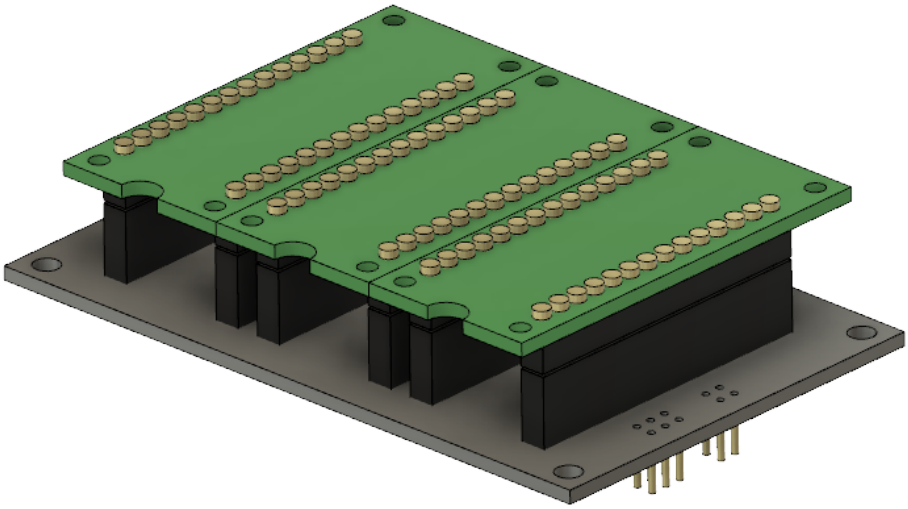
Purdue Sensor Payload Documentation

Table of Contents

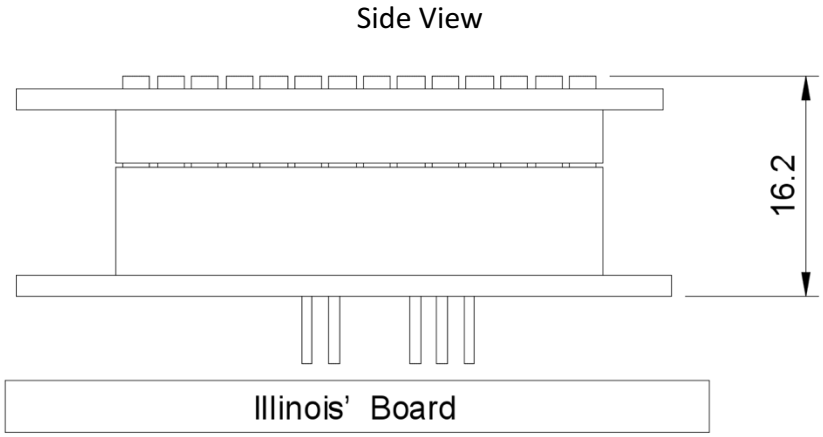
Revisions:

Version	Comments	Author	Date
1	Initial Release	Connor Vickers	10/10/17
2	Command Grammar Changed	Connor Vickers	10/29/17
3	Edit Connections, Communication Protocol	Connor Vickers	11/13/17
4	CRC specification, examples, link to code	Connor Vickers	12/5/17

