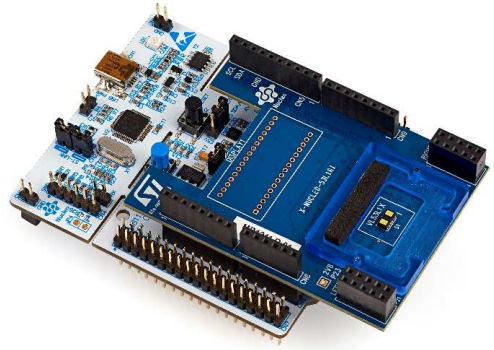
VL53L1X Simple Ranging Example

User Manual



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Long distance ranging sensor expansion board
Hardware Overview (1/3)

X-NUCLEO-53L1A1 Hardware Description

- The X-NUCLEO-53L1A1 is a long distance ranging sensor evaluation and development board system, designed around VL53L1X, a device based on ST's FlightSense™, Time-of-Flight technology.
- The VL53L1X communicates with STM32 Nucleo developer board host microcontroller through an I^2C link available on the Arduino UNO R3 connector.

Key Products on board

VL53L1X ranging and gesture detection sensor module.

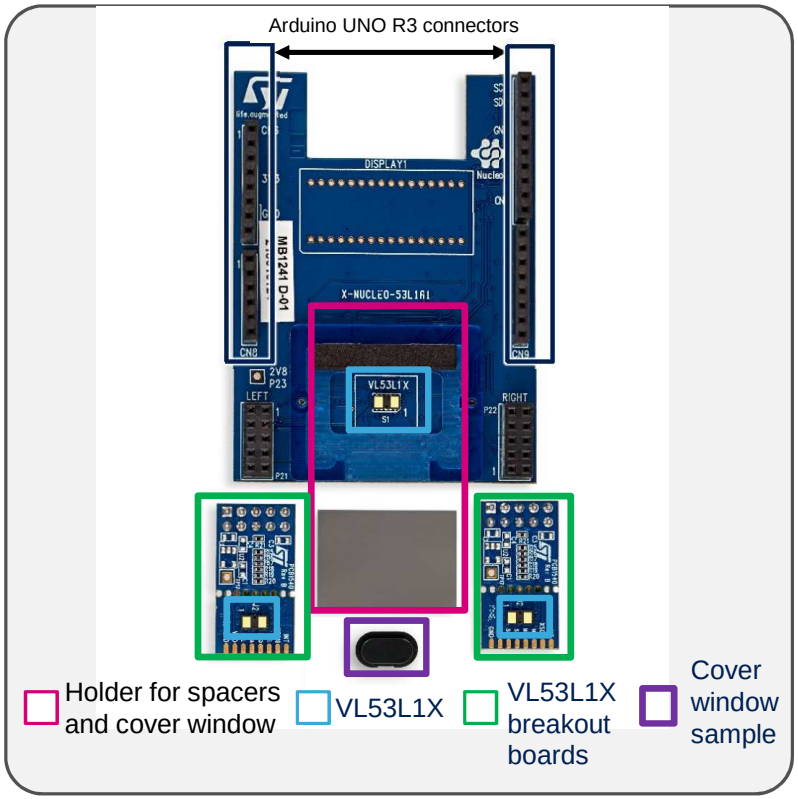
0.25, 0.5 and 1mm spacers to simulate air gaps, with the cover window.

