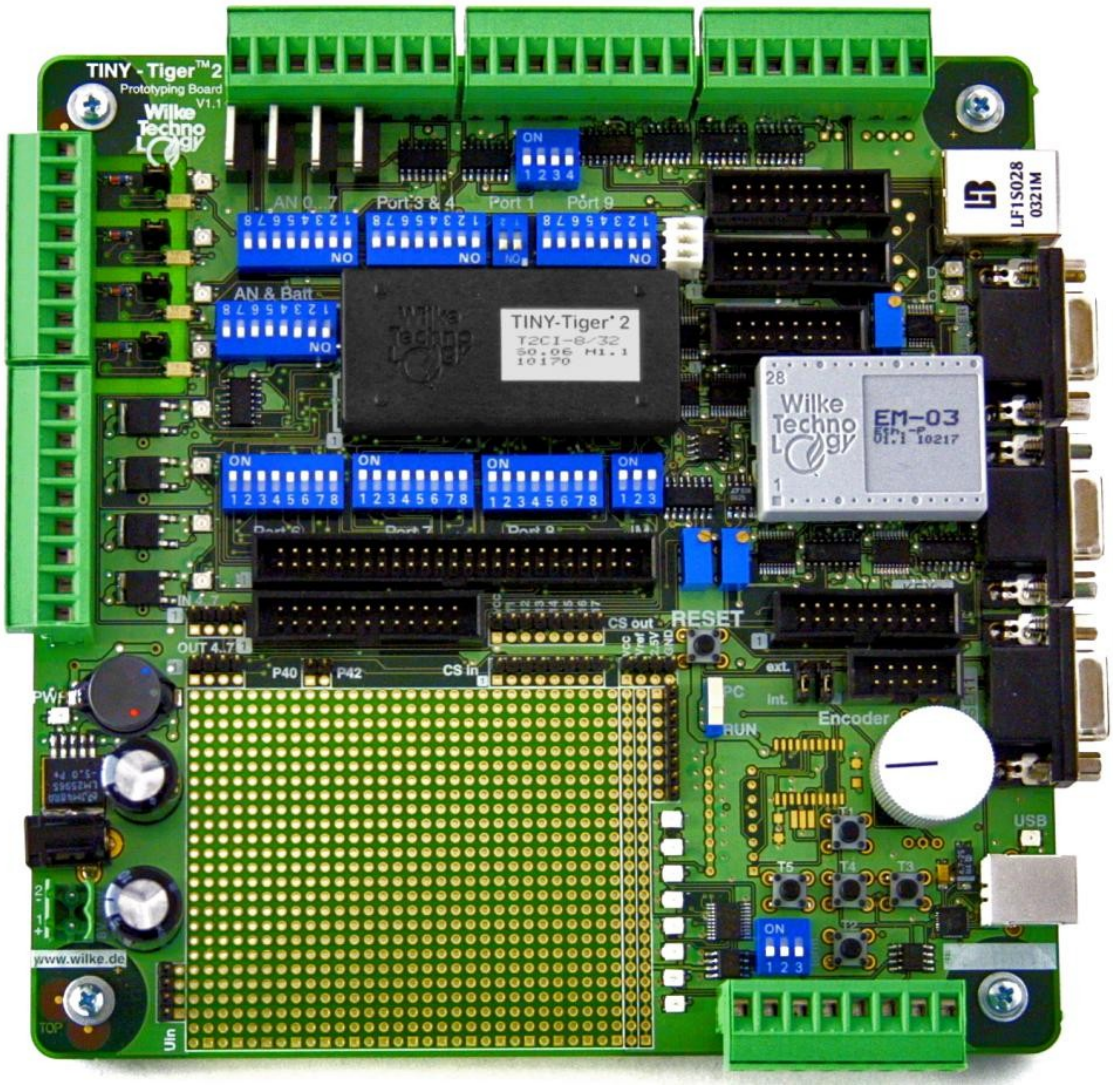
TINY-Tiger™ 2 Prototyping Board

Version of Product: V1.1

Technical Documentation



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1 Introduction

The TINY-Tiger 2 Prototyping Board presents an easy way to develop applications with the TINY-Tiger 2. It is a ready to go platform for the second generation of TINY-Tiger multitasking computers and includes useful inputs, outputs, LCD connectors and several communication ports.

You can customize the board to your requirements adding your own circuits at the patch field.
All pins of the TINY-Tiger 2 are connected to the extension port. The IO-Ports of the TINY-Tiger 2 can be dissconnected from the additional circuits of the board with the on-board DIP switches.

2 Features

- Power Supply 8V DC...24V DC
- Connector for text LCD
- Connector for graphic LCD
- 3 RS232 Ports
- RS485 Port
- CAN Bus
- USB Port
- Ethernet connection with module EM03-ETH-P
- 4 photo coupled digital inputs
- 4 extended 5V CMOS/TTL inputs
- 4 open drain FET outputs
- 4 extended 5V CMOS/TTL outputs
- 4 analog inputs 0mA...20mA with current limitation
- 4 analog inputs 0V...10V switchable to 0V...5V
- 2 analog inputs for direct connection of two PT1000 temperature sensors
- 2 analog inputs connected to a spindle resistor
- 8 LEDs for general purpose
- 5 push buttons
- RESET button and PC-Mode switch
- Encoder
- Patch field 30x25 pads with 2.54mm (100mil) distance, hole size 1mm

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3 Contents

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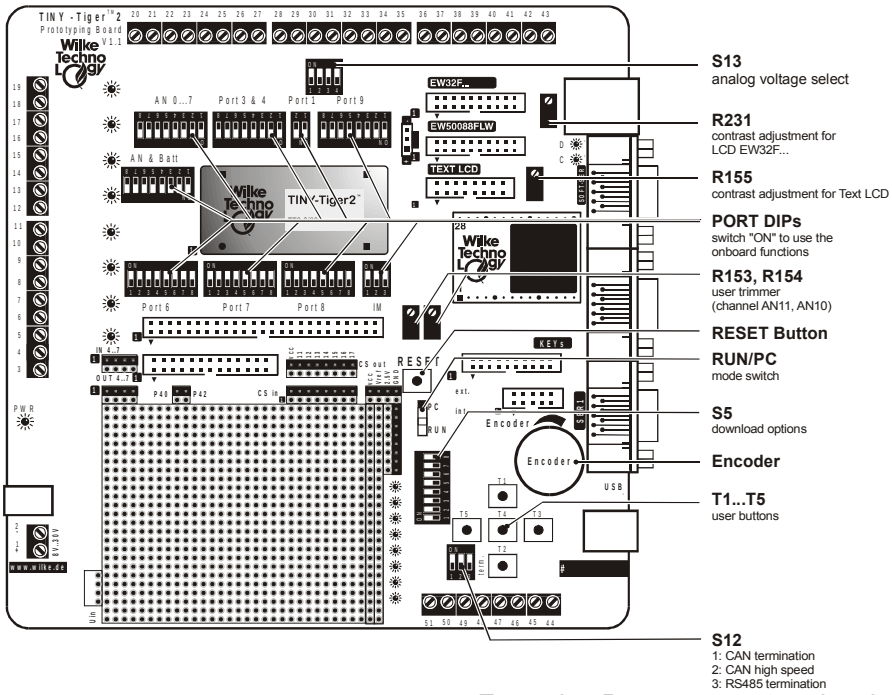


