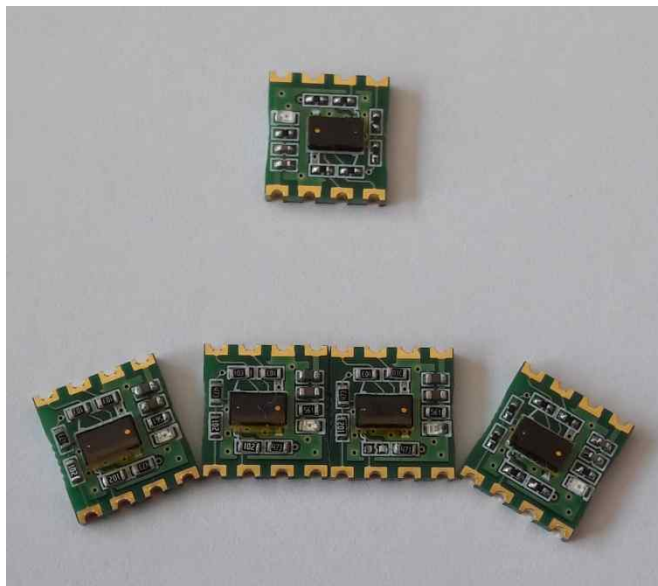# OSTSen-53LOX   User Guide

Ver 1.0

Hara Systems Inc.

1. OSTSen-53L0X Overview

OSTSen-VL53L0X is a Time-of-Flight laser-ranging module, which is based on STMicroelectronics VL53L0X. The VL53L0X is a new generation Time-of-Flight(ToF) laser-ranging module housed in the smallest today, providing accurate distance measurement whatever the target reflectances. It can measure absolute distances up to 2m, setting a new benchmark in ranging performance levels, opening the door to various new applications. The VL53L0X integrates a leading-edge SPAD array (Single Photon Avalanche Diodes) and embeds ST's second generation FlightSense™ patented technology.

The VL53L0X's 940nm VCSEL emitter (Vertical Cavity Surface-Emitting Laser), is totally invisible to the human eye, coupled with internal physical infrared filters, it enables longer ranging distance, higher immunity to ambient light and better robustness to cover-glass optical cross-talk.

2. Application

- User detection for Personal Computers/Laptops/Tablets and IoT(Energy saving)
- Robotics (obstacle detection)
- White Goods (hand detection in automatic faucet, soap dispensers etc)
- 1D gesture recognition
- Laser assisted Auto-Focus. Enhances and speeds-up camera AF system performance, especially in difficult scenes (low light levels, low contract) or fast moving video mode

3. Features

3.1 Fully integrated miniature module

- 940nm Laser VCSEL
- VCSEL driver
- Ranging sensor with advanced embedded micro controller
- 4.4 x 2.4 x 1.0 mm

3.2 Fast, accurate distance ranging

- Measures absolute range up to 2m
- Reported range is independent of the target reflectance
- Operates in high infrared ambient light levels
- Advanced embedded optical cross-talk compensation to simplify cover glass selection

3.3 Easy safe

- Class 1 laser device compliant with latest standard IEC 60825-1:2014-3rd edition

3.4 Easy integration

- Single reflowable component
- No additional optics
- Single power supply
- I2C interface for device control and data transfer
- Xshutdown(Reset) and interrupt GPIO
- Programmable I2C address

4. Application Information

4.1 Module Pin Out and Signal Description

Pin Number	Pin Name	Pin Description
1	V33	Power supply voltage (2.6V ~ 3.5V)
2	GND	Power supply ground
3	SCL	I2C serial clock (SCL) 7bit device address : 0x29
4	SDA	I2C serial data (SDA)
5	GPIO1	Interrupt output. Open drain output
6	XSHUT	Xshtutdown pin, Active LOW
7, 8	NC	Not Connect

```
   NC      NC     XSHUT   GPIO1

    8       7       6       5



    1       2       3       4

   V33     GND     SCL     SDA
```
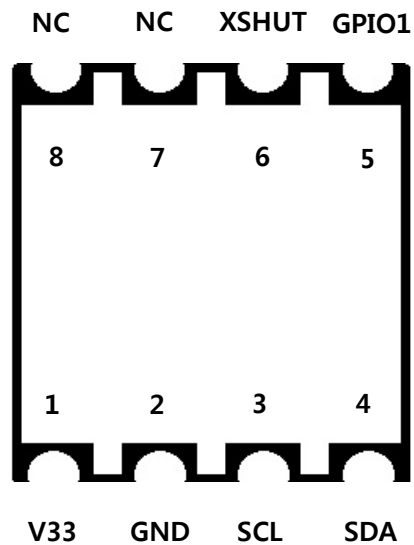
< Top View >

