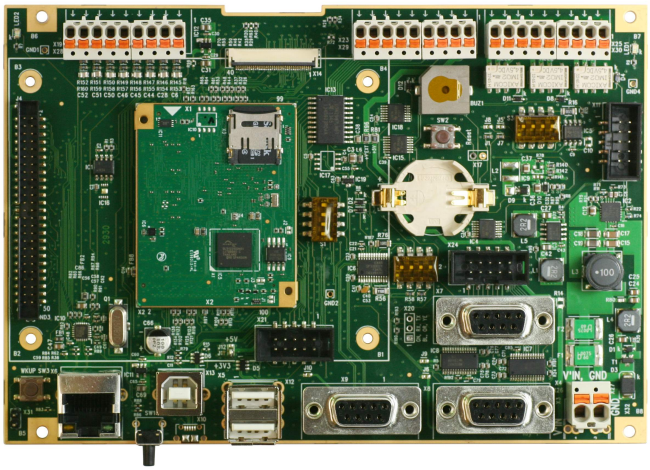

PanelA5

Technical Reference

PanelA5: Technical Reference

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1. Introduction

The PanelA5 is intended to be a highly configurable and ready-to-use HMI module for use in switchboards or machinery. It is available with a 7" LCD/TFT built-in capacitive or resitive touch.

It is available in different housing with IP65 front. It has a wide choice of peripherals and is available in many configurations. Connectors can be straight or angled, DIO can be 24V, 12V or 5V and many more. Speak to the taskit support in case of needs not on display.

The PanelA5 has a choice of I/O options like 8x analog in, 8x digital out and three relais. Furthermore it can be extended with any taskit gpio.net card.

Enhanced cryptographic options allow secure design with good performance. These include an encryption engine, a true random number generator, Atmel ® secure boot solution and an additional encryption chip for secure key generation and storage. All means for securing application and communication as well as prevent cloning and copying are available.

The ARM architecture as a modern and widely supported processor architecture is currently the platform of choice for medium performance embedded devices. Almost all major processor manufacturers have ARM products in their portfolio.

The availability of the widespread operating system "Linux" for the ARM platform opens access to a broad range of software, including tools, drivers, and software libraries. Programs written for ARM can easily be employed on the PC platform for testing and debugging.

Examples of actual or potential applications are: HMI for machinery or switchboards, measuring and test equipment, data-logging, as well as simple or more complex control and automation tasks.

2. Scope

This document describes the most important hardware features of the PanelA5. It contains all informations necessary to use the PanelA5. The Operating System Linux is described in a further document.

The manual comprises only a description of hardware specific issues of the PanelA5. More information on the used StampA5D3x can be found in its relevant manual. Details on the AT91SAMA5D3x processor are already described in depth in the manual of the manufacturer Atmel®. Descriptions of the ARM® core Cortex-A5 are available from Atmel® and also at *http://www.arm.com*. It is much recommended to have a look at these documents for a thorough understanding of the processor and its integrated peripherals.

3. Overview of Technical Characteristics

3.1. CPU

Atmel AT91SAMA5D3x Embedded Processor featuring an Cortex-A5™ ARM® core with ARM v7-A Thumb2® instruction set.

- CPU Frequency 528 MHz
- 32KB Instruction Cache
- 32KB Data Cache
- Memory Management Unit (MMU)
- Floating Point Unit (VFPv4)
- 3.3V Supply Voltage, 1.8V Memory Bus Voltage, 1.25V Core Voltage

3.2. Memory

- 256 MB NAND Flash Memory (optional up to 1GB)
- 256 MB Low Power Mobile DDR-RAM (optional up to 512 MB)
- 64 MB NOR Flash Memory (optional)
- 1 MB Serial Dataflash
- 128 KB SRAM
- Onboard Micro-SD Card Slot

3.3. Interfaces onboard

- 10/100 Ethernet MAC
- 2x USB 2.0 High Speed Host
- USB 2.0 High Speed Device
- 2x RS232
- 1x RS232/RS485/RS422 (switchable)
- 3x Serial TTL Level

3.4. Interfaces I/O Extension

- 1 x CAN

- 8 x 5V/12V/24V Digital Out
- 8 x Analogue In (alt. 8 x 5V/12V/24V Digital In)
- 3 x Relais
- gpio.net Extension Port

3.5. Interfaces Extension Bar

- 1x Three-channel 32-Bit Timer/Counter
- 1x Two Wire Interface (TWI, I^2C)
- Programmable Clock
- PWM
- 1 x SPI
- 8 x ADC
- 1 x Highspeed Multimedia Interface
- 1 x CAN
- Up to 41 Digital I/O

3.6. Miscellaneous

- ECC Public/Private and SHA-256 Crypto Chip
- 94 dB Buzzer
- RTC, Battery-backed
- Unique Serial Hardware Number

3.7. Display / Touch

- 7" Colour LCD
- 800x480 pix
- Capacitive or Resistive Touch

3.8. Power Supply

- 24V (optional 12V)
- 3V Backup Power Supply, e.g. from a Lithium Battery

3.9. Dimensions

- Dimensions: 170.0 x 116.0 mmm (WxD)

