Maverick

Ultra-low power consumption battery powered mesh node with powerful LoRa radio and suite of sensors.

Highlights

Product name	Maverick
Power input	2.5V – 4.2V 1S LiPo, or 5V trough USB.
Dimension	126mm (L) x 79mm (W) x 28mm (H)
MCU	Nordic nRF52840, ARM Cortex M4F, 64 MHz, 1MB Flash, 256KB RAM
Bluetooth	2.4 GHz low-power wireless interface supporting low-energy short-range radio (BLE-compatible), 8dBm, integrated PCB mounted antenna
LoRa	Semtech SX126x 433/470MHz or 868/915MHz, 1W-30dBm, built-in PA and LNA. range up to 12km, uFl to Antenna
GPS/GNSS	U-blox SAM-M10Q, GPS, GLONASS, Galileo, and BeiDou, integrated LNA and integrated PCB mounted antenna
Battery / charger	Li-ion battery connection and integrated 800 mA USB/solar charger
Temperature, pressure & humid	Bosch BME280, high linearity and high accuracy sensor and low current consumption.

Features

- Highly efficient MCU, with integrated BLE antenna

Nordic Semiconductor nRF52840 is an ultra-low power, highly flexible, ideal for wireless applications. It has a 2.4 GHz low-power wireless interface supporting low-energy radio (BLE-compatible). We use a specialized Integrated PCB trace antenna that increases range. A full-speed (12Mbs) USB 2.0 controller is also included on-chip.

- Powerfull LoRa radio

Semtech SX1268/1262 as main core, the Power Amplifier and Low Noise Aamplifier is built-in, which makes the maximum transmission power 1W*. The overall communication stability is greatly improved compared to the products without power amplifiers and low noise amplifiers. The anti-interference performance and communication distance have been further improved compared to the previous generation LoRa transceiver, and far superior to the current FSK and GFSK modulation products. The product can cover an ultra-wide frequency range of 433/470MHz or 868/915MHz. Communication distance tested is up to 12km. *

- Precision GNSS module with PCB integrated antenna

The u-blox M10 Professional grade precision GNSS platform, provides exceptional sensitivity and acquisition time for all L1 GNSS signals. The M10 platform supports concurrent reception of four GNSS (GPS, GLONASS, Galileo, and BeiDou). The high number of visible satellites enables the receiver to select the best signals. This maximizes the position availability, in particular under challenging conditions such as in deep urban canyons. The extremely low power consumption of 25 mW in continuous tracking mode allows great power autonomy, without compromising on GNSS performance. The SAM-M10Q GNSS includes an integrated patch antenna. No need to wire yet another antenna. The RF signal is further filtered and amplified by an internal SAW filter and a low-noise amplifier (LNA).The Ublox factory tuned integrated antenna is less sensitive to surroundings and has high tolerance against frequency detuning.

- Battery charger

A high quality charger optimized for high impedance input sources like solar. Makes it possible to efficiently charge the battery with a small solar panel. Almost all other chargers are optimized for low impedance input sources like USB. You can charge the battery at a current charge up to 800 mA trough Solar and or USB. Recommended solar panel size 1.5-3.5W 6V. This makes Maverick the perfect device for solar charged repeaters. The larger battery and more efficient and powerful charger will make it more efficient during winter when the sun is lower or at higher longitude places where less sun can be collected.

- Temperature, pressure & humidity

Bosch BME280, high linearity and high accuracy sensor and low current consumption. The sensor offers an extremely fast response time and therefore supports emerging applications such as context awareness, and high accuracy over a wide temperature range.

- Inertial Measurement Unit

A 3-axis accelerometer and 3-axis gyroscope with very low power consumption enabling always-on features for an optimal motion experience.

- Ambient light sensor

Built in high accuracy ambient light sensor. With wide dynamic range for ambient light detection from 0 lx to about 140 klx with resolution down to 0.0042 lx/ct, supports very low and very high light conditions.

- Battery monitoring sensor

Built in battery voltage monitoring and current sensor. This means you can very accurately see and log the state of charge and current consumption. So you will be able to see if Maverick is being charged by solar or USB remotely.

- Oled display

0.96 inch OLED display with 128x64 pixel resolution and bright white color on black background.

