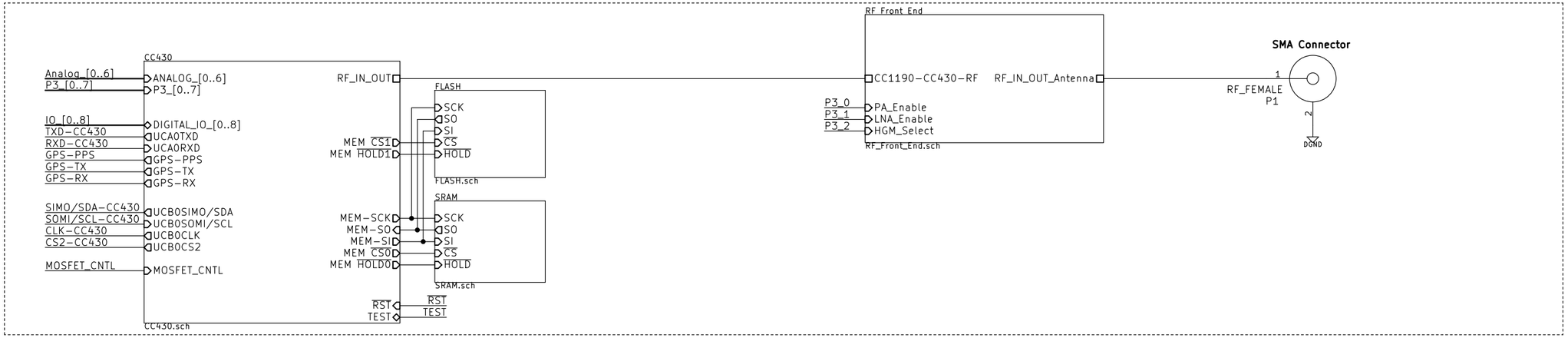
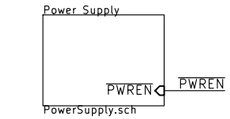
FaradayRF Wireless Module

