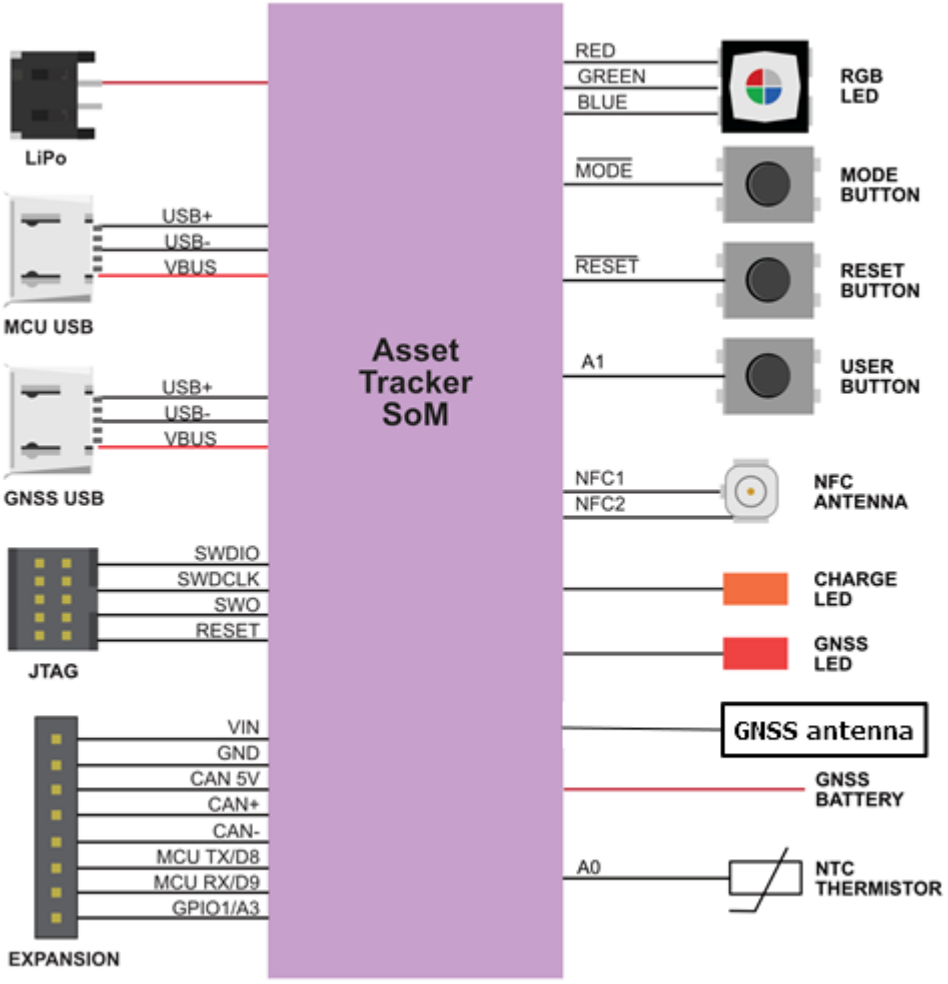
