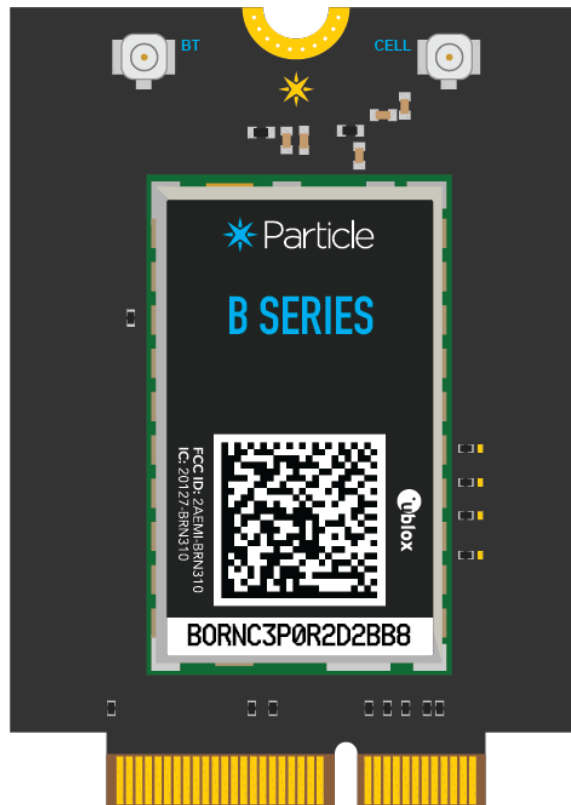# B402 Datasheet (008)

Functional description

OVERVIEW

The B Series System-on-a-Module (SoM) is a cellular device with support for BLE (Bluetooth LE). It is based on the Nordic nRF52840 micro-controller.

The B Series is designed to be integrated into your circuit board design, plugging into a M.2 NGFF connector on your board, allowing the module to be changed or upgraded easily.

FEATURES

- u-blox SARA-R410-02B LTE modem
    - LTE Cat M1 module with global hardware support (MVNO support for US only)
    - 3GPP Release 13 LTE Cat M1
    - Cat M1 bands: 2, 3, 4, 5, 8, 12, 13, 20, 28
- Nordic Semiconductor nRF52840 SoC
    - ARM Cortex-M4F 32-bit processor @ 64MHz
    - 1MB flash, 256KB RAM
    - Bluetooth 5: 2 Mbps, 1 Mbps, 500 Kbps, 125 Kbps
    - Supports DSP instructions, HW accelerated Floating Point Unit (FPU) calculations
    - ARM TrustZone CryptoCell-310 Cryptographic and security module
    - Up to +8 dBm TX power (down to -20 dBm in 4 dB steps)
    - NFC-A tag
- On-module additional 4MB SPI flash
- 24 mixed signal GPIO (8 x Analog, 4 x PWM), UART, I2C, SPI
- USB 2.0 full speed (12 Mbps)
- JTAG (SWD) pins
- RGB status pins for LED
- Reset and Mode pins for buttons
- On-module MFF2 Particle SIM
- Two on-module U.FL connectors for external antennas
- M.2 interface
- FCC and PTCRB certified
- RoHS compliant (lead-free)

Interfaces

POWER

VCC

VCC is used to supply power to the u-blox SARA-R410M cellular module. The recommended input voltage range on this pin is between 3.6V to 4.2V DC. Make sure that the supply can handle currents of at least 2 A.

3V3

3V3 is used to supply power to nRF52840, logic ICs, memory, etc. and 3.3v is recommended. VCC input voltage range is between 3V to 3.6V DC. Make sure that the supply can handle currents of at least 150mA.

VBus

VBus is connected to the USB detect pin of nRF52840 to enables the USB interface. The recommended input voltage range is between 4.35V to 5.5V DC.

There are two radios on the B402 module. A BLE radio (nRF52840) and a cellular radio (u-blox). We have provided two u.FL connectors to plug in the cellular and BLE antenna. These are required if you wish to use the cellular and BLE. If you do not need BLE, you do not need to connect the BLE antenna.

Certified Cellular Antenna

SKU	Description
ANTCW2EA	Particle Cellular Flex Antenna 2G/3G/LTE [x1]
ANTCW2TY	Particle Cellular Flex Antenna 2G/3G/LTE Tray of 50 [x50]

- Type: LTE Ultra Wide Band Flex Antenna
- Frequency/band: 698 MHz-2690 MHz
- RoHS Compliant
- Mechanical Specs:
  - Dimensions: 97 x 21 x 0.2 mm
  - Mounting: 3M adhesive backed for application on non-metallic surfaces
  - Connector type: FPC + IPEX connector
  - Cable length: 210 mm
  - Gain: 4.71 dBi

General Antenna Guidance

- The antenna placement needs to follow some basic rules, as any antenna is sensitive to its environment. Mount the antenna at least 10mm from metal components or surfaces, ideally 20mm for best radiation efficiency, and try to maintain a minimum of three directions free from obstructions to be able to operate effectively.
- Needs tuning with actual product enclosure and all components.
- For the BLE antenna, it is recommended to use a 2.4 GHz single-frequency antenna and not a 2.4 GHz + 5 GHz antenna, so as to avoid large gain at the frequency twice of 2.4 GHz which can cause the second harmonic radiation of 2.4 GHz to exceed standards.

Peripheral Type	Qty	Input(I) / Output(O)
Digital	24 (max)	I/O
Analog (ADC)	8 (max)	I
UART	1	I/O
SPI	2	I/O
I2C	2	I/O
USB	1	I/O
PWM	7 (max)	O
NFC	1	O

There are some optional B402 module specific I/O:

- u-blox USB and VBUS (for u-blox firmware upgrades)

Note: All GPIOs are only rated at 3.3VDC max.

