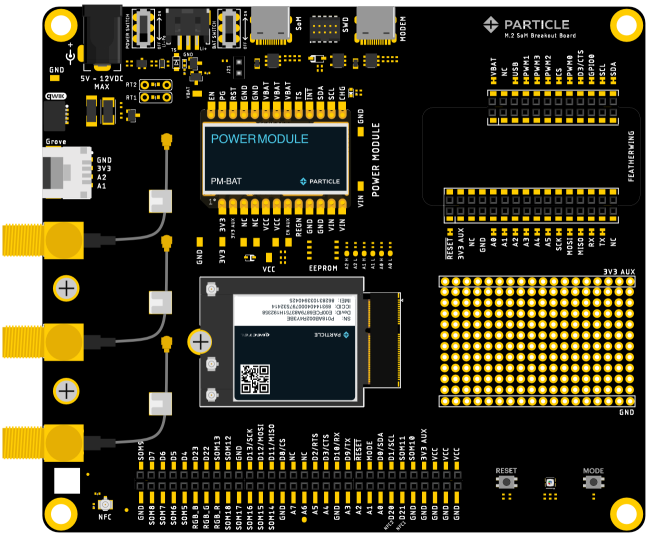
{{title}} 3
Block diagram 4
Board features 5
Setup 7
INSTALL THE SOM 7
CONNECT ANTENNAS 7
INSTALL A POWER MODULE 7
PM-BAT power module 7
PM-DC power module 7
POWER ON DEVICE 7
DEVICE SETUP AND CLAIMING 8
Onboard peripherals 9
QWIIC (8) 9
GROVE CONNECTOR (9) 9
FEATHER CONNECTOR (21) 9
FEATHER PIN MAPPING - M-SOM 9
FEATHER PIN MAPPING - B-SOM 9
JUMPERS (22) 10
JUMPERS (23) 10
LIPO CONNECTOR 10
3V3_AUX POWER 11
PM-BAT INTERFACE 11
USING ETHERNET 11
FIRMWARE EXAMPLE 12
USING SD CARD 12
Expansion header 14
EXPANSION HEADER - M-SOM 14
EXPANSION HEADER - B-SOM 14
FULL PIN LISTING 14
Module Pin 1 (GND) 14
Module Pin 2 (VCC) 15
Module Pin 3 (GND) 15
Module Pin 4 (VCC) 15
Module Pin 5 (GND) 15
Module Pin 6 (VCC) 15
Module Pin 7 (GND) 15
Module Pin 8 (3V3) 16
Module Pin 9 (GND) 16
Module Pin 10 (SOM10) 16
Module Pin 11 (SOM6 / D21) 16
Module Pin 12 (SOM11 / GNSS_TX) 17
Module Pin 13 (SOM7 / D20) 17
Module Pin 14 (D1) 17
Module Pin 15 (A0) 17
Module Pin 16 (D0) 18
Module Pin 17 (A1) 18

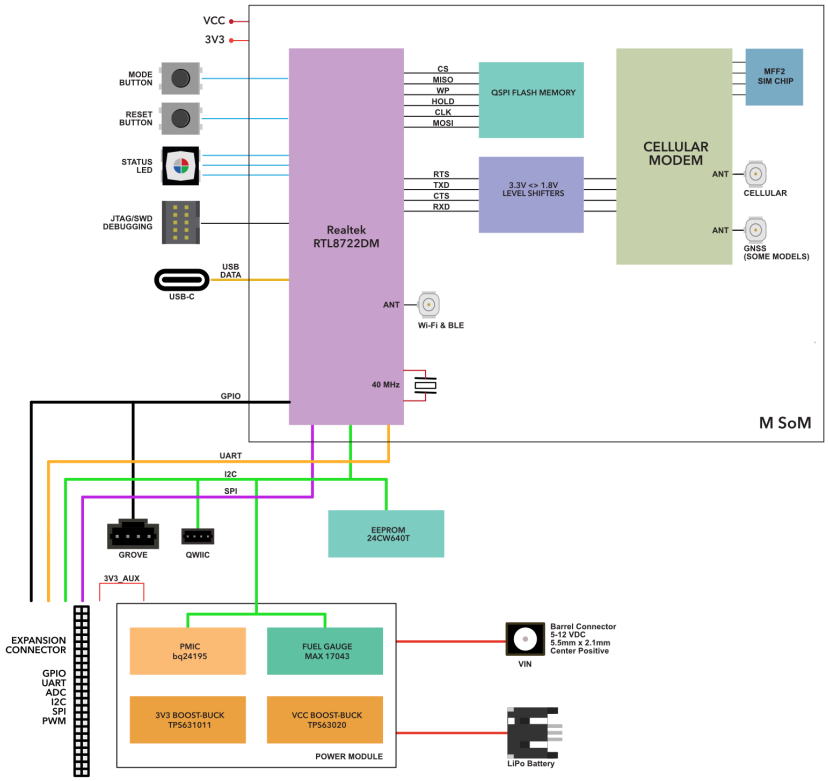
Module Pin 18 (MODE) 18
Module Pin 19 (A2) 19
Module Pin 20 (RST) 19
Module Pin 21 (A3) 19
Module Pin 22 (TX) 20
Module Pin 23 (GND) 20
Module Pin 24 (RX) 20
Module Pin 25 (A4) 21
Module Pin 26 (D3) 21
Module Pin 27 (A5) 21
Module Pin 28 (D2) 22
Module Pin 29 (A6) 22
Module Pin 30 (SOM0 / CELL USBD+) 23
Module Pin 31 (A7) 23
Module Pin 32 (SOM1 / CELL USBD-) 23
Module Pin 33 (GND) 23
Module Pin 34 (D8) 24
Module Pin 35 (SOM14) 24
Module Pin 36 (MISO) 24
Module Pin 37 (SOM15 / A5) 25
Module Pin 38 (MOSI) 25
Module Pin 39 (SOM16 / D27) 25
Module Pin 40 (SCK) 26
Module Pin 41 (SOM17) 26
Module Pin 42 (GND) 26
Module Pin 43 (SOM18 / D26) 26
Module Pin 44 (SOM12 / D24) 27
Module Pin 45 (RGBR) 27
Module Pin 46 (SOM13 / D25) 27
Module Pin 47 (RGBG) 28
Module Pin 48 (D22) 28
Module Pin 49 (RGBB) 28
Module Pin 50 (D23) 28
Module Pin 51 (SOM5) 29
Module Pin 52 (D4) 29
Module Pin 53 (SOM6) 29
Module Pin 54 (D5) 30
Module Pin 55 (SOM7 / SOM8) 30
Module Pin 56 (D6) 30
Module Pin 57 (SOM8 / SIM_DATA) 30
Module Pin 58 (D7) 31
Module Pin 59 (GND) 31
Module Pin 60 (SOM9 / SOM8) 31
Schematics 33
Mechanical specifications 34
DIMENSIONS AND WEIGHT 34
Revision history 35

