



Texas Instruments Tech Day Irvine 2009 Session Titles and Abstracts

Track & Course

Abstracts

Power Management

Component Selection, Layout and Thermal Design Consideration for DC/DC Converters

DC/DC converters with internal transistors and compensation have become very popular due to their relative ease of use. This topic covers how to select the external components and properly lay out the circuit to achieve the maximum performance of the converter. Several good and bad layout examples are provided to show how layout impacts sensitive circuits. Thermal layout for linear regulators is also explored.

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.

PWM and Light-Load PFM Mode Operation of DC-DC Converters

This topic will discuss the tradeoffs between fixed-frequency PWM and variable-frequency PFM control methods for portable DC-DC converter applications. PWM converters offer good transient response and low output ripple characteristics, and have predictable operating frequency, which may simplify the EMI filter design. However, they suffer from very poor conversion efficiency at light load or standby conditions. Hysteretic or PFM architectures can also offer other benefits for boost converters such as simple, inherently stable circuits that are easy to design. This session analyzes the relationship between the switching frequency and operating conditions of a hysteretic boost converter. PFM converters may not be appropriate for all applications. By understanding some basic details regarding the differences between PWM and PFM approaches, the system designer can make a more intelligent choice regarding the best architecture for a particular application.

Design Tool for DC-DC Converter Design

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.

Rechargeable Batteries and Their Optimized Chargers

Battery operated portable-power devices have been growing significantly. Safely, fast, and efficiently charging a Li-Ion battery has become a challenging task. This training session discusses the NiMH and Li-Ion, LiFePO4 battery charging requirements and how our charger implementation meets these requirements. As USB gradually becomes a main power source to charge a battery, the power adapter starts to share the same connector with the USB. Various USB battery chargers are presented with and without power path management functions. TI's 3-MHz synchronous switching single-cell charger (bq24150/1) increases the effective charging current, reduces the heat generated from the charger, and minimizes the charging time compared with linear battery chargers. A few switching-mode battery chargers are presented to charge multi-cell LiFePO4 and Li-Ion batteries.



Texas Instruments

Tech Day Irvine 2009

Session Titles and Abstracts

Track & Course

Abstracts

Signal Chain 1

Tackling EMI and RFI at the Board and System Level

Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) can affect any system in an undesirable manner as the proliferation of unintentional radiators and receptors continue to increase. EMI and RFI, an undesirable byproduct of electrical systems, produce a wide range of frequency spectra that can affect otherwise properly operating circuits. During this seminar hour, we will review the fundamental principles of radiated interference and coupled interference, along with the respective allowed limits for both of these interference sources. In this discussion, we will describe transmitters and receivers along with techniques to mitigate the effects of both culprits. The solutions we will cover will be effective power-line filtering, proper filtering for input signals of high-gain circuits, and details on key components. Finally, we will discuss the common rules of thumb for wire and PCB routing to minimize EMI and RFI effects. With this seminar you will see some basic methods that will help reduce sources and receptors of EMI and RFI events in and near your circuits

Designing with High-Speed DACs and Solving the Analog Interface

A typical transmit chain, whether it be in a communications application like VDSL, test and measurement application like arbitrary waveform generator, or one of many others, starts with a DAC followed by a signal processing chain. The purpose of this presentation is to discuss key performance criteria of the signal chain and how to select components to meet them. We start with an overview of DAC specifications like sampling, images, SNR, SFDR, current sinking versus current sourcing and compliance voltage, and op-amp specifications like bandwidth versus gain, noise, distortion, input/output voltage range, and inverting versus non-inverting. Next we discuss how to translate and combine specifications to estimate the overall performance of the signal chain.

To conclude, we get to the nuts and bolts of how to design around very high-performance DACs like the DAC5682Z, which has complementary current outputs. We derive the design equations required to achieve gain matching from each output and convert to a single-ended voltage and consider how to implement DAC reconstruction filtering. The presentation uses the TSW3070 16-bit 1-GSPS DAC5682Z evaluation platform to demonstrate operation and give examples of performance. Two computer design tools are provided and illustrated; an Excel spreadsheet for component calculation and a TINA-TI™ spice file for circuit simulation.

