Texas Instruments
Technology Day Kansas City 2009
Session Titles and Abstracts

Track & Course	Abstracts
Track 1 – Portable-Design Considerations	
Introduction to DC/DC Converter Topologies for Portable Applications	The wide variety of power-management solutions available to the designer keeps growing, particularly in integrated devices. The simplicity of the integrated converter may raise questions on how to properly test your solution; all of these questions will be addressed in this session. After a thorough review of the buck converter, we will explore other power-conversion topologies, including inductive boost, switched capacitor, SEPIC and buck/boost.
Stability, Transient Response and Noise of Portable DC/DC Converters	Poles, zeroes and Bode-plot analysis are all associated with the stability of a power supply's feedback network. How they relate to your design depends on your choice of topology, current or voltage-mode control, and integration level. This session will present some easy "tricks" to help you distinguish good from poor stability performance.
Li-Ion Battery Characteristics, Trends and Fuel Gauge, and Cell Balance in Multicell Battery Packs	With all the different battery chemistries and form factors available, it can be difficult to identify the best choice for your particular design. This session will provide an overview of current and future technology trends, including the trade-offs between capacity, voltage, discharge rate and safety. TI's Impedance Track™ fuel gauge will be introduced to show how it can accurately predict the battery's remaining capacity and time to empty. A cell-balancing technique for improving the safety of multicell applications will also be discussed.
Designing Power Drivers for Solid-State Lighting (LEDs)	Advancements in solid-state lighting (SSL) provide engineers with the opportunity to develop many interesting and revolutionary products. Designing an appropriate power driver for SSL can take full advantage of these advancements. This session will cover lessons learned from TI's power engineers who have solved various SSL driver issues. We will cover AC/DC and DC/DC topologies and ICs for low-, medium- and high-power SSL applications. Real-world schematic examples of how to tackle SSL challenges will also be presented.
Choose Your Weapon—Selecting an Optimal MOSFET	Have you ever spent hours selecting MOSFETs, calculating losses and comparing multiple possible devices, only to be left wondering if you've selected the best MOSFET? Have you ever wished there was a way to quickly evaluate and compare a dozen MOSFETs relative to the losses in your application? Now there is. Here, we will discuss MOSFET switching characteristics, loss factors and key parameters, then justify and present a new method developed at TI for rapidly comparing and selecting a loss-optimized MOSFET from a list of possible candidates. Generalized equations and equations for specific synchronous buck controllers will also be presented.

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Track 2 – Low-Power Wireless	
Low-Power RF Basics and Modulation Techniques	This session will provide an overview of common specifications, technologies and functional blocks for low-power RF sensors and networks.
Adapting TI LPW Reference Designs	A fast way to implement a low-power wireless (LPW) design is to duplicate a TI reference design on your own board. This session will discuss the do's and don't's of transferring the reference design to your own PCB, including some of the common pitfalls that can be avoided.
Improving the Range of Your LPW Design	The most common question that comes up in designing any low-power wireless (LPW) system is "What is its range going to be?" This is usually followed by the next most common question, "How can the range be improved?" This session will go through some of the ways to answer both of these difficult questions.
Energy Harvesting *Presented by Cymbet*	This session provides an overview of how to design autonomous wireless sensors by using various energy-harvesting transducers, energy-conversion circuits, energy storage and TI's MSP430™ and CC2500. Various autonomous-sensor configurations based on energy harvesting will be detailed. Low-power, energy-harvesting RF system architectures will be discussed, and design examples will be shown. An example of a zero-power wireless sensor will be demonstrated with the eZ430-RF2500-SEH development kit.
Antenna Fundamentals for Low-Power Wireless Designs	The antenna is often the most complicated part of a low-power wireless design. This session will help designers understand different types of antennas and reference designs and the trade-offs that can be made when a TI reference design is transferred to a new PCB layout.

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Track 3 – Signal-Chain Solutions	
Op Amp Stability and Fixes	Any system that has gain is subject to stability issues. The basic conditions necessary for extended ringing and even sustained oscillation are connected with phase shift and gain. With information from the product data sheet, a TINA-TI™ simulation, and bench tests, a stable system can be realized.
Circuit-Isolation Techniques and Implementations	Multiple options for implementing galvanic isolation are now available to electronics designers. Apart from having capacitive, optical, and inductive/magnetic isolation technologies to choose from, designers must also comply with the various isolation standards regarding voltage ratings and creepage/clearance distances. This session aims to simplify the decision making associated with choosing the right isolation solution.
Sensors and the Analog Interface	This session will cover how to monitor many different physical phenomena, such as temperature, air flow, humidity and power. We will discuss numerous sensor characteristics and the various styles of sensor signal conditioning that can be implemented in a system. The output of every sensor circuit discussed will be suitable for conversion to a digital signal. You will leave this session fully armed to tackle your onboard or remote-sensor challenges.
Circuit Sensitivity with Emphasis on Analog Filters	Designing the amplification and filtering circuits of an analog application can be challenging. There are often conflicting requirements for low cost and precision in these circuits, forcing the design engineer to make some difficult trade-offs. A good understanding of circuit sensitivity can provide a means to make these trade-offs easier, allowing the designer to provide greater performance within an allowable budget.
Approaches to Multichannel, High-Resolution Data Acquisition	Data-acquisition systems that require high resolution typically employ delta-sigma analog-to-digital converters. This type of converter has traditionally presented some challenges when used in multichannel systems; for example, multiplexer timing must be carefully considered to comprehend latency through the converter's digital filter. In some cases, this has led designers to use a converter-per-channel approach, which brings with it challenges in synchronization, especially if simultaneous sampling is required. Recent developments in integrated solutions make trade-offs such as these easier. This session will examine these issues and trade-offs in light of these new solutions and will suggest applications where different approaches may optimize the overall system performance.