Comments:

Board can be powered by 8-28 VDC or 24VAC

SiLab uC is powered up first, then
it controls the MX286 start up

SiLab uC does these functions:

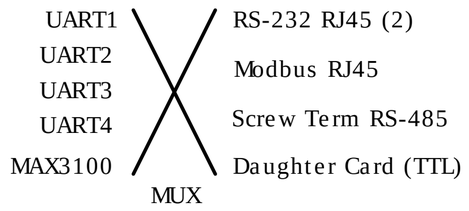
- Controls MX286 power up sequence
- USB Device to Console conversion
- Controls MX286 Sleep mode
- Can read Push Switch for Wake-up
- Measures Analog Power Rails
- Controls SuperCap charging
- Can trun on Blue LED

Rev.A --> B Changes

1) Changed to Vertical battery holder
2) Changed NAND to eMMC
3) Changed to SiLab micro
4) Changed RTC chip to ST Micro
5) Current Loop can be controlled
6) Added SPI Flash for booting
7) Added accelometer option
8) Added SuperCap Option
9) Bluetooth now has UART HS
10) Changed FPGA to MACH X02
11) Added CAN J1939 RC to both ports

Serial Port Usage

UART0 --> BlueTooth or other

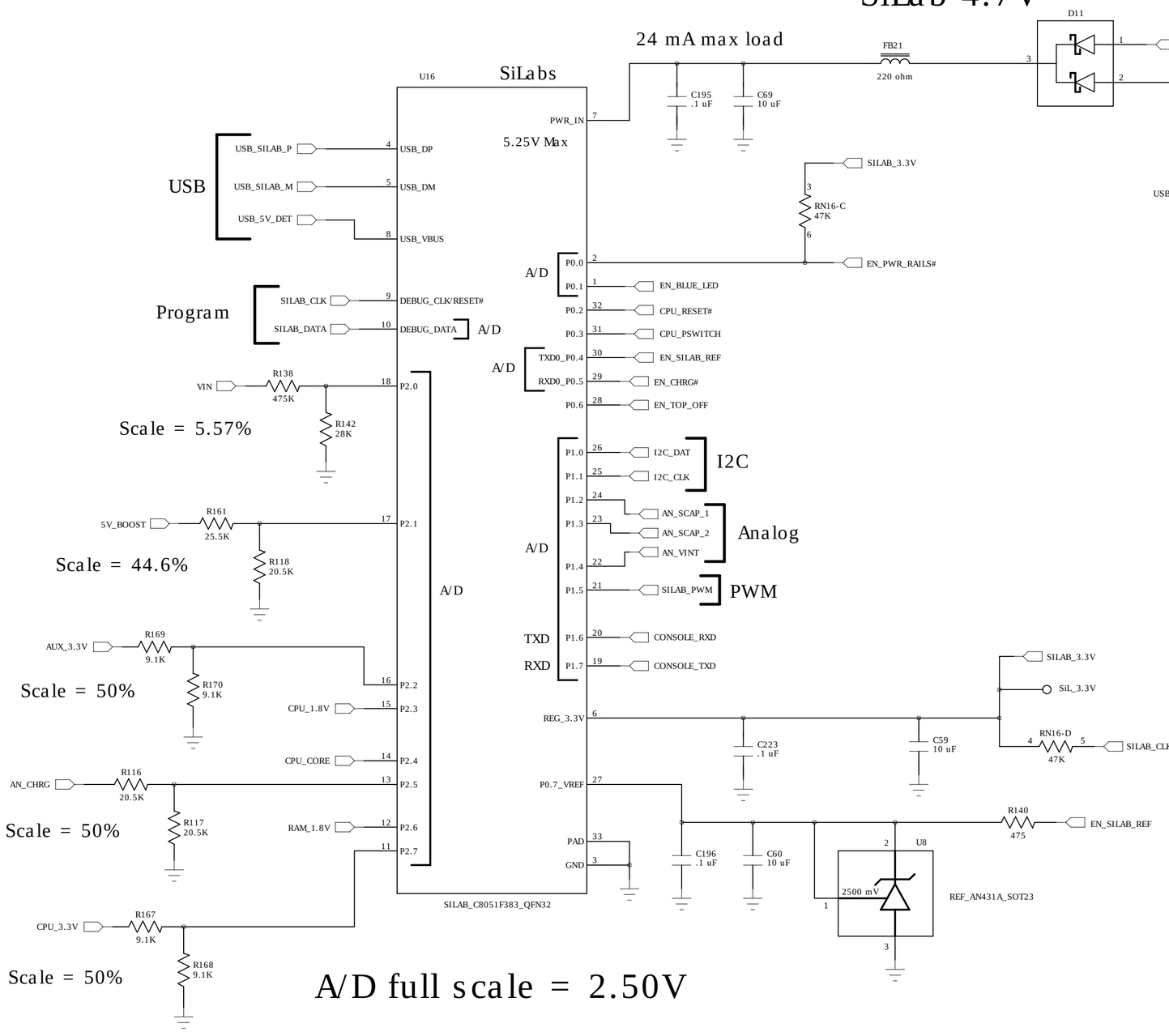


All Parts are Industrial Temp

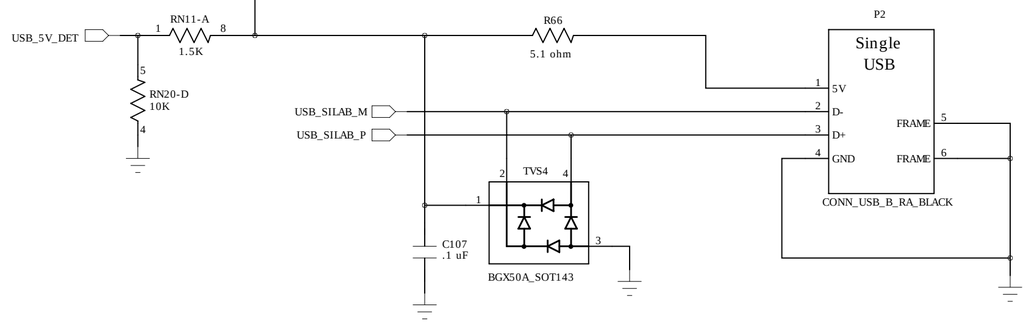
Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 Documentation		
Rev: B	Designer	Sheet 1 of 20

USB Device Port and SiLab uC

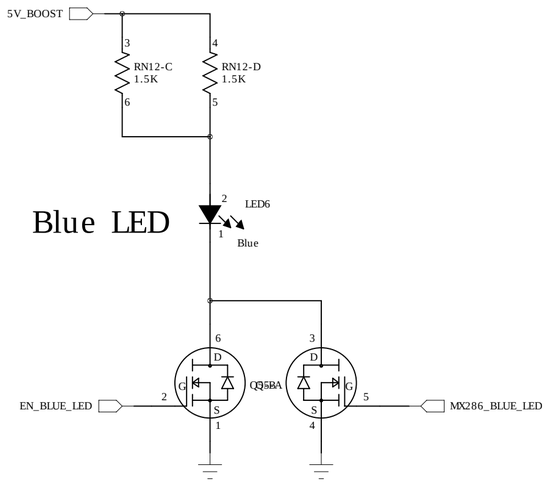
SiLab 4.7V



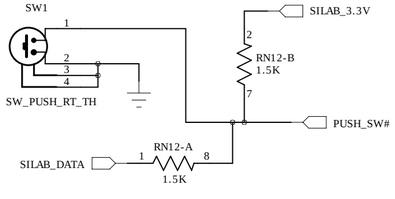
USB Device Port



Blue LED



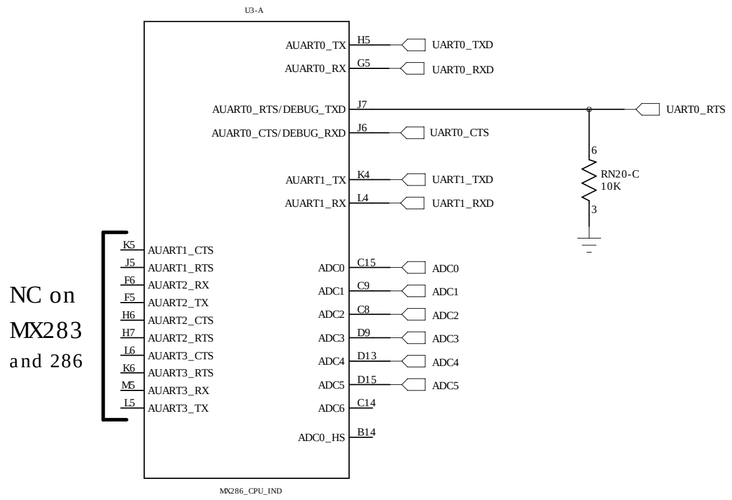
Push Switch



Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 SiLab uC and USB Device port		
Rev: B	Designer	Sheet 2 of 20

