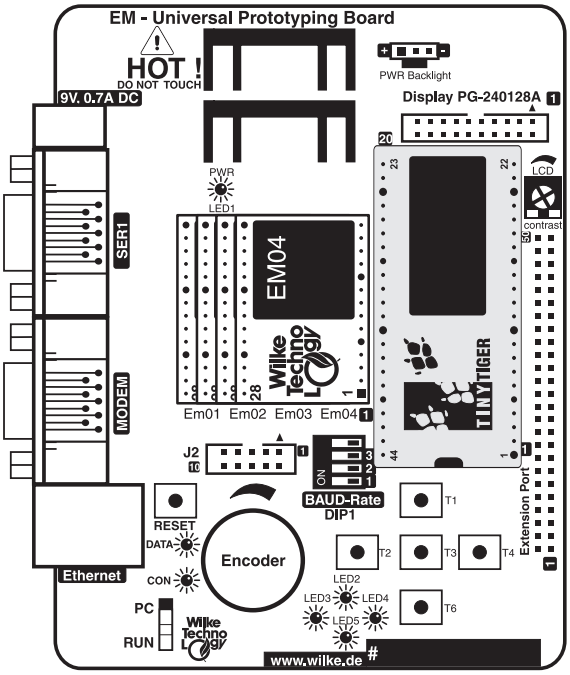
Technical Documentation

EM-Universal Prototyping Board

Board Version V1.1

Overview

The EM-Universal Prototyping Board presents an easy way to develop applications with connection to the Ethernet or connections via MOEDM. It is a ready to go multitasking computer with a TINY-Tiger™. You can plug in one of the modules EM01, EM02, EM03 or EM04. The necessary connectors and connection between TINY-Tiger™ and EM0x module is prepared ready to use.
You can easily develop your own application by copying and modifying the schematics and demonstration progams of the prototyping board.



Features

- TINY-Tiger™ Multitasking Computer
- Sockets for Ethernet modules EM01 and EM03
- Sockets for WEB modules EM02 and EM04
- Connector with filter-elements to ethernet
- RS232 Interface for communication with MODEM
- RS232 interface for communication or programm-download
- Connector for LC Graphic Display
- Power supply for Prototyping Board and LCD
- 5 push bottons, 4LED
- Encoder with push button
- Extension Port to connect your own hardware

Contents

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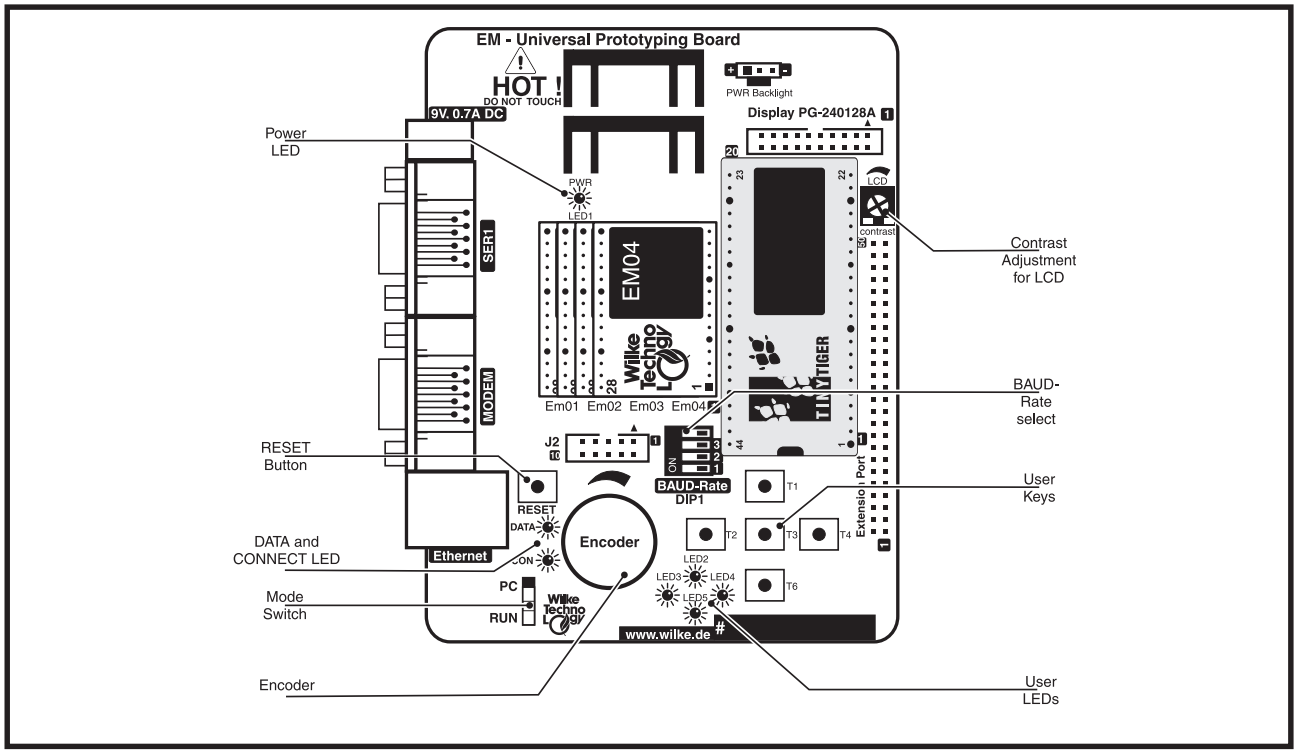
Control Elements



