

Part I

Technical Documentation

EVA Evaluation Board

This document contains the circuit diagram and manufacturing documentation of the EVA evaluation board.

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1 Technical Specifications

2 Mechanical Data

Dimensions (w/o MCU module)

Dimension	Min.	Typ.	Max.	Unit
Lenght	-	100	-	mm
Width	-	142	-	mm
Height	-	10	15	mm
Weight ^a				

^aOhne MCU-Modul

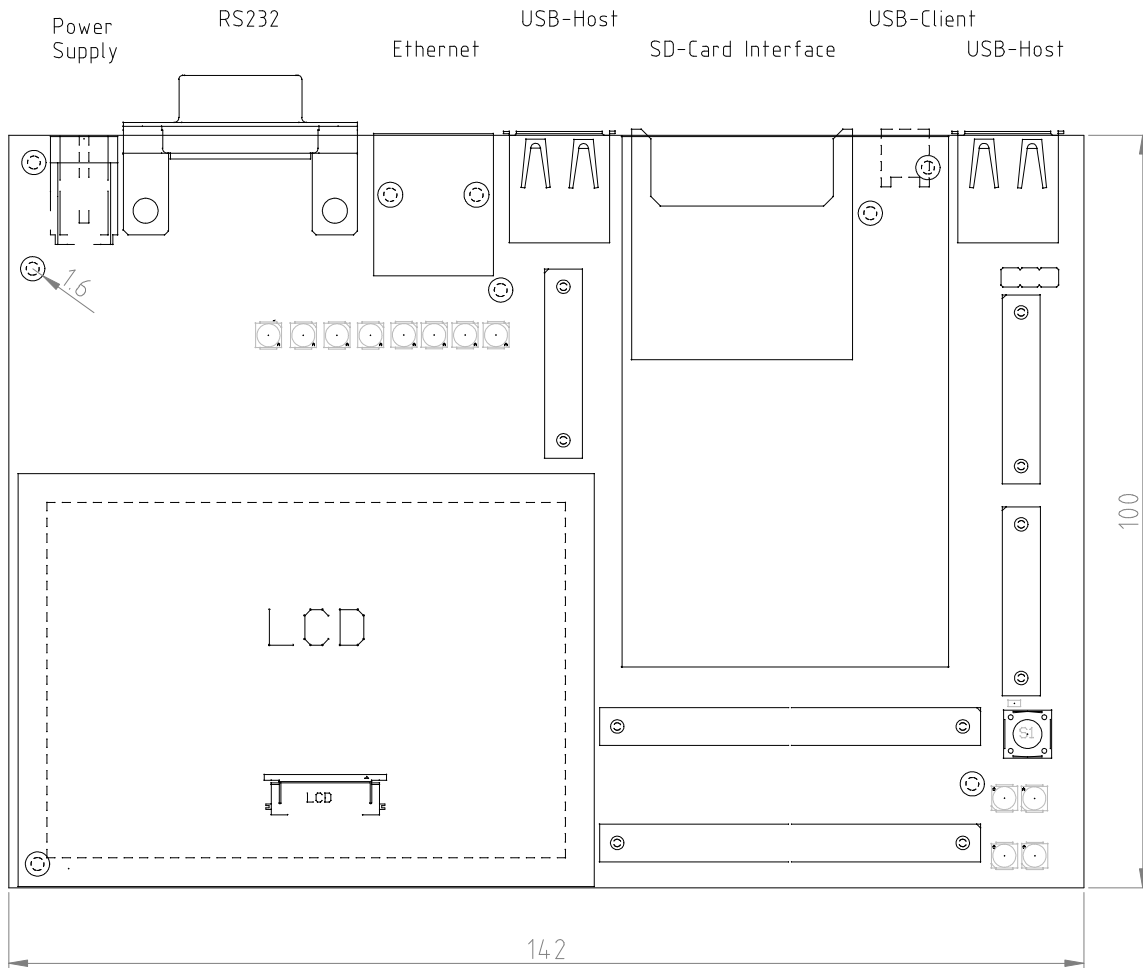


Figure 1: Overview (Dimensions)

3 Electrical Data

The following figures represent measured or calculated values with inclusion of the display.

Description	Min.	Typ.	Max.	Einheit
Supply Voltage	12	15	18	V
Supply Current	0.08	0.12	0.2	A
3.3V Supply Voltage	3.2	3.3	3.4	V
Supply Current	0.1	0.25 ^a	.5	A
Maximum Load	-	1	-	A
5V Supply Voltage	4.8	5	5.2	V
Supply Current	0 ^b	0.25	1 ^c	A
Maximum Load	-	1	-	A
1.8V Supply Voltage	1.719	1.8	1.881	V
Supply Current	0.03	0.05	0.06	A
Maximum Load	-	0.1	-	A

^aJe nach verwendeten Peripheriemodulen

^bOhne Verwendung des USB-Host; ausgeschaltete Displaybeleuchtung

^cBei USB-Vollbelastung

4 Connectors

The standard interface connectors follow the industry standard whenever possible.