MX286 ARM9 CPU

UARTs, ADC

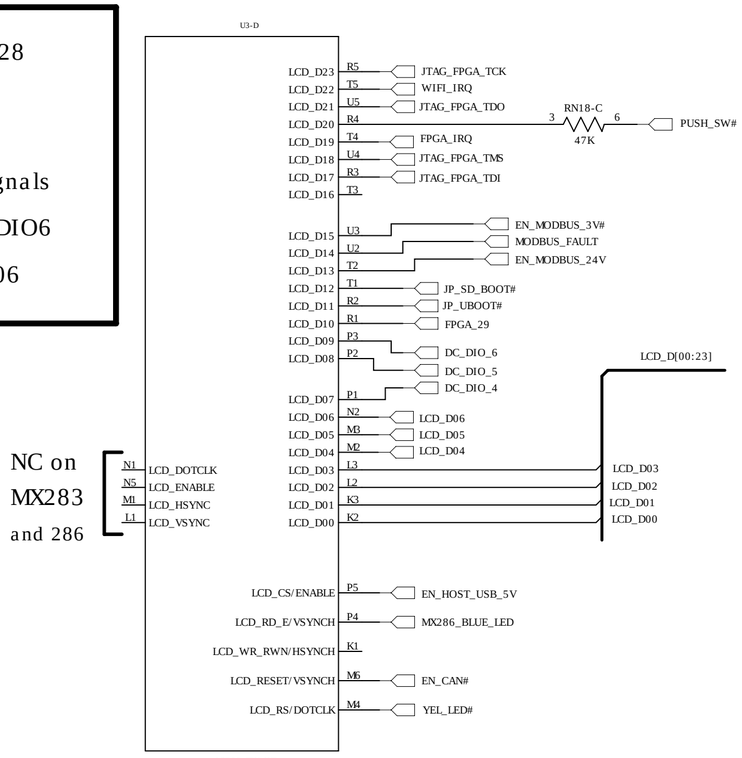


NC on MX283 and 286

These signals are on the same MX28 pins on both Rev.A and Rev.B

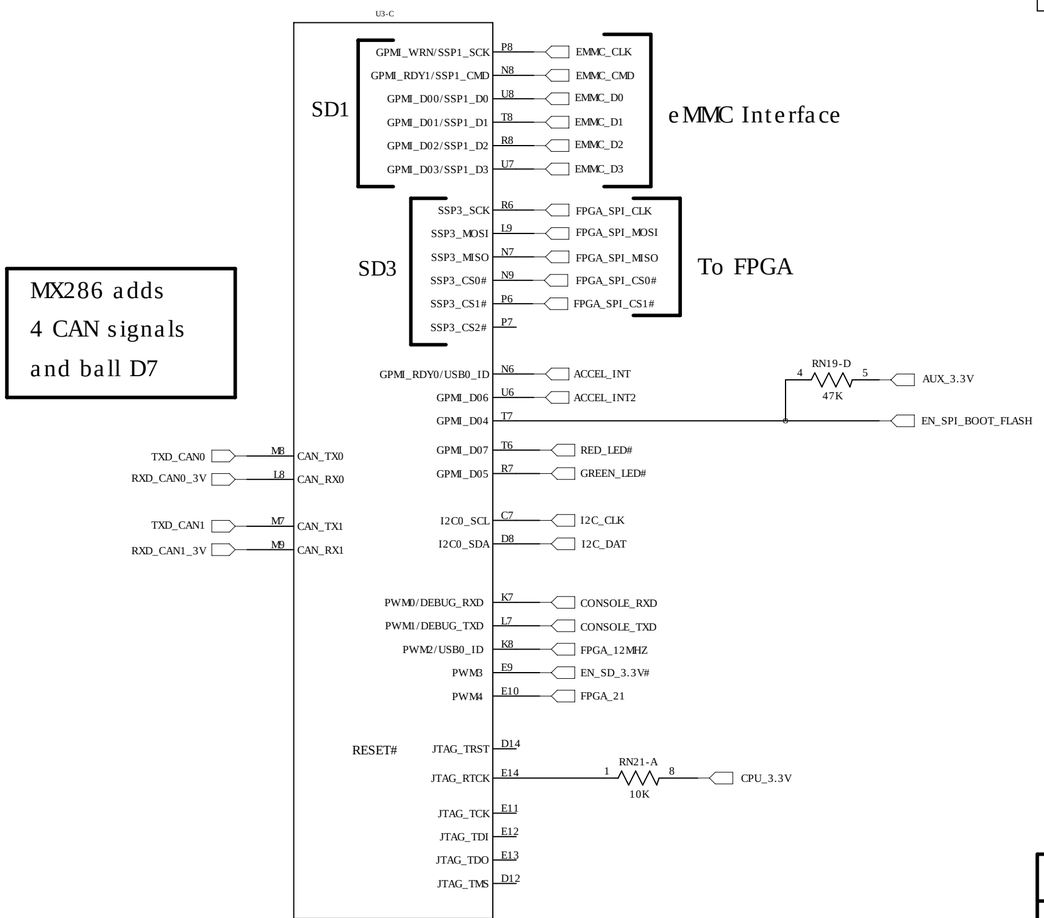
WIFI_IRQ	All MODBUS signals
FPGA_IRQ	DC_DIO4 thru DIO6
PUSH_SW#	LCD_00 thru D06
FPGA_29	

LCD



NC on MX283 and 286

NAND, PWM
JTAG, I2C



MX286 adds 4 CAN signals and ball D7

All JTAG have 47K internal PU except RTCK

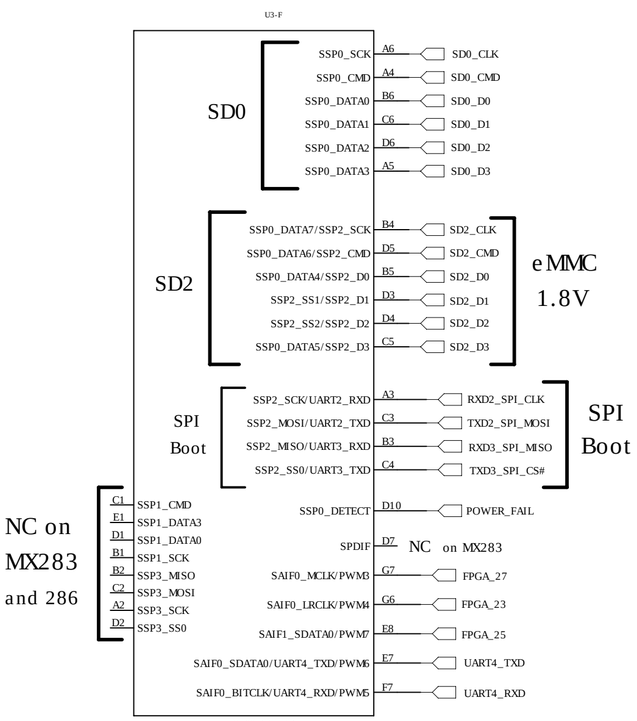
LCD_00 thru LCD_04
Control Boot Source

Hard strapped for SPI

EN_SPI_BOOT_FLASH is set low by CPU after done booting from SPI

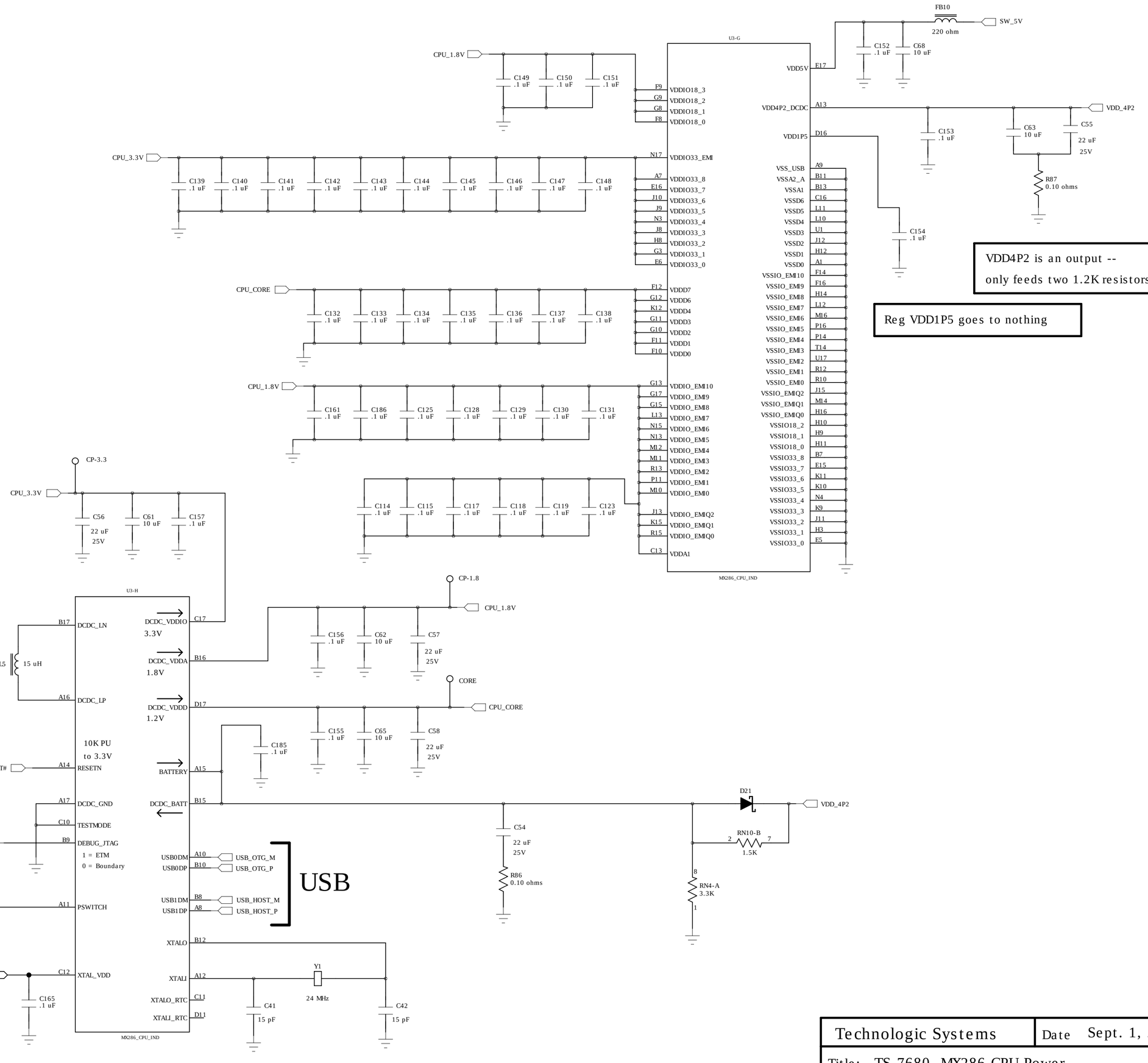
Then SPI signals are changed to UART2 and UART3 functions

SD Card
SPI Boot



NC on MX283 and 286

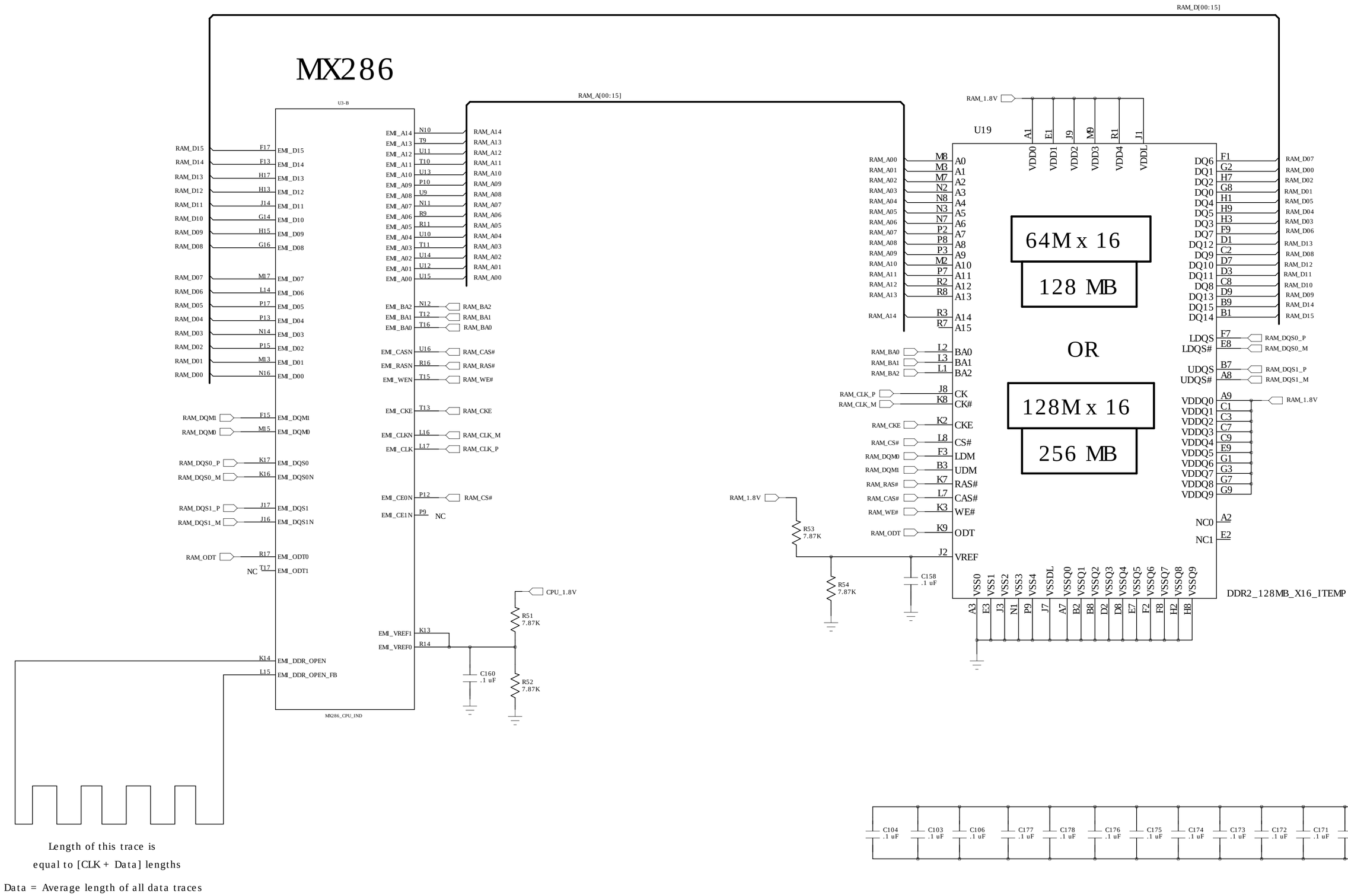
Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 MX286 CPU		
Rev: B	Designer	Sheet 3 of 20



