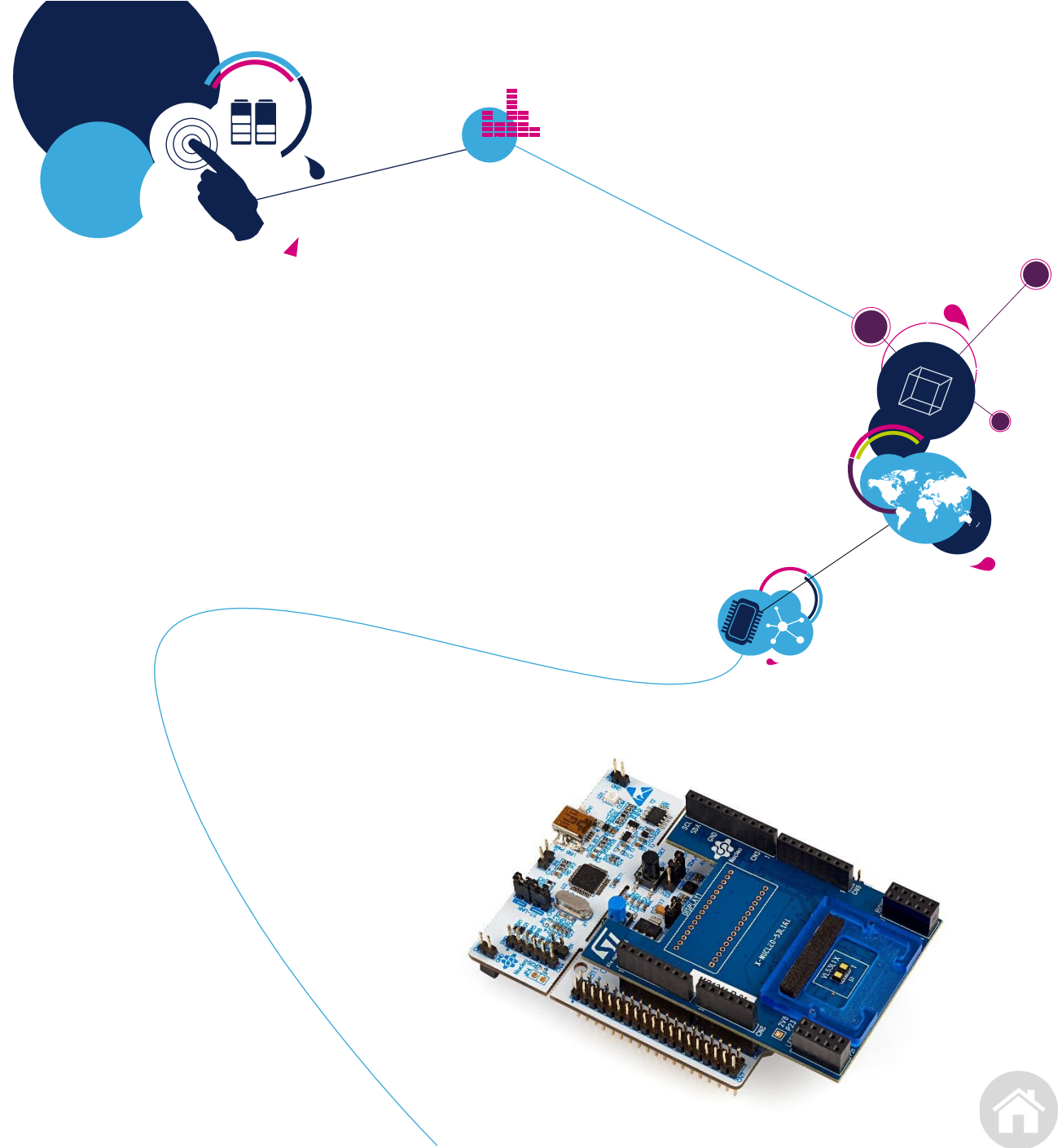


# AccessRegisters

## User Manual



# Long distance ranging sensor expansion board

## Hardware Overview (1/3)

2

### 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<sup>2</sup>C link available