JOHN GLASER

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BIO

John Glaser received his BSEE from the University of Illinois in Urbana-Champaign and went to Motorola to design RF power amplifiers for mobile and fleet radio systems, after which he earned an MSEE and Ph.D. from the University of Arizona. He spent two years at Hughes Missile Systems working on power electronics for TWT amplifiers, after which he joined General Electric Global Research. From 1998 to 2014, he worked on power electronics for consumer, commercial, medical, industrial, aerospace and wide-bandgap semiconductor applications, for power levels ranging from 1 W to 100 kW and frequencies ranging from 50 Hz to > 100 MHz. In 2014, he joined Efficient Power Conversion (EPC) as Director of Applications, where he develops applications, circuits, and methods to maximize the benefit of GaN and help others do the same. He has published more than 35 papers and has been granted 33 US patents and 12 non-US patents, with several more pending, and is an IEEE Senior Member.

ABSTRACT:

How to Be Mobile with GaN Power Technology

This tutorial will cover the use of GaN power device technology for a wide variety of mobility applications, with a focus on applications in the sub-200 V space. There will be a brief review of the present state of the art, followed by a review of design guidelines for using GaN. Since many mobility applications emphasize high power density, thermal management methods for chip-scale power devices will be covered and suggested approaches for low-cost thermal management will be given, including expected performance. Since reliability is of utmost importance in mobility applications, there will be a review of reliability work on chip-scale devices. Since GaN is a newer technology, it is not adequate to rely solely on the metrics developed for Si devices. Thus, the primary focus will be on test-to-fail methodology and root cause failure analysis. A sampling of application use cases will be presented, including 48 V to 12 V bidirectional power conversion at the kW level, 48 V 3-phase electric machine drives, and exterior/interior automotive lidar. The closing will discuss the future of GaN power technology and the benefits of monolithic power ICs made possible with GaN.

Short outline:

1. Brief review of GaN
2. Design guidelines
3. Thermal management of chip-scale packaged GaN power devices
4. GaN reliability and test-to-fail methodology
5. GaN Applications
    a. 48V power for mobility
    b. Benefits of GaN in motor drives
    c. Lidar for interior and exterior applications
6. The Future – Monolithic GaN Power ICs