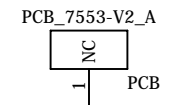
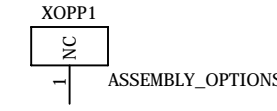


# TS-7553-V2

## Standard Options



Option 1	TS-7553-V2-SMN1I	TS-7553-V2 SBC with the i.MX286 454MHz ARM9, 128MB DDR2 RAM and 4GB eMMC Flash, Xbee socket, Relay, RoHS
Option 2	TS-7553-V2-SRN8I	TS-7553-V2 SBC with the i.MX286 454MHz ARM9, 256MB DDR2 RAM and 4GB eMMC Flash, TS-SILO, LCD/Keypad, Relay, 2nd CAN, Accellerometer
Option 3	TS-7553-V2-SRN9I	TS-7553-V2 SBC with the i.MX286 454MHz ARM9, 256MB DDR2 RAM and 4GB eMMC Flash, TS-SILO, Xbee, Relay, 2nd CAN, Accellerometer

### Xbee Socket Option:

Included on xxx1x, xxx9x Standard Options  
 Add: CN4  
 NOT Compatible with LCD/Keypad Option

### LCD/Keypad Option:

Included on xxx8x Standard Options  
 Add: CN2, CN7, HD4  
 NOT Compatible with Xbee Socket Option

### TS-SILO Option:

Included on xxx8x, xxx9x Standard Options  
 Remove: FB6  
 Add: C92, C93, U34

### Full Sized USB Type B for Linux Console Option:

Included on ALL Standard Options  
 Add: R74 thru R76 and FB22  
 Remove: R70 and R71

### Full Sized USB Type B for USB Device Option: Linux Console on Micro USB Type B

NOT Included on any Standard Options  
 Remove: R74 thru R76 and FB22  
 Add: P2, R70, and R71

### 1st CAN Option:

Included on ALL Standard Options  
 U25 and TVS5

### 2nd CAN Option:

Included on xxx8x, xxx9x Standard Options  
 Add: U26, TVS6

### RS-485 Option:

Included on ALL Standard Options  
 U15 thru U18

### Relay Option:

Included on ALL Standard Options  
 K2

### Accelerometer Option:

Included on xxx8x, xxx9x Standard Options  
 Add: U13

### Serial Port Usage

- UART0 = RS-232 Header
- UART1 = RS-232 DB9
- UART2 = RS-485
- UART3 = Daughter Card
- UART4 = Xbee radio
- Debug = Console/USB

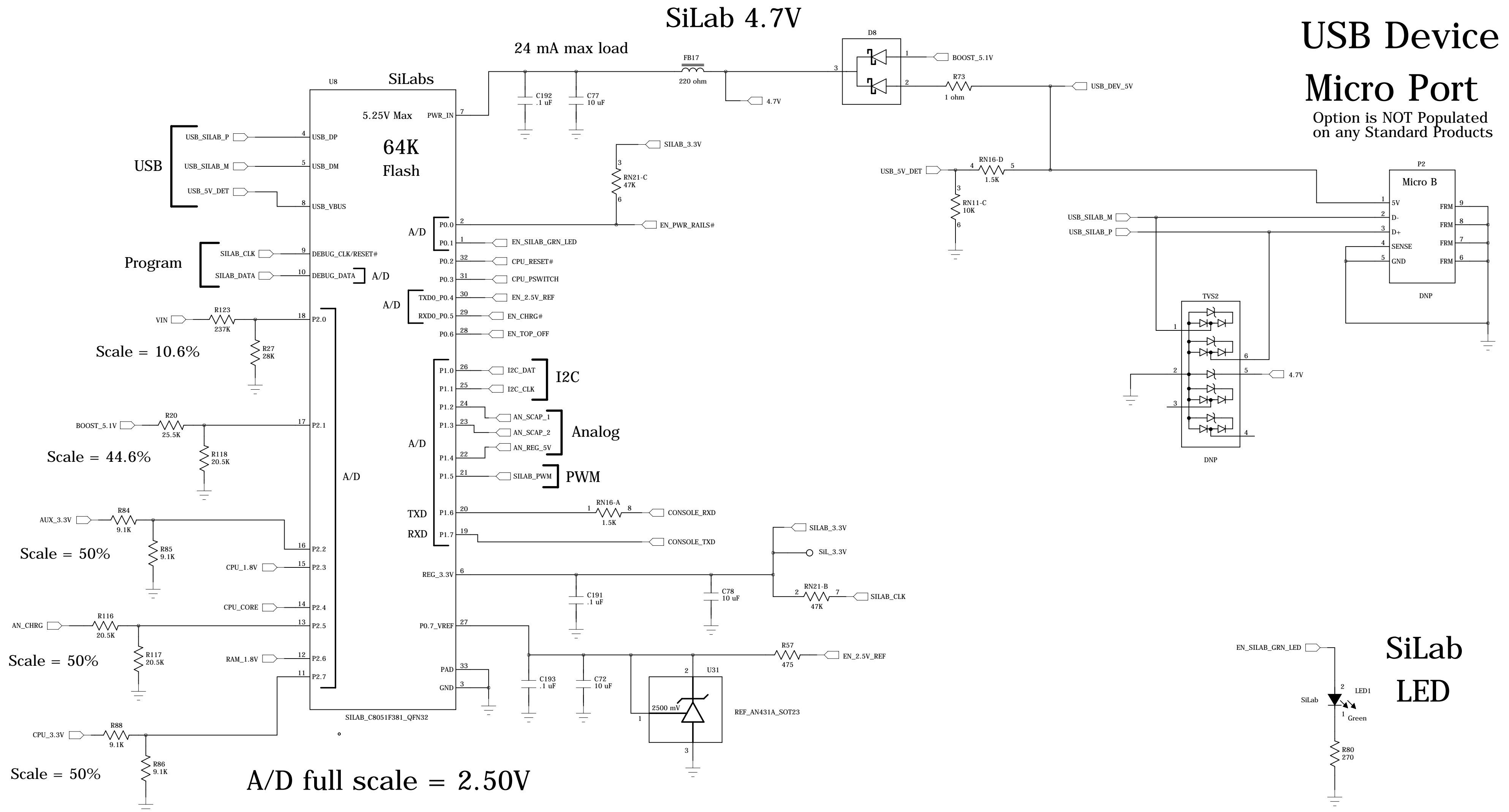
Debug can also go to Header 232  
 via zero ohm res. if SiLab not pop

Technologic Systems		Date	July 14, 2016
Title: TS-7553-V2 Documentation			
Rev: A	Designer	Sheet	0 of 17

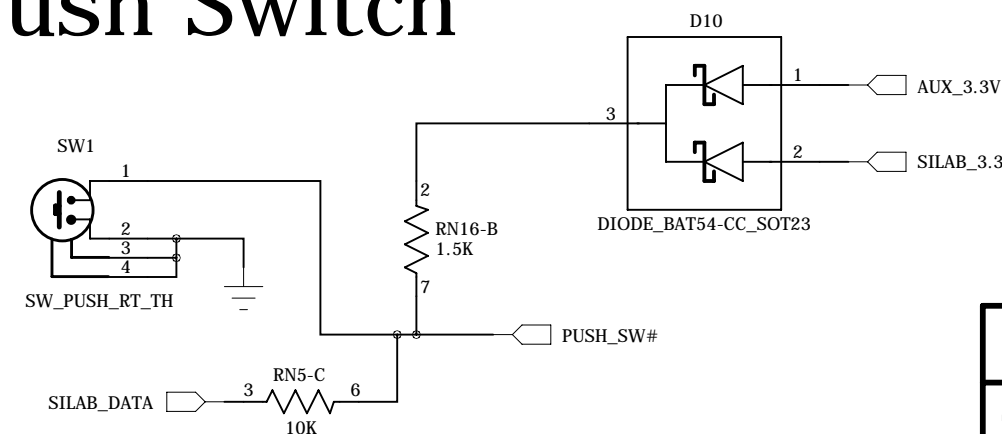
# USB Device Port and SiLab uC

## USB Device Micro Port

Option is NOT Populated  
on any Standard Products



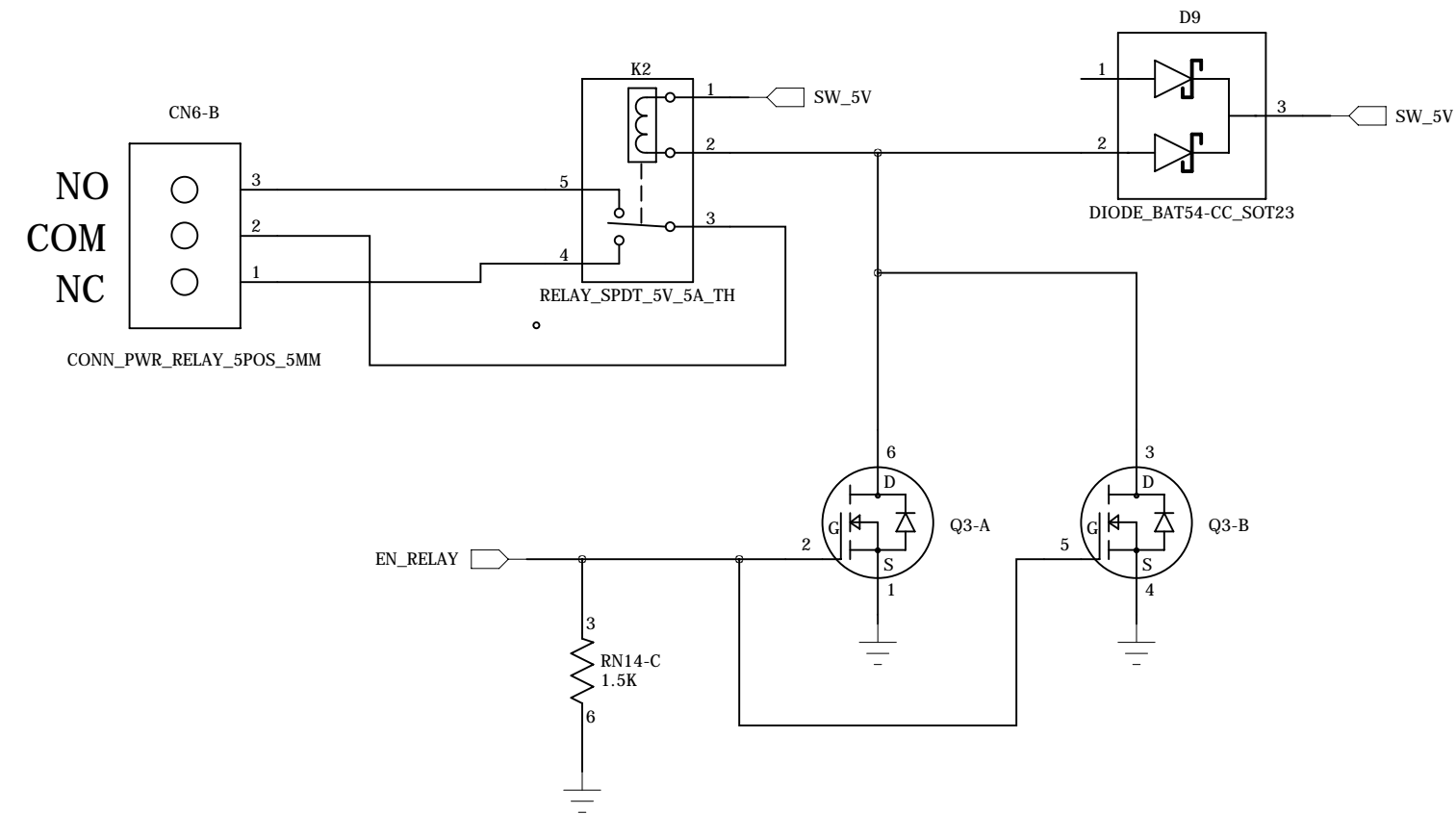
## Push Switch



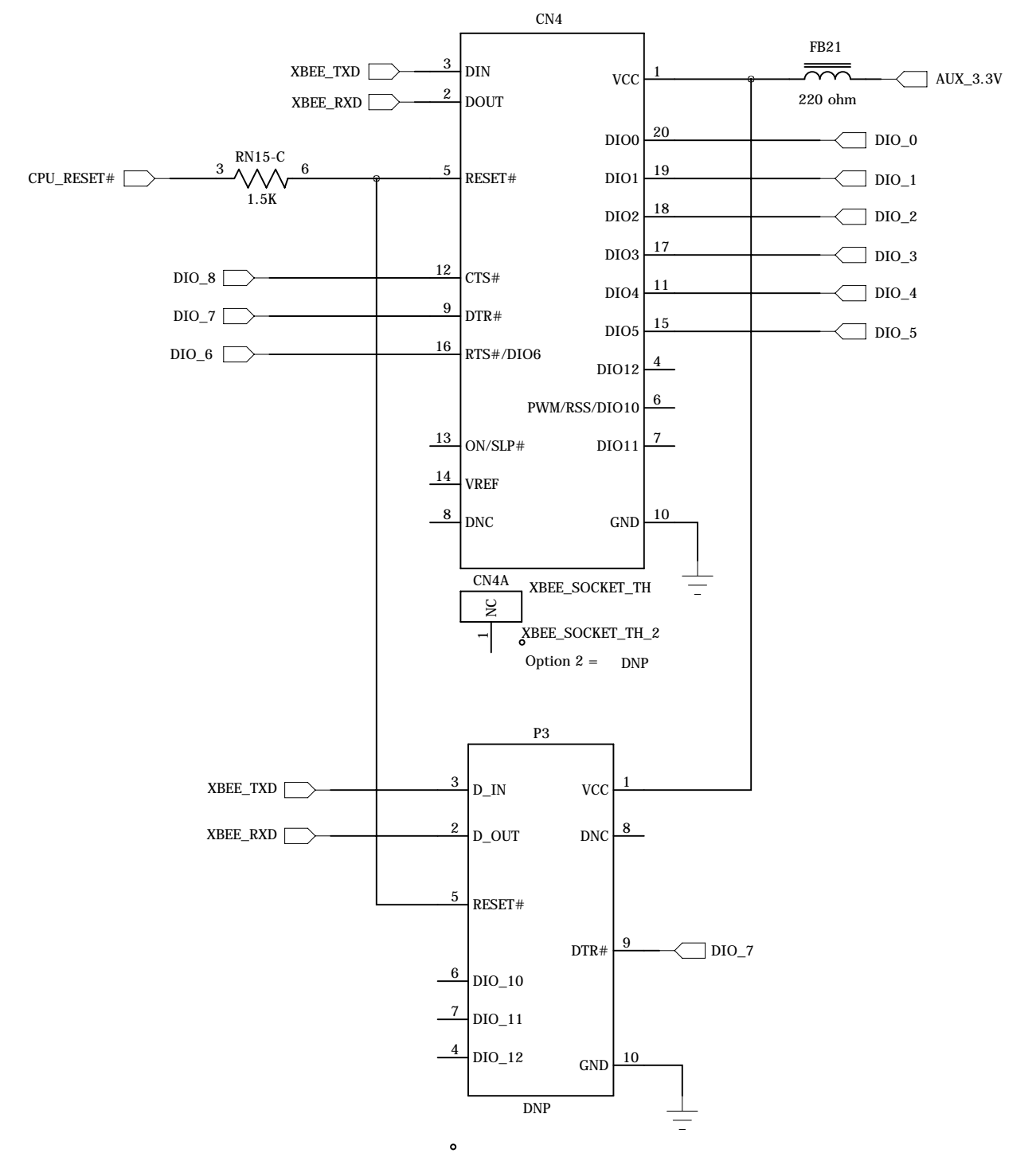
After MX286 powered up, wait  
200 ms before driving pin 20  
and deasserting CPU\_RESET#