4. Layout Description

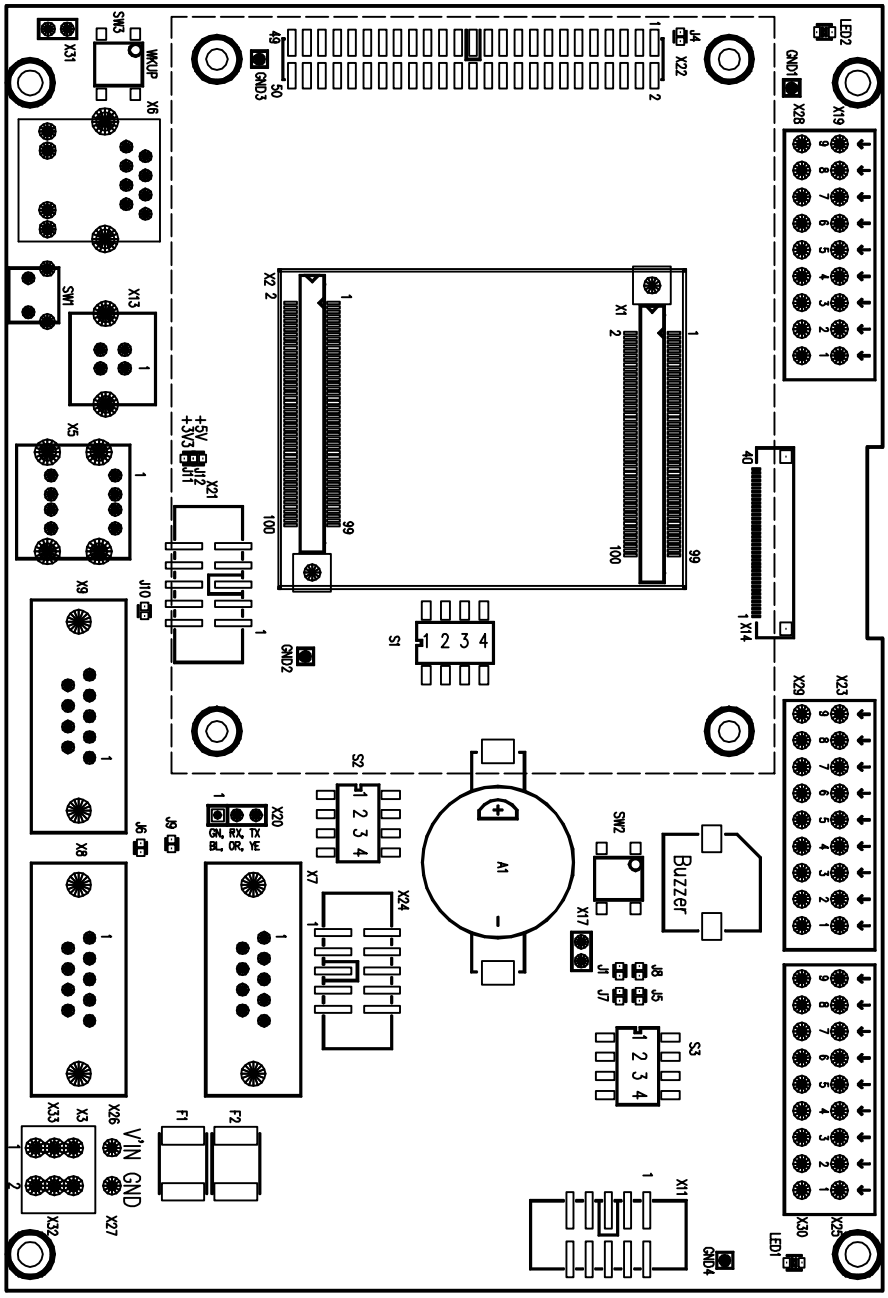

Figure 4.1. PanelA5 Layout Diagram

4.1. PanelA5 Connector Description

4.1.1. X1/X2 Stamp Connector

Two 100 Pin finepitch connectors for taskit StampA5D36.

4.1.2. X3/X33/X26 DC IN

Spring-clamp connection for 24V regulated DC-IN. It can be alternatively jumpered for 12V DC IN.

Warning

Do not connect voltages above the specified Voltage to the board. Overvoltage can result in damages beyond repair.

4.1.3. X5 Dual USB Host Ports

Two high speed USB 2.0 host ports.

4.1.4. X6 RJ45 Jack

RJ45 jack for 10/100 MBit/s ethernet.

4.1.5. X7 DSUB-9 male

Pin-header X7 is a DSUB-connector in RS232 levels. It corresponds to USART2 of the AT91SAMA5D3X. RI can be powered by 5V by setting jumper J9 (default unset).

Pin	Assignment	Processor Pin
1	-DCD	PE4/A4
2	RXD	PE25/A25/RXD2
3	TXD	PE26/NCS0/TXD2
4	-DTR	PE6/A6
5	GND	GND
6	-DSR	PE5/A5
7	-RTS	PE24/A24/RTS2
8	-CTS	PE23/A23/CTS2
9	-RI	PE3/A3

Table 4.1. X7 Pin Assignment

4.1.6. X8 DSUB-9 male

Pin-header X8 is a DSUB-connector in RS232 levels. It corresponds to USART1 of the AT91SAMA5D3x. RI can be powered by 5V by setting jumper J6 (default unset).

Pin	Assignment	Processor Pin
1	-DCD	PE8/A8

Pin	Assignment	Processor Pin
2	RXD	PB28/RXD1
3	TXD	PB29/TXD1
4	-DTR	PE10/A10
5	GND	GND
6	-DSR	PE9/A9
7	-RTS	PB27/RTS1/G125CK0
8	-CTS	PB26/CTS1/GRX7
9	-RI	PE1/A1

Table 4.2. X8 Pin Assignment

4.1.7. X9 DSUB-9 female

Pin-header X9 is a DSUB-connector in RS232/RS485/RS422 levels. It corresponds to USART0 of the AT91SAMA5D3x. The driver chip can be switched between the different modes. Drive PC17/TF0 high for RS485 mode and low for RS232 mode. Drive PC18/TD0 high for half-duplex mode and low for full duplex. Dip switch S1 also influences the level of these configuration lines. Refer to the schematics Appendix F, *PanelA5 Schematics* for details. RI can be powered by 5V by setting jumper J10 (default unset).

Pin	Assignment	Processor Pin
1	NC	
2	TXD/RS485-	PD18/TXD0
3	RXD/RS422-	PB08/RXD0
4	NC	
5	GND	GND
6	NC	
7	CTS/RS422+	PD15/CTS0/ SPI0_NPCS2/CANTX0
8	RTS/RS485+	PD16/RTS0/ SPI0_NPCS2/PWMFI3
9	-RI	+5V

Table 4.3. X8 Pin Assignment

4.1.8. X11 CAN Ten-way Connector

Pin-header X11 can either be connected to the CAN0 or CAN1 interface of the AT91SAMA5D3x. By default it is set to the CAN1 interface. This setting can be switched by setting jumpers J8 and J5 accordingly. Refer to the schematics Appendix F, *PanelA5 Schematics* for details.

Pin	Assignment	Processor Pin
1	GND	GND
2	CANL	PB15/GCOL/CANTX1
3	CANH	PB14/GCRS/CANRX1

Pin	Assignment	Processor Pin
4	GND	GND
5	NA	
6	NA	
7	NA	
8	5V	5V
9	NA	
10	GND	GND

Table 4.4. X11 Pin Assignment

4.1.9. X13 USB Device Port

High speed USB 2.0 device port.