RESET Button:

Pressing the button will reset the TINY-Tiger™ and the module EM01, EM02, EM03 or EM04.

Mode Switch:

Shift the switch to position „RUN“ and press RESET to start your aplication in RUN-Mode or to „PC“ to download a new program into the TINY-Tiger™ or to run the TINY-Tiger™ in debug mode.

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 the angle steps. The shaft encoder is supported by the DEVICE driver „ENC1_723.TDD“. Programme menus can be scrolled with the shaft encoder and the additional key function by pressing the axis serves as an enter key. The shaft encoder is connected to the Pins L72 and L73. The key is connected to L87.

Contrast Adjustment:

If you have connected a LC Display, you can adjust the contrast of the display here. **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 by turning the contrast adjustment clockwise. If the screen is to black, redu-se the contrast.

If you use a display type EW50088FLW this trimmer is not used

User Keys:

The 5 keys can be read by your aplication reading PORT 6 bits 0 to 4. A bit value of 0 indicates a pressed key.

User LEDs:

The 4 LEDs can be controlled by your aplication. The LEDs are connected to PORT 3 bits 6 and 7 and to PORT 7 bits 0 and 1. Writing 0 to these portbits will turn on the LEDs

DATA and CONNECT LEDs:

These LEDs are driven by the EM0x modules. Refer to the data sheet of your EM0x module, if the LEDs are supported.

BAUD rate select:

For comunication between TINY-Tiger™ and EM01 or EM02 module you must select the same BAUD rate as used in your BASIC program. Turn all switches off to get the default BAUD rate. Switch1 is connected to BAUD0 signal, switch2 to BAUD1 and switch3 to BAUD2 signal of the EM01 or EM02 module.

The DIP switches are not connected to EM03 and EM04 modules.

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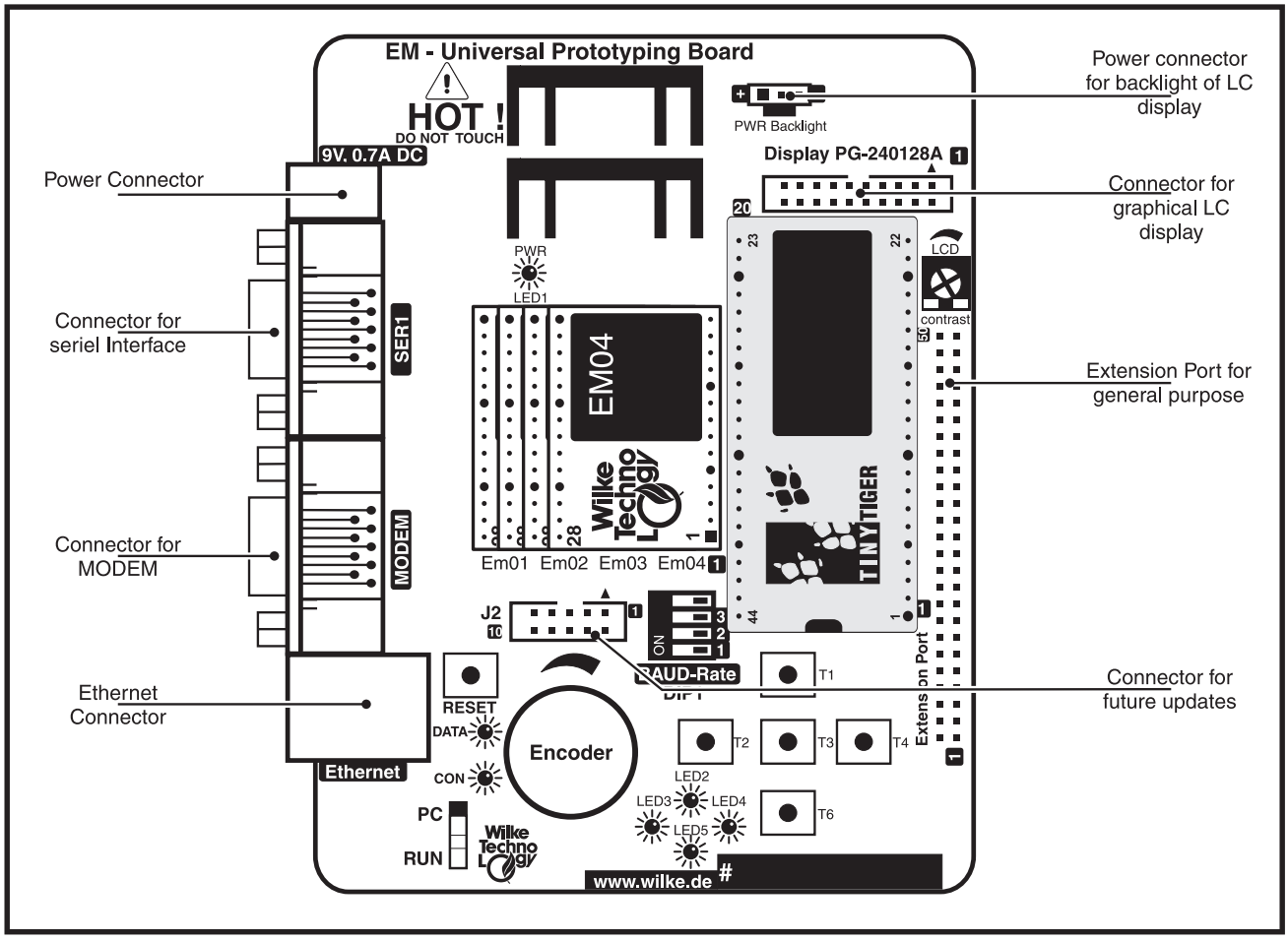
Connectors



