

Board 2//3S SKYPER 42 R



SKYPER®

IGBT Driver Core

Board 2//3S SKYPER 42 R

Preliminary Data

Features

- Two output channels
- Failure management

Typical Applications*

- Adaptor board for SKYPER IGBT drivers in bridge circuits for industrial applications
- DC bus up to 1200V

Footnotes

Isolation test voltage with external high voltage diode

The isolation test is not performed as a series test at SEMIKRON

The driver power can be expanded to 50µC with external boost capacitors

Isolation coordination in compliance with EN50178 PD2

Operating temperature is real ambient temperature around the driver core

Degree of protection: IP00

Absolute Maximum Ratings			
Symbol	Conditions	Values	Unit
V_s	Supply voltage primary	16	V
$I_{outPEAK}$	Output peak current	30	A
$I_{outAVmax}$	Output average current	150	mA
f_{max}	Max. switching frequency	100	kHz
V_{CE}	Collector emitter voltage sense across the IGBT	1700	V
V_{isolIO}	Isolation test voltage input - output (AC, rms, 2s)	4000	V
V_{isolPD}	Partial discharge extinction voltage, rms, $Q_{PD} \leq 10pC$	1500	V
V_{isol12}	Isolation test voltage output 1 - output 2 (AC, rms, 2s)	1500	V
$R_{Gon\ min}$	Minimum rating for external R_{Gon}	0.8	Ω
$R_{Goff\ min}$	Minimum rating for external R_{Goff}	0.8	Ω
T_{op}	Operating temperature	-40 ... 85	$^{\circ}C$
T_{stg}	Storage temperature	-40 ... 85	$^{\circ}C$

Characteristics					
Symbol	Conditions	min.	typ.	max.	Unit
V_s	Supply voltage primary side	14.4	15	15.6	V
V_i	Input signal voltage on / off		15 / 0		V
V_{IT+}	Input treshold voltage HIGH			12.3	V
V_{IT-}	Input threshold voltage (LOW)	4.6			V
$V_{G(on)}$	Turn on output voltage		15		V
$V_{G(off)}$	Turn off output voltage		-8		V
$t_{d(on)IO}$	Input-output turn-on propagation time		1.1		μs
$t_{d(off)IO}$	Input-output turn-on propagation time		1.1		μs

Adaptor board

Adaptor Board 2 parallel 3S SKYPER[®] 42 R

Technical Explanations

Revision 03

This Technical Explanation is valid for the following parts:

part number	type	date code (YYWW)
L5059201	Board 2 // 3S SKYPER [®] 42 R	≥ 1241

Related documents:

title
Technical Explanations SKYPER [®] 42 R

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Content

Application and Handling Instructions	2
Further application support	2
General Description	2
Dimensions	1
PIN Array	2
Setting Dynamic Short Circuit Protection	3
Collector Series Resistance.....	4
Adaptation Gate Resistors.....	5
Boost Capacitors	5
Temperature Signal	5
Mounting Notes.....	6
Parts List.....	6

Application and Handling Instructions

- Please provide for static discharge protection during handling. As long as the hybrid driver is not completely assembled, the input terminals have to be short-circuited. Persons working with devices have to wear a grounded bracelet. Any synthetic floor coverings must not be statically chargeable. Even during transportation the input terminals have to be short-circuited using, for example, conductive rubber. Worktables have to be grounded. The same safety requirements apply to MOSFET- and IGBT-modules.
- Any parasitic inductances within the DC-link have to be minimised. Over-voltages may be absorbed by C- or RCD-snubber networks between main terminals for PLUS and MINUS of the power module.
- When first operating a newly developed circuit, SEMIKRON recommends to apply low collector voltage and load current in the beginning and to increase these values gradually, observing the turn-off behaviour of the free-wheeling diode and the turn-off voltage spikes generated across the IGBT. An oscillographic control will be necessary. Additionally, the case temperature of the module has to be monitored. When the circuit works correctly under rated operation conditions, short-circuit testing may be done, starting again with low collector voltage.
- It is important to feed any errors back to the control circuit and to switch off the device immediately in failure events. Repeated turn-on of the IGBT into a short circuit with a high frequency may destroy the device.
- The inputs of the hybrid driver are sensitive to over-voltage. Voltages higher than $V_S + 0,3V$ or below $-0,3V$ may destroy these inputs. Therefore, control signal over-voltages exceeding the above values have to be avoided.
- The connecting leads between hybrid driver and the power module should be as short as possible (max. 20cm), the driver leads should be twisted.

