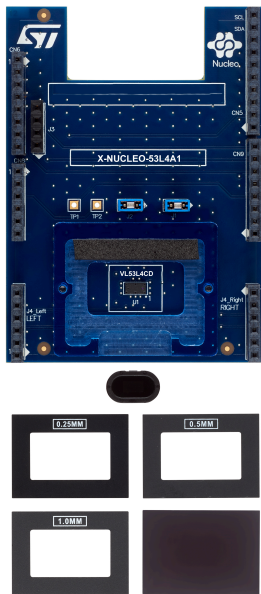# Time-of-Flight high-accuracy proximity sensor expansion board based on the VL53L4CD for STM32 Nucleo

Features

- VL53L4CD Time-of-Flight high-accuracy proximity sensor
- Accurate absolute ranging distance, independent of the reflectance of the target
- 0.25, 0.5, and 1 mm spacers to simulate air gaps
- Two different cover windows to protect the sensor from dust
- Compatible with STM32 Nucleo development boards
- Equipped with Arduino UNO R3 connectors
- Full system software supplied, including code examples and graphical user interface
- RoHS, CE, UKCA, and China RoHS compliant

Description

The X-NUCLEO-53L4A1 is an expansion board for any STM32 Nucleo board equipped with the Arduino R3 connectors. It provides a complete evaluation kit that allows you to learn, evaluate, and develop applications using the VL53L4CD Time-of-Flight high-accuracy proximity sensor.

The expansion board is delivered with a cover glass holder in which you can fit three different spacers of 0.25, 0.5, and 1 mm height below the cover glass to simulate various air gaps. A small oval cover glass fitting the sensor is included.

Several ST expansion boards can be stacked through the Arduino connectors, which allow, for example, the development of VL53L4CD applications with Bluetooth or Wi-Fi interfaces.

Product summary	
Time-of-Flight high-accuracy proximity sensor expansion board based on the VL53L4CD for STM32 Nucleo	X-NUCLEO-53L4A1
Time-of-Flight sensor software expansion for STM32Cube	X-CUBE-TOF1
STM32 Nucleo-64 development board with STM32F401RE MCU	NUCLEO-F401RE
Applications	Personal Electronics - Audio and Video
	Gaming and Drones
	Virtual - Augmented Reality
	Wearable

DB4623 - Rev 1 - December 2021
For further information contact your local STMicroelectronics sales office.

www.st.com

1 Laser safety considerations

The VL53L4CD contains a laser emitter and the 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 you use the STMicroelectronics recommended device settings and respect the operating conditions specified in the data sheet.

The laser output power must not be increased and no optics should be used with the intention of focusing the laser beam.

Figure 1. Class 1 laser product label

2 Optional VL53L4CD breakout boards

The SATEL-VL53L4CD is designed to connect remotely the VL53L4CD sensor to any type of electronic controller.

Attention: *The VL53L4CD is delivered with a liner to prevent potential foreign material from piercing the module holes during the assembly process. Remove this liner before use.*

The VL53L4CD breakout boards can be directly plugged onto the X-NUCLEO-53L4A1 expansion board through two six-pin connectors (Figure 2) or through flying wires (Figure 3).

You can buy the breakout boards separately as SATEL-VL53L4CD. This order code package includes two breakout boards.