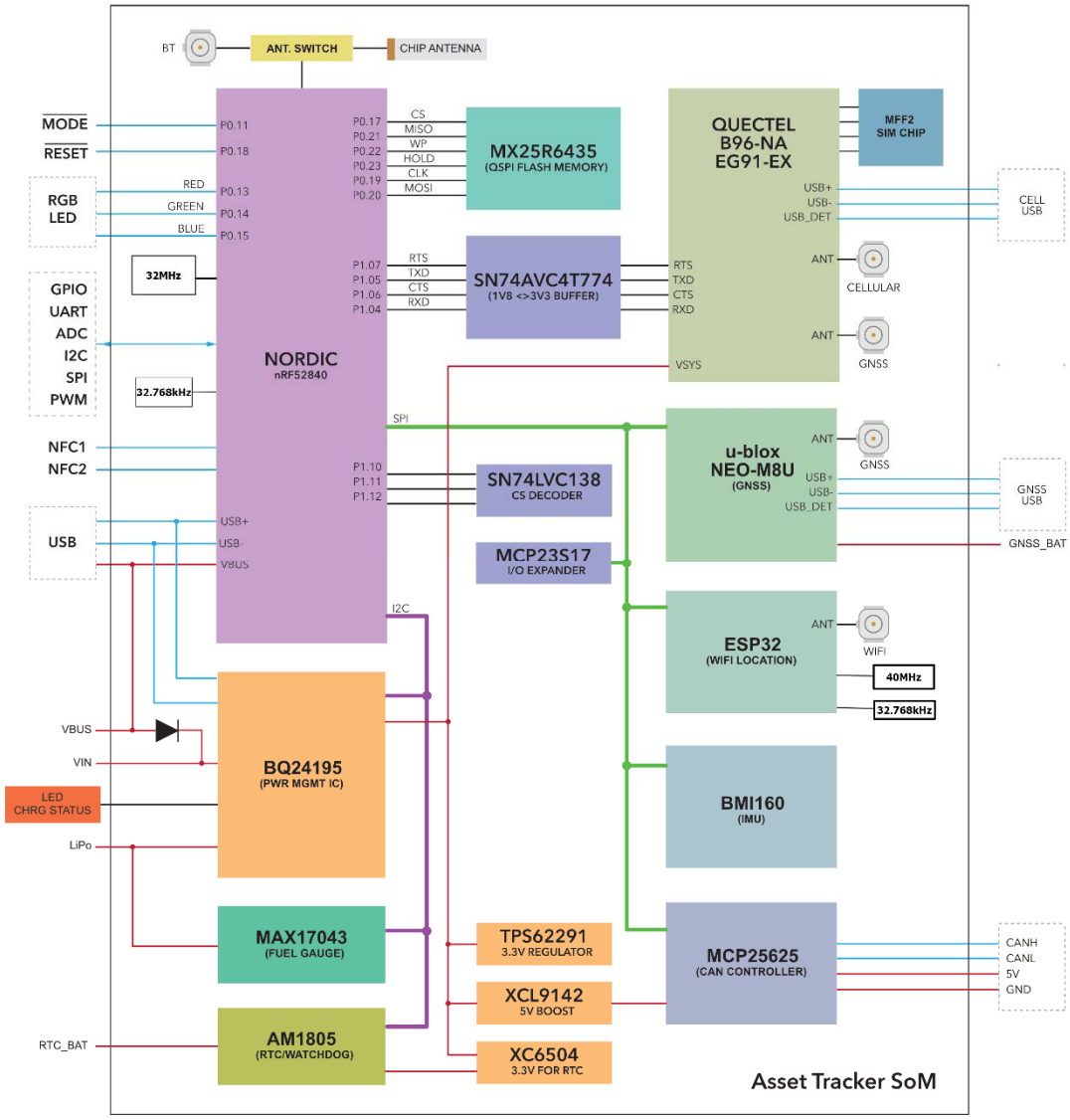
TRACKER ONE(005)

