Target

1SP0625V / 1SP0625S / 1SP0625D
Description & Application Manual

Driver solution for high-voltage and high-power modules with fiber-optic interface for 2-level, 3-level and multilevel converter topologies with paralleling capability of IGBT modules

Abstract

1SP0625 are single-channel drivers for the reliable driving of up to 3 paralleled high-voltage and high-power IGBT modules. The driver concept is based on a master-slave principle:

- 1SP0625V (master) is equipped with versatile fiber-optic links (AVAGO HFBR-x522)
- 1SP0625S (master) is equipped with ST fiber-optic links (AVAGO HFBR-x412Z)
- 1SP0625D (slave) is directly connected to a master driver over a paralleling interface.

The drivers are based on CONCEPT's SCALE-2 chipset, a highly integrated technology for the reliable driving and safe operation of IGBTs.

Perfectly matched driver versions are available for all mechanically compatible IGBT modules. The plug-and-play capability of the driver allows immediate operation after mounting. The user needs invest no effort in designing or adjusting it to a specific application.

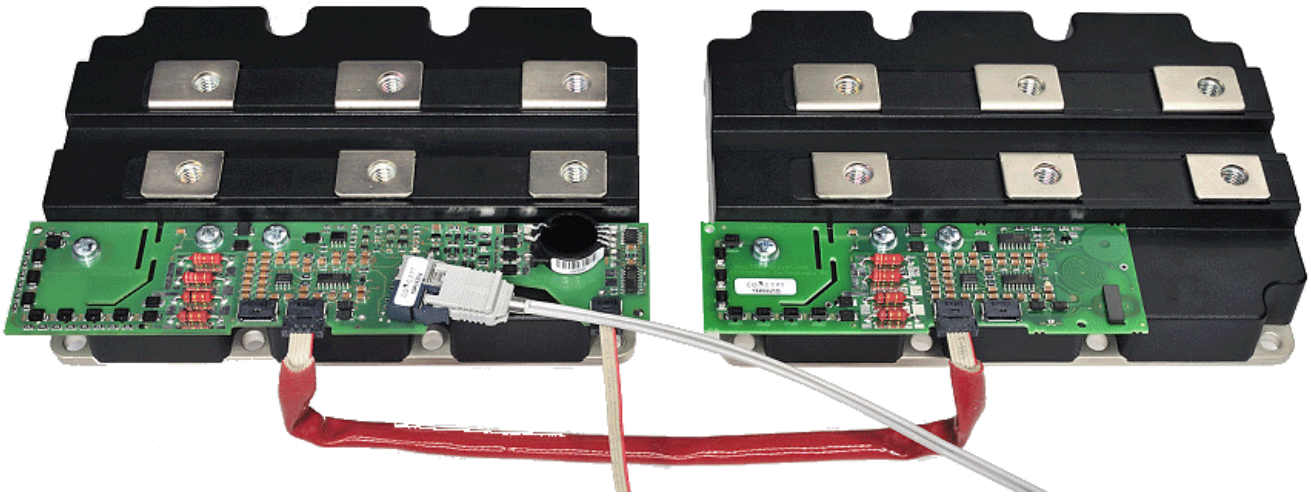

Fig. 1 1SP0625V (master) with 1SP0625D (slave) each screwed onto a 3.3kV IGBT module

Description and Application Manual

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System Overview

The 1SP0625 are plug-and-play drivers based on the highly integrated SCALE-2 chipset developed by CONCEPT /1/. This is a set of application-specific integrated circuits (ASICs) that cover the main range of functions needed to design intelligent gate drivers. The SCALE-2 driver chipset is a further development of the proven SCALE technology /2/.

1SP0625 drivers are specifically designed for the reliable and safe driving of high-voltage and high-power IGBT modules from the 1200V to the 3300V voltage class. The driver concept relies on a master-slave principle that allows the safe operation of parallel connected IGBT modules. The master (1SP0625V or 1SP0625S) can be used as a stand-alone driver without slave to drive IGBT modules without parallel connection or it can be used with 1 to 2 slaves 1SP0625D to drive up to 3 parallel connected IGBT modules. The following sections explain the basic topology of 1SP0625V or 1SP0625S (master) as well as 1SP0625D (slave) as well as the parallel operation of master and slave(s).

1. 1SP0625V/1SP0625S (Master)

The basic topology of the 1SP0625V and 1SP0625S drivers is shown in Fig. 2. The same driver can be used as a stand-alone driver without slave or with up to 2 slaves. The 2 slaves can be directly connected to the master over the provided paralleling interfaces X2 and X3. X2 and X3 interfaces are fully identical.

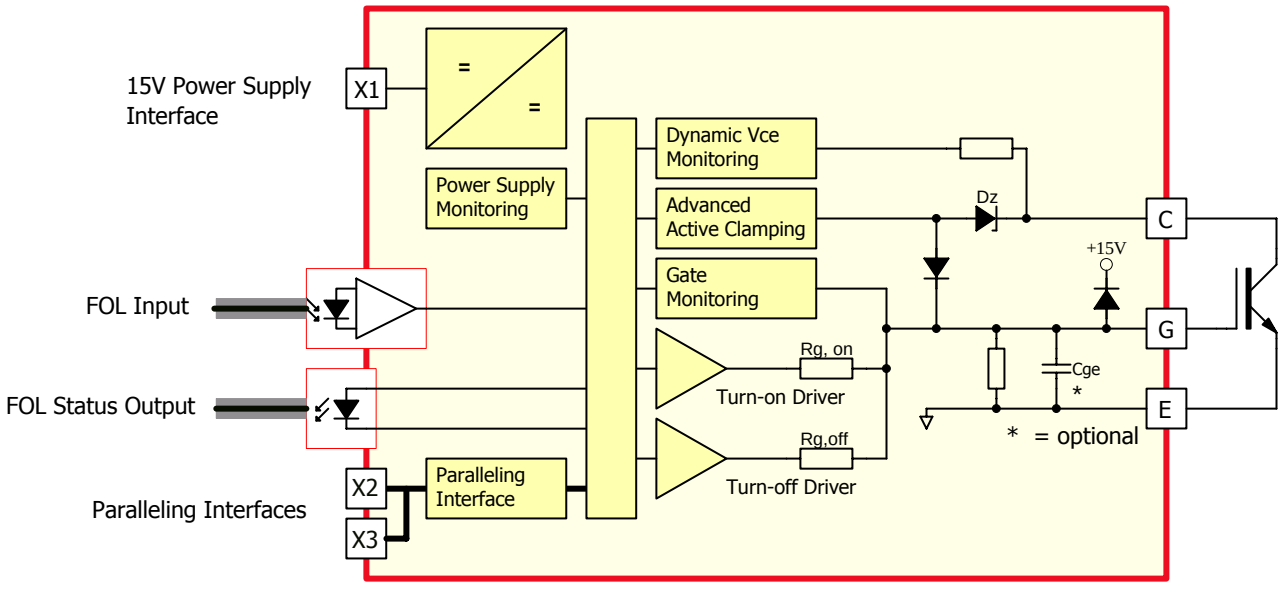


Fig. 2 Basic schematic of the 1SP0625V and 1SP0625S drivers

The driver is equipped with the following features:

- DC/DC converter designed for IGBT modules of the voltage class up to 3300V
- Power supply monitoring
- Fiber-optic interface (drive input and fault feedback)
- Dynamic Vce monitoring (short-circuit protection)
- Advanced active clamping (overvoltage protection at turn-off)
- Gate-monitoring

- Paralleling interfaces X2 and X3 for the master-slave connection

All necessary components for optimal and safe driving of the relevant IGBT module like smallest gate resistors in order to minimize switching losses, gate clamping, etc. are included on the driver. Moreover, it includes components for setting the turn-off trip level and the response time. Its plug-and-play capability means that it is ready to operate immediately after mounting. The user needs invest no effort in designing or adjusting the driver to a specific application.