Figure 2. SATEL-VL53L4CD breakout boards connected to the X-NUCLEO-53L4A1 expansion board
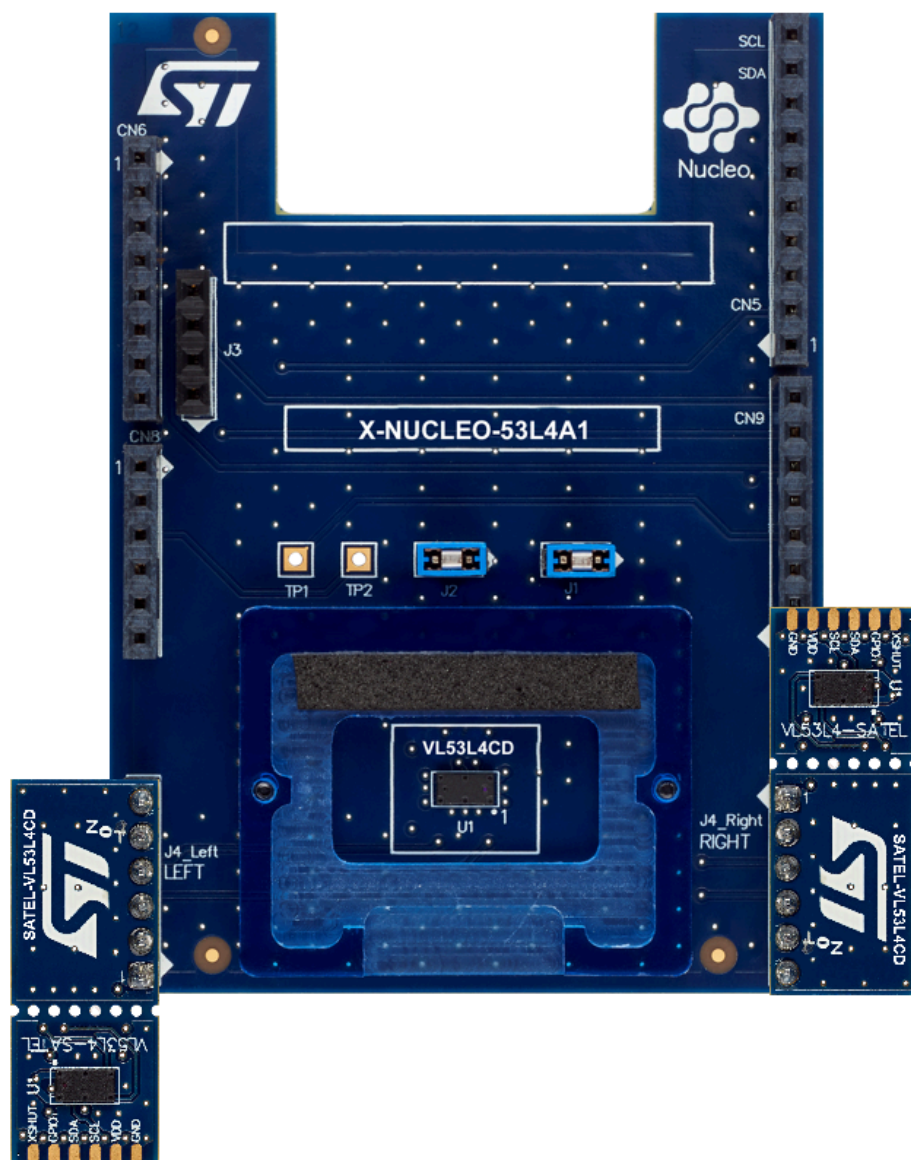
