ECE 298 Reservoir System Lab B4 Report

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LS-003
Group 14

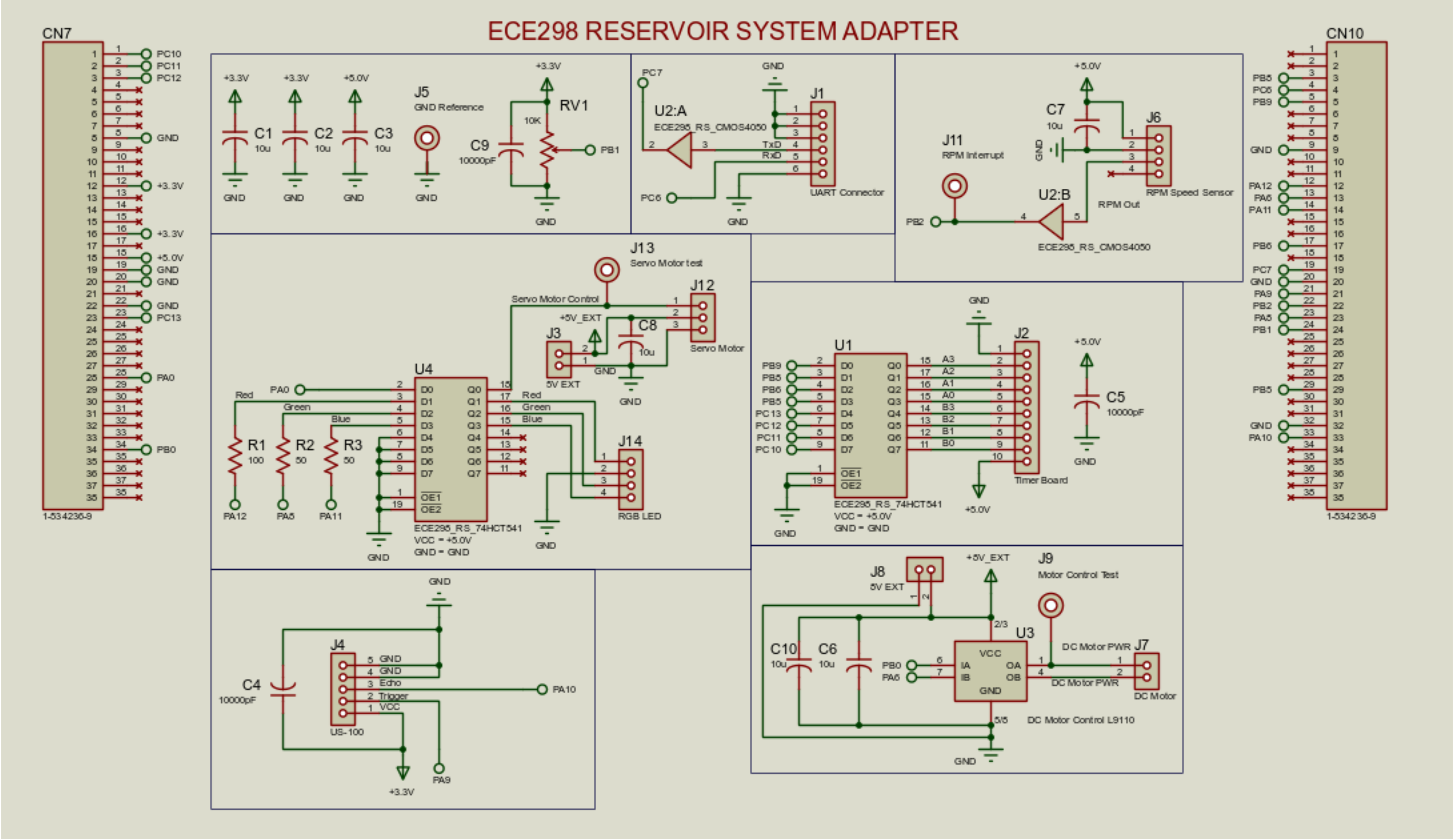
24-Hour Operating Cycle

Zone	Start Time	End Time	RPM	Power (kW)	Energy (kWh)	Water Transferred (Gallons)	Energy Rate ($)	Energy Cost ($)
Inlet	0	7	100	375	2625	71400	0.024	63.00
Inlet	7	10	88	250	750	22600	0.102	76.50
Zone 2	10	14	100	375	1500	30000	0.102	153.00
Zone 1	14	16	80	190	380	21000	0.102	38.76
Zone 1	16	18	70	125	250	17420	0.24	60.00
Zone 1*	21	22	100	375	375	11580	0.102	38.25
Zone 3	22	23	100	375	375	7000	0.102	38.25
Zone 3	23	24	100	375	375	7000	0.024	9.00
Total	0	24	-	-	6630	188000	-	476.76

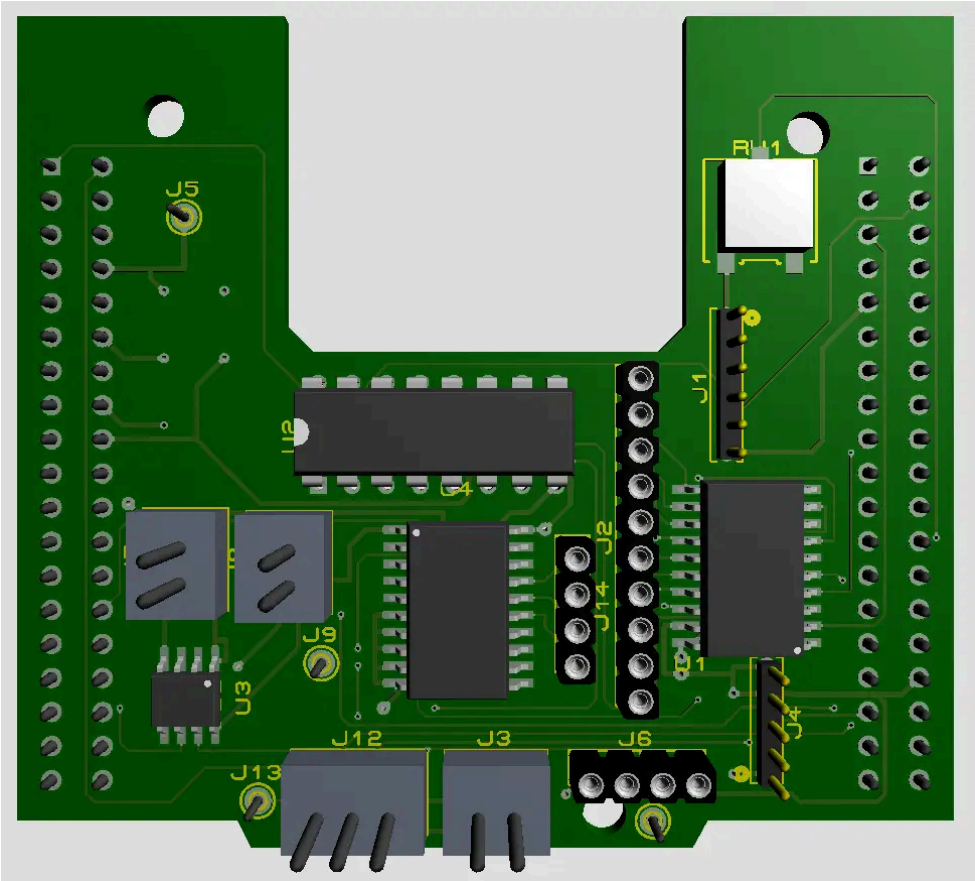
Using ULO rates, weekday only.

