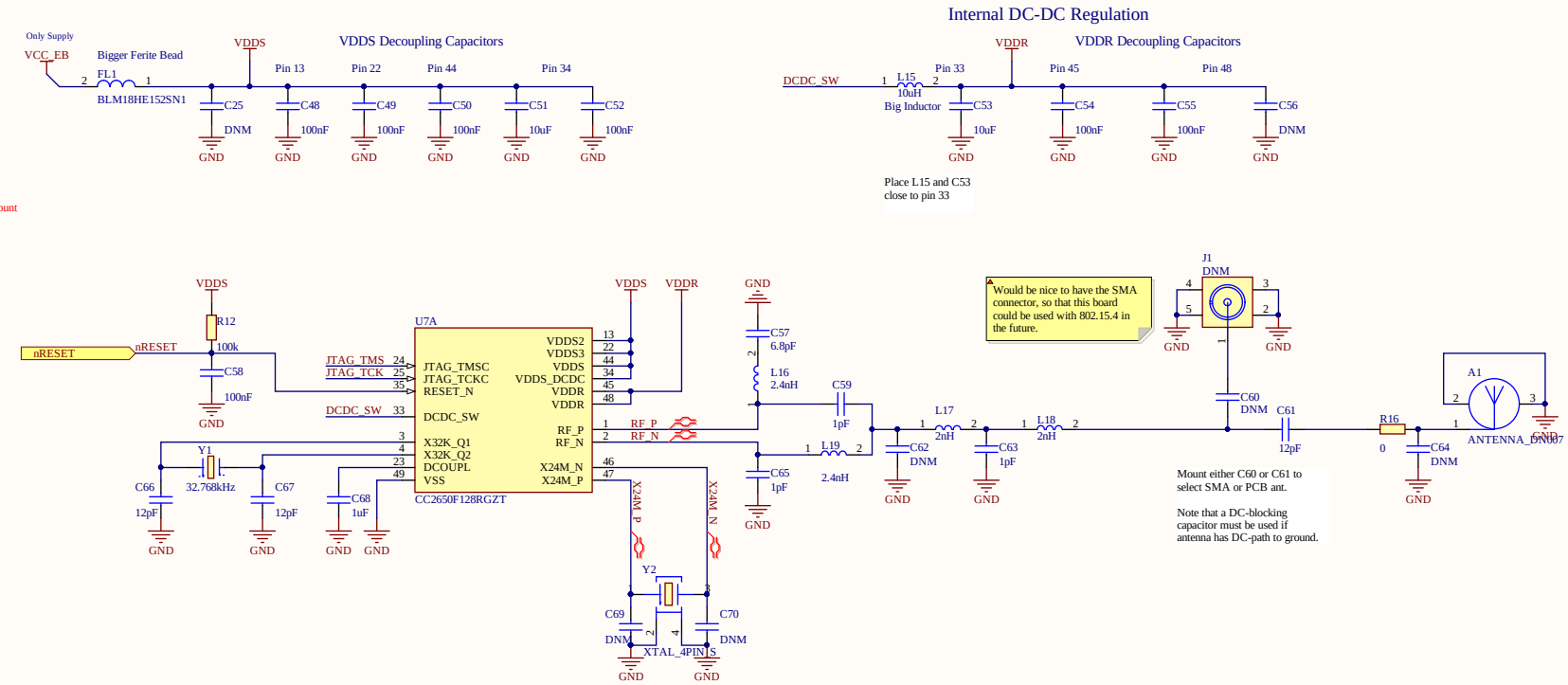


Title	TI CC2650 Radio and MCU	
Size: A3	Number:	Revision: 1
Date: 7/5/2016	Sheet of	
File: C:\Users\..\CC2650MCURadio.SchDoc	Drawn By: Craig Hesling	

TODO: Connect USB Shielding

P2
609-4613-1-ND

Shield6
Shield5
Shield4
Shield3
Shield2
Shield1
GND
ID
D+
D-
VCC
Pin5
Pin4
Pin3
Pin2
Pin1
USB_D_P
USB_D_N

