RASPBERRY PI ZERO POWER SENSOR HAT

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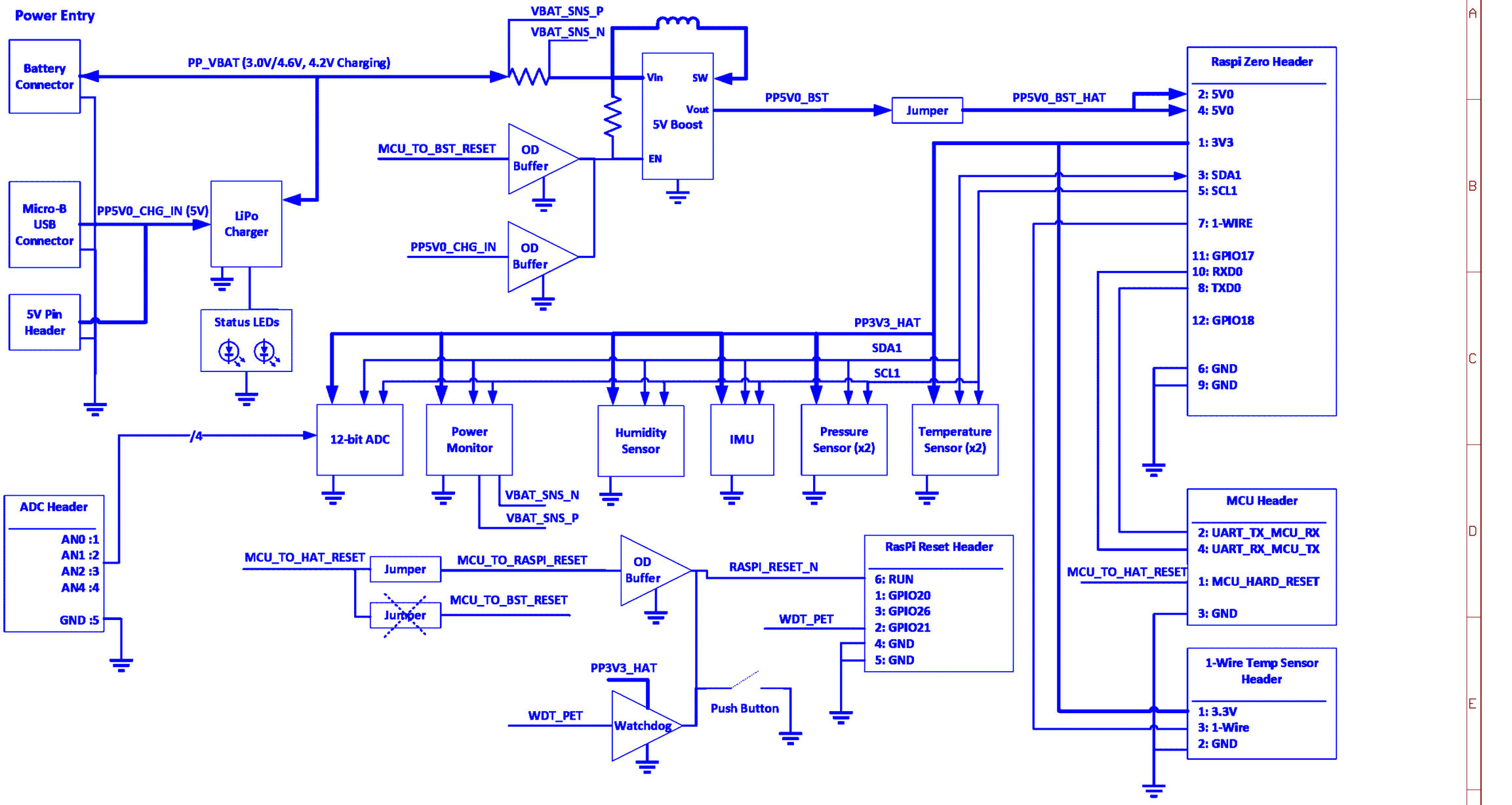
Raspberry Pi Zero Power/Sensor HAT Block Diagram