{{title}}

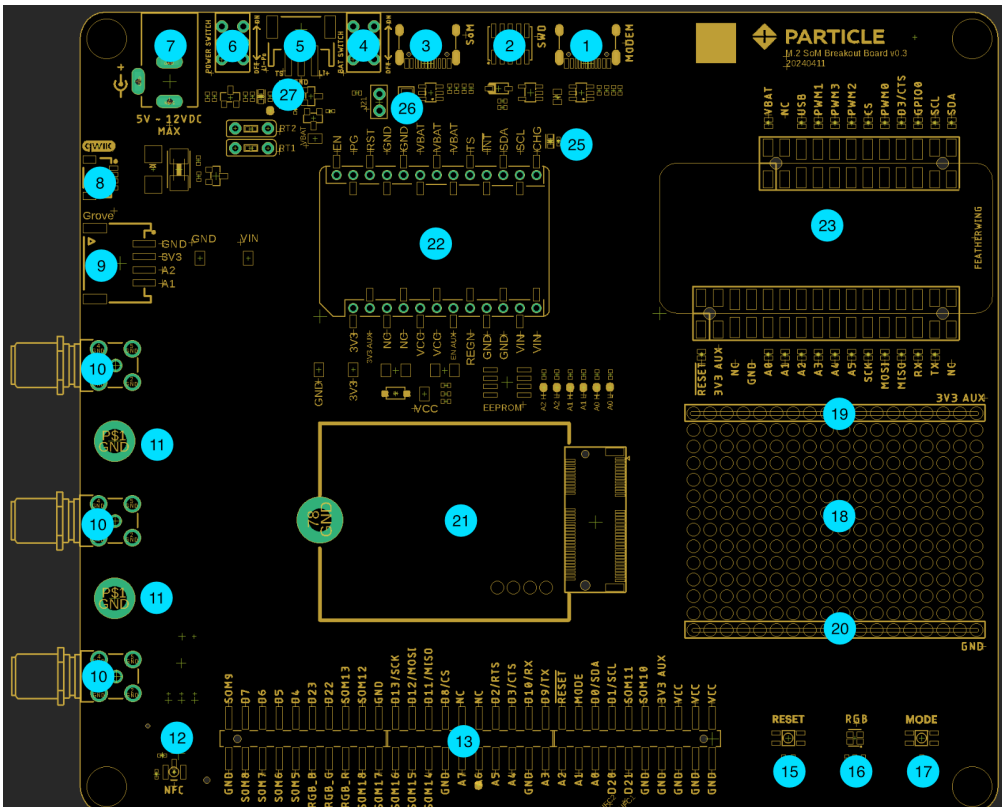
The M.2 breakout board is a convenient way to prototype with the B-SoM and M-SoM modules.



Block diagram



Board features



Label	Description
1	Cellular modem USB-C (not normally used)
2	SWD debugging connector
3	MCU USB-C (use this one)
4	LiPo battery power switch
5	LiPo battery connector (3-pin, with temperature sensor)
6	DC power switch
7	DC power barrel connector (5.5mm x 2.1mm, center positive)
8	QWIIC (3.3V I2C connector)
9	Grove expansion connector
10	U.FL to SMA connectors
11	Spare M.2 SoM screws
12	NFC U.FL connector (B-SoM only, not available on M-SoM)
13	Expansion connector
15	RESET button
16	RGB status LED
17	MODE button
18	Prototyping area
19	3V3_AUX
20	GND
21	M.2 SoM socket for B-SoM or M-SoM
22	Power module
23	Adafruit Feather connector (for accessories)
25	LiPo charge LED (yellow)
26	LiPo temperature sensor jumper (TS)

27	Power LED (red)

Setup

INSTALL THE SOM

The M.2 SoM breakout board requires a Particle M-SoM or B-SoM module. Install it in the M.2 socket (21) and secure it with a thumbscrew.

CONNECT ANTENNAS

The M.2 breakout board can be used with the standard flexible Particle antennas or the SMA adapters included on the breakout board.

- Plug the cellular antenna into the U.FL connector labeled **CELL** on the SoM. 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.
- If you are planning to use BLE, connect the 2.4 GHz antenna (the smaller one) to the **BT** U.FL connector on the SoM.
- The flexible Particle cellular and BLE antennas should be included in the M.2 SoM package, not the breakout board package.
- SMA antennas are not included with the M.2 breakout board. If used in a product, additional certification would be required to use a SMA antenna.

INSTALL A POWER MODULE

The M.2 breakout board includes two power modules; select and install the module you wish to use and install it in the power module socket (22).

Note the position of the notch to make sure the power module is installed in the correct orientation and make sure all of the pins are aligned with the socket on the breakout board.

PM-BAT power module

The PM-BAT power module allows the Particle SoM to be powered by a LiPo battery or DC adapter.

- Install the PM-BAT module in the power module socket (22).
- Connect the LiPo battery (2).
- Optionally connect the AC power adapter to VIN (7). With PM-BAT, VIN must be 5 - 12 VDC.
- You must use the LiPo battery, AC power adapter, or both, when using PM-BAT. You cannot power by USB only.
- The LiPo battery can be only be charged by VIN, it cannot be charged from USB.

PM-DC power module

The PM-DC power module allows the Particle SoM to be powered by an AC power adapter or external DC power source.

- Install the PM-DC module in the power module socket (22).
- Connect the power adapter to VIN (7). When powering PM-DC by VIN (barrel connector), 5 - 12 VDC is required at 12 watts.
- Power on the VIN barrel connector is required when using PM-DC; you cannot power the breakout board only by USB power.

POWER ON DEVICE

Turn on the appropriate power switches (4, 6).

The RGB status LED should turn on. Typically it will blink white once, then blink green though it may display a different pattern.

DEVICE SETUP AND CLAIMING

Connect the USB connector (3) to your computer. This is needed only for setup.

Visit https://setup.particle.io/ to finish setting up your device.

Onboard peripherals

QWIIC (8)

The SparkFun Qwiic system provides an easy way to expand and test various sensors, input devices, and displays. Multiple peripherals can be daisy-chained to a single port. The Adafruit Stemma QT are compatible with Qwiic and can be mixed and matched as well.

For more information, see Qwiic.