GND
L20
62 Ω
1
2
USB_5V

C71
100pF
C72
100pF
GND
GND

FTDI_VIO
VIO used for CBUS and UART IO

U8
FT232RQ-Reel

FTDI_3V3
C73
100pF
GND

Interface

USB_5V
FTDI_3V3
FTDI_VIO

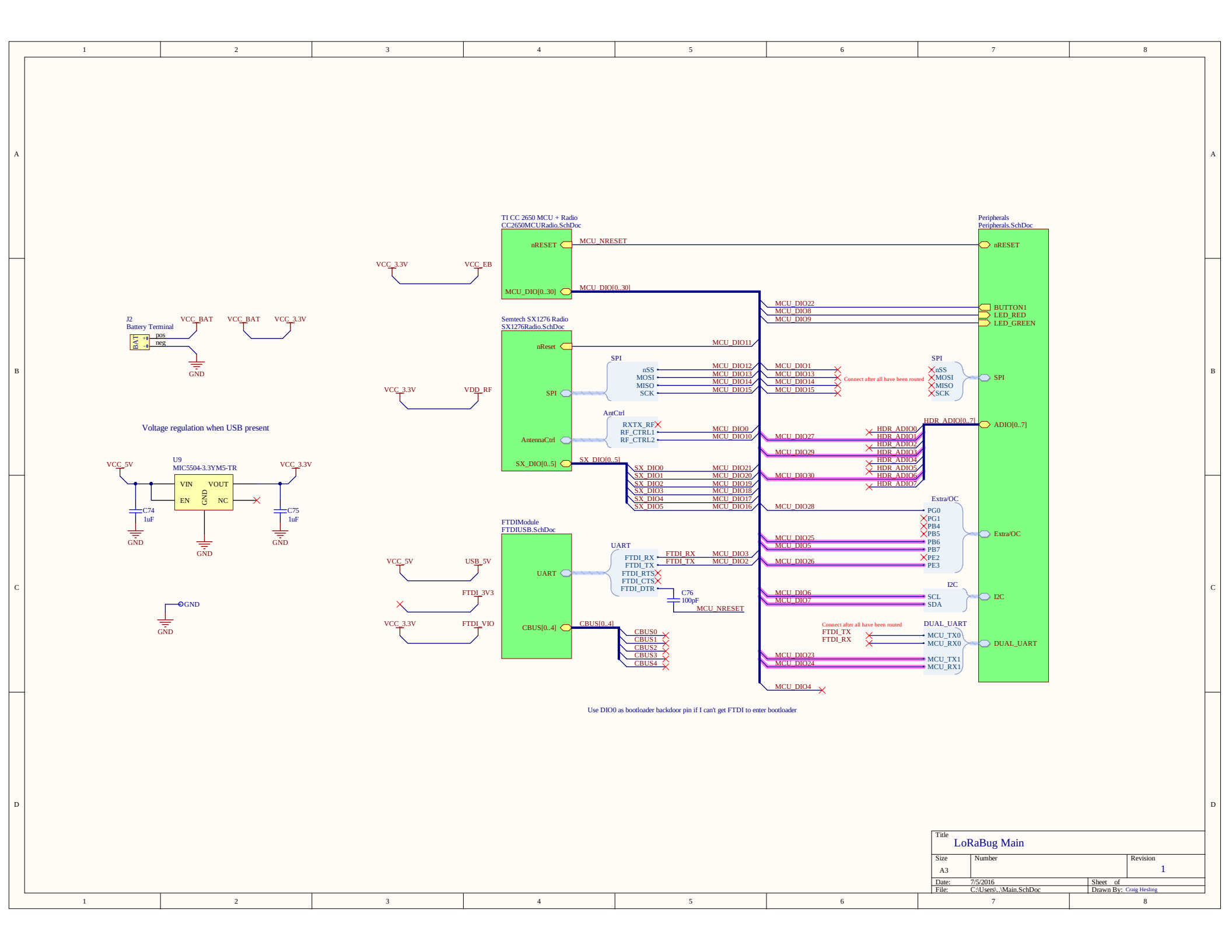
UART
UART
FTDI_RX
FTDI_TX
FTDI_RTS
FTDI_CTS
FTDI_DTR

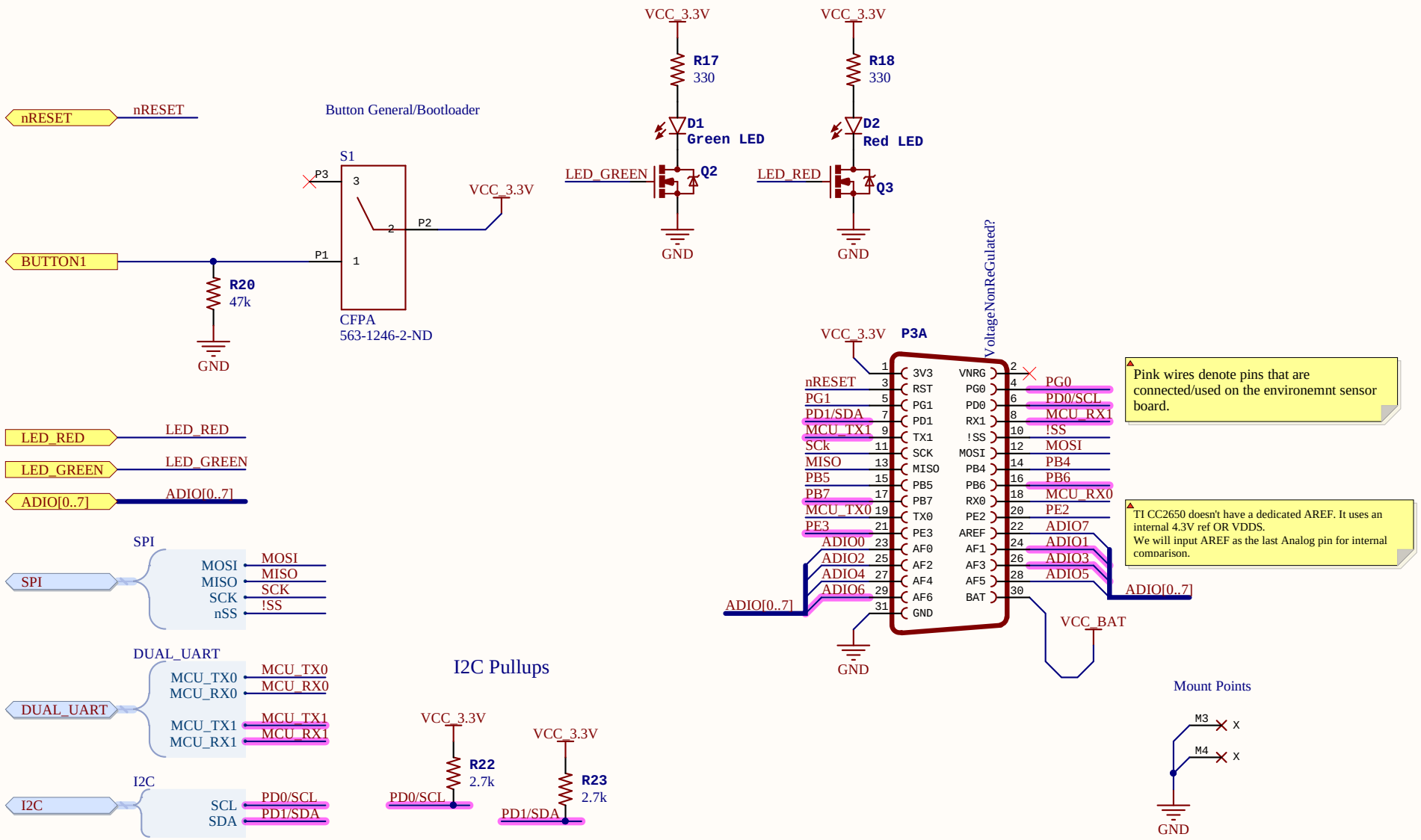
CBUS[0..4]
CBUS[0..4]

