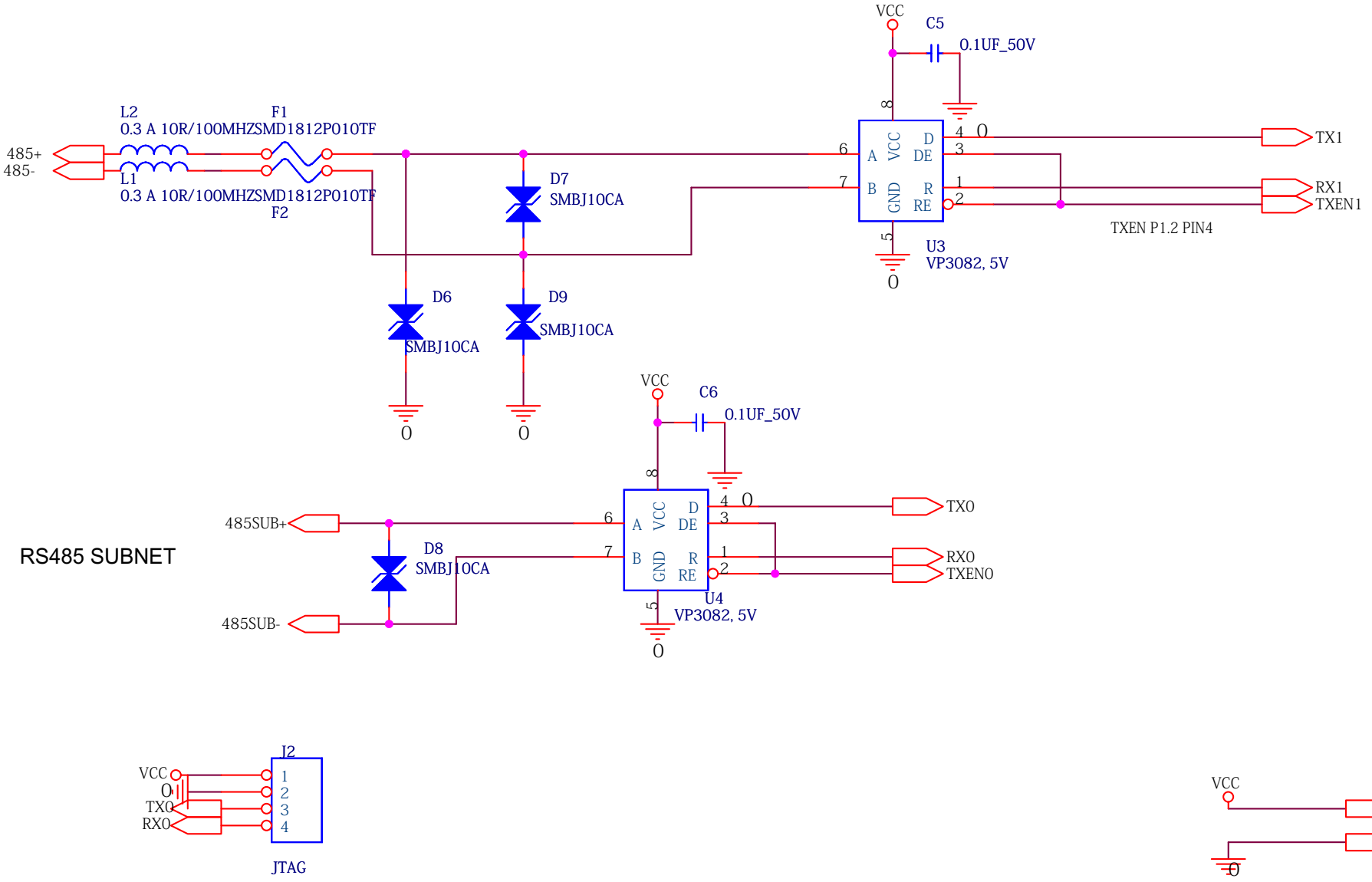
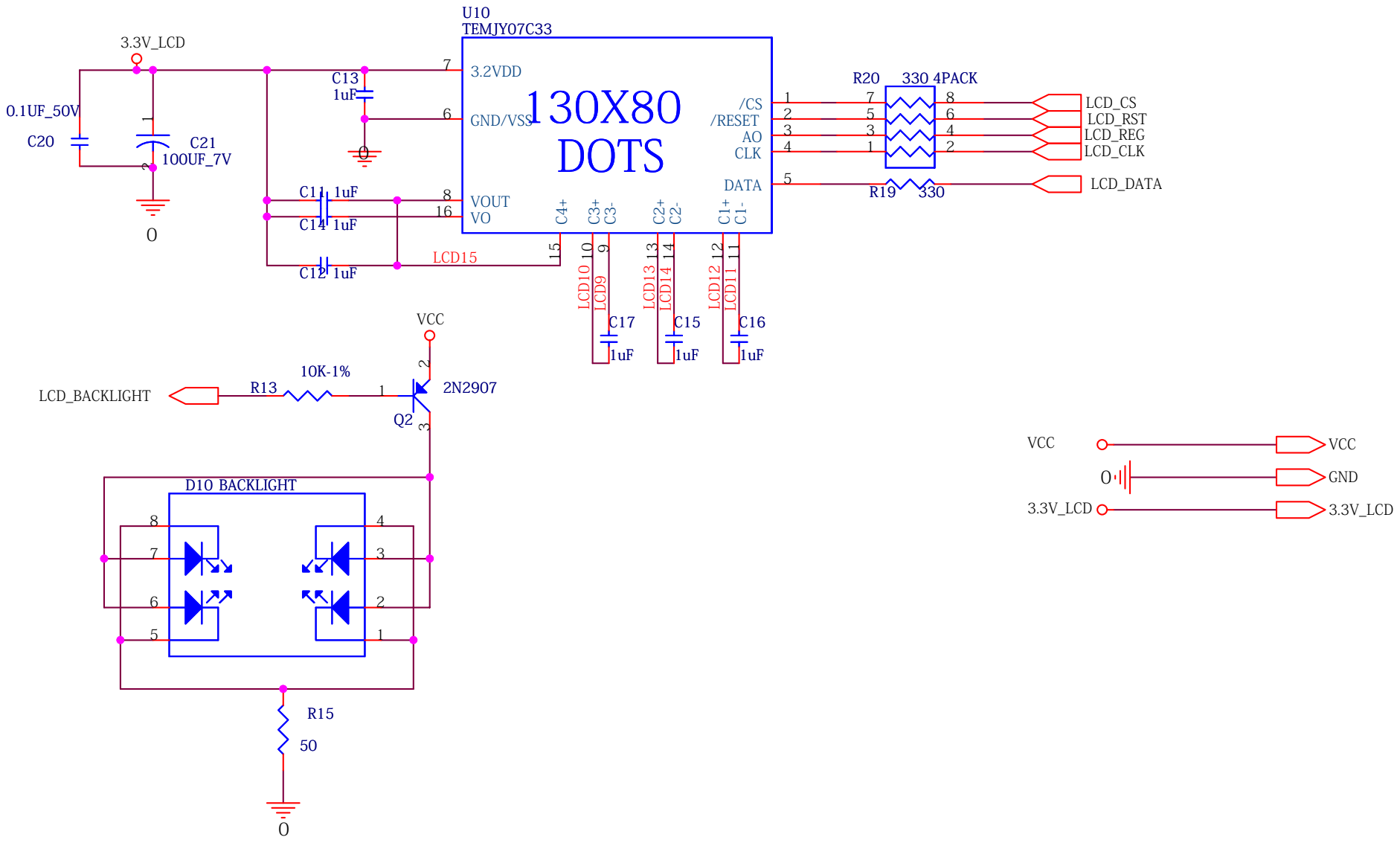
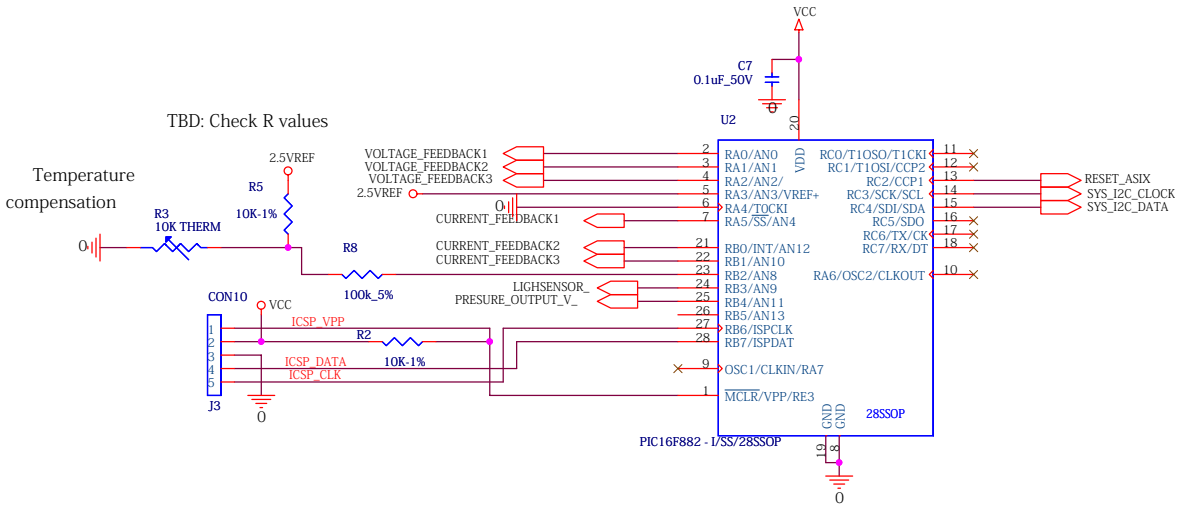
CO2 D/W Module



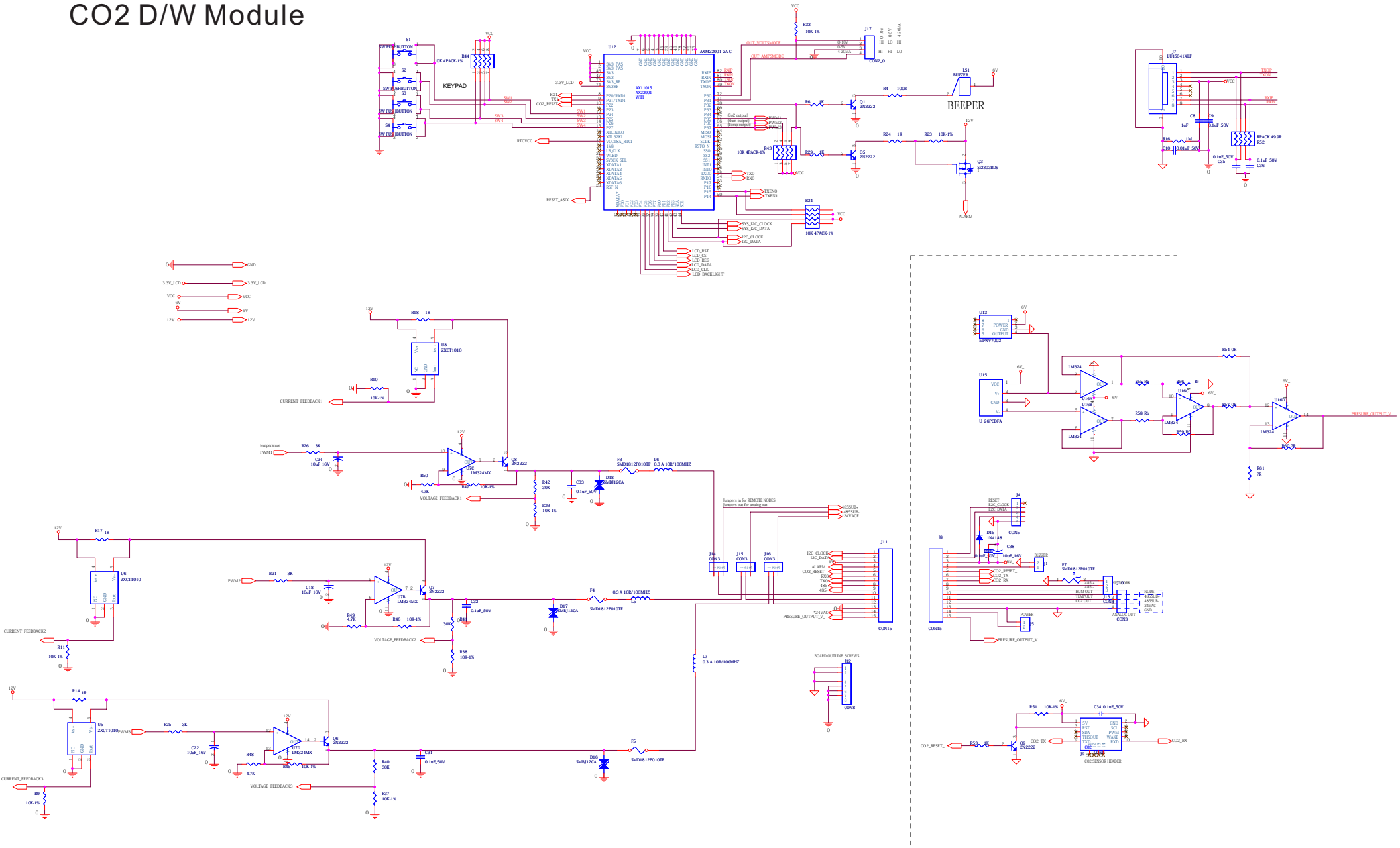
CO2 D/W Module



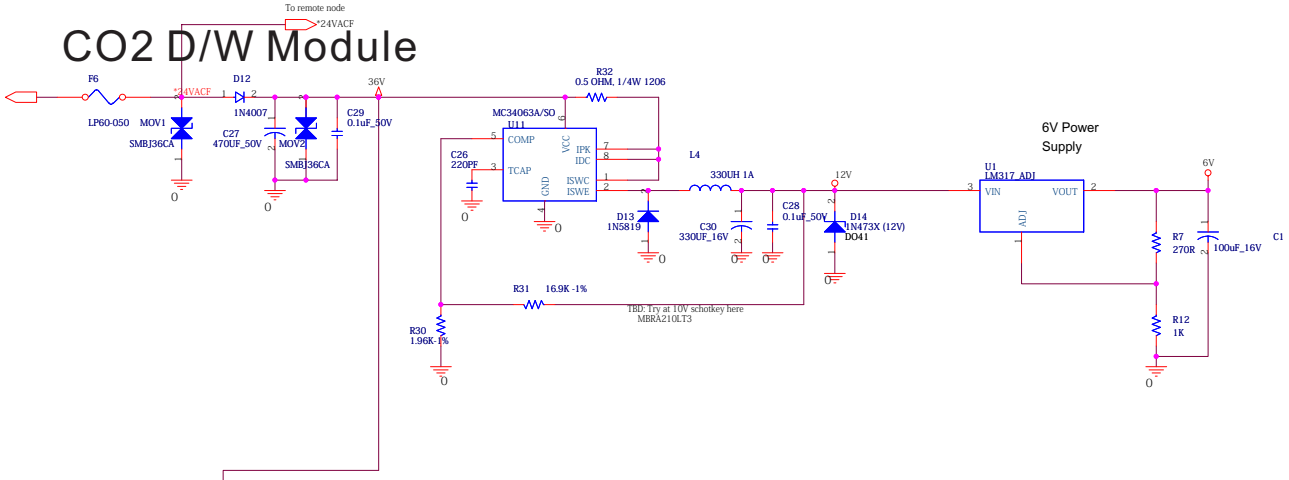
CO2 D/W Module

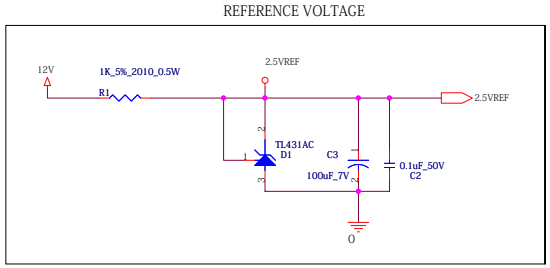


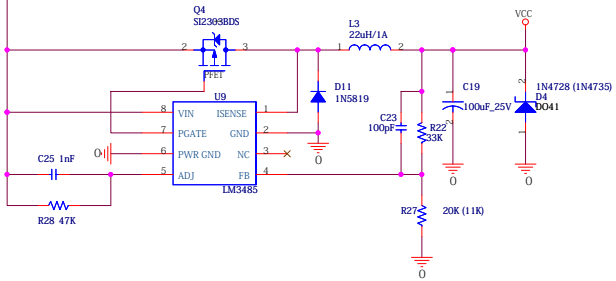
CO2 D/W Module

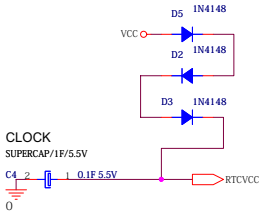


CO2 D/W Module









NOTE :

