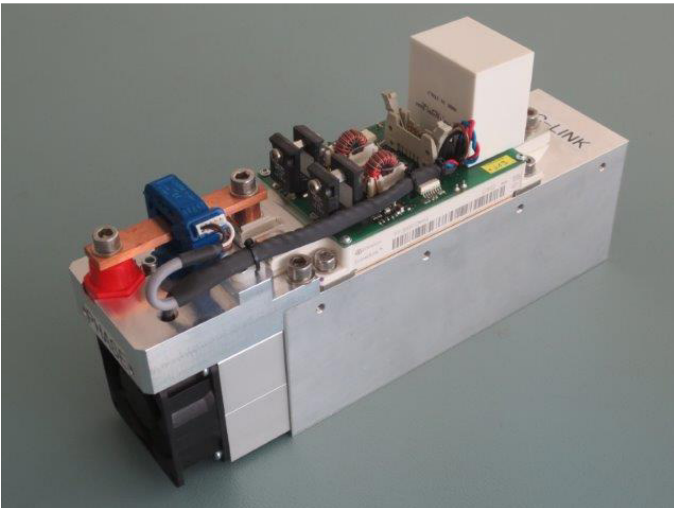


Modular IGBT Half-Bridge Power-Stage

Preliminary Data Sheet Rev.1



- Plug and Play IGBT Half-Bridge Solution
- 10-Pole Standard Ribbon Cable Connector for all Signals including Fan-Power
- Strong Gate-Driver (2x4W)
- Current Sensor
- Isolated Module NTC Temperature Sensing
- Up to 1200V Peak DC-Link Voltage*
- 8mm Creepage Distance

Modular IGBT Half-Bridge Power-Stage

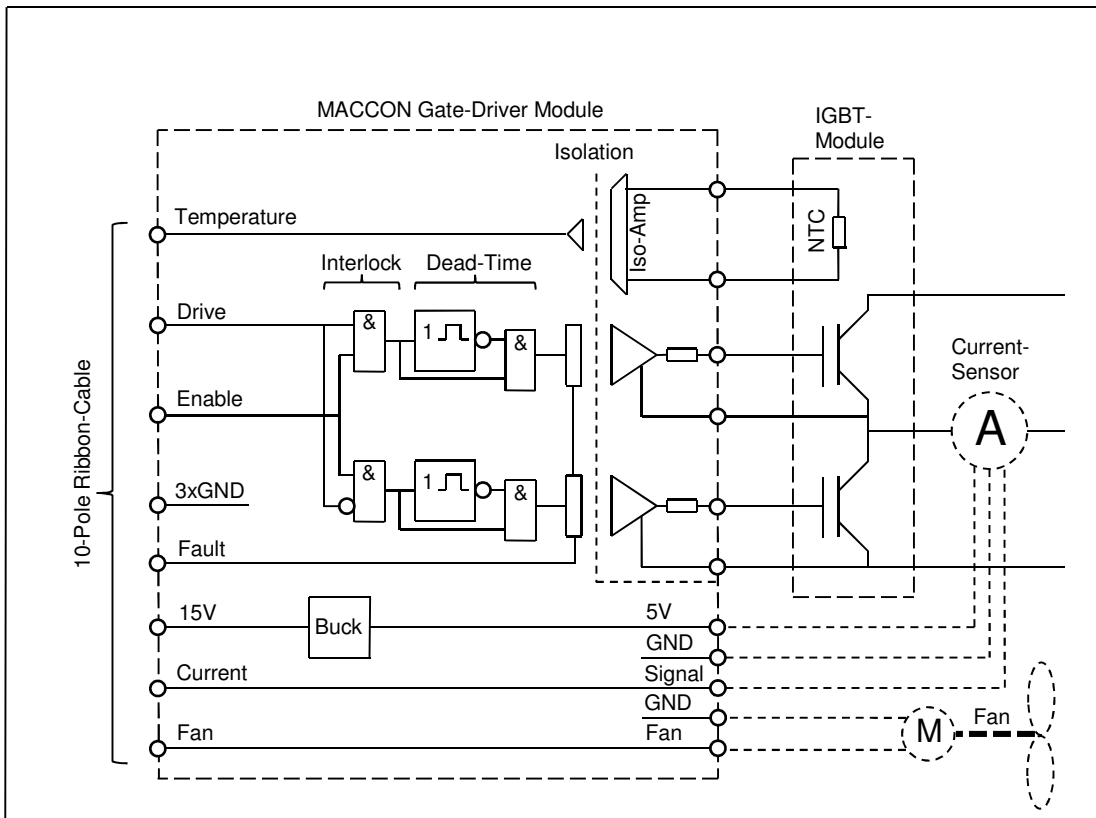
*Isolation surge test voltage is 4250Vrms. Please refer to the EN-Standard (e.g. DIN EN 61800-5-1) to define your maximum DC-Link Voltage according to the required overvoltage category for your application.