GROVE CONNECTOR (9)

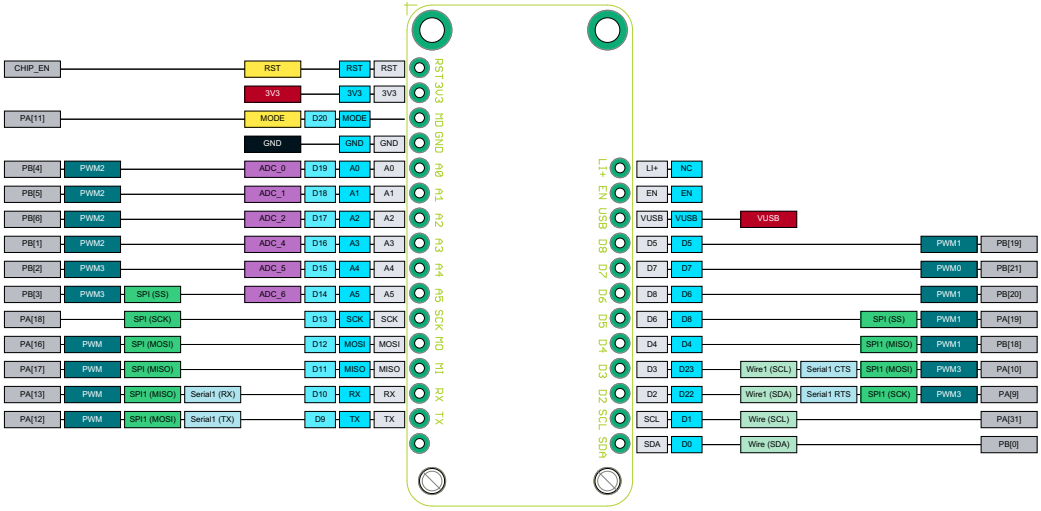
Additionally, Grove system of sensors and peripherals from Seeed Systems is another easy way to add peripheral devices. The M.2 breakout board has one Grove connectors connected to pins A1 and A2 that can be used as GPIO or analog inputs. This port cannot be used with I2C or Serial Grove peripherals.

| J11 | SoM Pin | SoM Pin Number | | :---: | :---: | :---: | :---: | | GND | | | | 3V3 | | | | ADC2 | A2 | 35 | | ADC1 | A1 | 33 |

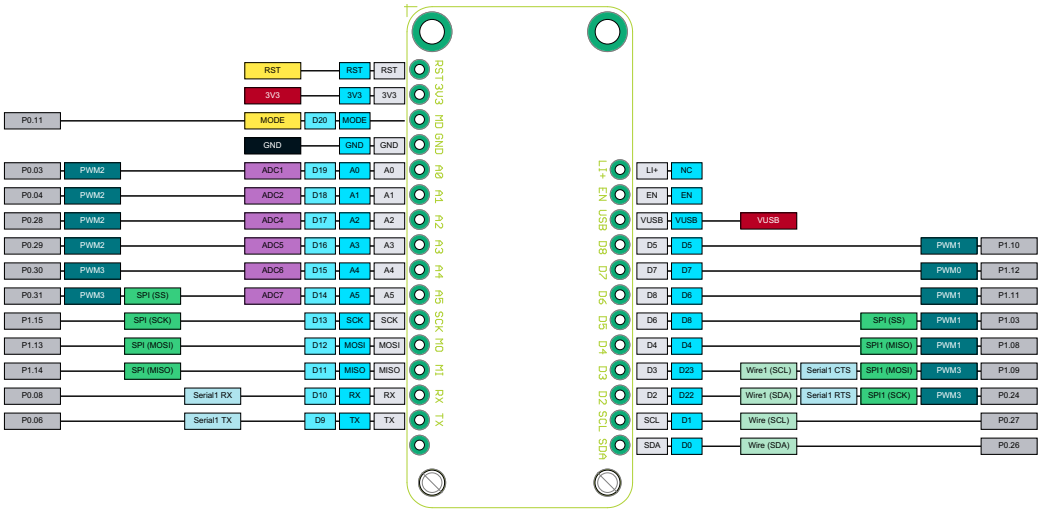
FEATHER CONNECTOR (21)

The Feather connector can be used for Adafruit FeatherWings, such as displays, sensors, and Ethernet. You cannot plug a Feather MCU into this socket!

FEATHER PIN MAPPING - M-SOM



FEATHER PIN MAPPING - B-SOM



JUMPERS (22)

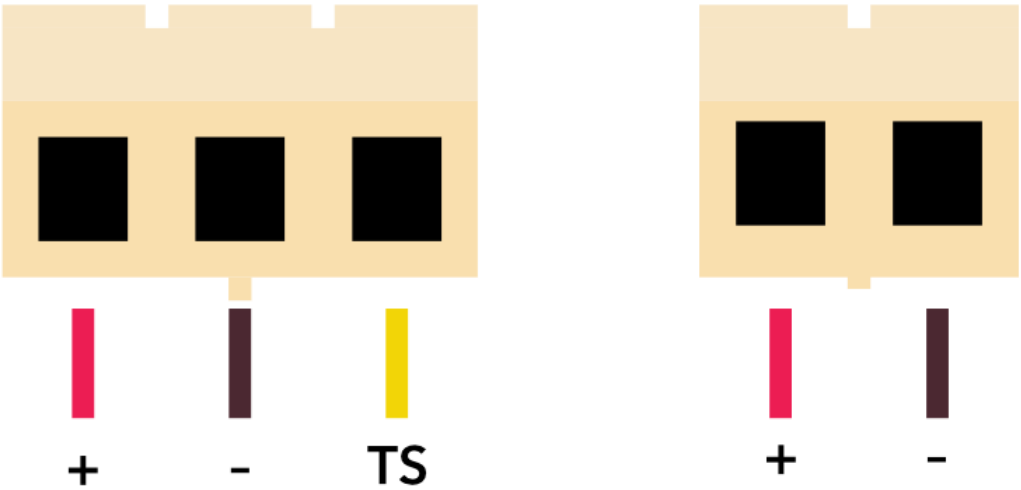
These jumpers connect the Feather A pin side to the M.2 connector. They can also be used to remap pins by using jumper wires instead of solid jumpers.

JUMPERS (23)

These jumpers connect the Feather D pin side to the M.2 connector. They can also be used to remap pins by using jumper wires instead of solid jumpers.

LIPO CONNECTOR

Note that the M.2 breakout board includes a 3-pin JST-PH connector (left), not the 2-pin JST-PH connector on some other Particle devices (right). The TS pin is expected to be connected to a 10K NTC thermistor in the battery pack. The TS jumper (26) must be installed for normal operation with a temperature sensor.



Looking at the exposed end of the connector attached to the battery

If you wish to use a battery without a temperature sensor, remove the TS jumper (26) and use a 3-pin to 2-pin JST-PH adapter, or change the shell of your JST-PH 2-pin connector to a 3-pin shell. The pin can be swapped without cutting, soldering, or crimping. See the battery guide for more information.

