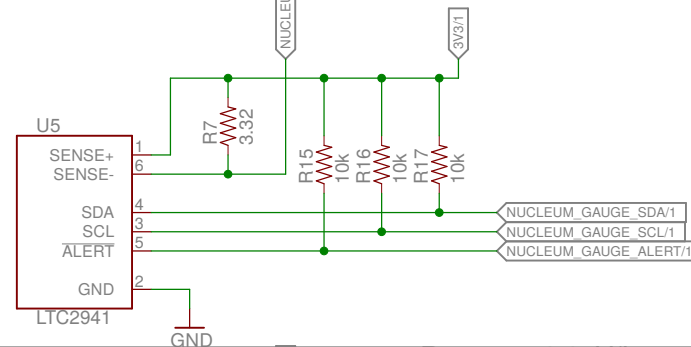


The Regulator Blocks

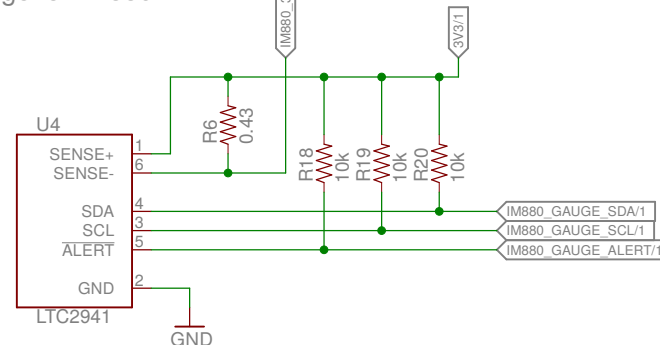
### Energy gauge for nucleum

$$R_{sense} = 0.05V/I_{max} = 0.05V/15mA$$



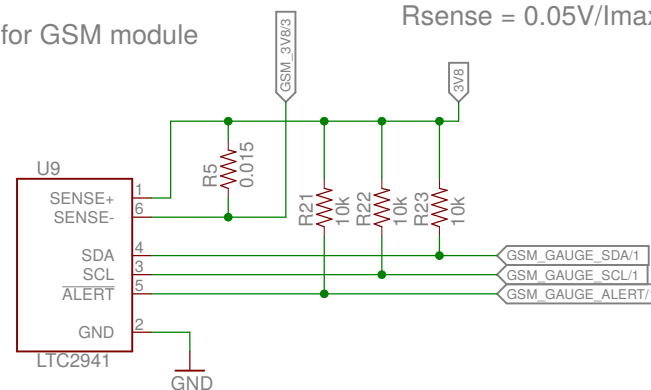
### Energy gauge for IM880

$$R_{sense} = 0.05V/I_{max} = 0.05V/118mA$$



