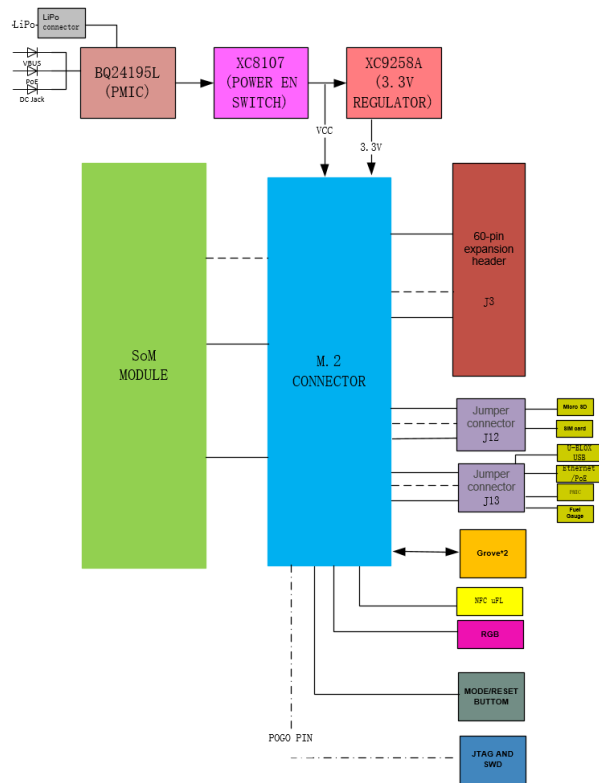


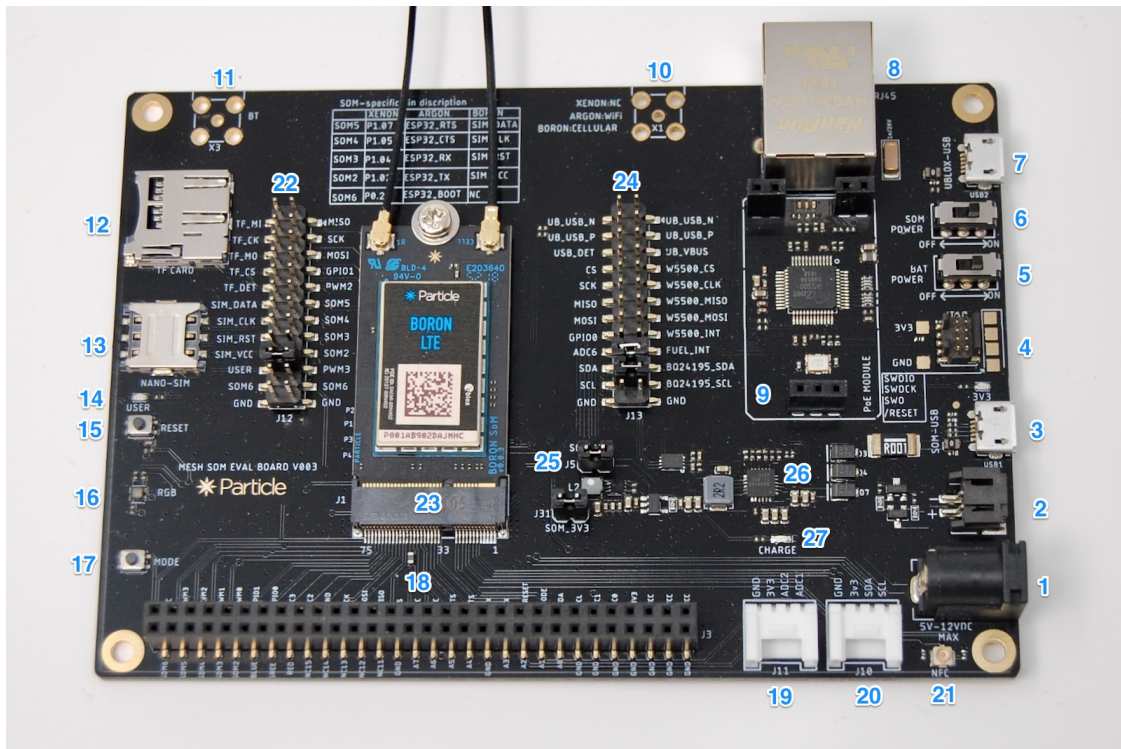
B Series Evaluation Board

This is a simple breakout board for Particle's B series of cellular IoT modules. It breaks out all of its pins via easy to use headers. The board features a redundant USB port, connector for the LiPo battery, a barrel jack power connector, buttons, RGB LED, and charge status LED.