PSWITCH can be driven to 3.3V if a series 10K res is used

Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 MX286 CPU Power		
Rev: B	Designer	Sheet 4 of 20

DDR2 SDRAM (128 or 256 MByte)



Length of this trace is
equal to [CLK + Data] lengths

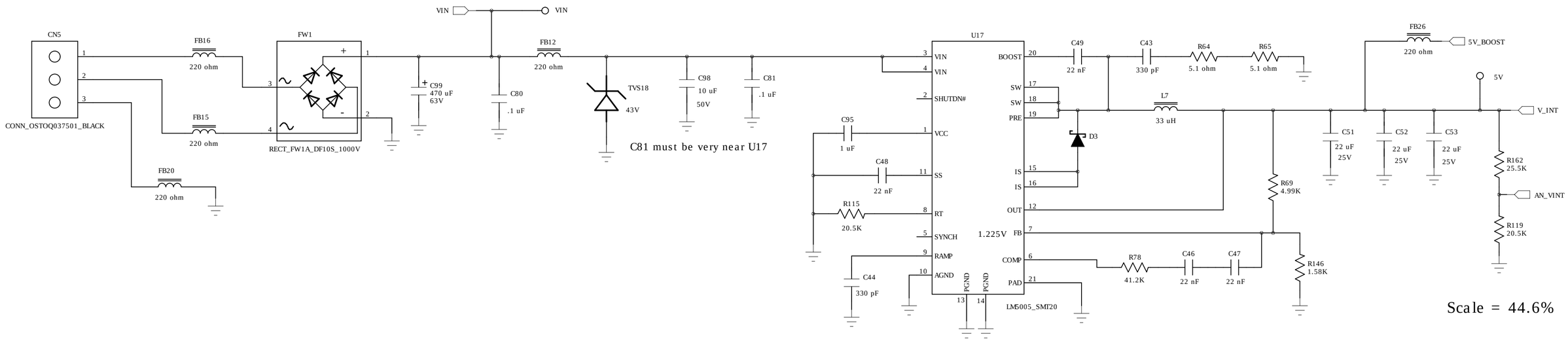
Data = Average length of all data traces

Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 DDR2 RAM		
Rev: B	Designer	Sheet 5 of 20

5V Power Supply (2000 mA)

8-28 VDC or AC Power Input

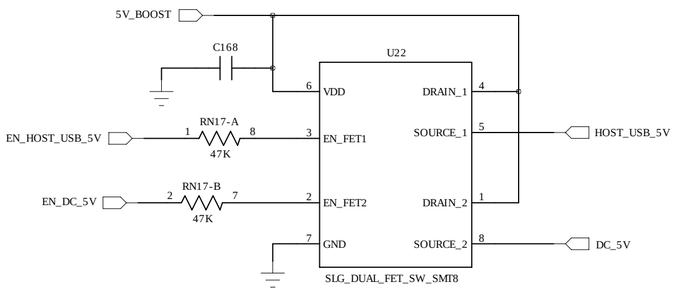
FB26 not pop if SCap used



Scale = 44.6%

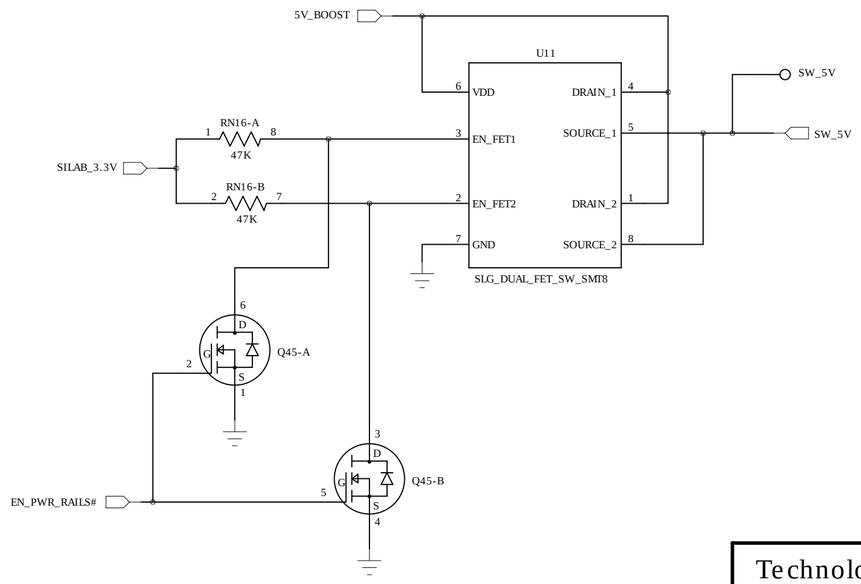
.063 hole

USB and Daughter Switched Power



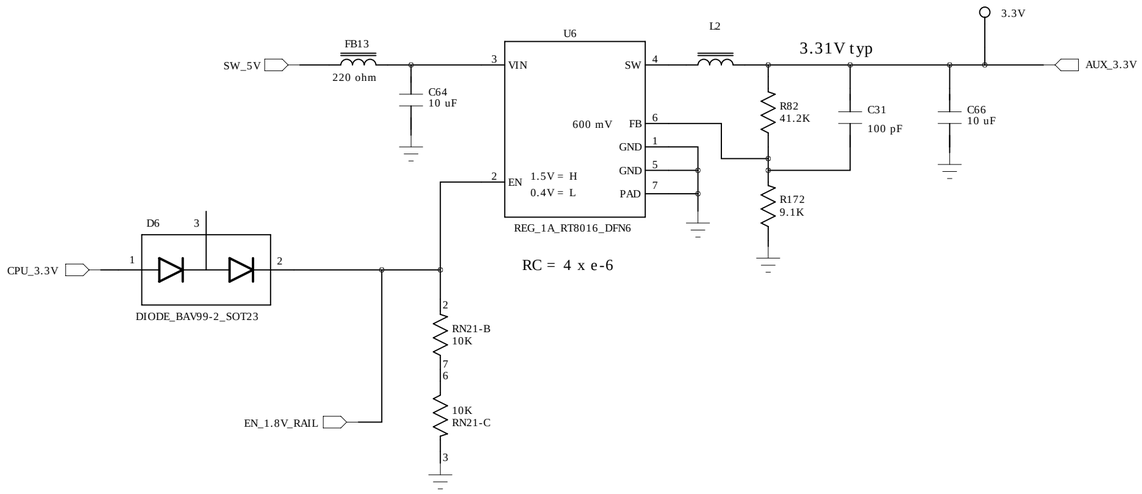
Rise time of both outputs measured at ~1V/ms

Switched 5V Power



Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 5V and Switched Power		
Rev: B	Designer	Sheet 6 of 20

Aux. 3.3V Reg

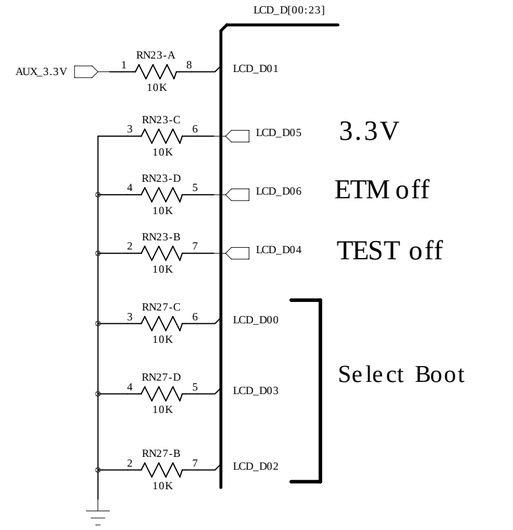


Boot Strap Bias Res.

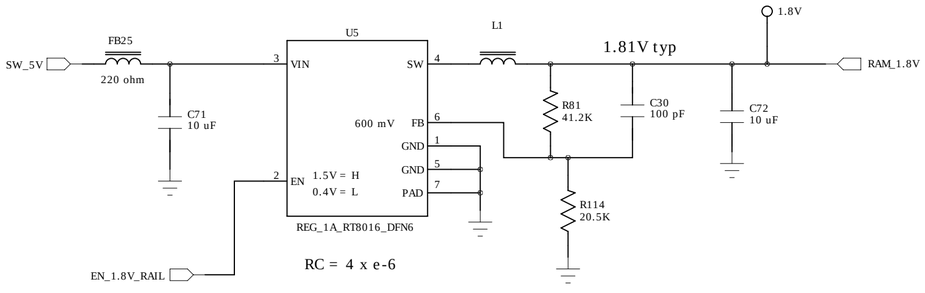
Strapped
SPI Boot

Boot Source

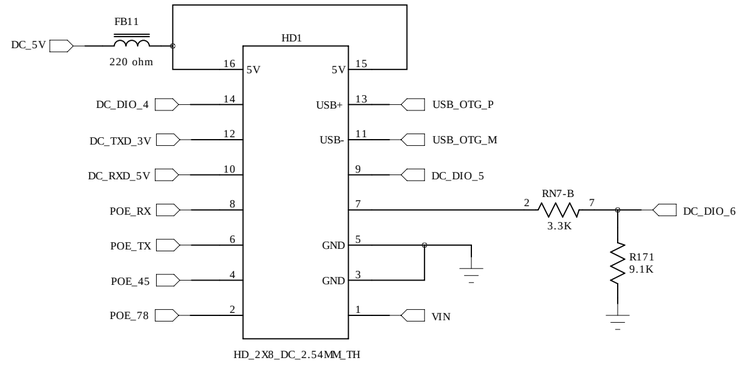
LCD_3	LCD_0	
0	0 1 0	SPI
1	0 0 1	SD Card
0	0 0 0	USB
0	1 0 0	NAND



RAM 1.8V Reg



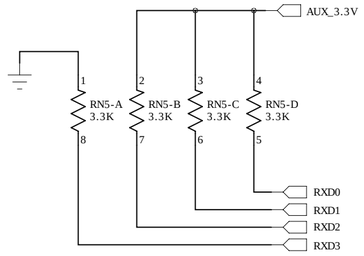
Daughter Card Interface



Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 AUX Power Reg, Boot Strap		
Rev: B	Designer	Sheet 7 of 20