Power Connector:

Use the power supply shiped with the EM-Universal Prototyping board or one with 9VDC +-10% and at least 0.5A.

Ethernet Connector:

Connect the Ethernet here. The used connector of Type LF1S028 contains necessary filter elements for the Ehernet connection. You can purchase such connectors at Wilke Technology GmbH

SER1:

RS232 Interface of the TINY Tiger™. Connect to your PC for running the TINY Tiger™ in PC Mode or for data transfer.

Connector for MODEM:

RS232 Interface of the WEB module EM02 or EM04. Connect your MODEM here with a straight Cable.

PWR Backlight:

Power output for backlight of LC Display. This is a current limited power output for the white LED of a Display of type PG-240128A

Display PG-240128A:

You can connect a LC Display of Type PG-240128A here. The display is supported by the device driver“LCD6963.TDD“

Extension Port:

All pins of the TINY Tiger™ are directly connected to the extension port of the EM-Universal Prototyping Board. To develop your aplication you can connect your components here.

Connector J2:

This connector is reserved for future updates

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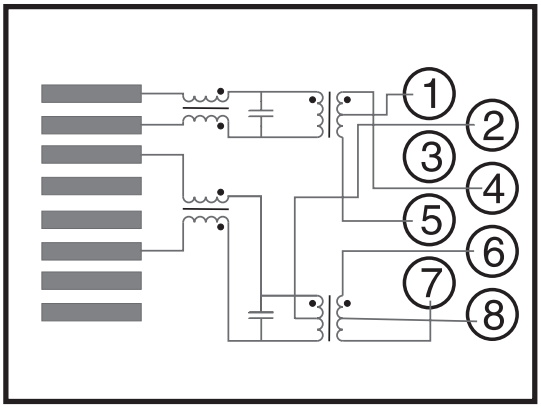
Ethernet Connector



1	connected via 100nF to GND
2	connected via 100nF to GND
3	not connected
4	TX_P positive transmit line
5	TX_M negative transmit line
6	RX_P positive receive line
7	RX_M negative receive line
8	not connected

Ethernet Connector top view

Connector

The Ethernet connector of type LF1S028 includes all necessary magnetics and filters to connect the Ethernet module EM01 or EM03 to the Ethernet.

You cannot connect the EM01 or EM03 to Ethernet without such elements. The Connector is available at Wilke Technology GmbH.

Connection to Ethernet

Use a straight Ethernet cable to connect the EM-Universal Prototyping Board to a hub or a switch.

To directly connect two EM-Universal Prototyping Boards or directly connect the EM-Universal Prototyping Board to a PC use a crosslinked cable.

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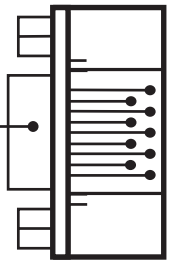
Connector for serial interface SER1

Connector for seriel Interface

9pol SUB D Connector (female)



pin	name
2	TxD
3	RxD
5	GND
7	connected to 8
8	connected to 7

SER1:

Connect the EM-Universal Prototyping Board to a PC for running the TINY Tiger™ in PC Mode or for data transfer at the serial Port SER1 with a straight 9 pole RS232 cable.

SER0:

The seriel PORT 0 of the TINY-Tiger™ is connected to the module EM01 or EM02.

Pinning:

2 - TXD (output)
Data Transmit line of the TINY Tiger™
The outgoing data from the EM-Universal Prototyping Boardis transmitted here.