The values for the gate resistors and other key components can be found in the specific datasheets for a given IGBT module /3/.

2. 1SP0625D (Slave)

The basic topology of the 1SP0625D drivers is shown in Fig. 3. 1SP0625D drivers can only be used in conjunction with 1SP0625V or 1SP0625S drivers when parallel connection of IGBT drivers is required. 1SP0625D driver can be connected over the paralleling interface X2 or X3 to a master 1SP0625V or 1SP0625S. Up to 2 slaves (and a master) can be directly parallel connected.

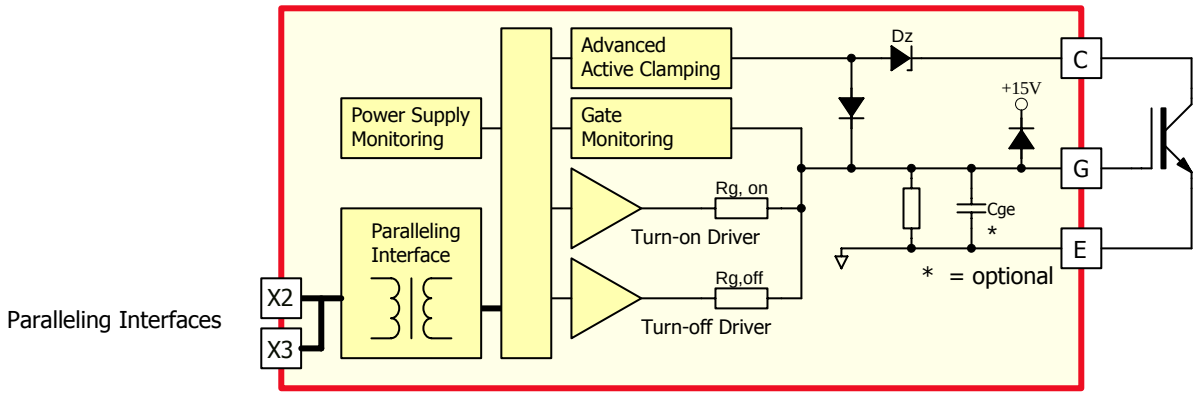


Fig. 3 Basic schematic of the 1SP0625D drivers

The driver is equipped with the following features:

- Power supply monitoring
- Advanced active clamping (overvoltage protection at turn-off)
- Gate-monitoring
- Paralleling interfaces X2 and X3 for the master-slave connection

All necessary components for optimal and safe driving of the relevant IGBT module like smallest gate resistors in order to minimize switching losses, gate clamping, etc. are included on the driver.

The supply voltage as well as the input signal are delivered from the master over the paralleling interfaces X2 or X3. No DC/DC converter as well as no fiber-optics are available on the driver 1SP0625D. Moreover no desaturation protection is implemented on the slave, as it is already implemented on the master.

Its plug-and-play capability means that it is ready to operate immediately after mounting. The user needs invest no effort in designing or adjusting the driver to a specific application.

The values for the gate resistors and other key components can be found in the specific datasheets for a given IGBT module /4/.

3. Parallel connection of IGBT modules with master and slave(s)

If parallel connection of 2 or 3 IGBT modules is required, one master as well as 1 or 2 slaves must be used. The basic principle is illustrated in Fig. 4.

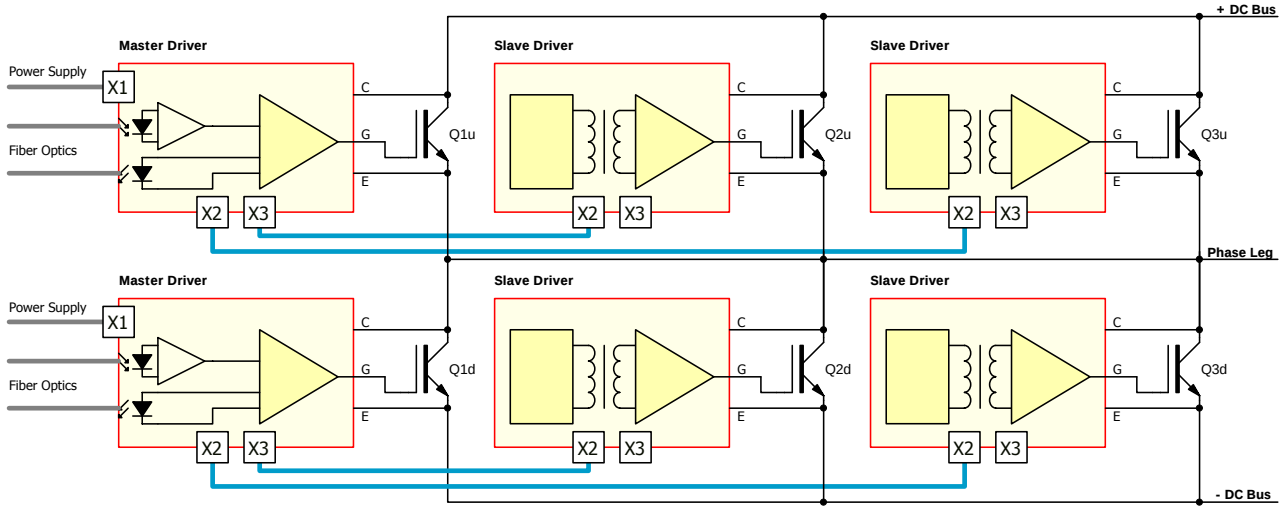


Fig. 4 Principle of parallel connection of 1SP0625 drivers with one master and 2 slaves in a half-bridge configuration

The electrical isolation is realized on the master (DC/DC converter with transformer for the power supply as well as fiber-optic interface for the input signal and the status feedback). The power supply of the slave as well as the input signal and gate monitoring feedback is transmitted to/from the slave from/to the master over the interface bus connected to the paralleling interfaces X2 and/or X3 respectively. Both interfaces X2 and X3 are fully identical and interchangeable on the master as well as on the slave. The paralleling interface X2 or X3 makes sure that all paralleled drivers switch on and off synchronously.

The Five Steps to Success

The following steps point out the easy way to use 1SP0625 drivers in power converters:

1. Choose a suitable driver

When applying 1SP0625 drivers, you should note that they are specifically adapted to a particular type of IGBT module.