- USB-C IP rated

Waterproof USB-C connector for data communication and charging. You can do serial over USB. This means you can connect a phone to the node and use USB to configure and use the node or update the firmware. When combined with waterproof housing this makes it waterproof, yet easy accessible.

- Solar panel connector

The Maverick is perfect for solar projects, it has very low power consumption. A 45% larger battery and 60% more powerful charger. Recommended solar panel size 1.5-3.5W 6V MAX.

- Extension connector + Qwiic connector

An extension connector footprint with all the connections for an Ethernet adapter is on the back of the board.. It has UART, SPI and GPIO's. There is also a Qwiic connector is onboard for easy connection to the large ecosystem of Qwiic sensors.

- 3x status LED

A red, green and blue LED for dynamic status feedback, user programmable.

- Push button, for user input

Short press to navigate, long press to 'enter'.
Extra long press (3s) to shutdown, push back again to start.

- Slide switch for switching ON/OFF battery

- 1S Battery protection onboard

- SWD connection

- Made in Europe 🇪🇺

* Unless local regulations do not allow for maximum radio power.

Hardware specifications

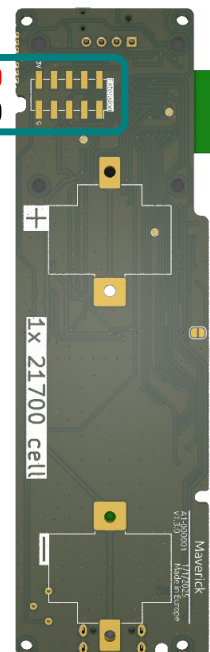|	
MCU	Nordic nRF52840, ARM Cortex M4F, 64 MHz, 1MB Flash, 256KB RAM 2.4 GHz low-power wireless interface supporting low-energy short-range radio (BLE-compatible), 8dBm
LoRa	Semtech SX126x 433/470MHz, 1W-30dBm, built-in PA and LNA. range 12km
GPS/GNSS	U-blox SAM-M10Q, GPS, GLONASS, Galileo, and BeiDou, integrated LNA and U-blox patch antenna
Battery	JST connector for battery, recommended size 1 000mAh – 5 000mAh Optional footprints for 'keystone 246TR' 21700 battery holder, do not use together with battery connected to JST battery connector.
Battery charger	Integrated 800 mA USB/solar charger
Temp, pressure & humid	Bosch BME280, high linearity and high accuracy sensor and low current consumption
6DoF IMU	STM LSM6DS3TR-C
Ambient light sensor	Vishay VEML7700
Battery monitoring sensor	Analog Devices MAX17048X
MEMS Microphone	TDK MMICT3902-00-012 (pending support for Meshtastic)
Oled display	0.96 inch OLED display with 128x64 pixel resolution, bright white color on black background.
USB-C IP-rated	Waterproof USB-C connector for data communication and charging
Push button	For user input
Battery protection	1S battery protection onboard
3x LED indicator	User programmable status LED
Solar panel connector	Up to 3.5W, 5-8V solar panel
Extension connector	UART + SPI + GPIO (can be used for Wiznet W5X00 Ethernet adapter)
Qwiic connector	I²C + 3.3V power for Qwiic sensors
Footprint for PIR detection sensor	Footprint for high quality PIR: EKMB1107112