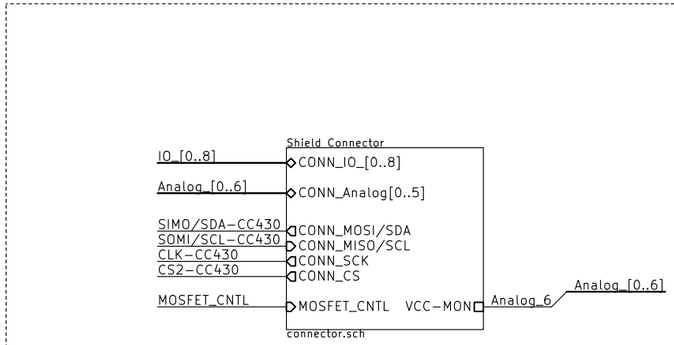
RF & Control Section



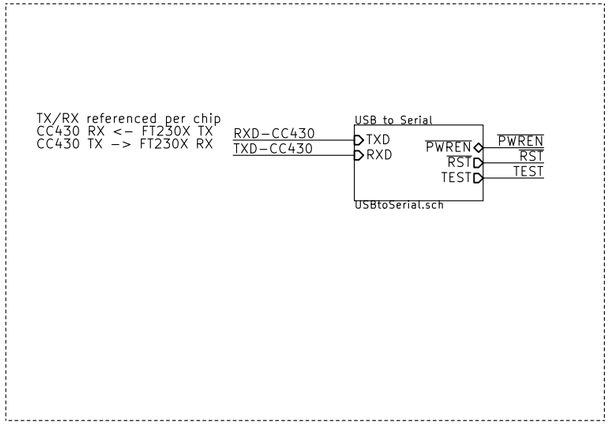
Voltage Regulator



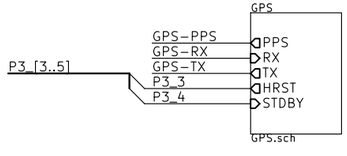
Connectors



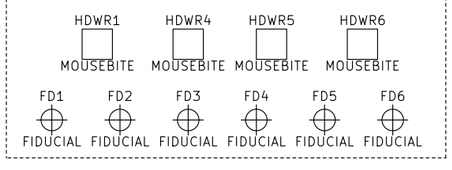
USB <-> UART



GPS Receiver



Manufacturing



FARADAY

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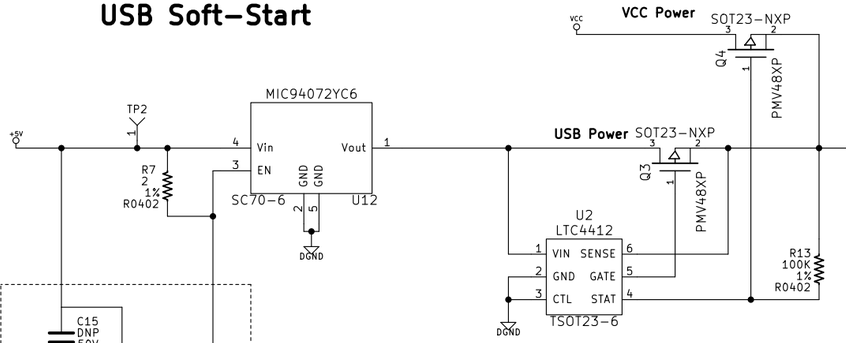
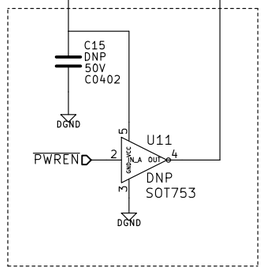
File: Faraday.sch Sheet: /		
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B* Id: 1/11
KiCad E.D.A.		

USB Soft-Start

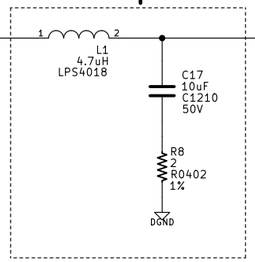


LTC4412 Datasheet Automatic Switchover of Load

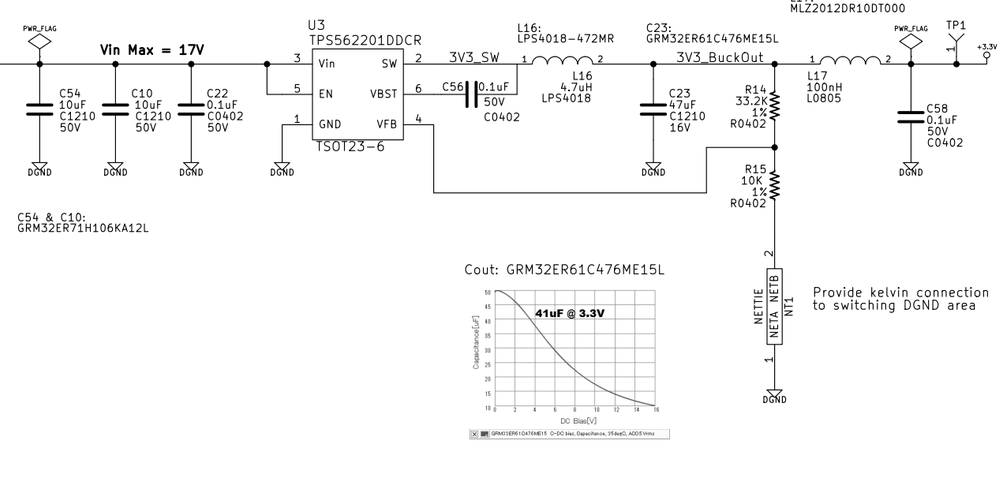


USB FT230X PWREN

65KHz Input Filter

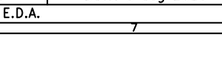


3.3V Buck Regulator – 0.5A



C54 & C10:
GRM32ER71H106KA12L

Cout: GRM32ER61C476ME15L



Provide kelvin connection
to switching DGND area

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File: PowerSupply.sch Sheet: /Power Supply/		
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B*
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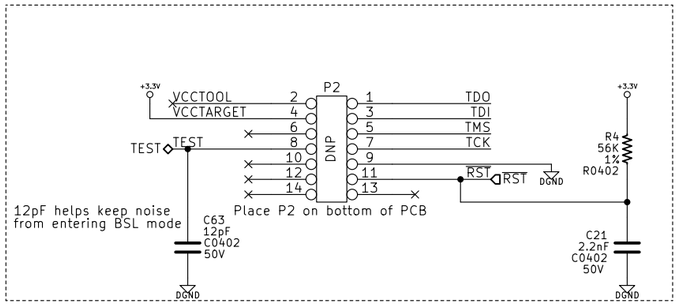
TI Evaluation Module Schematic
http://www.ti.com/lit/ug/slau278t/slau278t.pdf