4.2 VL53L0X Pin out and Signal Description

Pin Number	Pin Name	Pin Description
1	AVDDVCSEL	VCSEL supply, to be connected to main supply
2	AVSSCSEL	VCSEL Ground, to be connected to main ground
3	GND	To be connected to main ground
4	GND2	To be connected to main ground
5	XSHUT	Xshutdown pin, Active LOW
6	GND3	To be connected to main ground
7	GPIO1	Interrupt output, Open drain output
8	DNC	Do Not Connect, must be left floating
9	SDA	I2C serial data
10	SCL	I2C serial clock
11	AVDD	Supply, to be connected to main supply
12	GND4	To be connected to main ground

GND3

GPIO1	7	6	5	XSHUT
DNC	8		4	GND2
SDA	9		3	GND
SCL	10		2	AVSSVCSEL
AVDD	11	12	1	AVDDVCSEL

GND4
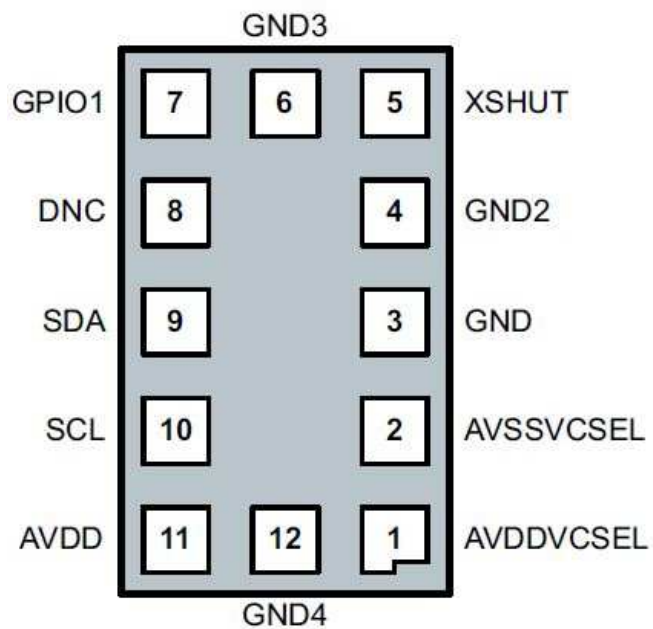
VL53L0X pinout (bottom view)

