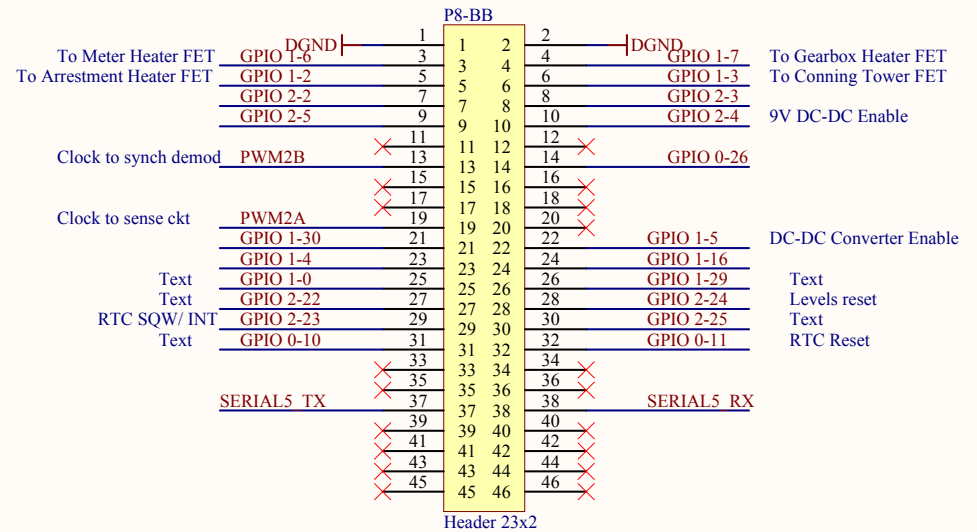
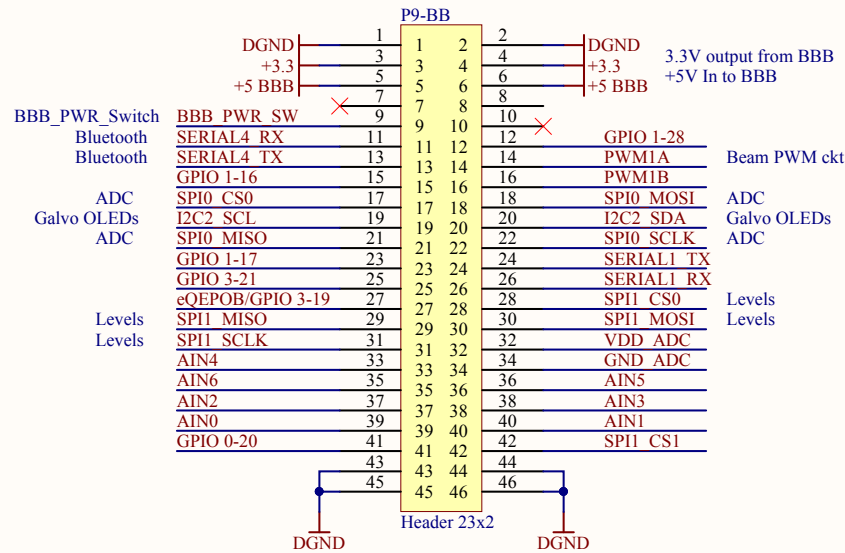


VERIFY VOLTAGE DOMAINS FOR ALL CIRCUITS  
 VERIFY ALL GROUND DOMAINS FOR EACH CIRCUIT  
 VERIFY GROUD PLANES CONNECTED  
 VERIFY I2C CONNECTIONS  
 VERIFY BBB CONNECTIONS  
 DECIDE ON ONE OR TWO CONNECTORS TO LID (POWER/ SWITCH)  
 VERIFY POWER ON/ OFF CIRCUIT



Layout files for Beaglebone Black can be found at:  
<http://elinux.org/Beagleboard:BeagleBoneBlack>

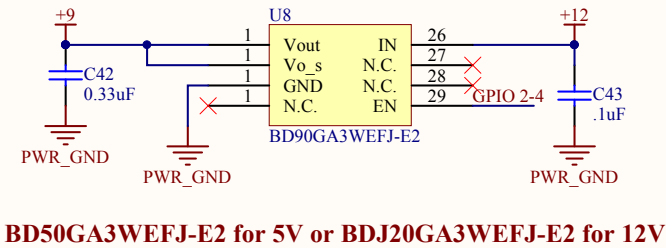
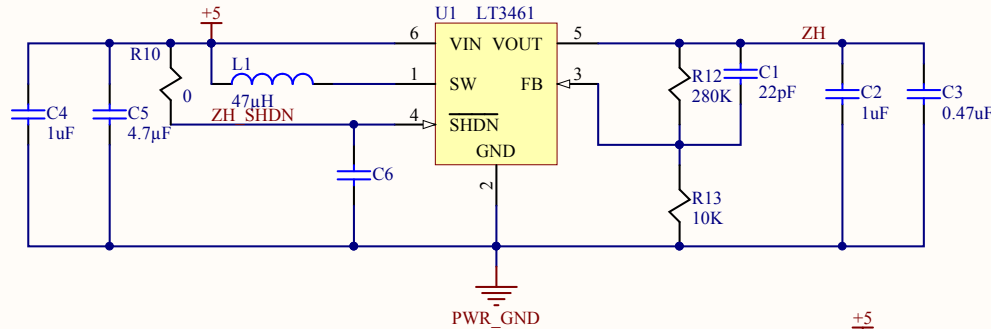
Ensure headers will mate to the BBB