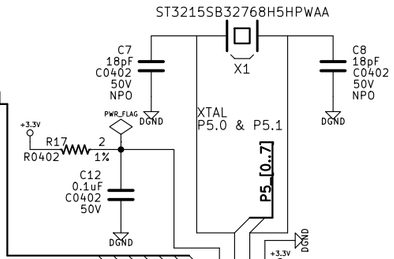
JTAG



http://processors.wiki.ti.com/index.php/File:JTAG_4_wire_pinout.JPG

32.768KHz Watch Crystal

ST3215SB32768H5HPWAA



P3_[0..7]
DIGITAL_IO_[0..8]
ANALOG_[0..6]
ADC_[0..6]
ADC_[0..6] FILTER_OUT_[1..7]
ADC Filters
ADC_Filters.sch
P2_[1..7]
P5_[0..7]

MOSFET_CNTL	P5_4	High Current MOSFET
UCA0RXD	P1_5	CC430 UCA UART
UCA0TXD	P1_6	
UCB0SIMO/SDA	P1_3	CC430 UCB SPI
UCB0SOMI/SCL	P1_2	
UCB0CLK	P1_4	
UCB0CS2	P1_1	
MEM-SO	P1_2	SPI SRAM & FLASH MEMORY - UCB0
MEM-SI	P1_3	
MEM-SCK	P1_4	
MEM CS0	P5_5	
MEM HOLD0	P5_6	
MEM CS1	P3_5	
MEM HOLD1	P5_7	
GPS-TX	P2_0	GPS
GPS-RX	P5_3	
GPS-PPS	P1_0	

P2_0 P2_1 P2_2 P2_3 P2_4 P2_5 P2_6 P2_7 P5_0 P5_1 RST TEST TCK

U1
CC430F6137
RGC

P1_7	1	P1.7/_PM_UCA0CLK/_PM_UCB0STE/_R03
P1_6	2	P1.6/_PM_UCA0TXD/_PMUCA0SIMO/_R13/LCDREF
P1_5	3	P1.5/_PM_UCA0RXD/_PM_UCA0SOMI/_R23
DGND	4	LCDCAP/_R33
	5	COM0
P5_7	6	P5.7/_COM1/_S26
P5_6	7	P5.6/_COM2/_S25
P5_5	8	P5.5/_COM3/_S24
P5_4	9	P5.4/_S23
	10	VCORE
	11	DVCC
P1_4	12	P1.4/_PM_UCB0CLK/_PM_UCA0STE/_S22
P1_3	13	P1.3/_PM_UCB0SIMO/_PM_UCB0SDA/_S21
P1_2	14	P1.2/_PM_UCB0SOMI/_PM_UCB0SCL/_S20
P1_1	15	P1.1/_PM_RFGDO2/_S19
P1_0	16	P1.0/_PM_RFGDO0/_S18

P2.0/_PM_CBOUT1/_PM_TA1CLK/_CB0_(A0)
P2.1/_PM_TA1CCR0A/_CB1/(A1)
P2.2/_PM_TA1CCR1A/_CB2/(A2)
P2.3/_PM_TA1CCR2A/_CB3_(A3)
P2.4/_PM_RTCCLK/_CB4_(A4/_VREF-/_VeREF-)
P2.5/_PM_SVMOUT/_CB5_(A5/_VREF+/_VeREF+)
P2.6/_PM_ACLK/_CB6_(A6)
P2.7/_PM_ADC12CLK/_PM_DMAE0/_CB7_(A7)
AVCC P5.0/_XIN P5.1/_XOUT AVSS DVCC RST/_NMI/_SBWTDIO TEST/_SBWTCK PJ.3/_TCK

PJ.2/_TMS	48	TMS
PJ.1/_TDI/_TCLK	47	TDI
PJ.0/_TDO	46	TDO
GUARD	45	
RBIAS	44	R3 56K 1% R0402 DGND
AVCC_RF	43	
AVCC_RF	42	
RF_N	41	RF_N
RF_P	39	RF_P
AVCC_RF	38	
AVCC_RF	37	
RF_XOUT	36	
RF_XIN	35	P5_2
P5.2/_S0	34	P5_3
P5.3/_S1	33	P4_0
P4.0/_S2		

P4_[0..7]
P5_[0..7]