4 Control Elements

4.1 Analog Voltage Select S13

With this DIP switches you can select the voltage levels of the analog voltage inputs:

ON: 0V...5V
OFF: 0V...10V

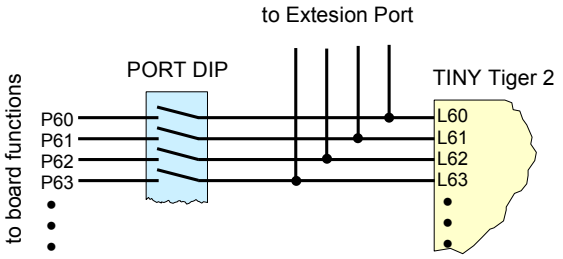
switch No.	*analog channel*	*terminals*
1	AN4	28
2	AN5	30
3	AN6	32
4	AN7	34

4.2 Contrast Adjustment R231, R155

You can adjust the contrast of the LC display EW32F... at R231 and the contrast of the text LC display at R155.
Note: You can reduce the contrast of the display downto no contrast. If you can't see your outputs at the display increase the contrast. If the screen is too black, reduce the contrast.

4.3 PORT DIPs

The IO ports and the analog input ports of the TINY Tiger 2 are directly connected to the Extension Port connector and to the DIP switches „PORT DIPs“.
All other functions of the Prototyping Board are not connected to the TINY Tiger 2 IO or analog ports but to the DIP switches.



You have to switch the PORT DIPs to position „ON“ if you want to use the on board functions of the Prototyping Board

4.4 User Trimmers R153, R154

You can vary the input voltage of the analog inputs AN 11 and AN10 to a value between 0V and V_{ref}.
R153(left trimmer) AN11
R154(right trimmer) AN10

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4.5 RESET Button and RUN/PC Mode Switch

Pressing the RESET button will restart the user program, if the mode switch is set to „RUN“.
If the mode switch is set to „PC“ then the TINY Tiger 2 will enter PC mode pressing the RESET button.

4.6 Download Options S5

These switches are used for future options.

4.7 Encoder

The encoder can be rotated in both directions without limitation. The rotation creates two transposed pulse chains, indicating both: the direction of rotation and the number of angle steps. The shaft encoder is supported by the device driver „ENC1_723.TD2“. Program menus can be scrolled up and down with the shaft encoder and the additional key function by pressing the axis serves as an enter key.
The shaft encoder is connected to P72 and P73. The key is connected to P71.
Setting the jumpers J36 and J37 to „external“ you can use an external encoder instead of the one on board.

4.8 CAN and RS485 Termination S12

With these switches you can turn the bus termination (120Ω) on or off.

RS485 and CAN are serial busses which should be terminated at each end of the line.
If the Prototyping Board is connected to one end of the bus then the termination should be switched to „ON“. Otherwise, if the board is connected to the mid of the bus, then the termination should be switched to „OFF“.

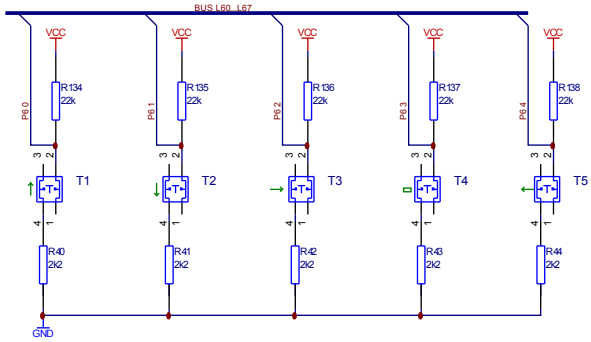
You can also select weather the CAN Bus should operate with a slope control to reduce EMI or not. Do not use the slope control if the CAN Bus operates at high speeds.

DIP No	*Bus*	*Function*
1	CAN	ON: bus termination active OFF: no termination
2	CAN	ON: high speed is possible OFF: slope control active
3	RS485	ON: bus termination active OFF: no termination

4.9 T1...T5 User Buttons

The address- and databuslines P60...P64 have pull up resistors. If you press a button T1...T5 you'll add a low impedance pull down resistor to these buslines.

If you read at an XIN address which is not used by any devices, then vou'll read a 1-bit if the key is open, and you'll read a 0-bit if the key is pressed



example:

```
value = XIN (30H, 2) bitor 11100000b
```

Note: You must reduce the speed of the XIN function with the second parameter because the bus is not driven by a active device reading the keys.You'll read a 0-bit for each pressed key.

Key	*Direction*	*Bit*
T1	up	0
T2	down	1
T3	right	2
T4	mid	3
T5	left	4

You'll read undefined values for bits 5, 6 and 7

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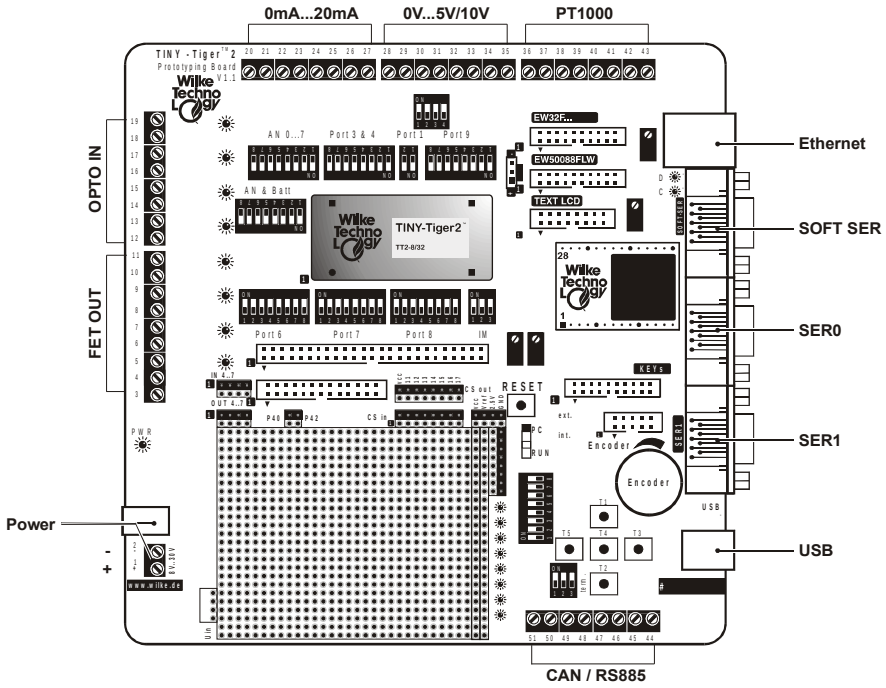


