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IGBT Modules Offer 1200-V, 900-A Ratings For Medium Power Drives,
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Photocouplers Shrink Designs For Industrial Automation And Solar Inverters, Renesas' RV1S92xxA and RV1S22xxA photocouplers

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**PMIC Powers Application-Processor-Based Systems,** STMicroelectronics' STPMIC1 power-management IC

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#### February 2020:

Highly Robust Gate Drivers Achieve AEC-Q100 Automotive Qualification, Power Integrations' SID1181KQ SCALE-iDriver gate driver

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**PMIC For Automotive Surround View Camera Systems,** Renesas Electronics' ISL78083 automotive camera PMIC

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**600-V Superjunction MOSFETs Enable High Power Density,** Infineon's CoolMOS PFD7 series superjunction MOSFETs

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Rad Hard Regulator Integrates Synchronous Buck And LDO For Satellites, Renesas Electronics' ISL70005SEH synchronous buck and low dropout regulator For more details...



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**600-V Input DC-DC Converters Deliver 5 kW,** ABSOPULSE Electronics' HVI 5K-3U7 series industrial dc-dc converters

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**Robust Gate Drivers For Fast Switching SiC Power Modules,** CISSOID's CMT-TIT0697 gate drivers for Wolfspeed's XM3 SiC MOSFET power modules

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#### March 2020:

Novel Carbon Nanotube Technology Creates More Powerful Ultracaps, NAWA Technologies' NAWACap POWER ultracapacitors

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**Plug-And-Play Gate Drivers Suit 4500-V Press-Pack IGBT Modules,** Power Integrations' 1SP0351 gate-drivers

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**40-A Buck Converter IC Is Stackable Up to 160 A,** Texas Instruments' TPS546D24A 40-A buck converter

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Time-Of-Flight Demo Board Showcases GaN Speed In Driving Lasers, Efficient Power Conversion's EPC9144 laser diode driver demo board

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System Combines Multiple Instruments And Software For Designing And Measuring Power Systems, Ridley Engineering's RidleyBox

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**Capacitor Simulation Tool Characterizes New High-Rel MLCCs,** AVX's updated version of its SpiCAT online simulation tool

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### **April 2020:**

What We Missed At APEC: Silicon Carbide Marches On And Other Power Product News, Power Integrations' PowiGaN, SiC SCALE iDriver gate driver, BRD 1167/1267 bridge switch motor driver ICs; Rohm Semiconductor's BM6112 isolated gate driver; Infineon Technologies' IR3887M, IR3888M and IR3889M OptiMOS iPOL



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regulators with Fast COT; ON Semiconductor's 1200-V and 900-V n-channel SiC MOSFETs including the 80-m $\Omega$  NVHL080N120SC1 and the NTBG060N090SC1, the FOD8334, NCD57000 and NCP51530 gate drivers, transfer molded power modules for industrial drives; Texas Instruments' TPS546D24A 40-A stackable buck converter, the TPSM53604 36-V input, 4-A output buck power module, the UCC12050/40 500-mW isolated dc-dc power supply, and the 600-V GaN FETs with on-resistances of 150 m $\Omega$ , 70 m $\Omega$ , and 50 m $\Omega$ ; Efficient Power Conversion's EPC2152 80-V, 12.5-A power stage IC (driver plus eGaN FET half-bridge) and the EPC9148 GaN-based multi-level converter reference design. This article also includes descriptions of various components that were in development at the time of APEC plus customer product examples, eval boards, reference designs and design platforms that were to be exhibited by these semiconductor companies at APEC 2020.

