Adaptor Board 2 parallel 4S SKYPER® 42 R

Technical Explanations

Revision 04

This Technical Explanation is valid for the following parts:

part number	*type*	*date code (YYWW)*
L5059801_03	***Board 2 // 4S SKYPER® 42 R***	*≥ 1240*

Related documents:

title
Technical Explanations SKYPER® 42 R

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Content

Further application support 3
General Description 3
Environmental conditions 4
Dimensions 4
PIN Array 5
Setting Dynamic Short Circuit Protection 6
Collector Series Resistance 6
Adaptation Gate Resistors 7
Boost Capacitors 8
Temperature Signal 8
Mounting Notes 9

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Board 2// 4S SKYPER® 42 R - Technical Explanations

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.

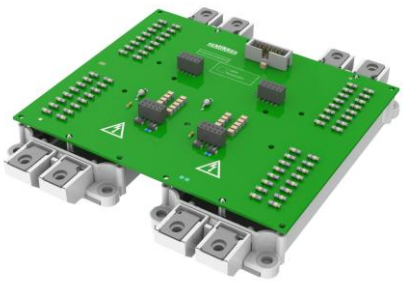
General Description

The Board 2 parallel 4S SKYPER® 42 R is an adaptor board for the IGBT module SEMiX® (spring pin version) with size 4. 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® 42. Please read the Technical Explanations SKYPER® 42 before using the Adaptor Board.

- Symmetric 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 4S modules

Board 2 // 4S SKYPER® 42 R



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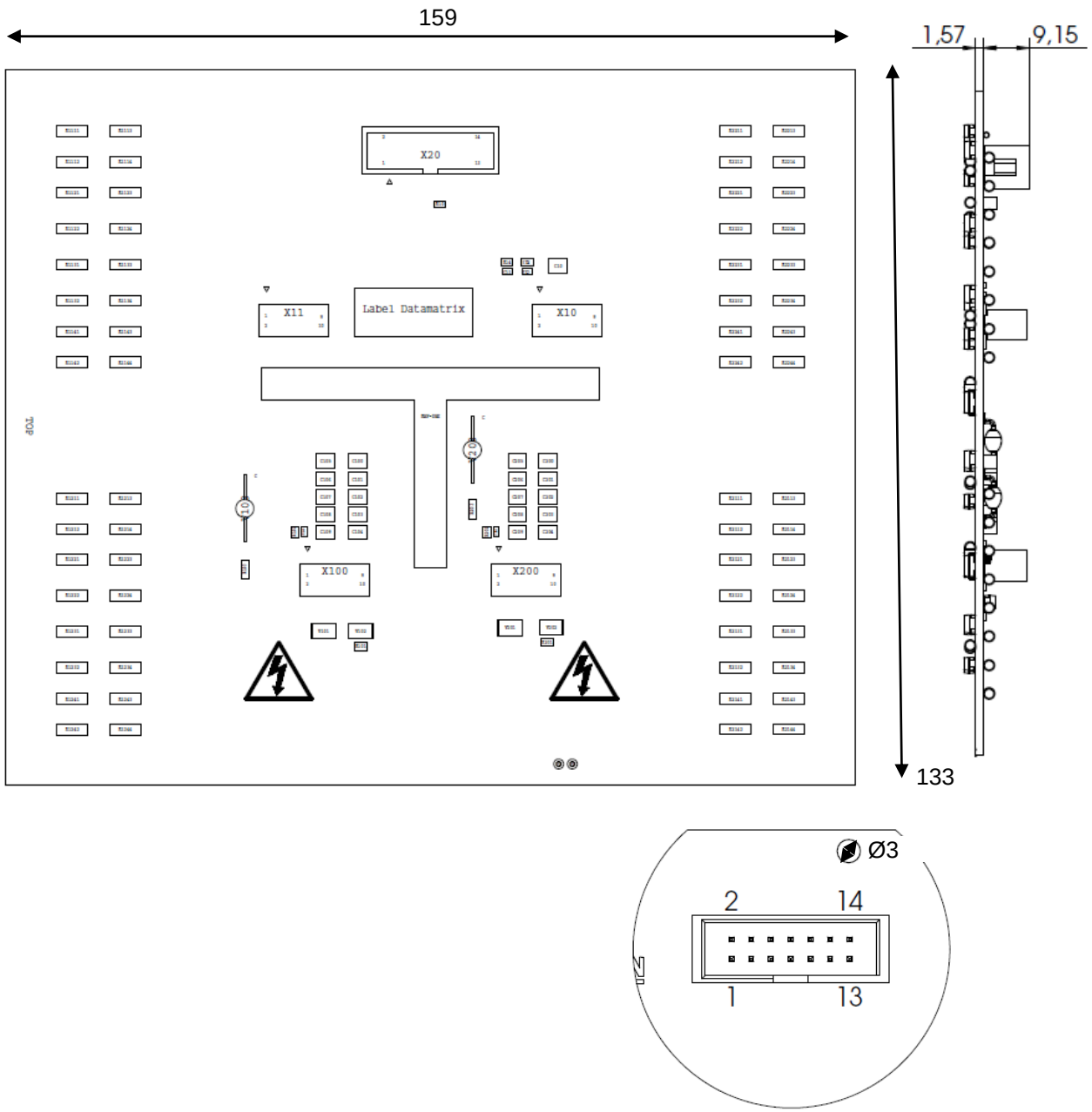
Environmental conditions

Please refer to the technical explanation of SKYPER 42 R for data sheet values and the environmental conditions.