Cover window sample with low cross-talk ready to use on VL53L1X (Hornix manufacturer)

2x VL53L1X breakout boards

Latest info available at www.st.com
X-NUCLEO-53L1A1

Remove the protective film on the VL53L1X sensor



Order Code: **X-NUCLEO-53L1A1**

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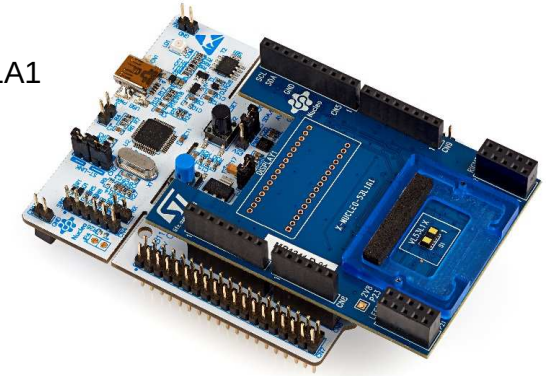
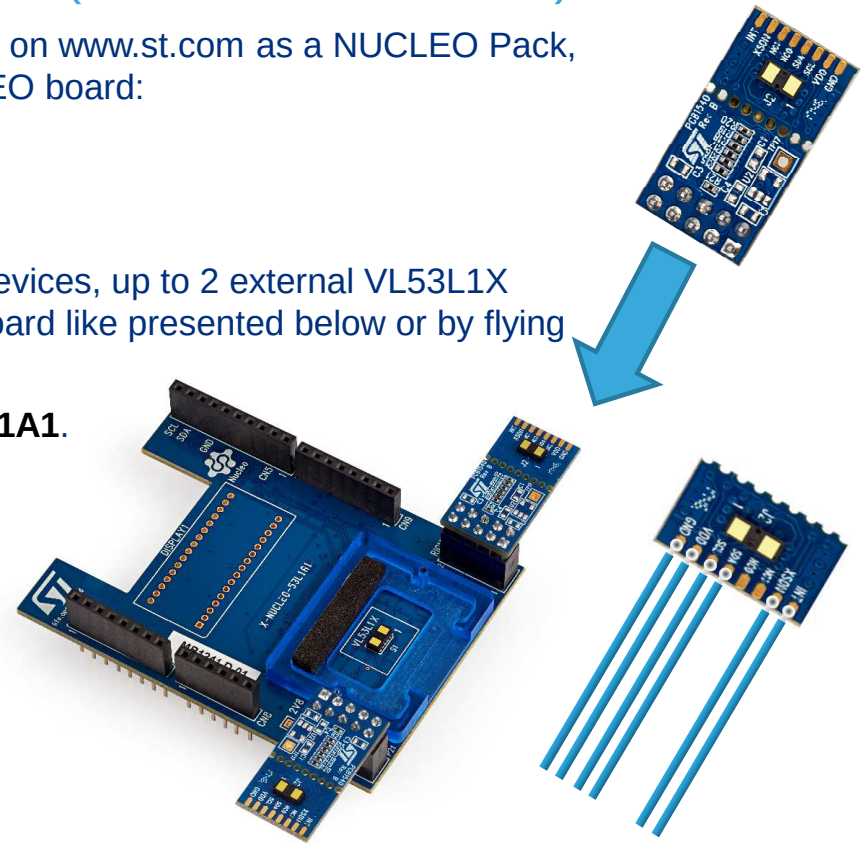
Long distance ranging sensor expansion board
Hardware Overview (2/3)

- X-NUCLEO-53L1A1 is also available as a Pack (P-NUCLEO-53L1A1)
  - The X-NUCLEO-53L1A1 expansion board can also be ordered on www.st.com as a NUCLEO Pack, combining the sensor expansion board and the STM32 NUCLEO board:

- X-NUCLEO-53L1A1 expansion board
  - In order to easily integrate multiple VL53L1X's into customer devices, up to 2 external VL53L1X breakout boards can be connected directly to the expansion board like presented below or by flying wires which can be soldered to any target..
  - These breakout boards are delivered with the **X-NUCLEO-53L1A1**.