5 Connectors and Screw-Terminals

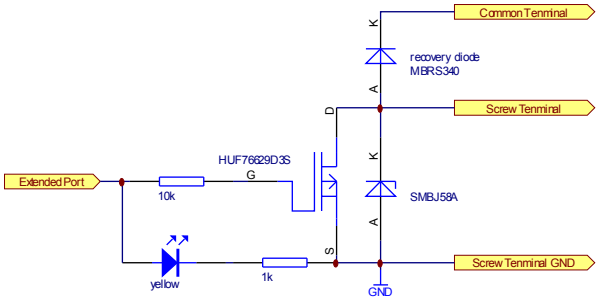
5.1 Power Supply

You can connect the power supply 8V...24V either at the DC connector or at the screw terminals no. 1 and 2

Terminal no	*Contact*	*Signal*
1	outside	8V...24V DC
2	Inside	GND

5.2 FET OUT

There are 4 FET outputs on the board.



The open drains of the FETs are connected to the screw terminals. Recovery diodes are connected between each drain and a common terminal. The gates are driven by the lower 4 bits of an extended port at address 10hex. A lighting LED indicates that the FET is in low impedance state.

Terminal no	*Signal*	*Bitnumber of extended port address 10hex*
3	recovery	-
4	D_out3	3
5	GND	-
6	D_out2	2
7	GND	-
8	D_out1	1
9	GND	-
10	D_out0	0
11	GND	-

To use the FET outputs you have to switch on all PORT DIPs of „Port 6“ and the PORT DIPs 1 and 2 of „Port 3 & 4“

Use one of the functions XOUT, XSET, XINV or XRES to change the state of the FETs.

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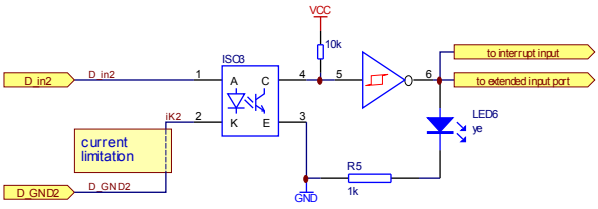
5.3 OPTO IN

The four opto inputs are connected to the screw terminals no. 12 to 19. The input state can be read at the lower 4 bits of the extended port at address 10hex. If a voltage (up to 24V DC) is applied at an input you'll read a bit value of 1.

The optocouplers are also connected to the interrupt inputs of the TINY-Tiger 2.

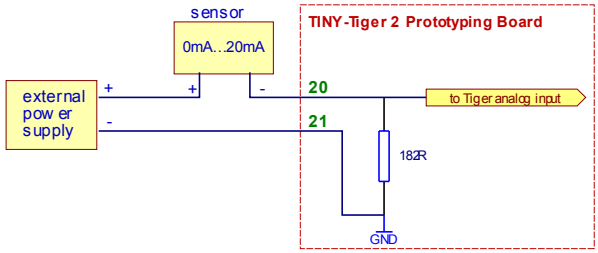
Terminal no	*Signal*	*Bit number of extended port address 10hex*	*Interrupt input*
12	D_in3	3	-
13	D_GND3	-	-
14	D_in2	2	IM3
15	D_GND2	-	-
16	D_in1	1	IM1
17	D_GND1	-	-
18	D_in0	0	IM0
19	D_GND0	-	-



You can set a jumper at each input to increase the low level input voltage.

5.4 Analog Input 0mA...20mA

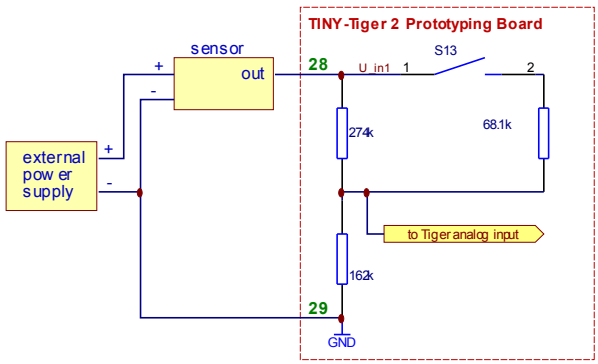
You can directly connect sensors with current outputs of 0mA...20mA (or 4mA...20mA) to the TINY-Tiger 2 Prototyping Board. The current is measured over a 182Ω resistor. As the Prototyping Board presents a 3.75V reference voltage, you'll get values between 0 and 994 using the device driver „ANALOG1.TD2“. (0.02A * 182Ω *1024 / 3.75V)



Terminal No	*Signal*	*Analog channel*
20	I_in1	0
21	GND	-
22	I_in2	1
23	GND	-
24	I_in3	2
25	GND	-
26	I_in4	3
27	GND	-

5.5 Analog Inputs 0V...5V / 10V

At the analog inputs 0V...5V / 10V you can connect sensors with a voltage output. At S13 you can select the input voltage range:
ON: 0V...5V
OFF: 0V...10V



The input resistance is 216.5kΩ at the input range 0V...5V and 436kΩ at the input range of 0V...10V

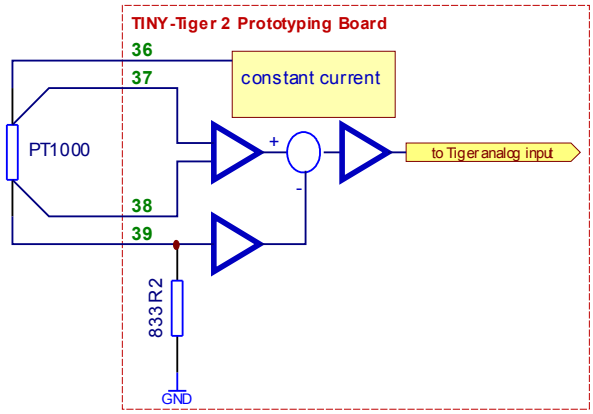
As the Prototyping Board presents a 3.75V reference voltage, you'll get values between 0 and 1021 at the input range 0V...5V, using the device driver „ANALOG1.TD2“.
5V * 162kΩ / (162kΩ+54.54kΩ) * (1024 / 3.75V)
At the input range of 0V...10V you'll get values

between 0 and 1015
10V * 162kΩ / (162kΩ+274kΩ) * (1024 / 3.75V)

Terminal No	Signal	Analog channel
28	U_In1	4
29	GND	-
30	U_In2	5
31	GND	-
32	U_In3	6
33	GND	-
34	U_In4	7
35	GND	-

5.6 PT1000 Sensor Inputs

The TINY-Tiger 2 Prototyping Board presents the possibility to connect 2 PT1000 temperature sensors in a 4 wire system.



