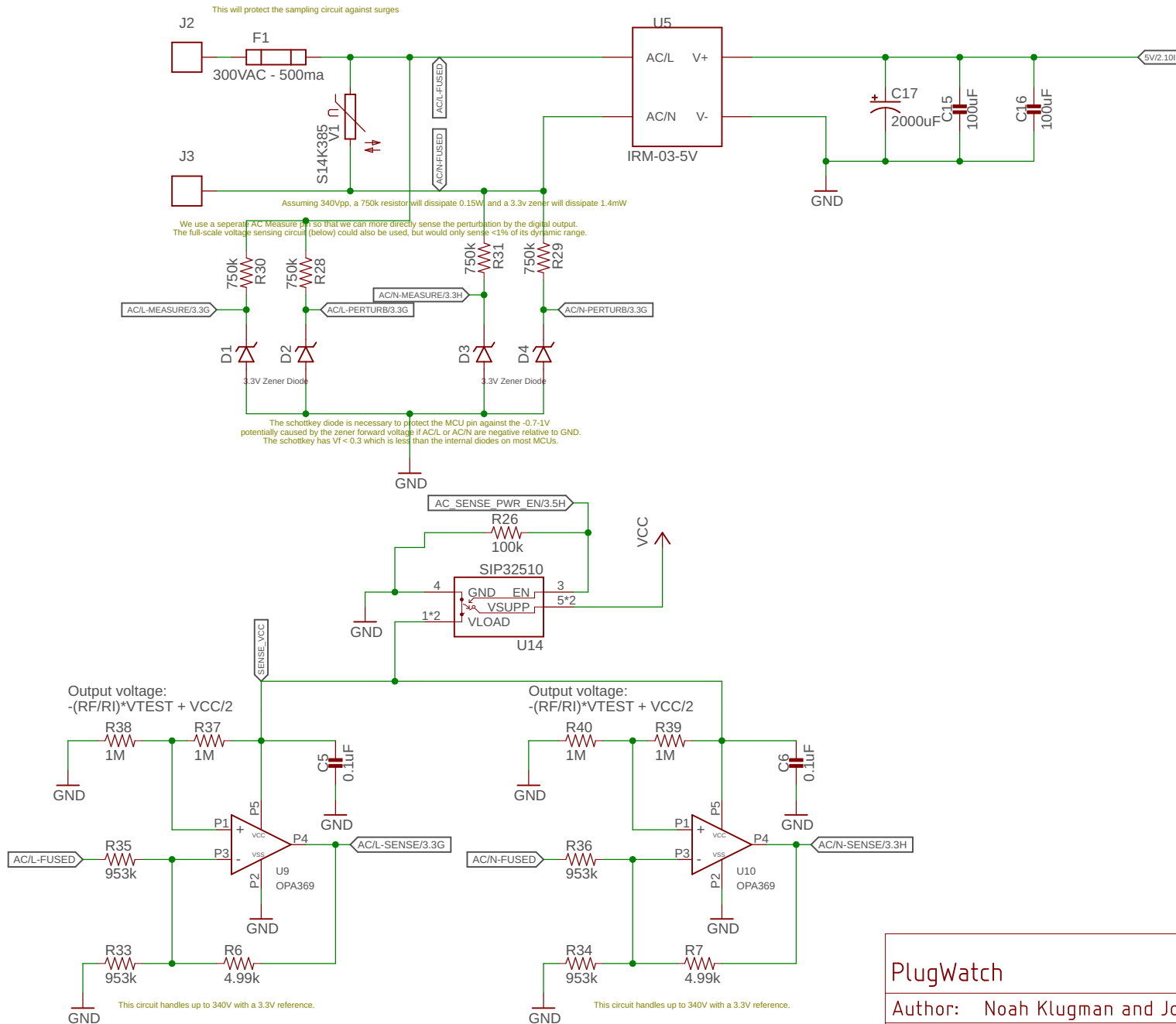
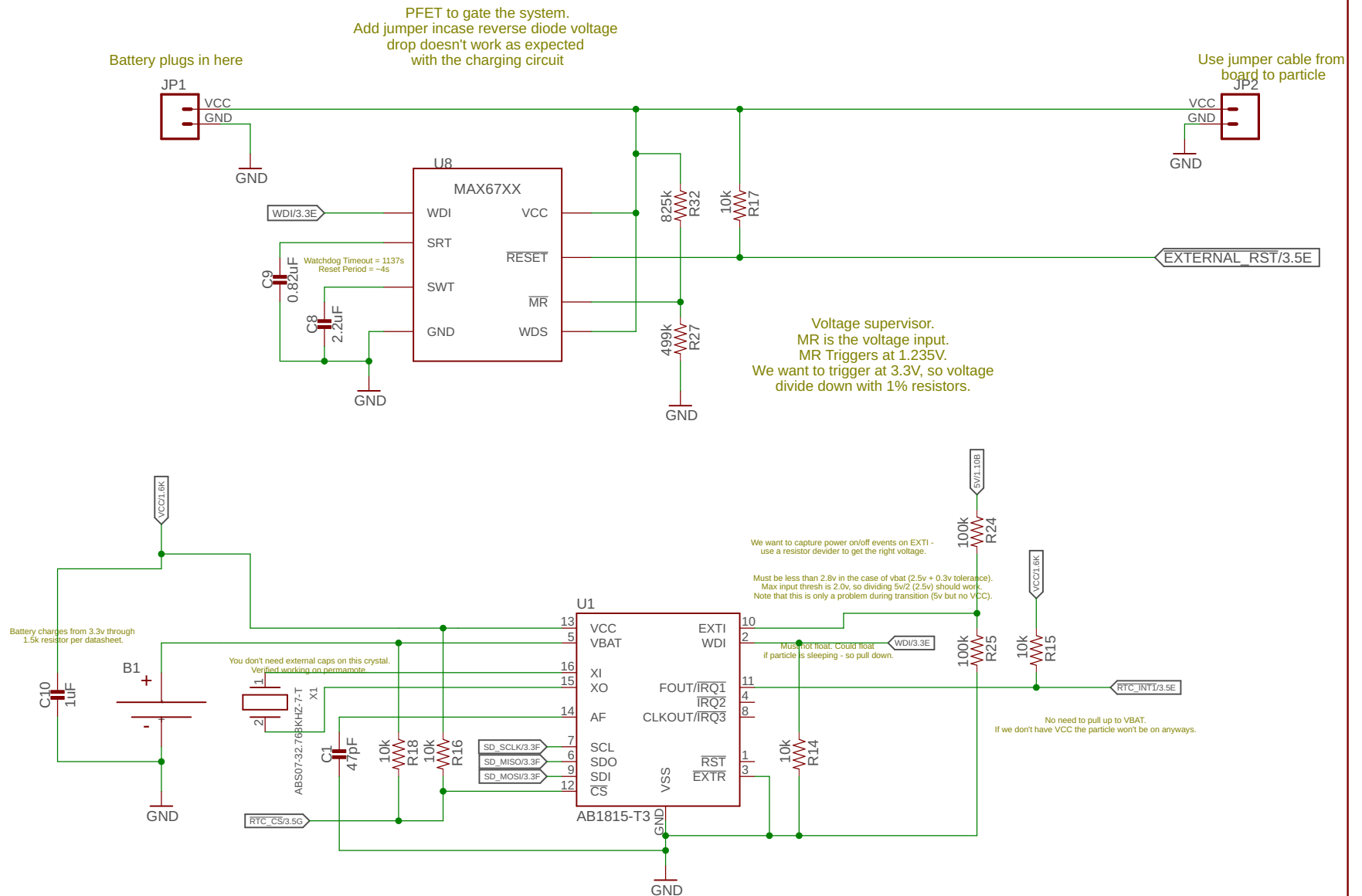


The peak power is $2A \cdot 600\mu s = -4.5mJ$. We are adding 8mJ of energy buffer to be safe. 8mJ of energy with a 5V to 4V swing is about 2mF