Title <b>BBB Headers</b>			ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <b>Orcad A</b>	Number: <b>UG-003</b>	Revision: <b>3.0</b>		
Date: 4/26/2017	Time: 9:15:51 AM	Sheet 1 of 11		
File: Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\BBB Headers.SchDoc				

For 36V R2 = 280k  
For 30V R2 = 240k

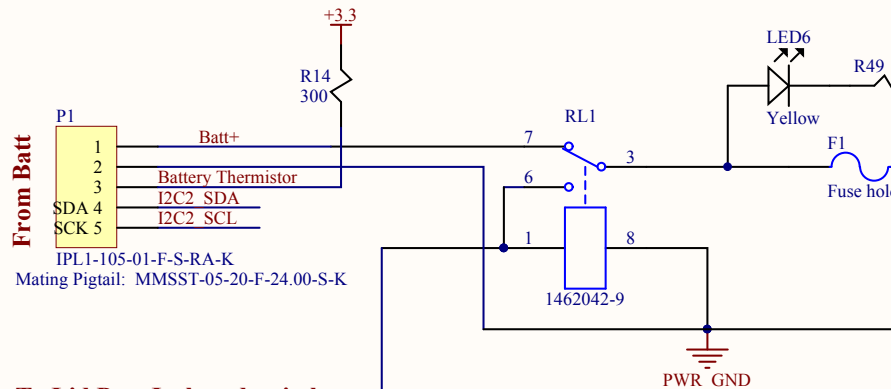
Use same layout as UG-026

70mA max

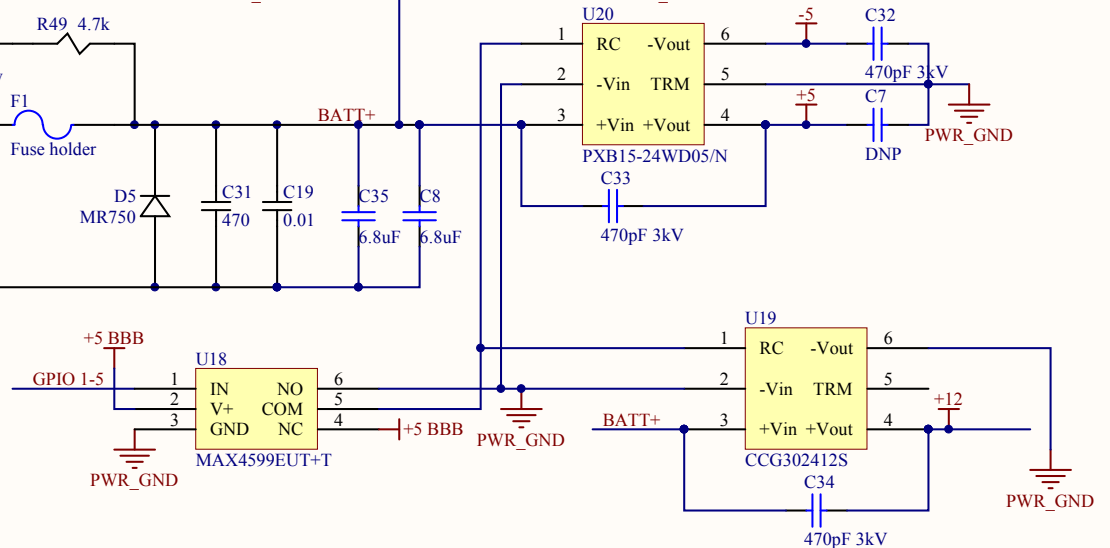
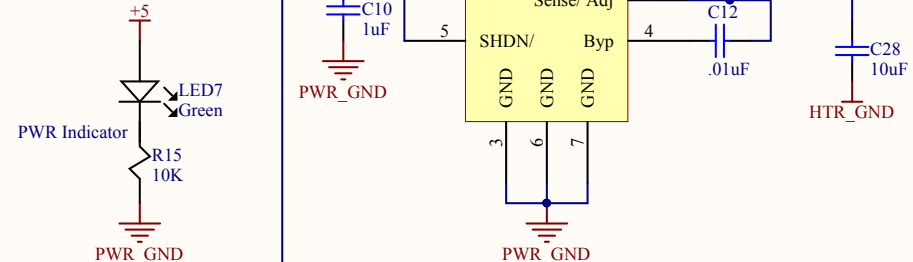
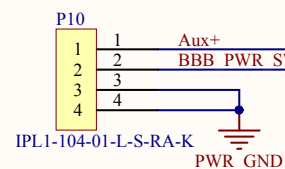