Block Diagram



Description



Num	ID	Description
1	External Power	5-12 VDC. Minimum power requirements are 5VDC @500mA (when the LiPo battery) or 5VDC @2000mA (without LiPo battery).
2	LiPo Battery connector	Plug in the LiPo battery here.
3	SoM USB port	This is the module's main USB port that connects to the microcontroller.
4	JTAG connector	This can plug directly into the Particle debugger ribbon cable.
5	Battery switch	Controls power between the LiPo connector and the charge controller.
6	SoM power switch	Controls 3V3 power to the SoM
7	u-blox USB port	This USB port connects directly to the u-blox module for firmware updates.
8	Ethernet connector	RJ45 connector for twisted pair Ethernet, 10 or 100 Mbit/sec.
9	PoE connector	Connect for the Particle PoE adapter for power-over-Ethernet.
10	Cellular antenna	Connector for an external SMA connected cellular antenna.
11	Bluetooth/mesh antenna	Connector for an external SMA connected antenna for Bluetooth and mesh networking.
12	TF/SD Card	MicroSD card slot.
13	Nano SIM	Nano 4FF SIM card slot.
14	User LED	Blue LED connected to pin D7.
15	Reset Button	This is same as the RESET button on the Boron.
16	RGB LED	System status indicator RGB LED.
17	Mode Button	This is the same as the MODE button on the Boron.
18	Expansion Connector	Allows easy access to SoM IO pins.
19	Grove Analog Port	Connects to Seeed Studio Grove analog and digital boards.
20	Grove I2C Port	Connects to Seeed Studio Grove I2C boards.
21	NFC Antenna	U.FL connector for an NFC antenna (optional).

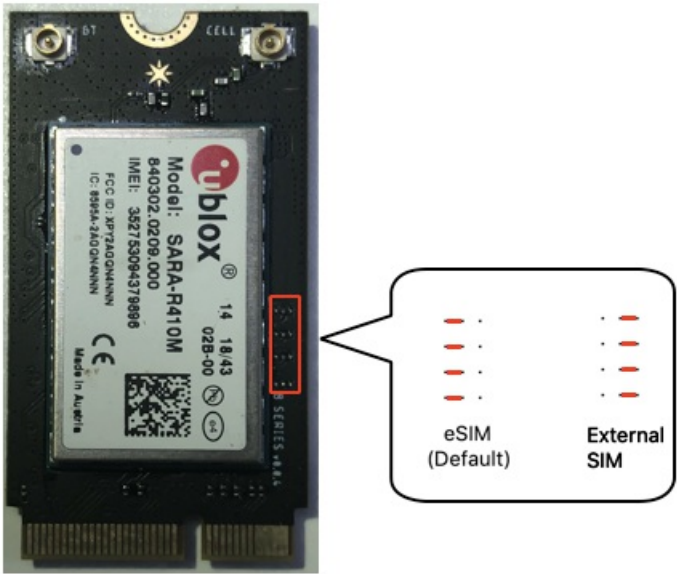
22	Jumpers J12	Enable or disable various features on the evaluation board.
23	SoM connector	M.2 connector for the Boron SoM.
24	Jumpers J13	Enable or disable various features on the evaluation board.
25	Power Jumpers	Enable or disable power from the evaluation board.
26	PMIC	Power management IC (bq24195) and charge controller.
27	Charge LED	Indicate LiPo is charging.

JUMPERS J12

These pins are intended to be connected across using removable two-pin jumpers to connect features on the board to standard ports.

