

### RPi/Multiplexer Header

Pin connections for RPi/Multiplexer Header:

- 1: PWR\_FLAG
- 2: 3V3
- 3: SDA/GPIO\_2, unused
- 4: SCL/GPIO\_3, unused
- 5: GPIO\_4/GPCLK0, used by multiplexer
- 6: ENAB\_RF
- 7: RF\_RST
- 8: 3V3 (unused)
- 9: MOSI
- 10: MISO
- 11: SCLK
- 12: GPIO\_0/ID\_SD, unused
- 13: RF\_CS
- 14: GPIO\_5
- 15: PWM1/GPIO\_13, unused
- 16: GPIO\_19, PCM\_FS
- 17: GPIO\_26, RF\_BUSY
- 18: TX
- 19: RX
- 20: PCM\_CLK/GPIO\_18, used by multiplexer
- 21: RF\_TX\_EN
- 22: RF\_RX\_EN
- 23: TCMX\_EN
- 24: SPI0\_CE0/GPIO\_8, unused
- 25: SPI0\_CE1/GPIO\_7, unused
- 26: GPIO\_1/ID\_SC, unused
- 27: PWM0/GPIO\_12, unused
- 28: GPIO\_16, unused
- 29: RF\_IO2
- 30: RF\_IO3
- 31: PCM\_DIN
- 32: PCM\_DOUT

### RPi Payload Power Converter

Regulator - 5V OUT

Note: ENAB\_RPI must be ran high to enable power to Raspberry Pi!  
EN\_Low < 0.4V, PB23 Low = 0V  
EN\_High > 1.5V, PB23 High = 3.3V  
Pull down resistor of 300KOhm used to keep the pin from floating when pycubed powered off, uses about 33uW

### 2400 MHz Radio Module

TCXO on by default whenever ENAB\_RF pulled up if placed. DNP for flight

### Pycubed Connector

Pin connections for Pycubed Connector:

- 1: PWR\_FLAG
- 2: VBATT
- 3: PYCUBED\_3V3
- 4: PyCubed\_AIN4
- 5: RPI\_RST
- 6: ENAB\_RPI
- 7: RX
- 8: TX
- 9: PWR\_FLAG

### RPi Reset

Pin connections for RPi Reset:

- 1: RPI\_RST
- 2: GLOBAL\_EN
- 3: RUN

### Thermistor Circuit

Pin connections for Thermistor Circuit:

- 1: PYCUBED\_3V3
- 2: R1
- 3: TH1

### RF Regulator

Set RF Voltage:  
 $V_{OUT} = 1.21 * (1 + R6/R7) * (35 - 6 * R6)$   
 $V_{OUT} = 4.9V$  ( $R6 = 10K$ ,  $R7 = 3.3K$ )