4.1 Power Supply

The power supply round connector accepts **12..18V DC voltage** (see 3), as provided by the included voltage converter.

Pin	Voltage
Inner Pin	+12V
Outer Ring	GND

4.2 Ethernet

Standard wiring.

Pin	Signal
1	n/c
2	n/c
3	R-
4	n/c
5	n/c
6	R+
7	T-
8	T+

4.3 V24 (RS232)

Sub-D9 connector (female), standard wiring.

Pin	Signal
1	n/c
2	TxD
3	RxD
4	DTR
5	GND
6	n/c
7	n/c
8	n/c
9	n/c

4.4 USB-Host

USB-A Connector, standard wiring.

Pin	Signal
1	GND
2	Px
3	Mx
4	VBUS

5 Header Wiring

Most MCU signals are terminated on 2.54mm double pin headers. They are grouped according to their function. Some internal signals are also wired to the headers, for instance signals used for the LCD module or the LEDs. They are documented under the section 7.

For using onboard periphery signals externally, a modification to the system software might be required. Without modification, internal signals should be regarded as "read-only" to avoid conflicts.

Achtung!

The supply voltage (3.3V) is available on the headers. Please note the maximum supply current of 1A. See 3. The header wiring can be found in the circuit diagram. See 8.5.

5.1 MCU I/O Ports

The following MCU ports are terminated on headers.

5.1.1 MCU „Port A”

Port	Header	Pin	Remark
GPIO_PA5			Used for LCD
GPIO_PA6			Used for 5V power supply
GPIO_PA17			Used for LCD backlight
GPIO_PA18			Used for User LED
GPIO_PA19	Test pin TP7		
GPIO_PA20	J8	30	
GPIO_PA21			Used for User LED
GPIO_PA22	J8	38	
GPIO_PA23	J8	40	
GPIO_PA24	J8	39	
GPIO_PA25			Used for User LED
GPIO_PA26			Used for User LED

Table 1: MCU „Port A”

5.1.2 MCU „Port B”

Port	Header	Pin	Remark
GPIO_PB0	J8	35	
GPIO_PB1	J8	33	
GPIO_PB2	J8	36	
GPIO_PB6	J8	31	
GPIO_PB7	J8	32	
GPIO_PB8	J8	34	
GPIO_PB9	J8	30	
GPIO_PB11	J8	27	
GPIO_PB12	J8	29	
GPIO_PB13	J8	20	
GPIO_PB14	J8	10	
GPIO_PB15	J8	4	
GPIO_PB16	J8	5	
GPIO_PB17	J8	19	
GPIO_PB18	J8	14	
GPIO_PB19	J8	8	
GPIO_PB20	J8	16	
GPIO_PB21	J8	18	
GPIO_PB22	J8	6	
GPIO_PB23	J8	12	
GPIO_PB24	J8	7	
GPIO_PB25	J8	9	
GPIO_PB26	J8	11	
GPIO_PB27	J8	13	
GPIO_PB29	J8	15	

Table 2: MCU „Port B”

5.1.3 MCU „Port C”

Port	Header	Pin	Remark
GPIO_PC0	J10	12	
GPIO_PC1	J10	14	
GPIO_PC2	J10	13	
GPIO_PC3	J10	11	
GPIO_PC5	J10	8	
GPIO_PC15	J10	7	

Table 3: MCU „Port C”

5.1.4 MCU „Port D”

Port	Header	Pin	Remark
GPIO_PD0	J10	3	
GPIO_PD1	J10	2	
GPIO_PD2	J10	5	
GPIO_PD3	J10	6	
GPIO_PD4	J10	1	
GPIO_PD5	J10	4	
GPIO_PD7	J11	8	
GPIO_PD8	J11	1	
GPIO_PD10	J11	3	
GPIO_PD13	J11	4	
GPIO_PD14	J11	5	
GPIO_PD15	J11	6	
GPIO_PD16	J11	7	
GPIO_PD17	J11	10	
GPIO_PD18	J11	9	
GPIO_PD21	J11	15	
GPIO_PD22	J11	13	
GPIO_PD23	J11	12	
GPIO_PD24	J11	16	
GPIO_PD25	J11	14	
GPIO_PD26	J11	18	
GPIO_PD27	J11	11	

Table 4: MCU „Port D”

5.2 J6

The data and address bus is terminated on this header. **16 data signals, 12 address signals** and **6 decoded chip select signals** are available. Please note that the LCD already requires a chip select signal. Additionally the 3.3V / GND power supply pins can be used for external circuitry.

5.3 J8

Several MCU I/O ports are terminated on this header. Most signals have double or triple meanings, depending on functional groups of the MCU. Refer to the MCU data sheet.

5.4 J10

Comprises most **port D** and **port C** GPIO signals and the SPI interface of the MCU.

5.5 J11

Comprises the rest of **port D** as well as the supply voltages and the **NRESET** signal.