Further application support

Latest information is available at <http://www.semikron.com>. For design support please read the SEMIKRON Application Manual Power Modules available at <http://www.semikron.com>.

General Description

The Board 2 parallel 3S SKYPER[®] 42 R is an adaptor board for the IGBT module SEMiX[®] (spring pin version) with size 3. The board is paralleling two SEMiX modules and realising a symmetrical gate control. The board can be customized allowing adaptation and optimization to the used IGBT module.

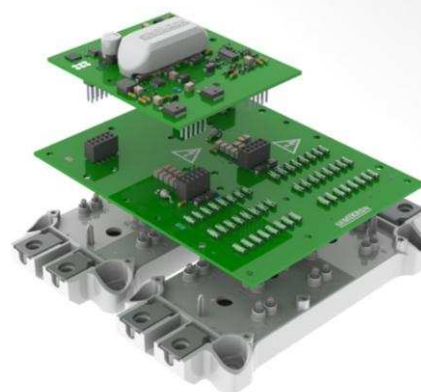
The switching characteristic of the IGBT can be influenced through user settings, e.g. changing turn-on and turn-off speed by variation of R_{Gon} and R_{Goff} . Furthermore, it is possible to adjust the monitoring level and blanking time for the DSCP (see Technical Explanations SKYPER[®] 42).

Please note:

This technical explanation is based on the Technical Explanations for SKYPER[®] 42PRO. Please read the Technical Explanations SKYPER[®] 42PRO before using the Adaptor Board.

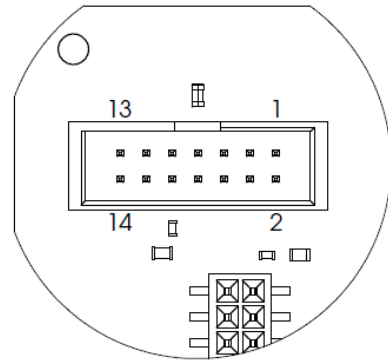
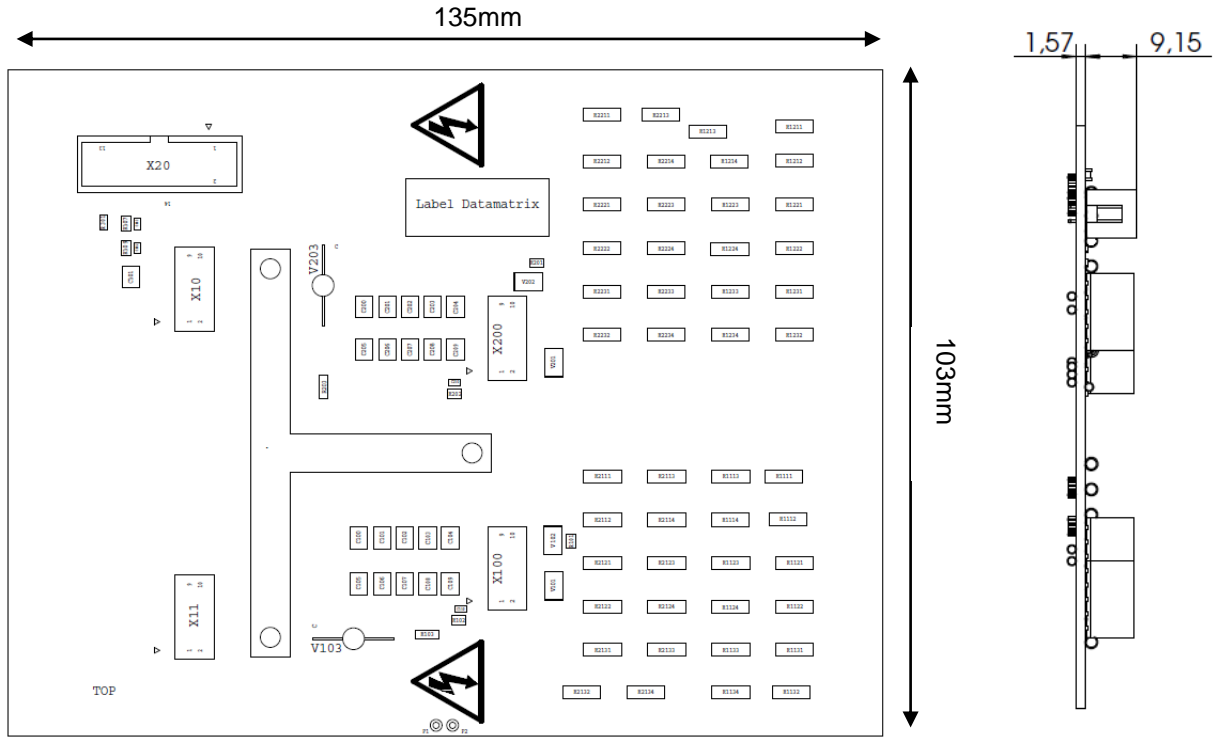
- Symmetric and decoupled gate control
- Easy plug and play solution with SKYPER 42 R
- Expandable up to 50 μC gate charge
- Dynamic Short Circuit Protection (DSCP) including high voltage diode
- Optimized paralleling of SEMiX 3S modules

