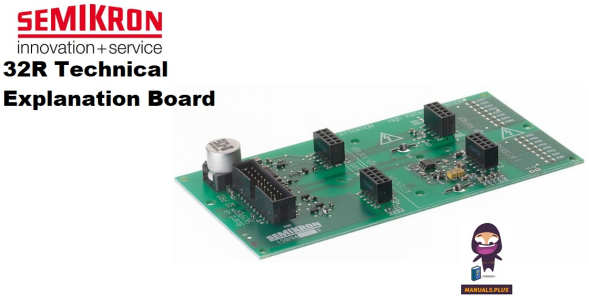

SEMIKRON 32R Technical Explanation Board Instruction Manual

Contents

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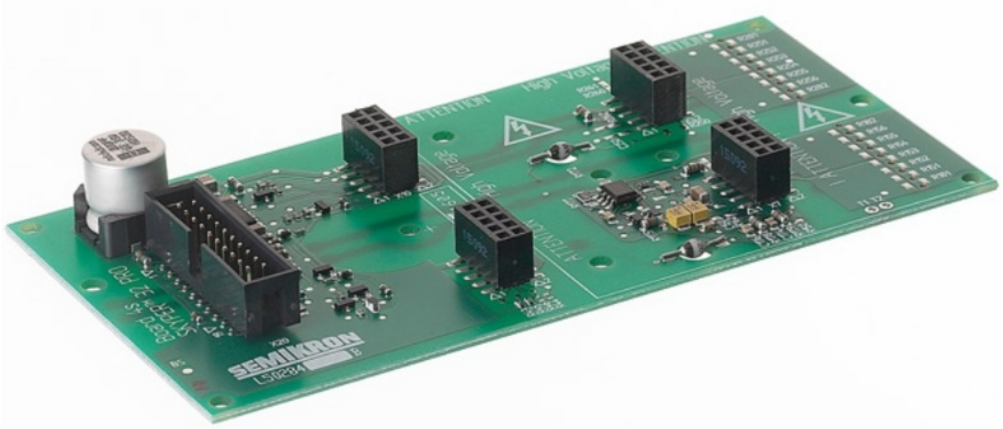
SEMIKRON 32R Technical Explanation Board



Specifications

1. **Model**: SKYPER IGBT Driver Adapter Board
2. **Revision**: 32 R
3. **Issue Date**: 2016-03-16
4. **Prepared by**: H.Flohrer
5. **Approved by:** J.Krapp

- **Application and Handling Instructions**
  For detailed application and handling instructions, refer to the SEMIKRON Application Manual Power Modules available at **http://www.semikron.com**.
- **General Description**
  The SKYPER IGBT Driver Adapter Board is designed to provide efficient switching signal inputs and drive power supply for IGBT modules.
- **PIN Array**
  Product information of suitable female connectors and distributor contact information is available at **http://www.harting.com** (part.nr.09 18 514 6813).
- **Setting Dynamic Short Circuit Protection**
  To set the dynamic short circuit protection, refer to Table 3 for RCE & CCE Designation.
- **Collector Series Resistance**
  Refer to Table 4 for RVCE Designation for collector series resistance values based on IGBT operation voltage.
- **Further Application Support**
  For the latest information and design support, visit **http://www.semikron.com**.

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 the user's technical experts for each application.

Application and Handling Instructions

- Please provide 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 minimized. 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 applying low collector voltage and load current in the beginning and increasing these values gradually, observing the turn-off behavior 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 operating 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. Currents higher than VS +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 the hybrid driver and the power module should be as short as possible (max. 20cm), and the driver leads should be twisted.

Further application support
The 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 Information

The Board 3s SKYPER® 32PRO R is an adapter board for the IGBT module SEMiX® 3s (spring contact version). The board can be customized allowing adaptation and optimization to the used SEMiX® Module. The switching characteristic of the IGBT can be influenced through user settings, eg changing turn-on and turn-off speed by variation of RGon and RGoff. Furthermore, it is possible to adjust the monitoring level and blanking time for the DSCP (see Technical Explanations SKYPER® 32PRO R).

Please note:
This technical explanation is based on the Technical Explanations for SKYPER® 32PRO R. Please read the Technical Explanations for SKYPER® 32 PRO R before using the Adaptor Board.

