New Product Update

Increase efficiency and power density with TI's low-power GaN portfolio

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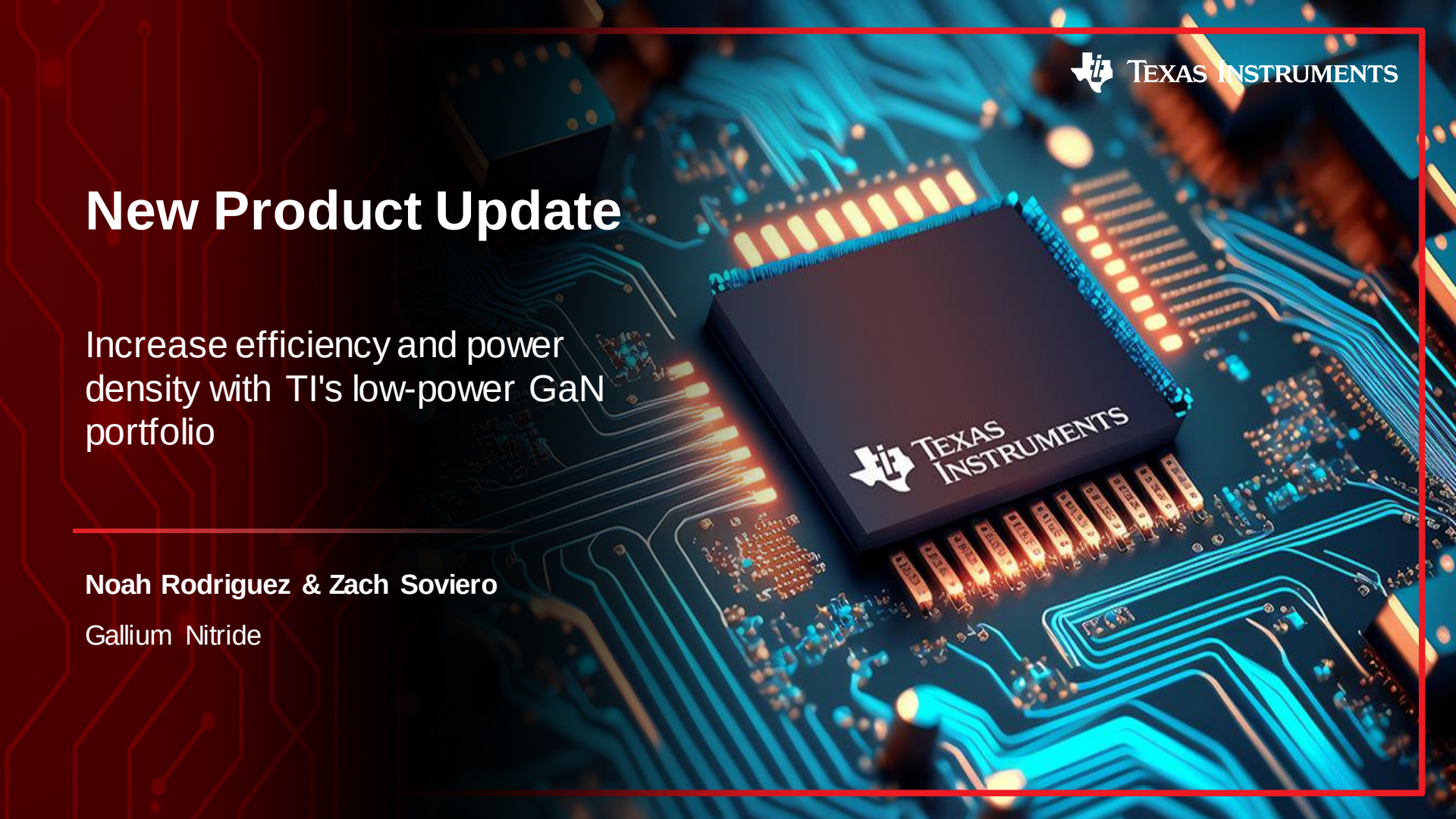
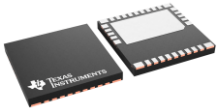
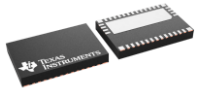
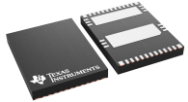
Gallium Nitride