*Operational time split to optimize cost.

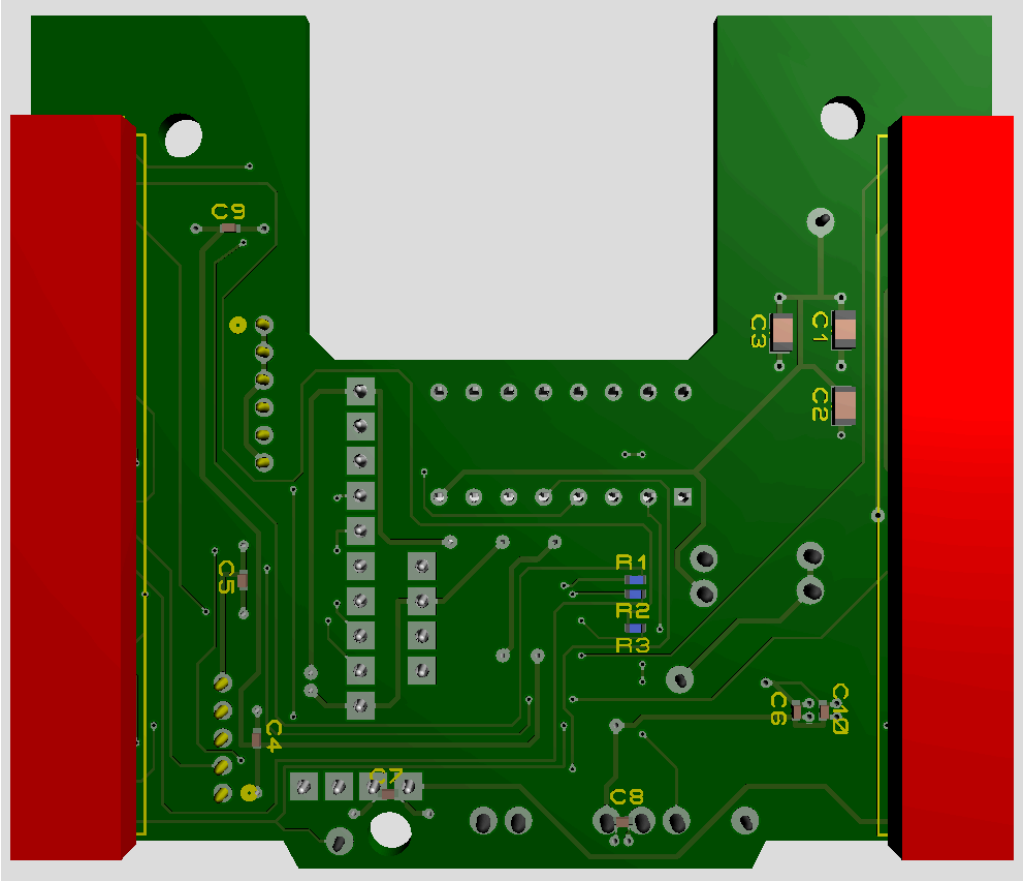
Schematic Diagram



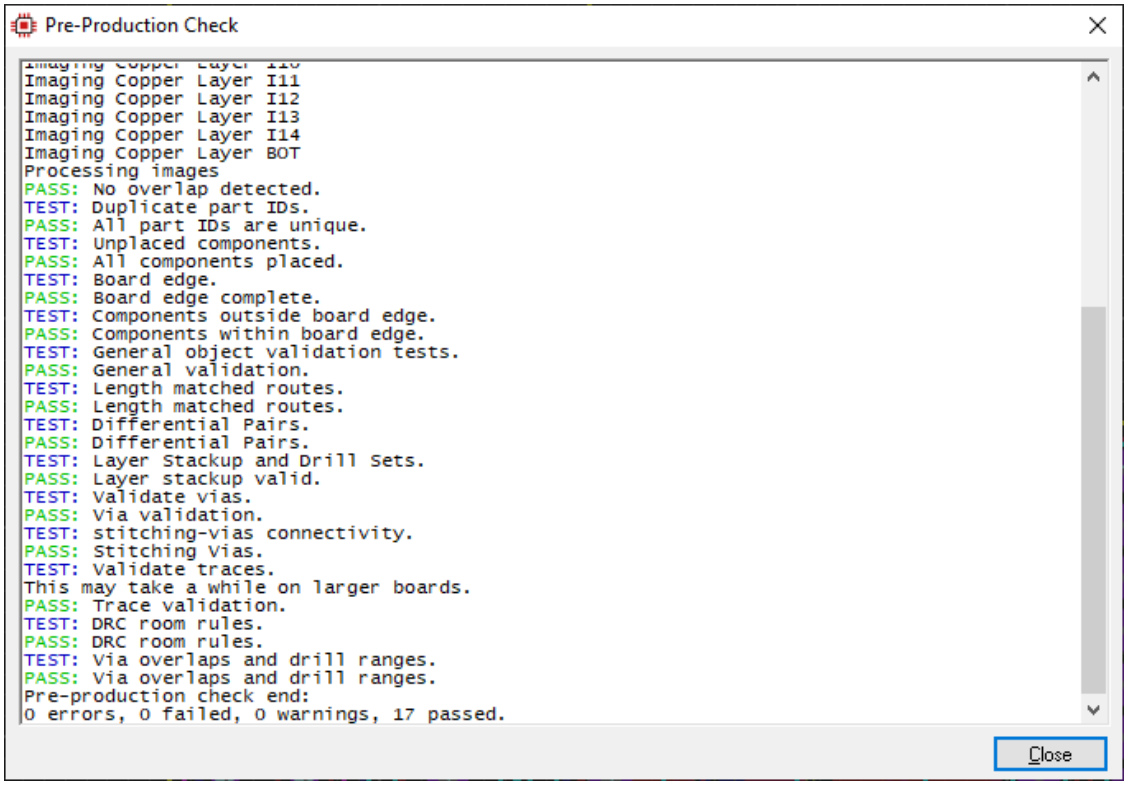
PCB 3D Top View

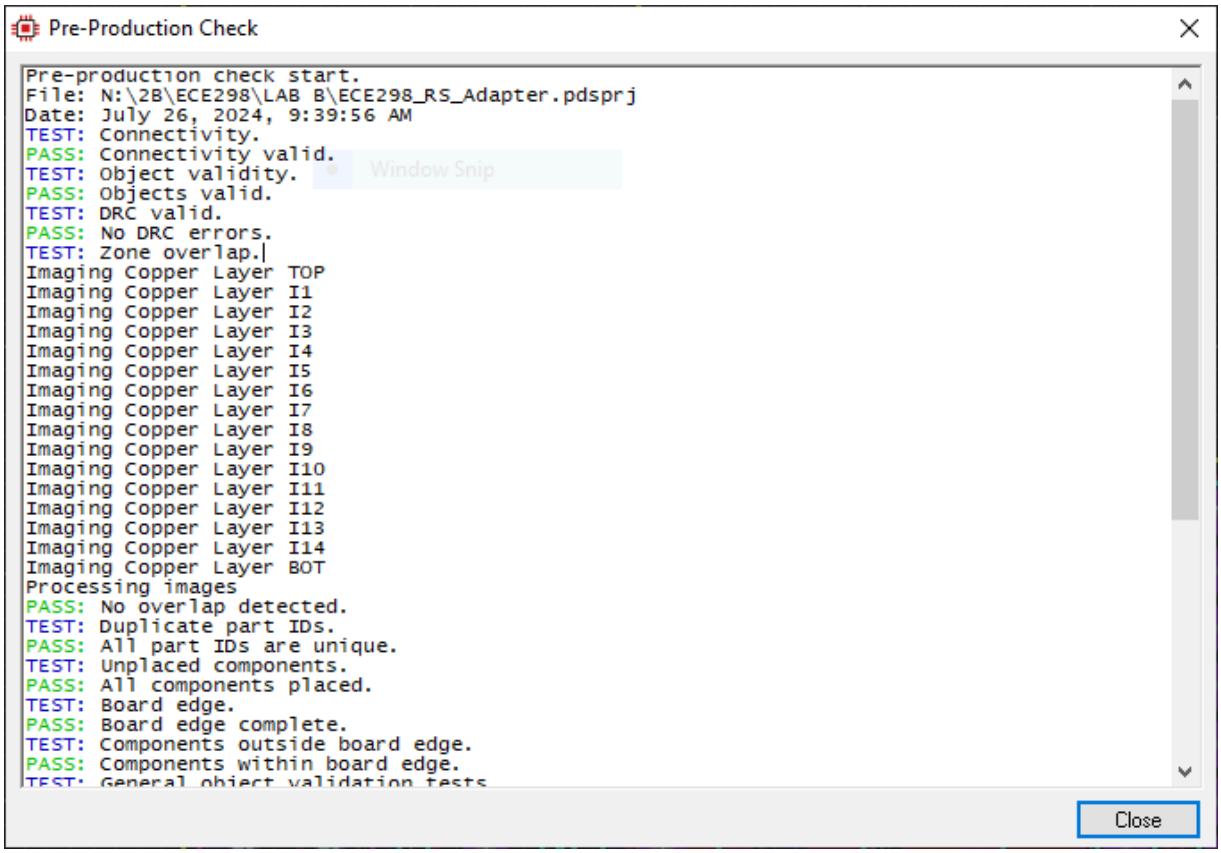


PCB 3D Bottom View

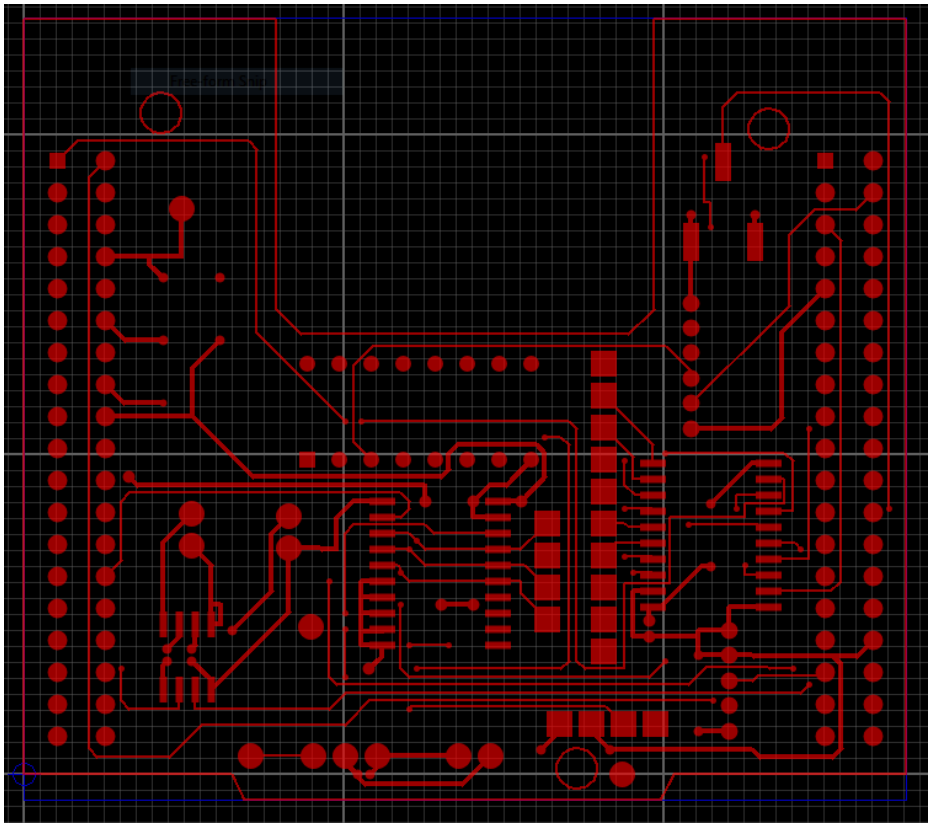


PPC Report

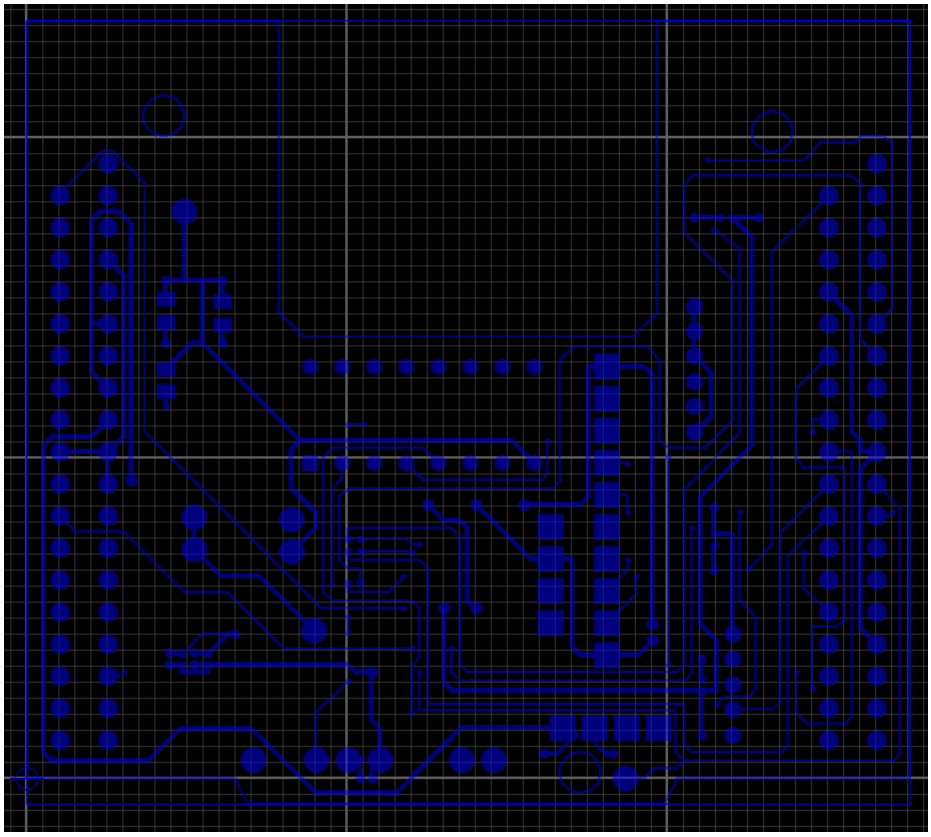




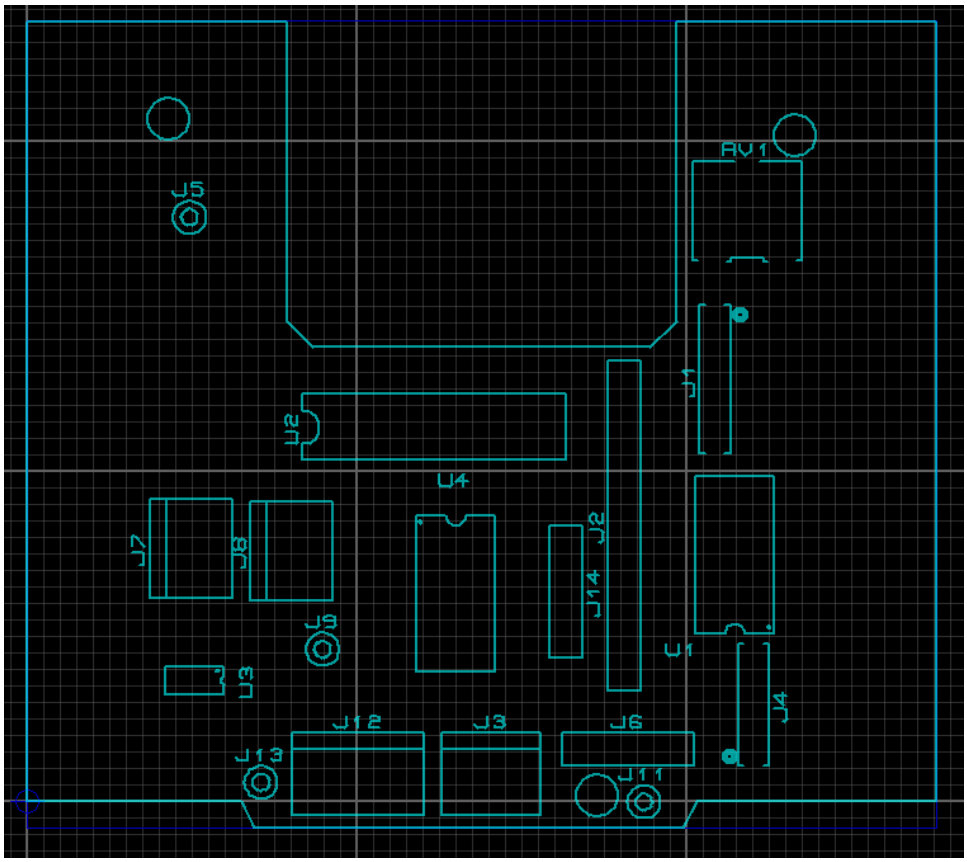
PCB Top Copper



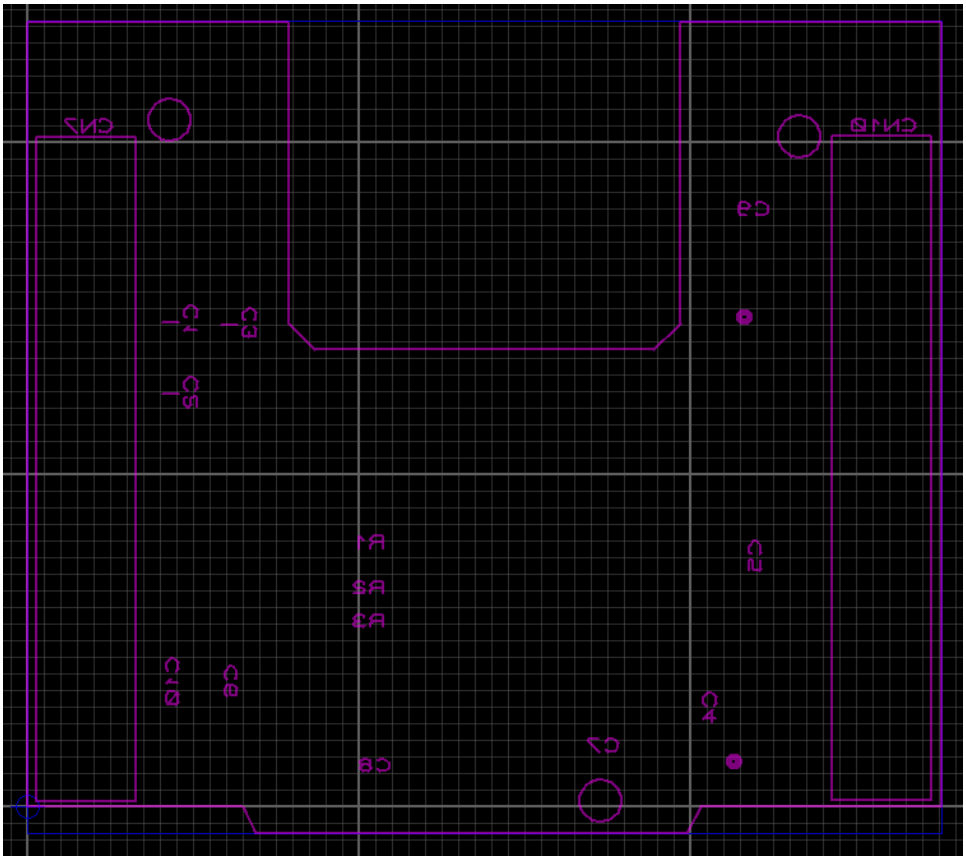
PCB Bottom Copper



PCB Top Silk

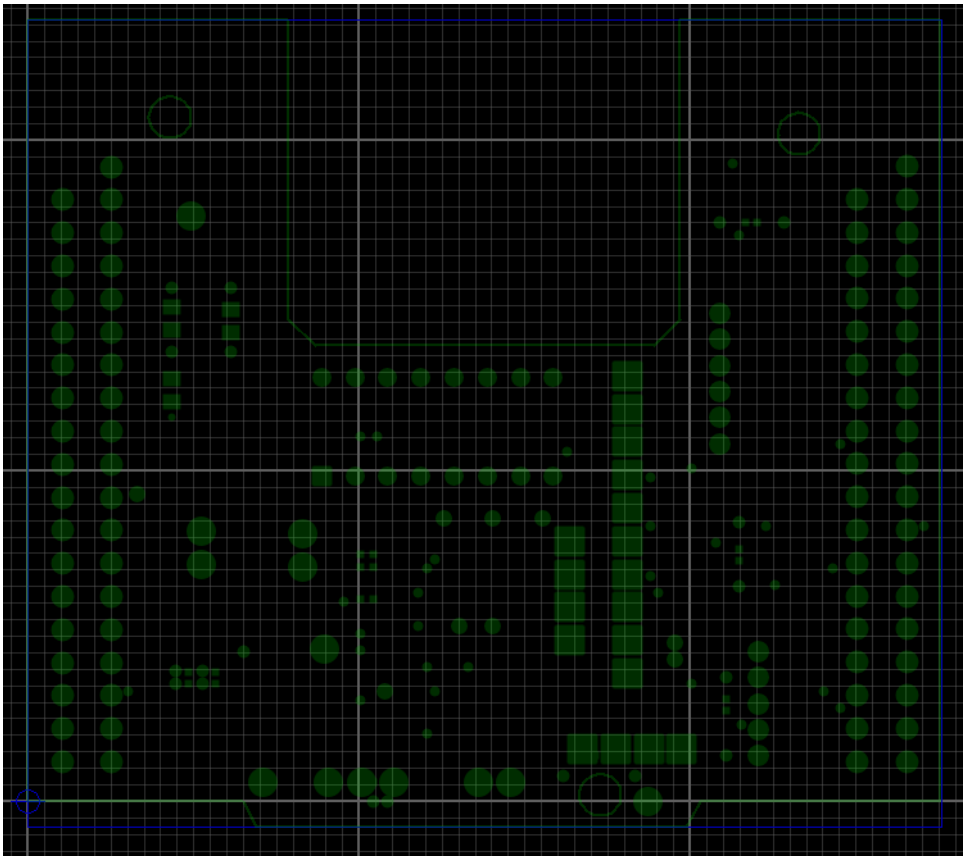


PCB Bottom Silk

