W ACF Reference Design Challenges GaN-Based Adapter Designs**, Silanna Semiconductor's RD-31 active clamp flyback (ACF)-based reference design

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**Precision P-Channel MOSFET Arrays Offer Nano-Power Operation**, Advanced Linear Devices' ALD310702A/ALD310702 nano-power precision p-channel EPAD MOSFET arrays

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**Fourth-Gen 600-V SJ MOSFET Lowers  $R_{DS(ON)}$  x  $Q_G$  FOM**, Vishay Intertechnology's Vishay Siliconix SiHK045N60E n-channel power MOSFET

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**600-V SJ MOSFETs Target Wide Range Of Applications**, Magnachip Semiconductor's 11 new 2.5 generation (2.5G) superjunction (SJ) MOSFETs

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**50- $\mu$ A Zener Diodes Extend Battery Runtime And Save Space**, Nexperia's Zener diodes in SOT23 (BZX8450), SOD323 (BZX38450), SOD523 (BZX58550) and DFN (BZX8850S) surface-mount packages

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### April 2022:

#### **APEC 2022: GaN Power Devices And Advanced Topologies Are Put To Work In Latest Adapter Designs**

- Infineon's demo of a 65-W dual USB type C charger reference design and 240-W technology demonstrator
- Innoscience Technology's 140-W USB-PD 3.1 adapter and 240-W adapter demos
- Efficient Power Conversion's EPC9171 240-W USB-PD 3.1 fast charger reference design

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- *Eggtronic's SmartEgg ac-dc architecture for power applications in the 75- to 1-kW range, and the associated 230-W demo*
- *Silanna Semiconductor's AnyPort RD-5 multi-port fast charger reference design, RD-16 100-W 2C1A multi-port USB-PD reference design and RD-25 118-W 1C1A multi-port USB-PD reference design and Smarter Living's 3510PDFE 65-W charger*
- *Power Integrations' HiperPFS-5 family of quasi-resonant PFC ICs with a 750-V GaN switch, HiperLCS-2 chipset for LLC resonant converters, and DER-916 reference design for a Multi-Port USB-C Wall Outlet Without Buck Converters*  
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**40-V Rad-Hard GaN FET Boasts Low On-Resistance**, EPC's EPC7019 eGaN FET  
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**650-V SiC MOSFETs In D<sup>2</sup>PAKs Reduce Switching Losses, Improve Thermal Performance**, Infineon Technologies' CoolSiC MOSFETs  
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**Startup's 650-V GaN Devices' Boast Ease Of Use**, Cambridge GaN Devices' ICeGaN 650-V H1 series of GaN HEMTs  
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**Charge-Pump Converter Expands Options For Distributing Board-Level Power**, Murata's MYC0409 charge-pump capacitor-divider module  
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**MOSFET Electrothermal Models Cover Entire Operating Temperature Range**, Nexperia's enhanced electrothermal models for its MOSFET devices  
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**GaN HEMT Enables High-Efficiency Power Supply For Smart Utility Meters**, GaNPower International's application note on high-voltage GaN for smart utility meters  
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**140-W Adapter Demo Uses Both High- And Low-Voltage GaN Switches**, Innoscience Technology's 140-W power supply demo  
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**Quasi-Resonant PFC Chips With GaN Switch Shrink PFC Stage For Adapters**, Power Integrations' HiperPFS-5 family of power-factor-correction ICs  
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**Chipset Boosts LLC Converter Efficiency, Slashes Component Count**, Power Integrations' HiperLCS-2 resonant switch and synchronous rectification chipset  
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**3.3-kV SiC MOSFETs And SBDs Extend Design Options For HV Power Electronics**, Microchip Technology's expanded SiC portfolio includes the 25-mΩ MSC025SMA330 SiC MOSFET and 90-A MSC090SDA330 SiC SBD

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**150-V GaN HEMTs Feature 8-V Withstand Gate Voltage**, ROHM Semiconductor's GNE10xxTB series 150-V GaN HEMTs

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### May 2022:

**RF Power Delivery Platform For Industrial Plasma Applications**, Advanced Energy Industries' ALTA platform RF power delivery solution

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**Tiny, Quad-Output Regulators Need No External Inductors Or Capacitors**, Empower Semiconductor's EP71xx integrated voltage regulators

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**SSRs Shrink Design Size, Improve Reliability And Safety In 800-V EVs**, Texas Instruments' TPSI3050-Q1 isolated switch driver and TPSI2140-Q1 isolated switch

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**350-V GaN Transistor Boasts Small Size And Low Cost**, Efficient Power Conversion's EPC2050 350-V GaN transistor

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**1200-V SiC FETs Ease Design Optimization**, UnitedSiC's UF4SC120023K4S, UF4SC120030K4S, UF4C120053K4S/K3S and UF4C120070K4S/K3S Gen 4 1200-V SiC FETs

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**System-In-Package Incorporates Complete Power System For Advanced SoC**, Octavo Systems' OSDZU3 family of SiP devices based on the AMD Xilinx Zynq UltraScale+ MPSoC Architecture includes power management

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**1200-V SiC MOSFET Chips Improve On-Resistance And Robustness**, Infineon Technologies' CoolSiC MOSFET 1200-V M1H advanced SiC chip

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**Demos Showcase GaN Devices In Range of Topologies And Power Levels**, Tagore Technology's APEC 2022 demos including a 65-W quasi-resonant flyback, a

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**Highly Accurate Measurement System For GaN And SiC Semiconductors,**  
*Teledyne LeCroy's DL-ISO high-voltage optically isolated 1-GHz probe and Power-Device test software*

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**GaN IC Enables Fast Switching, Narrow Pulses For Automotive Lidar,**  
*Efficient Power Conversion's EPC2221 common-source dual GaN FET*

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**Amplifier Combines High-Definition Sound With Class-G Efficiency,**  
*STMicroelectronics' TDA7901 automotive amplifier with buck controller for class-G power switching*

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**Low-Cost 1200-V SiC MOSFET Offers 50-mΩ On-Resistance,** *Solitron Devices' SD11720 SiC MOSFET*

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- *Low-Profile Inductors Enable High-Frequency Operation, Sumida's 0603CDWLF/DS and 0805CDWLF/DS inductors*
- *Rugged Chip Inductors For Power And RF Applications, Gowanda Electronics' SMP0603 ceramic core chip inductor series*
- *Shielded Inductors Withstand 30-G Peak Vibrations, Bourns' Model SRP1038WA and SRP1265WA automotive-grade power inductors*
- *Semi-Shielded Inductors Feature High Operating Temperatures, Bourns' Model SRN3030HA, SRN4030HA, and SRN5030HA AEC-200-compliant power*

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- *Inductors Offer Saturation Currents Up To 80 A, TDK's PCM120T series of shielded SMT power inductors*
- *Metal Inductors Offer Improved  $I_{sat}$  And DCR, Murata's DFE32CAH\_R0 series metal power inductors*
- *Shielded Inductors Leverage Metal Alloy Powder Core Process, Bourns' SRP2010TMA, SRP2012TMA, SRP2510TMA, SRP2512TMA and SRP3212A series inductors*
- *Compact Inductors Enhanced For Smartphone Power Circuits, TDK's TFM201208BLE series inductors*

### **Chokes**

- *Automotive Common-Mode Chokes Offer High Current Ratings In Small Size, Pulse's PMC9539 series common-mode chokes*
- *Automotive Bar Core Choke Features Excellent Saturation Behavior, Würth Elektronik's WE-CHSA magnetically shielded bar core choke*
- *Common-Mode Chokes Deliver Higher Current Density With EP13 Core Shape, Pulse's PAC6034 series common-mode chokes*
- *Automotive Wirewound Ferrite Inductors Offer Wide Selection, Optical Inspection, Taiyo Yuden's LCXH series inductors*
- *CM Choke Provides Low Profile, High Shock And Vibration Resistance, Vishay Intertechnology's Vishay Custom Magnetics IHCM-2321AA-10 common-mode choke*

