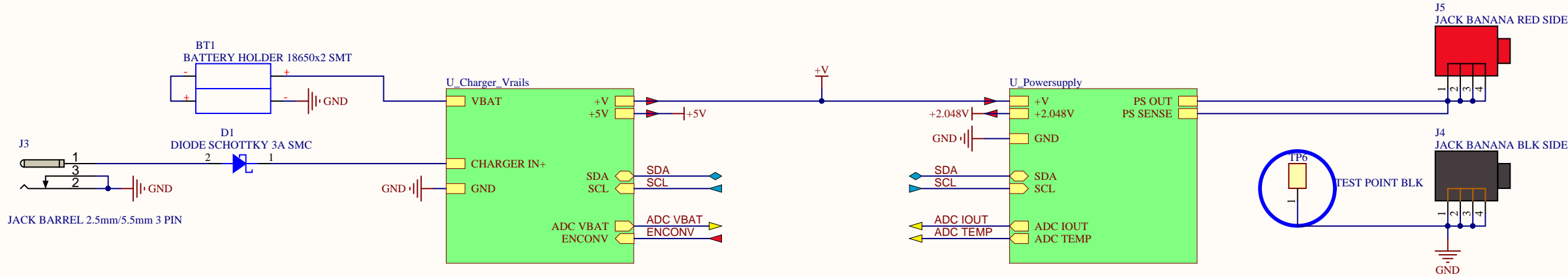
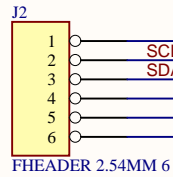


Note: Current limit is implemented in firmware.
 For manual operation or firmware failure: the LT3080 sets I_{max} of 1A
 For non-firmware / manual operation see [uSupply0100_Manual.pdf](#)

<div>▲Text</div>			Title BATTERY POWERED BENCH PSU		New Westminster British Columbia Canada	EMERALD <hr/> INSTRUMENTS
			Schem BlockDiagram.SchDoc			
Size A3	No. uSupply	Rev 0100	Created Sep 2018	Edited 19/09/2018		
Engineer Bruce Cardoza			File D:\Projects\Temp\uSupply\uSupply\BlockDiagram.SchDoc			
			1 of 5			