Technologic Systems	Date July 14, 2016
Title: TS-7553-V2 SiLab Microcontroller	
Rev: A	Designer
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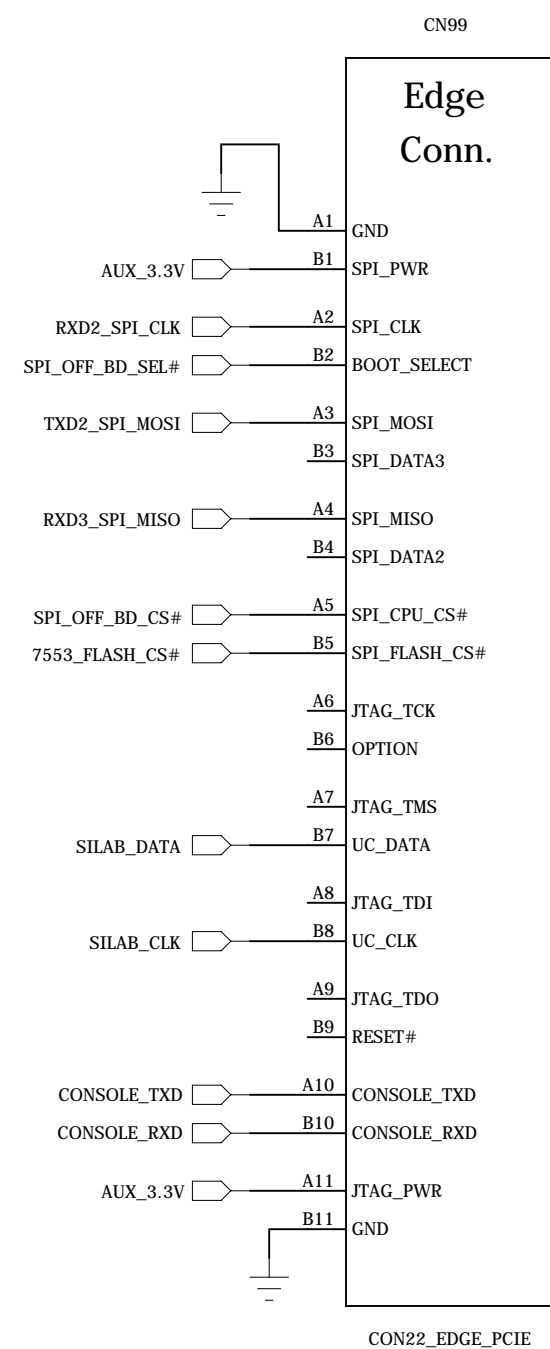
# Relay



# ZigBee Radio Socket



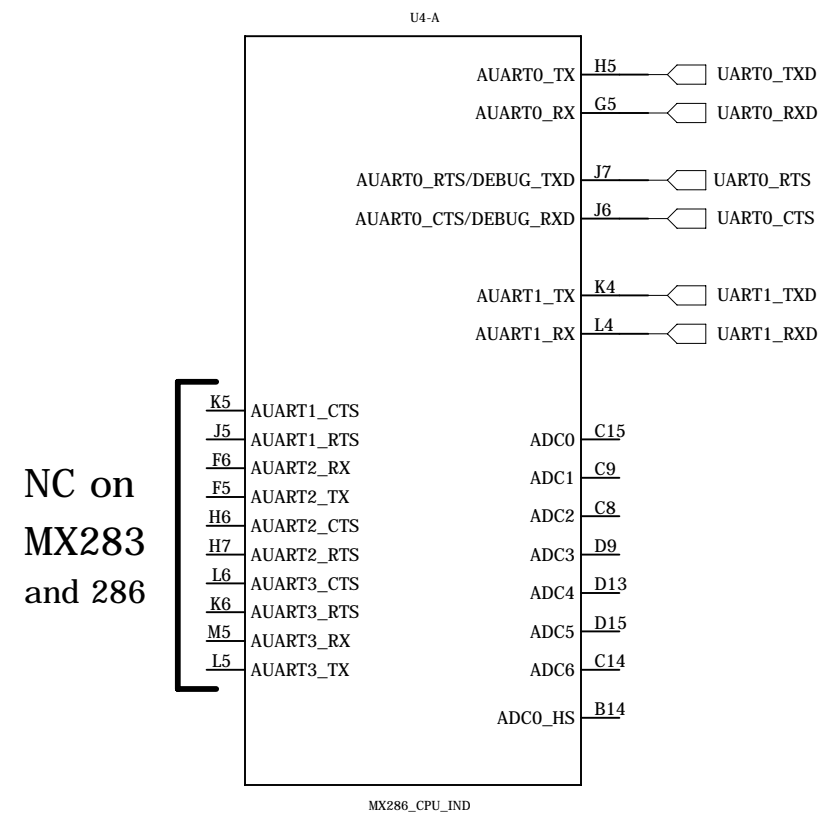
# Edge Conn.



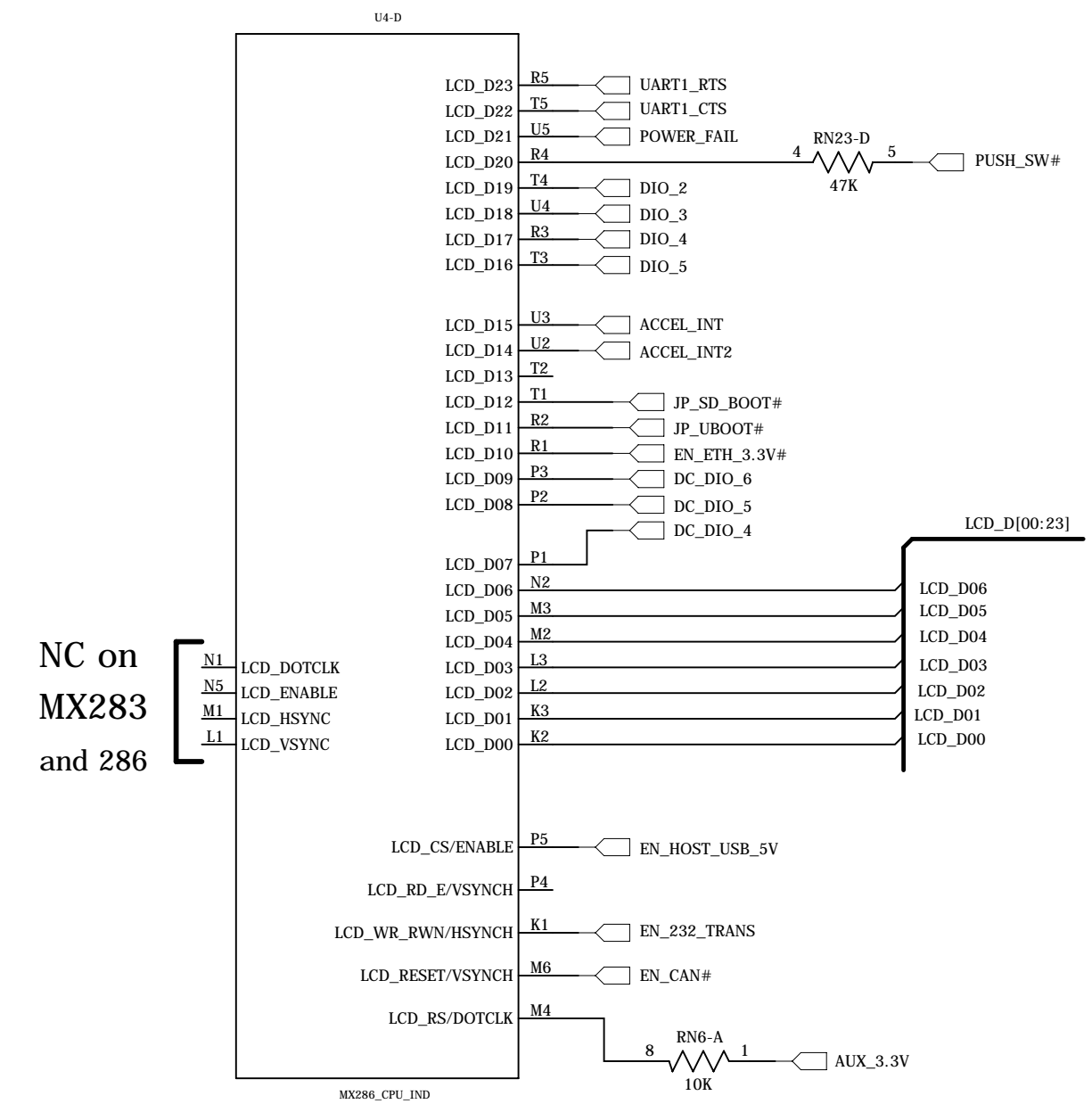
Technologic Systems		Date July 14, 2016	
Title: TS-7553-V2 Misc			
Rev: A	Designer	Sheet 4 of 17	