PlugWatch

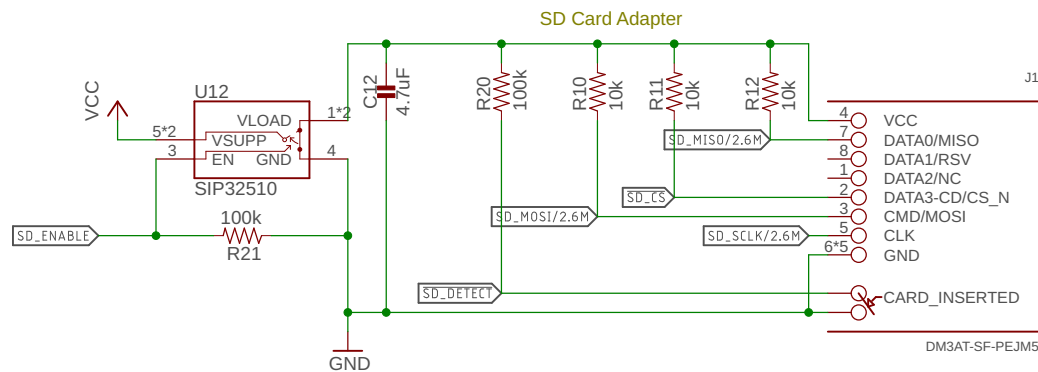
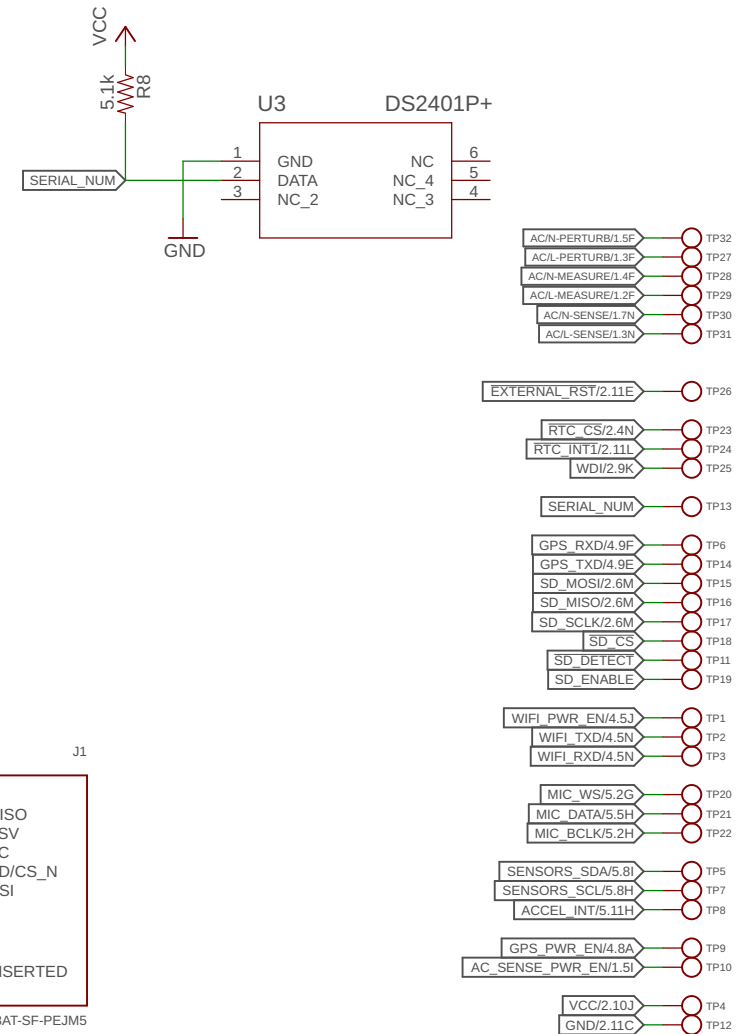
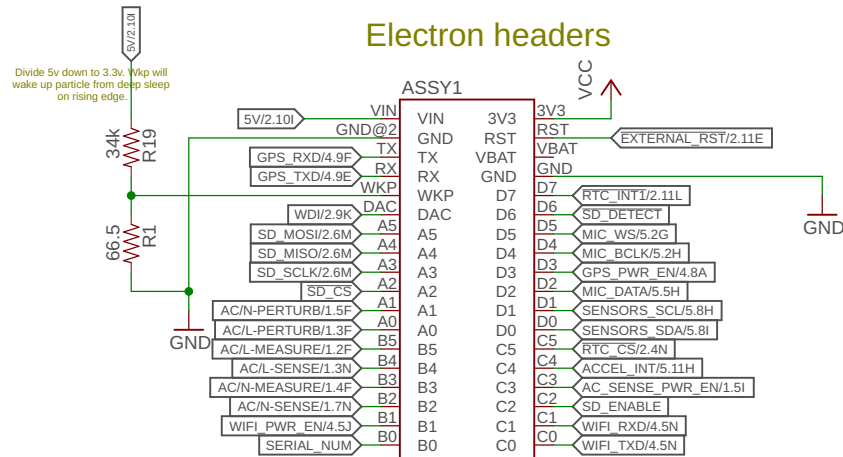
Author: Noah Klugman and Joshua Adkins

