

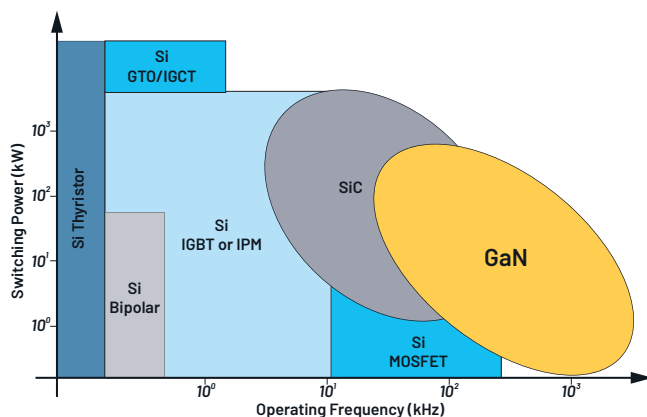
GaN Power Solutions

Power You Can Trust

Robust System Performance with Analog Devices' GaN Power Solutions

The superior switching performance of gallium nitride (GaN) FETs enables higher power density for space constrained applications. Analog Devices' GaN power solutions provide reliable control, design flexibility, and robust system performance for wide-band gap GaN HEMTs (high electron mobility transistor) in applications within industrial motor control, data center power, communication, EV power train, and renewable energy.

Explore how Analog Devices' GaN power solutions simplify the design process and enable energy-efficient performance.



Designing with GaN FETs Challenges

- Advanced Gate Control compared to Si MOSFETs
- Ensuring robust and reliable system operation
- Sensitive printed circuit board layout

Benefits

- Lower switching losses and increased efficiency
- Simpler system design for power conversion
- Miniaturization of the power solution

analog.com/GaNPower



GaN Maximizes Efficiency for DC-to-DC Power Conversion

Smaller Footprint

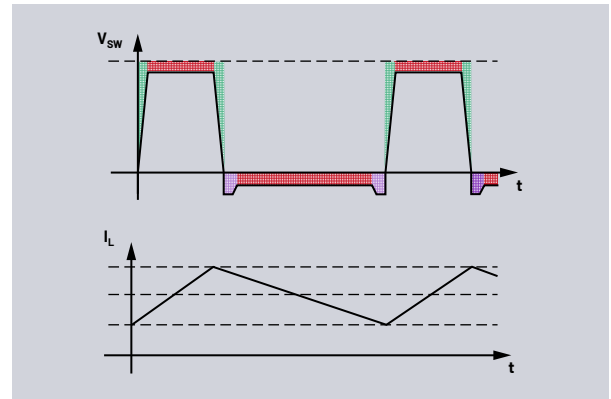
- Low R_{ON} GaN FET available in a smaller footprint compared to an equivalent silicon solution

Minimize Switching Loss

- GaN FET have significantly lower total gate charge than comparable Si MOSFET
- Strong pull-up and pull-down current for the gate driver

Minimize Dead Times Losses

- GaN FET: higher power loss when the GaN FET has reverse current flow and the gate driver is not driving the gate
- ADI gate drivers and controllers offer the flexibility to minimize dead time



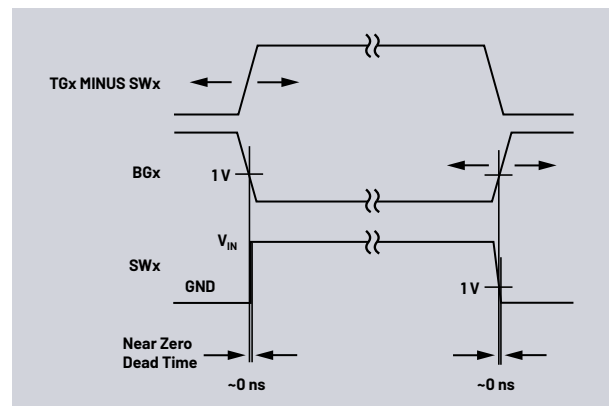
GaN Controller Decreases Dead Time to Near-Zero

Smart Dead Time Control

- When the BG edge achieves approximately 1 V (rising or falling), the SW activates the TG
- Reduces dead time to near-zero to lower power loss while both FETs are in the off state
- Increases overall efficiency and maximizes GaN performance