on the Arduino UNO R3 connector.

### Key Products on board

**VL53L1X** ranging and gesture detection sensor module.

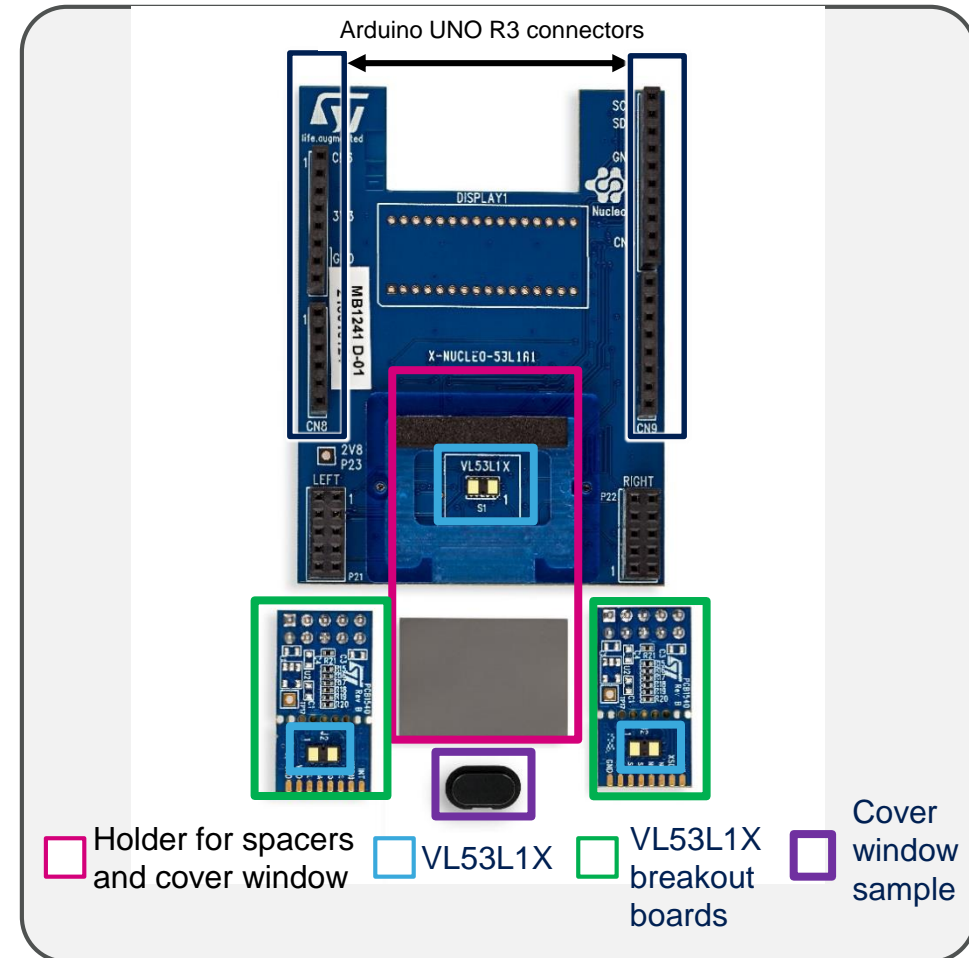
**0.25, 0.5 and 1mm spacers** to simulate air gaps, with the cover window.