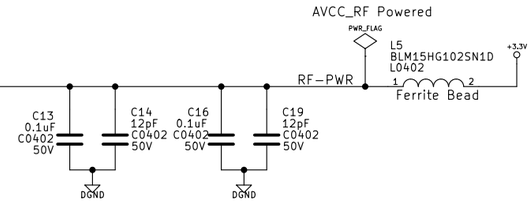
P3.7/_PM_SMCLK/_S17
P3.6/_PM_RFGDO1/S16
P3.5/_PM_TACCR4A/_S15
P3.4/_PM_TACCR3A/_S14
P3.3/_PM_TACCR2A/_S13
P3.2/_PM_TAOCCR1A/_S12
P3.1/_PM_TAOCCR0A/_S11
P3.0/_PM_CBOUT0/_PM_TACLK/_S10
DVCC P4.7/_S9 P4.6/_S8 P4.5/_S7 P4.4/_S6 P4.3/_S5 P4.2/_S4 P4.1/_S3

VSS_-_EXPOSED_PAD	65	DGND

P3_7 P3_6 P3_5 P3_4 P3_3 P3_2 P3_1 P3_0 P4_7 P4_6 P4_5 P4_4 P4_3 P4_2 P4_1

P3_[0..7] P4_[0..7]

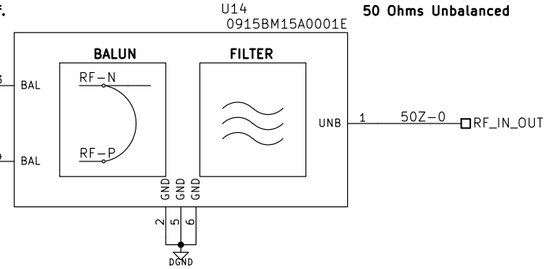
AVCC_RF Powered



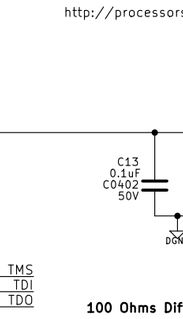
100 Ohms Diff.

U14
0915BM15A0001E

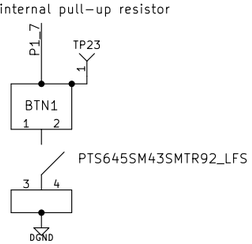
50 Ohms Unbalanced



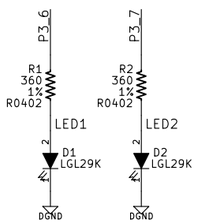
Application note for Balun/Filter is TI SWRA250A



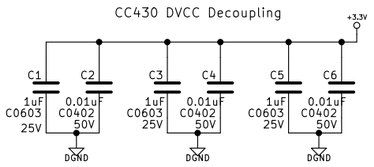
BTN1 uses internal pull-up resistor



About 6mA per LED @ 3.3V



CC430 DVCC Decoupling



3.3V External GPIO Interface

P4_[0..7] DIGITAL_IO_[0..8]

P4_7	DIGITAL_IO_0
P4_6	DIGITAL_IO_1
P4_5	DIGITAL_IO_2
P4_4	DIGITAL_IO_3
P4_3	DIGITAL_IO_4
P4_2	DIGITAL_IO_5
P4_1	DIGITAL_IO_6
P4_0	DIGITAL_IO_7
P5_2	DIGITAL_IO_8

USCI_Ax modules support:
- UART mode
- Pulse shaping for IrDA communications
- Automatic baud-rate detection for LIN communications
- SPI mode

USCI_Bx modules support:
- I²C mode
- SPI mode

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Brenton Salmi, KB1LQD	
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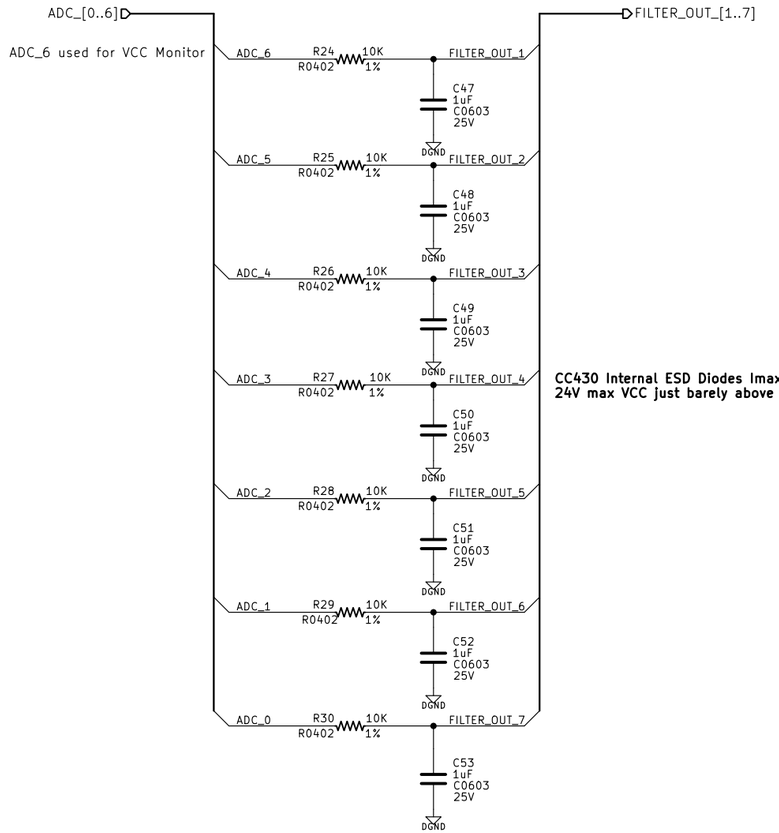
File: CC430.sch	
Sheet: /CC430/	
Title: Faraday Wireless Node	
Size: B	*Date: 8 aug 2016* — *Rev: B*
KiCad E.D.A.	Id: 3/11