If purchasing a LiPo battery from a 3rd-party supplier, beware as the polarity of the JST-PH

connector is not standardized and may be reversed. Permanent damage to the breakout board can occur if powered by reverse polarity on the JST connector. See the battery guide for additional information.

The included battery is a 3100 mAh 3.7V LiPo battery with temperature sensor. Battery datasheet.

3V3_AUX POWER

Both the PM-BAT and PM-DC power modules support an auxiliary 3.3V power supply. This is used to power the Feather socket 3V3 and the `3V3_AUX` rail.

Power module	SoM Pin	SoM Pin Number
EN_AUX	D23 / GPIO1	50

`3V3_AUX` is powered from `3V3` via a load switch (TPS22918). It can supply up to the full 2A of `3V3`. It defaults to off due to a pull-down resistor on `EN_AUX`. `EN_AUX` is connected to pin `D23`; set this pin to output high to enable `3V3_AUX`.

```
// Enable 3V3_AUX
pinMode(D23, OUTPUT);
digitalWrite(D23,
HIGH);
```

Devices using the Particle Power Module include a `3V3_AUX` power output that can be controlled by a GPIO. On the M.2 SoM breakout board, this powers the Feather connector. On the Muon, it powers the Ethernet port, LoRaWAN module, 40-pin expansion HAT connector, and QWIIC connector.

The main reason for this is that until the PMIC is configured, the input current with no battery connected is limited to 100 mA. This is insufficient for the M-SoM to boot when using a peripheral that requires a lot of current, like the WIZnet W5500 Ethernet module. The system power manager prevents turning on `3V3_AUX` until after the PMIC is configured and the PMIC has negotiated a higher current from the USB host (if powered by USB).

This setting is persistent and only needs to be set once. In fact, the PMIC initialization normally occurs before user firmware is run. This is also necessary because if you are using Ethernet and enter safe mode (breathing magenta), it's necessary to enable `3V3_AUX` so if you are using Ethernet, you can still get OTA updates while in safe mode.

After changing the auxiliary power configuration you must reset the device.

PM-BAT INTERFACE

The M.2 breakout board can be used with the PM-BAT power module that includes the bq24195 PMIC and MAX17043 fuel gauge chips which interface by the pins below

Power module	SoM Pin	SoM Pin Number
FUEL_INT	A6	45
SDA	D0	22
SCL	D1	20

USING ETHERNET

The M.2 breakout board does not contain Ethernet like the previous B-Series Eval board. You can, however, add it using the Adafruit Ethernet FeatherWing in the Feather socket.

Be sure to connect the nRESET and nINTERRUPT pins (on the small header on the short side) to pins D3 and D4 with jumper wires. These are required for proper operation.

The default mapping for the B-SoM and the original B-SoM eval board is listed below, but you may want to use Ethernet pin remapping to reassign the pins.

Particle Pin	M.2 Pin	Ethernet Pin
D8	CS	ETH_CS
A7	RESERVED	ETH_RESET
SCK	SCK	ETH_CLK
MISO	MISO	ETH_MISO
MOSI	MOSI	ETH_MOSI
D22	GPIO0	ETH_INT

FIRMWARE EXAMPLE

The following code can be used to enable Ethernet on the M.2 SoM breakout board. This only needs to be done once and the device must be reset after configuration for the changes to take effect. It requires Device OS 5.9.0 or later.

```
// Enable 3V3_AUX
SystemPowerConfiguration powerConfig = System.getPowerConfiguration();
powerConfig.auxiliaryPowerControlPin(D23).interruptPin(A6);
System.setPowerConfiguration(powerConfig);

// Enable Ethernet
if_wiznet_pin_remap remap = {};
remap.base.type = IF_WIZNET_DRIVER_SPECIFIC_PIN_REMAP;

System.enableFeature(FEATURE_ETHERNET_DETECTION);
remap.cs_pin = D5;
remap.reset_pin = PIN_INVALID;
remap.int_pin = PIN_INVALID;
auto ret = if_request(nullptr, IF_REQ_DRIVER_SPECIFIC, &remap, sizeof(remap),
nullptr);
```

USING SD CARD

The M.2 breakout board does not contain a Micro SD card socket as the previous B-Series Eval board did. You can, however, add it using the Adafruit Feather connector.

The Adalogger FeatherWing - RTC + SD Add-on For All Feather Boards contains a Micro SD card socket.

SD Card Pin	Feather Pin	Description
SCK	SCK	SPI Clock
MOSI	MOSI	Data (MCU to SD card)
MISO	MISO	Data (SD card to MCU)
SDCS	D5	Chip select

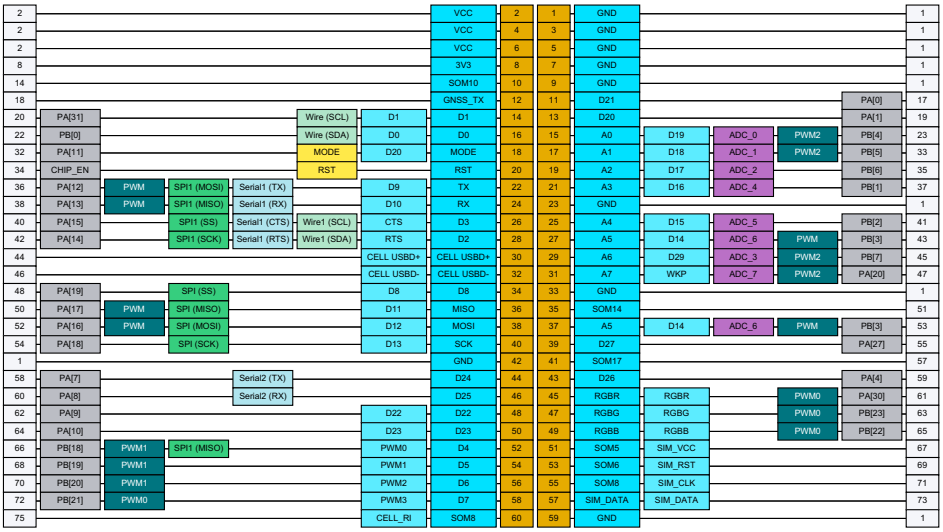
It is also possible to cut the a trace jumper for SDCS and use a different pin for SDCS. Note that this

will use `SPI` (primary SPI) but the B-Series Eval board use `SPI1` so your SD card initialization code will be different.

