

Garmin LIDAR-Lite v4 (Qwiic) Hookup Guide

Introduction

The new Garmin® LIDAR sensor is now easier to use, as a Qwiic device. The Garmin® LIDAR-Lite v4 (Qwiic), fuses the advanced measurement technology of Garmin®'s LIDAR-Lite v4 sensor with the simplicity of SparkFun's Qwiic connect system, for rapid prototyping.



Garmin LIDAR-Lite v4 LED - Distance Measurement Sensor (Qwiic)

● SEN-18009

The LIDAR sensor is ideal for drone, robot, IoT, or unmanned vehicle operations, with a range up to 10 meters and 1 cm resolution. Check out the video below for an overview of the product features.

Product Showcase: Garmin LIDAR-Lite v4 Qwiic





Required Materials

The Qwiic LIDAR-Lite v4 does need a few additional items for you to get started. The RedBoard Qwiic will be used for the Arduino examples. You may already have a few of these items, including the required Qwiic cable, so feel free to modify your cart based on your needs. Additionally, there are also alternative parts options that are available as well (*click button below to toggle options*).

ALTERNATIVE PARTS (TOGGLE)



SparkFun Qwiic Cable Kit

🕒 KIT-15081



SparkFun RedBoard Qwiic

🕒 DEV-15123



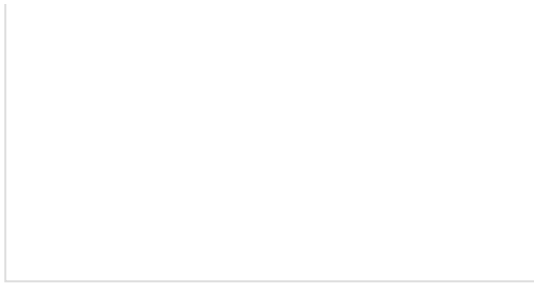
USB micro-B Cable - 6 Foot

🕒 CAB-10215

Suggested Reading

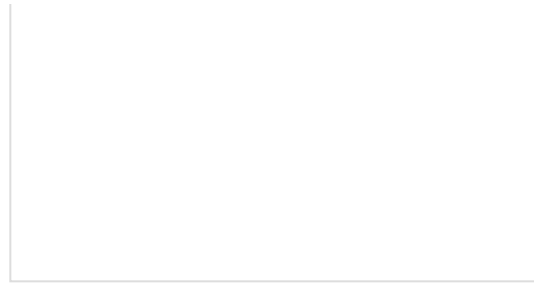
If you're unfamiliar with serial terminals, jumper pads, or I²C be sure to checkout some of these foundational tutorials.





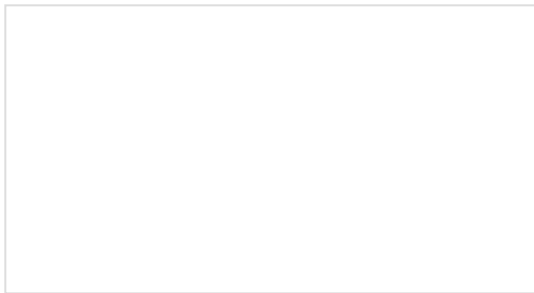
Installing an Arduino Library

How do I install a custom Arduino library? It's easy! This tutorial will go over how to install an Arduino library using the Arduino Library Manager. For libraries not linked with the Arduino IDE, we will also go over manually installing an Arduino library.



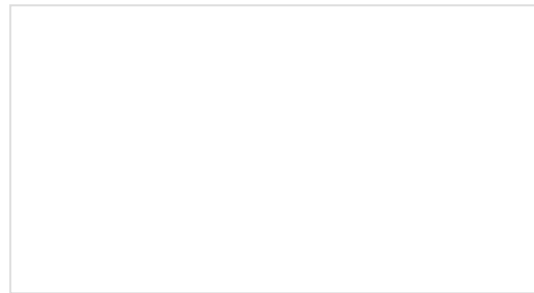
Installing Arduino IDE

A step-by-step guide to installing and testing the Arduino software on Windows, Mac, and Linux.



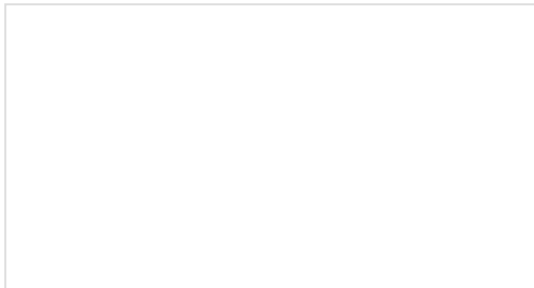
Logic Levels

Learn the difference between 3.3V and 5V devices and logic levels.



