Data Sheet
2SB315B-2MBI1200U4G-170

SCALE Dual-Channel Plug-and-Play Driver

Driver solution for 130mm x 140mm dual IGBT modules with fiber-optic interface for 2-level topologies

Abstract

The 2SB315B-2MBI1200U4G-170 is a dual-channel driver with a fiber-optic interface based on CONCEPT's dual SCALE driver 2SD315AI, a proven technology for reliable driving and safe operation of IGBTs.

The driver is matched to the 1700V module 2MBI1200U4G-170 from Fuji. Its plug-and-play capability makes it ready to operate immediately after mounting. The user needs invest no effort in designing or adjusting it to a specific application.

For drivers adapted to other types of high-power and high-voltage IGBT modules, refer to www.IGBT-Driver.com/go/plug-and-play

Product Highlights

- Suitable for 2MBI1200U4G-170
- Plug-and-play solution
- Active clamping of V_{ce} at turn-off
- IGBT short-circuit and overcurrent protection
- No electrolytic capacitors
- Fiber-optic interface
- Monitoring of power supply voltage
- Duty cycle 0... 100%
- Extremely reliable; long service life
- Shortens application development time

Applications

- Inverters
- Motor drives
- UPS
- Power-factor correctors
- Wind-power converters
- Welding
- SMPS
- and many others

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Important: Please refer to the relevant manuals!

This data sheet contains only product-specific data. A detailed description, must-read application notes and general data applicable to this driver family are found in: "Description and Application Manual for 2SB315B SCALE Plug-and-play IGBT Driver".

See www.IGBT-Driver.com/go/2SB315B

Dimensions

Dimensions: 130 x 145 mm, 21 mm height (30 mm with connector X1 and flat cable).

Mounting principle: Connected to IGBT module with screws.

Fiber Optics Interfaces

Interface	Remarks	Part type #
Drive signal input (Standard)	Fiber-optic receiver (Notes 14,15)	HFBR-2522Z
Drive signal input (Opt. 01)	Fiber-optic receiver (Notes 14,17)	HFBR-2412Z
Status output (Standard)	Fiber-optic transmitter (Notes 14,16)	HFBR-1522Z
Status output (Opt. 01)	Fiber-optic transmitter (Notes 14,18)	HFBR-1412Z

Absolute Maximum Ratings

Parameter	Remarks	Min	Max	Units
Supply voltage V_{DC}	VDC to GND (Note 1)	0	16	V
Supply voltage V_{DD}	VDD to GND	0	16	V
Gate peak current I_{out}	Note 6	-15	+15	A
Average supply current I_{DC}	Notes 2,3		500	mA
Output power per gate	Note 3		3	W
Switching frequency	Note 3		14	kHz
DC-link voltage	Note 4		1200	V
Operating temperature	Note 3	-40	+85	°C
Storage temperature		-40	+90	°C

All data refer to +25°C and V_{DC} = 15V unless otherwise specified

Electrical Characteristics

Power supply	Remarks	Min	Typ.	Max	Units
Nominal supply voltage V_{DC}	To GND (Note 1)		15		V_{dc}
Supply current I_{DC}	Without load		80		mA
Supply current I_{DC}	At 14 kHz switching frequency		500		mA
Efficiency η	Internal DC/DC converter		85		%
Nominal supply voltage V_{DD}	To GND		15		V_{dc}
Supply current I_{DD}	Without load				
	Standard		90		mA
	Opt. 1		130		mA
Supply current I_{DD}	At 14 kHz switching frequency				
	Standard		96		mA
	Opt. 1		136		mA

Power supply monitoring	Test conditions	Min	Typ.	Max	Units
Turn-on threshold V_{th}	Note 5		10.6		V_{dc}
Hysteresis on/off	Note 5		0.6		V_{dc}

Short circuit protection	Remarks	Min	Typ.	Max	units
V_{ce}-monitoring threshold	Betw. aux. terminals		5.5		V
Response time	Note 7		10		µs
Blocking time	After failure (Note 8)		1		s

Timing characteristics	Test conditions	Min	Typ.	Max	Units
Turn-on delay $t_{pd(on)}$	Note 9		420		ns
Turn-off delay $t_{pd(off)}$	Note 9		550		ns
Output rise time $t_{r(out)}$	Gx to Ex (Note 10)		150		ns
Output fall time $t_{f(out)}$	Gx to Ex (Note 10)		80		ns
Dead time between outputs	Half-bridge mode		2.5		µs

Gate outputs	Test conditions	Min	Typ.	Max	Units
Turn-on gate resistor $R_{g(on)}$			5		Ω
Turn-off gate resistor $R_{g(off)}$			10		Ω

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Electrical insulation	Test conditions	Min	Typ.	Max	Units
Operating voltage	Continuous or repeated (Note 4)			1200	V_{dc}
Test voltage	50 Hz/1 min (Note 11)			4000	$V_{AC(eff)}$
Partial discharge extinction volt.	IEC270 (Note 12)		>1700		$V_{AC(pk)}$
Creep path input-output			20		mm
Creep path output-output			25		mm
Maximum dV/dt at dV=1000 V	Note 13	100			kV/µs

