

LamaPLC: VL53Lnn STMicroelectronics time-of-flight (ToF) laser-ranging sensors with I²C communication

The STMicroelectronics VL53L1X is the successor to the STMicroelectronics VL53L0X, offering significant enhancements in range, speed, and functionality, while maintaining pin-to-pin compatibility. The most notable difference is the maximum distance measurement: the VL53L1X supports up to 4 meters, compared with 2 meters for its predecessor.



Feature Comparison:

| Feature | STMicroelectronics VL53L0X | STMicroelectronics VL53L1X |
|---------------------------------|---|---|
| Max Range (Optimal) | Up to 2 meters | Up to 4 meters |
| Max Ranging Frequency | Typically around 20 Hz (50 ms per measurement) | Up to 50 Hz |
| Field of View (FoV) | 25° fixed | 27° typical full FoV, but programmable (15° to 27°) |
| Multi-zone Capability | No | Yes, via programmable Region of Interest (ROI) |
| Ambient Light Immunity | Good (uses 940nm VCSEL and physical IR filters) | Improved (better performance in high ambient light) |
| Pin-to-Pin Compatibility | N/A | Pin-to-pin compatible with the VL53L0X sensor |
| Responsive time | 50ms | 50ms |
| Package Size | 4.4 x 2.4 x 1.0 mm | 4.9 x 2.5 x 1.56 mm (slightly larger) |
| Interface | I ² C, default addr.: 0x29 | I ² C, default addr.: 0x29 |

In summary, while the VL53L0X is a cost-effective choice for short-range applications, the VL53L1X offers enhanced performance and versatility for more demanding tasks, such as drone navigation, industrial automation, and gesture recognition, that require longer range and spatial awareness.



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Arduino & VL53L1X

- **VIN:** Power input (**2.8V - 5V**)
- **GND:** Ground
- **SCL:** I²C clock line
- **SDA:** I²C data line
- **XSHUT:** Shutdown pin, low-level shutdown, high-level normal operation
- **GPIO1:** Programmable interrupt output

The VL53L1X typically operates at 3.3V. Ensure your module includes a voltage regulator and level shifters when connecting to a 5V board, such as an Arduino Uno.

Arduino code

To interface the VL53L1X Time-of-Flight (ToF) sensor with an Arduino, the **Pololu VL53L1X** library is widely recommended for its simplicity and small memory footprint.

```
#include <Wire.h>
#include <VL53L1X.h>

VL53L1X sensor;

void setup() {
  Serial.begin(115200);
  Wire.begin();
  Wire.setClock(400000); // Use 400 kHz I2C for faster readings

  sensor.setTimeout(500);
  if (!sensor.init()) {
    Serial.println("Failed to detect and initialize sensor!");
    while (1);
  }

  // Set distance mode: Long (up to 4m) or Short (up to 1.3m)
  sensor.setDistanceMode(VL53L1X::Long);

  // Timing budget is the time spent taking one measurement (min 20ms short,
  33ms long)
  sensor.setMeasurementTimingBudget(50000); // 50ms

  // Start continuous readings every 50ms
  sensor.startContinuous(50);
}

void loop() {
  // Read distance in millimeters
  uint16_t distance = sensor.read();
```

```

Serial.print("Distance (mm): ");
Serial.println(distance);

if (sensor.timeoutOccurred()) {
  Serial.print(" TIMEOUT");
}
}

```

I²C topics on lamaPLC

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