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## How to connect the SATEL-VL53L7 to an STM32 Nucleo-64 board

### Introduction

The purpose of this document is to show how to connect the SATEL-VL53L7 to an STM32 Nucleo-64 board.

The SATEL-VL53L7 is composed of one miniaturized breakout board, which allows for simple integration into customer development and evaluation devices. The PCB section supporting the VL53L7 module is perforated, so developers can break off the mini-PCB for use in a 3.3 V supply application using flying wires.

The SATEL-VL53L7 is designed to connect the VL53L7 sensor remotely to any type of electronic controller.

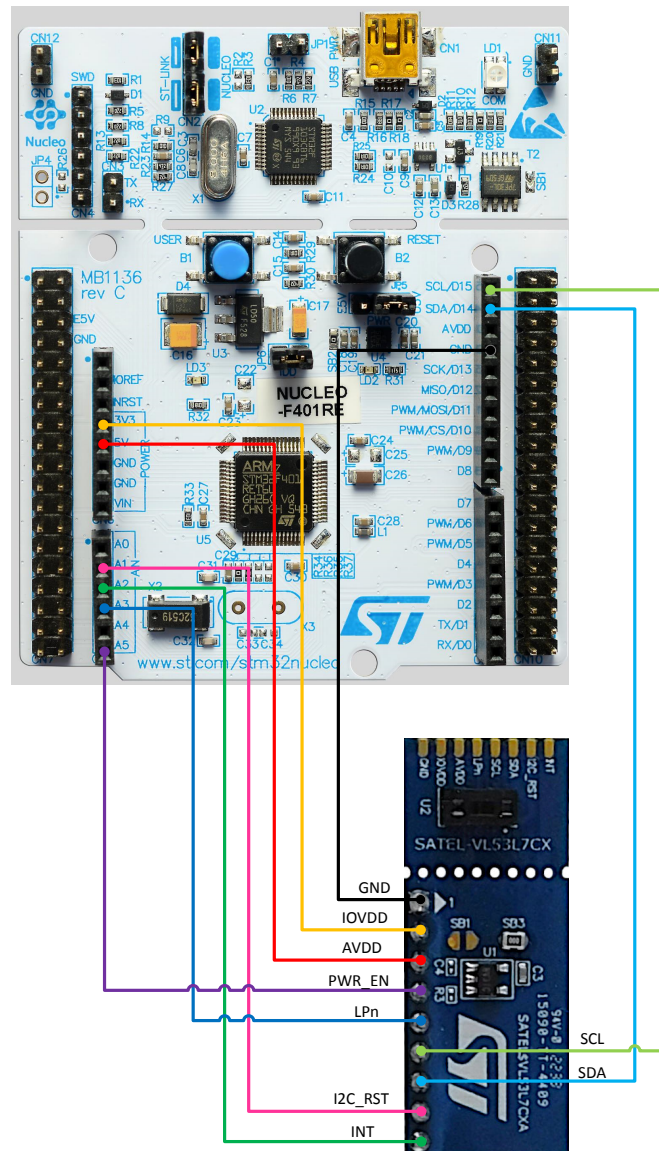
This sensor is a noncommercial ToF sensor, intended solely for evaluation purposes. It supports the entire VL53L7 series.

