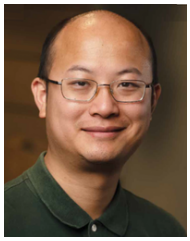
GaN Switching Devices for High-Efficiency Power Electronics Applications

SPEAKER



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About The Speaker:
Zhikai Tang is the GaN Technology Lead Engineer and Senior Member Technical Staff in the Kilby Labs at Texas Instruments (TI) focusing on GaN power technology research and development. Prior to TI, he was leading the next-generation power GaN product development as the Director, Device Engineering and Member of the Technical Staff at Efficient Power Conversion (EPC) from 2014 to 2022. In the technical community, Dr. Tang is currently serving on the technical program committees of IEEE IEDM and WiPDA, and is also a JEDEC JC-70 committee member and co-chair on Standards for GaN Device Test & Characterization Methods. He is an editor of multiple technical journals including IEEE Transactions on Electron Devices (T-ED), Japanese Journal of Applied Physics (JJAP) and Applied Physics Express (APEX). He is an IEEE Senior Member, EDS Compound Semiconductor Devices and Circuits Committee Member, and Member of the Japan Society of Applied Physics (JSAP). Dr. Tang has co-authored over 50 technical publications, more than 20 US patents and applications, and 1 book chapter in the field of GaN power device and IC technologies. He received the B.S. degree in Microelectronics from the University of Electronic Science and Technology of China and the Ph.D. degree in Electronic and Computer Engineering from the Hong Kong University of Science and Technology in 2010 and 2014, respectively.

ABSTRACT

Since the first demonstration of gallium nitride high electron mobility transistor (GaN HEMT) in a research lab in 1993, the GaN device field has witnessed tremendous performance and reliability improvement through enhanced device physics understanding and technology innovation for the past three decades. Today the GaN power switching device technology has become mature and competitive to be adopted in a multitude of critical power electronics applications in commercial, industrial, and automotive sectors that would have a great impact to a greener and sustainable future. In this short course, we will take a close look at what has enabled GaN as a major commercialized power device technology in mass production today with remarkably rapid market penetration and growth. This includes the excellent wide bandgap material properties of GaN, cost-effective substrates, unique device physics, novel device architectures and fab process techniques that are designed and developed for ubiquitous power management applications where simultaneous realization of high energy efficiency and high power density is indispensable. Key GaN-specific reliability aspects at both device and application levels focused upon during device technology development will also be presented and discussed.