

## Data Sheet

# SCALE High Voltage IGBT Driver 1SD418F2-FX800R33KF2

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

### Abstract

The SCALE HVI 1SD418F2-FX800R33KF2 is an ultra compact single-channel intelligent gate driver designed for EUPEC's high-voltage IGBTs type FD800R33KF2 and FZ800R33KF2. The driver features a fiber optic interface, a built-in DC/DC power supply, and 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  $V_{ce}$  at turn-off
- ✓ Extremely reliable; long service life
- ✓ No electrolytic capacitors
- ✓ Gate current up to  $\pm 18A$
- ✓ Electrical isolation 6000  $V_{AC}$
- ✓ Fiber-optic links
- ✓ Monitoring of supply voltage and fiber optics
- ✓ Switching frequency DC to max. 6kHz
- ✓ Duty cycle 0... 100%
- ✓ Build-in DC/DC power supply
- ✓ Shorten application's development time

### Applications

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

## Data Sheet 1SD418F2-FX800R33KF2

**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 1SD418F2 SCALE High Voltage IGBT Drivers".

**Quality Standard**

Manufacturing ISO9001 certified.

**Mechanical and Electrical Interfaces**

Dimensions: 183 x 38 (47) 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 18, 20)	HFBR-2522
Status output	Fiber optic transmitter (Notes 18, 21)	HFBR-1522
Power supply connector	On board connector (Note 19)	77315-101-05

  

<b>Power supply connector</b>	<b>Designator</b>	<b>Pin numbers</b>
Ground	GND	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	16	V
Gate peak current $I_{out}$	Note 8	-18	+18	A
Average supply current $I_{DC}$	Note 3		400	mA
Output power DC/DC converter	Notes 3, 13		4	W
Switching frequency	Note 13		6	kHz
Test voltage (50Hz/1min)	Primary to output (Note 17)		6000	$V_{AC}(eff)$
DC link voltage	Note 5		2200	V
Operating temperature	Note 13	-40	+85	°C
Storage temperature		-40	+90	°C

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### Electrical Characteristics

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

<b>Power supply</b>	<b>Remarks</b>	<b>min</b>	<b>typ</b>	<b>max</b>	<b>units</b>
Nominal supply voltage $V_{DC}$	VDC to GND (Note 1)	14,5	15	15,5	V
Supply current $I_{DC}$	Without load (Note 2)		120		mA
Efficiency $\eta$	Internal DC/DC converter		85		%
Turn-on threshold $V_{th}$	Note 4		13		V
Hysteresis on-/off	Note 4		0.7		V
Coupling capacitance $C_{io}$	Primary to output		15		pF
<b>Short-circuit protection</b>	<b>Remarks</b>	<b>min</b>	<b>typ</b>	<b>max</b>	<b>units</b>
Vce-monitoring threshold	Between aux. terminals	50		60	V
Response time	3-level mode (Note 11)		8.2	8.8	ms
Response time	2-level mode (Note 6)		9.3	10	ms
Blocking time	2-level mode (Note 7)		1		s
<b>Timing characteristics</b>	<b>Remarks</b>	<b>min</b>	<b>typ</b>	<b>max</b>	<b>units</b>
Turn-on delay $t_{pd(on)}$	Note 14		400		ns
Turn-off delay $t_{pd(off)}$	Note 14		550		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 16)		450		ns
Acknowledge pulse width	At status output	0.7		1.8	ms
<b>Gate Output</b>	<b>Remarks</b>	<b>min</b>	<b>typ</b>	<b>max</b>	<b>units</b>
Turn-on gate resistor $R_{g(on)}$	Note 8		2.1		W
Turn-off gate resistor $R_{g(off)}$	Note 8		3.4		W
Aux. gate capacitor $C_{ge}$			220		nF
<b>Electrical Isolation</b>	<b>Remarks</b>	<b>min</b>	<b>typ</b>	<b>max</b>	<b>units</b>
Operating voltage (Note 10)	Continuous or repeated			3300	V
Test voltage (50Hz/1min)	Primary to output (Note 17)			6000	$V_{AC}(eff)$
Partial discharge extinction volt.	IEC1287 / <10pC	2600			$V_{AC}(eff)$
Creepage distance	Primary to output	20			mm

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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 primary supply voltage. (Not regulated by the supply circuitry or by the gate drive unit.)
- 2) Static power consumption of the gate driver.
- 3) If the specified power consumption is exceeded at average, this indicates an overload of the DC/DC converter. The DC/DC converter is not protected against overload.
- 4) Under-voltage monitoring of power supply. For a voltage lower than that limit, the power modules are switched off. The voltage refers to the secondary supply voltage of the gate driver, which is approximately the same as the voltage between VDC and GND.
- 5) This limit is due to active clamping. Refer to "Description and Application Manual for 1SD418F2 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) Maximum continuous or repeatedly-applied DC voltage or peak value of the repeatedly-applied AC voltage between the power supply inputs and all other terminals.
- 11) 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.
- 13) 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.
- 14) 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.)
- 16) 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.
- 17) The test voltage 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 isolation layers due to the partial discharge. Consequently, this test is not performed at CONCEPT as a series test. In the case of repeated isolation 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 10% for each additional test. The more modern if more elaborate partial-discharge measurement is better suited than such test methods as it is almost entirely non-destructive.
- 18) 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)
- 19) Customer-side connector is 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)
- 20) 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.
- 21) The transmitter current at the gate driver is 30-35mA.

### 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.

## Data Sheet 1SD418F2-FX800R33KF2

## Ordering Information

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

EUPEC FD800R33KF2  
EUPEC FZ800R33KF2

1SD418F2- FX800R33KF2  
1SD418F2- FX800R33KF2

## 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)

## Manufacturer

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