USB_D_N
USB_D_P
Internal Pullup
Use Internal Oscillator

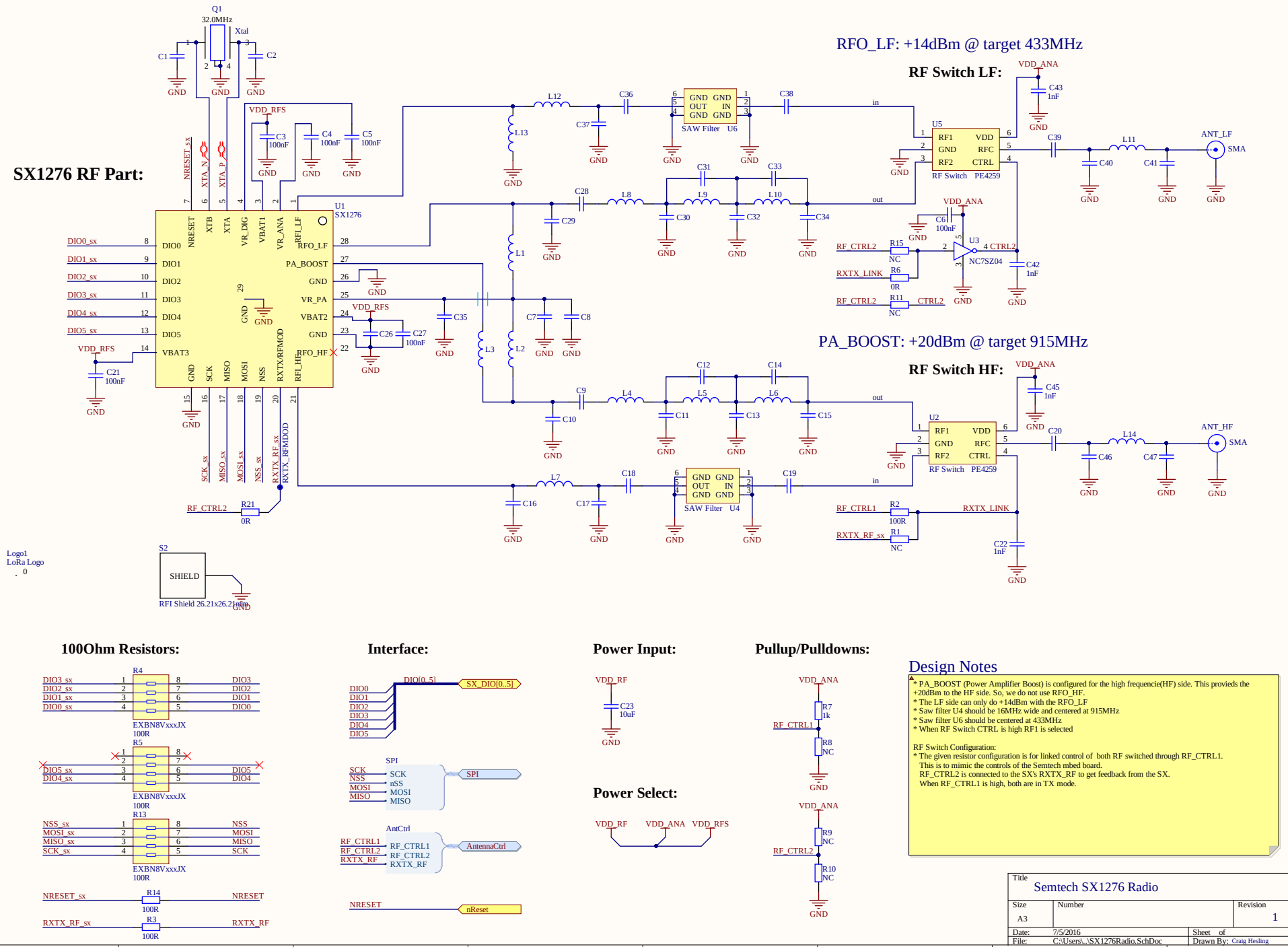
3V3OUT
VCC
VCCIO
USBDM
USBDP
RESET
OSCI
OSCO
TEST
AGND
GND
TXD
RXD
DTR
DSR
RTS
CTS
DCD
RI
CBUS0
CBUS1
CBUS2
CBUS3
CBUS4
NC