The Tracker One is a ready-to-go Tracker SoM carrier board with optional weatherproof enclosure. It is used with other equipment, such as on a truck. It is not a portable device.

- **Ready to go** with IP67-rated enclosure.
- **GNSS Antenna Onboard:** convenient high-gain GNSS antenna for easy access to GNSS signals.
- **Flexible Power Supply:** easily add asset tracking to most devices. A wide 6-30V power supply copes with most power delivery systems. Also accepts 5V supply via USB-C. LiPo battery connector, charge LED, backup battery for GPS. Supports up to 90V when connecting directly to the carrier board.
- **High-precision Thermistor** with accuracy to 1%.
- **Extensible:** IP67-rated M8 connector includes CAN Bus, UART, GPIO, and power for simple expansion.
- **USB-C** for flashing, debugging and power with higher charging rates than Micro-USB or for use without an internal battery.
- **RGB LED** for use as both a user-configurable device as well as Particle status information.

Block Diagram





Description


14
CIROCOMM
VBUS
GNSS_P
GNSS_N
GND
13
Particle
2
GND
SIM_DATA
SIM_CLK
SIM_RST
SIM_VCC
JTAG
12
ON
USB SWITCH
CHRG LED
10
9
GNSS LED
RESET
7
8
RGB LED
USER
5
6
1
3
LiPo
NFC2
NFC1
NFC

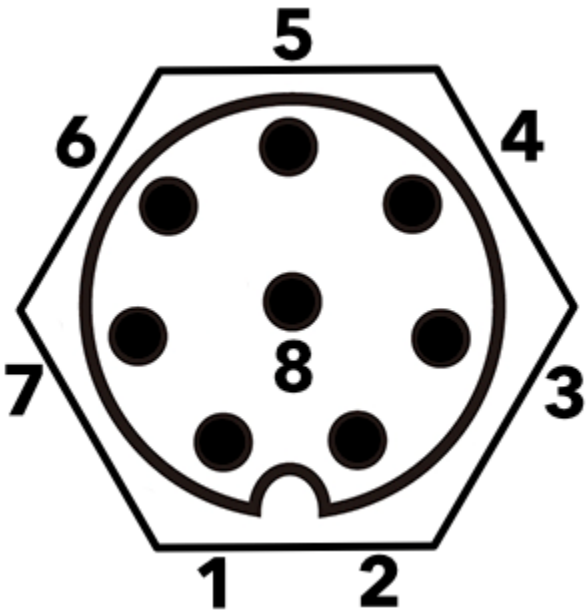
(Different models have different corresponding Cellular module models. Another model is T523M)

Num	ID	Description
1	J1	Power and I/O connector
3		LiPo Connector
4		MCU USB-C
5		RGB Status LED
6	USER	User Button
7	GNSS LED	GNSS Status LED
8	RESET	RESET Button
9	MODE	MODE button
10	CHRG	LiPo charge status LED
11		NFC
12		JTAG/SWD debugging connector for nRF52 MCU
13	GNSS USB	u-blox GNSS USB connection (Micro USB)
14		GNSS Antenna
15		Tracker SoM (on back side)

Power and I/O Connector (M8)

M8 Pin	Function	Function	Function	I/O	Color
1	CAN_P			IO[2]	Yellow
2	VIN[3]			I	Red
3	Analog A3		GPIO D3	IO[1]	White
4	Serial1 RX	Wire3 SDA	GPIO D8	IO[1]	Green
5	Serial1 TX	Wire3 SCL	GPIO D9	IO[1]	Brown
6	CAN_5V[4]		CAN_PWR	O	Orange
7	CAN_N			IO[2]	Blue
8	GND				Black

The IP67 M8, 8-pin, male pins with threaded barrel connector is accessible from the outside of the enclosure.



View as looking into the M8 connector on the outside of the enclosure.

Note: Version 003 and earlier of this datasheet had a different pin numbering for M8 connector that didn't match the connector manufacturer's numbering. Only the numbering has changed; the function of the pin at a given location is unchanged and the change should not affect existing designs.

[1]MCU GPIO is limited to 3.3V maximum.

[2]CAN Bus specifications can be found in the Tracker SoM datasheet. CAN Bus termination is provided on the carrier board.

[3]6.0 to 30 VDC at 2A when using the M8 connector. 6.0 - 90 VDC at 2A when connecting directly to the board.

[4]5V, 400 mA maximum. Controlled by the CAN_PWR GPIO.

The connector on the carrier board itself is is a JST B8B-PH-SM4-TB(LF)(SN), 8-position, 2mm pitch, male pins, shrouded. The mating connector is the JST PHR-8. The female sockets are available plain, with leads, and in pre-manufactured ribbon cable formats.

