

Data Sheet

2SB315B-CM1200DC-34N

SCALE Dual-Channel Plug-and-Play Driver

Driver solution for 130mm x 140mm dual IGBT modules with fiber-optic interface suitable for the following IGBT modules:

- CM1200DC-34N
- CM1200DB-34N

Abstract

The 2SB315B-CM1200DC-34N 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 above mentioned 1700V modules from Mitsubishi. 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

- ✓ 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
- ✓ 2-level converters
- ✓ 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-2522 |
| Drive signal input (Opt. 01) | Fiber-optic receiver (Notes 14,17) | HFBR-2412Z |
| Status output (Standard) | Fiber-optic transmitter (Notes 14,16) | HFBR-1522 |
| 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 | | 8.5 | 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 8.5 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 8.5 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 | | 3.65 | | V |
| Response time | Note 7 | | 9.5 | | 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 $R_{g(on)}$ | | | 1.4 | | Ω |
| Turn-off gate resistor $R_{g(off)}$ | | | 5.6 | | 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 |

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.

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- 17) The recommended transmitter current at the host controller is 60mA.
- 18) The transmitter current at the gate driver is about 53mA.

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.

Technical Support

CONCEPT provides expert help for your questions and problems:

Internet: www.IGBT-Driver.com/go/support

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

| | |
|-------------------------|------------------------------|
| Mitsubishi CM1200DC-34N | 2SB315B-CM1200DC-34N |
| Mitsubishi CM1200DB-34N | 2SB315B-CM1200DC-34N |
| Mitsubishi CM1200DC-34N | 2SB315B-CM1200DC-34N Opt. 01 |
| Mitsubishi CM1200DB-34N | 2SB315B-CM1200DC-34N Opt. 01 |

Opt. 01: ST Fiber-optic interface with threaded port (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

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