BLOCK_DIAGRAM	
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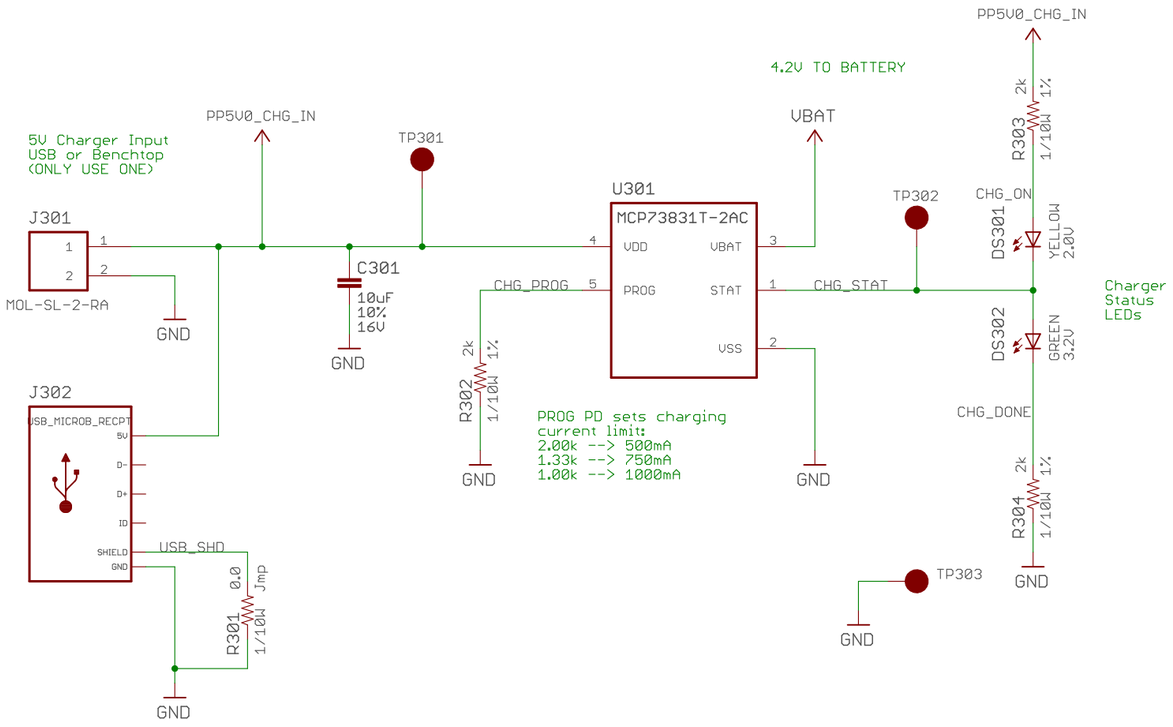
LiPo Battery Charger and BCM Reset Circuitry