Date: 11/1/18 1:18 AM

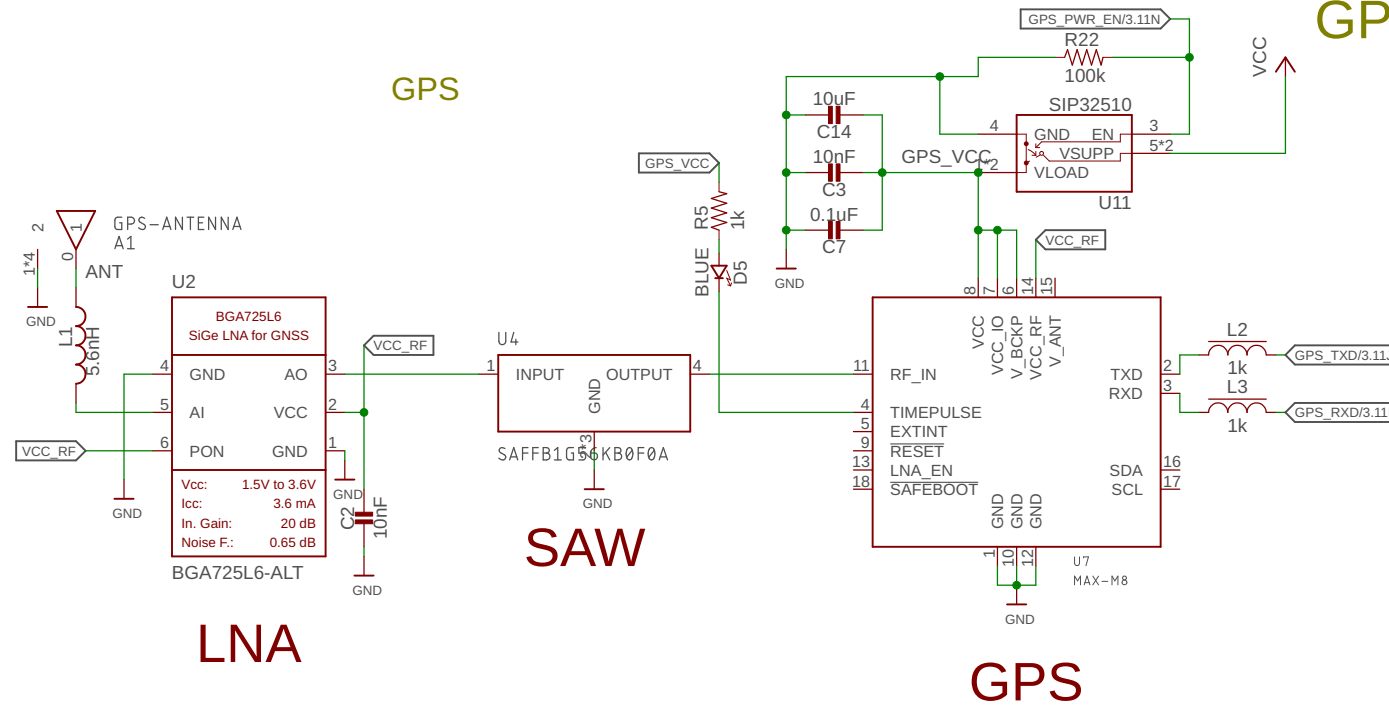
Sheet: 2/5

REV:
D

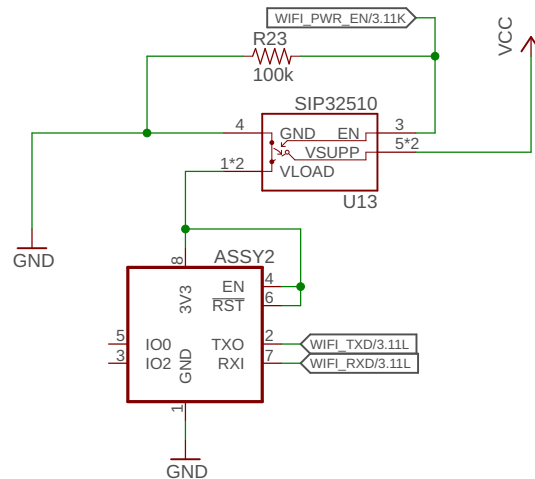
Headers



GPS and WiFi Radios



WiFi
<https://cdn.sparkfun.com/datasheets/Wireless/WiFi/ESP8266ModuleV1.pdf>



PlugWatch

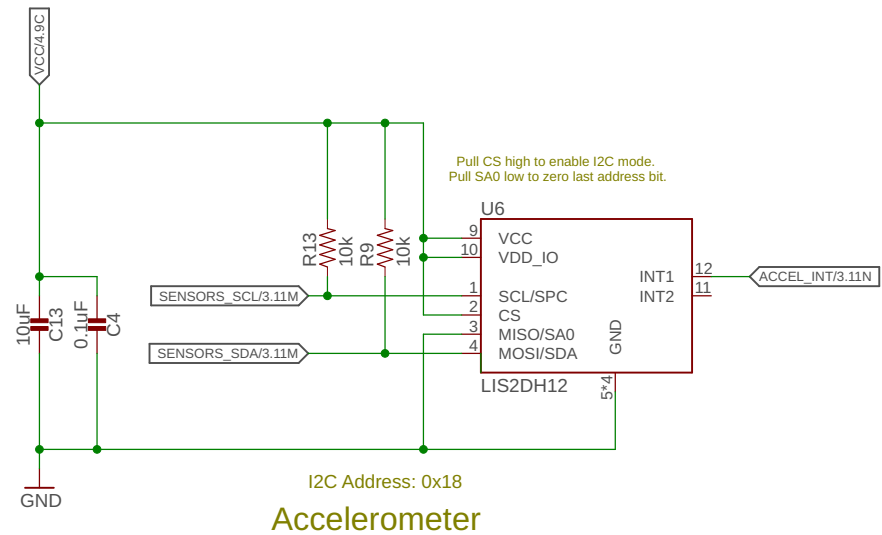
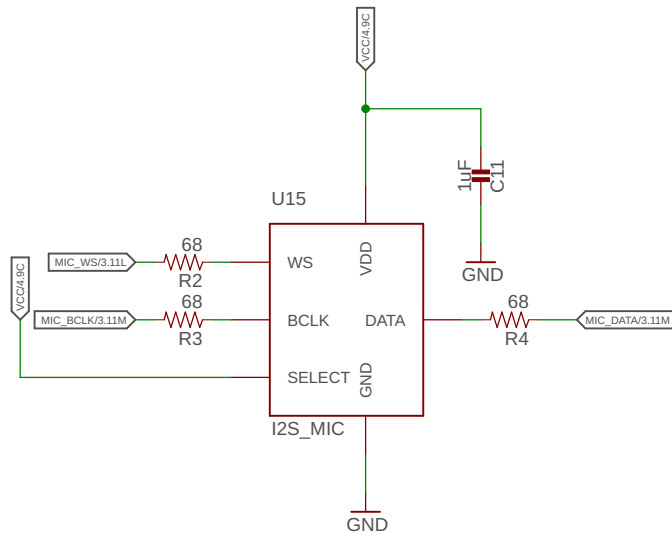
REV:
D

Author: Noah Klugman and Joshua Adkins

Date: 11/1/18 1:18 AM

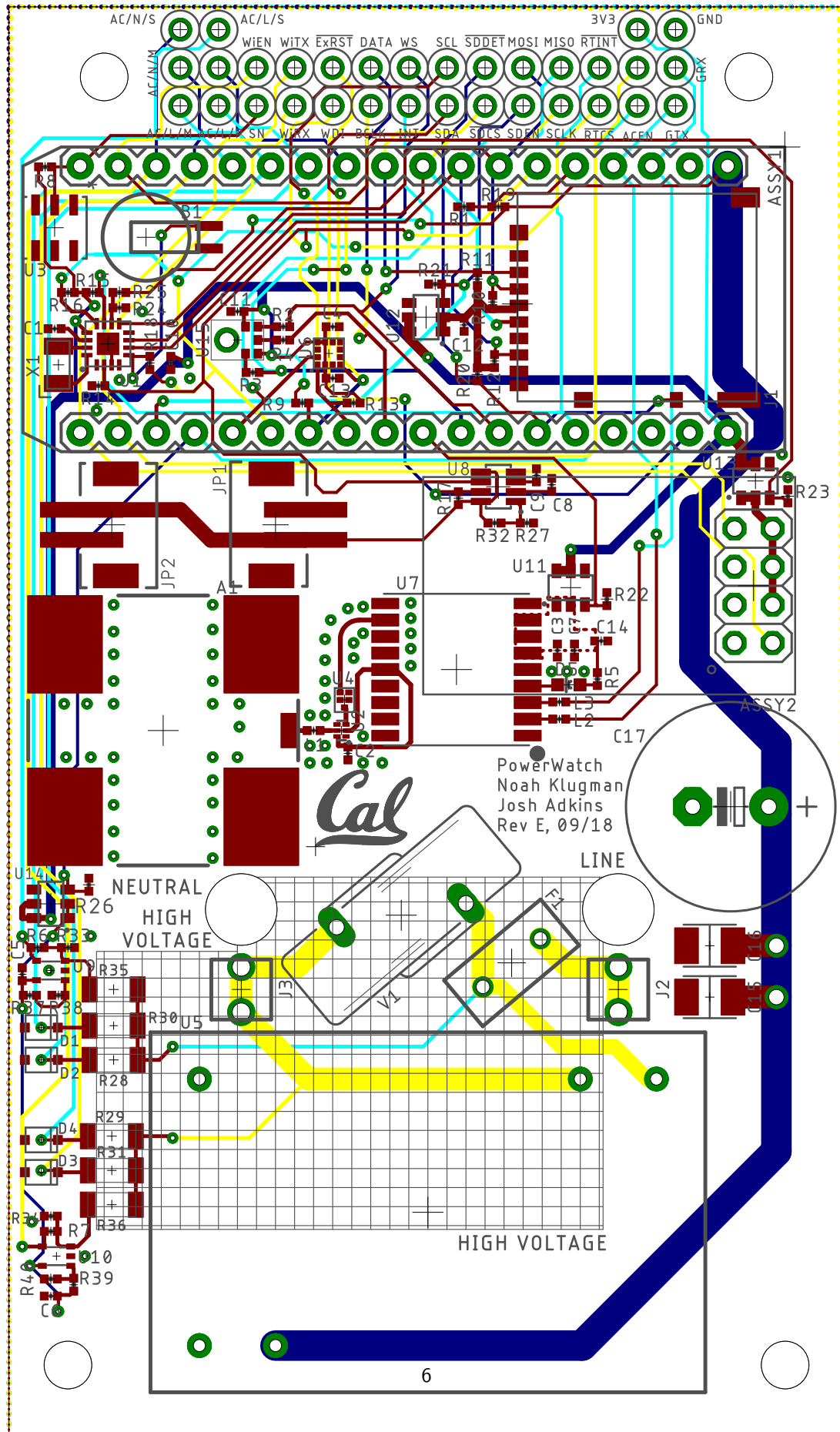
Sheet: 4/5

Sensors

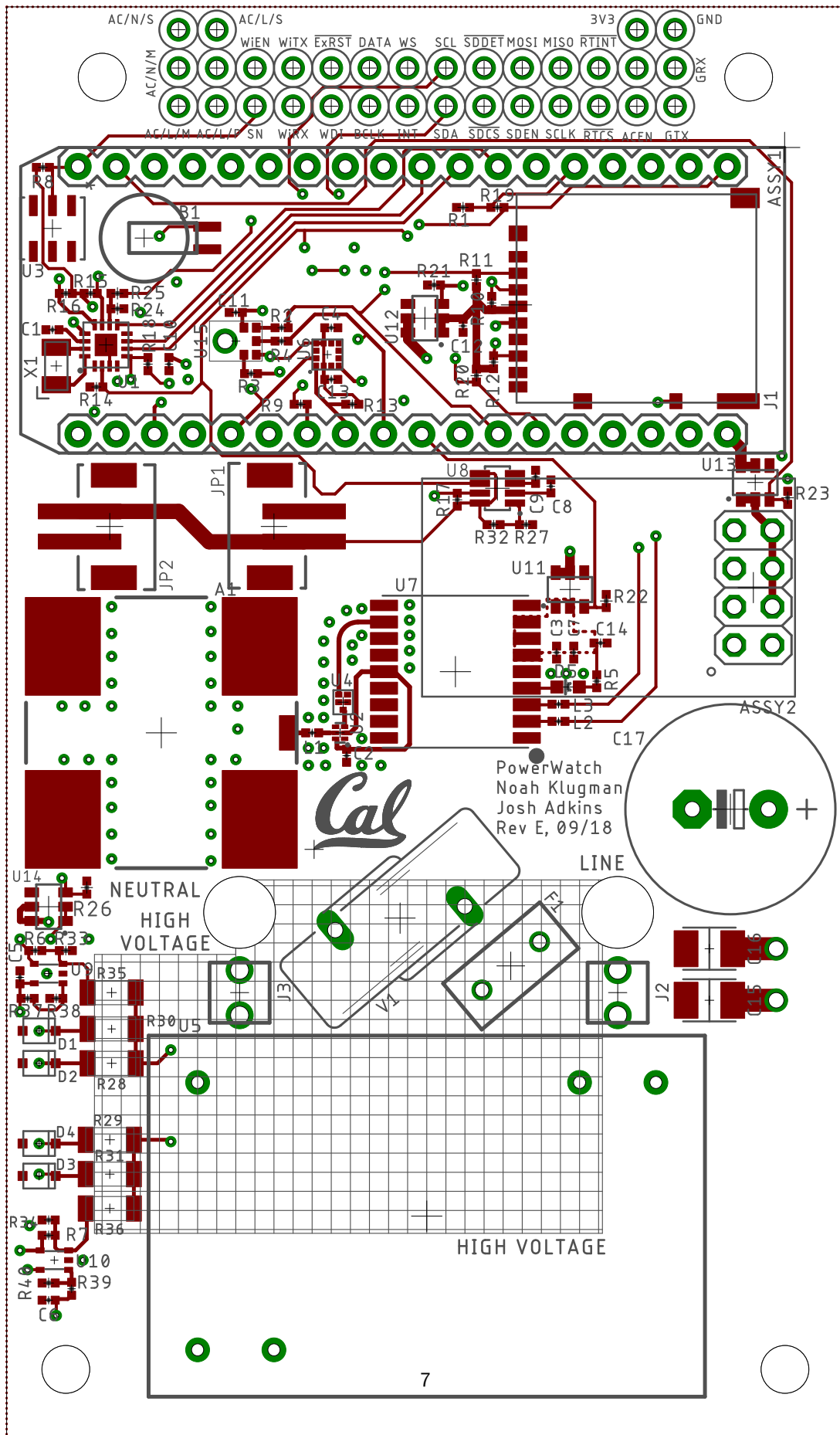


PlugWatch	REV: D
Author: Noah Klugman and Joshua Adkins	
Date: 11/1/18 1:18 AM	Sheet: 5/5