Figure 3. VL53L4CD mini PCB flying wires connection to X-NUCLEO-53L4A1 expansion board
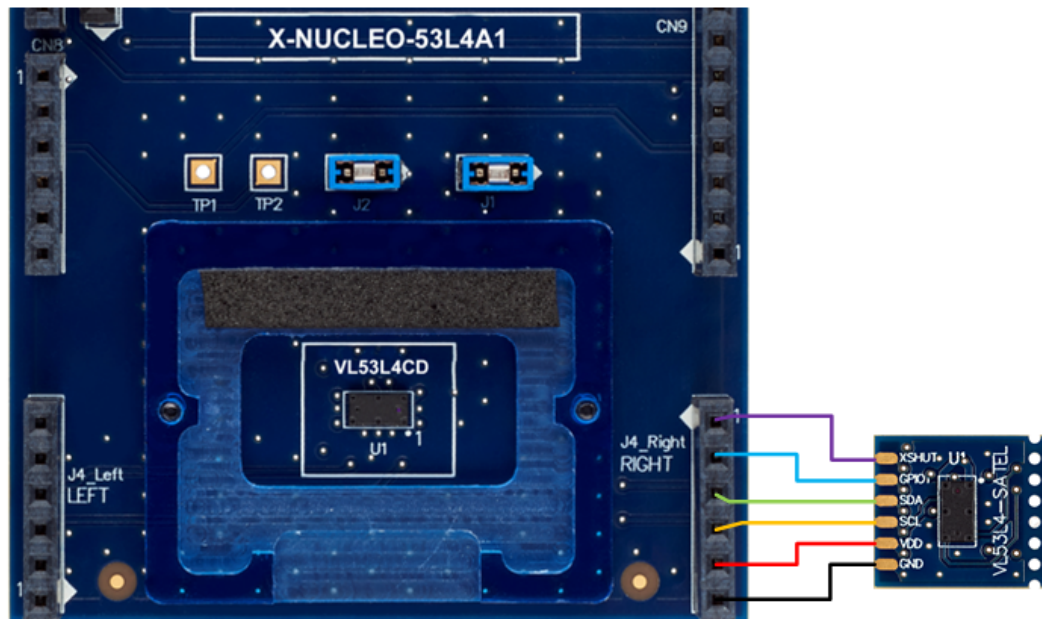
3   Simplified schematics
