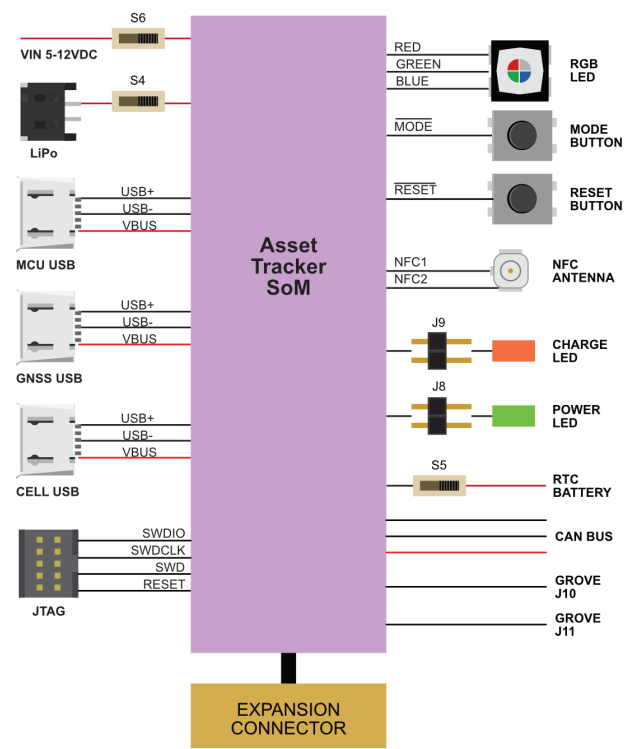


Tracker SoM Evaluation Board⁽⁰⁰¹⁾

This is a breakout board for Particle's Tracker SoM. The Tracker SoM Cellular GNSS module is a castellated system-on-a-module that can either be reflow soldered to your own custom base board, or can be used in this evaluation board, or the carrier board.

Block Diagram



Num	ID	Description
1	GNSS USB	u-blox GNSS USB connection
2	CELL USB	Quectel cellular modem USB connection
3	JTAG	JTAG/SWD debugging connector for nRF52 MCU
4	NFC	NFC antenna connection for NFC tag feature
5	MODE	MODE button
6	RGB	RGB status LED
7	RESET	RESET button
8	MCU USB	nRF52 MCU USB-C for debugging or power.
9	J8	3V3 LED jumper. Normally installed, remove to disable 3V3 LED.
10	3V3 LED	Power LED, indicates 3.3V supply is enabled.
11	STAT LED	Charge status indicator.
12	J9	STAT LED jumper. Normally installed, remove to disable STAT LED.
13	VIN	External power 3.9-17 VDC
14	LiPo	JST-PH connector for LiPo battery
15	S4	Battery switch
16	S6	SoM power switch
17		Expansion connector
18	J10	Grove connector (A0, A1 or I2C)
19	J11	Grove connector (A2, A3)
20	S5	RTC battery switch
21	RTC battery	Optional battery
22	J4	CAN data connection and 3.3V power output
23	J5	CAN power jumper (selects 3.3V or 5V)

POWERING THE TRACKER SOM EVALUATION BOARD

There are several options for powering the evaluation board:

The **MCU USB** connector. If using a laptop with a 500 mA USB port, you should also use the LiPo battery. With a 2A tablet charger, you can power only by USB.

The **VIN** connector (3.9 to 17 VDC). This is useful with an external power supply. Switch **S6** is the power switch.

The **LiPo** connector. This is typically used with a LiPo battery. Use switch **S4** to enable the battery.

USB CONNECTORS

There are three USB connectors on the evaluation board, however you most commonly will only use the **MCU USB** connector.

The **MCU USB** connector is connected to the nRF52 MCU and can be used for Serial debugging, flashing code, and setup by USB. It can also power the AssetTracker SoM. If using a laptop with a 500 mA USB port, you should also use the LiPo battery. With a 2A tablet charger, you can power only by USB.

The **GNSS USB** connector is connected to the u-blox NEO-M8U GNSS. It can be used for firmware upgrades or with the u-blox u-center application.

The **CELL USB** connector is connected to the Quectel cellular modem. It can be used for firmware upgrades.