The type designation of the driver consequently also includes a number corresponding to a specific IGBT module (see "Ordering Information").

If no parallel connection of IGBT modules is required, only one master 1SP0625V or 1SP0625S is to be used. If parallel connection is required, one master as well as 1 or 2 slaves is to be used.

These drivers are not valid for IGBT modules other than those specified. Incorrect use may result in failure.

2. Attach the drivers to the IGBT modules (one driver per IGBT module)

Any handling of IGBT modules or drivers is subject to the general specifications for protecting electrostatic-sensitive devices according to international standard IEC 60747-1, Chapter IX or European standard EN 100015 (i.e. the workplace, tools, etc. must comply with these standards).

If these specifications are ignored, both IGBTs and drivers may be damaged.

The driver can be easily mounted onto an IGBT module by screwing the corresponding terminals.

3. Connect the driver to the control electronics

Master: Connect the power supply plug X1 as well as the fiber-optic transmitters and receivers. If parallel connection is required, the paralleling interfaces X2 and/or X3 must be connected to the slave(s).

Slave(s): Connect the paralleling interfaces X2 or X3 to the master. One master must be used in conjunction with the slave(s).

4. Check the driver function

Check the gate voltage of all drivers (master and slaves): For the off-state, the nominal gate voltage is specified in the relevant data sheets /3/ and /4/. For the on-state, it is +15V. Also check the input current consumption of the driver without clock signals and at the desired switching frequency.

These tests should be performed before installation, as the gate terminals may otherwise not be accessible.

5. Set up and test the power stack

Before starting up the system, it is recommended that each logical switch (parallel connection of IGBT modules) be checked separately under power-cycling conditions. It is usually sufficient to apply the single or double-pulse technique. CONCEPT specially recommends users to check that the IGBT modules switch inside the SOA in the worst case condition, as this strongly depends on the specific converter construction.

Even if only single IGBTs are tested, all the system's gate drivers must be supplied with energy. All the other IGBTs are then kept in the off state by applying negative gate voltages. This is particularly important when switching the IGBTs under test.

The short-circuit behavior can also be verified at this point.

The system is then ready to start under real-world load conditions. This allows the thermal behavior of the whole arrangement to be determined.

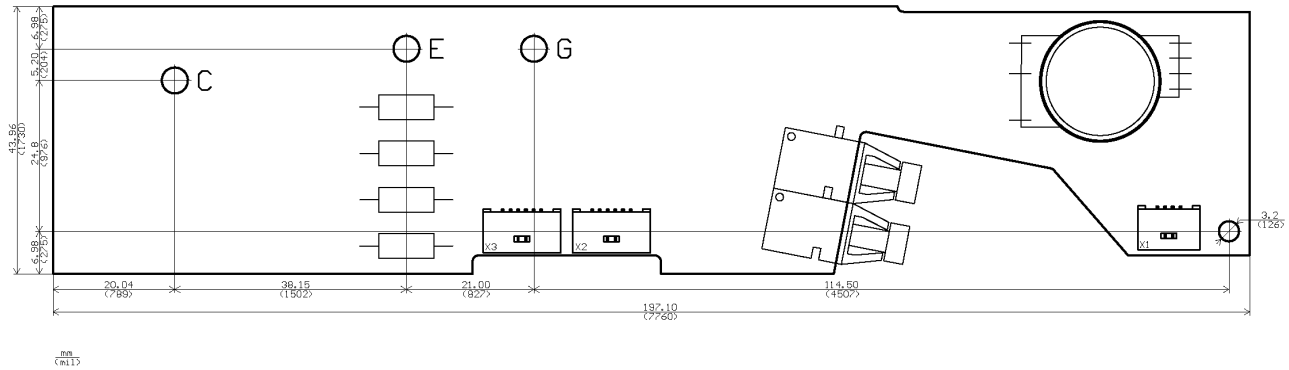
The system must be re-qualified over the entire specified range of temperature and load conditions.

CAUTION: All handling with high voltages involves risk to life.

It is imperative to comply with the respective safety regulations!

Mechanical Dimensions

1. 1SP0625V (Master)

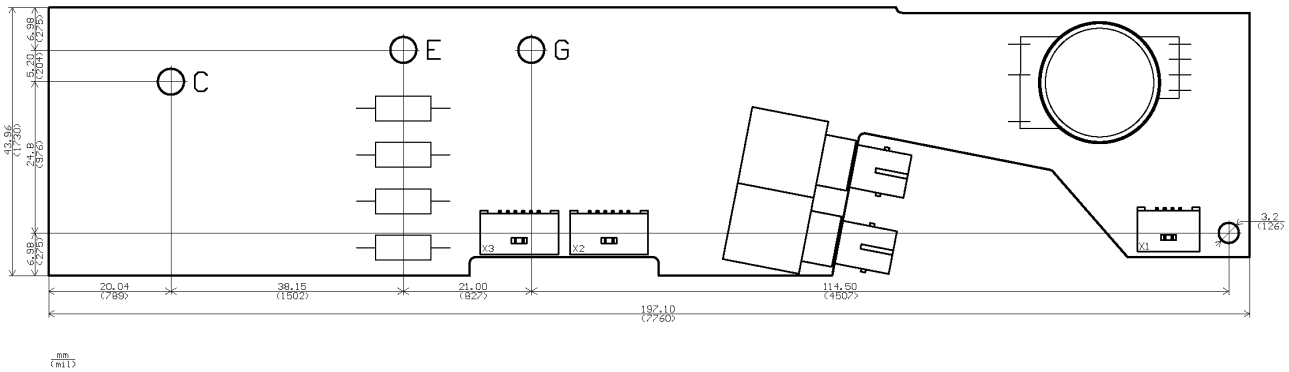


Max. driver height: 12mm measured from bottom layer

Electrical connector on the driver and recommended cables: refer to the relevant data sheet /3/

Fig. 5 Mechanical dimensions of 1SP0625V

2. 1SP0625S (Master)

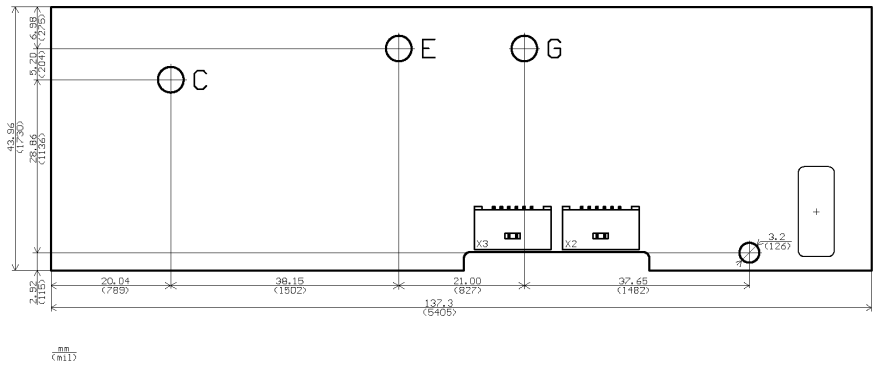


Max. driver height: 13mm measured from bottom layer

Electrical connector on the driver and recommended cables: refer to the relevant data sheet /3/

