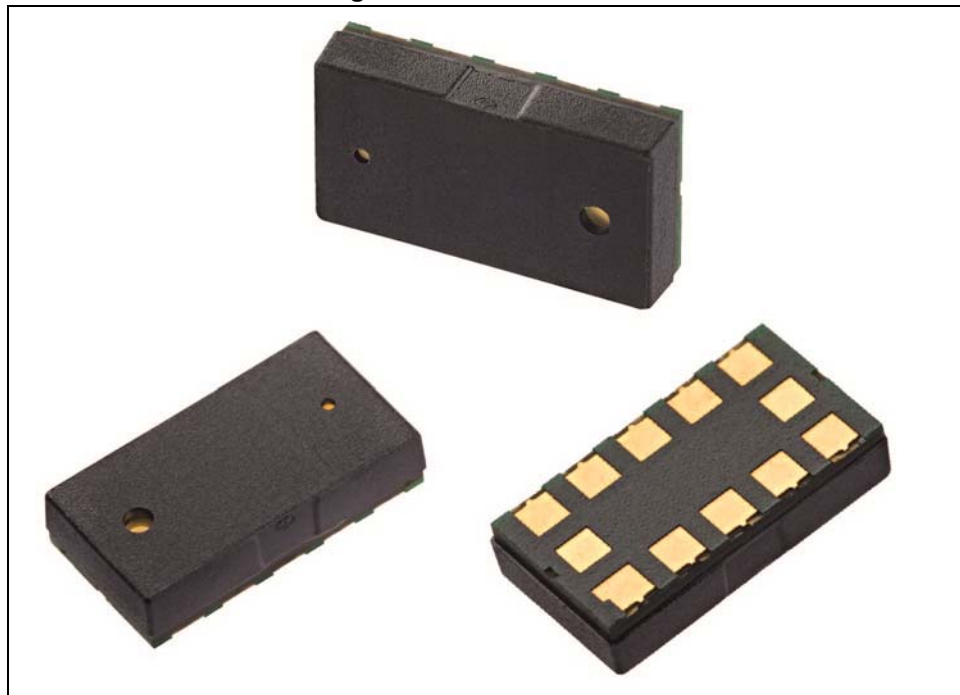


## Introduction

The purpose of this document is to give an example of how multiple VL53L0X devices can be placed on a board design while only using a single I2C interface to interact with the devices.

Figure 1. VL53L0X device



# Contents

- 1 Purpose ..... 3**
- 2 Multiple VL53L0X application ..... 3**
  - 2.1 VL53L0X control management ..... 3
  - 2.2 VL53L0X API management ..... 5
- 3 Revision history ..... 6**

# 1 Purpose

The purpose of this document is to give an example of how multiple VL53L0X devices can be used on a board design while only using a single I2C interface. The VL53L0X is a ranging sensor that uses time of flight principle to measure distance to an object. The control and output interface is an I2C interface. Each VL53L0X device has both a XSHUT pin and an interrupt (GPIO1) pin, which will be used in this design setup for using multiple devices.

The uses for multiple VL53L0X on a single design can include the following:

1. Distance sensing in multiple directions
2. Robotics with multiple sensors
3. Gesture Detection
4. and much more!

## 2 Multiple VL53L0X application

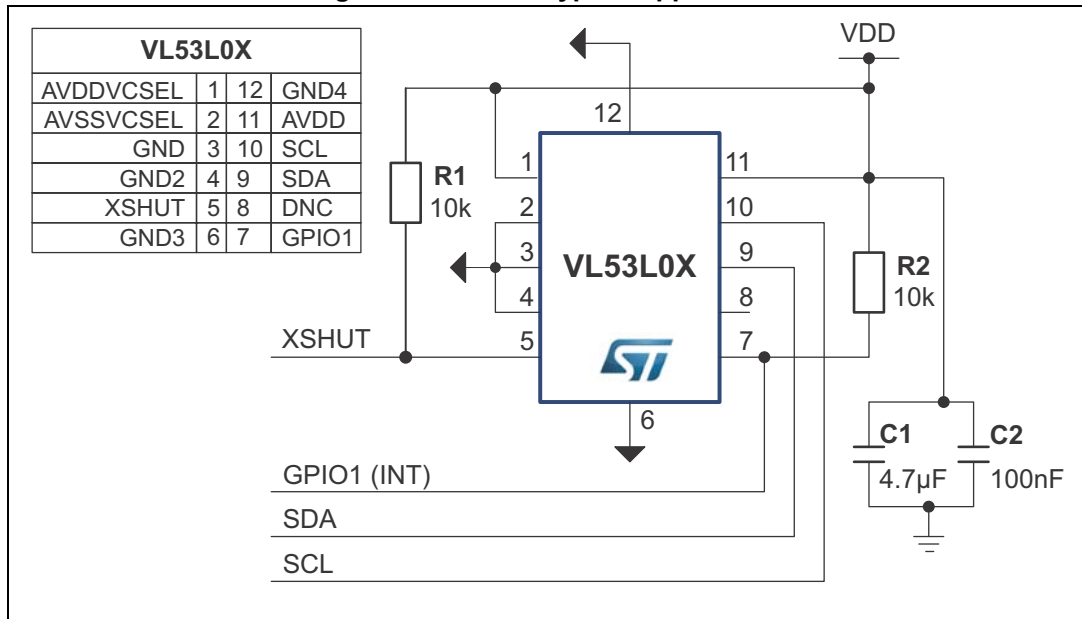
This chapter shows how multiple VL53L0X devices can be used on a board design while only using a single I2C interface to interact with all the devices.

Each VL53L0X device has both a reset pin and an interrupt pin, which can be used to enable a multiple device setup.