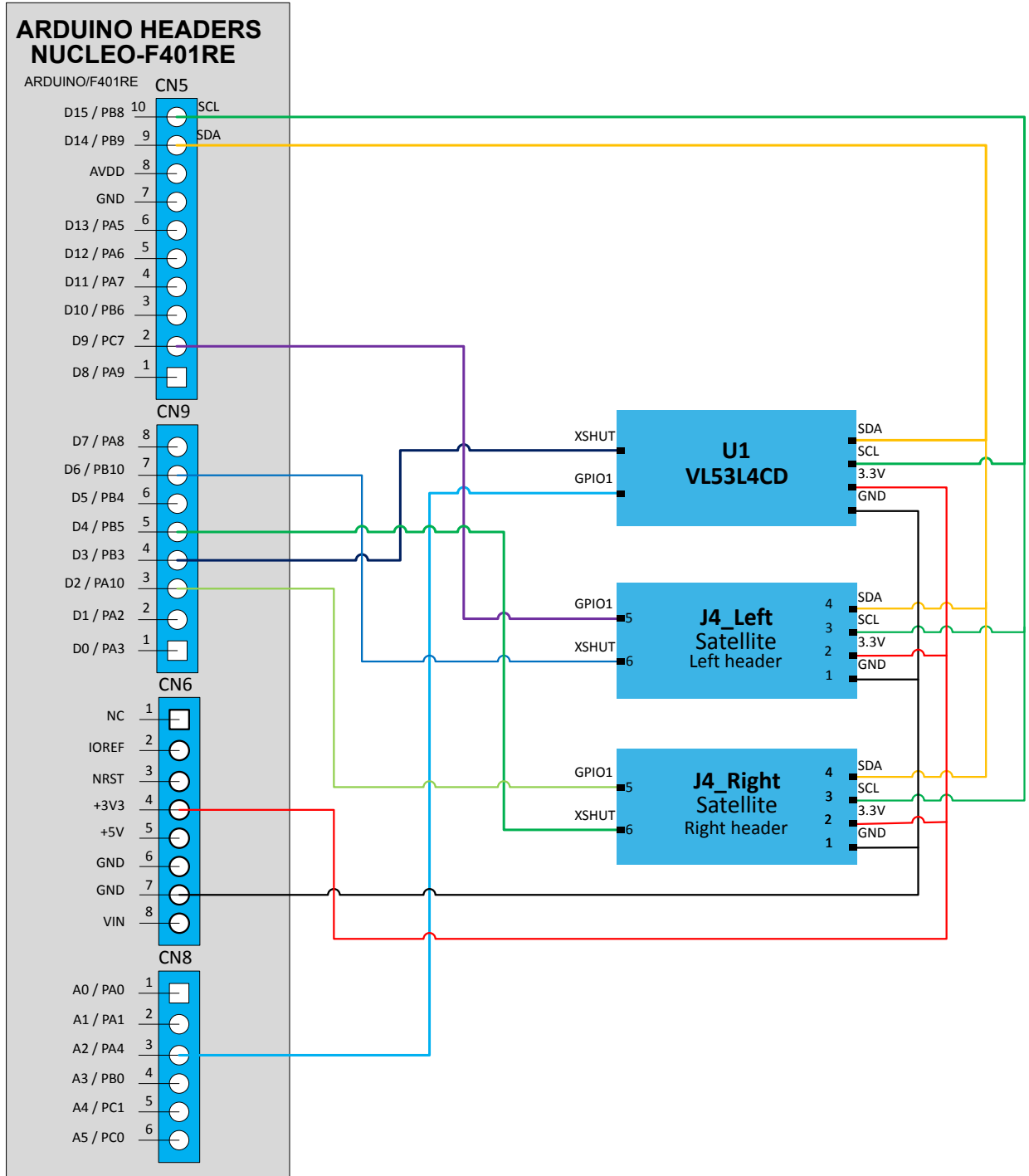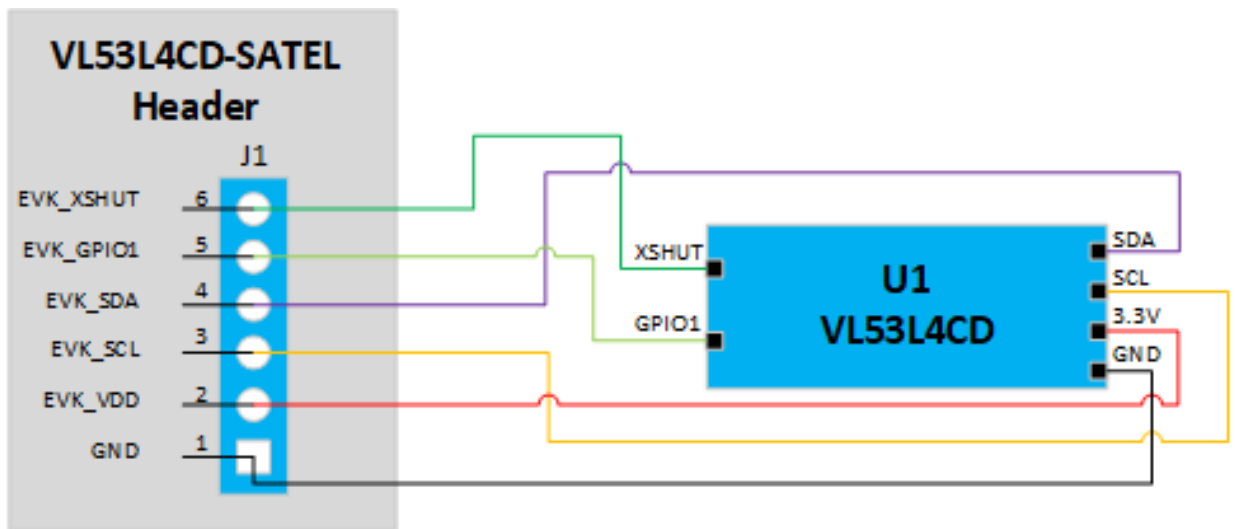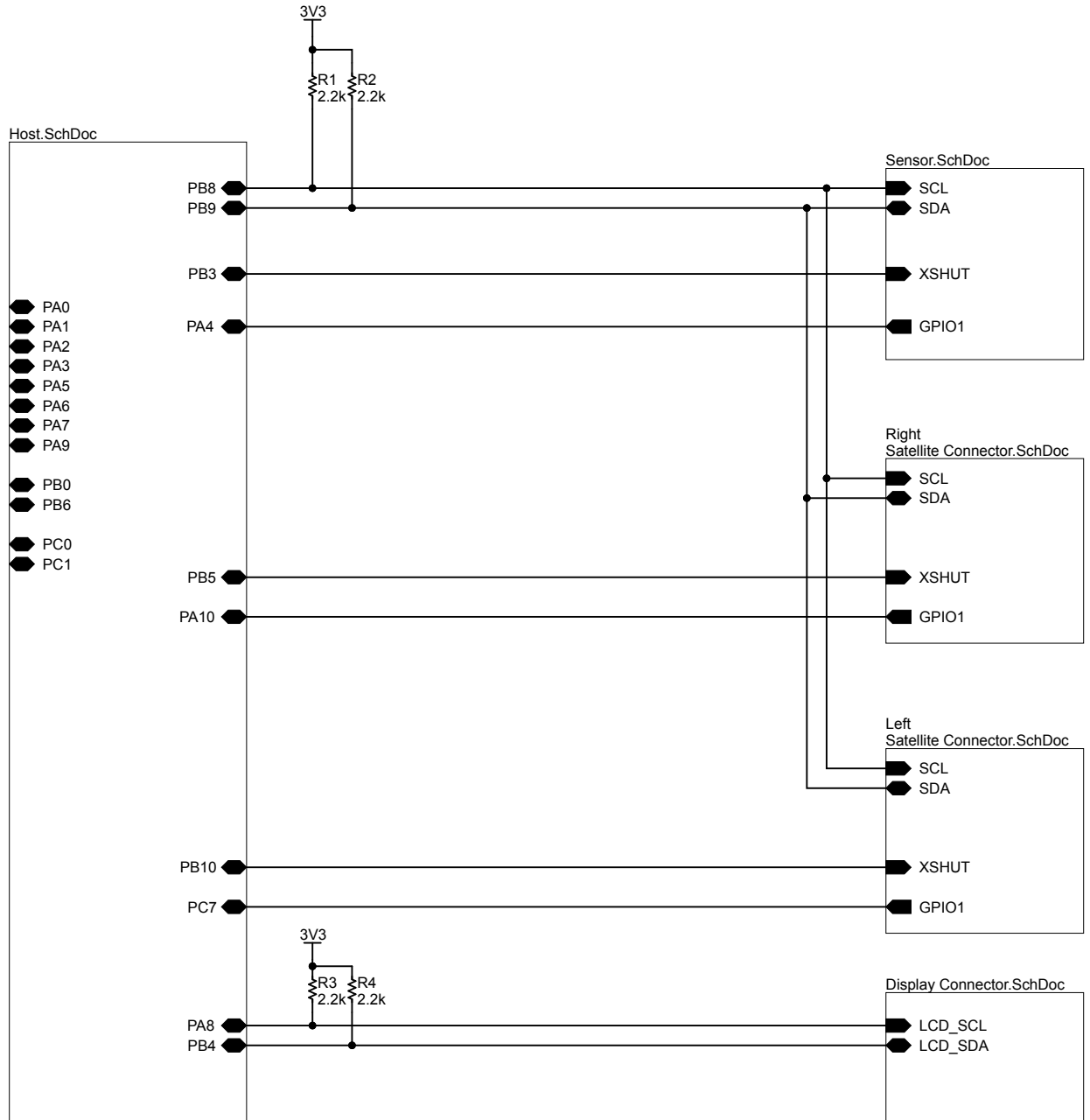
Figure 4. X-NUCLEO-53L4CD simplified schematic