BD50GA3WEFJ-E2 for 5V or BDJ20GA3WEFJ-E2 for 12V

Battery  
Vmax=12.6V Vnom=10.8V Vcutoff=7.2V  
MAX CONTINUOUS DISCHARGE 10A



To Lid Pwr Jack and switch



BATTERY CONNECTIONS  
P1 BATTERY  
2 A - NEGATIVE  
3 B - TEMPERATURE  
4 C - DATA  
5 D - CLOCK  
1 E - POSITIVE  
N/C F - KEY

Mating Pigtail: LIKE MMSST-02-20-F-12.00-S-K

Title **Power**

Size: **Orcad A**

Number:UG-003

Revision:3.0

Date: 4/26/2017

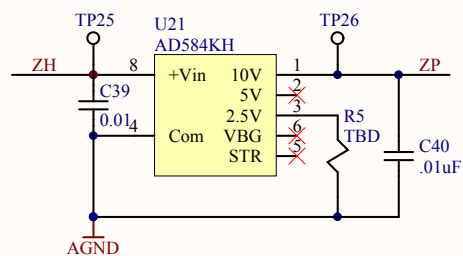
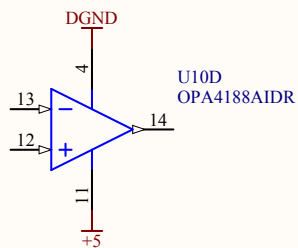
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Sheet2 of 11

File: Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\Power.SchDoc

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7801 North Lamar Blvd  
Suite E-184  
Austin, TX 78752  
Phone: (512) 453-0288

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file  
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Mac\Documents  
\Misc

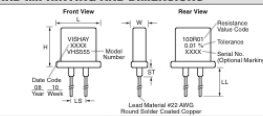


### Resistor size information for R5

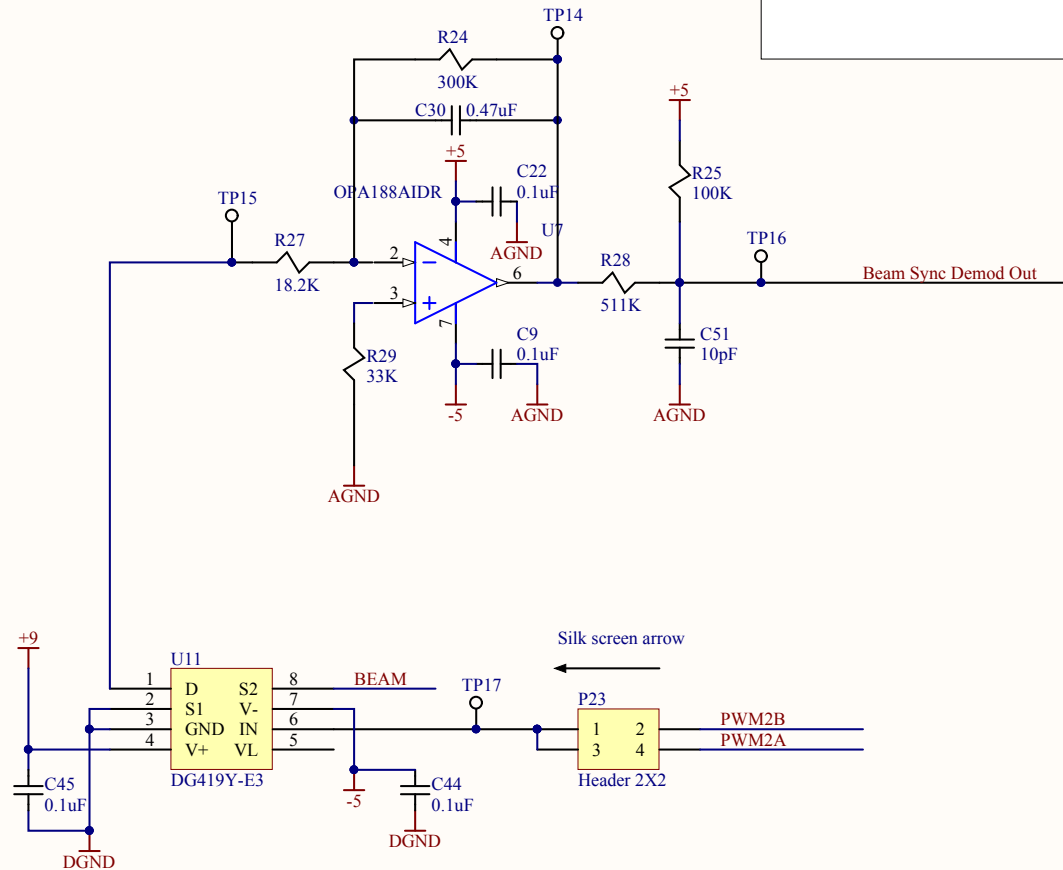
TABLE 1. MODEL SELECTION									
MODEL NUMBER	RESISTANCE RANGE (%)	STANDARD TOLERANCE <sup>a</sup> (%)	MAXIMUM WORKING VOLTAGE	AMBIENT POWER RATING <sup>b</sup> (W)	AVERAGE WEIGHT (g)	DIMENSIONS			
		HIGHEST   LOWEST	at 70 °C   at 125 °C			INCHES	mm		
VH102K	30 to 10 150K	+0.05   -0.10	300	0.6 W	0.3 W	1.4	W	4.75 maximum	4.70 maximum
	10 to > 30.1	+0.01   +0.10					L	1.435 maximum	11.05 maximum
	10 to > 30.1	+0.01   +0.10					H	0.430 maximum	10.95 maximum
VH102	5 to 10	+0.10   +0.20					LL	1.0 ± 0.25	25.4 ± 3.8
	5 to 10	+0.10   +0.20					LS	0.102 ± 0.016	1.61 ± 0.35
	5 to 10	+0.10   +0.20					ST	0.095 maximum	2.43 maximum
VH5501	30 to 150 150K	+0.005   +0.10							
	10 to > 30.1	+0.01   +0.10							
	4.99 to 16.2	+0.10   +0.20							