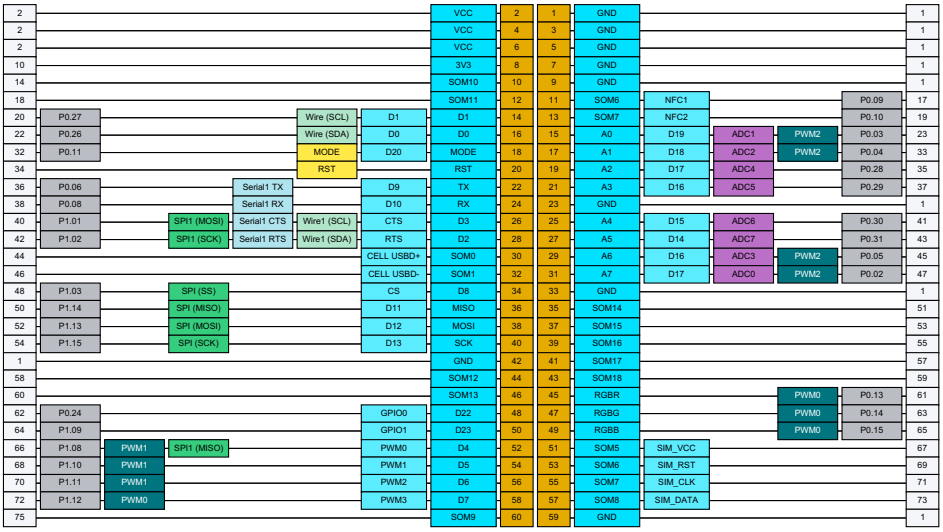
See the Adafruit tutorial for additional information.

Expansion header

EXPANSION HEADER - M-SOM



EXPANSION HEADER - B-SOM



FULL PIN LISTING

Skip past this section (the full pin listing is long)

Module Pin 1 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	1
Pin Name	GND

Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 2 (VCC)

	Unchanged between B-SoM and M-SoM
Pin Number	2
Pin Name	VCC
Description	Cellular modem power. Typically 3.9V, can be 3.6V to 4.2V
M.2 connector pin number	2
SoM Common Pin Name	VCC

Module Pin 3 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	3
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 4 (VCC)

	Unchanged between B-SoM and M-SoM
Pin Number	4
Pin Name	VCC
Description	Cellular modem power. Typically 3.9V, can be 3.6V to 4.2V
M.2 connector pin number	2
SoM Common Pin Name	VCC

Module Pin 5 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	5
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 6 (VCC)

	Unchanged between B-SoM and M-SoM
Pin Number	6
Pin Name	VCC
Description	Cellular modem power. Typically 3.9V, can be 3.6V to 4.2V
M.2 connector pin number	2
SoM Common Pin Name	VCC

Module Pin 7 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	7
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 8 (3V3)

	B-SoM	M-SoM
Pin Number	8	8
Pin Name	3V3	3V3
Description	3.3V used to power MCU	3.3V used to power MCU
Δ M.2 connector pin number	10	8
Δ SoM Common Pin Name	3V3	VCC

Module Pin 9 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	9
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 10 (SOM10)

	Unchanged between B-SoM and M-SoM
Pin Number	10
Pin Name	SOM10
Description	Not currently used, leave unconnected.
M.2 connector pin number	14
SoM Common Pin Name	RESERVED

Module Pin 11 (SOM6 / D21)

	B-SoM	M-SoM
Pin Number	11	11
Δ Pin Name	SOM6	D21
Δ Pin Alternate Name	NFC1	n/a
Δ Description	NFC Antenna 1.	D21 GPIO. Is NFC1 on B-SoM.
Δ Supports digitalRead	n/a	Yes
Δ Supports digitalWrite	n/a	Yes
Δ Supports attachInterrupt	n/a	Yes
Δ I2S interface	n/a	I2S RX
Δ Internal pull resistance	n/a	22K. No internal pull up or pull down in HIBERNATE sleep mode.
M.2 connector pin number	17	17
Δ SoM Common Pin Name	SOM3	RESERVED

Module Pin 12 (SOM11 / GNSS_TX)

		B-SoM	M-SoM
	Pin Number	12	12
Δ	Pin Name	SOM11	GNSS_TX
Δ	Description	Not currently used, leave unconnected.	Cellular modem GNSS UART TX
	M.2 connector pin number	18	18
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 13 (SOM7 / D20)

		B-SoM	M-SoM
	Pin Number	13	13
Δ	Pin Name	SOM7	D20
Δ	Pin Alternate Name	NFC2	n/a
Δ	Description	NFC Antenna 2. NFC2 is the center pin.	D20 GPIO. Is NFC2 on B-SoM.
Δ	Supports digitalRead	n/a	Yes
Δ	Supports digitalWrite	n/a	Yes
Δ	Supports attachInterrupt	n/a	Yes
Δ	I2S interface	n/a	I2S TX
Δ	Internal pull resistance	n/a	???
	M.2 connector pin number	19	19
Δ	SoM Common Pin Name	SOM4	RESERVED

Module Pin 14 (D1)

		B-SoM	M-SoM
	Pin Number	14	14
	Pin Name	D1	D1
	Pin Alternate Name	D1	D1
	Description	I2C SCL. Cannot be used as GPIO.	I2C SCL. Cannot be used as GPIO.
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	I2C interface	SCL. Use Wire object.	SCL. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	20	20
	SoM Common Pin Name	SCL	SCL

Module Pin 15 (A0)

	B-SoM	M-SoM
Pin Number	15	15
Pin Name	A0	A0
Pin Alternate Name	D19	D19

	Description	A0 Analog in, GPIO, PWM	A0 Analog in, GPIO, PWM
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
	Supports analogWrite (PWM)	Yes	Yes
Δ	Supports tone	A0, A1, A6, and A7 must have the same frequency.	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	42K
	M.2 connector pin number	23	23
	SoM Common Pin Name	ADC0	ADC0

Module Pin 16 (D0)

		B-SoM	**M-SoM**
	Pin Number	16	16
	Pin Name	D0	D0
	Pin Alternate Name	D0	D0
	Description	I2C SDA. Cannot be used as GPIO.	I2C SDA. Cannot be used as GPIO.
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	I2C interface	SDA. Use Wire object.	SDA. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	22	22
	SoM Common Pin Name	SDA	SDA

Module Pin 17 (A1)

		B-SoM	**M-SoM**
	Pin Number	17	17
	Pin Name	A1	A1
	Pin Alternate Name	D18	D18
	Description	A1 Analog in, GPIO, PWM	A1 Analog in, GPIO, PWM
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
	Supports analogWrite (PWM)	Yes	Yes
Δ	Supports tone	A0, A1, A6, and A7 must have the same frequency.	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	33	33
	SoM Common Pin Name	ADC1	ADC1

Module Pin 18 (MODE)