### Energy gauge for GSM module

$$R_{sense} = 0.05V/I_{max} = 0.05V/3A$$



**M** Radio Module

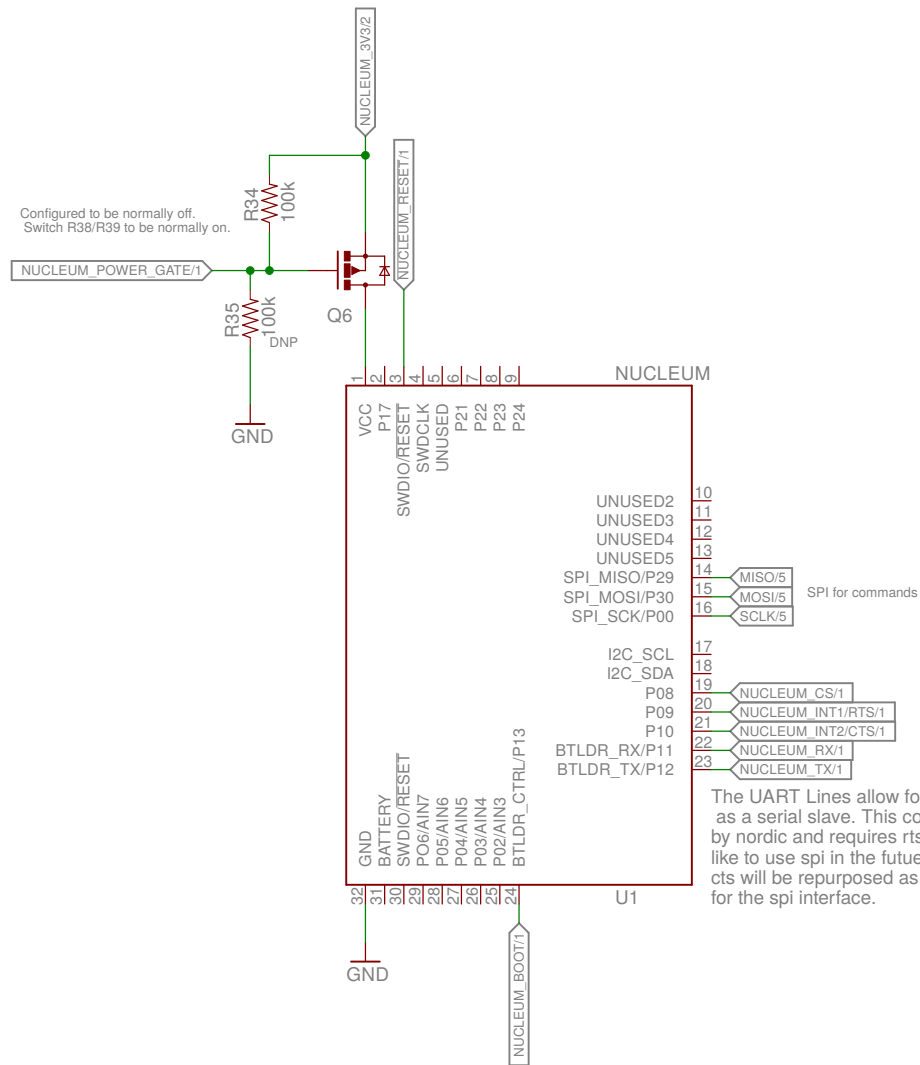
REV:  
A

Author: Joshua Adkins

Date: 9/19/16 11:47 AM

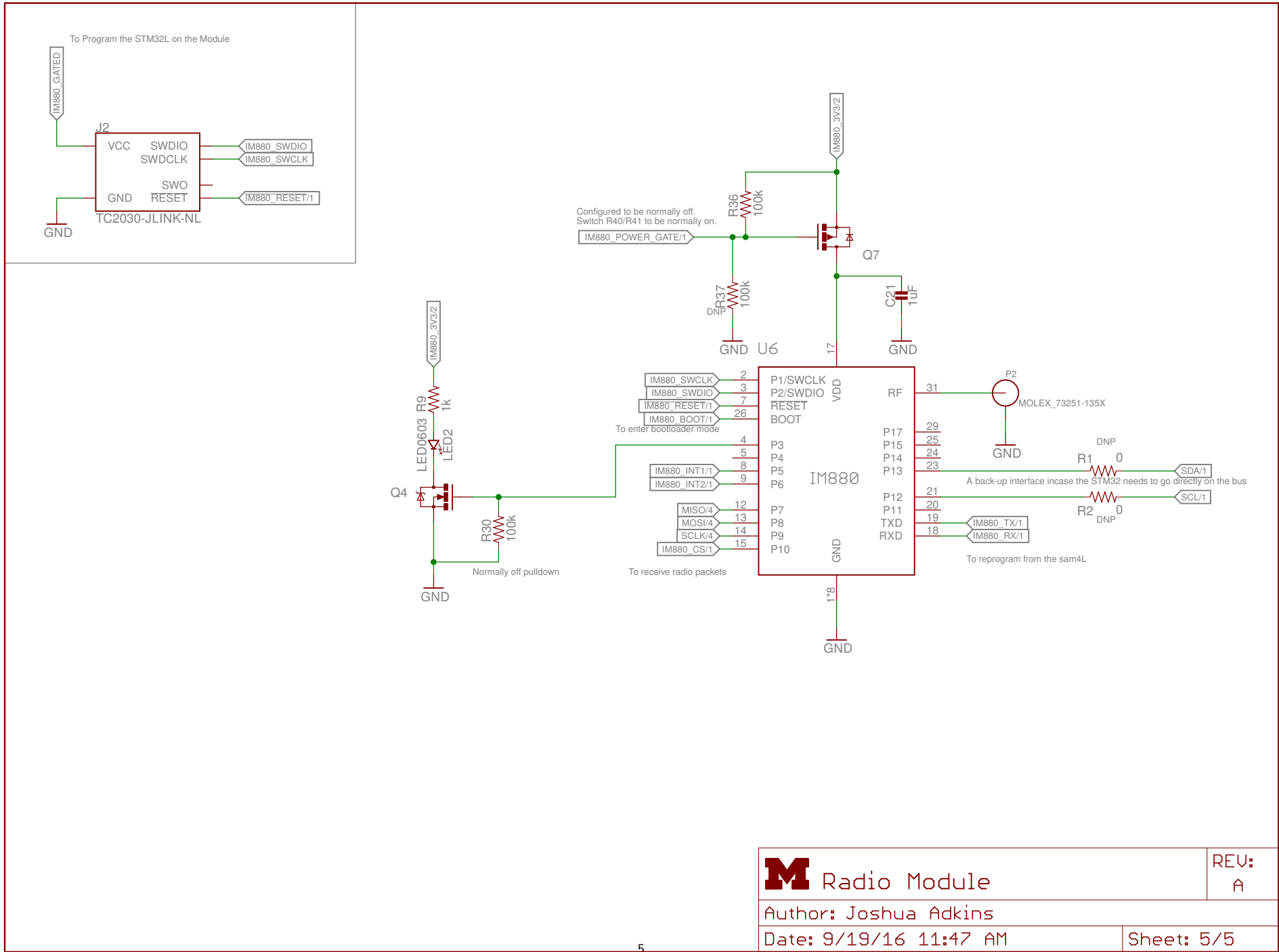
Sheet: 2/5



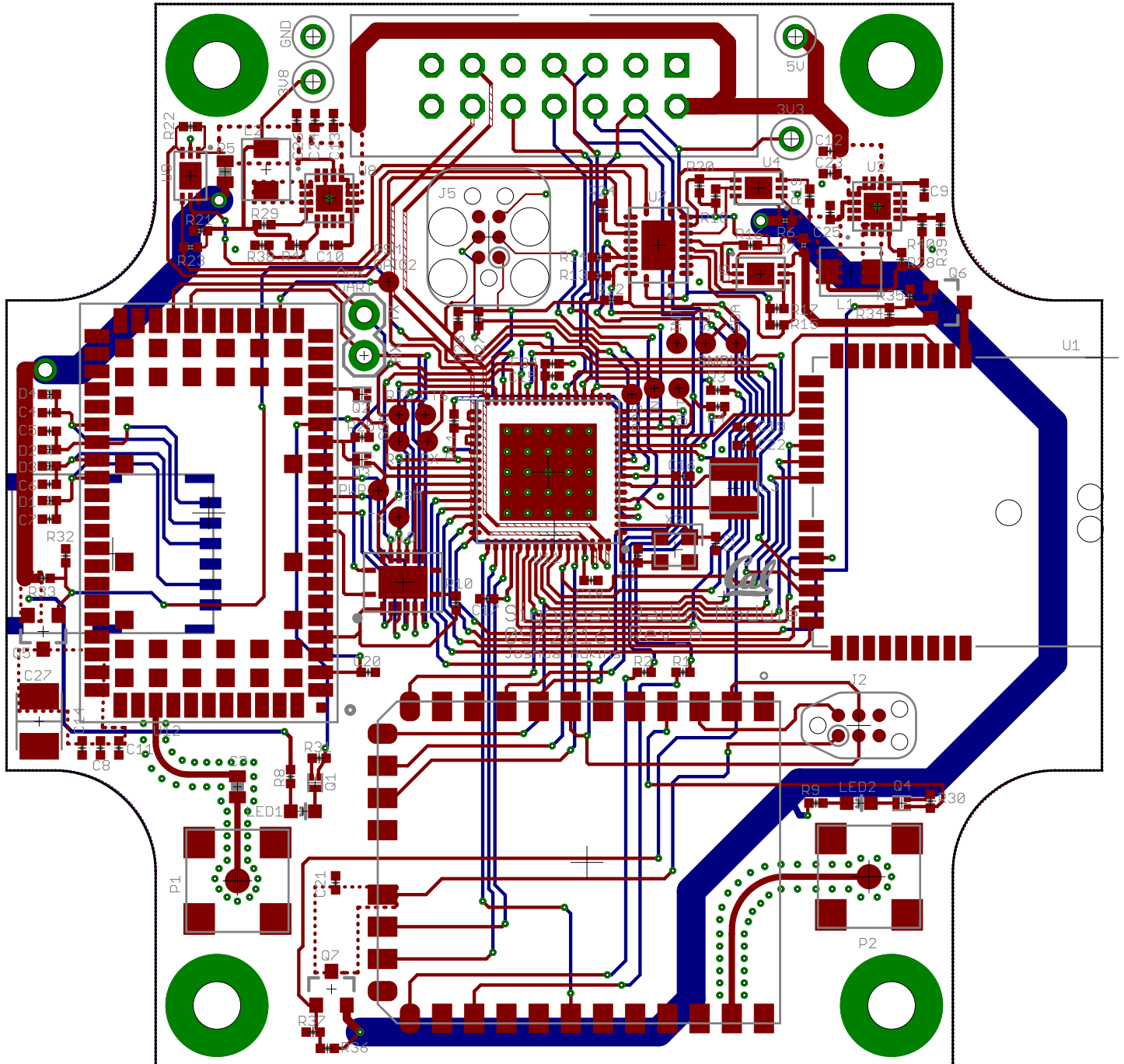


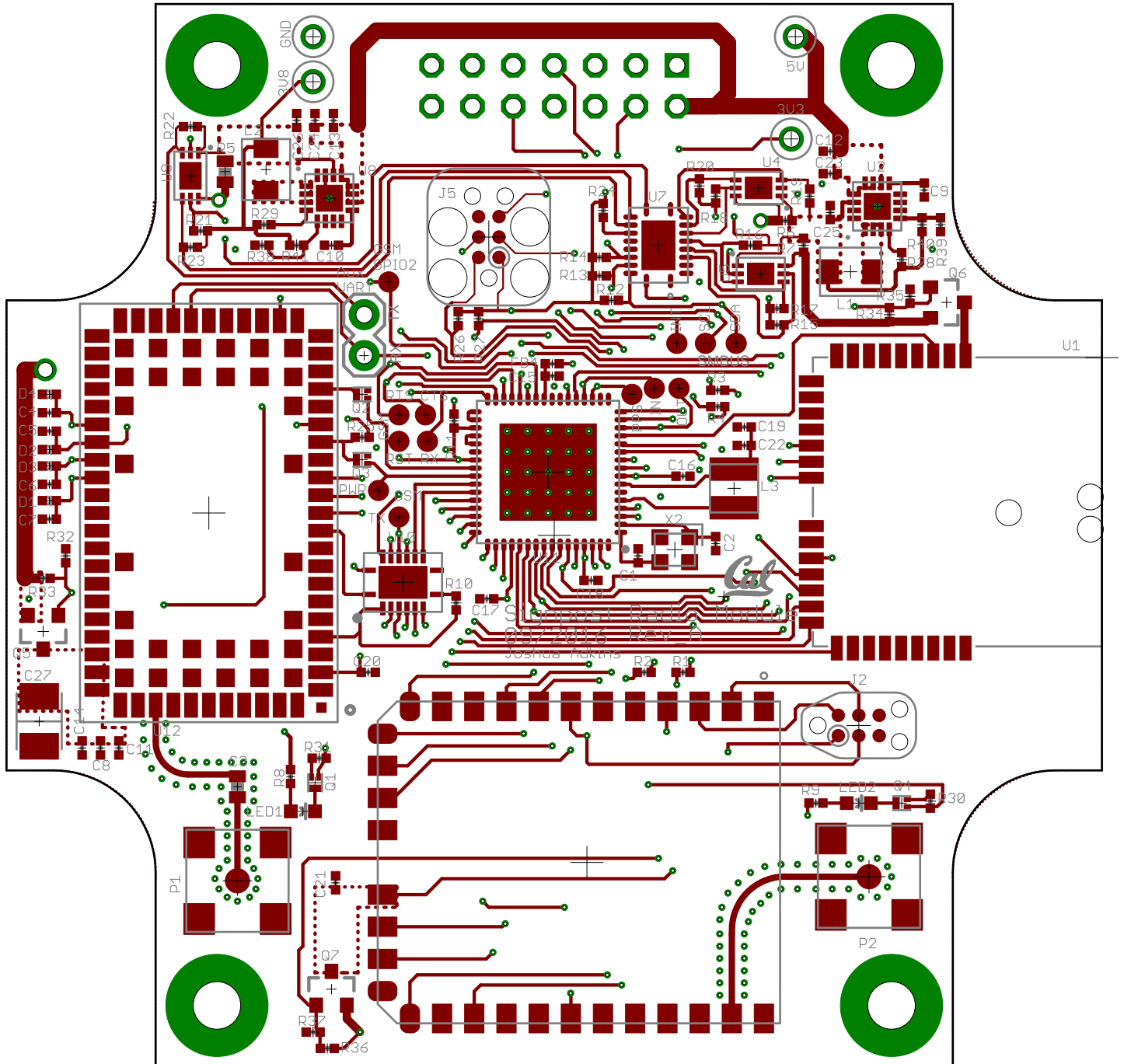
