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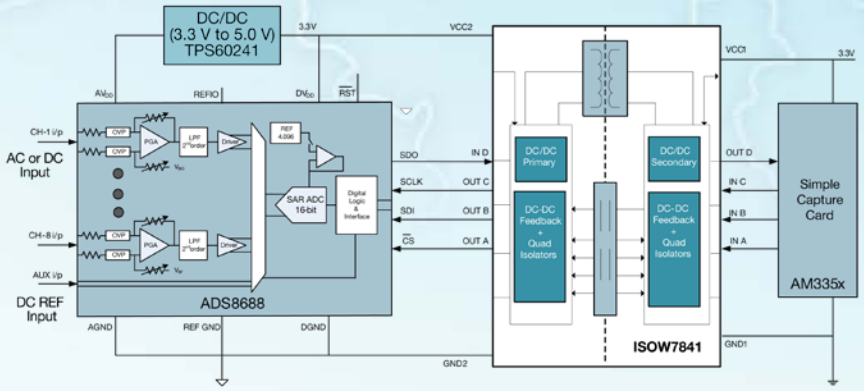
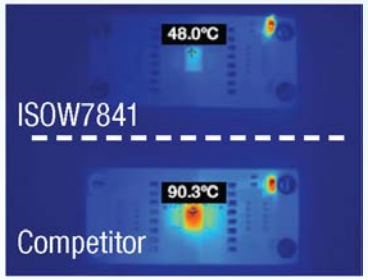
TI at APEC 2017

Demo Guide and Resources

Integrated isolated data and power helps enable efficient, reliable industrial system design





Let the industry's high-efficiency, lowest emissions reinforced isolator optimize your industrial design

The **ISOW7841 Thermal Comparison Demo** showcases the thermal performance of the ISOW7841 reinforced isolator with integrated power compared to a similar device available in the market today, demonstrating that the ISOW7841 offers 80% higher efficiency than existing integrated devices. With the industry's lowest power consumption, the ISOW7841 reduces device operating temperature by up to 40 degrees C, enabling higher power delivery, higher channel count and longer system lifetime than other integrated solutions.

In the **Small Form-Factor Analog Input Module Demo** , the ISOW7841 reinforced isolator with integrated power paired with an 8-channel, bipolar input-voltage, 16-bit SAR ADC enables a compact, highly accurate, 8-channel data acquisition design.

Additional Resources:

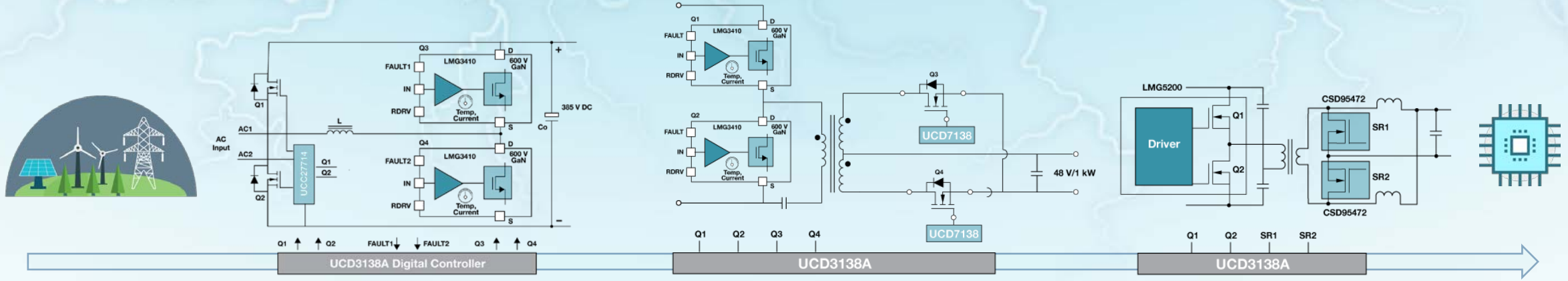
Learn more about the ISOW7841

Download the white paper, "Fully integrated signal and power isolation – applications and benefits."

Read more about signal isolation with integrated power in this Industrial Strength blog post.

Watch the video, "Reinforced Isolation and Power: An Integration Story."

AC-to-Processor: Powering Tomorrow's Datacenters with GaN



Let TI GaN Revolutionize your datacenter power design
Gallium Nitride (GaN) solution from Texas Instruments are enabling a new generation of power- conversion designs not previously possible with silicon MOSFETs. These designs enable systems to reach new levels of power density and efficiency. GaN- based solutions can be incorporated into power supplies throughout data centers, from the AC mains to the individual points of load (POLs). It GaN also enables new architectures such as the high- voltage DC distribution systems.