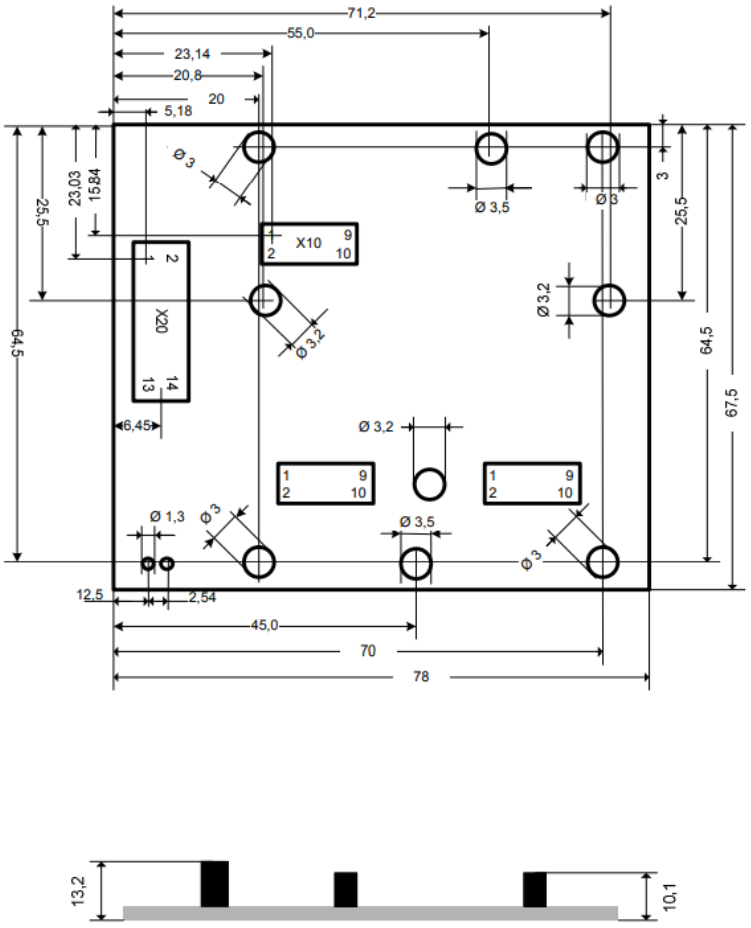
Figure 1: Board 2s SKYPER® 32 R

Quality

Table 1: Quality			
End of the exam	**test category**	**exam details**	**level**
AOI	Automated Optical Inspection	Control of accurate placement of components/solder joints	SEMIKRON
ICT	In-Circuit Test	Test of the populated PCB, checking the correct fabrication	SEMIKRON
Test type	**test category**	**conditional test**	**level**
EP	Electrical Parameters	Jamb = -40°C / +85°C	SEMIKRON
SP	STEP Test, Interrupted PS	20x 10µs to 2s	EN61000-4-29
Yes	Isolation Test	Maximum voltage test 4kV, 60s	EN 61800-5-1
TC	Thermal cycling	200 cycles, Tstgmax – Tstgmin	IEC60068-2-14
PD	Partial discharge test	>1.1 kV; suitable for 900V DC Link	VDE 0110-20
TH	Warm humidity	85°C, 85% RH, 96h	IEC 60068-2-67
VB	Vibration	Sine 20/2000Hz Random 10/2000Hz, 5g, 26 per x,y,z	IEC 60068-2-6
SH	Shock	Half-sinus pulse, 30g, 6000 shocks, 6ms, ±x, ±y, ±z	IEC 60068-2-29