The UART Lines allow for the NRF to act as a serial slave. This code is provided by nordic and requires rts/cts. We would like to use spi in the future, then rts and cts will be repurposed as interrupt pins for the spi interface.

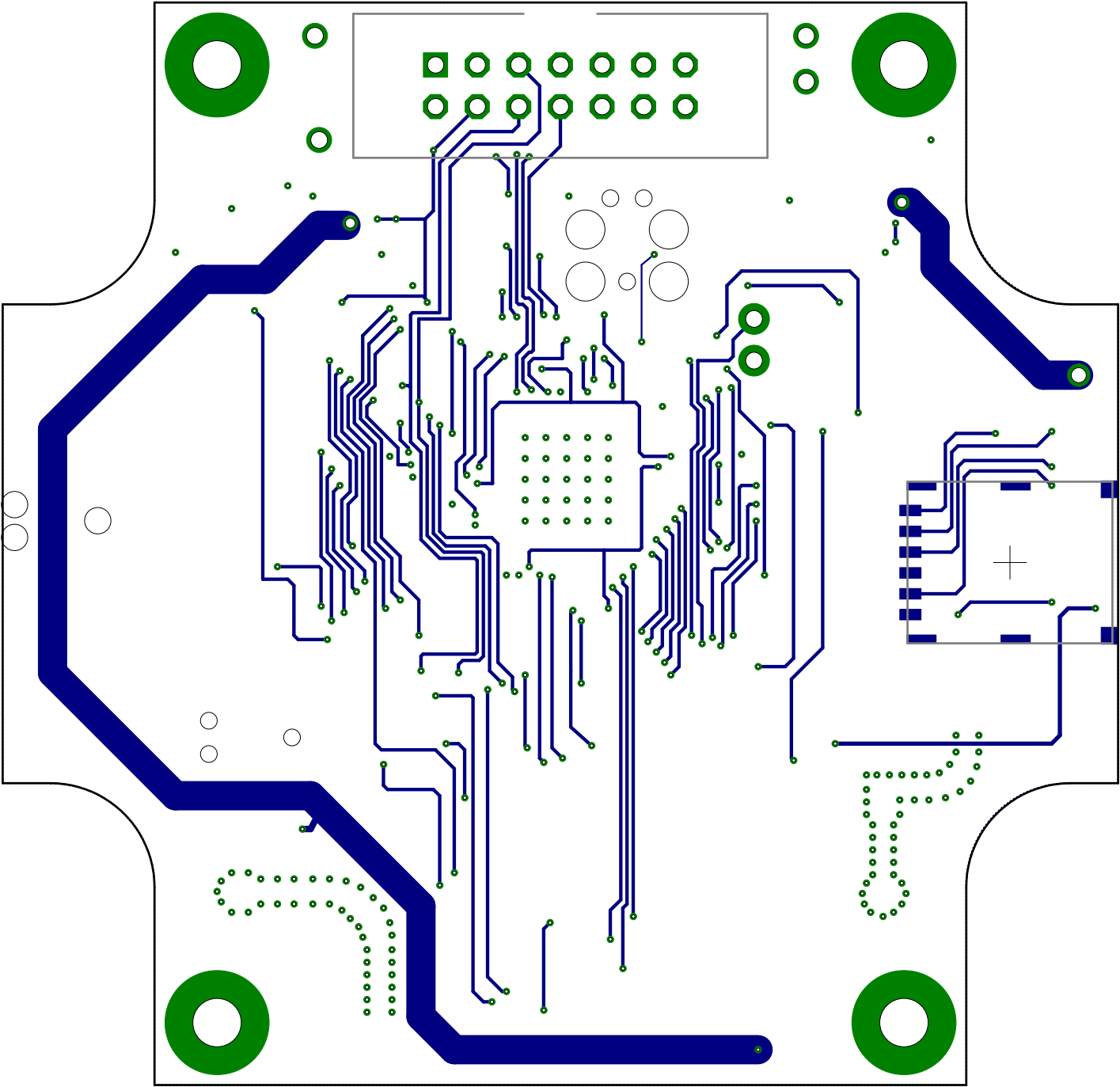
<b>M</b> Radio Module	REV: A
Author: Joshua Adkins	
Date: 9/19/16 11:47 AM	Sheet: 4/5