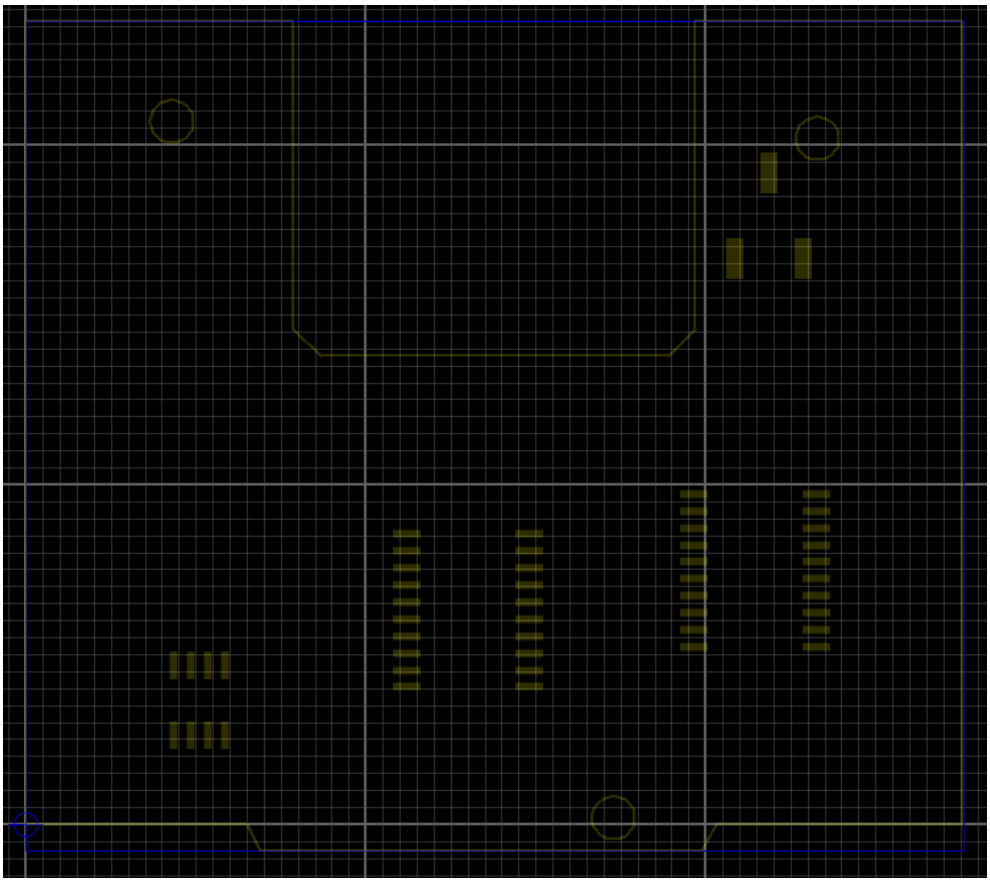


PCB Top Resist

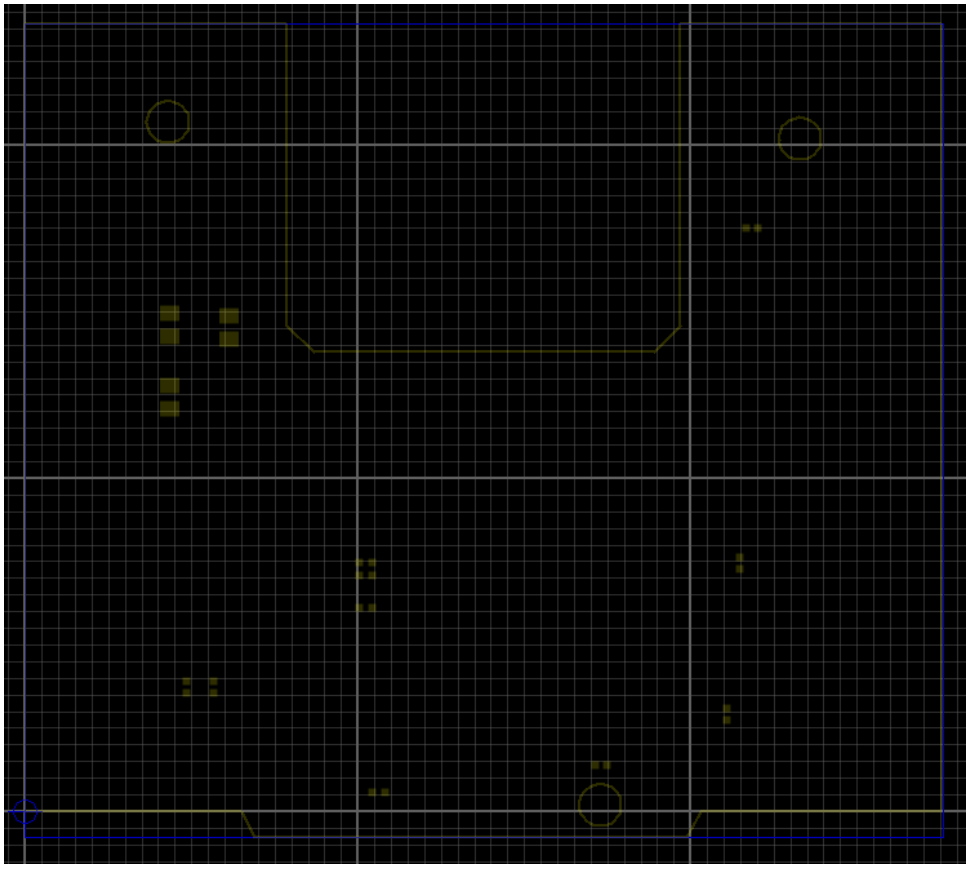
PCB Bottom Resist



PCB Top Paste



PCB Bottom Paste



Pick and Place File

	A	B	C	D	E	F	G	H
1	Part ID	Value	Package	Stock Code	Layer	Rotation	X	Y
2	CN7	1-534236-9	ECE298_REVTF	1-534236-9	BOT	0	177.362	1019.69
3	CN10	1-534236-9	ECE298_REVTF	1-534236-9	BOT	0	2577.36	1021.26
4	C1	10u	CAPC2012X100	Digikey PCC218	BOT	-90	433.071	1460.63
5	C3	10u	CAPC2012X100	Digikey PCC218	BOT	-90	610.236	1452.76
6	U3	DC Motor Contro	SO8		TOP	-90	508.661	367.539