		B-SoM	M-SoM
	Pin Number	18	18
	Pin Name	MODE	MODE
	Pin Alternate Name	D20	D20
Δ	Description	MODE button, has internal pull-up	MODE button. Pin number constant is BTN. External pull-up required!
Δ	Supports attachInterrupt	n/a	Yes
	M.2 connector pin number	32	32
	SoM Common Pin Name	MODE	MODE

Module Pin 19 (A2)

		B-SoM	M-SoM
	Pin Number	19	19
	Pin Name	A2	A2
	Pin Alternate Name	D17	D17
	Description	A2 Analog in, GPIO	A2 Analog in, GPIO
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	22K
	M.2 connector pin number	35	35
	SoM Common Pin Name	ADC2	ADC2

Module Pin 20 (RST)

		B-SoM	M-SoM
	Pin Number	20	20
	Pin Name	RST	RST
Δ	Description	Hardware reset, active low.	Hardware reset, active low. External pull-up required.
	M.2 connector pin number	34	34
	SoM Common Pin Name	RESET	RESET

Module Pin 21 (A3)

		B-SoM	M-SoM
	Pin Number	21	21
	Pin Name	A3	A3
	Pin Alternate Name	D16	D16
Δ	Description	A3 Analog in, GPIO	A3 Analog in, PDM CLK, GPIO
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K

	M.2 connector pin number	37	37
	SoM Common Pin Name	ADC3	ADC3

Module Pin 22 (TX)

		B-SoM	M-SoM
	Pin Number	22	22
	Pin Name	TX	TX
	Pin Alternate Name	D9	D9
Δ	Description	Serial TX, GPIO	Serial TX, PWM, GPIO, SPI1 MOSI
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports analogWrite (PWM)	No	Yes
Δ	Supports tone	No	Yes
	UART serial	TX. Use Serial1 object.	TX. Use Serial1 object.
Δ	SPI interface	n/a	MOSI. Use SPI1 object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	I2S interface	n/a	I2S MCLK
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	36	36
	SoM Common Pin Name	TX	TX

Module Pin 23 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	23
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 24 (RX)

		B-SoM	M-SoM
	Pin Number	24	24
	Pin Name	RX	RX
	Pin Alternate Name	D10	D10
Δ	Description	Serial RX, GPIO	Serial RX, PWM, GPIO, SPI1 MISO
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports analogWrite (PWM)	No	Yes
Δ	Supports tone	No	Yes
	UART serial	RX. Use Serial1 object.	RX. Use Serial1 object.
Δ	SPI interface	n/a	MISO. Use SPI1 object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	38	38

	SoM Common Pin Name	RX	RX

Module Pin 25 (A4)

		B-SoM	M-SoM
	Pin Number	25	25
	Pin Name	A4	A4
	Pin Alternate Name	D15	D15
Δ	Description	A4 Analog in, GPIO	A4 Analog in, PDM DAT, GPIO
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	41	41
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 26 (D3)

		B-SoM	M-SoM
	Pin Number	26	26
	Pin Name	D3	D3
	Pin Alternate Name	CTS	CTS
Δ	Description	SPI1 MOSI, Serial1 CTS, GPIO, Wire1 SCL	D3 GPIO, Serial1 CTS flow control (optional), SPI1 SS
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	UART serial	CTS. Use Serial1 object.	CTS. Use Serial1 object.
Δ	SPI interface	MOSI. Use SPI1 object.	SS. Use SPI1 object.
	I2C interface	SCL. Use Wire1 object.	SCL. Use Wire1 object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	40	40
Δ	SoM Common Pin Name	RESERVED	CTS

Module Pin 27 (A5)

		B-SoM	M-SoM
	Pin Number	27	27
	Pin Name	A5	A5
	Pin Alternate Name	D14	D14
Δ	Description	A5 Analog in, GPIO	A5 Analog in, PWM, GPIO, shared with pin 53
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes

Δ	Supports analogWrite (PWM)	No	Yes
Δ	Supports tone	No	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
Δ	SWD interface	n/a	SWCLK. 40K pull-down at boot.
Δ	Signal used at boot	n/a	SWCLK. 40K pull-down at boot.
	M.2 connector pin number	43	43
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 28 (D2)

		B-SoM	M-SoM
	Pin Number	28	28
	Pin Name	D2	D2
	Pin Alternate Name	RTS	RTS
Δ	Description	SPI1 SCK, Serial1 RTS, PWM, GPIO, Wire1 SDA	D2 GPIO, Serial RTS flow control (optional), SPI1 SCK
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	UART serial	RTS. Use Serial1 object.	RTS. Use Serial1 object.
	SPI interface	SCK. Use SPI1 object.	SCK. Use SPI1 object.
	I2C interface	SDA. Use Wire1 object.	SDA. Use Wire1 object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	42	42
Δ	SoM Common Pin Name	RESERVED	RTS

Module Pin 29 (A6)

		B-SoM	M-SoM
	Pin Number	29	29
	Pin Name	A6	A6
Δ	Pin Alternate Name	D16	D29
Δ	Description	A6 Analog in, PWM, GPIO	A6 Analog in, GPIO, PWM, M.2 eval PMIC INT
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
	Supports analogWrite (PWM)	Yes	Yes
Δ	Supports tone	A0, A1, A6, and A7 must have the same frequency.	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???

	M.2 connector pin number	45	45
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 30 (SOM0 / CELL USBD+)

		B-SoM	M-SoM
	Pin Number	30	30
Δ	Pin Name	SOM0	CELL USBD+
	Pin Alternate Name	CELL USBD+	CELL USBD+
Δ	Description	Cellular Modem USB Data+.	Cellular Modem USB Data+
	Input is 5V Tolerant	Yes	Yes
	M.2 connector pin number	44	44
	SoM Common Pin Name	SOM0	SOM0

Module Pin 31 (A7)

		B-SoM	M-SoM
	Pin Number	31	31
	Pin Name	A7	A7
Δ	Pin Alternate Name	D17	WKP
Δ	Description	A7 Analog in, GPIO	A7 Analog In, WKP, GPIO D28
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogRead	Yes	Yes
Δ	Supports analogWrite (PWM)	Yes	No
Δ	Supports tone	A0, A1, A6, and A7 must have the same frequency.	No
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	47	47
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 32 (SOM1 / CELL USBD-)

		B-SoM	M-SoM
	Pin Number	32	32
Δ	Pin Name	SOM1	CELL USBD-
	Pin Alternate Name	CELL USBD-	CELL USBD-
Δ	Description	Cellular Modem USB Data-.	Cellular Modem USB Data-
	Input is 5V Tolerant	Yes	Yes
	M.2 connector pin number	46	46
	SoM Common Pin Name	SOM1	SOM1

Module Pin 33 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	33

Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 34 (D8)