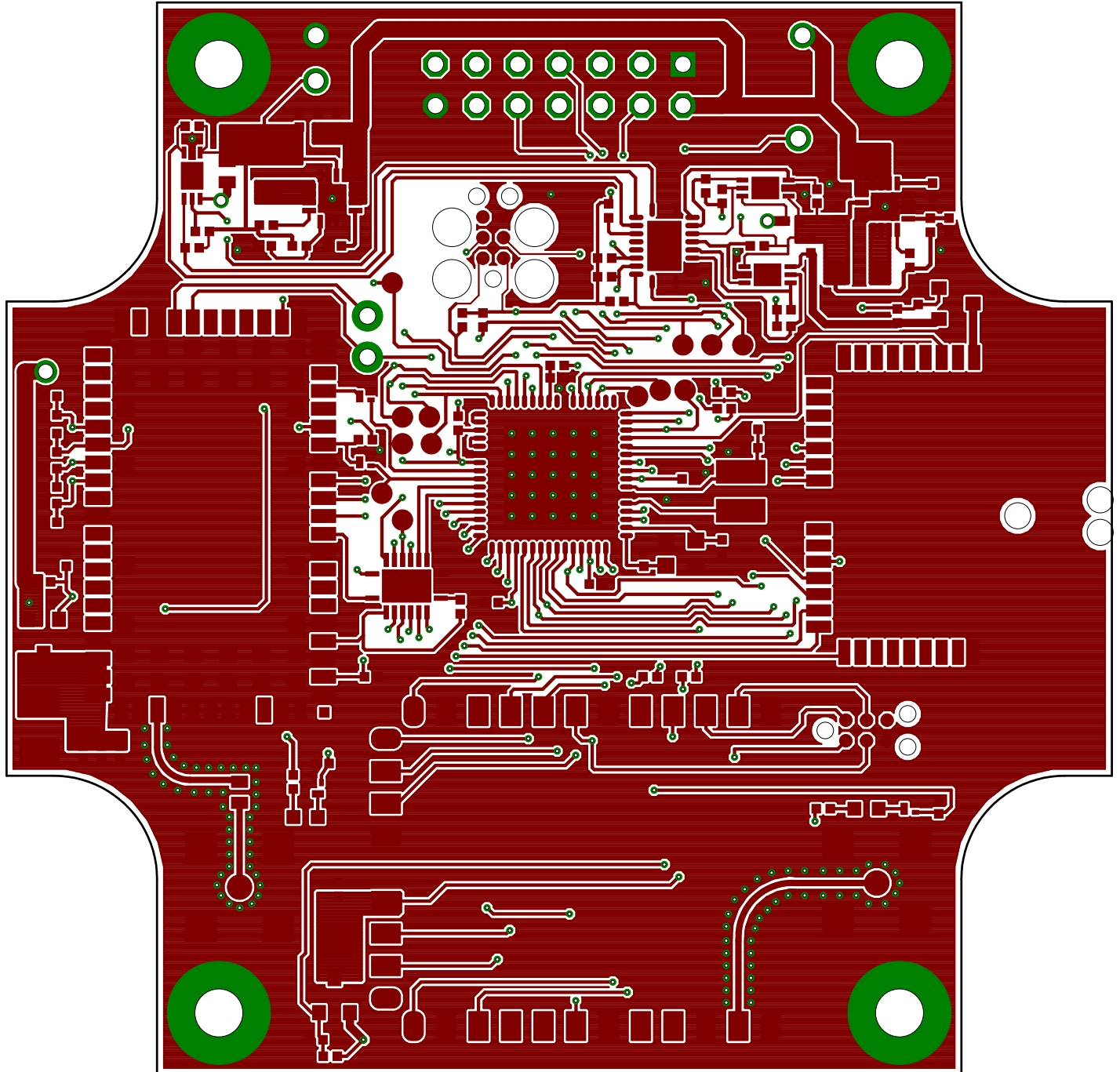
# Top and Bottom Layers

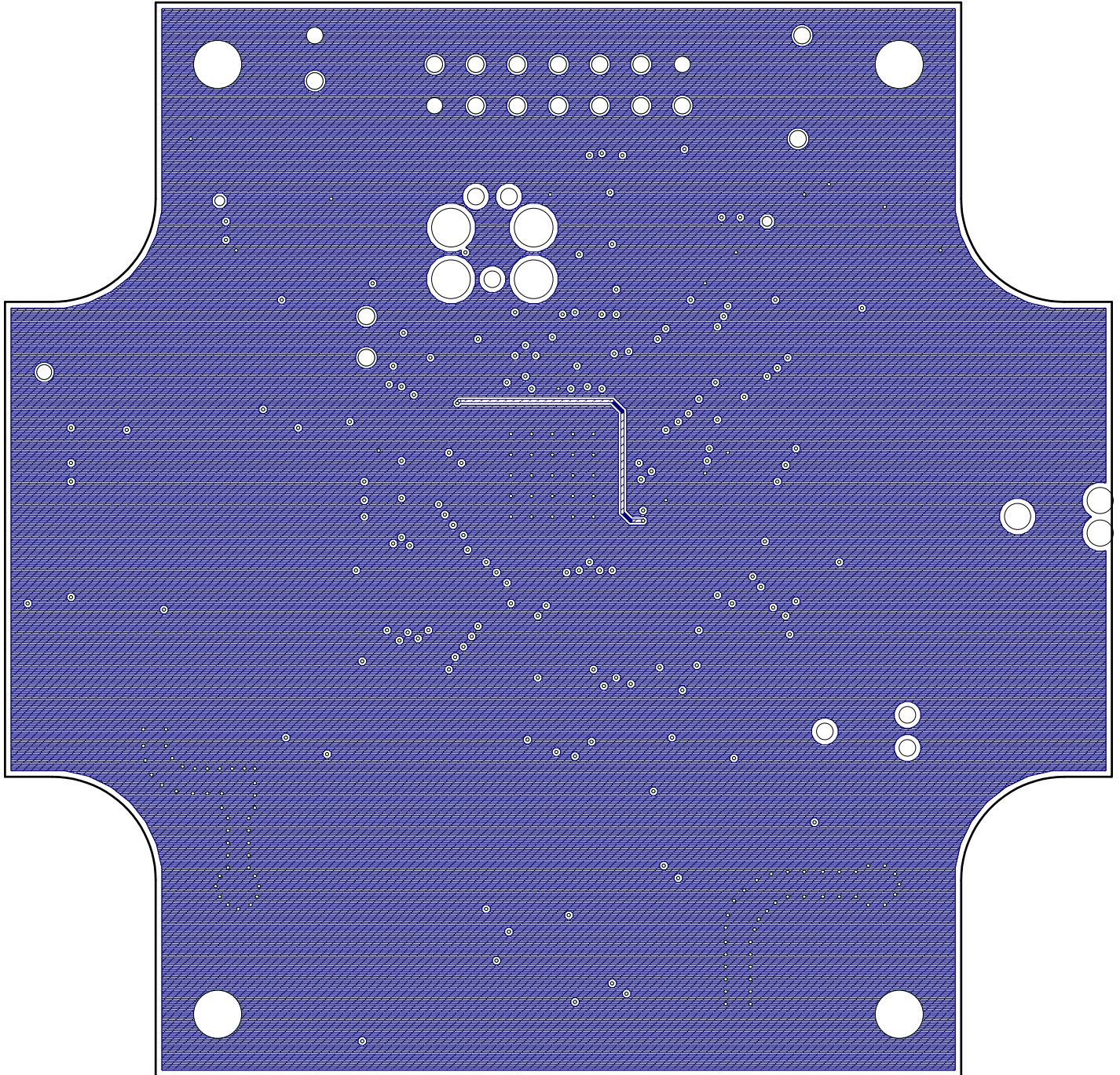


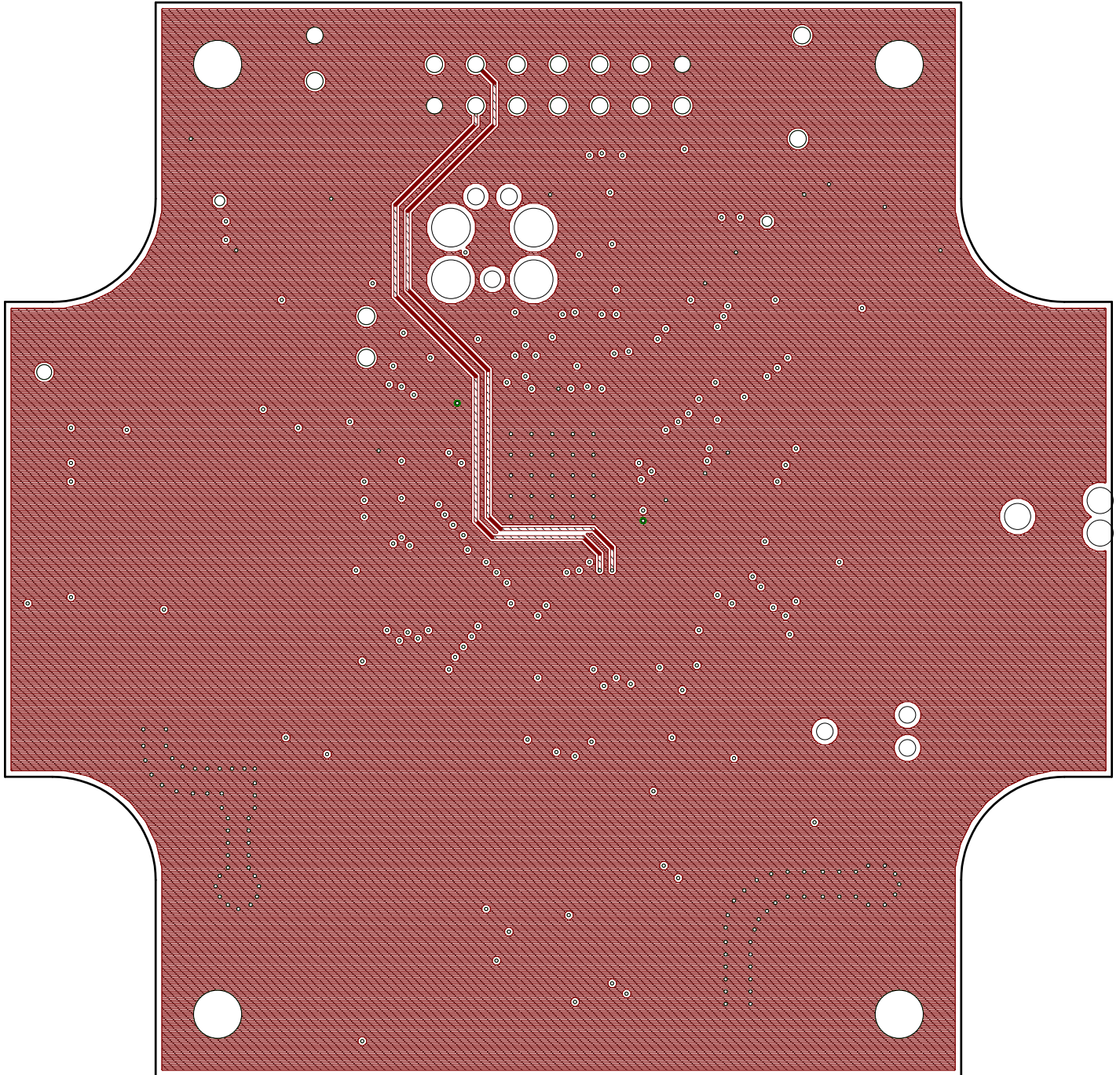


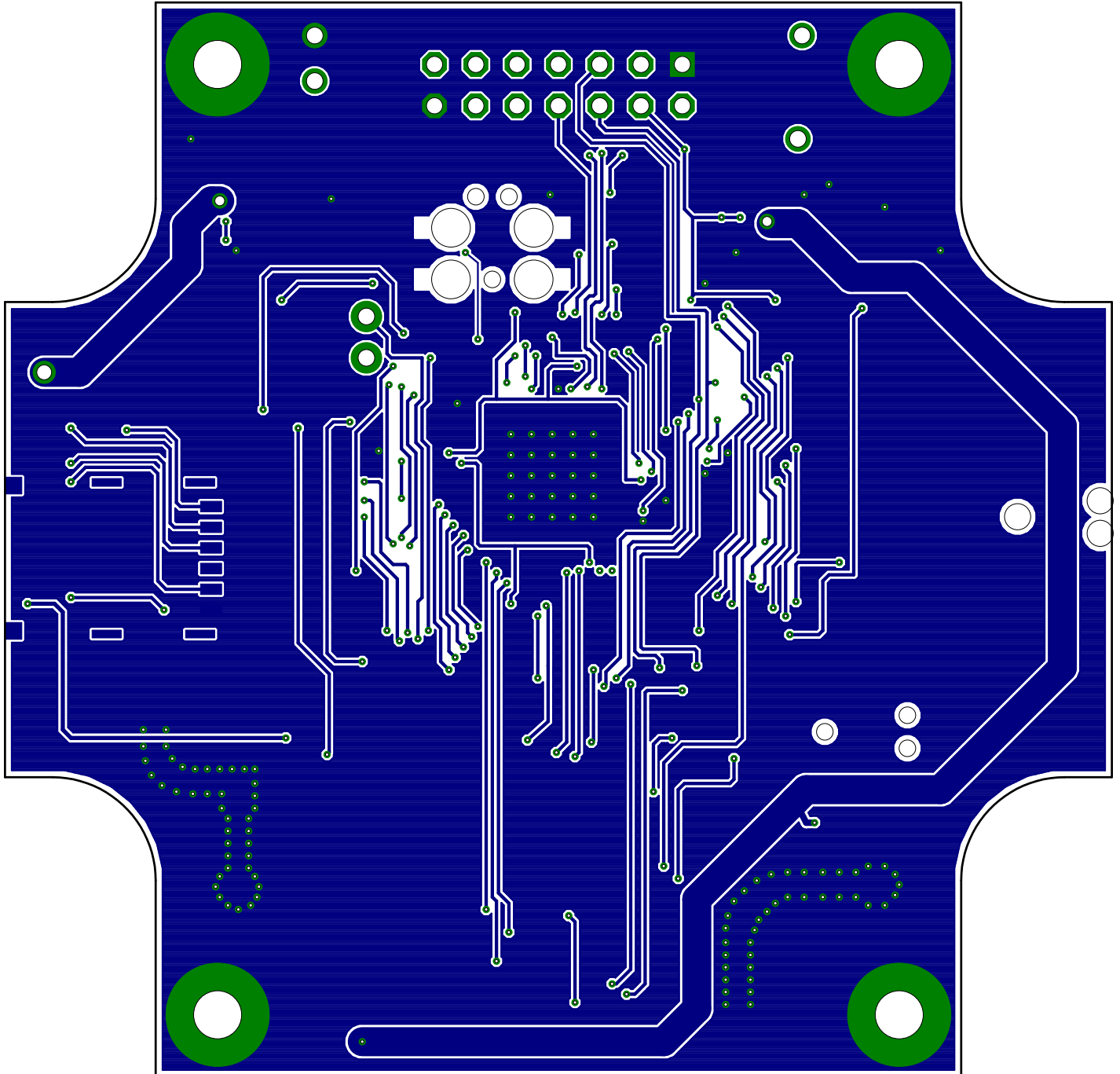




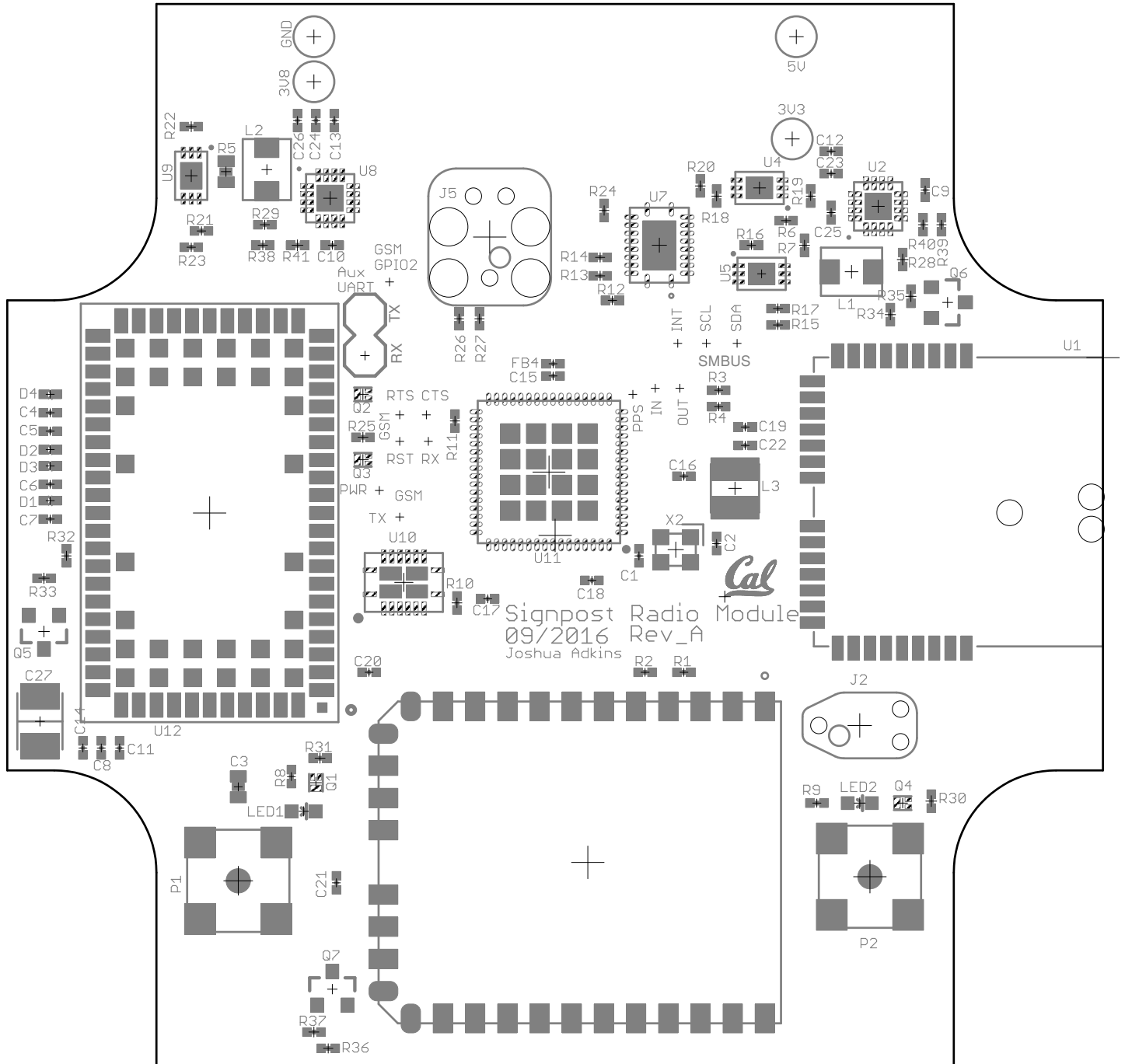




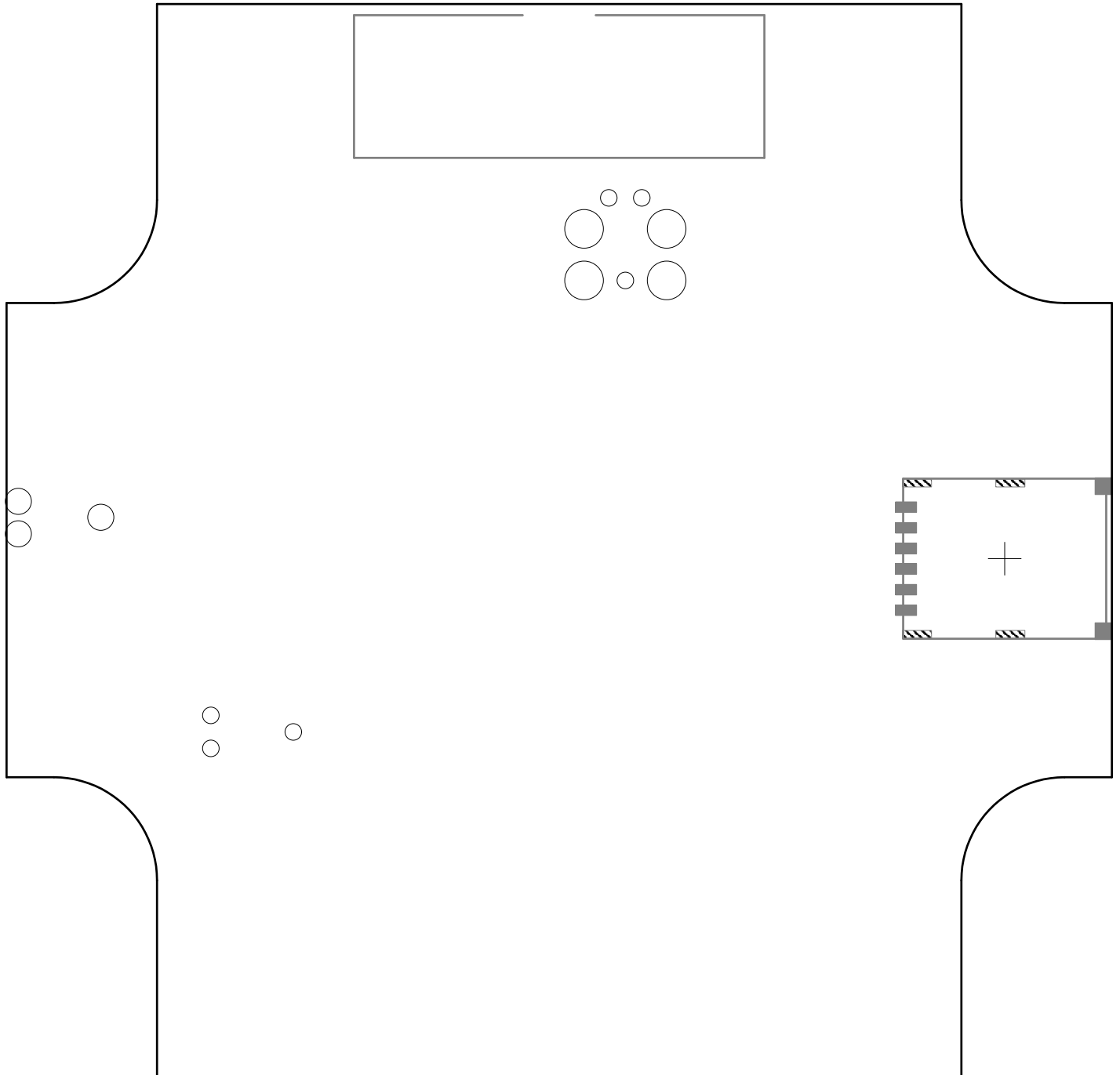


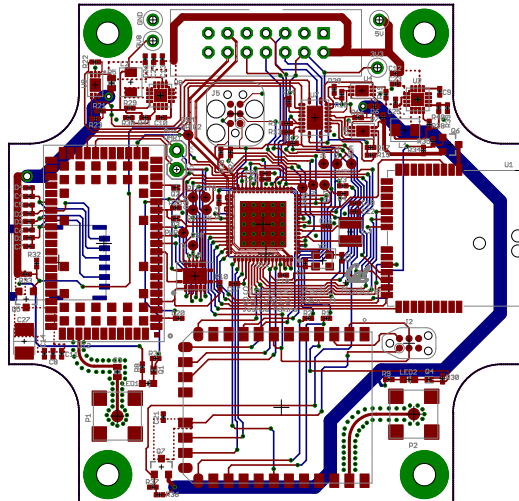


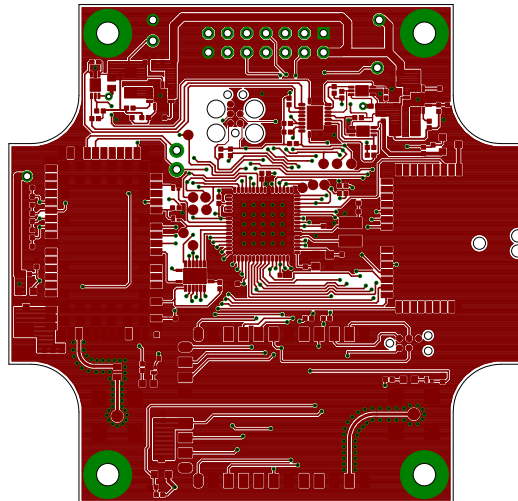
# Top Paste Layer with Silkscreen



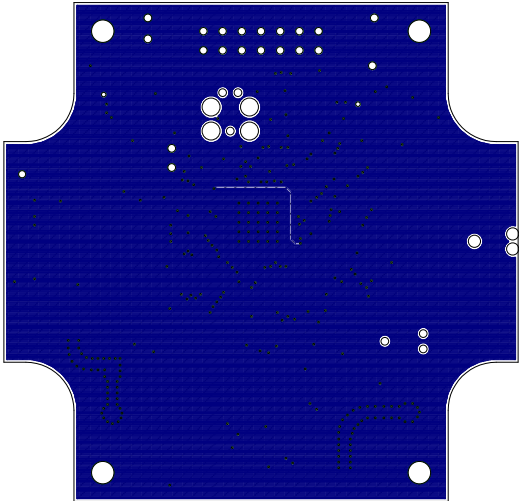
# Bottom Paste Layer with Silkscreen

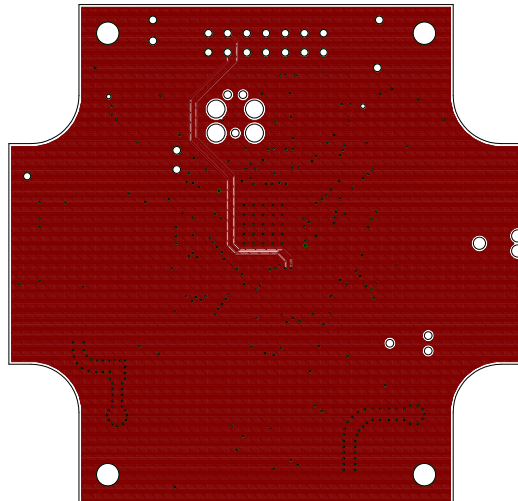




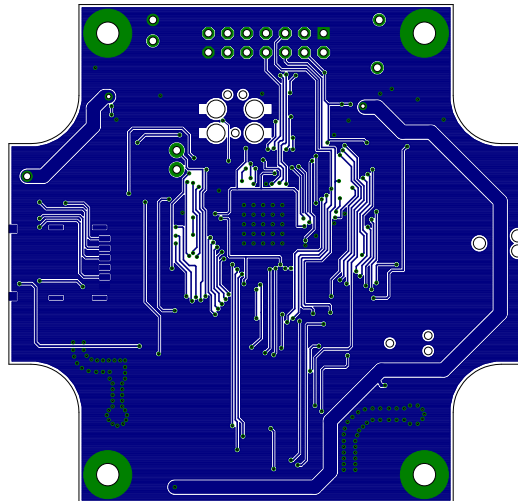








Bottom Copper Layer 1:1 Scale



