

Board MLI SKYPER® 32 PRO R

Technical Explanations

Revision 01

This Technical Explanation is valid for the following parts:

part number	type	date code (YYWW)
L5060701	Board MLI SKYPER® 32 PRO R	≥ 1220

Related documents:

title
Technical Explanations SKYPER® 32 PRO R

Prepared by: Johannes Krapp
Status: Preliminary

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Board MLI SKYPER[®] 32 R - Technical Explanations

Please note:

All values of the SKYPER 32 PRO R data sheet are valid. Please consider that this is an evaluation board. Evaluation board are not tested nor qualified so intended just for prototype testing.

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>.

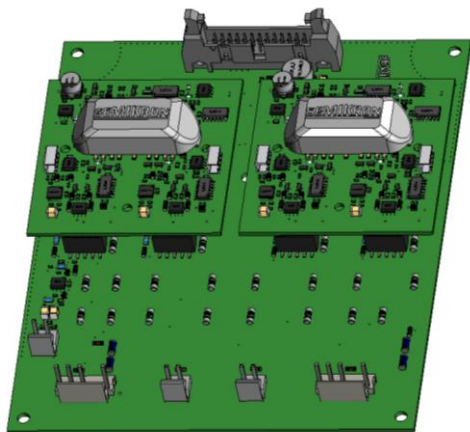
General Description

The Board MLI SKYPER[®] 32 is an adaptor board for multi level modules like SKiM4 MLI, SEMITRANS or MiniSKiIP MLI. 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[®] 32PRO. Please read the Technical Explanations SKYPER[®] 32 PRO before using the Adaptor Board.

Board MLI SKYPER[®] 32 PRO R



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Technical data

The technical performance is related to the SKYPER 32 PRO driver cores. All data out of the SKYPER data sheet is valid for the adapter board.

Please consider that the maximum DC Link voltage is 1200V.

The adapter board is just for evaluation purpose and not for series use. The boards are supplied without warranty of any kind, expressed, implied or statutory, including but not limited to, any implied warranty of merchantability or fitness for a particular purpose. Credit or replacement for evaluation products that fail to function will not be given nor will a failure analysis be performed. There is no entitlement to technical support for evaluation products.

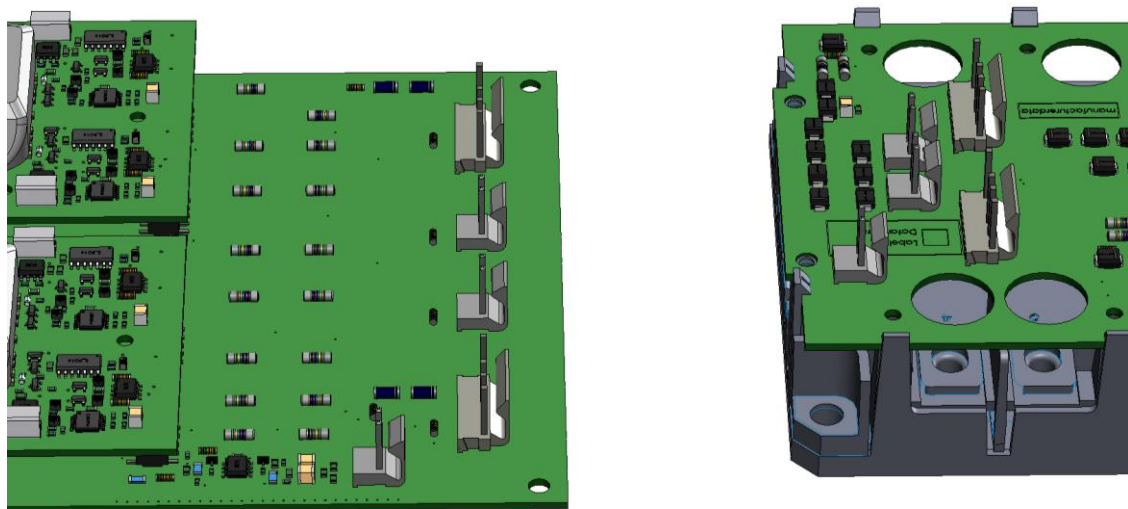
FOR SAFETY REASONS THE CUSTOMER IS NOT ALLOWED TO SELL EVALUATION PRODUCTS TO ANY END CUSTOMER.