Board 2 // 3S SKYPER[®] 42 R – not yet generated



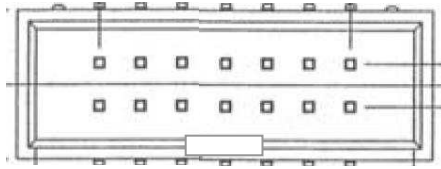
Dimensions

Adaptor Board



PIN Array

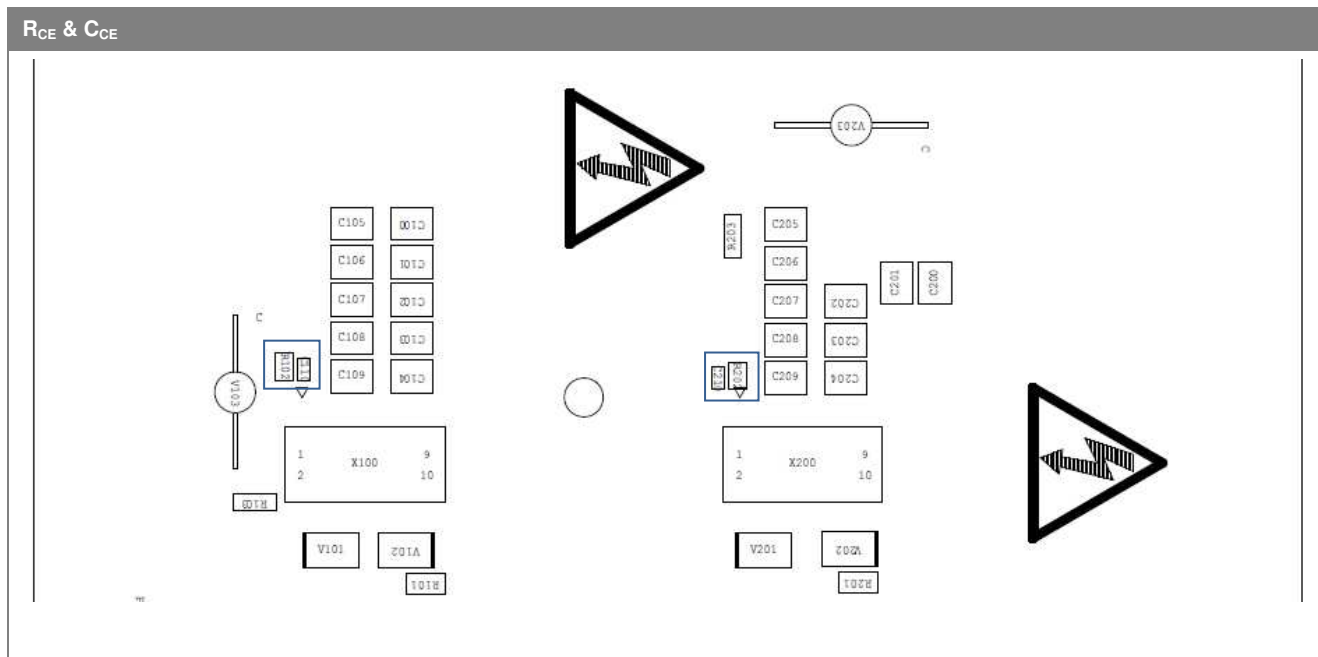
Connector X3 (male), RM2,54, 14p



Product information of suitable female connectors and distributor contact information is available at e.g. <http://www.harting.com>.