PHR-8 Pin	M8 Pin	Function	Color
1	2	VIN	Red
2	1	CAN_P	Yellow
3	7	CAN_N	Blue
4	6	CAN_5V	Orange
5	5	TX_SCL_D9	Brown
6	4	TX_SDA_D8	Green

PHR-8 Pin	M8 Pin	Function	Color
7	3	A3	White
8	8	GND	Black

Additional Peripherals

Signal	Device OS	Description
THERM	A0	NTC Thermistor
USER	A1	USER button
GNSS_LOCK	A2	GNSS lock indicator
GPIO1	A3	GPIO on power and I/O connector
MCU TX	TX	MCU serial TX, GPIO D9, Wire3 SCL
MCU RX	RX	MCU serial RX, GPIO D8, Wire3 SDA

Note: While the USER button exists inside the Tracker One, the Tracker One is a sealed unit and opening it will void the warranty and may affect certifications, thus it is not practical to use. It can be used with the Tracker Carrier Board.

Powering the Tracker Carrier Board

There are several options for powering the carrier board:

The **MCU USB** connector (USB-C). If using a laptop with a USB-A to USB-C cable and a 500 mA USB port, you should also use the LiPo battery. With an true USB-C port and cable, or a 2A tablet charger, you can power only by USB.

The **VIN** connector (6 to 30 VDC at 2A on the M8 connector, or 6 to 90 VDC at 2A to the B8B-PH connector on the board). This is useful with an external power supply.

The **LiPo** connector. This is typically used with a LiPo battery.

USB connectors

There are two USB connectors on the carrier 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.

LED Indicators

The **RGB LED** default behavior is:

- Red breathing: Attempting to connect to the cellular network
- Yellow breathing: Connecting to the cloud, weaker cellular signal
- Green breathing: Connecting to the cloud, good cellular signal
- Yellow solid: Connected to the cloud, weaker cellular signal
- Green solid: Connected to the cloud, good cellular signal

Alternatively the LED can be configured to the typical Particle color scheme (blinking green, blinking cyan, breathing cyan) via device or cloud configuration. Custom device firmware can provide other color schemes if desired.

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

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

The **GNSS** LED indicates the GNSS fix status:

- Off: GNSS is powered off.
- Blinking (1 Hz): Attempting to get a GNSS fix
- On: Has a GNSS fix.

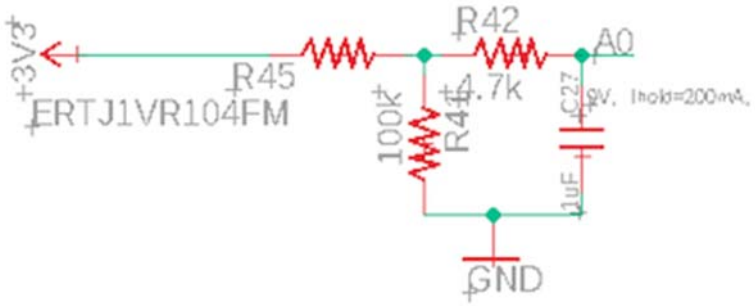
Tracker One Schematics

Will be provided at a later date.

Peripheral Details

Thermistor

The Tracker Carrier Board contains a 100K NTC thermistor, connected to A0. It is a Panasonic ERT-J1VR104FM connected high-side.



It can be read using the getTemperature() API.