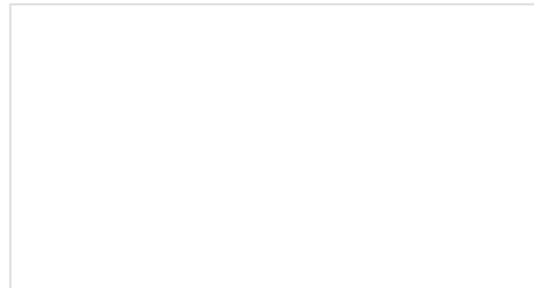
I2C

An introduction to I2C, one of the main embedded communications protocols in use today.



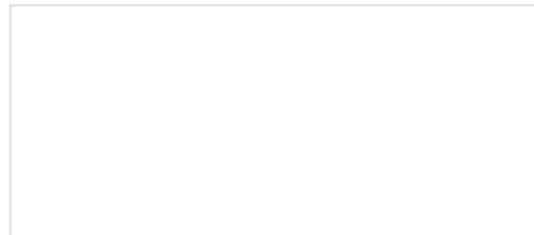
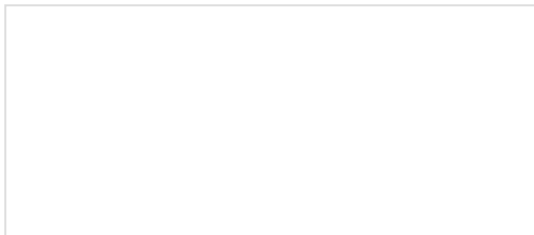
Serial Terminal Basics

This tutorial will show you how to communicate with your serial devices using a variety of terminal emulator applications.



How to Work with Jumper Pads and PCB Traces

Handling PCB jumper pads and traces is an essential skill. Learn how to cut a PCB trace, add a solder jumper between pads to reroute connections, and repair a trace with the green wire method if a trace is damaged.



RedBoard Qwiic Hookup Guide

This tutorial covers the basic functionality of the RedBoard Qwiic. This tutorial also covers how to get started blinking an LED and using the Qwiic system.

Arduino Shields v2

An update to our classic Arduino Shields Tutorial! All things Arduino shields. What they are and how to assemble them.



The Garmin LIDAR-Lite v4 (Qwiic) utilizes the Qwiic connect system. We recommend familiarizing yourself with the **Logic Levels** and **I²C** tutorials (above) before using it. Click on the banner above to learn more about our Qwiic products.

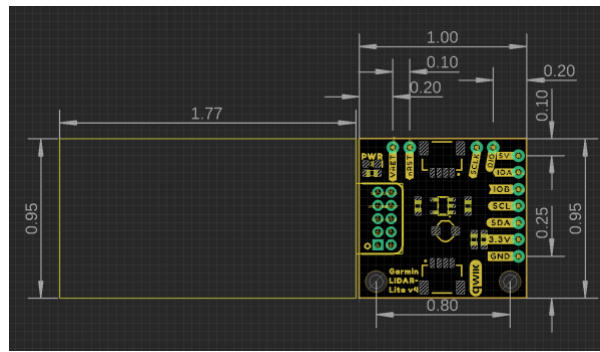
SparkFun's Qwiic Connect System



Hardware Overview

Board Dimensions

The Garmin LIDAR-Lite v4 (Qwiic) has an attached 1" x 1" Qwiic board for ease of use. The overall product dimensions are approximately 2.8" x 1.0" x 0.9" (L x W x H), with more detailed measurements in the drawing below.



Board dimensions (PDF) for the Garmin LIDAR-Lite v4 (Qwiic), in inches. (Click to enlarge)

Mounting Options

The Garmin LIDAR-Lite v4 operation manual lists zipties and double-sided tape as attachment methods. There are notches on the sensor housing that appear to be meant for a ziptie.



Screw holes and zip-tie notches on the Qwiic LIDAR-Lite v4. (Click to enlarge)

With our Qwiic version, we provide two screw holes on the Qwiic board as an additional mounting option. The holes are compatible with 4-40 screws and hardware.

Power

There is a power status LED to indicate when the Garmin LIDAR-Lite v4 (Qwiic) sensor is powered. Power the board either through the *polarized Qwiic connector* system or the breakout pins (**3.3V** or **5V** and **GND**) provided. The Qwiic system is meant to run on **3.3V**, be sure that you are NOT using another voltage when using the Qwiic system. A jumper is available on the back of the board to remove power to the LED for low-power applications (see *Jumpers* section below).