VCC=5V , R15=11K

VCC=3.3V, R15=20K

Title: Humidity Sensor		
Size: C	Document Number: <Doc>	Rev: 4
Date: Wednesday, April 30, 2014	Sheet 4 of 6	

CO2 D/W Module

Revision 1:

Revision 2:

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1:Main mcu SM5964 footprint use PLCC44

Revision 4:

DOWN :Main mcu SM5964 footprint use QFP44

DOWN :Check the error "485Minus",delete "R10" that unwanted
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Down :Display backlight change a footprint

Down :rs485 Surge protection use D10 D11
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TO DO :LCD FOOTPRINT ERROR,Lost a line between F4 and 24V

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TBD: make main board bigger to fit in new enclosure

Rev9

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Rev10

TBD: RENAME DAC 4922 I2C wires' name , make sure connect with 8051 I2C port

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Rev11

done: add zigbee interface
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TBD: add seperated reference 5V to the sensor board as mini pannel
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Rev18--REV20

REV21

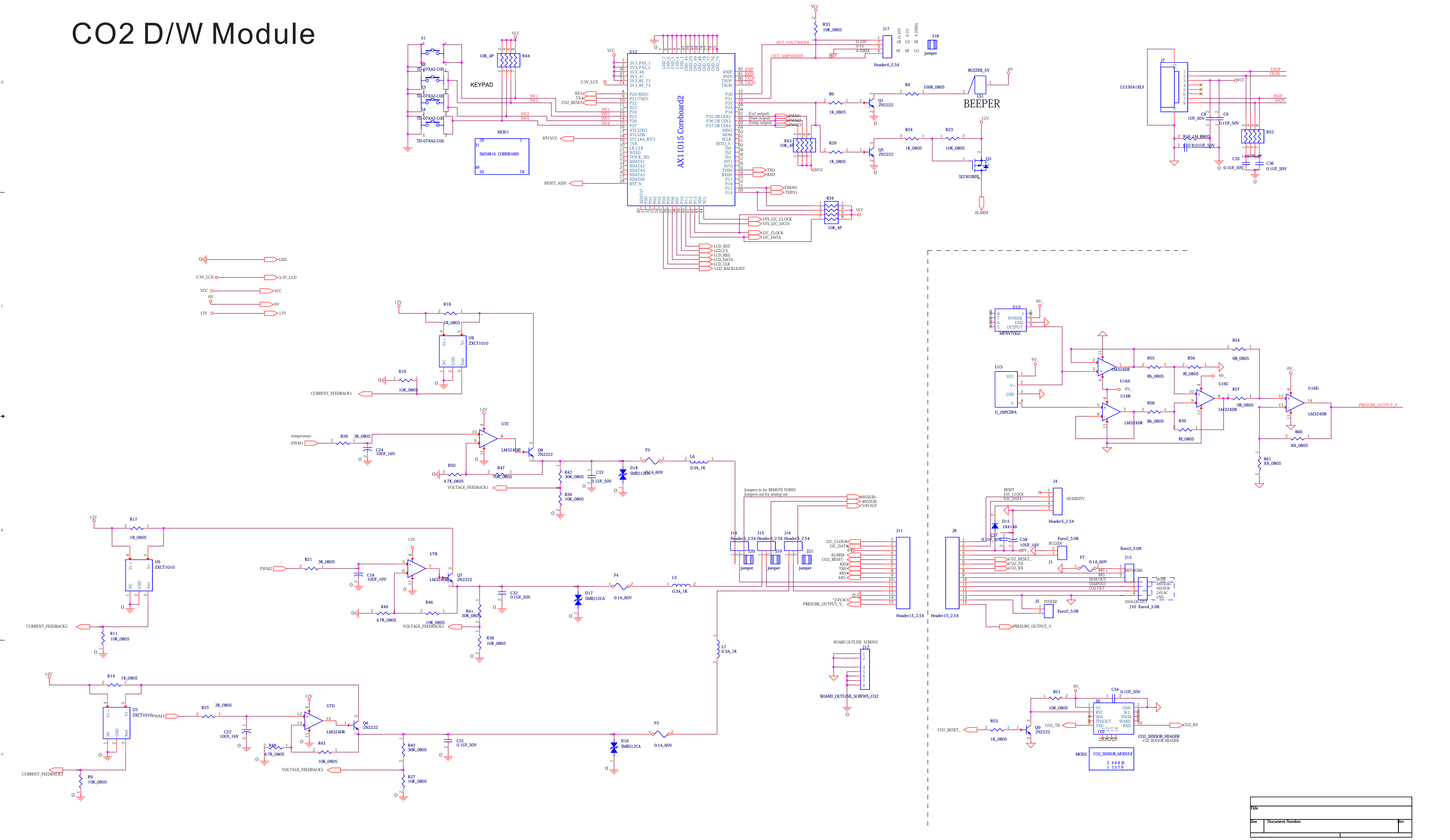
TBD : change MCU pin74 NET name from 3.3V to 3.3v _LCD .

REV22:

TBD : Delete R35,R36, X1 .

TBD : Ddd pressure sensor .

CO2 D/W Module



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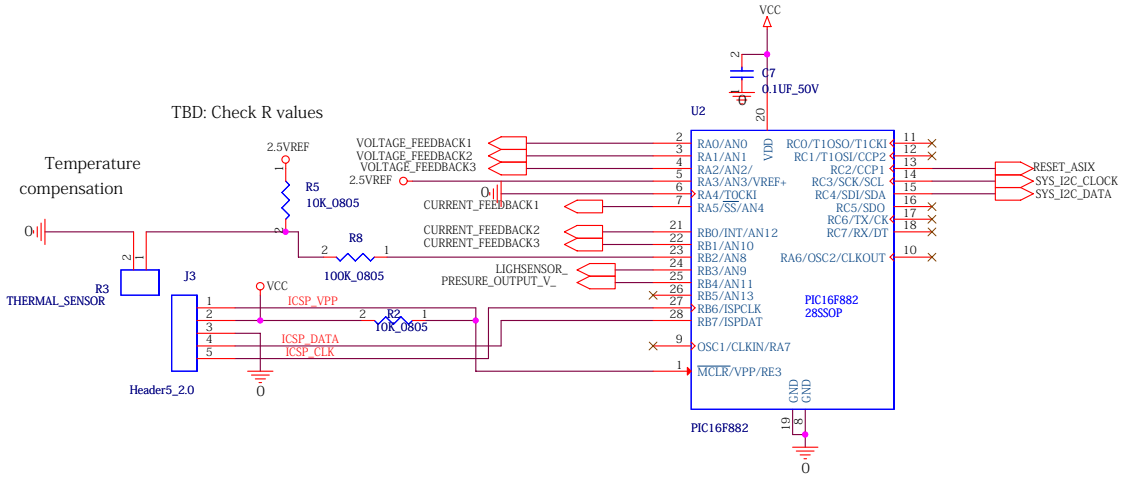
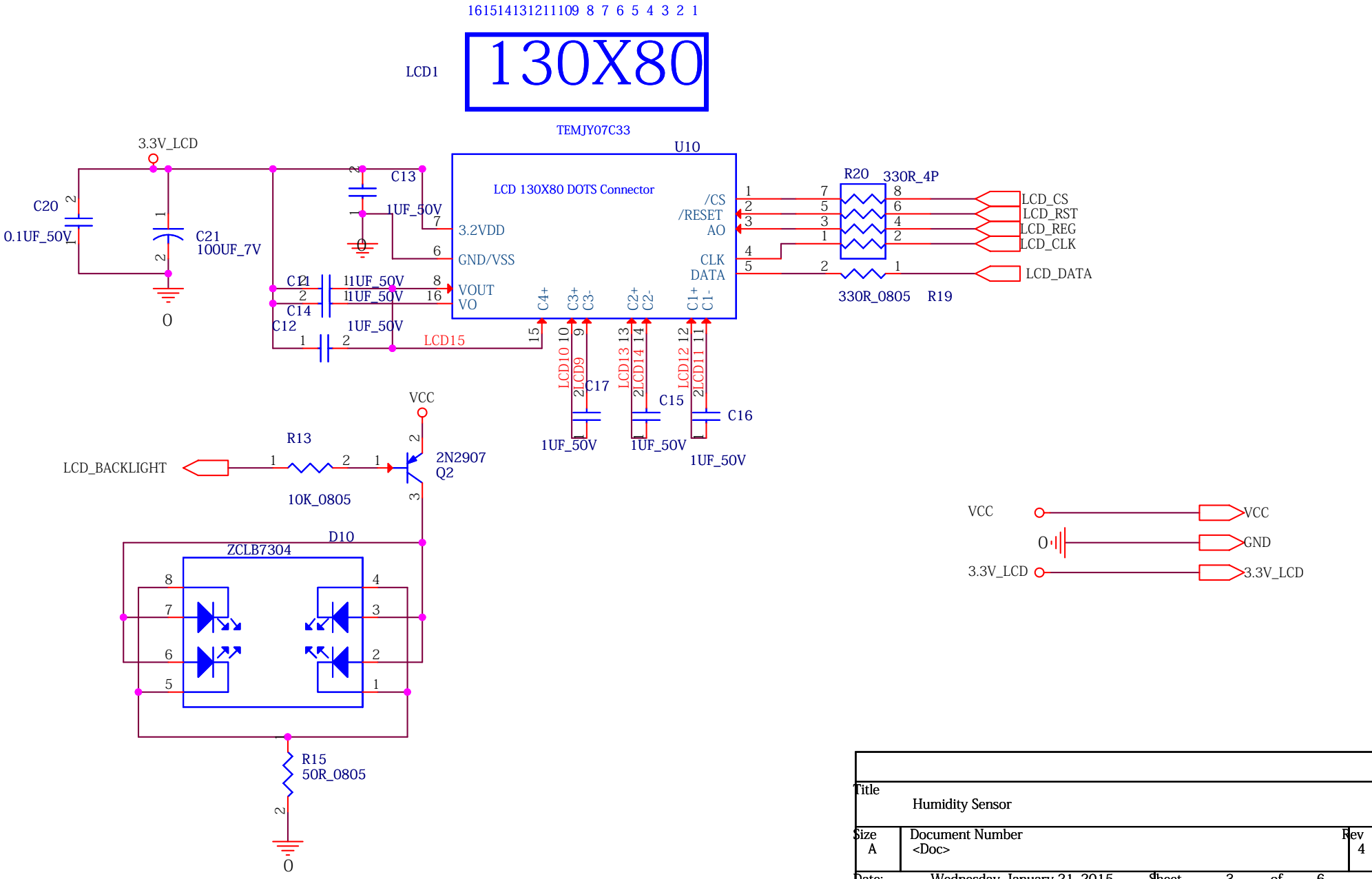


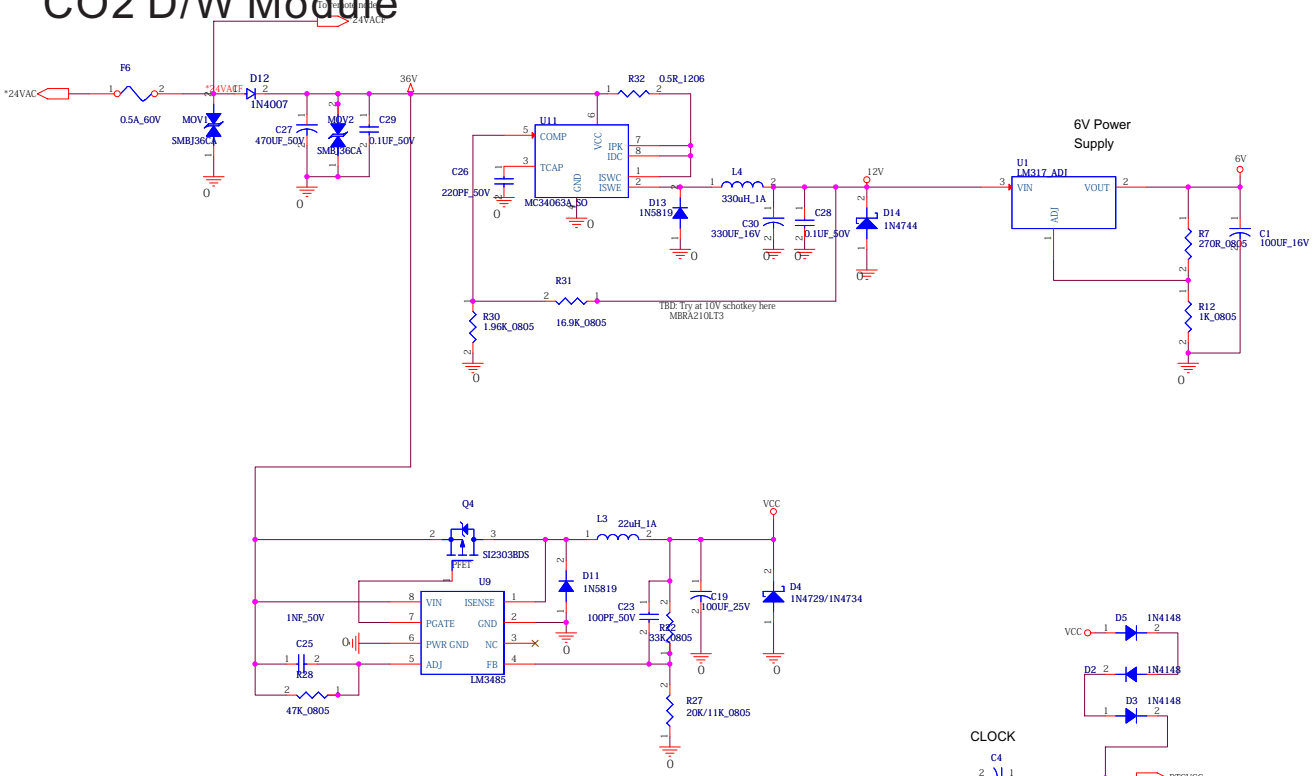
Title: Humidity Sensor		
Size: A3	Document Number: <Doc>	Rev: 4
Date: Wednesday, January 21, 2015	Sheet 2 of 6	

CO2 D/W Module

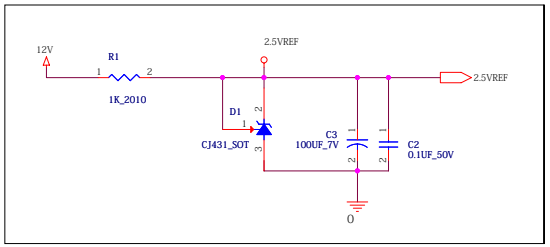


Title	Humidity Sensor	
Size A	Document Number <Doc>	Rev 4
Date: Wednesday, January 21, 2015	Sheet 3 of 6	

CO2 D/W Module



REFERENCE VOLTAGE



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Size C	Document Number <Doc>	Rev 4
Date: Wednesday, January 21, 2015	Sheet 4 of 6	

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Rev18--REV20

REV21

TBD : change MCU pin74 NET name from 3.3V to 3.3v _LCD .