# 1 Hardware connection guidelines

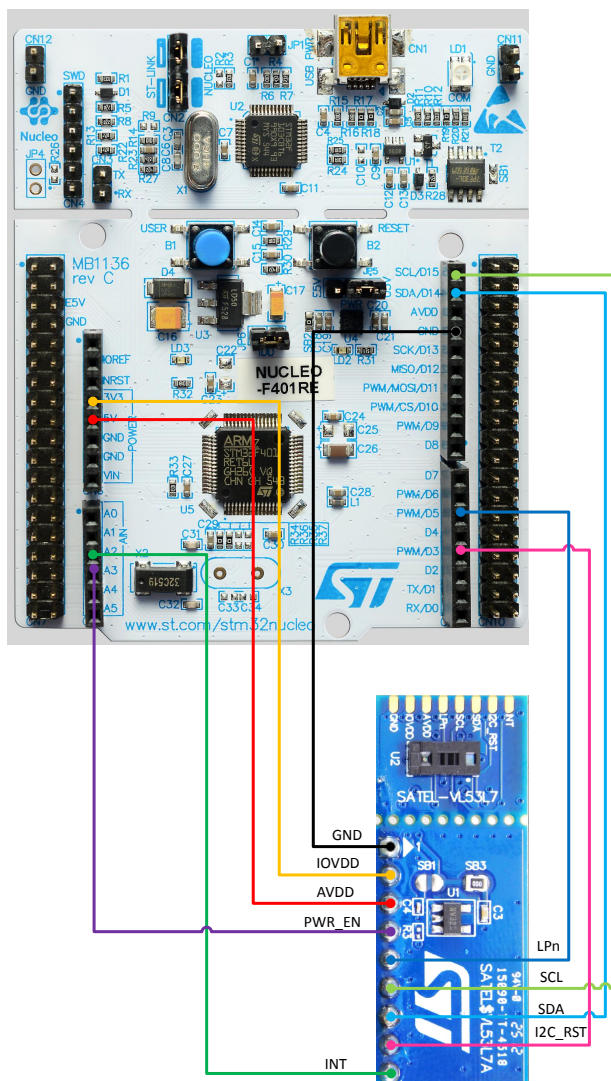
## 1.1 Use of SATEL-VL53L7 flying leads to connect to a NUCLEO-F401RE board

Figure 1 and Figure 2 show how to connect the SATEL-VL53L7 board directly to a NUCLEO-F401RE board, without an X-NUCLEO-53L7A1 expansion board.

**Figure 1. SATEL-VL53L7 flying lead connection to NUCLEO-F401RE with X-CUBE-TOF1 revision 3.4.1 and earlier**



**Figure 2. SATEL-VL53L7 flying lead connection to NUCLEO-F401RE with X-CUBE-TOF1 version 3.4.2 and later**

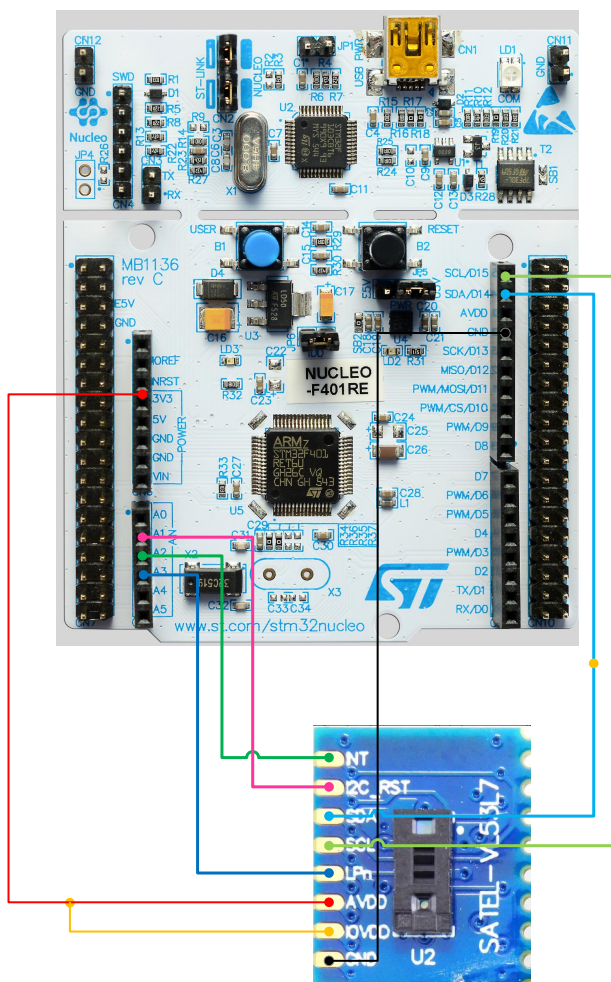


**Note:** This connection is also valid for the ULD (ultra lite driver) example code and GUI (graphical user interface) test.