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**650-V SiC MOSFETs Offer High Reliability And Performance,** Infineon Technologies' 650-V CoolSiC MOSFETs

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PMIC Reference Designs For Xilinx FPGAs And SoCs Speed Time To Market, Renesas Electronics' power management IC reference designs

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**Low-Cost ICs Provide Advanced Velocity Control Of Servo Motors,** Performance Motion Devices' Juno Velocity Control ICs

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SiC Schottky-Based Power Modules Maximize Ruggedness And Reliability, 700-, 1200- and 1700-V SiC Schottky barrier diode-based modules

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**1-kVA IP66-Rated Sinewave Inverter Is Convection Cooled,** ABSOPULSE Electronics' CSI 1K-24/230-3XD3-HSF sinewave inverter

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Surface-Mount Rectifiers Boost Density Of Power Supplies And Motor Controls, Taiwan Semiconductor's TUAS8X SMD rectifier series

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650-V MOSFETs Expand SiC Benefits To Broader Range Of Industrial Applications, Cree's Wolfspeed C3M0015065D, C3M0015065K, C3M0060065D, C3M0060065J and C3M0060065K 650-V SiC MOSFETs



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**DC Power Supplies Generate Up To Four Independent Channels,** Rohde & Schwarz's R&S NGP800 power supply series

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Synchronous-Rectification Controller Cuts BOM Costs For Power Adapters, STMicroelectronics' SRK1001 secondary-side synchronous-rectification controller For more details...

### May 2020:

**GaN Power Switch Increases Output Of Display PSUs To 75 W,** Power Integrations' InnoSwitch3-MX isolated switcher IC family

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PMIC Cuts Solution Size, Extends Battery Life For Wearables And Hearables, Maxim Integrated Products' MAX77654 power management IC

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Expanded Portfolio Of 1200-V IGBT Modules Offers Solutions To 22 kW, Infineon Technologies 1200-V TRENCHSTOP IGBT7 modules

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ACF Controllers Push Power Adapters To Higher Efficiency Using Silicon Only, Silanna Semiconductor's SZ1110 and SZ1130 active-clamp flyback controllers

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1300-W DC-DC Converter Delivers 451 W/in<sup>3</sup> For Air And Sea Applications, Vicor's DCM5614 isolated, regulated dc-dc converter

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Flexible And Rugged Controller Simplifies Power For Smart Devices, STMicroelectronics' VIPer222 controller for high-voltage converters

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**Eighth-Brick DC-DC Converters Deliver 120 W For Industrial Applications,** Murata Electronics' UWE-Q12 series dc-dc converters

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DSO Balances Performance, Usability And Cost For Engineers And Educators, Tektronix's TBS2000B series of digital storage oscilloscopes

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**DC-DC Power Supplies Deliver Up To 6000 V At 30 W With High Performance,** Dean Technology's UMR dc-dc high-voltage power supply modules

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### June 2020:

### Power Magnetics Component Roundup

#### **Power Inductors**

- High-Current Shielded Inductors For Consumer And High-Temperature Applications, Bourns' SRP series power inductors
- Shielded Inductors Feature Low Resistance, High Saturation Current, Bourns' Model SRP0xxx series shielded power inductors
- Molded Inductors Offer Ratings To 120 V And Low Losses, Coilcraft's XEL401xV, XEL4020V and XEL4030V molded power inductors
- Inductors Reduce DC Resistance By Up To 40%, Coilcraft's XGL4030 series of high-performance, molded power inductors
- Expanded Line Of High-Temperature Shielded Drum And Ring Core Inductors, Sumida's CDRH50D28B/T150 series of high-temperature shielded drum and ring core inductors
- Compact Dual Inductors With High Saturation Current, TDK's EPCOS series B82477D6 dual inductors
- Automotive-Grade Inductor Offers Stable Inductance Up To +180°C and 150
   A, Vishay Intertechnology's Vishay Custom Magnetics IHDM-1008BC-3A edge-wound, through-hole inductor
- Integrated E-Shield Inductors Save Space, Vishay Intertechnology's Vishay Dale IHLE-5050FH-51 and IHLE-5050FH-5A low-profile, high-current inductors
- Low-Profile, Edge-Wound Inductor Handles Saturation Current To 230 A, Vishay Intertechnology's Vishay Dale IHDF-1300AE-10 edge-wound, throughhole inductor