P-NUCLEO-53L1A1





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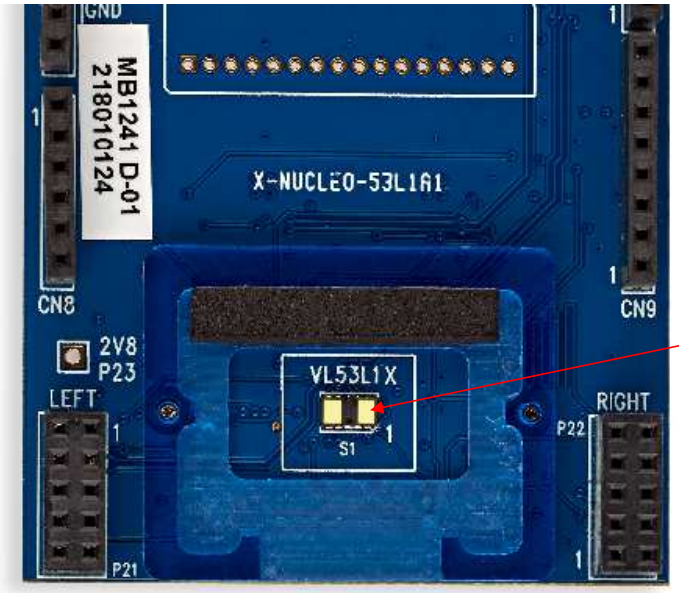
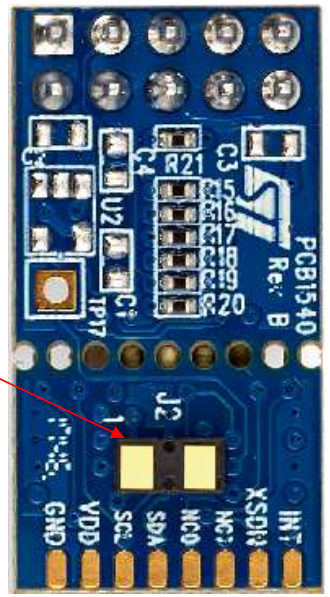
- When using the X-NUCLEO-53L1A1 expansion board or the breakout board, please remove the liner before use !
- Avoid touching the sensor with fingers



VL53L1X without liner



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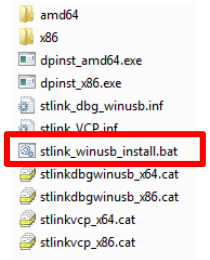
SW pre-requisites : to be done once

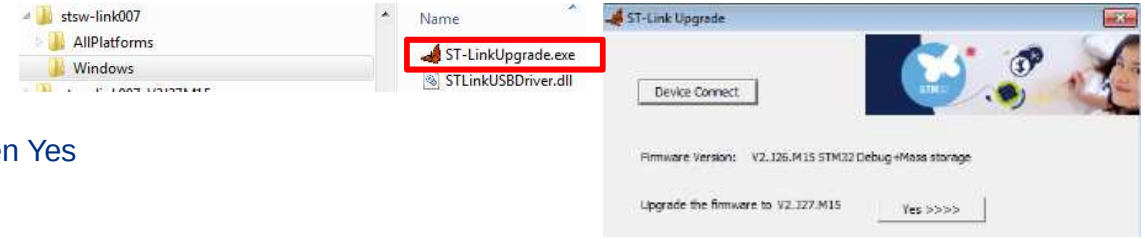
- API examples, X-CUBE data logging and GUI communicate with Nucleo through Serial com over USB (Virtual Com Port). Following SW packages must be installed
  - STSW-LINK009 : PC USB driver
  - STSW-LINK007 : Nucleo ST-LINK FW upgrade

- Connect the Nucleo pack to the PC through USB
  - Wait for the board to be recognized as a mass storage device (some drivers will be installed automatically)

- Install ST-Link Virtual Com port drivers on the PC (**STSW-LINK009**)
  - Search for STSW-LINK009 on st.com, download, unzip
  - Launch stlink_winusb_install.bat



- Upgrade ST-Link FW on the Nucleo board to get the latest version and benefit from best performances for UART over USB transfers (**STSW-LINK007**)
  - Search for STSW-LINK007 on st.com, download, unzip
  - Connect Nucleo board to the PC through USB
  - Launch ST-LinkUpgrade.exe, press Device Connect, then Yes