Feature	Feature Pin	SoM Pin	B Series Pin
MicroSD	TF_MI	MISO	MISO
	TF_CK	SCK	SCK
	TF_MO	MOSI	MOSI
	TF_CS	GPIO1	D23
	TF_DET	PWM2	D6
SIM	SIM_DATA	SOM8	
	SIM_CLK	SOM7	
	SIM_RST	SOM6	
	SIM_VCC	SOM5	
D7 LED	USER	PWM3	D7
	SOM9	SOM9	
	GND	GND	GND

By default, the external SIM card cannot be used. There are four jumpers on the B Series SoM that need to be changed in order to disable the onboard MFF2 SMD SIM.



JUMPERS J13

These pins are intended to be connected across using removable two-pin jumpers to connect features on the board to standard ports.

B Series Pin	SoM Pin	Feature Pin	Feature
	UB_USB_N	UB_USB_N	u-blox USB
	UB_USB_P	UB_USB_N	
	USB_DET	UB_VBUS	
D8	CS	W5500_CS	Ethernet
SCK	SCK	W5500_CLK	
MISO	MISO	W5500_MISO	
MOSI	MOSI	W5500_MOSI	
D22	GPIO0	W5500_INT	
A6	ADC6	FUEL_INT	Fuel Gauge
D0	SDA	BQ24195_SDA	PMIC
D1	SCL	BQ24195_SCL	PMIC

POWER JUMPERS

Jumper	Name
J5	SOM_VCC
J31	SOM_3V3

EXPANSION CONNECTOR

B Series Pin	SoM Pin	SoM Pin	B Series Pin
	SOM9	NC	
SIM_DATA	SOM8	PWM3	D7
SIM_CLK	SOM7	PWM2	D6
SIM_RST	SOM6	PWM1	D5
SIM_VCC	SOM5	PWM0	D4
	BLUE	GPIO1	D23
	GREEN	GPIO0	D22
	RED	NC	
	NC	NC	
	NC	GND	
	NC	SCK	D13
	NC	MOSI	D12
	NC	MISO	D11
	GND	CS	D8
A7/D20	ADC7	NC	
A6/D21	ADC6	NC	
A5/D14	ADC5	RTS	D2
A4/D15	ADC4	CTS	D3
	GND	RX	RX/D10
A3/D16	ADC3	TX	TX/D9

A2/D17	ADC2	RESET	
A1/D18	ADC1	MODE	
A0/D19	ADC0	SDA	D0
	GND	SCL	D1
	GND	NC	
	GND	NC	
	GND	VCC	
	GND	VCC	
	GND	VCC	

PWM DIFFERENCES

On the Boron SoM, pins D4, D5, D7, A0, A1, A6, and A7 can be used for PWM. Pins are assigned a PWM group. Each group must share the same frequency and resolution, but individual pins in the group can have a different duty cycle.

- Group 2: Pins A0, A1, A6, and A7.
- Group 1: Pins D4, D5, and D6.
- Group 0: Pin D7 and the RGB LED. This must use the default resolution of 8 bits (0-255) and frequency of 500 Hz.