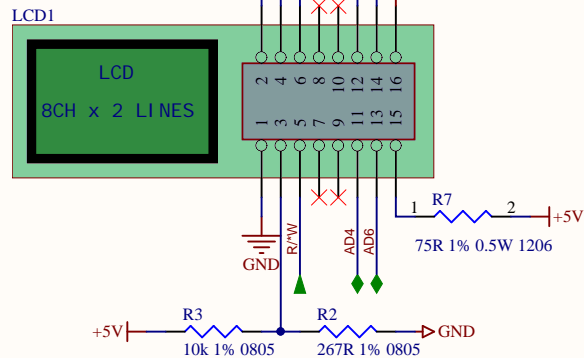
EXPANSION HEADER



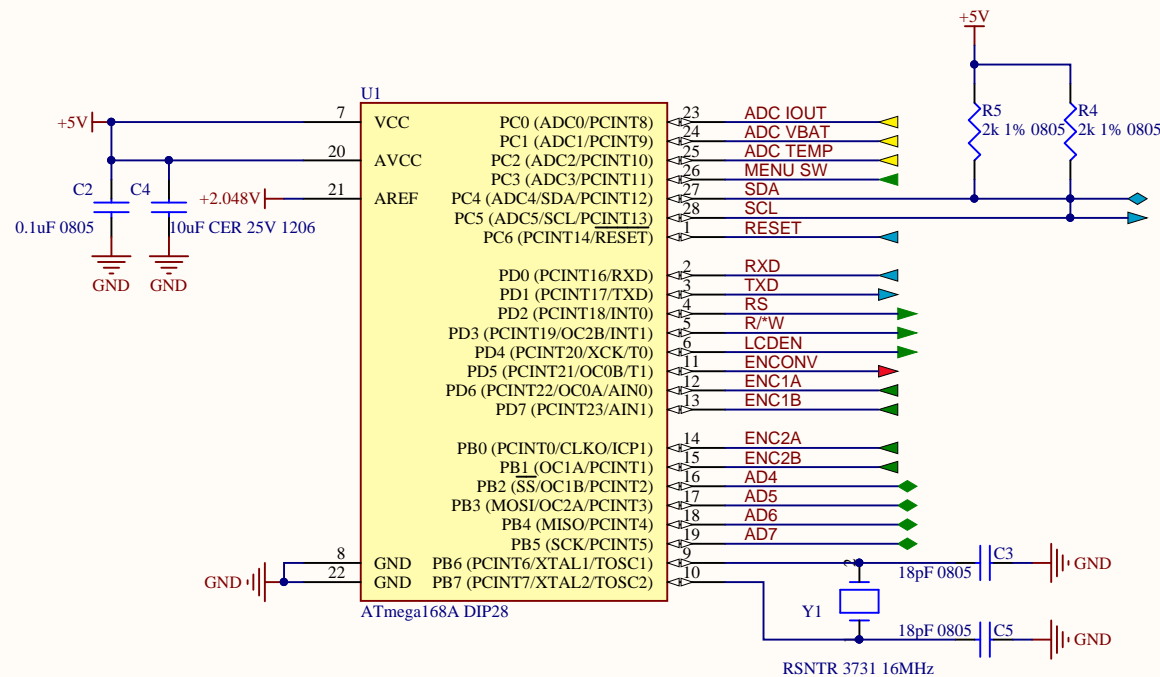
2 LINE X 8 CHAR LCD

LCD 0802 SMALL BACKLIGHT WITH CONNECTOR

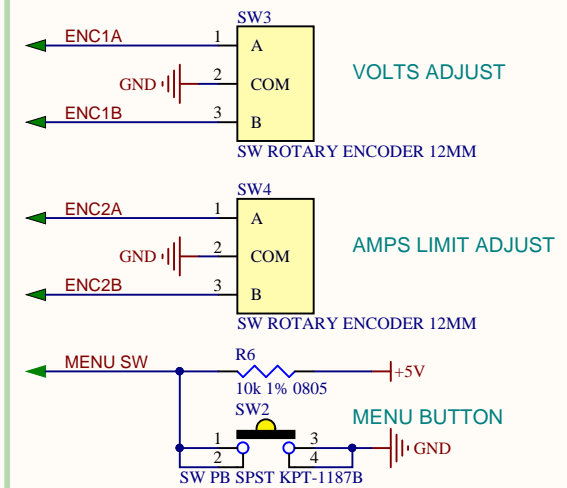
LCD uses a 4 data line parallel interface. Fixed backlight



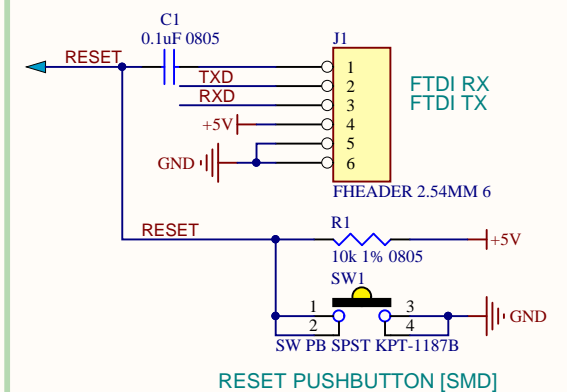
ARDUINO MICROCONTROLLER



USER INTERFACE:



MICRO PROGRAMMER



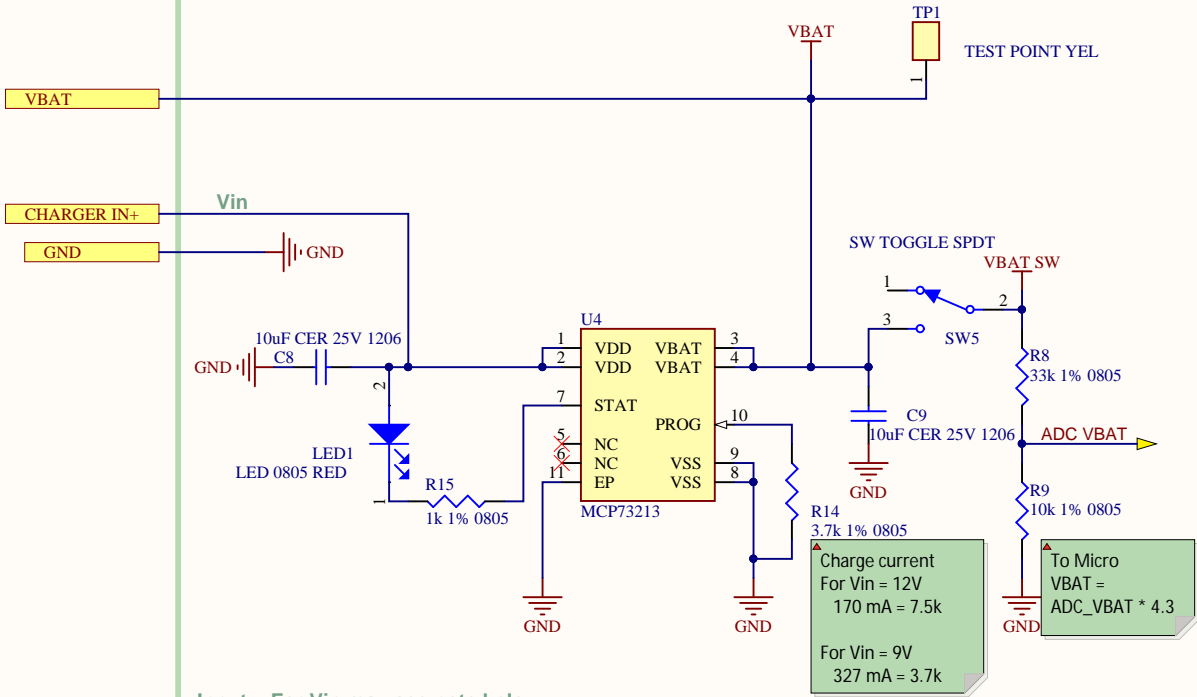
SPB



REV HISTORY

<div>Text</div>			Title		British Columbia Canada	<div>EMERALD</div> <div>INSTRUMENTS</div>
			Schem			
BATTERY POWERED BENCH PSU						
Main.SchDoc						
Size	No.	Rev	Created	Edited		
B	uSupply	0100	Apr 2017	19/09/2018		
Engineer			File			
Bruce Cardoza			D:\Projects\Temp\uSupply\uSupply\Main.SchDoc			
			2 of 5			

BATTERY CHARGER



Input = For Vin max see note below

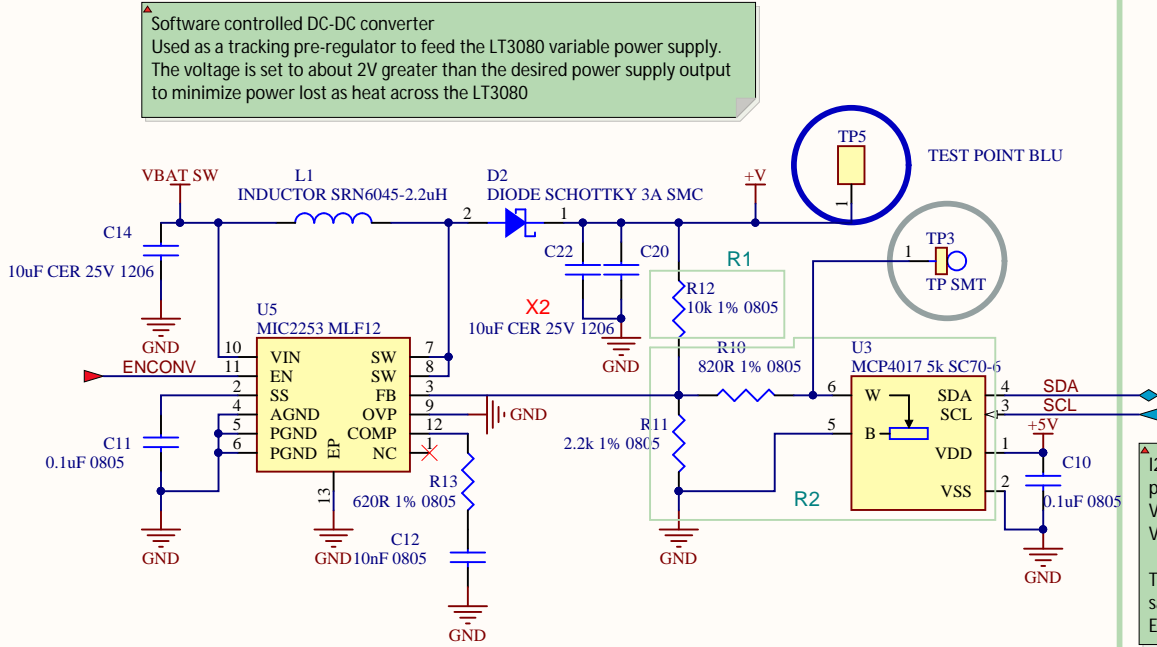
MCP73213 CHARGE CURRENT CALCULATIONS
Limiting factor: the MCP73213 junction temperature [Tj] must be less than 125 dC.
Therefore select a charge current [Ic] and charger voltage [Vcmax] to ensure Tj is less than 125 dC.
Calculate Tj from:
 $T_j = T_a + T_{diff}$ [where T_a = maximum ambient temperture and T_{diff} = temperature rise due to power dissipation]
Assume a max T_a of 40 dC
Calculate Tdiff
 $T_{diff} = 62 \text{ dC/W} * P_d$ [where 62 dC/W is the thermal resistance of the MCP73213 and P_d = power dissipation]
 $P_d = (V_{cmax} - 5.86V) * I_c$ [where V_{cmax} = Charger voltage and 5.86V = MCP73213 Vout minimum]
 $T_j = T_a + 62 \text{ dC/W} * (V_{cmax} - 5.86) * I_c$

