

Detroit Tech Day - September 28, 2017					
FPD Link & Automotive Ethernet	Signal Chain & Isolation	Power	Motor Drivers & Sensors	Embedded Processing & Wireless Connectivity	Automotive Systems
Registration and Exhibits Open					
System Bring-Up Methodology for FPD-Link III Devices	Op Amp Technology Overview	High-voltage solutions in HEV/EV Part 1: On board chargers and charging stations	Designing with Isolated Gate Drivers in Automotive Applications	Introduction to mmWave Radar	New Reference Designs for Body Electronics, Kick-to-Open and Ripple-Count Position
Breaks / Exhibits					
System Bring-up Practical Example using the 953 and 954	Introduction to Automotive EMI Standards and Designing for Certification at the Board Level	High-voltage solutions in HEV/EV Part 2: DC/DC and traction inverters	Relay Replacement for Brushed DC Motor Drive in Automotive Applications	Reconfigurable Digital Cluster Solution Based on TI Jacinto 6 SoC family	Automotive Telematics Deep Dive: Market Overview, System Needs, and Typical System diagrams
Lunch					
Automotive Ethernet 100BASE-T1, understanding PMA compliance	Simplify and Optimize Your Design using Logic and Level Shifters	EMI and Noise Mitigation for DC/DC Regulators	High Temperature Grade0 Motor Drive Applications	Fusion for ADAS	SEM - HEV/PT 48V DC/DC analog versus digital
Breaks / Exhibits					
Designing 100BASE-T1 systems meet automotive requirements	Isolation Products: Benefits, Applications & Systems Considerations	Switch-Mode Power Converter Compensation	Benefits of Smart Gate Driver Architecture for Driving External FETs in Motor Drive Applications	AI in Automotive: Practical Deep Learning	Becoming a Jedi Master - Gesture Control Using 3D Time-of-Flight Sensor for Industrial and Automotive
Breaks / Exhibits					
Understanding 100BASE-T1 tests and signaling, and how to measure	How to Protect Against Automotive Transients (ISO 7637/16750) with Power Switch Solutions	Dynamic Limitations of Switched Mode Power Supplies	Fully integrated 180 sinusoidal control motor driver for motors less than 20W output power	Automotive Radar System Topologies with TI mmWave sensors	Integrated device for switches status detection in automotive applications

Track	Session Title	Abstract
FPD Link & Automotive Ethernet	System Bring-Up Methodology for FPD-Link III Devices	FPD-Link III devices such as the DS90UB953-Q1/ DS90UB954-Q1 support camera use over serial link for Advanced Driver Assist Systems (ADAS) in the automotive industry. In this presentation, we will guide you through step-by-step procedures to initialize and bring-up the “Camera-Serializer-Deserializer-ISP” link to an optimal performance level. We will cover strategies through several flow charts and mention “tips and tricks” to address system challenges citing example of an ADAS serial link implemented using DS90UB953 and DS90UB954: (1) the link between the serializer and deserializer, (2) the link between the serializer and sensor, and (3) the link between the deserializer and Image Signal Processor (ISP).
FPD Link & Automotive Ethernet	System Bring-up Practical Example using the 953 and 954	This course will provide a live demonstration of DS90UB953-Q1 and DS90UB954-Q1 system bring-up. Emphasis will be placed on using Analog LaunchPAD software from TI to validate prototype systems. This session will build on the concepts presented during the “System bring-up methodology for FPD-Link III devices” session by applying them to a representative camera system. This session will provide participants with an understanding of how to use ALP to troubleshoot and diagnose system level issues.
FPD Link & Automotive Ethernet	Automotive Ethernet 100BASE-T1, understanding PMA compliance	Breaking down the PMA (Physical Medium Attachment) standard, understanding each of the PMA tests, what they mean, and how our DP83TC811 PHY addresses the requirements.
FPD Link & Automotive Ethernet	Designing 100BASE-T1 systems meet automotive requirements	Short overview of PMA standard, considerations to design PHY circuit and PCB for PMA compliance, design guidelines for robust EMC performance
FPD Link & Automotive Ethernet	Understanding 100BASE-T1 tests and signaling, and how to measure	Understanding PMA test requirements, how to measure, utilizing Keysight test suites to measure DP83TC811
Signal Chain & Isolation	Op Amp Technology Overview	What is the difference between a CMOS, Bipolar, and JFET amplifier? When should you use one over another? When should you use an amplifier with no input crossover distortion, and what is input crossover distortion? What about Zero-Drift, Chopper, and auto-zero amplifiers? This presentation will help you understand how to quickly help your customer in the selection of amplifiers.