4.1.10. X14 FFC LCD Connector

Brand	Type
EDT	ETM0350G0DH6
EDT	ETM0430G0DH6
EDT	ETM0500G0DH6
EDT	ETM0700G0DH6

Table 4.5. X14 Compatible LCDs

4.1.11. X15 FFC LCD Connector

Brand	Type
Innolux	AT070TN83V1

Table 4.6. X15 Compatible LCDs

4.1.12. X16 FFC Resistive Touch Connector

Pin	Processor Pin
1	PD20/AD0
2	PD22/AD2
3	PD21/AD1
4	PD23/AD3

Table 4.7. X16 Resistive Touch

4.1.13. X19/X28 Nine-way Analog In Pin Header

Pin-header X19/X28 has nine contacts in 3.5 mm grid pitch. X19 and X28 are identically assigned. The Pins are connected to the processors ADC. In an alternate assembling these pins can be used as digital input as well. Refer to the schematics Appendix F, *PanelA5 Schematics* for details.

Pin	Assignment	Processor Pin
1	AI0	PD24/AD4
2	AI1	PD25/AD5
3	AI2	PD26/AD6
4	AI3	PD27/AD7
5	AI4	PD28/AD8
6	AI5	PD29/AD9
7	AI6	PD30/AD10/PCK0
8	AI7	PD31/AD11/PCK1
9	GND	GND

Table 4.8. X19 Pin Assignment

4.1.14. X20 Three-way Pin Header for FTDI USB Debug Console

These three pins export the DBGU of the StampA5D36 in LVTTL-level. They are for connection with the FTDI USB/TTL converter cable TTL-232R-RPi.

4.1.15. X21 IF Ten-way Pin Header

Pin-header X21 has ten contacts in 2.54 mm grid pitch. It contains the necessary USART LVTTL Signals to connect a gpio.net card. Besides that X21 can be used customer specific.

Pin	Processor Pin
1	PC29/URXD0/PWMFI2/ISI_D8
2	PC30/UTXD0/ISI_PCK
3	PE18/A18/RXD3
4	PE19/A19/TXD3
5	PA30/TWD0/URXD1/ISI_VSYNC
6	PA31/TWCK0/UTXD1/ISI_HSYNC
7	PE16/A16/CTS3
8	PE17/A17/RTS3
9	3V3
10	GND

Table 4.9. X21 Pin Assignment

4.1.16. X22 Extension Bar

Pin-header X22 has 50 contacts in 2.1 mm grid pitch. It exports a variety of pins for free use.

Pin	GPIO	Periph. A	Periph. B	Periph. C		Periph. C	Periph. B	Periph. A	GPIO	Pin
1	VCC3.3					GND				2
3	PD24	AD4						AD5	PD25	4
5	PD26	AD6						AD7	PD27	6
7	PD28	AD8						AD9	PD29	8

Pin	GPIO	Periph. A	Periph. B	Periph. C		Periph. C	Periph. B	Periph. A	GPIO	Pin
9	PD30	AD10	PCK0				PCK1	AD11	PD31	10
11	VCC5					GND				12
13	PC22	SPI1 MISO						SPI1 MOSI	PC23	14
15	PC24	SPI1 SPCK						SPI1 NPCS0	PC25	16
17	PB0	GTX0	PWM H0				PWM L0	GTX1	PB1	18
19	PB2	GTX2	TK1			GND				20
21	PB3	GTX3	TF1				PWM H1	GRX0	PB4	22
23	PB5	GRX1	PWM L1				TD1	GRX2	PB6	24
25	PB7	GRX3	RK1				PWM H2	GTXCK	PB8	26
27	PB9	GTXEN	PWM L2				RF1	GTXER	PB10	28
29	PB11	GRXCK	RD1			GND				30
31	PB12	GRXDV	PWM H3				PWM L3	GRXER	PB13	32
33	PB14	GCRS	CANRX1				CANTX1	GCOL	PB15	34
35	PB16	GMDC						GMDIO	PB17	36
37	PC31	FIQ	PWMFI1				PWM L1	IRQ	PE31	38
39	PE28	NCS2	TIOB2	LCD DAT23		GND				40
41	PD0	MCI0 CDA						MCI0 DA0	PD1	42
43	PD2	MCI0 DA1						MCI0 DA2	PD3	44
45	PD4	MCI0 DA3				PWM L2	TIOB0	MCI0 DA5	PD6	46
47	PD7	MCI0 DA6	TCLK0	PWM H3		PWM L3		MCI0 DA7	PD8	48
49	PD9	MCI0 CK				GND				50

Table 4.10. Pin Assignment X22

4.1.17. X23/X29 Nine-way Digital Out Pin Header

Pin-header X23/X29 has nine contacts in 3.5 mm grid pitch. X23 and X29 are identically assigned. The Pins are connected to a 5V/12V/24V level shifter. Refer to the schematics Appendix F, *PanelA5 Schematics* for details.

Pin	Assignment	Processor Pin
1	DO0	PB0/GTX0/PWMH0
2	DO1	PB1/GTX1/PWML0
3	DO2	PB2/GTX2/TK1
4	DO3	PB3/GTX3/TF1
5	DO4	PB4/GRX0/PWMH1
6	DO5	PB5/GRX1/PWML1
7	DO6	PB6/GRX2/TD1
8	DO7	PB7/GRX3/RK1
9	GND	GND

Table 4.11. X11 Pin Assignment

4.1.18. X24 IF Ten-way Pin Header

Pin-header X24 has ten contacts in 2.54 mm grid pitch. It has identical RS232 signals to X7 and is an alternative assembling. It corresponds to USART2 of the AT91SAMA5D3X. RI can be powered by 5V by setting jumper J9 (default unset).

Pin	Assignment	Processor Pin
1	-DCD	PE4/A4
2	-DSR	PE5/A5
3	RXD	PE25/A25/RXD2
4	-RTS	PE24/RTS2/A24
5	TXD	PE26/NCS0/TXD2
6	-CTS	PE23/A23/CTS2
7	-DTR	PE6/A6
8	-RI	PE3/A3
9	GND	GND
10	NC	NC

Table 4.12. X24 Pin Assignment

4.1.19. X25/X30 Nine-way Relais Pin Header

Pin-header X25/X30 has nine contacts in 3.5 mm grid pitch. X19 and X28 are identically assigned. The Pins are connected to three independently operating SPDT Relais. Refer to the schematics Appendix F, *PanelA5 Schematics* for details.