Fig. 6 Mechanical dimensions of 1SP0625S

3. 1SP0625D (Slave)



Max. driver height: 6mm measured from bottom layer

Electrical connector on the driver and recommended cables: refer to the relevant data sheet /4/

Fig. 7 Mechanical dimensions of 1SP0625D

Pin Designation of Connector X1 (Power Supply of 1SP0625V/1SP0625S)

Pin	Des.	Function	Pin	Des.	Function
1	GND	Ground	2	VDC	+15V for DC/DC converter
3	VDC	+15V for DC/DC converter	4	GND	Ground

Description of Interface X1 (Power Supply of 1SP0625V/1SP0625S)

The driver is equipped with a 4-pin interface connector to supply the DC-DC converter for the secondary side. It is recommended to connect both GND as well as both VDC pins. For recommended cables, please consult the corresponding driver data sheet /3/.

The driver limits the inrush current at startup, and no external current limitation of the voltage source for VDC is needed.

Description of the Fiber-Optic Input (1SP0625V/1SP0625S)

It is the drive input.

Description of the Fiber-Optic Output (1SP0625V/1SP0625S)

During normal operation (i.e. the driver is supplied with power at nominal voltage, and there is no fault anywhere), the status feedback is "light on" at the optical link. A malfunction is signaled by "light off".

Each edge of the control signal is acknowledged by the driver with a short pulse (light is off for a period of about 700ns). As this can be observed by the host controller, this method allows simple and continuous

monitoring of all drivers and fiber-optic links of the system. Figure 8 shows the control and response signals of a gate driver for normal operation.

Figure 9 shows the response of the driver in case of a short-circuit fault. The fault status is transferred to the status feedback terminal after the response time. The light is then driven "off" during the delay to clear the fault state (about 11µs). The driver shuts the IGBT off about 2.4µs after the response time. The IGBT can be turned on again by applying a positive edge to the corresponding fiber-optic input after the fault status has disappeared.

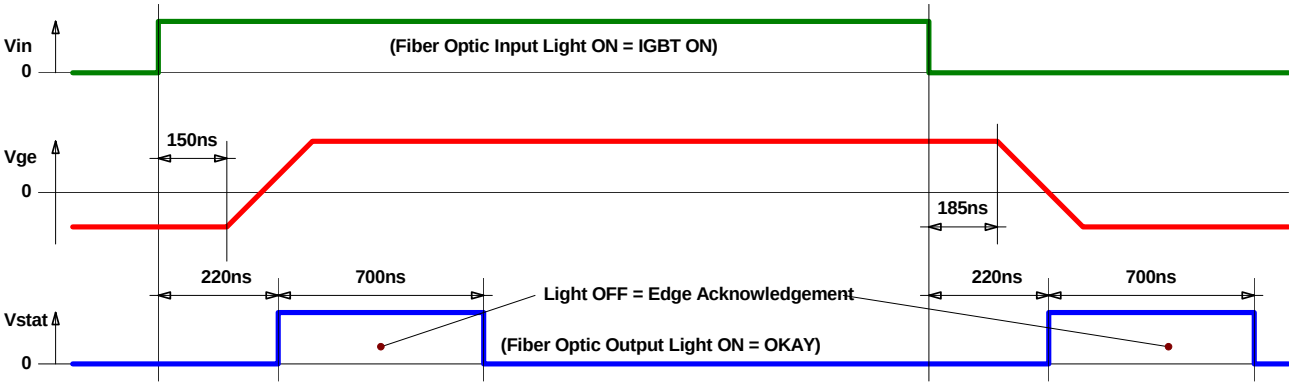


Fig. 8 Driver behavior and status feedback in normal operation

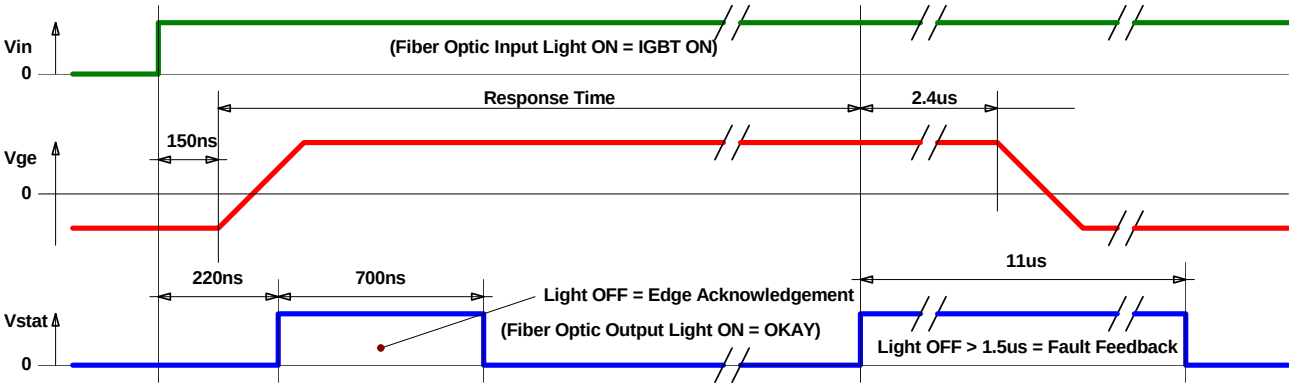


Fig. 9 Driver behavior and status feedback in short-circuit condition

In case of gate monitoring failure, the response of the driver is basically the same as in Fig. 9 (the response time delay is replaced by the filter delay). The fault status is transferred to the status feedback terminal. The light is then driven "off" during the delay to clear the fault state.

In case of a secondary supply undervoltage fault, the response of the driver is basically the same as in Fig. 9. The fault status keeps active and the driver channel is locked as long as the supply undervoltage remains on the corresponding driver channel.

N.B. During power up, the status feedback will also show a fault condition until the supply undervoltage disappears.

Recommended Interface Circuitry for Fiber Optics (1SP0625V/1SP0625S)

The fiber-optic links are available in two versions (refer to the relevant data sheet /3/): "Versatile" fiber-optic link (1SP0625V) and "ST" fiber-optic link (1SP0625S). See also Figs. 5 and 6.

The recommended circuitry for the fiber-optic links is given in Fig. 10 (1SP0625V) and Fig. 11 (1SP0625S).