REV22:

TBD : Delete R35,R36, X1 .

TBD : Ddd pressure sensor .

TBD: change dsn and max to use lib parts . Change 2n2222 .dsn and .max to stardard footprint (SM/SOT23_123)

TBD: Add a light sensor to the CO2 wall mount version for green house applications

Title: <Title>		
Size: D	Document Number: <Doc>	Rev: <Revision>
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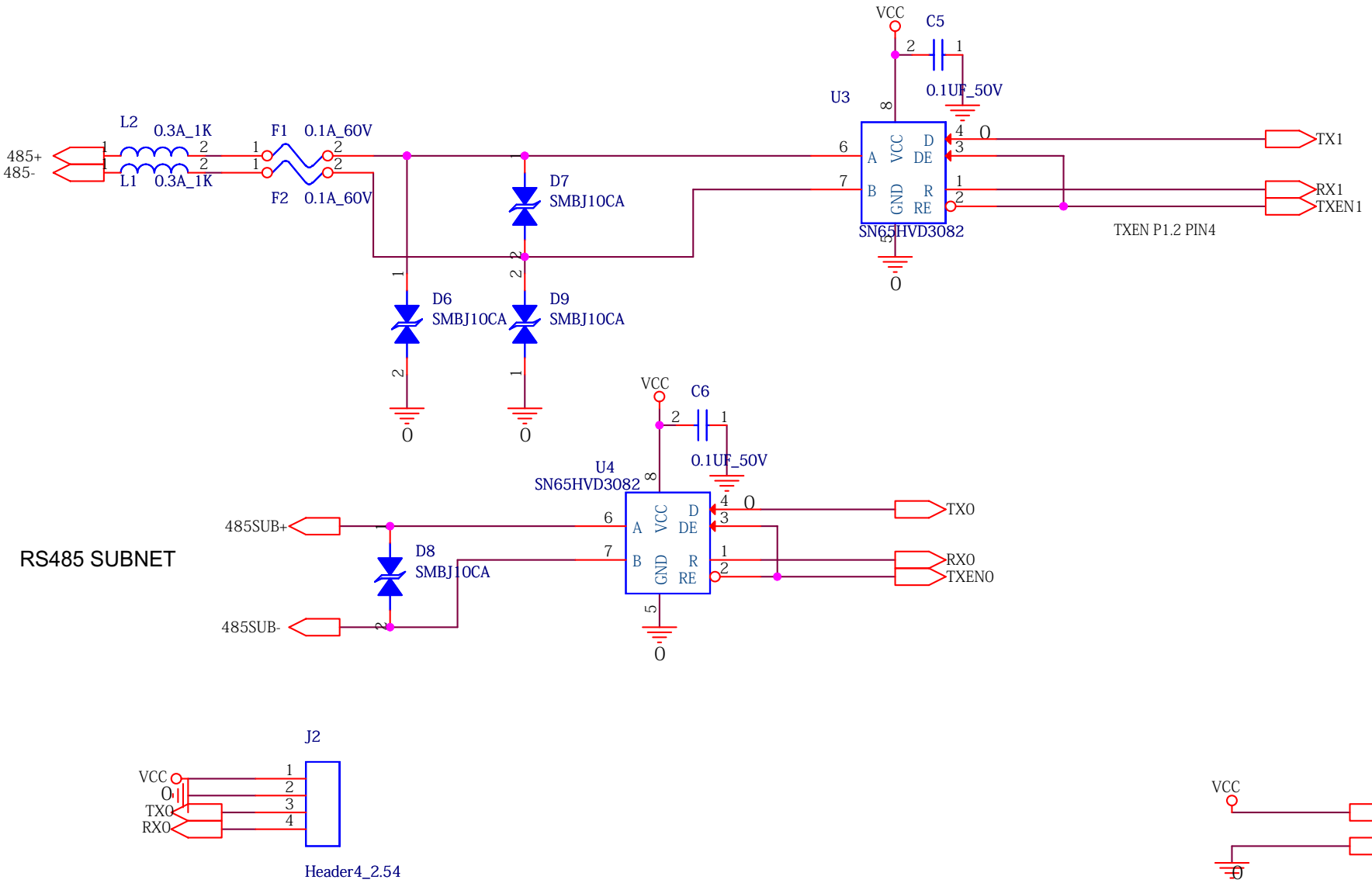
CO2 D/W Module



Title	Humidity Sensor	
Size A	Document Number <Doc>	Rev 4
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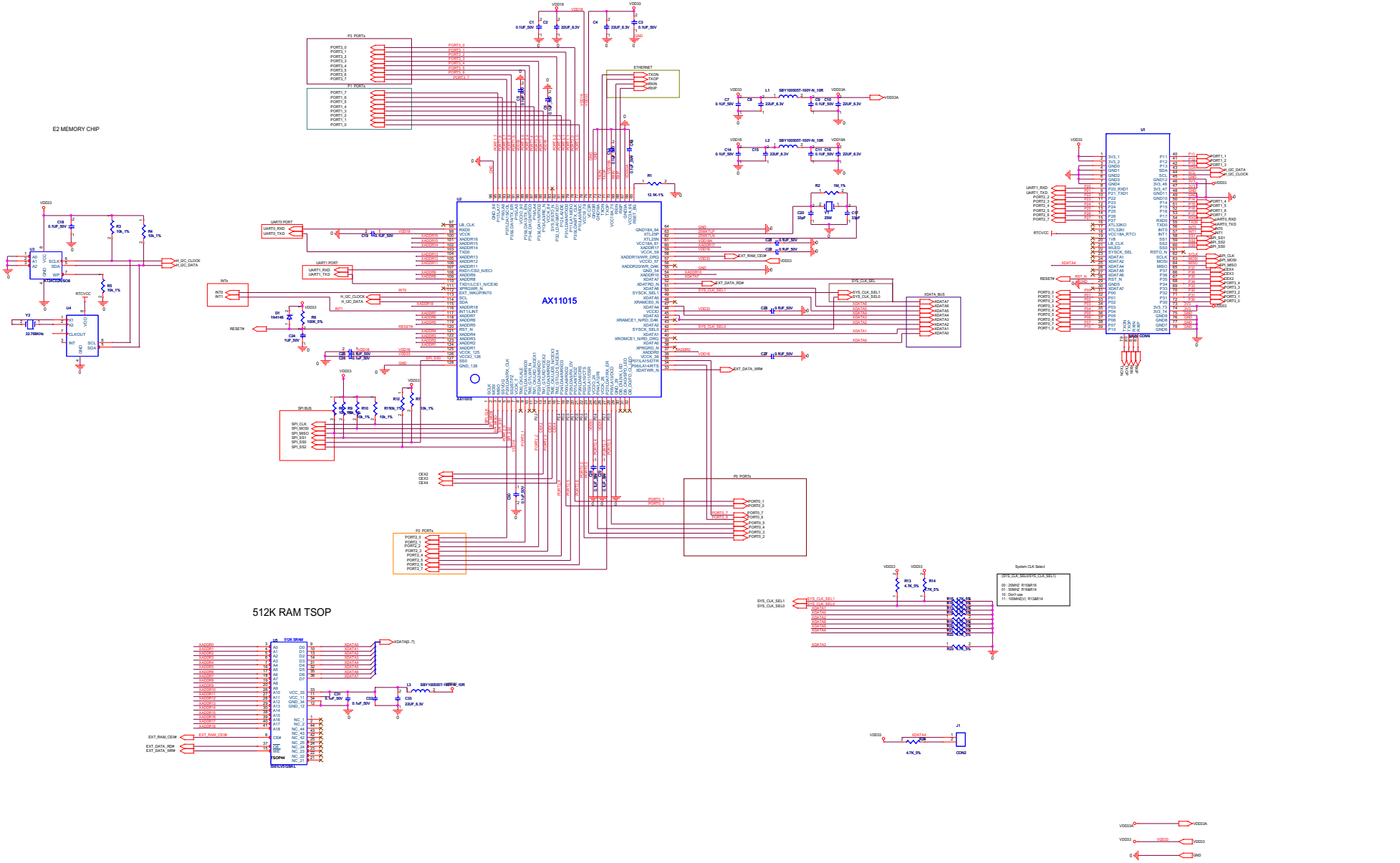
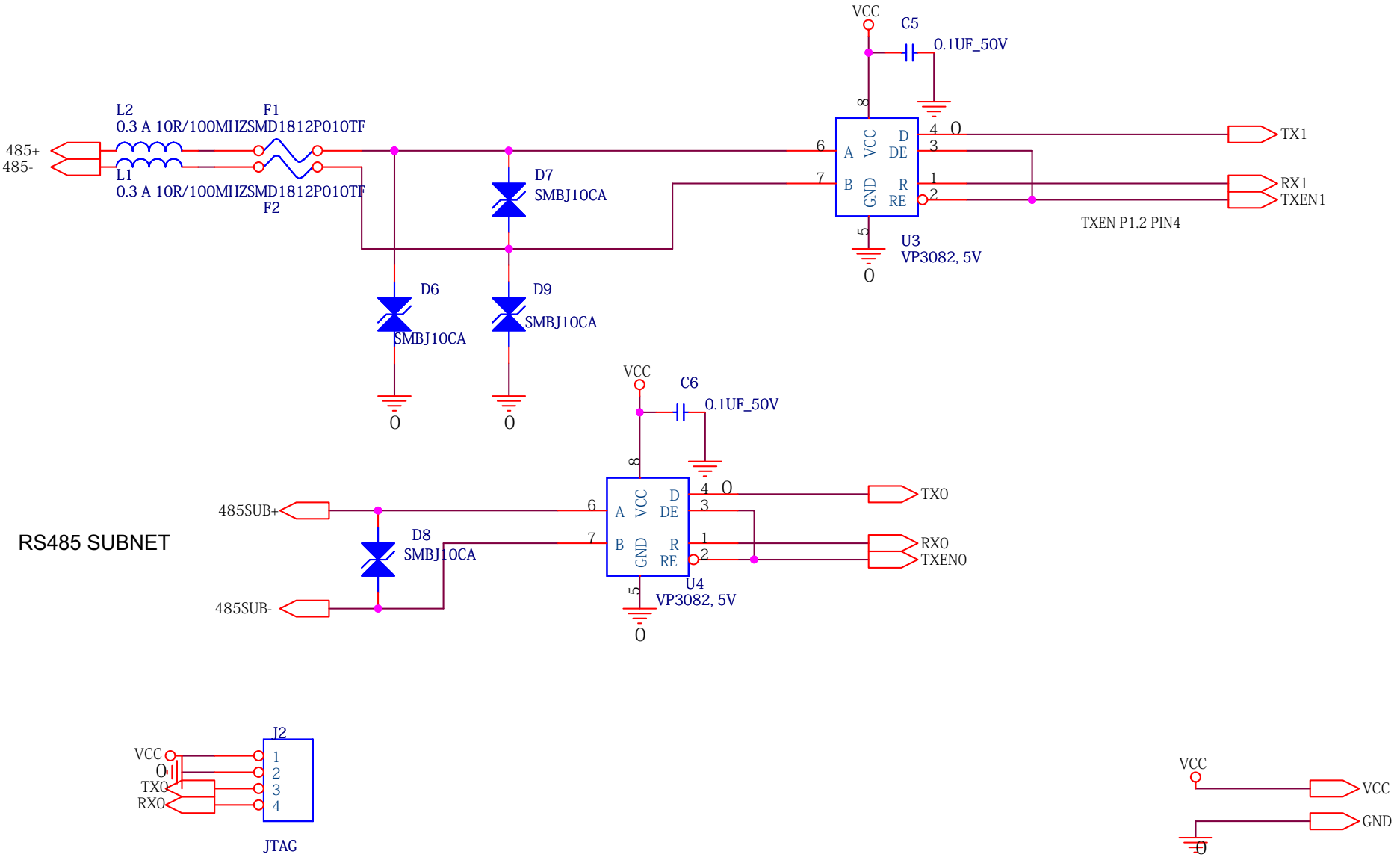
CO2 D/W Module with Ethernet