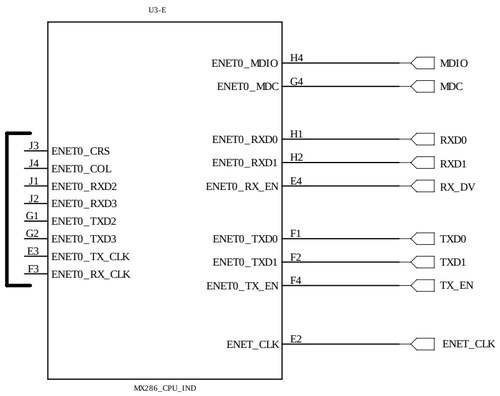
10/100 Ethernet 4-Port Switch

"0111" = RMII MAC mode

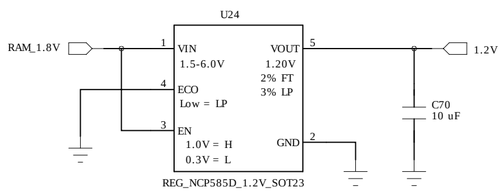


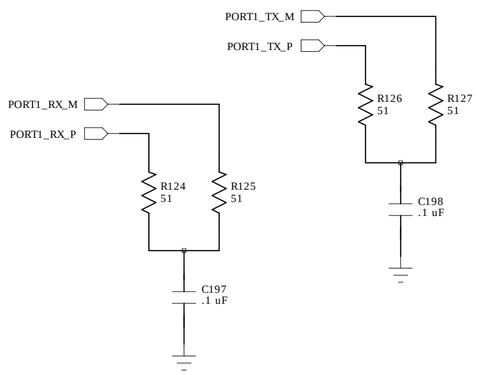
MX283

NC on MX283



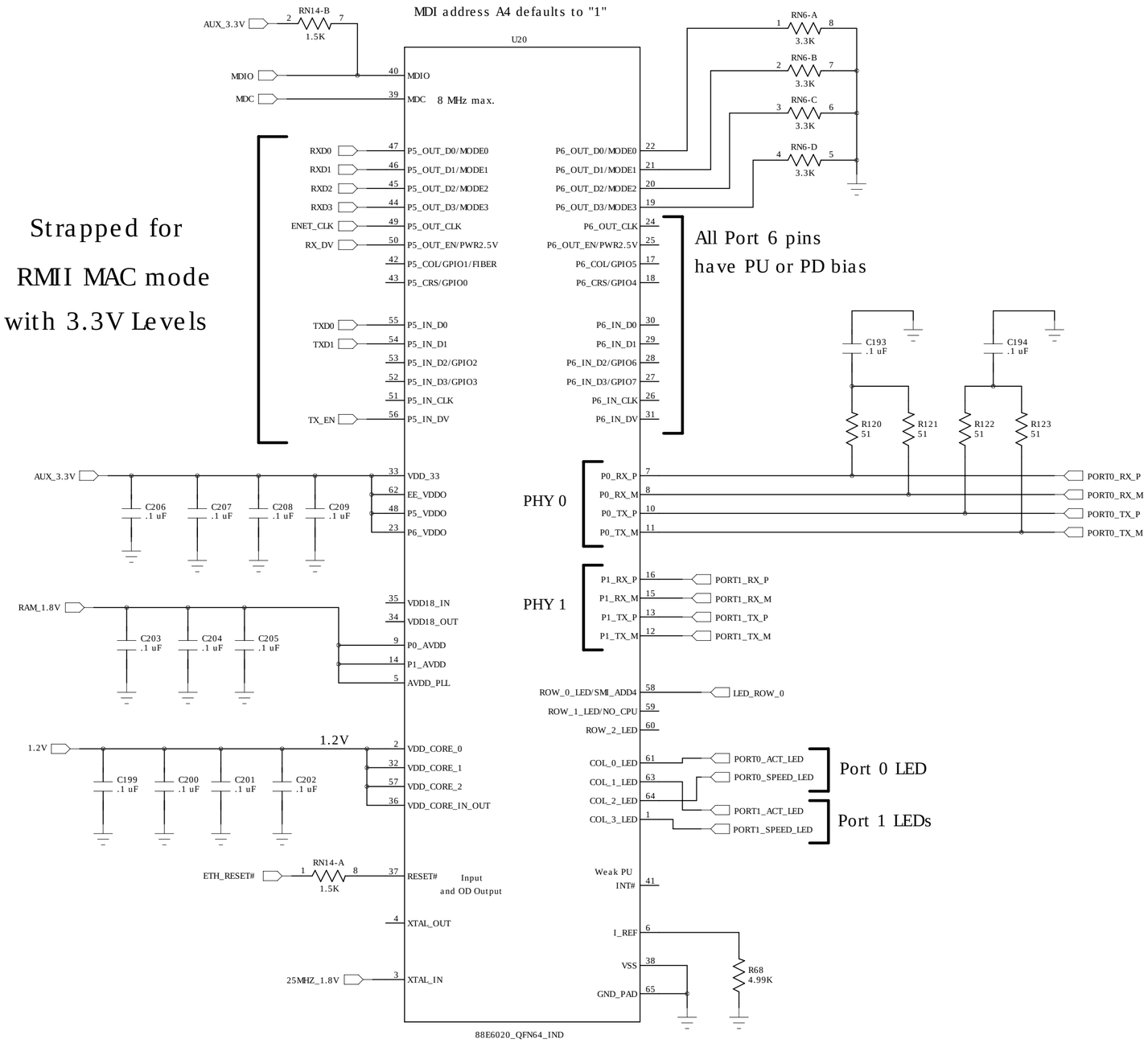
1.2V Regulator





Strapped for RMII MAC mode with 3.3V Levels

MDI address A4 defaults to "1"



Requires Reset# asserted for 10 ms after power

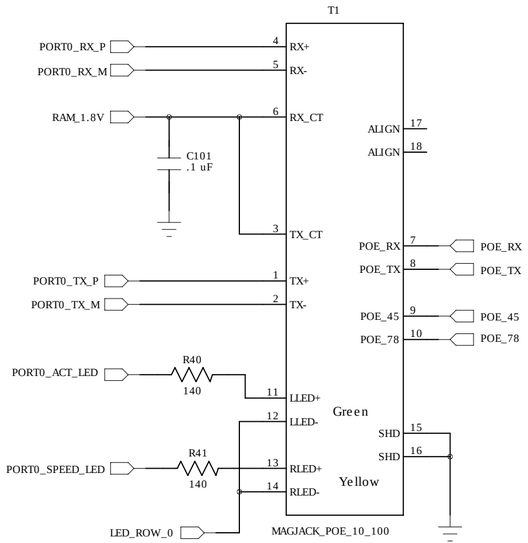
Auto MDIX is supported

Polarity Correction also supported

Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 Ethernet Switch		
Rev: B	Designer	Sheet 8 of 20

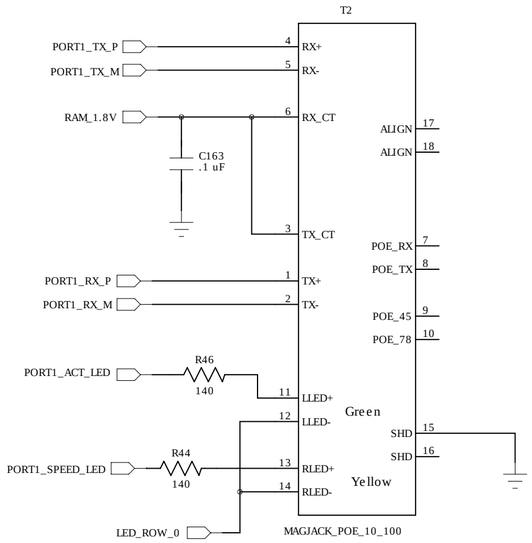
Port #0

10/100 MagJack



Port #1

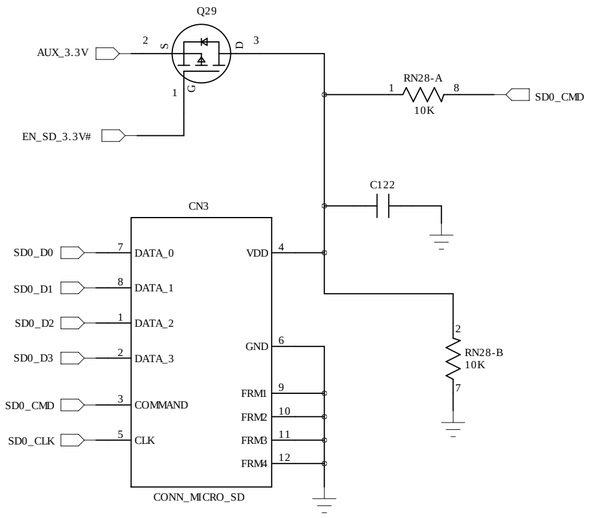
10/100 MagJack



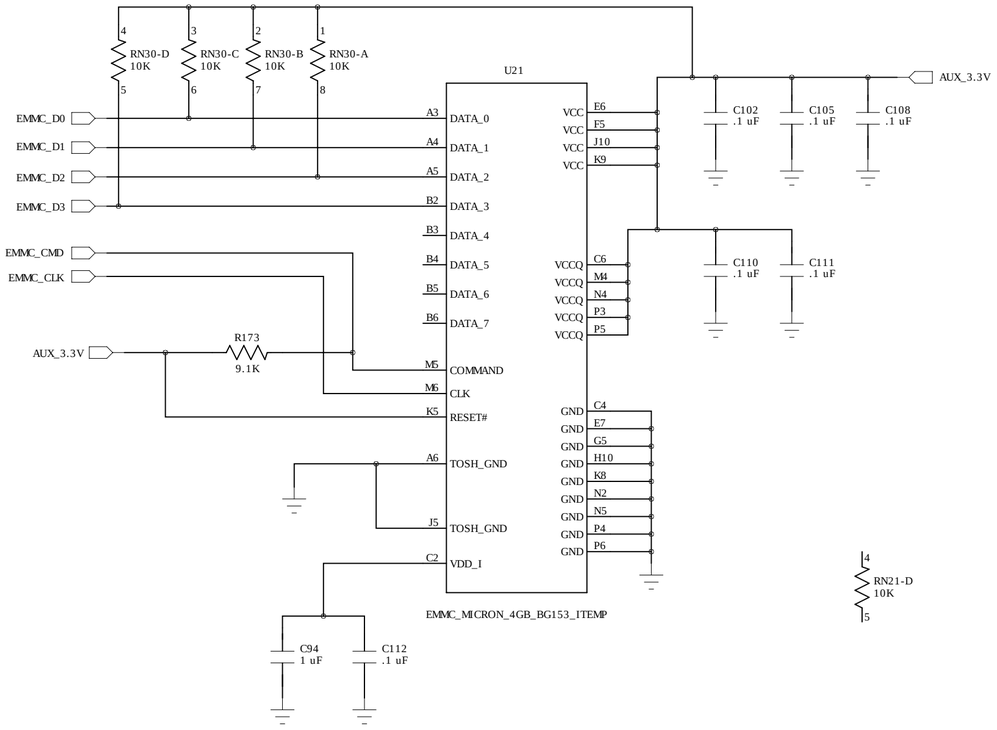
Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 MagJacks		
Rev: B	Designer	Sheet 9 of 20

Flash Memory

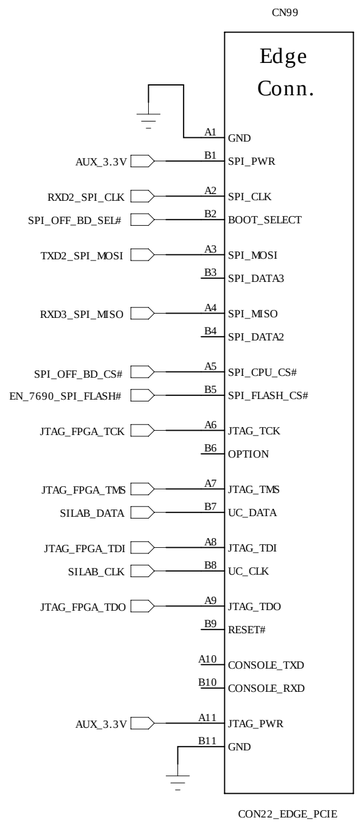
Micro SD Card Socket

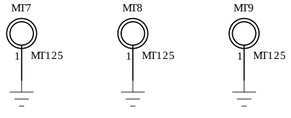


eMMC 4GB

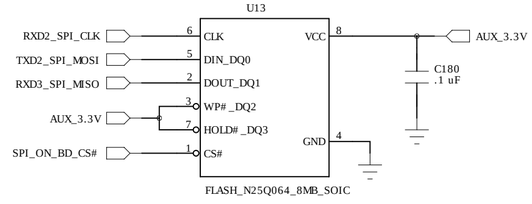


Edge Conn.





