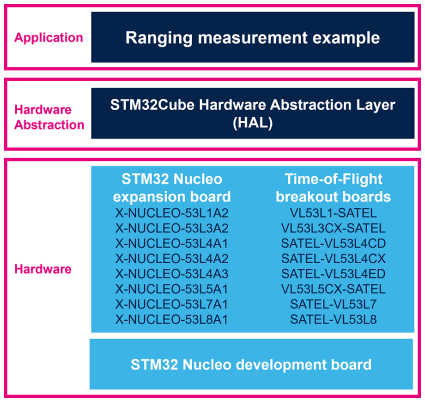
X-CUBE-TOF1

Data brief

Time-of-Flight (ToF) sensors software expansion for STM32Cube



Product links	
ToF sensors software expansion for STM32Cube	X-CUBE-TOF1
ToF sensors expansion boards for STM32 Nucleo	X-NUCLEO-53L1A2 X-NUCLEO-53L3A2 X-NUCLEO-53L4A1 X-NUCLEO-53L4A2 X-NUCLEO-53L4A3 X-NUCLEO-53L5A1 X-NUCLEO-53L7A1 X-NUCLEO-53L8A1
ToF breakout boards	VL53L1-SATEL VL53L3CX-SATEL SATEL-VL53L4CD SATEL-VL53L4CX SATEL-VL53L4ED VL53L5CX-SATEL SATEL-VL53L7CX SATEL-VL53L8
STM32 Nucleo development board	STM32 Nucleo

Features

- Complete software to build applications using the following sensors:
  - VL53L1, a ranging sensor with advanced multizone and multiobject detection for:
    - X-NUCLEO-53L1A2
    - VL53L1-SATEL
  - VL53L3CX, a ranging sensor with multitarget detection for:
    - X-NUCLEO-53L3A2
    - VL53L3CX-SATEL
  - VL53L4CD, a Time-of-Flight high accuracy proximity sensor for:
    - X-NUCLEO-53L4A1
    - SATEL-VL53L4CD
  - VL53L4CX, a Time-of-Flight sensor with extended range measurement for:
    - X-NUCLEO-53L4A2
    - SATEL-VL53L4CX
  - VL53L4ED, a Time-of-Flight high accuracy proximity sensor with extended temperature range for:
    - X-NUCLEO-53L4A3
    - SATEL-VL53L4ED
  - VL53L5CX, an 8x8 multizone ranging sensor with a wide field of view for:
    - X-NUCLEO-53L5A1
    - VL53L5CX-SATEL
  - VL53L7CX, a Time-of-Flight 8x8 multizone ranging sensor with 90-degrees FoV for:
    - X-NUCLEO-53L7A1
    - SATEL-VL53L7CX
  - VL53L8CX, a low-power high-performance 8x8 multizone Time-of-Flight sensor for:
    - X-NUCLEO-53L8A1
    - SATEL-VL53L8
- Several examples to show the innovative technology for the accurate distance ranging capability
- Sample application to transmit real-time sensor data to a PC
- Precompiled binaries are available on the boards listed above
- Package compatible with STM32CubeMX, can be downloaded from, and installed directly into, STM32CubeMX
- Easy portability across different MCU families, thanks to STM32Cube
- Free, user-friendly license terms

Description

The X-CUBE-TOF1 expansion software package for the STM32Cube runs on the STM32. It includes drivers that recognize the sensors and perform simple ranging on single or multiple devices.

The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers.

The software comes with a sample implementation of the drivers. They run on the VL53L1, VL53L3CX, VL53L4CD, VL53L4CX, VL53L4ED, VL53L5CX, VL53L7CX, and VL53L8CX development boards. The boards are connected to a featured STM32 Nucleo development board.

The software provides sample applications such as: simple ranging for expansion board and breakout boards, multisensors ranging, and calibration.

1 Detailed description

1.1 What is STM32Cube?

STM32Cube is a combination of a full set of PC software tools and embedded software blocks running on STM32.

microcontrollers and microprocessors:

- STM32CubeMX configuration tool for any STM32 device; it generates initialization C code for Cortex-M cores and the Linux device tree source for Cortex-A cores
- STM32CubeIDE integrated development environment based on open-source solutions like Eclipse or the GNU C/C++ toolchain, including compilation reporting features and advanced debug features
- STM32CubeProgrammer programming tool that provides an easy-to-use and efficient environment for reading, writing, and verifying devices and external memories via a wide variety of available communication media (JTAG, SWD, UART, USB DFU, I²C, SPI, CAN, etc.)
- STM32CubeMonitor family of tools (STM32CubeMonRF, STM32CubeMonUCPD, STM32CubeMonPwr) to help developers customize their applications in real-time
- STM32Cube MCU and MPU packages specific to each STM32 series with drivers (HAL, low-layer, etc.), middleware, and lots of example code used in a wide variety of real-world use cases
- STM32Cube expansion packages for application-oriented solutions

1.2 How does this software complement STM32Cube?

This software is based on the STM32CubeHAL hardware abstraction layer for the STM32 microcontroller.

The package extends STM32Cube by providing a board support package (BSP) for the sensor expansion board.

The drivers abstract the hardware low-level details and allow the applications to access sensor data in a hardware-independent manner.

Sensor data can be logged to a file selected by the user.

The package is compatible with STM32CubeMX. It can be downloaded from and installed directly into STM32CubeMX, as detailed in UM1718 (freely available on www.st.com).

Revision history

Table 1. **Document revision history**

Date	Version	Changes
22-Mar-2021	1	Initial release
20-May-2021	2	Section 1.2: How does this software complement STM32Cube? updated
13-Jul-2021	3	Update cover image Add compatibility with X-NUCLEO-53L5A1 and VL53L5CX-SATEL boards
03-Jan-2022	4	Update cover image Add compatibility with VL53L1
23-Jun-2022	5	Update cover image Features: added VL53L4CD and VL53L4CX details. Description: replaced X-NUCLEO-53L1A2, X-NUCLEO-53L3A2, and X-NUCLEO-53L5A1 expansion boards by VL53L1, VL53L3CX, VL53L4CD, VL53L4CX, and VL53L5CX development boards. Product links: added X-NUCLEO-53L4A1, X-NUCLEO-53L4A2, SATEL-VL53L4CD, and SATEL-VL53L4CX.
13-Oct-2022	6	Update cover image Features: added VL53L7CX Description: added VL53L7CX to the list of sample implementations provided Product links: added X-NUCLEO-53L7A1 and SATEL-VL53L7CX
15-Mar-2023	7	Update cover image Features: added VL53L8CX Description: added VL53L8CX to the list of sample implementations provided Product links: added X-NUCLEO-53L8A1 and SATEL-VL53L8
12-Jan-2024	8	Updated cover image Added information concerning the VL53L4ED.