3 - RxD (input)
Data Receive line of the TINY Tiger™
The incoming data to the EM Universal Prototyping Board is received here.

5 - GND
System Ground

7 and 8
Pin 7 and 8 are tied together to loop back an incoming handshake signal (RTS / CTS)

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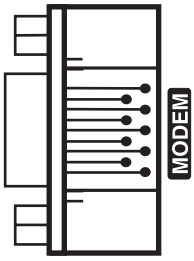
Connector for MODEM

Connector for MODEM

9pol SUB D Connector (male)

pin	name
2	RxD
3	TxD
4	+10V (DTR)
5	GND
7	RTS
8	CTS



MODEM:

When you use the EM-Universal Prototyping Board with the WEB Adapter EM02 or EM04 you can connect your MODEM with V.24 Interface here with a straight MODEM cable.

Pinning:

3 - TXD (output)
Data Transmit line of the EM adapter
The outgoing data from the EM adapter EM02 or EM04 is transmitted here.

2 - RxD (input)
Data Receive line of theEM adapter
The incoming data to the EM adapter EM02 or EM04 is received here.

4 - DTR (output)
Data Termina Ready. This signal is set active when the power supply is attached to the EM-Universal Prototyping Board.

5 - GND
System Ground

7 - RTS (output)
Handshake signal Request To Send. When the EM adapter EM02 or EM04 is ready to receive data, it turns this signal active (+3V...+12V).

7 - CTS (input)
Handshake signal Clear To Send. The MODEM should set this signal active (+3V...+12V), when it's ready to receive data from the EM02 or EM04.

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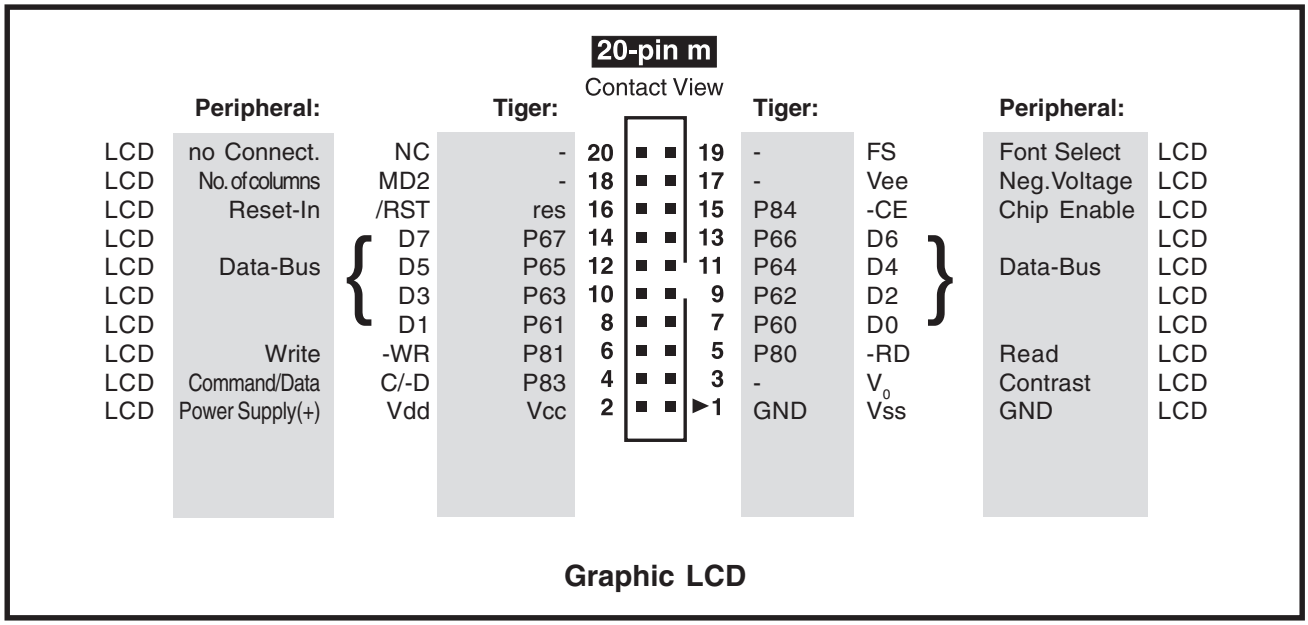
Connector for graphical LC display



With this connector a graphical LC display (Type PG-240128A) can be connected to the Ethernet Prototyping Board.
You may also use a LCD of type EW50088FLW with automatic contrast adjustment.

LCD type: 240 x 128 pixel, T6963C Controller

Selection pins: The displays Font Select (Pin 19) is by default set to low.
The displays Number of columns Select (Pin 18) is by default set to high.

LCD backlight: Is activated by connecting power to the separat "Power connector for backlight of LC display" on the EM-Universal Prototyping Board.