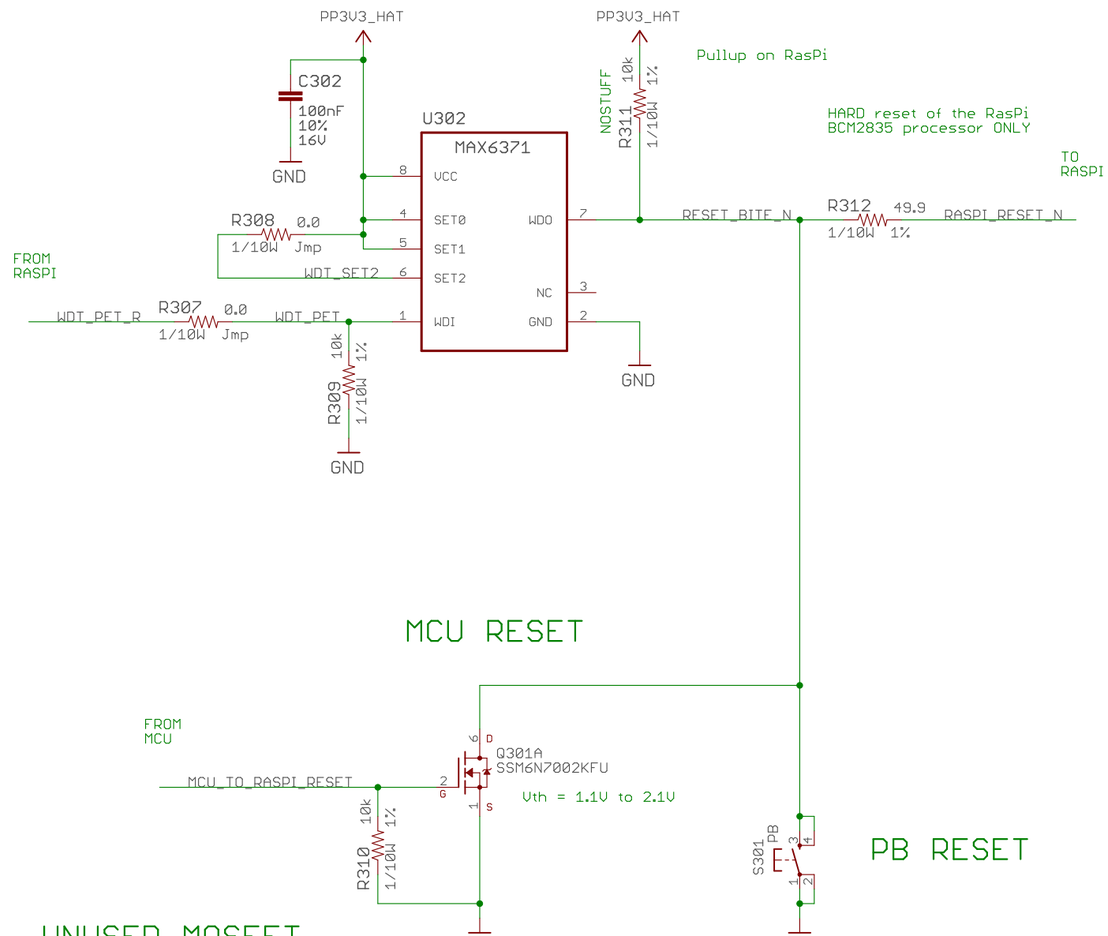
1-cell LiPo Battery Charger



WATCHDOG TIMER

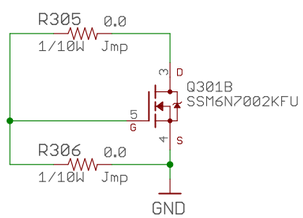
WDO is OD active low for at least 100us
Power-on delay is minimum of 60s

SET2	SET1	SET0	|| Mode
VCC	VCC	VCC	|| 60s timeout
GND	VCC	VCC	|| Disabled



MCU RESET

UNUSED MOSFET IN DUAL ARRAY



LIPO_CHARGER_AND_BCM_RESET	
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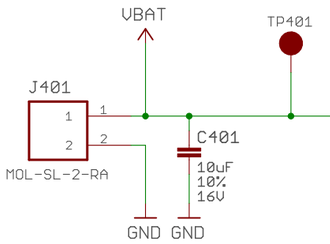
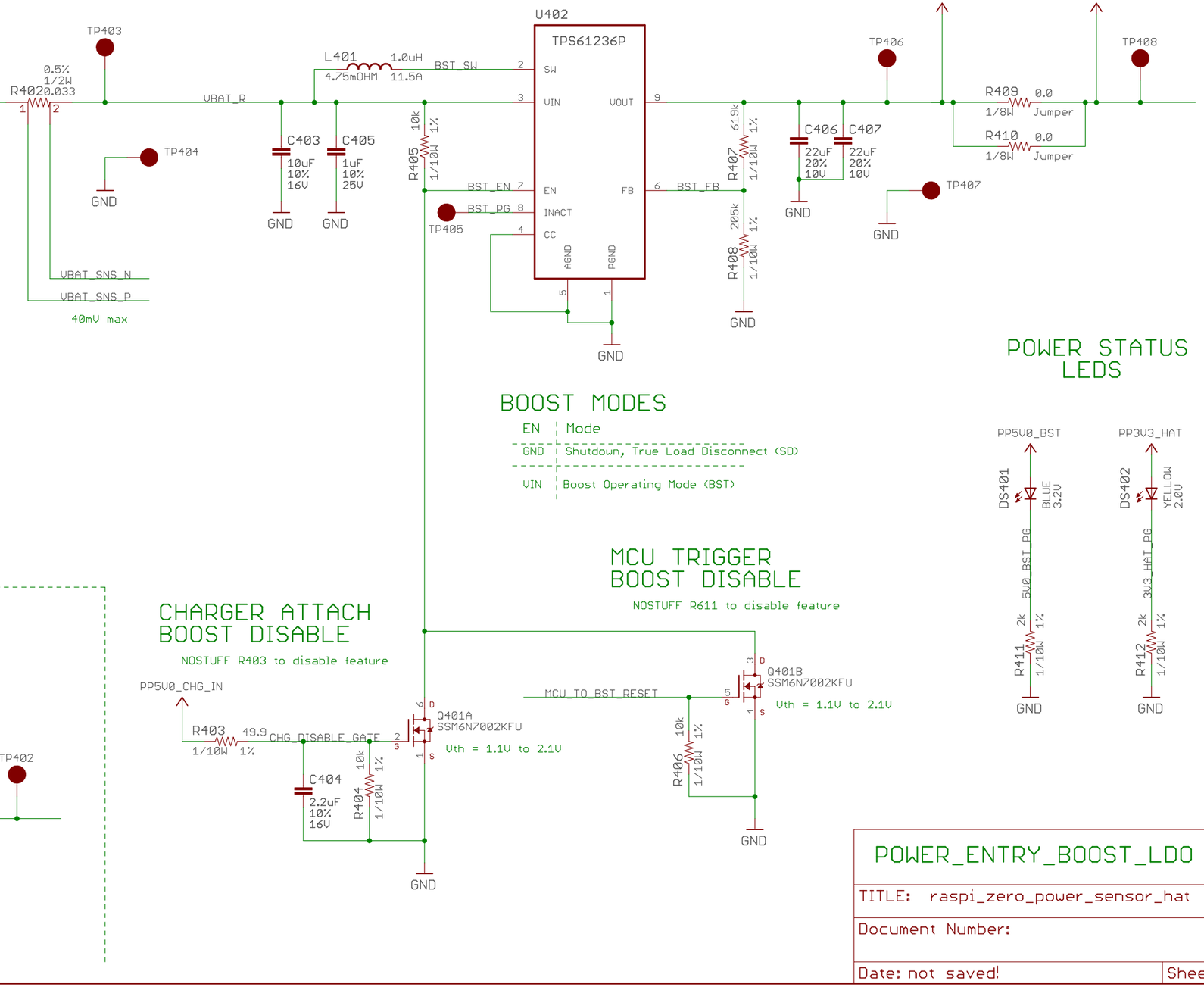
POWER ENTRY, 5V BOOST, AND 3.3V LDO