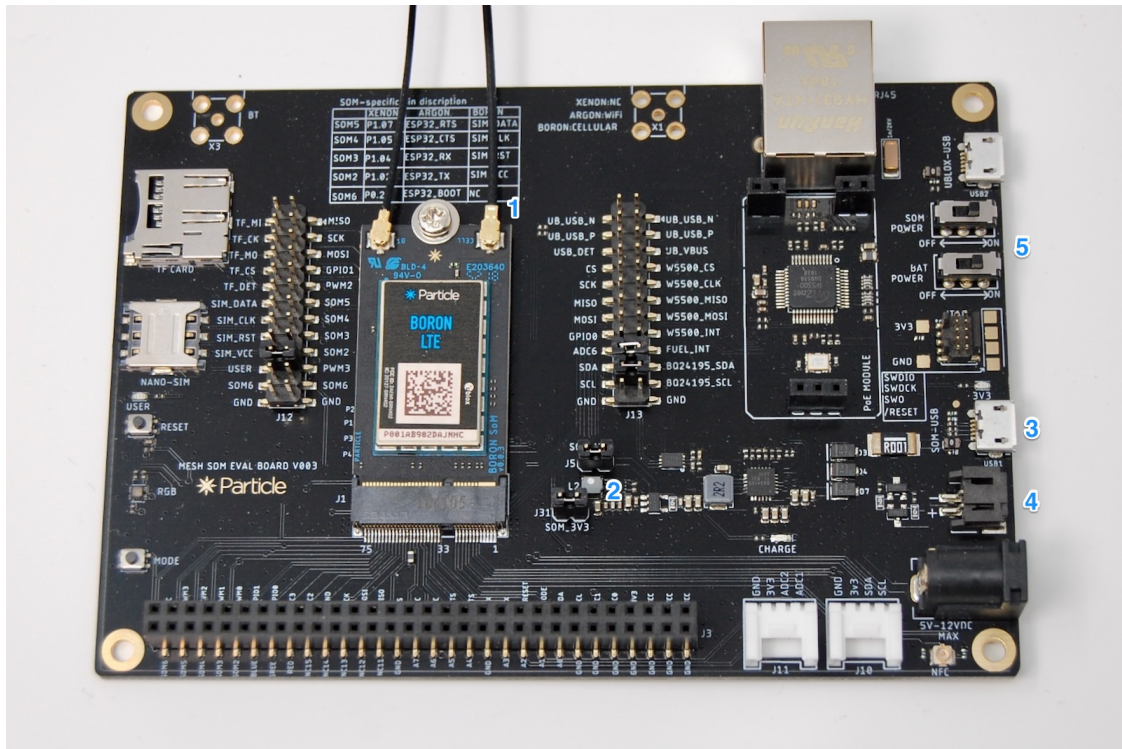
On Gen 3 Feather devices (Argon, Boron, Xenon), pins A0, A1, A2, A3, D2, D3, D4, D5, D6, D7, and D8 can be used for PWM. Pins are assigned a PWM group. Each group must share the same frequency and resolution, but individual pins in the group can have a different duty cycle.

- Group 3: Pins D2, D3, A4, and A5.
- Group 2: Pins A0, A1, A2, and A3.
- Group 1: Pins D4, D5, D6, and D8.
- Group 0: Pin D7 and the RGB LED. This must use the default resolution of 8 bits (0-255) and frequency of 500 Hz.

These rules also apply to tone() (square wave with 50% duty cycle), however since each group must share the same frequency you can only generate two different simultaneous tones of different frequencies on the B Series SoM. You cannot generate tone on group 0.

Basic Setup

The basic setup for the B series to be operational is shown below:



- Plug the antenna into the uFL connector (1). Remember never to power up this board without the antenna being connected. There is potential to damage the transmitter of the u-blox module if no antenna is connected.
- Make sure jumpers J5 and J31 are installed (2).
- Connect power the USB (3) or a LiPo battery (4).
- Turn on the power switches (5).

USING THE PMIC AND FUEL GAUGE (RECOMMENDED)

To use the bq24195 PMIC and MAX17043 fuel gauge you must add the jumpers:

- ADC6 to FUEL_INT
- SDA to BQ24195_SDA
- SCL to BQ24195_SCL

There is support for it in Device OS so you don't need to add any additional configuration.

USING THE MICROSD CARD

To use the MicroSD card, you must add the jumpers:

- TF_MI to MISO
- TF_CK to SCK
- TF_MO to MOSI
- TF_CS to GPIO1
- TF_DET to PWM2 (optional)

You will normally use this with the [SdFat](#) library.

With the jumpers installed, it will use the primary SPI and pin D23 as the chip select.