Signal Chain & Isolation	Introduction to Automotive EMI Standards and Designing for Certification at the Board Level	This presentation introduces the various levels of EMI certification for the Automotive market, as well as how to design at the board level to pass. The information will go into light detail of what is expected from Automotive manufacturers around the world in regards to EMI certification, and these standards/specifications will be referenced. Each standard and specification will be tied to a specific automaker, and how each certification is planned for through design. This will lead into the board level design techniques, strategies and practices. A real world example, of an SBC to meet German automotive EMI standards will be investigated and explained, and the progress from first Conducted emissions test, to final conducted emissions test, will show the results. This investigation will also elaborate on why SBCs are just as much of a challenge, if not more, to meet EMI standards compared to switch-mode power supplies alone. The strategies employed will be based on self-studying on layout techniques and EMI reduction strategies. The strategies will also include third-party software and hardware used to analyze boards, how they work, and how they were used to help with the board design in this specific instance. The strategies will be explained in a way that also alludes to using them for other types of devices and boards as well.
Signal Chain & Isolation	Simplify and Optimize Your Design using Logic and Level Shifters	When implementing logic circuits in your design, there is always more than meets the eye. This session will discuss logic and translation devices at a technical level to help you understand the inner workings of these parts. Ways to solve system level digital signal challenges will be discussed to help provide insight into how logic can simplify your design. Topics such as timing, signal integrity, drive strength, power considerations, and special features will be addressed. With more than 10,000 parts to choose from, ideal part selection is critical to optimizing system design.
Signal Chain & Isolation	Isolation Products: Benefits, Applications & Systems Considerations	Isolation products are used in a variety of automotive and industrial applications like EV and HEVs , Factory Automation, Industrial Motor Drives, Grid Infrastructure and more. The isolation needs for each end application is different from the others. This presentation aims at explaining the isolation use and requirements for key end equipments, while highlighting released and roadmap products that are most suited for each equipment sector. We’ll also talk about key system level considerations, such as EMC, and how they impact isolated systems differently from non-isolated systems. Along the way, we’ll briefly revisit key isolation terminologies and standards.
Signal Chain & Isolation	How to Protect Against Automotive Transients (ISO 7637/16750) with Power Switch Solutions	We’ll review the ISO-7637 and ISO-16750 transient requirements and waveforms and how they came to be. Common, historical solutions are compared to newer solutions, including TI roadmaps for future protection devices. In modern automotive applications, the challenges of the power system design has become more difficult to solve. Designs are complicated by requirements like low input voltage during start-stop (cold-crank), voltage surges during load dump, and reverse battery voltage condition. This presentation discusses key automotive requirements, solutions that overcome these challenges, and their benefits.
Power	High-voltage solutions in HEV/EV Part 1: On board chargers and charging stations	An overview of complete high voltage power solutions in on board chargers and charging stations. TI is a one stop shop!

Power	High-voltage solutions in HEV/EV Part 2: DC/DC and traction inverters	An overview of complete high voltage power solutions in DC/DCs and traction inverters. TI is a one stop shop!
Power	EMI and Noise Mitigation for DC/DC Regulators	<p>EMI and Noise Mitigation for DC/DC Regulators -This 2017 FAE Summit topic spotlights an increasingly-significant and challenging topic for high-current, fast-switching DC/DC regulators: electromagnetic interference (EMI). EMI is an increasingly vexing issue in the product design and qualification cycle, and one that customers find large difficulty with.</p> <p>Starting with an understanding of conducted and radiation emissions, measurement techniques for EMI are detailed. In particular, the separation of differential-mode and common-mode emissions is described. Based on this interpretation, the expansive topic of EMI filter design is approached using system modeling and experimental design techniques to achieve a small-size, low-cost filter implementation.</p> <p>A comprehensive illustration of the parasitic elements that affect switching performance and EMI behaviors is then provided. By understanding the contribution of inductive circuit parasitics, suggestions are offered for their minimization to reduce EMI signature at high frequencies. Also, an emphasis on compact, optimized power stage layout is provided that lowers EMI for easier regulatory compliance.</p>
Power	Switch-Mode Power Converter Compensation	Engineers have been designing switch-mode power converters for some time now, but if you are new to the design field or you don't compensate converters all the time, it will require some research to do correctly. This talk will break down the procedure into a step-by-step process that engineers can follow to compensate a power converter. The theory of compensation and why it is needed will be explained.