If the customer fails not to sell the evaluation products to any end customer or any other third party, then the customer shall indemnify SEMIKRON against all claims by the concerned end customer or third party in respect of any loss, damage or injury arising from the afore said reason.

Assembly with SKiM4 MLI

For connection with spring contacted IGBT modules like the SKiM4 MLI an additional contact board is necessary.

Board MLI SKYPER® 32 PRO R with contact board for SKiM 4 TMLI

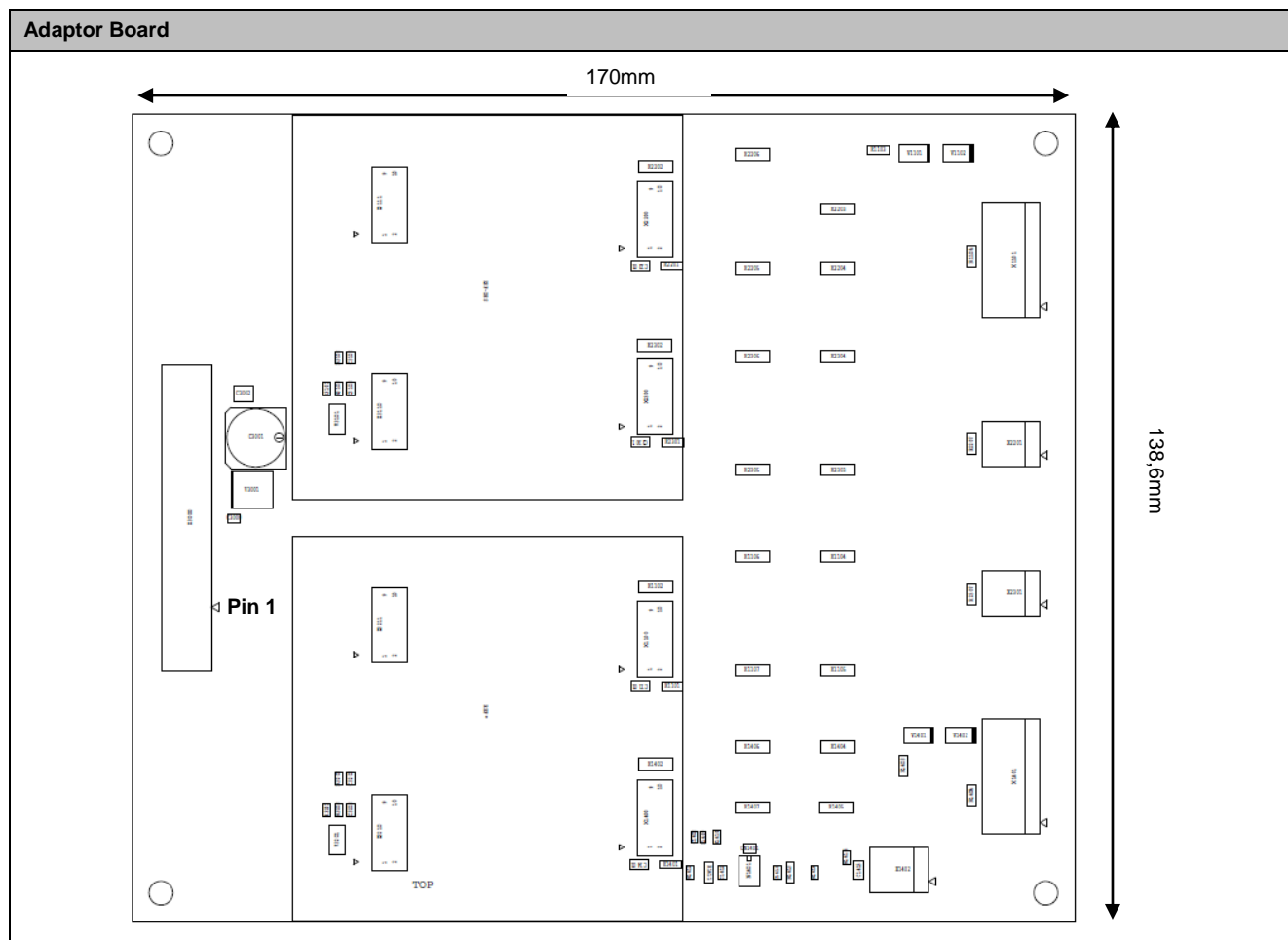


Contact boards for SKiM 4 MLI:

Art. No.:	451107 – Contact board SKiM4 MLI	– Available from CW30 onwards
Art. No.:	451108 – Contact board SKiM4 TMLI	– Available from CW30 onwards

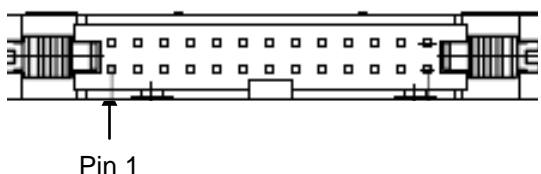
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Dimensions



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PIN Array

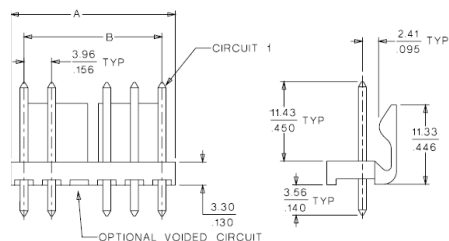
Connector X3000 (male), 26p	
 <p>Pin 1</p>	<p>Product information of suitable female connectors and distributor contact information is available at e.g. http://www.harting.com (part number 09 18 526 7 904).</p>

PIN	Signal	Function	Specification
X3000:01	reserved		
X3000:02	GND	GND for power supply and GND for digital signals	
X3000:03	T1_4_ERROR_OUT	ERROR output	LOW = NO ERROR; open collector output; max. 30V / 15mA (external pull up resistor necessary)
X3000:04	GND	GND for power supply and GND for digital signals	
X3000:05	MLI_T4	Switching signal input (T4 switch)	Digital 15 V; 10 kOhm impedance; LOW = TOP switch off; HIGH = TOP switch on
X3000:06	T2_3_ERROR_OUT	ERROR output	LOW = NO ERROR; open collector output; max. 30V / 15mA (external pull up resistor necessary)
X3000:07	MLI_T3	Switching signal input (T3 switch)	Digital 15 V; 10 kOhm impedance; LOW = TOP switch off; HIGH = TOP switch on
X3000:08	MLI_T2	Switching signal input (T2 switch)	Digital 15 V; 10 kOhm impedance; LOW = TOP switch off; HIGH = TOP switch on
X3000:09	T2_3_ERROR_OUT	ERROR output	LOW = NO ERROR; open collector output; max. 30V / 15mA (external pull up resistor necessary)
X3000:10	MLI_T1	Switching signal input (T1 switch)	Digital 15 V; 10 kOhm impedance; LOW = TOP switch off; HIGH = TOP switch on
X3000:11	T1_4_ERROR_OUT	ERROR output	LOW = NO ERROR; open collector output; max. 30V / 15mA (external pull up resistor necessary)
X3000:12	GND	GND for power supply and GND for digital signals	
X3000:13	reserved		
X3000:14	reserved		
X3000:15	reserved	Drive power supply	Stabilised +15V ±4%
X3000:16	IF_PWR_15P	Drive power supply	Stabilised +15V ±4%
X3000:17	IF_PWR_15P	Drive power supply	Stabilised +15V ±4%
X3000:18	GND	GND for power supply and GND for digital signals	GND
X3000:19	GND	GND for power supply and GND for digital signals	GND
X3000:20-26	reserved		

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PIN Array – Secondary Side

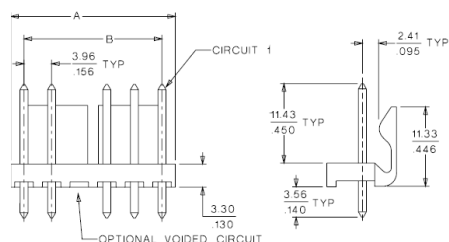
Connector X1101, X2201, X2301, X1401, for IGBT connection of switch T1/T2/T3/T4



Product information of suitable female connectors and distributor contact information is available at e.g. <http://www.MOLEX.com> (MX41791).