Pin	Assignment	Coil Pin
1	R1B	PB10/GTXER/RF1
2	COM	
3	R1C	
4	R2B	PB11/GRXCK/RD1
5	COM	
6	R2C	
7	R3B	PB12/GRXDV/PWMH3
8	COM	
9	R3C	

Table 4.13. X25 Pin Assignment

Appendix A. Peripheral Color Codes

This table matches the color used to identify various peripherals in tables.

Power Supply/Ground
USART
Debug UART
TWI (I^2C-Bus)
SD-Card/MMC
SPI
USB Host
USB Device
Reserved
Synhcronous Serial Controller (SSC)
JTAG
Control
Ethernet
Genral Purpose I/O Port
Programmable Clock Output
Analog-to-digital Converter
Timer Counter
Image Sensor Interface
LCD/TFT Controller Interface
Embedded Trace Macrocell
Static Memory Controller
Compact Flash Interface
Pulse Width Modulator
Touch Controller
Can Controller
AC97 Sound Interface
Encryption Device
Soft Modem
True Random Generator

Appendix B. PanelA5 Electrical Characteristics

Ambient temperature 25°C, unless otherwise indicated

Symbol	Description	Parameter	Min.	Typ.	Max	Unit
V_{CC}	Operating Voltage		3.0	3.3	3.6	V
V_{MEM}	Memory Bus Voltage		1.7	1.8	1.95	V
V_{RES}	Reset Treshhold			2.93		V
T_{RES}	Duration of Reset Pulse		tbd	tbd	tbd	ms
V_{IH}	High-Level Input Voltage	3.3V	2.0		V_{CC} + 0.3	V
V_{IL}	Low-Level Input Voltage	3.3V	-0.3		0.8	V
V_{VDDANA}	Analog DC Supply Voltage		3.0	3.3	3.6	V
R_{PULL}	Pull-up Resistance		45	70	130	kΩ
	Pull-down Resistance					
P	Normal Operation			tbd		mW
	Full Load	max.		tbd		mW
	Stand-By			tbd		mW
	Power-Down			tbd		mW
V_{BATT}	Battery Voltage		2.0	3.0	V_{CC}	V
I_{BATT}	Battery Current	Ambient temp. = 25°C		5		µA
		Ambient temp. = 70°C			17	µA
		Ambient temp. = 85°C			22	µA

Table B.1. Electrical Characteristics

Appendix C. PanelA5 Environmental Ratings

Symbol	Description	Parameter	Operating		Storage		Unit
			Min.	Max.	Min.	Max.	
T_A	Ambient temperature		-20	70	-20	70	℃
	Relative Humidity	no condensation		90		90	%RH
	Absolute Humidity		<= Humidity@T_A = 60℃, 90%RH				
	Corrosive Gas		not admissible				