### **Transformers**

- Flyback Transformer Enhances DC-DC Efficiency In Isolated Mode, Bourns' SM13117EL transformer for PoE powered device and PWM controller applications
- Environmentally Resilient Transformers For Low-Voltage Lighting, Signal Transformer's Lighting Transformer series



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 Current-Sense Transformers Support Overload Detection And Load Shedding, TDK's B82801A1 series EPCOS SMT current-sense transformers

#### Chokes And Beads

- Common-Mode Toroidal Chokes Provide Vertical PCB Mounting And High Current Capacity, Signal Transformer's HCTC series toroidal chokes
- Surface-Mount High-Voltage Double Chokes Offer Lower Losses, Würth Elektronik eiSos' WE-TDC HV series double chokes
- Storage Choke For Filtering In Class D Amplifiers, Würth Elektronik's WE-LHMD surface-mount storage choke
- Ferrite Chip Beads Deliver Small Size For Automotive Power Supplies, Murata's BLM18SP\_SH1 series ferrite beads

### Wireless Power Coils

- Wireless Charging Coils Are Direct Replacements For EOL Devices, Vishay Intertechnology's IWAS3222CZEB190JF1, IWAS3827ABEB110JF1, IWAS3827ABEB100JF1, IWAS4832ABEB110JF1, IWAS4832ADEB150JF1, IWAS4832AAEB220JF1, IWTX4646DCEB240JF1, IWTX47R0DAEB6R3JF1 and IWTX47R0EBEB240JF1 WPC-compliant wireless charging coils
- Wireless Power Coil Combines Charging Function and NFC, Würth Elektronik's WE-WPCC WPT/NFC coil and the high-power WE-WPCC 760308101311, WE-WPCC 760308101411 and 760308101410 wireless power transfer coils

#### **Design Tool And Magnetics Literature**

- Tool Calculates Application Parameters For Latest Ferrite Materials And Core Shapes, TDK's Magnetic Design Tool
- White Paper Explores Quality Issues And Strategies In Magnetics
   Manufacturing, Triad Magnetics' Why Is Quality Important? Quality Control
   and Quality Assurance in Magnetics white paper

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Free Power Supply Circuits For SIMPLIS Offer Ready-Made Design Templates, Christophe Basso's power supply circuits for SIMPLIS

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Isolated Shunt Modules Challenge Hall Sensors In High-Power Current Sensing Applications, Riedon's SSA Smart Shunt series modules

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Second-Gen Technology Boosts Performance Of 650-V GaN FET Devices, Nexperia's GAN041-650WSB and GAN039-650NTB/NBB GaN FETs



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**Automotive LED Driver Ensures Stable Lighting During Battery Voltage Drops,** ROHM Semiconductor's BD18336NUF-M LED driver IC

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Thermally Efficient PFC Controller IC Enables 100-W Adapters With No Heatsinks, Power Integrations' HiperPFS-4 ICs

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**Outer Loop Control ICs For Brushless DC And DC Brush Motors,** Performance Motion Devices' Juno Outer Loop Control ICs

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1200-V SiC MOSFETs Feature Low Gate Resistance For High Efficiency, Alpha and Omega Semiconductor's 1200-V SiC MOSFET platform which includes the  $AOK065V120X2~65-m\Omega$  SiC MOSFET

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**Rectifiers With Wettable Flank Contacts Offer 8-A And 1-kV Ratings,** Taiwan Semiconductor's TUAS8x surface-mount standard recovery rectifiers

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**750-W Converter Steps Down 48 V To 12 V With 97% Peak Efficiency,** Vicor's DCM3717 750-W dc-dc converter

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### **July 2020:**

Voltage Regulator ICs Take Monolithic Integration to Another Level, Empower Semiconductor's EP70xx Integrated Voltage Regulators