LED INDICATORS

The **STAT** LED indicates the charge status:

- Off: Not charging or no power
- On: Charging
- Blinking: Charge fault
- Flickering: No battery

Jumper **J9** disconnects the charge status LED.

The **3V3** LED indicates that the 3.3V MCU power supply is enabled. Jumper **J8** disconnects the power LED.

CAN CONNECTOR

The four-position screw terminal connector (J4) allows connection to CAN bus devices.

Pin	Label	Description
1	CAN_H	CAN Bus H or +
2	CAN_L	CAN Bus L or -
3	GND	Ground
4	CAN_VCC	3.3V or 5V

The CAN bus connection includes the 120 ohm termination resistor and ESD protection.

The CAN_VCC jumper (J5) allows the selection of the voltage on the CAN connector.

- Left position: 3.3V
- Right position: 5V

The 5V power supply is powered by a boost converter and can be turned on and off by software.

EXPANSION CONNECTOR

Left Description	Left	Right	Right Description
Ground	GND	GND	Ground
PMIC power out	PMID	LI+	LiPo battery
PMIC thermistor	TS	VBUS	nRF52 USB power
3.3V Out	3V3	STAT	PMIC charge status
Unused	SOM44	VIN	Power input 3.9 - 17 VDC
Ground	GND	GND	Ground
A4, D4, SPI MOSI	A4	A0	A0, D0, Wire SDA
A5, D5, SPI MISO	A5	A1	A1, D1, Wire SCL
A6, D6, SPI SCK	A6	A2	A2, D2, SerialI CTS
A7, D7, SS, WKP	A7	A3	A3, D3, SerialI RTS
Unused	SOM37	SOM59	Unused
Unused	SOM36	SOM60	Unused
Unused	SOM35	SOM61	Unused
Unused	SOM34	SOM62	Unused
3.3V Out	3V3	3V3	3.3V Out
Ground	GND	AGND	Analog Ground
RESET button	RESET	MCU_RX	SerialI RX, GPIO D9
MODE button	MODE	MCU_TX	SerialI TX, GPIO D8
RGB Status LED Red	R	RTC_BAT	RTC battery
RGB Status LED Green	G	RTC_BTN	RTC wake button
RGB Status LED Blue	B	SOM76	Unused
NFC Tag Antenna	NFC1	SOM77	Unused
NFC Tag Antenna	NFC2	SOM78	Unused
Unused	SOM21	SOM79	Unused
Unused	SOM20	SOM80	Unused
Unused	SOM19	SOM81	Unused
Unused	SOM18	SOM82	Unused
3.3V Out	3V3	3V3	3.3V Out
ESP32 Serial RX	WIFI_RXD	NC	
ESP32 Serial TX	WIFI_TXD	CELL_RX	Cellular serial RX
ESP32 boot mode	WIFI_BOOT	CELL_TX	Cellular serial TX
ESP32 enable	WIFI_EN	CELL_RI	Cellular ring indicator
Unused	SOM9	GNSS_TIME_PULSE	GNSS time pulse or fix indicator
Ground	GND	GND	Ground