The PT1000 is powered by a constant current source and the voltage at the PT1000 can be measured through a differential amplifyer. The constant current also flows over a 833.2 Ω resistor and the voltage drop over this resistor is substracted from the voltage of the differential amplifyer. So resistor values of the PT1000 sensor nearly down to 833R2 can be detected.

The constant current can be switched off writing a 1 to bit 0 of port 7. This will prevent the PT1000 sensor from self heating due to the constant current. The current should be turned on writing a 0 to bit 0 of port 7 at least 50ms before starting to measure.

The temperature which can be measured exactly reaches from -40°C to +120°C.

Resistance of PT1000	Temperature	Analog value
842.7Ω	-40°C	15
1461Ω	+120°C	972

Using the device driver „ANALOG1.TD2“ you'll get values which can be calculated with the following formular:
$X = (R\upsilon - 833.2\Omega) * I_m * 3.405 * 1024/V_{ref}$

Rυ resistance of the PT1000 sensor
I_m = 1.6654mA
V_{ref} = 3.75V

The resistance of the PT1000 sensor depends on the temperature:

$R\upsilon = R0*(1 + A* \upsilon/°C + B*(\upsilon/°C)^2)$
or at temperatures below 0°C
$R\upsilon =$
$R0*(1 + A* \upsilon/°C + B*(\upsilon/°C)^2 + C*(\upsilon/°C)^3 + D*(\upsilon/°C)^4)$

R0 = 1000Ω
υ: temperature
A = $3.90802*10^{-3}$
B = $-0.580195*10^{-6}$
C = $0.42735*10^{-9}$
D = $-4,2735*10^{-12}$

Note: As the values of B to D are quite small the relation between the resistance of the PT1000 sensor and the temperature is nearly linear.

Terminal No.	Signal	Analog channel
36	TempP1	8
37	TsenseP1	
38	TsenseM1	
39	TempM1	
40	TempP2	9
41	TsenseP2	
42	TsenseM2	
43	TempM2	

5.7 SER0: RS232 or RS485

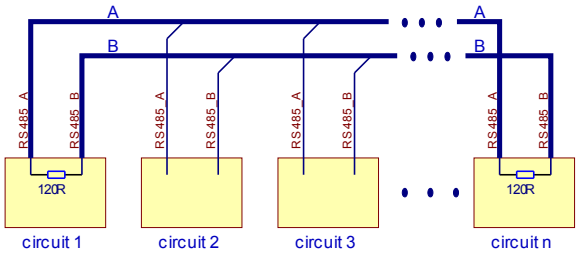
The serial port 0 of the TINY-Tiger 2 can be used either as RS232 or as RS485 port. Write “1“ to bit 7 of port 8 to use the RS485 port or write “0“ to bit 7 of port 8 to use the RS232 port SER0. The output driver of the RS485 is disabled, if the RS232 is used.

Use the device driver „SER1b.td2“ to communicate via the serial ports.

5.7.1 RS485

The RS485 signals are available at the screw terminals:

Terminal no	*Signal*
44	GND
45	Shield connection connected though a 1MΩ resistor parallel to a 100nF capacitor to GND
46	RS485_A positive RS485 signal
47	RS485_B negative RS485 signal



With the RS485 port a bus connection of multiple boards is possible. Bit 4 of port 1 is used as output enable pin of the RS485 bus driver. 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.

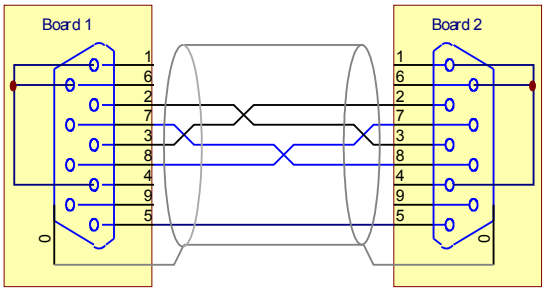
5.7.2 RS232

The signals of the RS232 port SER0 are available at the female SUB D connector.

SUB D pin no	*Signal*	*Direction*
1	connected with pin 4 and 6	-
2	TxD: Transmit Data	Output
3	RxD: Receive Data	Input
4	connected with pins 1 and 6	-
5	GND	-
6	connected with pin 1 and 4	-
7	CTS: Clear To Send	Input
8	RTS: Request To Send	Output
9		Not connected

At the RS232 port you can have a full duplex point to point connection to another device, e.g. you can connect the TINY-Tiger 2 Prototyping Board to a PC with a straight 1 to 1 cable and communicate via a terminal program with the board.

To connect 2 TINY-Tiger 2 Prototyping Boards you must use a crosslinked cable with male connectors.



5.8 SER1: RS232 or USB

The serial port 1 of the TINY-Tiger 2 can be used either as RS232 or as USB slave port. If the USB cable is plugged to the Prototyping Board the USB port will be activated, otherwise the RS232 port SER1 will be active. To connect the Prototyping Board to your PC via USB cable you must install the Virtual COM Port Driver shipped with the board on your PC.

At the RS232 port you can have a full duplex point to point connection as shown for SER0. The SER1

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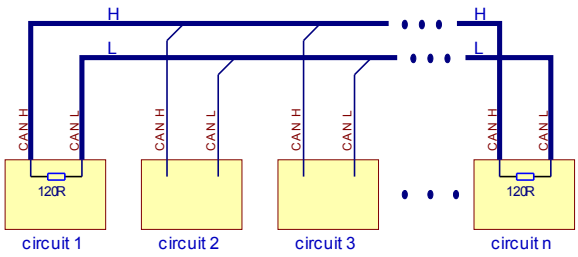
port is used as download and debug port at the TINY-Tiger 2.

5.9 CAN-Bus

The CAN-Bus of the TINY-Tiger 2 Prototyping Board is connected to the screw terminals 47 to 50.

Terminal no	*Signal*
48	GND
49	Shield connection connected though a 1MΩ resistor parallel to a 100nF capacitor to GND
50	CAN H
51	CAN L



With the CAN-Bus port a bus connection of multiple boards is possible. The hardware of the TINY-Tiger 2 supports the CAN 2.0A and 2.0B protocol.
Use the device driver „CAN1_K8.td2“ to communicate via CAN-Bus.