Description

The MACCON Modular Power-Stage is a highly integrated, ready to use IGBT half-bridge solution. It integrates all components like IGBT-module, gate-driver, current sensor, temperature sensor, snubber capacitor and heatsink with fan. MACCON offers also a compatible B6 rectifier module on the same type of heatsink.

The IGBT half-bridge can be delivered with different types of IGBT-modules from different manufacturers. The NTC-sensing circuit is compatible for Infineon and Fuji modules.

- **Powerful ready-to-use half-bridge gate-driver** (2x4W DC/DC converter combined with 2x15A driver and integrated gate resistors) ensures a compact, high-performance solution for large gates up to 100°C ambient temperature at free air convection, full load up to 50°C (see derating curve).
- **DESAT protection circuitry** can protect modules which are specified to withstand short circuit times larger than 6µs at the specified DC-link voltage. If a DESAT-error occurs, a fault signal will be sent over the ribbon cable to the controller. The error signal logic is fail-safe: An unplugged driver or a broken fault signal line will cause the controller to indicate an error signal. The DESAT protection circuit produces insignificant leakage on the DC-link compared to the IGBT-leakage current.
- **Isolated temperature sensing circuit** to safely measure the module's NTC temperature. The temperature signal is transmitted in the common ribbon cable to provide a robust and efficient wiring concept. The online baseplate temperature sensing offers the possibility to build converters working close to the limits to reach high power-densities at pulsed loads. Conventional drivers need an external isolation amplifier to read out the NTC-Temperature with additional connection lines. In the case of an IGBT-failure, high voltage can reach the internal NTC. Infineon and Fuji EconoDUAL-Modules use the same internal NTC, they are compatible from the temperature sensing perspective.



Block Diagram of the Modular Half-Bridge Power-Module

- **Tiny 10 pole standard ribbon-cable connector for all signals:** The module needs a single 15V supply and a 12V fan supply. The fan supply is independent of the module supply for regulated fan speed applications. All other signals like driver control and fault signals, current signal and temperature signal are also integrated on the same small ribbon cable connector for an efficient cabling solution.
- **Snubber capacitor:** The snubber capacitor is a critical component in converter power-stages because it has to take high current pulses. It is strongly recommended to connect a snubber capacitor close to the DC-Link terminals of the IGBT-module. A matching snubber capacitor is part of the power-stage package to simplify the choice of this critical part.

Notes

- **Danger of hazardous voltages! Only trained and certified personal should use this device!**
- **The test voltage of the driver isolation is 4250Vrms (6000Vpk). Before choosing this driver for your application, please define the required supply voltage conditions for the system including overvoltage category and perform an isolation coordination analysis for your system.**
- **Prevent excessive isolation testing, this will degrade Isolation!**
- **AWG24 ribbon cable is required for the controller interface. Ribbon interface cable should be as short as possible. Twisted-pair ribbon cables are recommended. Ribbon cables have only low voltage isolation, they must be safely isolated from high-voltage traces according to the required technical standards for the system.**

Electrical Characteristics

Parameter	Min.	Typ.	Max.	Unit
DC Supply Voltage	14,5	15	15,5	V
UVLO Threshold		tbd		V
UVLO Hysteresis		tbd		V
Quiescent Driver Supply Current: No Load		97		mA
Quiescent Current: 40kHz Switching on Both Channels, No Load		106		mA
Input Voltage Range Enable and Drive Signal	0		6	V
Input Low Level Enable and Drive Signal			1,5	V
Input High Level Enable and Drive Signal	3,5			V
Input Resistance Enable and Drive Signal		10		kOhm
Failure Signal Current (Open Collector)				
Dead Time		1,2		us
DESAT Delay		3,4		us
Switching Frequency (Maximum 4W per Channel, dependent on IGBT-Module!)			40	kHz
Maximum dV/dt for Ta=25°C			10	kV/us
DC-Link Voltage, Isolation Working Voltage (dependent of IGBT-Module!)			1200	V
Creepage Distance	8			mm
Driver Full Load (2x4W) Ambient Temperature at Free Air Convection			+50	°C
Storage Temperature and Powered Derated-Load Temperature	-20		+70	°C
Fan Supply Voltage			12	V
Fan Power at 12 V Fan Supply Voltage		2,9		W
Acoustic Noise at 12 V Fan Supply Voltage		41		dB(A)
Heatsink Thermal Resistance at 12 V Fan Supply Voltage		0,1125		K/W