CO2 D/W Module with Ethernet



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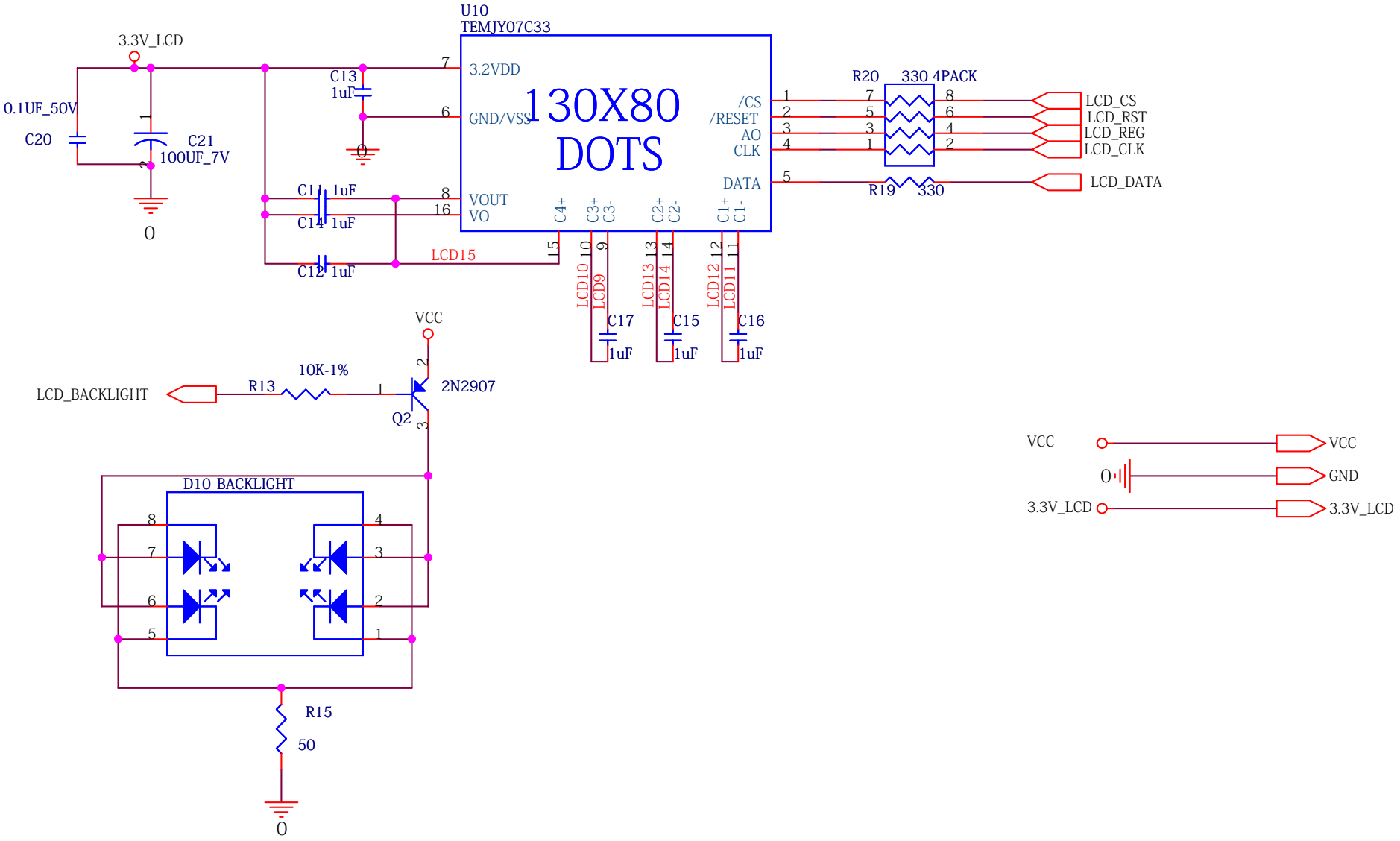
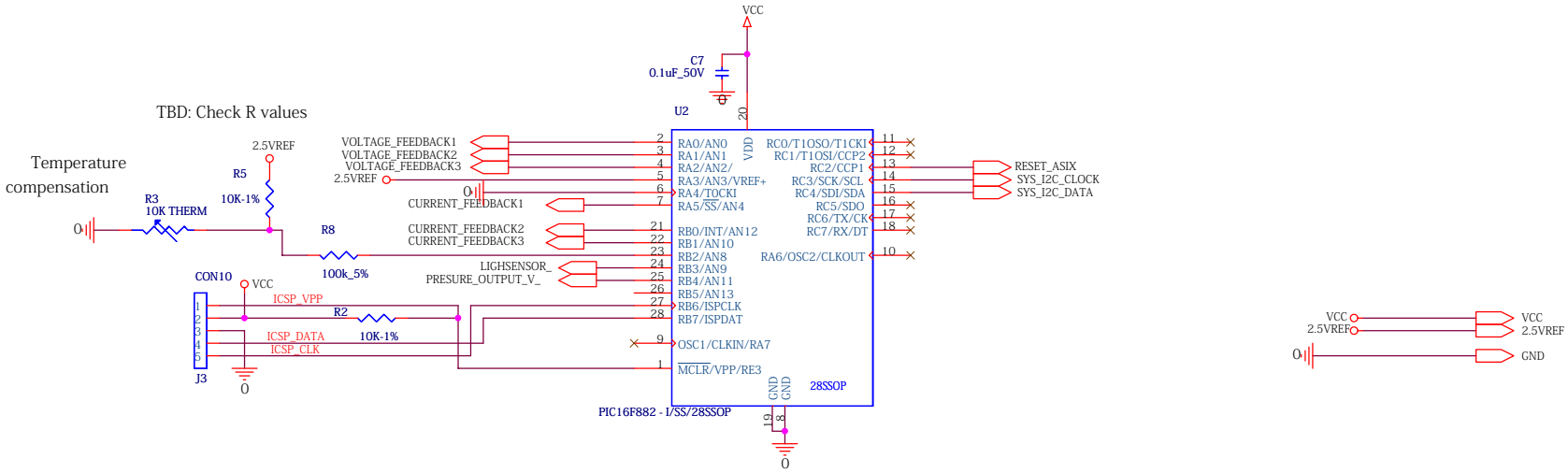
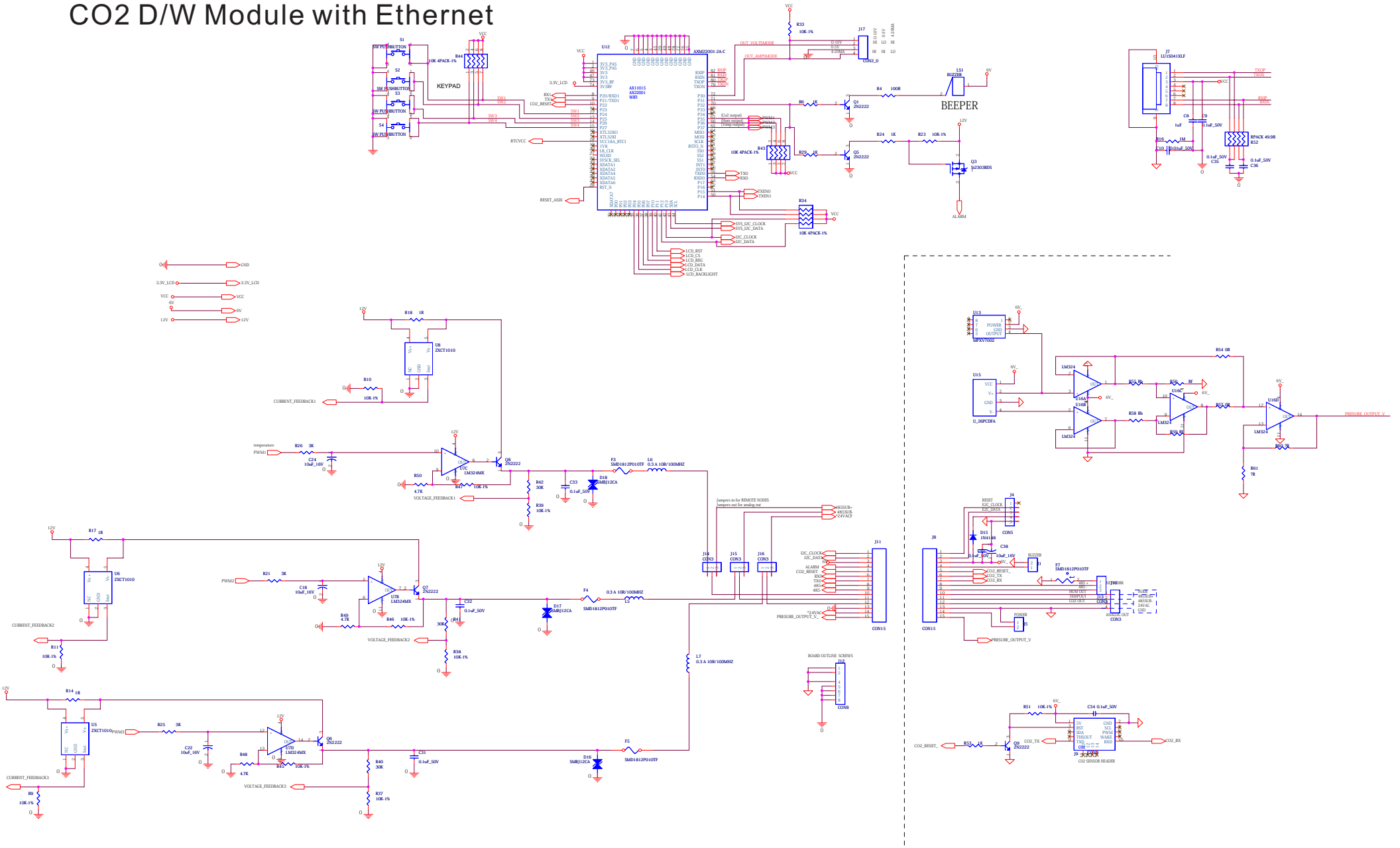


CO2 D/W Module with Ethernet



CO2 D/W Module with Ethernet



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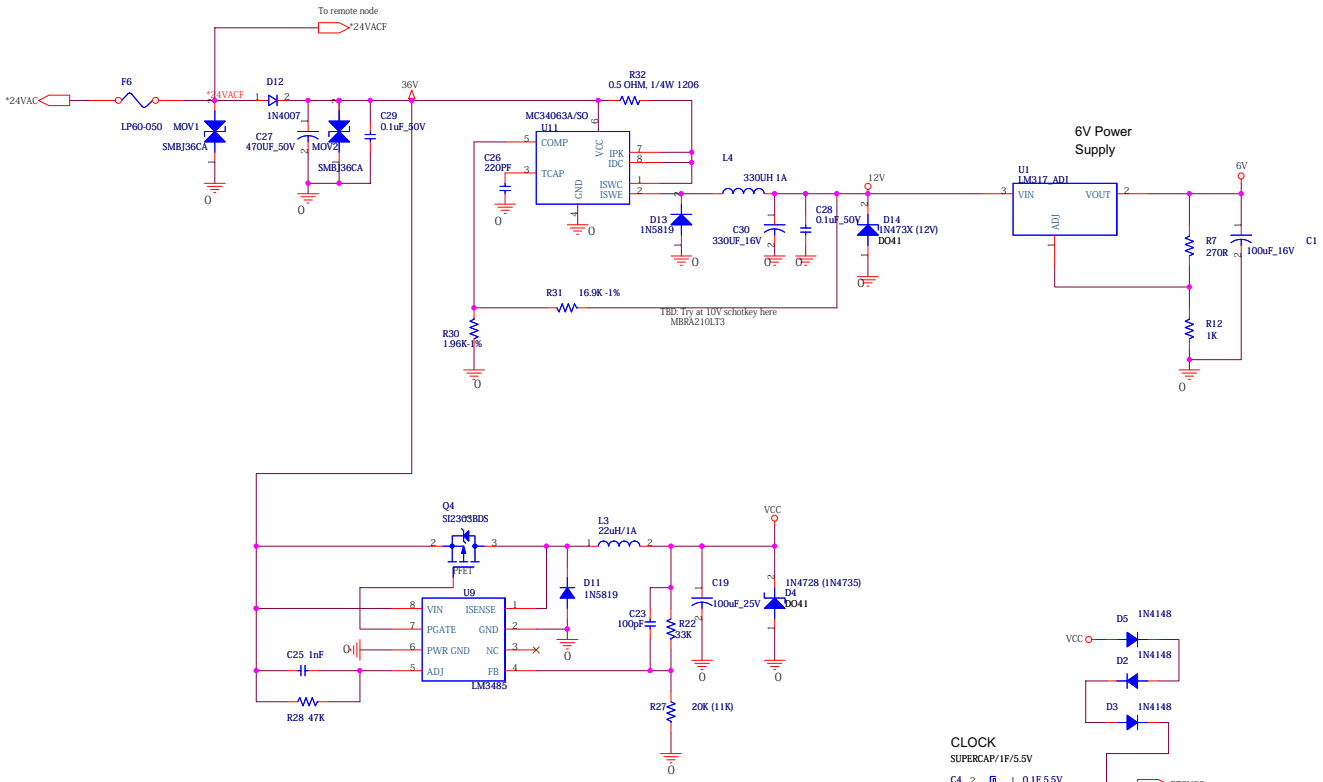

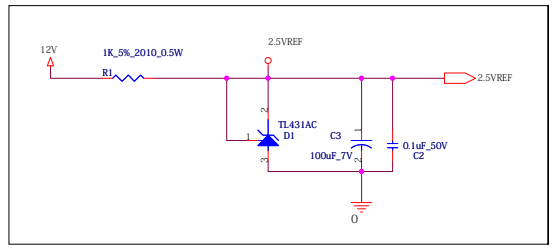

NOTE :

VCC=5V , R15=11K

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Title	Humidity Sensor	
Size C	Document Number <Doc>	Rev 4
Date: Wednesday, April 30, 2014	Sheet 4 of 6	

CO2 D/W Module with Ethernet

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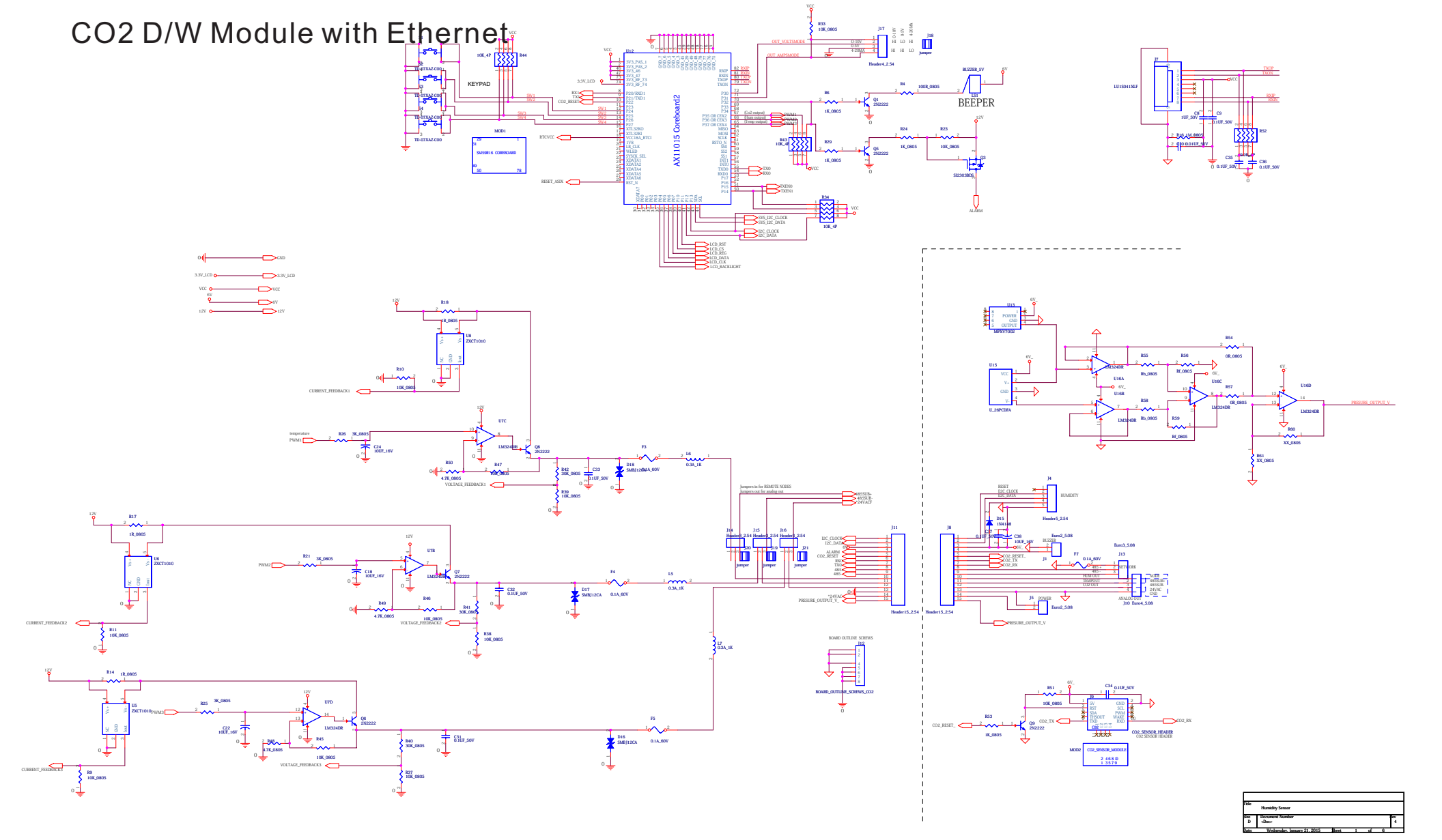
CO2 D/W Module with Ethernet