Table C.1. Environmental Ratings

Appendix D. PanelA5 Dimensions

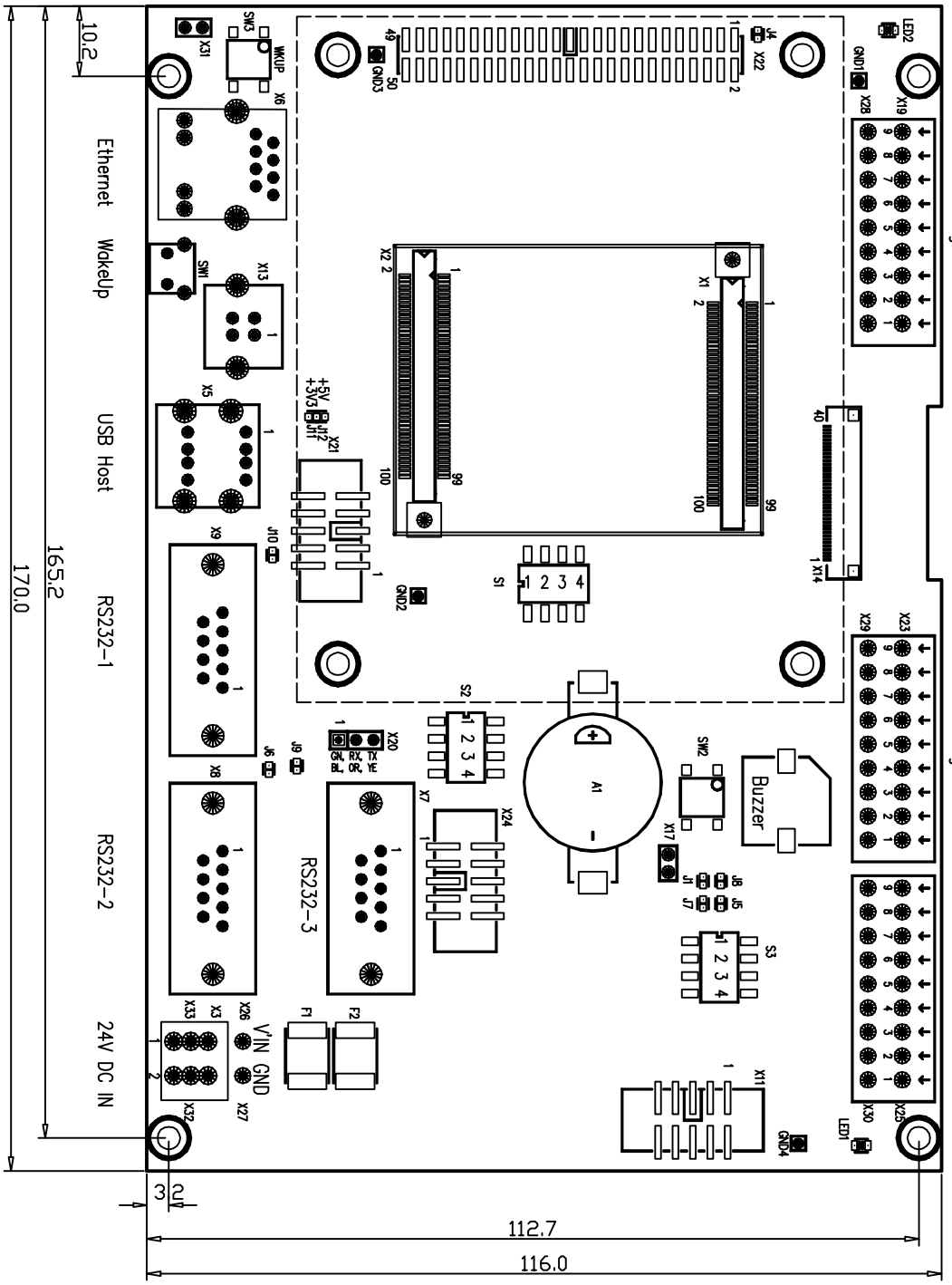

Figure D.1. PanelA5 Dimensions

Appendix E. StampA5D3x Dimensions