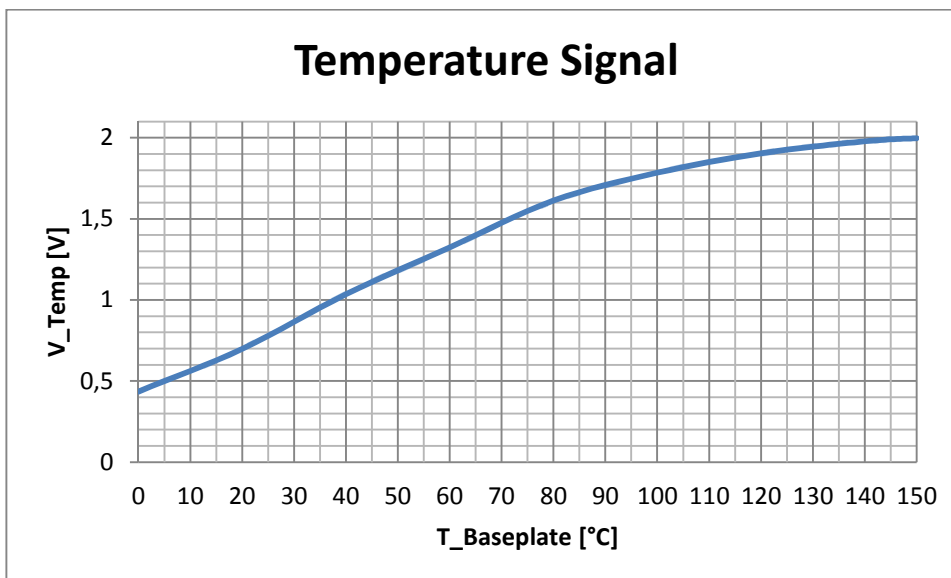
Parameter Table

Connection Scheme

Connector Pin	Signal	Description
1	Vcc 15V	Supply Voltage
2	Failure	Open Collector pulls Signal always to GND at Normal Operation (Fail Safe)
3	GND	Common GND for Enable, Drive, Failure, Current, Temperature, Vcc and FAN
4	Current	Prepared Current Signal for Connection of External Current Sensors
5	GND	Common GND for Enable, Drive, Failure, Current, Temperature, Vcc and FAN
6	Drive	Drive = High, HS-IGBT is Conducting, Drive = Low, the LS-IGBT is Conducting
7	GND	Common GND for Enable, Drive, Failure, Current, Temperature, Vcc and FAN
8	Enable	When Enable is Low, both IGBTs are Blocking
9	Temperature Signal	Analog Voltage Output
10	FAN	max. 24V/300mA Fans (Voltage Spacing/Current Loading of Signal Line)

Signal Table for 10-Pole Ribbon Cable Connector

Typical Performance Curves



Typical Dependency between Baseplate Temperature and Temperature Output Signal for Infineon Module FF600R06ME3. There are a Number of Modules available from Infineon and Fuji using the same internal NTC. This Theoretical Curve matches Practical Measurements quite closely, but of course, it is directly dependent on the accuracy of the module's own NTC, which is not specified.

For typical driver specific performance curves like gate signals please refer to the separate driver datasheet.

Accessories

- **Ribbon cable adapter for controllers prepared for Power-Integrations (CONCEPT) drivers:** this optional adapter can be plugged and mechanically fixed on the MACCON driver module. It offers limited compatibility to the widely used driver family from CONCEPT. Limitations are: temperature and current signals cannot be used, because they are not available in the Concept driver connection scheme. The MACCON driver can only work in half-bridge mode, not with independently-controlled gates. The fault signal is ganged for both transistors of the half-bridge.
- **10-pole female ribbon cable connector** with two internal contact fingers per contact for reliable contacting (most standard connectors use only one internal contact finger. A set of two connectors is available.