7	J7	DC Motor	SIL-100-02		TOP	-270	521.654	766.929
8	C6	10u	CAPC1005X55	Digikey PCC103	BOT	90	563.976	373.031
9	C10	10u	CAPC1005X55	Digikey PCC103	BOT	90	485.236	373.031
10	J9	Motor Control Te	PIN		TOP	0	895.669	462.598
11	J5	GND Reference	PIN		TOP	0	492.126	1771.65
12	J4	US-100	CON5_1X5_U_2	NorComp 25630	TOP	270	2204.72	295.276
13	C4	10000pF	CAPC1005X55	Digikey PCC103	BOT	-90	2106.3	293.307
14	J12	Servo Motor	SIL-100-03		TOP	0	1005.51	59.0551
15	J3	5V EXT	SIL-100-02		TOP	0	1408.27	59.0551
16	U4	ECE298_RS_74	SO20W		TOP	0	1299.21	629.921
17	U2	ECE298_RS_CI	DIL16		TOP	0	1235.83	1134.25
18	U1	ECE298_RS_74	SO20W		TOP	180	2145.67	748.031
19	J2	Timer Board	CONN-SIL10		TOP	90	1811.02	837.402
20	J14	RGB LED	CONN-SIL4		TOP	270	1633.86	637.402
21	R2	50	RESC1005X40	Digikey 311-150	BOT	0	1023.62	708.661
22	R3	50	RESC1005X40	Digikey 311-200	BOT	180	1023.62	610.236
23	R1	100	RESC1005X40	Digikey 311-150	BOT	0	1023.62	748.031
24	J8	8V EXT	SIL-100-02		TOP	90	826.772	758.661
25	J13	Servo Motor test	PIN		TOP	0	708.661	59.0551
26	J6	RPM Speed Sen	CONN-SIL4		TOP	0	1823.23	157.48
27	J11	RPM Interrupt	PIN		TOP	0	1870.08	0
28	RV1	10K	TRIM_3361P	Digikey 3361P-1	TOP	0	2185.04	1791.34
29	C7	10u	CAPC1005X55	Digikey PCC103	BOT	180	1730.31	137.795
30	C8	10u	CAPC1005X55	Digikey PCC103	BOT	180	1061.02	59.0551
31	C9	10000pF	CAPC1005X55	Digikey PCC103	BOT	0	2183.07	1751.97
32	C5	10000pF	CAPC1005X55	Digikey PCC103	BOT	-90	2145.67	746.063
33	C2	10u	CAPC2012X100	Digikey PCC218	BOT	-90	433.071	1244.09
34	J1	UART Connecto	CON6_1X6_U_2	NorComp 25630	TOP	90	2086.61	1279.53