Pinout
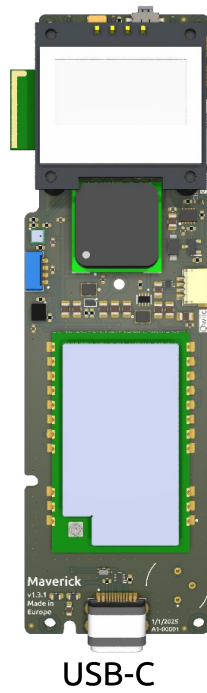
Battery
GND
+BATT

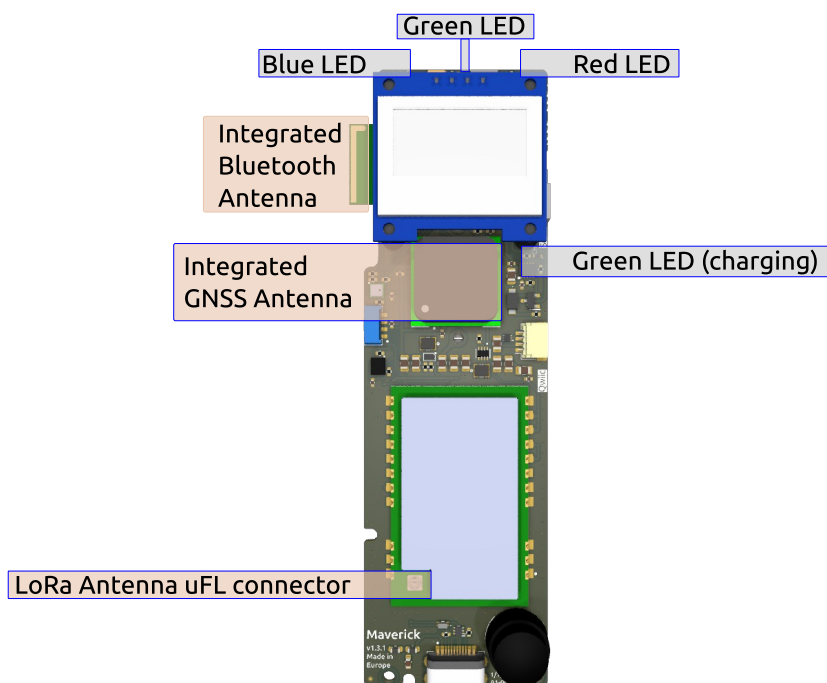**Solar panel**
GND
+SOLAR

Qwiic
I2C2 SCL
I2C2 SDA
3.3V
GND
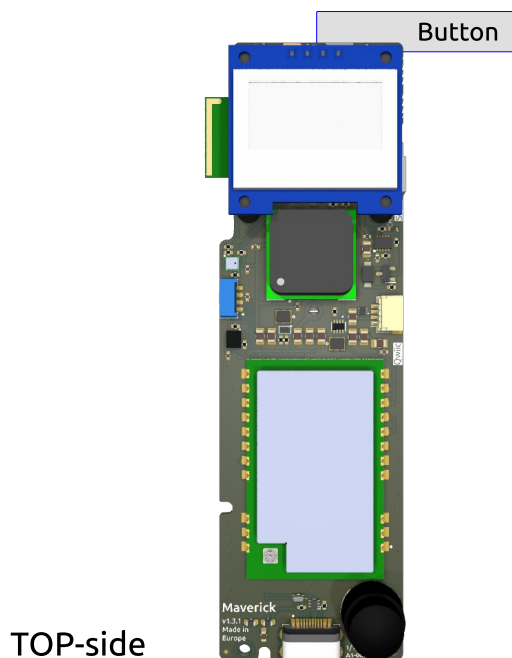
USB-C

Legend
+BATT
+SOLAR
GND
POWER
UART
GPIO
SPI
I2C
SWD

Extension connector

UART 1 RX	MOSI	RESET	AQ	3.3V
UART 1 TX	MISO	SCK	SS	GND

1x 21700 cell

LED's and buttons

Button

TOP-side

Green LED

Blue LED   Red LED

Integrated
Bluetooth
Antenna

Integrated
GNSS Antenna

Green LED (charging)

LoRa Antenna uFL connector

	Blue LED	Green LED	Red LED	Green LED (charging)
Plugged in USB	Bright breathing	/	/	ON
Battery power	Dim pulsing	/	/	/
Receive message	/	ON during 'nag' time	/	/
No firmware (DFU)	/	/	Dim breathing	/

Software

Meshtastic firmware for the Maverick can be downloaded on the Meshtastic website.

As a backup and documentation hub for the Maverick, we have made a github repo where you can find pre-release firmware:

https://github.com/GearUp-Company/Maverick

https://meshtastic.org/

Electrical characteristics

MAX IO voltage level	3.3V
MAX +VBAT voltage level	4.2V (1S, Single Cell)
MAX current 3.3V	0.5A
MAX current 5V	1.2A
MAC charging current	800mA
Minimum recommended battery size Max charging capability is **800mA**	1000mAh (1S, Single Cell)
Expected battery time: always on, light communication Meshtastic client mode, 3000mAh battery	5-7 days
Expected battery time: power save, 1 update per hour * Meshtastic tracker mode, 3000mAh battery	2-3 years

* When using as a tracker with power save enabled, 1x per hour GNSS location send trough LoRa.