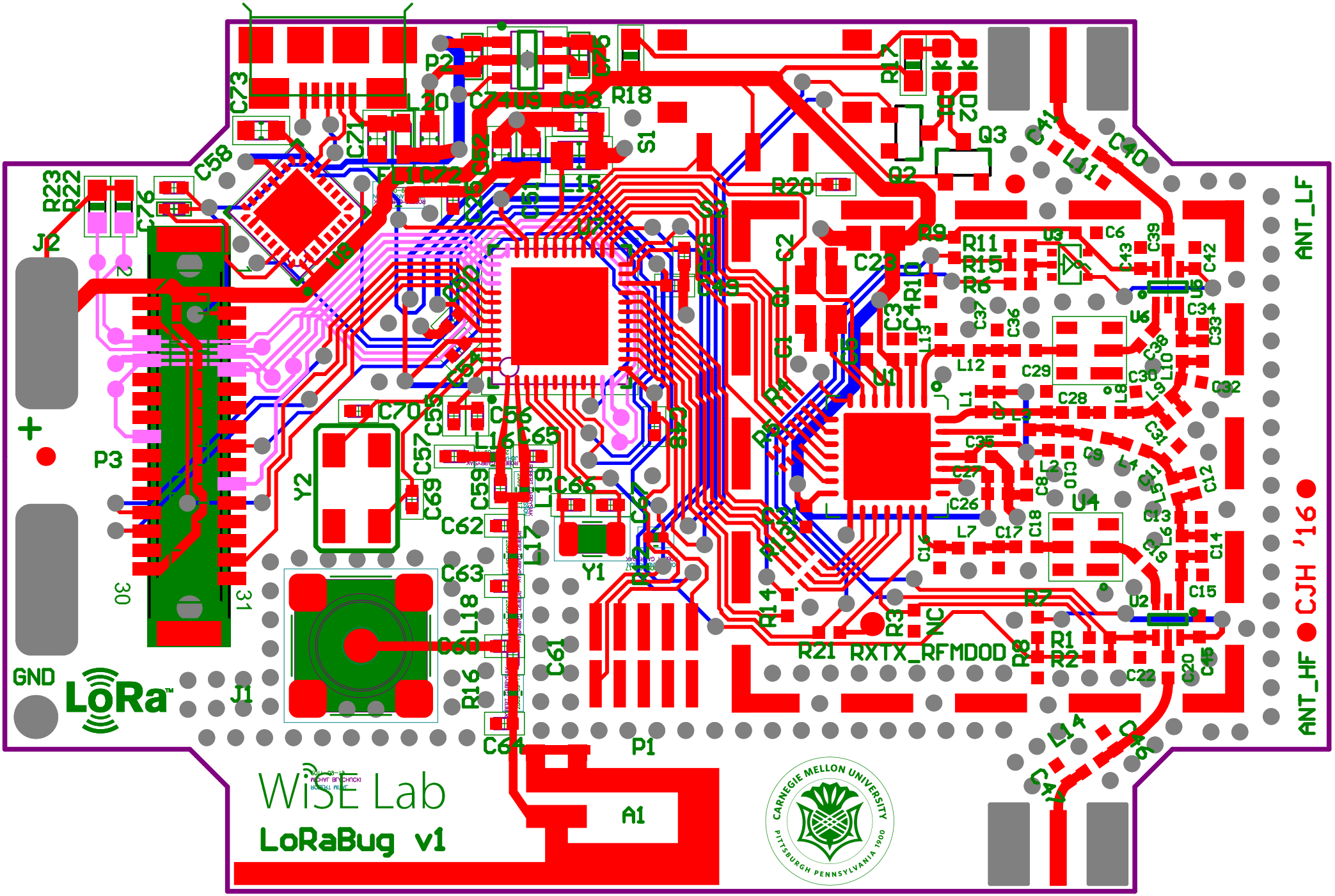
Title	FTDI USB		
Size	A	Number	Revision 1
Date:	7/5/2016		Sheet of
File:	C:\Users\..\FTDIUSB.SchDoc		Drawn By: Craig Hesling