**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](http://www.st.com)  
**X-NUCLEO-53L1A1**

Remove the protective film  
on the VL53L1X sensor



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

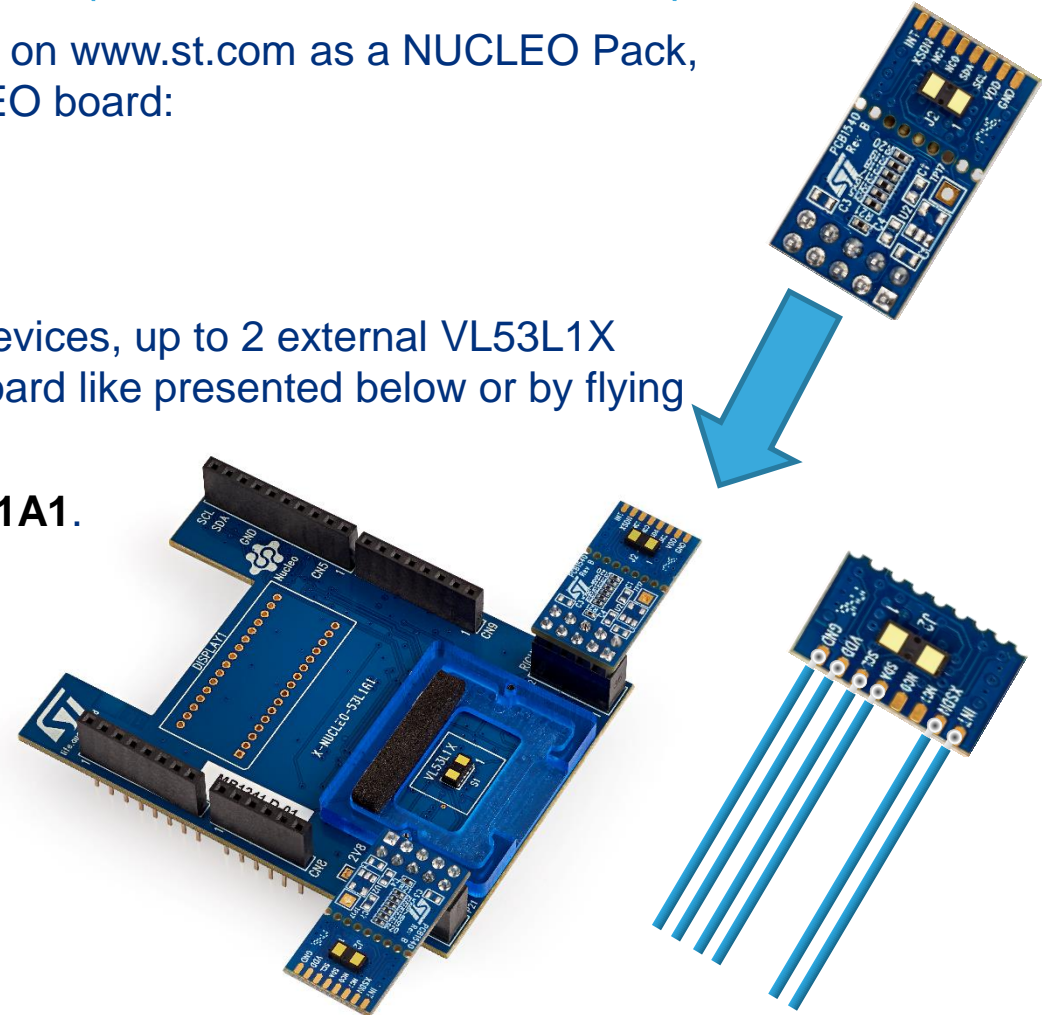
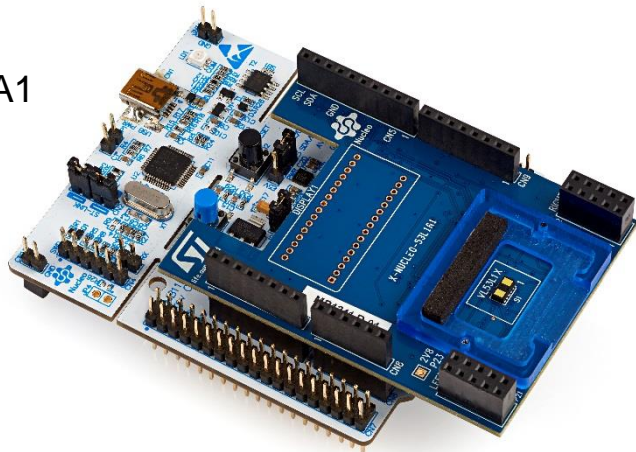
# Long distance ranging sensor expansion board