USING ETHERNET

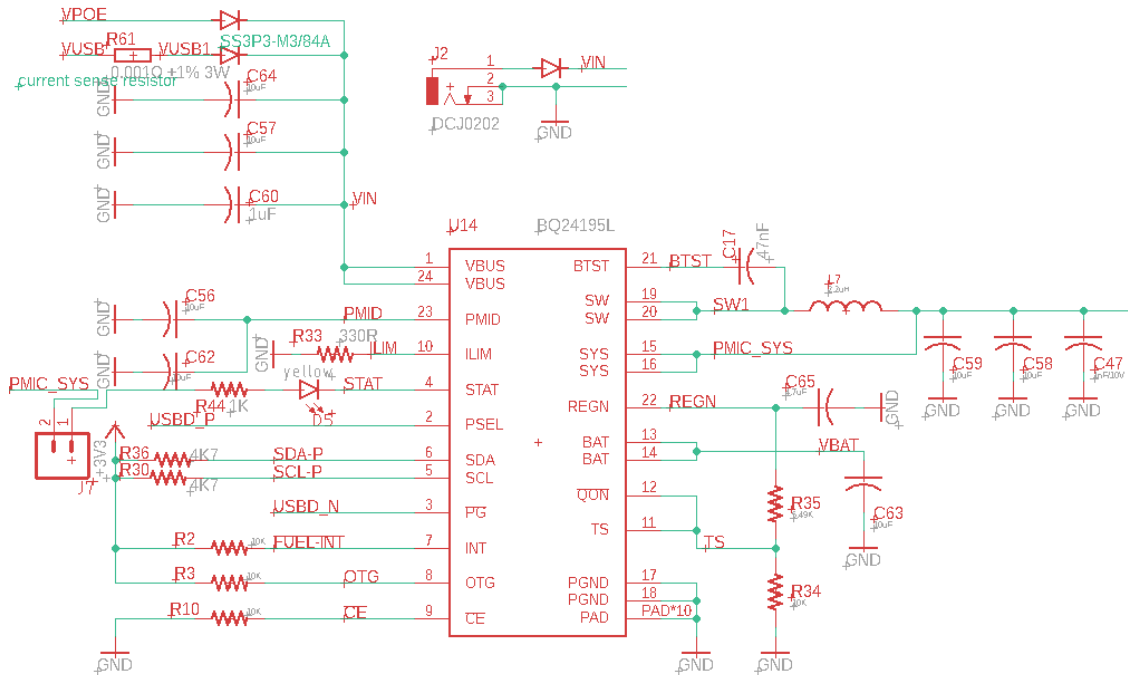
To use Ethernet, you must add the jumpers:

- CS to W5500_CS
- SCK to W5500_CLK
- MISO to W5500_MISO
- MOSI to W5500_MOSI
- GPIO0 to W5500_INT

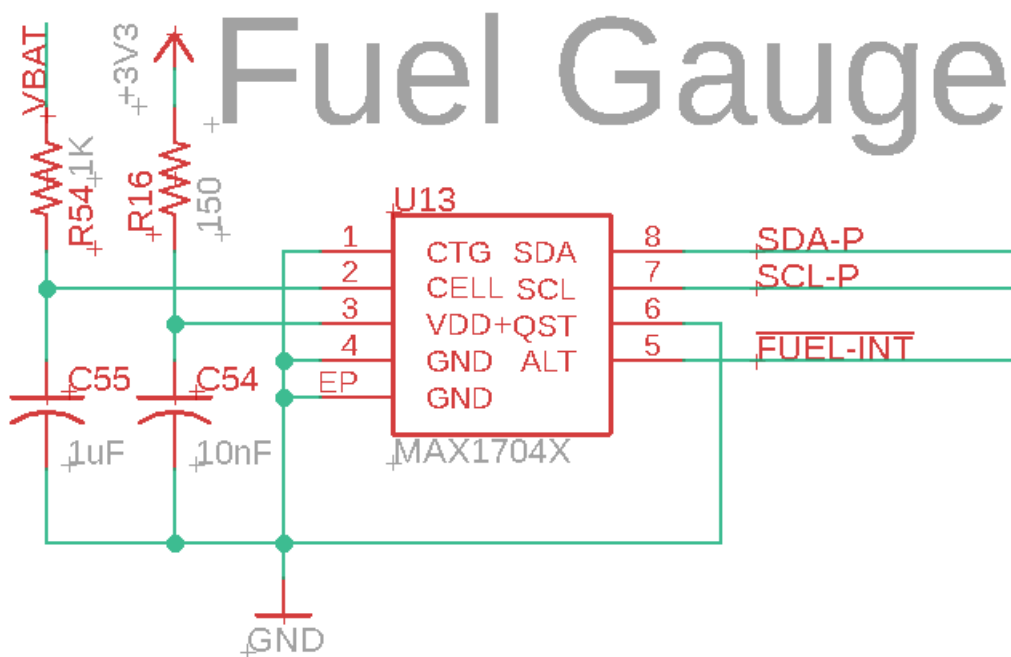
With the jumpers installed, it will use the primary SPI and pins D8 as the chip select and D22 as the interrupt pin.