PIN	Signal	Function
X1101:01	EMITTER_T1	Emitter output T1 IGBT
X1101:02	reserved	
X1101:03	GATE_T1	Gate output T1 IGBT
X1101:05	VCE_T1	Collector output T1 IGBT
X2201:01	EMITTER_T2	Emitter output T2 IGBT
X2201:02	GATE_T2	Gate output T2 IGBT
X2301:01	EMITTER_T3	Emitter output T3 IGBT
X2301:02	GATE_T3	Gate output T3 IGBT
X1401:01	EMITTER_T4	Emitter output T4 IGBT
X1401:02	Reserved	
X1401:03	GATE_T4	Gate output T4 IGBT
X1401:05	VCE_T4	Collector output T4 IGBT

Connector X1402, for temperature sensor connection



Product information of suitable female connectors and distributor contact information is available at e.g. <http://www.MOLEX.com> (MX41791).

PIN	Signal	Function
X1402:01	N_Temp	Negative Temperature Sensor Input
X1402:02	P_Temp	Positive Temperature Sensor Input

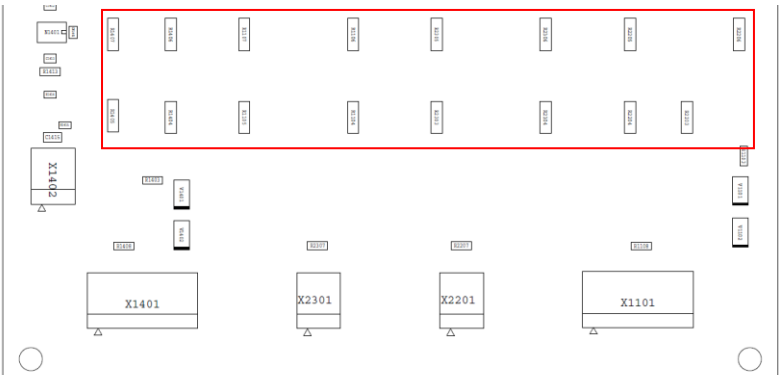
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Setting Dynamic Short Circuit Protection

The short circuit protection of T2/T3 is deactivated to ensure a safe switch off procedure in multilevel topology.

R_{CE} & C_{CE}			
Designation	Shape	Setting	
R1101	MINI Melf (SMD)	R_{CE} Factory setting: not equipped	T1
C1101	1206 (SMD)	C_{CE} Factory setting: not equipped	T1
R1401	MINI Melf (SMD)	R_{CE} Factory setting: not equipped	T4
C1401	1206 (SMD)	C_{CE} Factory setting: not equipped	T4

