

# SKYPER 12 press-fit 450A 1700V



**SKYPER®**

## Plug & Play Driver Board for SEMiX453GB17E4p

Order Number  
L5066604 – Driver  
27895404 – Module

### SKYPER 12 press-fit 450A 1700V

#### Features

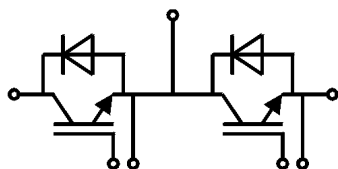
- Dynamic short circuit detection with SoftOff
- Undervoltage lockout on primary side and secondary side
- Internal power supply
- ROHS, UL recognized

#### Typical Applications\*

- Solar inverters
- Power supplies
- Motor drives

#### Remarks

- All data refer to  $T_{op} = +25^{\circ}\text{C}$  and  $V_S = V_{S(typ)}$  unless otherwise specified
- Environmental conditions please see technical explanation

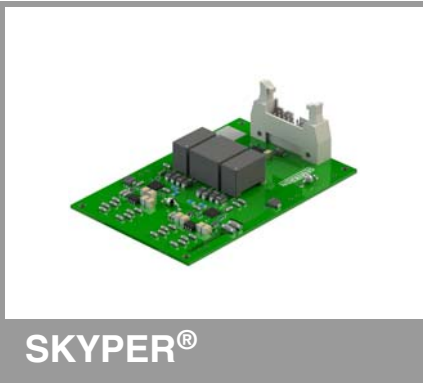


Two channel driver

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
$V_S$	Supply voltage primary side	15.7	V
$V_{IH}$	Input signal voltage (HIGH)	$V_S + 0.4$	V
$V_{IL}$	Input signal voltage (LOW)	$\text{GND} - 0.4$	V
$f_{max}$	Maximum switching frequency <sup>1)</sup>	13	kHz
$V_{CE}$	Collector emitter voltage <sup>2)</sup>	1700	V
$V_{DC}$	DC-Link voltage <sup>3)</sup>	1200	V
dv/dt	Rate of rise and fall of voltage secondary to primary side	50	kV/ $\mu\text{s}$
$V_{isol}$	Insulation test voltage <sup>4)</sup>	4000	V
$T_{op}$	Operating temperature	-40 ... 85	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature	-40 ... 85	$^{\circ}\text{C}$

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
$V_S$	Supply voltage primary side	14.4	15	15.6	V
$V_{UVLO(prim)}$	Undervoltage lockout primary side	12.2		13.9	V
$V_{UVLO(secP)}$	Undervoltage lockout secondary side, positive voltage	9.4			V
$V_{UVLO(secN)}$	Undervoltage lockout secondary side, negative voltage	-5.8		-4.1	V
$I_{S(idle)}$	Supply current primary side (no load)		120		mA
$I_{S(max)}$	Supply current primary side (full load)			450	mA
$V_I$	Input signal voltage on/off		$V_S/0$		V
$R_{IN(sw)}$	Input resistance (switching signals)		33		k $\Omega$
$C_{IN(sw)}$	Input capacitance (switching signals)		1		nF
$V_{G(on)}$	Turn-on output voltage		15		V
$V_{G(off)}$	Turn-off output voltage		-11.3		V
$t_{d(on)}$	Turn-on propagation delay time		1		$\mu\text{s}$
$t_{d(off)}$	Turn-off propagation delay time		1		$\mu\text{s}$
$R_{IN(terr)}$	Input resistance (error input)		150		k $\Omega$
$C_{IN(terr)}$	Input capacitance (error input)		10		nF
$t_{d(terr)}$	Error propagation delay time <sup>5)</sup>		0.6		$\mu\text{s}$
$t_{d(terr,ext)}$	External error propagation delay time <sup>6)</sup>		0.6		$\mu\text{s}$
$t_{IDT}$	Interlock dead time <sup>7)</sup>		2		$\mu\text{s}$
$t_{jitter}$	Signal transfer time deviation <sup>8)</sup>		$\pm 12.5$		ns
$t_{SPS}$	Short pulse suppression		0.395		$\mu\text{s}$
$t_{POR}$	Power-on reset time		0.15		s
$t_{reset}$	Error reset time <sup>9)</sup>	0.03			ms
$V_{CE(ref)}$	Reference voltage for $V_{CE}$ -monitoring <sup>10)</sup>		8.2		V
$t_{bl(VCE)}$	Blanking time $V_{CE}$ -monitoring <sup>11)</sup>		5.4		$\mu\text{s}$
$R_{OTLO}$	Over temperature lockout <sup>12)</sup>		243		$\Omega$
$R_{G(on)}$	Populated gate resistor for turn-on		2.06		$\Omega$
$R_{G(off)}$	Populated gate resistor for turn-off		0		$\Omega$
$l_{clear(PS)}$	Shortest distance in air, primary side to secondary side	13			mm
$l_{clear(SS)}$	Shortest distance in air, secondary sides	6.1			mm
$l_{clear(TS)}$	Shortest distance in air, temperature sensor pads to secondary side	3.1			mm
$l_{clear(TP)}$	Shortest distance in air, temperature sensor pads to primary side	13			mm