5.10 SOFT SER – RS232

With the device driver „SER2_*pp*_*xx*.td2“ it is possible to use standard IO pins as a RS232 port. *pp* specifies the pins which are used and *xx* specifies the buffer size. As the bits are shifted in and out by software without hardware support, the device driver will consume some CPU performance.
Nevertheless, if you need an additional RS232 port then the device driver is a cheap and easy way to upgrade your system with RS232 ports.

At the TINY-Tiger 2 Prototyping Board the bits 4 to 7 of port 7 can be used as software RS232 port.
Use the device driver „SER2_74_*xx*.TD2“.
xx can be R1, K1 or K4:

Device driver	*used buffer size*
SER2_74_R1.TD2	128 bytes
SER2_74_K1.TD2	1K byte
SER2_74_K4.TD2	4K bytes

The signals of the SOFT SER - RS232 port are available at the female SUB D connector.

SUB D pin no	*Signal*	*used Port Pin*	*Direction*
1	connected with pin 4 and 6	-	-
2	TxD: Transmit Data	P74	Output
3	RxD: Receive Data	P75	Input
4	connected with pins 1 and 6	-	-
5	GND	-	-
6	connected with pin 1 and 4	-	-
7	CTS: Clear To Send	P76	Input
8	RTS: Request To Send	P77	Output
9			Not connected

At the RS232 port you can have a full duplex point to point conection as shown for SER0.

5.11 Ethernet

On the TINY-Tiger 2 Prototyping Board the EM03-ETH-P Ethernet module is implemented which supports protocols like ARP, IP, TCP, DHCP, DNS, UDP, SNTP. Some more protocols are ready designed in BASIC language. Please take a look at the latest version of the EM03-ETH-P documentation.

The board presents a 10 BASE-T Ethernet connection. You can connect 2 boards with a crosslinked cable or connect to an existing network using a straight cable and a hub or switch.

As the board supports TCP/IP you can easily connect your application to an intranet or to the internet via a gateway.

Possible applications are for example WEB-Browser controlled devices or devices which send e-mails if a defined event occurs. With the TINY-Tiger Prototyping Board you can design measurement devices which will send its results to the hard drive of an internet service provider via FTP to get world wide access to the measured values.

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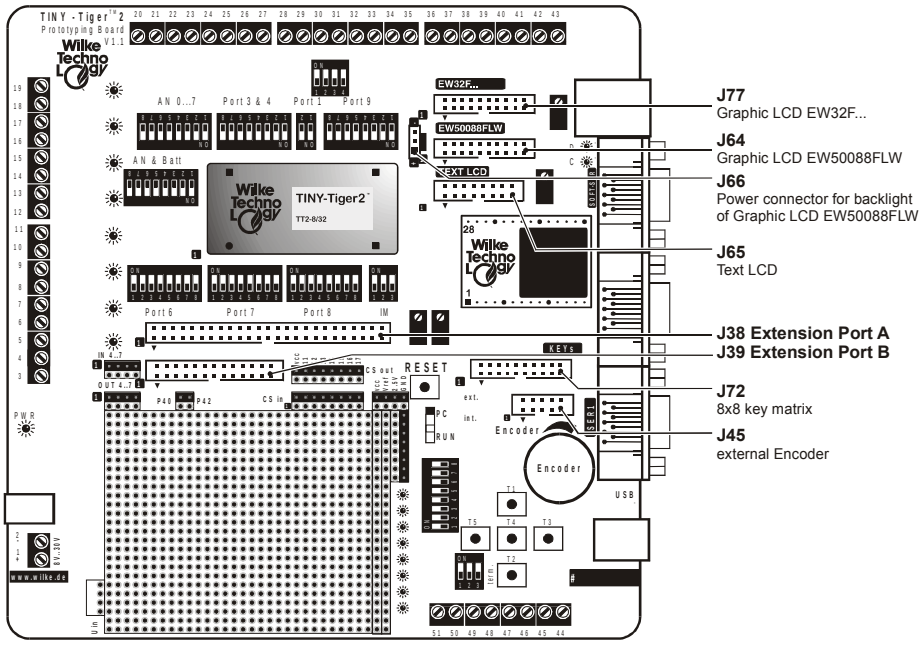
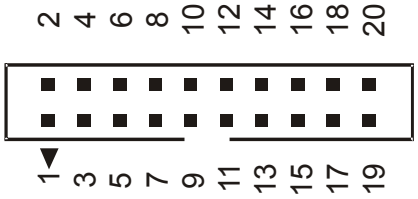


5.12 Header Connectors

5.12.1 J64 LCD EW32F...

The connector J77 is designed to connect a LC display of type EW32F... or compatible types.
Note: Do not connect displays with different voltage levels, because the display and the prototyping board may be permanently damaged! Do not use J64 and J77 at the same time!



Pin no.	Signal name	Used Tiger Signal	Description
1	Vss		power supply (GND)
2	Vdd		power supply (+)
3	-24V...VCC		contrast adjust
4	A0	P83	A0
5	/WR	P81	data write
6	/RD	P80	data read
7	D0	P60	data bus line
8	D1	P61	data bus line
9	D2	P62	data bus line
10	D3	P63	data bus line
11	D4	P64	data bus line
12	D5	P65	data bus line
13	D6	P66	data bus line
14	D7	P67	data bus line
15	/CE	P84	chip enable
16	/RST	P85	RESET
17	Vee		-24V DC supply input for LCD
18	SEL1		H:6800 L:8080
19	VLED		supply for backlight

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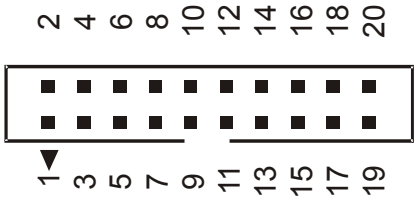
Pin no.	Signal name	Used Tiger Signal	Description
20	VLSS		supply for backlight

5.12.2 J64 LCD EW50088FLW

The connector J64 is designed to connect a LC-display of type EW50088FLW or compatible types.
Note: Do not connect displays with different voltage levels, because the display and the prototyping board may be permanently damaged! Do not use J64 and J77 at the same time!



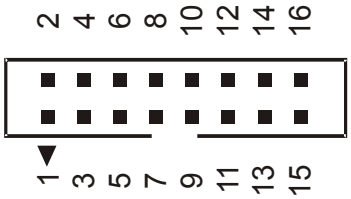
Pin no.	Signal name	Used Tiger Signal	Description
1	Vss		power supply (GND)
2	Vdd		power supply (+)
3	Vo		contrast adjust
4	C /D	P83	command /data select
5	/RD	P80	data read
6	/WR	P81	data write
7	D0	P60	data bus line
8	D1	P61	data bus line
9	D2	P62	data bus line
10	D3	P63	data bus line
11	D4	P64	data bus line
12	D5	P65	data bus line
13	D6	P66	data bus line
14	D7	P67	data bus line
15	/CE	P84	chip enable
16	/RST	P85	RESET
17	Vee		negative supply output
18	MD2		select number of columns

Pin no.	Signal name	Used Tiger Signal	Description
19	FS1	GND	font select
20	NC		not connected

The power of the LCD backlight can be connected at J66.