LCD contrast: Set by adjusting the LCD contrast potentiometer on the EM-Universal Prototyping Board.
Using a display of type EW50088FLW this signal has no function.

LCD reset: LC display reset is low active, two reset sources are combined (AND):
- RESET (System reset)
- Tiger output pin P85

so that the LCD is resetted at power-up and by system reset, as well as by explicitly setting Tiger pin P85 to low.

LCD bus lines: Data bus:

Data I/O	D0	P60
	...	...
	D7	P67

Control bus:

Read	-RD	P80
Write	-WR	P81
Command / Data	C/-D	P83
Chip Enable	-CE	P84
Reset-In	/RST	P85 and -Reset

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Extension Port for general purpose

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Pin description	Pin no.		Pin no.	Pin description
V+	1	■ ■	2	V+
GND	3	■ ■	4	Vcc
Res	5	■ ■	6	Vcc
L60	7	■ ■	8	Batt.
L61	9	■ ■	10	AGND
L62	11	■ ■	12	Aref
L63	13	■ ■	14	AN 3
L64	15	■ ■	16	AN 2
L65	17	■ ■	18	AN 1
L66	19	■ ■	20	AN 0
L67	21	■ ■	22	Alarm
L70	23	■ ■	24	Run/PC
L71	25	■ ■	26	
L72	27	■ ■	28	
L73	29	■ ■	30	L37
L80	31	■ ■	32	L36
L81	33	■ ■	34	L35 / INE
L82	35	■ ■	36	L34 / Dclk
L83	37	■ ■	38	L33 / Aclk
L84	39	■ ■	40	L95 / RTS0
L85	41	■ ■	42	L94 / RxD1
L86	43	■ ■	44	L93 / TxD1
L87	45	■ ■	46	L92 / CTS0
RESET	47	■ ■	48	L91 / RxD0
GND	49	■ ■	50	L90 / TxD0

Extension Port Pinout

On the "Extension Port for general purpose" connector all pins of the TINY-Tiger™ module are available for your individual usage.

But please remember that several pins are already used for special functionality, like e.g. for the graphical LC display. So when you intend to use LC display, keys, LEDs or the encoder some or all of the appropriate Tiger pins L36, L37, L60...L67, L70...L73, L80...L85 and L87 are not available and shouldn't be connected here.

note:

The EM-Universal prototyping board is an open evaluation board without enclosure, and it is entendet for use by experienced technicans and engineers in electronic laborties only.
Protect the board from electrostatic discharge. This equipment does not have adequate electromagnetic radiation shielding. Therefore, it is susceptible to the effects of external electromagnetic radiations and may generate electromagnetic radiation. Provide protection to other electronic equipment , to prevent errors on their operation or on operation of the EM-Universal prototyping board.

Revision Table

Dokument	Board Version	Changes
V001	1.0	-
V002	1.1	Revision of board: data and connect LED added
V003	1.1	Revision Table added, schematics added

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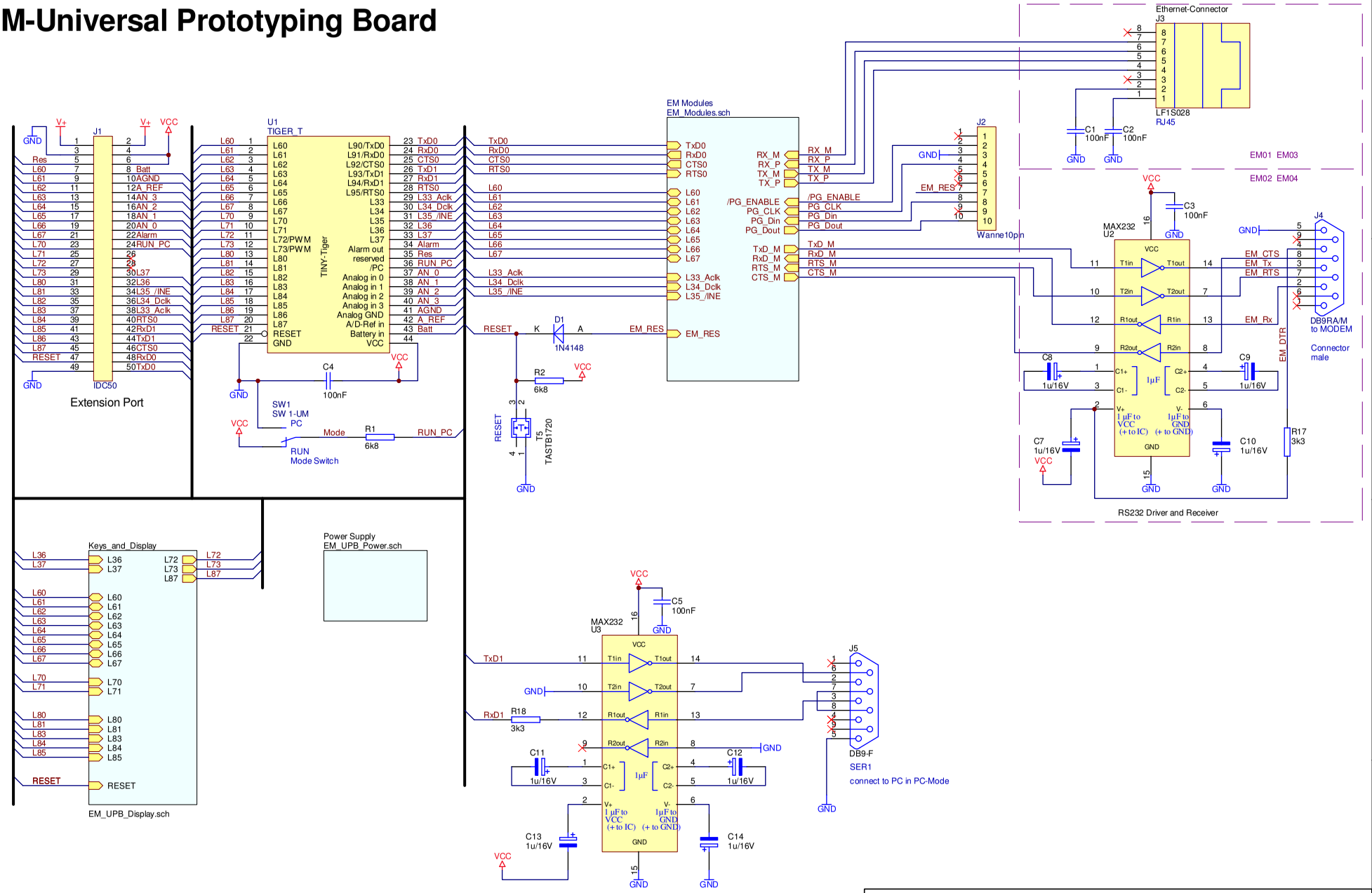

