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General conditions [1]

Term	Values	Units
Isolation test voltage input - output (2 sec. AC)	2500	V
Operating temperature	0... + 60	°C
Storage temperature	–25... + 70	°C

Electrical Characteristics [1]

Term	min.	typ.	max.	Units
Operating voltage (phase to phase)	–	480	528	V
Trigger current (output)	–	400	–	mA
Trigger current pulse length	10	12	15	µs
Pulse current cycling frequency	6,6	8,3	10	kHz
Power supply				
Supply voltage	14,4	15	15,6	V
Supply current (standby)	–	60	–	mA
Supply current (max.)	–	150	–	mA
Signals				
SCR / Thyristor trigger enable threshold (HIGH)	3,9	–	5,5	V
SCR / Thyristor trigger enable threshold (LOW)	–0,5	–	1	V
Input current „On"	–	10	–	mA
Open collector error outut (error = Low)				
U_{CE} (I_C = 4 mA)	–	–	1	V
I_C	–	–	5	mA
maximum rating voltages				
- power to earth (overvoltage cat. III)		300		V_{eff}
- power to logic (overvoltage cat. II)		900		V_{eff}
- logic to earth		60		V_{eff}

[1] @ T_{amb} = 25 °C

SCR / Thyristor Trigger Module

SKHIT 01

- SCR / Thyristor driver for three phase half controlled bridge

Preliminary Data

patent DE 197 10 371

Features

- SKHIT 01 can be soldered directly onto a printed circuit board
- isolation by transformers (DC/DC) and optocoupler (signal)

Typical Applications

- DC-link voltage converter with precharge circuit

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PIN array

Interface
(Power connectors: Plug connector RM 2,54 mm for soldering onto the PCB)

PIN	Signal	Description
X1	+UG	Ground connection secondary circuit
X2	TG1	Gate SCR / thyristor 1
X3	TG2	Gate SCR / thyristor 2
X4	TG3	Gate SCR / thyristor 3
X6	L1	Line voltage L1
X8	L2	Line voltage L2
X10	L3	Line voltage L3
X17	+ 15 V	+ 15 V - supply voltage
X18	NC	
X19	BSS	System ground connection
X20	BSS	System ground connection
X22	THO	SCR / thyristor trigger enable
X24	BB	Error indication
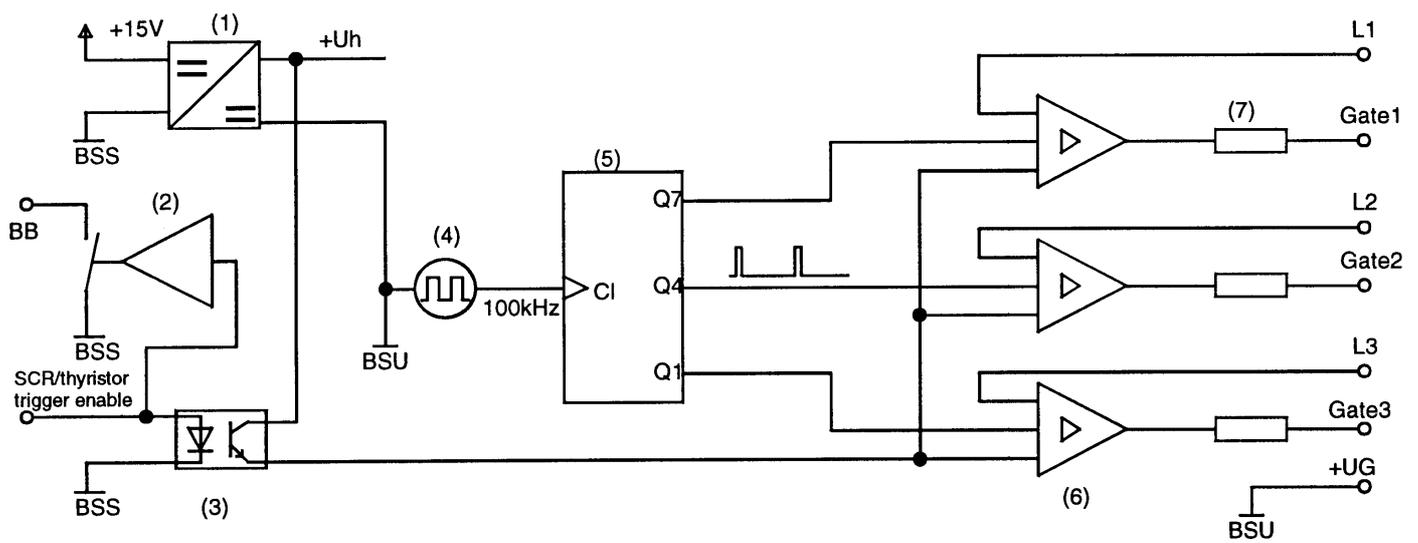
Fig. 1 Block diagram of SKHIT 01