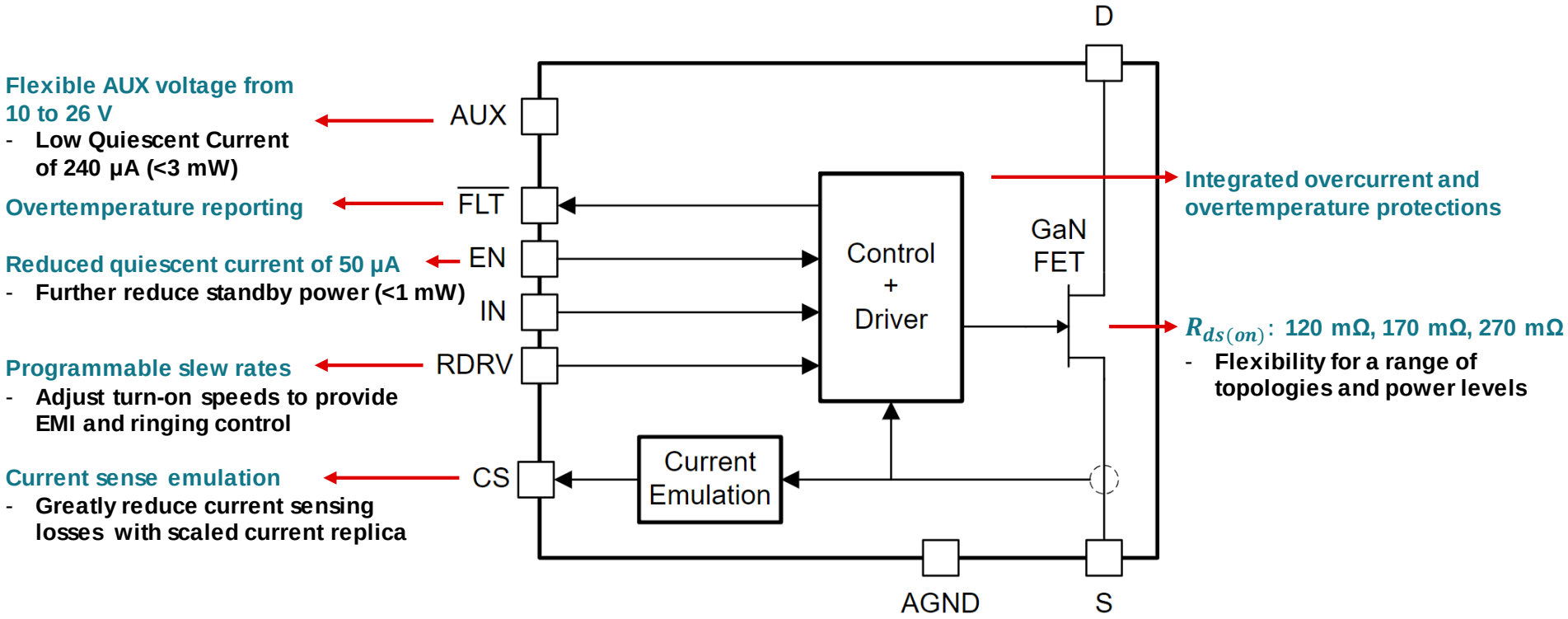
Agenda

- Low-power portfolio overview
- LMG36xx product overview
- Benefits of integrated features
- Design examples

TI GaN low-power portfolio

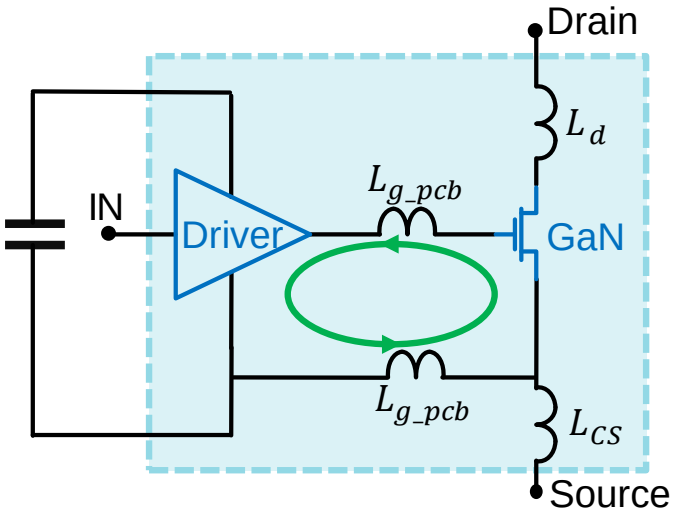
	GaN FET with integrated gate driver		GaN half-bridge with gate driver
			