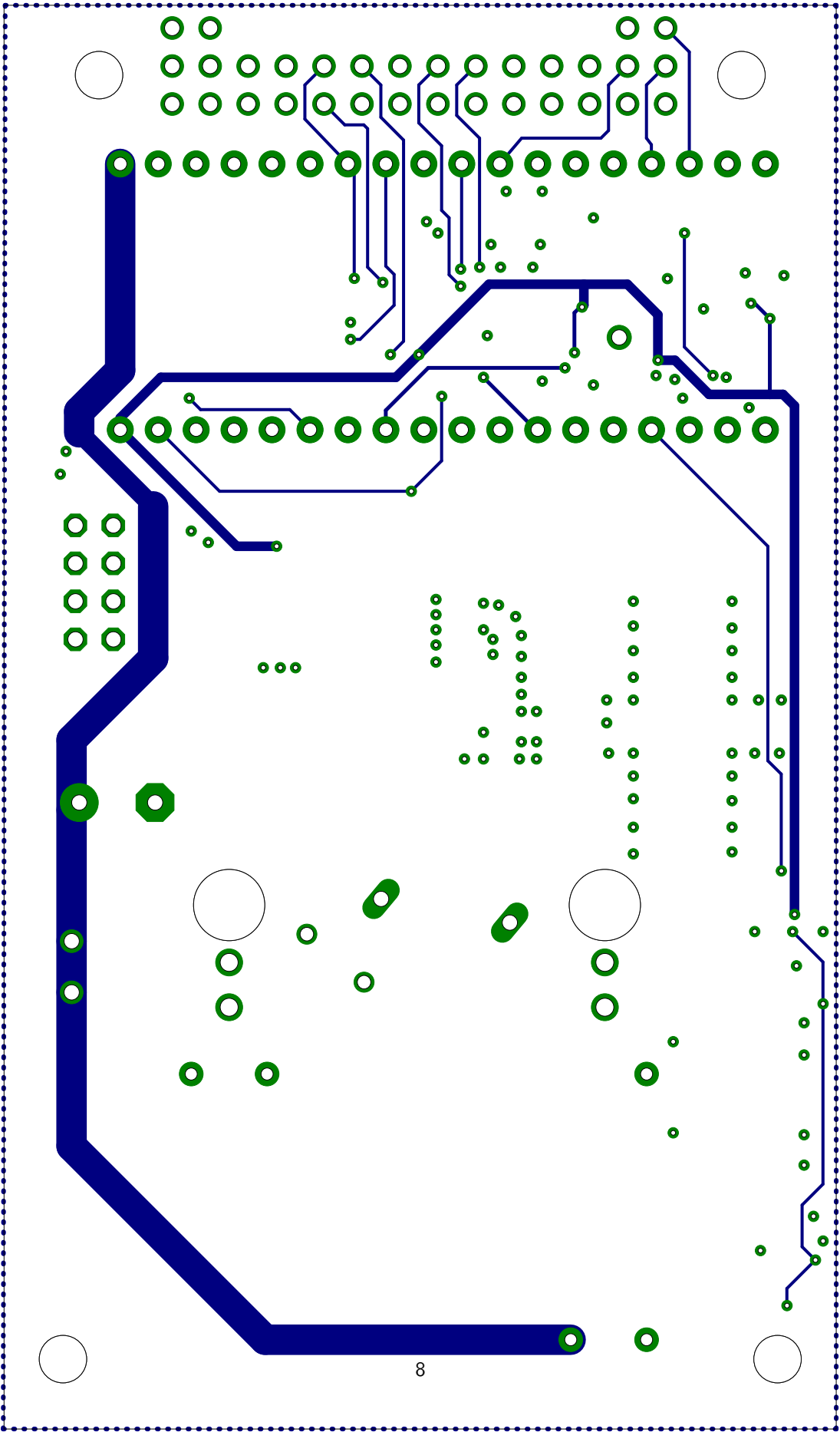
Top and Bottom Layers



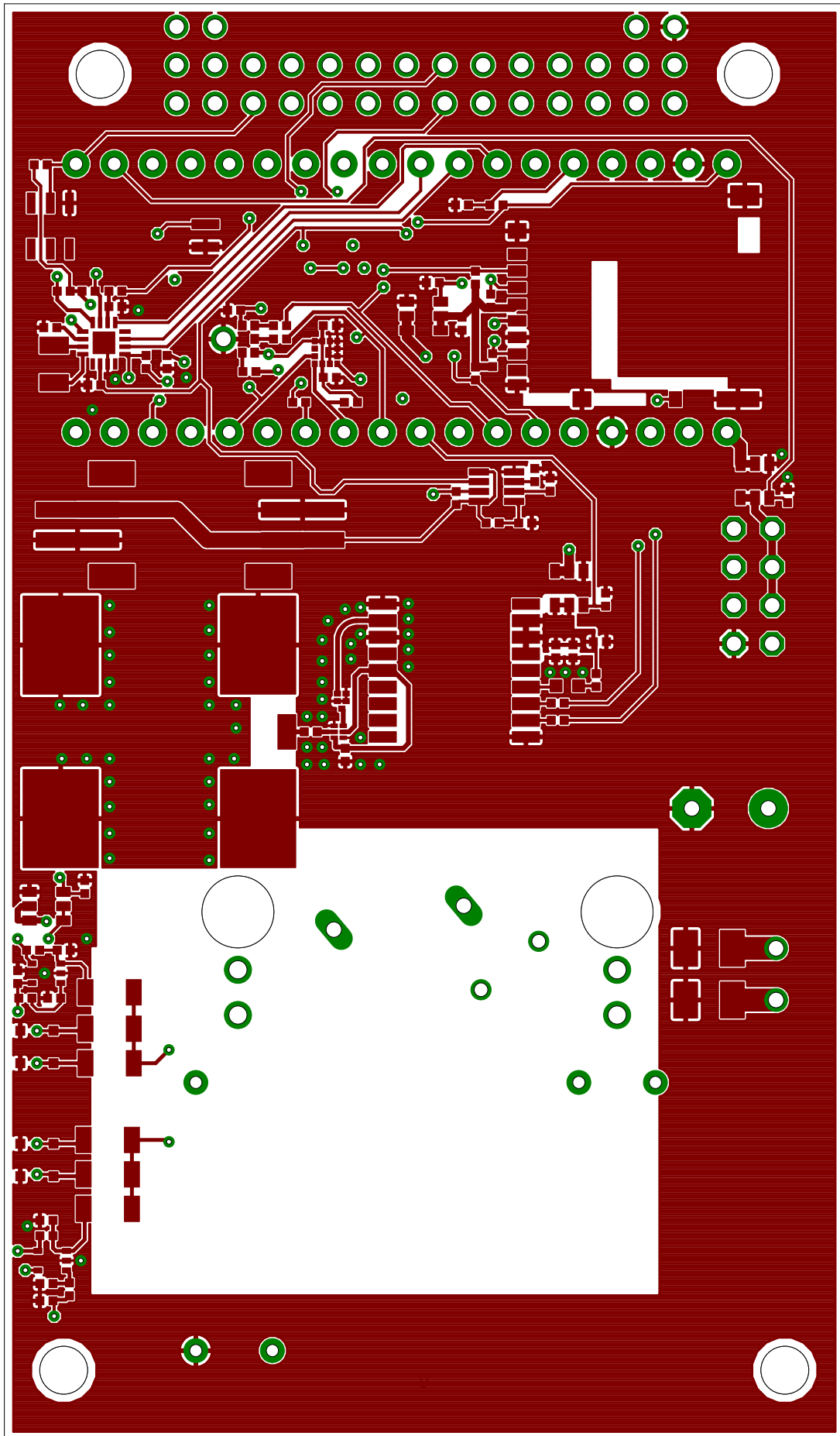
Top Layer



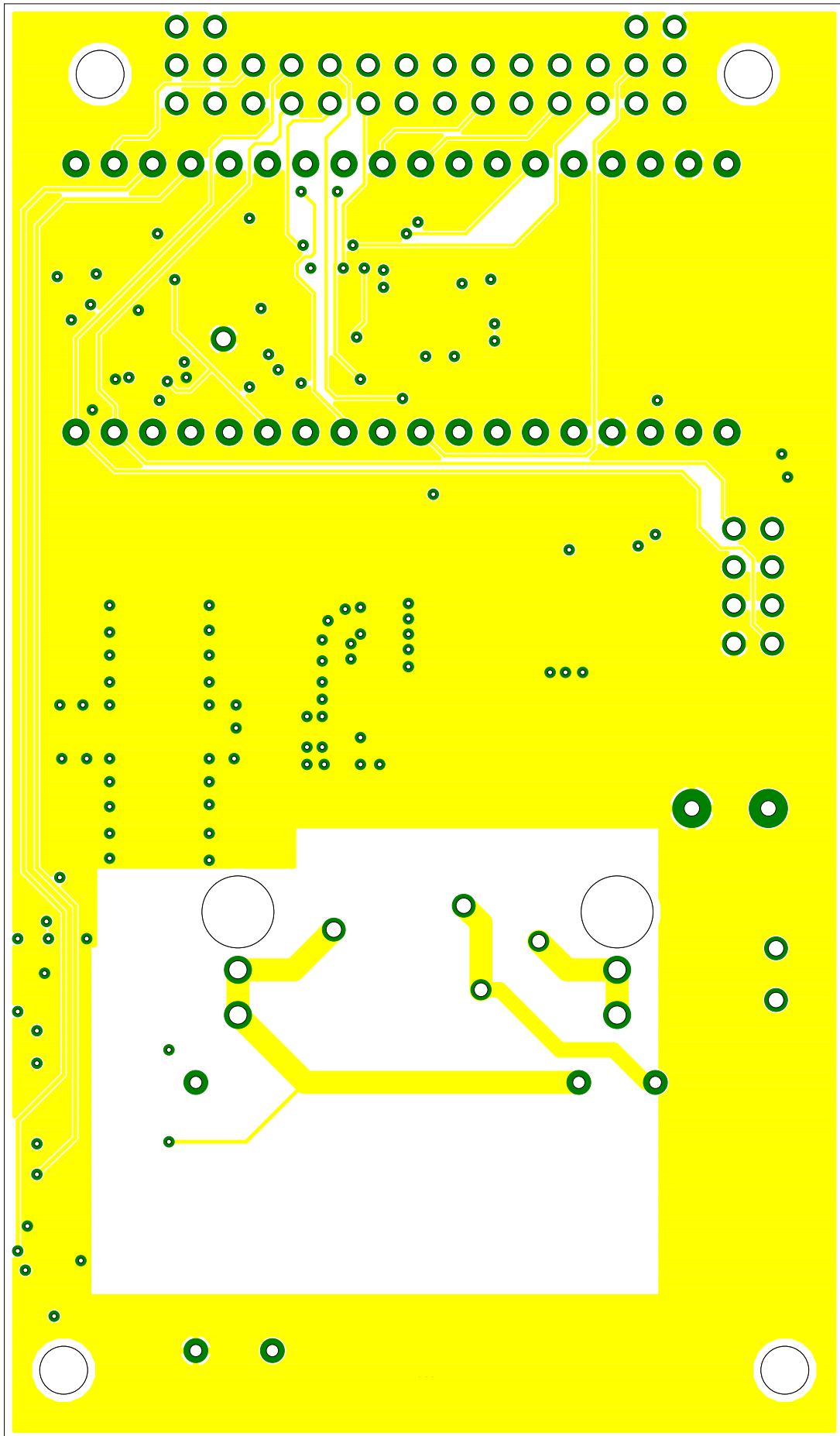
Bottom Layer



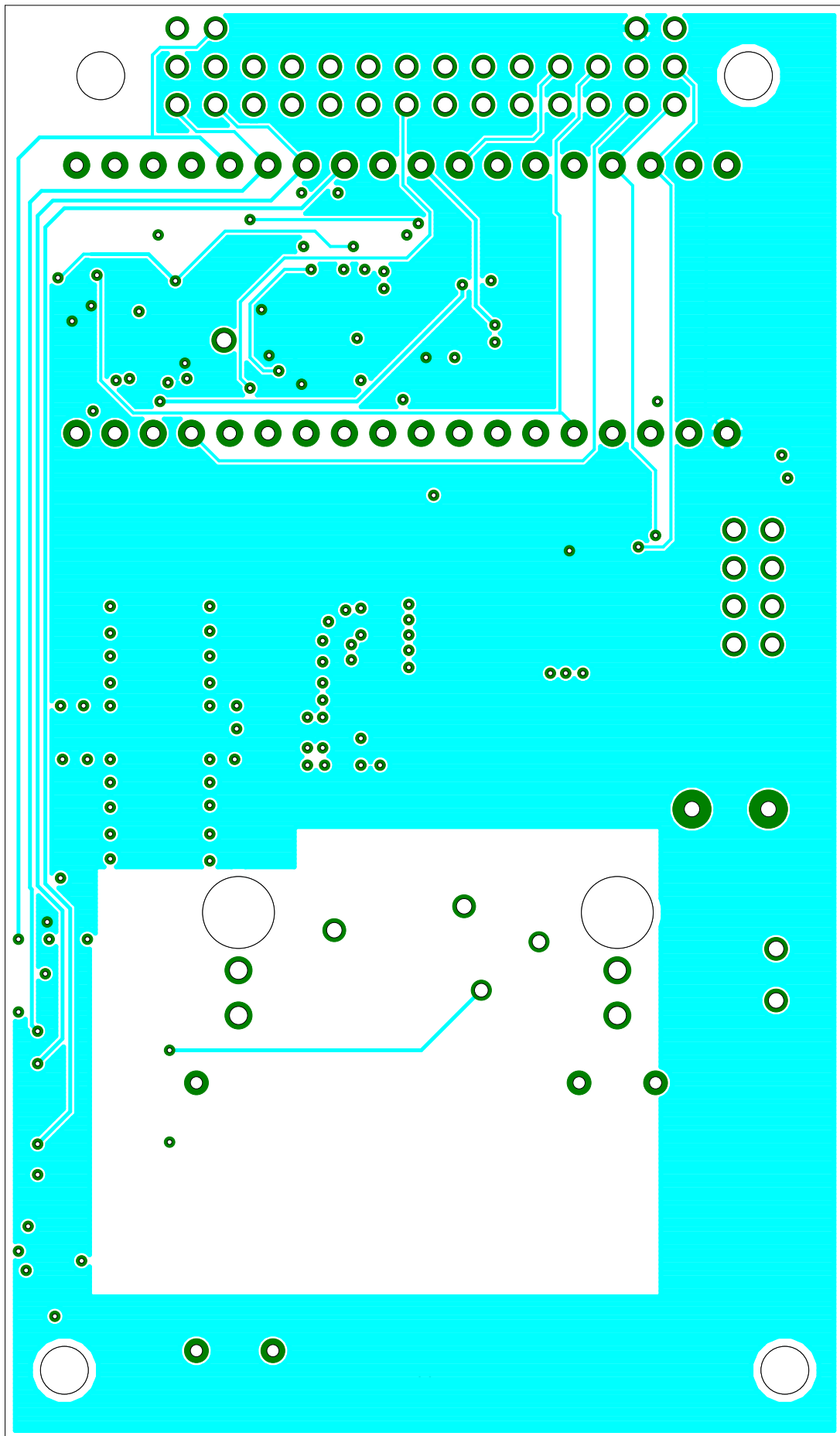
Top Copper Layer



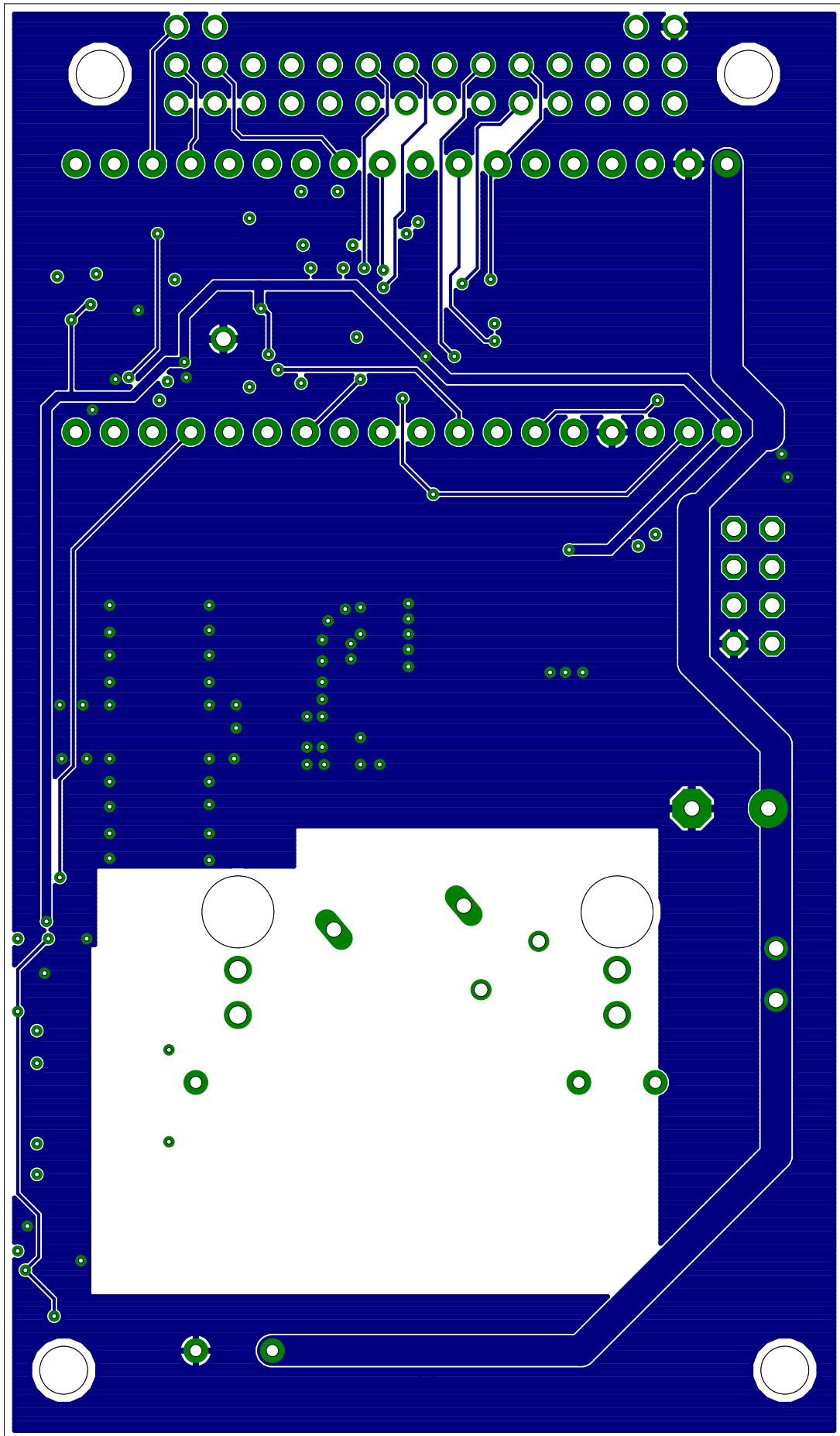
Layer 2 Copper



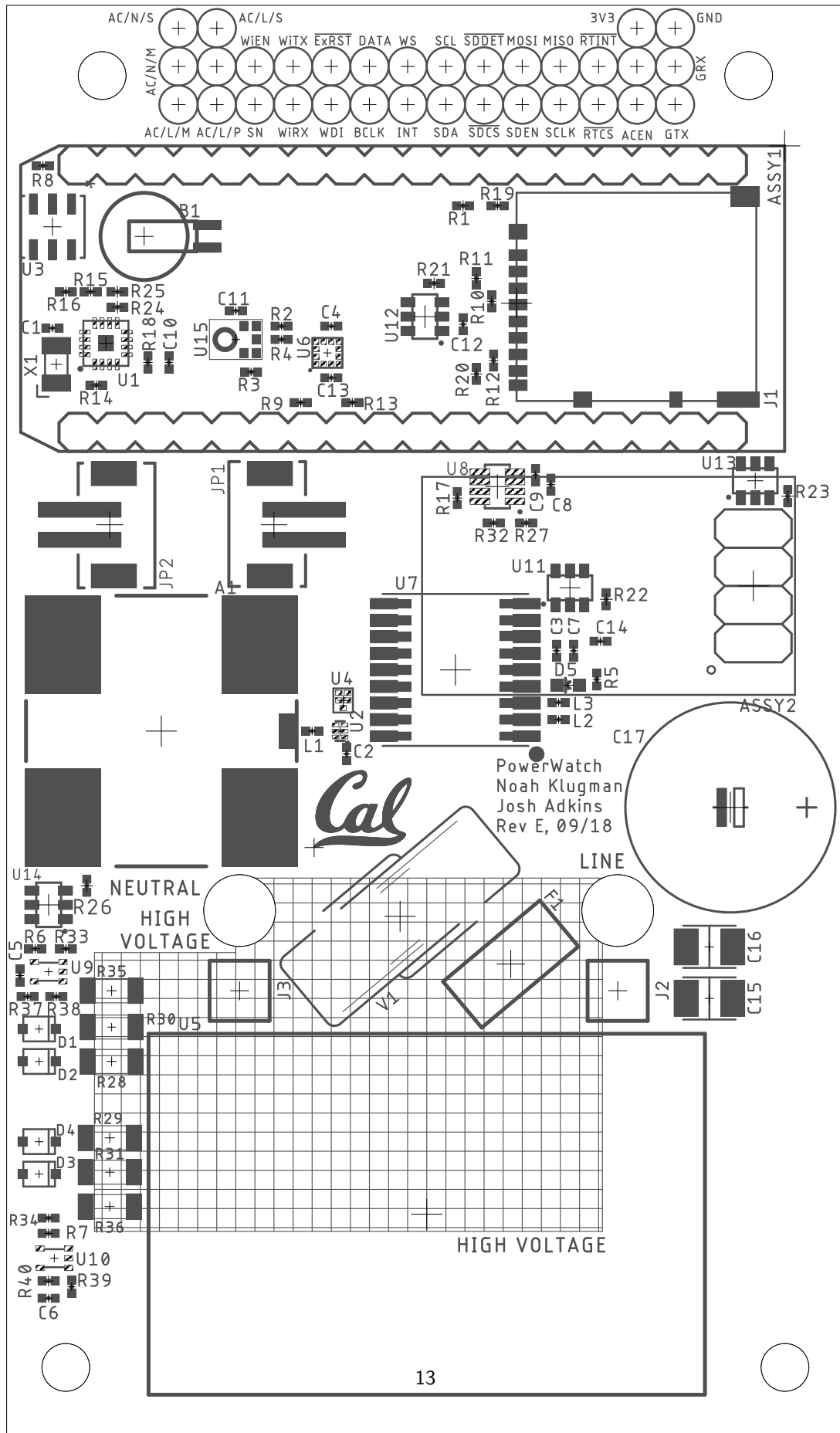
Layer 3 Copper



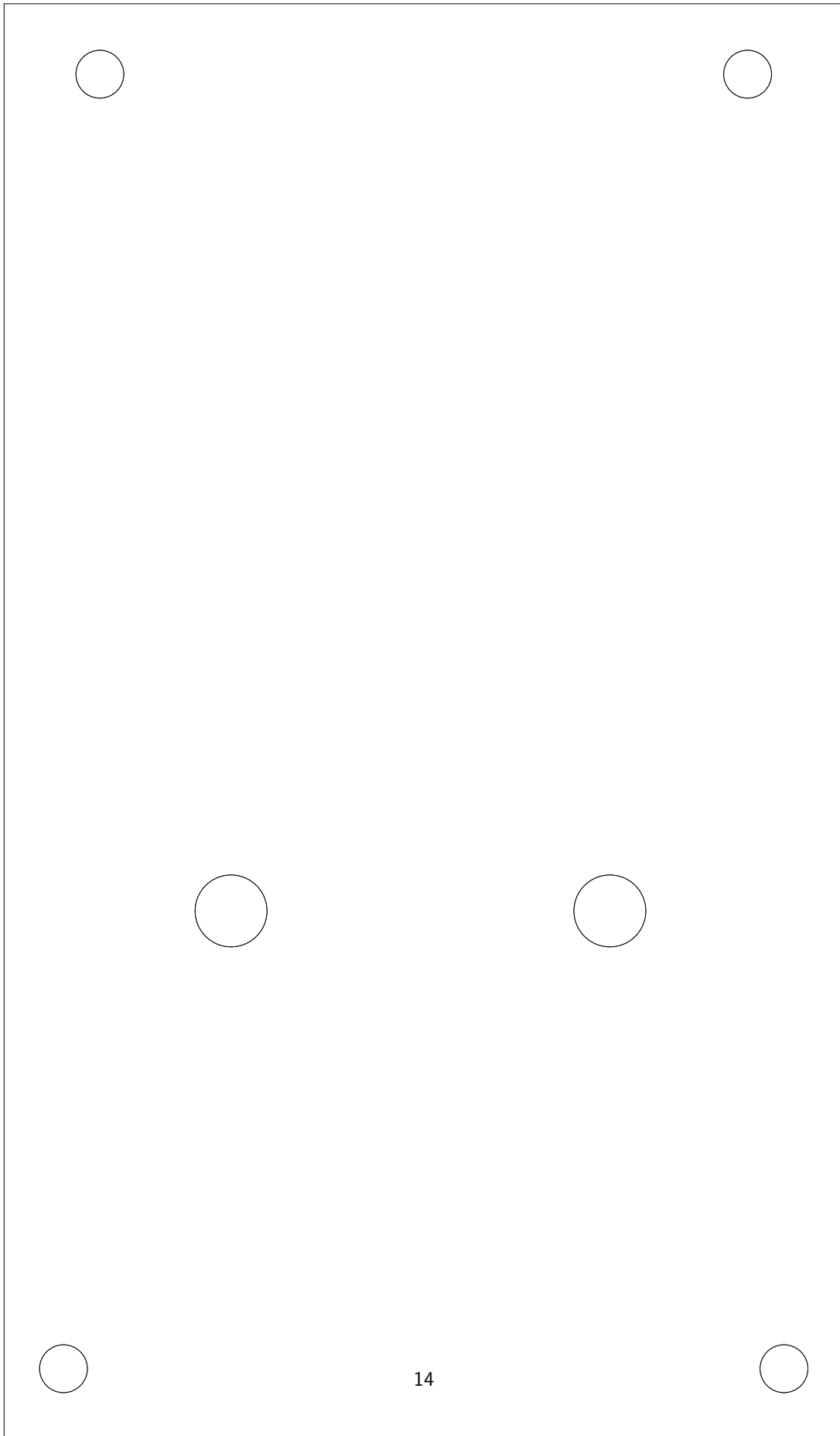
Bottom Copper Layer



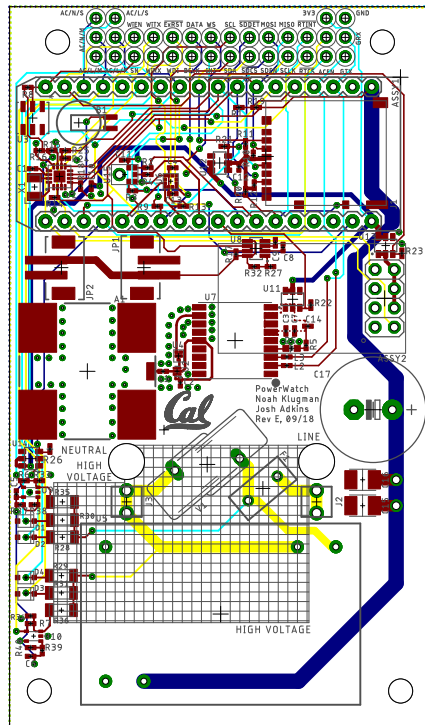
Top Paste Layer with Silkscreen

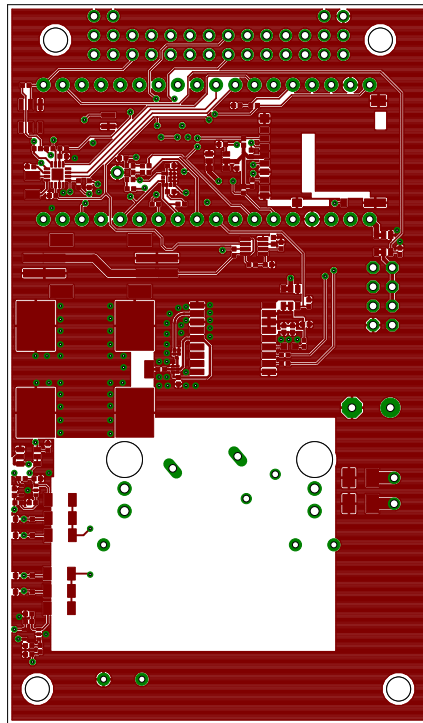


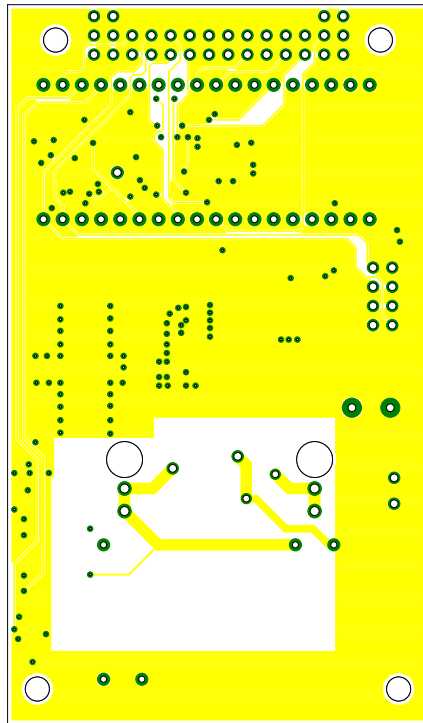
Bottom Paste Layer with Silkscreen

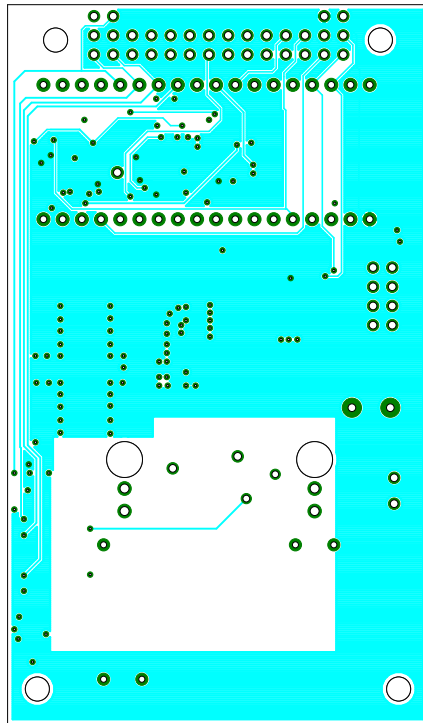