Notes  
† Available from 1  $\Omega$  to 100 k $\Omega$  only  
‡ Contains RNC90Y inside (4.99  $\Omega$  to 121 k $\Omega$ )  
††† Above 100 k $\Omega$  VHS102 power is derated to 0.4 W at +70 °C and 0.2 W at +125 °C

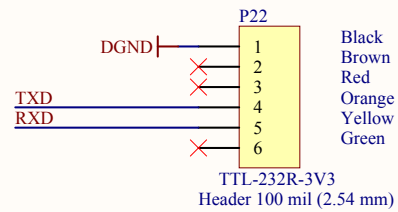
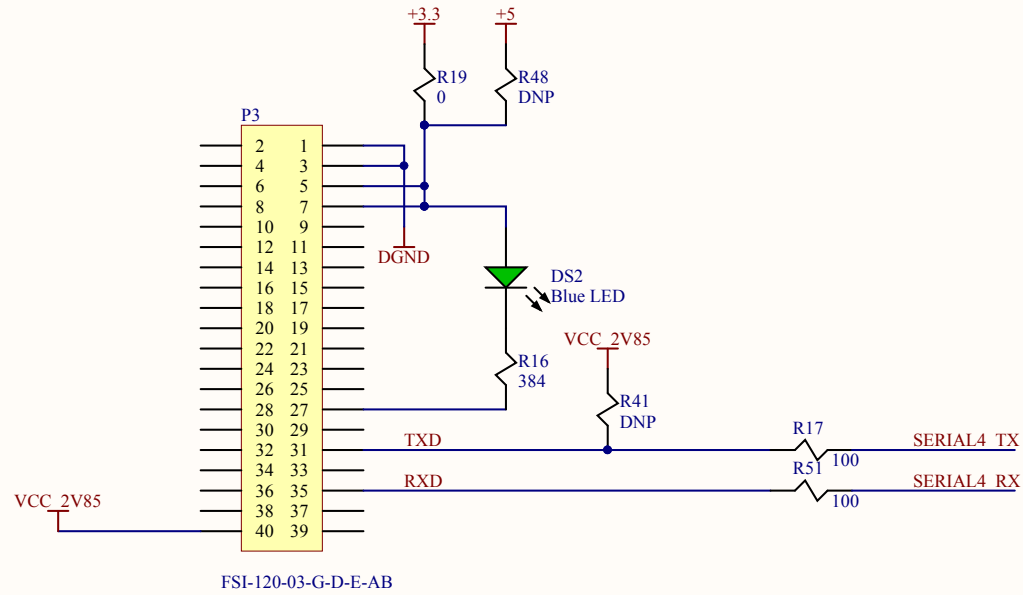
**FIGURE 1 - STANDARD IMPRINTING AND DIMENSIONS**



Remove 511K resistor and take beam measurements at TP3 before finalizing ckt. May want to add offset and gain to op-amp at ADC