# MX286 ARM9 CPU

## UARTs, ADC

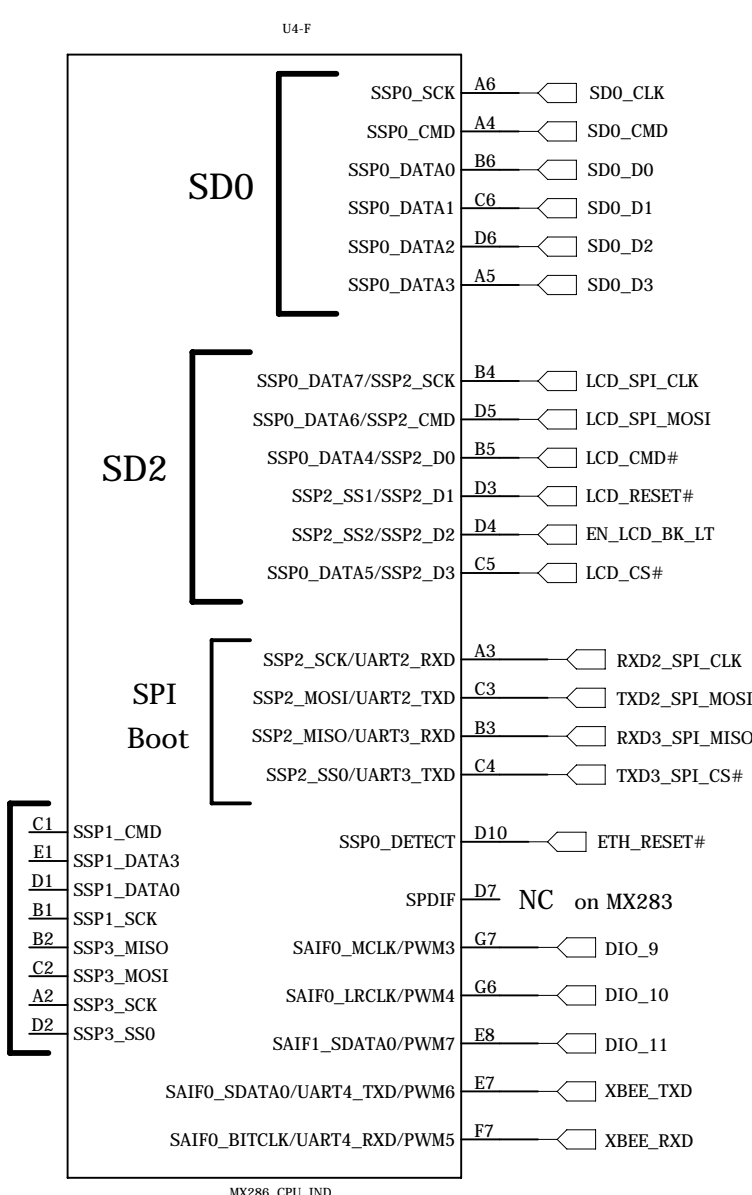


## LCD



## NAND, PWM JTAG, I2C

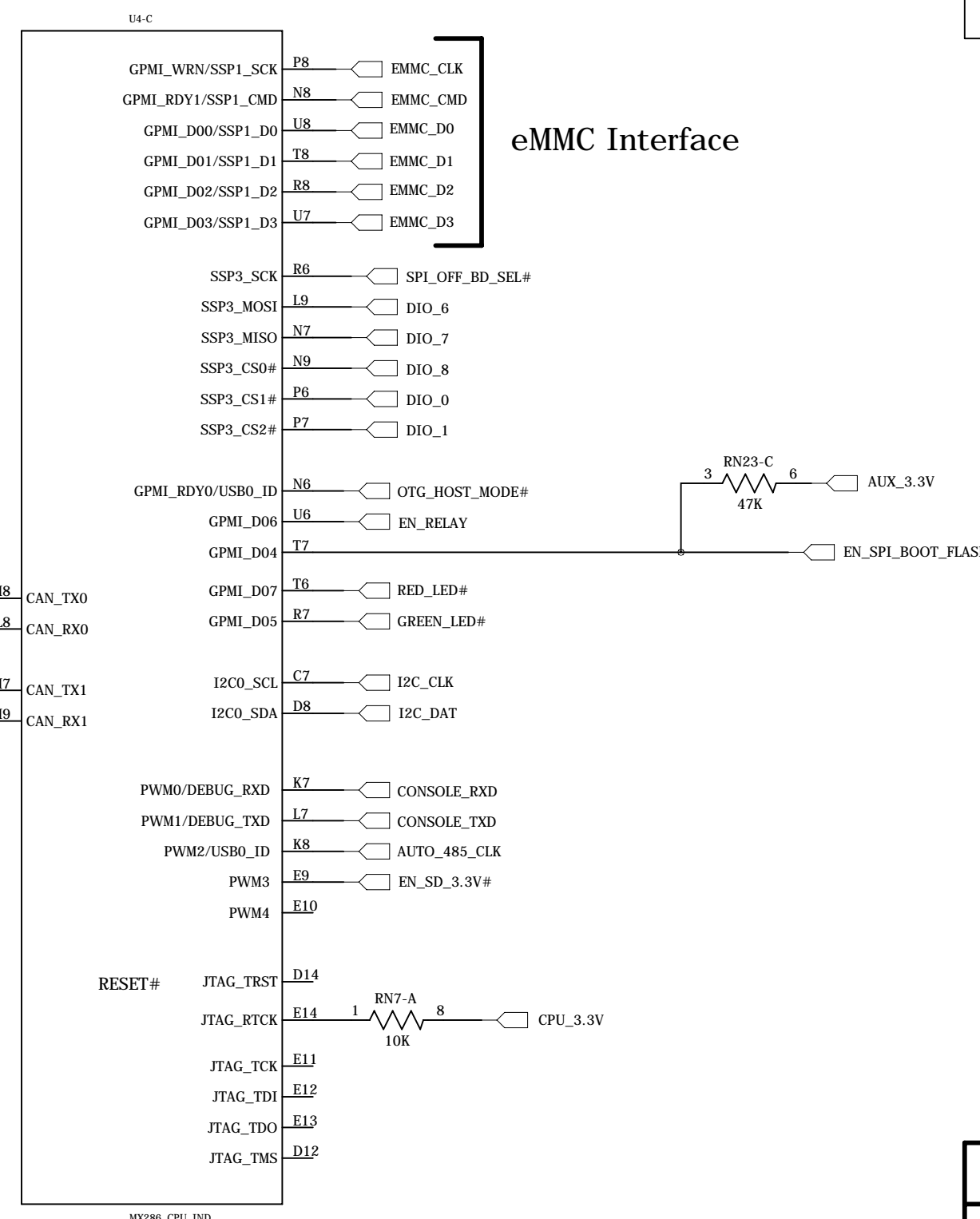
## Audio SD Card SPI Boot



SPI  
SCK = CLK  
CMD = MOSI  
D0 = MISO  
D3 = CS#

MX286 adds  
4 CAN signals  
and ball D7

12 MHz default boot clock  
U3.D3 and U3.D4 are extra  
2 data lines for SPI x4 read



LCD\_RS biased high  
LCD\_RS low = use OTP

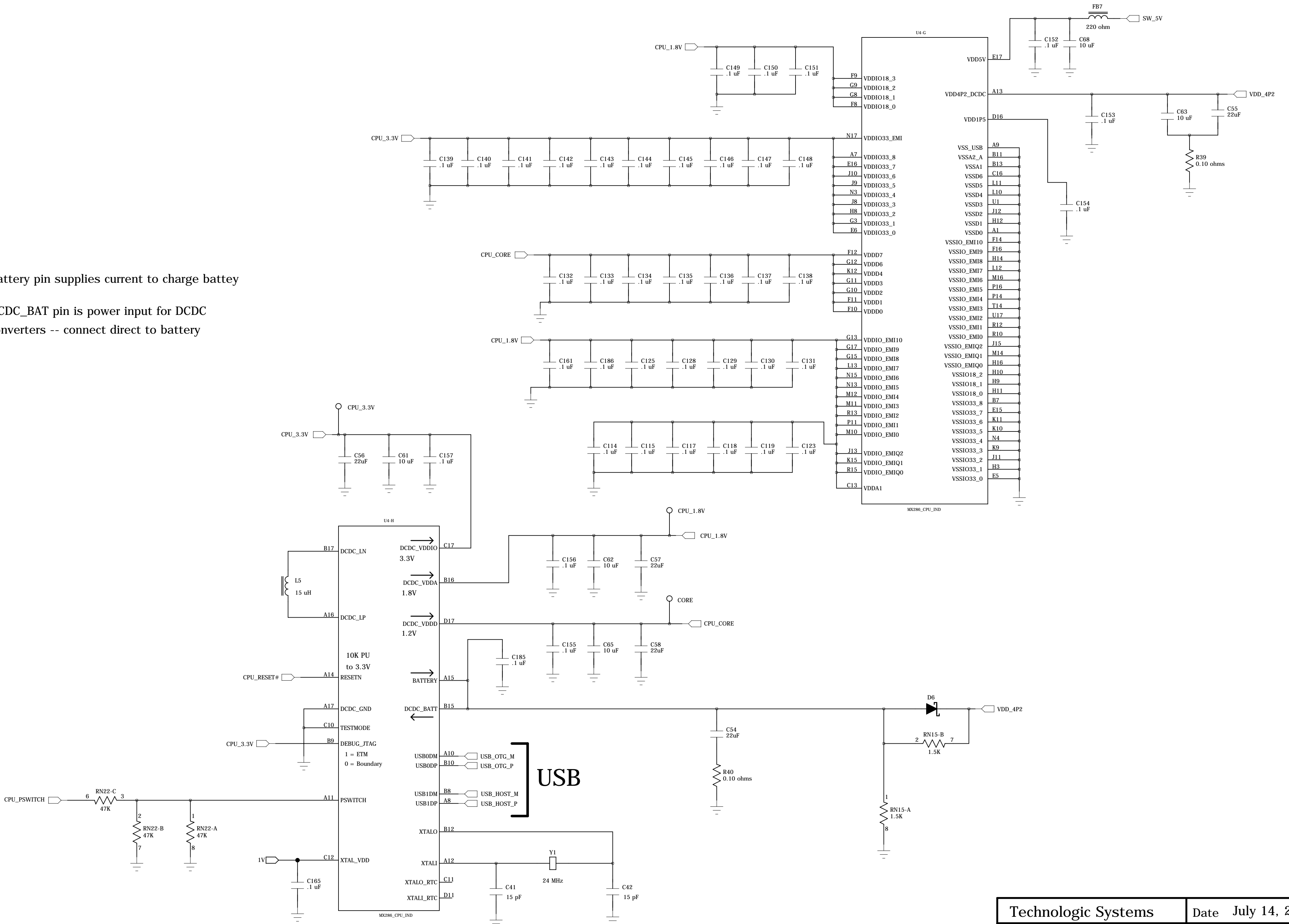
SPI\_OFF\_BD\_SEL# should be tri-state  
until done Booting. Drive it low  
to read/write external SPI Flash

When done Booting from SPI Flash,  
Drive EN\_SPI\_BOOT\_FLASH to logic zero  
Then UARTs can be used instead of SPI

PWM outputs can be 24 MHz  
divided by 16-bit integer  
Allows clock 12MHz and lower

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All JTAG have 47K internal PU except RTCK



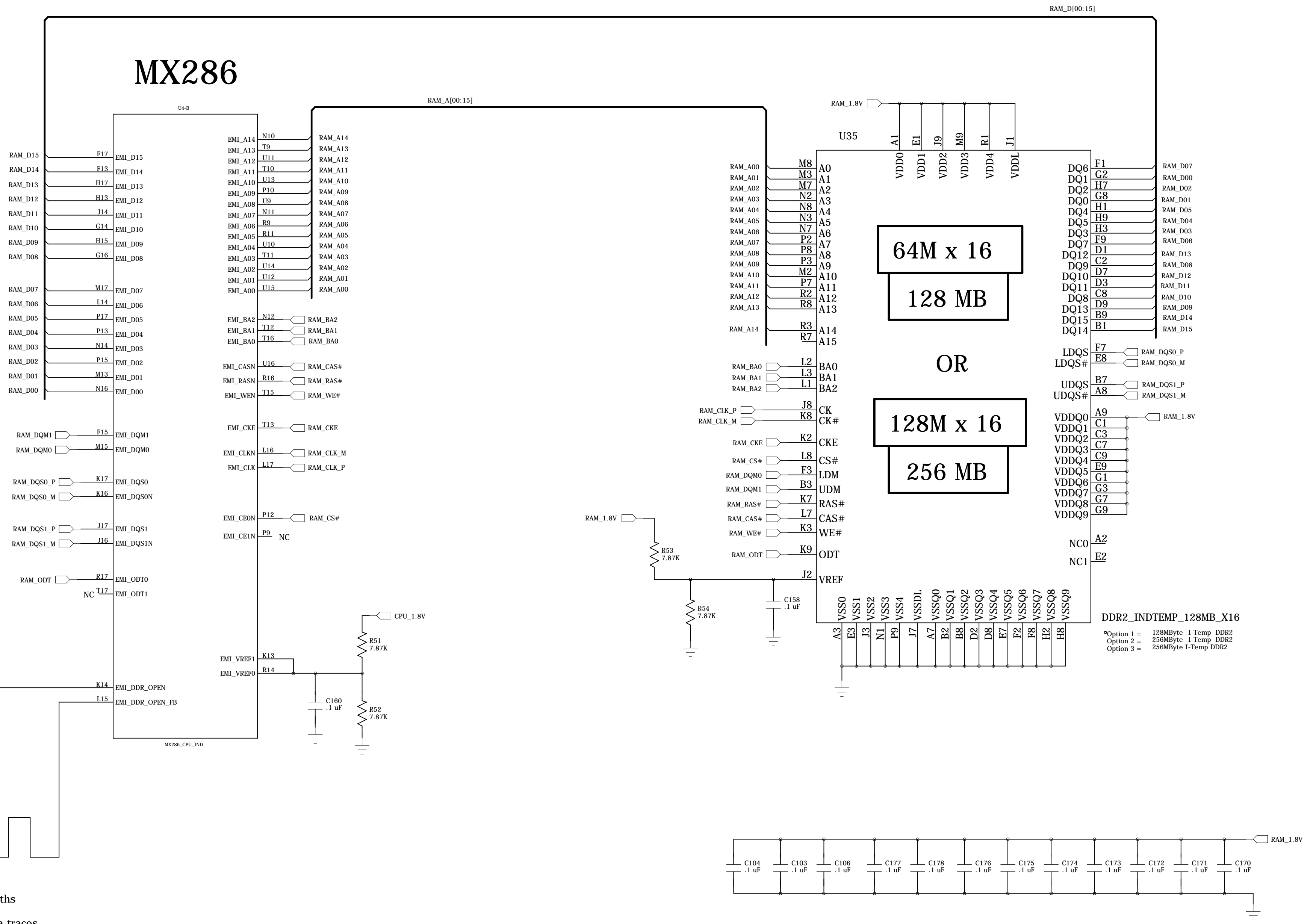
Battery pin supplies current to charge battery

DCDC\_BAT pin is power input for DCDC converters -- connect direct to battery

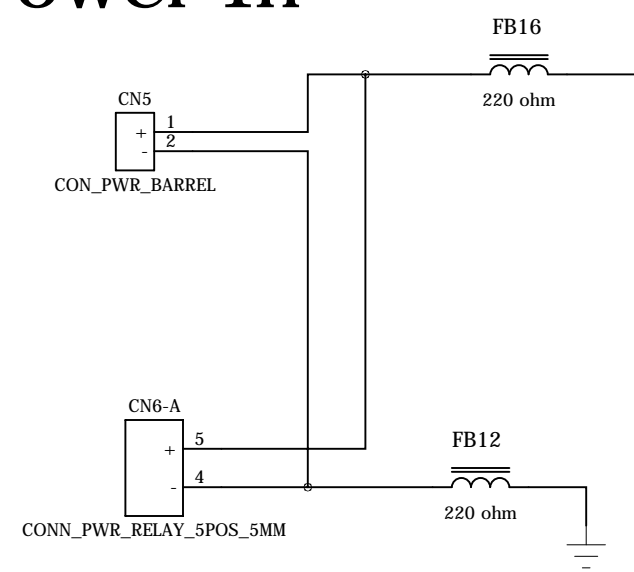
PSWITCH can be driven to 3.3V if a series 10K res is used

Technologic Systems	Date July 14, 2016
Title: TS-7553-V2 MX286 CPU Power	
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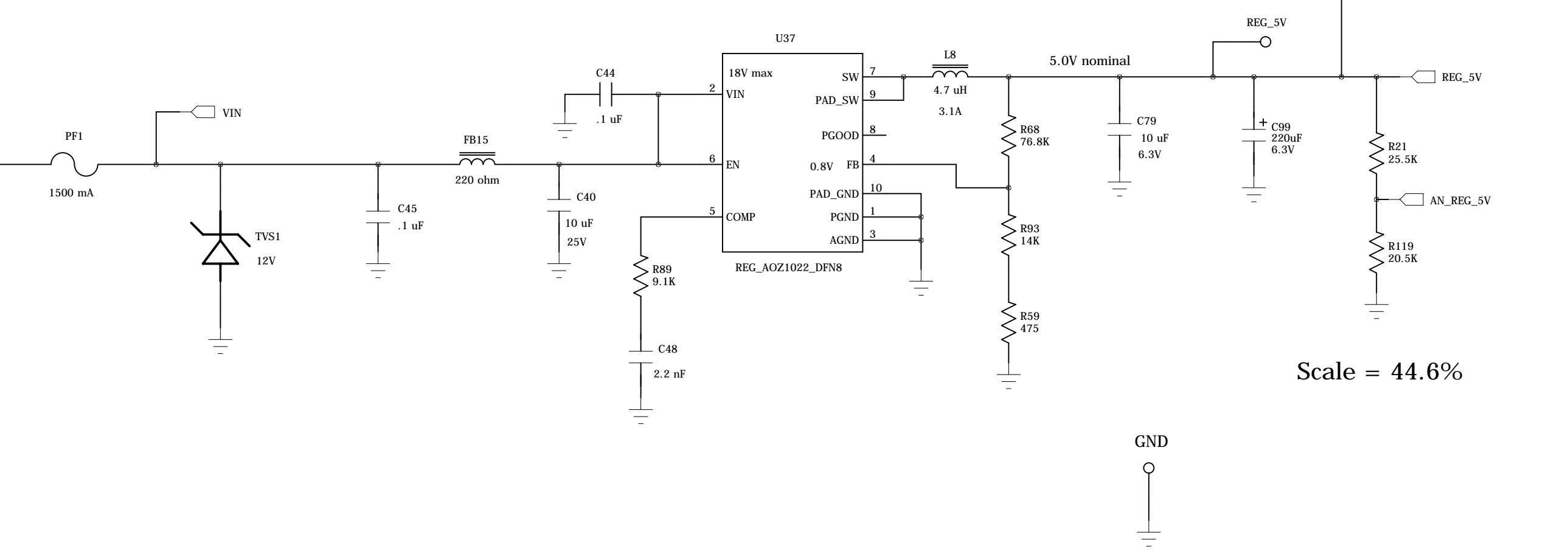
# DDR2 SDRAM (128 or 256 MByte)



