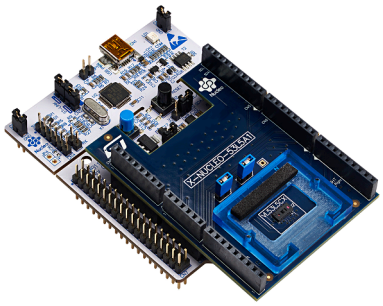
P-NUCLEO-53L5A1

Data brief

VL53L5CX nucleo pack with X-NUCLEO-53L5A1 expansion board and STM32F401RE nucleo board



Features

- VL53L5CX Time-of-Flight 8x8 multizone ranging sensor with wide field of view expansion board (X-NUCLEO-53L5A1)
- STM32F401RE nucleo board
- 0.25, 0.5, and 1 mm height spacers to simulate air gaps
- Cover window to protect sensor from dust
- Equipped with an Arduino UNO R3 connector
- RoHS, CE, UKCA, and China RoHS compliant
- Full system SW is supplied, including code examples and graphical user interface (GUI). All this can be downloaded on www.st.com

Description

The P-NUCLEO-53L5A1 is a complete evaluation kit allowing anyone to learn, evaluate, and develop their application using the VL53L5CX, Time-of-Flight 8x8 multizone ranging sensor with wide field of view (FoV).

The VL53L5CX is a state of the art, Time-of-Flight (ToF) multizone ranging sensor enhancing the ST FlightSense product family. Housed in a miniature reflowable package, it integrates a SPAD array, physical infrared filters, and diffractive optical elements (DOE) to achieve the best ranging performance in various ambient lighting conditions with a range of cover glass materials.

Multizone distance measurements are possible up to 8x8 zones with a wide 63 ° diagonal FoV which can be reduced by software. Each zone of the VL53L5CX is measuring the distance of the target up to 4 meters, at maximum frequency of 60 Hz.

Thanks to ST Histogram patented algorithms, the VL53L5CX is able to detect different objects within the FoV. The Histogram also provides immunity to cover glass crosstalk beyond 60 cm.

The STM32 nucleo board, NUCLEO-F401RE, provides an affordable and flexible way for users to try out new ideas and build prototypes with any STM32 microcontroller, choosing from the various combinations of performance, power consumption, and features.

Device summary

Order code	Description
P-NUCLEO-53L5A1	X-NUCLEO-53L5A1 and NUCLEO-F401RE boards

1 Board descriptions

1.1 NUCLEO-F401RE board

Information about NUCLEO-F401RE board can be found on www.st.com.

1.2 X-NUCLEO-53L5A1 expansion board

The X-NUCLEO-53L5A1 expansion board allows the user to test the VL53L5CX functionality and to program it, which helps understand how to develop an application using the VL53L5CX. It integrates:

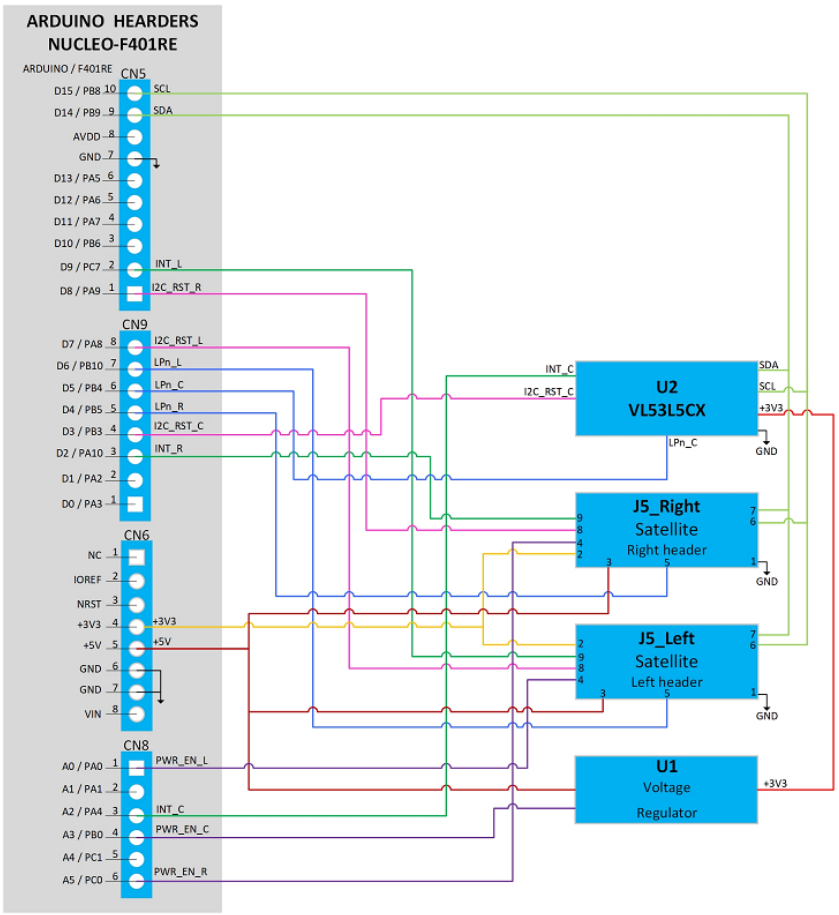
- 3.3 V voltage regulator to supply the VL53L5CX on the expansion board
- the necessary connectivity for the application
- two satellite headers to control two additional VL53L5CX-SATEL breakout boards