Power	Dynamic Limitations of Switched Mode Power Supplies	FAE Summit
Motor Drivers & Sensors	Designing with Isolated Gate Drivers in Automotive Applications	In this session, we will focus on design considerations for designing isolated gate drivers in automotive applications like air conditioning, traction inverters and on-board chargers. We will explain the key features when choosing isolation technologies and highlight the advantages of TI's capacitive isolation including electrical, isolation and lifetime performance. We will also share performance data from short circuit testing, soft turn-off and other essential protection features along with design considerations for powering isolated gate drivers. TI will also share details on its future isolated gate drive developments in the automotive space
Motor Drivers & Sensors	Relay Replacement for Brushed DC Motor Drive in Automotive Applications	Many modern automotive applications use relays for driving different loads for power distribution. Such applications include power outlets, AC clutch, seat heaters, sunroofs, rear windshield defrost, and HVAC blowers. Some of these applications use brushed DC (BDC) motors to drive a load. This presentation will address how Texas Instrument's automotive gate driver devices, in addition to MOSFETs, can be used to replace the mechanical relays in applications with a BDC motor.
Motor Drivers & Sensors	High Temperature Grade0 Motor Drive Applications	Transmission and Engine applications require IC components that can withstand harsh engine temperature environments. Adoption of motors in transmission applications like dual-clutch and shift-by-wire and in engine applications like cam phasers and motor actuated engine valves is increasing. In transmission applications, there is also a need for the systems to achieve a desired level of functional safety. In this session we will introduce some of the considerations and important specifications in choosing IC components for Grade0 applications along with details on the IC design considerations when designing for high temperature operation. We will also introduce the latest motor drivers from TI that are designed and qualified for Grade0 applications.
Motor Drivers & Sensors	Benefits of Smart Gate Driver Architecture for Driving External FETs in Motor Drive Applications	Control, efficiency, protection ... these are all terms you hear regarding new integrated circuits, but what do they really mean? TI's motor gate drivers for brushed DC, stepper and brushless DC motor applications are using a new architecture called smart gate drive which is a combination of protection features and gate-drive configurability that minimize external components and maximize performance.
Motor Drivers & Sensors	Fully integrated 180 sinusoidal control motor driver for motors less than 20W output power	This presentation discusses the pros and cons of control scheme, sensorless, sensed, 180 degree and trapezoidal and highlight advantage of 180 sensorless drives in the target EEs for DRV10983Q. We will also demo/go through TI-Designs, seat blower.
Embedded Processing & Wireless Connectivity	Introduction to mmWave Radar	an overview of Radar and then also maybe extending it a bit to talk about current best practices or techniques for different uses cases (LRR, MRR, SRR, etc.)