Figure 5. VL53L4CD-SATEL simplified schematic

4 Schematic diagrams

Figure 6. X-NUCLEO-53L4A1 circuit schematic (1 of 6)

Note: The display connector is an optional connector to connect an SSD1306 I2C OLED display to output the ranging data or other meaningful information if required. The related application note and example code will be available on st.com
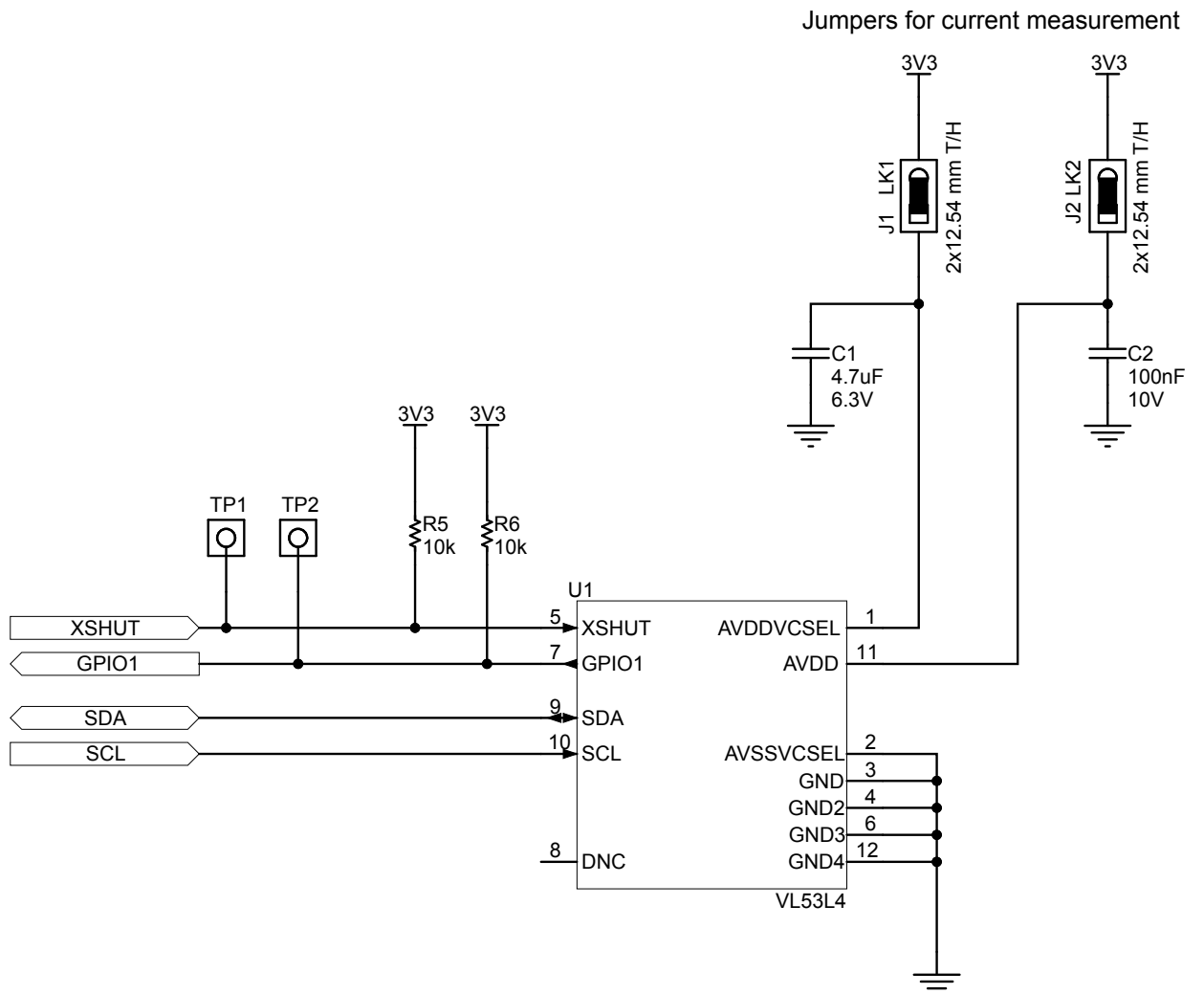
Figure 7. X-NUCLEO-53L4A1 circuit schematic (2 of 6)