Top and Bottom Layers 1:1 Scale

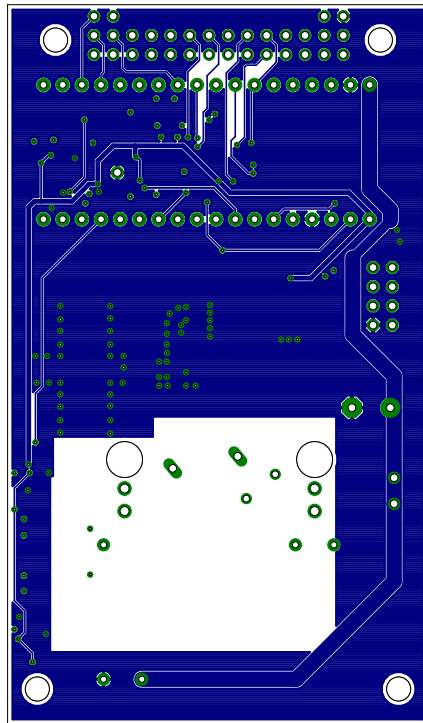








Bottom Copper Layer 1:1 Scale



plugwatch_bom

Qty	Value	Device
4		DIODE_ZENERSOT323
2		M024UCON-15767
1		MS518SE
1		SPH0645LM4H-B
4	0.1uF	CAPACITOR0402_CAP
1	0.82uF	CAPACITOR0402_CAP
7	100k	RESISTOR0402_RES
2	100uF	CAPACITOR1210_CAP
10	10k	RESISTOR0402_RES
2	10nF	CAPACITOR0402_CAP
2	10uF	CAPACITOR0402_CAP
4	1M	RESISTOR0402_RES
2	1k	FERRITE_BEAD0402
1	1k	RESISTOR0402_RES
2	1uF	CAPACITOR0402_CAP
1	2.2uF	CAPACITOR0402_CAP
1	2000uF	CPOL-USE5-13
1	300VAC - 500ma	MICRO_FUSE500MA_350VAC
1	34k	RESISTOR0402_RES
1	4.7uF	CAPACITOR0402_CAP
