

LamaPLC: TOFnnnC STMicroelectronics Time-of-Flight (ToF) sensors with I²C communication

The TOF050C, TOF200C, and TOF400C are a series of laser ranging sensor modules that use Time-of-Flight (ToF) technology to measure distances. They are designed for easy integration with microcontrollers such as Arduino and STM32 via the I²C interface.



These modules are based on different underlying STMicroelectronics chips, which determine their maximum measuring distances. They are commonly used in applications such as robot obstacle avoidance, altitude measurement for drones, and gesture recognition.

Model	Ranging Chip	Max. Measuring Distance	Field of View (FoV)	Infrared Wavelength
TOF050C	VL6180	50 cm	25°	850 nm
TOF200C	VL53L0X	2 meters	25°	940 nm
TOF400C	VL53L1X	4 meters	27°	940 nm

Common Specifications:

- **Communication Mode:** I²C digital interface, default address: **0x52**
- **Operating Voltage:** **3.0V to 5.0V DC**
- **Typical Current Consumption:** ~40mA (max)
- **Operating Temperature:** -20°C to 70°C.
- **Key Features:**
 - Measure absolute range independent of object color and reflectance
 - Equipped with a dedicated optical cover for dust protection and ambient light resistance
 - Feature M2 mounting holes for easy installation
 - Compatible with Arduino, STM32, ESP32, and other microcontroller platforms



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Pinout

Pin Name	Type	Description
VIN	Power	Power supply input, typically 3.0V to 5.0V
GND	Power	Ground connection

Pin Name	Type	Description
SCL	I ² C	Serial Clock line for I ² C communication
SDA	I ² C	Serial Data line for I ² C communication
INT	Output	Interrupt output; can signal the MCU when data is ready (often labeled GPIO1 on the chip)
SHUT	Input	Shutdown control (Active Low); pull low to enter standby, high to enable (often labeled XSHUT)

Most TOF400C modules include an onboard voltage regulator that supports 3.3V or 5V.

Arduino Example Code

The **Pololu VL53L1X** library is recommended for its lightweight footprint and ease of use.

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

VL53L1X sensor;

void setup() {
  Serial.begin(115200);
  Wire.begin();
  Wire.setClock(400000); // 400 kHz I2C for better performance

  sensor.setTimeout(500);
  if (!sensor.init()) {
    Serial.println("Failed to detect TOF400C sensor!");
    while (1);
  }

  // TOF400C supports three modes: Short (1.3m), Medium (3m), Long (4m)
  sensor.setDistanceMode(VL53L1X::Long);

  // Timing budget: more time = higher accuracy (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: ");
  Serial.print(distance);
  Serial.println(" mm");
}
```

```

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

```

I²C topics on lamaPLC

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