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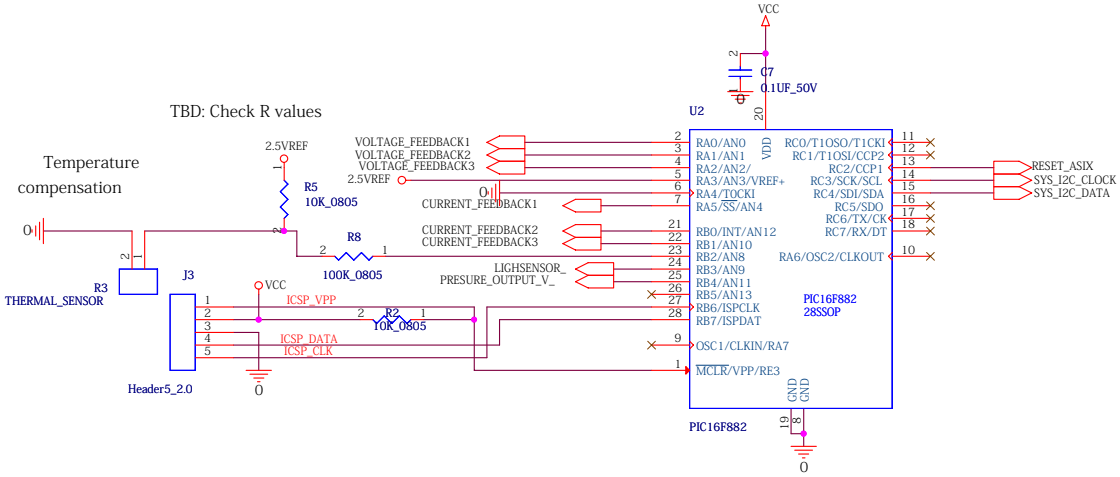

Title	Humidity Sensor	
Size A3	Document Number <Doc>	Rev 4
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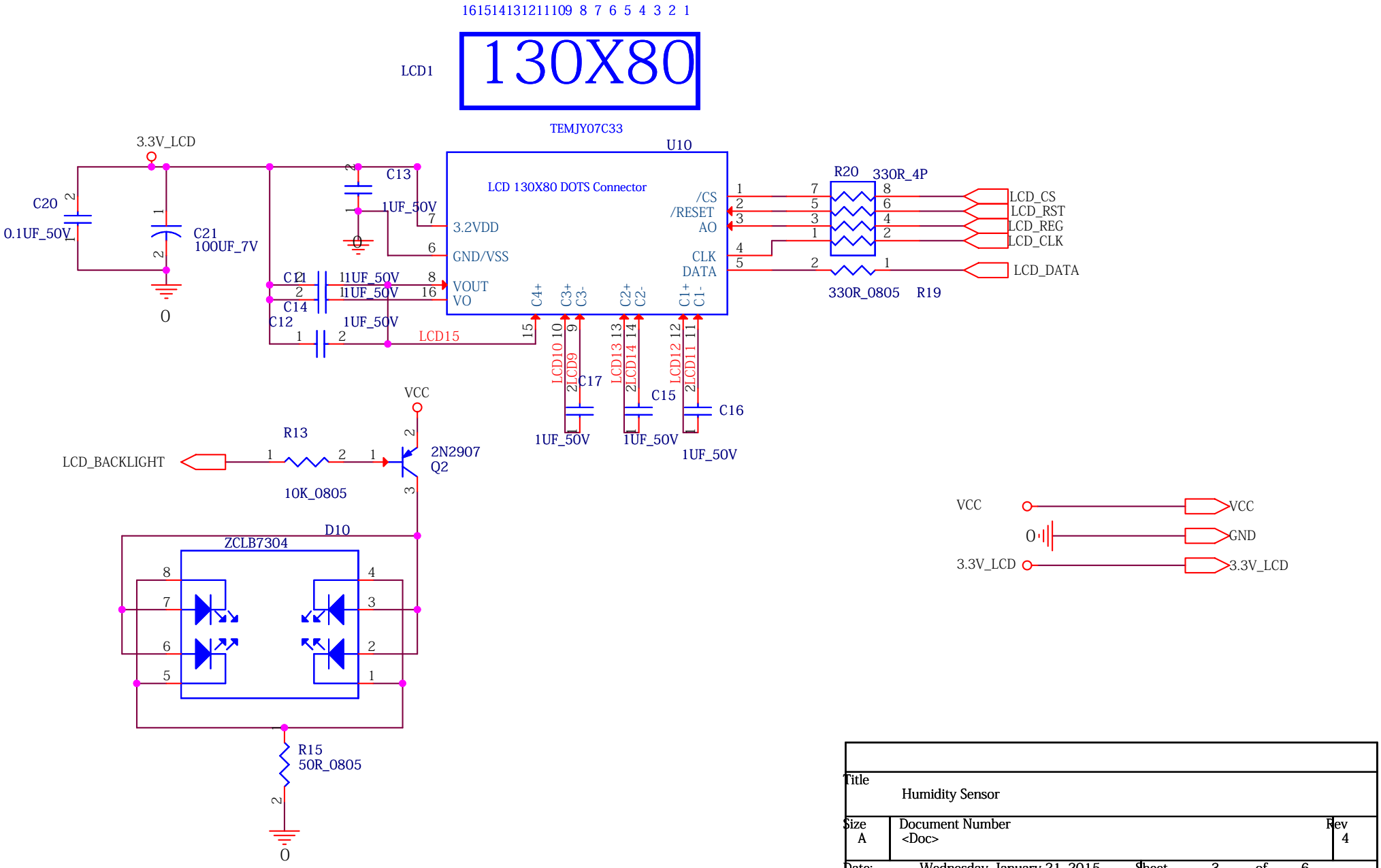
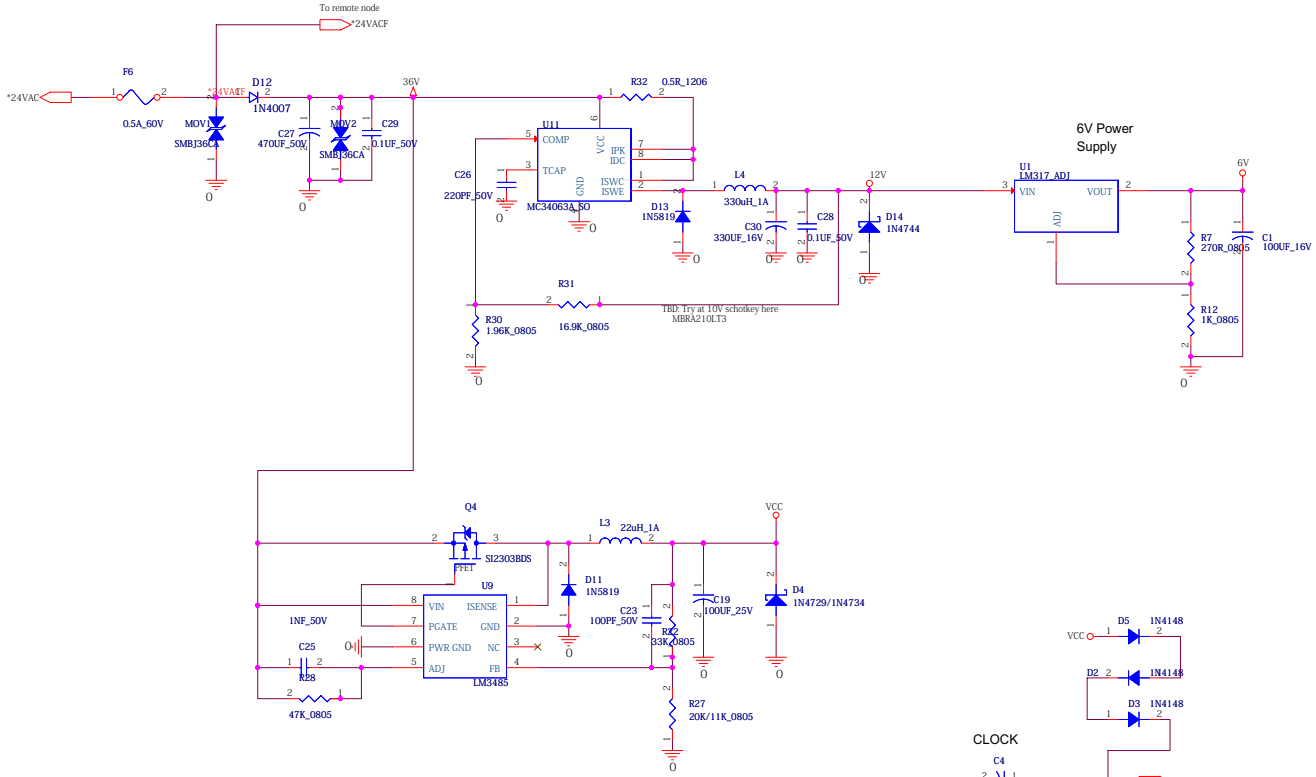
CO2 D/W Module with Ethernet

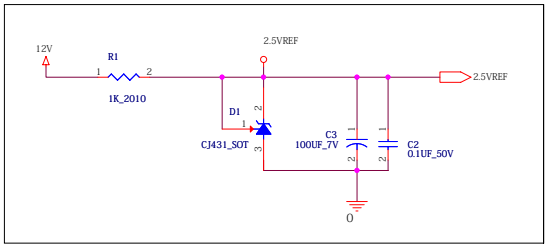


Title	Humidity Sensor	
Size A	Document Number <Doc>	Rev 4
Date: Wednesday, January 21, 2015	Sheet 3 of 6	

CO2 D/W Module with Ethernet



REFERENCE VOLTAGE



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Revision 5:

Done: Made samples for Mahmoud, June 08 approx
DOWN :LCD FOOTPRINT ,Get the line between F4 and 24V
P.S:CODE use MainBoard_Rev02,Sensor use Rev4
TBD: Make 20 samples, Aug08. Main=Rev5, Sensor=Rev4
TBD: Make a smaller module using femto cap sensor and tiny CPU.

Revision 6:

DONE :C9 maybe change to 22pf
Done: Change size of PCB from 61mm to 58mm in width.
Done :LM324 connected to GND and 12V

Rev7(never make)

Done: Backlight always on,hardware change
Done: LM7805 is too hot
Done: D4 wrong connection?

Rev8(never make)

Not built yet
TBD: 4-20ma output option for both temperature and humidity,so need add 2 4-20mA part
TBD: PTC on analog outputs
TBD: PTC on rs485
TBD: make main board bigger to fit in new enclosure

Rev9

TBD: 4-20ma output option for both temperature and humidity,so need add 2 4-20mA part

Rev10

TBD: RENAME DAC 4922 I2C wires' name , make sure connect with 8051 I2C port

TBD: adjust two connectors position on the left side, we need see the name of each pin

TBD: adjust the connector position on the screw board,now it's too closed to the assembly hole

TBD: adjust main board connector,so humidity sensor now assembly on the buttom board

TBD: make sure BZA408bB is 10V range

Rev11

done: add zigbee interface
done: add jumpers so can detect customer output set

Rev12

TBD: add seperated reference 5V to the sensor board as mini pannel
Done: add CO2 sensor to main board
Done: add CO2 output circuit, use pwm function generate voltage
Done: Add jumpers for selecting ma/volts like the other signals

Rev13

Done: Fix RS485 protection
Done: Add movs on analog outputs
Done: Add RS485 subnet for CO2 sensors
Done: D8 Zener, change to smt
TBD: figure something out about reading the C02 sensor, not humidity module
TBD: change L3,L4 to ICBG201209U102,standar component

Rev14

Done: Fix the buzzer drive schematic
Done: Fix the HEART ON/OFF schematic
Done: Change some component comment faults
TBD: Separate output for beeper (pre alarm)

Rev15: no notes
Rev16: no notes

Rev17

Jan 13, Done by Maurice
Done: Fix reference supply
Done: simplified analog outputs
Done: change to CPU module for bacnet, wifi, ethernet
Done: simplify jumpers for node/transducer models
Done: add reset to main cpu from pic
Done: add self calibration of analog outputs
Done: add clock batt backup

TBD: barometric compensation, add a pressure sensor
TBD: 2 net alias wrong: analog_feedback2 & analog_feedback3, they should be changed as voltage_feedback2 & voltage_feedback3,
TBD: add light sensor

Rev18--REV20

REV21

TBD : change MCU pin74 NET name from 3.3V to 3.3v _LCD .

REV22:

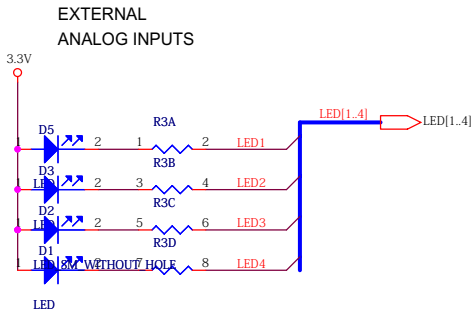
TBD : Delete R35,R36, X1 .

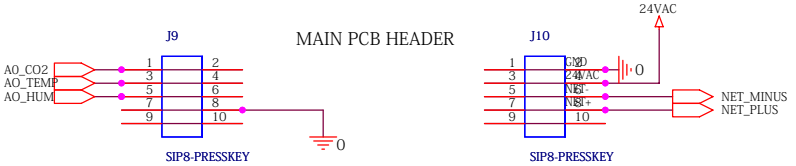
TBD : Ddd pressure sensor .