Wilke Technology		**Project:** EM-Universal Prototyping Board		
Project No.:		**PCB No.:** 03.1300. V1.1		**Sheet** 1 **of** 4
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Date:	**Revision:**	**Design:**	**test/final**	**Changes documentated in:**
10.Aug.2003	V1.0	Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc
22.Mrz.2004	V1.1	Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc

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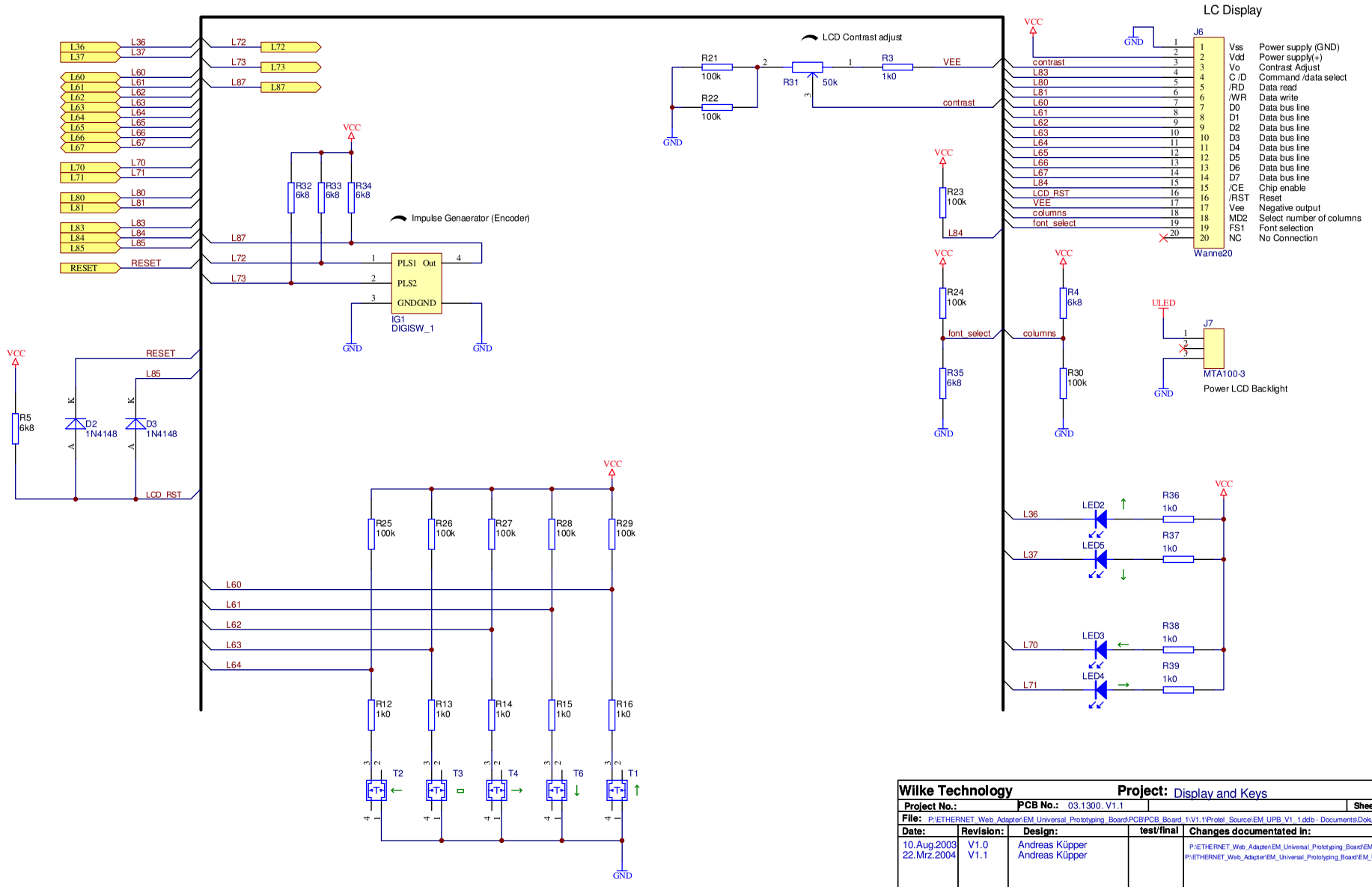