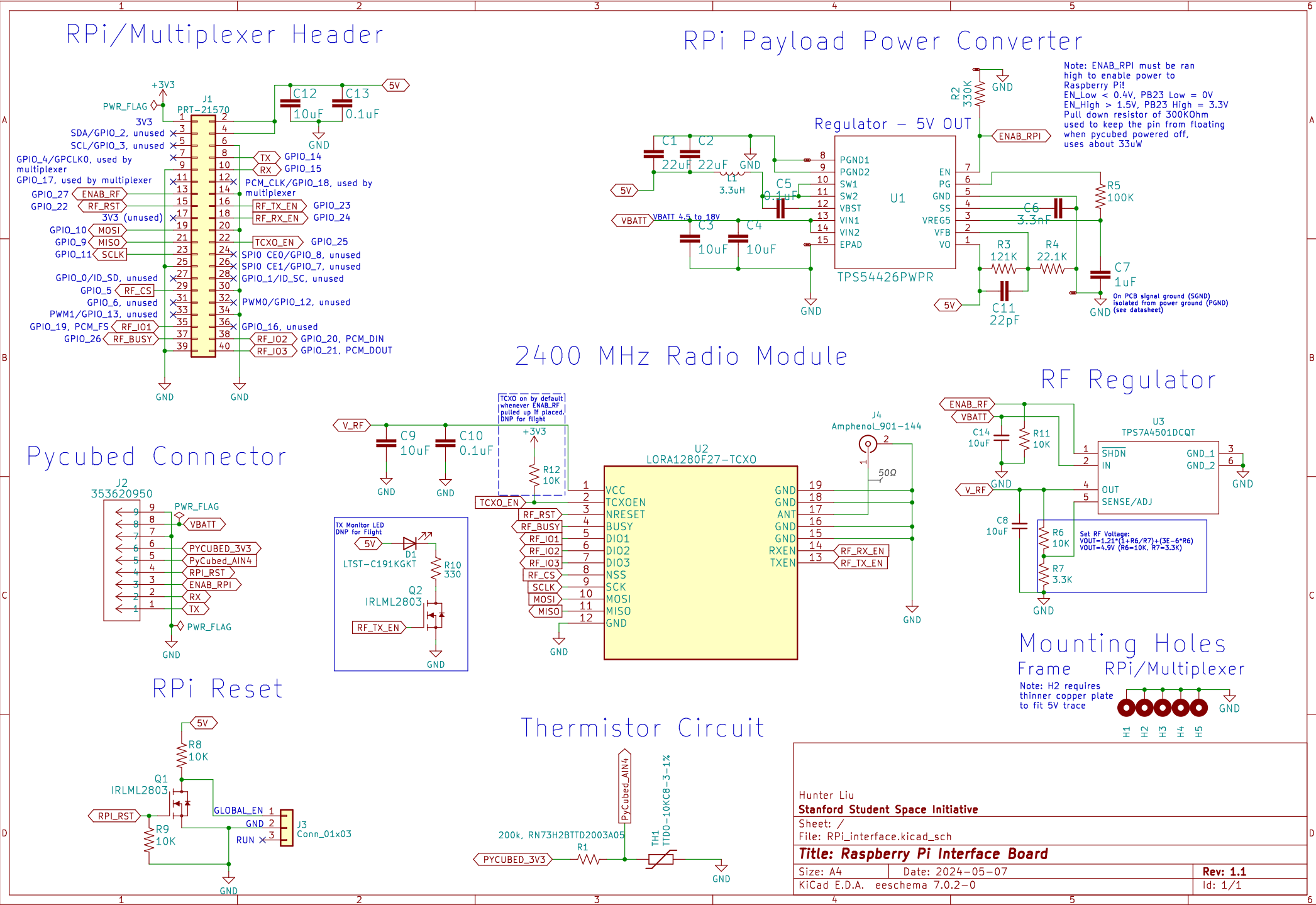
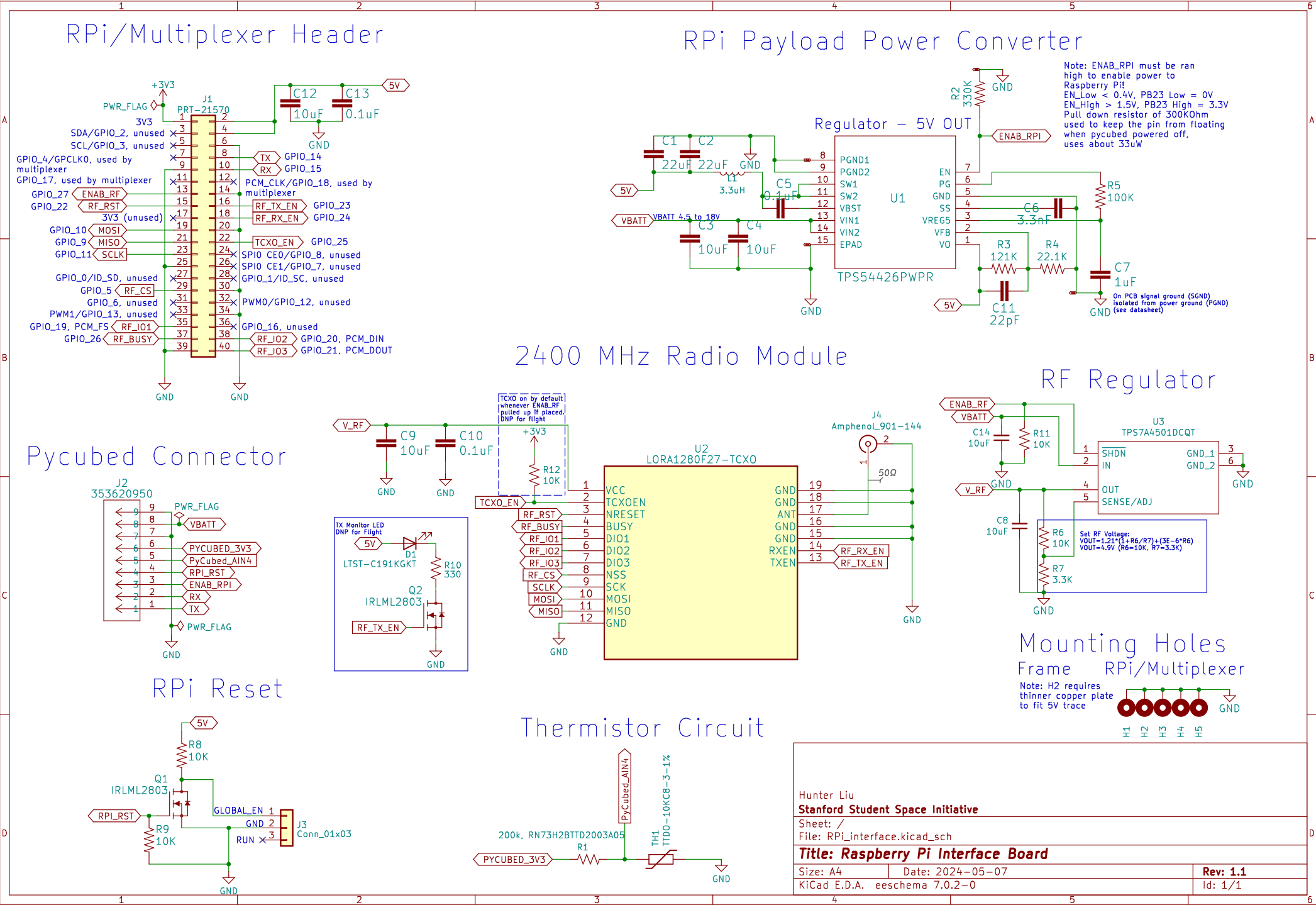
### Mounting Holes

