

Texas Instruments Demonstrations at **APEC 2018**



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TI is pushing the technology boundaries with the **power to do anything**. Experience the latest innovation in product and application technologies, interact with live demos, and engage directly with TI's power experts.

GALLIUM NITRIDE (GaN)

8kW Three-Phase Bidirectional Grid Link with GaN

Developed jointly by Siemens and Texas Instruments, this innovative solution demonstrates a high-frequency bidirectional multilevel converter between a three-phase AC grid (400V-480V) and a DC bus (650V-800V) using TI's [LMG3410](#) 600V GaN power stage and [C2000™ dual-core Delfino™ real-time controller](#). With 99% peak efficiency and less than 1% THD, this solution delivers 8kW of power in grid-connected applications such as PV inverters, offline PFC, HEV/EV onboard chargers and high-voltage battery storage systems.

The Industry's Fastest and Most Efficient CrM Totem-Pole PFC Design

This critical-conduction-mode reference design features TI's [600V GaN power-stage technology](#) and [Piccolo™ F280049 controller](#) to achieve up to 99% efficiency at full load. The 1MHz, high-density-interleaved 1.6kW design is ideal for space-constrained applications such as server, telecom and industrial power supplies. Interleaving the power stages reduces input and output ripple currents. The hardware of this device is designed to pass conducted emissions and surge requirements, helping designers achieve 80 Plus Titanium specifications. Download the [TIDA-00961 reference design](#).

50MHz GaN Envelope Tracking with Dead-Time Control

This 50MHz design for envelope tracking features the [LMG1210](#) half-bridge GaN driver with an adjustable dead-time feature. The system is designed for high-speed DC/DC converters in applications such as 5G envelope-tracking applications where minimized dead time is very critical for efficiency and speed.

Nanosecond GaN Driver for High-Resolution LIDAR Lasers

An industry first in size, speed and power density, see a LIDAR laser driver with GaN FETs designed for high-resolution industrial LIDAR systems. It features the [LMG1020](#) high-speed GaN driver, capable of delivering 100W in less than 1ns and enabling 300m-range LIDAR vision while ensuring eye safety. Download the [TIDA-01573 reference design](#) of a nanosecond laser driver for LIDAR.

SILICON CARBIDE (SiC) GATE DRIVERS

Unleash the Power of Silicon Carbide

See a full solar to vehicular charging ecosystem. The electricity generated by solar energy is conditioned by a string inverter and charging pile for energy storage. This is then transferred into the electric vehicle via an onboard charger. TI's [UCC21520-Q1](#), [ISO5852S](#) and [UCC5320](#) gate drivers enable the full potential of SiC to revolutionize the concept of eco-friendly smart living. These robust drivers, as well as the [C2000 real-time controller](#), provide an energy-efficient and compact system design and feature best-in-class isolation, noise immunity and protection. Download the [TIDA-01604](#), [TIDA-01605](#) and [TIDA-01606](#) reference designs.

PC GAMING

Fast Action Driven by Faster Power!

Up your game with TI's newest LLC controller, the [UCC256301](#). This gaming console power supply has been retrofitted with the UCC256301 to deliver best-in-class transient response and excellent light-load performance with respect to efficiency and standby power. Achieve 79mW of no-load standby power at 230VAC, meet challenging energy standards like COC Tier 2 and DoE Level 6, and eliminate the need for a flyback controller (auxiliary power) in the power supply with the [PMP21251](#) and [TIDA-01557](#) reference designs.

FASTER, SMALLER CHARGING

Industry's First Three-Level 6A Parallel Battery Charger

See the first integrated three-level converter for battery charging that reduces PCB footprints by 60% while also increasing efficiency by 5%, bringing it to a high of 95%. This demonstration features the new [bq25910](#), charging in parallel with an earlier-generation device.

92% Efficient, 30W/in³ 60W USB Power Delivery AC/DC Adapter

This fully tested, USB Power Delivery reference design is a high-efficiency, high power density, AC/DC adapter solution with a wide input-voltage range (85-265VAC) for laptop adapters and smartphone charger applications. The 65W USB Power Delivery AC/DC adapter uses the [active clamp flyback topology](#) to achieve up to 92% efficiency at a density of 30W/in³. Featuring the [UCC28780](#) flyback controller and [UCC24612](#) controller, the design can cut the solution size of adapters for laptops in half. Download the [TIDA-01622](#) reference design.