# radio\_module

Part	Value	Device	Package
C1	8pF	CAPACITOR0402_CAP	0402_CAP
C2	8pF	CAPACITOR0402_CAP	0402_CAP
C3	33pF	CAPACITOR0603_CAP	0603_CAP
C4	47pF	CAPACITOR0402_CAP	0402_CAP
C5	47pF	CAPACITOR0402_CAP	0402_CAP
C6	47pF	CAPACITOR0402_CAP	0402_CAP
C7	47pF	CAPACITOR0402_CAP	0402_CAP
C8	56pF	CAPACITOR0402_CAP	0402_CAP
C9	3.3nF	CAPACITOR0402_CAP	0402_CAP
C10	3.3nF	CAPACITOR0402_CAP	0402_CAP
C11	10nF	CAPACITOR0402_CAP	0402_CAP
C12	0.1uF	CAPACITOR0402_CAP	0402_CAP
C13	0.1uF	CAPACITOR0402_CAP	0402_CAP
C14	100nF	CAPACITOR0402_CAP	0402_CAP
C15	100nF	CAPACITOR0402_CAP	0402_CAP
C16	100nF	CAPACITOR0402_CAP	0402_CAP
C17	100nF	CAPACITOR0402_CAP	0402_CAP
C18	100nF	CAPACITOR0402_CAP	0402_CAP
C19	100nF	CAPACITOR0402_CAP	0402_CAP
C20	100nF	CAPACITOR0402_CAP	0402_CAP
C21	1uF	CAPACITOR0402_CAP	0402_CAP
C22	4.7uF	CAPACITOR0402_CAP	0402_CAP
C23	10uF	CAPACITOR0402_CAP	0402_CAP
C24	10uF	CAPACITOR0402_CAP	0402_CAP
C25	22uF	CAPACITOR0402_CAP	0402_CAP
C26	22uF	CAPACITOR0402_CAP	0402_CAP
C27	220uF	CAPACITOR1210_CAP	1210_CAP
D1		DIODE_ZENER	0402_DIODE
D2		DIODE_ZENER	0402_DIODE
D3		DIODE_ZENER	0402_DIODE
D4		DIODE_ZENER	0402_DIODE
FB4	1.5k	FERRITE_BEAD0402	0402_CAP