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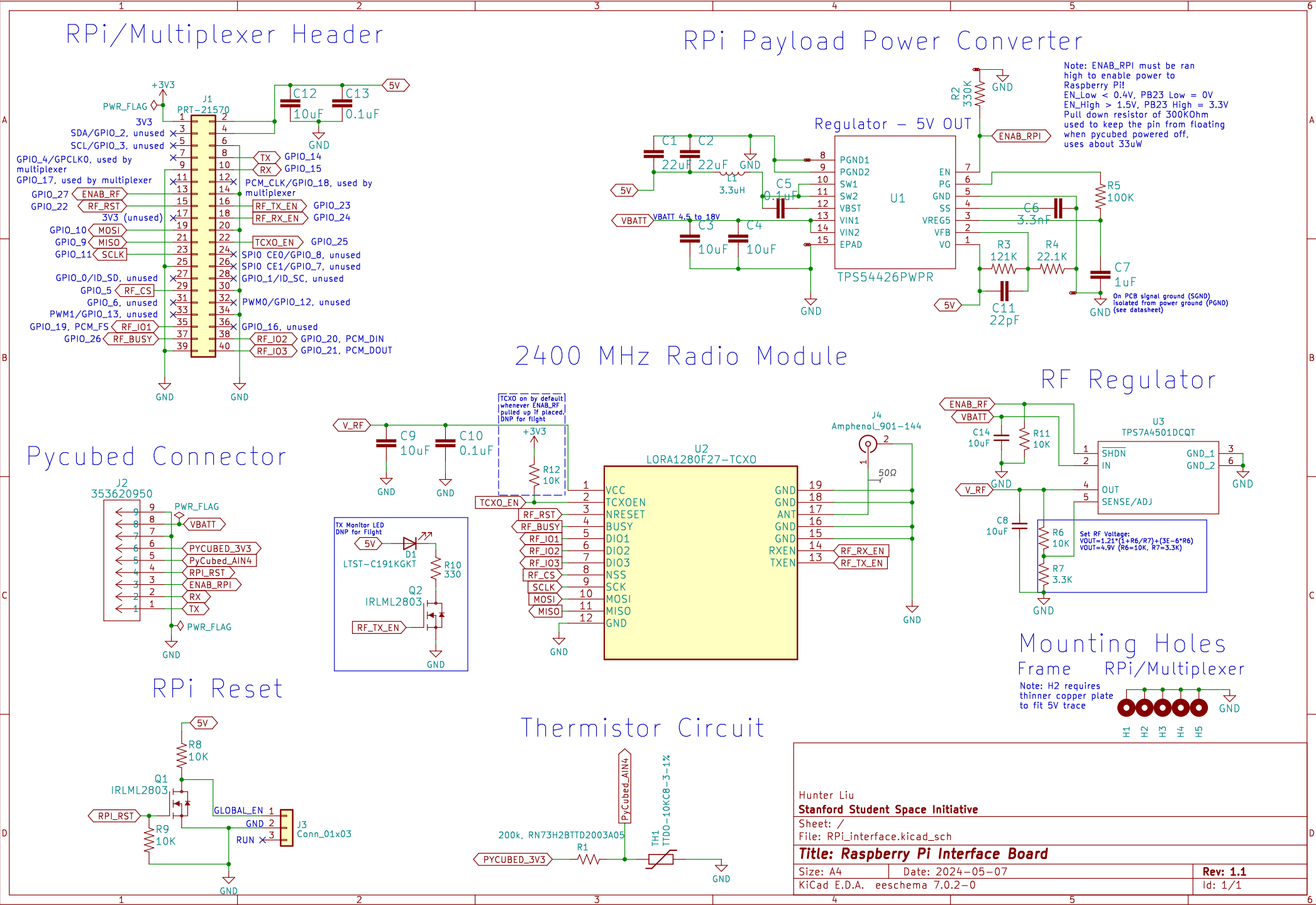
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