# 5V-13V Power In

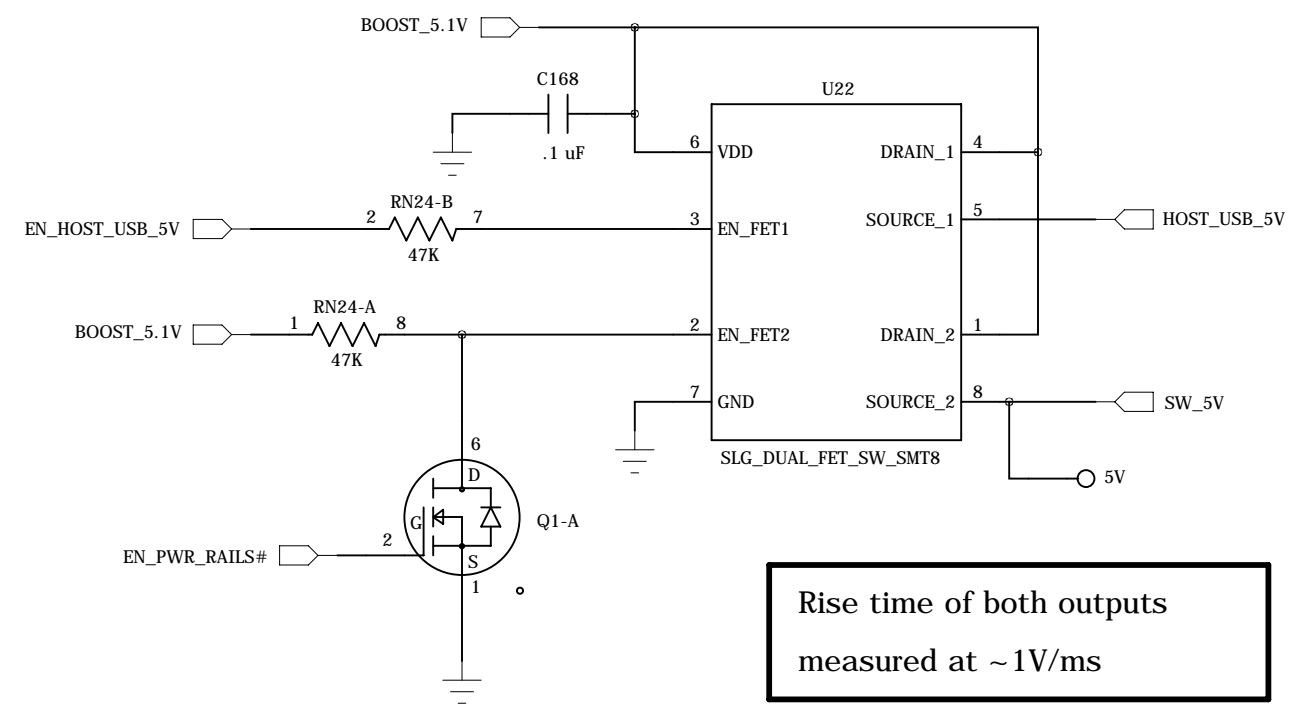


# 5.0V Power Supply (2.5A)



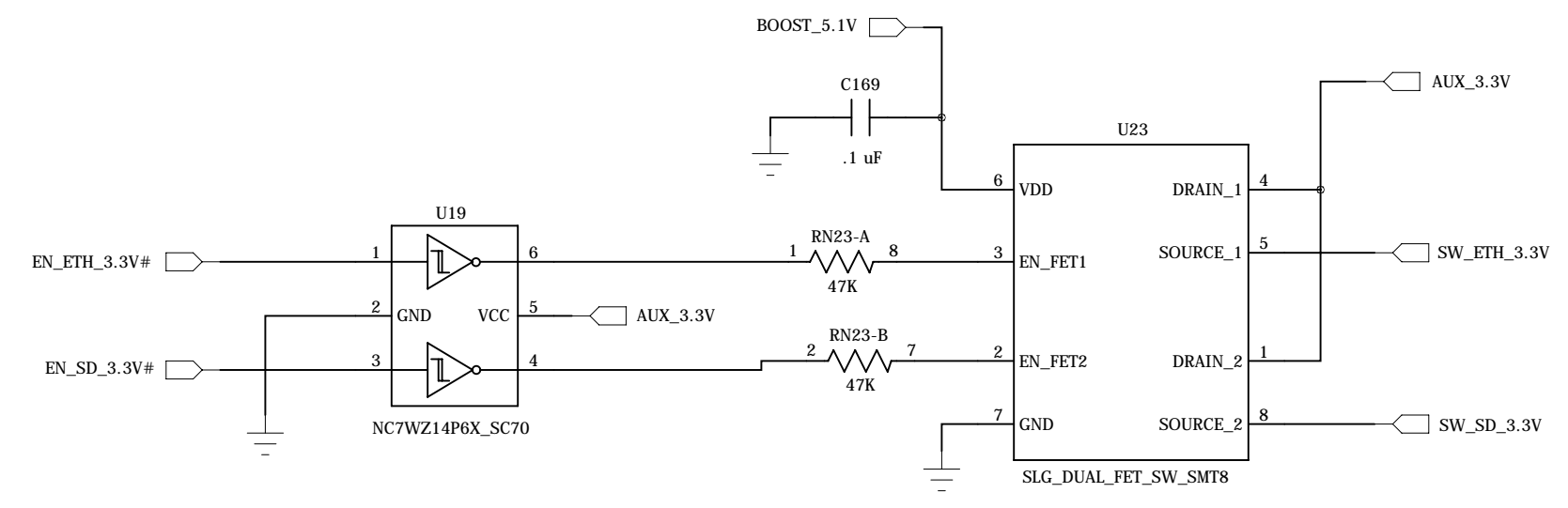
Scale = 44.6%

# USB and MX286 Switched Power



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

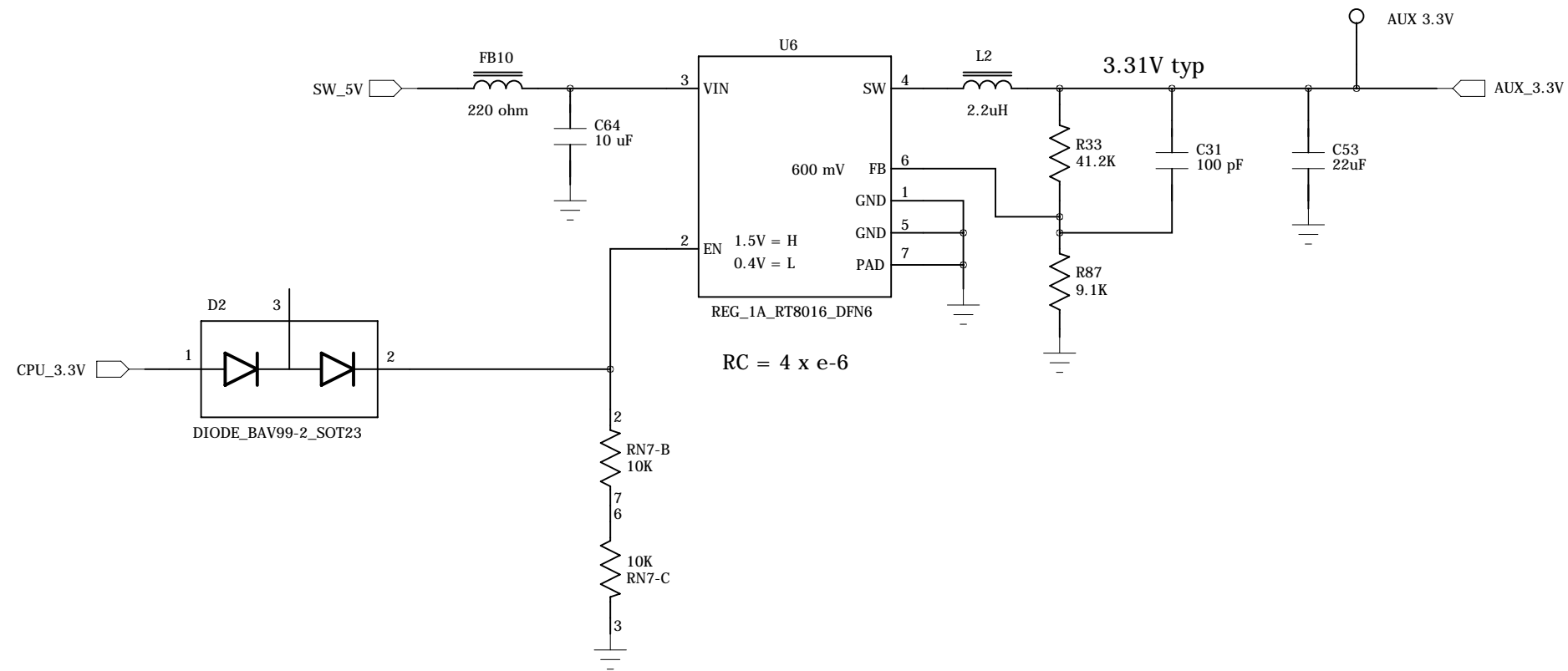
# Ethernet and SD Switched Power



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

Technologic Systems	Date July 14, 2016
Title: TS-7553-V2 5V and Switched Power	
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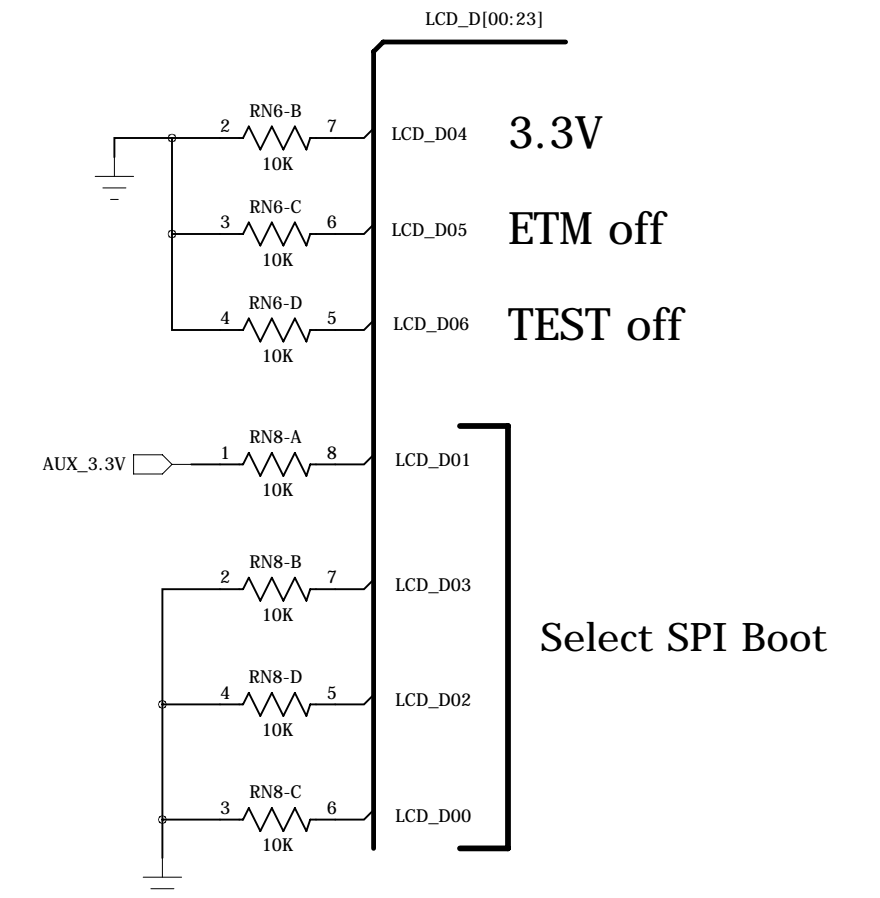
# Aux. 3.3V Reg



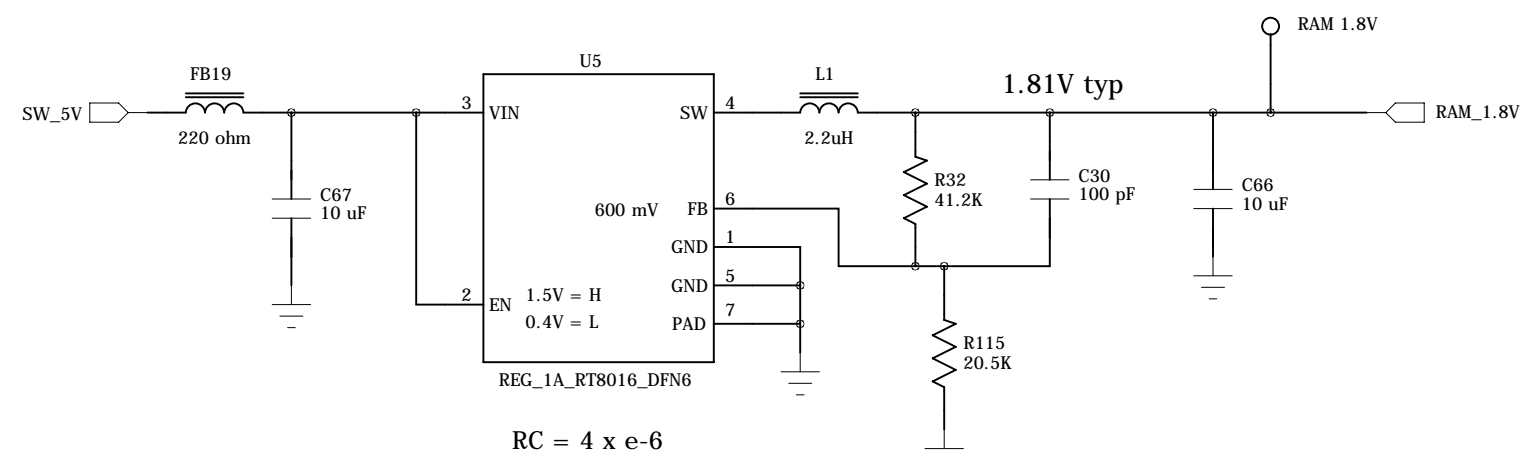
# Boot Strap Bias Res.

## Boot Source

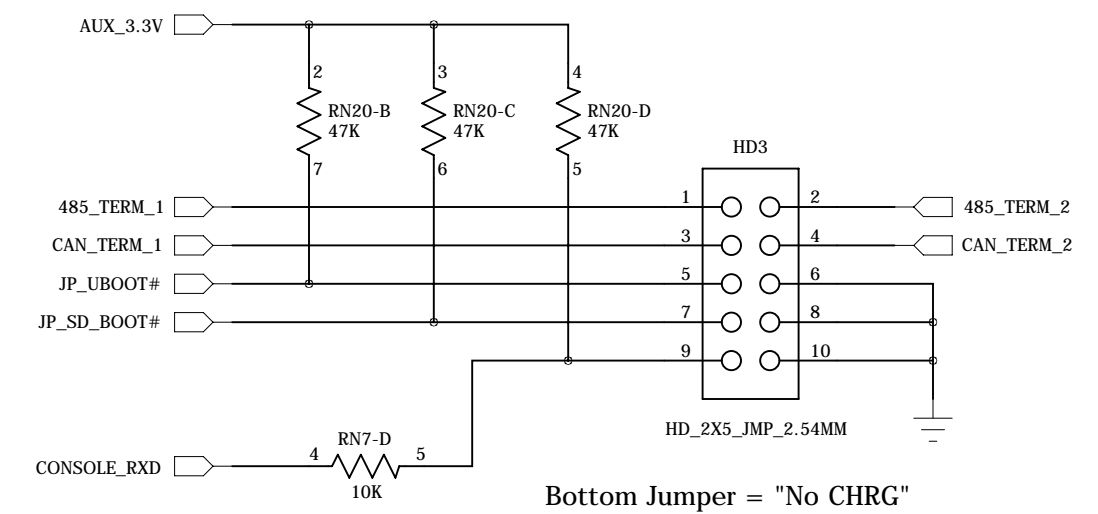
LCD_3	LCD_0	
0	0	SPI
1	0	SD0 Card
1	0	eMMC
0	0	USB
0	1	NAND



# RAM 1.8V Reg



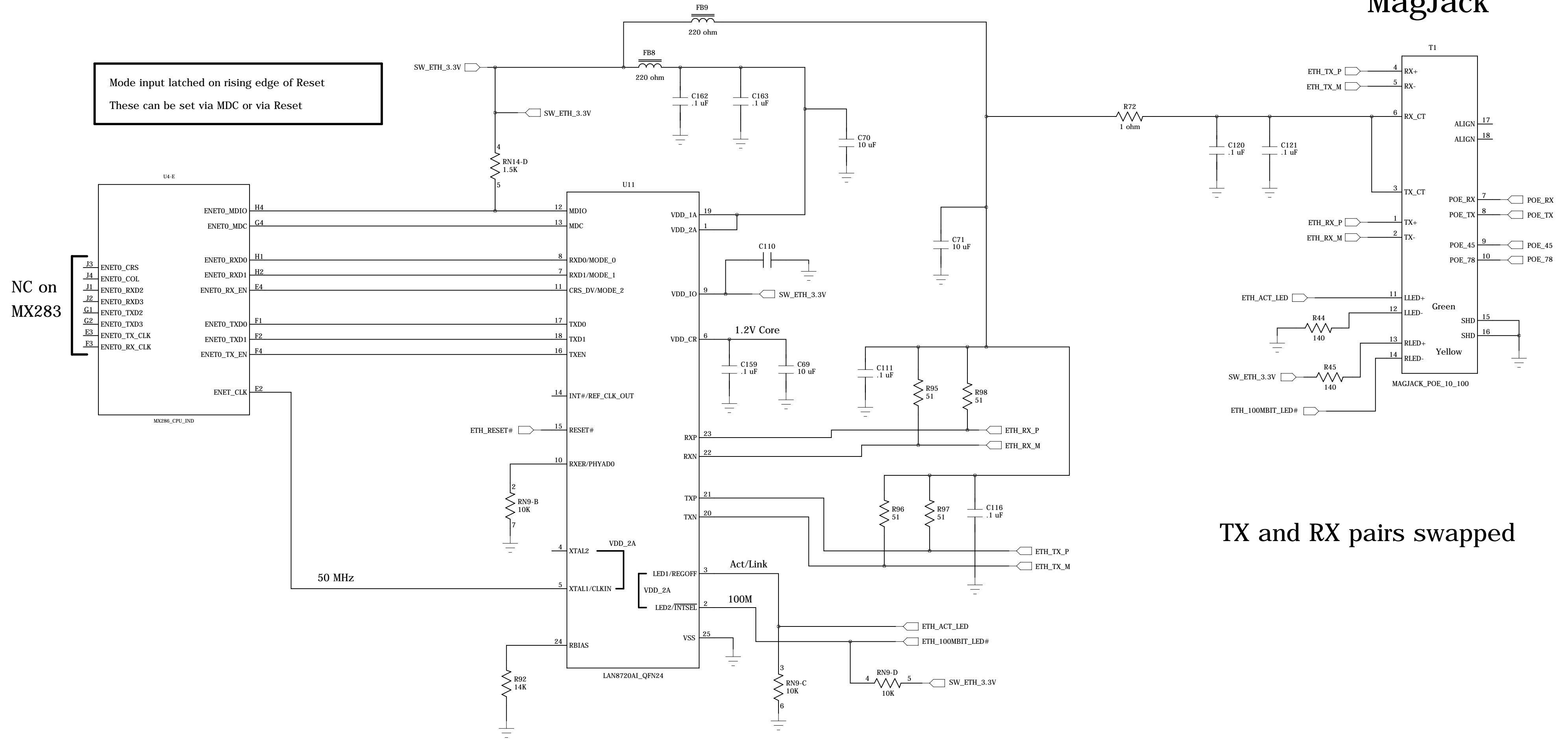
# Jumpers





# 10/100 Ethernet

## MagJack



Mode input latched on rising edge of Reset  
These can be set via MDC or via Reset