BATTERY INPUT

LiPo Battery: ~3.0V-4.2V or
3xAA Battery: ~3.7V to 4.6V
Battery Current: ~425mA (AVG)
~900mA (PEAK)

BATTERY JUMPER





5V Boost SMPS

Vin UVLO: 2.3V (MAX)
Fsw: ~1MHz

POWER TO SYSTEM

System Current: ~275mA (AVG)
~575mA (PEAK)

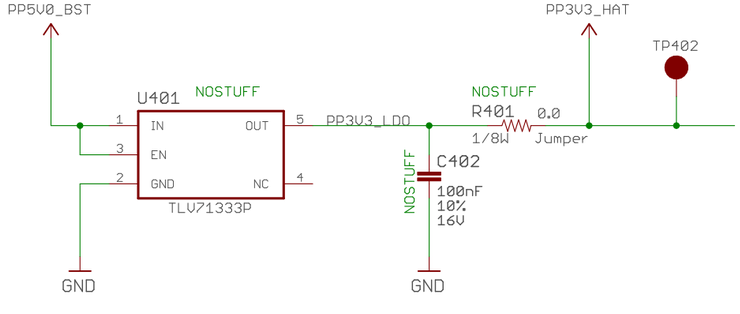
BOOST MODES

EN	Mode
GND	Shutdown, True Load Disconnect (SD)
VIN	Boost Operating Mode (BST)

POWER STATUS LEDS

3.3V LDO (No RasPi Operation)

Placeholder for 3.3V rail supply if the
board is used without a RasPi, since the
RasPi supplies the 3.3V rail during operation



CHARGER ATTACH BOOST DISABLE

NOSTUFF R403 to disable feature

MCU TRIGGER BOOST DISABLE

NOSTUFF R611 to disable feature

POWER_ENTRY_BOOST_LDO	
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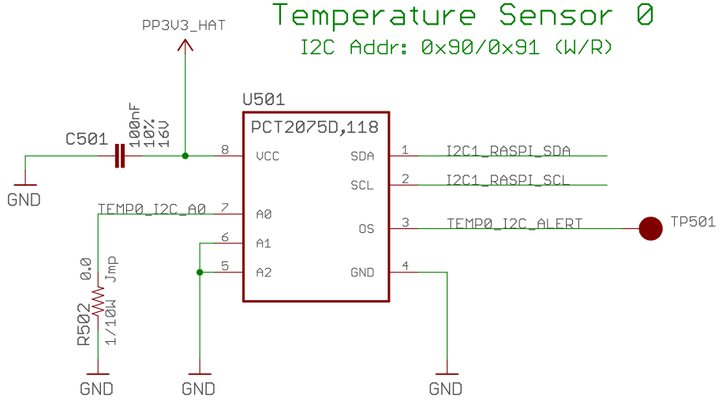
SENSORS