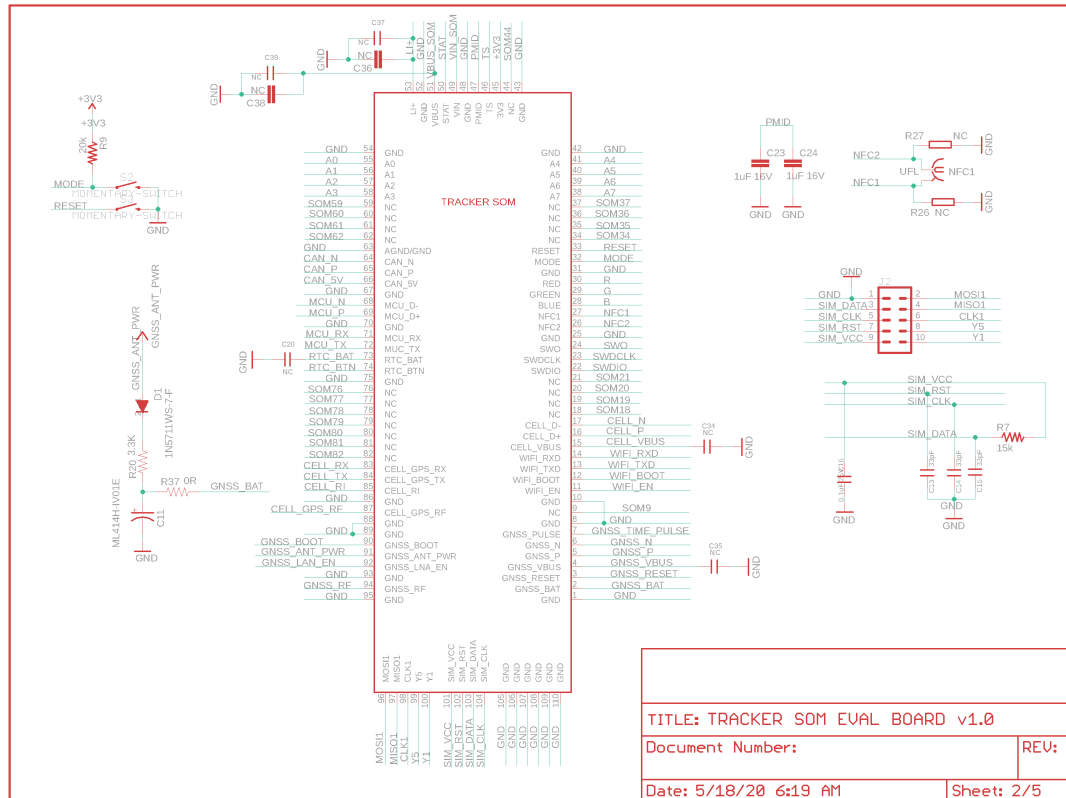
Basic Setup

The basic setup for the Tracker SoM Eval Board to be operational is shown below:

- 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 cellular module if no antenna is connected.
- Connect power the **MCU USB** (8), **VIN** (13), or a LiPo battery (14).
- Turn on the appropriate power switches (15 and/or 16).

Evaluation Board Schematics

Tracker SoM



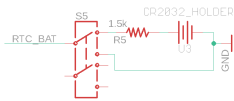
[illegible]

The diagram illustrates the pin connections for the TRACKER SOM EVAL BOARD v1.0. It shows two SOM modules (SOM59 and SOM80) connected to a common header. The connections are as follows:

- Power and Ground:**
 - TP6: L+ (SOM59), L- (SOM80)
 - TP7: VBUS_SOM
 - TP8: S1AT
 - TP1: VIN_SOM
 - TP9: A0
 - TP10: A1
 - TP11: A2
 - TP12: A3
 - TP13: SOM59
 - TP14: SOM80
 - TP15: SOM81
 - TP16: SOM62
 - TP17: 3V3
 - TP27: MCU_RX
 - TP29: MCU_TX
 - TP4: RTC_BAT
 - TP37: RTC_BTN
- Header Connections:**
 - 1: GND
 - 2: GND
 - 3: 4 PMID
 - 4: 6 TS
 - 5: 8 3V3
 - 6: 10 SOM44
 - 7: 12 GND
 - 8: 14 A4
 - 9: 16 A5
 - 10: 18 A6
 - 11: 20 A7
 - 12: 22 SOM37
 - 13: 24 SOM36
 - 14: 26 SOM35
 - 15: 28 SOM34
 - 16: 30 3V3
 - 17: 32 GND
 - 18: 34 RESET
 - 19: 36 MODE
 - 20: 38 R
 - 21: 40 G
- Other Connections:**
 - TP33: TP33
 - TP59: TP59
 - TP60: TP60
 - TP61: TP61
 - TP62: TP62
 - TP63: TP63
 - TP64: TP64
 - TP2: TP2
 - TP65: TP65
 - TP66: TP66
 - TP67: TP67
 - TP68: TP68

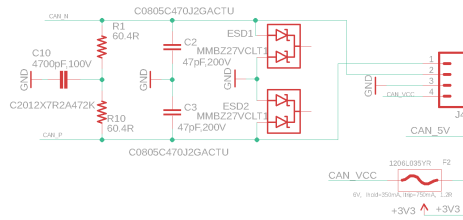
Misc

RTC Battery

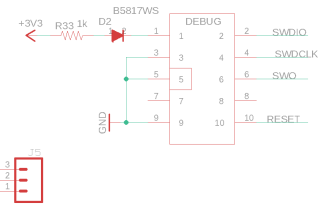


RTC_BAT short to GND when there is no button battery.