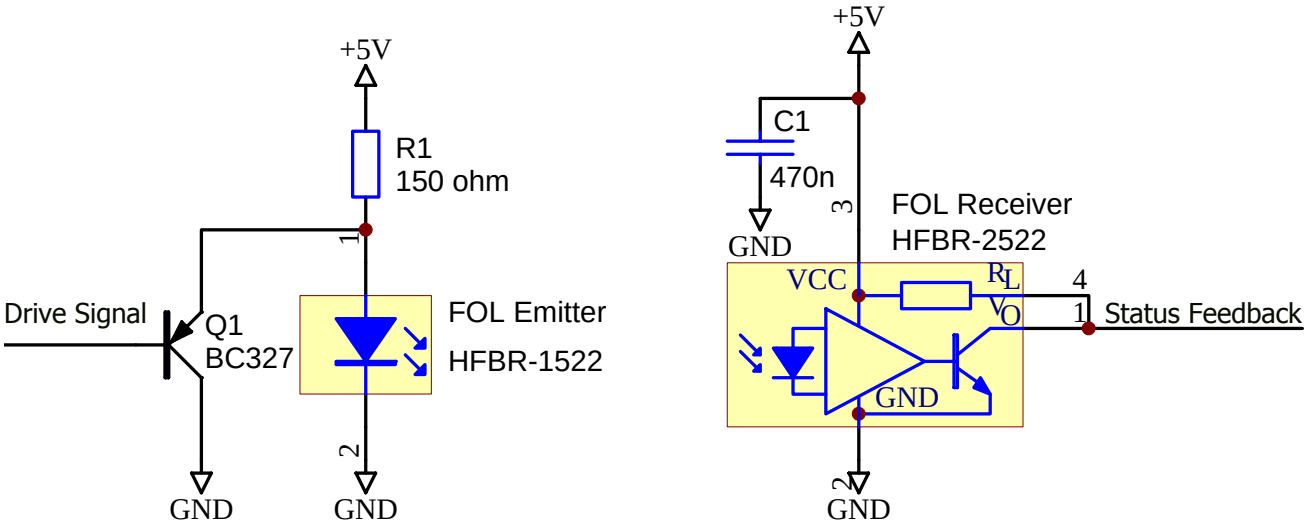


Fig. 10 Recommended circuitry for the "versatile" fiber-optic links (1SP0625V)

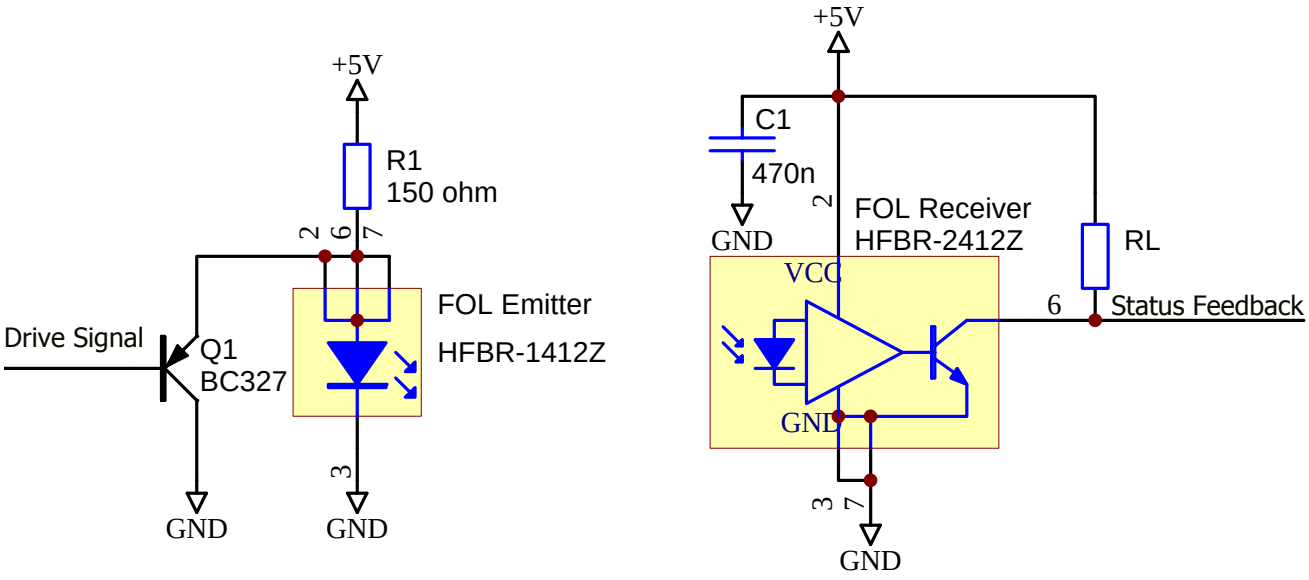


Fig. 11 Recommended circuitry for the "ST" fiber-optic links (1SP0625S)

Description of Paralleling Interfaces X2 and X3

General

The paralleling interfaces X2 and X3 are available on 1SP0625V/1SP0625S (master) as well as on 1SP0625D (slave). They allow to connect:

- A master to one or two slaves
- A slave to the master

Both connectors X2 and X3 are connected in parallel. The following signals are available on this interface:

- Supply voltage from the master to the slaves
- Drive signal from the master to the slaves. The drivers are configured so that all paralleled IGBT modules switch on and off synchronously.
- Gate-monitoring signal from the slaves to the master

For recommended cables, please consult the corresponding driver data sheet /3/ or /4/.

Please note that the paralleling cables carry high potential. The voltage rating of the recommended cables is only 300V. They must therefore be isolated with a corresponding insulating sleeve (see Fig. 1).

LED-Status Indicators

To facilitate verification, master and slave drivers are each equipped with a green status LED. They are located close to the fiber-optic links (master) respectively close to the paralleling interface X2 (slave) and light up under normal operation. A turned-off LED means that the respective driver is not supplied with voltage, the supply voltage is too low (master and slave) or that the gate monitoring function has detected a fault condition (master). Moreover, in case of IGBT short-circuit, the LED on the master is switched off during the delay to clear fault state (see data sheet /3/ for timing information).

How Do 1SP0625V and 1SP0625S SCALE-2 Drivers Work in Detail?

Overview

The 1SP0625V and 1SP0625S series of plug-and-play single-channel drivers are designed for high-power and high-voltage IGBT modules. 1SP0625V and 1SP0625S SCALE-2 drivers are equipped with usual protection functions such as dynamic V_{ce} monitoring for short-circuit protection, supply-undervoltage shutdown and status feedback. A gate monitoring function is also implemented on 1SP0625V and 1SP0625S drivers. Moreover a paralleling interface allows the parallel connection up to 3 IGBT modules using slave drivers 1SP0625D (see also Fig. 2).

Outstanding features of 1SP0625V and 1SP0625S SCALE-2 drivers are: compact size, simple mounting - directly onto the IGBT module, advanced active-clamping function, very low propagation delay time. Active clamping describes an active scheme designed to protect the IGBTs against overvoltage during turn-off. It is

particularly relevant when turning an IGBT off in cases of high DC-link voltage and collector current or short circuit.

Power supply and electrical isolation

The driver is equipped with a DC/DC converter to provide an electrically insulated power supply to the gate driver circuitry. SCALE-2 plug-and-play drivers are designed for the same insulation and test voltages as the corresponding IGBT module (Refer to the data sheets /3/).

Note that the driver needs a stabilized supply voltage.

Clearance and creepage distances are designed according to IEC 60077-1. Please note that it is necessary to apply the provided plastic case over the driver primary side and the transformer in order to fulfill the clearance and creepage distances given in the data sheets /3/.