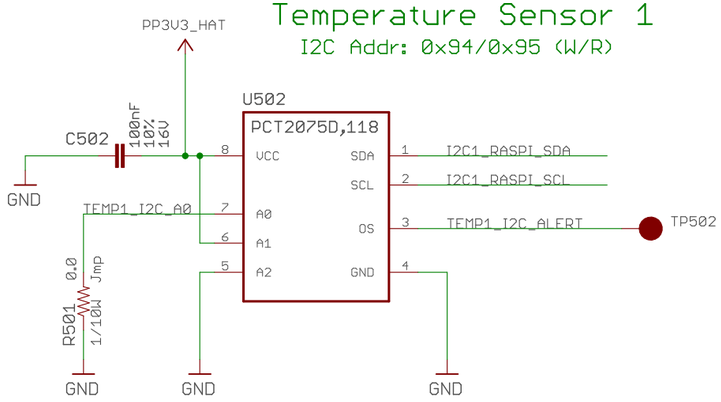
Temperature Sensor 0

I2C Addr: 0x90/0x91 (W/R)



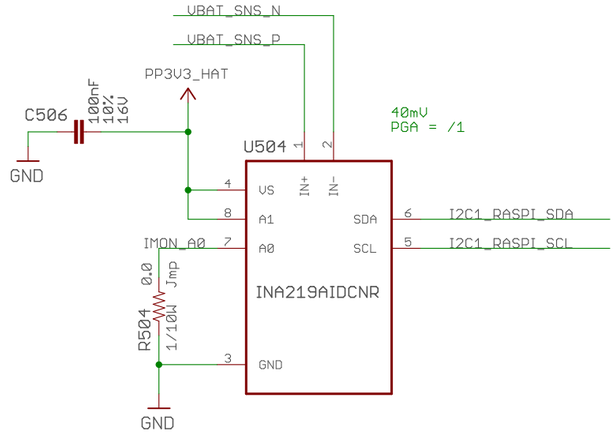
Temperature Sensor 1

I2C Addr: 0x94/0x95 (W/R)



Current/Voltage Sense Amp.

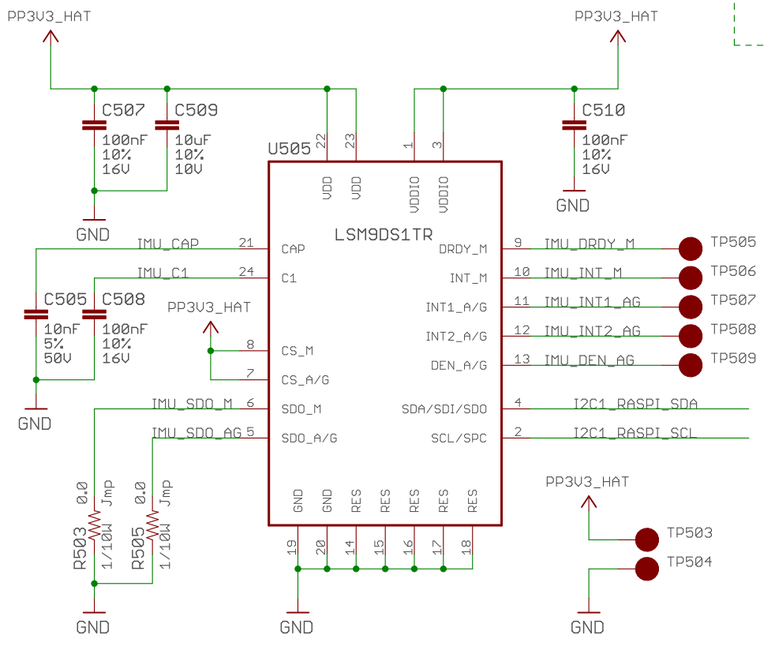
I2C Addr: 0x88/0x89 (W/R)



IMU (Accel, Gyro, Mag)