Embedded Processing & Wireless Connectivity	Reconfigurable Digital Cluster Solution Based on TI Jacinto 6 SoC family	<p>Automotive instruments panels are a critical part of the ongoing digital cockpit revolution in car. Automotive industry is in the midst of an overhaul to upgrade instrument cluster from analog to hybrid and digital reconfigurable solutions which will enable more complex content, bigger display, new ergonomics including the addition of augmented reality HUD to display in the center field of vision relevant information and safety contents according to current driving situation</p> <p>However, moving from analog to digital instrument cluster introduces a number of unique challenges. Digital cluster solutions need to satisfy several critical system requirements:</p> <ol style="list-style-type: none">1. Feature rich 3-D graphics rendering with 60fps needles rendering and high resolution display support.2. ASIL-B safety support for telltales3. Fast system boot and early cluster rendering for less than 2s.4. System BOM optimizations5. Integrate features such as driver monitoring, robust rear-view camera. <p>As digital cluster requirements in terms of graphics content and display resolution increases, MCU-based solutions cannot satisfy system requirements and an powerful application processor will be needed.</p> <p>TI Jacinto 6 SoC family offers a scalable solution from entry to high-end cluster while addressing above challenges. This presentation will overview digital cluster system and software solution based Jacinto 6 SoCs and how Jacinto SoC architecture addresses graphics, safety, early boot requirements of cluster system to provide optimized system solution. In addition, the presentation will cover how “Jacinto 6” heterogeneous architecture enables integration of additional features into digital cluster system including driver monitoring system, robust rear-view-camera, and content from infotainment head-unit. Finally, we will discuss and demonstrate a number digital cluster proof of concepts running on Jacinto 6 processor family and share performance metrics.</p>
Embedded Processing & Wireless Connectivity	Fusion for ADAS	This session will present the two types of data fusion used for mainstream ADAS systems to increase safety and reliability. Both raw and object fusion will be covered and detailed examples will be provided to further facilitate understanding. Various sensor modalities will be discussed with a primary focus on camera and radar fusion for vision systems. Attention will result in a much better understanding of fusion within ADAS end equipment, relative differences of fusion types, sensor connectivity options, and what TI offers for these types of applications.
Embedded Processing & Wireless Connectivity	AI in Automotive: Practical Deep Learning	Deep learning is proving to be a key component on the road from ADAS to autonomous driving. This session will give an overview of practical implementations and uses of deep learning in future ADAS applications. Topics discussed will include CNN, core partitioning, hardware acceleration advantages, deep learning software/tools, and more. Attendees will also get to hear a success story from a key third party solution provider. This session will provide valuable understanding of how automotive innovators can integrate deep learning into their solutions to create smarter and safer vehicles on the road to autonomous driving.
Embedded Processing & Wireless Connectivity	Automotive Radar System Topologies with TI mmWave sensors	<p>Recently, there has been tremendous growth in the use of radar technology for various automotive applications, such as Blind Spot Detect (BSD), Front/Rear Cross Traffic Alert (F/RCTA), Autonomous Emergency Braking (AEB), and Adaptive Cruise Control (ACC). In addition, the industry is shifting toward the use of the 77GHz frequency band due to emerging regulatory requirements, as well as smaller size, larger bandwidth availability and performance advantages.</p> <p>Future sensors trend shows divergent paths- ultra high performance sensors for tackling dense urban environments, and ultra-low power proximity sensors for diverse applications in, around, and under the vehicle. To address this trend, TI has developed a mmWave sensor portfolio of three devices with different levels of integration, from a radar front-end [AWR1243], to single-chip radar [AWR1443 and AWR1642]. In the presentation, we will discuss TI’s portfolio of mmWave sensors, scalability across ADAS applications, and value proposition of each device. We will review different system topologies for ADAS applications and their readiness for successful deployment.</p>
Automotive Systems	New Reference Designs for Body Electronics, Kick-to-Open and Ripple-Count Position	In this session we will present the designs and results for two innovative technologies; hands-free kick-to-open sensing and sensorless position sensing using motor ripple counting. Kick-to-open is a growing feature for trunks, lift-gates, and sliding doors; we will compare capacitive sensing with ultrasonic sensing. Position sensing using the ripple of the motor current provides an alternative to Hall Effect or encoder feedback, and can be used wherever a DC motor drives a mechanism. For both designs, system-level requirements, design details, and test results will be provided.
Automotive Systems	Automotive Telematics Deep Dive: Market Overview, System Needs, and Typical System diagrams	

Automotive Systems	SEM - HEV/PT 48V DC/DC analog versus digital	
Automotive Systems	Becoming a Jedi Master - Gesture Control Using 3D Time-of-Flight Sensor for Industrial and Automotive	Controlling environment with a simple wave of hand has long been portrayed in science-fictions, but with 3D time-of-flight sensor, robust gesture control is now a reality, finding applications in industrial, automotive and gaming. In this training you will learn how 3D time-of-flight sensor works and how it is applied in various gesture applications, and see a video demo of gesture control using OPT8320 time-of-flight sensor.
Automotive Systems	Integrated device for switches status detection in automotive applications	This training will: discuss the system-level challenges in today’s Body Control Module (BCM) design, introduce an inovative new device to address these challenges, and highlight new features and functionality that the MSDI device can provide.

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