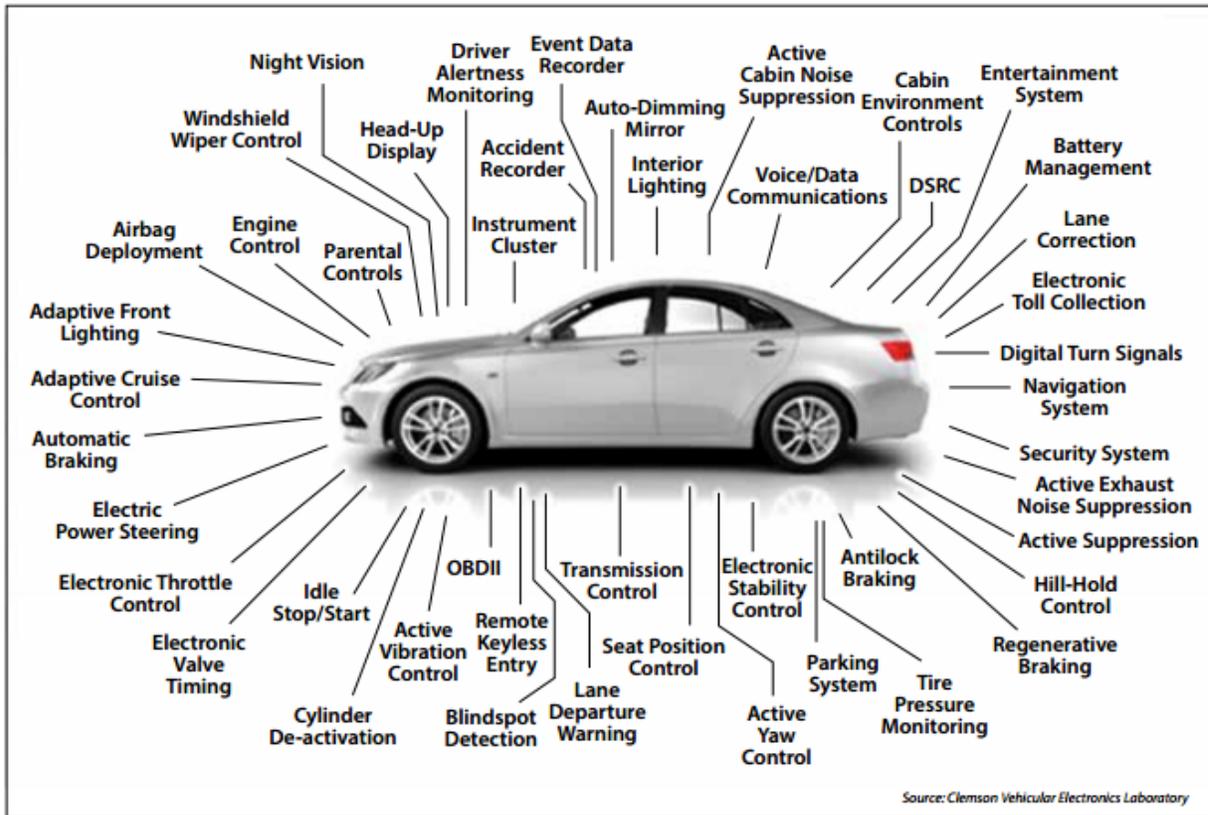


Automotive Packaging



Autonomous driving, Clean & Green and connectivity & entertainment driving the growth of electronics contents in the **automotive** industry. Many of the new functions requires new unique packaging requirements. The new packaging needs extended hours at high temperature operation thus requires more robust materials, assembly processes and higher reliability compare to consumer products. Deeper temperature cycles in use case requires higher board-level reliability. EPTC 2016 have line up a keynote and an invited speakers to present on the automotive packaging. Full details are in the subsequent pages.

KEYNOTE



Achieving Automotive Quality Excellence: Zero Defect Performance - a Foundry's Perspective

JAGADISH C.V.

SYSTEMS ON SILICON MANUFACTURING COMPANY (SSMC)

The automotive industry is well known for its high demand on safety, quality and reliability. Furthermore, the electronic content of an automotive vehicle has been increasing steadily in the last two decades to achieve higher system integration of new functions and capabilities. Hence the semiconductor chip, which is at the heart of its electronic system, needs to be extremely low in defect (or zero defect) and high in reliability. Automotive Semiconductor Manufacturers strive to meet the challenge of developing high quality fabrication processes to support the expansion of automotive ICs of future markets.

This keynote presentation will outline a systematic approach to implementing automotive readiness in critical fabrication processes that help to accelerate the supply chain towards automotive quality excellence. A 360 degree foundry perspective in achieving the automotive quality goal will be presented. In addition, top must-do actions for going beyond zero defect performance, moving from ppm to ppb level, meeting today and future automotive market, will be shared.

Biography: Jagadish C.V.

