

# GD3160: ADVANCED HIGH-VOLTAGE GATE DRIVER WITH INTEGRATED ISOLATION

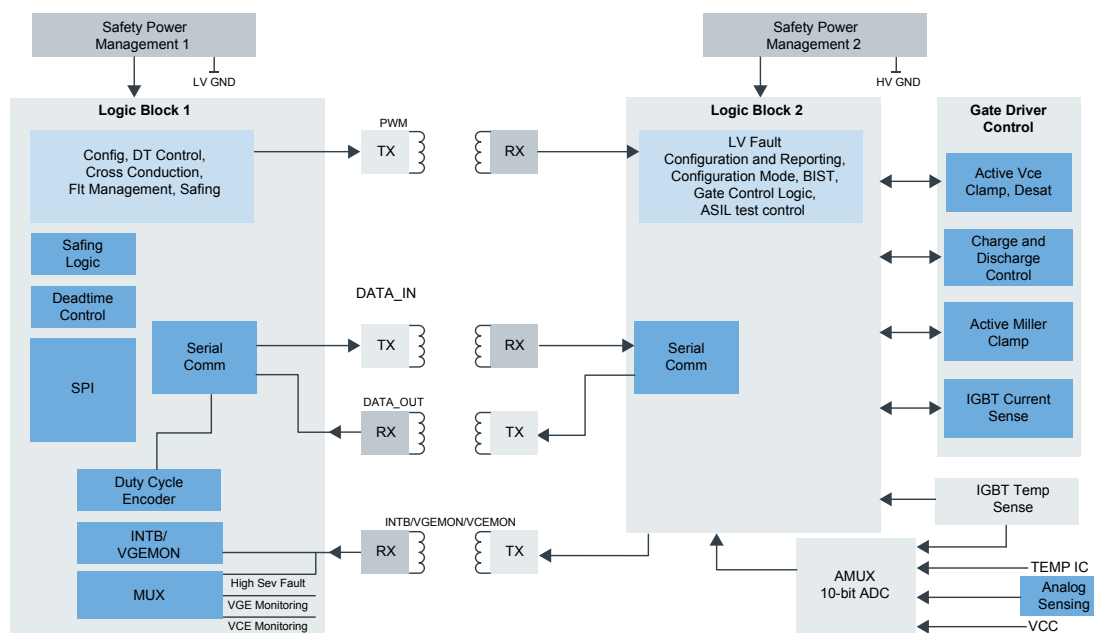
The GD3160 is a programmable high-voltage gate driver with advanced functional safety, control and protection features developed for automotive and EV powertrain applications. GD3160 supports implementation of high-voltage HEV/EV traction inverters, and DC/DC converters using silicon IGBTs or SiC MOSFETs.

## FEATURES

The GD3160 is a highly integrated single output IGBT and SiC MOSFET gate driver for automotive electric vehicles (EV) traction motor inverters.

- Integrated magnetic high-voltage isolation is compatible with 200 to 1700 V IGBT/SiC
- Integrated 15 A gate drivers for one-chip solution means less board space
- Integrated current and voltage monitors to protect the high-voltage system

## GD3160 BLOCK DIAGRAM



## ADVANCED SAFETY AND PROTECTION, ASIL D CERTIFIED

- ISO 26262 certified, providing safety manual and FMEDA
- Rich diagnostics/BIST/framing error/deadtime enforcement/gate monitor feedback
- Helps keep the overall system cost and complexity to a minimum

## HIGHLY PROGRAMMABLE THROUGH SPI

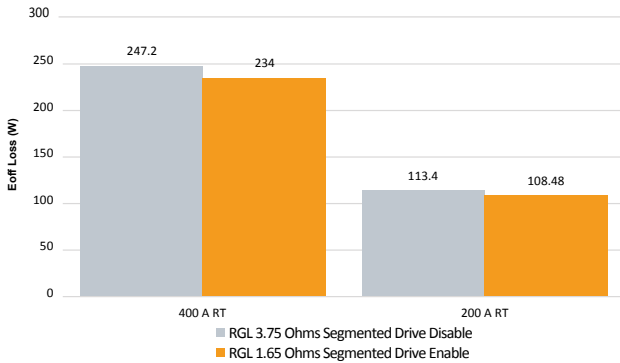
- Configurable to drive any manufacturer's IGBT or SiC module
- Programmable current and DESAT, two level turn-off, soft-shutdown thresholds
- Faster time to market with comprehensive development hardware and reference designs