Power-supply monitoring

The driver's secondary-side is equipped with a local undervoltage monitoring circuit.

In case of secondary-side supply undervoltage, the IGBT (as well as all paralleled IGBTs if parallel connection of IGBT is used) is driven with a negative gate voltage to keep it in the off-state (the driver is blocked) and a fault condition is transmitted to the fiber-optic status feedback.

Even in the case of a low power supply voltage, the driver provides a low-impedance path from the IGBT gate to the emitter.

Within a half-bridge, it is advised not to operate the IGBTs with an IGBT driver in the event of a low supply voltage. Otherwise, a high rate of increase of V_{ce} may cause partial turn-on of these IGBTs.

V_{ce} monitoring / short-circuit protection

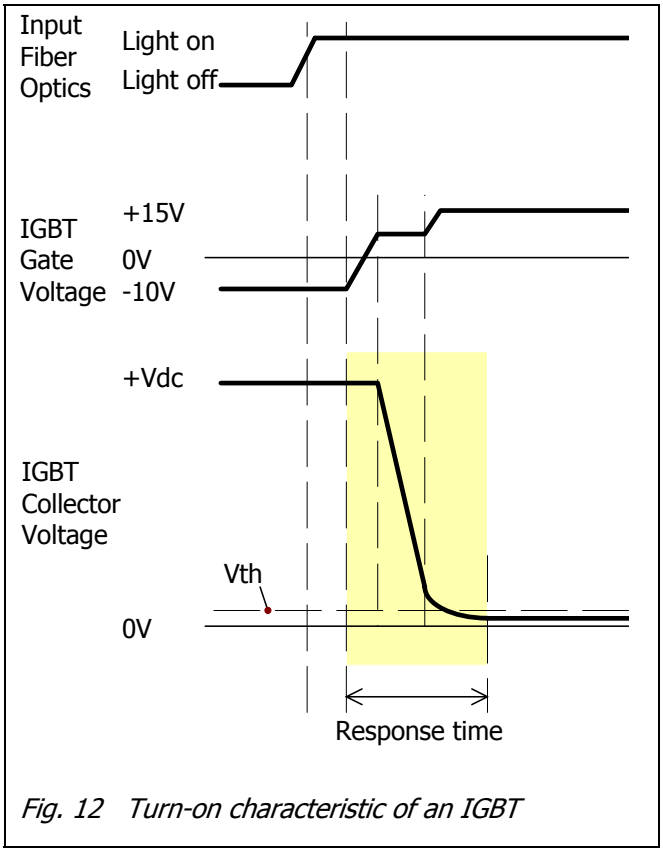


Fig. 12 Turn-on characteristic of an IGBT

A dynamic V_{ce} monitoring circuit is implemented in 1SP0625V and 1SP0625S SCALE-2 drivers. The IGBT collector-emitter voltage is measured with a resistor network.

V_{ce} is checked after the response time (see Fig. 10) at turn-on to detect a short circuit. If this voltage is higher than the programmed threshold Vth, the driver detects a short circuit at the IGBT and signals it immediately to the fiber-optic status feedback. After an additional delay, the corresponding IGBT is switched off. The fault feedback is automatically reset after the delay to clear the fault state. The IGBT is turned on again as soon as the next positive edge is applied to the fiber-optic input after the fault status has disappeared.

The dynamic V_{ce} monitoring circuit allows to better fit the Vce curve form. It should be noted that the response time is as a consequence dependent on the DC-link voltages. It increases with decreasing DC-link voltages. Please read the relevant driver data sheet for timing information /3/.

Note: The desaturation function is for short-circuit detection only and cannot provide overcurrent protection. However, overcurrent detection has a lower time priority and can be easily provided by the application.

Gate monitoring

The driver is equipped with a gate monitoring function. The mean value $V_{GE,mean}$ of all gate voltages (master and all slaves) is filtered and compared to reference values at turn-on and turn-off (Refer to the corresponding data sheet for the values /3/). If the specified values are exceeded ($V_{GE,mean}<V_{GE,on,min}$ at turn-on resp. $V_{GE,mean}>V_{GE,off,max}$ at turn-off) the driver turns-off all parallel-connected IGBTs and a fault is transmitted to the status output.

The gate monitoring function allows to avoid the operation of the converter if one or more paralleled drivers are not switching according to the reference value (drive signal input).

How Do 1SP0625D Drivers Work in Detail?

Overview

The 1SP0625D series of plug-and-play single-channel drivers (slaves) are designed for high-power and high-voltage IGBT modules. They can only be used in conjunction with 1SP0625V or 1SP0625S SCALE-2 drivers

(masters) when parallel connection of IGBT modules is required. A paralleling interface allows the connection of the slaves 1SP0625D with the master driver 1SP0625V or 1SP0625S (see also Fig. 3).

The drivers are equipped with protection functions such as supply-undervoltage shutdown and gate monitoring function. No V_{ce} monitoring is implemented on 1SP0625D drivers as this function is already implemented on the master driver.

Outstanding features of 1SP0625D drivers are: compact size, simple mounting - directly onto the IGBT module, advanced active-clamping function, very low propagation delay time. The slave drivers are fully synchronized with the master driver thanks to the paralleling interface. Moreover they don't need a separate power supply as it is delivered over the paralleling interface.

Power supply and electrical isolation

The power supply of 1SP0625D is delivered from the master driver over the paralleling interfaces X2 or X3. The insulation is provided on the master driver, so no isolation has to be provided on the slaves.

However, an insulation of $200V_{peak}$ is provided on the slave drivers. This allows to withstand dynamic voltage differences between parallel connected drivers in case of not fully symmetrical switching operation.

The signal insulation is realized with a planar transformer.

Coreless common mode coils are placed in the supply conductors in order to limit the dynamic equalizing currents flowing from and to the master during not fully symmetrical switching operation. Please read the corresponding data sheet for allowed max. values /3/. It is recommended to measure the resulting equalizing current flowing over the paralleling interface. This can be easily done by using a Rogowsky coil over the paralleling cable.

Note that the peak value as well as the rms value of the equalizing current can be reduce by inserting a ferrite core over the paralleling cables if required.

Clearance and creepage distances are designed according to IEC 60077-1.

Power-supply monitoring

The slave drivers are equipped with a local undervoltage monitoring circuit.

In case of supply undervoltage, the corresponding IGBT is driven immediately with a negative gate voltage to keep it in the off-state (the channel is blocked). Only the corresponding IGBT is switched off immediately, not all paralleled IGBTs. However, all other paralleled connected IGBTs will be turned off by the gate monitoring function implemented on all drivers after the given delay (see corresponding data sheet /3/ for timing information).

In case of a supply voltage interruption of the master, it cannot be predicted which driver (master or slaves) will detect the supply undervoltage first. In order to avoid asynchronous turn-off of parallel connected IGBT modules in case of a local undervoltage supply voltage detection of a slave driver, the used is advised to implement an additional supply voltage monitoring on the primary supply voltage of the master driver. The threshold limit should be set at 13V. As soon as the main supply voltage of the master falls below this limit, the master driver must be turned off. All parallel connected IGBT modules will then be switched off synchronously.