Choose a low Vcmax to minimize power dissipation.
12V is common but will reduce the charge current.
9V is not so common but available.
Ic in the formula will give Tj = 125 dC. We need some headroom so reduce to 75 %

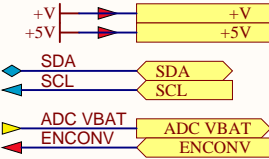
RESULTS
for 12V and 9V charger voltges and 75% of Ic calculated.

Vcmax = 12V	9V
Ta = 40 dC	40 dC
Icmax = 169 mA	327 mA
Rcharge = 7.5 kOhms	3.7 kOhms
Charge time 15 hours	8 hours
Tj max 104 dC	104 dC

TRACKING PRE-REGULATOR



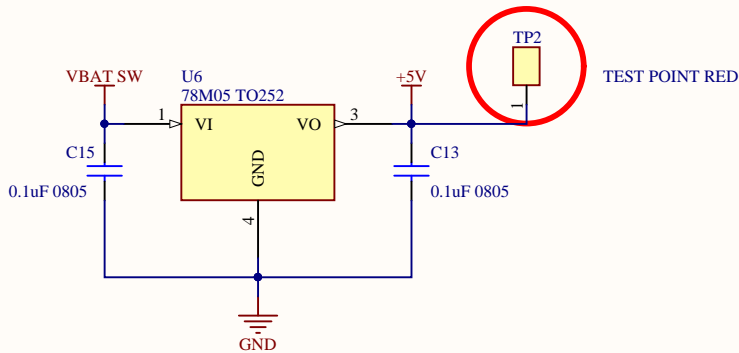
I2C controlled Digital Pot to set the tracking pre-regulator output.
 $V_{out} = 1.245 * (1 + R1/R2)$
Vout range: 7.8V to 20.8V
The setting is held in volatile memory so save setting in Arduino ATmega168's EEPROM memory.