Part #	LMG341x	LMG36xx	LMG2610
Package details	QFN 8x8 mm	QFN 5.3x8 mm	QFN 7x9 mm
Gate drive capability	25-100 V/ns slew rate	45-150 V/ns slew rate	20-165 V/ns slew rate Built-in HS level shift
Protection features	OCP, SCP, OTP, UVLO	OCP, SCP, OTP, UVLO	OCP, SCP, OTP, UVLO turn-on interlock
Advanced features		"Lossless" current sensing 240 uA idle mode 50 uA standby pin	"Lossless" current sensing Low I_Q standby mode
<65 W		270 mΩ	170/248 mΩ
65 W – 140 W		120 mΩ / 170 mΩ Sampling now	
140 W – 500 W	50, 70, 150 mΩ		
Topologies	Boost PFC, Totem-pole PFC	Boost PFC, Totem-pole PFC, QR, ZVS flyback, ACF, AHB, LLC	ACF, AHB, LLC

LMG362x 650-V GaN FET product overview



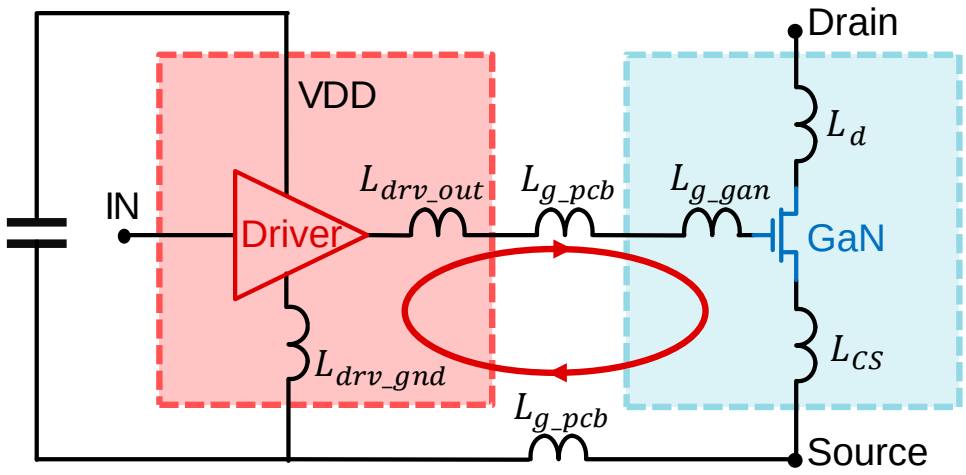
Integrated gate driver

TI driver + GaN



Minimized switching loop, maximum efficiency

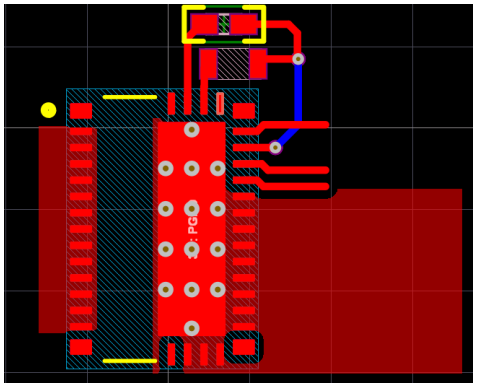
Discrete GaN with external driver

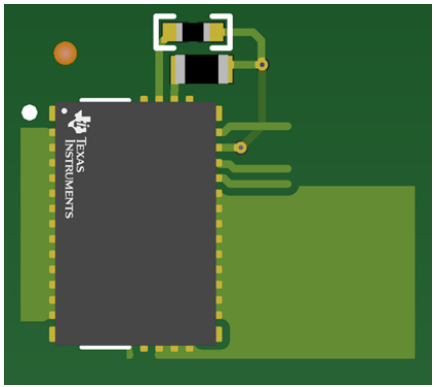


Large parasitic inductances, increased switching losses

Achieve a better PCB layout with TI GaN

- ✓ Higher ratio of Heatsink area / package area
- ✓ Signal and Power Traces are separated
- ✓ Easy to extend the GND plane for better thermal performance
- ✓ Separate AGND and source





Easy to extend GND plane for better thermal performance and easier layout

Integrated protection features

Overcurrent protection

- Cycle-by-cycle current monitoring to prevent device from failure
- Automatically restarts to prevent transient event issues