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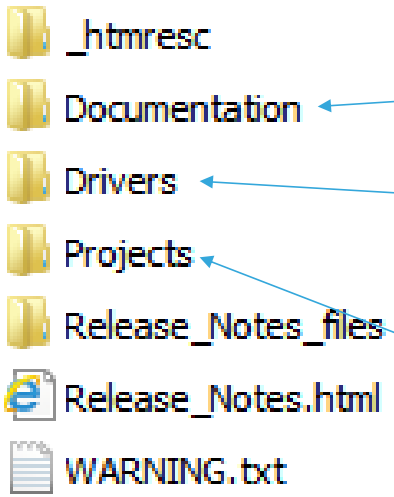
X-CUBE-53L1A1 : Content

- Search for **X-CUBE-53L1A1** on st.com, download and unzip the package on your PC
  - It is strongly recommended to unzip in a short path (like C:\Work) as the package contains many sub-folders and maximum path length supported by IAR or Keil could be reached (leading to "file not found" errors).



Documentation

VL53L1X API and other Nucleo drivers

VL53L1X example project
Projects\Multi\Examples\VL53L1X\SimpleRangingExamples

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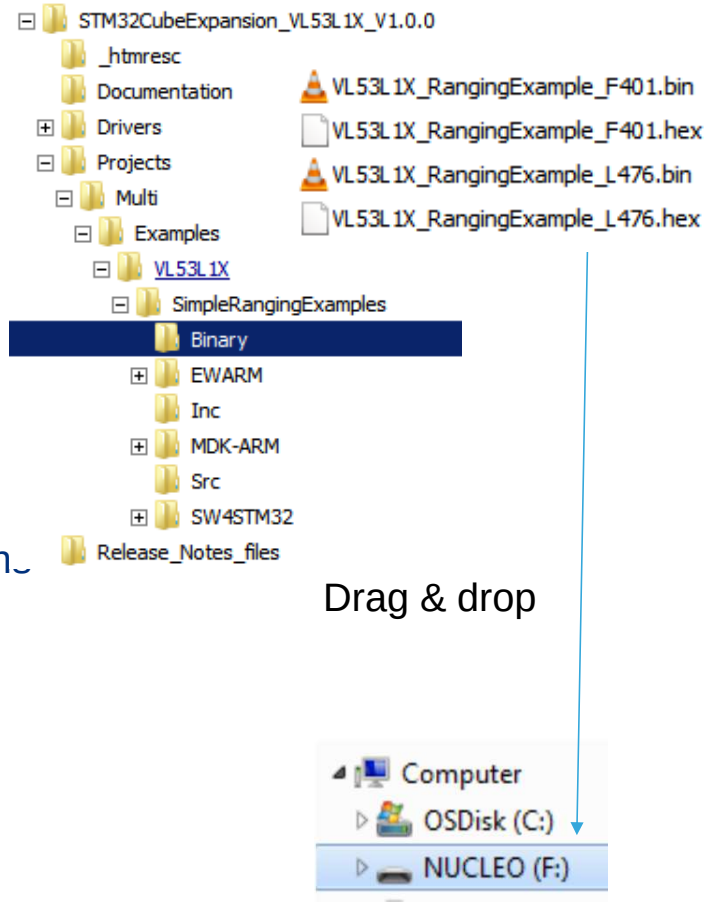
Get data logging from Nucleo (1/5)

- Hardware
  - Nucleo F401 (or L476) + X-NUCLEO-53L1A1 Expansion board
- PC connection
  - Plug hardware to PC through USB
  - Wait for drivers to be installed and Nucleo to be seen in Windows explorer
- Flash and run the demo
  - Drag & drop the correct binary (.bin) from Examples or Application directories onto the Nucleo mass storage
- Refer to X-CUBE-53L1A1 User Manual (UM2371) to get more details on the demo design.