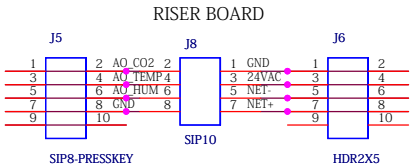
TBD: change dsn and max to use lib parts . Change 2n2222 .dsn and .max to stardard footprint (SM/SOT23_123)

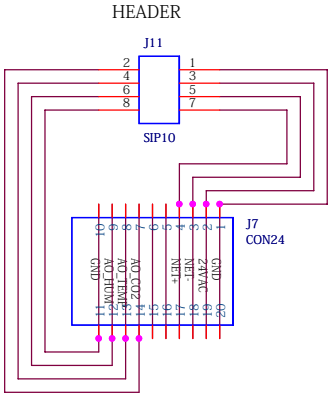
TBD: Add a light sensor to the C02 wall mount version for green house applications

CO2 Node


EXTERNAL
ANALOG INPUTS
3.3V
D5
D3
D2
D1
LED
R3A
R3B
R3C
R3D
LED1
LED2
LED3
LED4
LED[1..4]
LED[1..4]


MAIN PCB HEADER
J9
AO_CO2
AO_TEMP
AO_HUM
SIP8-PRESSKEY
0
J10
24VAC
0
NET_MINUS
NET_PLUS
SIP8-PRESSKEY

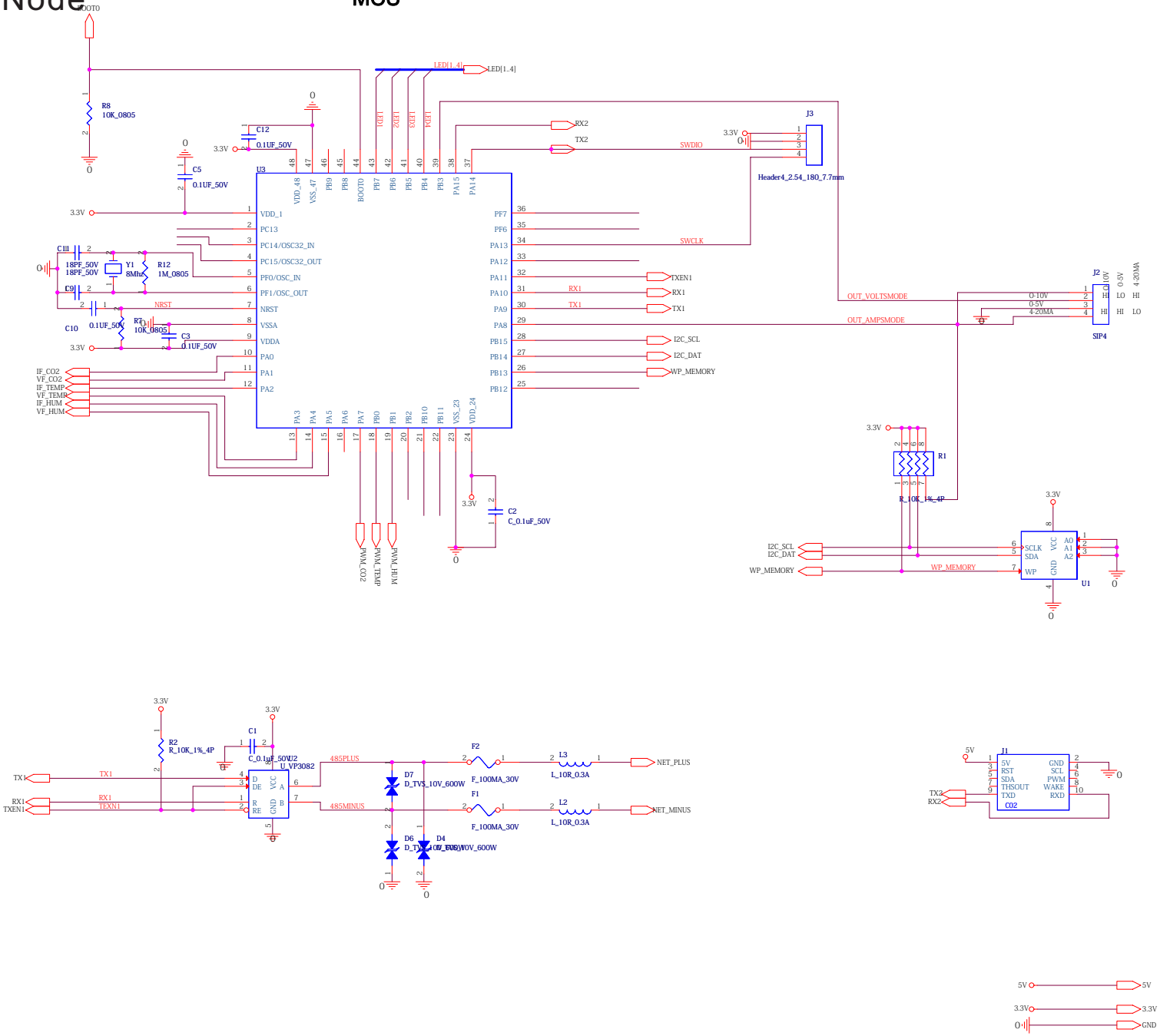

RISER BOARD
J5
J8
J6
AO_CO2
AO_TEMP
AO_HUM
GND
GND
24VAC
NET-
NET+
SIP8-PRESSKEY
SIP10
HDR2X5


HEADER
J11
SIP10
J7
CON24

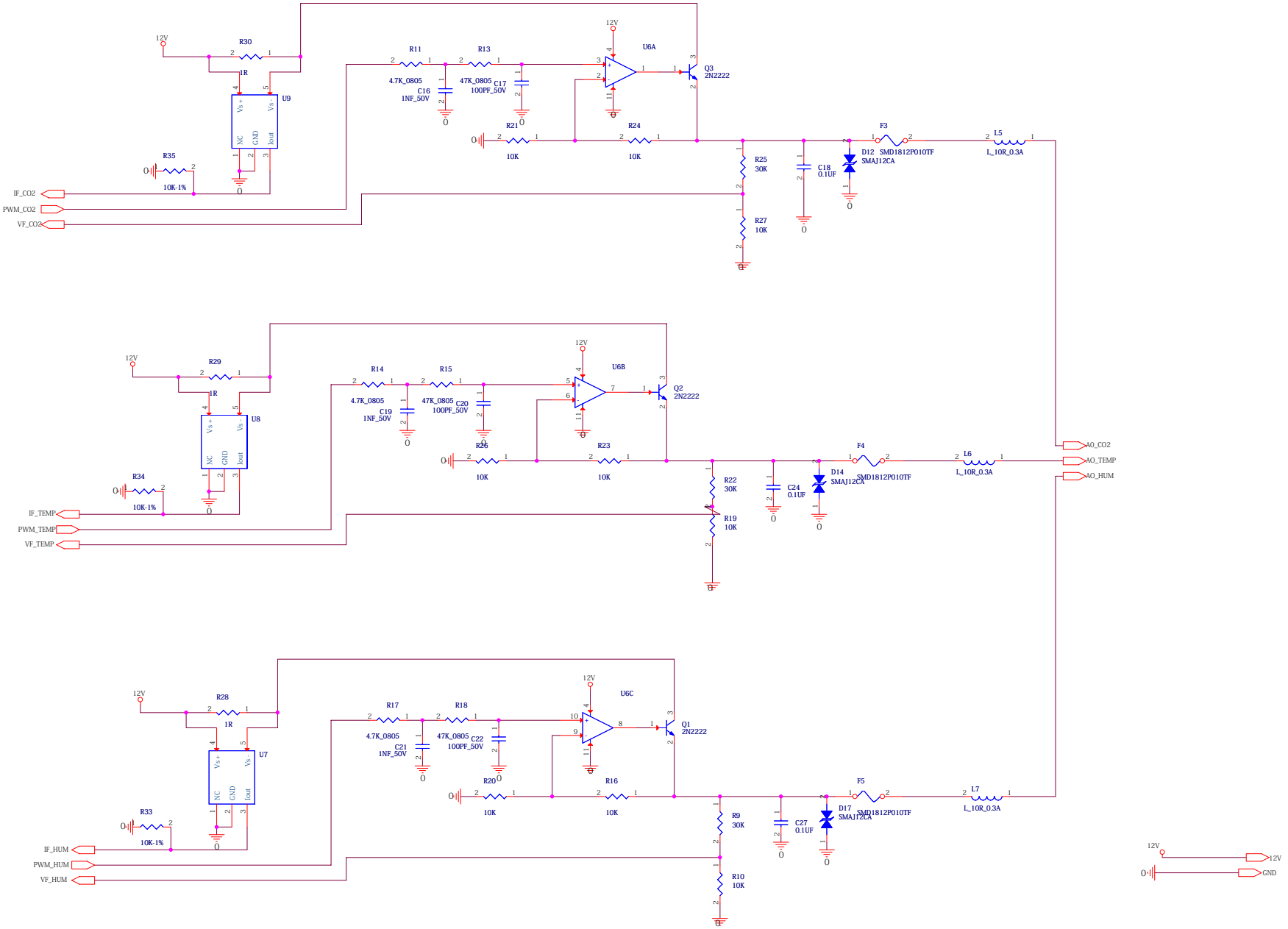

5V
+12V
3.3V
0
5V
+12V
3.3V
GND

CO2 Node

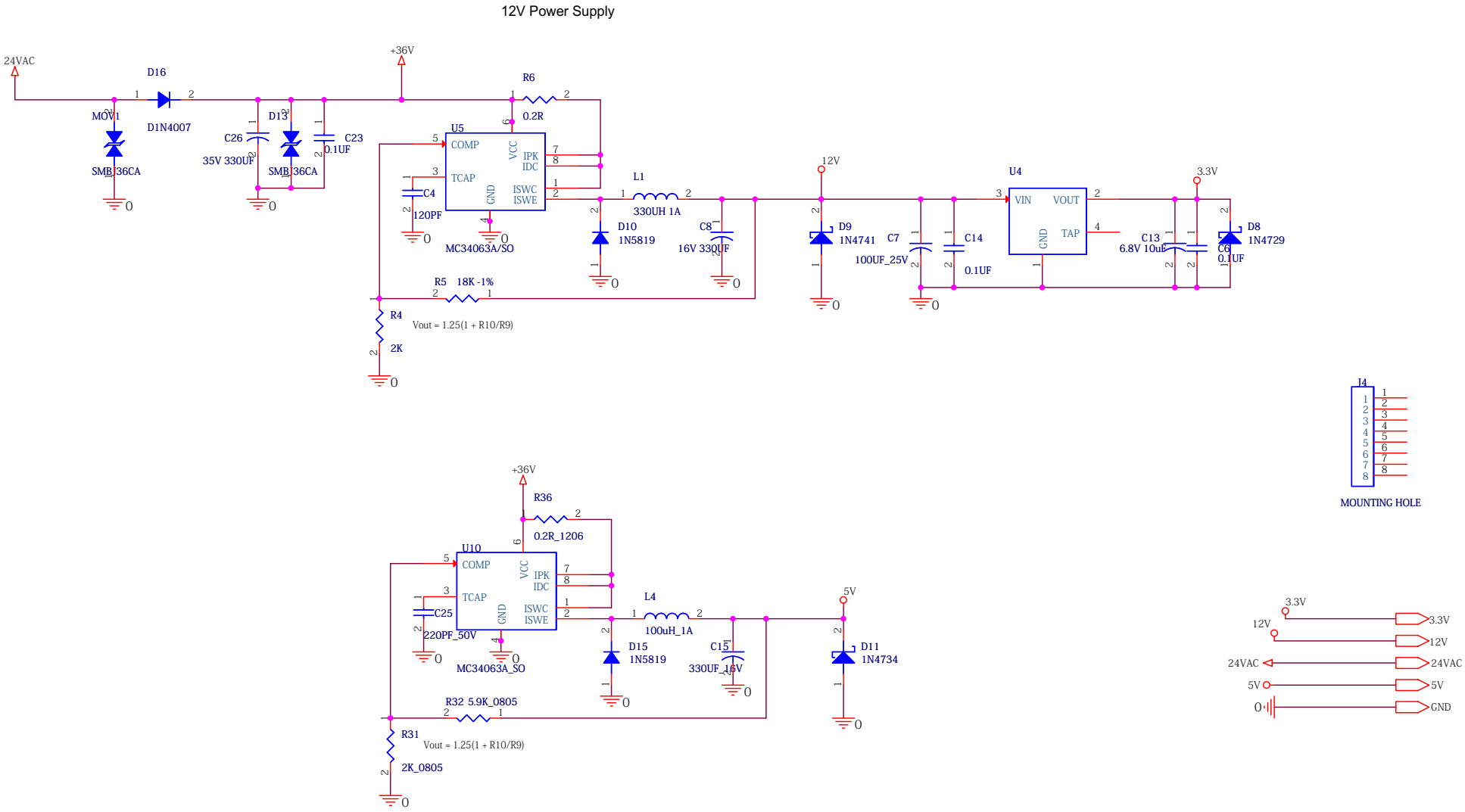
MCU


BOOT0
R8
10K_0805
LED[1..4]
C12
0.1UF_50V
C5
0.1UF_50V
U3
VDD_1
PC13
PC14/OSC32_IN
PC15/OSC32_OUT
PF0/OSC_IN
PF1/OSC_OUT
NRST
VSSA
VDDA
PA0
PA1
PA2
C11
18PF_50V
C9
18PF_50V
Y1
8Mhz
R12
1M_0805
C10
0.1UF_50V
R7
10K_0805
C3
0.1UF_50V
RX2
TX2
SWDIO
SWCLK
TXEN1
RX1
TX1
I2C_SCL
I2C_DAT
WP_MEMORY
J3
Header4_2.54_180_7.7mm
OUT_VOLTSMODE
OUT_AMPSMODE
J2
SIP4
0-10V
0-5V
4-20MA
R1
R_10K_1%_4P
C2
C_0.1uF_50V
IF_CO2
VF_CO2
IF_TEMP
VF_TEMP
IF_HUM
VF_HUM
PWM_CO2
PWM_TEMP
PWM_HUM
U1
SCLK
SDA
WP
VCC
GND
A0
A1
A2
R2
R_10K_1%_4P
C1
C_0.1uF_50V
U_VP3082
485PLUS
485MINUS
F2
F_100MA_30V
F1
F_100MA_30V
L3
L_10R_0.3A
L2
L_10R_0.3A
NET_PLUS
NET_MINUS
D7
D_TVS_10V_600W
D6
D4
J1
CO2
5V
3.3V
GND