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A Better Package For Rad Hard MOSFETs—PCBs Meet Their (CTE) Match, IR HiRel's SupIR-SMD package

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Silicon Germanium Rectifiers Enable Higher Efficiency In High Temperature Applications, Nexperia's PMEGxGxELR/P SiGe rectifiers

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Configurable Mixed-Signal IC Adds High-Voltage Capability For Driving Motors, Dialog Semiconductor's SLG47105 HV PAK IC



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100-V Half-Bridge MOSFET Drivers Offer Ruggedness And High Performance, Renesas Electronics' HIP2211 and HIP2210 half-bridge MOSFET drivers

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MLCC Squeezes 0.1 μF Into 008004 Package, Murata Electronics' GRM011R60J104M MLCC

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**Switcher IC Powers EV Subsystems Directly From 400-Vdc Bus,** Power Integrations' AEC-Q100-qualified version of its LinkSwitch-TN2 switcher IC

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SiC-Based Three-Phase Driver Module Delivers 80 A Peak, Is Fully Integrated, Apex Microtechnology's SA310 three-phase driver

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**6U VITA-62-Compliant Power Supply For MIL-COTS VPX Applications,** Vicor's VITA 62-compliant power supply

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**Scope Software Options Aid Power Management Debug,** Teledyne LeCroy's SMBus TD and TDME software options

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Dual-Channel Buck Converters Feature Low EMI And Stackable Outputs, Analog Devices' LT8650S, LT8652S and LT8653S Silent Switcher converter ICs For more details...

**2-kW Industrial Power Supply With PFC Is Rugged, Compact And Light,** ABSOPULSE Electronics' PFL 2K-E/110-F6W switching power supply designed For more details...

### **August 2020:**

**Switcher IC Eases Operation From High-Voltage EV Batteries,** Power Integrations' InnoSwitch3-AQ flyback switcher IC

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**Versatile LED Driver Powers A Host of Automotive Applications,** Taiwan Semiconductor's TS19501 dimmable LED driver



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**Another VNA Now Offers Non-Invasive Stability Measurement,** Picotest's NISM software for CMT's Compact series VNAs

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High-Speed Current Sensor With High Accuracy Supports Faster Switching Frequencies, Allegro MicroSystems' ACS37002 Hall-effect current sensor

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**Buck-Boost Chargers Deliver Greater Power Density For USB And Wireless Dual-Input Charging,** Texas Instruments' BQ25790 and BQ25792 buck-boost battery charger ICs

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Interleaved PFC Digital Power Controller Features Mechanical Inrush Control, STMicroelectronics' STNRGPF02 two-channel interleaved PFC controller For more details...

**Efficient Modular Inverter Systems For Datacom, Utility And Industrial Applications,** UNIPOWER's family of Bravo inverters, the ECI and TSI models
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### September 2020:

Planar Transformer Features 10-kV Partial Discharge Extinction Voltage, Payton America's 10-kW planar transformer

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Kit Speeds Design Of Rad Hard Power ICs And Other Mixed-Signal Chips, Apogee Semiconductor's TalRad Process Design Kit

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Highly Integrated Automotive-Grade Buck Converters Power In-Cabin Electronics, Dialog Semiconductor's DA913X-A dc-dc converters



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**Updated Curve Fit Equation Tool Eases Magnetics Design,** Magnetics' updated Curve Fit Equation tool

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**SiC Power Module And Gate Driver Kit Speeds Inverter Design,** Microchip Technology's AgileSwitch digital programmable gate driver and SP6LI SiC power module kit

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**CMOS LED ICs Replace Legacy Bipolar Drivers,** Taiwan Semiconductor's TSCR4 linear CMOS LED driver ICs

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**Low-ESR, Low-Cost Supercapacitors Offer Values Up To 600 F,** CDE's Illinois Capacitor brand DGH series supercapacitors