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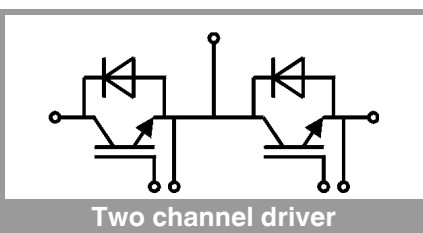
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#### Remarks

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Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
$I_{creep(PS)}$	Shortest distance along the surface, primary side to secondary side	13			mm
$I_{creep(SS)}$	Shortest distance along the surface, secondary sides	6.1			mm
$I_{creep(TS)}$	Shortest distance along the surface, temperature sensor pads to secondary side	6.1			mm
$I_{creep(TP)}$	Shortest distance along the surface, temperature sensor pads to primary side	13			mm
$V_{PDPS}$	Partial discharge extinction voltage, primary side to secondary side <sup>13)</sup>	2107			V
$V_{PDTP}$	Partial discharge extinction voltage, temperature sensor pads to primary side <sup>13)</sup>	2107			V
w	Weight		45		g
MTBF	Mean Time Between Failure <sup>14)</sup>		7.5		$10^6\text{h}$



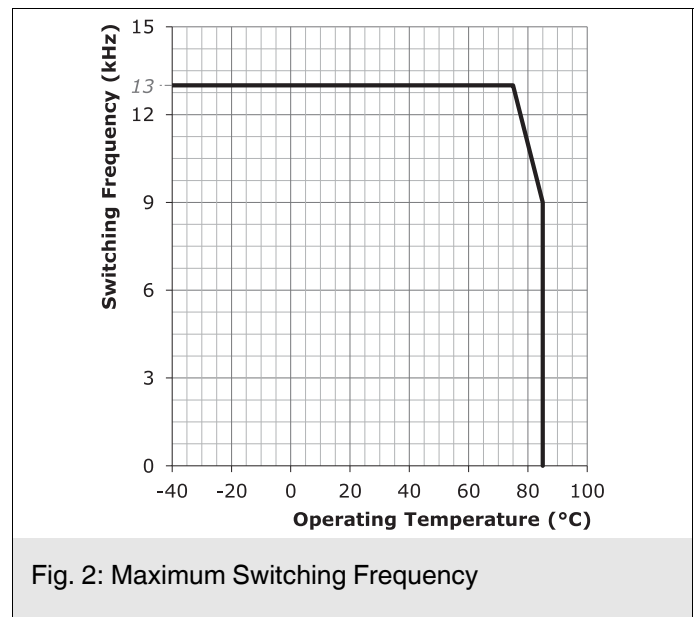
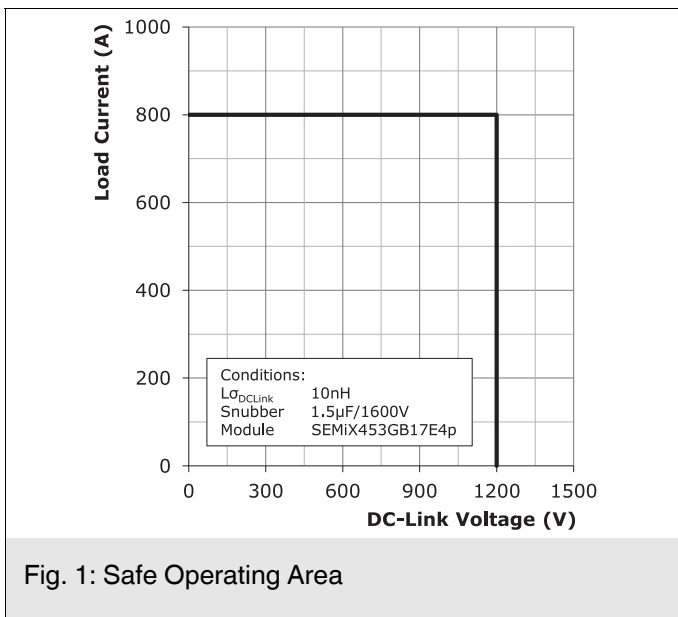
## Footnotes