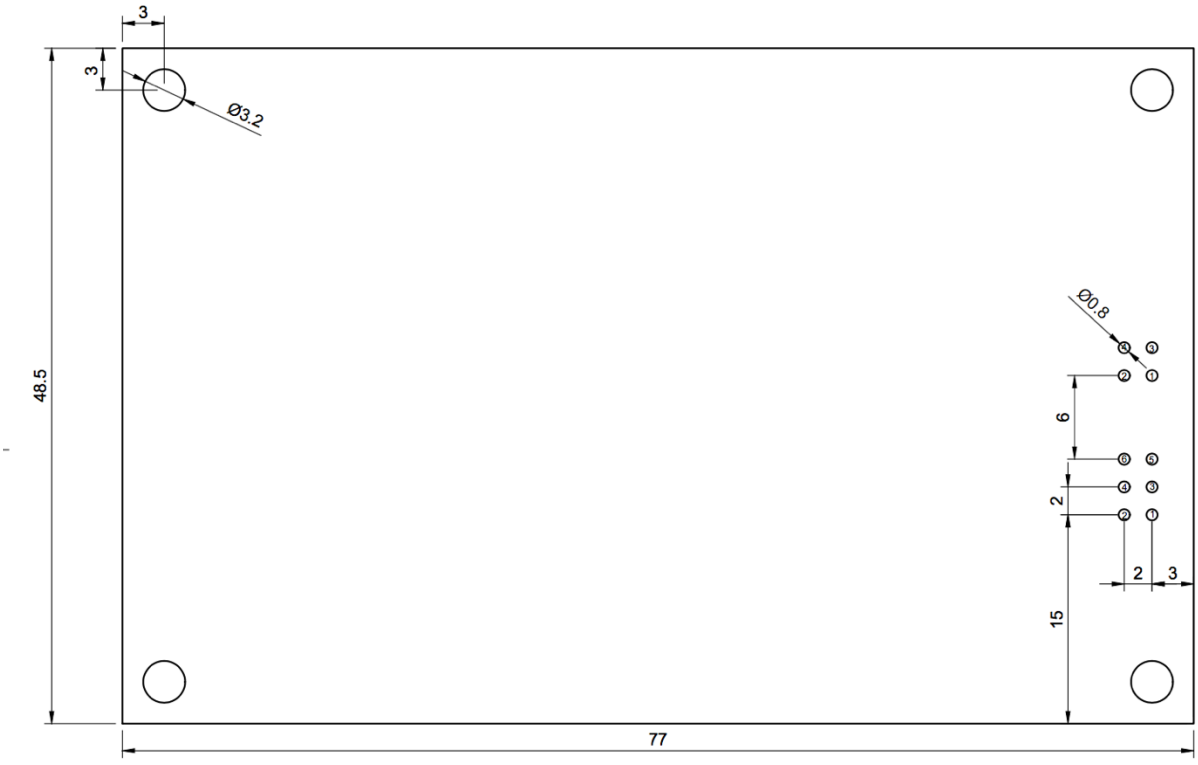
Render:



Mechanical:



Top View



This is a view from the top looking down. In this view, the Purdue Board will be on top of Illinois' board. Purdue will have the Male DF-11 connector on the bottom of their board. Illinois will have the Female DF-11 connector on the top of their board. Units are in mm

Connections:

6pin DF-11

Pin	Function
1	TX -
2	TX +
3	NC
4	NC
5	RX +
6	TX -

4pin DF-11

Pin	Function
1	5V
2	5V
3	GND
4	GND

Communication Protocol:

RS-422, 9600 Baud, 8 data bits, 0 parity bits, 1 stop bit
Byte order is big-endian (most significant byte first).
Wait at least 500ms between commands.
If command format/checksum does not match will respond with '?' (0x3F)

Query

Send: 1 Byte

Number of Bytes	Value
1	Q (0x51)

Receive: 17 Bytes

Number of Bytes	Value	
1	Q (0x51)	Start
3	Heat Flux Sensor	
3	Thermocouple	
2	Cold junction	
2	microPirani A value	
2	microPirani B value	
2	microPirani C value	
2	CRC16 bit	End

Manual

This command hopefully will never be used. It provides access to each individual sensor registers should they be needed in a contingency. The specification for the sensor command part is defined in each individual sensor data sheet. Link in address table.

Send: 6-35 bytes

Number of Bytes	Value	
1	M (0x4D)	Start
1	Unsigned int representing the sensor address to send to see below	
1	Unsigned int representing the length of the sensor command (max 30)	
1-30	sensor command	
2	CRC16 bit	End

Receive: 6-32 Bytes

Number of Bytes	Value	
1	M (0x4D)	Start
1	Unsigned int representing the sensor address received from see below	
1	Unsigned int representing the length of the sensor response (max 30)	
1-30	sensor response	
2	CRC16 bit	End