NC on  
MX283

TX and RX pairs swapped

PHY address and modes latched  
on rising edge of Reset#

LED high voltage  
is VDD\_2A = 3.3V

LED active state is always  
the opposite as the strap state

MDIO bus can not be  
used until 100 uS after  
Reset# is deasserted

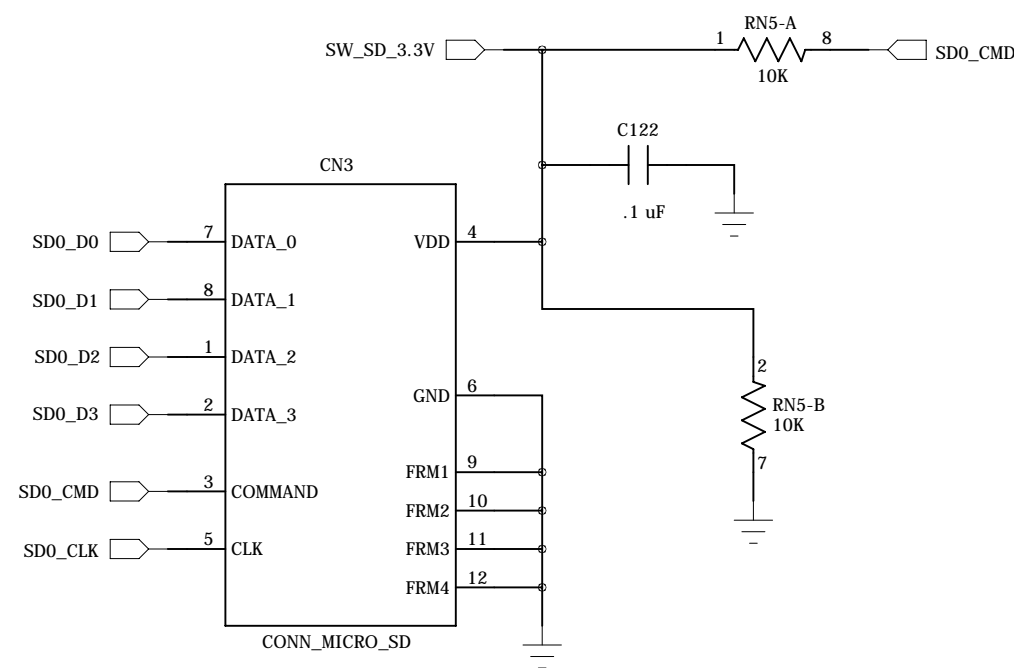
MDCLK max is 2.5 MHz

Auto MDIX is supported and  
Polarity Correction supported

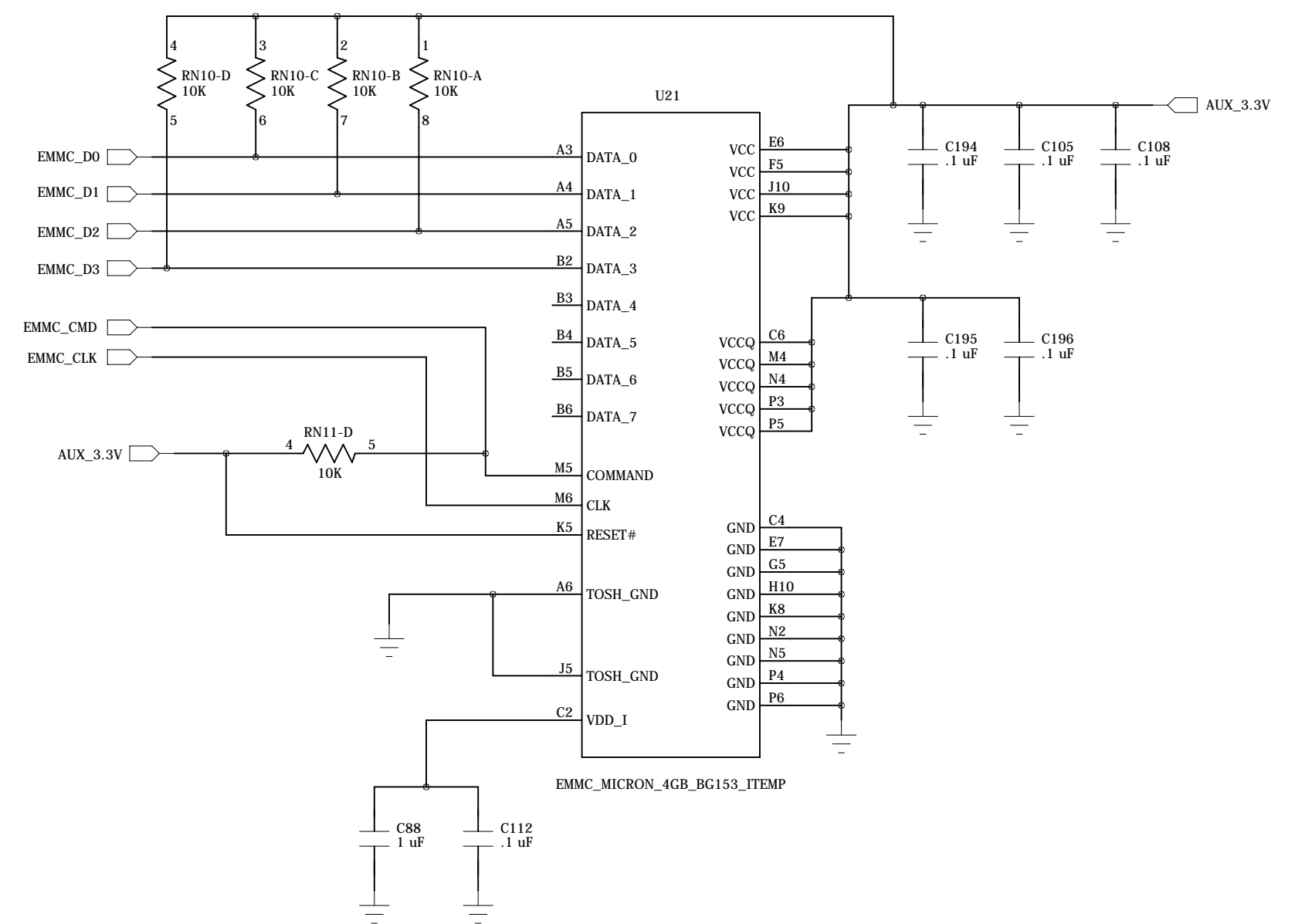
Technologic Systems	Date July 14, 2016
Title: TS-7553-V2 Ethernet Port	
Rev: A	Designer
Sheet 10 of 17	