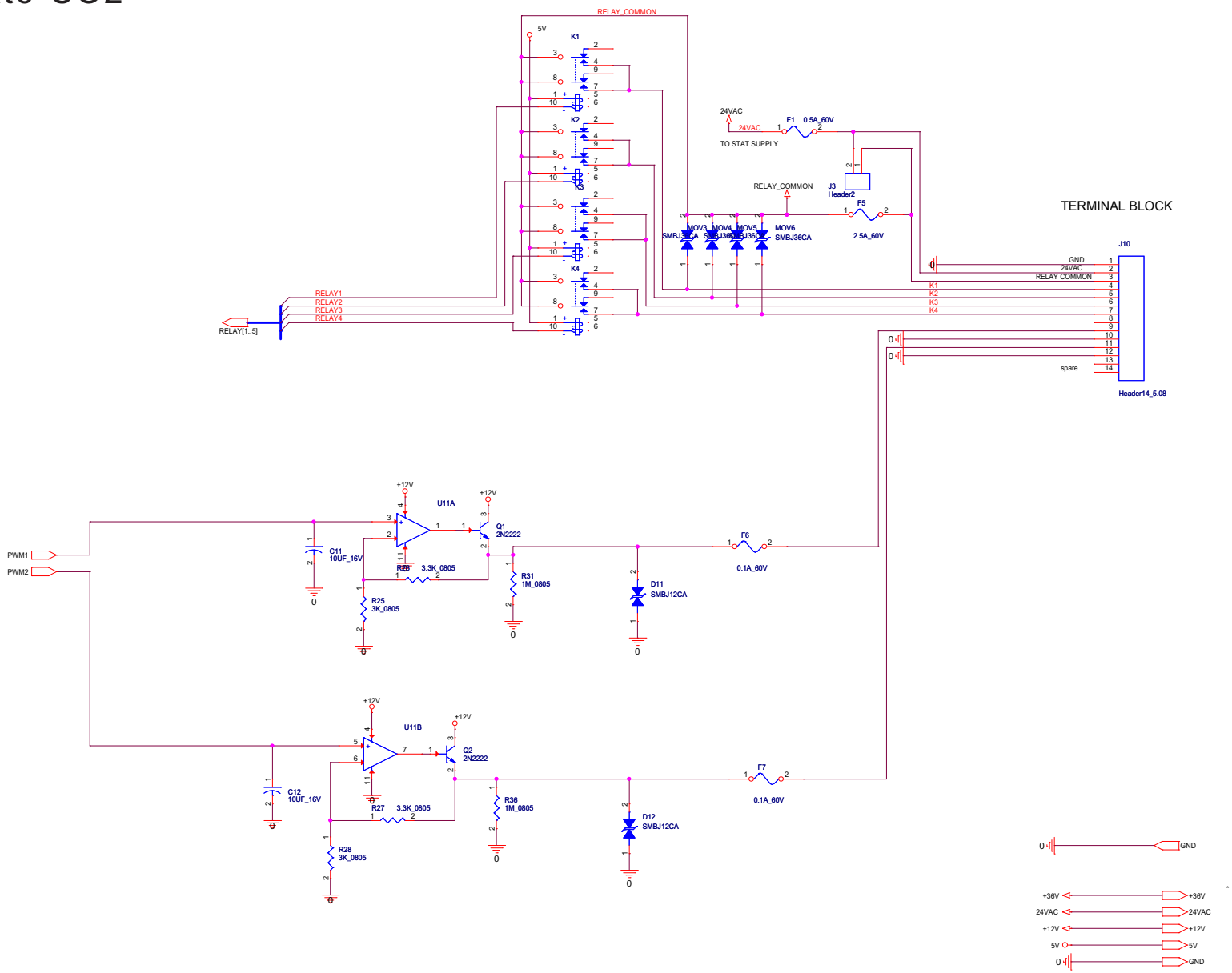
CO2 Node


12V
R30
1R
U9
Vs+
Vs-
NC
GND
Iout
R35
10K-1%
IF_CO2
PWM_CO2
VF_CO2
R11
4.7K_0805
C16
1NF_50V
R13
47K_0805
C17
100PF_50V
U6A
Q3
2N2222
R21
10K
R24
10K
R25
30K
R27
10K
C18
0.1UF
F3
D12 SMD1812P010TF
SMAJ12CA
L5
L_10R_0.3A
R29
U8
R34
R14
R15
C19
C20
U6B
Q2
R26
R23
R22
R19
C24
F4
D14
L6
R28
U7
R33
R17
R18
C21
C22
U6C
Q1
R20
R16
R9
R10
C27
F5
D17
L7
IF_HUM
PWM_HUM
VF_HUM
AO_CO2
AO_TEMP
AO_HUM
GND

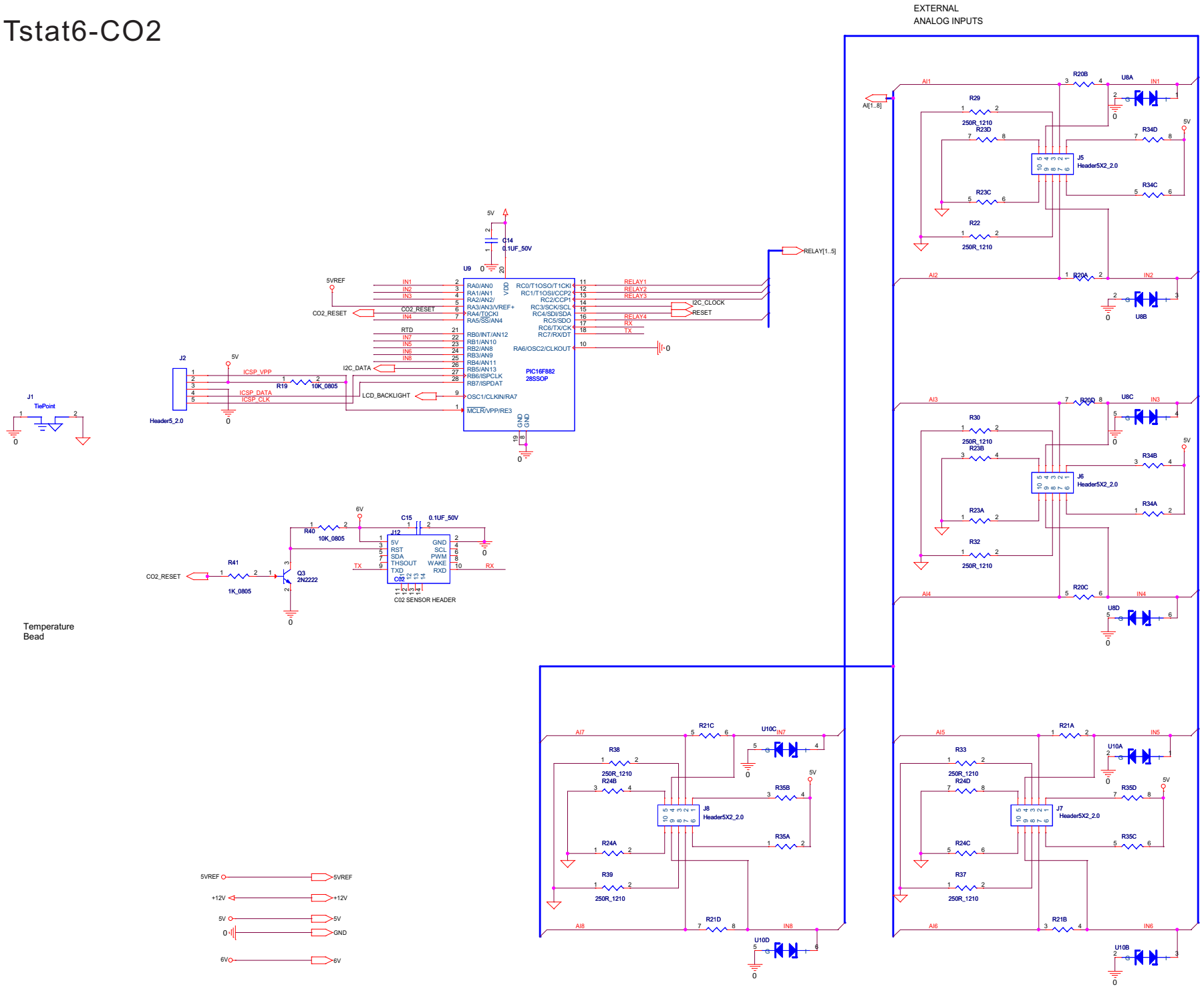
CO2 Node


12V Power Supply
24VAC
D16
D1N4007
MOV1
SMB136CA
C26
35V 330UF
D13
SMB136CA
C23
0.1UF
+36V
R6
0.2R
U5
COMP
TCAP
VCC
IPK
IDC
ISWC
ISWE
GND
C4
120PF
MC34063A/SO
L1
330UH 1A
D10
1N5819
C8
16V 330UF
12V
D9
1N4741
C7
100UF_25V
U4
VIN
VOUT
GND
TAP
C14
0.1UF
3.3V
C13
6.8V 10uF
C6
0.1UF
D8
1N4729
R5 18K -1%
R4
2K
Vout = 1.25(1 + R10/R9)
J4
MOUNTING HOLE
+36V
R36
0.2R_1206
U10
C25
220PF_50V
MC34063A_SO
L4
100uH_1A
D15
1N5819
C15
330UF_16V
5V
D11
1N4734
R32 5.9K_0805
R31
2K_0805
Vout = 1.25(1 + R10/R9)
3.3V
12V
24VAC
5V
GND

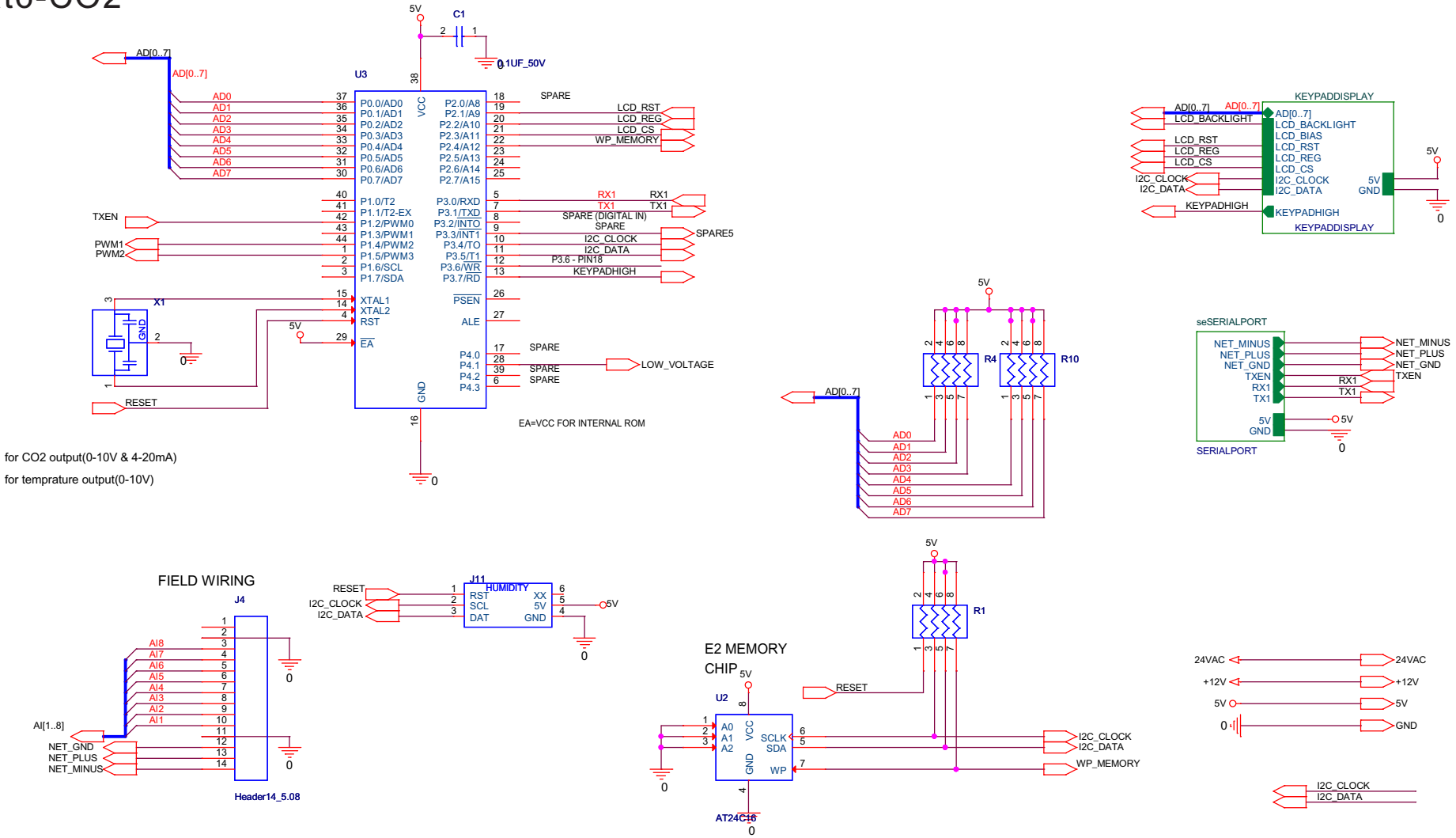
Tstat6-CO2


RELAY_COMMON
5V
K1
K2
K3
K4
24VAC
F1 0.5A_60V
TO STAT SUPPLY
J3
Header2
F5
2.5A_60V
MOV3
MOV4
MOV5
MOV6
SMBJ36CA
TERMINAL BLOCK
J10
GND
24VAC
RELAY_COMMON
spare
Header14_5.08
RELAY1
RELAY2
RELAY3
RELAY4
RELAY[1..5]
PWM1
PWM2
+12V
U11A
U11B
Q1
Q2
2N2222
C11
10UF_16V
C12
R25
3K_0805
R26
3.3K_0805
R27
R28
R31
1M_0805
R36
D11
D12
SMBJ12CA
F6
F7
0.1A_60V
+36V