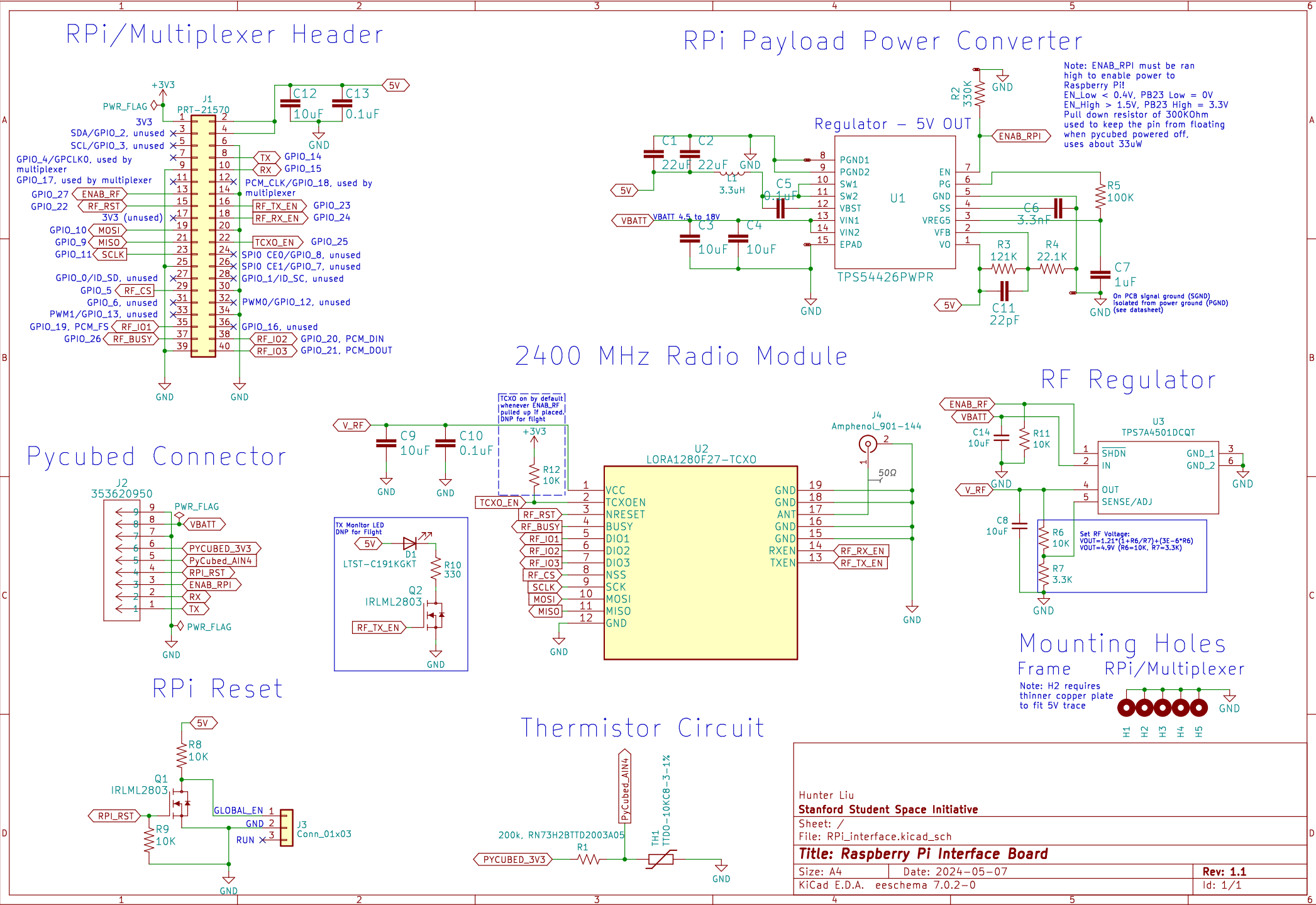
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### Pycubed Connector

