Texas Instruments
Tech Day Washington DC 2009
Session Titles and Abstracts

Track & Course	Abstracts
Track 1 – Power	
SwitcherPro™ Tool	SwitcherPro is a new online tool that allows the development of both internally and externally compensated power-supply designs and helps users to quickly achieve high-performance solutions. The SwitcherPro tool generates test-case schematics and loop responses, evaluates efficiency and analyzes circuit performance. This session will discuss and demonstrate how to: create new designs, calculate design efficiency, calculate loop responses, view stress information on all key parts in the design, customize designs by changing parts, part labels and outputs, change design parameters for what-if case analysis, and output a simple schematic and bill of materials for your design.
Preventing Battery System Failures in Portable Devices *by MircoPower*	Sony has implemented the largest battery pack recalls in the history of portable computing. Catastrophic safety issues – ranging from under-performance to explosions – with portable battery systems has heightened concern over battery system safety. We'll examine the most common causes for dangerous failures in battery systems, and provide design guidelines and techniques for power system designers to eliminate these failures in their own portable products. These design guidelines include cell selection and qualification, protection circuit design and placement, battery authentication, charging regimens, mechanical considerations, and battery integration with portable devices. This presentation will provide insight into developing portable power systems that are extremely safe and preclude dangerous failures.
Buck-Boost Converters for Portable Systems	This topic presents several solutions to a typical problem encountered by many designers of portable power – how to produce 3.3 V from a single-cell Li-Ion battery. The advantages and disadvantages of each solution are provided along with measured data on overall battery runtime. This data helps the designer select the best overall solution for specific system requirements. This topic also provides a detailed comparison of TI's fully integrated TPS63000 buck + boost converter and other buck-boost solutions. The efficiency, overall ease of use, and operation in "transition mode" – when the converter switches from buck to boost mode – are discussed.
Design Consideration in Selecting the Switching Frequency of Power Controllers	Most designers use the switching frequency as the primary parameter on which a controller is chosen. A common misconception is that higher frequency control is better. Designing the controller to comply with the most critical design constraints of the system is the best approach. This presentation looks at some of the practical implications of increasing switching frequency and how to select the appropriate frequency for your application.
UCD92xx Digital Controller Solutions – You Don't Have To Write Code	Digital Power technology promises to revolutionize the way power architectures are designed. In this session, we will review TI's latest product developments along with the theory of digital control. System-level benefits and application examples will also be covered along with device configuration details using an intuitive graphical user interface (GUI). A product demonstration using the Fusion Digital Power™ Design Tool and the UCD9240 evaluation board will be given.

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Track 2 – Low-Power RF	
RF Basics	This presentation gives a introduction to RF systems. The presentation gives an overview of a complete RF system as well as an introduction to the different building blocks in an RF system. Important parameters such as sensitivity, selectivity, output power and link budget are discussed in detail. Finally, compliance to frequency regulations around the world are discussed.
Low-Power RF Protocol Overview	TI's Low-Power RF (LPRF) offers RF solutions (transceivers and SoCs) that target many different RF frequencies and standards. For some of them TI provides the HW (sub-1 GHz and 2.4 GHz) and software (proprietary: SimpliciTI™; standards: MAC 802.15.4, RemoTI™ and Z-Stack™ for the ZigBee® standard) and for others it provides the hardware only and cooperates with partners to provide the software (Wireless M-Bus, 6LoWPAN, SP100, HART). This training helps the attendee to better understand which questions to ask when taking the decision on which software (RF protocol) to use. Although the main topic is software hardware related questions like “Which frequency is targeted?” are also discussed as they have an influence on which oftware protocols one can chose from. Then the advantages and disadvantages of the different protocols are discussed in more detail by looking at two different use cases: (1) Point-to-point connection for a remote control (2) Multi node network to control the temperature in a house
RF Hardware System Design	There are several aspects to consider when designing an RF system. This presentation discusses: • Regulations • How to select correct IC for the application • HW design issues • PCB layout issues • HW testing There are also links to resources provided by TI to make it easier for customers to finalize their products.
CC430: MCUs for Space Constrained, Ultra-Low-Power, Wireless Applications	The CC430 platform is a highly integrated, monolithic SoC based on the industry-leading MSP430 MCU architecture and TI’s ultra-low-power RF solutions. By making RF design easy, small, performance-rich and power-efficient, the CC430 platform helps advance applications including RF networking, energy harvesting, industrial monitoring and tamper detection, personal wireless networks, automatic metering infrastructure (AMI) and heat cost allocators.
Precision Analog, High-Res ADC/DAC and Complimentary OPA	This presentation will provide discussion and analysis of accuracy and noise in the analog signal chain and through the data converter. Amplifier specs and data converter specs are often given in different formats, such as ENOB for an ADC vs. per Hertz noise density for an opamp. We’ll review how to compare these and other specs often provided in different formats. In this presentation we will focus on understanding the principles of the specifications, not just memorizing simplified formulas. Tina Spice and useful Excel calculators will be demonstrated to illustrate the examples.