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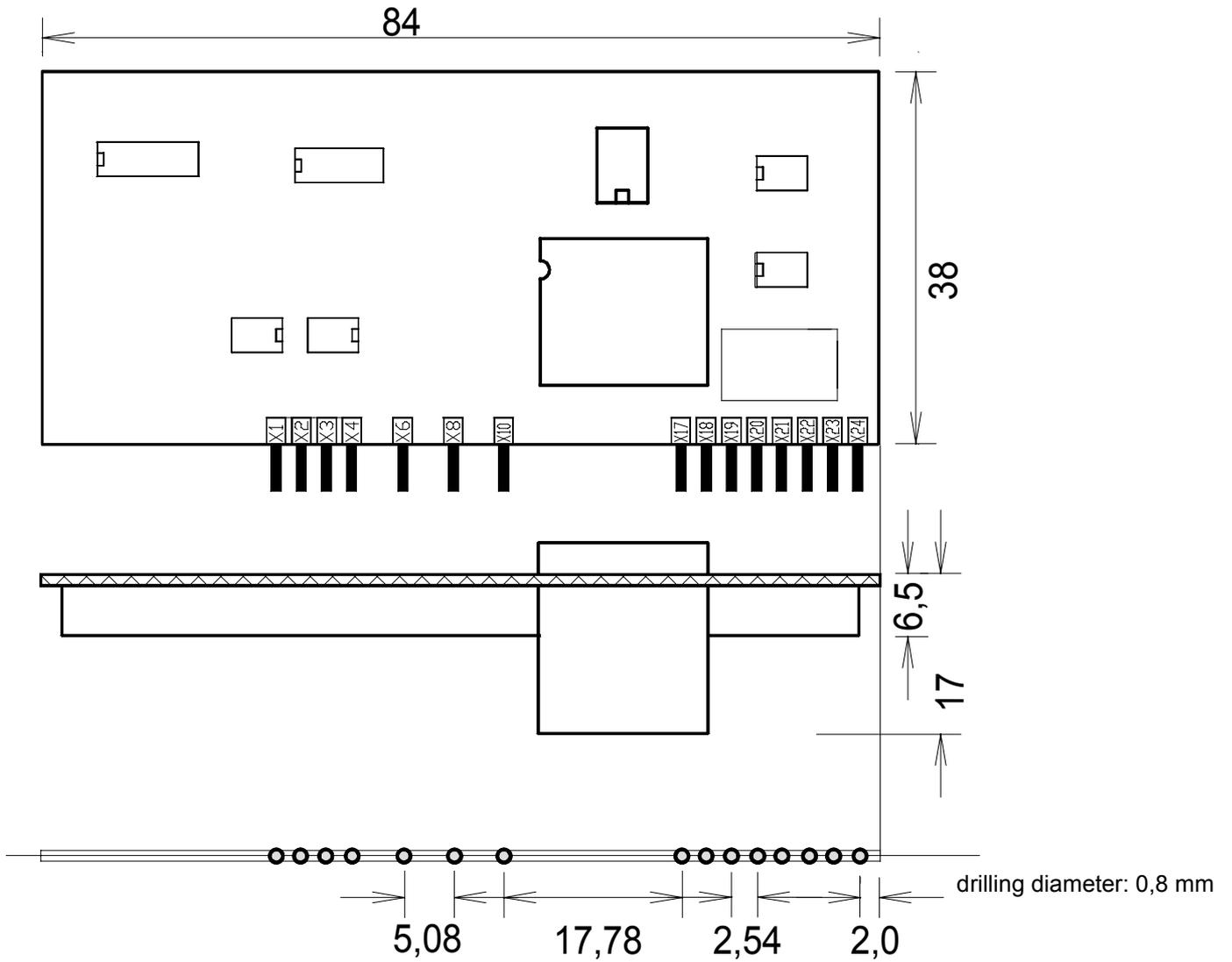
Fig. 2 Dimension drawing and PIN array of SKHIT 01