Acronyms

- TG = Top Gate
- BG = Bottom Gate
- SW = Switch Node
- GND = Ground



LTspice® Simulation for GaN Power Solutions

High Performance Tool for the Design and Optimization of Analog and Power Circuits

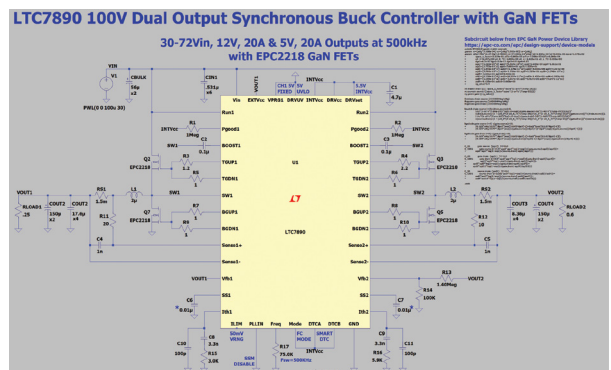
- Schematic capture—probe nodes of interest
- Waveform viewer—AC and noise analysis
- Example circuits—models ready to run

LTspice Simulation

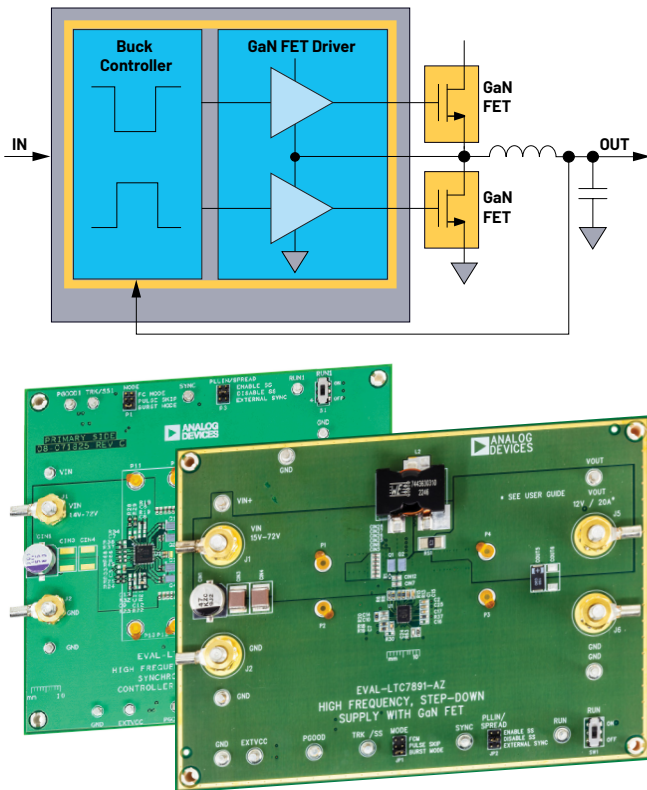
Get the Software—[LTspice](#)



Chat with Other Engineers—[Visit the LTspice Forum in EngineerZone®](#)



GaN FET Step-Down Controllers



Features

Robust

- Precise gate drive voltage optimizes performance and protects the GaN FET
- High switching frequency up to 3 MHz

Smart

- Smart integrated bootstrap switch
- Smart near-zero dead time increases efficiency and maximizes GaN performance

Control

- Split gate drive for pull-up and pull-down
- Dead time control adaptive or with a resistor



LTC7890

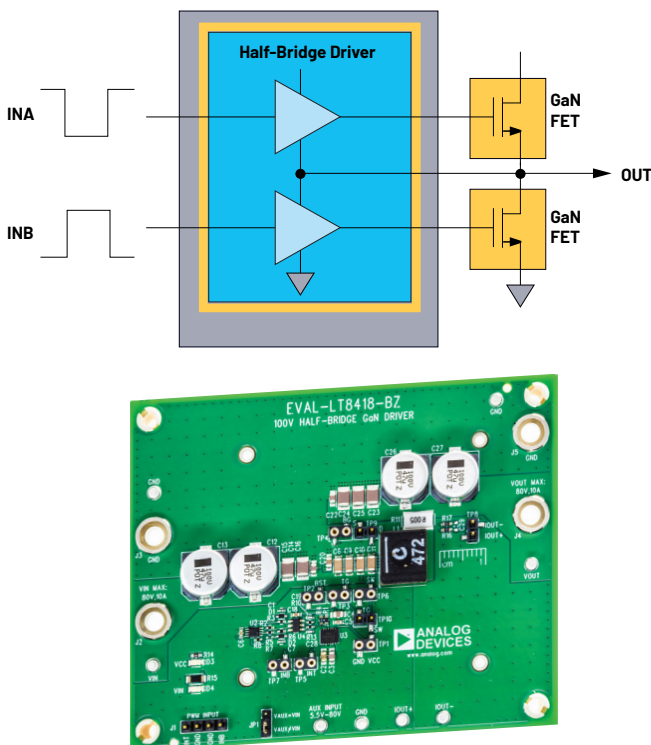
Low I_O , Dual, 2-Phase Synchronous Step-Down Controller for GaN FETs



