SBC 3010 Single Board Computer

Version of Product 1.6

Technical Documentation

1 Introduction

This single board computer is composed of a high speed multitasking controller ECONO-Tiger™.

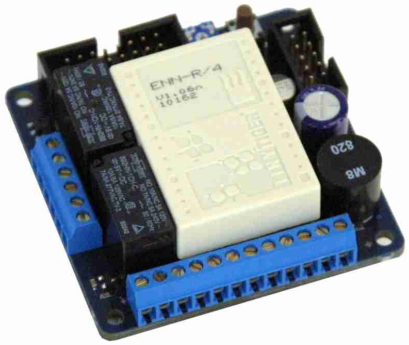
The five digital I/Os of the SBC3010 can be used as digital CMOS inputs or outputs. Each pin can be configured separately.

The SBC3010 has included two relays and one open drain FET output. It can be used for switching external devices.

A text display can be plugged in to visualize informations. The back light make sure reading the display in dark rooms, as well.

Two different serial ports can be used to communicate with other devices. The RS485 interface is designed to use the SBC3010 in a network. So you can connect several **SBCs** with each other.
For comfortable controlling your network of single board computers we recommend our **TP1000**.

The ECONO-Tiger™ can be programmed in system over the RS232 port with the powerful, well known and easy to learn Tiger-Basic™.



2 Applications

- Local controlling unit for external devices
- RS485 bus for networking
- Digital I/Os for controlling digital devices

3 Features

- In circuit programmable ECONO-Tiger™ multitasking controller
- Power supply 9...24V DC
- Connector for text LCD with back light
- RS232 port
- RS485 port
- five digital CMOS I/Os
- two relay outputs
- open drain FET output
- RESET button and PC-Mode jumper

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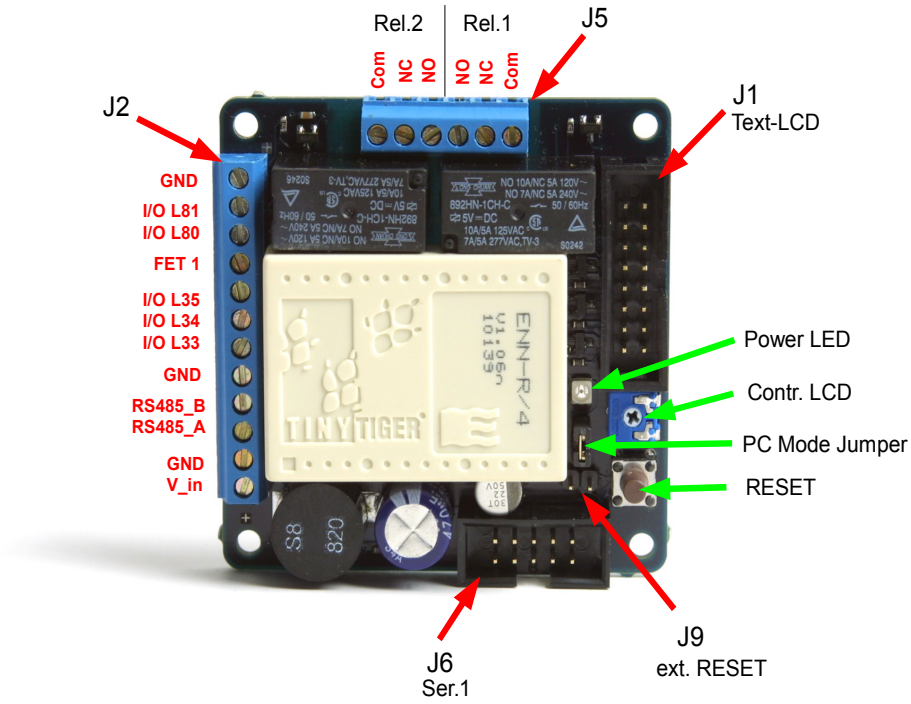


5 Control Elements

5.1 Contrast Adjustment for Text LCD

You can adjust the contrast of the text LC display at R18.

Note: You can reduce the contrast of the display down to no contrast. If you can't see your outputs at the display increase the contrast. If the screen is too black, reduce the contrast.