The end-to-end solution from TI includes:

- 1kW Totem Pole PFC solution scalable to 3kW with 99% efficiency and up to 4X the switching frequency of existing designs
- 1MHz LLC isolated DCDC stage delivering over 140W/in3 of power density , or nearly 3X of today's solutions
- 2x50A stackable single stage 48V to POL DCDC converter, eliminating intermediate bus (IBC) step and reducing the component count by over 50%.

Additional Resources:

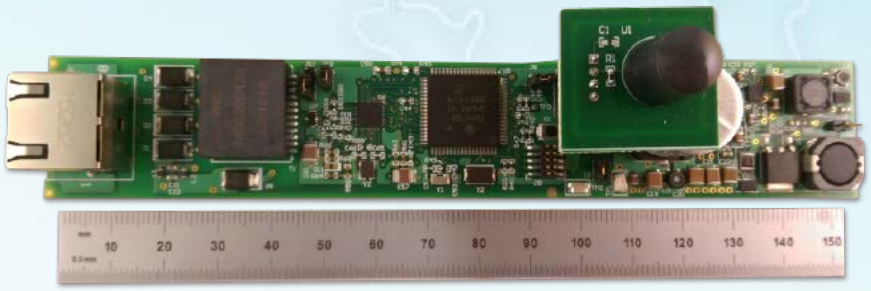
View TI GaN Ecosystem

Read Evolving high-voltage power delivery white paper

Read: Rethink compute density with GaN

Read: Rethinking server power architecture in a post-silicon world: Getting from 48Vin-1Vout directly

IEEE802.3bt PoE Demo for LED Lighting Applications



In the era of IoT, Texas Instruments has developed PMP20537, a IEEE802.3bt compliant Power over Ethernet Powered Device (PoE PD) system solution for smart lighting and IoT applications such as energy management, reactive room illumination, wayfinding, and alert/alarm systems.

This demo features high power PoE LED lighting (51W – Class 6), ultra-low standby power consumption, connected lighting control over ethernet, and motion detection.

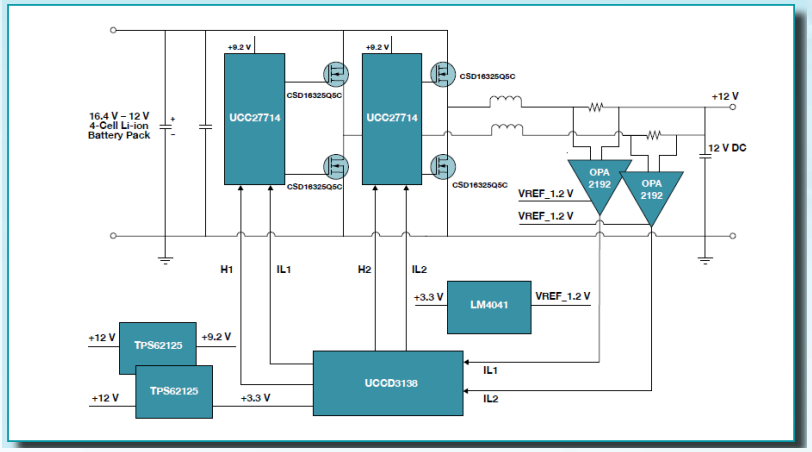
Additional Resources:

Read “PoE Lighting is coming”

Click here for all PoE IEEE802.3bt blogs

Visit the PoE page for more information

Ultra-compact bidirectional DC/DC converter for energy storage systems



The TIDA-00705 is an ultra-compact (1”x1”x1”) high efficiency bi-directional DC-DC power converter capable of delivering 480W for use in Local Energy Storage (LES) and Battery Back-up power applications, specifically designed for server PSUs embedded with battery backup units (BBU).

Additional Resources:

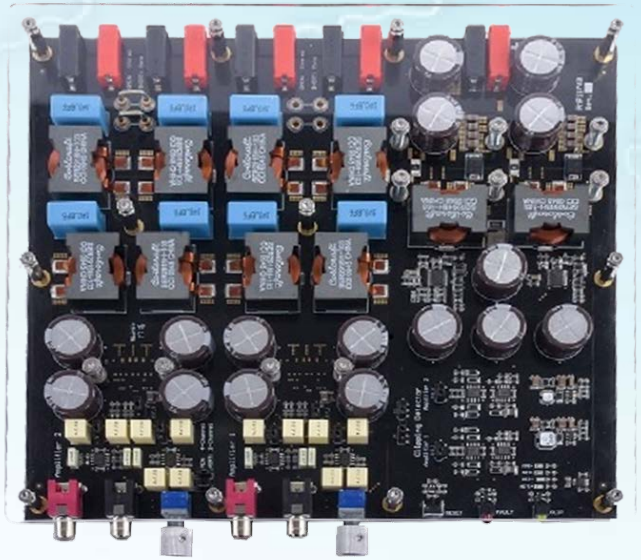
See the full reference design

Visit the power delivery portal for more information

Use the UCD3138 Application Development Firmware Kit

Watch the UCD3138 digital power trainings

700-W Automotive Class-D Audio Amplifier

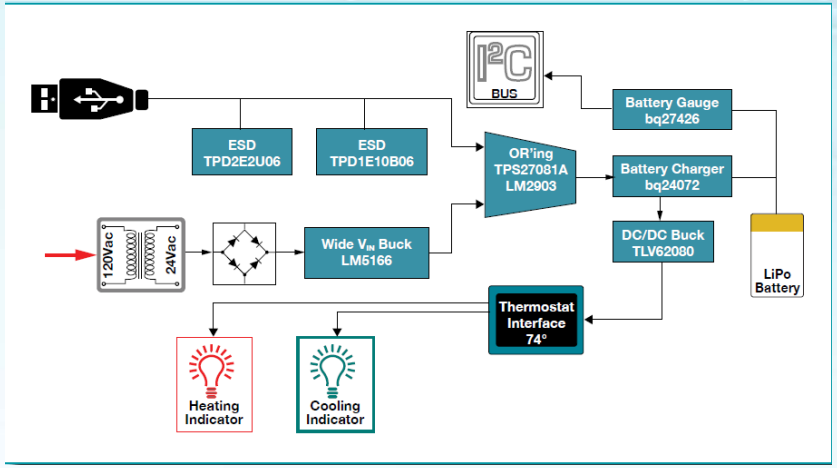


The PMP11769 reference design is a complete solution for a 700W automotive audio amplifier. The boost converter provides 36 V @ 10 A continuous / 20 A peak from an input voltage of 9 -16 V. It contains two Class-D amplifiers which provide 2x 175 W @ 4 Ohm load (left & right channel) and 1x 350 W @ 2 Ohm (subwoofer).

The design is well suited for car audio external amp applications due to its thin profile and high power output.

1. **Additional Resources:** See full reference design

Ultra-Efficient Smart Thermostat Power Supply



The demo utilizes TI's 24Vac reference designs to provide power and backup functionality to a WiFi-enabled smart thermostat, which can be controlled with a phone. Two lights representing a heater/furnace and cooler/compressor are displayed. When the thermostat's desired temperature is adjusted, the demo will light up the appropriate light to indicate cooling or heating.

The design's power stage takes a 24Vac input and produces a 5V and 3.3V output rail. The design provides LiPo battery charging and seamless switching to backup battery power during a 24Vac brownout.

Additional Resources:

Design 24-V AC Power Stage With Wide Vin Converter and Battery Backup Reference Design for Smart Thermostat

Design 24-V AC Power Stage With Wide Vin Converter and Battery Gauge Reference Design for Smart Thermostat

Non-Military Drone/Robot, or RC 2S1P Battery Management Solution

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Add flight time and extend battery life to quadcopters and other non-military consumer and industrial drones used to deliver packages, provide surveillance or communicate and assist at long distances. This live demonstration and interactive GUI shows TI technology monitoring the drone's battery in real time - including state of charge, remaining time to empty, and the battery's state of health.

Speed up or slow down the rotors and see in real time the current and voltage profile of the battery, even when the drone momentarily draws up to 18 amperes from the battery when the rotors are at full speed.

Additional Resources:

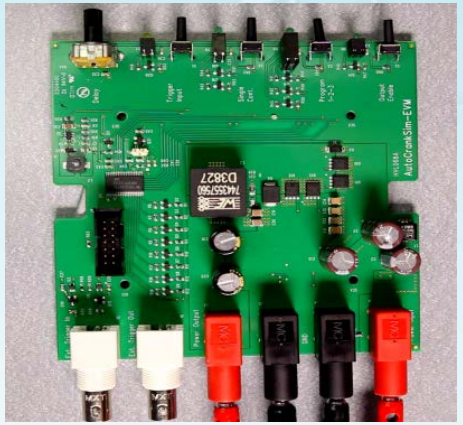
Reference design: Learn more about TI's 2S1P Battery Management System