Power LED and power breakout pins on the Qwiic LIDAR-Lite v4. (Click to enlarge)

DC-DC Converter

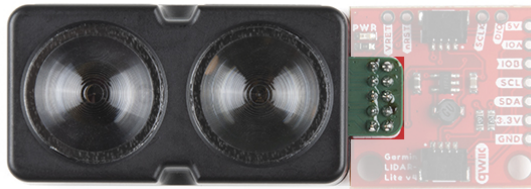
The Garmin LIDAR-Lite v4 sensor requires **5V** to operate. In order to provide 5V to the sensor from the **3.3V** line of the Qwiic connector, a DC-to-DC voltage converter is utilized. This can also be referred to as the buck/boost converter/circuit. For more details, check out the XC9140 datasheet.



Boost converter on the Qwiic LIDAR-Lite v4. (Click to enlarge)

Garmin LIDAR-Lite v4

The Garmin® LIDAR-Lite v4 is a distance measurement sensor. For more details on the sensor, please refer to the operation manual and technical specifications.



Garmin® LIDAR-Lite v4 sensor. (Click to enlarge)

Note: For the sensor's compliance and safety information, please refer to the safety and product information documentation.

Sensor Characteristics

⚡ Note:

The power and current consumption characteristics listed below are from the operation manual and technical specifications. However, these specifications are for the sensor itself.

To prevent brown outs, users should be wary when attaching several Qwiic LIDAR-Lite v4s to the Qwiic connect system. Users can easily surpass the current (supply) limitation of their Qwiic microcontroller board. The Qwiic LIDAR-Lite v4 operates at **3.3V** and we have measured the current consumption from the 3.3V line to be approximately:

- **120mA** (idle)
- **165mA** (during an acquisition)

Below, are the LIDAR sensor's electrical and performance characteristics, as listed in the operation manual and technical specifications datasheet.

Characteristic	Description
Power (operating voltage)	4.75 to 5.25 Vdc
Current Consumption	2 mA idle 85 mA during an acquisition
I/O Voltage	3.3 V
Max Range	5 cm to 10 m (1.97 in. to 32.8 ft.)
Resolution	1 cm (0.4 in.)
Beam divergence	4.77 degrees
LED Wavelength	940 nm
Optical Aperture	14.9 mm

Measurement Repeatability*	± 1 cm up to 2 m ± 2 cm up to 4 m ± 5 cm up to 10m
I ² C Address	0x62 (Default) Software configurable

***NOTE:** As measured indoors to a 90% reflective target; 1 cm is equivalent to 1 standard deviation. Measurements were obtained using high accuracy mode.

Qwiic and I²C

I²C Address

The Garmin LIDAR-Lite v4 (Qwiic)'s I²C address, **0x62** (7-bit), is factory set. However, this address is software configurable.

Qwiic Connectors

The simplest way to use the Garmin LIDAR-Lite v4 (Qwiic) is through the Qwiic connect system. The connectors are polarized for the I²C connection and power. (*They are tied to the corresponding power and I²C breakout pins.)



Qwiic connectors on the Qwiic LIDAR-Lite v4. (Click to enlarge)

Breakout Pins

⚡ **Note:** Excluding the 5V pin, the rest are **3.3V** pins.

The board also provides eleven labeled breakout pins. Besides the 5V (and GND) pin, the rest of the pins are only 3.3V tolerant.

I²C

You can connect these lines to the I²C bus of your microcontroller and power pins (**3.3V** and **GND**), if it doesn't have a Qwiic connector. The interrupt pins are also broken out to use for triggered events.



I²C Connections- The pins are tied to the Qwiic connectors.

J-Link Debug and I/O Pins

DANGER!

Reprogramming the nRF52840 System on Chip (SoC) removes all pre-programmed factory software. SparkFun is **NOT** able to help you recover the software once it has been removed.

Before attempting to mess with the the nRF52840 System on Chip (SoC), we highly recommend users refer to the operation manual and technical specifications for other considerations and notices from the manufacturer.

The J-Link and I/O pins are also broken out for users, in case they wish to interface with the RF52840 SoC.



Other breakout pins on the Qwiic LIDAR-Lite v4. (Click to enlarge)

Jumpers

There are three jumpers on the board. Not sure how to cut or modify a jumper? Read here!