Wilke Technology		Project: Display and Keys		
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Date:	Revision:	Design:	test/final	Changes documentated in:
10.Aug.2003	V1.0	Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc
22.Mrz.2004	V1.1	Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc
	6		7	8

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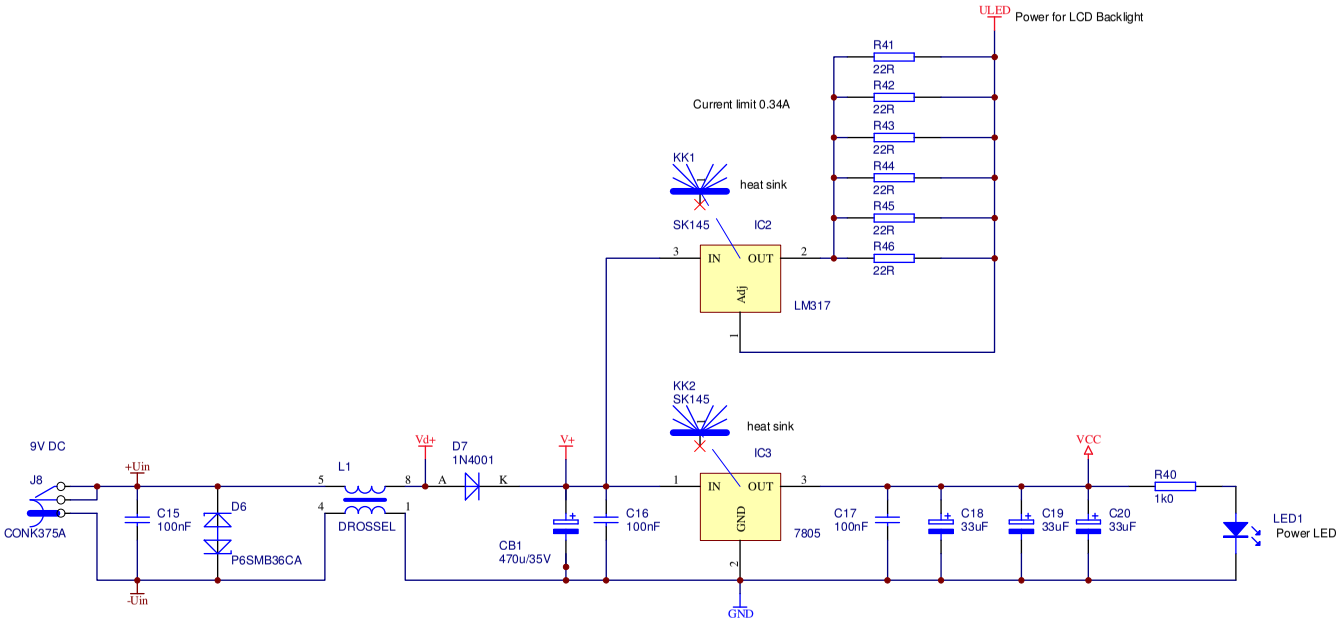

Wilke Technology		Project: Power-Supply		
Project No.:		PCB No.: 03.1300. V1.1		Sheet 3 of 4
File: P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\PCB\PCB_Board_1\V1.1\Protel_Source\EM_UPB_V1_1.ddb - Documents\Doku\EM_UPB_Power.sch				
Date:	Revision:	Design:	test/final	Changes documentated in:
10.Aug.2003 22.Mrz.2004	V1.0 V1.1	Andreas Küpper Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc
	6		7	8