Dimensions

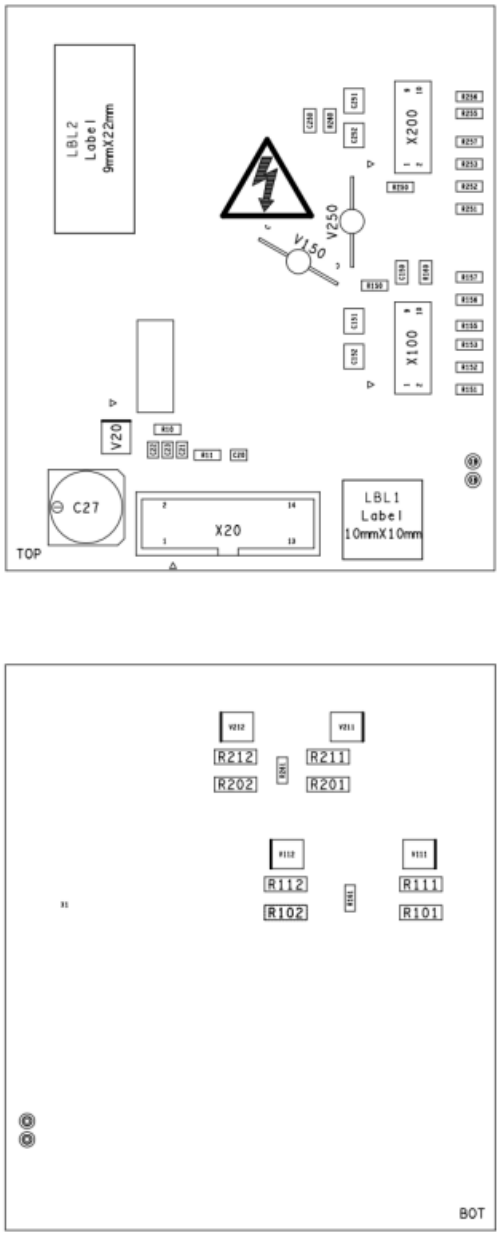
Figure 2: Dimensions in mm



Component Placement Layout

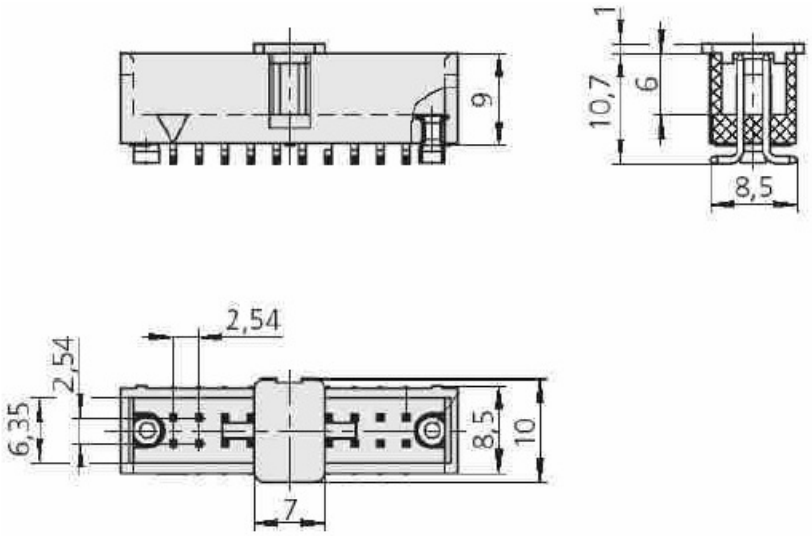
Figure 3: Adapter Board

Figure 3: Adaptor Board



PIN Array

Figure 4: Connector X20 (Assmann AWHW 20G SMD)



Product information of suitable female connectors and distributor contact information is available at eg **http://www.harting.com** (part number 09 18 520 6 813).

Table 2: PIN Range

PIN	Waves	Work	Measurements
X20:01	IF_PWR_15P	Drive power supply	Stabilized +15V ±4%
X20:02	IF_PWR_GND	GND for power supply	
X20:03	IF_PWR_15P	Drive power supply	Stabilized +15V ±4%
X20:04	IF_PWR_GND	GND for power supply	
X20:05	IF_PWR_15P	Drive power supply	Stabilized +15V ±4%
X20:06	IF_PWR_GND	GND for power supply	
X20:07	reserved		
X20:08	IF_PWR_GND	GND for power supply	
X20:09	IF_CMN_nHALT	Driver core status signal (bidirectional signal with dominant recessive behavior)	Digital 15V logic;LOW (dominant) = driver disabled; HIGH (recessive) = ready to operate
X20:10	reserved		
X20:11	reserved		
X20:12	IF_CMN_GND	GND for signal IF_CMN_nHALT	
X20:13	reserved		
X20:14	reserved		
X20:15	IF_HB_TOP	Switching signal input (TOP switch)	Digital 15 V logic; 10 kOhm impedance;LOW = TOP switch off; HIGH = TOP switch on
X20:16	IF_HB_BOT	Switching signal input (BOTTOM switch)	Digital 15 V logic; 10 kOhm impedance;LOW = BOT switch off; HIGH = BOT switch on
X20:17	reserved		
X20:18	IF_HB_GND	GND for signals IF_HB_TOP & F_HB_BOT	
X20:19	reserved		
X20:20	reserved		

Please note:
The feature PRIM_ERROR_IN of the driver core is not available at the interface X20.