Mr. Jagadish C.V. was appointed CEO of Systems on Silicon Manufacturing Company (SSMC), a joint venture of TSMC and NXP in December 2006. Jagadish has vast experience in the business development arena and semiconductor industry. He was a Director with FEI Company of USA before embarking his career with SSMC. Prior to his appointment as CEO, Jagadish served as Vice President, Business Operations of SSMC. He is currently a member of the NXP's operations management team. Jagadish also serves as the Deputy Chairman of the Singapore National Quality Award Governing Council and Power Quality Advisory Panel (PQAP) of Singapore since 2007. He is also the Vice Chairman of SEMI, Singapore Regional Advisory Board (RAB) since 2010; and Deputy Chairman of the PUB Water Network Panel since 2015. He is also a member of Singapore Semiconductor Industry Association (SSIA) Board of Advisors since 2011. He holds a first class honors bachelor's degree in Electronics & Communication from the National Institute of Engineering Mysore, India; and completed the International Executive Program by INSEAD Management School, France.

INVITED PRESENTATION



Package Miniaturization & Integration for Future Automotive Applications

Andreas Fischer

ASIC Packaging Development

Robert Bosch GmbH

Technical Session: 2nd December 2016, 8:30hrs

Venue : MR333

Abstract

Advanced driver assistance systems, automated driving features, and comprehensive vehicle connectivity are key selling features for current and future automobiles. The race of car manufacturers towards smart mobility is both, a major challenge and an opportunity for the automotive electronics industry.

Smart mobility requires highly integrated solutions with technology and packaging features and performance known from consumer electronics, but designed and approved for safety-relevant automotive applications under harsh conditions. Heterogeneously integrated packaging solutions will significantly increase technical complexity. At the same time automotive quality standards and lifetime requirements for the entire system have to be fulfilled, knowing that trends in automotive electronics will push the limits for certain applications to even higher levels than today.

Key capabilities to be successful are a profound knowledge of technology features, the related failure modes, and quantitative characterization of materials and interfaces. Those will be the basis for improved simulation-based engineering already in early design phases. Examples for that methodology are shown and an outlook towards possible improvements will be given.

Biography: Andreas Fischer

Andreas Fischer has studied physics at the University of Ulm, Germany, focusing on solid state and polymer physics. After his master thesis on nuclear magnetic resonance and polymer dynamics he joined Bosch in 1990, starting as a process development engineer for hybrid circuits and sensors. Then he moved to assembly & packaging as a project manager for packaging development for ASICs. Currently he is senior manager for ASIC packaging development.



Requirement for Advanced-Packaging Technology of Power Semiconductor Module in High Power Density Converter for More Electric Transportation

Dr. Rejeki Simanjorang

Advanced Technology Center, Rolls-Royce Singapore

Technical Session: 2nd December 2016, 13:40hrs

Venue : MR336

A recent trend in more electric technology for transportation system, such as in automotive, traction, and even in aircraft has made power electronics technology become indispensable. In aircraft industry, more electric technology will replace mechanical, hydraulic, and pneumatic system with electrical system that is more efficient, reliable, and environmentally friendly. This is commonly known as More Electric Aircraft (MEA) technology. As a result, there is increasing electric power demand in the aircraft. To satisfy such demand, power electronics converter that converts and control electrical power is the key enabling technology. For this weight concerned application, the main performance index of the power converters is their power density which determines how heavy and compact the converters are.

To realize a high power density converter, the most straight-forward way will be by increasing the switching frequency of the converter. By doing so, the size of passive components (capacitor and inductor) will reduce. Along with that, thermal management of the converter should be taken care of to ensure the device operates within permissible temperature range. High switching frequency of converter means driving the power semiconductor module (consists of power semiconductor devices in a package) at high frequency. This can only be achieved by high speed switching techniques to minimize the switching losses in the power module. To enable high speed switching there are two important factors, i.e. the power devices and the packaging around it.

In recent years, wide band gap power devices such as Silicon Carbide and Gallium Nitride have entered the commercial market. These power devices have the capability for high speed switching. Unfortunately, the currently applied packaging technology does not allow full utilization of these wide band gap devices' capability.

This presentation will elaborate the electrical performances of power module required for high speed switching in high power density converter. Parasitic impedance in power module that originates from devices and packaging layout will be discussed. Their effects to the power converters such as overshoot voltage, EMI issues, and switching loss will be elaborated. Finally, advanced packaging technique to minimize these parasitic impedances will be presented.

Biography: Rejeki Simanjorang

Rejeki Simanjorang was born in Tanah Karo, Indonesia. He received his B.Sc., M.Eng. and Dr.Eng. degrees in Electrical Engineering from University of Sumatera Utara (Indonesia, 1998), Bandung Institute of Technology (Indonesia, 2002)

and Osaka University (Japan, 2008) respectively. He was a researcher in National Institute of Advanced Industrial Science and Technology (AIST) and R&D partnership for Future Power Electronic Technology (FUPET), Japan from 2008 to 2013. Currently, he is a technologist in Rolls-Royce Singapore and leading some collaboration research projects between Rolls-Royce Singapore and external partners. His main research focuses are application of power electronic converter in electrical system, design of high power density converter, and Electrical Health Monitoring (EHM) system for power electronics.