

## Data Sheet

# SCALE High Voltage IGBT Driver 1SD210F2-FX400R65KF1

Plug-and-play, compact, high performance, single channel driver for 2-level, 3-level, and multilevel converters

### Abstract

The SCALE HVI 1SD210F2-FX400R65KF1 is a compact single-channel intelligent gate driver designed for EUPEC's high-voltage IGBTs type FD400R65KF1-K and FZ400R65KF1. The driver features a fiber optic interface and a selectable operation mode via jumper.

For drivers adapted to other types of high-power and high-voltage IGBT modules refer to [www.Igbt-Driver.com/HVI](http://www.Igbt-Driver.com/HVI)

### Product Highlights

- ✓ Plug-and play solution
- ✓ Protects the IGBT from short-circuit failure
- ✓ Active clamping of Vce at turn-off
- ✓ Extremely reliable; long service life
- ✓ No electrolytic capacitors
- ✓ Gate current up to -6A/+10A
- ✓ Fiber-optic links
- ✓ Monitoring of supply voltage and fiber optics
- ✓ Switching frequency DC to max. 3kHz
- ✓ Duty cycle 0... 100%
- ✓ Suitable DC/DC power supply as separate unit
- ✓ Shorten application's development time

### Applications

- ✓ Three/multi-level converters
- ✓ Two-level converters
- ✓ Medium-voltage converters
- ✓ High-voltage applications
- ✓ Industrial drives
- ✓ Traction
- ✓ Railroad power supplies
- ✓ Wind-power converters
- ✓ Radiology and laser technology
- ✓ Research
- ✓ Almost all other conceivable

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**Important: Please Refer to the Related Manuals!**

This data sheet contains only product-specific data. For a detailed description, must-read application notes, and common data that apply to the whole series, please refer to "Description and Application Manual for 1SD210F2 SCALE High Voltage IGBT Drivers".

**Quality Standard**

Manufacturing ISO9001 certified.

**Mechanical and Electrical Interfaces**

Dimensions: 156 x 79.5 mm. Mounting Principle: Direct screw mount on IGBT.

<b>Interface</b>	<b>Remarks</b>	<b>Part type #</b>
Drive signal input	Fiber optic receiver (Notes 14, 16)	HFBR-2522
Status output	Fiber optic transmitter (Notes 14, 17)	HFBR-1522
Power supply connector	On board connector (Note 15)	77315-101-05

  

<b>Power supply connector</b>	<b>Designator</b>	<b>Pin numbers</b>
Ground	GND (Note 19)	1, 2, 4, 5
Supply voltage	$V_{DC}$	3

**Absolute Maximum Ratings**

<b>Parameter</b>	<b>Remarks</b>	<b>min</b>	<b>max</b>	<b>Unit</b>
Supply voltage $V_{DC}$	VDC to GND (Note 1)	0	17.3	V
Gate peak current $I_{out}$	Note 8	-6	+10	A
Average supply current $I_{DC}$	Note 3		190	mA
Output power gate driver	Notes 3, 11		2	W
Switching frequency	Note 11		3	kHz
DC link voltage	Note 5		4400	V
Operating temperature	Note 11	-40	+85	°C
Storage temperature		-40	+90	°C

### Electrical Characteristics

All data refer to +25°C and  $V_{DC} = 16.4V$  unless otherwise specified

Power supply	Remarks	min	typ	max	units
Nominal supply voltage $V_{DC}$	VDC to GND (Note 1)	15.5	16.4	16.8	V
Supply current $I_{DC}$	Without load (Note 2)		80		mA
Turn-on threshold $V_{th}$	Note 4		14		V
Hysteresis on-/off	Note 4		1.0		V

Short-circuit protection	Remarks	min	typ	max	units
Vce-monitoring threshold	Between aux. terminals		1200		V
Response time	3-level mode (Notes 10, 18)		10.8	11.5	ms
Response time	2-level mode (Notes 6, 18)		11.6	12.4	ms
Blocking time	2-level mode (Note 7)		1		s

Timing characteristics	Remarks	min	typ	max	units
Turn-on delay $t_{pd(on)}$	Note 12		430		ns
Turn-off delay $t_{pd(off)}$	Note 12		520		ns
Output rise time $t_{r(out)}$	Note 9		100		ns
Output fall time $t_{f(out)}$	Note 9		100		ns
Acknowledge delay time	At status output (Note 13)		450		ns
Acknowledge pulse width	At status output	0.7		1.8	ms

Gate Output	Remarks	min	typ	max	units
Turn-on gate resistor $R_{g(on)}$	Note 8		6.2		W
Turn-off gate resistor $R_{g(off)}$	Note 8		36		W
Aux. gate capacitor $C_{ge}$			47		nF