Setting Dynamic Short Circuit Protection

Table 3: R_{CE} & C_{CE}			
Designation	**Pattern Name**	**Setting**	
R160	1206	RCE Factory setting: not equipped	TOP
C150	1206	CCE Factory setting: not equipped	TOP
R260	1206	RCE Factory setting: not equipped	BOT
C250	1206	CCE Factory setting: not equipped	BOT

Collector Series Resistance

Table 4: R_{VCE}			
Designation	**Pattern Name**	**Setting**	
R150	MiniMELF	RVCE * Factory setting: not equipped	TOP
R250	MiniMELF	RVCE * Factory setting: not equipped	BOT

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

Adaptation Gate Resistors

Table 5: R_{Gon} & R_{Goff}			
Designation	**Pattern Name**	**Setting**	
R151, R152, R153 (parallel connected)	MiniMELF	RGon Factory setting: not equipped	TOP
R155, R156, R157 (parallel connected)	MiniMELF	RGoff Factory setting: not equipped	TOP
R251, R252, R253 (parallel connected)	MiniMELF	RGon Factory setting: not equipped	BOT
R255, R256, R257 (parallel connected)	MiniMELF	RGoff Factory setting: not equipped	BOT

Adaptation Decoupling Gate Resistors
For details to the decoupling gate resistors and recommended values, see Modules Explanations and Data Sheets SEMiX®.

Table 6: R_{G1}, R_{G2}			
Designation	**Pattern Name**	**Setting**	
R101	MELF	RG1 Factory setting: not equipped	TOP
R102	MELF	RG2 Factory setting: not equipped	TOP
R201	MELF	RG1 Factory setting: not equipped	BOT
R202	MELF	RG2 Factory setting: not equipped	BOT

Boost Capacitors

Table 7: Cboost15P & Cboost8N			
Designation	**Pattern Name**	**Setting**	
C151	1210	Cboost8N Factory setting: 4,7µF/16V *	TOP
C152	1210	Cboost15P Factory setting: 2,2µF/25V *	TOP
C251	1210	Cboost8N Factory setting: 4,7µF/16V *	BOT
C252	1210	Cboost15P Factory setting: 2,2µF/25V *	BOT

* output charge pulse: 5µC

Temperature Signal
The temperature sensor inside the SEMiX® module is directly connected to contacting points T1 and T2. 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.

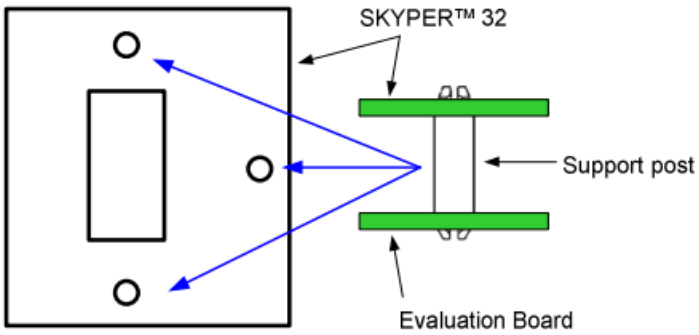
Mounting Notes

The electrical connections between adaptor board and SEMiX® are realised via spring contacts integrated in SEMiX® power modules and via landing pads on the bottom side of the adaptor board.

Figure 5: Adaptor Board & Driver Core Mounting

1. Soldering of components (e.g. RGon, RGoff, etc.) on adapter board.
2. Adaptor Board has to be fixed to the SEMiX® module (see “Mounting Instruction and Application Notes for SEMiX® IGBT modules” on SEMiX® product overview page at **http://www.semikron.com**).
3. Insert driver core into the box connector on adaptor board.

- 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** (e.g. part number DLMSPM-8-01, LCBST-8-01).