## 1.2 Use of VL53L7 mini-PCB flying leads to connect to a NUCLEO-F401RE board

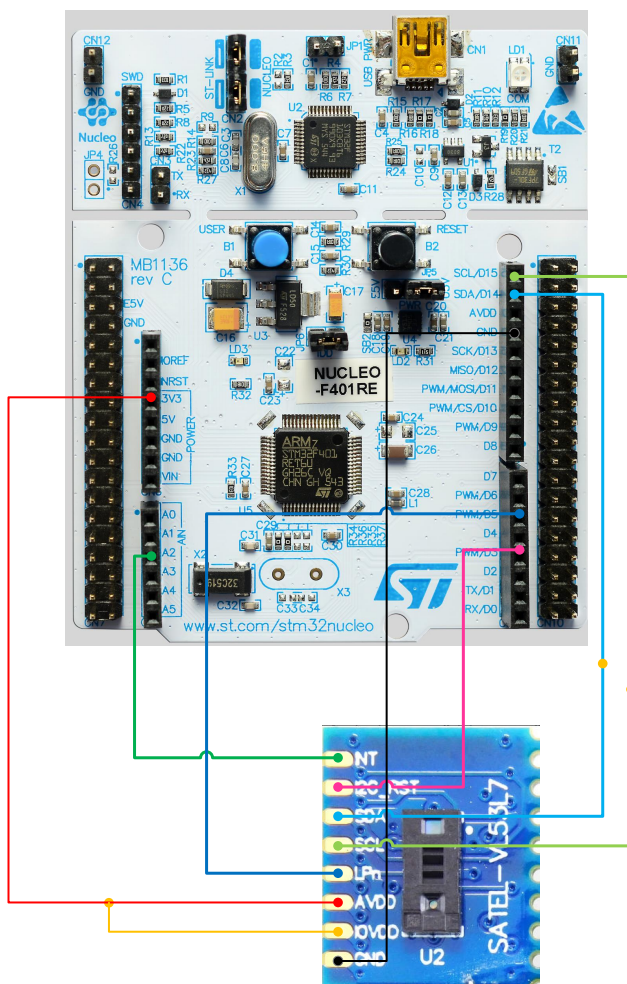
Solder the wires of the satellite breakout PCB to connect to the NUCLEO-F401RE (see Figure 3 and Figure 4).

**Figure 3. VL53L7 mini-PCB flying lead connection to NUCLEO-F401RE with X-CUBE-TOF1 revision 3.4.1 and earlier**





**Figure 4. VL53L7 mini-PCB flying lead connection to NUCLEO-F401RE with X-CUBE-TOF1 revision 3.4.2 and later**



*Note: This connection is also valid for the ULD (ultra lite driver) example code and GUI (graphical user interface) test.*

## 2 Programming guidelines

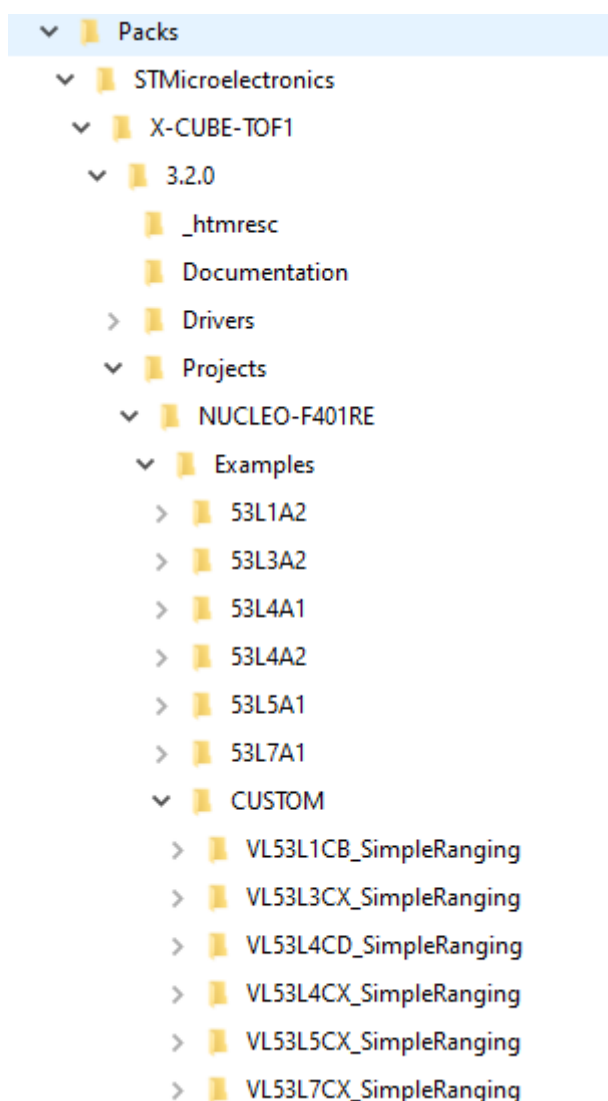
The software project to make the sensor board work directly with the NUCLEO-F401RE is available on st.com. Download the package X-CUBE-TOF1, then install the X-CUBE-TOF1 software pack in CubeMX.