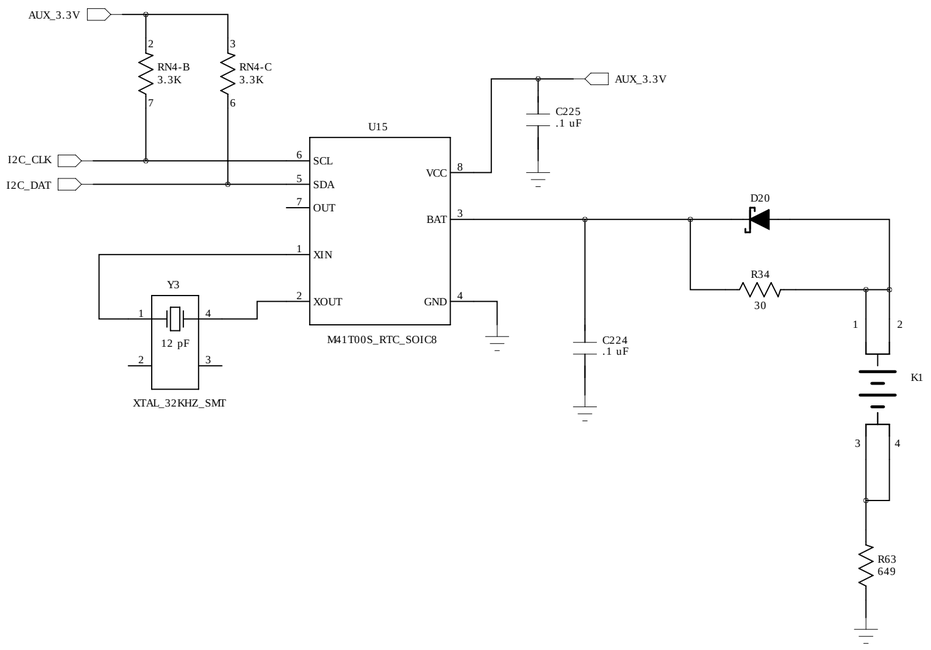
SPI Boot Flash



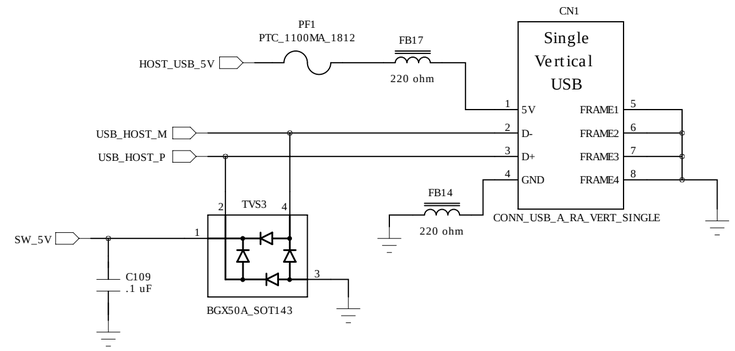
Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 NAND and SD Card		
Rev: B	Designer	Sheet 10 of 20

RTC and Host USB

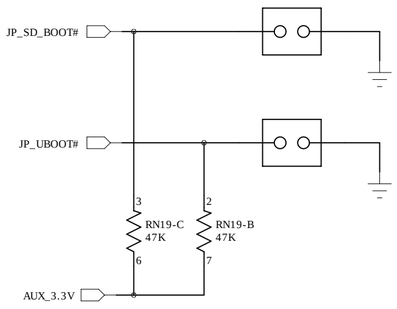
ST Micro RTC



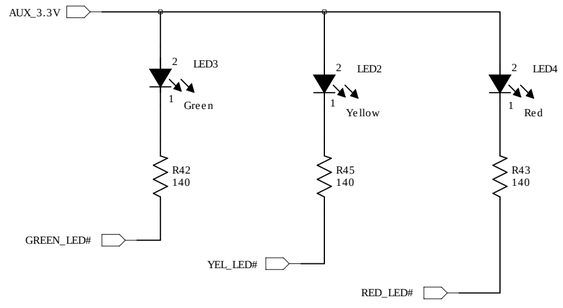
External Host USB Port



Boot Jumpers



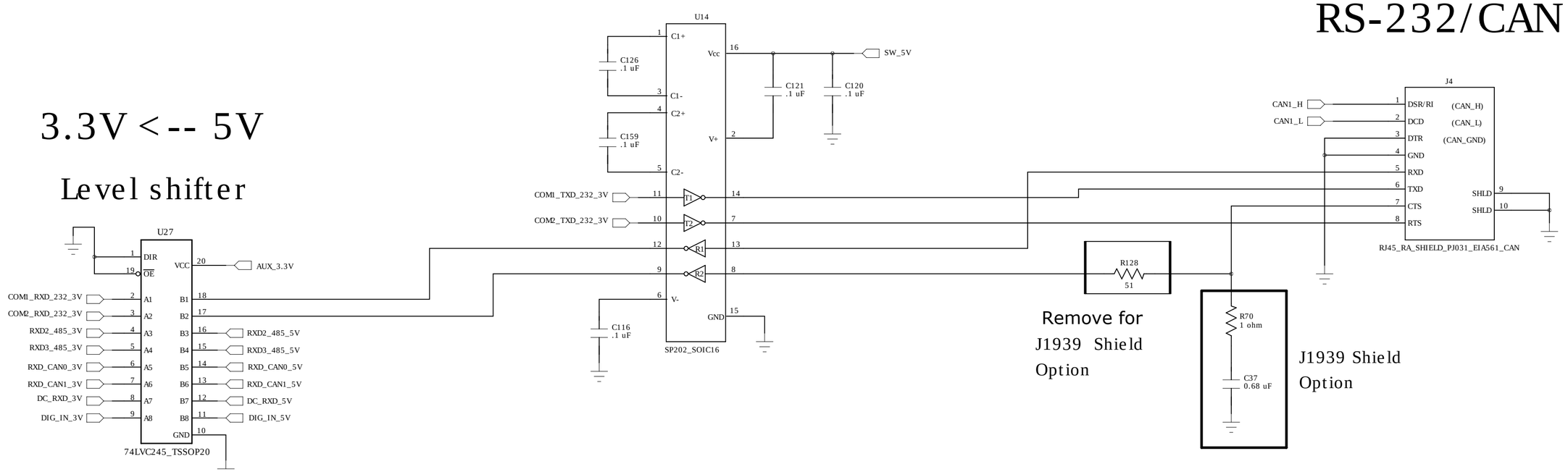
SMT RA LEDs



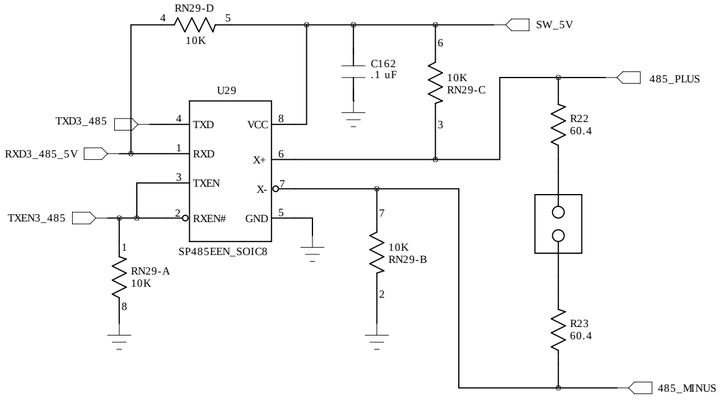
Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 RTC and Host USB		
Rev: B	Designer	Sheet 11 of 20

RS-232 Ports and Daughter Card Headers

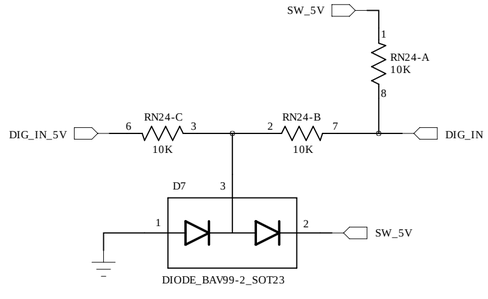
RS-232 Transceiver

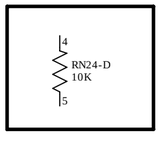


STC RS-485 Driver



Dig. Input



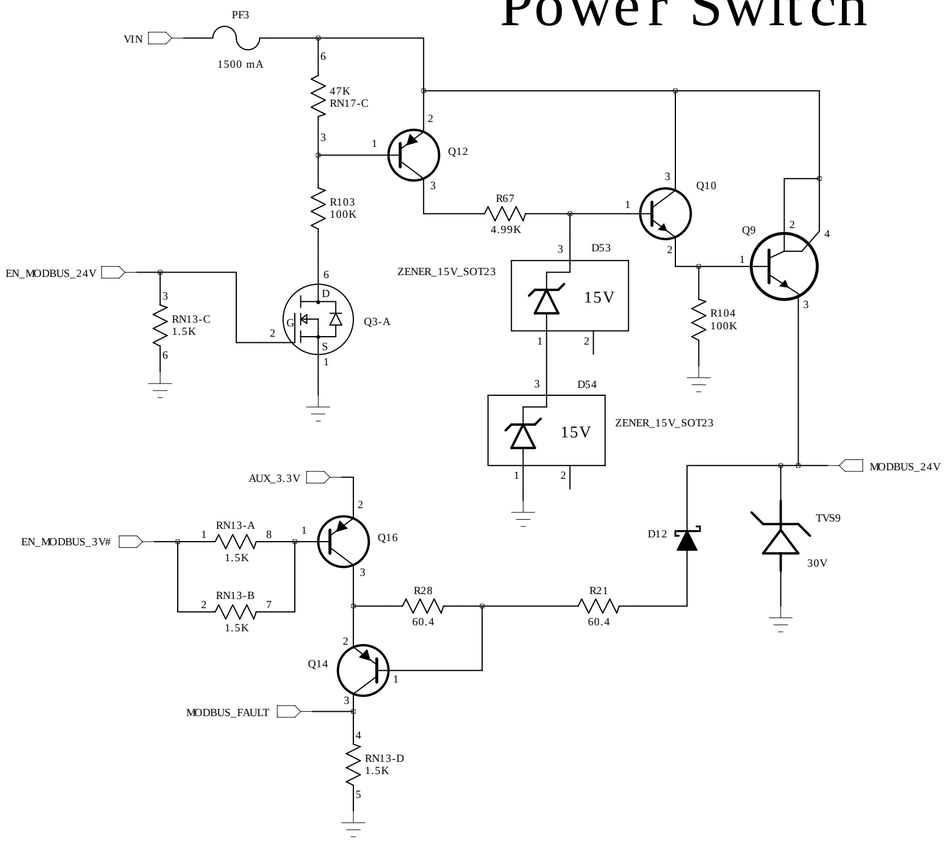


Do not use

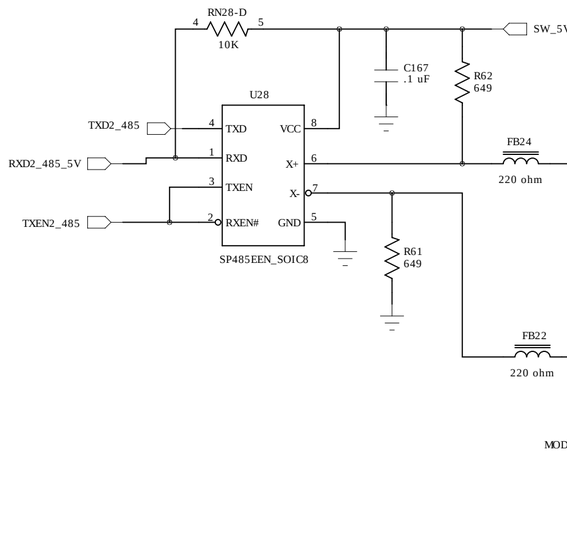
Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 RS-232 Ports		
Rev: B	Designer	Sheet 12 of 20