Schematics

Figure 6: Schematic I Adaptor Board

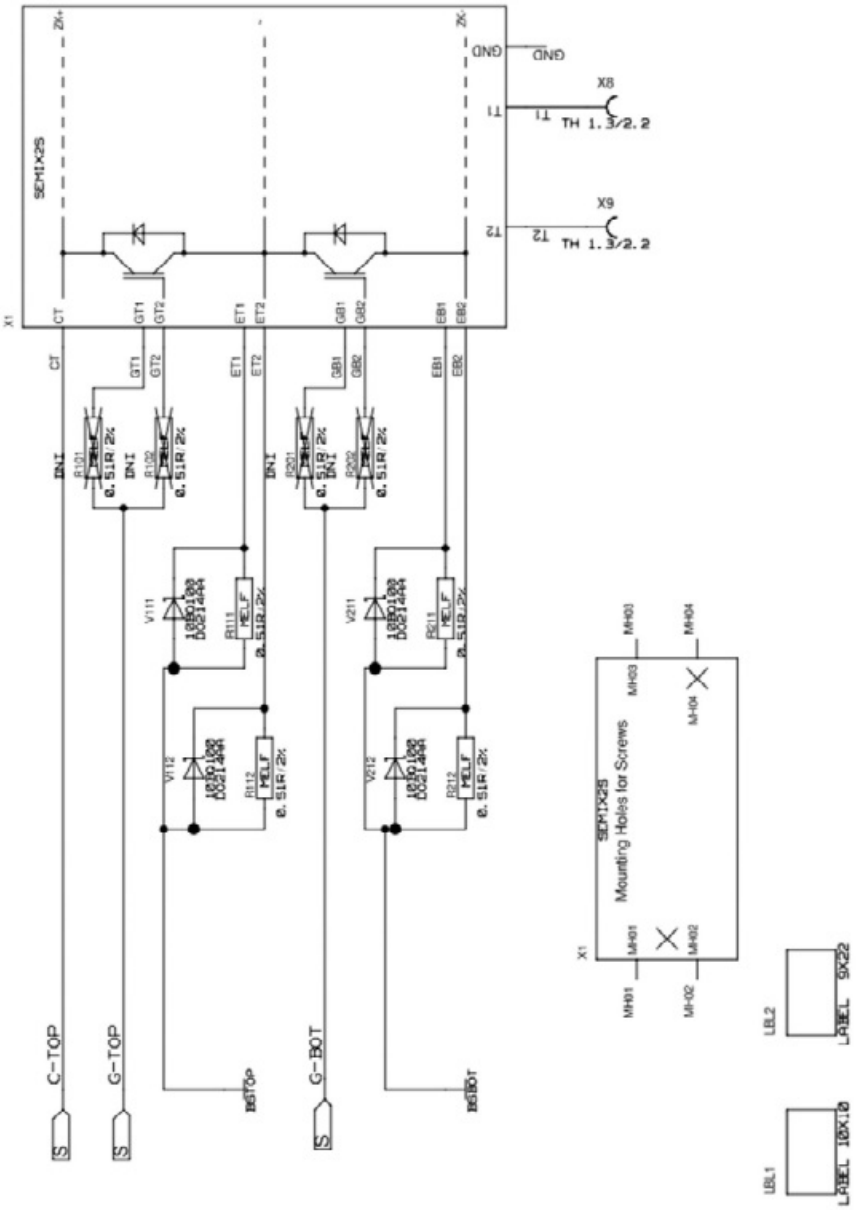
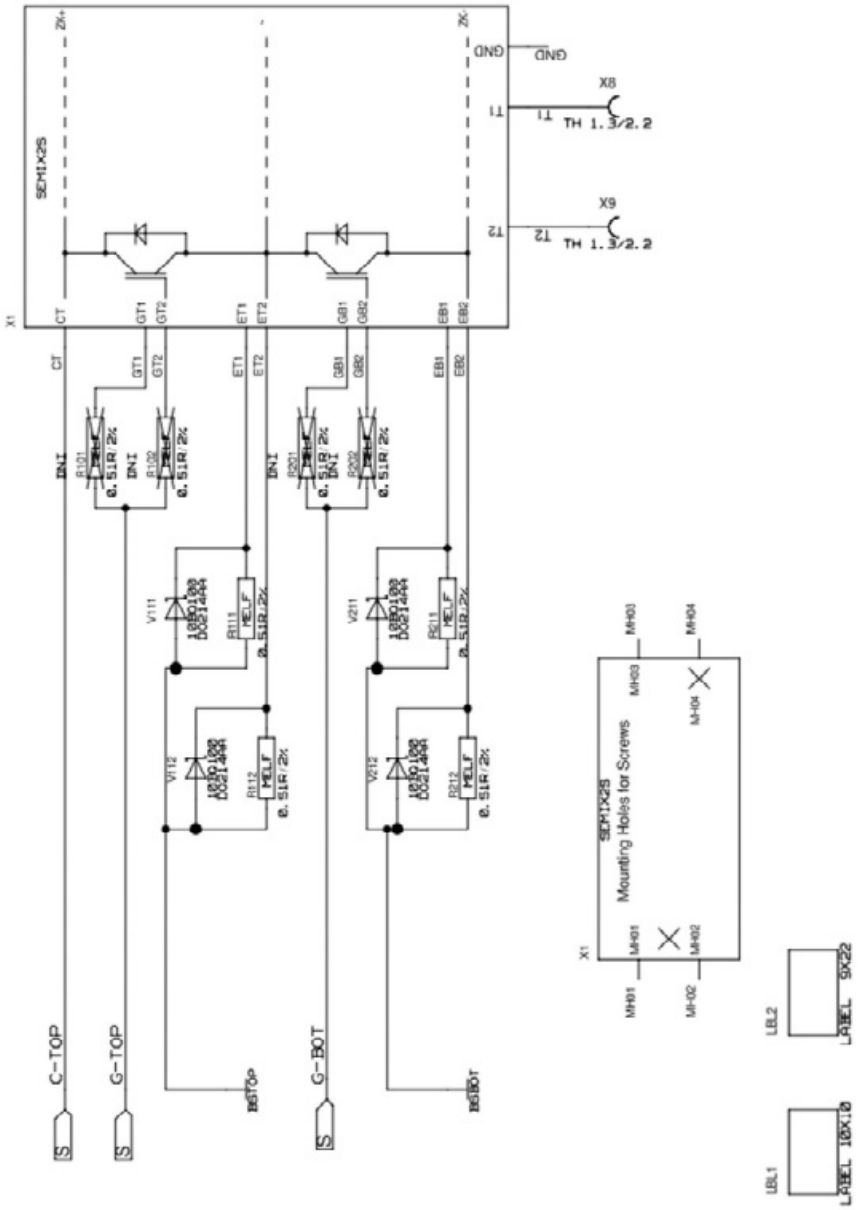