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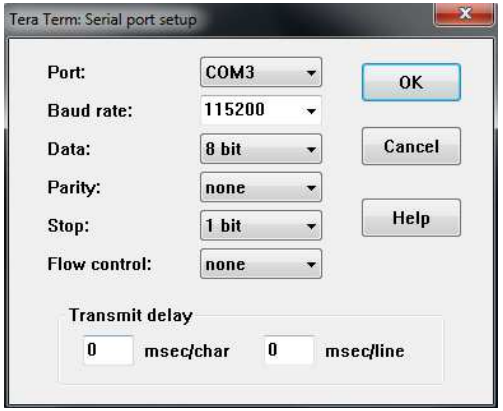
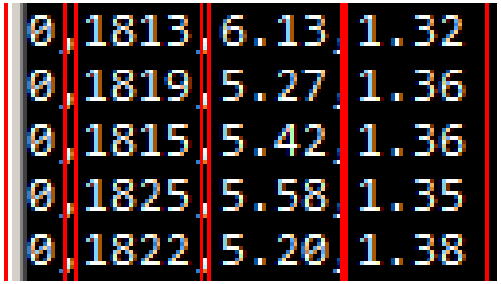
Get data logging from Nucleo (2/5)

- Please read X-CUBE-53L1A1 User Manual (in Documentations directory) to know how to
  - Get Data logging on the PC from Nucleo through serial port (over USB)
  - Import a project in your STM32 IDE
  - Compile, Flash, Debug
  - Browse the code and get key functions implemented in the demo