The B402 module has 4 pads at the bottom exposing the SWD interface of the nRF52840. This interface can be used to debug your code or reprogram your E402 bootloader, device OS, or the user firmware. We use 4 pogo-pins connecting to these pads during production for firmware flashing.
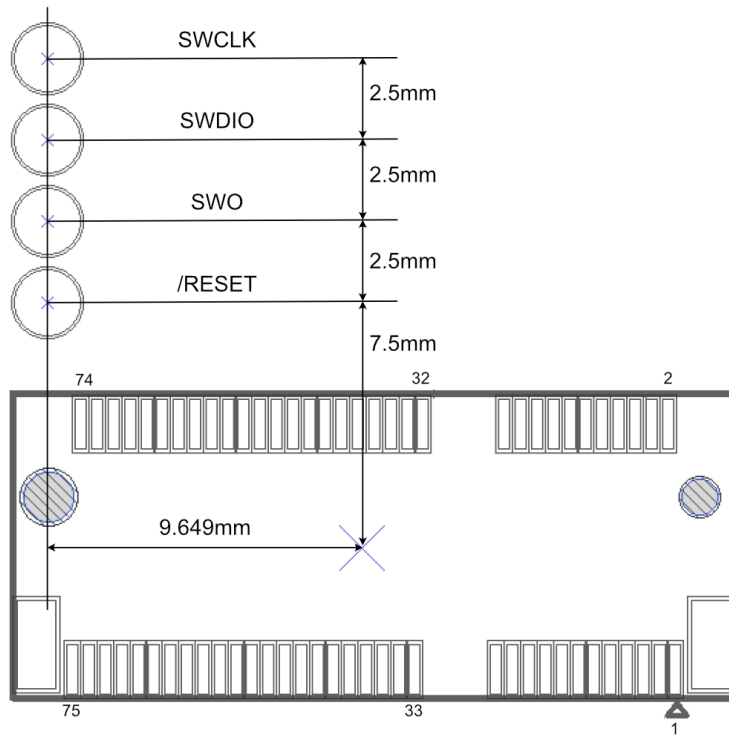
Memory map

NRF52840 FLASH LAYOUT OVERVIEW

- Bootloader (48KB, @0xF4000)
- User Application (128KB, @0xD4000)
- System (656KB, @0x30000)
- SoftDevice (192KB)

EXTERNAL SPI FLASH LAYOUT OVERVIEW (DFU OFFSET: 0X80000000)

- OTA (1500KB, @0x00289000)
- Reserved (420KB, @0x00220000)
- FAC (128KB, @0x00200000)
- LittleFS (2M, @0x00000000)

Pins and button definitions

	H1	H3	
	H5		
VCC	2	1	GND
VCC	4	3	GND
VCC	6	5	GND
VCC	8	7	GND
3V3	10	9	GND
3V3	12	11	USB D+
RESERVED	14	13	USB D-
VUSB	16	15	GND
RESERVED	18	17	NFC1
SCL	20	19	NFC2
SDA	22	21	GND
KEY		23	ADC0
MODE	32	33	ADC1
RESET	34	35	ADC2
TX	36	37	ADC3
RX	38	39	AGND
CTS	40	41	ADC4
RTS	42	43	ADC5
u-blox USB+	44	45	ADC6
u-blox USB-	46	47	ADC7
CS	48	49	AGND
MISO	50	51	RESERVED
MOSI	52	53	RESERVED
SCK	54	55	RESERVED
GND	56	57	RESERVED
RESERVED	58	59	RESERVED
RESERVED	60	61	RED
GPIO0	62	63	GREEN
GPIO1	64	65	BLUE
PWM0	66	67	SIM_VCC
PWM1	68	69	SIM_RST
PWM2	70	71	SIM_CLK
PWM3	72	73	SIM_DATA
u-blox VBUS	74	75	NC
	H2	H4	

Pins SOM0 to SOM9 will vary across various SoM modules. For example, cellular-specific pins exists in this range.

Additionally there are RESERVED[3] pins, whose functions vary depending on the SoM. For example, nRF52 MCU-based modules use some of these pins for additional ADC and GPIO. They are able to be used as described on the B402, but their function may be be different on future modules.

For maximum cross-module flexibility, you should try to use only the common pins when possible.

PIN DESCRIPTION

#	Pin	Common	Function	nRF52	Description
1	GND	GND	POWER		System ground.
2	VCC	VCC	POWER		System power in, connect to the +LiPo or supply a fixed 3.6-4.2v power.
3	GND	GND	POWER		System ground.
4	VCC	VCC	POWER		System power in, connect to the +LiPo or supply a fixed 3.6-4.2v power.
5	GND	GND	POWER		System ground.
6	VCC	VCC	POWER		System power in, connect to the +LiPo or supply a fixed 3.6-4.2v power.
7	GND	GND	POWER		System ground.
8	VCC	VCC	POWER		System power in, connect to the +LiPo or supply a fixed 3.6-4.2v power.
9	GND	GND	POWER		System ground.
10	3V3	3V3	POWER		System power in, supply a fixed 3.0-3.6v power.

11	USB D+	USB D+	IO		Data+ pin of the NRF52840 USB port.
12	3V3	3V3	POWER		System power in, supply a fixed 3.0-3.6v power.
13	USB D-	USB D-	IO		Data- pin of the NRF52840 USB port.
14	NC	RESERVED[3]	NC		Leave unconnected.
15	GND	GND	POWER		System ground.
16	VUSB	VUSB	POWER		System power in, USB detect pin for nRF52840. 5V on this pin enables the USB interface.
17	NFC1	SOM3[3]	NFC input	P0.9	NFC antenna connection.
18	NC	RESERVED[3]	NC		Leave unconnected.
19	NFC2	SOM4[3]	NFC input	P0.10	NFC antenna connection.
20	D1	SCL	IO	P0.27	I2C SCL, and digital only GPIO.
21	GND	GND	POWER		System ground.
22	D0	SDA	IO	P0.26	I2C SDA, and digital only GPIO.
23	A0	ADC0	IO	P0.3	Analog input ADC0[2], and digital GPIO.
32	MODE	MODE	IO	P0.11	Connected to the MODE button input, and digital only GPIO.
33	A1	ADC1	IO	P0.4	Analog input ADC1[2], and digital GPIO.
34	RESET	RESET	I		Active-low reset input.
35	A2	ADC2	IO	P0.28	Analog input ADC2[2], and digital GPIO.
36	D9	TX	IO	P0.6	Primarily used as UART TX, but can also be used as a digital GPIO.
37	A3	ADC3	IO	P0.29	Analog input ADC3[2], and digital GPIO.
38	D10	RX	IO	P0.08	Primarily used as UART RX, but can also be used as a digital GPIO.
39	AGND	AGND	POWER		System analog ground.
40	D3	RESERVED[3]	IO	P1.1	UART flow control interface CTS, SCL1 (Wire1), SPI1 MOSI, and digital only GPIO.
41	A4	RESERVED[3]	IO	P0.30	Analog input ADC4[2], and digital GPIO.
42	D2	RESERVED[3]	IO	P1.2	UART flow control interface RTS, SDA1 (Wire1), SPI1 SCK, and digital only GPIO.
43	A5	RESERVED[3]	IO	P0.31	Analog input ADC5[2], and digital GPIO.
44	u-blox USB D+	SOM0	IO		Data+ pin of the R410M USB port.
45	A6	RESERVED[3]	IO	P0.5	Analog input ADC6[2], and digital GPIO.
46	u-blox USB D-	SOM1	IO		Data- pin of the R410M USB port.
47	A7	RESERVED[3]	IO	P0.2	Analog input ADC7[2], and digital GPIO.
48	D8	CS	IO	P1.3	SPI interface CS, and digital only GPIO.
49	AGND	AGND	POWER		System analog ground.
50	D11	MISO	IO	P1.14	SPI interface MISO, and digital only GPIO.
51	NC	RESERVED[3]	NC		Leave unconnected.
52	D12	MOSI	IO	P1.13	SPI interface MOSI, and digital only GPIO.
53	NC	RESERVED[3]	NC		Leave unconnected.
54	D13	SCK	IO	P1.15	SPI interface SCK, and digital only GPIO.
55	NC	RESERVED[3]	NC		Leave unconnected.
56	GND	GND	POWER		System analog ground.