Figure 8. X-NUCLEO-53L4A1 circuit schematic (3 of 6)
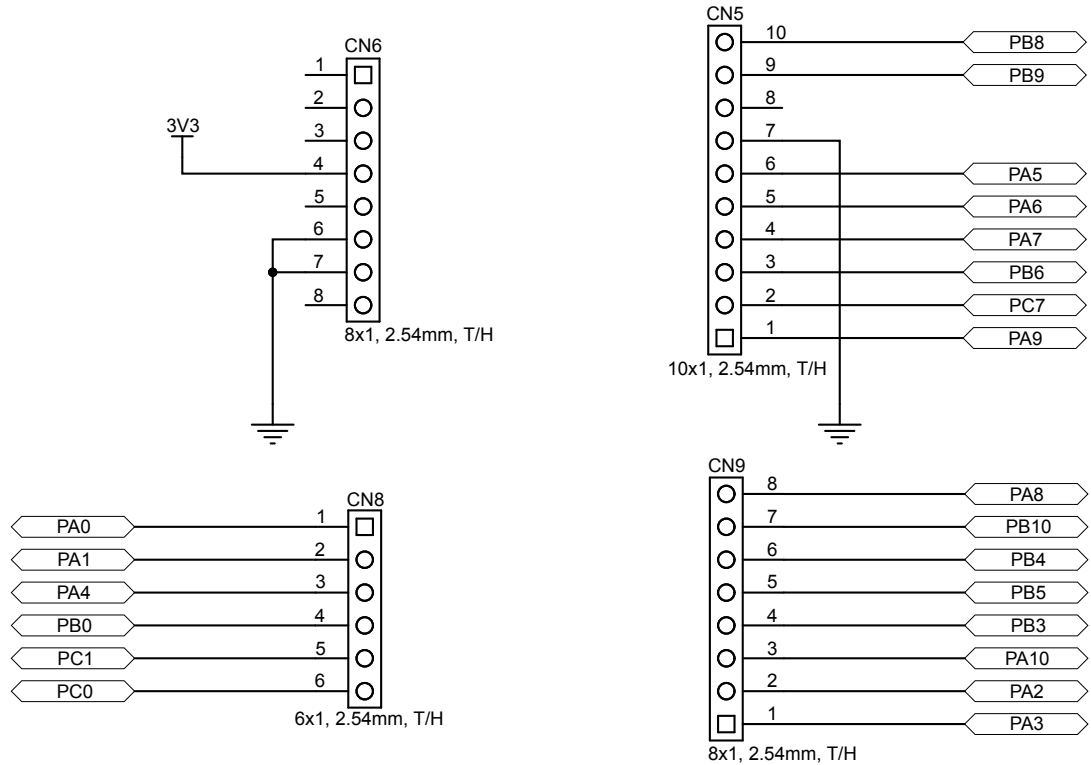
STM32 Nucleo Arduino connectors