PIN	Signal	Function	Specification
X3:01	IF_PWR_GND	GND for power supply and GND for digital signals	
X3:02	IF_HB_BOT	Switching signal input (BOTTOM switch)	Digital 15 V; 10 kOhm impedance; LOW = BOT switch off; HIGH = BOT switch on
X3:03	IF_nERROR_OUT	ERROR output	LOW = NO ERROR; open collector output; max. 30V / 15mA (external pull up resistor necessary)
X3:04	IF_HB_TOP	Switching signal input (TOP switch)	Digital 15 V; 10 kOhm impedance; LOW = TOP switch off; HIGH = TOP switch on
X3:05	IF_PWR_GND	GND for power supply and GND for digital signals	
X3:06	reserved		
X3:07	reserved		
X3:08	IF_PWR_15P	Drive power supply	Stabilised +15V ±4%
X3:09	IF_PWR_15P	Drive power supply	Stabilised +15V ±4%
X3:10-14	IF_PWR_GND	GND for power supply and GND for digital signals	

Setting Dynamic Short Circuit Protection



Designation	Shape	Setting	
R102	0805	R_{CE} Factory setting: not equipped	TOP
C110	0603	C_{CE} Factory setting: not equipped	TOP
R202	0805	R_{CE} Factory setting: not equipped	BOT
C210	0603	C_{CE} Factory setting: not equipped	BOT

Please refer to the data sheet of SKYPER 42 R for V_{CE} formula.

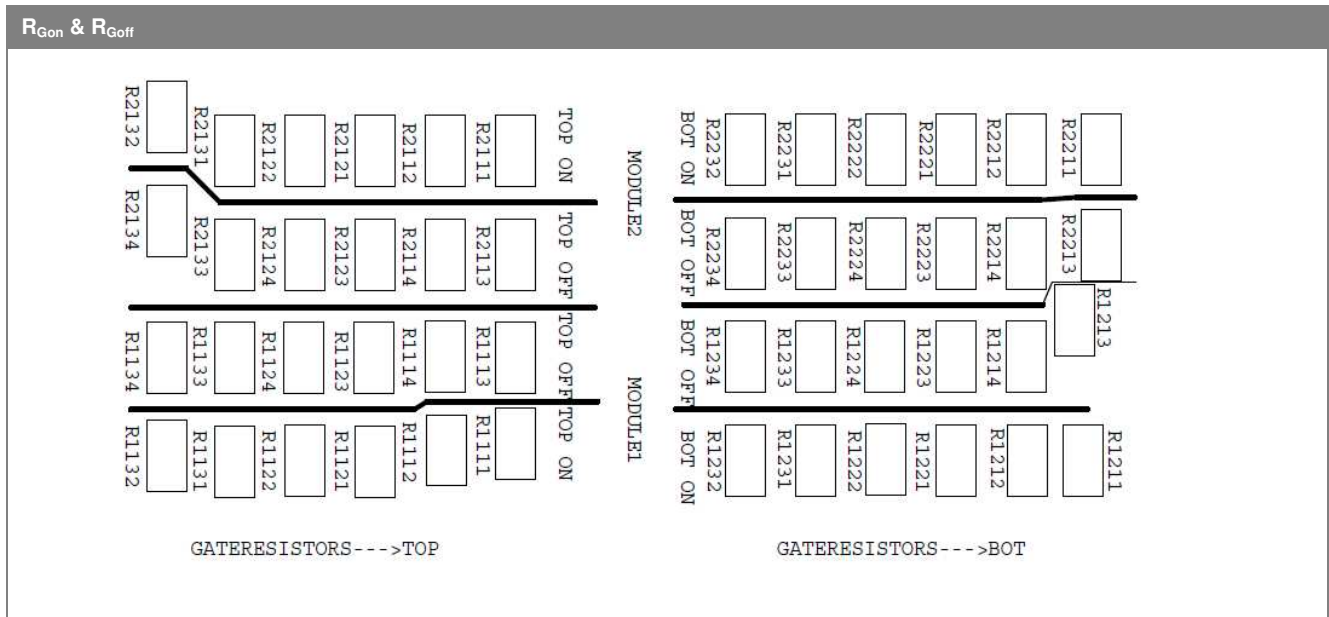
Collector Series Resistance

R_{VCE}

Designation	Setting	
R103	R _{VCE} * Factory setting: not equipped	TOP
R203	R _{VCE} * Factory setting: not equipped	BOT