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**Latest Generation 200-V GaN FETs Double The Performance,** EPC's EPC2215 and EPC2207 200-V eGaN FETs

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#### October 2020:

**Power Electronics Simulation Software Is Fast, Powerful And Easy To Use,** AESIM. Tech's SIMBA power electronics simulation software

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**Efficient GaN-Powered LED Drivers Target Smart-Lighting Designs**, Power Integrations' LYT6078C LED driver IC

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And Other Devices, Renesas Electronics' ISL9122A buck-boost regulator
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Rad Hard GaN Power Transistors Span 40 V To 300 V, EPC Space's rad hard GaN power transistors

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**1000-V Bridge Rectifiers Facilitate Compliance And Manufacturability,**Taiwan Semiconductor's RxBS family of glass-passivated 1000-V bridge rectifiers
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**100-V GaN FETs Feature Lower On-Resistance, Higher Voltage Ratings,** Efficient Power Conversion's EPC2218 and EPC2204 100-V eGaN FETs

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**200-V MOSFET Delivers 61-mΩ On-Resistance In 3-mm x 3-mm Package,** Vishay Intertechnology's Vishay Siliconix SiSS94DN n-channel MOSFET For more details...

#### November 2020:

**Power IC Shrinks Input Bulk Capacitor, Reduces Inrush Current,** Power Integrations' MinE-CAP power IC

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Isolated IGBT/SiC MOSFET Gate Driver Benefits HEV/EV Applications, Texas Instruments' UCC5870-Q1 IGBT/SiC MOSFET gate driver

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**80-V DC-DC Controllers Provide Extra Voltage Margin For Data Center,** Telecom Applications, Renesas Electronics' ISL81801 and ISL81802 dc-dc controllers

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Isolated Oscilloscope Probes Offer Smaller Size And More Capabilities, Tektronix's TIVP series IsoVu isolated oscilloscope probes

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**6.5-kV SiC MOSFETs Offer High Performance For Medium-Voltage Applications,** GeneSiC Semiconductor's 6.5-kV SiC MOSFET bare chips
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Application Specific FETs—A New Category Of More-Optimized MOSFETs, Nexperia's Application Specific MOSFETs (ASFETs)

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**Next-Gen 650-V GaN Transistor Is Automotive Qualified,** GaN Systems' GS-065-060-5-T-A 650-V, 60-A GaN transistor



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**AEC-Q101 Qualified SiC Schottkys Are Rugged And Reliable,** Microchip Technology's 700-V and 1200-V SiC Schottky barrier diodes

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**Probes Suit 48-V GaN-Based Power Conversion Measurements,** Teledyne LeCroy's DL-HCM 60-V common-mode differential probes

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Automotive GaN FET Includes Driver, Protection And Active Power
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GaN FETs with integrated driver, protection and temperature reporting
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**Modules Protect 5-V And Lower Designs From Overvoltage,** Advanced Linear Devices' SABMBOVP family of overvoltage protection PCBs

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**Automotive Gate Drivers Target 48-V Battery Systems,** Allegro MicroSystems'AMT49100, AMT49101, AMT49502, A89503 and the A89500 three-phase and half-bridge gate drivers

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#### December 2020:

### Power Magnetics Component Roundup

#### **Power Inductors**

- Power Inductor Design Benefits Power Management In ADAS And AD Systems, TDK's CLT32 series power inductors
- Automotive Power Inductors Deliver 47 μH In Small Package, TDK's BCL322515RT AEC-Q200-qualified power inductors
- Ultra-low DCR Power Bead Inductors For Computing And Storage Applications, Pulse Electronics' PA4059, PA5041, PA4990, PG1712, PA4987 and PA5187 power bead inductors
- SMD Power Inductors Handle High Temperatures And High Currents, Sumida's CDEP13D\*\*/T150 line of AEC-Q200 qualified SMD inductors
- Automotive-Grade Dual Inductor Reduces Space Requirements In Class D Amplifiers, Vishay Intertechnology's Vishay Dale IHLD-2525GG-5A dual inductor



