



Next-generation GaN Isolators for High Frequency, High Efficiency Power Conversion

PSMA Industry Session, Isolation Barrier Technologies for Power Electronics

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Abstract

- Half- and full-bridge circuits are the foundations for most power converters / inverters. One critical factor is the ability to control the high-side switch(es) from a ground-referenced controller, i.e. to cross an isolation gap and ‘level-shift’ the control signal. As converters have been optimized for efficiency, size and cost, switching frequencies have increased and the limitations of old techniques have been exposed.
- This paper reviews the progression of isolator / level-shifter techniques and introduces the next-generation, high performance HV monolithic GaN Power IC solutions for high density power applications.
- This is a placeholder
- Final presentation available after March 27th from <http://www.navitassemi.com/white-papers-articles/>

Target Applications / Audience / Usefulness

- 1. Applications:
 - AC-DC chargers / adapters
 - Cloud / Telecom AC-DC SMPS
 - Motor drive
 - Inverters
- 2. Audience:
 - System architects
 - Design engineers
 - Academics
- 3. Usefulness:
 - Review application needs for isolation / level-shifting
 - Review solution performance trade-offs
 - Introduce new high-frequency solutions
 - Identify new solutions to old problems

Content:

- 1. Progression in isolation techniques
 - Pulse transformers
 - Opto-couplers
 - Si LV monolithic level-shift + FET
 - Si HV level-shift
 - CMOS
 - CMOS and air core
 - GaN Power IC
- 2. Comparative performance (vs. frequency, power):
 - Isolation levels (functional, galvanic)
 - Propagation delay / frequency limits (vs. temp)
 - Efficiency (level-shift, drivers)
 - System complexity, component count, power density
 - EMI considerations (switching waveforms, dV/dt , etc.)
- 3. Example system applications