57	NC	RESERVED[3]	NC		Leave unconnected.
58	NC	RESERVED[3]	NC		Leave unconnected.
59	NC	RESERVED[3]	NC		Leave unconnected.
60	NC	RESERVED[3]	NC		Leave unconnected.
61	RGBR	RED	IO	P0.13	Red pin of the RGB LED.
62	D22	GPIO0	IO	P0.24	GPIO0, digital only.
63	RGBG	GREEN	IO	P0.14	Green pin of the RGB LED.
64	D23	GPIO1	IO	P1.9	GPIO1, digital only.
65	RGBB	BLUE	IO	P0.15	Blue pin of the RGB LED.
66	D4	PWM0	IO	P1.8	SPI1 MISO, Digital only GPIO, and PWM0.
67	SIM_VCC[1]	SOM5[3]	POWER		Leave unconnected, 1.8V/3V SIM Supply Output from R410M.
68	D5	PWM1	IO	P1.10	Digital only GPIO, and PWM1.
69	SIM_RST[1]	SOM6[3]	IO		Leave unconnected, 1.8V/3V SIM Reset Output from R410M.
70	D6	PWM2	IO	P1.11	Digital only GPIO, and PWM2.
71	SIM_CLK[1]	SOM7[3]	IO		Leave unconnected, 1.8V/3V SIM Clock Output from R410M.
72	D7	PWM3	IO	P1.12	Digital only GPIO, and PWM3.
73	SIM_DATA[1]	SOM8[3]	IO		Leave unconnected, 1.8V/3V SIM Data I/O of R410m with internal 4.7 k pull-up.
74	u-blox VBUS	SOM2[3]	IO		USB detect pin for R410M. 5V on this pin enables the u-blox USB interface.
75	NC	SOM9[3]	NC		Leave unconnected.

[1]These pins are connected to the internal MFF2 SIM and should be left open.

[2]A0-A7 are 12-bit Analog-to-Digital (A/D) inputs (0-4095).

[3]SoM-specific and Reserved pins will vary depending on module. They are able to be used on the B402, but their function may be be different on future modules.

By default, the Tinker application firmware enables the use of the bq24195 PMIC and MAX17043 fuel gauge. This in turn uses I2C (D0 and D1) and pin A6 (PM_INT). If you are not using the PMIC and fuel gauge and with to use these pins for other purposes, be sure to disable system power configuration. This setting is persistent, so you may want to disable it with your manufacturing firmware only.

```
System.setPowerConfiguration(SystemPowerConfiguration());
```

LED STATUS

System RGB LED

Unlike the Boron, the B402 module does not have an on-module RGB system status LED. We have provided its individual control pins for you to connect an LED of your liking. This will allow greater flexibility in the end design of your products.

A detailed explanation of different color codes of the RGB system LED can be found here.

Technical specifications

ABSOLUTE MAXIMUM RATINGS [1]

Supply voltages

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltages					
Supply Input Voltage	VCC	-0.3		+6.0	V
Supply Input Voltage	3V3	-0.3		+3.9	V
VBUS USB supply voltage	VUSB	-0.3		+5.8	V
I/O pin voltage					
VI/O, VDD ≤ 3.6 V	IO	-0.3		VDD + 0.3	V
VI/O, VDD > 3.6 V	IO	-0.3		+3.9	V
NFC antenna pin current					
$I_{NFC1/2}$	NFC1/NFC2			80	mA
Radio					
BT RF input level (52840)				10	dBm
Environmental					
Storage temperature		-40		+85	°C

[1] Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltages					
Supply Input Voltage	VCC	+3.6	+3.8	+4.2	V
Supply Input Voltage	3V3	+3.0	+3.3	+3.6	V
VBUS USB supply voltage	VUSB	+4.35	+5.0	+5.5	V
Environmental					
Normal operating temperature[1]		-20	+25	+65	°C
Extended operating temperature[2]		-40		+85	°C
Humidity Range Non condensing, relative humidity				95	%

Notes:

[1] Normal operating temperature range (fully functional and meet 3GPP specifications).

[2] Extended operating temperature range (RF performance may be affected outside normal operating range, though module is fully functional)

POWER CONSUMPTION

Parameter	Symbol	Min	Typ	Max	Unit
Operating Current (uC on, peripherals and radio disabled)	I_{idle}	4.48	4.71	5.17	mA
Operating Current (uC on, cellular on but not connected)	I_{cell_idle}	5.1	45.2	166	mA
Operating Current (uC on, cellular connecting to tower)	$I_{cell\_conn\_twr}$	13.7	56.0	192	mA
Operating Current (uC on, cellular connecting to cloud)	$I_{cell\_conn\_cloud}$		63.2	185	mA
Operating Current (uC on, cellular connected but idle)	$I_{cell\_cloud\_idle}$	13.4	15.5	98.3	mA
Operating Current (uC on, cellular connected and transmitting)	$I_{cell\_cloud\_tx}$	9.47	66.3	192	mA
STOP mode sleep, GPIO wake-up	I_{stop_gpio}	552	555	559	uA
STOP mode sleep, analog wake-up	I_{stop_analog}	554	557	559	uA
STOP mode sleep, RTC wake-up	I_{stop_intrtc}	553	556	558	uA
STOP mode sleep, BLE wake-up, advertising	$I_{stop\_ble\_adv}$		631	2650	uA
STOP mode sleep, BLE wake-up, connected	$I_{stop\_ble\_conn}$	47.3	630	1540	uA
STOP mode sleep, serial wake-up	I_{stop_usart}	553	556	558	uA
STOP mode sleep, cellular wake-up	I_{stop_cell}	8.87	9.65	63.6	mA
ULP mode sleep, GPIO wake-up	I_{ulp_gpio}	44.7	47.6	49.6	uA
ULP mode sleep, analog wake-up	I_{ulp_analog}	45.0	47.8	49.5	uA
ULP mode sleep, RTC wake-up	I_{ulp_intrtc}	43.4	46.4	47.9	uA
ULP mode sleep, BLE wake-up, advertising	$I_{ulp\_ble\_adv}$		130	2560	uA
ULP mode sleep, BLE wake-up, connected	$I_{ulp\_ble\_conn}$		121	1010	uA
ULP mode sleep, serial wake-up	I_{ulp_usart}	554	557	559	uA
ULP mode sleep, cellular wake-up	I_{ulp_cell}	0.37	9.47	53.7	mA
HIBERNATE mode sleep, GPIO wake-up	I_{hib_gpio}	23.6	26.0	29.7	uA
HIBERNATE mode sleep, analog wake-up	I_{hib_analog}	23.9	26.5	30.5	uA