16 Hz ADC Filters

Filter channels flipped for routing!



ADC_6 = P2.1
ADC_5 = P2.2
ADC_4 = P2.3
ADC_3 = P2.4
ADC_2 = P2.5
ADC_1 = P2.6
ADC_0 = P2.7

CC430 Internal ESD Diodes Imax = 2mA
24V max VCC just barely above 2mA @40mW dissipation

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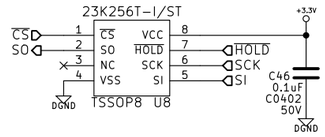
File: ADC_Filters.sch		
Sheet: /CC430/ADC Filters/		
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B*
KiCad E.D.A.		Id: 4/11



Bryce Salmi, KB1LQC Brenton Salmi, KB1LQD www.FaradayRF.com *FaradayRF*		
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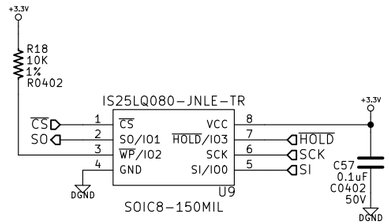
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B*
KiCad E.D.A.		Id: 5/11

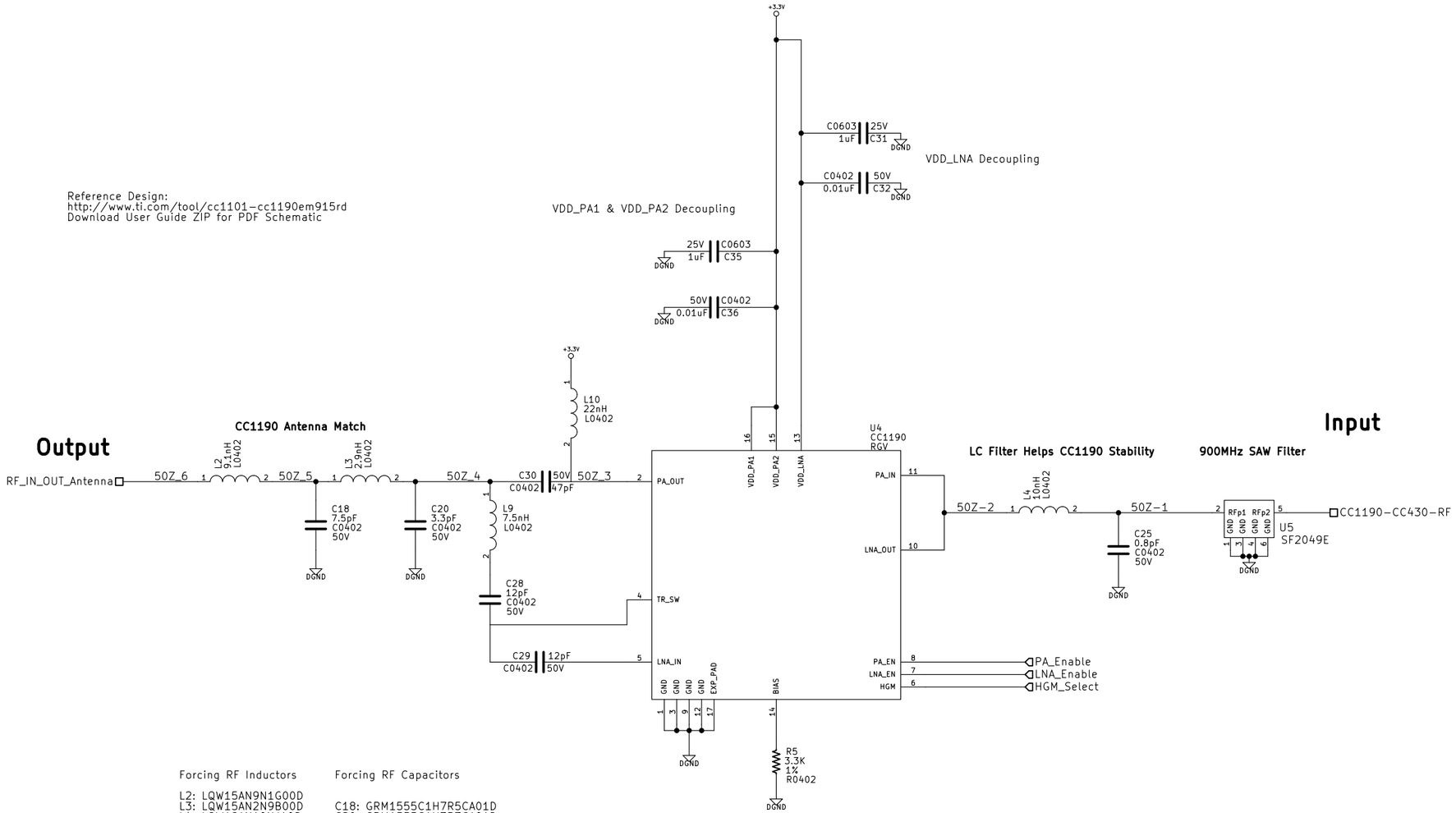


Bryce Salmi, KB1LQC Brenton Salmi, KB1LQD www.FaradayRF.com *FaradayRF*		
File: FLASH.sch Sheet: /FLASH/		
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B*
KiCad E.D.A.		Id: 6/11

Reference Design:
http://www.ti.com/tool/cc1101-cc1190em915rd
Download User Guide ZIP for PDF Schematic

VDD_PA1 & VDD_PA2 Decoupling

VDD_LNA Decoupling



Forcing RF Inductors

L2: LQW15AN9N1G00D
L3: LQW15AN2N9B00D
L4: LQW18AN10NJ10D
L9: LQW15AN7N5G00D
L10: LQW18AN22NJ10D

Forcing RF Capacitors

C18: GRM1555C1H7R5CA01D
C20: GRM1555C1H3R3CA01D
C25: GRM1555C1HR80CA01D
C28: GRM1555C1H120JA01D
C29: GRM1555C1H120JA01D
C30: GRM1555C1H470JA01D