Pin no.	Signal name	Description
1	VLCD	power supply for LED(+)
2	NC	not connected
3	GND	power supply for LED(GND)

5.12.3 J65 Text LCD



Connect your text LCD at J65

Pin no.	Signal name	Used Tiger Signal	Description
1	Vss		power supply (GND)
2	Vdd		power supply (+)
3	Vo		contrast adjust
4	RS	P37	register select
5	R/W	GND	read /write
6	E	P36	enable
7	D0	P60	data bus line
8	D1	P61	data bus line
9	D2	P62	data bus line
10	D3	P63	data bus line

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Pin no.	*Signal name*	*Used Tiger Signal*	*Description*
11	D4	P64	data bus line
12	D5	P65	data bus line
13	D6	P66	data bus line
14	D7	P67	data bus line
15	BLA		back light anode
16	BLK		back light cathode

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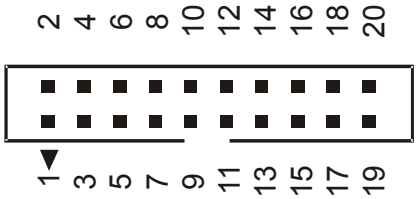
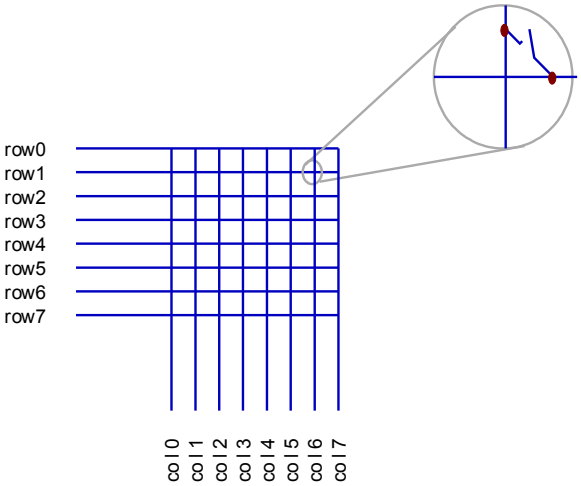
5.12.4 J72 8x8 Key Matrix



At J72 you can connect a 8x8 key matrix.

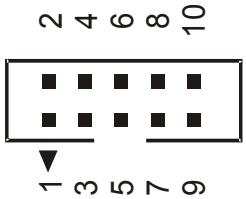


Pin no.	Signal name	Description
1	row0	row 0 (input with pull-up)
2	row1	row 1 (input with pull-up)
3	row2	row 2 (input with pull-up)
4	row3	row 3 (input with pull-up)
5	row4	row 4 (input with pull-up)
6	row5	row 5 (input with pull-up)
7	row6	row 6 (input with pull-up)
8	row7	row 7 (input with pull-up)
9	col0	column 0 (output: low or high impedance)
10	col1	column 1 (output: low or high impedance)
11	col2	column 2 (output: low or high impedance)
12	col3	column 3 (output: low or high impedance)
13	col4	column 4 (output: low or high impedance)
14	col5	column 5 (output: low or high impedance)
15	col6	column 6 (output: low or high impedance)
16	col7	column 7 (output: low or high impedance)
17	beep	no function but reserved for beeper
18	keyled	no function but reserved for keyled
19	VCC	power supply (VCC)
20	GND	power supply (GND)

The key matrix is mapped to the physical address 88hex to 8fhex. You can use the device driver „LCD1.td2“ to use the keymatrix as input device.

5.12.5 J45 external encoder

If you want to connect an external encoder instead of the on board one then connect it at J45 and set the jumpers J36 and J37 to „external“



Pin no.	Signal name	Description
1	GND	power supply (GND)
2	GND	power supply (GND)
3	DecExt1	external input1 connected over J36 to P72
4	GND	power supply (GND)
5	DecExt2	external input2 connected over J37 to P73
6	GND	power supply (GND)
7	shaft button	connected to P71
8	button1	not connected but reserved for additional button
9	button2	not connected but reserved for additional button
10	VCC	power supply (VCC)

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5.12.6 J38 Extension Port A

The Extension Port A is directly connected to the pins of the TINY-Tiger 2. You may connect your own circuits to this port. Prevent conflicts with the on board hardware by switching off the on board functions at the Port DIPs.

Pin no.	*Signal name*	*TINY-Tiger 2 pin no*
1	V+ (U_in fused with 200mA)	-
2	V+ (U_in fused with 200mA)	-
3	GND	22a
4	VCC	44a, 44b
5	INTM0	35a
6	VCC	44a, 44b
7	L60	1a
8	BATT	43a, 43b via Port DIP S11
9	L61	2a
10	AGND	41a
11	L62	3a
12	A_REF	42a
13	L63	4a
14	AN_3	40a
15	L64	5a
16	AN_2	39a
17	L65	6a
18	AN_1	38a
19	L66	7a
20	AN_0	37a
21	L67	8a
22	ALARM	34a
23	L70	9a
24	L41_/PC	36a
25	L71	10a
26	L40	37b
27	L72	11a
28	Alarm	34a
29	L73	12a
30	L37	33a
31	L80	13a
32	L36	32a
33	L81	14a
34	L35	31a
35	L82	15a
36	L34	30a
37	L83	16a
38	L33	29a
39	L84	17a
40	L14	28a
41	L85	18a
42	L94	27a
43	L86	19a
44	L93	26a
45	L87	20a
46	L92	25a
47	/RESET	21a
48	L91	24a
49	GND	22a
50	L90	23a

5.12.7 J39 Extension Port B

The Extension Port B is directly connected to the pins of the TINY-Tiger 2. You may connect your own circuits to this port. Prevent conflicts with the on board hardware by switching off the on board functions at the Port DIPs.