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- *Power Transformers Tout High Isolation In Compact Footprint, Pulse's PGT646xNL series of EFD15 power transformers*

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- *Automotive-Grade Flyback Transformer For SiC Device Switching, Pulse's PM9595NL IATF flyback transformer*
- *Transformer For Battery Management Provides 4300-Vdc Isolation, Würth Elektronik's WE-BMS transformer for battery management systems*

### Current Sensors

- *Smaller Current Transducers Feature Up To 2-MHz Bandwidth And 200 A-Primary Current, Danisense's DT series current transducers*
- *50-A Current Sense Transformer Suits Kilowatt-Plus Power Supplies, Pulse's PAS6322 series current-sense transformers*

### Wireless Power Coils

- *Wireless Power Coils Support High Power Levels and High Data Rates, Würth Elektronik's WE-WPCC WPT/NFC wireless power coils with an integrated NFC antenna*

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**PMIC Complements Bluetooth Low Energy Chips, Nordic Semiconductor's nPM1100 power management IC**

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**Press Pack IGBT For Transmission And Distribution Applications, Infineon Technologies Bipolar's Press Pack IGBT**

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**GaN-Based Inverter Reference Design Shrinks Motor Drives For eBikes And Drones, EPC's EPC9173 GaN-based inverter reference design**

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**Inverter Proof-Of-Concept Improves Efficiency Of 80-kW Electric Motor, Hillcrest Energy Technologies' high-efficiency inverter**

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**65-W ACF Reference Design Achieves 30-W/in<sup>3</sup> Power Density, Innoscience Technology and Silanna Semiconductor's 65-W active clamp flyback (ACF) reference design**

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**Switcher ICs Extend Adapter Designs To 220 W With Small Size, Power Integrations' InnoSwitch4-CZ and the ClampZero ICs**

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**Trench Schottky Rectifiers Come In Space-Saving Package, Nexperia's 45-V, 60-V and 100-V rectifiers in CFP2-HP packages**

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**Architecture Simplifies Development Of Multi Port Chargers, Silanna Semiconductor's AnyPort architecture**

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**LDO Features Low Noise, Dropout And Quiescent Current, STMicroelectronics' LD56020 200-mA low-dropout voltage regulator**

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**Shunt Resistors Offer A 5-W Rating In 2818 Case Size, Stackpole Electronics' HCSM2818 high-current shunt resistors**

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**TVSs Offer High Surge Capability, Low Leakage Current In SMC Package, Vishay Intertechnology's SMC3KxxxCAHM3\_A TRANSZORB bidirectional transient voltage suppressors**

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### July 2022:

**Test Kits With Cooling Speed Evaluation Of SiC-Based Inverter Designs, PPM Power's inverter test kits**

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**Highly-Integrated Motor Controllers For Battery-Powered Products, Infineon Technologies' MOTIX IMD700A and IMD701A motor controllers**

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**Automotive LDO Regulators Are Stable With 100-nF Output Capacitance, ROHM Semiconductor's BD9xxN1 series LDOs**

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**2400-W EV Charger For 48-V Li-Ion Applications Features CAN And IP66 Rating, Green Watt Power's EVC-60-2400 series ac chargers**

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**Tool Speeds Selection Of Capacitors, Inductors, Filters And Other Devices, KYOCERA AVX's interactive component search tool**

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**Rad Hard 100-V GaN Transistor Boasts Low On-Resistance, Efficient Power Conversion's EPC7018 3.9-m $\Omega$ , 345-Apulsed GaN FET**

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**650-V IGBT Targets Solar Inverters, Magnachip Semiconductor's MBQ75T65P IGBT**

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**GaN Transistor Targets Consumer, Industrial and Data Center Applications, GaN Systems' GS-065-018-2-L 650-V 78-m $\Omega$  GaN transistor**

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### August 2022:

**Silicon Capacitors Shrink Footprint And Component Count For High-Frequency Decoupling, Empower Semiconductor's E-CAP silicon capacitors**