The NUCLEO-F401RE board has to be programmed to control the X-NUCLEO-53L5A1 expansion board. The required software is available on www.st.com.

X-NUCLEO-53L5A1 expansion board and the NUCLEO-F401RE board are connected through the Arduino compatible connectors CN5, CN6, CN8, and CN9 (see the figure and tables below).

The Arduino connectors on the NUCLEO-F401RE board support the Arduino Uno Revision 3.

Figure 1. X-NUCLEO-53L5A1 circuit diagram



1.3 Optional VL53L5CX breakout boards

The VL53L5CX breakout boards can be directly plugged onto the X-NUCLEO-53L5A1 expansion board through two 9-pin headers (see Figure 2. Connecting the VL53L5CX breakout boards) or they can be connected to the expansion board by soldering the wires (see Figure 3. VL53L5CX mini PCB connection to X-NUCLEO-53L5A1 expansion board).

Breakout boards can be purchased separately using the reference: VL53L5CX-SATEL (link to the page: https://www.st.com/en/evaluation-tools/vl53l5cx-satel.html). In this pack, two breakout boards are provided.

When connected through flying leads, developers should break off the mini PCB from the breakout board and use only the “VL53L5CX mini PCB” which is smaller and integrates more easily into the customer’s devices.

Figure 2. Connecting the VL53L5CX breakout boards

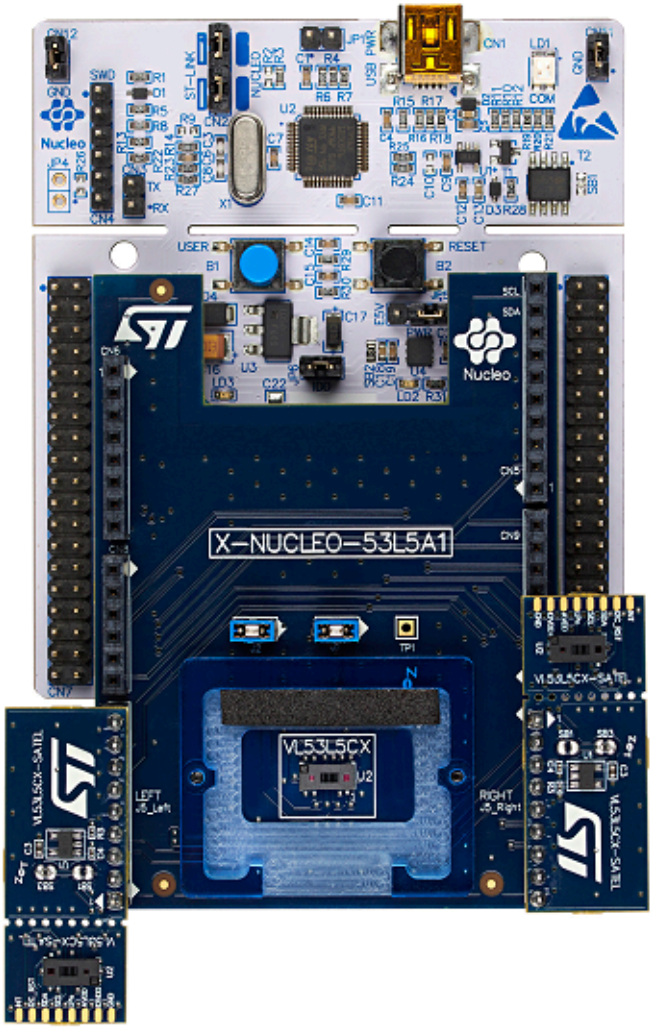
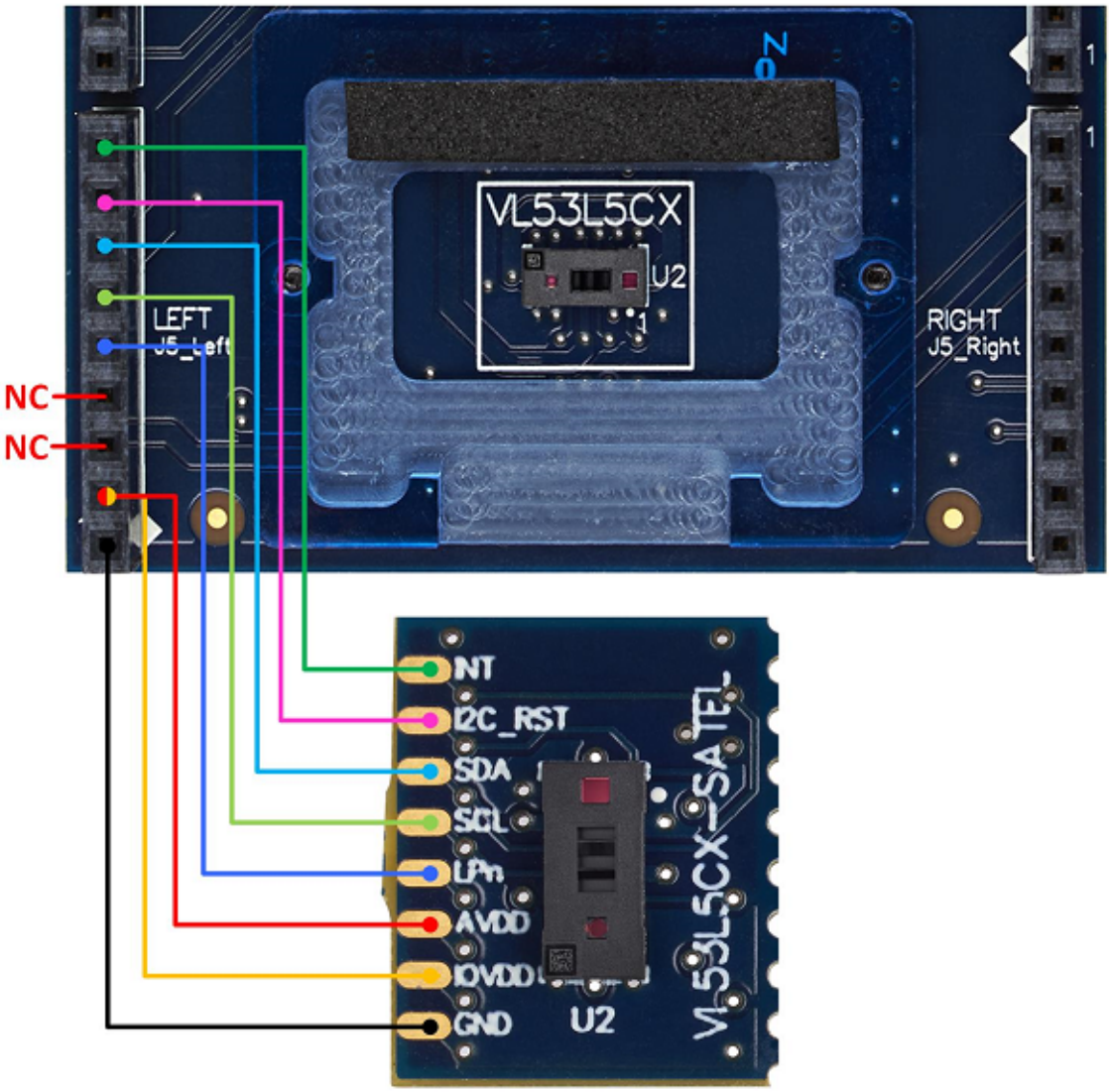


Figure 3. **VL53L5CX mini PCB connection to X-NUCLEO-53L5A1 expansion board**



2 Laser safety considerations

The VL53L5CX contains a laser emitter and corresponding drive circuitry. The laser output is designed to remain within Class 1 laser safety limits under all reasonable foreseeable conditions, including single faults, in compliance with the IEC 60825-1:2014 (third edition). The laser output remains within Class 1 limits as long as the STMicroelectronic's recommended device settings are used and the operating conditions specified in the datasheet are respected. The laser output power must not be increased and no optics should be used with the intention of focusing the laser beam.

Figure 4. Class 1 laser product label



3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

Revision history

Table 1. **Document revision history**

Date	Version	Changes
21-Jun-2021	1	Initial release

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