Bill Of Materials for ECE298_RS_ADAPTER

Design Title	ECE298_RS_ADAPTER
Author	
Document Number	
Revision	
Design Created	July 7, 2023
Design Last Modified	July 26, 2024
Total Parts In Design	33

10 Capacitors

Quantity	References	Value
7	C1-C3,C6-C8,C10	10u
3	C4-C5,C9	10000pF

Sub-totals:

3 Resistors

Quantity	References	Value
1	R1	100
2	R2-R3	50

Sub-totals:

4 Integrated Circuits

Quantity	References	Value
2	U1,U4	ECE298_RS_74HCT541
1	U2	ECE298_RS_CMOS4050
1	U3	DC Motor Control L9110

Sub-totals:

0 Transistors

Quantity	References	Value

Sub-totals:

0 Diodes

Quantity	References	Value

Sub-totals:

16 Miscellaneous

Quantity	References	Value
2	CN7,CN10	1-534236-9
1	J1	UART Connector
1	J2	Timer Board
1	J3	5V EXT
1	J4	US-100
1	J5	GND Reference
1	J6	RPM Speed Sensor
1	J7	DC Motor
1	J8	8V EXT
1	J9	Motor Control Test
1	J11	RPM Interrupt
1	J12	Servo Motor
1	J13	Servo Motor test
1	J14	RGB LED
1	RV1	10K

Sub-totals:

Totals:

July 30, 2024 3:57:57 PM

ISIS SCHEMATIC DESCRIPTION FORMAT 8.0
==========
Design: ECE298_RS_ADAPTER
Doc. no.: <NONE>
Revision: <NONE>
Author: <NONE>
Created: 2023-07-07
Modified: 2024-07-26

*PROPERTIES,0

*MODELDEFS,0

*PARTLIST,33
C1,ECE298_RS_CAP_10U,10u,CODE="Digikey PCC2182TR-ND",EID=B,PACKAGE=CAPC2012X100
C2,ECE298_RS_CAP_10U,10u,CODE="Digikey PCC2182TR-ND",EID=13,PACKAGE=CAPC2012X100
C3,ECE298_RS_CAP_10U,10u,CODE="Digikey PCC2182TR-ND",EID=C,PACKAGE=CAPC2012X100
C4,ECE298_RS_CAP_0U1,10000pF,CODE="Digikey
PCC103BQDKR-ND",EID=3,PACKAGE=CAPC1005X55
C5,ECE298_RS_CAP_0U1,10000pF,CODE="Digikey
PCC103BQDKR-ND",EID=A,PACKAGE=CAPC1005X55
C6,ECE298_RS_CAP_0U1,10u,CODE="Digikey
PCC103BQDKR-ND",EID=16,PACKAGE=CAPC1005X55
C7,ECE298_RS_CAP_0U1,10u,CODE="Digikey
PCC103BQDKR-ND",EID=15,PACKAGE=CAPC1005X55
C8,ECE298_RS_CAP_0U1,10u,CODE="Digikey
PCC103BQDKR-ND",EID=28,PACKAGE=CAPC1005X55
C9,ECE298_RS_CAP_0U1,10000pF,CODE="Digikey
PCC103BQDKR-ND",EID=4,PACKAGE=CAPC1005X55
C10,ECE298_RS_CAP_0U1,10u,CODE="Digikey
PCC103BQDKR-ND",EID=19,PACKAGE=CAPC1005X55
CN7,1-534236-9,1-534236-9,CODE=1-534236-9,EID=1,PACKAGE=ECE298_REVTRANS38DIL-1,SUPP
LIER=TE_CONNECTIVITY
CN10,1-534236-9,1-534236-9,CODE=1-534236-9,EID=2,PACKAGE=ECE298_REVTRANS38DIL-1,SUP
PLIER=TE_CONNECTIVITY
J1,25630601RP2,"UART Connector",CODE="NorComp
25630601RP2",EID=1B,PACKAGE=CON6_1X6_U_2563
J2,ECE298_RS_10PINREC,"Timer Board",EID=5,PACKAGE=CONN-SIL10
J3,ECE298_RS_2PINHDR,"5V EXT",EID=14,PACKAGE=SIL-100-02
J4,25630501RP2,US-100,CODE="NorComp 25630501RP2",EID=1C,PACKAGE=CON5_1X5_U_2563
J5,ECE298_TERMINAL_VIA,"GND Reference",EID=10,PACKAGE=PIN
J6,ECE298_RS_4PINREC,"RPM Speed Sensor",EID=12,PACKAGE=CONN-SIL4
J7,ECE298_RS_2PINHDR,"DC Motor",EID=11,PACKAGE=SIL-100-02
J8,ECE298_RS_2PINHDR,"8V EXT",EID=1A,PACKAGE=SIL-100-02
J9,ECE298_TERMINAL_VIA,"Motor Control Test",EID=F,PACKAGE=PIN
J11,ECE298_TERMINAL_VIA,"RPM Interrupt",EID=26,PACKAGE=PIN
J12,ECE298_RS_3PINHDR,"Servo Motor",EID=18,PACKAGE=SIL-100-03
J13,ECE298_TERMINAL_VIA,"Servo Motor test",EID=27,PACKAGE=PIN
J14,ECE298_RS_4PINREC,"RGB LED",EID=29,PACKAGE=CONN-SIL4
R1,9C04021A1500JLHF3,100,CODE="Digikey
311-150JDKR-ND",EID=2F,PACKAGE=RESC1005X40,PRIMTYPE=RESISTOR
R2,9C04021A1500JLHF3,50,CODE="Digikey
311-150JDKR-ND",EID=2C,PACKAGE=RESC1005X40,PRIMTYPE=RESISTOR
R3,9C04021A2000JLHF3,50,CODE="Digikey
311-200JCT-ND",EID=31,PACKAGE=RESC1005X40,PRIMTYPE=RESISTOR

RV1,ECE298_RS_POT10K,10K,CODE="Digikey 3361P-103GLFDKR-ND",EID=E,PACKAGE=TRIM_3361P,STATE=5
U1,ECE298_RS_74HCT541,ECE298_RS_74HCT541,EID=6,GND=GND,PACKAGE=SO20W,PINSWAP="1,19",VCC=+5.0V
U2,ECE298_RS_CMOS4050,ECE298_RS_CMOS4050,EID_A=7,EID_B=8,ITFMOD=CMOS,MODFILE=40BUF,PACKAGE=DIL16,VOLTAGE=+5.0V
U3,ECE298_RS_L9110,"DC Motor Control L9110",EID=D,ITFMOD=TTL,PACKAGE=SO8
U4,ECE298_RS_74HCT541,ECE298_RS_74HCT541,EID=17,GND=GND,PACKAGE=SO20W,PINSWAP="1,19",VCC=+5.0V