Overtemperature protection

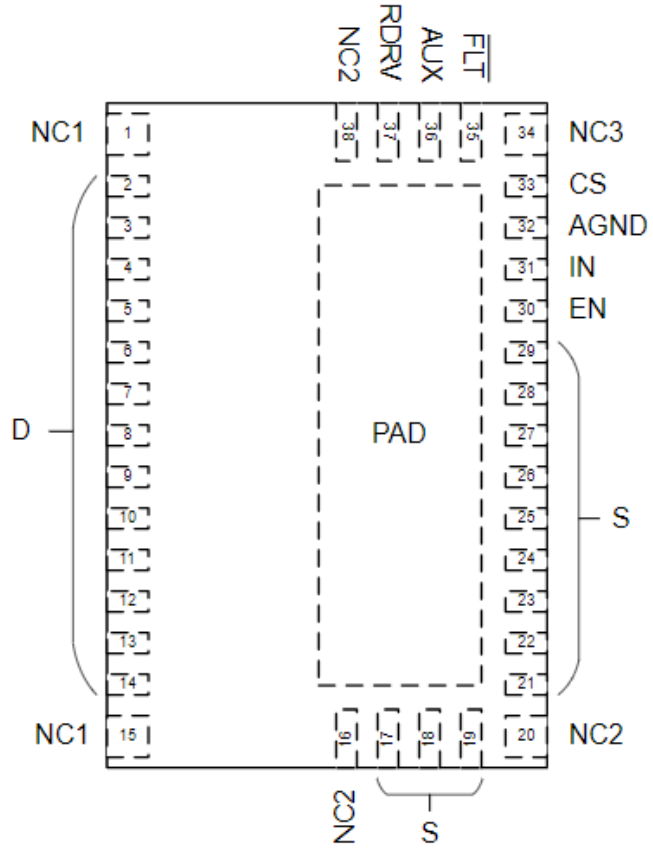
- Accurate junction temperature reading shuts down device before failure
- Ideal for thermally constrained AC/DC adapter designs

Undervoltage lockout

- Protection against aux power failure from controller or isolated bias supply

Fault signal output

- Constant feedback to report a thermal shutdown event
- Connect to controller for full system-level communication



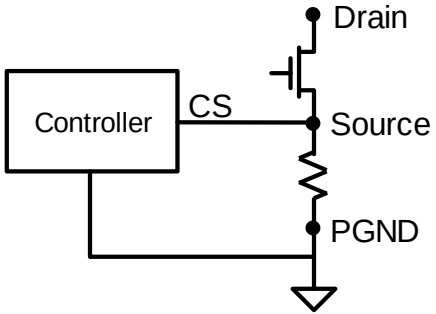
“Lossless” current sensing – overview

How it works:

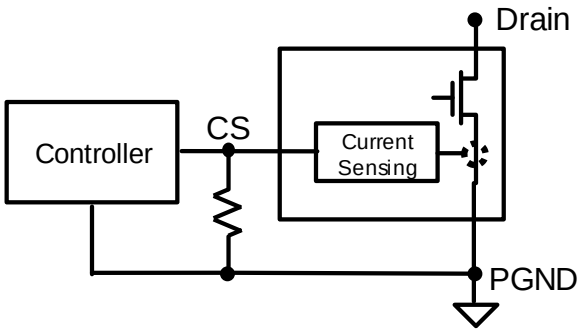
Scaled-down replica of GaN drain-source **current** is sourced out of device pin into external resistor to create current sense signal.

Achieves both **power loss** and **space savings** by eliminating traditional high-power / large-size current sense resistor in series with power FET source.

Traditional current sensing



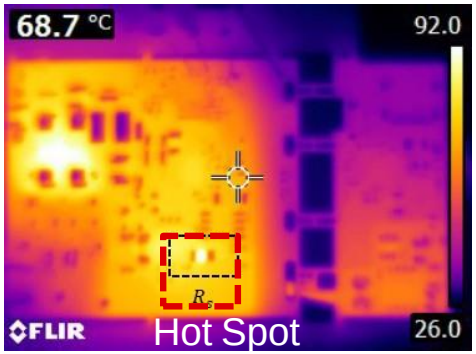
“Lossless” current sensing



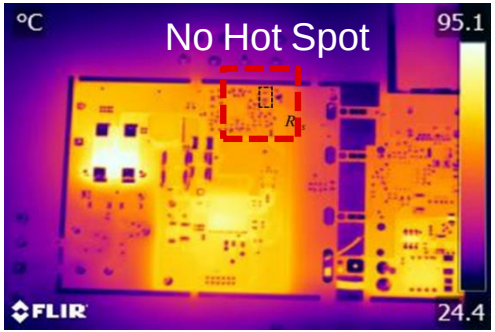
✓ Small resistor package
✓ FET source connected to PGND
✓ Reduce power losses