2	4.99k	RESISTOR0402_RES
1	47pF	CAPACITOR0402_CAP
1	499k	RESISTOR0402_RES
1	5.1k	RESISTOR0402_RES
1	5.6nH	INDUCTOR0402
1		66.5 RESISTOR0402_RES
3		68 RESISTOR0402_RES
4	750k	RESISTOR1206_RES_HIGH_CLEARANCE
1	825k	RESISTOR0402_RES
2	953k	RESISTOR0402_RES
2	953k	RESISTOR1206_RES_HIGH_CLEARANCE
1	AB1815-T3	AB1815-T3
1	ABS07-32.768KHZ-7-T	ABS07-32.768KHZ-7-T
1	BGA725L6-ALT	BGA725L6-ALT
1	BLUE	LED0603
1	DM3AT-SF-PEJM5	DM3AT-SF-PEJM5
1	DS2401P+	DS2401P+
1	ELECTRON	ELECTRON
1	GPS-ANTENNA	GPS-ANTENNA
1	IRM-03-5V	IRM-03-5V
1	LIS2DH12	LIS2DW12
1	MAX-M8	MAX-M8
1	MAX67XXMAX6749MAX67XX	MAX67XXMAX6749MAX67XX
2	OPA369	OPA369
1	S14K385	S14K385
1	SAFFB1G56KB0F0A	FILTERS
2	SCREW_TERMNIAL_1	SCREW_TERMNIAL_1
4	SIP32510	SIP32510

plugwatch_bom

1 WRL-13678

WRL-13678

plugwatch_bom

Package
SOD323
JST-2-SMD-VERT
MS518SE-FL35E
SPH0465
0402_CAP
0402_CAP
0402_RES
1210_CAP
0402_RES
0402_CAP
0402_CAP
0402_RES
0402_CAP
0402_RES
0402_CAP
0402_CAP
E5-13
MIRCRO_FUSE_5MM
0402_RES
0402_CAP
0402_RES
0402_CAP
0402_RES
0402_RES
0402_CAP
0402_RES
0402_RES
1206_RES_HIGH_CLEARANCE
0402_RES
0402_RES
1206_RES_HIGH_CLEARANCE
QFN-16-3MM
2-SMD
LNA-TSLP-6-2-ALT
LED-0603
DM3AT-SF-PEJM5
21-0382
ELECTRON_SINGLE-ROW
ANT1818B00BT1516S
IRM-03
LGA-12
MAX-M8
SOT-23-8
SC70-5
S14K385
QCS5I
360272-TERMINAL-BLOCK
TSOT23-6