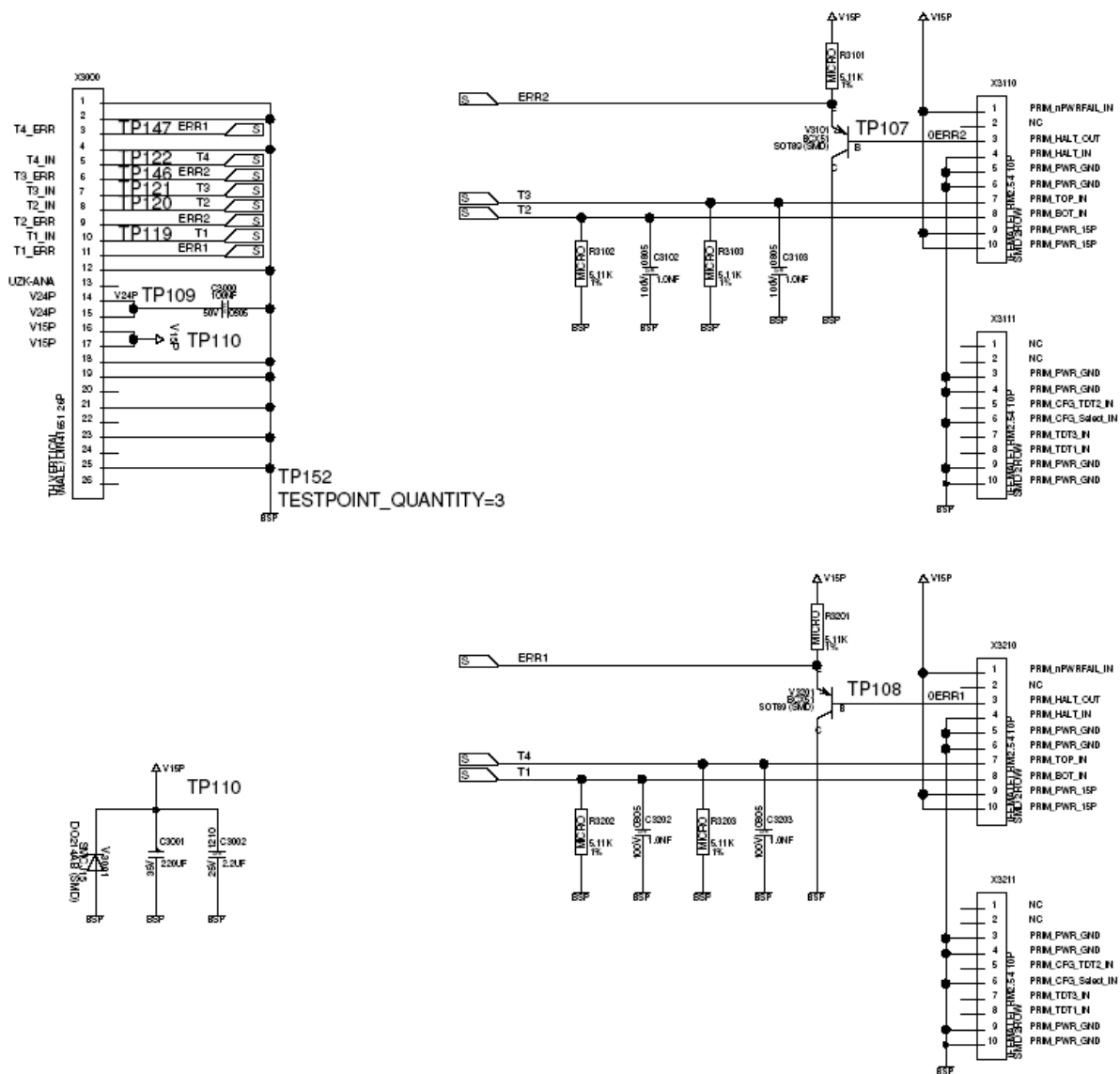
Adaptation Gate Resistors

R_{Gon} & R_{Goff}			
			
Designation	Shape	Setting	
R1104, R1105 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	T 1
R1106, R1107 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	T 1
R2203, R2204 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	T 2
R2205, R2206 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	T 2
R2303, R2304 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	T 3
R2305, R2306 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	T 3
R1404, R1405 (parallel connected)	MELF	R_{Gon} Factory setting: not equipped	T 4
R1406, R1407 (parallel connected)	MELF	R_{Goff} Factory setting: not equipped	T 4