Mod Bus RS-485 and CAN Ports

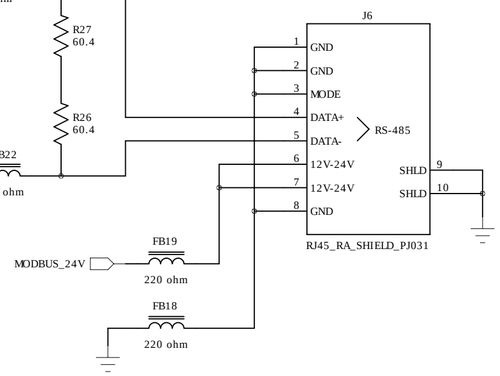
Modbus Power Switch



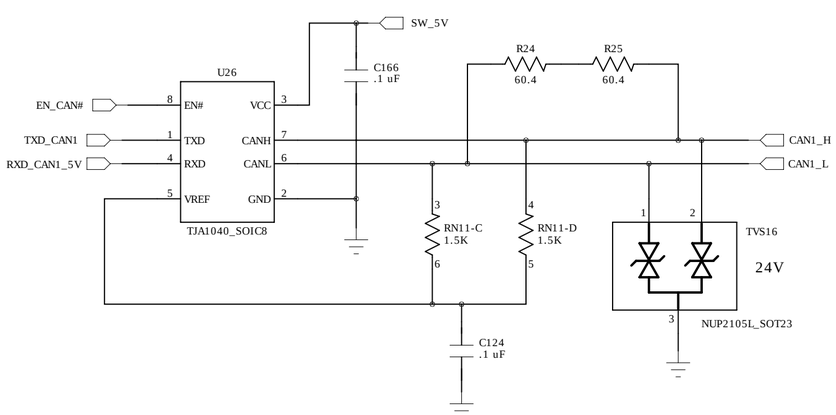
RS-485 Driver



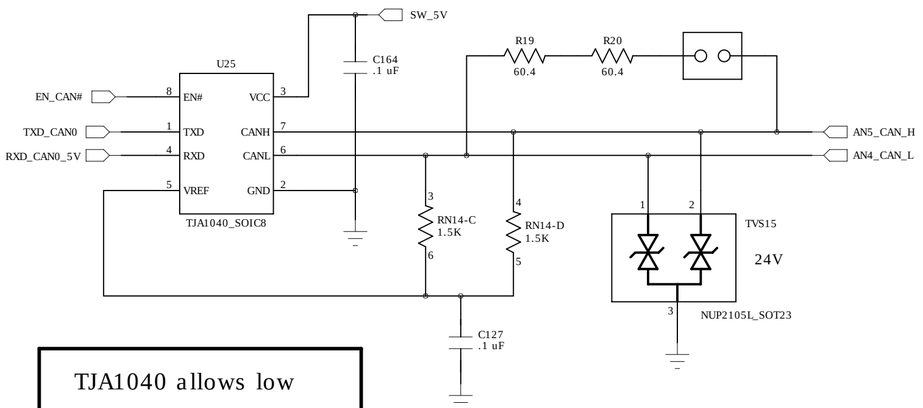
Modbus RJ45



CAN_1 Tranceiver



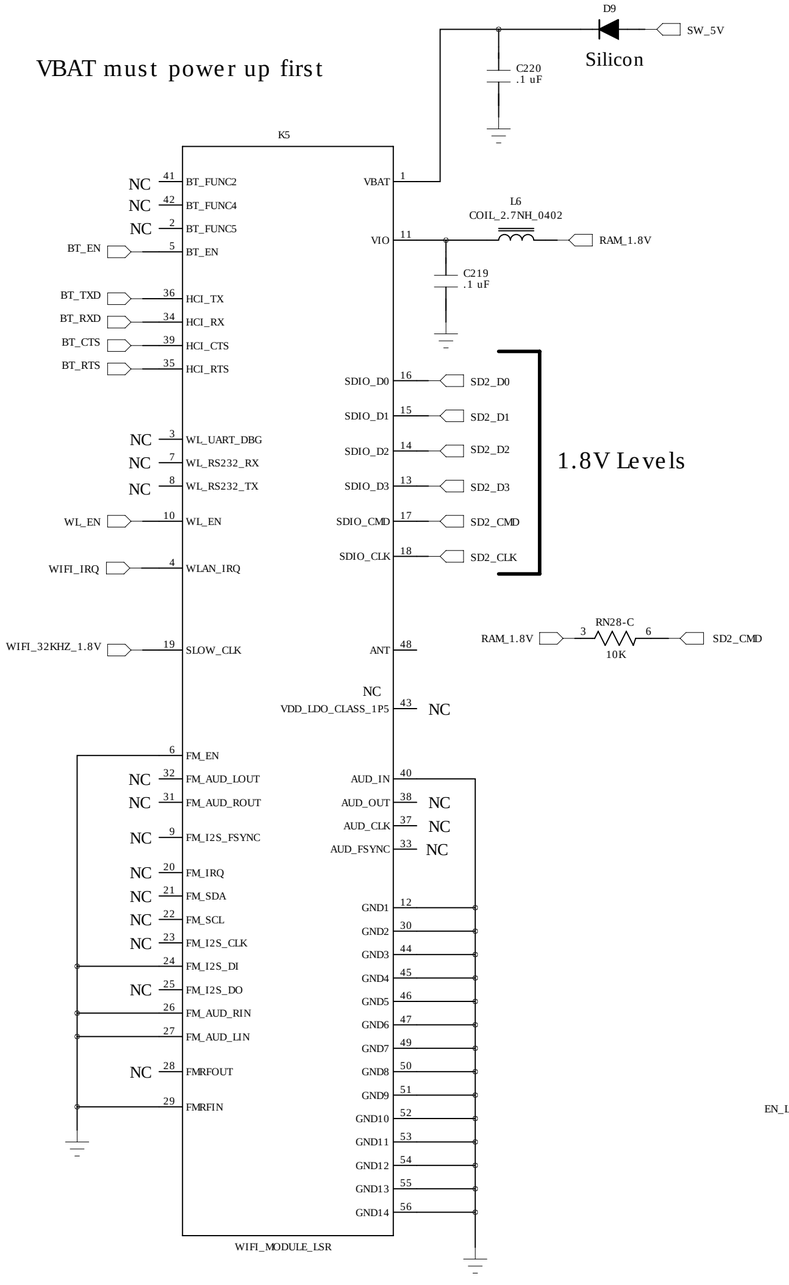
CAN_0 Tranceiver



TJA1040 allows low power 15 uA mode

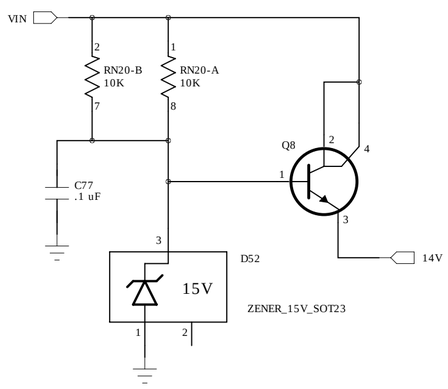
Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 Modbus and CAN		
Rev: B	Designer	Sheet 13 of 20

WiFi Radio
(Optional Feature)

