

Getting started with the STEVAL-VL53L9 board based on the VL53L9CX for STM32 Nucleo N657X0 and N6570DK

Introduction

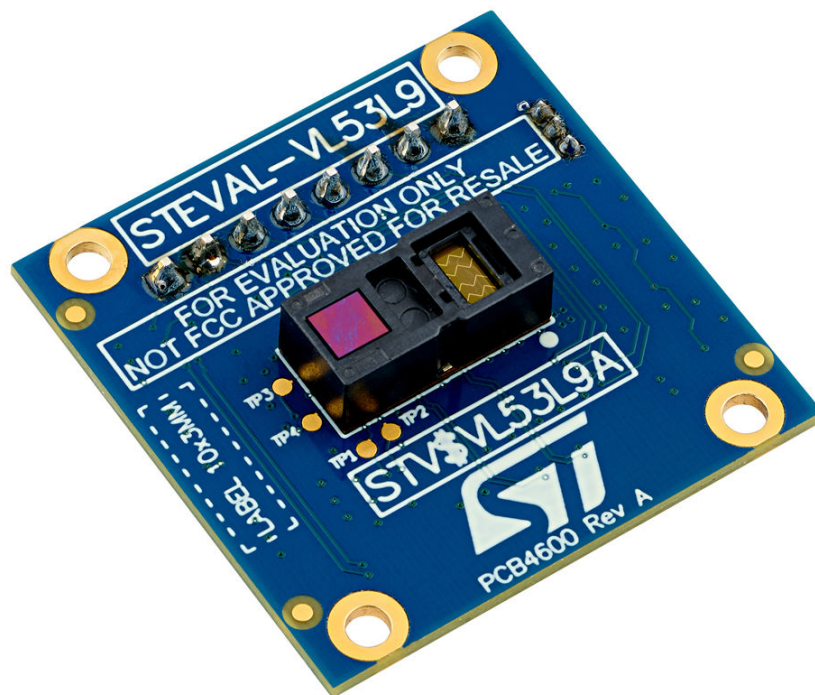
The **STEVAL-VL53L9** board is a development board for the **STM32 Nucleo** N657X0 and N6570DK, equipped with a camera module connector.

It provides a complete evaluation kit that allows you to learn, evaluate, and develop applications based on the VL53L9CX ToF sensor.

When the STEVAL-VL53L9 is connected through the camera module connector, it allows the user to develop high-frame-rate applications using the MIPI interface.

Several STEVAL-VL53L9 boards can be connected using flying wires, which allows, for example, the development of multiple-VL53L9CX applications via I3C interfaces.

Figure 1. STEVAL-VL53L9 evaluation board



Notice: For dedicated assistance, submit a request through our online support portal at www.st.com/support.

1 Getting started

1.1 Safety considerations

1.1.1 Electrostatic precautions

Warning: *Take electrostatic precautions, including the use of grounding straps, when using the STEVAL-VL53L9 board. Failure to prevent electrostatic discharge may damage the device.*

Figure 2. Electrostatic logo



1.1.2 Laser safety considerations

The STEVAL-VL53L9 contains a laser emitter and the associated drive circuitry.

The laser output is designed to remain within Class 1 laser safety limits under all reasonably foreseeable conditions, including single faults, in compliance with IEC 60825-1:2014.

Use of this product without additional safety protection is considered risk-free, provided the following laser safety recommendations are verified:

- There is no visible damage to the module (visual inspection)
- There is no visible damage to the Tx (visual inspection)
- No additional reliability conditions are imposed for indoor/outdoor use or for dry tests
- No temperature tests are performed (use at ambient temperature only)
- No humidity tests are performed
- The product has not been subjected to shock or vibration
- No additional optics are placed in front of the device
- The module has not been reverse engineered or deprocessed in a way that could damage it
- Only the GUI, driver, and modes/settings provided by STMicroelectronics are used

Caution: *Use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.*

Figure 3. Class 1 laser product label



Figure 4. Laser notice 56



Laser notice 56 applies to IEC 60825-1:2014.