6 Assembly options

Several assembly options are available, which partially can be configured by jumpers. The jumper settings have no effect on the following components:

- 5V power supply
- Reset behavior

6.1 General assembly options

6.1.1 5V supply voltage for the USB host interface

Generation of 5V supply voltage is required for the following circuit parts:

- USB host function
- LCD backlight

Three different modes can be selected through jumper **J4**:

1. 5V supply voltage permanently on.
2. 5V supply voltage permanently off.
3. 5V supply voltage controlled by signal **GPIO_PA6**.

If the USB host function and the LCD backlight are not used, the 5V supply voltage can be switched off temporarily or permanently. For temporarily switching via a MCU port pin, **J4** has to be set accordingly. This way the current consumption can be lowered when 5V supply voltage is not required.

Jumper	Function
1-2	5V permanently on
2-3	MCU controls 5V by GPIO PA6
open	5V permanently off

6.1.2 Reset control through the V24 interface

The reset signal can be triggered by the DTR signal of the V24 interface. This function can be enabled through **J1**:

Jumper	Function
2-3	Reset by V24::DTR enabled
1-2	Reset by V24::DTR disabled
open	Reset by V24::DTR disabled

You can measure the signal "DTR" at test-pad **TP13**.

Hinweis

6.1.3 Selection of the Debug interfaces

Two debug interfaces are available:

1. JTAG
2. ICE

The JTAG interfaces is terminated on the socket **H1** and can directly be used. Jumper **J3** is used to select the interfaces.

Jumper	Function
1-2	JTAG
2-3	ICE
open	JTAG

If J3 is not set, JTAG is preselected by R16.

7 Onboard Periphery

7.1 LEDs

Four LEDs can be used for general purposes: **LED9** to **LED12** in the circuit diagram. They are connected to the MCU via Schmitt Trigger inverters. Due to the inverting, the corresponding bit must be set at 0 for lighting the LED.

LED	Schaltplan	GPIO
U1	LED9	GPIO_PA21
U2	LED10	GPIO_PA25
U3	LED11	GPIO_PA26
U4	LED12	GPIO_PA18

7.2 LCD

The LCD signals are terminated on a 20 pin connector, designed exclusively for a **24HA-0** LCD module. The following signals are wired to the connector:

LCD connector	Signal	Remark
Backlight	GPIO_PA17	Either GPIO or timer output of the MCU (high active)
„CD”	GPIO_PA5	Selects between control registers and frame buffer
„CS1”	/NCS7	Chip select connected with inverted
„BM0”	GND	Selects bus mode
WR1_NRD	NRD	Read
zWR0_NWE	NWE	Write
D0..D7	D0..D7	Data bus

Please refer to the LCD data sheet for accessing the LCD module.

7.3 5V Power Supply

If jumper **J4** is set accordingly, the 5V supply voltage can be switched on and off by the MCU and controlled as follows:

GPIO_PA6 State	Voltage at TP2	Function
0	ca. 0V	5V off
1	ca. 3.3V	5V on

The voltage level at the /SHDN input of the 5V switching regulator can be measured at test pin 2.