## Hardware Overview (2/3)

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](http://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

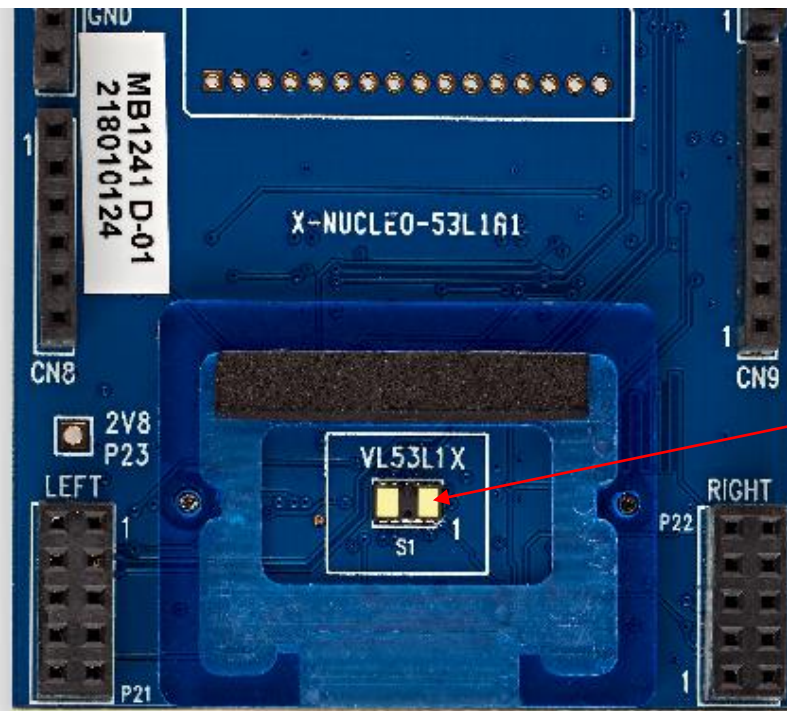


# Long distance ranging sensor expansion board

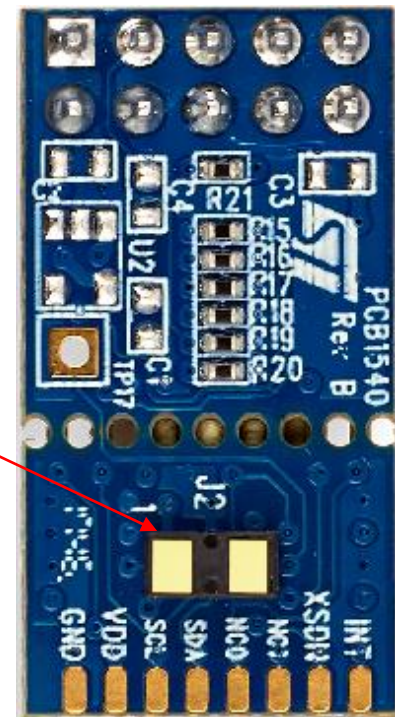
## Hardware Overview (3/3)

4

- 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





# SW pre-requisites : to be done once

5

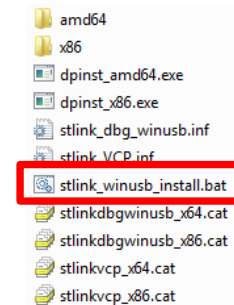
- API examples, X-CUBE data logging and GUI communicate with Nucleo through Serial com over USB (Virtual Com Port). Following SW packages must be installed
  - STSW-LINK009 : PC USB driver
  - STSW-LINK007 : Nucleo ST-LINK FW upgrade