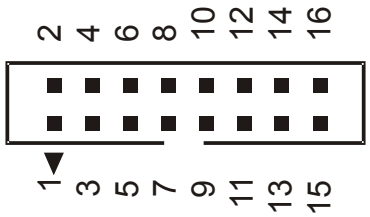
5.2 RESET Button and RUN/PC Mode Jumper

Pressing the RESET button will restart the user program if the „PC“ Mode Jumper is absend. If the mode Jumper „PC“ is connected then the TINY Tiger™ will enter PC mode after pressing the RESET button.

6 Connectors

6.1 Text LCD

Connect your text LCD on Connector J1. Use the device driver LCD1.tdd.
You may use the text LCD together with one of the graphic LCDs. The cable length connected here must not exceed 0.5m.



Connector J1

Pin	Signal	Description
1	Vss	power supply (GND)
2	Vdd	power supply (+)
3	Vo	contrast adjust
4	RS	register select
5	R/W	read /write
6	E	enable
7	D0	data bus line
8	D1	data bus line
9	D2	data bus line
10	D3	data bus line
11	D4	data bus line
12	D5	data bus line
13	D6	data bus line
14	D7	data bus line
15	BLA	backlight anode (V_in)
16	BLK	backlight cathode (GND)

NOTE: The backlight anode of your text LCD is directly connected to V_in. So you have to choose a pre-resistor in dependence of the used power supply:

R = (V_in - 2.9V)/0.1A

Please refer also to the datasheet of your text LCD!

6.2 Clamp-Connector J2

On connector J2 are multiple functions of the SBC3010 available. The clamps are designed for wires with cross section up to 1.5mm².

6.2.1 Power Supply

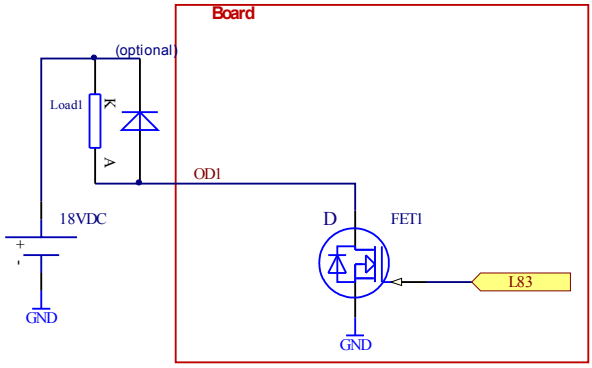
You can connect the power supply 9...24V DC at connector J2 pin 12 (V_in) and 11 (GND).

The Power LED will light, if power supply is turned on.

Note: This power input is unfused! You have to use a fused power supply.

6.2.2 open drain FET

A open drain output is available on connector J2 pin 4 of the SBC3010. This output is designed for switching low power devices. Please refer chapter absolute maximum rating and electrical specification for more technical specifications.



Note: Please don't forget the recovery diode, if a inductive load is connected!

This FET is controlled by port 8 bit 3. A high level on this bit will connect GND to the drain of the FET. A low level disconnect it again.

```
dir_pin 8,3,0

out 8, 00001000b, 255  'turns device at OD1 on
out 8, 00001000b, 0    'turns device off
```

6.2.3 digital I/Os

The SBC3010 includes five digital CMOS I/Os. This I/Os are available on connector J2 pin 2, 3 and 5 to 7. Each I/O is connected to the ECONO-Tiger™ and can be set to output or input seperatly by using the `dir_pin` command.

Please refer chapter absolute maximum rating and electrical specification for more technical specifications.

Connector J2	I/O-Port of ECONO-Tiger
2	L81
3	L80
5	L35
6	L34
7	L33

6.2.4 Ser 0: RS485

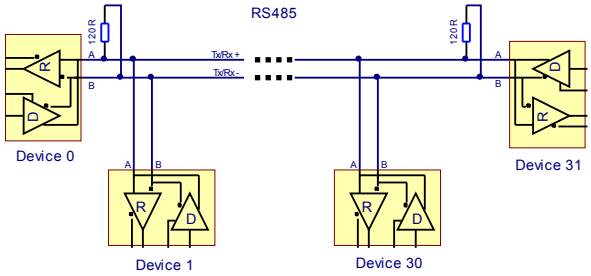
The serial port 0 of the ECONO-Tiger™ is used as RS485 port. Bit 6 of port 8 is used as transmit enable pin of the RS485 bus driver. With `print` / `put` or `get` you can easily send or receive messages from the RS485 bus. For example send 'Hello World' to an other device:

```
PRINT #SER, #0, "Hello World"
```

The RS485 signals are available at the connector J2 pin 10 (A *positive RS485 signal*) and 9 (B *negative RS485 signal*).