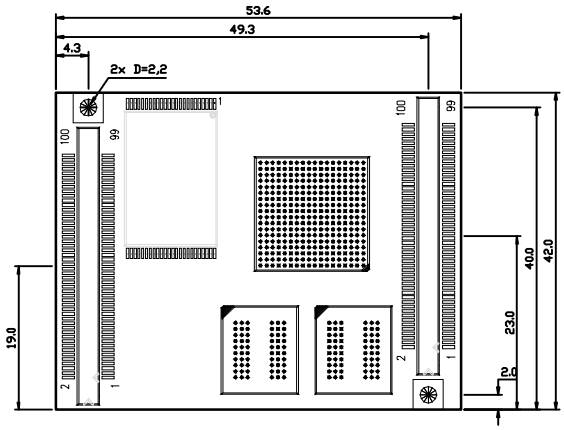

Figure E.1. StampA5D3x Dimensions

Appendix F. PanelA5 Schematics

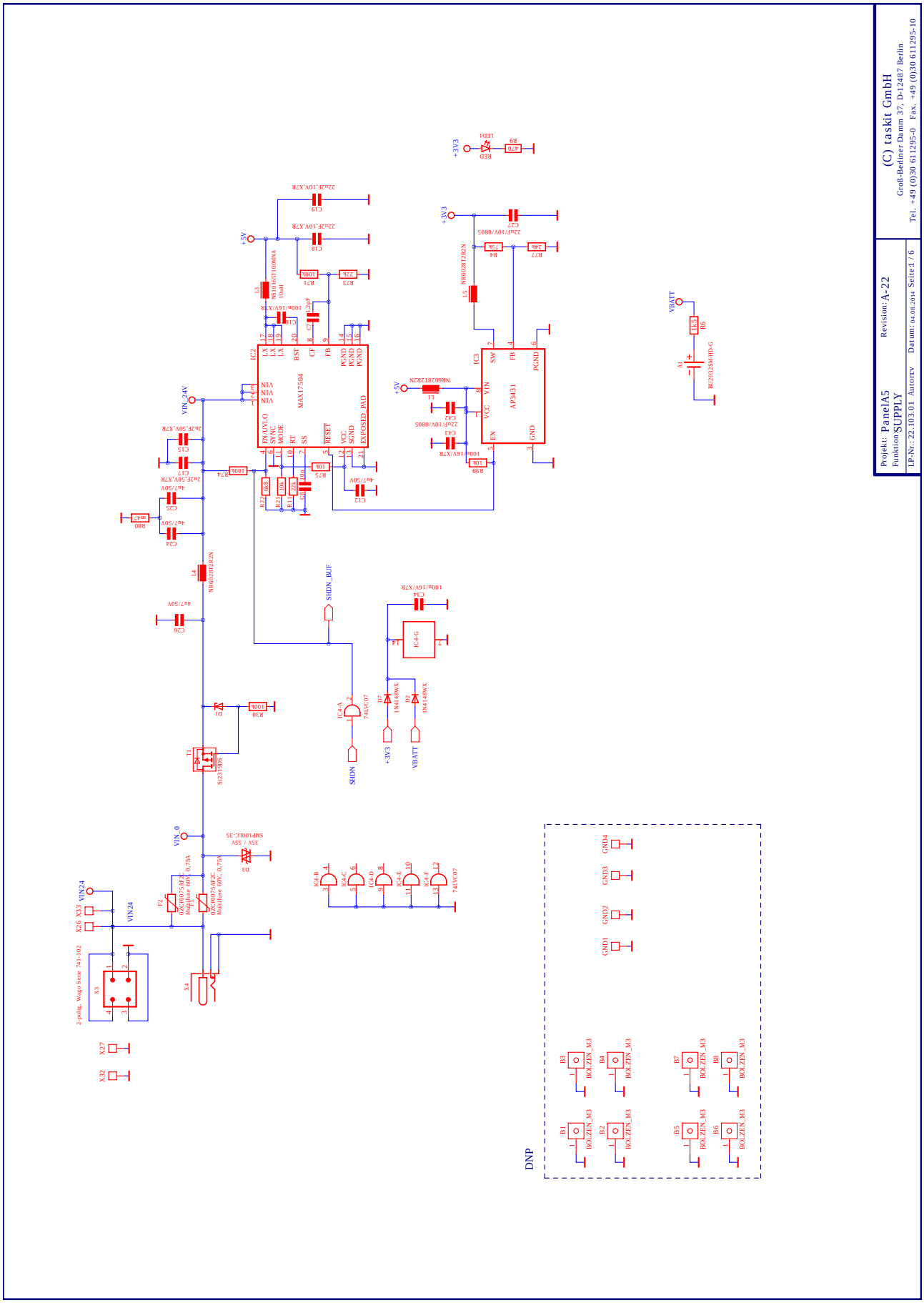

Figure F.1. PanelA5 Power Supply