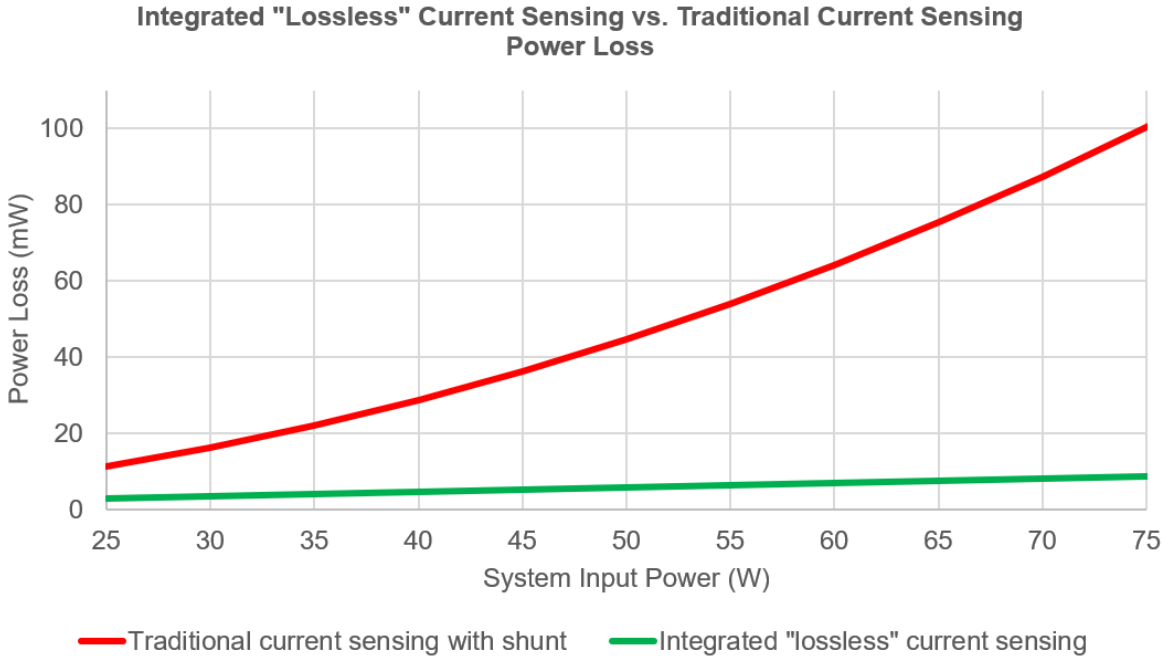
“Lossless” current sensing – improved efficiency