# Flash Memory

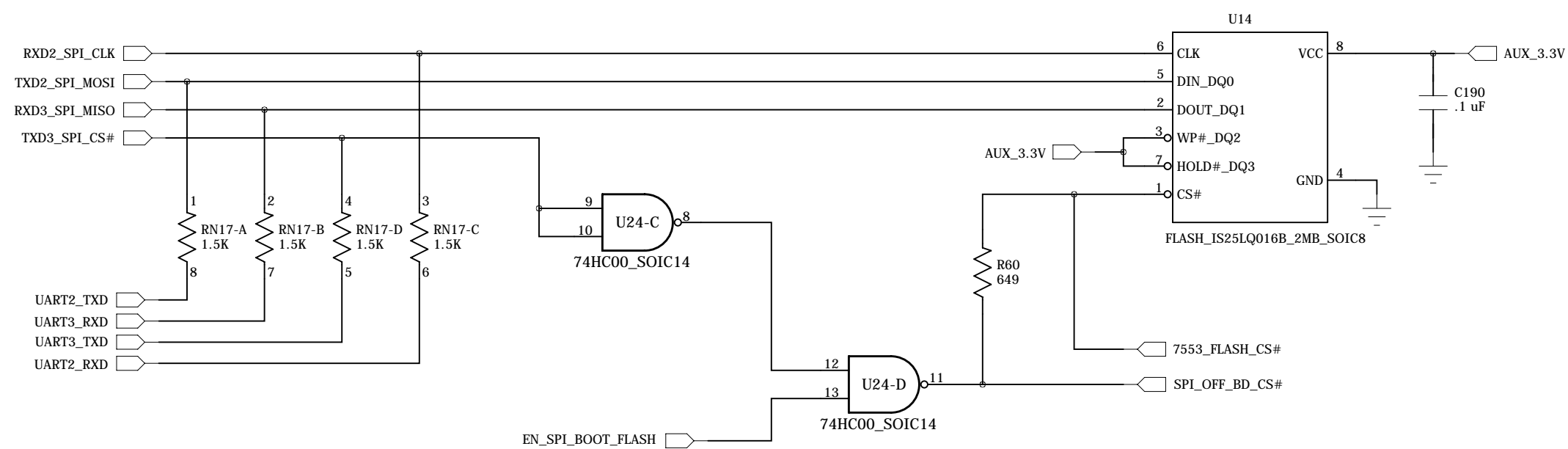
## Micro SD Card Socket



## eMMC 4GB

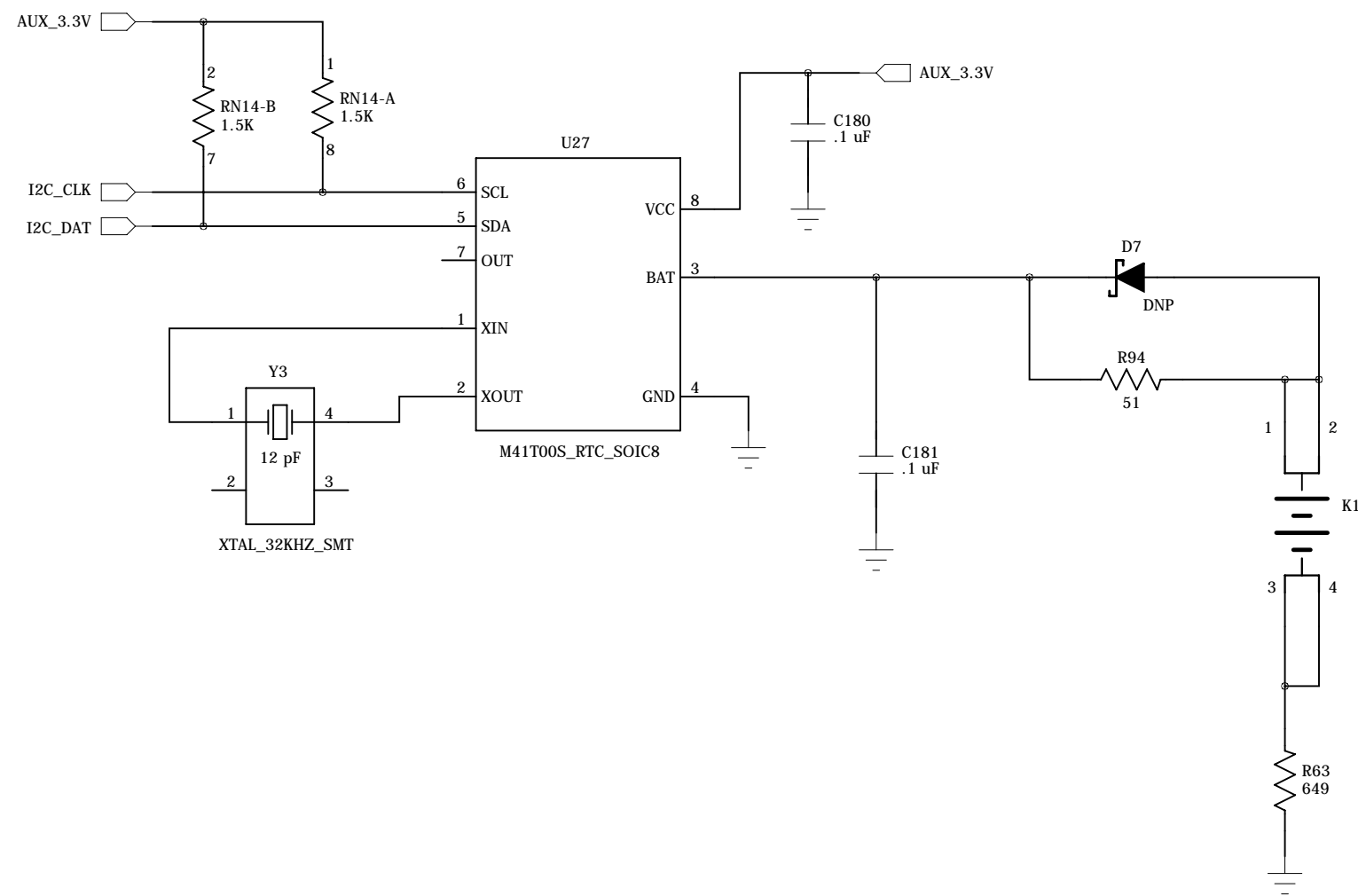


## 2 Mbyte SPI Boot Flash

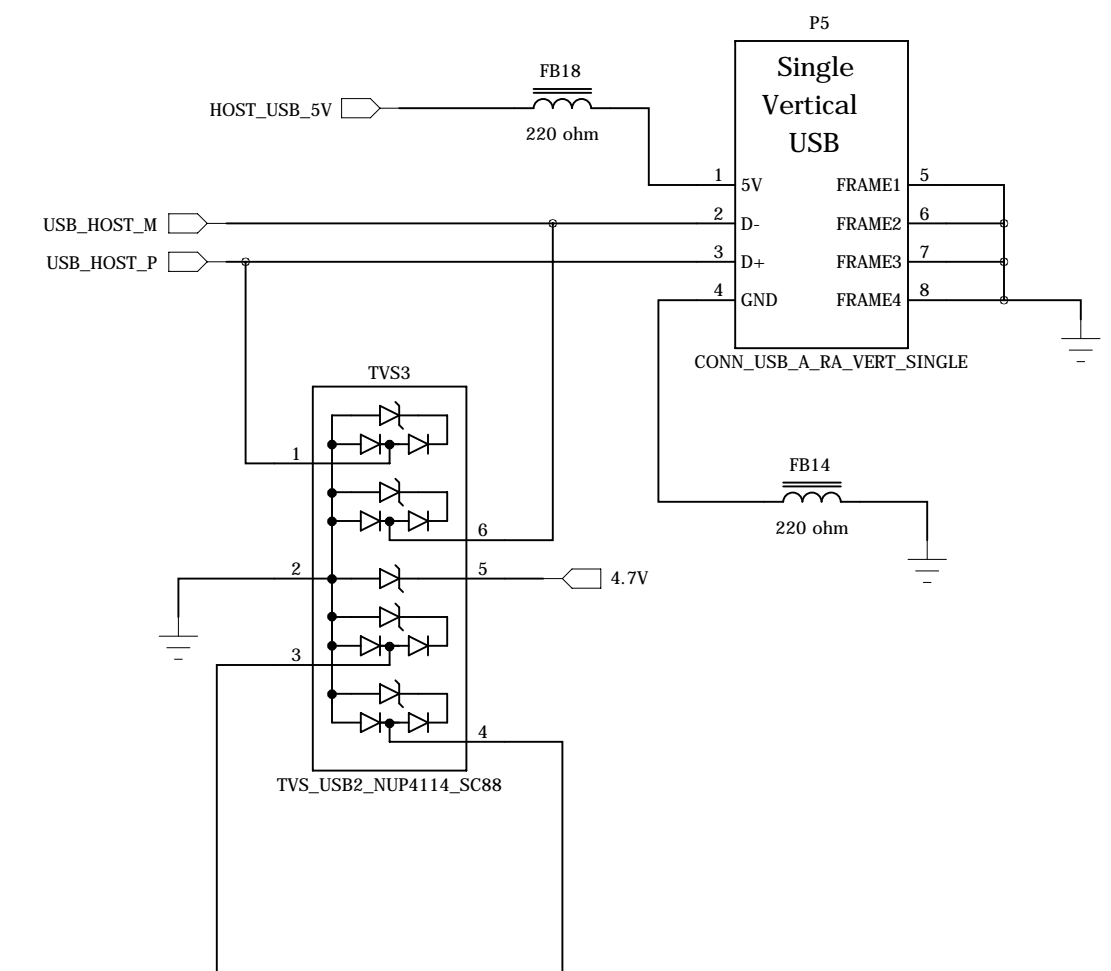


# RTC and USB Ports

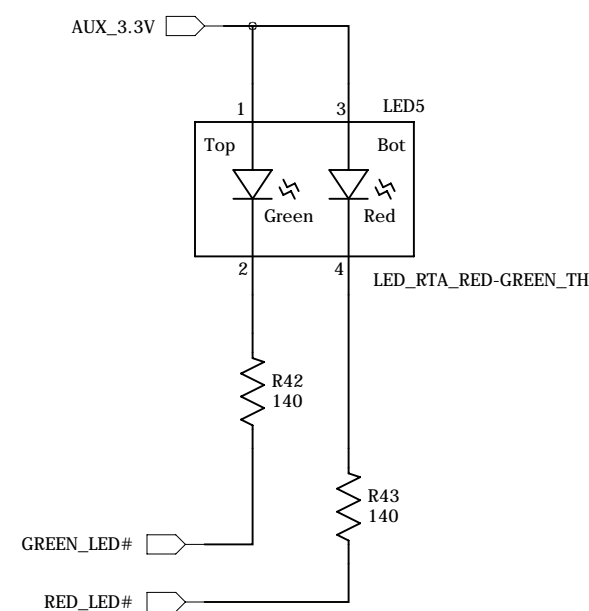
## ST Micro RTC



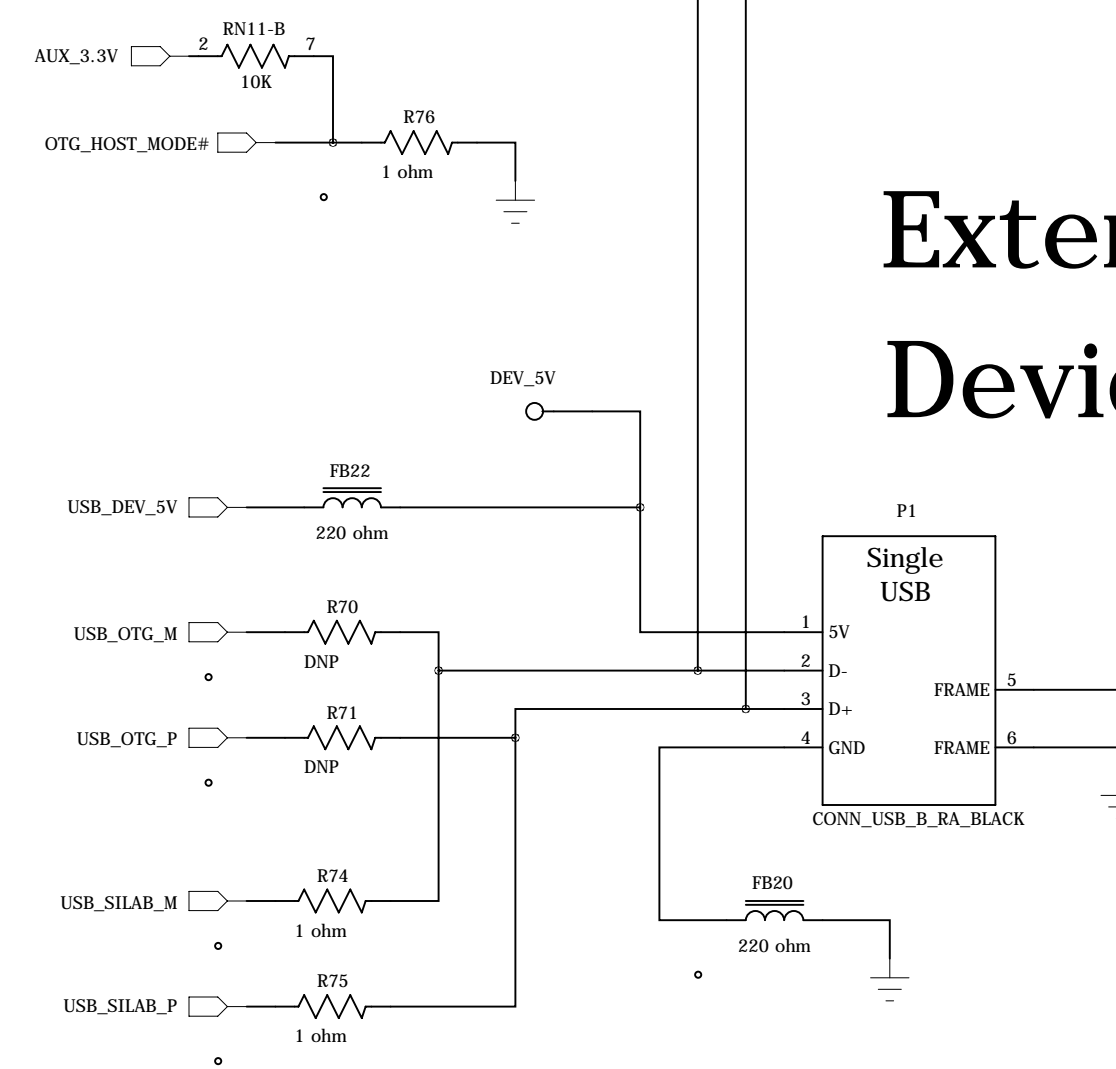
## External USB Host Port



## Red Green LEDs



## External USB Device Port

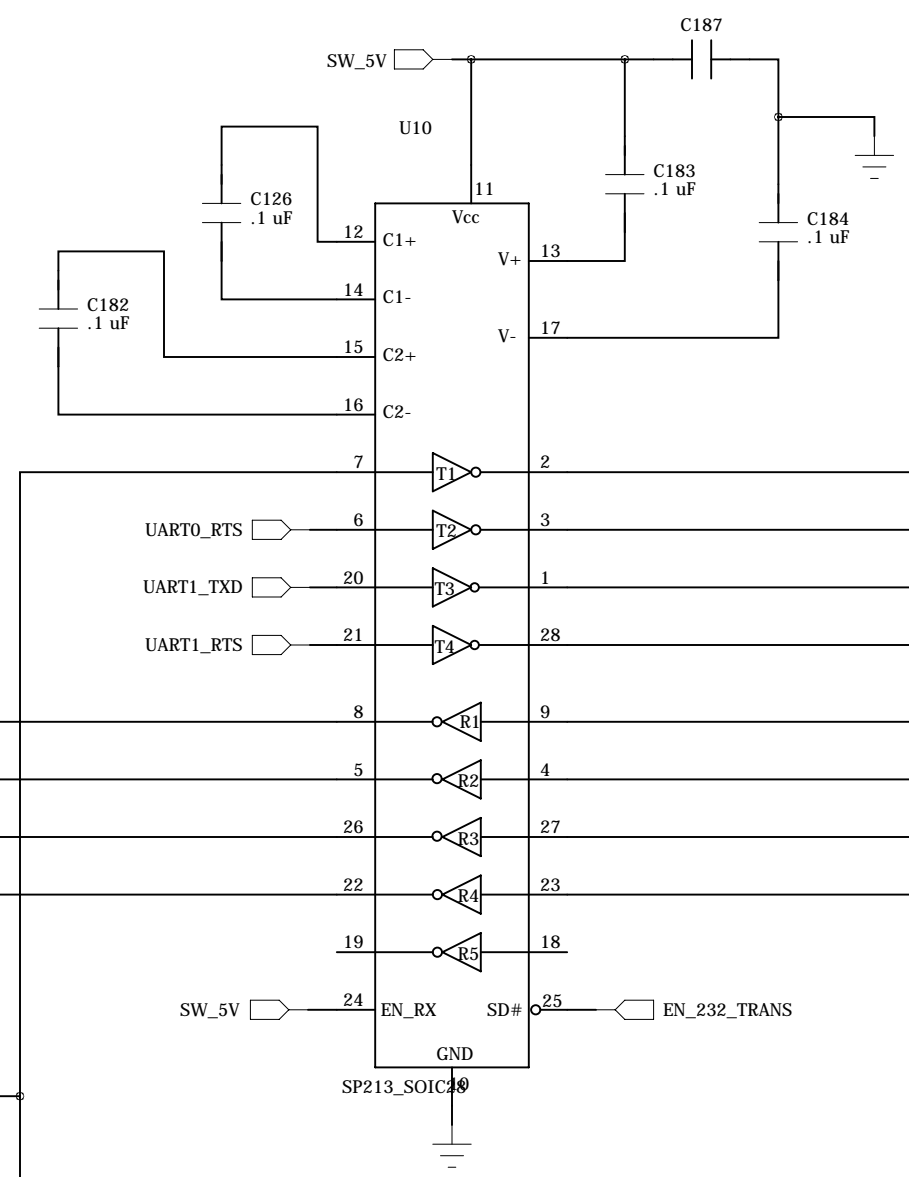
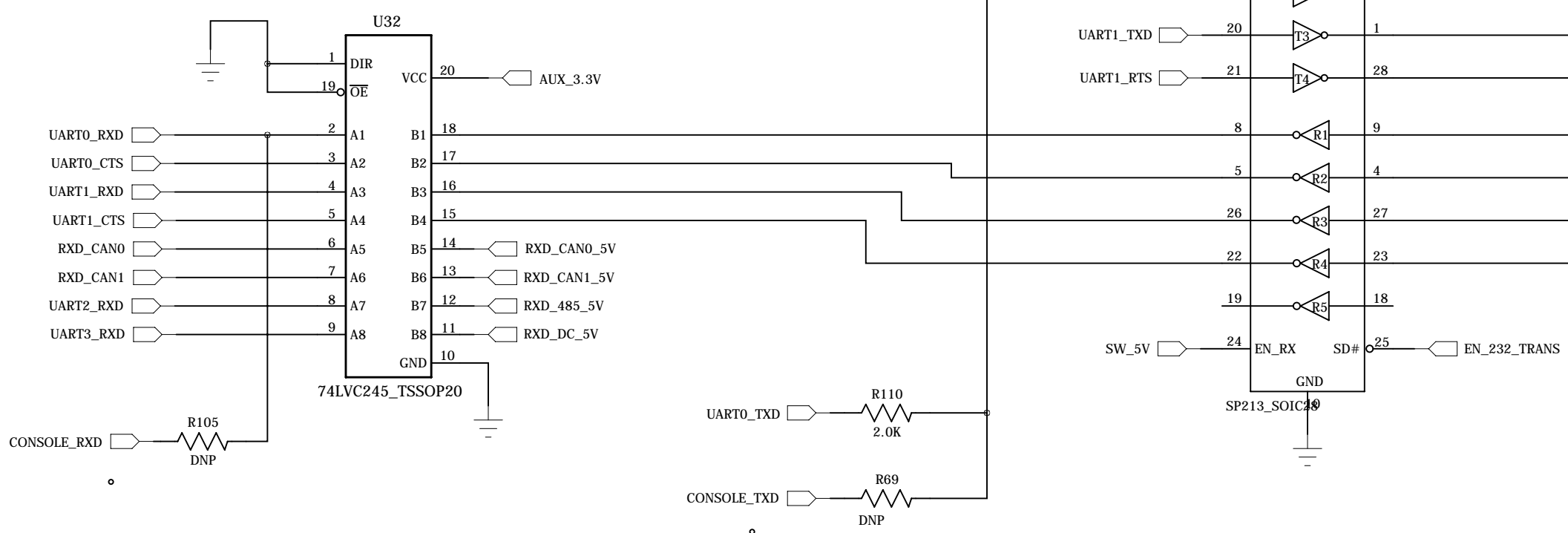


# RS-232 and CAN Transceivers

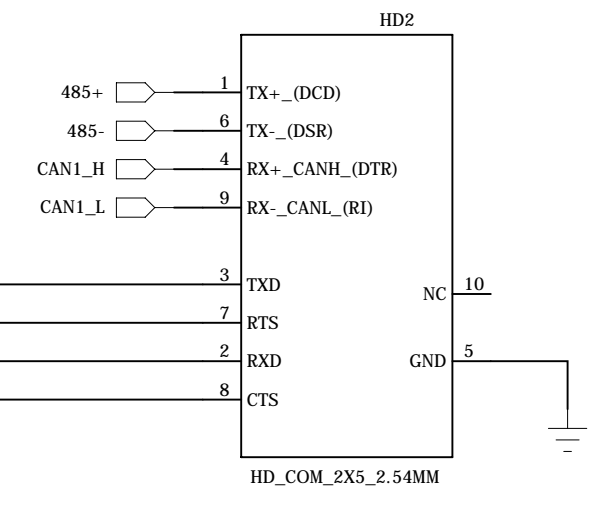
## RS-232 Transceiver

3.3V <-- 5V

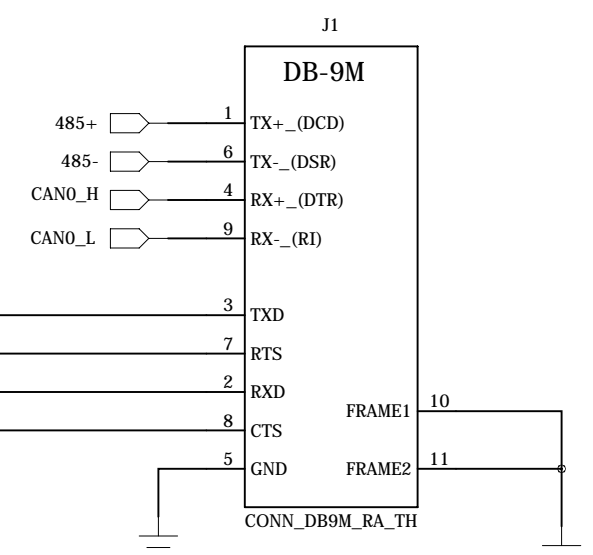
Level shifter



## 2nd COM Header

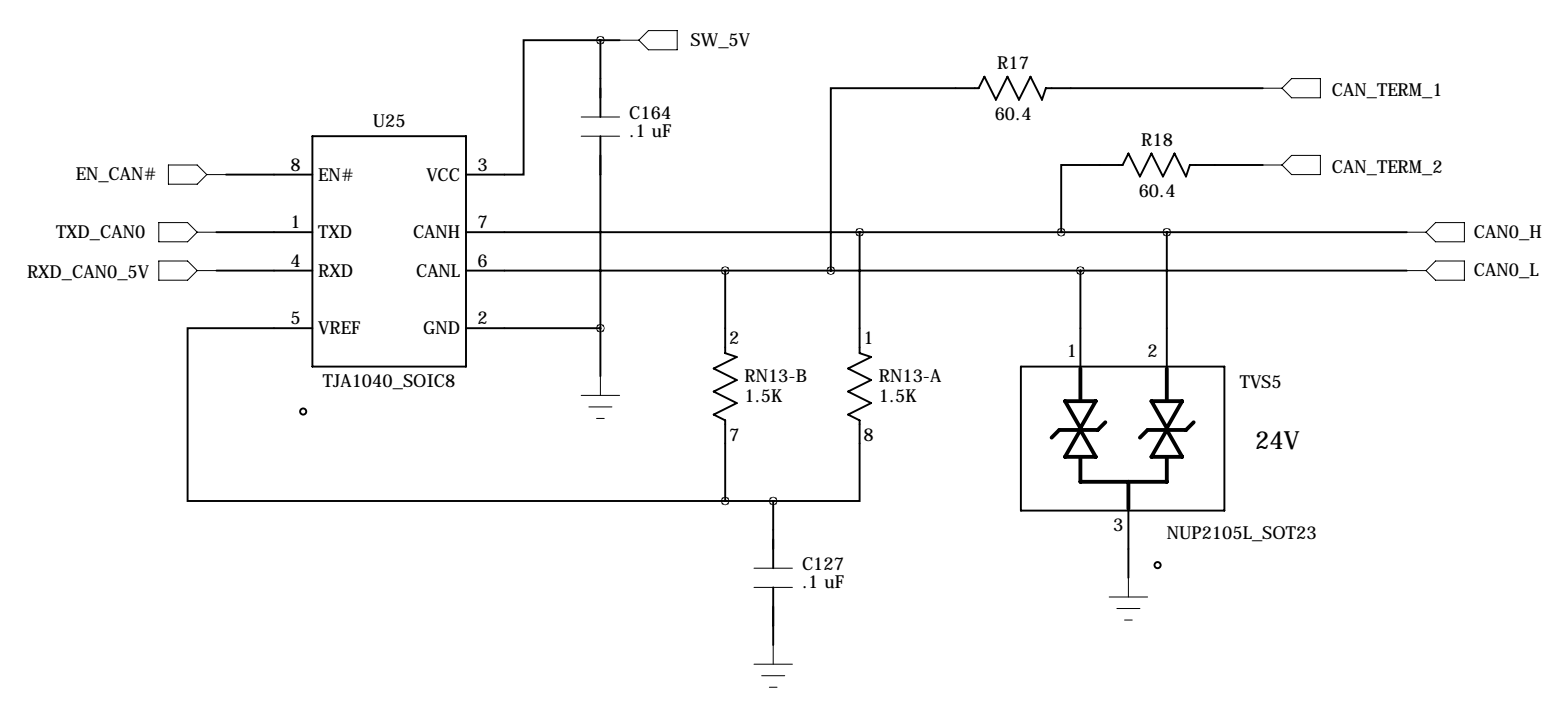
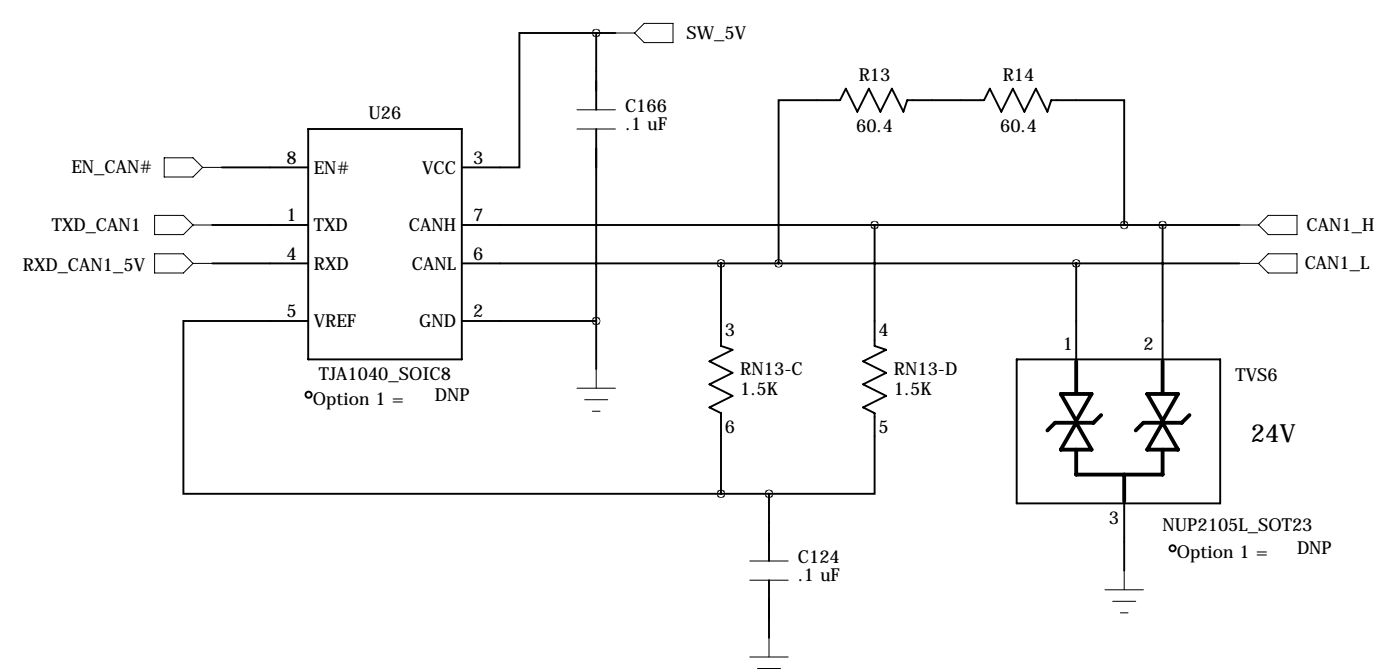