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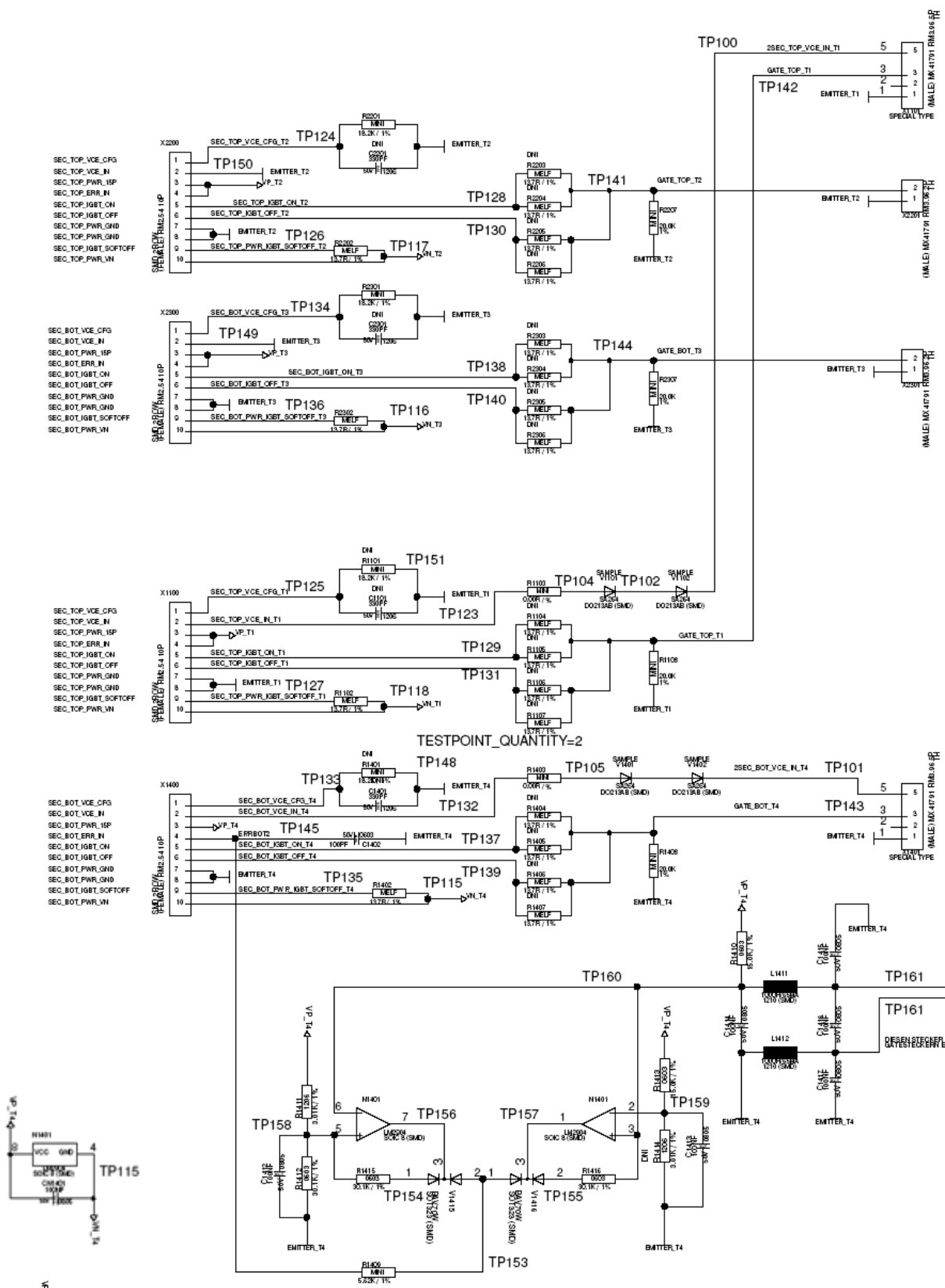
Circuit Diagram

Circuit Diagram I



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Circuit Diagram II



Over Temperature Protection Circuit (OTP)

The external error input SEC_TOP_ERR_IN on the secondary side (high potential) of the driver core is used for an over temperature protection circuit to place the gate driver into halt mode.

Dimensioning OTP

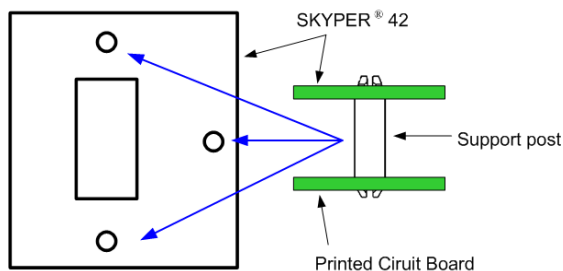
1. Define an over temperature trip level according to the application.
2. Calculate the nominal ohmic resistance value of the temperature sensor at the defined trip level (see "Modules – Explanations").
3. The trip level on the adapter board is set with R1412 by using the calculated resistance value.

- **Factory setting R1412: 30k ohm**
- **If no resistor is used, a failure signal is generated.**

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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