

MaxDrive-1200/650-D1

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Digital-Isolation SiC MOSFET Gate Driver Board

Firmware: MaxDrive OS V1.0 · Config tool: MaxDrive Studio (optional)

Key Features

- **Digital isolation** — replaces optocoupler links for higher isolation withstand, lower propagation delay and stronger noise immunity
- **Adaptive dead-time** — auto-tunes to bus voltage & load current, balancing switching loss against shoot-through risk
- **Multi-level short-circuit protection** — DESAT detection, Miller clamp and soft turn-off, fault response $\leq 2\ \mu\text{s}$
- **Parametric module adaptation** — one driver architecture, reconfigurable across SiC module vendors via parameter template, no hardware redesign
- **CAN 2.0B telemetry** — reports drive status, fault codes and board temperature

Isolation voltage	1200 V
Channel current	650 A (pk)
Output voltage	-5~+20 V
Switching freq.	10~100 kHz
SC response	$\leq 2\ \mu\text{s}$
Comm.	CAN 2.0B
Op. temp.	-40~+85°C

Applications

- EV traction inverters
- ESS power conversion systems (PCS)
- Industrial high-power converters

Functional Block Diagram



Compatible SiC Power Modules — Validated in V1.0

- Wolfspeed
- BASiC Semiconductor
- StarPower

Additional module profiles are added via parameter templates in MaxDrive Studio; contact MAXWELL Semiconductor applications support for modules not listed.

Technical Specifications

PARAMETER	VALUE	NOTES
Rated isolation voltage	1200 V	—
Drive channel rated current	650 A	Peak
Isolation method	Digital isolator	Not optocoupler-based
Input signal logic level	3.3 V / 5 V	Selectable
Drive output voltage range	-5 V ~ +20 V	Configurable
Typical switching frequency	10 kHz ~ 100 kHz	—
Short-circuit protection response	≤ 2 μs	—
Dead-time range	Adaptive	Configurable baseline, 100 ns ~ 2 μs
Communication interface	CAN 2.0B	250k / 500k / 1M selectable baud rate
Operating temperature	-40°C ~ +85°C	—
Storage temperature	-40°C ~ +105°C	—
Compatible power modules	Wolfspeed / BASiC / StarPower	Validated in V1.0; see parameter template list

Connector / Interface Overview

CONNECTOR	FUNCTION
J1	Isolated-side power supply input
J2	PWM input signal (high-side / low-side)
J3	Gate drive output (to power module gate / emitter)
J4	CAN communication interface
J5	Fault status feedback (dry contact / level signal)
J6	NTC temperature sense input

Detailed pin assignment and mechanical drawing (board outline, mounting hole pattern, connector part numbers) are provided in the design-in package — contact MAXWELL Semiconductor applications support.

Protection Mechanisms

MECHANISM	FUNCTION
DESAT detection	Detects abnormal on-state voltage rise; identifies short/over-current; triggers soft turn-off
Miller clamp	Suppresses parasitic turn-on from opposite half-bridge switching transients, lowering shoot-through risk
Under-voltage lockout (UVLO)	Latches off drive output below supply voltage threshold, preventing gate under-drive damage
Over-temperature protection	Triggers derating or lockout when temperature exceeds the configured threshold

Fault Codes

CODE	MEANING	RECOMMENDED ACTION
F01	DESAT protection triggered (suspected short / over-current)	Check load and module condition; reset after confirming no short
F02	Drive under-voltage	Check drive supply stability
F03	Over-temperature protection	Check cooling system and ambient temperature
F04	CAN communication timeout	Check bus wiring and termination resistor
F05	Parameter configuration checksum failure	Re-download the parameter template

MaxDrive operates in high-voltage circuits. Installation, commissioning and maintenance must be performed only by personnel qualified for high-voltage equipment. Confirm bus capacitors are fully discharged before handling the board.

Ordering Information

ORDER CODE	DESCRIPTION
MaxDrive-1200/650-D1	Driver board hardware, 1200 V / 650 A, firmware revision D1
MaxDrive OS V1.0	Embedded firmware (factory pre-loaded, encrypted)
MaxDrive Studio	PC configuration & monitoring tool (optional, via USB-CAN adapter)

Revision History

VERSION	DATE	DESCRIPTION
V1.0	2026-07	Initial release

Specifications in this document are subject to change without notice and do not constitute a guarantee of fitness for any particular application. Mechanical dimensions, full pin assignment and application circuit examples are provided separately in the MaxDrive design-in package under NDA. MAXWELL Semiconductor (Shenzhen) — domestic delivery & engineering support. MAXWELL Semiconductor (Hong Kong) — international brand office & cross-border partnerships. maxwellsic.com