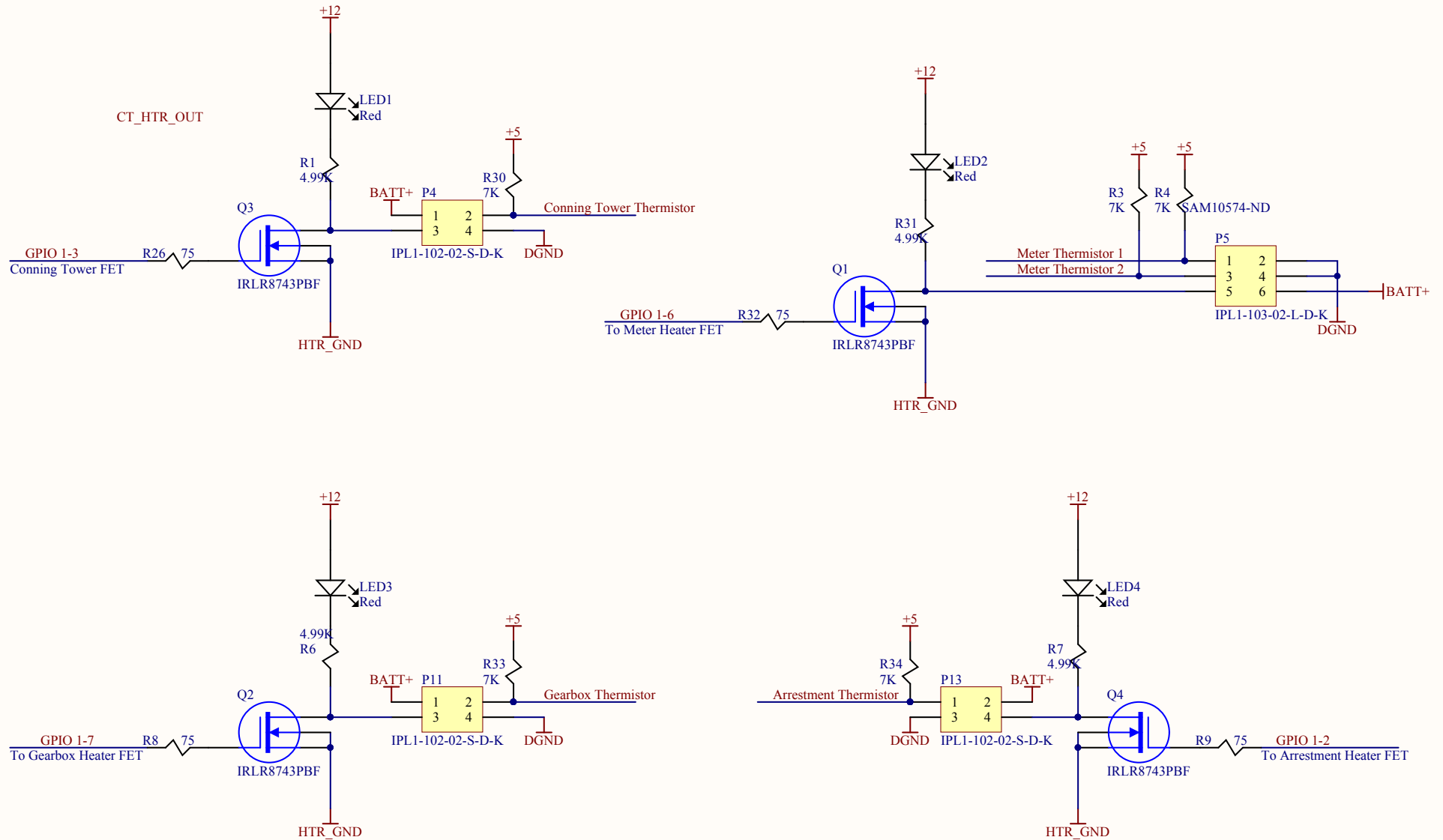


Title <i><b>Sync Demod</b></i>			<i>ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288</i>	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <b>Orcad A</b>	Number: <b>UG-003</b>	Revision: <b>3.0</b>		
Date: <b>4/26/2017</b>	Time: <b>9:15:52 AM</b>	Sheet <b>5</b> of <b>11</b>		
File: <b>Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\Sync Demod.SchDoc</b>				



Title <b>RS232</b>			ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <b>Orcad A</b>	Number: <b>UG-003</b>	Revision: <b>3.0</b>		
Date: <b>4/26/2017</b>	Time: <b>9:15:52 AM</b>	Sheet <b>6</b> of <b>11</b>		
File: <b>Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\RS232.SchDoc</b>				

Make these chip LEDs at FET and use GPIO for board LEDs



@ 12V

Arrestment Heater	2.8W
Conning Tower Heater	2.8W
Gearbox Heater	2.8W
Meter Heater	6W

Total	14.4W
-------	-------

Title **Heater Control**

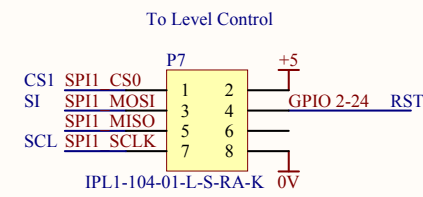
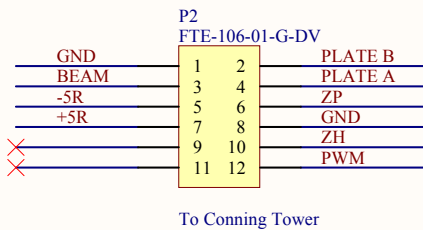
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Date: <b>4/26/2017</b>	Time: <b>9:15:52 AM</b>	Sheet <b>7</b> of <b>11</b>
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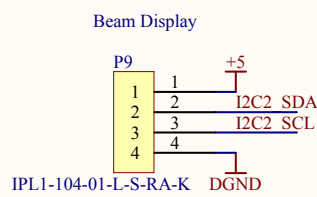
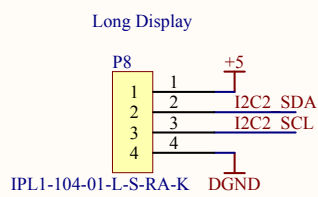
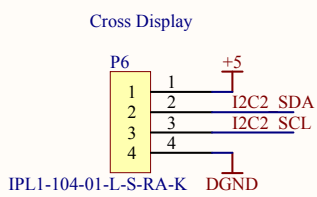
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Suite E-184  
Austin, TX 78752  
Phone: (512) 453-0288

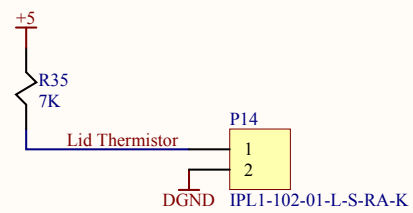
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Mac\Documents  
\Misc