- 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

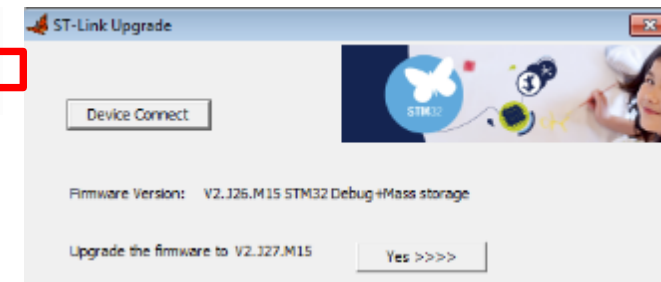


- Upgrade ST-Link FW on the Nucleo board to get the latest version and benefit from best performances for UART over USB transfers (**STSW-LINK007**)

- 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



# X-CUBE-53L1A1 : Content

6

- 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).



\_htmresc



Documentation

Documentation



Drivers

VL53L1X API and other Nucleo drivers



Projects

VL53L1X example project



Release\_Notes\_files



Release\_Notes.html

Projects\Multi\Examples\VL53L1X\AccessRegisters

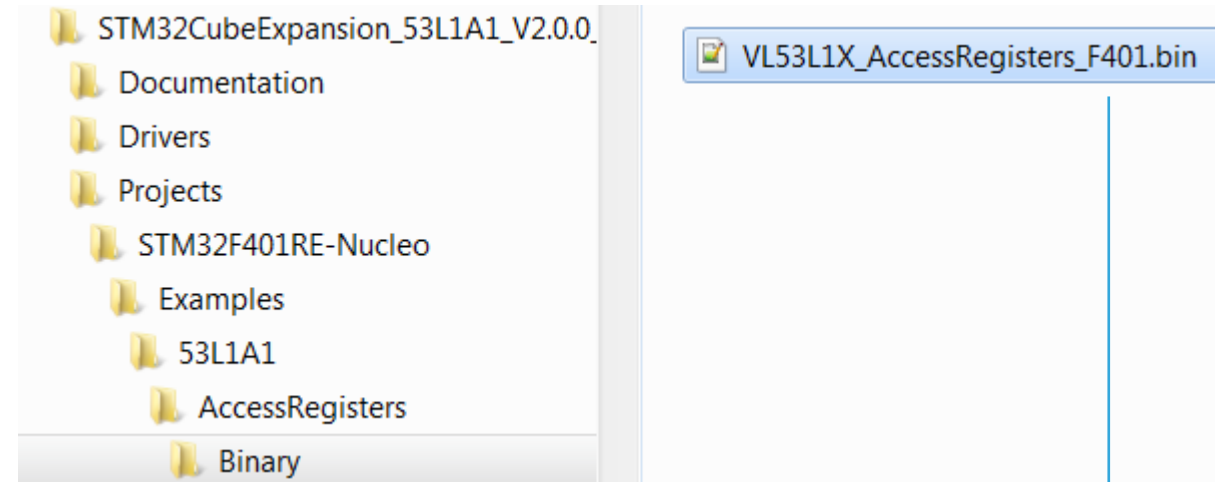


WARNING.txt

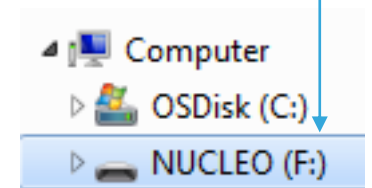
# Get data logging from Nucleo (1/5)

7

- 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 Applications directories onto the Nucleo mass storage
- Refer to X-CUBE-53L1A1 User Manual (UM2371) to get more details on the demo design.