1.2 Features

This ToF board is based on the VL53L9CX and has the following features:

- dToF 3D lidar all-in-one module with high resolution of 2.3 K zones
- Wide $55^\circ \times 42^\circ$ FoV, with accurate ranging from 5 cm to 9 m
- Accurate absolute ranging distance, independent of target reflectance
- Operates up to 100 frames per second over 5 cm to 9 m, with a typical system power of 150 mW
- Histogram-based ranging technology
- Excellent ranging performance under strong ambient light, and with a wide range of cover glass materials
- Multiobject detection capability
- Outputs rich 2D data (signal, reflectance, ambient), enabling advanced AI, and processing
- Full system software supplied, including code examples and a graphical user interface
- RoHS, CE, UKCA, and China RoHS compliant

1.3 VL53L9CX characteristics

The module uses an invisible laser with a wavelength of 940 nm. The maximum emitted laser power is 210 mW, and the minimum integration time is 2 ms.

2 Connecting the STEVAL-VL53L9 board to the Nucleo N657X0 connectors

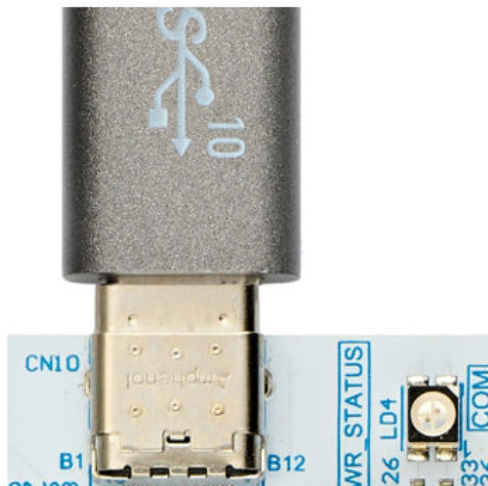
The figure below shows the complete setup, with the STEVAL-VL53L9 board mounted on the NUCLEO-N657X0 and powered through the USB connection.

Figure 5. NUCLEO-N6 and STEVAL-VL53L9 top view with USB



- Connect a USB 3.0 Type-C to Type-C cable to the CN10 connector on the NUCLEO-N657X0 board.

Figure 6. Connecting the board to the cable



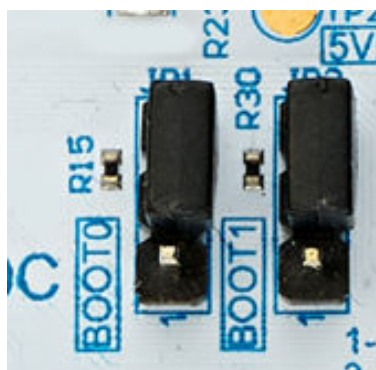
- Place jumper CN9 in position 1–2 (5 V STLK).

Figure 7. CN9 connection



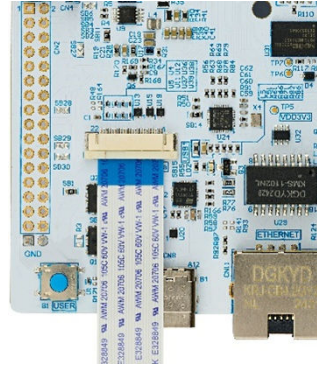
- Connect the BOOT0 (JP1) and BOOT1 (JP2) jumpers in the correct positions.

Figure 8. BOOT connections



- Connect the camera flex cable to the camera connector (CN6). Make sure the flex is correctly oriented, with the metal contacts facing the PCB.

Figure 9. CN6 connection



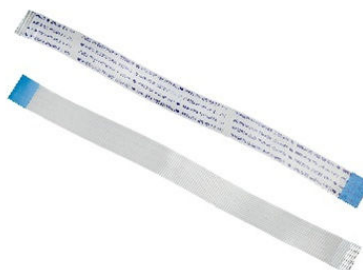
- Connect the flex cable to the STEVAL-VL53L9 board (J1). Make sure the flex is correctly oriented, with the metal contacts facing upwards. Handle the connector carefully. It is fragile.

Figure 10. Flex connection



- Use the appropriate flex type top and bottom flex, with connexion on opposite side.