Sensor Addresses

Address	Sensor	
0	ADC (temp and heat flux)	Start
1	Cold junction	
2	microPirani A	
3	microPirani B	
4	microPirani C	End

```
Example: Check the temperature of microPirani B
Send [M,0x3,0x11,@,2,5,3,T,E,M,?,;,F,F,0x3,0x51]
Receive: [M,0x3,0x11,@,2,5,3,A,C,K,2,.,1,0,E,+,1,;,F,F,0xCB,0xB9]
```

Power:

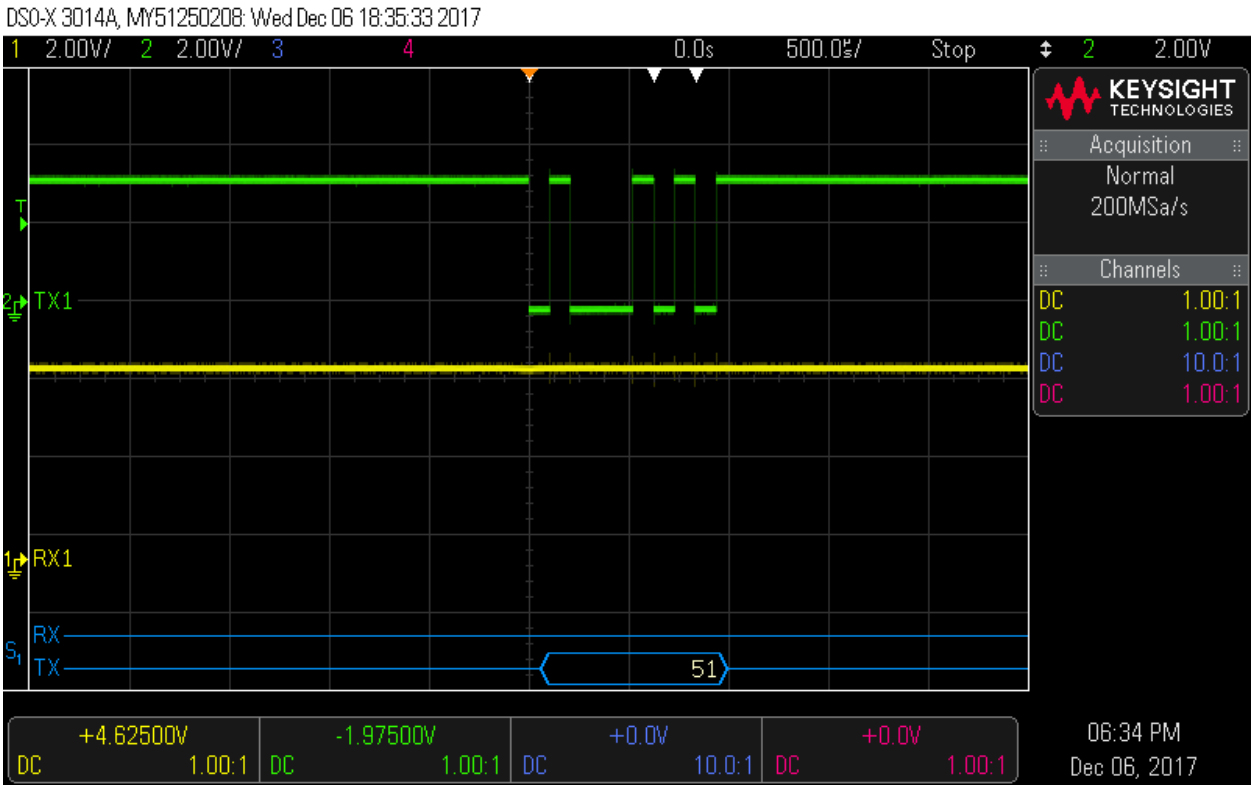
PSP has power-on-reset
Requires 5V +/- 2% very low noise (preferably 1mv peak to peak with power switching regulator < 50kHz)
All three micro-piranis: 0.74W at 5V
One micro-piranis: 0.29W at 5V

CRC:

The 16 bit CRC is calculated with a polynomial of 0x8005. See https://github.com/Connor-Vickers/SASSII-PSP/blob/master/sassii/crc.h for the exact code.

Example communication:

Query:



Response (500ms latter):