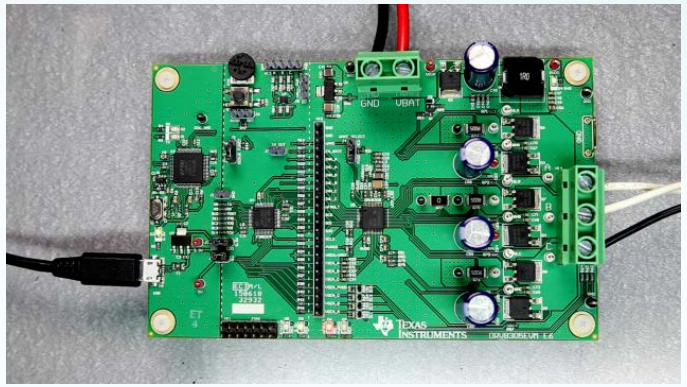
Evaluation module: BQ24600 Multi Cell Synchronous Switch-Mode Charger

Evaluation module: 1 Series, 2 Series, 3 Series, and 4 Series Li-Ion Battery Pack Manager Evaluation Module

Evaluation module: TPS62175EVM-098 Step Down Converter With Snooze/Sleep/Standby Mode Evaluation Module Board

Start-Stop effect on Brushless DC (BLDC) Motor Drives in Automotive Applications





Industry's first automotive BLDC gate driver operating at cold crank voltages as low as 4.4V. This device enables the pump to push fluid in low voltage conditions.

Additional Resources:

Design TI's Automotive 12V 200W (20A) BLDC Motor Drive

Read How motor drivers aid in an automobile's "limp-home" mode

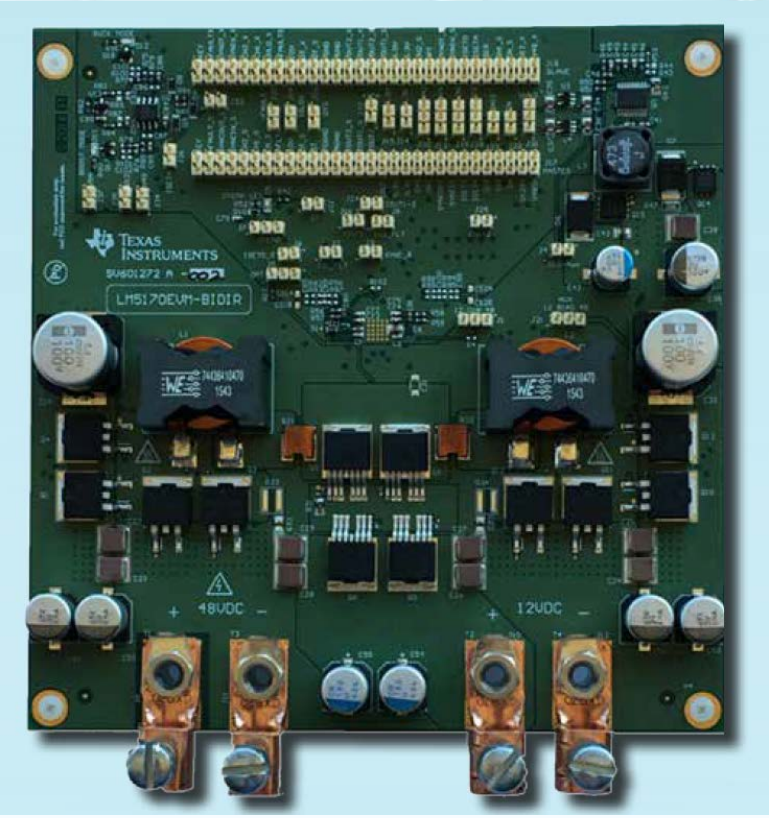
Read The other motors in electric vehicle systems (part 2)

