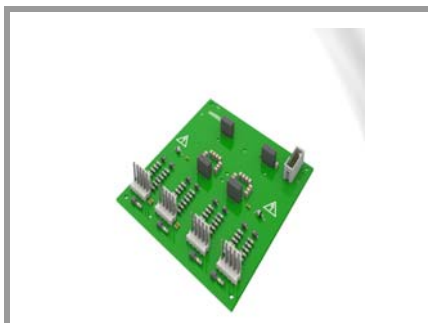


# Board 2 generic SKYPER 42 R



**SKYPER®**

## IGBT Driver Core

### Board 2 generic 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

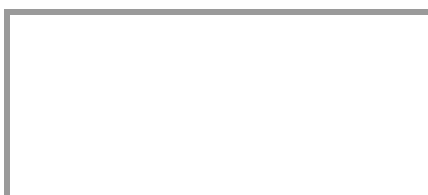
Isolation coordination in compliance with EN50178 PD2

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	$\Omega$
$R_{Goff\ min}$	Minimum rating for external $R_{Goff}$	0.8	$\Omega$
$T_{op}$	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		$\mu s$
$t_{d(off)IO}$	Input-output turn-on propagation time		1.1		$\mu s$



**Adaptor board**

## Adaptor Board 2 // SKYPER<sup>®</sup> 42 R

### Technical Explanations

Revision 04

This Technical Explanation is valid for the following parts:

part number	type	date code (YYWW)
L5059301	Board 2 // SKYPER <sup>®</sup> 42 R	≥ 1240

Related documents:

title
Technical Explanations SKYPER <sup>®</sup> 42 R

Prepared by: Johannes Krapp

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**Please note:**

All values in this technical explanation are typical values. Typical values are the average values expected in large quantities and are provided for information purposes only. These values can and do vary in different applications. All operating parameters should be validated by user's technical experts for each application.

## 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

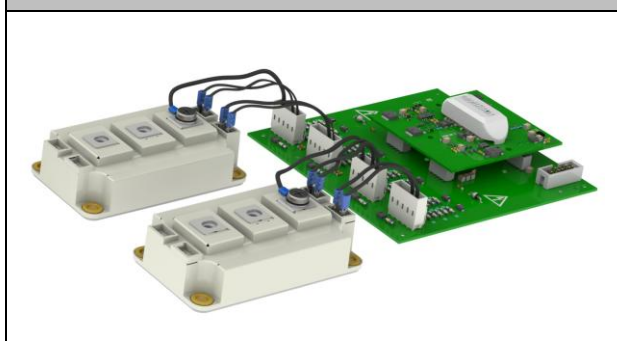
The Board 2 // SKYPER<sup>®</sup> 42 R is an adaptor board for the IGBT module e.g. SEMITRANS<sup>™</sup>, SEMiX<sup>®</sup> (solder pin version). The board can be used for one IGBT module or for two in parallel. The board can be customized allowing adaptation and optimization to the used IGBT module.

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<sup>®</sup> 42 R).