Mating connector / pigtail:  
MMSST-06-28-F-12.00-D-K-LDS

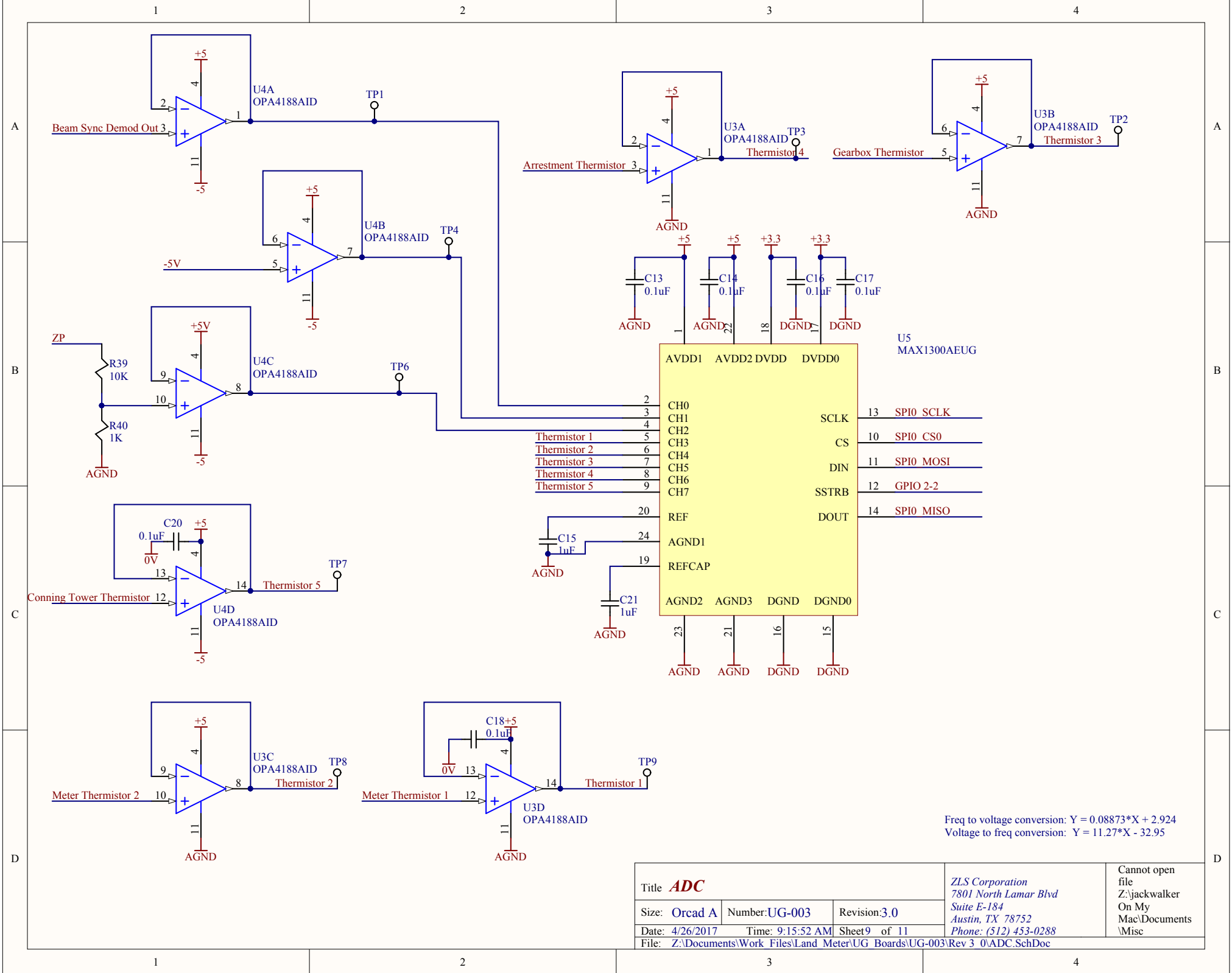


Mating Pigtail: MMSST-04-28-F-12.00-S-K



$f(x) = 94974.5413538519 - 4696.967283124496x + 129.82663269538722x^2 - 2.618627915229906x^3 + 0.042544388235024x^4 - 0.0005976238111017604x^5 + 0.00000781963813533688x^6 - 9.536309770896e-8x^7 + 9.6915670491e-10x^8 - 7.19177773e-12x^9 + 3.497936e-14x^{10} - 9.821e-17x^{11} + 1.2e-19x^{12}$