J1	MODULE_GENERIC	MODULE_GENERIC	MODULE_GENERIC
J4	NANO_SIM	NANO_SIM	WURTH_NANO_SIM
JP1		M02PTH	1X02
L1	2.2uH	INDUCTOR1HL	IHL-1212BZ-11
L2	2.2uH	INDUCTOR1HL	IHL-1212BZ-11
L3	22uH	LHQ3NP	1212
LED1	LED0603	LED0603	LED-0603
LED2	LED0603	LED0603	LED-0603
P1	MOLEX_73251-135X	MOLEX_73251-135X	SMA-J/PCB
P2	MOLEX_73251-135X	MOLEX_73251-135X	SMA-J/PCB
Q1	MOSFET-NCHANNELXFDN-3	MOSFET-NCHANNELXFDN-3	XFDN-3
Q2	MOSFET-NCHANNELXFDN-3	MOSFET-NCHANNELXFDN-3	XFDN-3
Q3	MOSFET-NCHANNELXFDN-3	MOSFET-NCHANNELXFDN-3	XFDN-3
Q4	MOSFET-NCHANNELXFDN-3	MOSFET-NCHANNELXFDN-3	XFDN-3
Q5	SI223DDS	SI223DDS	SOT23-3
Q6	SI223DDS	SI223DDS	SOT23-3