### Please note:

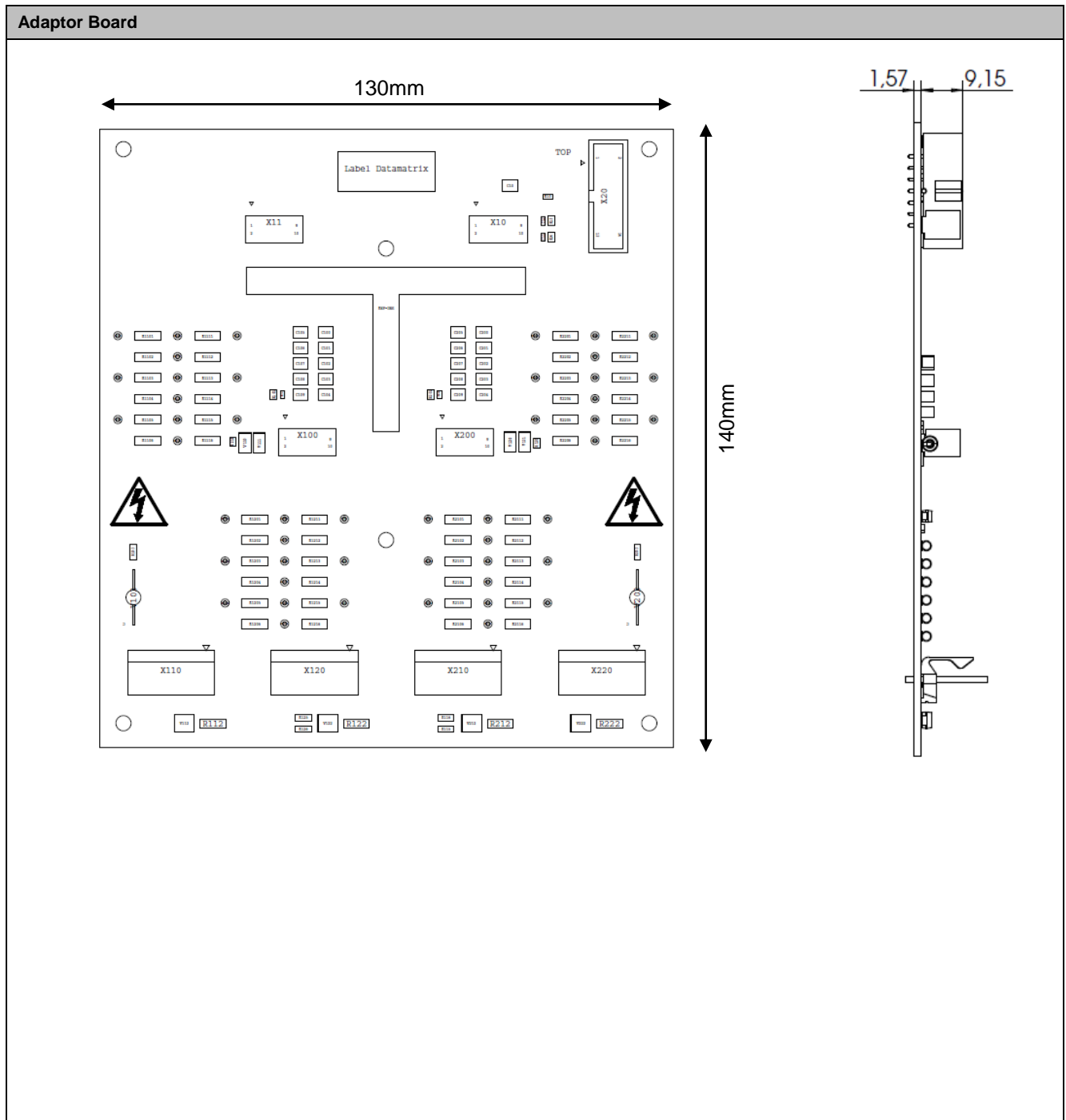
This technical explanation is based on the Technical Explanations for SKYPER<sup>®</sup> 42R. Please read the Technical Explanations SKYPER<sup>®</sup> 42 R before using the Adaptor Board.

Board 2 SKYPER<sup>®</sup> 42 R



# Board 2 SKYPER® 42 R - Technical Explanations

## Dimensions



# Board 2 SKYPER<sup>®</sup> 42 R - Technical Explanations

## PIN Array

Connector X20 (male), RM2,54, 14p	
	<p>Product information of suitable female connectors and distributor contact information is available at e.g. <a href="http://www.harting.com">http://www.harting.com</a> (part number 09 18 520 6 813).</p>

PIN	Signal	Function	Specification
X30:01	IF_PWR_GND	GND for power supply and GND for digital signals	
X30:02	IF_HB_BOT	Switching signal input (BOTTOM switch)	Digital 15 V; 10 kOhm impedance; LOW = BOT switch off; HIGH = BOT switch on
X30:03	IF_nERROR_OUT	ERROR output	LOW = NO ERROR; open collector output; max. 30V / 15mA (external pull up resistor necessary)
X30:04	IF_HB_TOP	Switching signal input (TOP switch)	Digital 15 V; 10 kOhm impedance; LOW = TOP switch off; HIGH = TOP switch on
X30:05	IF_PWR_GND	GND for power supply and GND for digital signals	
X30:06	reserved		
X30:07	reserved		
X30:08	IF_PWR_15P	Drive power supply	Stabilised +15V ±4%
X30:09	IF_PWR_15P	Drive power supply	Stabilised +15V ±4%
X30:10-14	IF_PWR_GND	GND for power supply and GND for digital signals	

# Board 2 SKYPER<sup>®</sup> 42 R - Technical Explanations

## PIN Array – Secondary Side

Connector X110, X120, X210, X220 (MOLEX Series)	
	<p>Product information of suitable female connectors and distributor contact information is available at e.g. <a href="http://www.molex.com">http://www.molex.com</a> (e.g. series 41695).</p>