CAN Bus



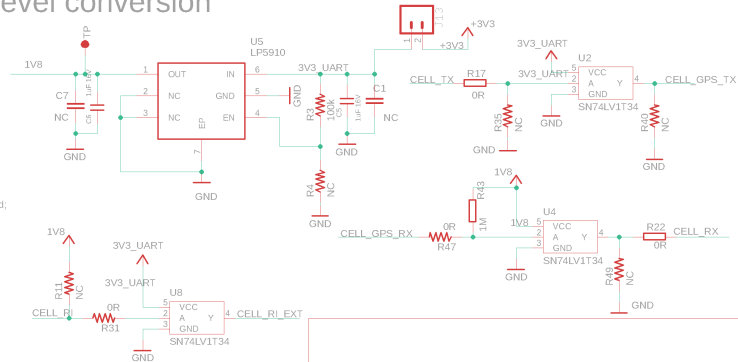
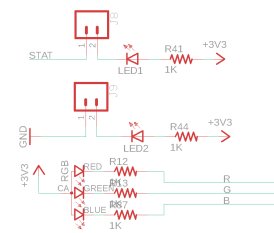
JTAG



EG91 UART level conversion

LED

STAT=0, LED up, indicates charge in progress;
STAT=1, LED go off, indicates charge complete or charge disabled;
Any fault condition occurs, LED blinks at 1Hz.



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Design Files

The Tracker SoM Evaluation board is open-source and the Eagle CAD design files are available in GitHub:

<https://github.com/particle-iot/tracker-hardware>

Mechanical specifications

To be provided at a later date.

DIMENSIONS AND WEIGHT

Parameter	Value	Units
Width	97	mm
Length	164	mm
Thickness	14	mm
Weight		g

Weight will be provided at a later date.

Ordering Information

SKU	Description	Region	Modem	EtherSIM	Lifecycle	Replacement
T404MKIT	Tracker SoM LTE M1 (NorAm) Evaluation Kit, [x1]	NORAM	BG96-MC	✓	GA	
T524MKIT	Tracker SoM LTE CAT1/3G/2G (EMEAA) Evaluation Kit, [x1]	EMEAA	EG91-EX	✓	GA	
T402MKIT	Tracker SoM LTE M1 (NorAm) Evaluation Kit, [x1]	NORAM	BG96-MC		NRND	T404MKIT
T523MKIT	Tracker SoM LTE CAT1/3G/2G (Europe) Evaluation Kit, [x1]	EMEAA	EG91-EX		NRND	T524MKIT

†EMEAA: Selected countries in Europe, Middle East, Africa, and Asia, including Australia and New Zealand. See the [cellular carrier list](#) for more information.

Product Handling

ESD PRECAUTIONS

The Tracker SoM contains highly sensitive electronic circuitry and is an Electrostatic Sensitive Device (ESD). Handling an module 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 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 module!

CONNECTORS

The U.FL antenna connectors are 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.

DISPOSAL



This device must be treated as Waste Electrical & Electronic Equipment (WEEE) when disposed of.

Any WEEE marked waste products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. For proper treatment, recovery and recycling; please take all WEEE marked waste to your Local Authority Civic waste site, where it will be accepted free of charge. If all consumers dispose of Waste Electrical & Electronic Equipment correctly, they will be helping to save valuable resources and preventing any potential negative effects upon human health and the environment of any hazardous materials that the waste may contain.

Revision history

Revision	Date	Author	Comments
pre1	31 Mar 2020	RK	Preview Release
pre2	12 May 2020	RK	Added partial dimensions
001	29 Jun 2020	RK	First release