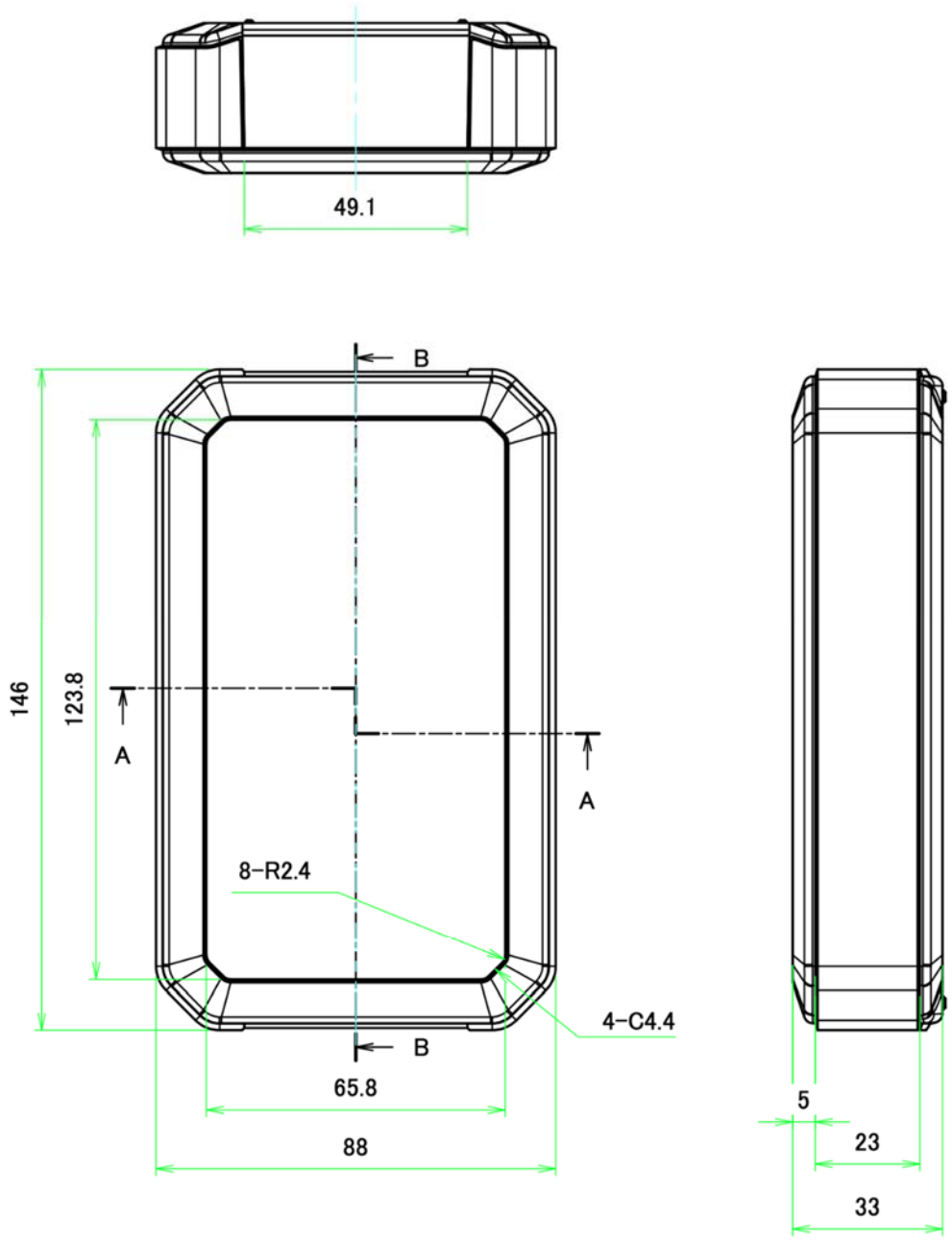
Mechanical specifications

Dimensions and weight

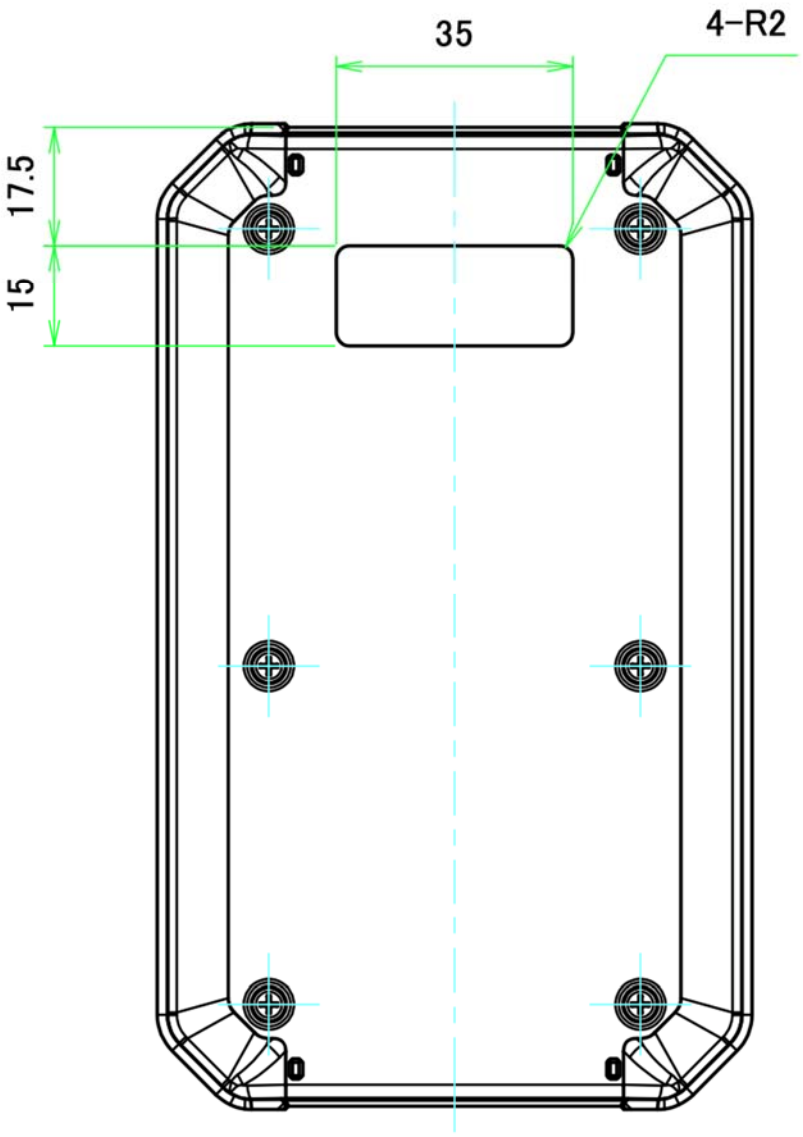
Parameter	Value	Units
Width	88	mm
Length (case only)	146	mm
Length (including M8 connector)	154	mm
Thickness	33	mm
Weight		g

Weight will be provided at a later date.