		B-SoM	M-SoM
	Pin Number	34	34
	Pin Name	D8	D8
Δ	Pin Alternate Name	CS	D8
Δ	Description	GPIO, SPI SS	D8 GPIO, SPI SS
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	SPI interface	SS. Use SPI object. This is only the default SS/CS pin, you can use any GPIO instead.	Default SS for SPI.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	48	48
	SoM Common Pin Name	CS	CS

Module Pin 35 (SOM14)

	Unchanged between B-SoM and M-SoM
Pin Number	35
Pin Name	SOM14
Description	M.2 pin 51. Not currently used, leave unconnected.
M.2 connector pin number	51
SoM Common Pin Name	RESERVED

Module Pin 36 (MISO)

		B-SoM	M-SoM
	Pin Number	36	36
	Pin Name	MISO	MISO
	Pin Alternate Name	D11	D11
Δ	Description	SPI MISO, GPIO	D11 GPIO, PWM, SPI MISO
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports analogWrite (PWM)	No	Yes
Δ	Supports tone	No	Yes
	SPI interface	MISO. Use SPI object.	MISO. Use SPI object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	50	50

	SoM Common Pin Name	MISO	MISO

Module Pin 37 (SOM15 / A5)

		B-SoM	M-SoM
	Pin Number	37	37
Δ	Pin Name	SOM15	A5
Δ	Pin Alternate Name	n/a	D14
Δ	Description	M.2 pin 53. Not currently used, leave unconnected.	A5 Analog in, PWM, GPIO, SWCLK, shared with pin 43
Δ	Supports digitalRead	n/a	Yes
Δ	Supports digitalWrite	n/a	Yes
Δ	Supports analogRead	n/a	Yes
Δ	Supports analogWrite (PWM)	n/a	Yes
Δ	Supports tone	n/a	Yes
Δ	Supports attachInterrupt	n/a	Yes
Δ	Internal pull resistance	n/a	42K
Δ	SWD interface	n/a	SWCLK. 40K pull-down at boot.
Δ	Signal used at boot	n/a	SWCLK. 40K pull-down at boot.
	M.2 connector pin number	53	53
Δ	SoM Common Pin Name	RESERVED	SWD_CLK

Module Pin 38 (MOSI)

		B-SoM	M-SoM
	Pin Number	38	38
	Pin Name	MOSI	MOSI
	Pin Alternate Name	D12	D12
Δ	Description	SPI MOSI, GPIO	D12 GPIO, PWM, SPI MOSI
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports analogWrite (PWM)	No	Yes
Δ	Supports tone	No	Yes
	SPI interface	MOSI. Use SPI object.	MOSI. Use SPI object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	52	52
	SoM Common Pin Name	MOSI	MOSI

Module Pin 39 (SOM16 / D27)

		B-SoM	M-SoM
	Pin Number	39	39
Δ	Pin Name	SOM16	D27
Δ	Description	M.2 pin 55. Not currently used, leave unconnected.	D27 GPIO, SWDIO (SWD_DATA), do not pull down at boot

Δ	Supports digitalRead	n/a	Yes
Δ	Supports digitalWrite	n/a	Yes
Δ	Supports attachInterrupt	n/a	Yes
Δ	Internal pull resistance	n/a	42K
Δ	SWD interface	n/a	SWDIO. 40K pull-up at boot.
Δ	Signal used at boot	n/a	SWDIO. 40K pull-up at boot. Low at boot triggers MCU test mode.
	M.2 connector pin number	55	55
Δ	SoM Common Pin Name	RESERVED	SWD_DATA

Module Pin 40 (SCK)

		B-SoM	M-SoM
	Pin Number	40	40
	Pin Name	SCK	SCK
	Pin Alternate Name	D13	D13
Δ	Description	SPI SCK, GPIO	D13 GPIO, SPI SCK
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	SPI interface	SCK. Use SPI object.	SCK. Use SPI object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	2.1K
	M.2 connector pin number	54	54
	SoM Common Pin Name	SCK	SCK

Module Pin 41 (SOM17)

	Unchanged between B-SoM and M-SoM
Pin Number	41
Pin Name	SOM17
Description	M.2 pin 57. Not currently used, leave unconnected.
M.2 connector pin number	57
SoM Common Pin Name	RESERVED

Module Pin 42 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	42
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 43 (SOM18 / D26)

		B-SoM	M-SoM
	Pin Number	43	43
Δ	Pin Name	SOM18	D26
Δ	Description	M.2 pin 59. Not currently used, leave unconnected.	D26 GPIO
Δ	Supports digitalRead	n/a	Yes
Δ	Supports digitalWrite	n/a	Yes
Δ	Supports attachInterrupt	n/a	Yes
Δ	I2S interface	n/a	I2S WS
Δ	Internal pull resistance	n/a	???
	M.2 connector pin number	59	59
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 44 (SOM12 / D24)

		B-SoM	M-SoM
	Pin Number	44	44
Δ	Pin Name	SOM12	D24
Δ	Description	M.2 pin 58. Not currently used, leave unconnected.	D24 GPIO, Serial2 TX, do not pull down at boot
Δ	Supports digitalRead	n/a	Yes
Δ	Supports digitalWrite	n/a	Yes
Δ	UART serial	n/a	TX. Use Serial2 object.
Δ	Supports attachInterrupt	n/a	Yes
Δ	Internal pull resistance	n/a	42K
Δ	Signal used at boot	n/a	Low at boot triggers ISP flash download
	M.2 connector pin number	58	58
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 45 (RGBR)

		B-SoM	M-SoM
	Pin Number	45	45
	Pin Name	RGBR	RGBR
Δ	Pin Alternate Name	n/a	RGBR
	Description	RGB LED Red	RGB LED Red
Δ	Signal used at boot	n/a	Low at boot triggers trap mode
	M.2 connector pin number	61	61
	SoM Common Pin Name	RED	RED

Module Pin 46 (SOM13 / D25)

		B-SoM	M-SoM
	Pin Number	46	46
Δ	Pin Name	SOM13	D25
Δ	Description	M.2 pin 60. Not currently used, leave unconnected.	GPIO25, Serial2 RX
Δ	Supports digitalRead	n/a	Yes

Δ	Supports digitalWrite	n/a	Yes
Δ	UART serial	n/a	RX. Use Serial2 object.
Δ	Supports attachInterrupt	n/a	Yes
Δ	Internal pull resistance	n/a	42K
Δ	Signal used at boot	n/a	Goes high at boot
	M.2 connector pin number	60	60
	SoM Common Pin Name	RESERVED	RESERVED

Module Pin 47 (RGBG)