Environment characteristics

Temperature range	0 - 70 °C
Humidity	0 - 90%, no condensation allowed

Antenna's

For LoRa there is uFl connector for connecting the Antenna.
The Maverick uses an internal PCB mounted GNSS antenna.
The Maverick uses an internal PCB mounted BLE antenna.

Recommended Antenna's for LoRa 868MHz (EU)

Type	Length	Gain	Connector	Link
Large 90° bendable uFl	**200mm**	**3dBi**	**SMA**	[TX868-JKD-20](#)
Small straight	40mm	2dBi	SMA	[TX868-JZ-5](#)

Recommended Antenna's for LoRa 915MHz (US)

Type	Length	Gain	Connector	Link
Large 90° bendable uFl	**200mm**	**3.5dBi**	**SMA**	[TX915-JKD-20](#)

Recommended Antenna's for LoRa 433MHz (EU)

Type	Length	Gain	Connector	Link
Medium rubber straight	**100mm**	**3dBi**	**SMA**	[TX433-JZ-10](#)
Medium 90° bendable uFl	210mm	3dBi	uFl	[TX433-JKS-IPX20](#)
Small straight	40mm	3dBi	SMA	[TX433-JZ-4](#)

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Order numbers

Order number	Frequency	Antenna	Housing	Battery
Maverick-433	433/470MHz	Medium rubber straight	IP67 molded	Included 3000mAh
Maverick-868	868MHz	Large 90° bendable uFl	IP67 molded	Included 3000mAh
Maverick-915	915MHz	Large 90° bendable uFl	IP67 molded	Included 3000mAh
Maverick-433-3D	433/470MHz	Medium rubber straight	3D print	Included 3000mAh
Maverick-868-3D	868MHz	Large 90° bendable uFl	3D print	Included 3000mAh
Maverick-915-3D	915MHz	Large 90° bendable uFl	3D print	Included 3000mAh
Maverick-433-PCB	433/470MHz	UFL to PCB antenna	No	No
Maverick-868-PCB	868MHz	UFL to PCB antenna	No	No
Maverick-915-PCB	915MHz	UFL to PCB antenna	No	No

Case

Variant 1, IP67 case

- Complete IP 67 housing for maverick.
- IP-68 USB-C in combination with IP-68 u-Fl to SMA and IP-68 membrane push button.
- The OLED is made waterproof by an extra plastic transparent cover.
- All LED's are visible externally, yet waterproof.
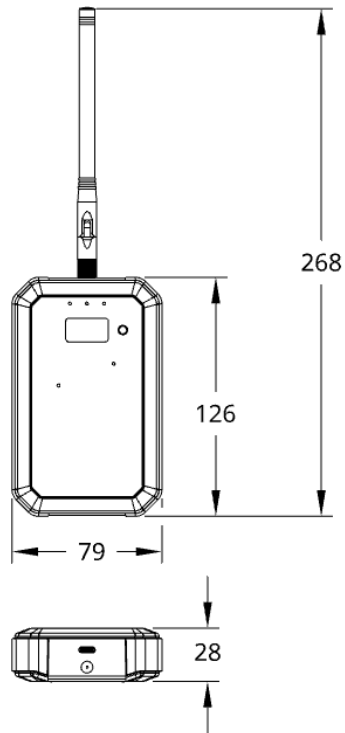
Variant 2, 3D printed case

- Complete 3D printed housing for maverick.
- Push button accessible.
- OLED is visible.
- All LED's are visible externally.