Figure 6: Schematic I Adaptor Board



Parts List

Count	Ref. Designator	Value	Pattern Name	Description
2	C151, C251	4.7uF	1210 (SMD)	Capacitor X7R
2	C152, C252	2.2uF	1210 (SMD)	Capacitor X7R
4	C20, C21, C22, C23	1nF	0805 (SMD)	Capacitor X7R
1	C27	220uF/35V	SMD	Longlife-Elko
1	R10	0.000Ohm	MiniMelf (SMD)	1%
3	R11, R161, R261	10.0KOhm	MiniMelf (SMD)	2%
4	R111, R112, R201, R212	0.51Ohm	Melf (SMD)	
2	V150, V250	BY203/20S	DO215AA (SMD)	High Voltage Diode
1	V20	SMBJ15A	DO214AA (SMD)	Suppressor Diode
4	V111, V112, V211, V212	10BQ100N	SMD	Diode Schottky
3	X10, X100, X200	RM2.54 10p.	SMD	Box Connector
1	X20	14p.		Box Connector: SUYIN 254100FA010G200ZU

- **TP:** Test Review
- **Box Connector:** SUYIN 254100FA010G200ZU

References

- www.SEMIKRON.com
- A. Wintrich, U. Nicolai, W. Tursky, T. Reimann, “Application Manual Power Semiconductors”, ISLE Verlag 2011, ISBN 978-3-938843-666

HISTORIA
SEMIKRON reserves the right to make changes without further notice herein

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FAQ

Q: Are the values provided in the technical explanation specific to my application?
A: No, the values provided are typical values and may vary in different applications. It is recommended to validate all operating parameters with technical experts for each specific application.

Documents / Resources

	SEMIKRON 32R Technical Explanation Board [pdf] Instruction Manual 32R Technical Explanation Board, 32R, Technical Explanation Board, Explanation Board, Board

References

- We are the Ultimate Partner in Power Electronics | Semikron Danfoss
- User Manual