Footnote	Description
1)	The rated maximum switching frequency is valid for an operating temperature up to 75°C. For operating temperatures above 75°C the limits are specified according to the graph 'Maximum Switching Frequency'.
2)	Voltage class of semiconductor.
3)	The DC-Link voltage is limited due to the specified safe operation area boundaries.
4)	Test Conditions: ACrms, 2s, input to output
5)	Time between the driver detects an error at the secondary side until the primary side reports an error at the interface.
6)	Time between the driver receives an external error signal at the primary side until the driver turns off its outputs at the secondary side.
7)	The interlock dead time prevents the two outputs from being activated simultaneously. The dead time generation starts with each turn-off command at the driver's primary side.
8)	The jitter is defined as the maximum deviation of the switching signal propagation delay time at constant environmental conditions.
9)	Minimum time of the driver in error state.
10)	The driver detects a desaturation event, when one of its outputs is in on-state and the applied voltage at the corresponding V <sub>CE</sub> -monitoring input exceeds the reference voltage for V <sub>CE</sub> -monitoring.
11)	Time elapsed when the driver starts the power semiconductor's turn-on process after the V <sub>CE</sub> -monitoring input has fallen below the reference voltage for V <sub>CE</sub> -monitoring.
12)	The driver sets both outputs to V <sub>G(off)</sub> , if the ohmic resistance of the applied temperature sensor is less than R <sub>OTLO</sub> . For proper function of the temperature lockout a NTC temperature sensor has to be used. The temperature sensor of the SEMIKRON's SEMiX 3 press-fit modules has an ohmic resistance of R <sub>OTLO</sub> at 130°C, typically.
13)	The partial discharge extinction voltage in this data sheet is defined as peak voltage.
14)	Conditions: T <sub>op</sub> = 40°C; full load

## Signal Connector

PIN	Signal	Function	Specifications
X10:01	reserved		To be connected to ground
X10:02	BOT_IN	Switching signal input (BOT)	15V logic; 33k $\Omega$ /1nF (pull-down) LOW = BOT switch off HIGH = BOT switch on
X10:03	nERR_OUT	Error output	Open collector output; max. 18V/15mA (external pull-up resistor needed) LOW = Error HIGH = No error
X10:04	TOP_IN	Switching signal input (TOP)	15V logic; 33k $\Omega$ /1nF (pull-down) LOW = TOP switch off HIGH = TOP switch on
X10:05	nERR_IN	Error input	15V logic inverted; 150k $\Omega$ /10nF (pull-up) LOW = External error HIGH = No external error
X10:06	reserved		To be connected to ground
X10:07	reserved		To be connected to ground
X10:08	PWR_VS	Driver power supply	Stabilised +15V $\pm$ 4%
X10:09	PWR_VS	Driver power supply	Stabilised +15V $\pm$ 4%
X10:10	PWR_GND	Ground potential for power supply and digital inputs	To be connected to ground
X10:11	PWR_GND	Ground potential for power supply and digital inputs	To be connected to ground
X10:12	reserved		To be connected to ground
X10:13	reserved		To be connected to ground
X10:14	reserved		To be connected to ground

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

## \*IMPORTANT INFORMATION AND WARNINGS

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