With the RS485 port a bus connection of multiple boards is possible. You should implement a software protocol to prevent that more than one circuit is writing to the bus at the same time. All circuits must use the same baud rate.

Note: The line should terminated at both ends in it characteristic impedance. Stub lengths off the main line should be kept as short as possible.
You have to connect GND to each module if a separate power supply is used!



6.3 Relay outputs

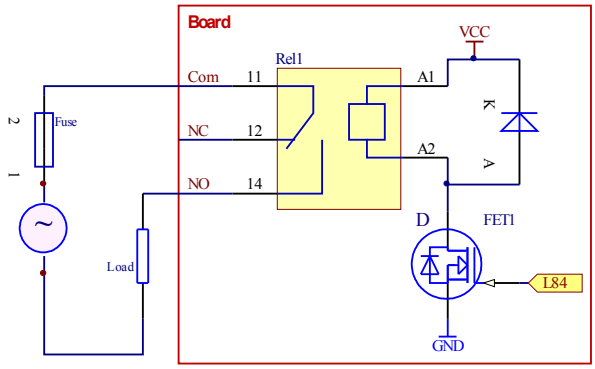
On connector J5 are two relay outputs available. Please see chapter absolute maximum ratings for technical specifications.

A fuse is NOT mounted on the SBC3010. So it is important to use a external fuse to protect the relays.

The relays are controlled by port 8 bit 4 for relay 1 and bit 5 for relay 2. A high level on this bit connect *Com* to *NO.* A low level connect *Com* to *NC.*

```
dir_pin 8,4,0

out 8, 00010000b, 255  'turns relais 1 on
out 8, 00010000b, 0    'turns relais 1 off
```



6.4 Serial ports

The SBC3010 includes two different serial ports for communication with other devices. Please use our latest serial device driver and include the following source code in your application:

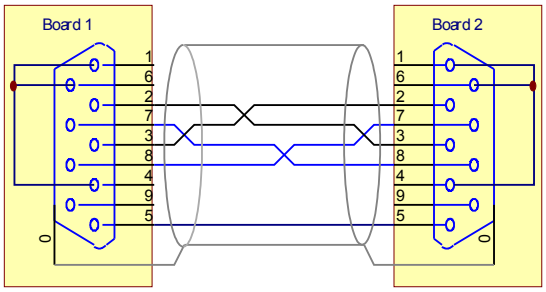
```
INSTALL_DEVICE #SER, "SER1B_K1.TDD", &
  BD_38_400, DP_8N, YES, &    'SER0
  BD_38_400, DP_8N, YES, &    'SER1
  00000100b, 8, 0          'L82 = RTS0
```

6.4.1 Ser1: RS232

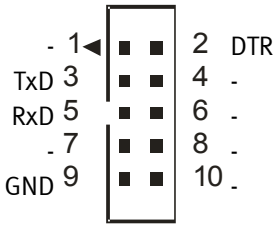
On RS232 port you can have a full duplex point to point connection to another device.

If the SBC3010 is started in PC Mode then this RS232 port can used as download and debug port.

To connect two SBC3010 boards you have to use a cross linked cable with male connectors.



Cross linked cable for RS232



Connector J6 (male)

6.5 RESET Connector

An external RESET button can be connected to J9. The onboard button will work in this case, as well.

7 Used Tiger Pins

ECONO-Tigers I/O	used for:
L33	Digital CMOS I/O
L34	Digital CMOS I/O
L35	Digital CMOS I/O
L36	enable signal for text LCD *high active output*
L37	register select for text LCD
L41	PC mode jumper input.
L60 to L67	data bus lines used by text LCD
L80	Digital CMOS I/O
L81	Digital CMOS I/O
L82	Transmit enable Ser0: RS485
L83	Open Drain FET
L84	Relay 1
L85	Relay 2
L86/L92	Not used, but connected to GND
L87/L91	RxD0 (RS485)
L90	TxD0 (RS485)
L93	TxD1 (RS232)
L94	RxD1 (RS232)

8 Technical Specification

8.1 Absolute maximum Ratings

(beyond which permanent damage may occur)

maximum supply voltage V_in (screw terminal 1 in respect of GND)	30V DC
maximum current at each relay output	2.5A
maximum voltage at relay outputs electrical isolation	60V AC 140V
maximum current at each FET output	150mA
maximum voltage at FET output	22.9V DC
input voltage at digital inputs	-0.3...30V DC
operating temperature	0...70°C

Do not connect any signal connector of the SBC3010 directly to wires which are outside a building.