Boron has two radio modules.

nRF52840

- Bluetooth® 5, 2.4 GHz
  - 95 dBm sensitivity in 1 Mbps Bluetooth® low energy mode
  - 103 dBm sensitivity in 125 kbps Bluetooth® low energy mode (long range)
  - 20 to +8 dBm TX power, configurable in 4 dB steps

u-blox SARA-R410M-02-B

Parameter	Value
Protocol stack	3GPP Release 13
RAT	LTE Cat M1 Half-Duplex
LTE FDD Bands	Band 12 (700 MHz)
	Band 17 (700 MHz)
	Band 28 (700 MHz)
	Band 13 (750 MHz)
	Band 20 (800 MHz)
	Band 26 (850 MHz)
	Band 18 (850 MHz)
	Band 5 (850 MHz)
	Band 19 (850 MHz)
	Band 8 (900 MHz)
	Band 4 (1700 MHz)
	Band 3 (1800 MHz)
	Band 2 (1900 MHz)
	Band 25 (1900 MHz)
	Band 1 (2100 MHz)
LTE TDD bands	Band 39 (1900 MHz)
Power class	Class 3 (23 dBm)

I/O CHARACTERISTICS

These specifications are based on the nRF52840 datasheet.

| Symbol	Parameter	Min	Typ	Max	Unit
VIH	Input high voltage	0.7 xVDD		VDD	V
VIL	Input low voltage	VSS		0.3 xVDD	V
VOH,SD	Output high voltage, standard drive, 0.5 mA, VDD ≥1.7	VDD - 0.4		VDD	V
VOH,HDH	Output high voltage, high drive, 5 mA, VDD >= 2.7 V	VDD - 0.4		VDD	V
VOH,HDL	Output high voltage, high drive, 3 mA, VDD >= 1.7 V	VDD - 0.4		VDD	V
VOL,SD	Output low voltage, standard drive, 0.5 mA, VDD ≥1.7	VSS		VSS + 0.4	V
VOL,HDH	Output low voltage, high drive, 5 mA, VDD >= 2.7 V	VSS		VSS + 0.4	V
VOL,HDL	Output low voltage, high drive,3 mA, VDD >= 1.7 V	VSS		VSS + 0.4	V
IOL,SD	Current at VSS+0.4 V, output set low, standard drive, VDD≥1.7	1	2	4	mA
IOL,HDH	Current at VSS+0.4 V, output set low, high drive, VDD >= 2.7V	6	10	15	mA
IOL,HDL	Current at VSS+0.4 V, output set low, high drive, VDD >= 1.7V	3			mA
IOH,SD	Current at VDD-0.4 V, output set high, standard drive, VDD≥1.7	1	2	4	mA
IOH,HDH	Current at VDD-0.4 V, output set high, high drive, VDD >= 2.7V	6	9	14	mA
IOH,HDL	Current at VDD-0.4 V, output set high, high drive, VDD >= 1.7V	3			mA
tRF,15pF	Rise/fall time, standard drivemode, 10-90%, 15 pF load[1]		9		ns
tRF,25pF	Rise/fall time, standard drive mode, 10-90%, 25 pF load[1]		13		ns
tRF,50pF	Rise/fall time, standard drive mode, 10-90%, 50 pF load[1]		25		ns
tHRF,15pF	Rise/Fall time, high drive mode, 10-90%, 15 pF load[1]		4		ns
tHRF,25pF	Rise/Fall time, high drive mode, 10-90%, 25 pF load[1]		5		ns
tHRF,50pF	Rise/Fall time, high drive mode, 10-90%, 50 pF load[1]		8		ns
RPU	Pull-up resistance	11	13	16	kΩ
RPD	Pull-down resistance	11	13	16	kΩ
CPAD	Pad capacitance		3		pF
CPAD_NFC	Pad capacitance on NFC pads		4		pF
INFC_LEAK	Leakage current between NFC pads when driven to different states		1	10	µA

- Rise and fall times based on simulations

- GPIO default to standard drive (2mA) but can be reconfigured to high drive (9mA) in Device OS 2.0.0 and later using the `pinSetDriveStrength()` function.