5. Module Dimension

9.525mm

10.16mm

| 8 | 7 | 6 | 5 |

| 1 | 2 | 3 | 4 |

2.54mm
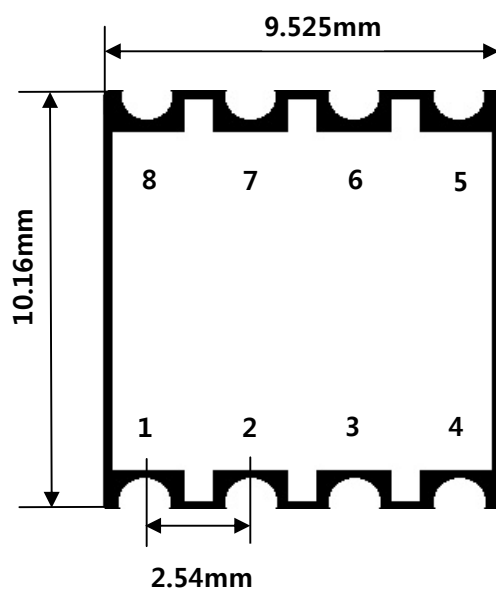
< OSTSen-53L0X   module >

6. I2C Communications

Data transfer protocol
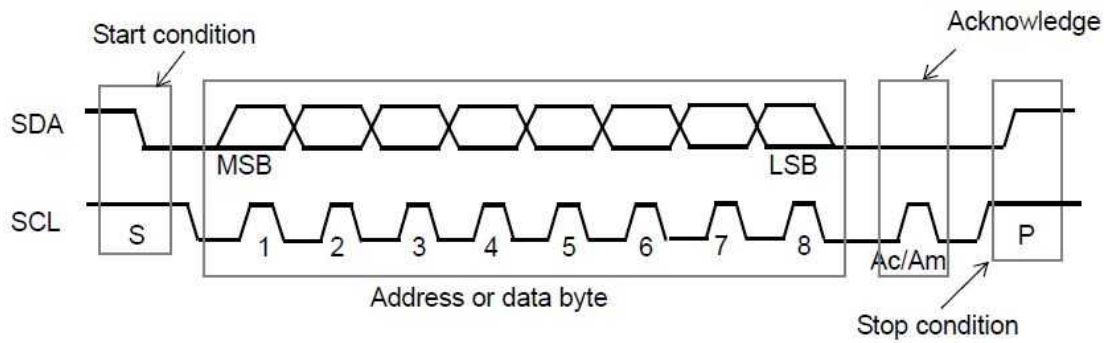
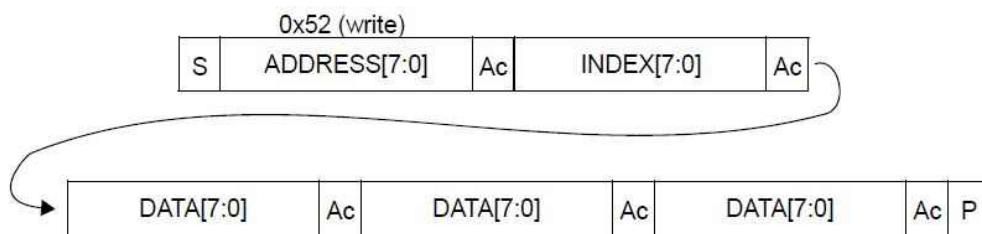**VL53L0X I2C 7bit device address : 0x29**

VL53L0X data format (write)
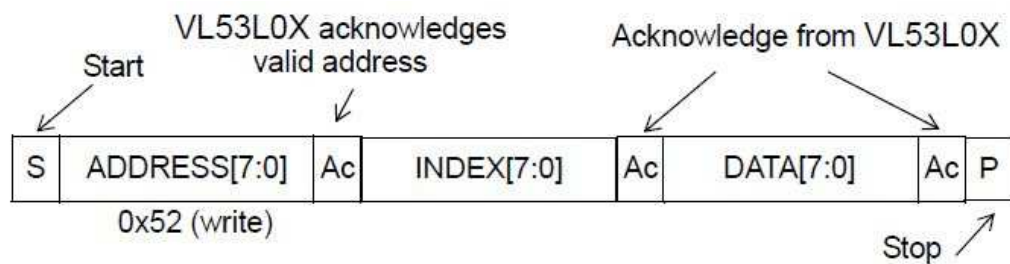
VL53L0X data format (read)
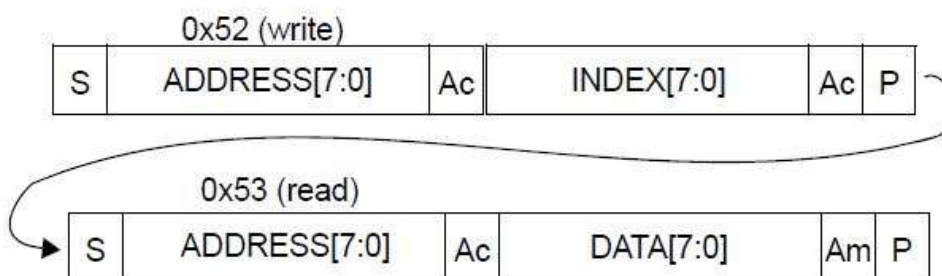
VL53L0X data format (sequential write)
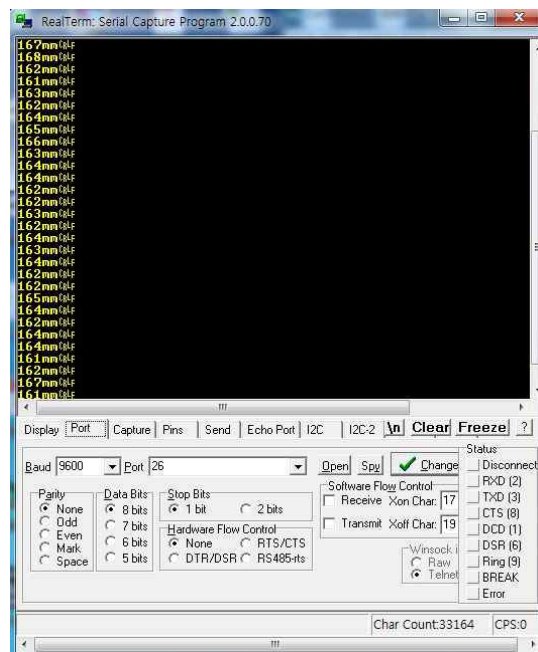
0x52 (write)