CN6

CN5

3V3

PB8
PB9

PA5
PA6
PA7
PB6
PC7
PA9

8x1, 2.54mm, T/H

10x1, 2.54mm, T/H

CN8

CN9

PA0
PA1
PA4
PB0
PC1
PC0

PA8
PB10
PB4
PB5
PB3
PA10
PA2
PA3

6x1, 2.54mm, T/H

8x1, 2.54mm, T/H

Figure 9. X-NUCLEO-53L4A1 circuit schematic (4 of 6)

Header for LCD

3V3

J3

LCD_SDA

LCD_SCL

4x1, 2.54mm, T/H
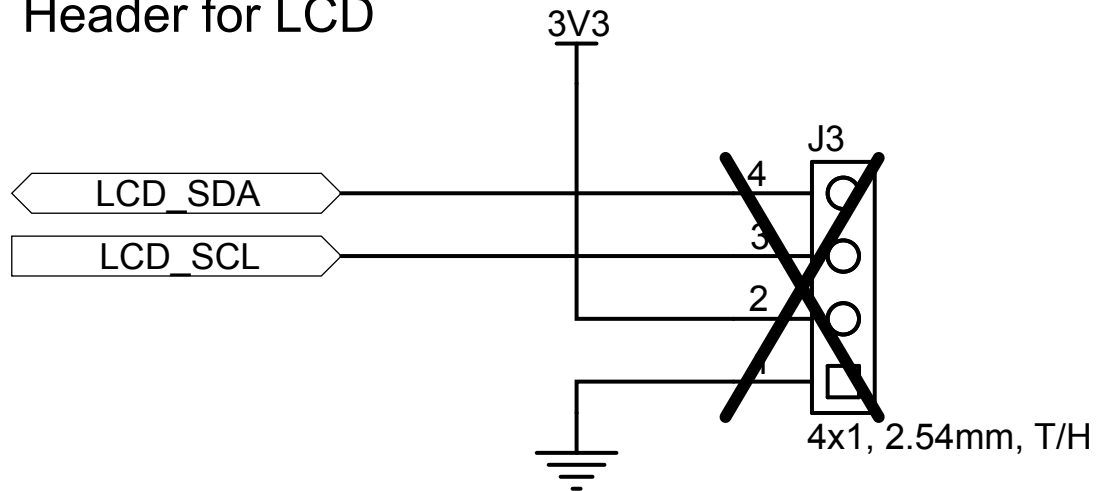
Figure 10. **X-NUCLEO-53L4A1 circuit schematic (5 of 6)**