### RPi Reset

### Thermistor Circuit

### RPi Payload Power Converter



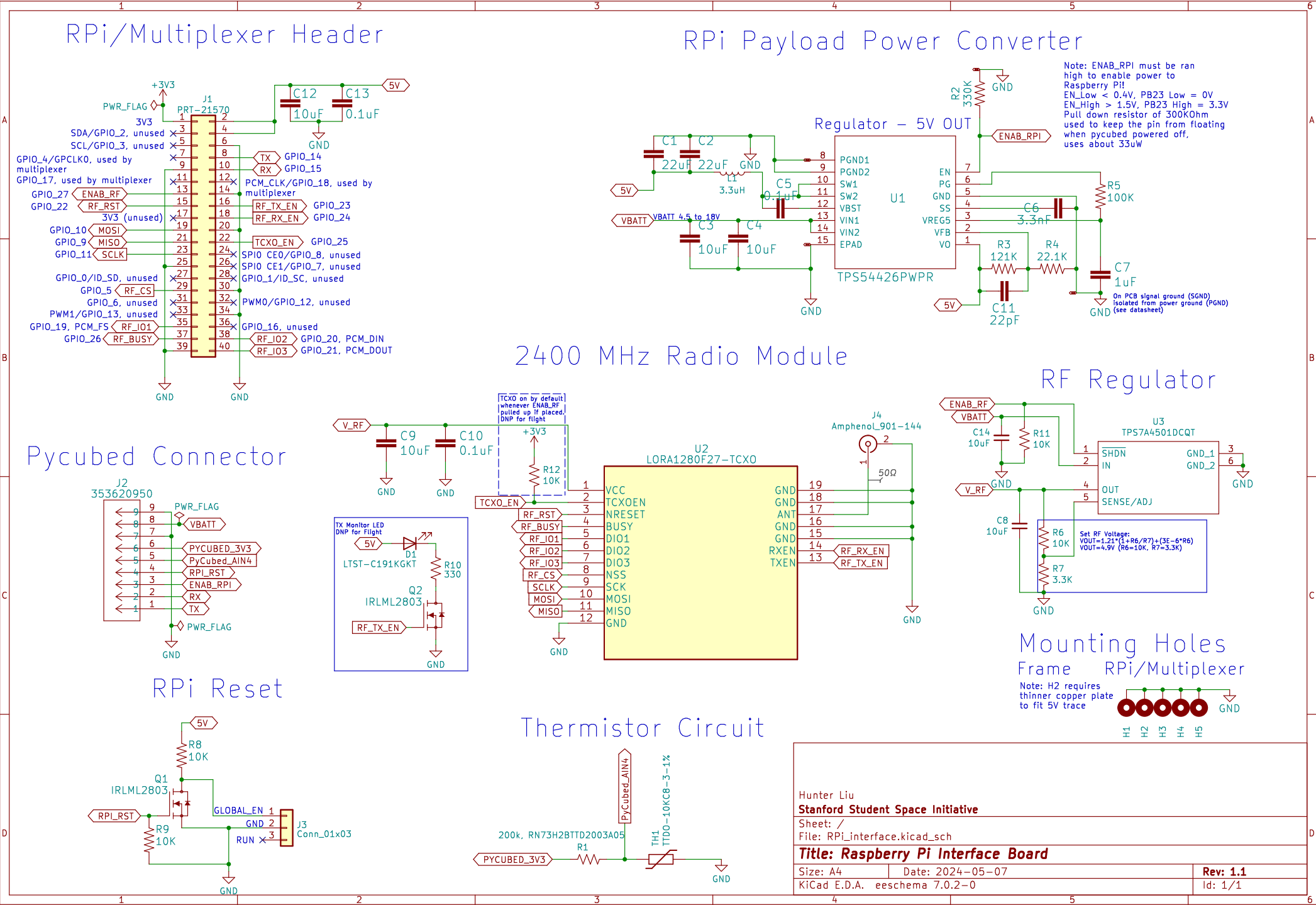