Hinweis

8.2 Power Supply

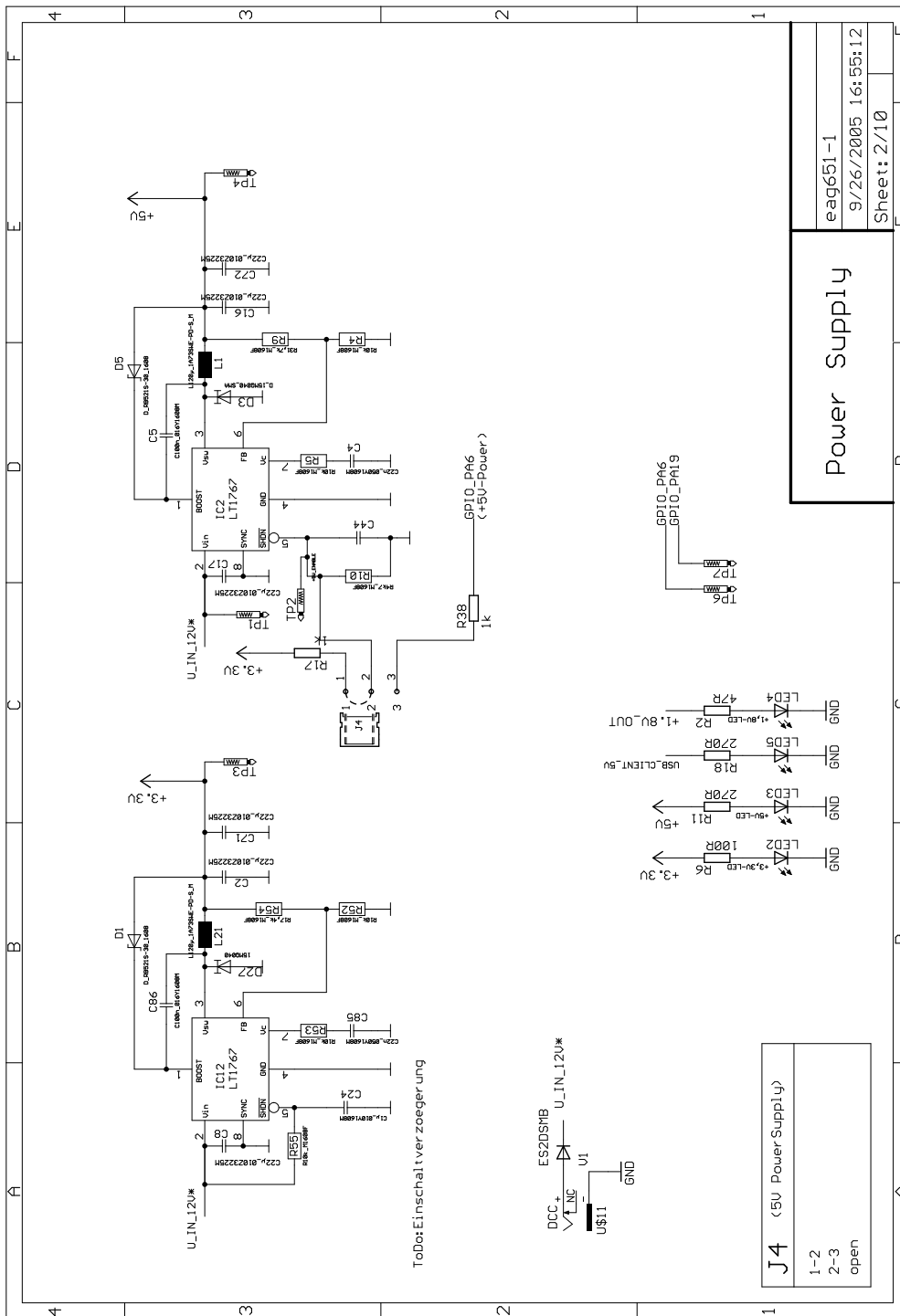


Figure 3: Power Supply

8.3 Serial Interfaces

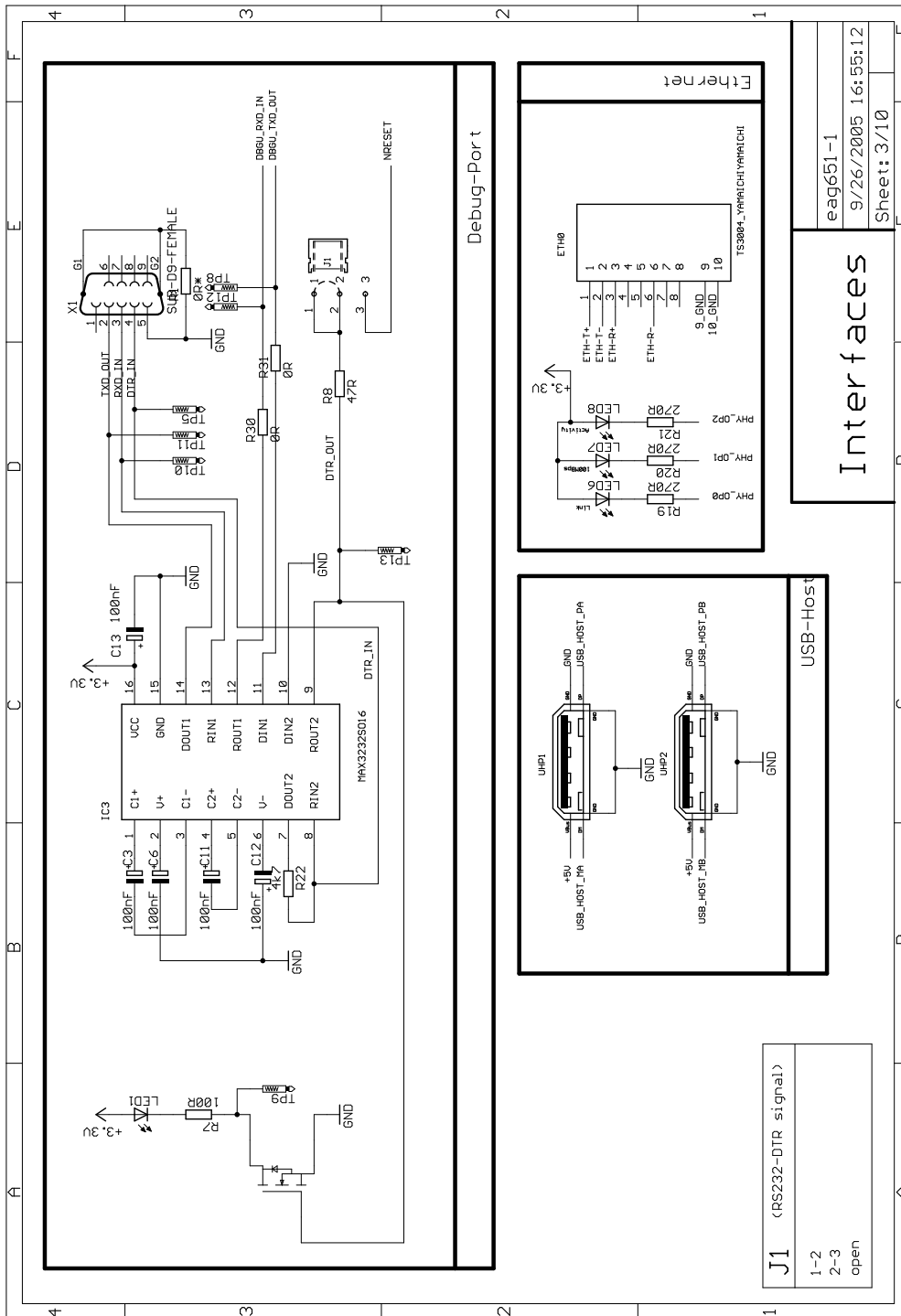


Figure 4: Serial Interfaces

8.4 JTAG Port

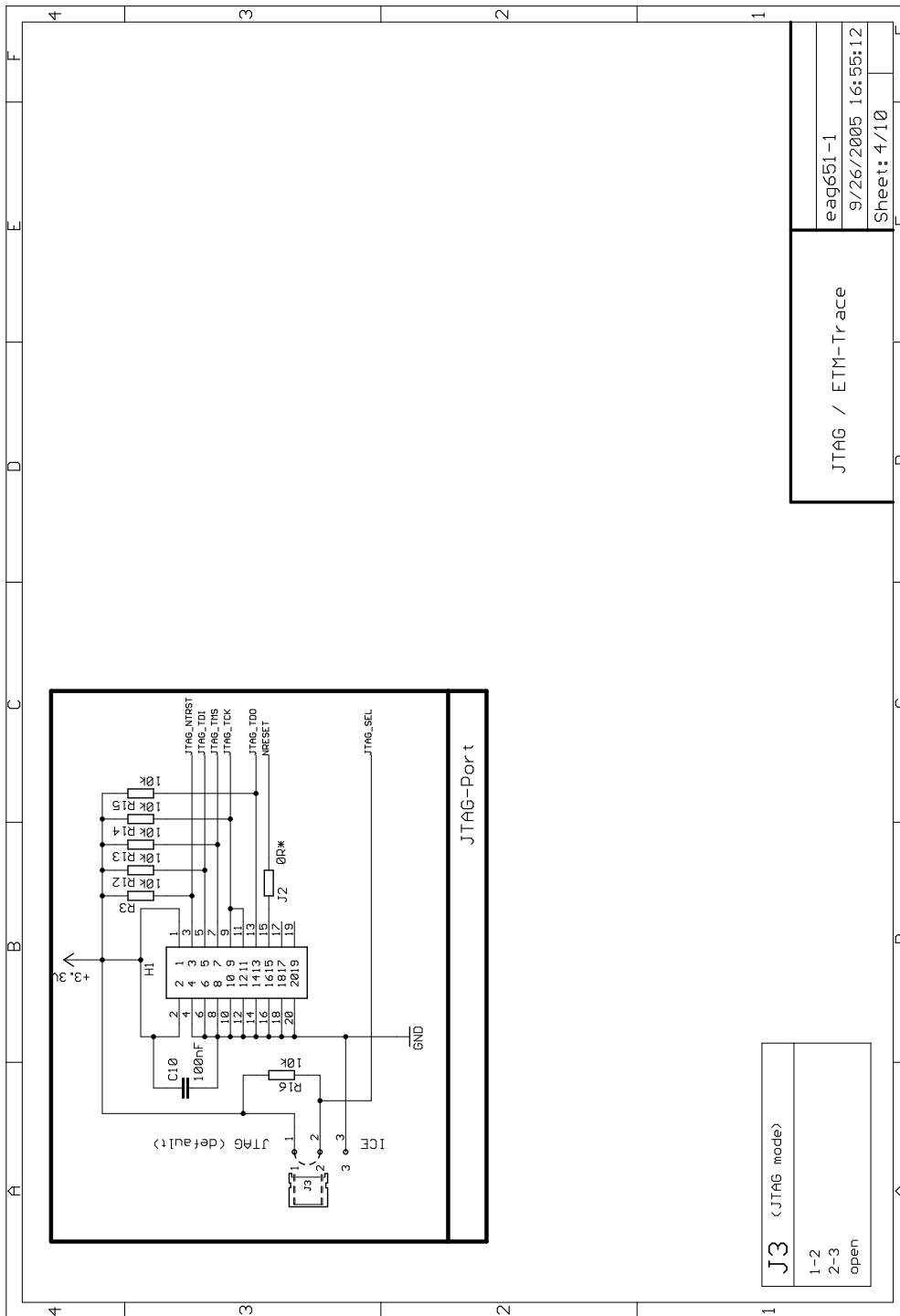


Figure 5: JTAG Port

8.5 Connectors

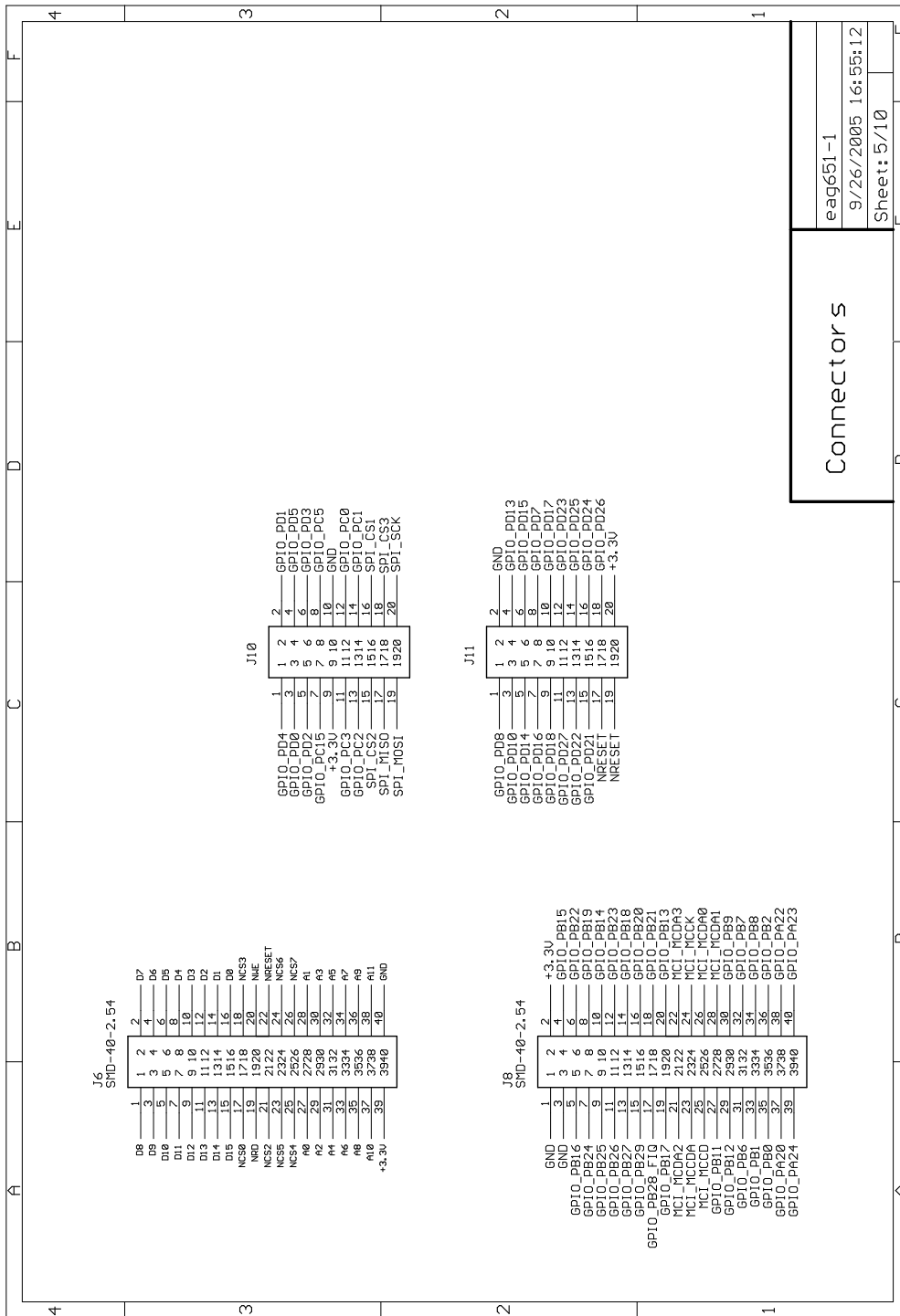


Figure 6: Connectors

8.6 LCD Interface

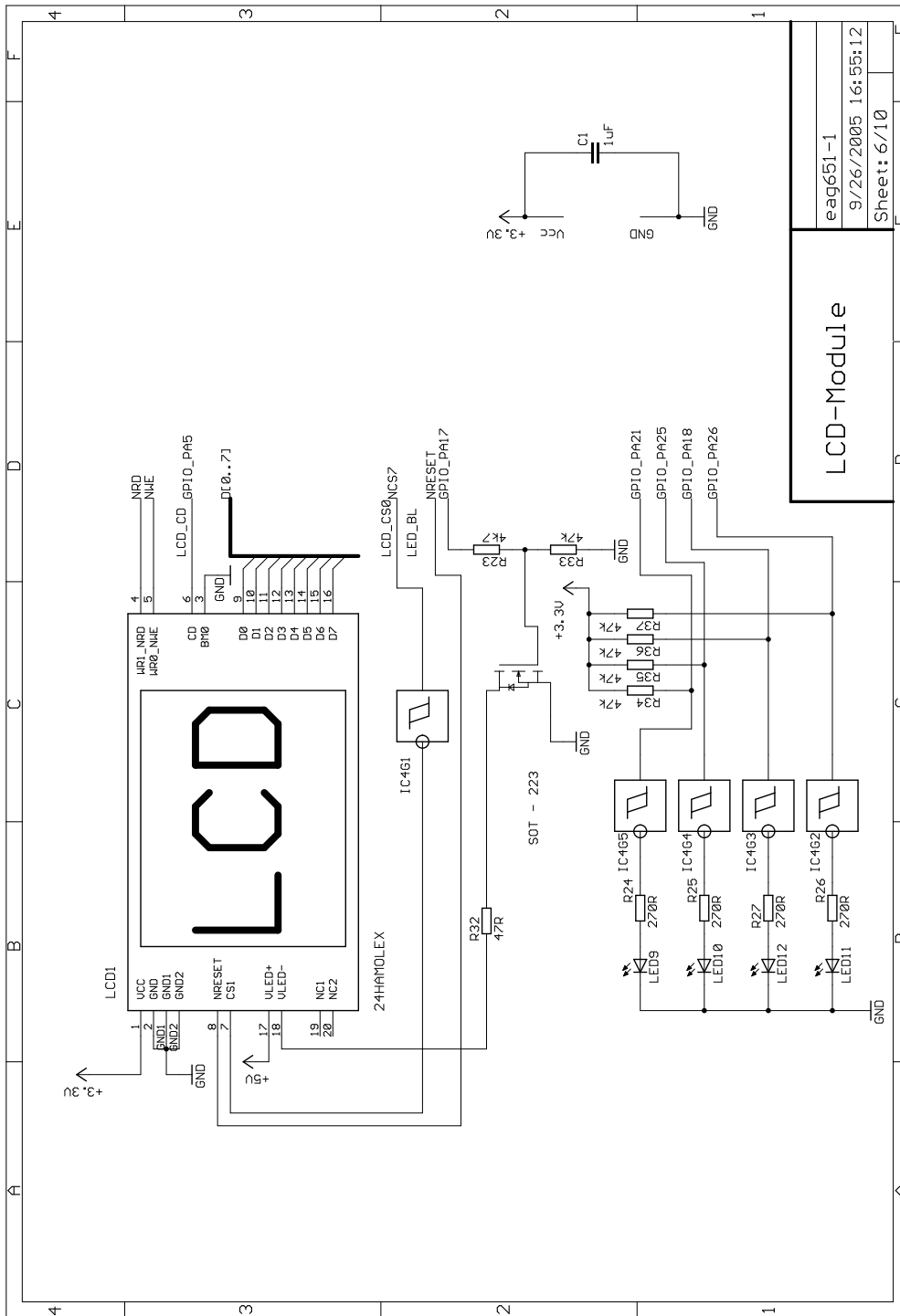


Figure 7: LCD interface

9 Production data