PIN	Signal	Function	Specification
X110:01	EMITTER_TOP	Emitter output TOP 1 IGBT	
X110:02	reserved		
X110:03	GATE_TOP	Gate output TOP 1 IGBT	
X110:05	VCE_TOP	Collector output TOP 1 IGBT	
X120:01	EMITTER_BOT	Emitter output BOT 1 IGBT	
X120:02	reserved		
X120:03	GATE_BOT	Gate output BOT 1 IGBT	
X120:05	VCE_BOT	Collector output BOT 1 IGBT	
X210:01	EMITTER_TOP	Emitter output TOP 2 IGBT	
X210:02	reserved		
X210:03	GATE_TOP	Gate output TOP 2 IGBT	
X210:05	VCE_TOP	Collector output TOP 2 IGBT	
X220:01	EMITTER_BOT	Emitter output BOT 2 IGBT	
X220:02	reserved		
X220:03	GATE_BOT	Gate output BOT 2 IGBT	
X220:05	VCE_BOT	Collector output BOT 2 IGBT	

# Board 2 SKYPER<sup>®</sup> 42 R - Technical Explanations

## Adjustment of single or dual mode

**Resistors R115, R116, R125, R126**

The adaptor board can be used for one or two modules in parallel.  
For using the adaptor board with one module the resistors marked in the picture

- R115
- R116
- R125
- R126

have to be assembled with 0Ω. In that case the connectors are:

- X110 = TOP channel
- X220 = BOT channel

For using the board as parallel board these resistors must not be equipped\*.

In parallel mode the connectors are:

- X110 = TOP 1
- X120 = BOT 1
- X210 = TOP 2
- X220 = BOT 2

\*Factory setting: not equipped

## Setting Dynamic Short Circuit Protection

R <sub>CE</sub> & C <sub>CE</sub>			
Designation	Shape	Setting	
R102	0805 (SMD)	R <sub>CE</sub> Factory setting: not equipped	TOP
C110	0603 (SMD)	C <sub>CE</sub> Factory setting: not equipped	TOP
R202	0805 (SMD)	R <sub>CE</sub> Factory setting: not equipped	BOT
C210	0603 (SMD)	C <sub>CE</sub> Factory setting: not equipped	BOT

## Collector Series Resistance

**R<sub>VCE</sub>**

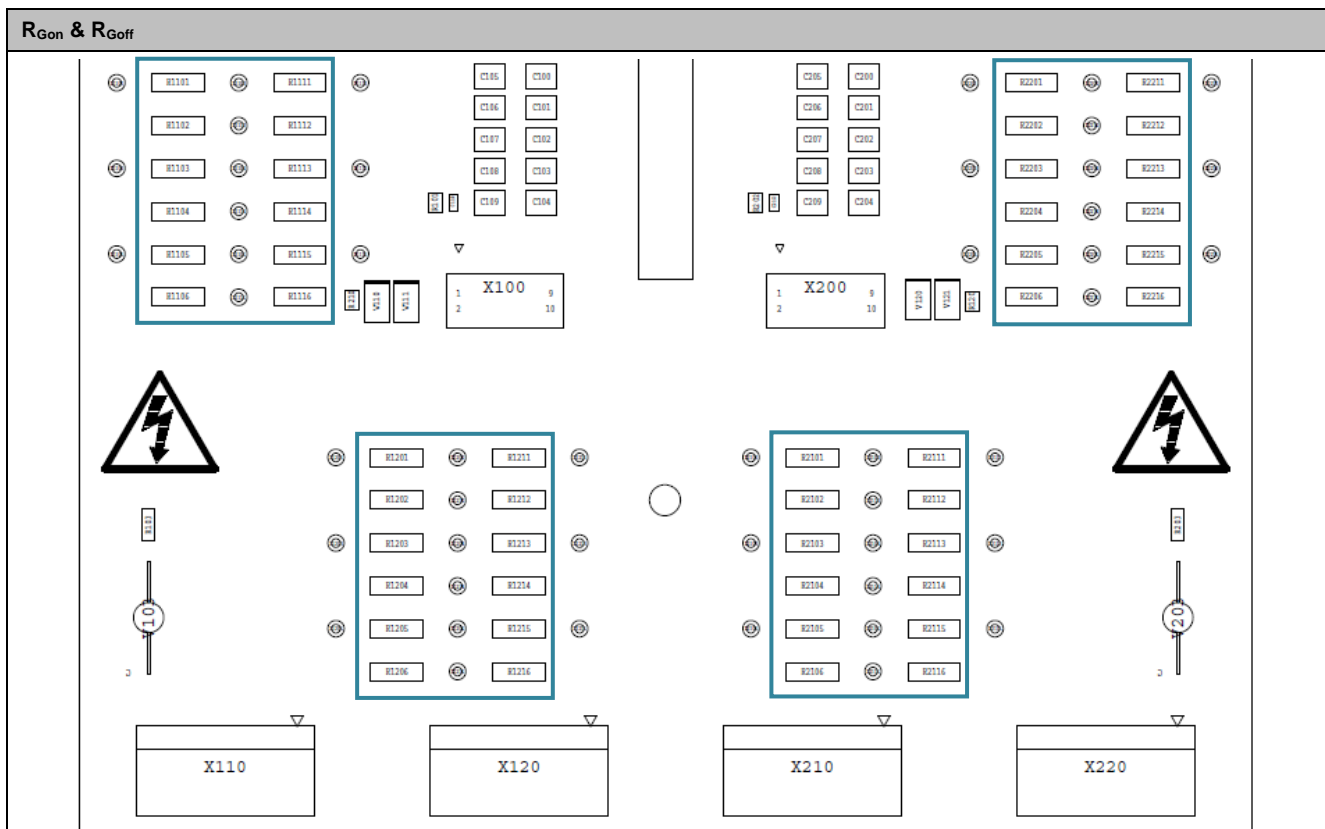
The diagram illustrates the placement of collector series resistors (R<sub>VCE</sub>) on the board. It shows two configurations: one for a single module (left) and one for two modules in parallel (right). The resistors are arranged in a grid around the connector locations X110 and X220. The factory setting for these resistors is 'not equipped'.