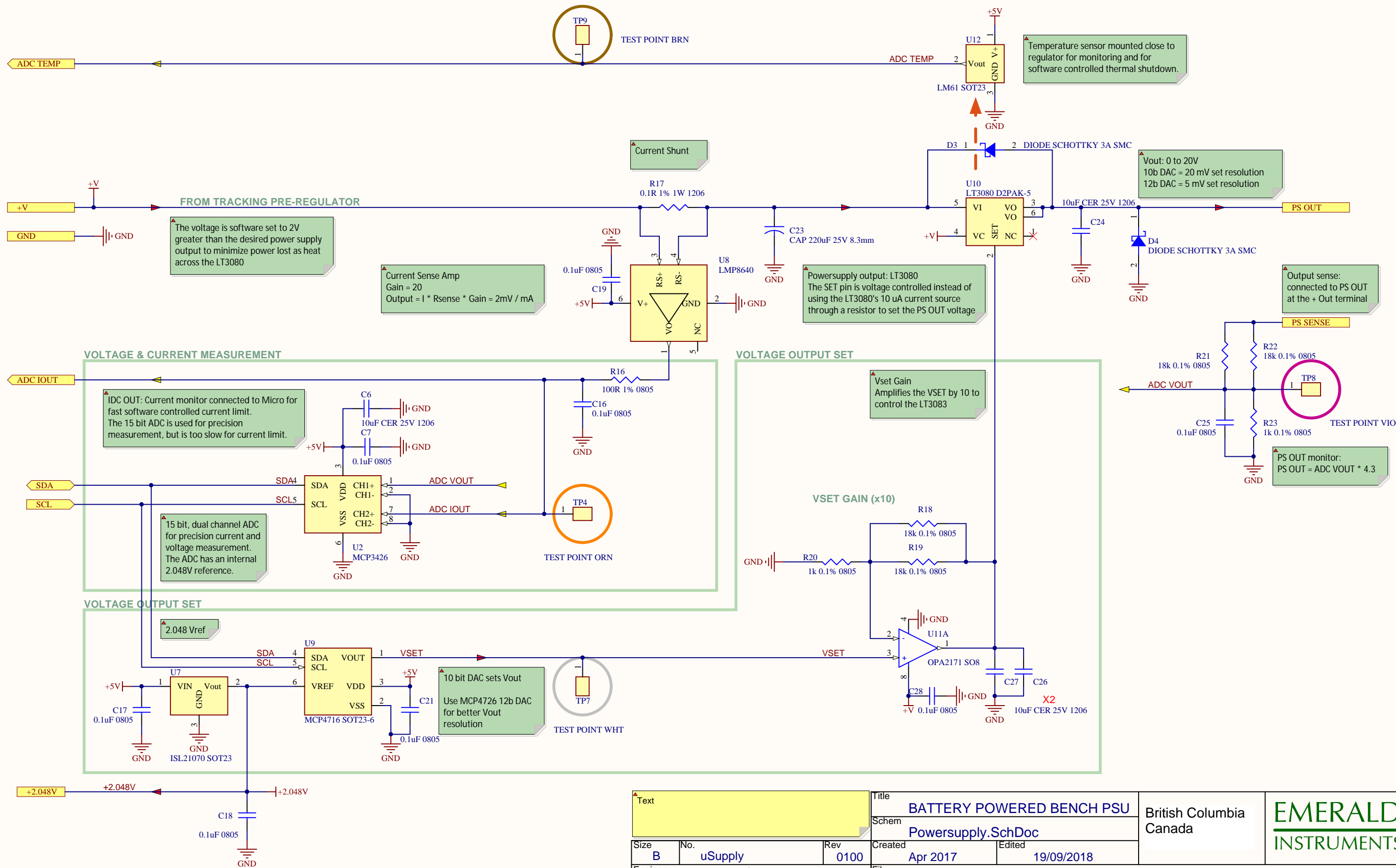


Battery monitor to Micro

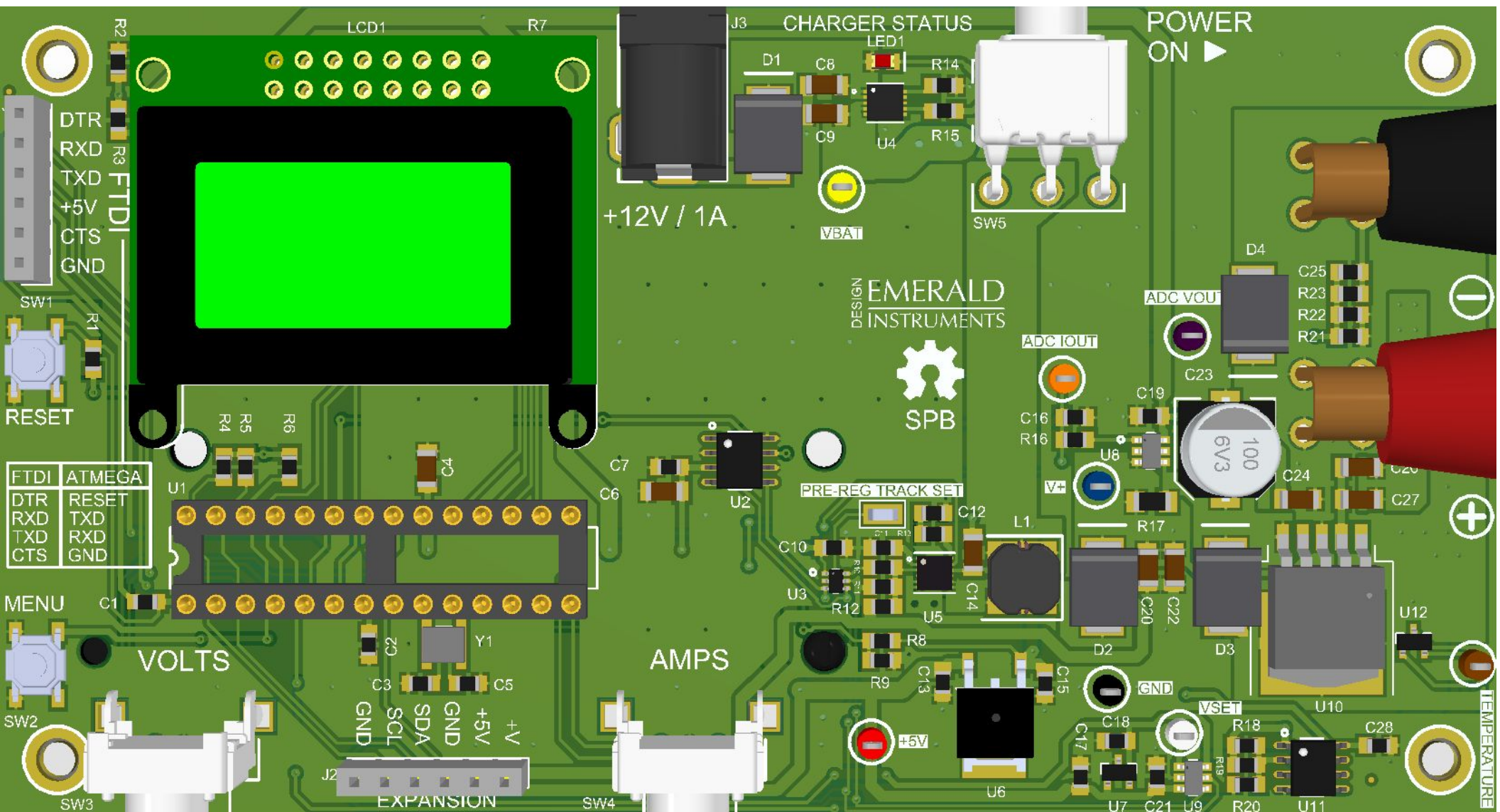
Enable tracking pre-regulator

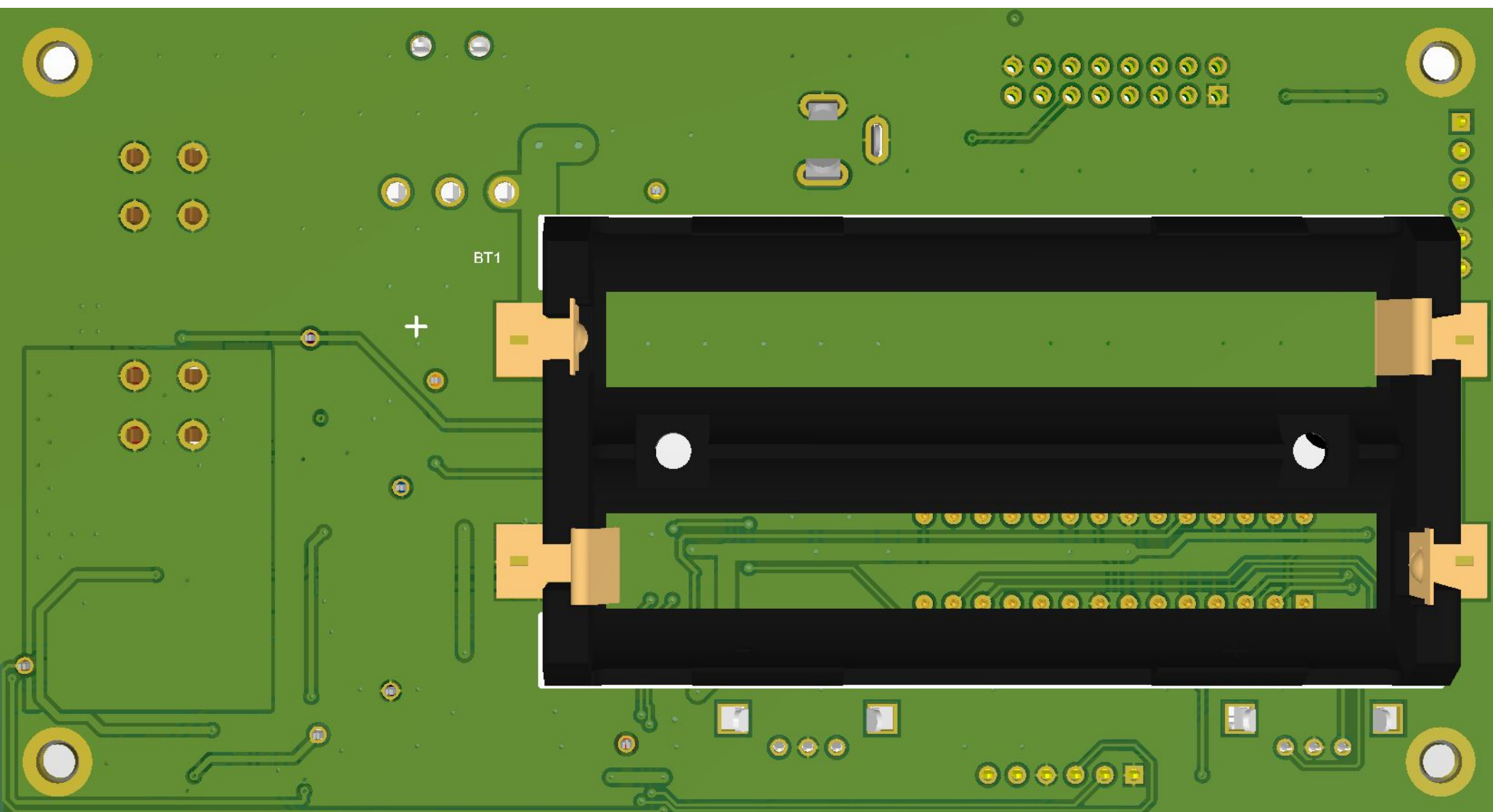
FIXED VOLTAGE REGULATORS





1	2	3	4	5	6
A	<div>REVISION HISTORY</div> <div>14th Sep 2009</div> <div>Rev 1.0</div> <div>First Draft</div>				
B					
C					
D	<div><div><div>▲Text</div><div></div></div><div><div>Size</div><div>B</div></div><div><div>No.