9.1 Assembly diagram

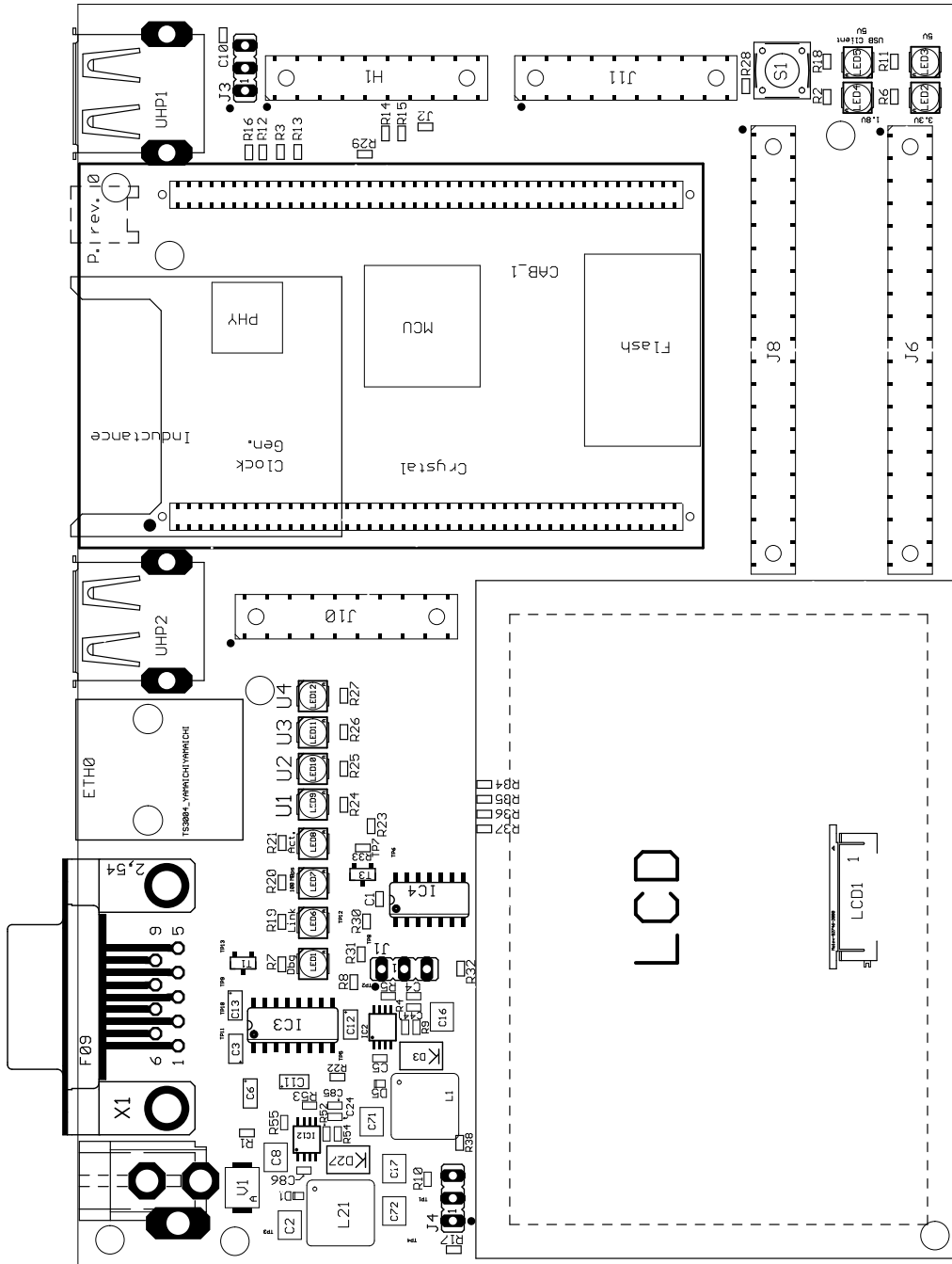


Figure 8: Assembly diagram (enlarged)

9.2 Component list

Part list for /mnt/data/server/develop/conitec/carmeva/hw/eb1/eag651-1.brd

Count	Part	Value	Package	Option
1	C1	1uF	0603	
6	C2, C8, C16, C17, C71, C72	C22u_010Z3225M	3225	
5	C3, C6, C11, C12, C13	100nF	1206_DIR	
2	C4, C85	C22n_050Y1608M	1608	
2	C5, C86	C100n_016Y1608M	1608	
1	C10	100nF	0603	
2	C24, C44	C1u_010Y1608M	1608	