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### Footnotes to the key data

- 1) Supply voltages higher than specified can lead to the destruction of the driver and protection circuits on the output side. The gate-emitter voltage tracks with the supply voltage. (Not regulated by the gate drive unit.) The recommended DC/DC power supply ISO3116I with high voltage isolation capability is a suitable separate unit.
- 2) Static power consumption of the gate driver.
- 3) If the specified power consumption of the gate driver is exceeded at average, this indicates an overload of the gate driver and the external DC/DC power supply ISO3116I.
- 4) Under-voltage monitoring of supply voltage of the gate driver. For a voltage lower than that limit, the power modules are switched off.
- 5) This limit is due to active clamping. Refer to "Description and Application Manual for 1SD210F2 SCALE High Voltage IGBT Drivers".
- 6) Pulswidth of the direct output of the gate drive unit. (Not covering the delay of the gate resistors.)
- 7) Duration of blocking the command input (keeping the gate driver and the IGBT in off-state) after fault detection, i.e. power supply undervoltage lock out, or – only at 2-level mode - short circuit detection. (For three/multilevel mode, turn-off under short-circuit condition is managed by the host controller.)
- 8) The gate current is limited by on-board gate resistors.
- 9) Refers to the direct output of the gate drive unit. (Not covering the delay of the gate resistors.)
- 10) Including the delay of external fiber optic links. Measured from turn-on transition at direct output of the gate drive unit (not covering the delay of the gate resistors) to the transition of status signal at the host controller side optical receiver.
- 11) Application-specific self-heating of gate drivers and IGBT modules, especially at high switching frequency, must be taken into account. Commonly, the switching frequency is limited due to 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. So, it is recommended to check the gate driver's ambient temperature within the system.
- 12) Including the delay of external fiber optic links. Measured from the transition of turn-on or turn-off command at the host controller side optical transmitter to direct output of the gate drive unit. (Not covering the delay of the gate resistors.)
- 13) Including the delay of external fiber optic links. Measured from the transition of turn-on or turn-off command at the host controller side optical transmitter to the transition of acknowledge signal at the host controller side optical receiver.
- 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.semiconductor.agilent.com](http://www.semiconductor.agilent.com)
- 15) Connector and cable to the DC/DC power supply are not delivered with the gate driver, but via FCI inc. Recommended crimp contact housing: order code 65039-032; recommended crimp contacts: 5 pcs, order code 48236-002. Refer to [www.fciconnect.com](http://www.fciconnect.com)
- 16) The recommended transmitter current at the host controller is 30-35mA, suitable for plastic optic fiber with a length of less than 2.5 meters. Higher current may increase jitter or delay at turn-off.
- 17) The transmitter current at the gate driver is 30-35mA.
- 18) The delay from turn-on transition at direct output of the gate drive unit to the turn-on of the IGBT amounts to about 2ms (due to gate resistors). But turn-off at short-circuit happens without delay; so the real short-circuit time is 2ms less than the response time.
- 19) GND of power supply is not the same electrical potential as the aux. emitter terminal of the IGBT and they must never be connected together.

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**Exclusion Clause**

CONCEPT 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 Technology Ltd. apply.

**Technical Support**

CONCEPT offers you expert help for your questions and problems:

[www.IGBT-Driver.com/support](http://www.IGBT-Driver.com/support)

E-Mail: [Support@CT-Concept.com](mailto:Support@CT-Concept.com)

Fax international +41 32 341 71 21

**Quite Special: Customized SCALE HVI Drivers**

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

CONCEPT engineers have more than 15 years experience in the development and manufacture of intelligent drivers for power MOSFETs and IGBTs and have already implemented a large number of customized solutions.

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## Ordering Information

**Related IGBT****CONCEPT Driver Type #**

EUPEC FD400R65KF1-K	1SD210F2- FX400R65KF1
EUPEC FZ400R65KF1	1SD210F2- FX400R65KF1
EUPEC FD400R65KF1-K	1SD210F2- FX400R65KF1 Opt. 01
EUPEC FZ400R65KF1	1SD210F2- FX400R65KF1 Opt. 01

Opt. 01: Lateral fiber optic interface, see "Description and Application Manual for 1SD210F2 SCALE High Voltage IGBT Drivers".

## Information about Other Products

**For drivers adapted to other high-voltage IGBT modules**

Direct link: [www.IGBT-Driver.com/HVI](http://www.IGBT-Driver.com/HVI)

**Other drivers and evaluation boards**

Please click: [www.IGBT-Driver.com](http://www.IGBT-Driver.com)

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