The precompiled software project is available under:

C:\Users\<username>\STM32Cube\Repository\Packs\STMicroelectronics\X-CUBE-TOF1\<version>\Projects\NUCLEO-F401RE\Examples\CUSTOM\VL53L7\_SimpleRanging.

A SATEL-VL53L7 board project for NUCLEO-F401RE is available in the directory tree as shown in [Figure 5. X-CUBE-TOF1 directory](#). The difference between the ST common expansion board X-NUCLEO-53L7A1 and the SATEL-VL53L7 board is the classification name. The SATEL-VL53L7 board project is part of the "CUSTOM" directory.

**Figure 5. X-CUBE-TOF1 directory**

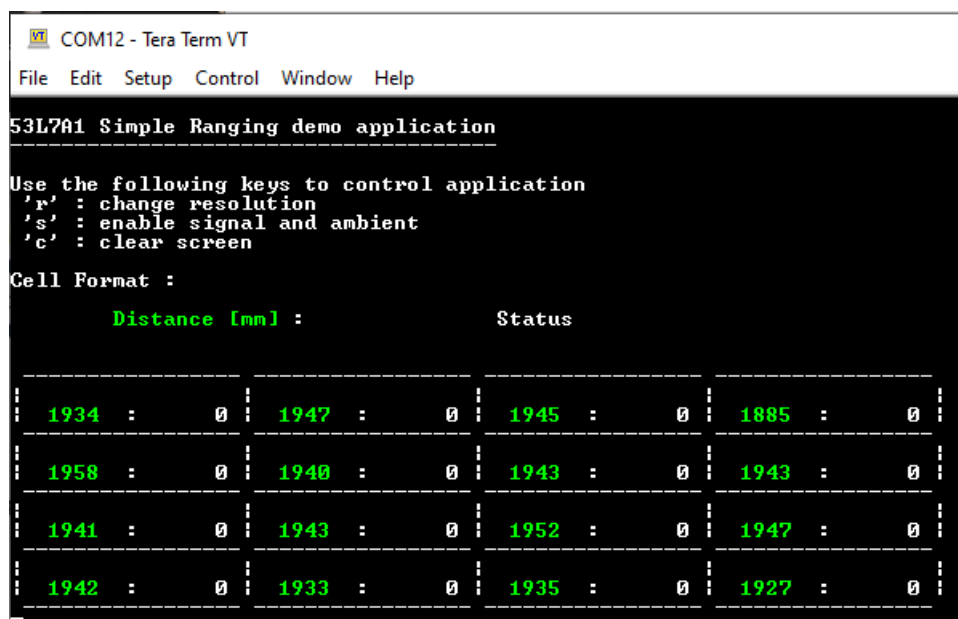


The SATEL-VL53L7 board project is developed for IAR Systems, Keil®, and STM32CubeIDE toolkits. The user can select any software development kit and make it run.

Another method is to directly push the embedded software binary file. Simply drag and drop the binary file located in the binary directory, into the STM32 target represented by "NODE\_F401RE" in the PC file tree.