Pin no.	*Signal name*	*TINY-Tiger 2 pin no*
1	AN_4	39b
2	AN_5	40b
3	AN_6	41b
4	AN_7	42b
5	AN_8	4b
6	AN_9	3b
7	AN_10	2b

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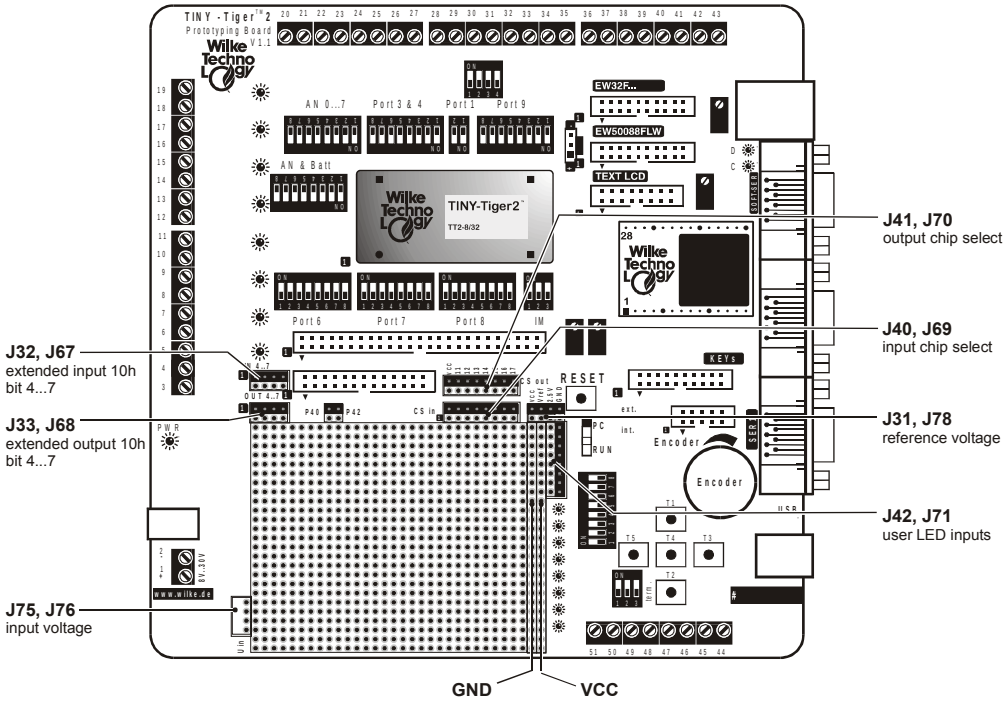
Pin no.	*Signal name*	*TINY-Tiger 2 pin no*
8	AN_11	1b
9	GND	22a
10	L74	10b
11	L75	11b
12	L76	12b
13	L77	13b
14	L15	32b
15	L97	35b
16	L96	34b
17	L95	33b
18	GND	22a
19	res2	5b
20	res3	6b
21	INTM3	7b
22	INTM1	8b
23	res6	9b
24	3V3	36b
25	VCC	44a, 44b
26	GND	22a

TINY-Tiger™ 2 Prototyping Board

Version of Product: V1.1



6 Patch Field

At the patch field you can place your own circuits to extend the TINY-Tiger 2 Prototyping Board to your demands. This is an easy way to design your prototypes.

The patch field consists of 25x30 free vias. Around this field there are some already connected vias and header connectors which may be useful to design your extensions.

Note: If you implement the TINY-Tiger 2 Prototyping Board with your additional circuits into your application, then you'll have to check that the extended board meets the specifications of electromagnetic radiation and EMI.

6.1 VCC and GND

The two rows at the right hand side are connected with GND and VCC. (VCC: 5V ±5%)
(position of vias: see picture above)

6.2 J31, J78 Reference Voltage

At J31 and J78 you have access to the reference voltages used on the board:

PAD no	*Voltage*	*Accuracy*
1	5V (VCC)	±5,0%
2	3.75V(VREF)	±1.7%
3	2.5V	±1.7%
4	GND	-

6.3 J32, J67 Extended Input

The header connector J32 and the pads J67 are connected to a 5V COMS and TTL compatible input wich can be read at the XPORT address 10hex bits 4 to 7. There are 100kΩ pull down resistors implemented to prevent the inputs from floating.

PAD no / Pin no. of header connector	*Bit no.*
1	4
2	5
3	6
4	7

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6.4 J33, J68 Extended Output

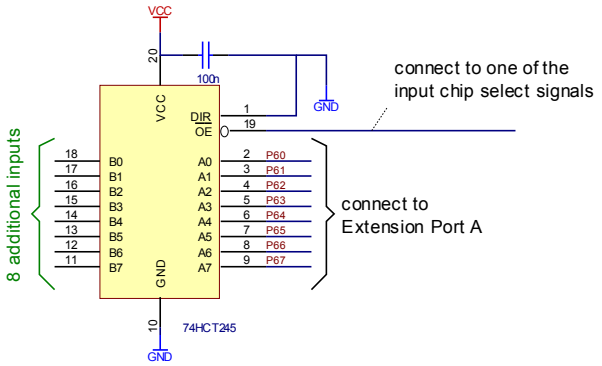
The header connector J33 and the pads J68 are connected to a 5V CMOS and TTL compatible output which can be set or reset at the XPORT address 10hex bits 4 to 7.

PAD no / Pin no. of header connector	*Bit no.*
1	4
2	5
3	6
4	7

6.5 J40, J69 Input Chip Select

The header connector J40 and the pads J69 present 7 chip select signals which are low active if a XPORT input address 11hex to 17hex is selected and P35 is low active. This state will occur, if the XIN function is used with one of the addresses 11hex to 17hex.

This signals may be used to connect the /OE signal of additional bus drivers placed on the patch field to implement additional digital inputs.

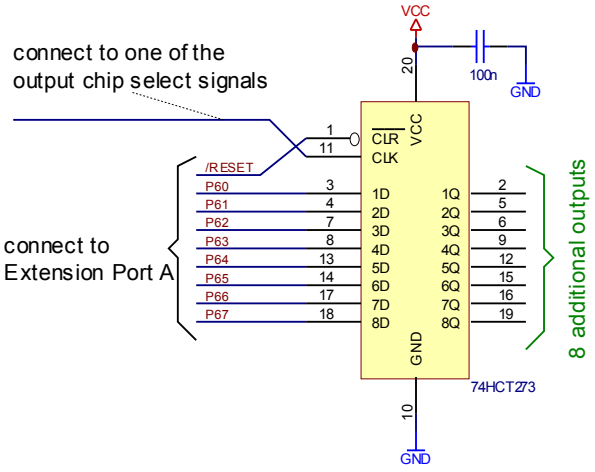


PAD no / Pin no. of header connector	*XPORT address*
1	none (directly connected to VCC)
2	11hex
3	12hex
4	13hex
5	14hex
6	15hex
7	16hex
8	17hex

6.6 J41, J70 Output Chip Select

The header connector J41 and the pads J70 present 7 chip select signals which are low active if a XPORT output address 11hex to 17hex is selected and P34_Dclk is high active. This state will occur, if the XOUT function is used with one of the addresses 11hex to 17hex.