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SCR / Thyristor Trigger Module

SKHIT 01

The SCR / thyristor trigger module SKHIT 01 has been designed for triggering half controlled bridges.

Application range

When switching on a DC-link voltage converter the DC-link capacitors are uncharged and are, thus, signalizing a short circuit situation to the applied supply voltage. Therefore, the charge current has to be limited to the rated value by switching suitable circuits; SEMIKRON prefers to realize those circuits without electromagnetic components such as relays or contactors. Instead of an uncontrolled B6-diode input bridge (B6U), a half-controlled diode thyristor bridge is used (B6H).
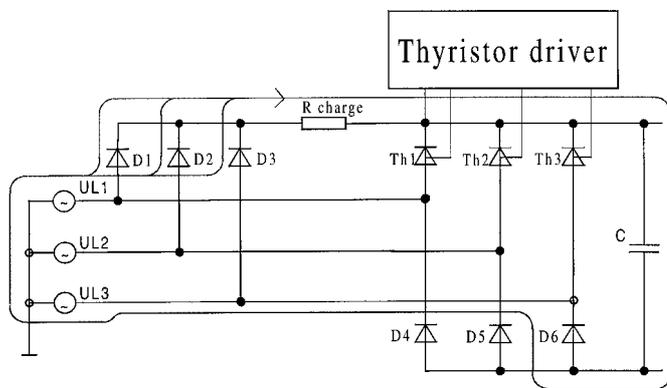

Fig. 3 Charge circuit

At beginning of the switch-on process the thyristors are blocked, the DC-link capacitors are charged via diodes D1 - D3 and R_{charge} (fig. 3). After having finished the charging process, the thyristors have permanently to be triggered by a driver stage such as the SKHIT 01.

Technical explanations

Conventional thyristor drivers use to trigger the thyristors in synchronization with the line voltage, i.e. the trigger signal is given out at a (variable) phase angle of the line voltage. However, such an angle control is only necessary for controlling the rectifier output voltage.

The SKHIT 01 fades out the trigger pulses at negative thyristor voltage.

Description of the block diagram (Fig. 1)

A cycle generator (4) and a decimal counter (5) generate square-wave signals, which are to each other time-delayed with a cyclic duration factor of 10µs and a frequency of 10kHz. These pulses are directed to the single thyristor gates via comparators and output amplifiers (6) as well as series resistors (7). If the voltage applied to the thyristor is negative or if there is no release signal, the trigger pulse signals will be suppressed. The phase relationship of the driver pulses is independent of the phase relationship of the line voltage.

The trigger enable signal (THO) is transmitted to the process logic via an optocoupler (3).

The ground connection of the control logic of an inverter is not identical with the ground connection of the thyristors. The ground connection potential of the secondary circuit of the thyristor trigger stage (BSU) is identical with the positive rectifier output voltage "+UG", while the input ground connection potential normally is identical with the logic potential "BSS". The required supply voltage is transmitted via a DC/DC-converter (1).

The feedback signal "ready for operation" (BB) is set to LOW, if the thyristor trigger enable signal is not applied (THO=Low).

Mounting instructions

- The SKHIT 01 thyristor driver has been designed for vertical mounting (soldering) to PCBs.
- The driver should be placed as close as possible to the thyristors.
- The necessary creepage paths on the PCB have to be dimensioned according to the application-specific voltage ratings.

Further application notes

The PCB-mountable thyristor driver SKHIT 01 is delivered as a subcomponent for a driving system dimensioned by the user. The responsibility for proper system operation, especially with view to keeping the valid standards, is taken only by the user.