Mechanical specifications

DIMENSIONS AND WEIGHT

Parameters	Value	Unit
Width	30	mm
Height	42	mm
Thickness	5.5	mm
Weight	6.2	grams

MECHANICAL DRAWING
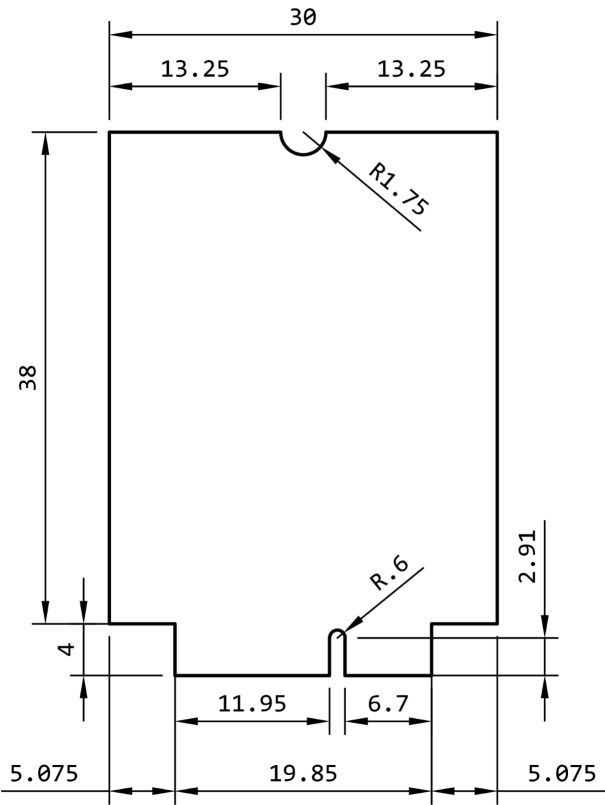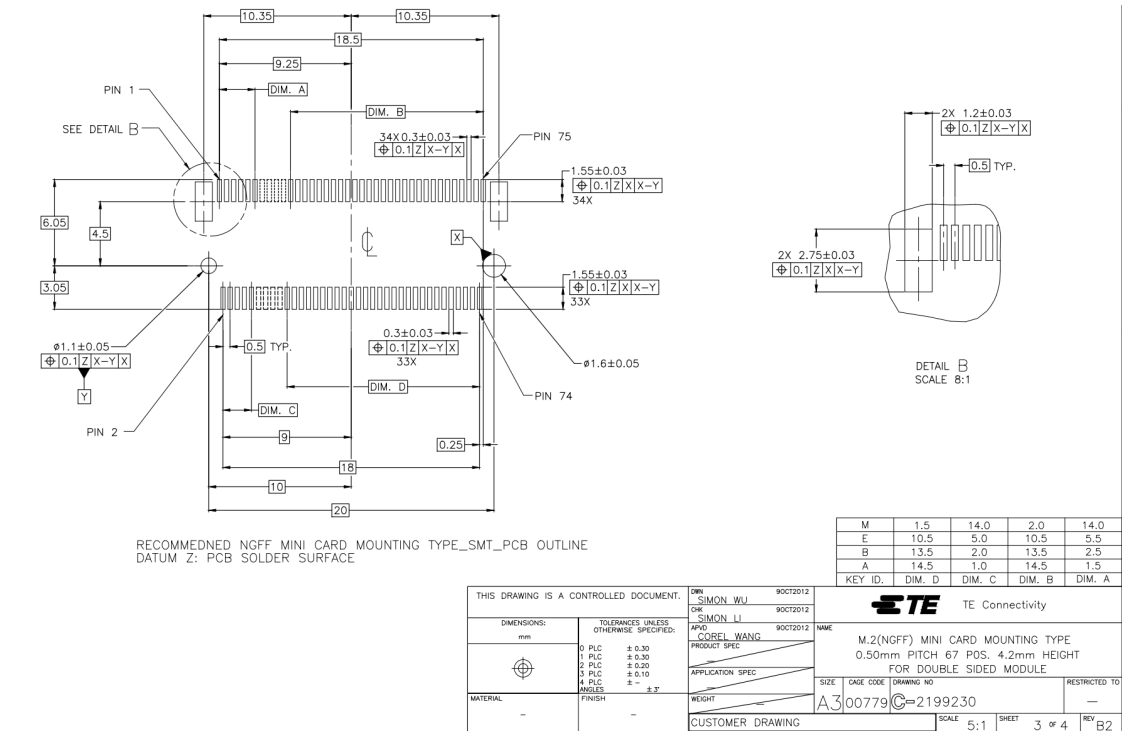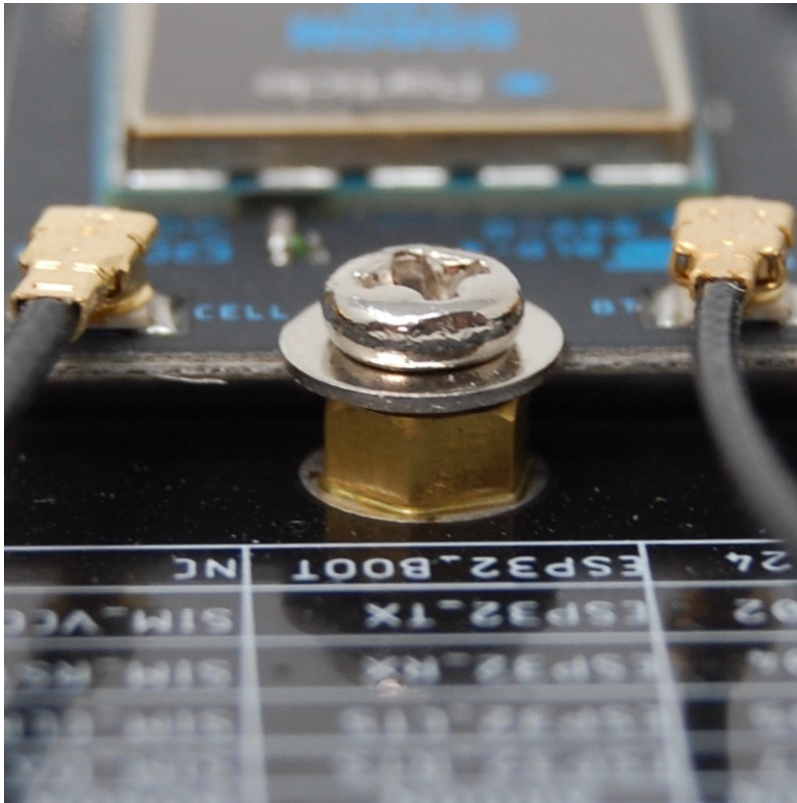

Dimensions are in millimeters.

The mating connector is a an M.2 (NGFF) type 4. Note that there are several different key configurations for the M.2, and type 4 is different than is commonly used on SSDs.

One compatible connector is the TE 2199230-4. It is widely available including at suppliers such as DigiKey.

RECOMMEDNED NGFF MINI CARD MOUNTING TYPE_SMT_PCB OUTLINE
DATUM Z: PCB SOLDER SURFACE

DETAIL B
SCALE 8:1

KEY ID.	DIM. D	DIM. C	DIM. B	DIM. A
M	1.5	14.0	2.0	14.0
E	10.5	5.0	10.5	5.5
B	13.5	2.0	13.5	2.5
A	14.5	1.0	14.5	1.5

THIS DRAWING IS A CONTROLLED DOCUMENT.