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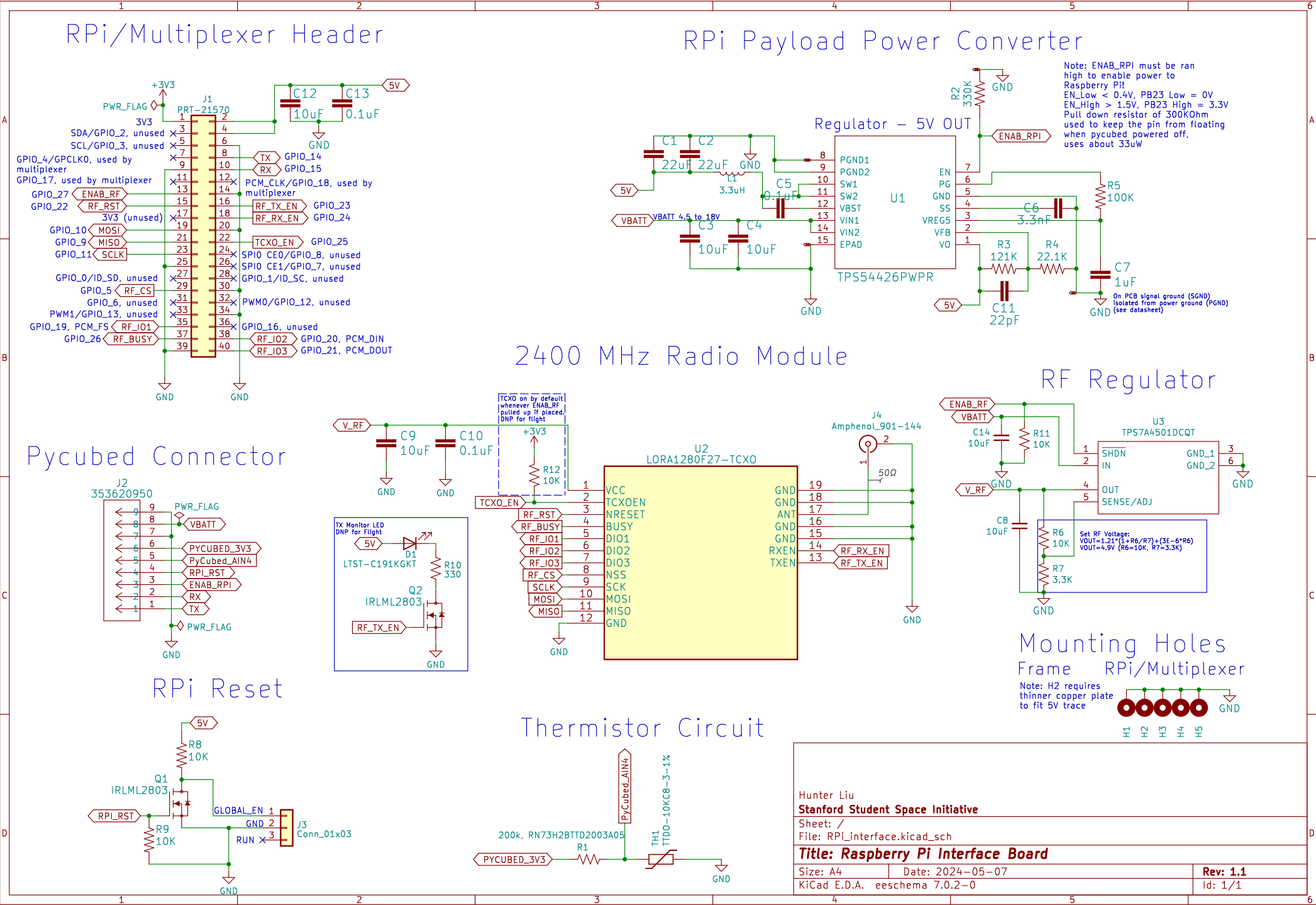
### RPi/Multiplexer Header