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**App Note Describes Efficient Power Supply For Three-Phase Smart Utility Meters, GaNPower International's GPI-HVACDC-QR-EVB eval board and application note**

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**Buck Regulators With Integrated Inductor Save Space, Infineon Technologies' TDM3883 and TDM3885 synchronous buck regulators**

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**750-V SiC FETs Come In Thermally Enhanced Surface-Mount D2PAKs, Qorvo's Gen 4 UJ4C/SC series SiC FETs with 9- to 60-m $\Omega$  on-resistance**

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**40-V MOSFETs Offer Low On-Resistance And Switching FOM, Taiwan Semiconductor's PerFET series single- and dual-channel 40-V MOSFETS**

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**Power Transient Voltage Suppressors In Compact DFNs, Bourns' PTVS1 and PTVS2 power transient voltage suppressor (PTVS) product families**

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**NSREC Notes: Exhibitors Showcase Latest Reference Designs Along With Progress In Rad-Tolerant And Rad-Hard Power Components**

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- *IR HiRel's rad-hard RIC74424 gate-driver eval board; the IRHYS9A97034CM and IRHYB9A97034CM 60-V, 46-mΩ R9 p-channel MOSFETs; and the SMD-0.5e and the SMD-0.2e packages*
- *Vicor's three-chip solution for stepping down a 100-V bus to 3 V at 50 A*
- *EPC Space's EPC7C006 reference design demo board for a rad-hard three-phase motor control plus driver with GaN FETs and the FBS-GAM02-P-R50 motor drive module in a reaction wheel application example*
- *Texas Instruments showed Alpha Data's development board for the Versal space-grade (rad-tolerant) FPGA from Xilinx, which contains TI's power management solution for all the power rails; TI also showed the TPS7H5001-SP rad-hard PWM controller and TI's demo board for the TPS7H4010 SEP 6-A 30-V input POL*
- *Apogee Semiconductor's AFP1422 rad-hard PWM controller IC*

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- *Crane Aerospace & Electronics' SMP12005S space dc-dc converter with 80-V to 160-V input*
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- *STMicroelectronics' eval board for the RHRPMICL1A integrated current limiter*
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**Converter-In-Package Delivers 4 kW For Automotive Applications,** *From PPM Power, TTPi's UltraMod4000 family of isolated dc-dc converters*

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**Robust 800-W Power Supplies For Industrial And Medical Applications,**  
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**Li-Ion Battery Chargers For EVs With CAN Communications,** *Green Watt Power's EVC-1500 series of ruggedized chargers*

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**Power Modules Simplify SiC Inverter Designs,** *STMicroelectronics' A2F12M12W2-F1 and A2U12M12W2-F2 STPOWER modules*

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**Front End Converters Provide High Performance And Flexible Input Options,** *Murata's D1U54T-M-2500-12-HxxC and D1U54-D-2500-12-HxxC series rack-mountable front-end converters*

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**25-A And 40-A Buck Regulators Feature SVID And I<sup>2</sup>C/PMBus Interfaces,**  
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**Novel Approach To PFC Enables High Efficiency With Optimized System Cost,** *Pulsiv's OSMIUM microcontrollers*

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**GaN Half-Bridge Power ICs Enable Megahertz Switching,** *Navitas Semiconductor's NV6247 and NV6245C GaNSense half-bridge ICs*

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**Fixed-Frequency AC-DC Integrated Power Stages Add 800-V And 950-V Models,** Infineon's fifth-generation fixed-frequency CoolSET integrated power stages

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**Buck Regulators Provide Dynamic Voltage Scaling With Programmable Slew Rate,** Halo Microelectronics' HL7593 and HL7594 synchronous buck converters

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**Automotive-Qualified MLVs With Soft Terminations Withstand Severe Flexing,** KYOCERA AVX's multilayer varistors with FLEXITERM soft-termination technology

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**Next-Generation GaN Technology Doubles Power Density,** Efficient Power Conversion's EPC2619 80-V 4-m $\Omega$  GaN FET