Drag & drop

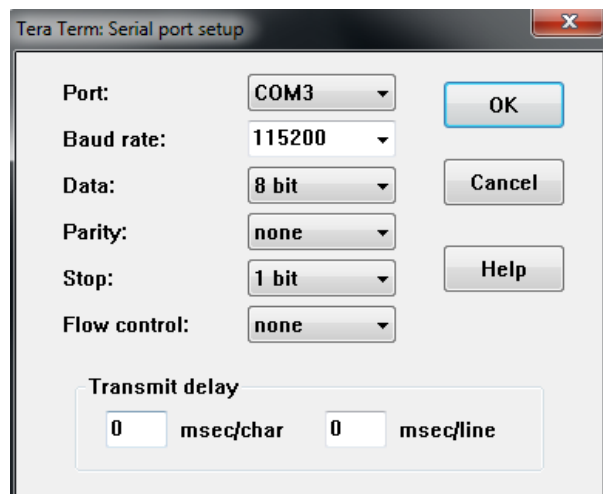


# Get data logging from Nucleo (2/5)

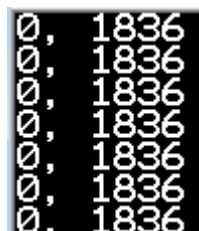
8

- 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

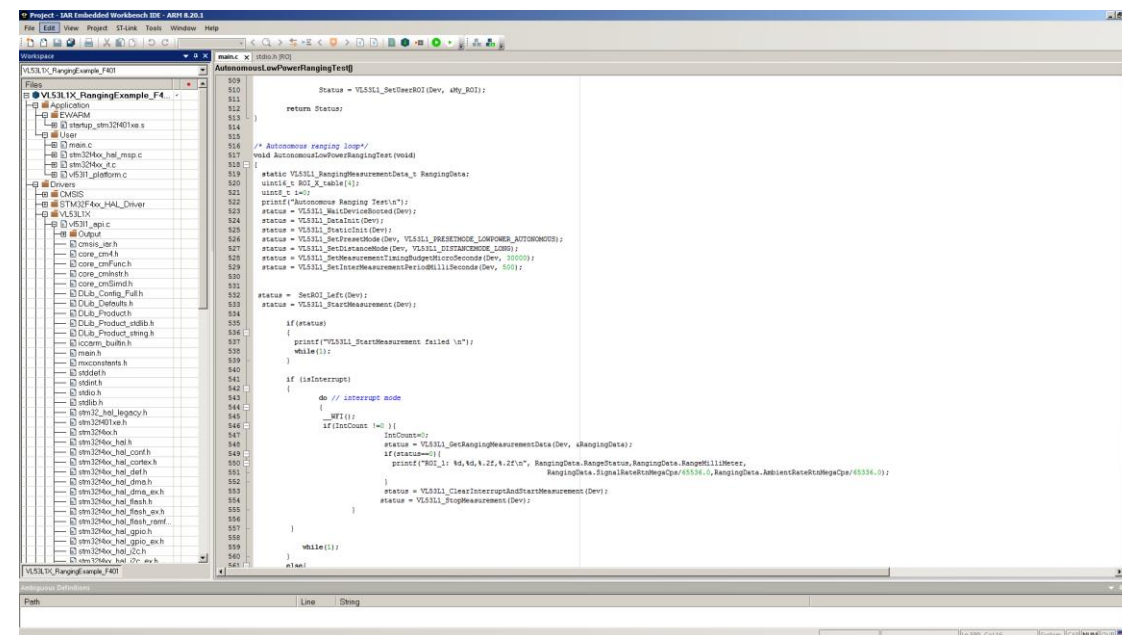
## Serial port utility



## Data logging



## Example of project in IAR IDE for STM32



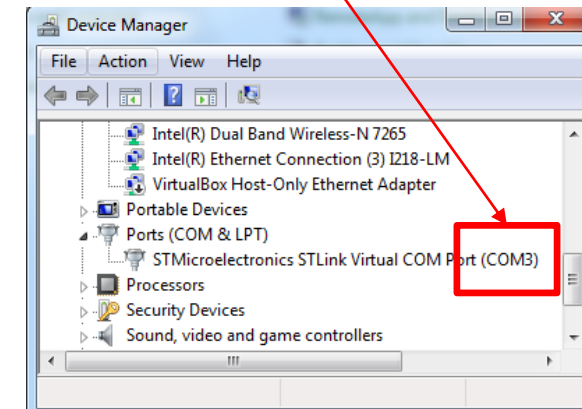
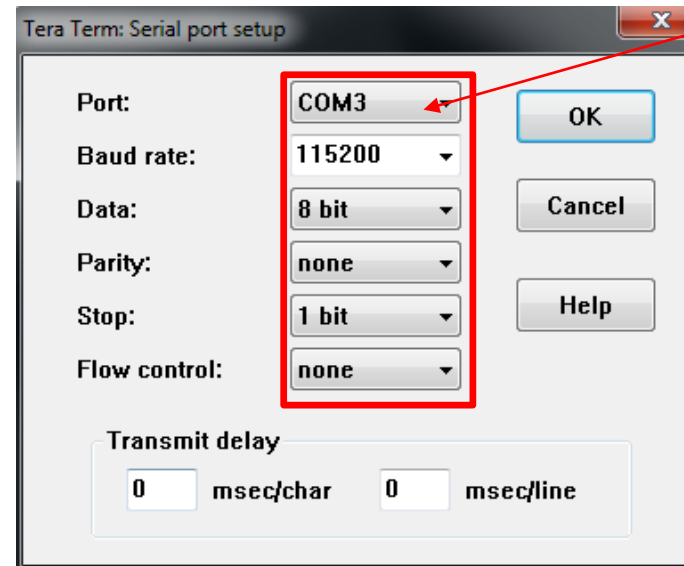
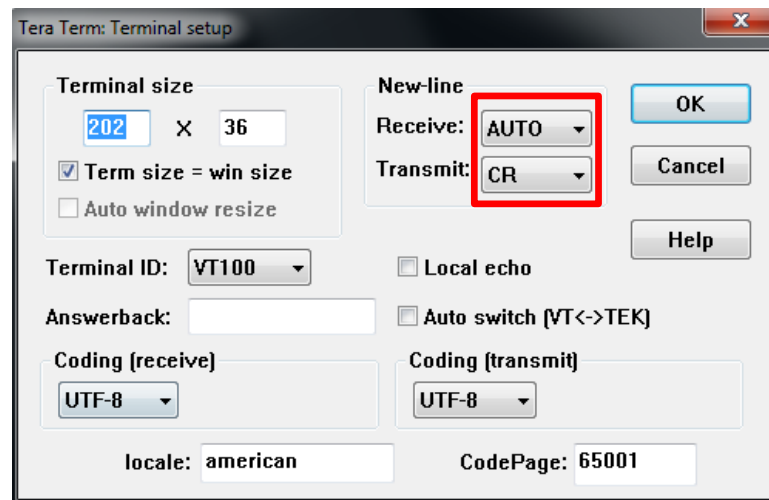


# Get data logging from Nucleo (3/5)

9

- 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



# Get data logging from Nucleo (4/5)

10

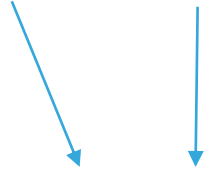
- Un-plug/re-plug Nucleo board
- Start TeraTerm
- Select the right com in TeraTerm
  - Setup > Serial Port...
- Key ranging data are outputted from Nucleo to PC through serial com over USB. This provides an easy way to collect data for device evaluation or GUI building
  - RangeStatus returned by VL53L1X 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)
  - AmbientRate : Ambient 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)

# Get data logging from Nucleo (5/5)

11

RangeStatus, RangeMillimeter,,

Single device data logging



```
0, 1836
0, 1836
0, 1836
0, 1836
0, 1836
0, 1836
0, 1836
0, 1836
0, 1836
```