Header for satellite board

3V3

J4_Left

XSHUT

GPIO1

SDA

SCL

6
5
4
3
2
1

6x1, 2.54 mm, T/H
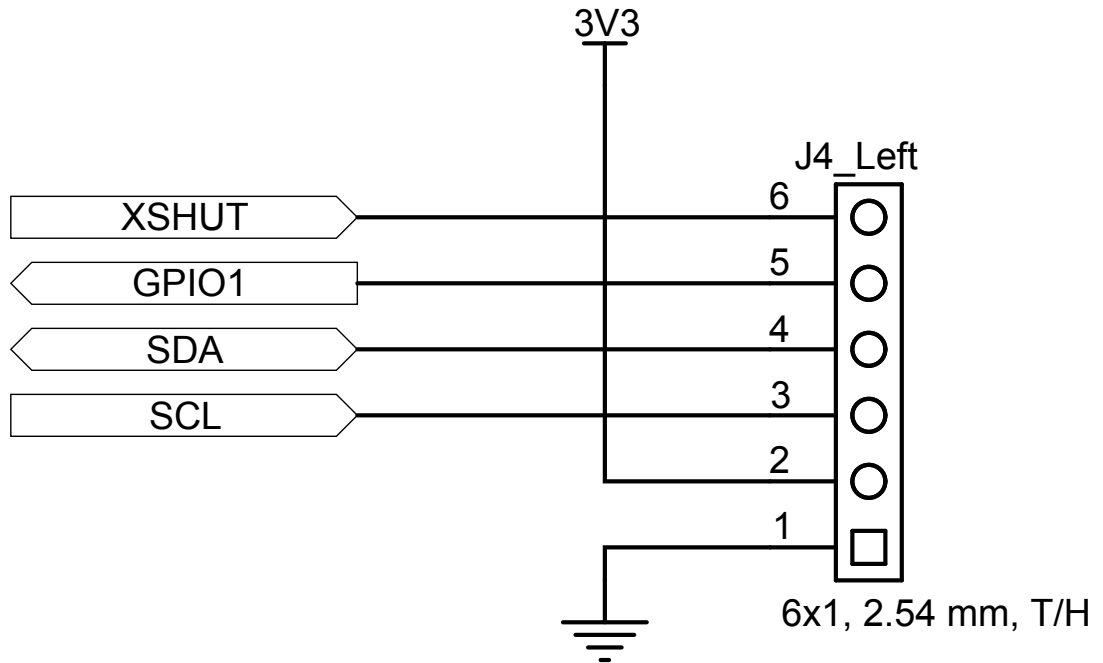
Figure 11. **X-NUCLEO-53L4A1 circuit schematic (6 of 6)**

Header for satellite board

3V3

J4_Right

XSHUT

GPIO1

SDA

SCL

6
5
4
3
2
1

6x1, 2.54 mm, T/H
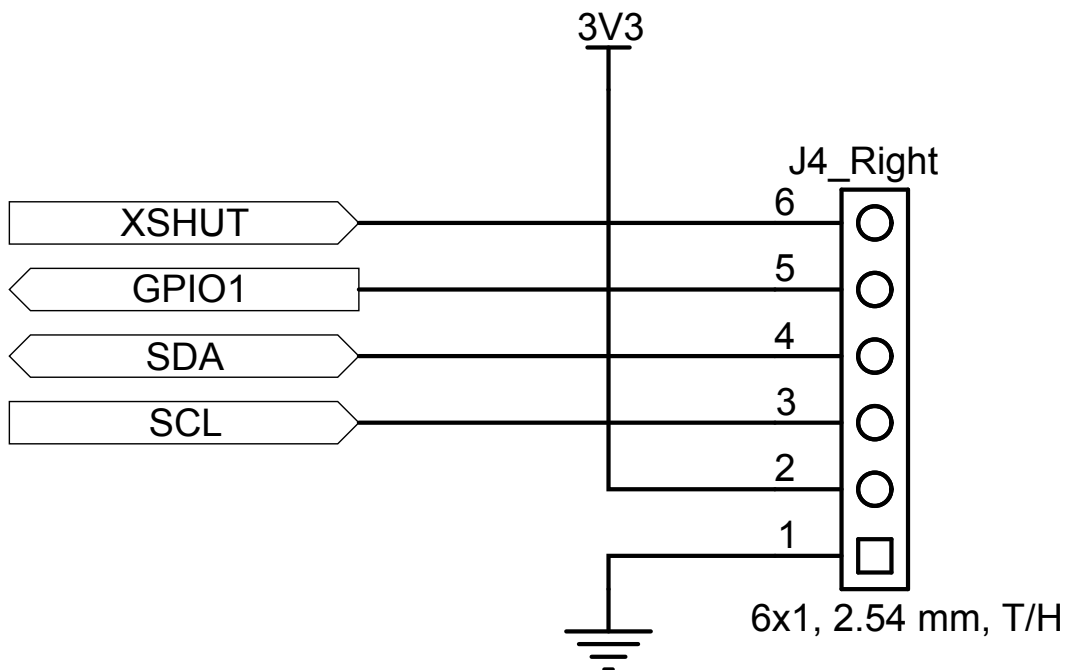
5 Board versions

Table 1. X-NUCLEO-53L4A1 versions

Finished good	Schematic diagrams	Bill of materials
X$NUCLEO-53L4A1- [1]	X$NUCLEO-53L4A1- schematic diagrams	X$NUCLEO-53L4A1-bill of materials

1. This code identifies the X-NUCLEO-53L4A1 expansion board first version.

Revision history

Table 2. Document revision history

Date	Revision	Changes
21-Dec-2021	1	Initial release.

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