Evaluation Board Schematics

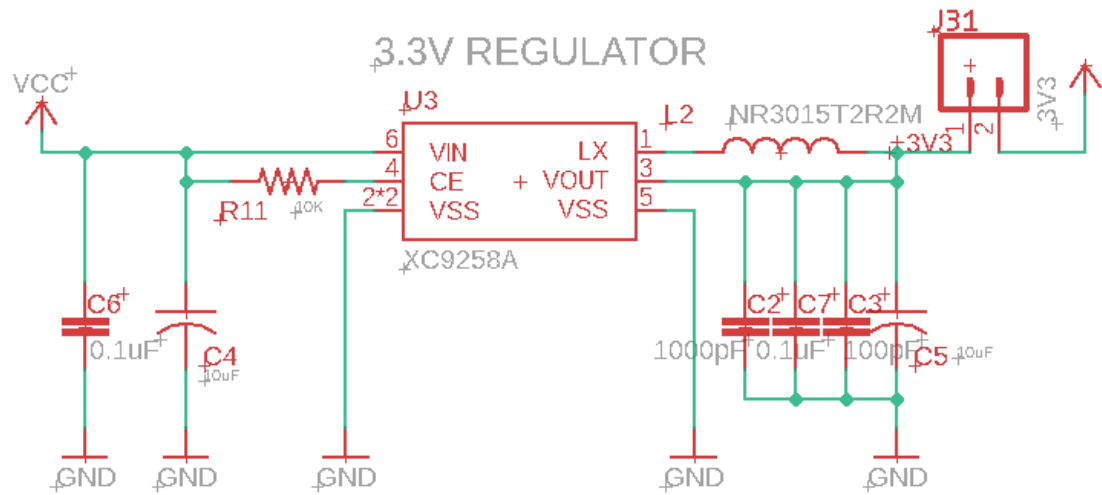
PMIC



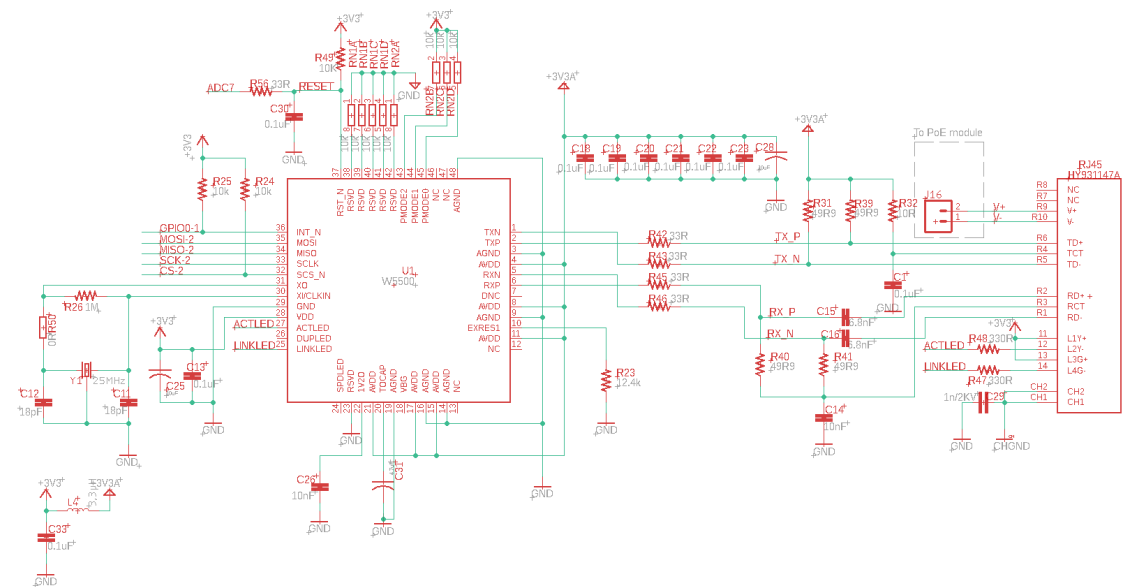
FUEL GAUGE



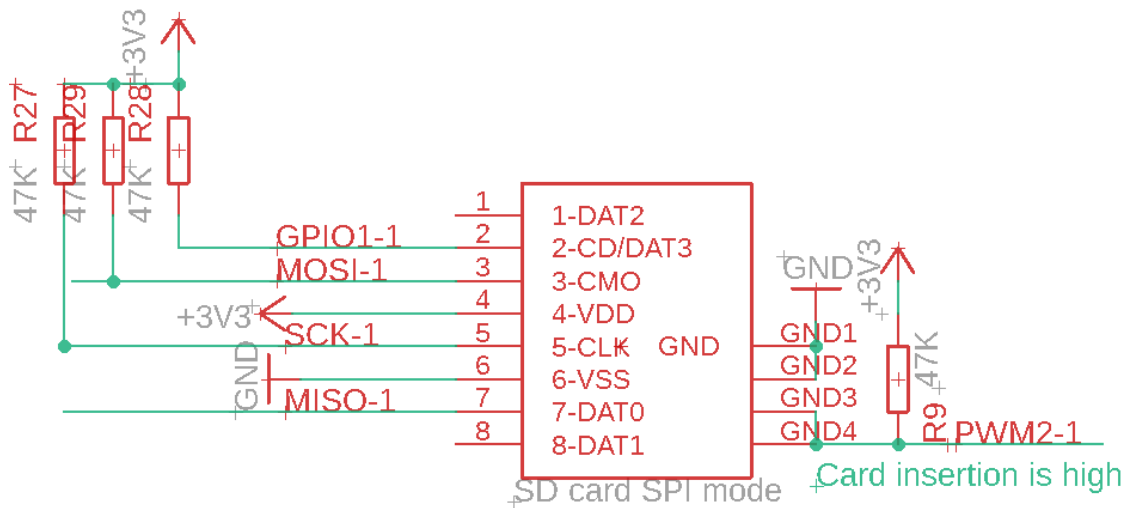