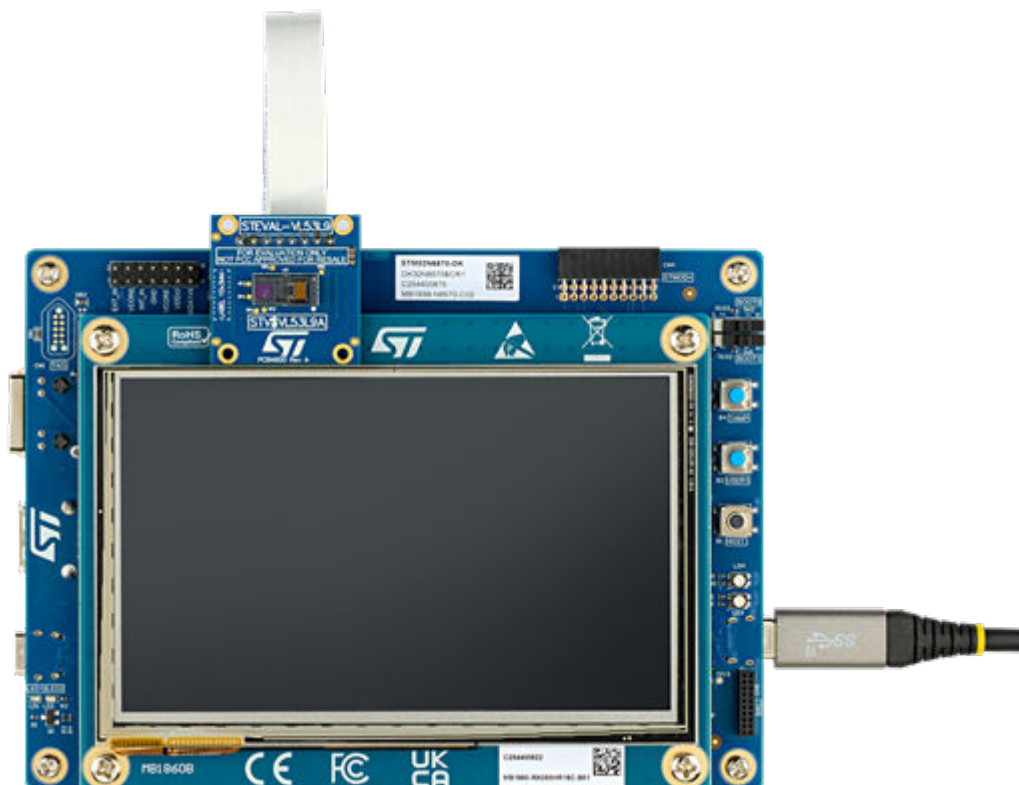
Figure 11. Flex type



3 Connecting the STEVAL-VL53L9 board to the N6570DK connectors

The figure below shows the complete setup, with the STEVAL-VL53L9 board connected to the relevant N6570DK connectors.

Figure 12. N6570DK connectors and STEVAL-VL53L9 top view with USB



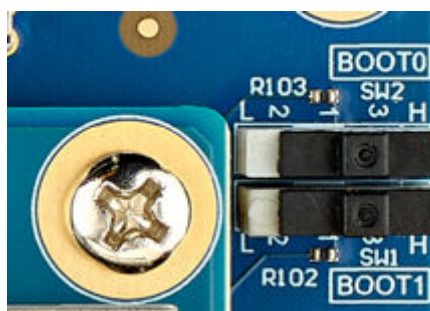
- Connect a USB 3.0 Type-C to Type-C cable to connector CN6.

Figure 13. CN6 connection

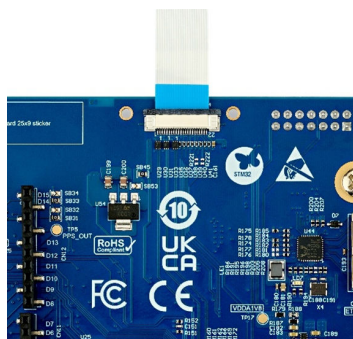

- Place the JP2 jumper in position 1–2 (5V STLK).

Figure 14. JP2 connection

- Connect the BOOT0 (SW2) and BOOT1 (SW1) jumpers in the correct positions.

Figure 15. BOOT connections


- Connect the camera flex cable to connector CN14 on the ST N6570DK board. Ensure the metal side of the flex is oriented towards the PCB.

Figure 16. CN14 connection


- Connect the flex cable to the STEVAL connector. Ensure the metal side of the flex is oriented upwards (towards the top). Insert the flex into the top part of the connector. Handle the connector carefully. It is fragile.