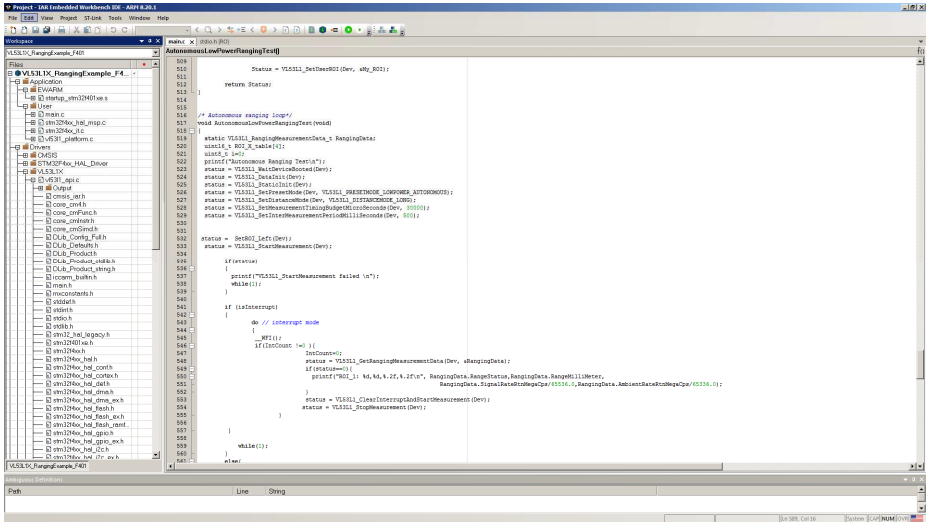
Serial port utility



Data logging



Example of project in IAR IDE for STM32



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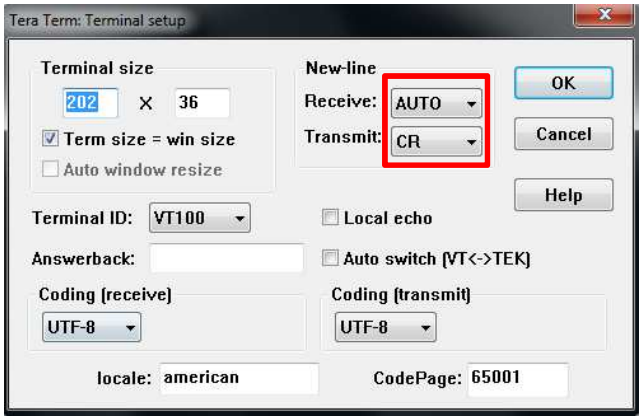
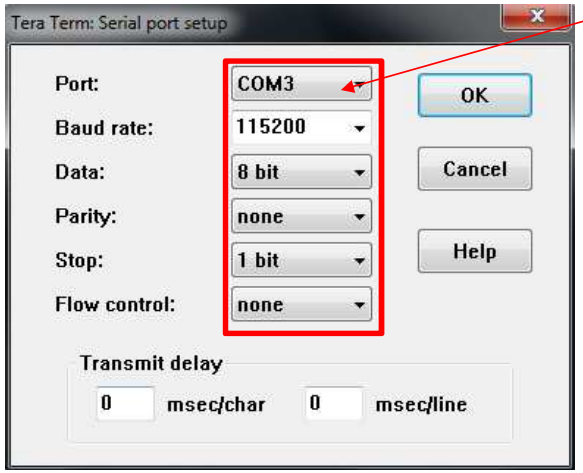
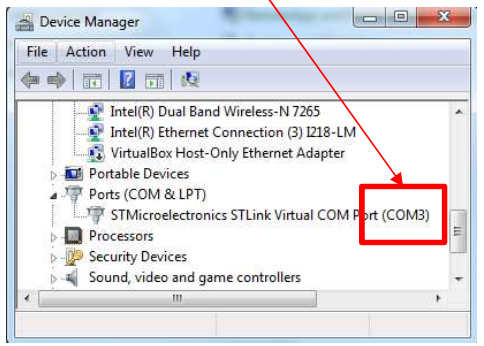
Get data logging from Nucleo (3/5)

- Install (if not already done) on your PC a terminal emulator program supporting serial port connections
  - Tera Term : http://ttssh2.osdn.jp/index.html.en
  - Putty : http://www.chiark.greenend.org.uk/~sgtatham/putty/
- Configure the program as follows
  - Setup > Terminal… and Setup > Serial Port…





Get COM number from Device Manager once Nucleo is plugged to the PC



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Get data logging from Nucleo (4/5)

- Un-plug/re-plug Nucleo board
- Start TeraTerm
- Select the right com in TeraTerm
  - Setup > Serial Port…
- Key ranging data are outputted from Nucleo to PC through serial com over USB. This provides an easy way to collect data for device evaluation or GUI building
  - RangeStatus returned by VL53L1X API.
  - RangeMillimeter : Distance in mm returned by VL53L1X API (valid only if RangeStatus is null)
  - SignalRate : Return rate in Mcps coded as a 16.16 fixed-point value
    - Divide the integer value by 65536.0 to get the floating point value (in Mcps)
  - AmbiantRate : Ambiant ratio in Mcps coded as a 16.16 fixed-point value
    - Divide the integer value by 65536.0 to get the floating point value (in Mcps)

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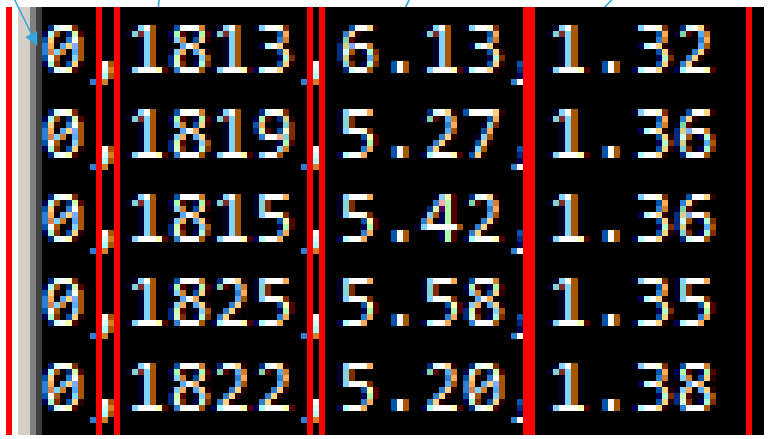
Get data logging from Nucleo (5/5)

RangeStatus, RangeMillimeter, SignalRate, AmbientRate

Single device data logging



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