8.2 Electrical Specifications

supply voltage V_in	9...24V DC
supply current at 9V input voltage at 24V input voltage at 9V input voltage with text LCD connected at 24V input voltage with text LCD connected	 100mA 50mA 200mA 70mA
Supply voltage at open drain FET	2...18V DC
CMOS logic levels high input V_{IH} low input V_{IL} high output V_{OH} low output V_{OL}	 › 3.5V ‹ 0.8V › 4.4V ‹ 0.1V

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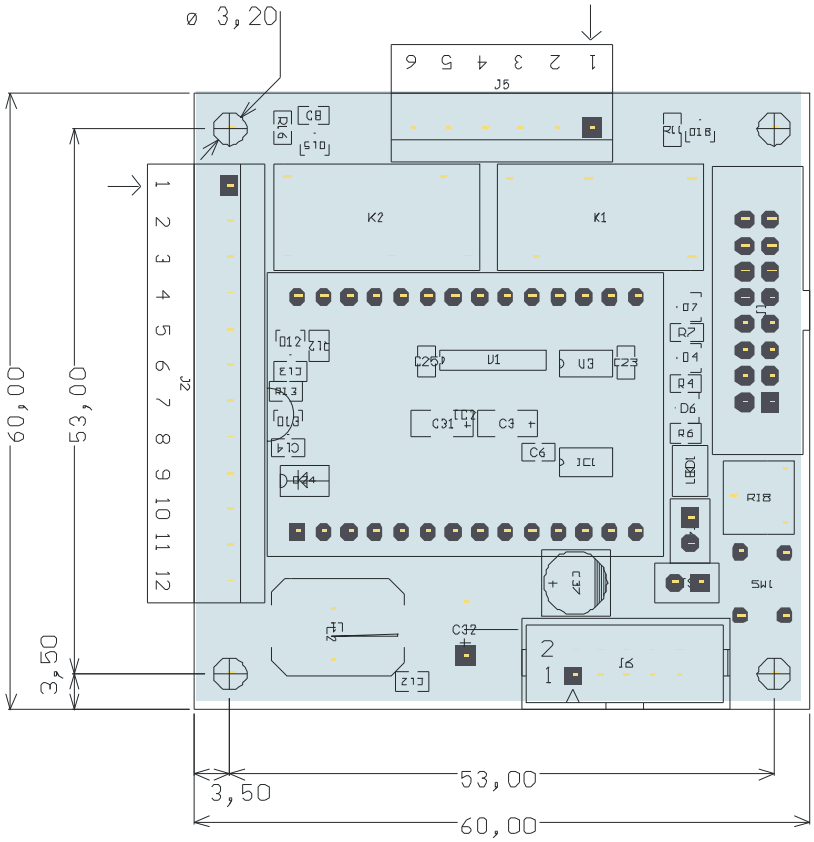
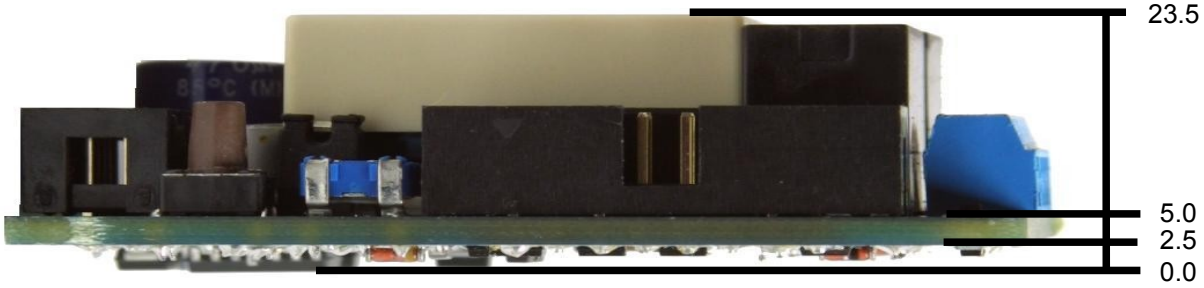
8.3 Mechanical Specifications





All dimensions in mm

9 Document History

Version of Documentation	Board Version	Description / Changes
V008	V1.6	Correct electrical specifications, change layout