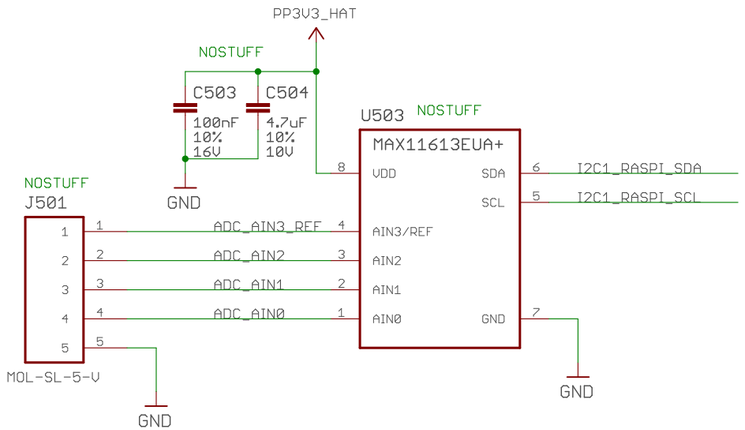
Accel/Gyro I2C Addr: 0xD4/0xD5 (W/R)

Mag I2C Addr: 0x38/0x39 (W/R)



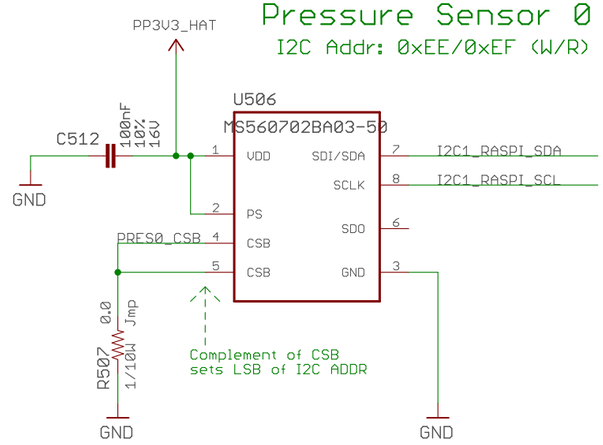
12-bit ADC

I2C Addr: 0x68/0x69 (W/R)



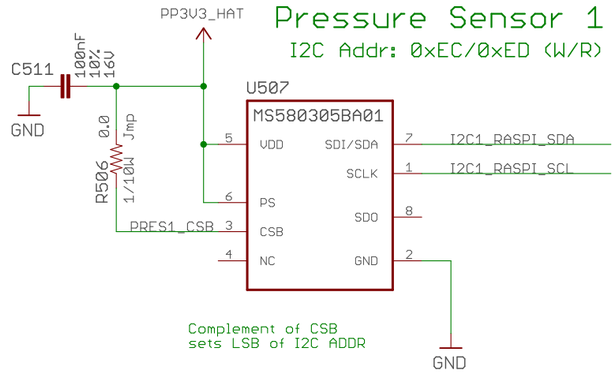
Pressure Sensor 0

I2C Addr: 0xEE/0xEF (W/R)



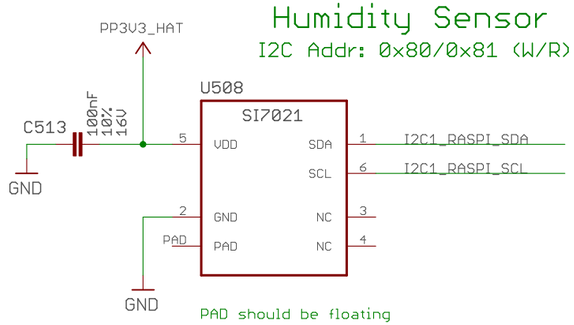
Pressure Sensor 1

I2C Addr: 0xEC/0xED (W/R)



Humidity Sensor

I2C Addr: 0x80/0x81 (W/R)



