# SparkFun GPS Breakout - NEO-M9N, U.FL (Qwiic)

GPS-15712 Open Source Hardware

The SparkFun NEO-M9N GPS Breakout is a high quality, GPS board with equally impressive configuration options. The NEO-M9N module is a 92-channel u-blox M9 engine GNSS receiver, meaning it can receive signals from the GPS, GLONASS, Galileo, and BeiDou constellations with ~1.5 meter accuracy. This breakout supports concurrent reception of four GNSS maximizes position accuracy in challenging conditions increasing precision and decreases lock time and thanks to the onboard rechargeable battery, you'll have backup power enabling the GPS to get a hot lock within seconds! Additionally, this u-blox receiver supports I$^2$C (u-blox calls this Display Data Channel) which made it perfect for the Qwiic compatibility so we don't have to use up our precious UART ports. Utilizing our handy Qwiic system, no soldering is required to connect it to the rest of your system. However, we still have broken out 0.1"-spaced pins in case you prefer to use a breadboard.

The NEO-M9N module detects jamming and spoofing events and can reports them to the host, so that the system can react to such events. A SAW (Surface Acoustic Wave) filter combined with an LNA (Low Noise Amplifier) in the RF path is integrated into the NEO-M9N module which allows normal operation even under strong RF interferences.

U-blox based GPS products are configurable using the popular, but dense, windows program called u-center. Plenty of different functions can be configured on the NEO-M9N: baud rates, update rates, geofencing, spoofing detection, external interrupts, SBAS/D-GPS, etc. All of this can be done within the SparkFun Arduino Library!

The SparkFun NEO-M9N GPS Breakout is also equipped with an on-board rechargeable battery that provides power to the RTC on the NEO-M9N. This reduces the time-to-first fix from a cold start (~24s) to a hot start (~2s). The battery will maintain RTC and GNSS orbit data without being connected to power for plenty of time.
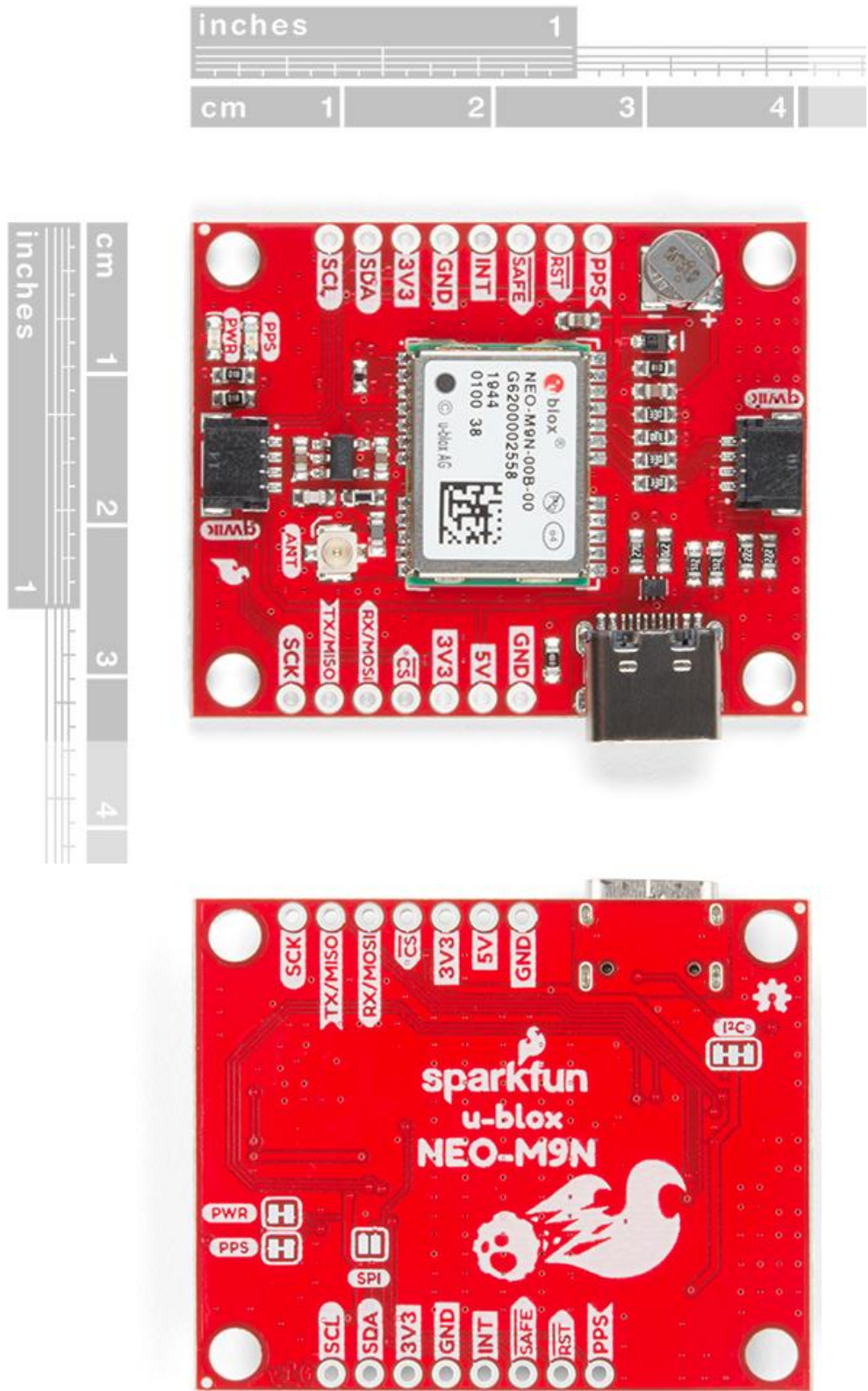
*The SparkFun Qwiic Connect System is an ecosystem of I²C sensors, actuators, shields and cables that make prototyping faster and less prone to error. All Qwiic-enabled boards use a common 1mm pitch, 4-pin JST connector. This reduces the amount of required PCB space, and polarized connections mean you can't hook it up wrong.*

## FEATURES

- Integrated U.FL connector for use with antenna of your choice
- 92-Channel GNSS Receiver
- 1.5m Horizontal Accuracy
- 25Hz Max Update Rate (4 concurrent GNSS)
- Time-To-First-Fix:
  - Cold: 24s
  - Hot: 2s
- Max Altitude: 80,000m
- Max G: ≤4
- Max Velocity: 500m/s
- Velocity Accuracy: 0.05m/s
- Heading Accuracy: 0.3 degrees
- Time Pulse Accuracy: 30ns
- 3.3V VCC and I/O
  - Current Consumption: ~31mA Tracking GPS+GLONASS
- Software Configurable
  - Geofencing
  - Odometer
  - Spoofing Detection
  - External Interrupt
  - Pin Control
  - Low Power Mode
  - Many others!
- Supports NMEA, UBX, and RTCM protocols over UART or I2C interfaces

## DOCUMENTS

- Schematic
- Eagle Files
- Board Dimensions
- Datasheet (NEO-M9M)
- Product Summary
- Integration Manual
- u-blox Protocol Specification