Even in the case of a low power supply voltage, the driver provides a low-impedance path from the IGBT gate to the emitter.

Within a half-bridge, it is advised not to operate the IGBTs with an IGBT driver in the event of a low supply voltage. Otherwise, a high rate of increase of V_{ce} may cause partial turn-on of these IGBTs.

V_{ce} monitoring / short-circuit protection

No Vce monitoring circuit is implemented on the slave drivers as the function is already implemented on the master driver.

Gate monitoring

Refer to the paragraph "Gate monitoring" under "How Do 1SP0625V and 1SP0625S SCALE-2 Drivers Work in Detail?" on page 14.

General Considerations using 1SP0625V/1SP0625S/1SP0625D

Parallel connection of IGBT modules using 1SP0625 drivers

When using 1SP0625 drivers to drive parallel connected IGBT modules, it is important – like in every parallel connection of IGBT modules – to ensure symmetrical operation of the parallel connected IGBT modules. Measurements in half-bridge topologies have shown that highly symmetrical operation of the paralleled IGBT modules can be reached when using a properly designed converter. The following points must especially be considered:

- It is important to have low-inductance connection between all paralleled IGBT modules. This avoids large difference voltages between these IGBT modules.
- The converter should be constructed as symmetrical as possible regarding the paralleled IGBT modules in order to ensure symmetrical operation. Especially the DC-link stray inductance of each paralleled IGBT module should be similar.
- Generally speaking it is advantageous to keep the DC-link stray inductance of the converter low.

Figure 13 shows an exemplary turn-on transition (collector voltages and currents) of two 1500A/3300V IGBT modules controlled with a 1SP0625 drivers.

Dynamic behavior of IGBTs

The dynamic behavior of IGBT modules depends on the type and manufacturer due to the particular behavior of the included IGBT and diode chips, the particular module construction and the distribution of internal gate resistances and inductances. Note that different module types from the same manufacturer may also require a specific gate-driver adaptation.

CONCEPT therefore supplies specific versions of SCALE-2 plug-and-play drivers adapted to the particular IGBT module. These drivers must not be used with IGBT modules other than those for which they were specified.

Turn-on of the IGBT / commutation of diode current

When a driver input goes high, the gate driver turns on the corresponding IGBT. The driver already includes the gate resistors, which are matched to the relevant IGBT module.

The driver is optimized to achieve minimum switching losses for the case of relatively low inductances within the power stack. It is recommended to check the commutation behavior within the final system assembly.

Turn-off of the IGBT

The IGBT is turned off when the corresponding input turns low. The gate resistors are determined by CONCEPT and must not be altered.

Fast turn-off of the IGBT may cause overvoltage, which increases with DC-link voltage or load current. The turn-off overvoltage can be approximated by:

$V_{tr} = -L_s * di_c/dt$

where V_{tr} is the turn-off overvoltage, i_c the collector current and L_s the stray inductance.

Most competing drivers are unable to limit the overvoltage in case of overload or short circuit. However, this is essential for high-power or high-voltage IGBTs. To solve this problem, SCALE-2 plug-and-play drivers provide an advanced active-clamping function which is described below.

Advanced active clamping

Active clamping is a technique designed to partially turn on the IGBT in case the collector-emitter voltage exceeds a predefined threshold. The IGBT is then kept in linear operation. The basic circuit for active clamping can be found in /5/.

Basic active-clamping topologies implement a single feedback path from the IGBT's collector through transient voltage suppressor devices (TVS) to the IGBT gate. 1SP0625 SCALE-2 drivers support CONCEPT's advanced active clamping based on this principle: when active clamping is activated, the turn-off MOSFET of the driver is switched off in order to improve the effectiveness of the active clamping and to reduce the losses in the TVS. This feature is mainly integrated in the secondary side ASIC.

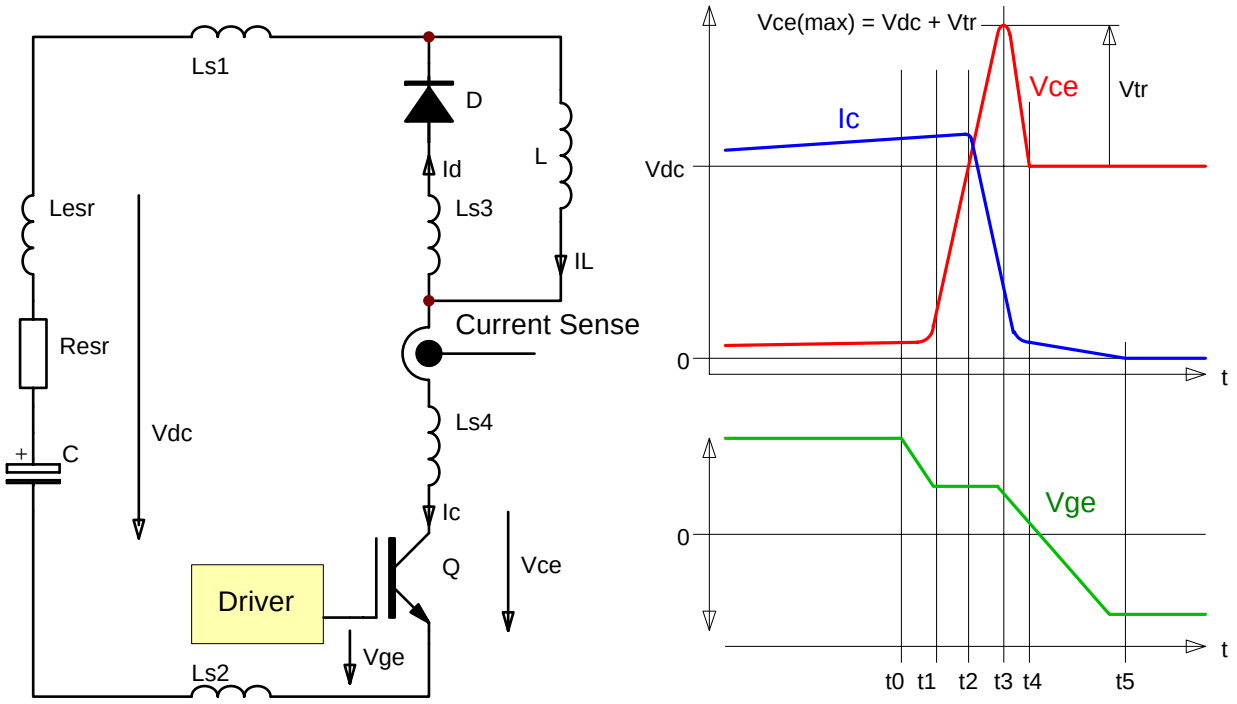


Fig. 14 Test circuit (left) and typical switching behavior (right)

Legend to Fig. 14

t0 = Initiation of the turn-off process
t1 = Start of turn-off time
t2 = Start of collector current fall time
t3 = Maximum collector voltage
t4 = IGBT is blocking, start of tail current
t5 = End of tail current

In comparison with other driving methods, active clamping allows enhanced utilization of the IGBT modules during normal operation by increasing the switching speed and therefore reducing switching losses. The overvoltage at fault-current turn-off is also managed by active clamping. For the maximum permitted DC-link voltage, refer to the gate driver data sheets /3/ and /4/.