Please consider that the RVCE resistor has to be equipped before operation.
 * 1200V IGBT operation: 0Ω
 1700V IGBT operation: 1kΩ / 0,4W

Adaptation Gate Resistors



Boost Capacitors

$C_{boost15P}$ & $C_{boost8N}$

Designation	Pattern Name	Setting	
C105, C106, C107, C108, C109	1210	$C_{boost+15V}$ Factory setting: C104, C106 = 10 μ F/25V* C107, C108, C109 = not equipped	TOP
C100, C101, C102, C103, C104	1210	$C_{boost-8V}$ Factory setting: C100, C101 = 10 μ F/25V * C102, C103, C104 = not equipped	TOP
C205, C206, C207, C208, C209	1210	$C_{boost+15V}$ Factory setting: C205, C206 = 10 μ F/25V* C207, C208, C209 = not equipped	BOT
C200, C201, C202, C203, C204	1210	$C_{boost-8V}$ Factory setting: C200, C201 = 10 μ F/25V * C202, C203, C204 = not equipped	BOT

* Output charge pulse
Formula: 4 μ F = 1 μ C -> 20 μ F capacitors on the adapter board = 5 μ C gate charge (SKYPER 42 R: 10 μ F)

Temperature Signal

The temperature sensor inside the SEMiX[®] module is directly connected to contacting points P1 and P2. For details to the temperature sensor, see Modules Explanations SEMiX[®].

Safety Warnings:

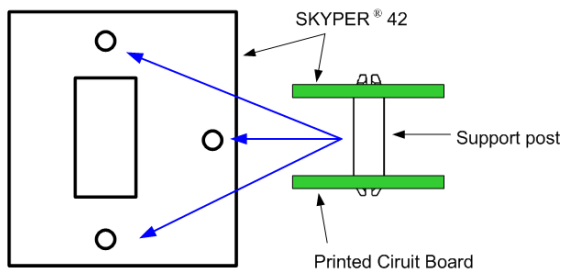


The contacting points T1 and T2 are not electrical isolated. Due to high voltage that may be present at the contacting points T1 and T2, some care must be taken in order to avoid accident. There is no cover or potential isolation that protect the high voltage sections / wires from accidental human contact.

Mounting Notes

Driver Core Mounting

1. Soldering of components (e.g. R_{Gon}, R_{Goff}, etc.) on adaptor board.
2. Insert driver core into the box connector on adaptor board.
3. The connecting leads between board and power module should be as short as possible (max. 20cm), the leads should be twisted.



The connection between driver core and adaptor board should be mechanical reinforced by using support posts. The posts have to be spaced between driver core and adaptor board.

Product information of suitable support posts and distributor contact information is available at e.g. <http://www.richco-inc.com>.

Parts List

Parts List Adaptor Board

Reference	Description	Value	Shape	Count
R101, R201	Resistor Chip	10,0KOhm	1206 (SMD)	2
R130, R131, R132, R133, R134, R135, R170, R171, R172, R173, R174, R175, R230, R231, R232, R233, R234, R235, R270, R271, R272, R273, R274, R275	Resistor Melf	1,00Ohm	MiniMelf (SMD)	24
R307, R309	Resistor Chip	10,0KOhm	0805 (SMD)	2
V103, V203	Diode High Voltage	BY203/20S	SMD	2
D130, D132, D134, D170, D172, D174, D230, D232, D234, D270, D272, D274	Diode Schottky	10BQ100	DO214AA (SMD)	12
C302, C303	Capacitor NP0	1,0nF	0603 (SMD)	2
R301	Resistor Melf	10,0KOhm	MicroMelf (SMD)	1
X10, X11, X100, X200	Connector	(female) RM2.54 10p	SMD 2ROW	4
X3	Connector	(male) RM2.54 14p	SMD	1
C100, C101, C105, C106, C200, C201, C205, C206, C301	Capacitor X7R	10uF	1210 (SMD)	9
V101, V102, V201, V202	Diode Suppressor	SMAJ15CA	DO214AC (SMD)	4

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