### 2.1 VL53L0X control management

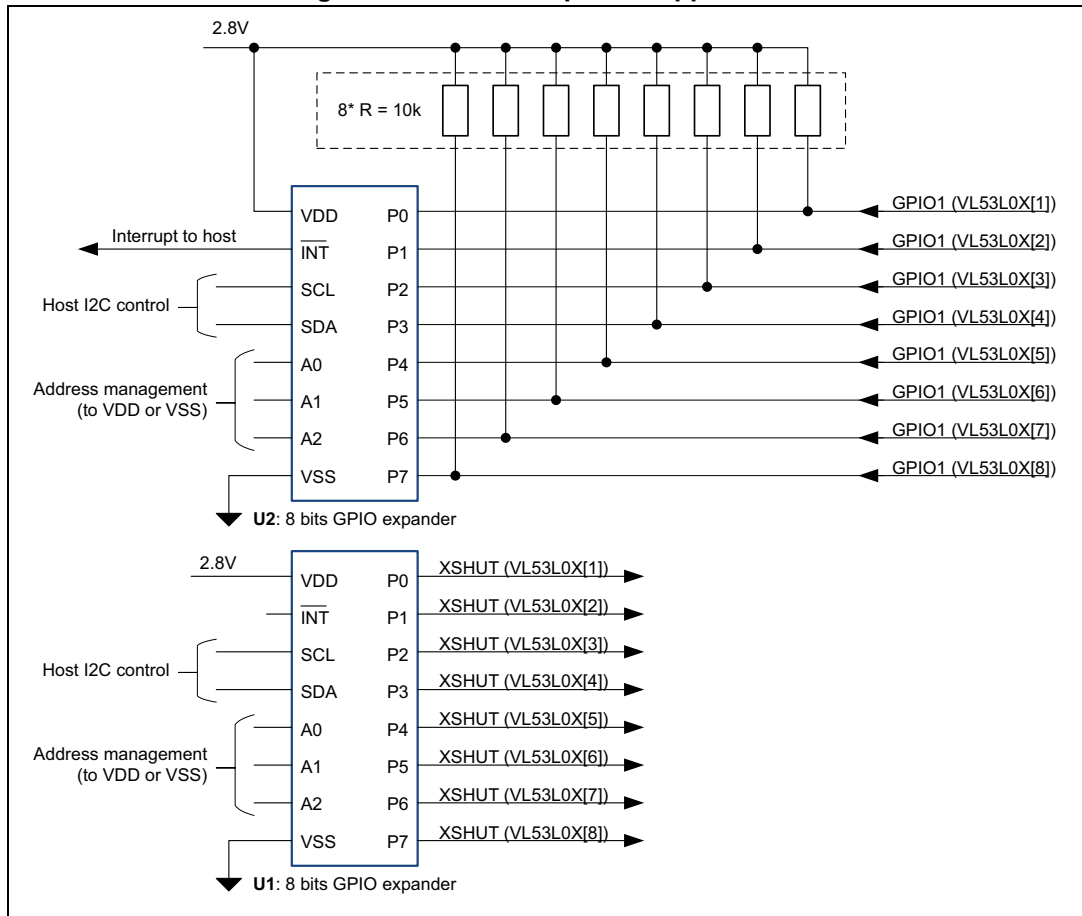
1. [Figure 2](#) is a typical example schematic using a VL53L0X device. Since the VL53L0X can have the I2C device address changed by doing an I2C write once it is booted, a unique reset pin would be needed for each VL53L0X used in a design. Each device is then taken out of reset one at a time, and then the I2C Device Address is changed to a new unique address. This can be done by using multiple GPIO pins from the microprocessor on the board.

Figure 2. VL53L0X typical application



2. For a board with multiple VL53L0X used in the design, if there are a limited number of GPIO pins available on the microprocessor, the recommended options for the use of these GPIO pins available are:
  - a) If only one GPIO is available from the micro-processor with multiple VL53L0X devices, then two I2C GPIO expanders would be used, where the first would be for resetting the devices (XSHUT) and the second would be used for the interrupts. An example schematic is shown in [Figure 3](#).
  - b) If (x) VL53L0X devices are being used, and (x+1) GPIOs are available, then it is recommended to use a GPIO expander for the resetting (XSHUT) of the VL53L0X devices, and connect each individual interrupt to the microprocessor. Since the interrupt of each VL53L0X is going directly to the microprocessor, time is saved when an interrupt is triggered directly to the microprocessor instead of going through a GPIO expander IC.
  - c) If (x) VL53L0X devices are being used, and (2x) GPIOs are available, then no GPIO expander chips are needed, and all reset (XSHUT) and interrupts pins would be connected directly to the microprocessor.

Figure 3. I2C GPIO expander application



## 2.2 VL53L0X API management

See also “VL53L0X\_API\_Integration Guide.pdf” on [www.st.com/VL53L0X](http://www.st.com/VL53L0X) in “Design Resources” page.

In vl53L0x\_platform.h API file

- Set VL53L0x\_SINGLE\_DEVICE\_DRIVER macro to 0 so that API implementation will be automatically adapted to a multi-device context.
- Define VL53L0xDev\_t type as a structure pointer holding any data required for multi-device management. A mandatory field is an instance of VL53L0xDevData containing ST API private data.
- Then
  - define, “N” the number of VL53L0X (Struct MyVL53L0xDev\_t BoardDevs[N])
  - Put all devices under reset
  - Enable VL53L0X one after the other and set their I2C address through VL53L0X\_SetDeviceAddress (&BoardDevs[i], FinalI2cAddr)

### 3 Revision history

Table 1. Document revision history

Date	Revision	Changes
23-May-2016	1	Initial release.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2016 STMicroelectronics – All rights reserved