WRL-13678

plugwatch_bom

Parts

D1,D2,D3,D4

JP1,JP2

B1

U15

C4,C5,C6,C7

C9

R20,R21,R22,R23,R24,R25,R26

C15,C16

R9,R10,R11,R12,R13,R14,R15,R16,R17,R18

C2,C3

C13,C14

R37,R38,R39,R40

L2,L3

R5

C10,C11

C8

C17

F1

R19

C12

R6,R7

C1

R27

R8

L1

R1

R2,R3,R4

R28,R29,R30,R31

R32

R33,R34

R35,R36

U1

X1

U2

D5

J1

U3

ASSY1

A1

U5

U6

U7

U8

U9,U10

V1

U4

J2,J3

U11,U12,U13,U14

ASSY2

plugwatch_bom

Description	DESCRIPTION
Header 2	DIODE ZENER 3.3V 200MW SOD323F
A small, low leakage rechargeable battery for RTC backup	CONN HEADER PH TOP 2POS 2MM SMD
An I2S microphone down to 20hz	
SMD Capacitor	CAP CER 0.1UF 10V X5R 0402
SMD Capacitor	
Resistor	RES SMD 100K OHM 1% 1/16W 0402
SMD Capacitor	CAP CER 100UF 10V X5R 1210
Resistor	RES SMD 10K OHM 1% 1/16W 0402
SMD Capacitor	CAP CER 10000PF 16V X7R 0402
SMD Capacitor	CAP CER 10UF 6.3V X5R 0402
Resistor	RES 1M OHM 1% 1/16W 0402
	FERRITE BEAD 1 KOHM 0402 1LN
Resistor	RES SMD 1K OHM 1% 1/16W 0402
SMD Capacitor	CAP CER 1UF 10V X7S 0402
SMD Capacitor	
POLARIZED CAPACITOR, American symbol	CAP ALUM 2000UF 20% 6.3V T/H
A 5mm AC micro fuse package	FUSE BRD MNT 500MA 350VAC 100VDC
Resistor	RES SMD 34K OHM 1% 1/10W 0402
SMD Capacitor	CAP CER 4.7UF 6.3V X5R 0402
Resistor	RES SMD 4.99K OHM 1% 1/10W 0402
SMD Capacitor	CAP CER 47PF 100V C0G/NP0 0402
Resistor	RES SMD 499K OHM 1% 1/10W 0402
Resistor	RES SMD 5.1K OHM 1% 1/10W 0402
A very specific inductor	FIXED IND 5.6NH 1.77A 40 MOHM
Resistor	RES SMD 66.5 OHM 1% 1/16W 0402
Resistor	RES SMD 68 OHM 1% 1/16W 0402
Resistor	RES SMD 750K OHM 1% 1/4W 1206
Resistor	RES SMD 825K OHM 1% 1/10W 0402
Resistor	RES SMD 953K OHM 1% 1/16W 0402
Resistor	
Ultra-low current RTC. 55nA quiescent @ 3V. 1.5-3.6V input.	
32.768kHz Crystal	IC AMP MMIC RF LNA 20DB TSLP-6
LED	LED BLUE CLEAR SMD
CONN MICRO SD R/A PUSH-PUSH SMD	CONN MICRO SD CARD PUSH-PUSH R/A
A one wire serial number chip.	
	18 Position header
	PATCH ANT GPS/GLO CP SMD
A 5V 3W board mount power supply	
ultra low power 3 axis accelerometer	
	IC RECEIVER GPS/GNSS 18LCC
A simple watchdog timer with adjustable timeouts and reset time	
VARISTOR	VARISTOR 620V 5KA DISC 14MM
	FILTER SAW 1.582GHZ 5SMD
A small, single terminal block	
Load switch, slew rate controlled. By Vishay	

ESP8266 WiFi Module

plugwatch_bom

DIGIKEY	MANUFACTURER	MOUSER
MM3Z3V3BCT-ND	ON Semiconductor	
455-1734-1-ND	JST Sales America Inc.	
728-1054-ND	Seiko	
423-1405-1-ND	Knowles	721-SPH0645LM4H-B
311-1336-1-ND	Yageo	
490-10440-1-ND	Murata Electronics North America	
311-100KLRCT-ND	Yageo	
490-9969-6-ND	Murata Electronics North America	
311-10.0KLRCT-ND	Yageo	
490-4762-1-ND	Murata Electronics North America	
490-13211-1-ND	Murata Electronics North America	
311-1.00MLRCT-ND	Yageo	
490-4003-1-ND	Murata	
311-1.00KLRCT-ND	Yageo	
490-13409-1-ND	Murata Electronics North America	
490-10448-1-ND	Murata Electronics North America	
P122284TB-ND	Panasonic Electronic Components	
507-1903-ND	Bel Fuse Inc	
P34.0KLCT-ND	Panasonic Electronic Components	
490-5408-1-ND	Murata Electronics North America	
P4.99KLCT-ND	Panasonic Electronic Components	
490-7307-1-ND	Murata Electronics North America	
P499KLCT-ND	Panasonic Electronic Components	
P5.10KLCT-ND	Panasonic Electronic Components	
490-11766-1-ND	Murata	
YAG3210CT-ND	Yageo	
P68.0LCT-ND	Panasonic Electronic Components	
311-750KFRCT-ND	Yageo	
P825KLCT-ND	Panasonic Electronic Components	
YAG3262CT-ND	Yageo	
P953KBCCT-ND	Panasonic Electronic Components	
535-11936-1-ND	Abracon	
535-9543-1-ND	ABRACON	
BGA725L6E6327FTSA1CT-ND	Infineon	
160-1837-6-ND	Lite-On Inc.	
HR1964CT-ND	Hirose Electric Co Ltd	
DS2401P+-ND	Maxim Integrated	
S7051-ND,S7051-ND	Sullins	
311-1531-ND	Yageo	
1866-3020-ND	Mean Well USA	
497-14851-1-ND	STMicroelectronics	511-LIS2DH12TR
672-1003-1-ND	u-blox	
MAX6749KA+TCT-ND	Maxim Integrated	
296-25252-1-ND	Texas Instruments	
495-5945-ND	EPCOS (TDK)	
587-3990-1-ND	Taiyo Yuden	
1849-1246-ND	METZ CONNECT USA Inc.	
SIP32510DT-T1-GE3CT-ND	Vishay	

plugwatch_bom

1568-1235-ND

plugwatch_bom

MPN	SPICEPREFIX
MM3Z3V3B	
B2B-PH-SM4-TB(LF)(SN)	
MS518SE-FL35E	
SPH0645LM4H-B	
CC0402KRX5R6BB104	
GRM155C80J824KE15D	
RC0402FR-07100KL	
GRM32ER61A107ME20L	
RC0402FR-0710KL	
GCM155R71H103KA55D	
GRJ155R60J106ME11D	
RC0402FR-071ML	
BLM15HD102SN1D	
RC0402FR-071KL	
GCM155C71A105KE38D	
GRM155D71A225ME15D	
EEU-FS0J202B	C
0697H0500-01	
ERJ-2RKF3402X	
GRM155R60J475ME87D	
ERJ-2RKF4991X	
GRM155C2A470JA01D	
ERJ-2RKF4993X	
ERJ-2RKF5101X	
LQW15AN5N6B80D	
RC0402FR-0766R5L	
ERJ-2RKF68R0X	
RC1206FR-07750KL	
ERJ-2RKF8253X	
RC0402FR-07953KL	
ERA-8AEB9533V	
AB1815-T3	
ABS07-32.768KHZ-7-T	
BGA725L6E6327FTSA1	
LTST-C194TBKT	
DM3AT-SF-PEJM5	
DS2401P+	X
PPPC181LFBN-RC	
ANT1818B00BT1516S	
IRM-03-5	
LIS2DH12TR	
MAX-M8Q-0	
MAX6749KA+T	
OPA369AIDCKR	
B72214S2381K101	
F6QA1G582H2JM-J	
	360272
SIP32510DT-T1-GE3	