This signals may be used to connect the clock signal of additional flip flops placed on the patch field.



PAD no / Pin no. of header connector	*XPORT address*
1	none (directly connected to VCC)
2	11hex
3	12hex
4	13hex
5	14hex
6	15hex
7	16hex
8	17hex

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6.7 J42, J71 User LED Inputs

On the right hand side of the patch field there are 8 LEDs which are driven by a bus driver (74HCT245). The inputs of the bus driver (5V CMOS and TTL compatible) are available at the connector J42 and the pads J71. Pull down resistors (100kΩ) prevent the inputs from floating. The LEDs will light if you attach a high active signal at the pins of the connector J42 or at the pads J71.

6.8 J75, J76 Input Voltage

All 4 pads and pins are connected to the positive pole of the power connector.

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7 Technical Specifications

7.1 Absolute Maximum and Minimum Ratings

(beyond which permanent damage may occur)

maximum supply voltage U_in (screw terminal 1 in respect of GND)	30V DC
maximum current at FET outputs (screw terminals 4, 6, 8 and 10)	1.5A
maximum current at each GND screw terminal	1.5A
voltage at FET outputs (screw terminals 4, 6, 8 and 10 in respect of GND)	-0.4V...40V
input voltage at OPTO inputs (screw terminals 12 in respect of 13, 14 in respect of 15, 16 in respect of 17 and 18 in respect of 19)	±30V
isolation voltage at OPTO inputs (screw terminals 12, 13, 14, 15, 16, 17, 18 and 19 in respect of GND and in respect to each other) **NOTE**: additional touch protection is required if high voltages are attached to the TINY-Tiger™ 2 Prototyping Board	±400V
input voltage at analog inputs 0mA...20mA (screw terminals 20, 22, 24 and 26 in respect of GND)	-0.3V...30V
input voltage at analog inputs 0V...5V / 10V (screw terminals 28, 30, 32 and 34 in respect of GND)	-0.3V...30V
input voltage at PT1000 inputs (screw terminals 36 to 43 in respect to GND)	0V...2V
resistance of thermo resistor	0Ω...∞Ω
operating temperature	-20°C...70°C

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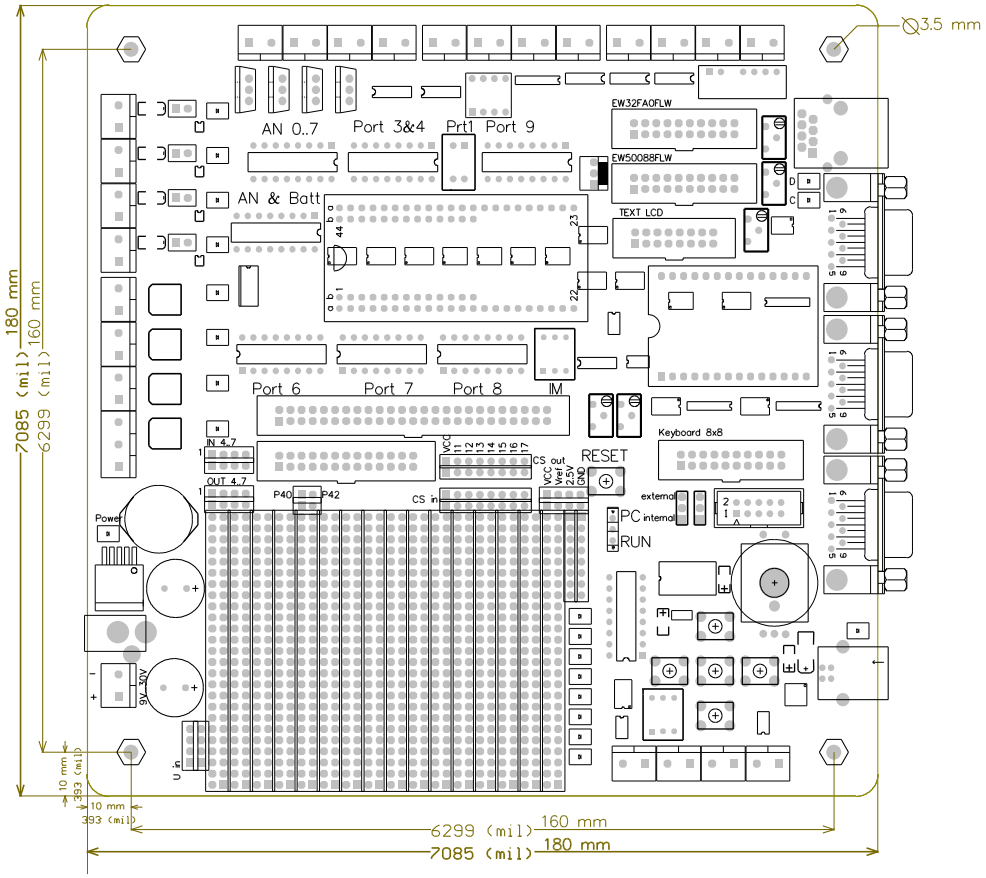
7.2 Electrical Specifications

supply voltage U_in (screw terminal 1 in respect of GND)	8V...28V DC
supply current at 8V input voltage at 28V input voltage at 8V input voltage with text and graphic LCD connected at 28V input voltage with text and graphic LCD connected	 450mA 130mA 800mA 230mA
low level input voltage at opto in with jumper set without jumper set	 -0.3V...5V -0.3V...0.8V
high level input voltage at opto in with jumper set without jumper set	 15V...30V 2V...30V
input current at OPTO inputs at input voltage of 3.6V at input voltage of 5V at input voltage of 30V	 7mA 10mA 15mA
Tolerances of analog inputs at 25°C temperature drift	 < 1.0% *NOTE 1 < 50ppm/°C *NOTE 1

*NOTE 1: refered to the maximum input value, plus input tolerance of TINY-Tiger 2

Technical Documentation

7.3 Dimensions



Technical Documentation

8 Dokumentation History

Version of Documentation	*Board Version*	*Description / Changes*
V001	V1.0	First documentation of the board
V002	V1.1	Board version changed: screw terminal for willing diode added, terminal numbers updated, J78 added, pictures and drawings updated
V003	V1.1	"Used Tiger Pins" column added at tables for LCD Header Connectors.
V004	V1.1	Chapter "SOFT SER – RS232" amended, order of chapters "Introduction", "Features" and "Contents" changed, drawings of header connectors turned with pin 1 to the left bottom corner, schematics are provided in a separate file.
V005	V1.1	Chapter "Control Elements 3.1": terminal description of analog channels AN4, AN5, AN6 and AN7 amended.
V006	V1.1	Contact information updated.