Read Understanding TDRIVE and IDRIVE In TI Motor Gate Drivers

Watch 1 PWM Mode

Watch Start-Stop BLDC drive

12-48V Bi-directional power balancing system

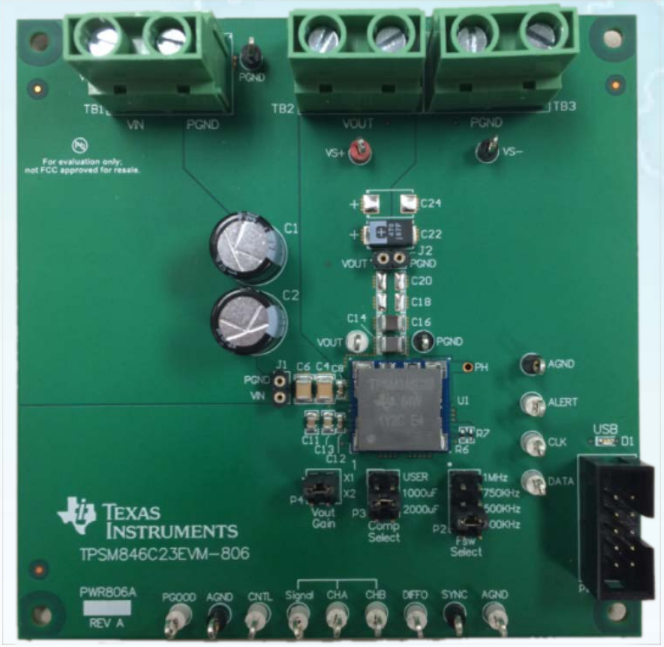


This demo utilizes a standard evaluation module to demonstrate the LM5170-Q1's ability to transfer current in either buck mode (48V to 12V) or boost mode (12V to 48V) operation by simply controlling the direction pin.

The LM5170-Q1 will operate smoothly through a dynamic change in current direction without any overshoot. This allows each phase to remain enabled while the direction input is changed, simplifying any sequencing of input signals and allowing for a smooth transition between buck or boost mode. To maximize efficiency, phases can also be enabled or disabled as needed by using the separate enable pins for each channel.

Additional Resource:
Design with the 48V-12V Bidirectional Converter Evaluation Module

High current PMBus™ power module with telemetry for communication applications

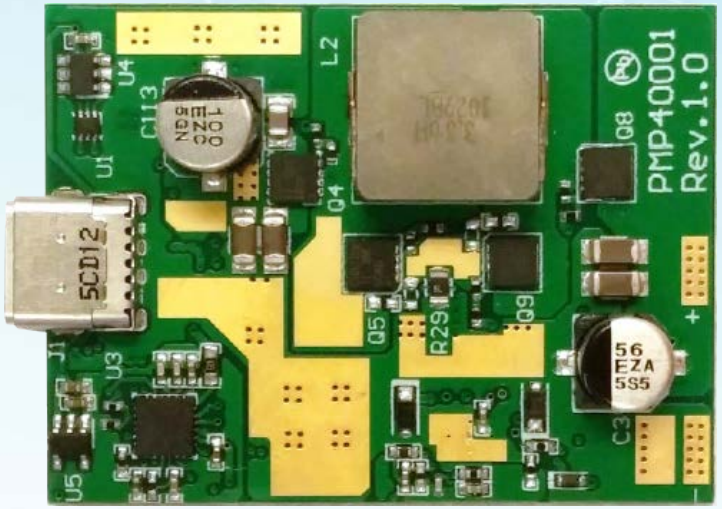


The integrated-inductor power module at the heart of this PMBus™ demo is rated for 18VIN-max and 35A, and is configured for a default output of 1.2V.

The module's PMBus™ compatibility allows for output voltage, current, and junction temperature telemetry, each of which are displayed in real time on the computer interface. The module is controllable through a GUI that allows the user to enable or disable the device, and also allows soft start and soft stop.

Additional Resource:
Design with TPSM846C23EVM-806

High efficiency USB Type-C™ charging, no matter the application



A wide variety of USB Type-C™ demonstrations are on display, showcasing TI's versatility and ability to address any application. Multiple automotive USB Type-C™ designs include key features that any automotive power supply designer would love- high efficiency, high switching frequency, low EMI, low Iq, and wide input voltage.

Several personal electronics designs highlight the high efficiency and small size required in these space-constrained applications.

Explore all the demos:

Design TI's USB Type-C™ PD DFP 5/12/20V @ 3A output with 2~3 Cell Battery Input Power Bank Reference Design

Design TI's CISPR 25 Class 5 USB Type-C™ Port with USB3.0 Data Support Reference Design

Design TI's USB Type-C™ 5V, 3A Car Charger Reference Design

Design TI's 36W USB Dual Port USB Type-C™ PD Reference Design with Port Power Management DC/DC Charger

Three Phase Power Factor Correction Reference Design Using C2000 MCU

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The 60KW Fast DC EV charging station from Xuji is one of the 4 million EV charging stations planned for deployment throughout China by 2020. This charging station delivers 10s of kilowatts and will scale higher in the future. TI enables the high efficiency power conversion inside these stations, minimizing energy loss by monitoring power conversion to and from the battery, and improving power conversion efficiencies.

This charging station is equipped with eight 7.5KW power modules, using two Piccolo™ F2803x microcontrollers per module. It also features TI processors for HMI, high-voltage sensing components and high-voltage gate drivers for improved efficiency and accurate sensing.

Additional Resources:

Read “Intelligent battery management and charging for electric vehicles”

Design Three Phase Power Factor Correction using C2000 MCU

Visit TI.com for information on real-time control for electric vehicles

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