3.3V REGULATOR

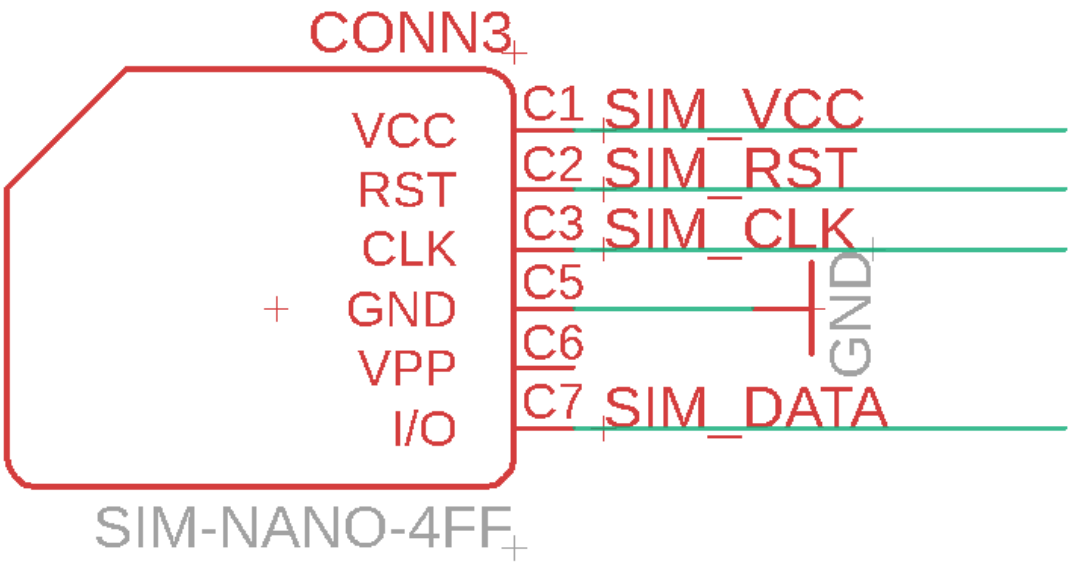


ETHERNET



SD CARD





Revision history

Revision	Date	Author	Comments
001	29 Apr 2019	RK	Initial Release