Traditional current sensing



“Lossless” current sensing

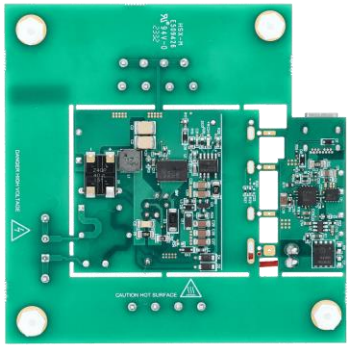


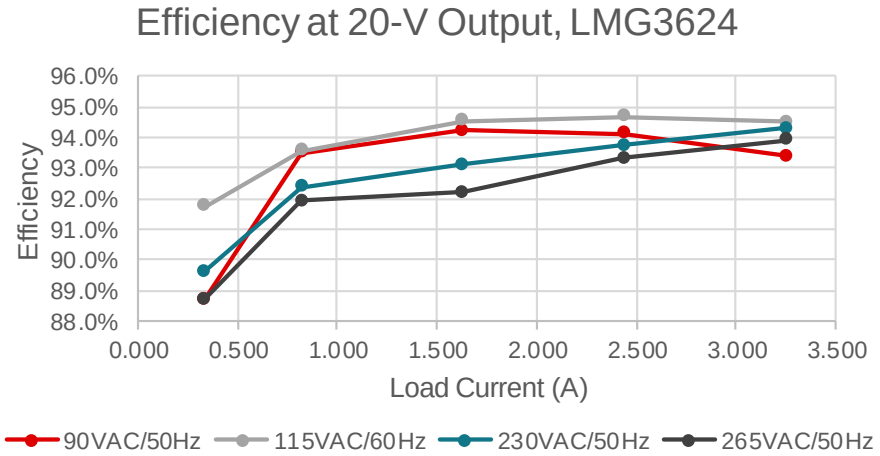


LMG362xEVM 65-W QR flyback USB PD evaluation module

Features & benefits

- **93-94%** efficiency at full-load under entire input voltage range
- **28W/in^3** power density enabled by 180-kHz maximum switching frequency
- **Current sense emulation** greatly reduces power losses associated with traditional current sensing circuitry
- **Integration** of GaN, driver, OCP, and OTP simplifies design, reduces BOM count, and increases system robustness





TIDA-050072 140-W, 84-cm³ high-density adaptor

Features

- TM PFC + Asymmetric Half Bridge Flyback (AHB) design with high density
- PFC by UCC28056 + LMG3622 (TI GaN_120 mΩ) with gate driver integrated
- DC-DC by AHB + LMG2610 (TI Half Bridge GAN_170 mΩ/248 mΩ) integrated level shift and bootstrap diode
- Output: 5 V / 9 V / 15 V / 20 V / 28 V adjustable
- Full load Efficiency: > 95% at 230 Vac and > 94% at 115 Vac
- PFC was disabled at 5 V and 9 V output
- Power density: 1.67 W/cc or 27.33 W/in^3
- Size without case: 50 mm x 73 mm x 23 mm (83.95 cc)

Typical application

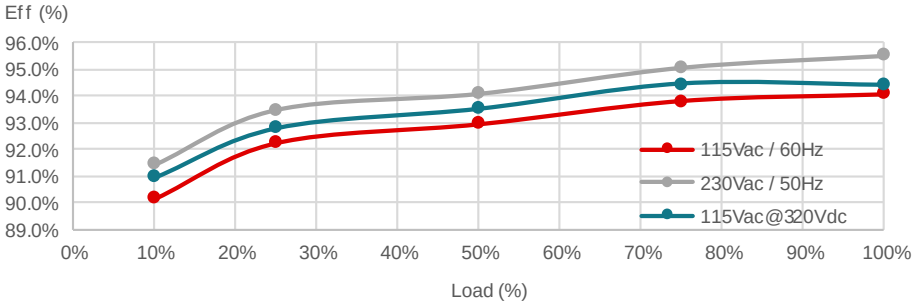
- Notebook PC power adapter
- USB PD adapter

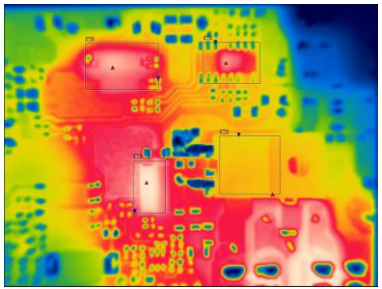
Tools & resources

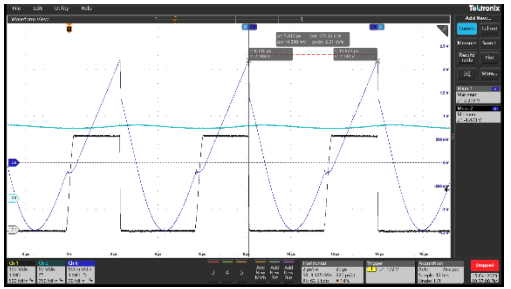
- **Design Files:** Schematics, BOM, Gerber
- **Device Datasheets:**
  - UCC28056
  - LMG3622
  - LMG2610

Benefits

- RM10 Core size for transformer design with 170 kHz operation frequency
- TI GaN integrated current emulation to reduce the loss and the size from the current sense Resistor in PFC stage
- Compliant with CoC Tier 2 and DoE Level VI







Getting started

You can start evaluating these devices leveraging the following:

Content type	LMG36xx	Link to content or more details
Product folder	650-V GaN FET with integrated driver, protection and current sense emulation	LMG3622, LMG3624, LMG3626
Technical blog content or white paper	The benefits of low-power GaN in common AC/DC power topologies	Technical article
Selection and design tools and models	LMG36xx quasi-resonant flyback power stage design calculator	LMG36XX-CALC
Development tool or evaluation kit	LMG362x evaluation module for 65-W quasi-resonant flyback converter with USB Type-C PD	LMG3622EVM-082 LMG3624EVM-081 LMG3626EVM-074

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