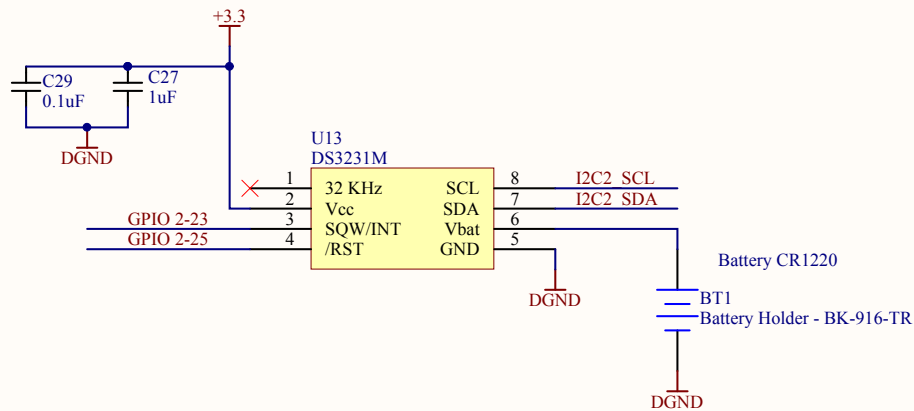
Title <i><b>Connectors</b></i>			ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <b>Orcad A</b>	Number: <b>UG-003</b>	Revision: <b>3.0</b>		
Date: <b>4/26/2017</b>	Time: <b>9:15:52 AM</b>	Sheet <b>8</b> of <b>11</b>		
File: <b>Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\Connectors.SchDoc</b>				



Freq to voltage conversion:  $Y = 0.08873 \cdot X + 2.924$   
Voltage to freq conversion:  $Y = 11.27 \cdot X - 32.95$

Title <i>ADC</i>			<i>ZLS Corporation</i> <i>7801 North Lamar Blvd</i> <i>Suite E-184</i> <i>Austin, TX 78752</i> <i>Phone: (512) 453-0288</i>	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <i>Orcad A</i>	Number: <i>UG-003</i>	Revision: <i>3.0</i>		
Date: <i>4/26/2017</i>	Time: <i>9:15:52 AM</i>	Sheet <i>9</i> of <i>11</i>		
File: <i>Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\ADC.SchDoc</i>				





<https://learn.adafruit.com/adafruit-ds3231-precision-rtc-breakout/overview>

Title <i><b>Real Time Clock</b></i>			ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <b>Orcad A</b>	Number:UG-003	Revision:3.0		
Date: 4/26/2017	Time: 9:15:52 AM	Sheet10 of 11		
File: Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\Real Time Clock.SchDoc				

A

B

C

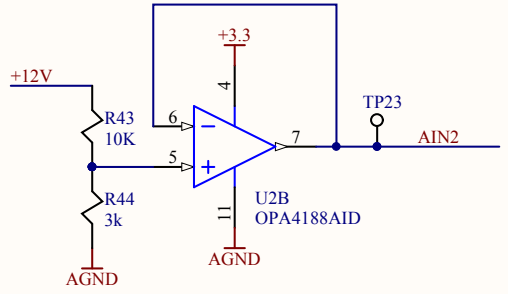
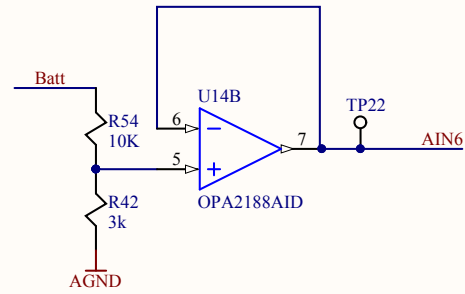
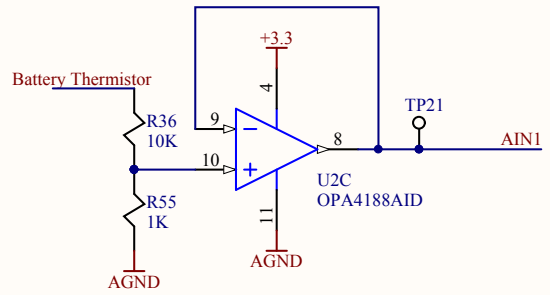
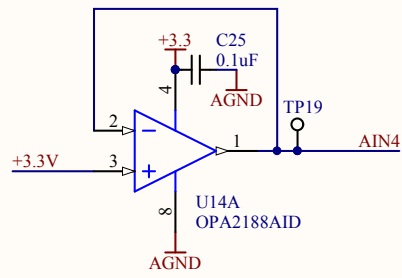
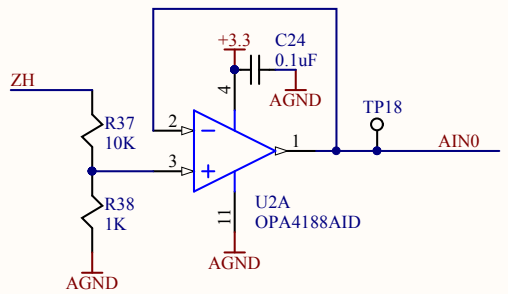
D

A

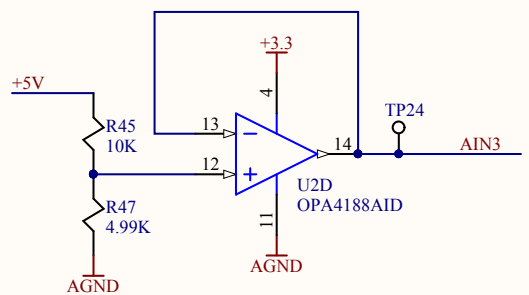
B

C

D



AIN5



Title <b><i>Power Monitor</i></b>			ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288	Cannot open file Z:\jackwalker On My Mac\Documents\Misc
Size: <b>Orcad A</b>	Number:UG-003	Revision:3.0		
Date: 4/26/2017	Time: 9:15:52 AM	Sheet11 of 11		
File: Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\Power Monitor.SchDoc				

