Gate Driver for Enhancement Mode GaN Power FETs

100V Half-Bridge Driver Enables Greater Efficiency, Power Density, and Simplicity

Texas Instruments

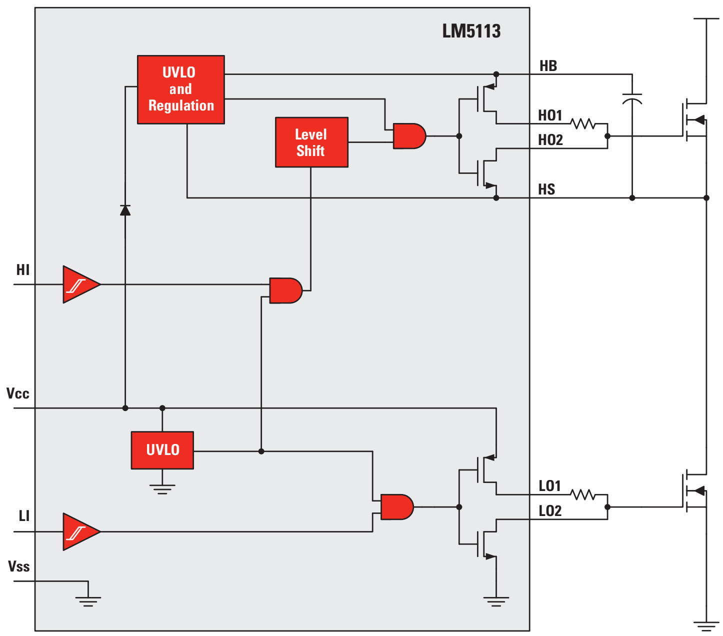
Product Bulletin

Gallium Nitride Power FETs Deliver New Levels of Power Density

Enhancement mode Gallium Nitride (GaN) power FETs can provide significant power density benefits over silicon MOSFETs in power converters. They have a much lower figure of merit (FOM) due to lower Rdson and lower Qg. With greater efficiencies, faster switching frequencies, and an ultra-small package footprint, GaN FETs enable higher density power converters. However, realizing these benefits does present a new set of challenges. Large source-drain voltages and the stringent gate-source voltage drive requirements of GaN power FETs pose new challenges related to limiting the high-side FET drive level to less than 6V, as well as preventing high dV/dt transients from causing erratic switching behavior.

LM5113 Brings Simplicity to GaN

Texas Instruments (TI) solves the challenges of driving GaN power FETs with LM5113—the industry's first 100V integrated half-bridge driver for GaN power FETs. Compared to discrete implementations, the LM5113 provides significant PCB area savings to achieve industry-best power density and efficiency while simplifying the task of driving GaN FETs reliably.

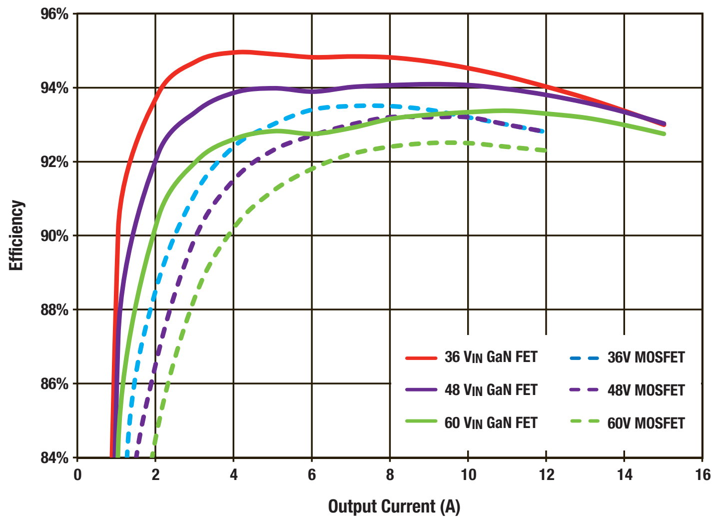


LM5113 block diagram.