Please consider:
The maximum DC Link voltage when using the Board 2//4S SKYPER 42 R is limited to 1000V DC.

Dimensions

Adaptor Board



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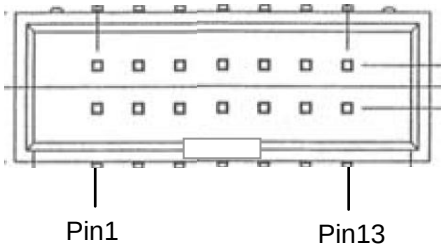
PIN Array

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	

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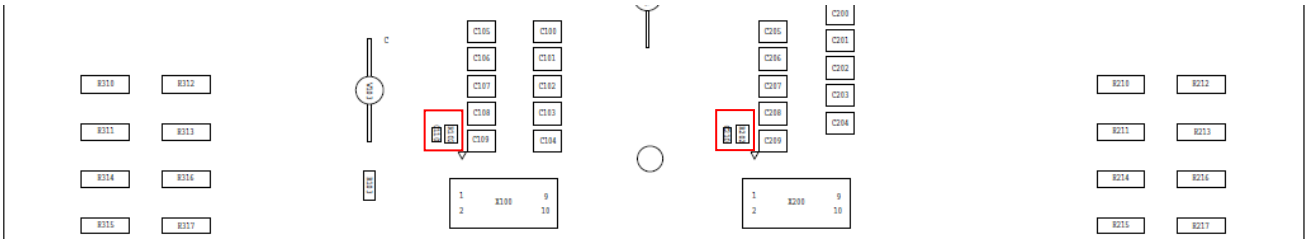
Setting Dynamic Short Circuit Protection

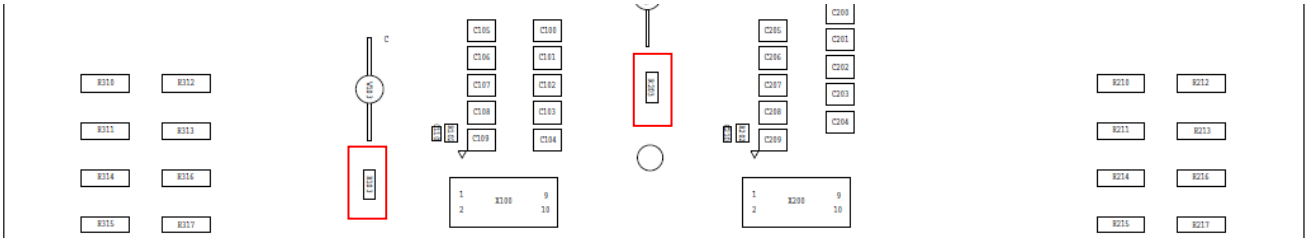
R_{CE} & C_{CE}



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

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

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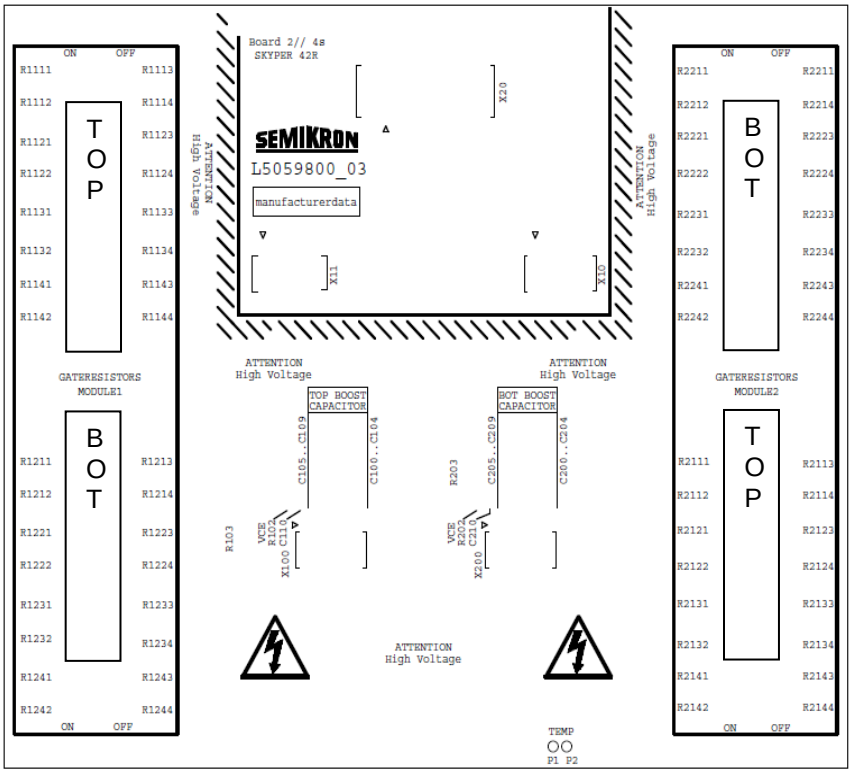
Adaptation Gate Resistors