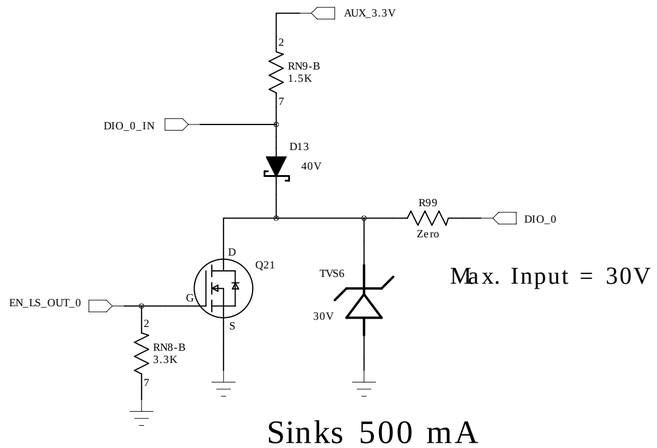


DAC

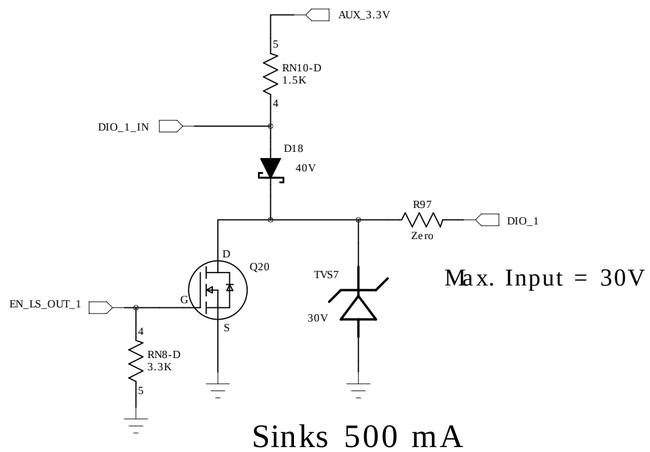
14V Supply



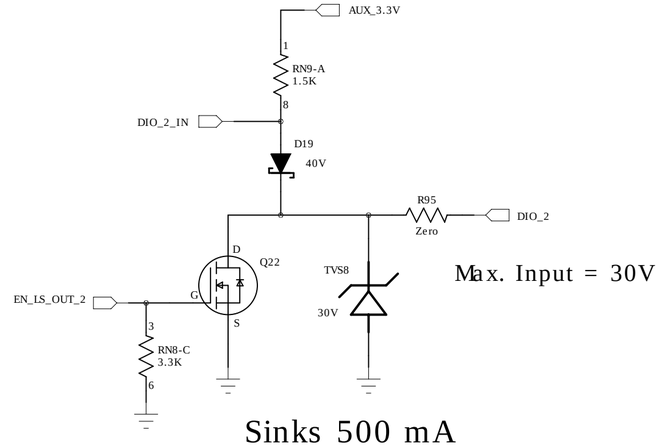
DIO_0



DIO_1



DIO_2



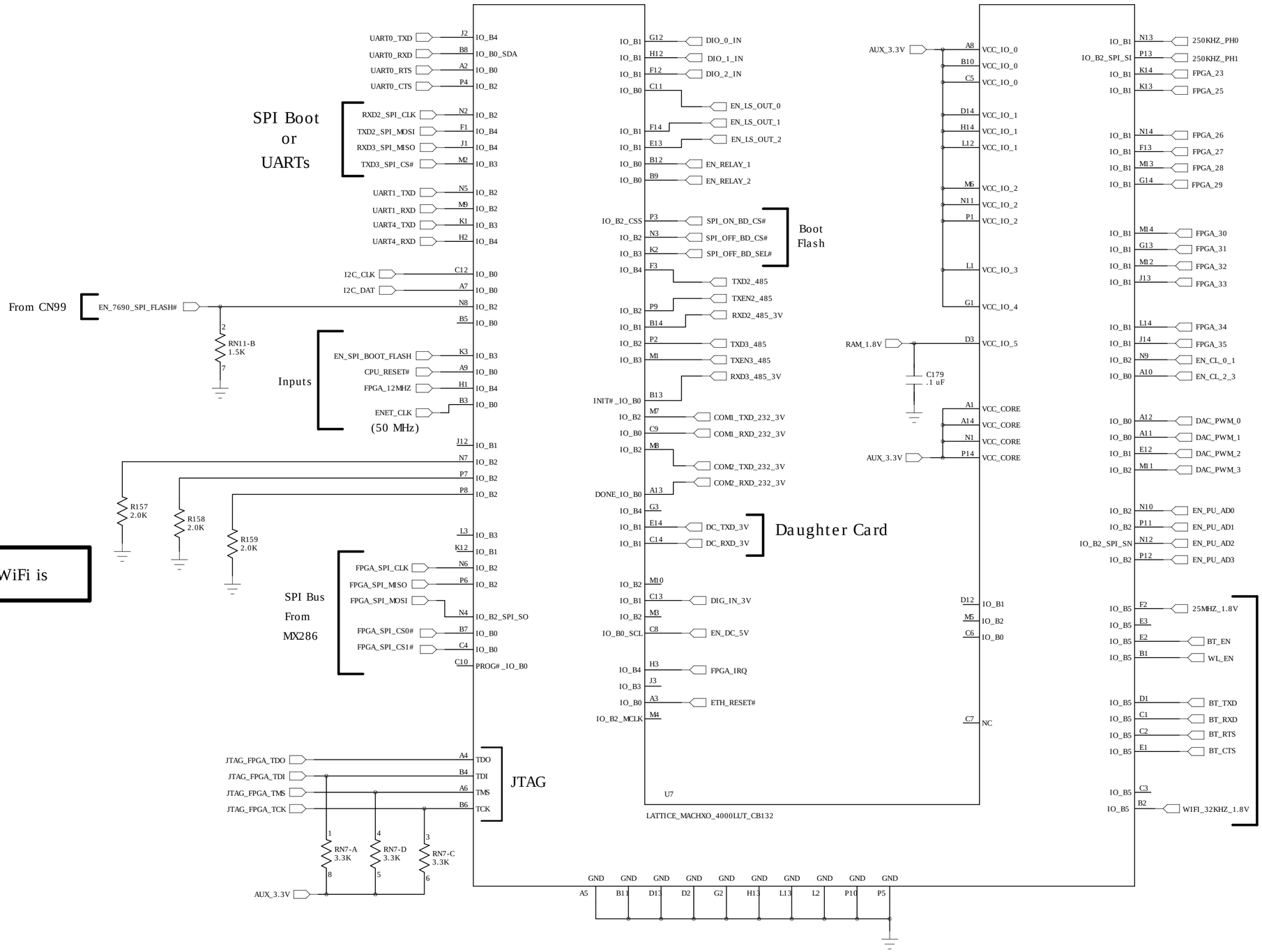
Technologic Systems		Date Sept. 1, 2015
Title: TS-7680 WIFI and DIO		
Rev: B	Designer	Sheet 14 of 20

MACH XO2 FPGA

FPGA required for:

- Auto-485 for two UARTs
- PWMs for DACs
- MUX for all UARTs
- BlueTooth Level Shifting
- Additional I/O
- HD4 Daughter Card (Future)

R126 pop when WiFi is

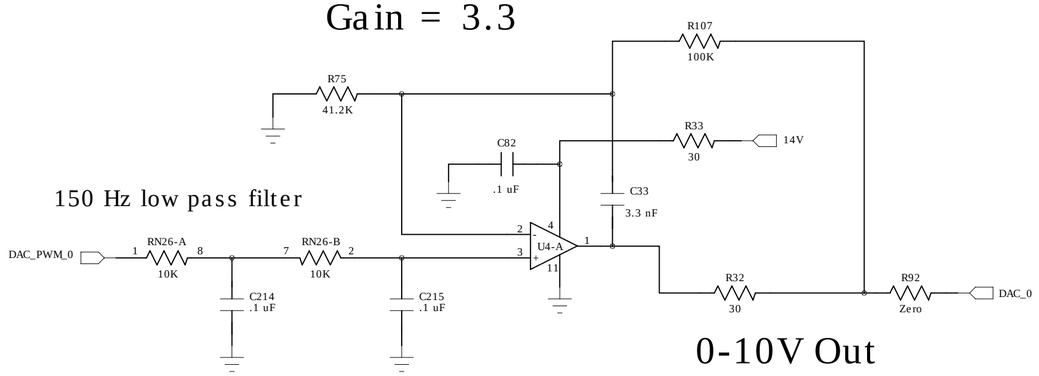


UART2 and UART3 changed to SPI when Booting from SPI

Technologic Systems	Date Sept. 1, 2015	
Title: TS-7680 FPGA		
Rev: B	Designer	Sheet 15 of 20

10-bit DACs

Gain = 3.3



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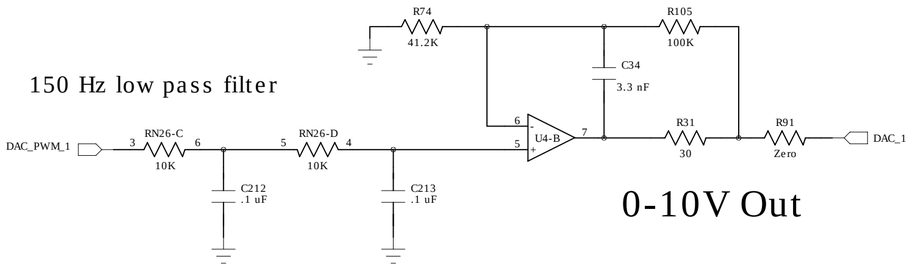

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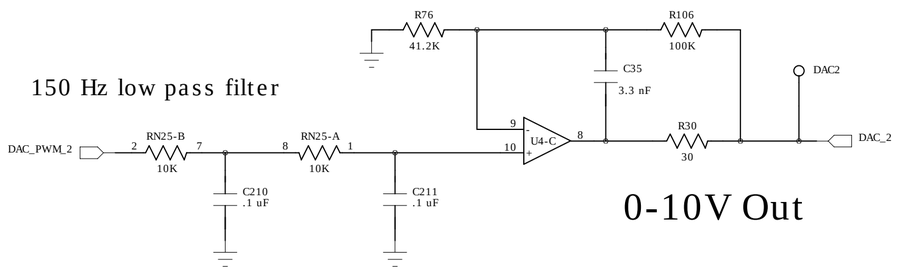
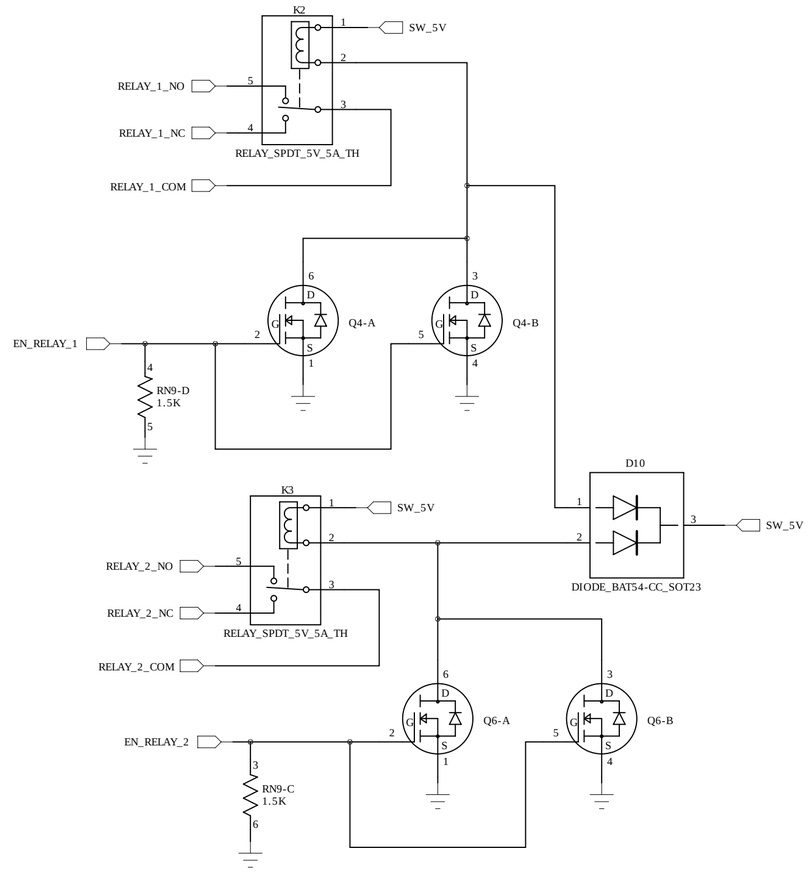
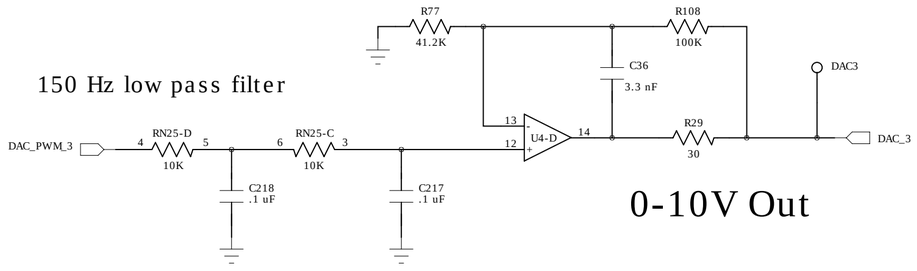