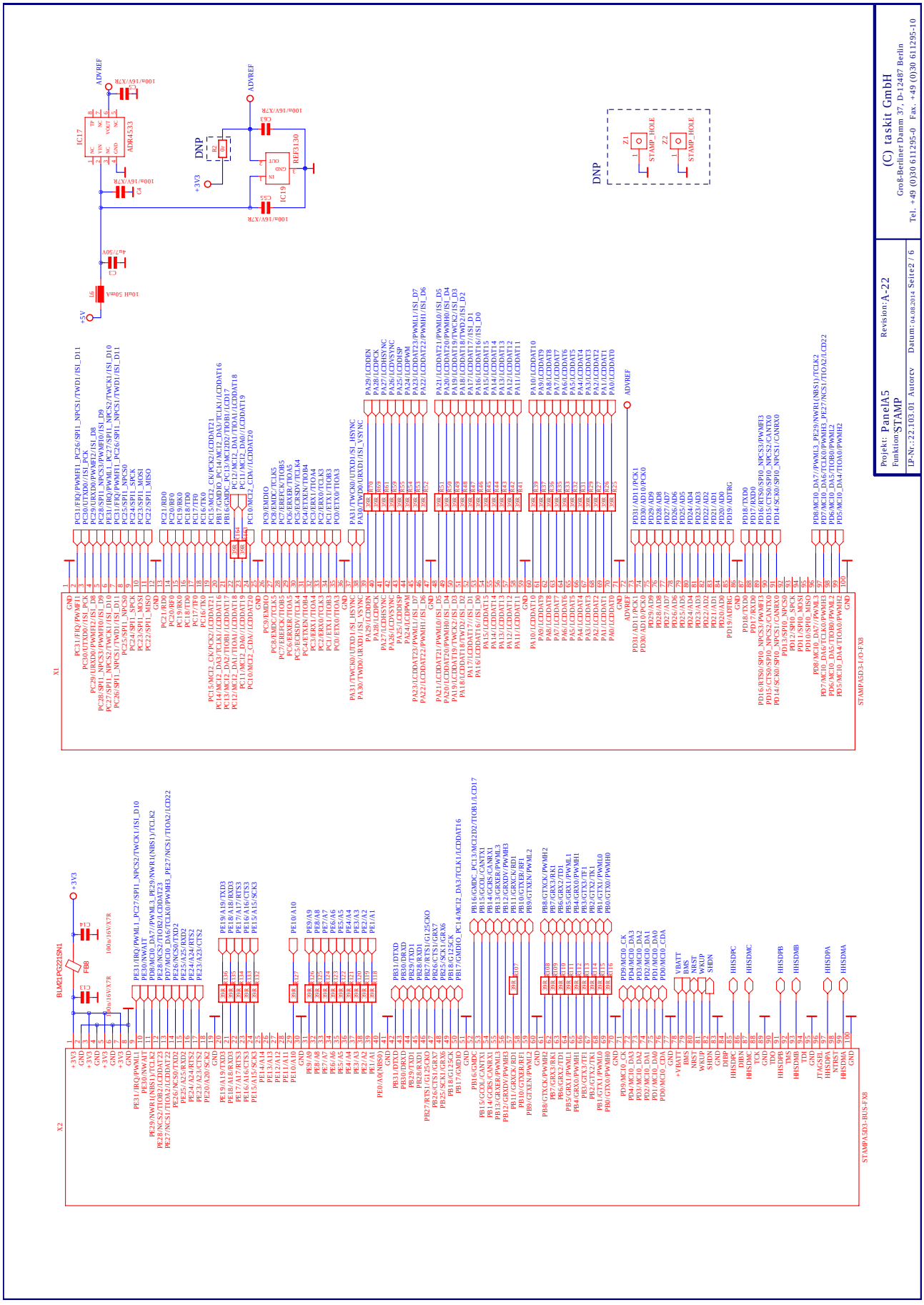

Figure F.2. PanelA5 Stamp

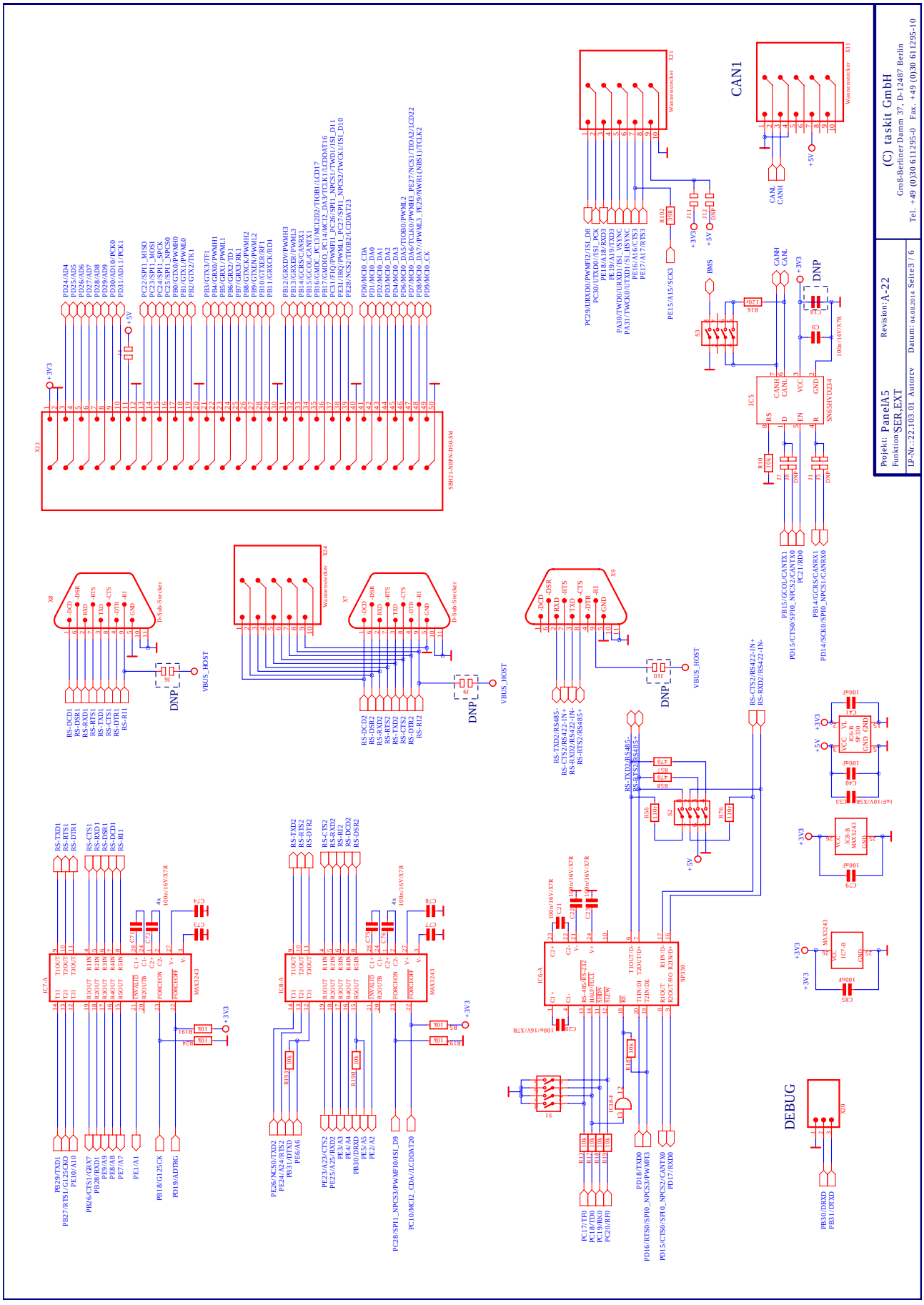

Figure F.3. PanelA5 Connectors

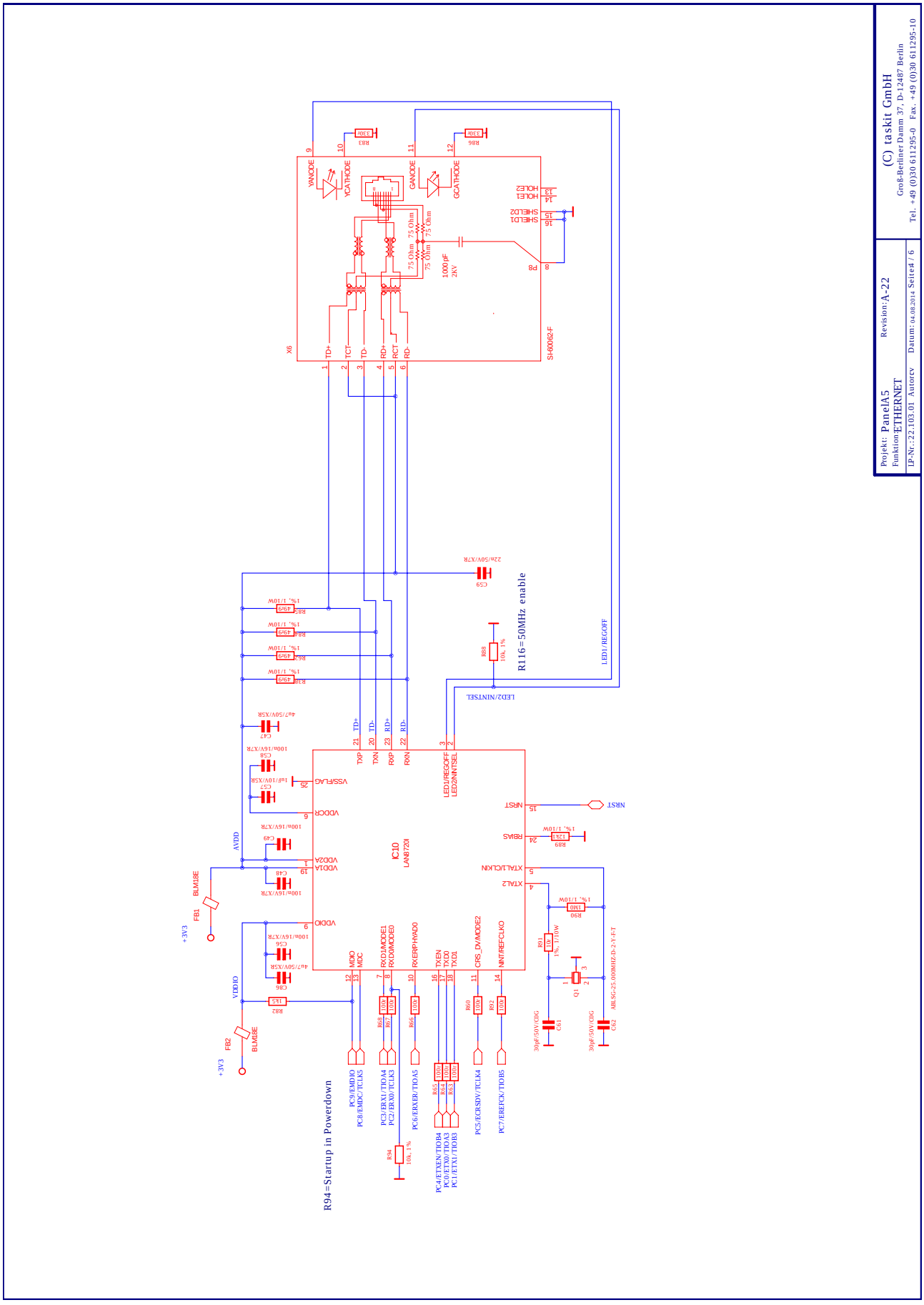