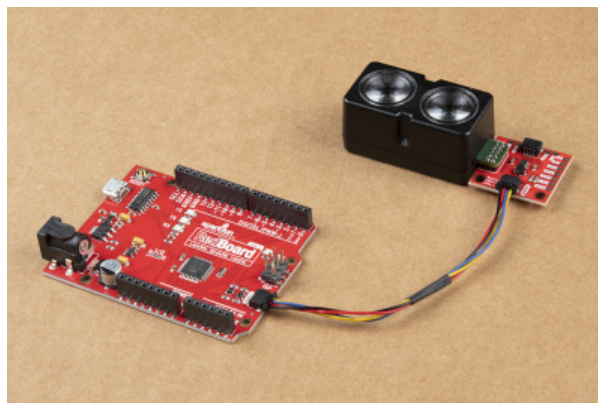
- **Power LED** - Cutting the LED jumper will remove the **1k Ω** resistors and PWR LED from the **3.3V** power. This is useful for lowering power consumption.
- **I²C Pull-Up** - Cutting the I²C jumper will remove the **4.7k Ω** pull-up resistors from the I²C bus. If you have many devices on your I²C bus you may want to remove these jumpers.
- **5V Disconnect** - Cutting the 5V jumper on the board will disconnect the buck converter from the 5V power trace. This is useful when users power the board through the 5V breakout pin.



The power LED, I²C pull-up resistor, and 5V disconnect jumpers on the Qwiic LIDAR-Lite v4. (Click to enlarge)

Hardware Assembly

With the Qwiic connector system, assembling the hardware is simple. All you need to do is connect your Garmin LIDAR-Lite v4 (Qwiic) to the RedBoard Qwiic with a Qwiic cable. Otherwise, you can use the I²C pins of your microcontroller; just be aware of logic levels.



RedBoard Qwiic connected the Qwiic LIDAR-Lite v4 with a Qwiic cable.

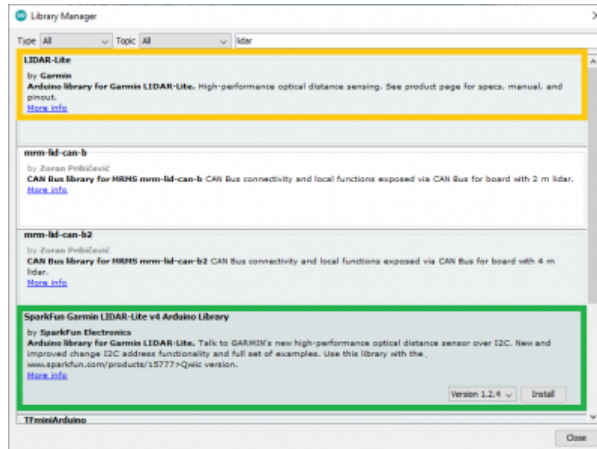
Arduino Library

Note: This example assumes you are using the latest version of the Arduino IDE on your desktop. If this is your first time using Arduino, please review our tutorial on installing the Arduino IDE. If you have not previously installed an Arduino library, please check out our installation guide.

We've written a library to easily get setup and take readings from the Garmin LIDAR-Lite v4 (Qwiic). However, before we jump into retrieving measurements from the sensor, let's take a closer look at the available functions in the library. You can install this library through the Arduino Library Manager. Search for **SparkFun Garmin LIDAR-Lite v4 Arduino Library** and you should be able to install the latest version. If you prefer manually downloading the libraries from the GitHub repository, you can grab them here:

DOWNLOAD THE SPARKFUN GARMIN LIDAR-LITE V4 ARDUINO LIBRARY

Note: Users may also notice another Arduino for the Garmin LIDAR-Lite. This library is provided and maintained by Garmin®, for all their LIDAR sensors. For more details, check out the GitHub repository.



Garmin and SparkFun Arduino libraries for the Garmin LIDAR-Lite v4. (click to enlarge)

Arduino Examples

Example 1: Basic Readings

Once you've got the library installed, open the **Example1_GetDistance** sketch. You can find it under

File > Examples > SparkFun Garmin LIDAR-Lite v4 Arduino Library > Examples

Then upload the sketch onto your RedBoard or Uno and open your favorite Serial Terminal to see the printed values. (*Don't forget to set the baud rate to **115200bps**.*)



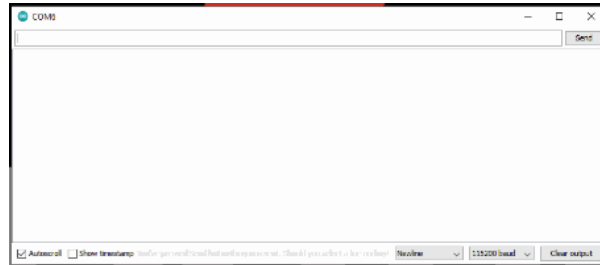
Distance readings from the LIDAR sensor. (Click to enlarge)

Example 2: Address Change

Note: The Qwiic LIDAR-Lite v4 will reset to the default I²C address if power is disconnected.