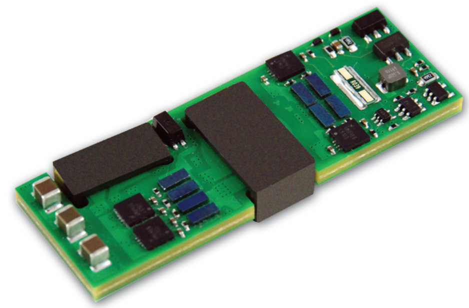
Key Features

- Independent high and low TTL logic inputs
- 1.2A / 5A peak source/sink current
- High-side floating bias voltage rail operates up to 100V
- Internal bootstrap supply voltage clamping
- Split outputs for adjustable turn-on/turn-off strength
- 0.5Ω / 2Ω pull-down/pull-up resistance
- Fast propagation times—30 ns typical

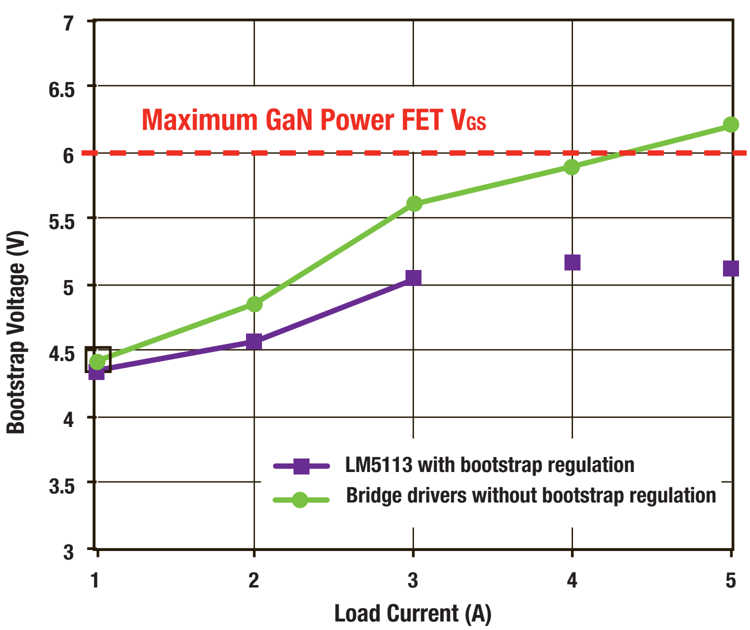
The LM5113 uses proprietary technology to regulate the high-side gate voltage at approximately 5.25V to optimally drive GaN power FETs without exceeding the maximum gate-source voltage rating of 6V. The bridge driver also features independent sink and source outputs for flexibility in the turn-on strength with respect to the turn-off strength. The LM5113 has a low impedance pull down path of 0.5Ω to prevent undesired dV/dt turn-on and provides a fast turn-off path of the low threshold voltage GaN power FET.



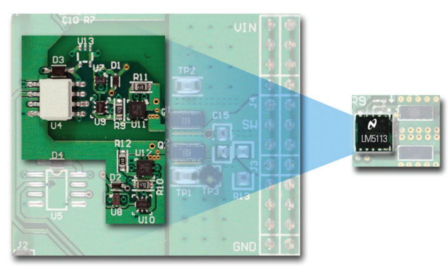
GaN FET efficiency vs traditional MOSFET. Input 36 to 75V; regulated output 12V; switching frequency at 333 KHz GaN FET, 250 KHz MOSFET.



1/8 power brick featuring the EPC2001 eGaN FET and LM5113 GaN FET driver.



LM5113 bootstrap voltage regulation, synchronous buck converter evaluation board. input 48V; output 10V; switching frequency at 800 KHz.



Discrete driver solution and integrated LM5113 driver. The LM5113 delivers tremendous efficiency and PCB area savings compared to discrete implementations.

Visit www.ti.com/lm5113 for more information.

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