A

B

C

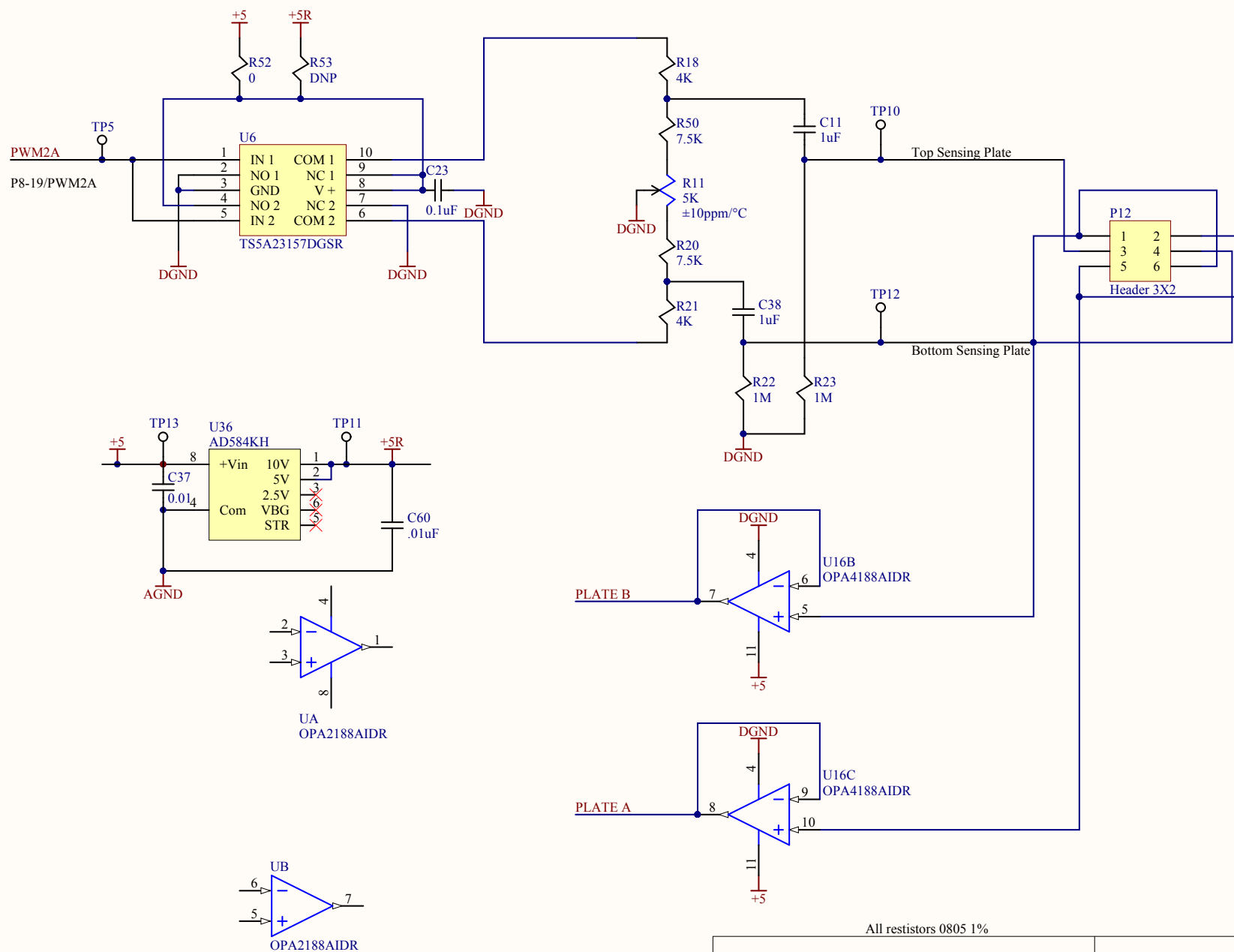
D

A

B

C

D



Future digital pot: MAX5431CEUB+

MPMT50011002AT1  
5k, 10k Ohm  $\pm 0.1\%$  100mW Power Per Element Voltage Divider Resistor Network/Array  $\pm 25\text{ppm}/^\circ\text{C}$  TO-236-3, SC-59, SOT-23-3

All resistors 0805 1%

Title <i><b>Sense Clock Ckt</b></i>			ZLS Corporation 7801 North Lamar Blvd Suite E-184 Austin, TX 78752 Phone: (512) 453-0288	Cannot open file Z:\jackwalker On My Mac\Documents \Misc
Size: <b>Orcad A</b>	Number: <b>UG-003</b>	Revision: <b>3</b>		
Date: 4/26/2017	Time: 9:15:52 AM	Sheet* of *		
File: Z:\Documents\Work Files\Land Meter\UG Boards\UG-003\Rev 3 0\Sense Clock Ckt.SchDoc				