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- High Current Inductor In 4024 Case Delivers Improved Saturation And Temperature Stability, Vishay Intertechnology's Vishay Dale IHVR-4024KE-51 high-current inductor
- Shielded Flat-Wire Coil Delivers High Rated Current And High Saturation Performance, Würth Elektronik's WE-HCFA high-current inductor
- Rugged High-Current Inductors With Soft Saturation Behavior, Würth Elektronik's WE-HCIT robust THT inductors for vibration-sensitive applications
- Power Inductors Feature Low AC Winding Losses And Other Benefits, Würth Elektronik's WE-MAPI coiled metal-alloy power inductors in 5020, 5030 and 4020HT sizes

### **Transformers**

- DC-DC Transformers Double The Power Density, Pulse Electronics' EP7+ series (PA5099.XXXNL and PA5100.XXXNL) and EP10+ series (PA5130.XXXNL and PA5131.XXXNL) dc-dc transformers
- Transformers Offer Wide Array of Power And Platform Designs For PoE Applications, Signal Transformer's SPoE series surface-mount transformers

### Wireless Charging Coils

• Wireless Charging Coils Come In Single And Multiple Windings, Signal Transformer's wireless charging transmission coils (WCC)

#### **Chokes And Ferrite Beads**

- Dual-Choke Filter Inductors Deliver Superior Suppression In Signal And Power Line Applications, Bourns' Model DR334A line filter series
- Low-Profile Chokes Deliver CM And DM Filtering For DC Power Line Applications, Bourns' SRF1206A and SRF9045A series high-current commonmode chokes
- High-Current Toroidal Choke Design Kit Features 15 Popular Part Numbers, Signal Transformer's high-current toroidal choke (HCTC) design kit
- EMI Suppression Ferrite Beads Come In More Case Sizes, Würth Elektronik's WE-CBA Ferrite Bead families in 0402, 0603, 0805, 1206, 1806 and 1812 packages

#### Cores

• LP And EER Shape Cores Come In New Sizes, Magnetics' LP shape powder cores in size 36 x 24 mm, and EER shape powder cores in 25.5 mm and 40 mm



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 Nanocrystalline Cores Shrink Common-Mode Chokes, Magnetics' nanocrystalline cores in toroids or split cores from 5 mm to 145 mm

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Automotive-Qualified High-Side Switch ICs With User-Definable Protection, ROHM's V2HD045EFU-C, BV2HC045EFU-C and BV2HD070EFU-C two-channel high-side switch ICs

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Buck Regulators Deliver High Efficiency, Small Size For USB-PD Applications, Silanna Semiconductor's SZPL3102A/3103A dc-dc converters

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**Low-Noise Buck Converters With Ferrite-Bead Compensation Eliminate LDOs,** Texas Instruments' TPS62912 and TPS62913 switching regulators
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Transfer Molded IPM Brings SiC Advantages To 1200-V Modules, Infineon Technologies' CIPOS Maxi IPM 1200-V SiC integrated power module

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**SiC Schottky Diodes Boast Surge Current Robustness,** UnitedSiC's UJ3D1725K2, UJ3D1210K2, UJ3D1220K2 and UJ3D1250K2 1200-V and 1700-V SiC Schottkys

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**Programmable Regenerative DC Power Supplies Address Industrial And Scientific Applications,** REGATRON's G5.RSS series programmable regenerative dc power supplies

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**LED Drivers Come In DFN With Side-Wettable Flanks,** Nexperia's NCR32xPAS/NCR42xPAS LED driver ICs

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**Space-Grade Point-Of-Load Converters Are Sampling,** VPT's space-grade SVRPL3R306SG point-of-load converter modules