

Modules and Gate Driver Boards



Our power modules bring all the proven benefits of Wolfspeed SiC MOSFET and Schottky diode performance to higher power (kilowatt to megawatt) applications. Because they are packaged in standard industrial housings, system designers can quickly evaluate the system-level benefits enabled by Wolfspeed’s all-SiC modules. Ease of evaluation is further enhanced by Wolfspeed’s gate driver boards, designed to complement Wolfspeed power modules.

Wolfspeed power modules are footprint and pin-compatible to standard silicon IGBT modules, however the internal design is optimized to deliver maximum performance. Parasitic stray inductance, which limits switching speed, is minimized through careful layout and terminal designs. Parasitic thermal impedance, which limits the current handling capability, is minimized through the selection of high thermal conductivity insulating materials. Thanks to these enhancements, Wolfspeed power modules provide five to ten times faster switching speeds than comparably rated Si IGBT modules—without sacrificing efficiency. High performance capability is delivered with industry-standard reliability.

Wolfspeed gate driver boards are valuable tools for all users. For those looking for a commercial-off-the-shelf solution that is ready for volume production, the PT-series of gate drivers is designed with all of the operational and safety features expected in a complete gate driver solution. For users performing initial design and prototyping work, boards in the CGD-series have all the basic driver functionality. The CGD driver design files are also available as valuable collateral for users designing their own gate drivers.

All Wolfspeed module and driver products are backed with world-class technical support from industry experts in power applications and semiconductor devices.

FEATURES

- Ultra-low losses from state-of-the-art Wolfspeed SiC MOSFETs and Schottky diodes
- High thermal conductivity aluminum nitride insulator
- High frequency operation
- Avalanche capable
- Positive temperature coefficient for MOSFET on-resistance and Schottky diode forward voltage
- Pin-compatible to industry standard Si IGBT power modules

CORRESPONDING BENEFITS

- High efficiency operation
- Reduced thermal requirements
- Reduced size, weight, and cost of passive elements
- Mitigates over-voltage protection
- Ease of paralleling multiple modules with minimal current de-rating
- Ease of in-system evaluation

MODULE PORTFOLIO

| | 1700V | 1200V | | | | |
|---------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| $R_{DS(on)}$ | 8m Ω | 3.7m Ω | 5m Ω | 13m Ω | 25m Ω | 80m Ω |
| $I_{D(MAX)}$ | 225A | 325A | 300A | 120A | 50A | 20A |
| Configuration | Half-Bridge | Half-Bridge | Half-Bridge | Half-Bridge | Six-Pack | Six-Pack |
| Housing | Industry Standard 62mm | High Performance 62mm | Industry Standard 62mm | Industry Standard 62mm | Industry Standard 45mm | Industry Standard 45mm |

GATE DRIVER BOARDS

| | Description | Features |
|---|---|---|
| CRD-001 Universal Gate Driver | <ul style="list-style-type: none"> • 1 Output Channel • Mounting Style: Daughter Board • Power Inputs: +10V | <ul style="list-style-type: none"> • Flexibility • Small Size • Low Cost |
| CGD15HB62P1 Basic 1.2kV Gate Driver for 62mm Modules | <ul style="list-style-type: none"> • 2 Output Channels • Mounting Style: Direct Mount • Power Inputs: +15V | <ul style="list-style-type: none"> • De-saturation • Minimum Pulse Suppression • No Optocouplers • Visual Indicators • Low Parasitics |
| CGD15FB45P1 Basic 1.2kV Gate Driver for 45mm (Six-Pack) Modules | <ul style="list-style-type: none"> • 6 Output Channels • Mounting Style: Direct Mount • Power Inputs: +15V | <ul style="list-style-type: none"> • De-saturation • Minimum Pulse Suppression • No Optocouplers • Visual Indicators • Low Parasitics |
| CGD15HB62LP Advanced 1.2kV Gate Driver for High Performance 62mm Modules | <ul style="list-style-type: none"> • 2 Output Channels • Mounting Style: Direct Mount • Power Inputs: +12V, +15V | <ul style="list-style-type: none"> • De-saturation • Under-voltage Lockout • Overvoltage & Reverse Polarity Protection • Minimum Pulse Suppression • No Optocouplers • Low Parasitics |
| PT62SCMD12 & PT62SCMD17 Advanced 1.2/1.7kV Gate Driver for 62mm Modules | <ul style="list-style-type: none"> • 2 Output Channels • Mounting Style: Direct Mount • Power Inputs: +15V, +24V | <ul style="list-style-type: none"> • De-saturation • Under-voltage Lockout • Interlock • Minimum Pulse Suppression • No Optocouplers • Low Parasitics |