SENSORS	
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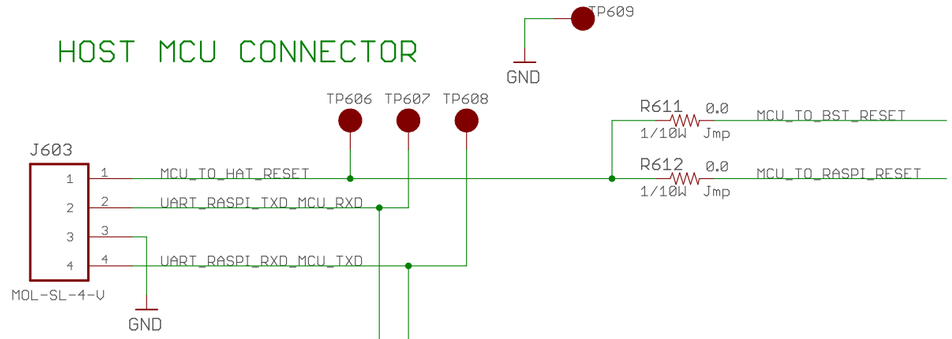
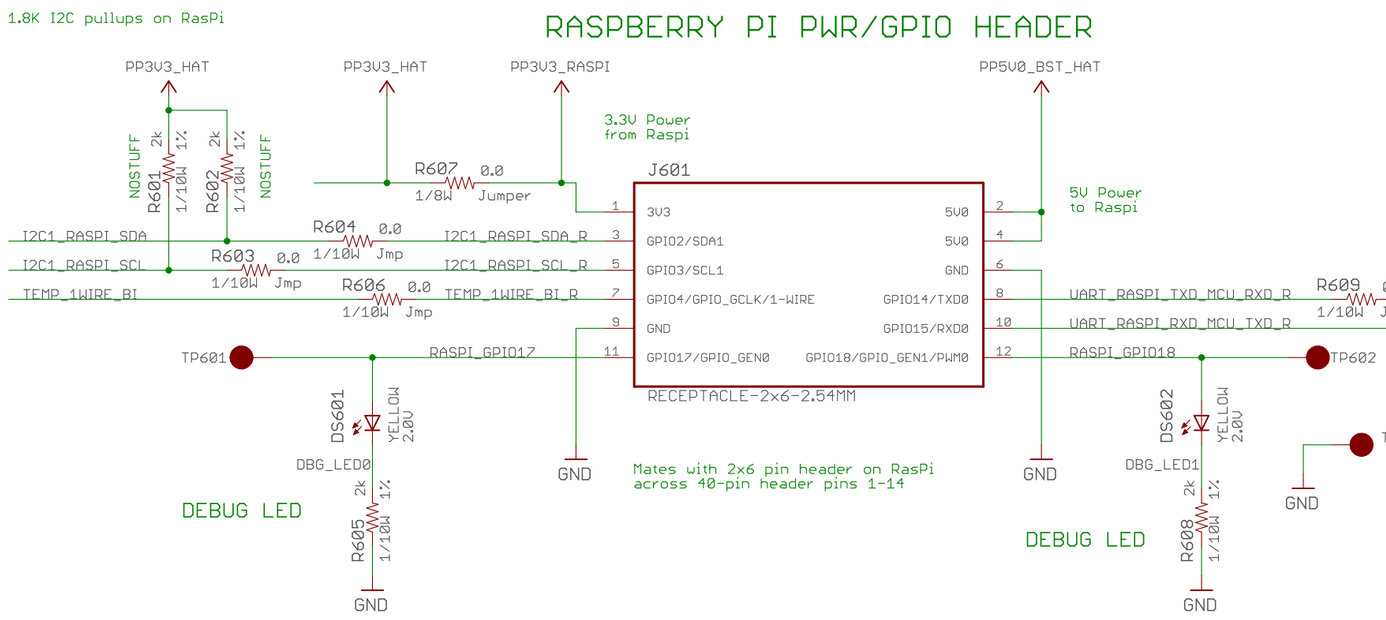
HOST/RASPI CONNECTORS and MOUNTING

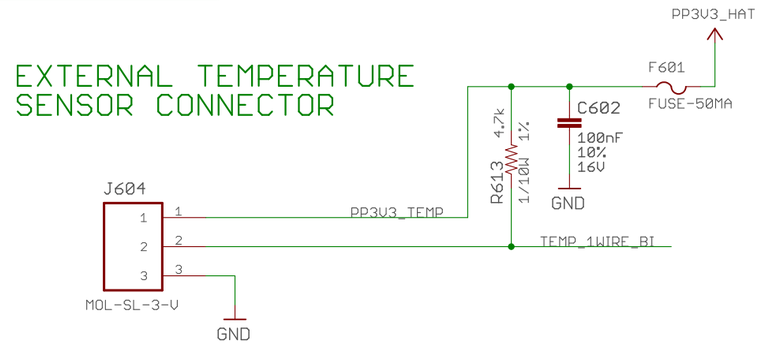
HOST MCU CONNECTOR



RASPBERRY PI PWR/GPIO HEADER



EXTERNAL TEMPERATURE SENSOR CONNECTOR



RASPI ZERO HAT OUTLINE

Only using 3 mounting holes since the 2x6 pin connector stabilizes the upper left board quadrant.