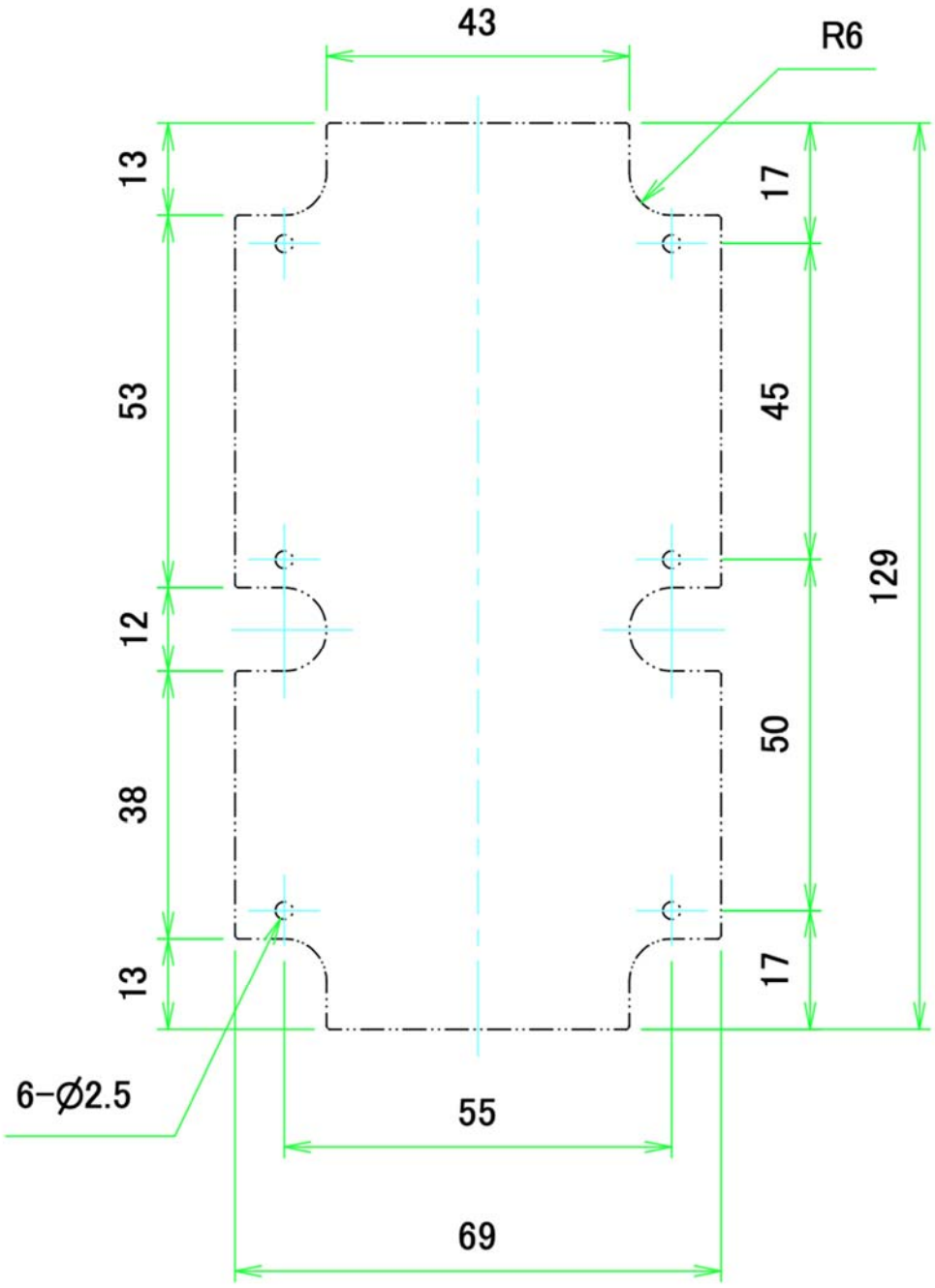
Case Dimensions (mm):



Bottom:



Maximum Carrier Board Dimensions (mm):



Note: The Tracker Carrier Board has a smaller bottom tab to provide space for the M8 connector.

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!

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.

CAUTION
RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS

Ordering Information

SKU	Description	Packaging
ONE402M	Tracker One LTE M1/2G (NorAm), [x1]	Each
ONE523M	Tracker One LTE CAT1/3G/2G (Europe), [x1]	Each
TCAR	Tracker Carrier Board, [x1]	Each

Revision history

Revision	Date	Author	Comments
pre1	20 Apr 2020	RK	Preview Release1

Revision	Date	Author	Comments
pre2	12 May 2020	RK	Added partial dimensions
001	29 Jun 2020	RK	First release
002	30 Jun 2020	RK	CAN 5V is limited to 400 mA, not 500 mA
003	16 Jul 2020	RK	Corrected M8 pinouts
004	06 Aug 2020	RK	Corrected M8 pin numbering
005	09 Aug 2020	RK	Updated VIN voltages

FCC:

FCC STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

To comply with FCC's RF radiation exposure limits for general population/uncontrolled exposure, this device must be installed to provide a separation distance of at least 20cm from all persons.

WARNING: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device must not be collocated or operating in conjunction with any other antenna or transmitter.

IC:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

this device may not cause interference.

this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
l'appareil ne doit pas produire de brouillage, et
l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter, except tested built-in radios.
Cet appareil et son antenne ne doivent pas être situés ou fonctionner en conjonction avec une autre antenne ou un autre émetteur, exception faites des radios intégrées qui ont été testées.

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

CAUTION
Risk of explosion if battery is replaced by an incorrect type.
Replacement of a battery with an incorrect type that can defeat a safeguard;
Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, that can result in an explosion;
Leaving a battery in an extremely high temperature surrounding environment that can result in an explosion or the leakage of flammable liquid or gas.
A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.