## DB-9M



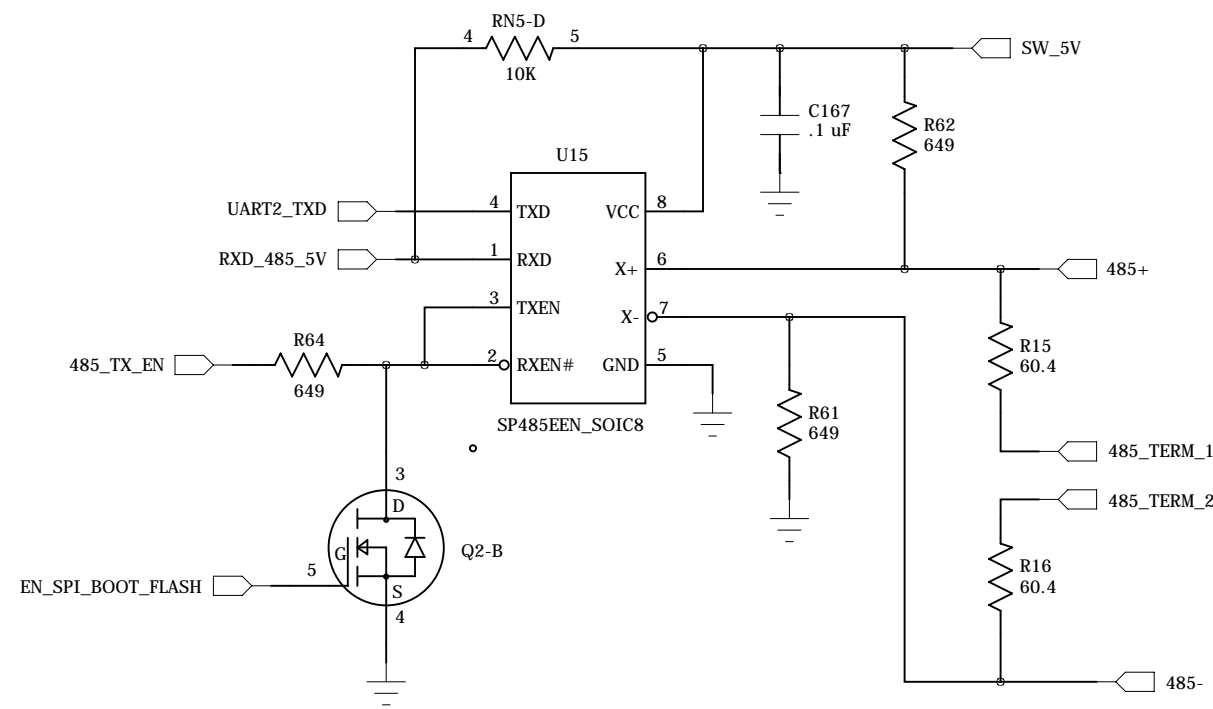
## CAN\_0 Transceiver

### 2nd Transceiver (Optional)

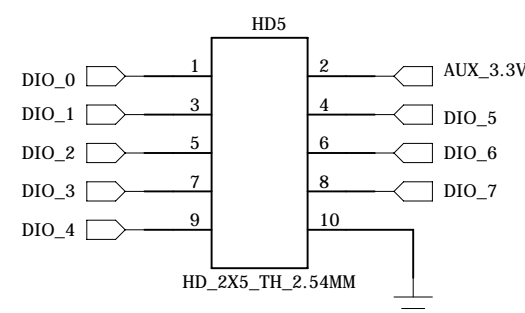


# RS-485 and Auto circuit

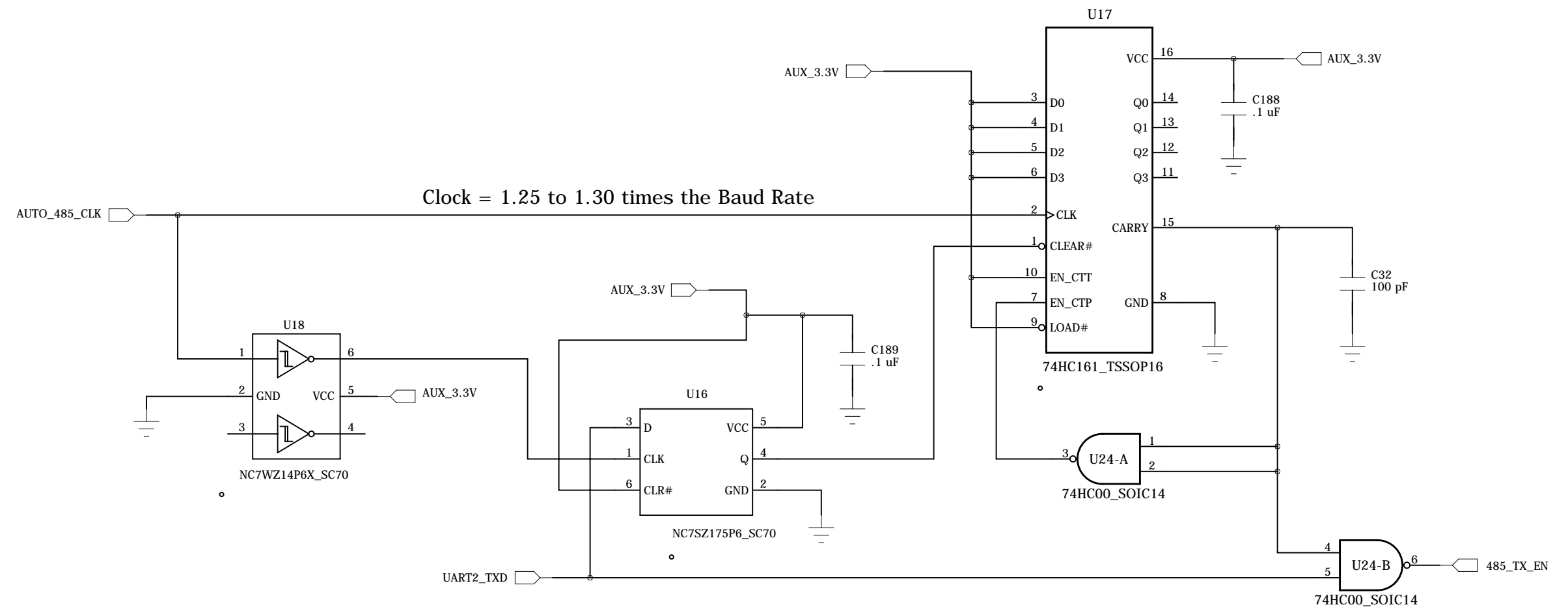
## RS-485 Driver



## DIO



## Auto 485 TX Enable



## Auto RS-485 Enable

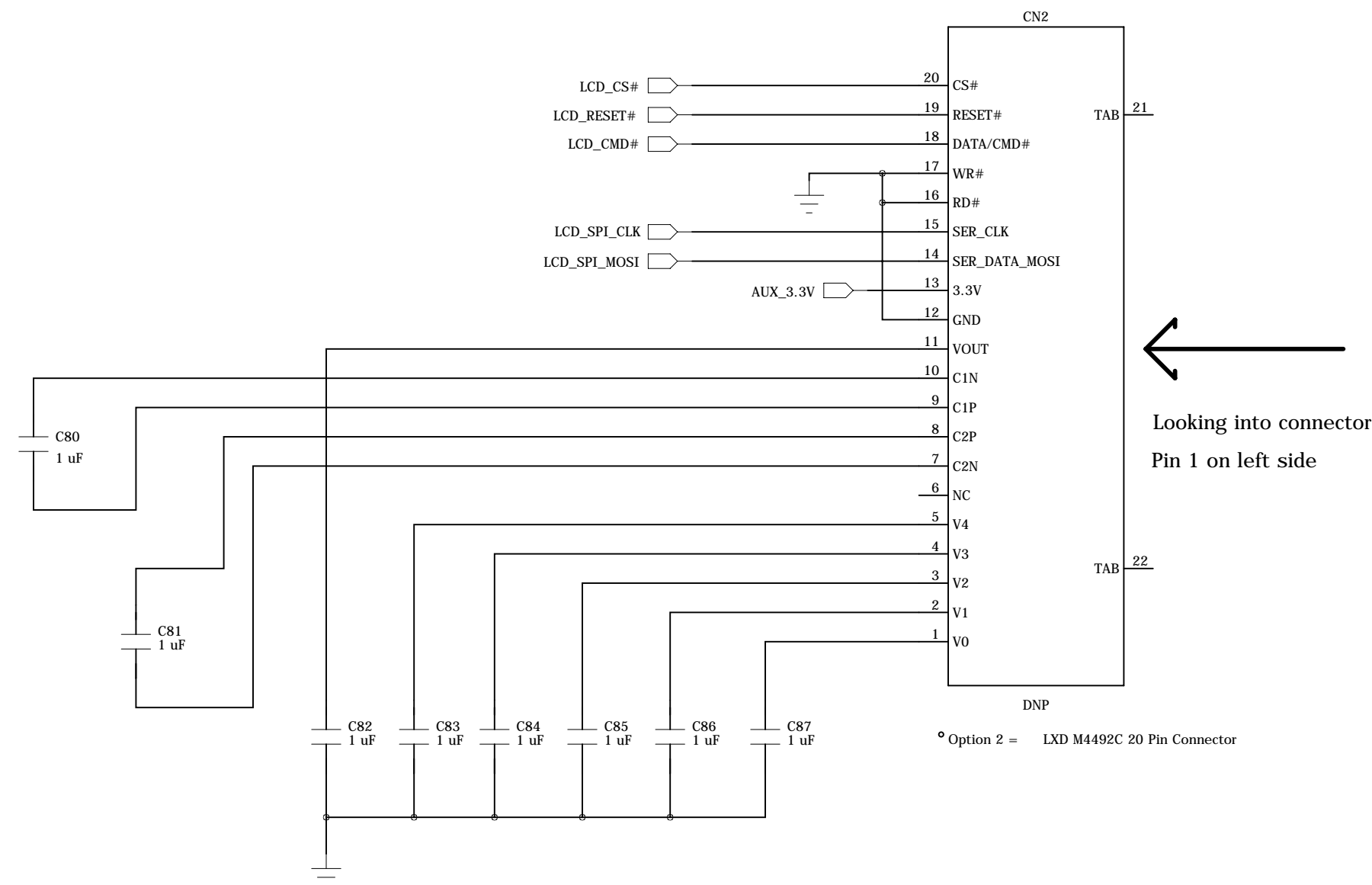
Counter asserts TX\_EN for 14.5 clocks after Clear removed  
 Assuming the clock is 1.28 times the Baud rate, this is 11.3 data bits  
 Worst case (bit 7 = 0 of last data byte in packet),  
 TX\_EN asserted about 11 bit times past end of packet  
 Quickest Turn off of TX\_EN occurs when last packet byte is FF  
 Then TX\_EN turns off about 2 bit times after end of packet

**Max Baud Rate supported is 1042 Kbaud**

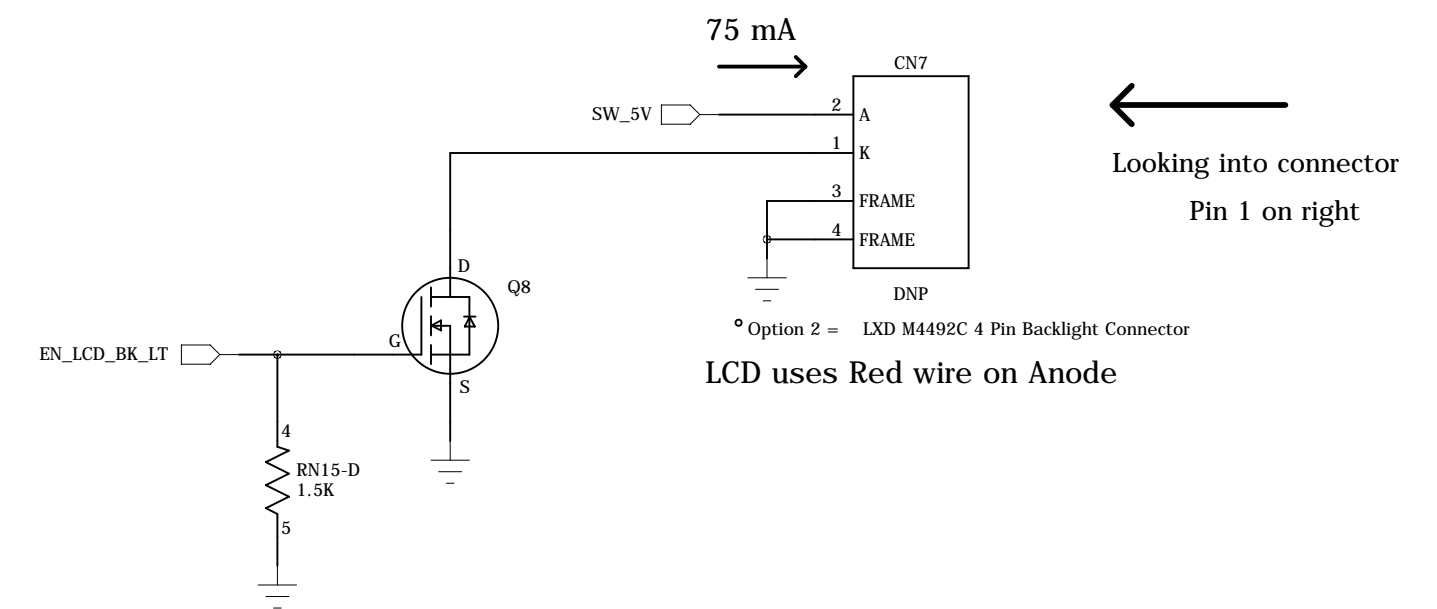
Clock for this baud rate is 1.33 MHz

Technologic Systems	Date July 14, 2016
Title: TS-7553-V2 RS-485	
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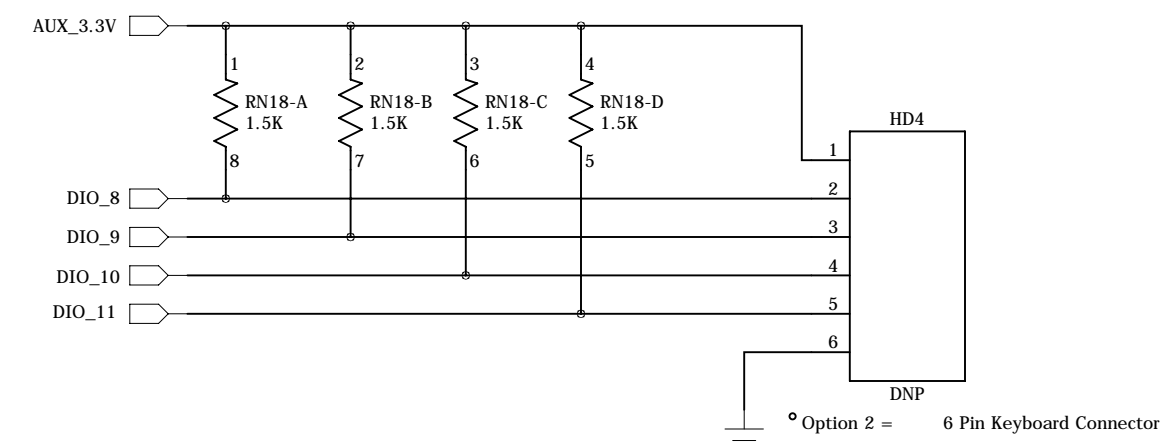
# Monochrome 128 x 64 LCD Conn.