Designing Mixed Signal Systems with Noise Reduction Techniques in Mind

Sensor applications often have low-level signals. A peaceful co-existence of the sensor signal, analog circuitry, and processor requires careful attention to layout and noise reduction techniques. In this session we will discuss three sources of noise, the paths noise travels and how to reduce noise to tolerable levels. We will discuss the proper selection and placement of noise isolating and limiting components to keep analog and digital noise out of sensitive input circuits.

Tools for Evaluating Precision Analog-to-Digital Converters

When you consider an analog-to-digital converter (ADC) for a new design, you can get a rapid assessment of the device with an evaluation board (EVM). If you intend to view collected time-domain, histogram, or FFT data, the new ADCPro™ software from TI will ease your evaluation. During this session we will identify the appropriate test equipment for your EVM and introduce basic ADC evaluation test methods. We will show how ADCPro will simplify the tasks of collecting and analyzing ADC data.

Op-Amp Stability Analysis 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 with TINA simulation and bench tests a stable system can be realized.



Texas Instruments

Tech Day Irvine 2009

Session Titles and Abstracts

Track & Course

Abstracts

Signal Chain 2

Circuit Isolation Techniques and Implementations

Multiple options are now available to electronics designers to implement galvanic isolation. Apart from isolation technologies like capacitive, optical and inductive/magnetic to choose from, they must also contend with the various isolation standards regarding voltage ratings and creepage/clearance distances. This discussion intends to simplify the decision making associated with choosing the right isolation solution.

Getting Started with 900-MHz and 2.4-GHz Products and Protocols

This presentation serves as an overview of the parameters and considerations a designer would use to select a low-power wireless (LPW) solution. It also highlights the devices and tools from TI and how they fit in a typical LPW design.

Practical Techniques for Thermal Management in Portable Products

The design of any power-conversion circuit requires that some attention be given to the thermal aspects of the design. Traditional methods of thermal management (such as heat sinks, ventilation, cooling fans, etc.) are not generally applicable to the design of handheld products. The primary method used to transfer heat away and keep the silicon cool is the design of the PC board itself. This topic explains some of the basic methods of analyzing power-dissipation capability of a given PCB design, and offers suggestions for optimizing layouts to improve thermal relief capability.

High-Speed Op-Amp 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 dos and don'ts of high-speed layout.

Circuit Sensitivity with Emphasis on Analog Filters

In analog applications, much of what is done in the analog domain is amplification and filtering. 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.



Texas Instruments Tech Day Irvine 2009 Session Titles and Abstracts

Track & Course

Abstracts

Embedded Processing

Essential Concepts in SoC System Design with OMAP™ and DaVinci™

Learn how to successfully develop with TI's OMAP and DaVinci devices. This session will provide a hardware overview as well as provide a dissection of software architecture. Attendees will gain an understanding of TI delivered software components (OSs, LSP, codecs), use cases, collateral and support paths, and system integration. Program management best practices will also be covered.

Exploring Windows Embedded CE 6.0

In this session, attendees will learn how to build an OS image using Platform Builder and Visual Studio 2005. The presentation will also cover some of the unique attributes of the OMAP3 platform as it relates to the DSP and graphics accelerator, all running under Windows CE. Each attendee will receive an evaluation copy of Platform Builder with Visual Studio 2005.

Video Fundamentals and Future Codec Directions

The world of video is filled with its own terminology which can make it difficult to get started; terms such as D1, NTSC, YUV, BT.656, etc. can be very intimidating. This session is aimed at engineers looking to become familiar with the terminology and concepts involved in image/video processing. Concepts such as resolution, bit-depth, color space, and common hardware interfaces will be covered. This session will also highlight emerging codecs as well as provide an overview of the TI's eXpressDSP™ licensable software codecs.

Leveraging Ultra-Low-Power Best Practices

Realizing a low-power system design when every microampere counts is rarely an easy task to achieve. Such an effort requires detailed knowledge of everything your MCU offers in the way of enabling ultra-low power (ULP) as well as the features of any external components. This course gives practical instructions of how to realize a ULP application using the MSP430 family. Special focus is given to specific ULP features, how to select components for ULP applications and coding techniques that reduce the power consumption of your embedded application.

Introduction to Code Composer Studio™ (CCS) 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.

ADCPro, Code Composer Studio, DaVinci, eXpressDSP, Fusion Digital Power, OMAP, SwitcherPro and TINA-TI are trademarks of Texas Instruments.

All other trademarks are the property of their respective owners.

© 2009 Texas Instruments Inc.