Figure 15 shows an exemplary turn-off transition of a 1500A/3300V IGBT module controlled with a 1SP0625V driver.

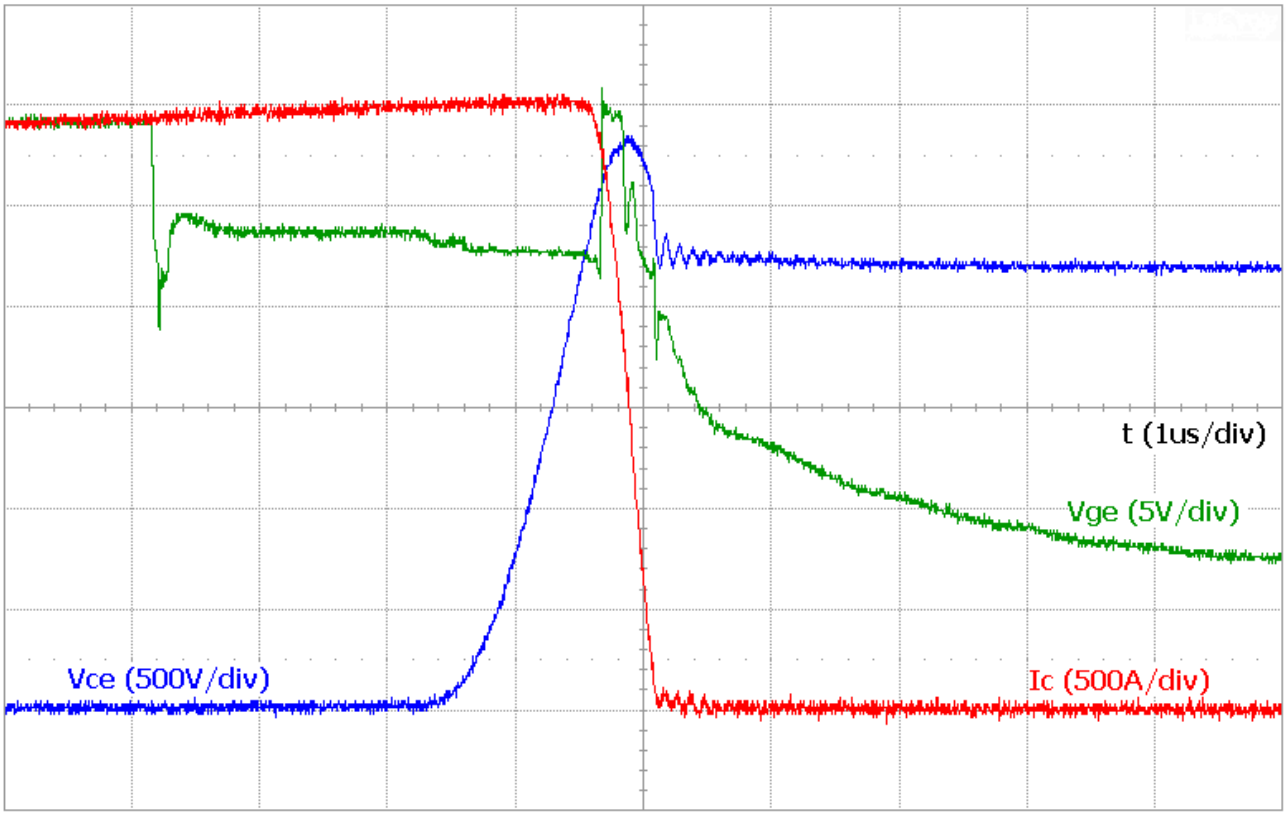


Fig. 15 Behavior of a 1500A/3300V IGBT module turning off at a DC-link voltage of 2200V a collector current of 3000A, which is twice the nominal collector current

Low-inductance layout

The active-clamping function should not lead anyone to forget about the inductances of the power stack. For several reasons, it is still necessary to reduce the DC-link stray inductance to about 40nH…120nH with 1SP0625 plug-and-play drivers.

3-level and multilevel topologies

If 1SP0625 drivers are to be used in 3-level or multilevel topologies, please refer to the application note AN-0901 on www.IGBT-Driver.com/go/app-note.

Higher requirements for traction applications or similar

The power-supply interface X1 as well as the paralleling interfaces X2 and X3 provide a mechanical interlock and are suitable for traction applications.

The vibration withstand capability of 1SP0625 SCALE-2 drivers can be improved by screw-fitting the driver board onto the cooler.

Furthermore, an interlocking version of the fiber optic links is also available and ST fiber-optic links may also be supplied (1SP0625S). For available fiber-optic links, refer to the data sheets /3/.

Note that clearance and creepage distances are designed according to IEC 60077-1.

Bibliography

/1/ "Smart Power Chip Tuning", Bodo's Power Systems, May 2007

/2/ "Description and Application Manual for SCALE Drivers", CONCEPT

/3/ Data sheets SCALE-2 plug-and-play driver 1SP0625x2Mx-xxx, CONCEPT

/4/ Data sheets SCALE-2 plug-and-play driver 1SP0625D2Sx-xxx, CONCEPT

/5/ "Driver Solutions for High-Voltage IGBTs", PCIM Europe Magazine, April 2002

Note: These documents are available on the Internet at www.IGBT-Driver.com/go/papers

The Information Source: SCALE-2 Driver Data Sheets

CONCEPT offers the widest selection of gate drivers for power MOSFETs and IGBTs for almost any application needs. The largest website on gate-drive circuitry anywhere contains all data sheets, application notes and manuals, technical information and support sections: www.IGBT-Driver.com

Quite Special: Customized SCALE-2 Drivers

If you need an IGBT driver that is not included in the delivery range, please don't hesitate to contact CONCEPT or your CONCEPT sales partner.

CONCEPT has more than 20 years experience in the development and manufacture of intelligent gate drivers for power MOSFETs and IGBTs and has already implemented a large number of customized solutions.

Technical Support

CONCEPT provides expert help with your questions and problems:

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-2 series are manufactured to the ISO9001:2000 quality standard.

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.

Ordering Information

See the current list on www.IGBT-Driver.com/go/1SP0625

Refer to www.IGBT-Driver.com/go/nomenclature for information on driver nomenclature

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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, evaluation systems product documentation and application support

Please click onto: www.IGBT-Driver.com

Manufacturer

CT-Concept Technologie AG
Intelligent Power Electronics
Renferstrasse 15
CH-2504 Biel-Bienne
Switzerland

Tel. +41 - 32 - 344 47 47
Fax +41 - 32 - 344 47 40

E-mail Info@IGBT-Driver.com
Internet www.IGBT-Driver.com