Figure F.4. PanelA5 Ethernet

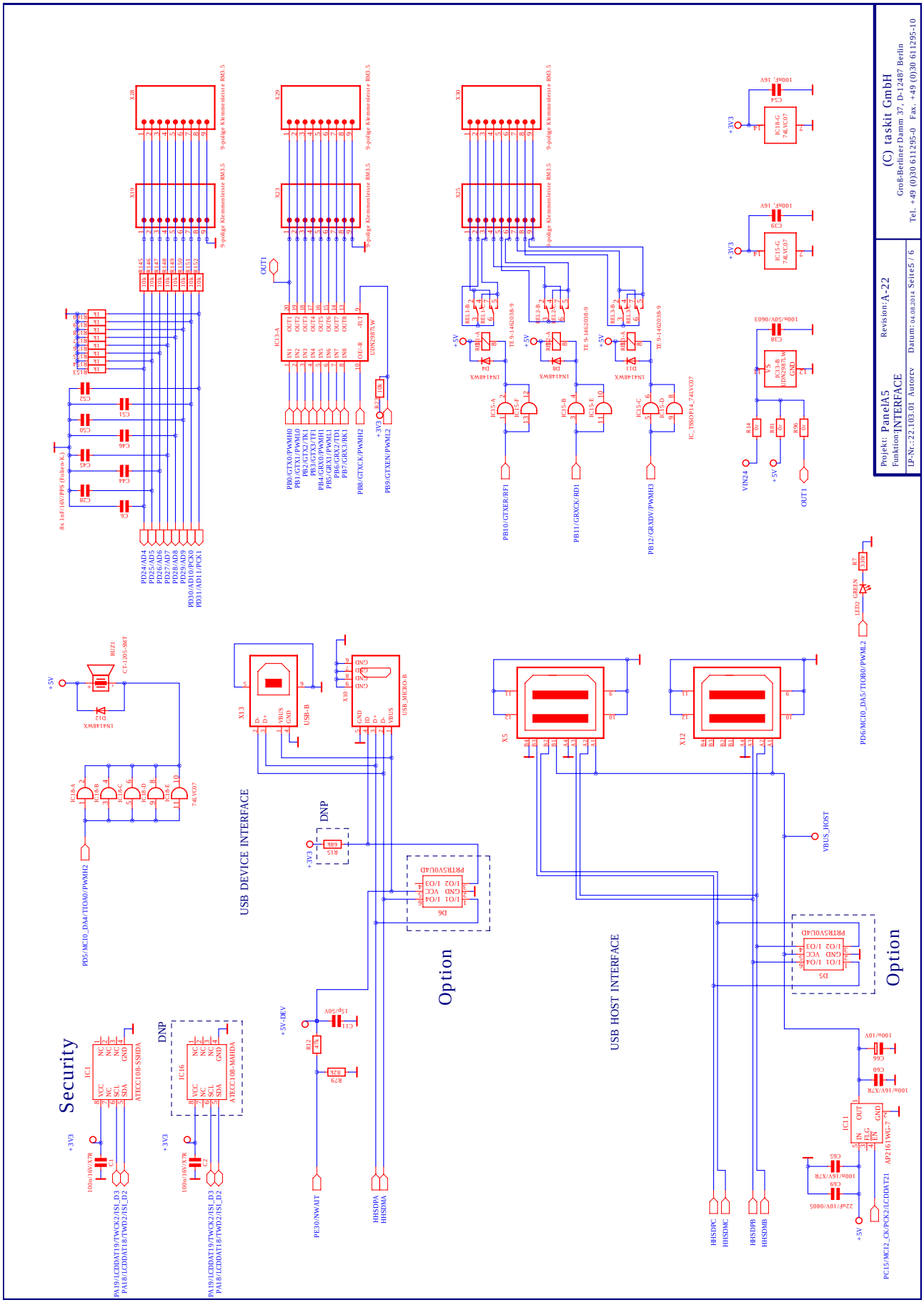

Figure F.5. PanelA5 Interface

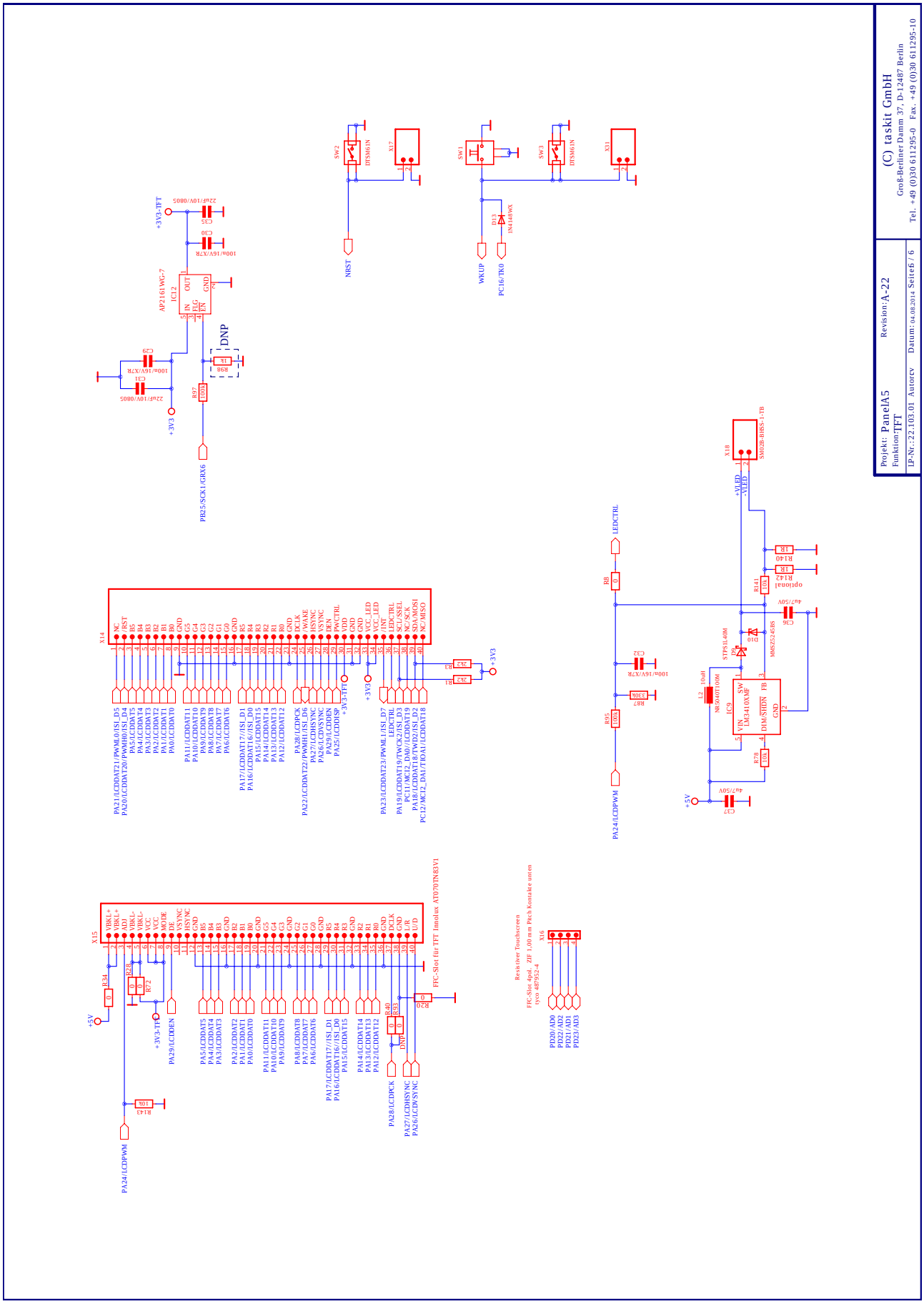

Figure F.6. PanelA5 TFT