DWN	SIMON WU 9OCT2012
CHK	SIMON LI 9OCT2012
APVD	COREL WANG 9OCT2012

TE TE Connectivity

NAME
M.2(NGFF) MINI CARD MOUNTING TYPE
0.50mm PITCH 67 POS. 4.2mm HEIGHT
FOR DOUBLE SIDED MODULE

DIMENSIONS:
mm

TOLERANCES UNLESS OTHERWISE SPECIFIED:

0 PLC	± 0.30
1 PLC	± 0.30
2 PLC	± 0.20
3 PLC	± 0.10
4 PLC	± –
ANGLES	± 3°

PRODUCT SPEC

APPLICATION SPEC

MATERIAL — FINISH — WEIGHT

SIZE	CAGE CODE	DRAWING NO		RESTRICTED TO
A3	00779	C=2199230		—

CUSTOMER DRAWING

SCALE 5:1   SHEET 3 OF 4   REV B2

We recommend this screw assembly to securely affix the B series SoM to your circuit board. From top to bottom:

- M3 screw, 3mm long
- M3 washer
- M3 standoff, 2.45mm
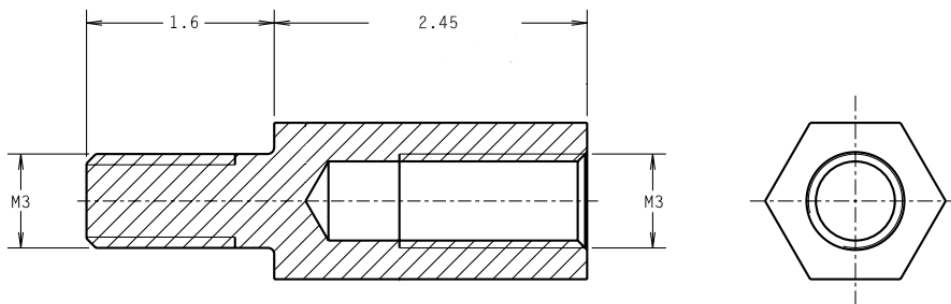
- Mounting hole, 2.6 mm metal hole, 3.1mm metal ring diameter (picture is of the bottom side of the circuit board)

- An alternative design uses a JAE SM3ZS067U410-NUT1-R1200 standoff. It's reflow soldered to your base board and has a threaded hole for a M2*3 screw to hold down the SoM. This may be easier to obtain.

- Note that a hold-down screw is required because the M.2 connector does not have integrated locks and the SoM will pop up if not attached to the base board.

DESIGN CONSIDERATIONS

We strongly recommend against placing components under the SOM board because there is not enough height.

30mm

Ø3mm

42mm

38mm

KEEP OUT

+
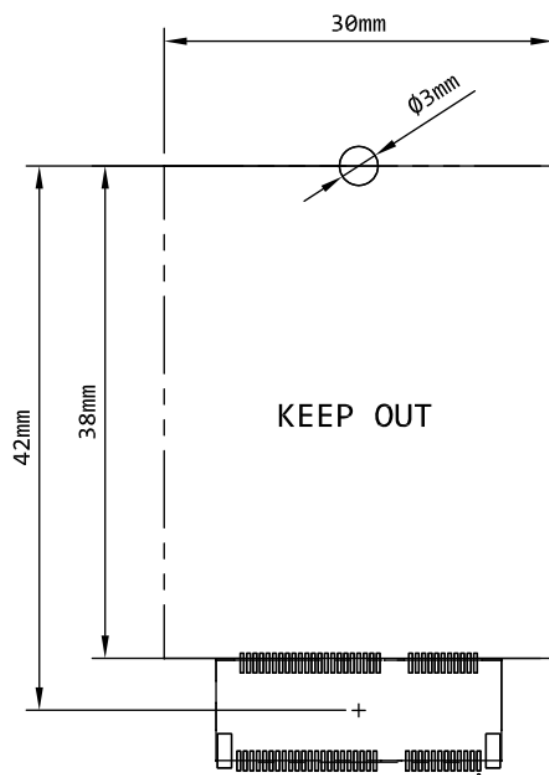
Product Handling

ESD PRECAUTIONS

The B series contains highly sensitive electronic circuitry and is an Electrostatic Sensitive Device (ESD). Handling an B series without proper ESD protection may destroy or damage it permanently. Proper ESD handling and packaging procedures must be applied throughout the processing, handling and operation of any application that incorporates the B series module. ESD precautions should be implemented on the application board where the B series is mounted. Failure to observe these precautions can result in severe damage to the B series!
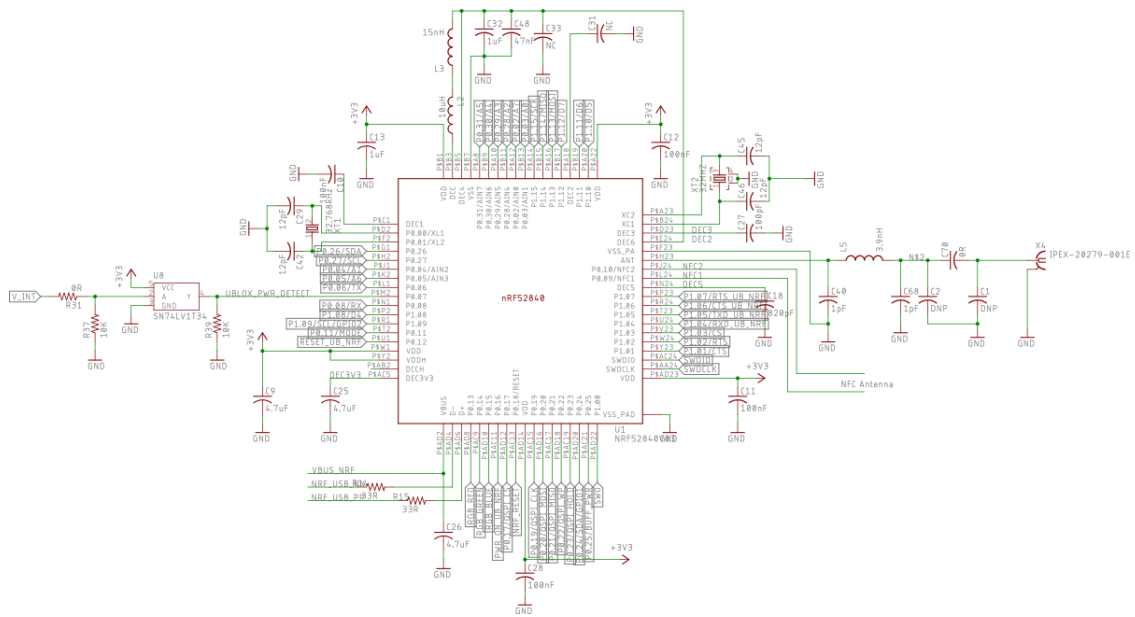
CONNECTORS