This allows for easier routing of the boost output to the Pi's 5V0 pin.

RASPI CAM MOUNTING HOLES

Mounting holes for the Raspi Camera

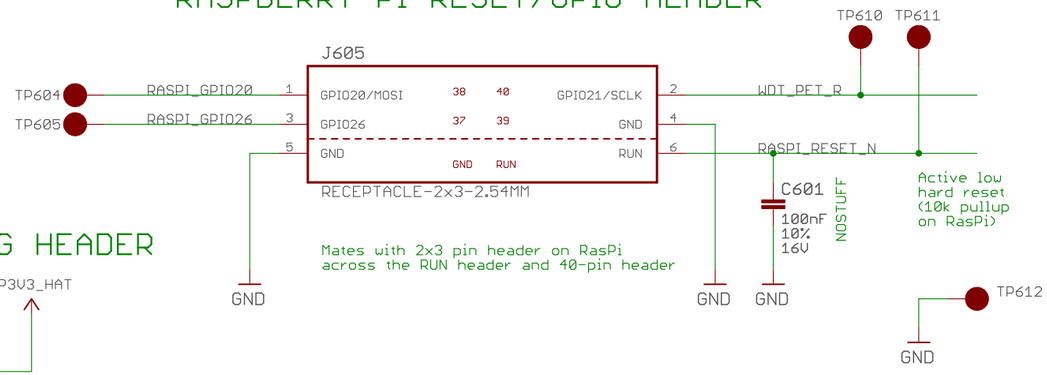
H601 2.2mm_drill_2.0mm_radius

H602 2.2mm_drill_2.0mm_radius

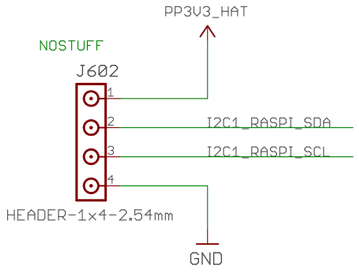
H603 2.2mm_drill_2.0mm_radius

H604 2.2mm_drill_2.0mm_radius

RASPBERRY PI RESET/GPIO HEADER



I2C DEBUG HEADER



PI_MCU_CONNECT_AND_MOUNTING	
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CONNECTOR ASSEMBLY and EXTERNAL SENSORS

J301: 5V Charger Input

BOM701	SL 70066 2PIN HOUSING	Digi-key	WM2900-ND
BOM702	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM703	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND

3x 12mm Nylon Standoffs (Top Righ, Bottom Right, Bottom Left)

Not listed on BOM, enough for 6 HATs (Amazon: B01HBYDH70)

J401: 1-cell Li-Ion Battery Input

BOM704	SL 70066 2PIN HOUSING	Digi-key	WM2900-ND
BOM705	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM706	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND

2000mAh 3.7V Battery ordered from Adafruit (Part Number: 2011)

J402: Battery Jumper

BOM727	SL 70066 2PIN HOUSING	Digi-key	WM2900-ND
BOM728	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM729	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND

J501: ADC Inputs

BOM707	SL 70066 5PIN HOUSING	Digi-key	WM2903-ND
BOM708	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM709	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM710	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM711	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM712	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND

J601: RasPi Power/GPIO Header

BOM713	HEADER-RECT-MALE-2X6	Digi-key	952-2125-ND

J602: 1-Wire Temperature Sensor

BOM714	SL 70066 3PIN HOUSING	Digi-key	WM2901-ND
BOM715	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM716	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM717	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM718	1-Wire Temperature Sensor	Digi-key	DS18B20+-ND
BOM719	1-Wire Temperature Sensor	Digi-key	DS18B20+-ND

J603: MCU IO

BOM720	SL 70066 4PIN HOUSING	Digi-key	WM2902-ND
BOM721	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM722	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM723	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND
BOM724	SL 70058 GOLD CRIMP	Digi-key	WM2512CT-ND

J604: RasPi Reset/GPIO Header

BOM725	HEADER-RECT-MALE-2X3	Digi-key	952-2120-ND

J605: I2C Debug Header

BOM726	HEADER-RECT-MALE-1X4	Digi-key	S1011EC-04-ND

ASSEMBLY_COMPONENTS

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