## KEY DIFFERENTIATORS

### SEGMENTED DRIVE

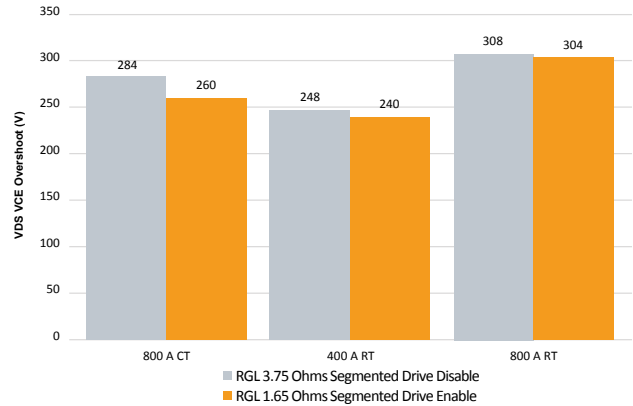
Segmented drive is an integrated gate drive feature that dynamically reduces turn-off current in non-fault conditions, with the goal of reducing overshoot in normal conditions. It allows selection of smaller gate Roff resistors to reduce Eoff losses. Segmented drive parameters are tunable via SPI for optimal performance — there is no external BoM cost since it reuses the DESAT circuitry. The solution varies by gate resistor, power device, current, temperature, etc.

**Inverter Turn Off Losses (Eoff) vs. Gate Resistance RGL and Segmented Drive**



Using Segmented Drive improves overall inverter efficiency up to ~5%

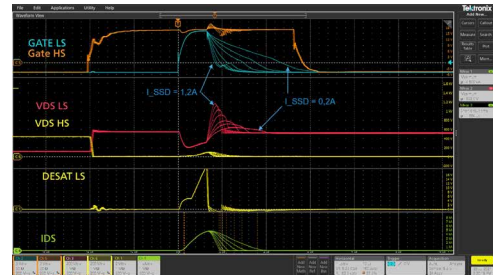
**VDS/VCE Overshoot vs. Gate Resistance RGL and Segmented Drive**



Reduce VDS/VCE overshoot during high-current switching

### ENHANCED DESAT SHORT CIRCUIT PROTECTION

The faster operation for SiC in comparison to IGBTs results in the need for faster short circuit protection to avoid damage to power device. The GD3160 provides a fault turn-off off sequence. The time from the SC detection to the completion of the turn-off sequence is less than 1  $\mu$ s.



### NXP HV INVERTER SOLUTION

The HV traction inverter solution combines NXP's comprehensive portfolio of automotive microcontrollers (MCUs), CAN bus transceivers and functional safety system basis chips (SBCs) in combination with high-voltage isolated gate drivers to enable customers to rapidly implement complete and scalable HV traction inverter solutions which also support high-levels of system-level functional safety (ASIL C or ASIL D).

<https://www.nxp.com/EV-INVERTERHDBT>

### ENABLEMENT TOOLS

|                  |  |
|------------------|--|
| FRDMGD31RPEVM    | GD3160 half-bridge evaluation kit for Hitachi ABB RoadPak power module |
| FRDMGD3160HBIEVM | GD3160 half-bridge kit for HPD/P6 power module                         |
| FRDMGD3160XM3EVM | GD3160 half-bridge kit for Wolfspeed XM3 power module                  |
| FRDMGD3160DSCHB  | GD3160 half-bridge kit for DSC/B power module                          |
| RDGD31603PHSEVM  | GD3160 three-phase board for HPD-2 power modules                       |
| FRDMGD3160DCMHB  | GD3160 half-bridge kit for Danfoss DCM™1000X power module              |
| RDGD31603PSMKEVM | GD3160 three-phase board for SEMIKRON eMPack modules                   |

[www.nxp.com/GD3160](http://www.nxp.com/GD3160)

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