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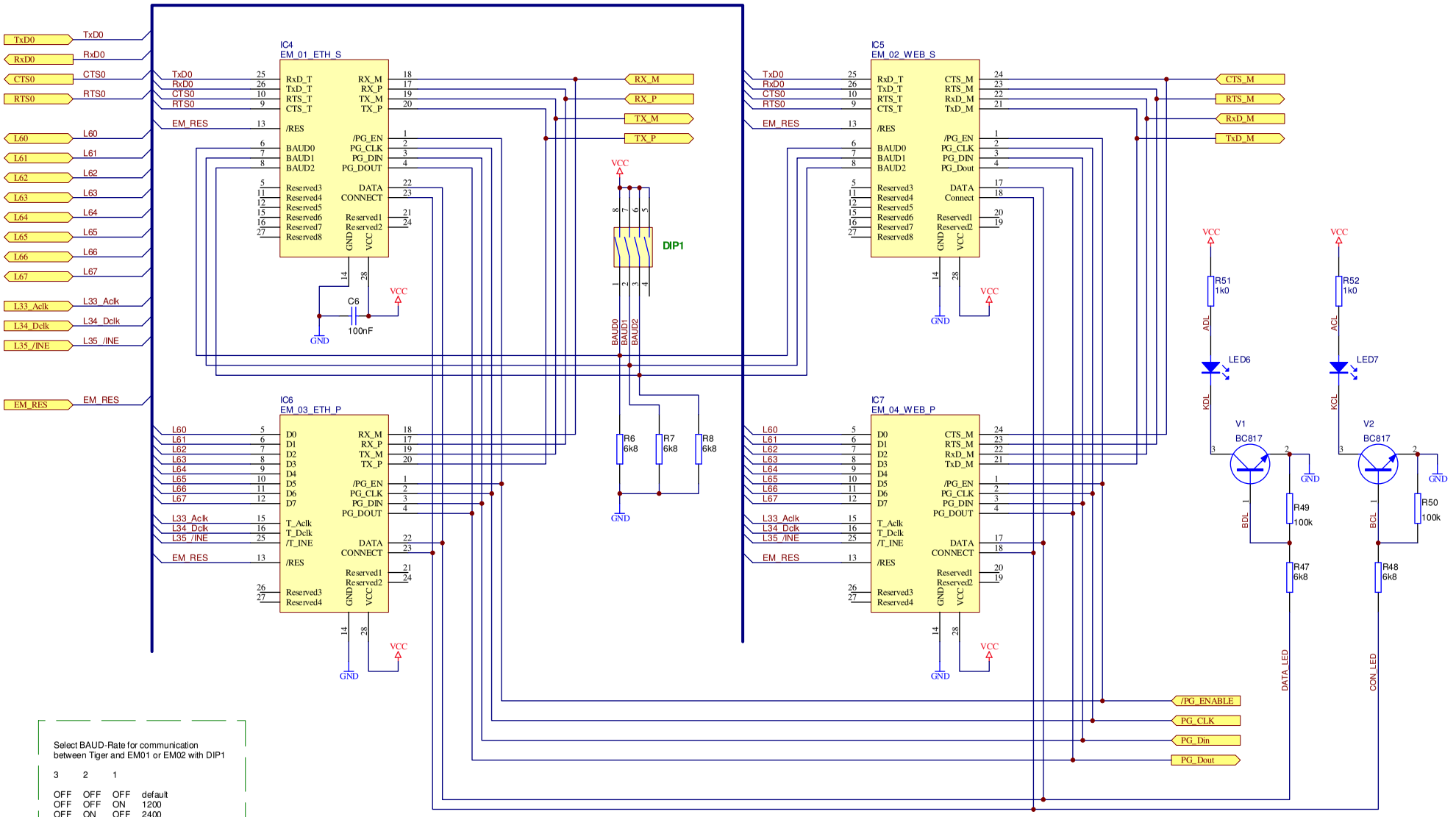

Select BAUD-Rate for communication between Tiger and EM01 or EM02 with DIP1

3	2	1	
OFF	OFF	OFF	default
OFF	OFF	ON	1200
OFF	ON	OFF	2400
OFF	ON	ON	4800
ON	OFF	OFF	9600
ON	OFF	ON	19200
ON	ON	OFF	38400

Only one of the adapters EM01 to EM04 can be plugged in at the same time

Wilke Technology		Project: EM Modules		
Project No.:		PCB No.: 03.1300. V1.1		Sheet 4 of 4
File: P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\PCB\PCB_Board_1\V1.1\Protel_Source\EM_UPB_V1_1.ddb - Documents\Doku\EM_Modules.sch				
Date:	Revision:	Design:	test/final	Changes documentated in:
10.Aug.2003	V1.0	Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc
22.Mrz.2004	V1.1	Andreas Küpper		P:\ETHERNET_Web_Adapter\EM_Universal_Prototyping_Board\EM_UPB_History.doc