Relays



Gain = 3.3



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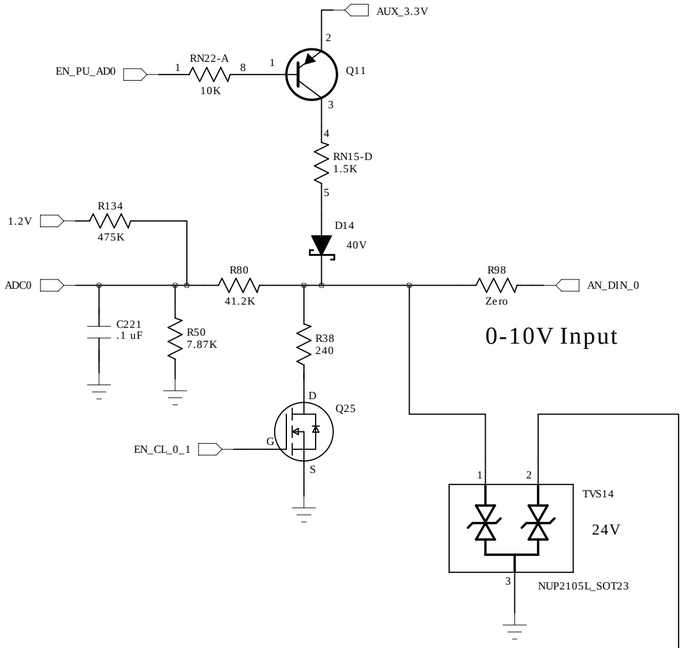
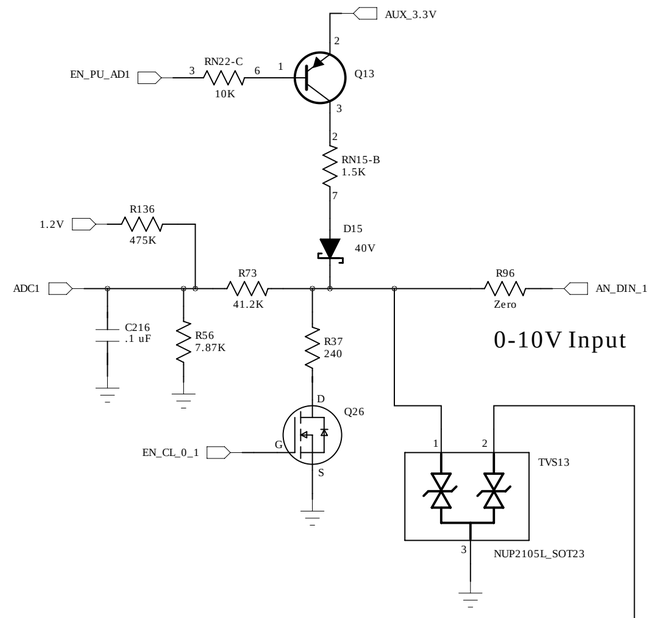
Analog In Channels

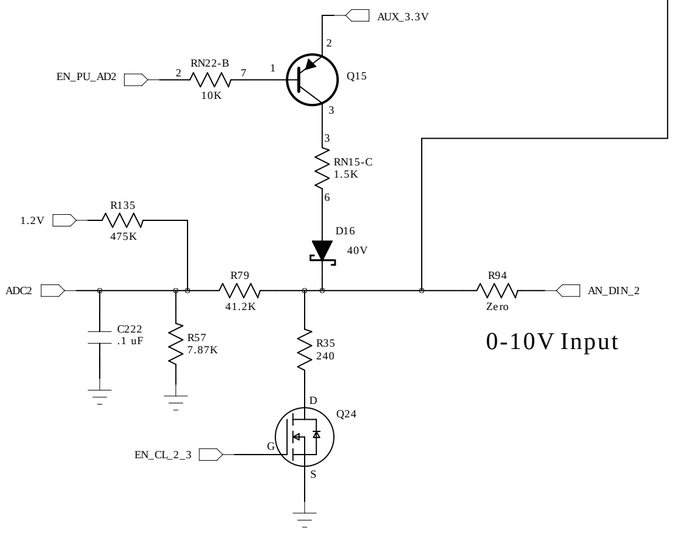


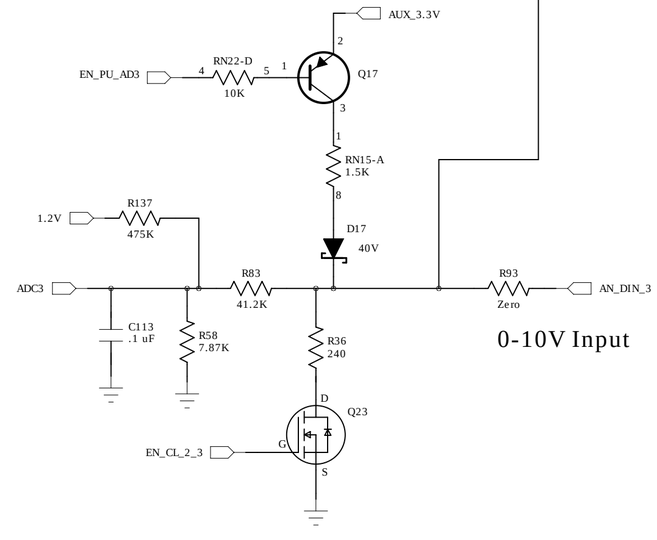


By adjusting resistor values

All A/D Inputs can be converted

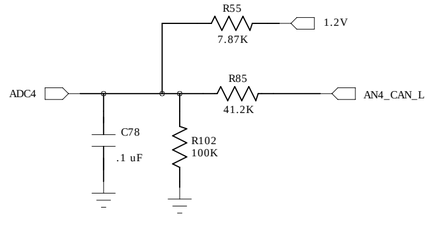
to Bipolar, but must remove FETs

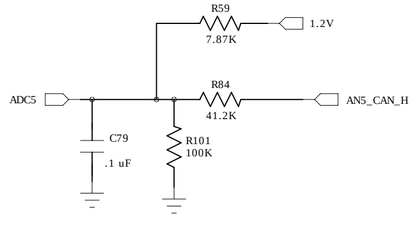




Bipolar Analog Inputs

-5V to +5V Input Range





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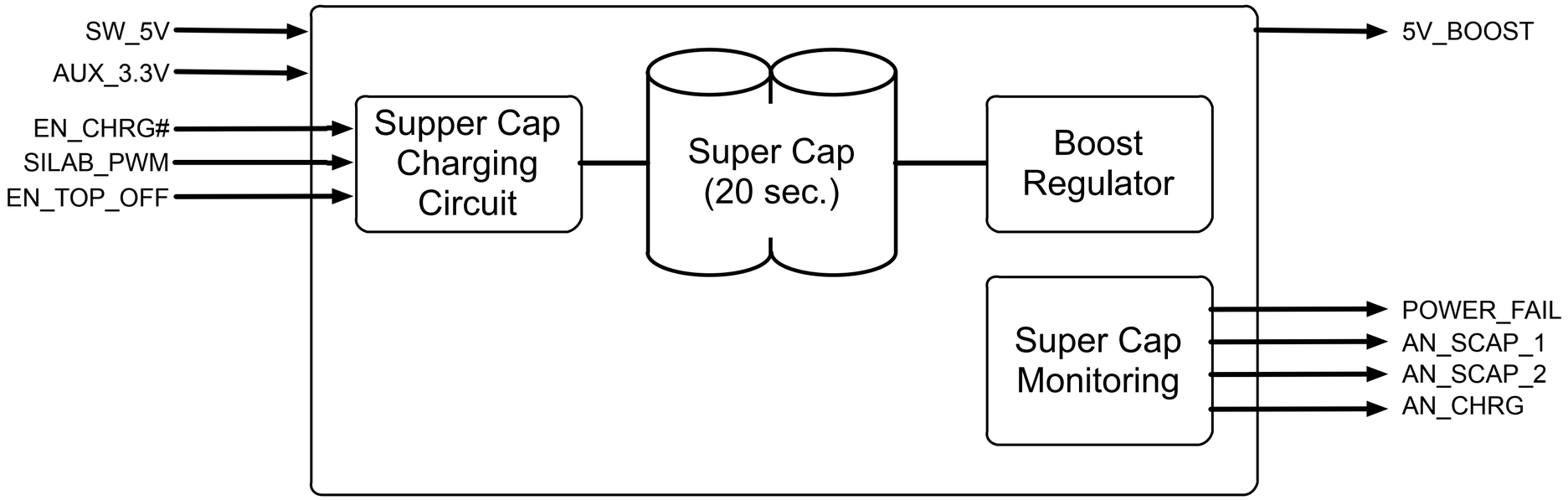
SuperCap 20 Second Power Hold
(Optional Feature)



20 seconds assumes 3 watt load

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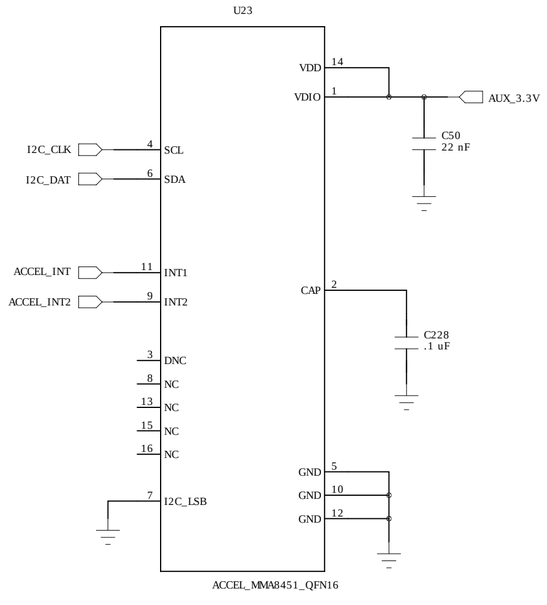
Accelerometer
(Optional Feature)



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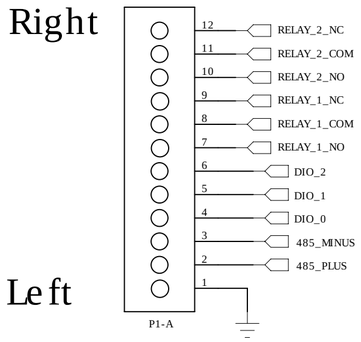
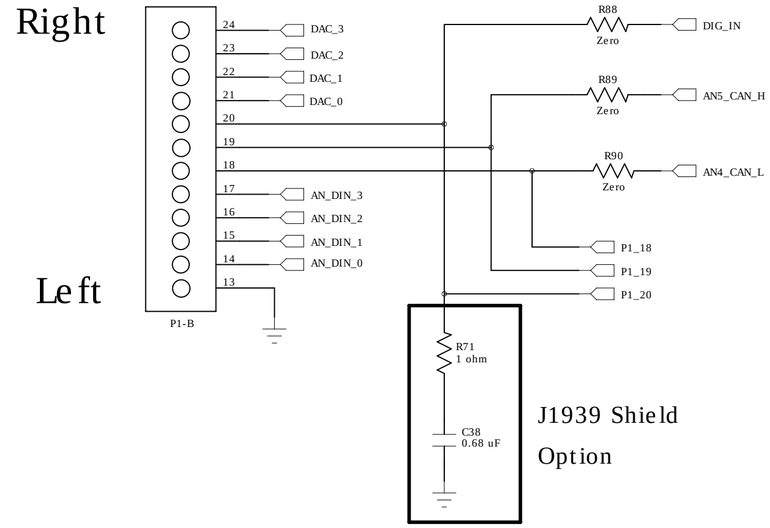
24 Screw Term. Positions

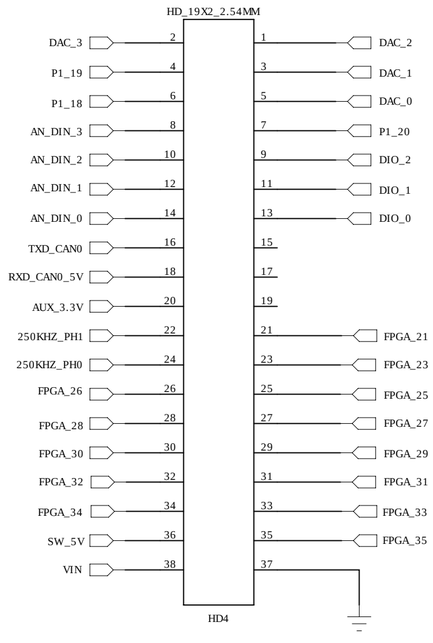
Top Row



Bottom Row



DC Header



17 STC positions go to HD4

FPGA_21, 23, 25, 27, 29 go to MX286 (5)

FPGA_22 thru FPGA_35 go to FPGA (14)

FPGA_29 to SiLab uC

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