SMART LIGHTING

Industry 4.0 Smart LED Lighting System

This LED lighting system is a simplified example of what you might find on a factory floor as part of an automated industrial process. Dynamic headroom control manages LED forward voltages for the three colors, achieved by adjusting the output voltage of three [LM5166](#) DC/DC converters for each of three LED strings. This design reduces power consumption by 30% when using a linear [TLC5971](#) LED driver for an RGB LED matrix powered by the 24V from an IO-Link interface, while simultaneously extending the brightness control range. Download the [TIDA-01437](#) reference design.

POWER MODULES

Experience the Design Simplicity that Power Modules Provide

TI's portfolio of power modules provides industry-best solution sizes. The [LMZM23601](#) is the industry's smallest 36V, 1A power module that requires only two external components. This inverting regulator demonstration takes a nominal 24V input and generates a range of negative output voltages. In addition, the 17V, 8A [TPSM84824](#) demonstrates the excellent transient response achieved with [TurboTrans™ technology](#). The Mouser booth (No. 411) has a single board highlighting the diverse array of TI power module packaging options.

AUTOMOTIVE

Automotive Start-Stop Solution

This combined solution for demanding automotive infotainment, instrumental clusters and ADAS applications features the low I_Q [LM5150-Q1](#) boost and [LM5141-Q1](#) buck controllers that offer several high-performance features, including 2.2MHz switching, few external components, small solution size and fast dynamic response even under [severe start-stop cranking scenarios](#).

DESIGN RESOURCES

Get to Market Faster – WEBENCH® Power Supply Design Tool

Analyze and interpret designs with WEBENCH Power Design tools. Go beyond the traditional concerns of performance, footprint and cost with tools that mitigate electromagnetic interference (EMI) noise and handle noise-sensitive loads. Start a design now at [TI.com/WEBENCH](#).

Work Smarter, Not Harder – Power Stage Designer™ Tool

The [Power Stage Designer](#) Java-based software tool helps engineers accelerate their power-supply designs by calculating voltages and currents of 20 topologies according to user inputs. The Power Stage Designer tool also contains a Bode plotting tool and a toolbox with various functions to make power-supply design easier. Because all calculations execute in real time, this is the quickest tool to start a new power-supply design.

SEE TI AT OUR PARTNERS' BOOTHS

Digi-Key Booth, No. 1544

- **48V/10A High-Frequency Three-Phase GaN Inverter for High-Speed Motor Drives.** This demo features a three-phase inverter with three 80V/10A half-bridge GaN [LMG5200](#) power modules and uses shunt-based phase-current sensing. The GaN FET switching performance enables a high-speed 100kHz inverter, which minimizes losses and torque ripple in low-voltage, high-speed motor drives. TI's integration of a GaN FET and driver in the same package reduces parasitic inductances, optimizes switching performance to further reduce losses, and shrinks or eliminates heat sinks altogether.

Littelfuse Booth, No. 1619

- **10kW, 1kV, Three-Phase, Three-Level SiC-Based Grid Tie Inverter.** See a demonstration of a transformerless solar string inverter with 99% peak efficiency and industry-leading power density while switching at 50kHz. The demonstration features TI's isolated SiC gate drivers, voltage and current sensing, TI's C2000 MCU, and Littelfuse SiC MOSFETs.

Mouser Booth, No. 411

- **High-Current Bidirectional Battery Test Solution.** This demonstration showcases a bidirectional battery test solution featuring TI's [LM5170-Q1](#) high-performance, dual-channel bidirectional current controller and a signal control board built with precision amplifiers to improve current-sense accuracy better than .05% at full scale. Download the [PMP15038](#) reference design.
- **Power Module Packaging.** See how TI's portfolio of power modules provides industry-best solution size. For example, the [LMZM23601](#), which is the industry's smallest 36V, 1A power module, requires just two external components.

Würth Booth, No. 401

- **Build a Board Virtually.** Immerse yourself in a virtual reality experience and build your own power supply using tools and products from Würth and Texas Instruments.

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