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**Vendor's Tool Automates Planar Magnetics Design For Power Supply Designs Using Its Offline Switcher ICs,** Power Integrations' PI Magnetics-Designer

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**1-kV Voltage Sensor Measures  $V_{DS}$  Of SiC And GaN Transistors,** Tell-i Technologies' VON1k5Vm sensor

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**950-V Superjunction MOSFETs With Fast Body Diode Address Lighting And Industrial SMPSs,** Infineon Technologies' CoolMOS PFD7 MOSFET family

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**Another Source For Automotive LDOs With Options For Higher Integration,** Taiwan Semiconductor's TQL8xx low-dropout regulators

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**Oscilloscopes Deliver Faster Update Rate, More Memory,** Rohde & Schwarz's R&S MXO 4 series of oscilloscopes

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**GaN HEMT Family Adds 190-m $\Omega$ , 350-m $\Omega$  And 600-m $\Omega$  Devices In DFN Packages,** Innoscience Technology's INN650D190A, INN650DA190A, INN650D350A, INN650DA350A and INN650DA600A 650-V GaN HEMT devices

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**IPMs Increase Reliability And Performance For Low- And Medium-Power Drives**, Infineon Technologies' IM523 series of intelligent power modules

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**Small Smart Motor Module Addresses Space-Constrained Designs**, Alpha and Omega Semiconductor's AOZ9530QV Smart Motor Module half-bridge power stage

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**Chip Balances Supercapacitors Rated At 3.0 V And Higher**, Advanced Linear Devices' ALD810030 precision MOSFET array

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**Buck Converter IC For ADAS Achieves Highly Stable Operation**, ROHM Semiconductor's BD9S402MUF-C buck converter IC with built-in MOSFET

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- *High-Frequency Litz Wire Inductor Is Designed For QR Converters*, Pulse's PH9499.xxxCNL high-frequency inductor series
- *Metal Inductors Come In Range Of Footprints*, Sumida's CY\*\*\*\*\*T125/DS series of automotive-grade SMD metal inductors
- *Edge-Wound Inductors Deliver Stable Inductance To 180°C*, Vishay Intertechnology's IHDM-1107BBEV-20 and IHDM-1107BBEV-30 through-hole inductors in the 1107 case
- *Compact Inductors For ADAS/AD Power Management*, TDK's CLT32 series power inductors
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- *Ferrite-Core Inductors Suit PSiP Power Supplies, Pulse's PGL6477 and PGL6478 series high-current, low-DCR inductors*
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- *Inductors Feature High Magnetic Shielding, TDK's VLS5030EX-D type power inductor for automotive power circuits*
- *Shielded Power Bead Inductors Target Multiphase Applications, Bourns' Model SPB0705, SPB1005, SPB1007, SPB1012 and SPB1308 power bead inductor series*
- *Flat-Wire Inductors For Multiphase Power Supplies, Sumida's CDEPH7212 magnetically shielded power inductor*
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- *Low-Profile Isolation Transformers For BMS Chipsets, Pulse's 3.45-mm-high BMS transformers*
- *Compact SMT Transformers With High Dielectric Strength For DC-DC Converters, TDK's EPCOS E13EMHV series of SMT transformers, also referred to as the B78308\*A003 series*
- *Integrated Resonant Transformer-Inductor Saves Space In LLC Converters, Vishay Intertechnology's 5.5-kW MRTI5R5EZ resonant transformer*
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- *Multilayer Metal Power Inductor Combines Small Size With High Current, Low DCR, Taiyo Yuden's seven new models in two sizes in the LCCN series*
- *Multilayer Inductors Meet Evolving Automotive PoC Demands, TDK's MLJ1608WG series multilayer inductors*
- *EMI-RFI Three-Phase Filter Is Volumetrically Efficient, KEMET's GTX series of metal box three-phase filters*

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- *Alloy Powder Cores With Better Bias Come In E Shape And Blocks, Magnetics' Edge powder core materials in E shape and blocks*

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