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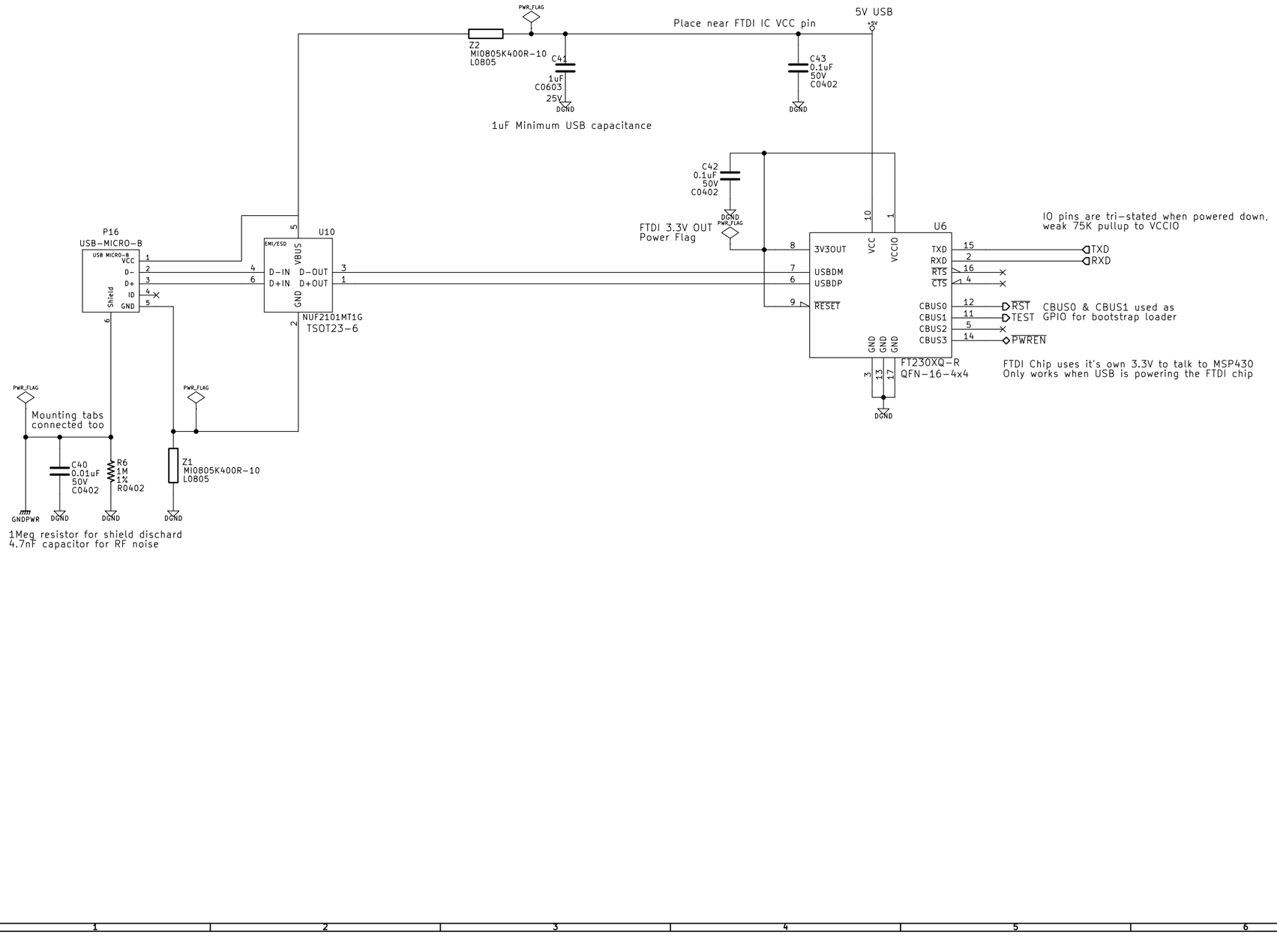
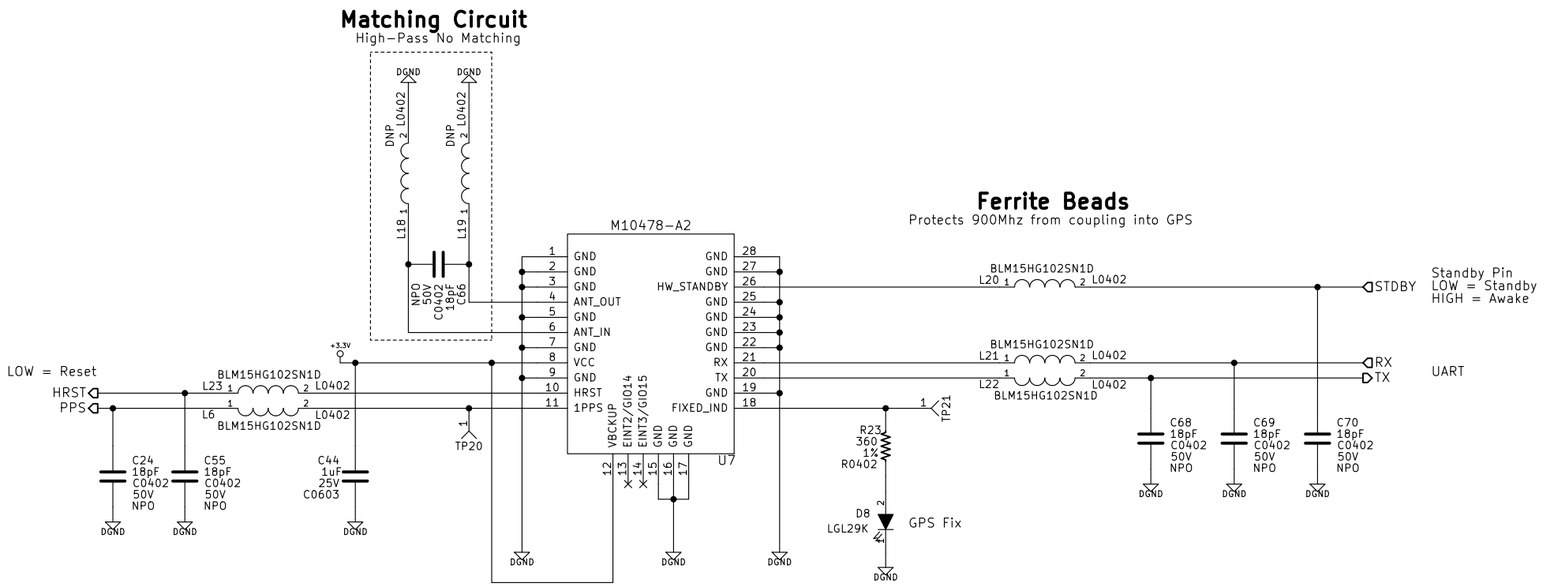
File: RF_Front_End.sch
Sheet: /RF Front End/
Title: Faraday Wireless Node
Size: B | *Date: 8 aug 2016* | *Rev: B*
KiCad E.D.A. | Id: 7/11