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### RPi/Multiplexer Header

Diagram showing the connection of various components to the RPi/Multiplexer Header (J1, PRT-21570). The header pins are connected to:

- 3V3: PWR\_FLAG, SDA/GPIO\_2, unused, SCL/GPIO\_3, unused, GPIO\_4/GPCLK0, used by multiplexer, GPIO\_17, used by multiplexer, GPIO\_27, ENAB\_RF, GPIO\_22, RF\_RST, 3V3 (unused), GPIO\_10, MOSI, GPIO\_9, MISO, GPIO\_11, SCLK, GPIO\_0/ID\_SD, unused, GPIO\_5, RF\_CS, GPIO\_6, unused, PWM1/GPIO\_13, unused, GPIO\_19, PCM\_FS, RF\_IO1, GPIO\_26, RF\_BUSY.
- GND: Various ground connections.
- 5V: C12 (10uF), C13 (0.1uF).
- Other components: TX, RX, PCM\_CLK/GPIO\_18, used by multiplexer, RF\_TX\_EN, RF\_RX\_EN, TCMX\_EN, SPI0\_CE0/GPIO\_8, unused, SPI0\_CE1/GPIO\_7, unused, GPIO\_1/ID\_SC, unused, PWM0/GPIO\_12, unused, GPIO\_16, unused, RF\_IO2, RF\_IO3, GPIO\_20, PCM\_DIN, GPIO\_21, PCM\_DOUT.

### RPi Payload Power Converter

Diagram showing the RPi Payload Power Converter (U1, TPS54426PWR) converting 5V input to 5V output. The converter is configured with various capacitors (C1, C2, C3, C4, C5, C6, C7) and resistors (R2, R3, R4, R5). The output is 5V, which is used for ENAB\_RPI. Note: ENAB\_RPI must be high to enable power to Raspberry Pi! EN\_Low < 0.4V, PB23 Low = 0V. EN\_High > 1.5V, PB23 High = 3.3V. Pull down resistor of 300KOhm used to keep the pin from floating when pycubed powered off, uses about 33uW.

### 2400 MHz Radio Module

Diagram showing the 2400 MHz Radio Module (U2, LORA1280F27-TCXO). The module is connected to VCC, TCXOEN, NRESET, BUSY, DIO1, DIO2, DIO3, NSS, SCK, MOSI, MISO, RXEN, TXEN, RF\_RST, RF\_BUSY, RF\_IO1, RF\_IO2, RF\_IO3, RF\_CS, SCLK, MOSI, MISO, and GND. The TCXO is connected to VCC and GND. The module is also connected to V\_RF and GND.

### RF Regulator

Diagram showing the RF Regulator (U3, TP57A4501DCQT) converting 5V input to 5V output. The regulator is configured with various capacitors (C14, C8) and resistors (R11, R6, R7). The output is 5V, which is used for ENAB\_RF. Note: ENAB\_RF must be high to enable power to Raspberry Pi! EN\_Low < 0.4V, PB23 Low = 0V. EN\_High > 1.5V, PB23 High = 3.3V. Pull down resistor of 300KOhm used to keep the pin from floating when pycubed powered off, uses about 33uW.

### RPi Reset

Diagram showing the RPi Reset circuit (Q1, IRLML2803). The circuit is connected to 5V, R8 (10K), R9 (10K), RPI\_RST, GLOBAL\_EN, RUN, and GND. The reset signal is generated by the transistor Q1.