The U.FL antenna connector is not designed to be constantly plugged and unplugged. The antenna pin is static sensitive and you can destroy the radio with improper handling. A tiny dab of glue (epoxy, rubber cement, liquid tape or hot glue) on the connector can be used securely hold the plug in place.
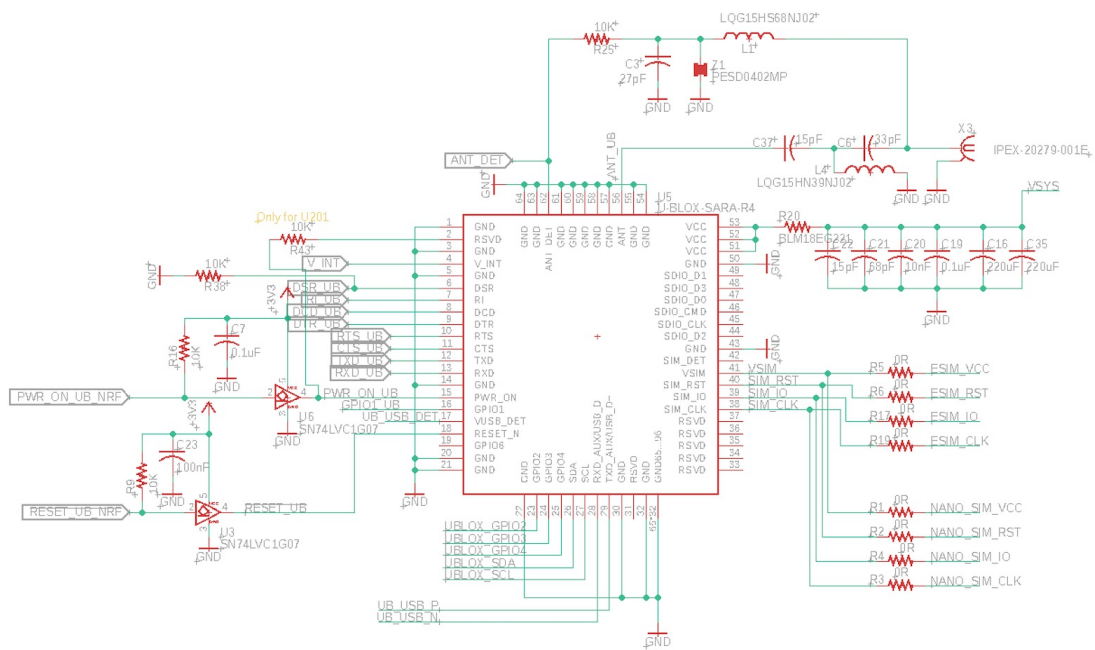
The M.2 edge connector is static sensitive and should be handled carefully. The M.2 connector is not designed for repeated removal and insertion of the module.
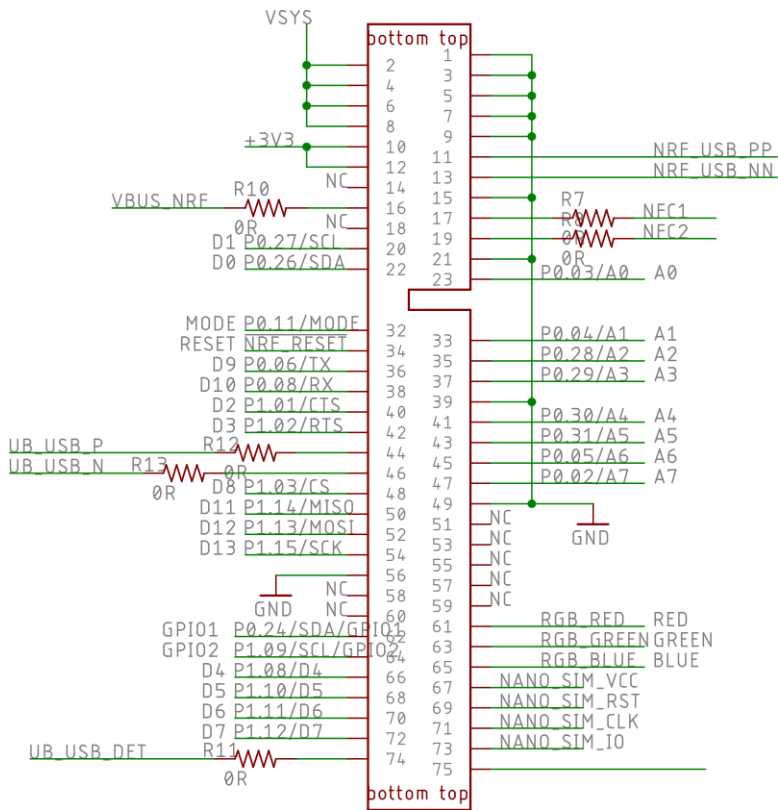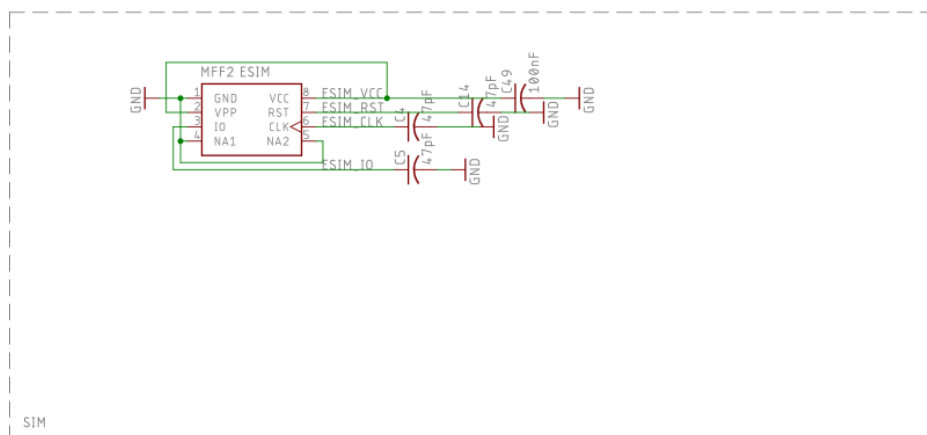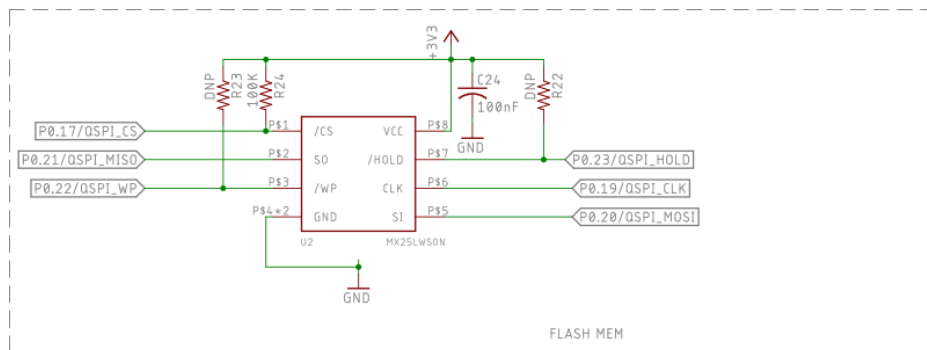
Schematics