</div><div>uSupply</div></div><div><div>Rev</div><div>0100</div></div><div><div>Created</div><div>Apr 2017</div></div><div><div>Edited</div><div>19/09/2018</div></div><div><div>Title</div><div>BATTERY POWERED BENCH PSU</div></div><div><div>Schem</div><div>REVHISTORY.SchDoc</div></div><div><div>British Columbia</div><div>Canada</div></div><div><div>EMERALD</div><div>INSTRUMENTS</div></div><div><div>Engineer</div><div>Bruce Cardoza</div></div><div><div>File</div><div>D:\Projects\Temp\uSupply\uSupply\REVHISTORY.SchDoc</div></div><div><div>5</div><div>of</div><div>5</div></div></div>				





uSUPPLY: MANUAL OPERATION WITHOUT ARDUINO

View from Top side (Scale 2:1)

Current Sense
Install R16, R17, C19, U8
2mV per mA

PRE-REG TRACK SET
Set TP3 at least 2 V higher than desired output

VOLT SET
Power supply output = 10x value at TP7

uSUPPLY: MANUAL OPERATION WITHOUT ARDUINO

View from Top side (Scale 2:1)

Current Sense
Install R16, R17, C19, U8
2mV per mA

PRE-REG TRACK SET
Set TP3 at least 2 V higher than desired output

VOLT SET
Power supply output = 10x value at TP7

5k POT

7.5k 1%