		B-SoM	M-SoM
	Pin Number	47	47
	Pin Name	RGBG	RGBG
Δ	Pin Alternate Name	n/a	RGBG
	Description	RGB LED Green	RGB LED Green
	M.2 connector pin number	63	63
	SoM Common Pin Name	GREEN	GREEN

Module Pin 48 (D22)

		B-SoM	M-SoM
	Pin Number	48	48
	Pin Name	D22	D22
Δ	Pin Alternate Name	GPIO0	D22
Δ	Description	GPIO D22	D22 GPIO
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	62	62
	SoM Common Pin Name	GPIO0	GPIO0

Module Pin 49 (RGBB)

		B-SoM	M-SoM
	Pin Number	49	49
	Pin Name	RGBB	RGBB
Δ	Pin Alternate Name	n/a	RGBB
	Description	RGB LED Blue	RGB LED Blue
	M.2 connector pin number	65	65
	SoM Common Pin Name	BLUE	BLUE

Module Pin 50 (D23)

		B-SoM	M-SoM
	Pin Number	50	50
	Pin Name	D23	D23
Δ	Pin Alternate Name	GPIO1	D23
Δ	Description	GPIO D23	D23 GPIO

	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	64	64
	SoM Common Pin Name	GPIO1	GPIO1

Module Pin 51 (SOM5)

		B-SoM	M-SoM
	Pin Number	51	51
	Pin Name	SOM5	SOM5
	Pin Alternate Name	SIM_VCC	SIM_VCC
Δ	Description	Leave unconnected. External SIM support is not available on B-SoM.	Leave unconnected, 1.8V/3V SIM Supply Output from R410M.
	M.2 connector pin number	67	67
	SoM Common Pin Name	SOM5	SOM5

Module Pin 52 (D4)

		B-SoM	M-SoM
	Pin Number	52	52
	Pin Name	D4	D4
	Pin Alternate Name	PWM0	PWM0
Δ	Description	SPI1 MISO, PWM, GPIO D4	D4 GPIO, PWM
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogWrite (PWM)	Yes	Yes
Δ	Supports tone	D4, D5, and D6 must have the same frequency.	Yes
	SPI interface	MISO. Use SPI1 object.	MISO. Use SPI1 object.
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	66	66
	SoM Common Pin Name	PWM0	PWM0

Module Pin 53 (SOM6)

		B-SoM	M-SoM
	Pin Number	53	53
	Pin Name	SOM6	SOM6
	Pin Alternate Name	SIM_RST	SIM_RST
Δ	Description	Leave unconnected. External SIM support is not available on B-SoM.	Leave unconnected, 1.8V/3V SIM Reset Output from cellular modem.
	M.2 connector pin number	69	69
	SoM Common Pin Name	SOM6	SOM6

Module Pin 54 (D5)

		B-SoM	M-SoM
	Pin Number	54	54
	Pin Name	D5	D5
	Pin Alternate Name	PWM1	PWM1
Δ	Description	PWM, GPIO D5	D5 GPIO, PWM
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogWrite (PWM)	Yes	Yes
Δ	Supports tone	D4, D5, and D6 must have the same frequency.	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	I2S interface	n/a	I2S TX
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	68	68
	SoM Common Pin Name	PWM1	PWM1

Module Pin 55 (SOM7 / SOM8)

		B-SoM	M-SoM
	Pin Number	55	55
Δ	Pin Name	SOM7	SOM8
	Pin Alternate Name	SIM_CLK	SIM_CLK
Δ	Description	Leave unconnected, 1.8V/3V SIM Clock Output from R410M.	Leave unconnected, 1.8V/3V SIM Clock Output from cellular modem.
	M.2 connector pin number	71	71
	SoM Common Pin Name	SOM7	SOM7

Module Pin 56 (D6)

		B-SoM	M-SoM
	Pin Number	56	56
	Pin Name	D6	D6
	Pin Alternate Name	PWM2	PWM2
Δ	Description	PWM, GPIO D6	D6 GPIO, PWM
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
	Supports analogWrite (PWM)	Yes	Yes
Δ	Supports tone	D4, D5, and D6 must have the same frequency.	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	I2S interface	n/a	I2S CLK
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	70	70
	SoM Common Pin Name	PWM2	PWM2

Module Pin 57 (SOM8 / SIM_DATA)

		B-SoM	M-SoM
	Pin Number	57	57
Δ	Pin Name	SOM8	SIM_DATA
	Pin Alternate Name	SIM_DATA	SIM_DATA
Δ	Description	Leave unconnected. External SIM support is not available on B-SoM.	Leave unconnected, 1.8V/3V SIM Data I/O of cellular modem with internal 4.7 k pull-up.
	M.2 connector pin number	73	73
	SoM Common Pin Name	SOM8	SOM8

Module Pin 58 (D7)

		B-SoM	M-SoM
	Pin Number	58	58
	Pin Name	D7	D7
	Pin Alternate Name	PWM3	PWM3
Δ	Description	PWM, GPIO D7, Blue LED	D7 GPIO, PWM
	Supports digitalRead	Yes	Yes
	Supports digitalWrite	Yes	Yes
Δ	Supports analogWrite (PWM)	PWM is shared with the RGB LED, you can specify a different duty cycle but should not change the frequency.	Yes
Δ	Supports tone	No	Yes
Δ	Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
Δ	I2S interface	n/a	I2S WS
Δ	Internal pull resistance	13K	???
	M.2 connector pin number	72	72
	SoM Common Pin Name	PWM3	PWM3

Module Pin 59 (GND)

	Unchanged between B-SoM and M-SoM
Pin Number	59
Pin Name	GND
Description	Ground.
M.2 connector pin number	1
SoM Common Pin Name	GND

Module Pin 60 (SOM9 / SOM8)

		B-SoM	M-SoM
	Pin Number	60	60
Δ	Pin Name	SOM9	SOM8
Δ	Pin Alternate Name	n/a	CELL_RI

Δ	Description	M.2 pin 75. Not currently used, leave unconnected.	CELL_RI, ring indicator output, leave unconnected.
	M.2 connector pin number	75	75
	SoM Common Pin Name	SOM9	SOM9

Schematics

To be provided at a later date.

Mechanical specifications

Parameter	Value
Operating temperature	-20°C to 65°C

DIMENSIONS AND WEIGHT

To be provided at a later date.

Revision history

Revision	Date	Author	Comments
pre	2024-03-18	RK	Initial Release (based on board v0.2 20240315)
	2024-03-19	RK	USB-C power limitations
	2024-04-16	RK	Description of TS jumper was backwards
1	2024-05-22	RK	Public release
2	2024-05-29	RK	Descriptions for labels 1 and 3 were reversed
3	2024-08-08	RK	Input voltage is 5 - 12 VDC, not 24
4	2024-09-18	RK	Add firmware settings