J2
Battery Terminal
BAT
+
-
pos
neg
VCC_BAT
VCC_BAT
VCC_3.3V
GND
Voltage regulation when USB present
VCC_5V
U9
MIC5504-3.3YM5-TR
VIN
VOUT
EN
GND
NC
VCC_3.3V
C74
1uF
C75
1uF
GND
GND
GND
GND
TI CC 2650 MCU + Radio
CC2650MCURadio.SchDoc
nRESET
MCU_NRESET
VCC_3.3V
VCC_EB
MCU_DIO[0..30]
MCU_DIO[0..30]
Semtech SX1276 Radio
SX1276Radio.SchDoc
nReset
MCU_DIO11
SPI
nSS
MOSI
MISO
SCK
MCU_DIO12
MCU_DIO13
MCU_DIO14
MCU_DIO15
VCC_3.3V
VDD_RF
AntCtrl
RXTX_RF
RF_CTRL1
RF_CTRL2
AntennaCtrl
MCU_DIO0
MCU_DIO10
SX_DIO[0..5]
SX_DIO[0..5]
SX_DIO0
SX_DIO1
SX_DIO2
SX_DIO3
SX_DIO4
SX_DIO5
MCU_DIO21
MCU_DIO20
MCU_DIO19
MCU_DIO18
MCU_DIO17
MCU_DIO16
FTDIModule
FTDIUSB.SchDoc
UART
FTDI_RX
FTDI_TX
FTDI_RTS
FTDI_CTS
FTDI_DTR
FTDI_RX
FTDI_TX
MCU_DIO3
MCU_DIO2
C76
100pF
MCU_NRESET
VCC_5V
USB_5V
FTDI_3V3
VCC_3.3V
FTDI_VIO
CBUS[0..4]
CBUS[0..4]
CBUS0
CBUS1
CBUS2
CBUS3
CBUS4
MCU_DIO22
MCU_DIO8
MCU_DIO9
MCU_DIO1
MCU_DIO13
MCU_DIO14
MCU_DIO15
Connect after all have been routed
MCU_DIO27
MCU_DIO29
MCU_DIO30
MCU_DIO28
MCU_DIO25
MCU_DIO5
MCU_DIO26
MCU_DIO6
MCU_DIO7
Connect after all have been routed
FTDI_TX
FTDI_RX
MCU_DIO23
MCU_DIO24
MCU_DIO4
Peripherals
Peripherals.SchDoc
nRESET
BUTTON1
LED_RED
LED_GREEN
SPI
nSS
MOSI
MISO
SCK
HDR_ADIO[0..7]
ADIO[0..7]
HDR_ADIO0
HDR_ADIO1
HDR_ADIO2
HDR_ADIO3
HDR_ADIO4
HDR_ADIO5
HDR_ADIO6
HDR_ADIO7
Extra/OC
PG0
PG1
PB4
PB5
PB6
PB7
PE2
PE3
I2C
SCL
SDA
DUAL_UART
MCU_TX0
MCU_RX0
MCU_TX1
MCU_RX1
Use DIO0 as bootloader backdoor pin if I can't get FTDI to enter bootloader
Title
LoRaBug Main
Size
A3
Number
Revision
1
Date:
7/5/2016
Sheet of
File:
C:\Users\..\Main.SchDoc
Drawn By:
Craig Hesling



Title: Peripherals		
Size: A	Number:	Revision: 1
Date: 7/5/2016		Sheet of
File: C:\Users\..\Peripherals.SchDoc		Drawn By: Craig Hesling


SX1276 RF Part:
RFO_LF: +14dBm @ target 433MHz
RF Switch LF:
PA_BOOST: +20dBm @ target 915MHz
RF Switch HF:
Q1
32.0MHz
Xtal
U1
SX1276
U5
RF Switch PE4259
U2
RF Switch PE4259
U3
NC7SZ04
SAW Filter U6
SAW Filter U4
ANT_LF
ANT_HF
SMA
VDD_ANA
VDD_RFS
VDD_RF
GND
RF_CTRL2
RXTX_LINK
RF_CTRL1
RXTX_RF_sx
Logo1
LoRa Logo
S2
SHIELD
RFI Shield 26.21x26.21mm
100Ohm Resistors:
EXBN8V xxxJX
100R
Interface:
SPI
AntCtrl
nReset
Power Input:
Power Select:
Pullup/Pulldowns:
Design Notes
* PA_BOOST (Power Amplifier Boost) is configured for the high frequencie(HF) side. This provieds the +20dBm to the HF side. So, we do not use RFO_HF.
* The LF side can only do +14dBm with the RFO_LF
* Saw filter U4 should be 16MHz wide and centered at 915MHz
* Saw filter U6 should be centered at 433MHz
* When RF Switch CTRL is high RF1 is selected
RF Switch Configuration:
* The given resistor configuration is for linked control of both RF switched through RF_CTRL1.
This is to mimic the controls of the Semtech mbed board.
RF_CTRL2 is connected to the SX's RXTX_RF to get feedback from the SX.
When RF_CTRL1 is high, both are in TX mode.
Title
Semtech SX1276 Radio
Size
A3
Number
Revision
1
Date: 7/5/2016
File: C:\Users\..\SX1276Radio.SchDoc
Sheet of
Drawn By: Craig Hesling


WiSE Lab
LoRaBug v1
LoRa™
GND
ANT_LF
ANT_HF
CJH '16
RXTX_RFMDOD
NC
CARNEGIE MELLON UNIVERSITY
PITTSBURGH PENNSYLVANIA 1900