1	CAB_1	CAB_V1	CAB_V1	
2	CONITEC1, CONITEC2	CONITEC	CONITEC	
2	D1, D5	D_RB521S-30_1608	SOD523	
1	D3	D_15MQ040_SMA	SMA	
1	D27	15MQ040	SMA	
1	ETH0	TS3004_YAMAICHIYAMAICHI	TS3004_YAMAICHI	
3	H1, J10, J11	ST-202.54-SMD	2.54-20-SMD	
2	IC2, IC12	LT1767	MSOP8	
1	IC3	MAX3232S016	S016	
1	IC4	74XX14	S014	
3	J1, J3, J4	J3DIL	J3-2.54-DIL	
2	J2, R1	0R*	0603	value
2	J6, J8	SMD-40-2.54	2.54-40-SMD	
2	L1, L21	L120u_1A73SWE-PD-S_M	WE_PD_S	
1	LCD1	24HAMOLEX	24HA	
12	LED1, LED2, LED3, LED4, LED5, LED6, LED7, LED8, LED9, LED10, LED11, LED12	(no value)	PLCC2_DIODE	
2	R2, R32	47R	0603	

6	R3, R12, R13, R14, R15, R16	10k	0603
5	R4, R5, R52, R53, R55	R10k_M1608F	1608
2	R6, R7	100R	0603
3	R8, R17, R38	1k	0603
1	R9	R31,7k_M1608F	1608
1	R10	R4k7_M1608F	1608
10	R11, R18, R19, R20, R21, R24, R25, R26, R27, R28	270R	0603
3	R22, R23, R29	4k7	0603
2	R30, R31	0R	0603
5	R33, R34, R35, R36, R37	47k	0603
1	R54	R17,4k_M1608F	1608
1	S1	BUTTON	DTSM6XN
2	T1, T3	BSS138	SOT23
13	TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13	TEST_PAD	PTR1.5
1	U\$11	DCC	DCC
9	U\$14, U\$16, U\$18, U\$19, U\$20, U\$21, U\$22, U\$23, U\$24	(no value)	PASSER
2	UHP1, UHP2	(no value)	USB-A-SMD
1	V1	ES2DSMB	SMB_DIODE
1	X1	SUB-D9-FEMALE	F09HP

Part II

Document History

This chapter shows differences between document versions since creation.

Version r1.3 (first release)