### Thermistor Circuit

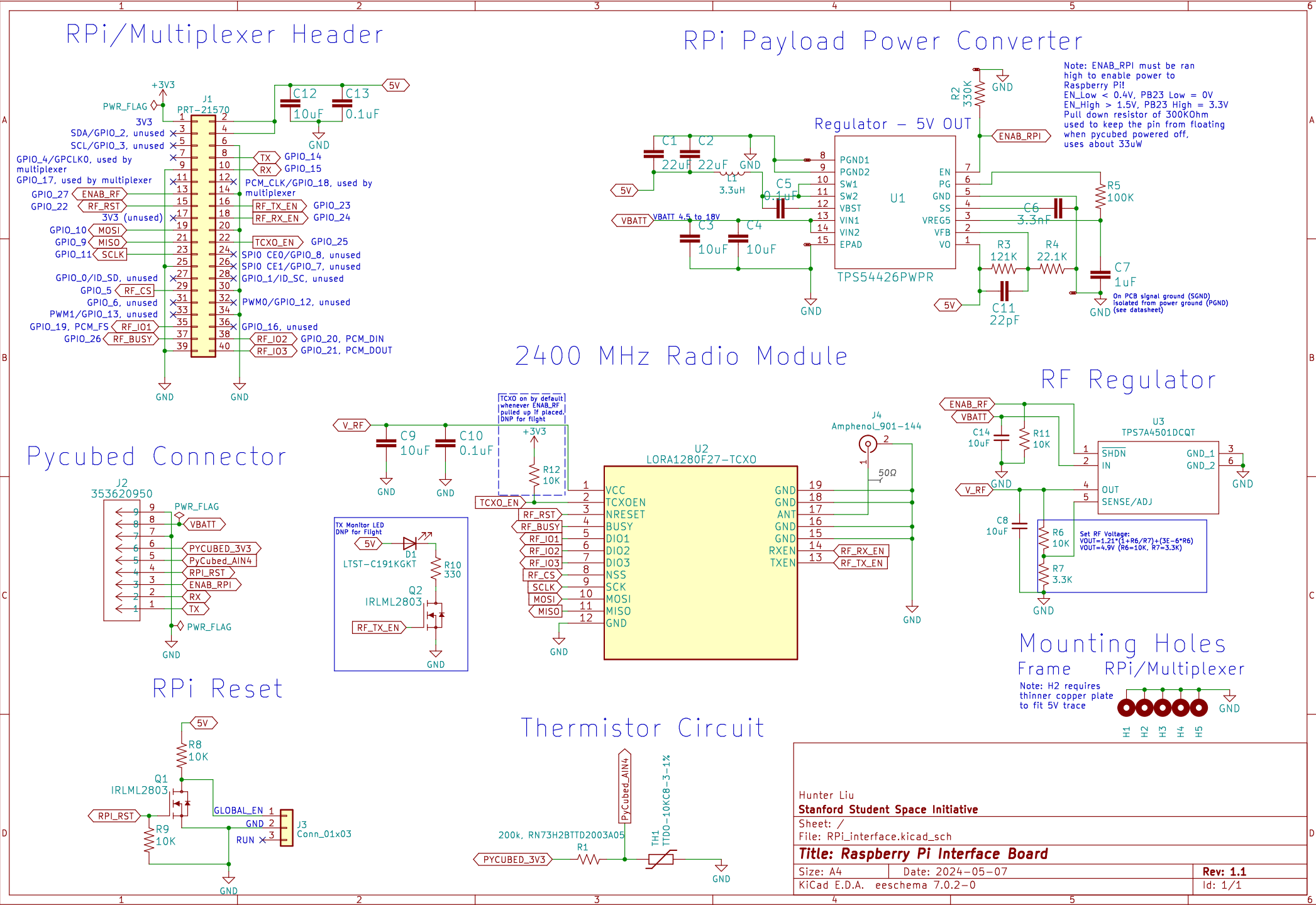
Diagram showing the Thermistor Circuit (TH1, TTD0-10KC8-3-1%). The circuit is connected to PYCUBED\_3V3, R1 (200k, RN73H2BTTD2003A05), TH1, and GND. The thermistor is used to monitor the temperature of the board.

### Mounting Holes

Diagram showing the Mounting Holes (H1, H2, H3, H4, H5) for the RPi/Multiplexer. The holes are spaced 2.54mm apart. Note: H2 requires thinner copper plate to fit 5V trace.

### Footer

Hunter Liu  
Stanford Student Space Initiative  
Sheet: /  
File: RPi\_interface.kicad\_sch  
**Title: Raspberry Pi Interface Board**  
Size: A4 Date: 2024-05-07 Rev: 1.1  
KiCad E.D.A. eeschema 7.0.2-0 Id: 1/1



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