Collector current	Remarks	Min	Typ.	Max	Units
Max. IGBT collector current	Note 19		2300		A

All data refer to +25°C and V_{DC} = 15 V unless otherwise specified

Footnotes to the key data

1) The drivers have a zener diode on each channel for over-voltage protection. When the feed voltage exceeds 16V, this protection may be exposed to thermal overload.
2) If the specified power consumption is exceeded, this indicates an overload of the DC/DC converter. It should be noted that these DC/DC converters are not protected against overload.
3) Application-specific self-heating of gate drivers and IGBT modules, especially at high switching frequency, must be taken into account. As a rule, the switching frequency is limited due to the switching losses of the IGBT modules. Because CONCEPT cannot predict how the drivers will be incorporated in the user's application, no binding recommended value for self-heating and thus for the maximum useable output power can be made. Users are therefore recommended to check the gate driver's ambient temperature within the system.
4) This limit is due to active clamping. Refer to the "Description and Application Manual for 2SB315B SCALE Dual-Channel Plug-and-play IGBT Driver".
5) Under-voltage monitoring of the supply voltage to the gate driver. If the voltage drops below this limit, the power modules are switched off.
6) The gate current is limited by the gate resistors located on the driver.
7) Pulse width of the direct output of the gate drive unit (excluding the delay of the gate resistors).
8) The typical blocking time after an error is 1 second. Versions with other blocking times may also be supplied if required.
9) Measured from the transition of the turn-on or turn-off command at the host controller to direct output of the gate drive unit (excluding the delay of the gate resistors).
10) Refers to the direct output of the gate drive unit (excluding the delay of the gate resistors).
11) The test voltage of 4000 $V_{ac(rms)}$/50Hz may be applied only once during one minute. It should be noted that with this (strictly speaking obsolete) test method, some (minor) damage occurs to the insulation layers due to the partial discharge. Consequently, this test is not performed at CONCEPT as a series test. In the case of repeated insulation tests (e.g. module test, equipment test, system test), the subsequent tests should be performed with a lower test voltage: the test voltage is reduced by 400V for each additional test. The more modern if more elaborate partial-discharge measurement is preferable to such test methods as it is almost entirely non-destructive.
12) The partial discharge is not measured for the standard types. Tested and selected types with guaranteed partial-discharge immunity can be supplied for applications with maximum requirements and higher operating voltages (such as railroad applications).
13) This specification guarantees that the drive information will be transferred reliably even at a high DC-link voltage and with ultra-fast switching operations.

14) The transceivers required at the host controller side are not delivered with the gate driver. It is recommended to use the same types as used in the gate driver. For product information refer to www.IGBT-Driver.com/go/fiberoptics
15) The recommended transmitter current at the host controller is 30-35mA, suitable for plastic optic fibers with a length of less than 2.5 meters. Higher current may increase jitter or delay at turn-off.
16) The transmitter current at the gate driver is about 29mA.
17) The recommended transmitter current at the host controller is 60mA.
18) The transmitter current at the gate driver is about 53mA.
19) Due to the switching behaviour of the IGBT module and the response time of the IGBT driver the maximum collector current is limited to about 2300A at T_j=125°C and U_{dc}=1200V. At higher currents the desaturation protection of the driver will be activated at turn-on.

Important Notice

The data contained in this product data sheet is intended exclusively for technically trained staff. Handling all high-voltage equipment involves risk to life. Strict compliance with the respective safety regulations is mandatory!

Any handling of electronic devices is subject to the general specifications for protecting electrostatic-sensitive devices according to international standard IEC 747-1, Chapter IX or European standard EN 100015 (i.e. the workplace, tools, etc. must comply with these standards). Otherwise, this product may be damaged.

Legal Disclaimer

This data sheet specifies devices but cannot promise to deliver any specific characteristics. No warranty or guarantee is given – either expressly or implicitly – regarding delivery, performance or suitability.

CT-Concept Technologie AG reserves the right to make modifications to its technical data and product specifications at any time without prior notice. The general terms and conditions of delivery of CT-Concept Technologie AG apply.

Quality

The obligation to high quality is one of the central features laid down in the mission statement of CT-Concept Technologie AG. The quality management system covers all stages of product development and production up to delivery. The drivers of the SCALE series are manufactured to the ISO 9001 standard.

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Ordering Information

The general terms and conditions of delivery of CT-Concept Technologie AG apply.

Related IGBT	CONCEPT Driver Type #
Fuji 2MBI1200U4G-170	2SB315B-2MBI1200U4G-170
Fuji 2MBI1200U4G-170	2SB315B-2MBI1200U4G-170 Opt. 01

Opt. 01: ST Fiber-optic interface (HFBR-2412Z and HFBR-1412Z), see "Description and Application Manual for 2SB315B SCALE Dual-Channel Plug-and-Play IGBT Drivers".

Information about Other Products

For drivers adapted to other high-voltage or high-power IGBT modules

Direct link: www.IGBT-Driver.com/go/plug-and-play

For other drivers and evaluation systems

Please click: www.IGBT-Driver.com

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