# radio\_module

Q7	SI223DDS	SI223DDS	SOT23-3
R1		0 RESISTOR0402_RES	0402_RES
R2		0 RESISTOR0402_RES	0402_RES
R3		0 RESISTOR0402_RES	0402_RES
R4		0 RESISTOR0402_RES	0402_RES
R5		0.015 RESISTOR0603_RES	0603-RES
R6		0.43 RESISTOR0402_RES	0402_RES
R7		3.32 RESISTOR0402_RES	0402_RES
R8	1k	RESISTOR0402_RES	0402_RES
R9	1k	RESISTOR0402_RES	0402_RES
R10	10k	RESISTOR0402_RES	0402_RES
R11	10k	RESISTOR0402_RES	0402_RES
R12	10k	RESISTOR0402_RES	0402_RES
R13	10k	RESISTOR0402_RES	0402_RES
R14	10k	RESISTOR0402_RES	0402_RES
R15	10k	RESISTOR0402_RES	0402_RES
R16	10k	RESISTOR0402_RES	0402_RES
R17	10k	RESISTOR0402_RES	0402_RES
R18	10k	RESISTOR0402_RES	0402_RES
R19	10k	RESISTOR0402_RES	0402_RES
R20	10k	RESISTOR0402_RES	0402_RES
R21	10k	RESISTOR0402_RES	0402_RES
R22	10k	RESISTOR0402_RES	0402_RES
R23	10k	RESISTOR0402_RES	0402_RES
R24	10k	RESISTOR0402_RES	0402_RES
R25	100k	RESISTOR0402_RES	0402_RES
R26	100k	RESISTOR0402_RES	0402_RES
R27	100k	RESISTOR0402_RES	0402_RES
R28	100k	RESISTOR0402_RES	0402_RES
R29	100k	RESISTOR0402_RES	0402_RES
R30	100k	RESISTOR0402_RES	0402_RES
R31	100k	RESISTOR0402_RES	0402_RES
R32	100k	RESISTOR0402_RES	0402_RES
R33	100k	RESISTOR0402_RES	0402_RES
R34	100k	RESISTOR0402_RES	0402_RES
R35	100k	RESISTOR0402_RES	0402_RES
R36	100k	RESISTOR0402_RES	0402_RES
R37	100k	RESISTOR0402_RES	0402_RES
R38	200k	RESISTOR0402_RES	0402_RES
R39	240k	RESISTOR0402_RES	0402_RES
R40	750k	RESISTOR0402_RES	0402_RES
R41	750k	RESISTOR0402_RES	0402_RES
U1	NUCLEUM	NUCLEUM	NUCLEUM
U2	TLV62130	TLV62130	TQFN-16/3MM
U4	LTC2941	LTC2941	DFN-6-2MMX3MM
U5	LTC2941	LTC2941	DFN-6-2MMX3MM
U6	IM880_MODULE	IM880_MODULE	IM880_MODULE
U7	PCA9544AQFN-N20	PCA9544AQFN-N20	QFN-N20
U8	TLV62130	TLV62130	TQFN-16/3MM

# radio\_module

U9	LTC2941	LTC2941	DFN-6-2MMX3MM
U10	TXB0106	TXB0106	R-PVQFN-N16
U11	SAM4LC8BA	SAM4LC8BA	QFN-64-9MM
U12	UBLOX_SARA_G350	UBLOX_SARA_G350	UBLOX_SARA_G3
X2	16 MHz	FH1600015	FHXXX

## radio\_module

Description	DIGIKEY
0402 Capacitor	490-5867-1-ND
0402 Capacitor	490-5867-1-ND
0402 Capacitor	490-6241-1-ND
0402 Capacitor	491-6241-1-ND
0402 Capacitor	492-6241-1-ND
0402 Capacitor	493-6241-1-ND
0402 Capacitor	494-6241-1-ND
0402 Capacitor	490-1288-1-ND
0402 Capacitor	490-3248-1-ND
0402 Capacitor	491-3248-1-ND
0402 Capacitor	490-4516-1-ND
0402 Capacitor	490-6328-1-ND
0402 Capacitor	491-6328-1-ND
0402 Capacitor	492-6328-1-ND
0402 Capacitor	493-6328-1-ND
0402 Capacitor	494-6328-1-ND
0402 Capacitor	495-6328-1-ND
0402 Capacitor	496-6328-1-ND
0402 Capacitor	497-6328-1-ND
0402 Capacitor	498-6328-1-ND
0402 Capacitor	490-1320-1-ND
0402 Capacitor	490-5915-1-ND
0402 Capacitor	311-1729-1-ND
0402 Capacitor	312-1729-1-ND
0402 Capacitor	1276-6834-1-ND
0402 Capacitor	1277-6834-1-ND
0402 Capacitor	1276-3375-1-ND
	PESD0402-140CT-ND
	PESD0402-140CT-ND
	PESD0402-140CT-ND
	PESD0402-140CT-ND
	490-5216-1-ND
Module header and PCB	guilS9170-ND
WURTH Nano SIM Connecto	732-5954-1-ND
Header 2	3M9447-ND
A very specific inductor	541-1322-1-ND
A very specific inductor	541-1322-1-ND
LHQ3NP Inductor	490-5350-1-ND
LED	511-1578-1-ND
LED	512-1578-1-ND
SMA JACK SMT 50 OHM	WM9357-ND
SMA JACK SMT 50 OHM	WM9357-ND
Generic NMOS footprint	DMN2400UFB4-7DICT-ND
Generic NMOS footprint	DMN2400UFB4-7DICT-ND
Generic NMOS footprint	DMN2400UFB4-7DICT-ND
Generic NMOS footprint	DMN2400UFB4-7DICT-ND
6A SOT-23 P Fet	SI2333DDS-T1-GE3CT-ND
6A SOT-23 P Fet	SI2333DDS-T1-GE3CT-ND

## radio\_module

6A SOT-23 P Fet	SI2333DDS-T1-GE3CT-ND
Resistor	311-0.0JRCT-ND
Resistor	312-0.0JRCT-ND
Resistor	313-0.0JRCT-ND
Resistor	314-0.0JRCT-ND
Resistor	408-1406-1-ND
Resistor	P.43AKCT-ND
Resistor	541-3.32LLCT-ND
Resistor	311-1.0KJRCT-ND
Resistor	312-1.0KJRCT-ND
Resistor	311-10KJRCT-ND
Resistor	312-10KJRCT-ND
Resistor	313-10KJRCT-ND
Resistor	314-10KJRCT-ND
Resistor	315-10KJRCT-ND
Resistor	316-10KJRCT-ND
Resistor	317-10KJRCT-ND
Resistor	318-10KJRCT-ND
Resistor	319-10KJRCT-ND
Resistor	320-10KJRCT-ND
Resistor	321-10KJRCT-ND
Resistor	322-10KJRCT-ND
Resistor	323-10KJRCT-ND
Resistor	324-10KJRCT-ND
Resistor	325-10KJRCT-ND
Resistor	311-100KLRCT-ND
Resistor	312-100KLRCT-ND
Resistor	313-100KLRCT-ND
Resistor	314-100KLRCT-ND
Resistor	315-100KLRCT-ND
Resistor	316-100KLRCT-ND
Resistor	317-100KLRCT-ND
Resistor	318-100KLRCT-ND
Resistor	319-100KLRCT-ND
Resistor	320-100KLRCT-ND
Resistor	321-100KLRCT-ND
Resistor	322-100KLRCT-ND
Resistor	323-100KLRCT-ND
Resistor	P200KLCT-ND
Resistor	YAG3291CT-ND
Resistor	YAG3228CT-ND
Resistor	YAG3228CT-ND
Nucleum sensorboard prototyping module.	
High Efficient 3A switching st	296-35978-1-ND
I2C Battery Gas Gauge	LTC2941IDCB#TRMPBFCT-ND
I2C Battery Gas Gauge	LTC2941IDCB#TRMPBFCT-ND
Lora Radio module by IMST	
1-4 I2C/SMBUS Multiplexer v	296-20960-1-ND
High Efficient 3A switching st	296-35978-1-ND



## radio\_module

I2C Battery Gas Gauge      LTC2941IDCB#TRMPBFCT-ND  
6 channel level translator      296-23868-2-ND  
SAM4L Microcontroller. 64QFATSAM4LC8BA-MURDKR-ND  
Sara G350 2.5G Radio Module  
Pericom Type FH 16 MHz 2.5FH1600015CT-ND