

Title: The automotive transformation – cost, time-to-market, reliability and security driven design optimization from application down to semiconductor technology

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Abstract:

The car becomes the ultimate mobile device, a robot being guided by an IoT environment and by integrating step-by-step different levels of artificial intelligence. As being stated as a long term vision/expectation one can infer that the corresponding and challenging implementation will come from a global electronic vendor rather from a vehicle manufacturer of the old days – a transformation is required. This tutorial will guide the participant through the changing automotive industry with both – the eyes of a semiconductor vendor as well its end customer. Starting with the automotive total quality management process, a detailed explanation of past and new approaches will be given not only from a formal, but rather from a technical level. Topics discussed will include the various definitions and differences between automotive and non-automotive semiconductor components w.r.t. pure environmental as well as functional perspectives. Corresponding dependencies to ECU design, vehicle design and services are discussed with context to ADAS, connected car, autonomous driving, IoT, semiconductor market dynamics and supply chain configurations. Requirements and solution proposals for new automotive semiconductor classes will be given and explained. A technology node dependent parallel application of a zero defect strategy with failure tolerant design, resilient design and replacement electronics (compatibility design) approaches will also be discussed. Semiconductor reliability in form of a DfX approach is the key enabler for electronic innovations of the automotive industry. However, beside defect caused fails, new technology inherent mechanisms under automotive loads pop up to limit automotive applicability.

Biography

Andreas Aal leads the semiconductor strategy and reliability assurance activities within the electric-/electronic development department at Volkswagen, Germany, which he joined in 2011. His activities concentrate on technology capability enhancement of nodes down to 12 nm as well as optimization of power electronics for automotive applications. He leads two semiconductor related European projects and is a strong representative of the through-the-supply-chain-joint-development approach.

Mr. Aal has been working within the semiconductor industry since 1998 holding different positions from engineering to management working on production monitoring, process and technology development, qualification, and failure analysis. He was involved in device optimization, the development of test structure design as well as new combined stress/measurement and data analysis methodologies for qualification and fWLR monitoring.

Andreas (certified reliability professional) published and co-authored various papers, has given invited talks, served as reviewer for different Journals and has served in the technical and management committee for IEEE IIRW. He is a member of the IEEE Electron Devices, CPMT, Nuclear and Plasma Sciences, Reliability and Solid-State Circuits Societies and also a frequent participant / contributor of the JEDEC subcommittee 14.2. Since 2007 he is chair of the German ITG group 8.5.6 (VDE) on (f) WLR, reliability simulations and qualification.