Open the **Example2_ChangeI2CAddress** sketch from the library examples.

Once the sketch has been uploaded, open up a Serial Terminal with the baud rate set at **115200bps**. There, users will be prompted to input a value to change the I2C address.



Prompt for changing the LIDAR sensor's I²C address. (Click to enlarge)

Following the address change, the sketch will scan the I²C bus for connected devices and display their address. Users should see the LIDAR sensor at the address they specified.

Troubleshooting

Below, we have also included some troubleshooting tips for issues that you may come across.

1. One of our employees compiled a great list of troubleshooting tips based on the most common customer issues. This is the perfect place to start.
2. For any Arduino IDE specific issues, we recommend starting with their troubleshooting guide.

🔧 Not working as expected and need help?

If you need technical assistance and more information on a product that is not working as you expected, we recommend heading on over to the SparkFun Technical Assistance page for some initial troubleshooting.

SPARKFUN TECHNICAL ASSISTANCE PAGE

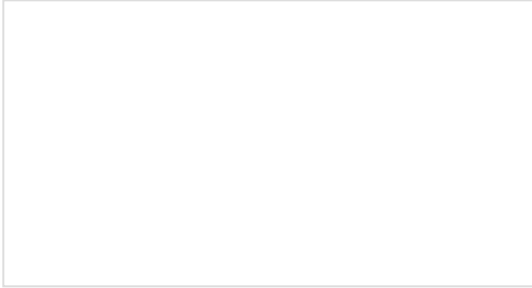
If you can't find what you need there, you'll need a Forum Account to search product forums and post questions.

Resources and Going Further

- Schematic (PDF)
- Eagle Files (ZIP)
- Board Dimensions (PDF)
- Garmin LIDAR Lite v4 Product Information:
 - Garmin: Operation Manual and Technical Specifications
 - Garmin: Safety and Product Information
 - Garmin: LIDAR-Lite Arduino Library Github

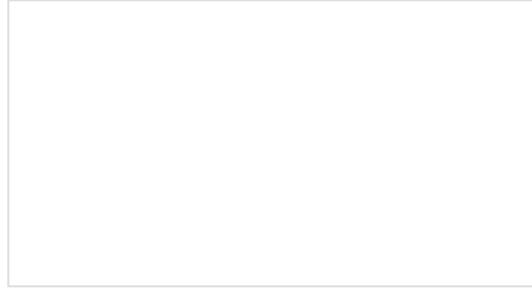
- Garmin: LIDAR-Lite ANT Library
- SparkFun: Qwiic LIDAR Lite v4 Arduino library
- Hardware GitHub Repository
- Product Showcase Video

Looking for other distance sensors? Check out some of these tutorials:



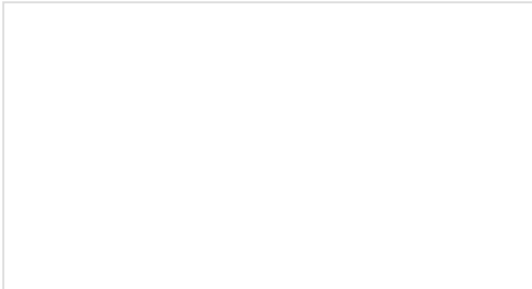
Qwiic Distance Sensor (RFD77402) Hookup Guide

The RFD77402 uses an infrared VCSEL (Vertical Cavity Surface Emitting Laser) TOF (Time of Flight) module capable of millimeter precision distance readings up to 2 meters. It's also part of SparkFun's Qwiic system, so you won't have to do any soldering to figure out how far away things are.



Qwiic Distance Sensor (VL53L1X) Hookup Guide

The Qwiic VL53L1X time of flight sensor is capable of several modes, as well as having a range of 4M. Let's hook it up and find out just how far away that thing over there is.



Getting Started with the A111 Pulsed Radar Sensor

Get started with the Acconeer A111 SDK with a Raspberry Pi! The tiny A111 pulsed coherent radar (PCR) adds high-precision, cutting-edge distance measurement for speed-, material-, motion-, or gesture-sensing projects! We're not talking about simple ultrasonic, or even infrared sensors here, but 60GHz radar!



Qwiic Ultrasonic Distance Sensor (HC-SR04) Hookup Guide

Get started with the Qwiic Ultrasonic Distance Sensor!