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Track 3 – Signal Chain	
High-Speed Amplifier Design Considerations	Voltage feedback (VFB) and Current feedback (CFB) amplifiers are the two most common high-speed op amp architectures in use today. This presentation develops VFB and CFB models from simplified schematics, and shows the impact on amplifier circuit design, feedback and stability, and highlights the similarities and differences. Application comparisons are shown to point the designer to the right type of op amp given the application they are developing. The presentation then shows how these principles are applied to high-speed op-amp PCB layout giving practical do's and don'ts of high-speed layout.
Solving Common Design Issues in High-Speed Data Converters	This session deals with some of the common issues that haunt the proper application of ADCs. This is meant for the customers that have a working understanding of data conversion fundamentals already. We will treat subjects such as clocking and jitter, driving the analog input, driving/capturing digital data effectively and layout considerations. The session will focus more on real-world practical issues and their solutions.
Compliance by Design by LS Research	This session will outline the importance of RF component selection and PCB layout techniques and how they can be instrumental in achieving regulatory approval and optimal design performance. This will include a brief discussion on the pros and cons of using RF modules, reducing risk with compliance prescans and the insight provided through measurement of antenna radiation patterns.
Clocking Schemes for High-Speed Data Converters	Selecting a clock driver for a high performance sampling system involving high speed data converters is a hard task and often underestimated. It is especially harder for an Analog-to-Digital Converter (ADC). If the ADC fundamentals are well understood, it makes the job of identifying required clock driver performance easier. Such a clock driver can be a simple (non-PLL) clock distribution circuit, clock generator/synthesizer or jitter cleaner. A clock driver can do the signal processing such as frequency integer or fractional multiplication and division, level translation, skew control, etc. The higher the input frequency of an ADC, the more important the sampling clock jitter becomes and need to be kept at levels of the ADC's internal aperture jitter to achieve best possible SNR (and SFDR). This presentation will address sampling clock dependencies on the ADC performance metrics (namely SNR and SFDR), explain methods to calculate required sampling clock jitter, introduce TI high performance synthesizers/jitter cleaners and show demonstrations of achieving best possible SNR (and SFDR) with such cost effective yet high performance clocking devices.
The Complex IF Transmitter	The complex IF Transmitter is an alternative radio architecture using high-speed DACs and IQ modulators. Complex radio architectures have been traditionally used with the IQ modulator input signal centered at 0 Hz. This paper will present the complex IF transmitter architecture, where the baseband signal is first digitally quadrature modulated to a complex intermediate frequency (IF) using a high-speed DAC before being input to an IQ modulator. This architecture has the advantage of perfect IQ balance within the baseband signal (similar to a real IF radio) with the added benefits of sideband, LO and DAC image suppression at the modulator output.This allows the complex IF architecture to be implemented in most cases without IF filtering and relaxed RF filtering, resulting in reductions in components, size and power.

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Track 4 – Embedded Processing	
Overview of TI's OMAP™ Devices	Learn about TI's OMAP applications processors for consumer, medical and other embedded applications. With a scalable roadmap, the OMAP applications processors will provide a variety of combinations including the Cortex A-8 core, multimedia-rich peripherals, accelerators and TMS320C64x+™ DSP to address applications' needs for increased graphics, web browsing capabilities and other market demands. In this session, we will review the details of the chip including the OMAP processor, the Cortex A-8 core advantages, peripherals, accelerators and DSP options as well as OMAP Evaluation Modules, tools and software details to get you started today.
Choosing the Right Video Processor	TI has several embedded processing solutions that are tailored for digital video applications. They consist of integrated processors, software, tools and support to aid in simplifying the design process and accelerate innovation. In this session, we will review TI's portfolio including the new OMAP35x application processors and the DaVinci™ processors including TMS320DM644x, TMS320DM643x, TMS320DM64x, TMS320DM355 and the recently announced TMS320DM6467 HD transcode engine. Among the many applications spaces for this technology, we can outline machine vision, video security, video telephony, digital media streaming and IP set-to-boxes (STB).
Introduction to Stellaris® ARM Cortex™-M3 MCUs	TI's Stellaris MCUs pair the ARM Cortex-M3 core along with advanced communication capabilities, including 10/100 Ethernet MAC+PHY, CAN, USB On-The-Go, USB Host/Device, SSI/SPI, UARTs, and I2C. TI also provides an extensive range of over 20 superb reference design, evaluation and development kits starting at $49. Stellaris MCUs are targeted at highly-connected applications including monitoring, building controls, network appliances and switches, factory automation, electronic point-of-sale machines, test and measurement equipment, medical instrumentation and gaming equipment. This presentation provides an overview of Stellaris MCUs, software tools and kits, StellarisWare™ software, and applications. The session will close with a free-form Q&A session to handle your questions on the more than 140 microcontrollers in TI's Stellaris family of MCUs.
Getting Started with Low-Power Floating Point Processors	This session will explain how TI's low-power floating point processors map to end application needs. Topics such as floating point performance at fixed point prices and getting started with the EVM will be covered. Attendees in this session will be provided with detailed information on OS support and power management techniques.
Introduction to Code Composer Studio™ v4.0	CCS v4.0 is a major new release of Code Composer Studio that is based on the Eclipse open-source software framework. Eclipse is becoming very popular in the embedded development community and is now becoming a standard in development environments. This session will provide an overview and explain advantages to using CCS v4.0 for your development.