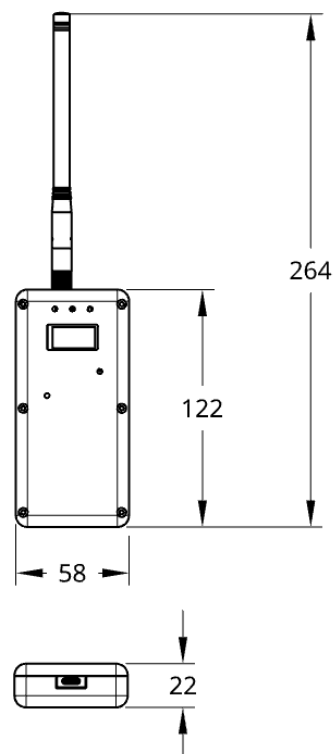3D case design files can be downloaded at:
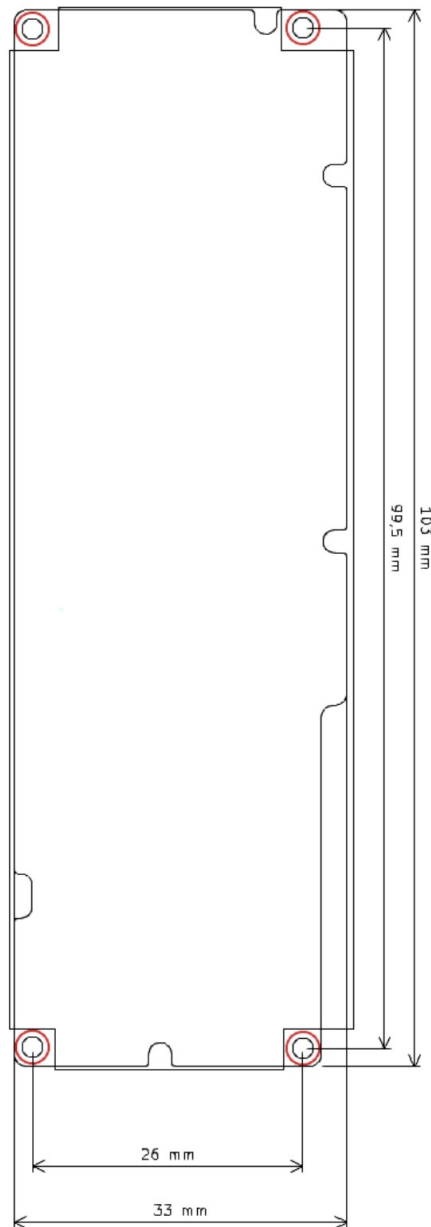**https://github.com/GearUp-Company/Maverick**

Mechanical drawing

IP-67 case (in mm):

3D printed case (in mm):

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PCB:

Easter eggs

You can 'shutdown' your Maverick by extra long pressing (3s) the button and then release. Push the button back again to start the Maverick.

Optional footprint for 'keystone 246TR' 21700 battery holder, do not use together with battery connected to JST battery connector.

There is a footprint for high quality PIR: EKMB1107112, to use as detection sensor.

Safety Information

- This product is intended as a mesh communication device.
- Not a toy. Only to be installed by qualified users familiar with electronic safety.
- Always keep antenna connected when device is under power.
- Maximum input voltage: 4.2 V DC. Exceeding this may damage the device.
- Operate within 0–60 °C and 0–90% RH, non-condensing.
- Handle only in ESD-safe environments.

Installation & Use

- Connect only to supported systems.
- Ensure correct polarity of power input. Reverse polarity may cause permanent damage.
- Only use antenna that is provided to device.
- Do not operate near flammable materials.

Regulatory & Compliance

- **CE Compliance**:
  This product has been designed and tested for conformity with the essential requirements of:

  - Electromagnetic Compatibility (EMC) Directive 2014/30/EU
  - Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU (as amended by 2015/863)
  - Radio Equipment Directive (RED) 2014/53/EU

- **CE Marking**:
  The CE mark affixed to this product indicates conformity with applicable EU legislation.
  The EU Declaration of Conformity for this product is available at: **www.takeyourgear.com/compliance**

- **Electromagnetic Compatibility (EMC)**:
  The device has undergone EMC testing. Users must install and operate the product according to this manual to maintain EMC performance.

- **RoHS Compliance**:
  All electronic components and assemblies are compliant with RoHS substance restrictions.

- **WEEE / Disposal**:
  This product is subject to EU Waste Electrical and Electronic Equipment (WEEE) regulations. Do not dispose of this product with household waste. At end of life, return it to an authorized collection facility for recycling.

- **Contains FCC ID:** 2ASVOE22-900M30S, 2AA9B-BT840F, XPYUBX10
  Complies with Part 15 of the FCC Rules.

- **ESD Precautions**:
  This product contains sensitive electronic components. Handle only in an ESD-safe environment and use proper grounding measures.

Disclaimer

- Improper installation or misuse may result in loss of communication.
- Always follow local regulations when operating.
- The manufacturer is not liable for any damages resulting from misuse or modification.

Sales & support

Website: www.takeyourgear.com

Email: info@takeyourgear.com

Made in Belgium