Technical Article

GaN Drivers – Switching Faster than Today's Technology

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It feels like we are living in a high-speed world, full of technology with a constantly growing demand for higher and faster performance.

Power engineers are at the forefront of this battle, developing solutions that are smaller, faster and more efficient than ever before. In applications like light detection and ranging (LIDAR), older-generation solutions only operated in hundreds of kilohertz. Newer platforms requiring longer ranges and increased accuracy need to be 10 times faster, with laser pulses below 5ns.

To achieve nontraditional performance, you need nontraditional technology. Only gallium nitride (GaN) can provide speed that fast with optimal performance. But to really harness the power of GaN, you need a driver capable of handling those frequency levels.

A very high switching frequency is necessary for next-generation telecom infrastructures like 5G envelope tracking, a key power method that ensures that the power amplifier is operating at peak efficiency during each point of transmission. Figure 1 shows losses from traditional supply-voltage methods compared to GaN-enabled envelope-tracking methods.

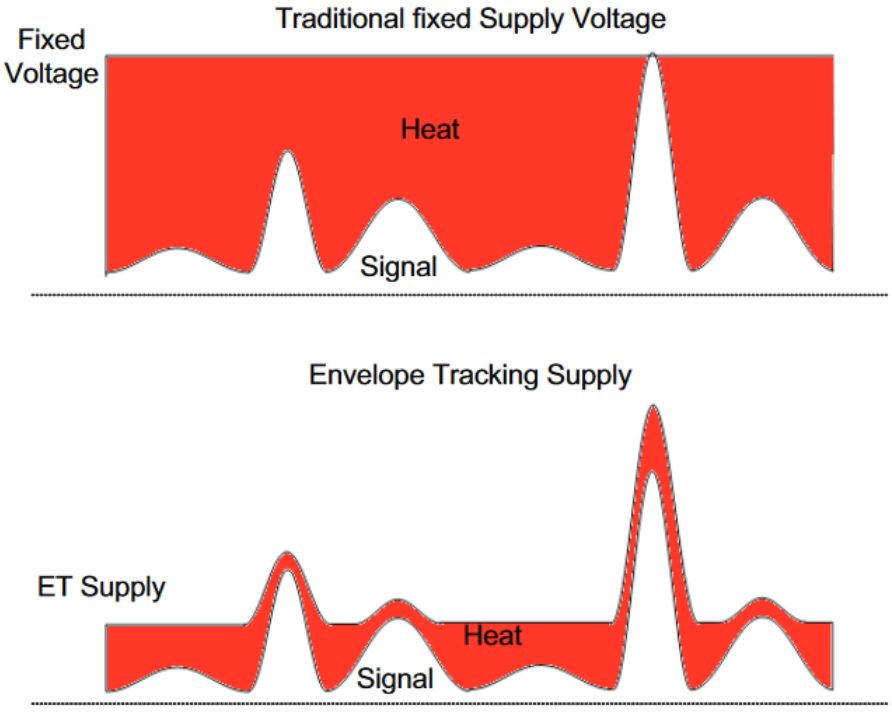

Figure 1. Traditional Supply-voltage Methods

TI's Multi-Megahertz GaN Power Stage Design for High Speed DC/DC Converters, featuring the LMG1210 half-bridge GaN driver, enables 50MHz operation and optimized efficiency capability through adjustable dead-time control for the highest efficiency in 5G communication.

The driver's ability to control dead time is a key design parameter in high-frequency converters, and is especially important as the frequency of operation increases. The device's integrated dead-time control function allows you to fine-tune your design for best efficiency.

LIDAR is giving eyes to our technology, for detection, monitoring and mapping applications. But engineers need the fastest possible laser drivers to achieve high-resolution in LIDAR vision. The Nanosecond Laser Drive Reference Design for High Resolution LIDAR features the LMG1020 low-side driver; its 60MHz/ns performance provides sub-nanosecond pulses for the best performance in LIDAR laser applications. The increased power density in the industry's smallest GaN driver enables extended range for industrial LIDAR vision, while short pulses comply with infrared (IR) laser eye safety standards.

5G envelope tracking, LIDAR, along with others, require excellent high-speed performance only enabled by GaN. TI's GaN portfolio of products, including GaN drivers, gives you the speed to keep up with tomorrow's technology.

See also TI's Break the Speed Barrier with GaN Drivers video for more information.

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