Bryce Salmi, KB1LQC Brenton Salmi, KB1LQD www.FaradayRF.com *FaradayRF*	
File: USBtoSerial.sch Sheet: /USB to Serial/	
Title: Faraday Wireless Node	
Size: B	*Date: 8 aug 2016* — Rev: B
KiCad E.D.A.	Id: 8/11



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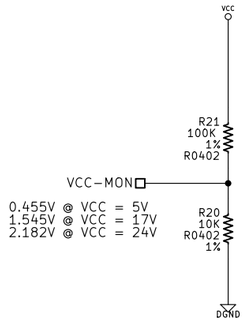
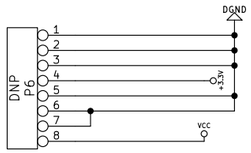
File: GPS.sch Sheet: /GPS/	
Title: Faraday Wireless Node	
Size: B	*Date: 8 aug 2016* — *Rev: B*
KiCad E.D.A.	Id: 9/11



Power

Arduino Shield Connector

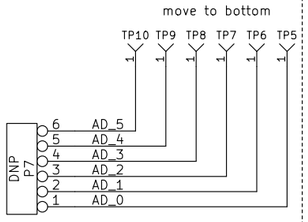


Mounting Holes 125 mil

Connected to USB shield

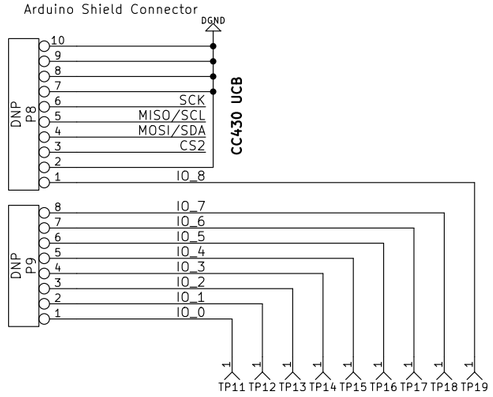
Analog In

move to bottom



Digital

Arduino Shield Connector



Place on bottom of PCB

CONN_IO_[0..8] ◇— IO_[0..8]

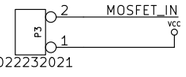
CONN_Analog[0..5] ◇— AD_[0..5]

CONN_MOSI/SDA ◇— MOSI/SDA
CONN_MISO/SCL ◇— MISO/SCL
CONN_SCK ◇— SCK
CONN_CS ◇— CS2

MOSFET_CNTL ▷ MOSFET_CNTL

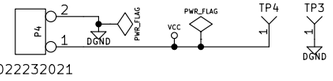
Ext. Power/MOSFET

Molex 2.54mm Pitch



0022232021

Molex 2.54mm Pitch



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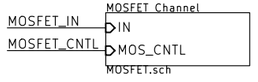
Ground is driven



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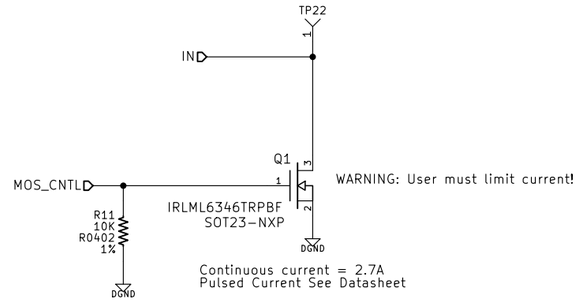
File: connector.sch Sheet: /Shield Connector/		
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B*
KiCad E.D.A.		Id: 10/11



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File: MOSFET.sch Sheet: /Shield Connector/MOSFET Channel/		
Title: Faraday Wireless Node		
Size: B	*Date: 8 aug 2016*	*Rev: B*
KiCad E.D.A.		Id: 11/11