R_{Gon} & R_{Goff}



Designation	Shape	Setting	
R1111, R1112, R1121, R1122; R1131, R1132, R1141, R1142 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	TOP 1
R1113, R1114, R1123, R1124; R1133, R1134, R1143, R1144 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	TOP 1
R1211, R1212, R1221, R1222; R1231, R1232, R1241, R1242 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	BOT 1
R1213, R1214, R1223, R1224; R1233, R1234, R1243, R1244 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	BOT 1
R2111, R2112, R2121, R2122; R2131, R2132, R2141, R2142 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	TOP 2
R2113, R2114, R2123, R2124; R2133, R2134, R2143, R2144 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	TOP 2
R2211, R2212, R2221, R2222; R2231, R2232, R2241, R2242 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	BOT 2
R2213, R2214, R2223, R2224; R2233, R2234, R2243, R2244 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	BOT 2

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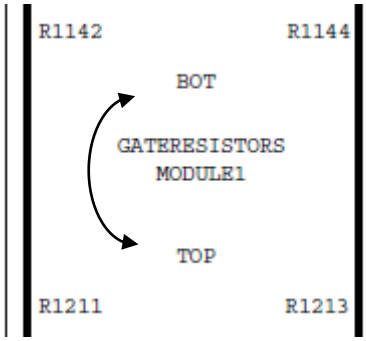
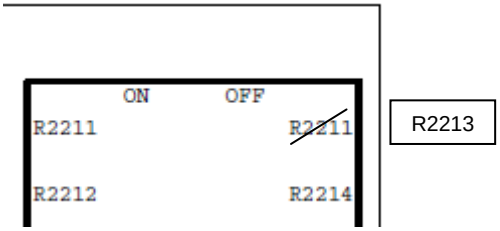
Please consider that not all gate resistors have to be populated. For the minimum gate resistor population all components with Rxxx1 and Rxxx3 have to be mounted. The number and value of the gate resistors have to be calculated according to each application. For details please refer to application note AN 7003 - Gate Resistor. As starting point for evaluation the recommended values of the IGBT data sheet can be taken.

Please take care with index L5059801_03



The Index L5059801_03 does have a mixed print on the module 1 side of the PCB. TOP and BOT have to be exchanged.



The Index L5059801_03 does have a mixed print on the module 2 side of the PCB. R2211 has to be named with R2213.

Boost Capacitors

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

Designation	Pattern Name	Setting	
C105, C106, C107,C108, C109	1210	$C_{boos+15V}$ Factory setting: C105, C106 = 10µF/25V* C107,C108, C109 = not equipped	TOP
C100, C101, C102,C103, C104	1210	$C_{boost-7V}$ Factory setting: C100, C101=10µF/25V * C102,C103, C104 = not equipped	TOP
C205, C206, C207,C208, C209	1210	$C_{boos+15V}$ Factory setting: C205, C206 = 10µF/25V* C207,C208, C209 = not equipped	BOT
C200, C201, C202,C203, C204	1210	$C_{boos-7V}$ Factory setting: C200, C201=10µF/25V * C202,C203, C204 = not equipped	BOT

* Output charge pulse – Factory setting:

	Value of boost capacitors	Fit to gate charge value
Standard relation	4µF	1µC
SKYPER 42 R	10µF	2,5µC
Board 4S SKYPER 42 R	20µF	5µC

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 P1 and P2 are not electrical isolated. Due to high voltage that may be present at the contacting points P1 and P2, 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.

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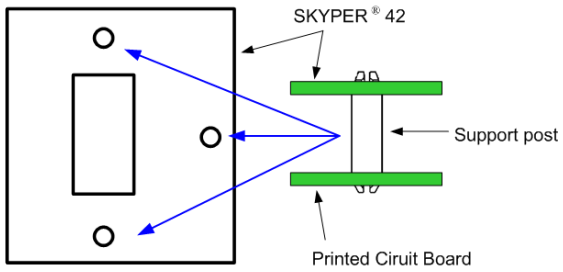
Mounting Notes

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.

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