LTC7891

100 V, Low I_O , Synchronous Step-Down Controller for GaN FETs

GaN Gate Drivers



Features

Flexible

- Split gate drivers for adjustable turn-on/off behavior
- 4 A peak source, 8 A peak sink current capability

Control

- Low propagation delay: 10 ns typical
- Tight propagation delay matching: 1.5 ns typical
- High dv/dt immunity: up to 50 V/ns

Robust

- Smart integrated bootstrap switch
- Undervoltage and overvoltage lockout



LT8418

100 V Half-Bridge GaN Driver with Smart Integrated Bootstrap Switch

GaN Technology Performance



Industrial Automation

- Reduced solution size for compact, high power systems
- Increased switching frequency for higher bandwidth and more precise motor control
- High efficiency for lower power consumption in battery back-up systems



Data Center

- Reduced system power lowers the power needed for cooling
- Better overall operating efficiency
- Increase in power density frees up physical space



Automotive

- Lightweight and flexible battery designs for longer drive distance
- Efficiency improves charging performance
- Optimized energy usage improves the management of vehicle power



Communication

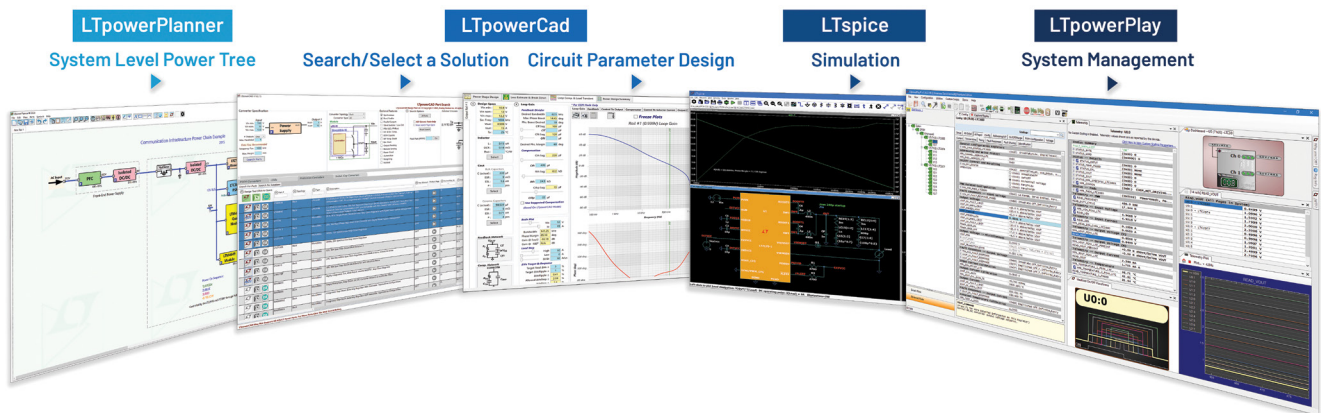
- Reliability for high capacity and high speed data transmissions
- Supports higher voltages without compromising performance
- Efficiency supports expansion of advanced communication infrastructure



Renewable Energy

- Durable performance supports long lifetimes in energy storage systems
- Ensures stable, high quality power to and from the grid
- Efficient conversion of DC electricity advances energy production

Power Design Tools



Start Your GaN Power Solution with Analog Devices

Visit analog.com/GaNPower



analog.com

For regional headquarters, sales, and distributors or to contact customer service and technical support, visit analog.com/contact.

©2024 Analog Devices, Inc. All rights reserved. Trademarks and registered trademarks are the property of their respective owners.