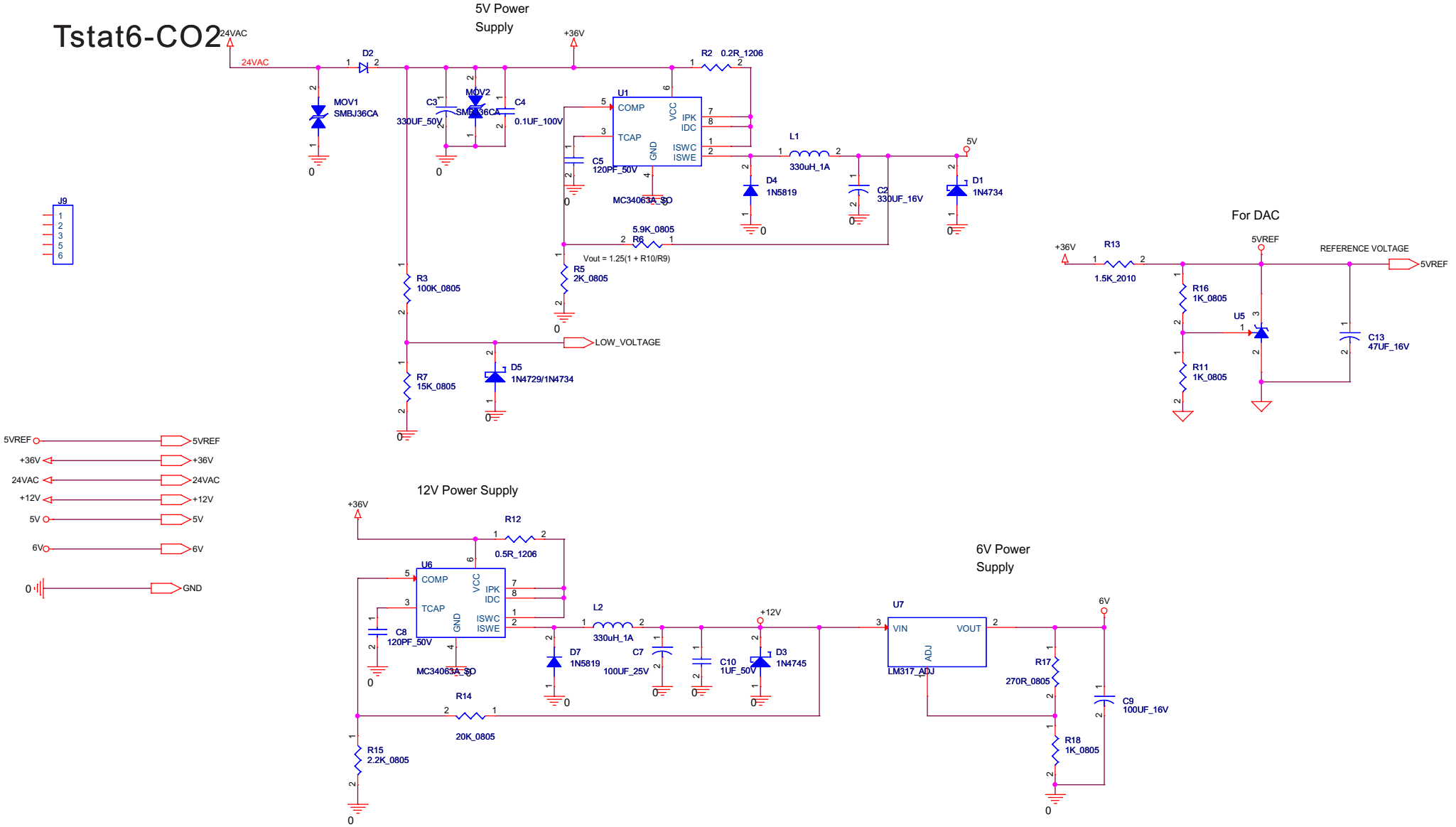
Tstat6-CO2


EXTERNAL
ANALOG INPUTS
AI[1..8]
AI1
AI2
AI3
AI4
AI5
AI6
AI7
AI8
R20B
R20A
R20D
R20C
R21C
R21A
R21D
R21B
U8A
U8B
U8C
U8D
U10C
U10A
U10D
U10B
IN1
IN2
IN3
IN4
IN5
IN6
IN7
IN8
R29
R23D
R34D
R34C
R23C
R22
R30
R23B
R34B
R34A
R23A
R32
R38
R24B
R35B
R24A
R35A
R39
R33
R24D
R35D
R24C
R35C
R37
250R_1210
J5
J6
J7
J8
Header5X2_2.0
5V
0
U9
PIC16F882
28SSOP
C14
0.1UF_50V
5VREF
CO2_RESET
RTD
I2C_DATA
LCD_BACKLIGHT
ICSP_VPP
ICSP_DATA
ICSP_CLK
RELAY[1..5]
RELAY1
RELAY2
RELAY3
RELAY4
I2C_CLOCK
RESET
RX
TX
J2
Header5_2.0
R19
10K_0805
J1
TiePoint
Temperature
Bead
C15
R40
J12
R41
Q3
2N2222
1K_0805
C02 SENSOR HEADER
+12V
6V
GND

Tstat6-CO2


U3
C1
0.1UF_50V
AD[0..7]
SPARE
LCD_RST
LCD_REG
LCD_CS
WP_MEMORY
RX1
TX1
SPARE (DIGITAL IN)
SPARE5
I2C_CLOCK
I2C_DATA
P3.6 - PIN18
KEYPADHIGH
TXEN
PWM1
PWM2
X1
RESET
LOW_VOLTAGE
EA=VCC FOR INTERNAL ROM
for CO2 output(0-10V & 4-20mA)
for temprature output(0-10V)
KEYPADDISPLAY
LCD_BACKLIGHT
LCD_BIAS
R4
R10
seSERIALPORT
NET_MINUS
NET_PLUS
NET_GND
SERIALPORT
FIELD WIRING
J4
Header14_5.08
AI[1..8]
J11
HUMIDITY
E2 MEMORY
CHIP
U2
AT24C16
R1
24VAC
+12V
5V
GND

Tstat6-CO2


5V Power Supply
24VAC
D2
MOV1
SMBJ36CA
C3
330UF_50V
MOV2
SMBJ36CA
C4
0.1UF_100V
+36V
R2 0.2R_1206
U1
COMP
TCAP
GND
VCC
IPK
IDC
ISWC
ISWE
C5
120PF_50V
MC34063A_SO
L1
330uH_1A
5V
D4
1N5819
C2
330UF_16V
D1
1N4734
5.9K_0805
R6
Vout = 1.25(1 + R10/R9)
R5
2K_0805
R3
100K_0805
LOW_VOLTAGE
R7
15K_0805
D5
1N4729/1N4734
J9
For DAC
+36V
R13
1.5K_2010
5VREF
REFERENCE VOLTAGE
R16
1K_0805
U5
C13
47UF_16V
R11
1K_0805
5VREF
+36V
24VAC
+12V
5V
6V
GND
12V Power Supply
+36V
R12
0.5R_1206
U6
COMP
TCAP
GND
VCC
IPK
IDC
ISWC
ISWE
C8
120PF_50V
MC34063A_SO
L2
330uH_1A
+12V
D7
1N5819
C7
100UF_25V
C10
1UF_50V
D3
1N4745
R14
20K_0805
R15
2.2K_0805
6V Power Supply
U7
VIN
VOUT
ADJ
LM317_ADJ
6V
R17
270R_0805
C9
100UF_16V
R18
1K_0805

Tstat6-CO2

REV 0,1

Done: Copy Tstat5 Base Board

REV 2

TBD: COPY TSTAT5E REV4
TBD: change pic to 16F688
TBD: add c02 sensor and relays to new version
TBD: add CO2 Rx and Tx line

REV 3

DONE: add 50ohm resistor on backlighthigh net
DONE: add 10k resistor for pull high with
LCD_backlight1

DONE: change BZA418B with BZA408B
DONE: we need move J12 to right about 1mm
DONE: we need adjust k1 position
Done: change pic footprint
Done: change pic RX/TX lines
Done: move mux from main cpu to pic
Done: add power connector to c02 sensor
Done: fixed TX&RX pin name(TX,RX exchanged),using h ardware uart
Done: RA4 connect to MUX pin 10 as select pin

TBD: rs485 gnd, use rtd instead of resister

REV 4

DONE: add 4-20mA current loop circuit,using 8051 P1 .5 pian for PWM3
DONE: conbine 4-20mA & 0-10V to one port, customer can use jumper to select
DONE: add 0.1uF decoupling capacitor on DAC(U200) V DD pin
DONE: change PWM2(8051 pin 3) to DAC chip select
Done: add 78L05 to generate 5Vref
Done: use spare a/d pic pin to self calibrate dac.
Done: use pic to select mux channel, not main cpu
Done: use bat54s intead of 2 PCS 1n4004,on 4-20mA c ircuit
DONE: use two channelS DAC mcp4922 instead of TLC56 15
DONE: changed U12 footprint with tssop14
DONE: changed U9 PIN NAME

REV 5

DONE: need change footprint of D14 with sot23_123
TBD: need make sure the area of pin near the plug l ine port have no via.
DONE: we need make sure the GND and AGND connect.
TBD: need change the footprint of U9
TBD:how to deal with the keypad loction
TBD:need change the footprint of J15
TBD:need check the BZA408B that can't bare the 12v
TBD:need adjust the hole positon
TBD:change the value of 100K resistor of analog inp ut circiut with 10K
TBD: light sensor
TBD: figure something out with the keypad

DONE: we have changed the 485 circuit protect parts .
DONE: delete the phone port is used for 485

REV 6

TBD: change the new press key which is 2.5MM higher
TBD: change the holes of screw match plastic enclos ure

DONE: changed all value of components like tstat6
DONE: Use TL431 generation 5V reference replace 78L 05
DONE: Use PIC driver realys like tstat6 and delete uln2003
DONE: change the footprint of 39V zener with SMT

REV 7

TBD:need make the hole of the end place match with the plastic
DNE:It is the better way to move the co2 Module lit tle down in order to obligate enough space for ter minal. toward to down near 1.56mm
TBD:Cause the capcitor volume too big so that the b ackplate not easy to assembly. near 2.3mm
Dne: Need put the silkscreen to top layer of Backli ght
done: Add humidity sensor
done: change the key sequency the same as tstat6
done: change ref5V circuit
done: delete the thermostate

REV 8

DONE: change the humidity connecter

REV 9

DONE: change the 5V reference circuit

DONE: adjust the hum module location

DONE: change the MOV1,D5 with SMBJ36CA

DONE: change the CO2 module with new one

DONE: move the AI pin upper and delete one pin each side

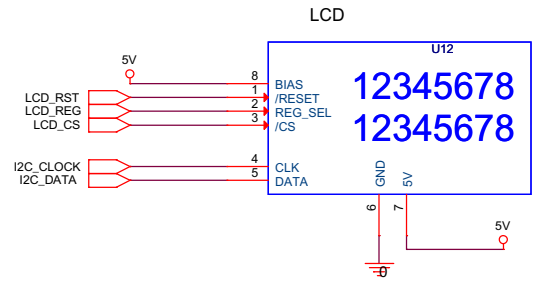
DONE: change the SM5964 with SM59128

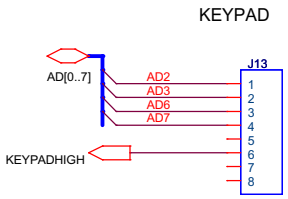
DNE: we need move the terminal to down more than 1 MM
DNE: we need adjust the hum modult to suit location
dne: Footprint of the HUM connecter need be change to correct.
DNE: delete one pin at the each side.
dne: we need add a slot on the right of key board

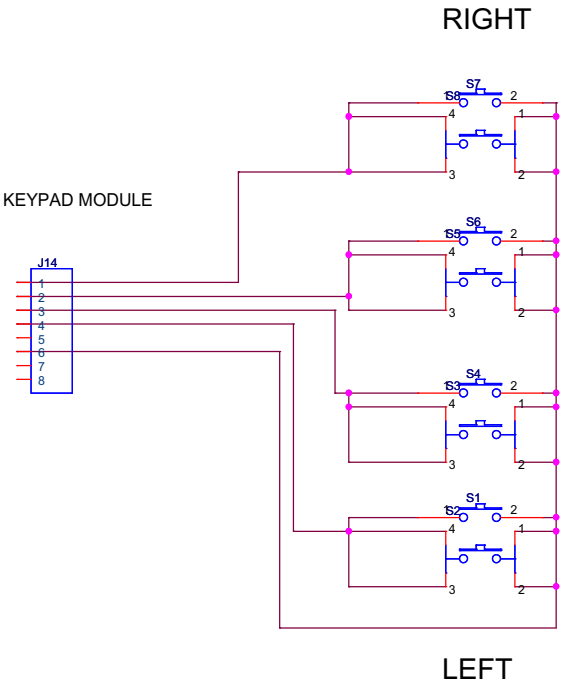
DNE: Q1,Q2'S footprint not correct 8/29
DNE: J1 chagne to 0R with SM/R_0805 8/29

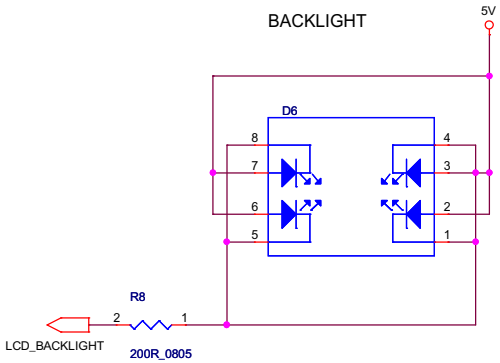
REV 10

Tstat6-CO2


LCD
U12
5V
LCD_RST
LCD_REG
LCD_CS
I2C_CLOCK
I2C_DATA
BIAS
/RESET
REG_SEL
/CS
CLK
DATA
GND
5V
12345678
12345678
0

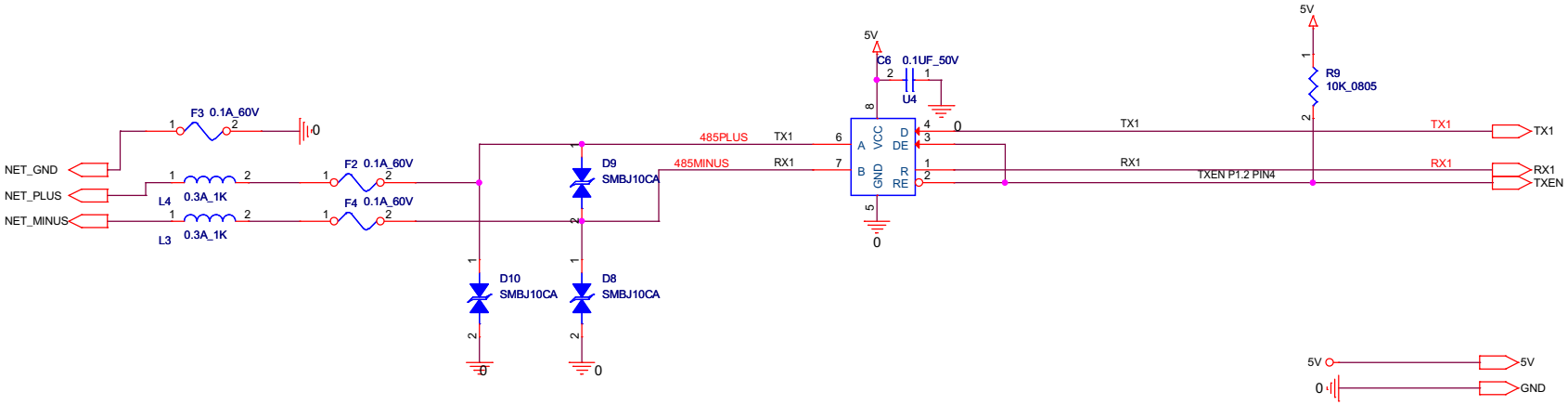

KEYPAD
AD[0..7]
AD2
AD3
AD6
AD7
KEYPADHIGH
J13


RIGHT
KEYPAD MODULE
J14
S7
S8
S6
S5
S4
S3
S1
S2
LEFT


BACKLIGHT
5V
D6
R8
LCD_BACKLIGHT
200R_0805


5V
0
5V
GND

Tstat6-CO2


NET_GND
NET_PLUS
NET_MINUS
F3 0.1A_60V
F2 0.1A_60V
F4 0.1A_60V
L4 0.3A_1K
L3 0.3A_1K
D9 SMBJ10CA
D10 SMBJ10CA
D8 SMBJ10CA
485PLUS
485MINUS
TX1
RX1
5V
C6 0.1UF_50V
U4
A VCC D DE
B GND R RE
R9 10K_0805
TXEN P1.2 PIN4
TX1
RX1
TXEN
5V
GND
0