FIGURE 1

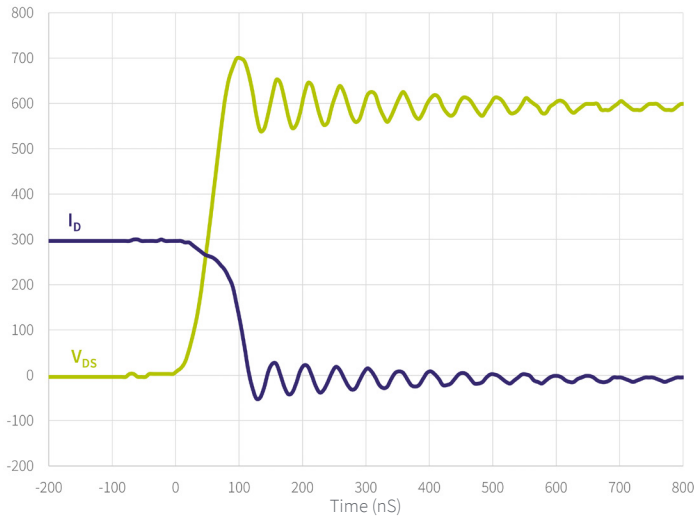
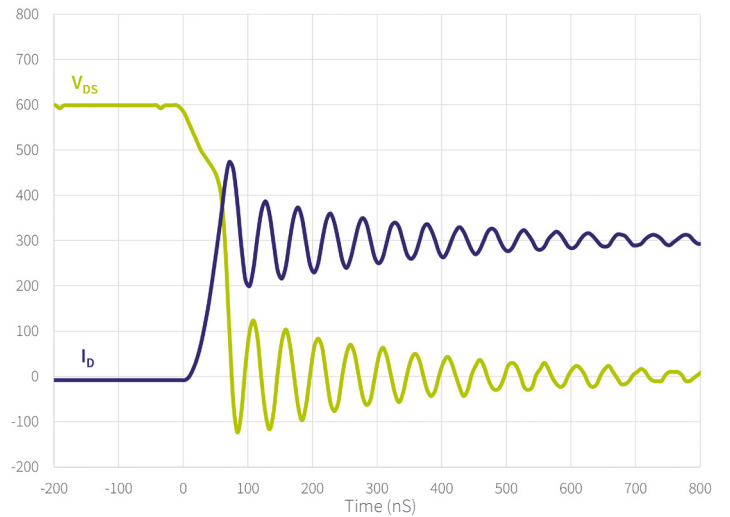


FIGURE 2



Switching transients of Wolfspeed's CAS300M12BM2 half-bridge modules exhibit fast transitions without any turn-off current tailing effects inherent with Si IGBTs as seen in figure 1 nor large current overshoots during turn-on inherent to Si PiN diode reverse recovery, as seen in figure 2.

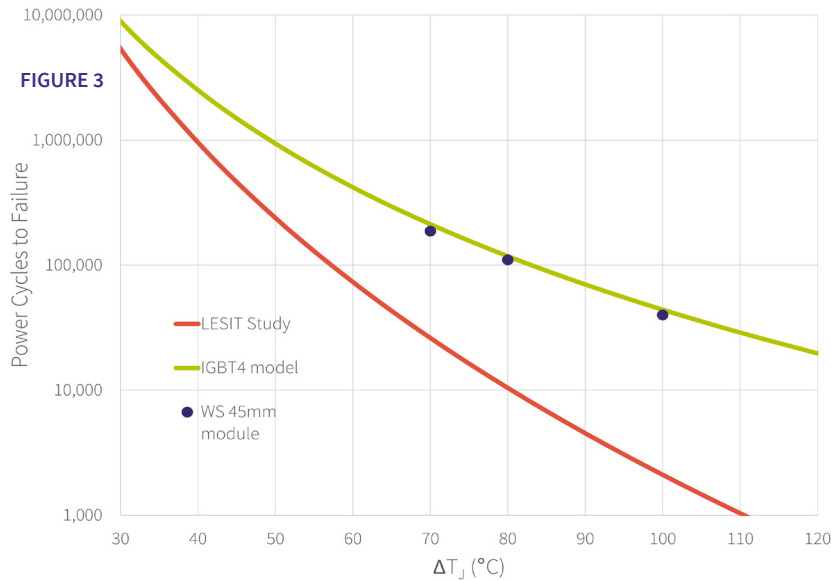


Figure 3: Power cycling results of Wolfspeed's CCS050M12CM2 six-pack module exhibit lifetimes that are significantly better than the LESIT¹ study (an independent study of standard Si IGBTs that represents the minimum requirements for module performance) and approach the levels capable in modern Si IGBT4 modules, while offering the performance advantages seen in figures 1 and 2.

[1] Held, M.; Jacob, P.; Nicoletti, G.; Scacco, P.; Poech, M.H.: "Fast Power Cycling Test for IGBT Modules in Traction Application", Power Electronics and Drive Systems 1997, Conference Proceedings

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Visit wolfspeed.com/power to learn more about our modules, gate driver boards as well as other products and services.

There you can access our reference designs, models, evaluation tools and more.

Have additional questions? Contact us at power@wolfspeed.com