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Designation	Shape	Setting	
R103	MiniMELF (SMD)	$R_{VCE}^*$ Factory setting: not equipped	TOP
R203	MiniMELF (SMD)	$R_{VCE}^*$ Factory setting: not equipped	BOT

\* 1200V IGBT operation: 0Ω  
1700V IGBT operation: 1kΩ / 0,4W

## Adaptation Gate Resistors



Designation	Shape	Setting	
R1101-R1106 (parallel connected)	MELF	$R_{Gon}$ Factory setting: not equipped	TOP 1
R1111-R1116 (parallel connected)	MELF	$R_{Goff}$ Factory setting: not equipped	TOP 1
R1201-R1206 (parallel connected)	MELF	$R_{Gon}$ Factory setting: not equipped	BOT 1
R1211-R1216 (parallel connected)	MELF	$R_{Goff}$ Factory setting: not equipped	BOT 1
R2101-R2106 (parallel connected)	MELF	$R_{Gon}$ Factory setting: not equipped	TOP 2
R2111-R2116 (parallel connected)	MELF	$R_{Goff}$ Factory setting: not equipped	TOP 2
R2201-R2206 (parallel connected)	MELF	$R_{Gon}$ Factory setting: not equipped	BOT 2
R2211-R2216 (parallel connected)	MELF	$R_{Goff}$ Factory setting: not equipped	BOT 2



# Board 2 SKYPER<sup>®</sup> 42 R - Technical Explanations

Please consider that not all gate resistors have to be populated. The number and value of the gate resistors have to be calculated according to each application. For details please refer to application note AN 7003 - Gate Resistor. As starting point for evaluation the recommended values of the IGBT data sheet can be taken.

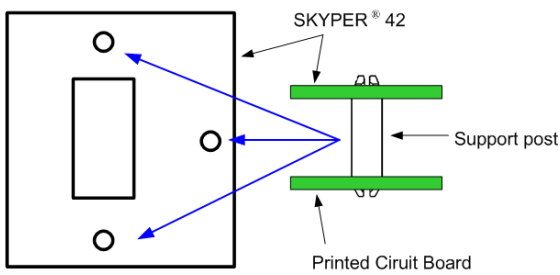
## Boost Capacitors

**C<sub>boost15P</sub> & C<sub>boost8N</sub>**

Designation	Pattern Name	Setting
C105-C108	1210	C <sub>boost15P</sub> Factory setting: C105, C106: 10µF/25V* TOP
C100-C104	1210	C <sub>boost8N</sub> Factory setting: C100, C101: 10µF/25V * TOP
C205-C208	1210	C <sub>boost15P</sub> Factory setting: C205, C206: 10µF/25V* BOT
C200-C204	1210	C <sub>boost8N</sub> Factory setting: C200, C201: 10µF/25V * BOT

\* output charge pulse: 4µF=1µC. Factory setting: 5µC per channel

## Mounting Notes

Driver Core Mounting	
<ol style="list-style-type: none"><li>1. Soldering of components (e.g. <math>R_{Gon}</math>, <math>R_{Goff}</math>, etc.) on adaptor board.</li><li>2. Insert driver core into the box connector on adaptor board.</li><li>3. The connecting leads between board and power module should be as short as possible (max. 20cm), the leads should be twisted.</li></ol>	
	<p>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.</p> <p>Product information of suitable support posts and distributor contact information is available at e.g. <a href="http://www.richco-inc.com">http://www.richco-inc.com</a>.</p> <p>Please refer to the technical explanation of the SKIM93 module for further mounting instructions.</p>

## Environmental conditions and standards

Please refer to the technical explanation of SKYPER 42 R for the environmental conditions and valid standards.

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