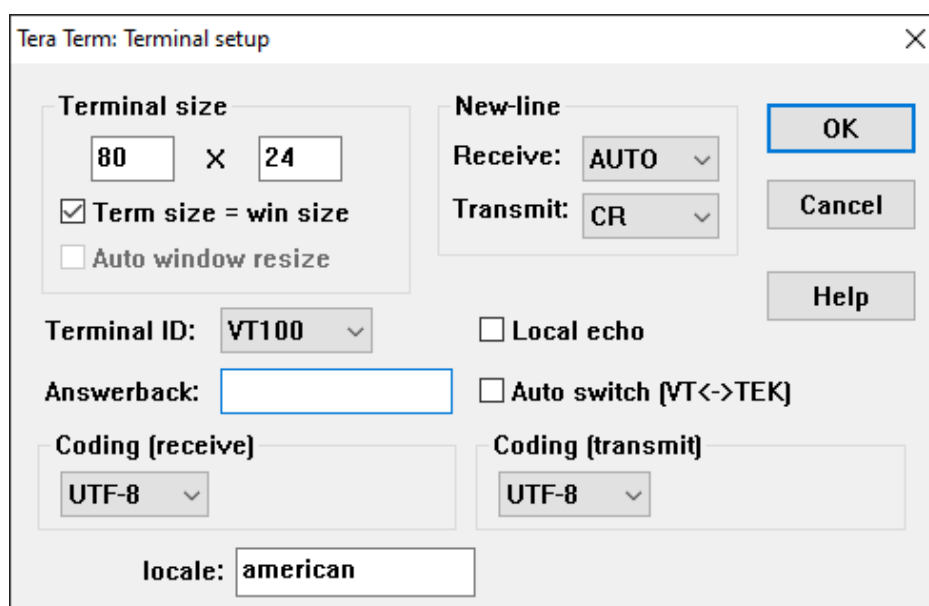
By default, the software programs the sensor in 4x4 mode. To render the result, use a serial tool (such as Tera Term) to access the Nucleo com port, as shown in Figure 6. Display rendering in 4x4 mode (default). By default, the display is rendered in 4x4 mode.

Figure 6. Display rendering in 4x4 mode (default)



To view this display, the terminal must be configured as shown in the Figure 7. Terminal settings below.

Figure 7. Terminal settings



The SATEL-VL53L7 board project embeds bidirectional communication through a universal asynchronous receiver transmitter (UART). The resolution can be changed by typing “r”. Switch the display to 8x8 mode as shown in Figure 8. Display rendering in 8x8 mode.

Figure 8. Display rendering in 8x8 mode

COM12 - Tera Term VT

File Edit Setup Control Window Help

53L701 Simple Ranging demo application

Use the following keys to control application  
'r' : change resolution  
's' : enable signal and ambient  
'c' : clear screen

Cell Format :

Distance [mm] :		Status					
2011 : 0	1966 : 0	1946 : 0	1931 : 0	1925 : 0	1939 : 0	1920 : 0	1704 : 0
1976 : 0	1929 : 0	1954 : 0	1917 : 0	1933 : 0	1936 : 0	1943 : 0	1908 : 0
1955 : 0	1914 : 0	1950 : 0	1950 : 0	1917 : 0	1934 : 0	1936 : 0	1936 : 0
1928 : 0	1941 : 0	1933 : 0	1960 : 0	1942 : 0	1937 : 0	1925 : 0	1925 : 0
1949 : 0	1923 : 0	1957 : 0	1936 : 0	1956 : 0	1954 : 0	1955 : 0	1925 : 0
1946 : 0	1915 : 0	1956 : 0	1943 : 0	X : X	1979 : 0	X : X	1926 : 0
1948 : 0	1919 : 0	1918 : 0	1938 : 0	1928 : 0	1924 : 0	1964 : 0	1911 : 0
2003 : 0	1947 : 0	1931 : 0	1928 : 0	1936 : 0	1943 : 0	1915 : 0	1959 : 0

## Revision history

**Table 1. Document revision history**

Date	Version	Changes
15-Nov-2022	1	Initial release
02-Feb-2023	2	Modified the range of the resistor values and modified <a href="#">Figure 3. VL53L7 mini-PCB flying lead connection to NUCLEO-F401RE with X-CUBE-TOF1 revision 3.4.1 and earlier</a>
09-Sep-2024	3	Section 1: Hardware connection guidelines: split the main content of this section into two subsections. Section 1.2: Use of VL53L7 mini-PCB flying leads to connect to a NUCLEO-F401RE board: Removed the note and updated the image.
16-Dec-2024	4	Updated <a href="#">Figure 3. VL53L7 mini-PCB flying lead connection to NUCLEO-F401RE with X-CUBE-TOF1 revision 3.4.1 and earlier</a> . Section 2: Programming guidelines: Added <a href="#">Figure 7. Terminal settings to show terminal configuration</a> .
13-Nov-2025	5	Replaced all instances of VL53L7CX with VL53L7, and SATEL-VL53L7CX with SATEL-VL53L7 throughout the document. Added <a href="#">Figure 2</a> and note. Updated <a href="#">Figure 3</a> . Added <a href="#">Figure 4</a> and note.

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