MICROCONTROLLER

U-BLOX CELLULAR MODEM

M.2 CONNECTOR

VSYS

+3V3

	bottom top	
	2	1
	4	3
	6	5
	8	7
	10	9
	12	11
NC	14	13
VBUS_NRF R10 0R	16	15
NC	18	17
D1 P0.27/SCL	20	19
D0 P0.26/SDA	22	21
		23

NRF_USB_PP
NRF_USB_NN

R7
NFC1
R8
NFC2
0R
P0.03/A0 A0

MODE P0.11/MODE	32	33
RESET NRF_RESET	34	35
D9 P0.06/TX	36	37
D10 P0.08/RX	38	39
D2 P1.01/CTS	40	41
D3 P1.02/RTS	42	43
UB_USB_P R12	44	45
UB_USB_N R13 0R	46	47
0R D8 P1.03/CS	48	49
D11 P1.14/MISO	50	51
D12 P1.13/MOSI	52	53
D13 P1.15/SCK	54	55
	56	57
NC GND	58	59
NC	60	61
GPIO1 P0.24/SDA/GPIO1	62	63
GPIO2 P1.09/SCL/GPIO2	64	65
D4 P1.08/D4	66	67
D5 P1.10/D5	68	69
D6 P1.11/D6	70	71
D7 P1.12/D7	72	73
UB_USB_DET R11 0R	74	75
	bottom top	

P0.04/A1 A1
P0.28/A2 A2
P0.29/A3 A3
P0.30/A4 A4
P0.31/A5 A5
P0.05/A6 A6
P0.02/A7 A7

NC
NC GND
NC
NC
NC

RGB_RED RED
RGB_GREEN GREEN
RGB_BLUE BLUE
NANO_SIM_VCC
NANO_SIM_RST
NANO_SIM_CLK
NANO_SIM_IO

SIM AND FLASH

	DNP R23 100K R24	+3V3 C24 100nF DNP R22
P0.17/QSPI_CS	P$1 /CS VCC P$8	GND
P0.21/QSPI_MISO	P$2 SO /HOLD P$7	P0.23/QSPI_HOLD
P0.22/QSPI_WP	P$3 /WP CLK P$6	P0.19/QSPI_CLK
	P$4*2 GND SI P$5	P0.20/QSPI_MOSI
	U2 MX25LW50N	
	GND	

FLASH MEM

MFF2 ESIM

	GND VCC	8 ESIM_VCC
	VPP RST	7 ESIM_RST
	IO CLK	6 ESIM_CLK
	NA1 NA2	5

GND
C14 47pF C49 100nF GND GND
C4 47pF
ESIM_IO C5 47pF GND
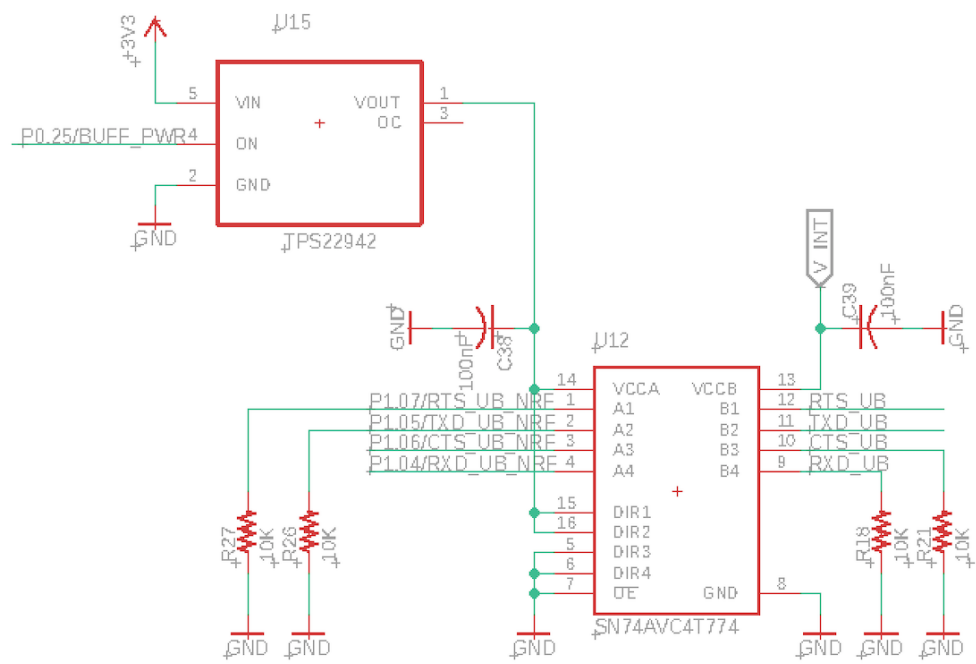
SIM

Default settings

The B series comes pre-programmed with a bootloader and a user application called Tinker. This application works with an iOS and Android app also named Tinker that allows you to very easily toggle digital pins, take analog and digital readings and drive variable PWM outputs.

The bootloader allows you to easily update the user application via several different methods, USB, OTA, Serial Y-Modem, and also internally via the Factory Reset procedure. All of these methods have multiple tools associated with them as well.

Country compatibility

{{!-- BEGIN do not edit content below, it is automatically generated c9241a2c-76e0-11eb-9439-0242ac130002 --}}

Country	Model	Technologies	Carriers
Canada	B404	M1	Bell Mobility, Rogers Wireless, Telus
Mexico	B404	M1	AT&T
United States	B404	M1	AT&T

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Ordering information

{{!-- BEGIN do not edit content below, it is automatically generated 91d8b83c-76ce-11eb-9439-0242ac130002 --}}

SKU	Description	Region	Modem	Lifecycle	Replacement
B402MEA	B Series LTE CAT-M1 (NorAm), [x1]	NORAM	R410	GA	B404MEA
B402MTY	B Series LTE CAT-M1 (NorAm), Tray [x50]	NORAM	R410	GA	B404MTY
B404MEA	B Series LTE CAT-M1 (NorAm), [x1]	NORAM	R410	Beta	
B404MTY	B Series LTE CAT-M1 (NorAm), Tray [x50]	NORAM	R410	Beta	

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Revision history

Revision	Date	Author	Comments
001	29 Apr 2019	RK	Initial Release
002	03 Feb 2020	RK	Fixed number of I2C, SPI, and PWM
003	18 Feb 2020	RK	Keep-out diagram M.2 connector was upside-down
004	16-Sep-2020	RK	Added power consumption information
005	16-Dec-2020	RK	Added missing TBD power consumption values
006	04-Jan-2021	RK	Fix incorrect pin number on pogo pin diagram
007	03-Feb-2021	RK	Split u-blox schematics into two images
008	15-Mar-2021	RK	Updated model, carrier, ordering information