*NETLIST,42
DC MOTOR PWR,6,CLASS=POWER
DC MOTOR PWR,LBL
J7,PS,2
U3,OP,4
J7,PS,1
U3,OP,1
J9,PS,1

RPM OUT,3,CLASS=SIGNAL
RPM OUT,LBL
J6,PS,3
U2,IP,5

PB0,3,CLASS=SIGNAL
PB0,GT
U3,IP,6
CN7,PS,34

PA6,3,CLASS=SIGNAL
PA6,GT
U3,IP,7
CN10,PS,13

PC7,3,CLASS=SIGNAL
PC7,GT
U2,OP,2
CN10,PS,19

PC6,4,CLASS=SIGNAL
PC6,GT
RXD,LBL
J1,PS,5
CN10,PS,4

PB2,4,CLASS=SIGNAL
PB2,GT
J11,PS,1
U2,OP,4
CN10,PS,22

PB9,3,CLASS=SIGNAL
PB9,GT
U1,IP,2
CN10,PS,5

PB8,3,CLASS=SIGNAL
PB8,GT
U1,IP,3
CN10,PS,3

PB6,3,CLASS=SIGNAL
PB6,GT
U1,IP,4
CN10,PS,17

PB5,3,CLASS=SIGNAL
PB5,GT
U1,IP,5
CN10,PS,29

PC13,3,CLASS=SIGNAL
PC13,GT
U1,IP,6
CN7,PS,23

PC12,3,CLASS=SIGNAL
PC12,GT
U1,IP,7
CN7,PS,3

PC11,3,CLASS=SIGNAL
PC11,GT
U1,IP,8
CN7,PS,2

PC10,3,CLASS=SIGNAL
PC10,GT
U1,IP,9
CN7,PS,1

A3,3,CLASS=SIGNAL
A3,LBL
U1,TS,18
J2,PS,2

A2,3,CLASS=SIGNAL
A2,LBL
U1,TS,17
J2,PS,3

A1,3,CLASS=SIGNAL
A1,LBL
U1,TS,16
J2,PS,4

A0,3,CLASS=SIGNAL
A0,LBL
U1,TS,15
J2,PS,5

B3,3,CLASS=SIGNAL
B3,LBL
U1,TS,14
J2,PS,6

B2,3,CLASS=SIGNAL
B2,LBL
U1,TS,13
J2,PS,7

B1,3,CLASS=SIGNAL
B1,LBL
U1,TS,12
J2,PS,8

B0,3,CLASS=SIGNAL
B0,LBL
U1,TS,11
J2,PS,9

PB1,3,CLASS=SIGNAL
PB1,GT
RV1,PS,3
CN10,PS,24

SERVO MOTOR CONTROL,4,CLASS=SIGNAL
SERVO MOTOR CONTROL,LBL
J12,PS,1
J13,PS,1
U4,TS,18

PA0,3,CLASS=SIGNAL
PA0,GT
U4,IP,2
CN7,PS,28

PA8,3,CLASS=SIGNAL
PA8,GT
R2,PS,2
CN10,PS,23

PA12,3,CLASS=SIGNAL
PA12,GT
R1,PS,2
CN10,PS,12

PA11,3,CLASS=SIGNAL
PA11,GT
R3,PS,2
CN10,PS,14

BLUE,5,CLASS=SIGNAL
BLUE,LBL
R3,PS,1

U4,IP,5
J14,PS,4
U4,TS,15

GREEN,5,CLASS=SIGNAL
GREEN,LBL
R2,PS,1
U4,IP,4
J14,PS,3
U4,TS,16

RED,5,CLASS=SIGNAL
RED,LBL
R1,PS,1
U4,IP,3
J14,PS,1
U4,TS,17

PA10,4,CLASS=SIGNAL
PA10,GT
ECHO,LBL
J4,PS,3
CN10,PS,33

PA9,4,CLASS=SIGNAL
PA9,GT
TRIGGER,LBL
J4,PS,2
CN10,PS,21

TXD,3,CLASS=SIGNAL
TXD,LBL
U2,IP,3
J1,PS,4

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CN7,PS,17
U2,PS,13
U2,PS,16
CN10,PS,37
CN10,PS,35
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U4,TS,11
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U4,TS,13
U4,TS,14
J6,PS,4
CN7,PS,14
CN10,PS,8
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CN7,PS,29
CN7,PS,27
CN7,PS,26
CN7,PS,25
CN7,PS,24
CN7,PS,11
CN7,PS,10

+3.3V,10,CLASS=POWER
+3.3V,PR
VCC,LBL
J4,PS,1
C4,PS,1
C2,PS,1
C1,PS,1
RV1,PS,2
C9,PS,1
CN7,PS,16
CN7,PS,12

+5.0V,9,CLASS=POWER
+5.0V,PR
J2,PS,10
U4,PP,20
C5,PS,1
C3,PS,1
U1,PP,20
J6,PS,1

C7,PS,1
CN7,PS,18

+5V_EXT,5,CLASS=POWER
+5V_EXT,PR
5V EXT,LBL
J12,PS,2
C8,PS,1
J3,PS,2

+8V_EXT,6,CLASS=POWER
+8V_EXT,PR
U3,PP,2
U3,PP,3
C6,PS,1
C10,PS,1
J8,PS,2

GND,46,CLASS=POWER
GND,PR
VSS,PT
U4,PP,10
U4,IP,6
U4,IP,7
U4,IP,8
U4,IP,9
U4,IP,1
U4,IP,19
J1,PS,1
J1,PS,2
J1,PS,3
J1,PS,6
J4,PS,5
J4,PS,4
C4,PS,2
J14,PS,2
J12,PS,3
J3,PS,1
C8,PS,2
C5,PS,2
C3,PS,2
C2,PS,2
C1,PS,2
J5,PS,1
RV1,PS,1
C9,PS,2
U1,PP,10
U1,IP,1
U1,IP,19
J2,PS,1
J6,PS,2
C7,PS,2
U3,PP,5
U3,PP,8
C6,PS,2

C10,PS,2
J8,PS,1
CN10,PS,9
CN10,PS,32
CN10,PS,20
CN7,PS,8
CN7,PS,22
CN7,PS,20
CN7,PS,19
U2,PP,8

VCC/VDD,3,CLASS=POWER
VDD,PT
VCC/VDD,PR
U2,PP,1