S	ADDRESS[7:0]	Ac	INDEX[7:0]	Ac

DATA[7:0]	Ac	DATA[7:0]	Ac	DATA[7:0]	Ac	P

VL53L0X data format (sequential read)

0x52 (write)

S	ADDRESS[7:0]	Ac	INDEX[7:0]	Ac	P

0x53 (read)

S	ADDRESS[7:0]	Ac	DATA[7:0]	Am	DATA[7:0]	Am

DATA[7:0]	Am	DATA[7:0]	Am	DATA[7:0]	Am	P
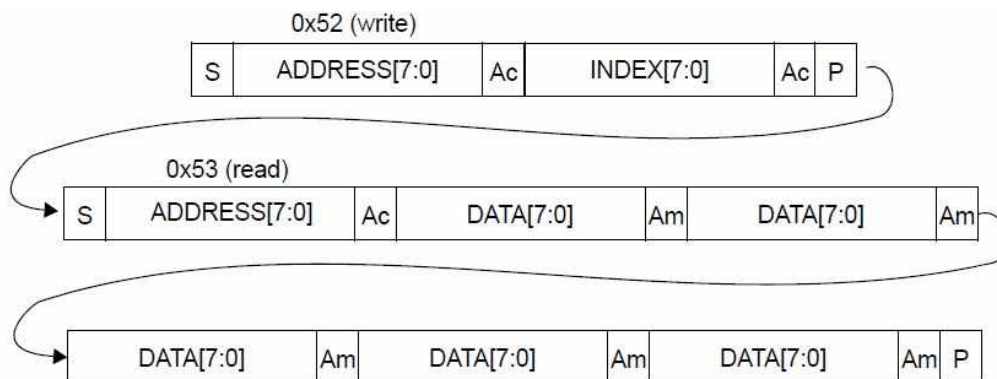
7. Demo System
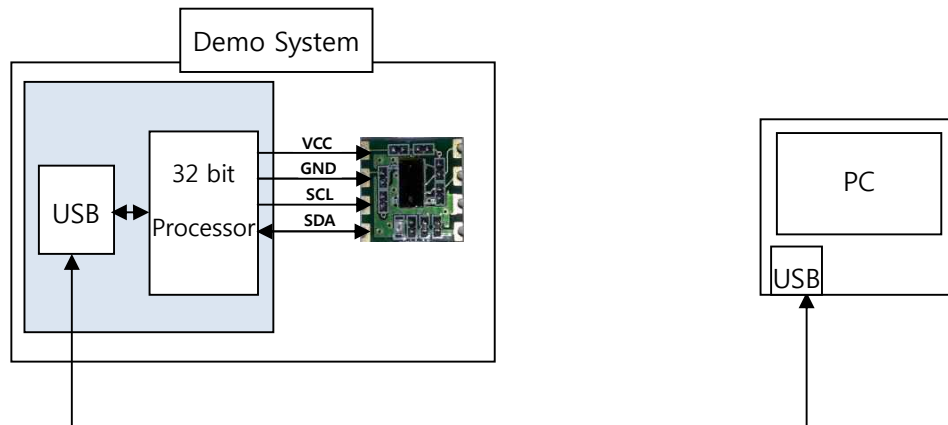
OSTSen-53L0X   Data Display on PC

8. Reference

1) http://www.st.com/content/st_com/en/products/imaging-and-photonics-solutions/proximity-sensors/vl53l0x.html
2) http://www.st.com/content/ccc/resource/technical/document/datasheet/group3/b2/1e/33/77/c6/92/47/6b/DM00279086/files/DM00279086.pdf/jcr:content/translations/en.DM00279086.pdf
3) https://github.com/pololu/vl53l0x-arduino
4) https://github.com/adafruit/Fritzing-Library
5) https://github.com/adafruit/Adafruit_VL53L0X

- If you need more information or have some questions about OSTSen-53L0X, contact   ostsen@hanmail.net.