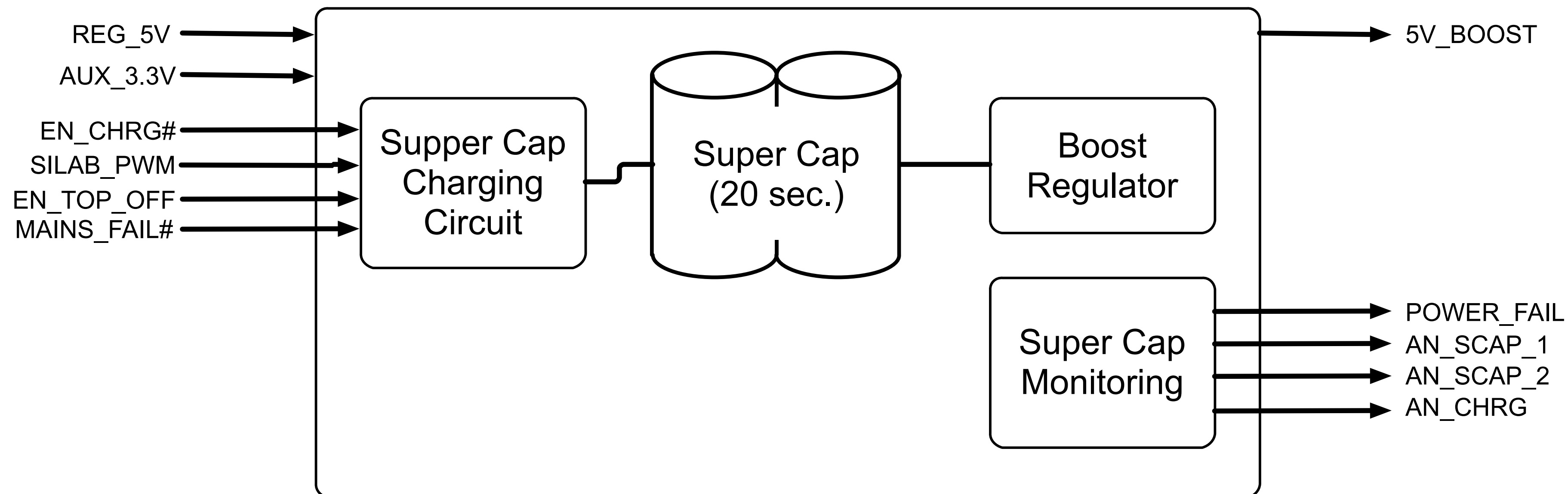
# LCD Back Light Connector



# Membrane Switches



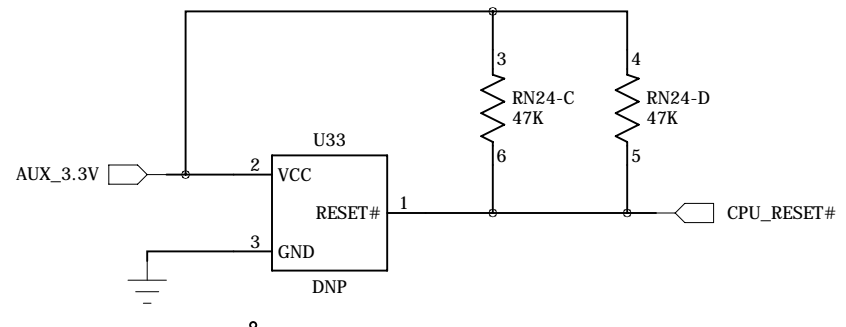
# SuperCap 15 Second Power Hold



15 seconds assumes 2 watt load  
10F SuperCaps charged to 4.8V  
Functions down to SuperCap = 2.5V

Technologic Systems	Date July 14, 2016	
Title: TS-7553-V2 Super Caps		
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# CPU Reset



U33 not populated on Standard Options

# Boost 5V Reg

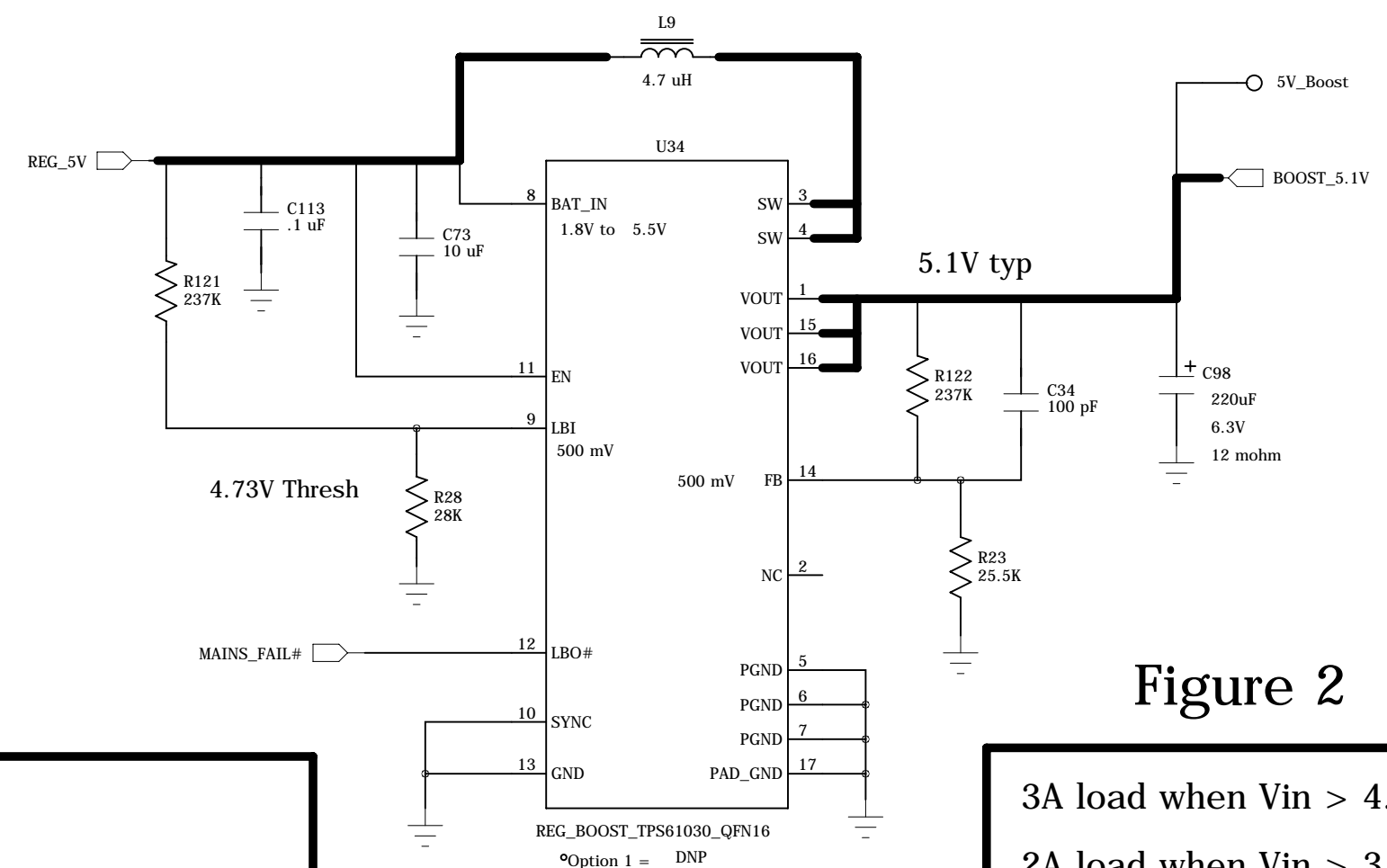
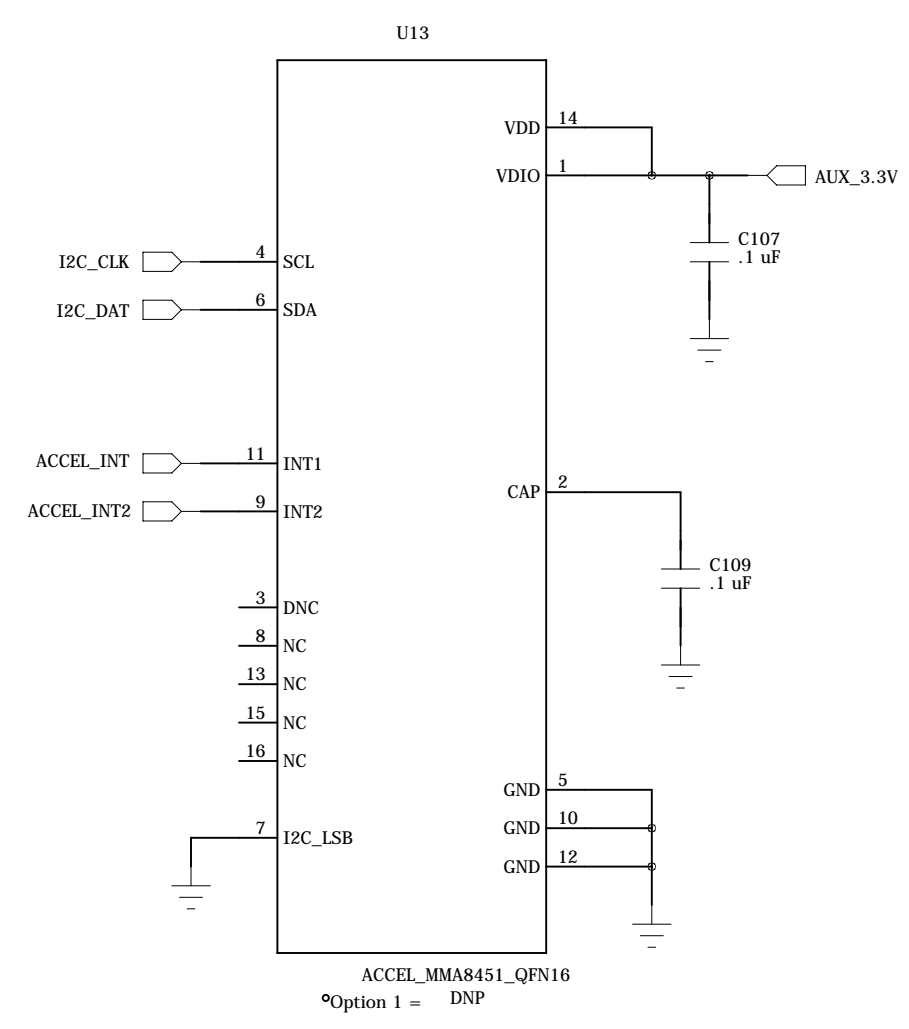


Figure 2

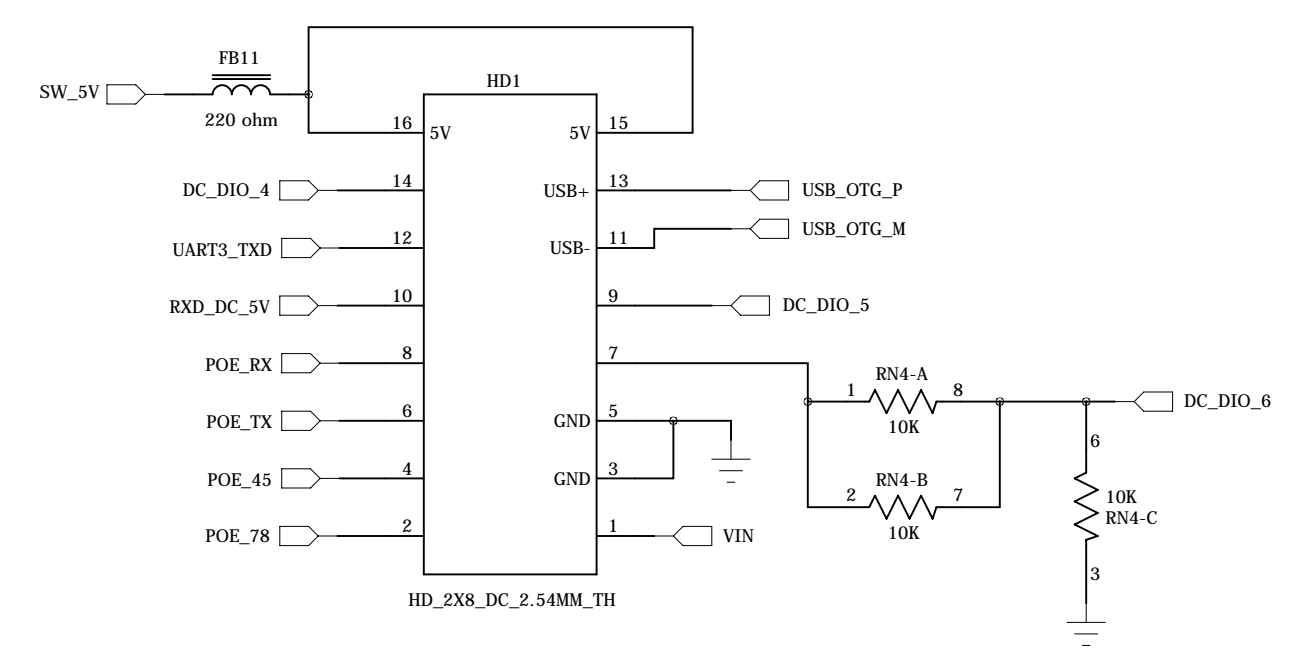
REG\_5V is normally 5V  
 But when Mains fail, and in Power Hold,  
 it will range from 4.5V down to 2.2V

3A load when Vin > 4.6V  
 2A load when Vin > 3.5V  
 1A load when Vin > 1.8V

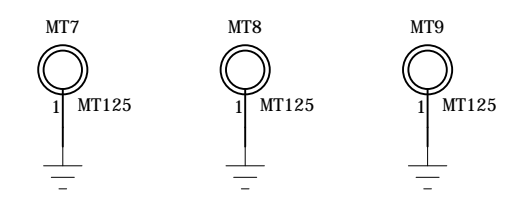
# Accelerometer



# Daughter Card Interface



# Daughter Card



Technologic Systems		Date July 14, 2016
Title: TS-7553-V2 Boost 5V Reg.		
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