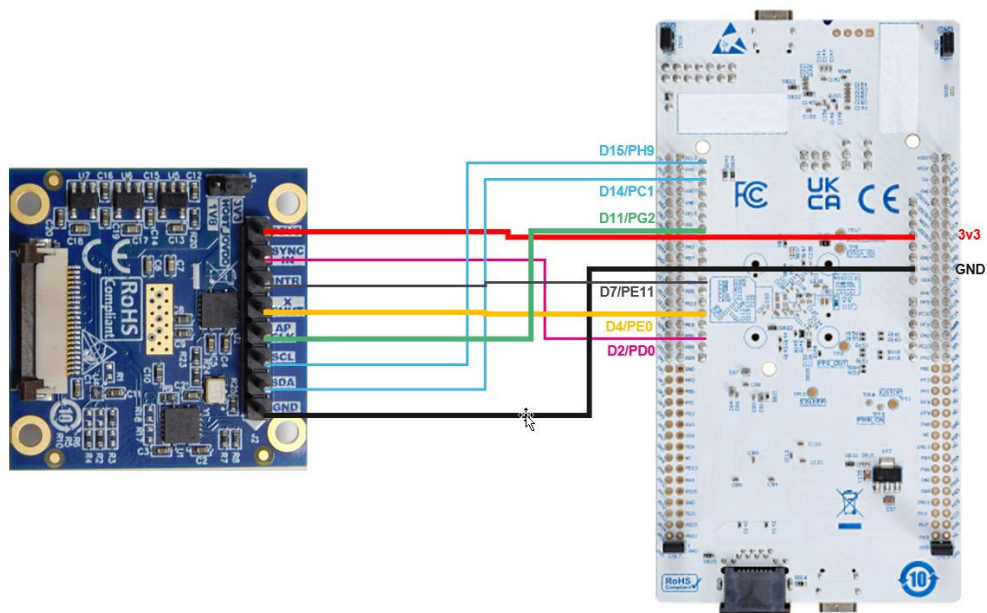
Figure 17. Flex connection


- Make sure you are using the correct flex type (top/bottom) for the connection.

Figure 18. Flew type


4 Connection using flying wires to the NUCLEO-N657X0-Q

Figure 19. Flying wires connection



5 Schematic diagrams

Figure 20. STEVAL-VL53L9 circuit schematic (1 of 6)

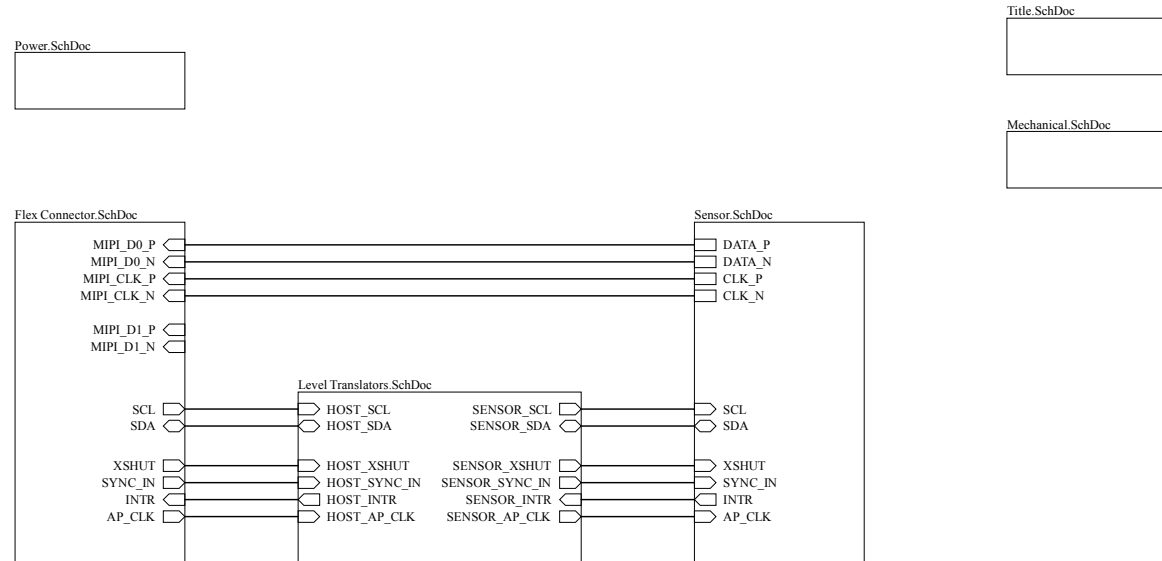


Figure 21. STEVAL-VL53L9 circuit schematic (2 of 6)

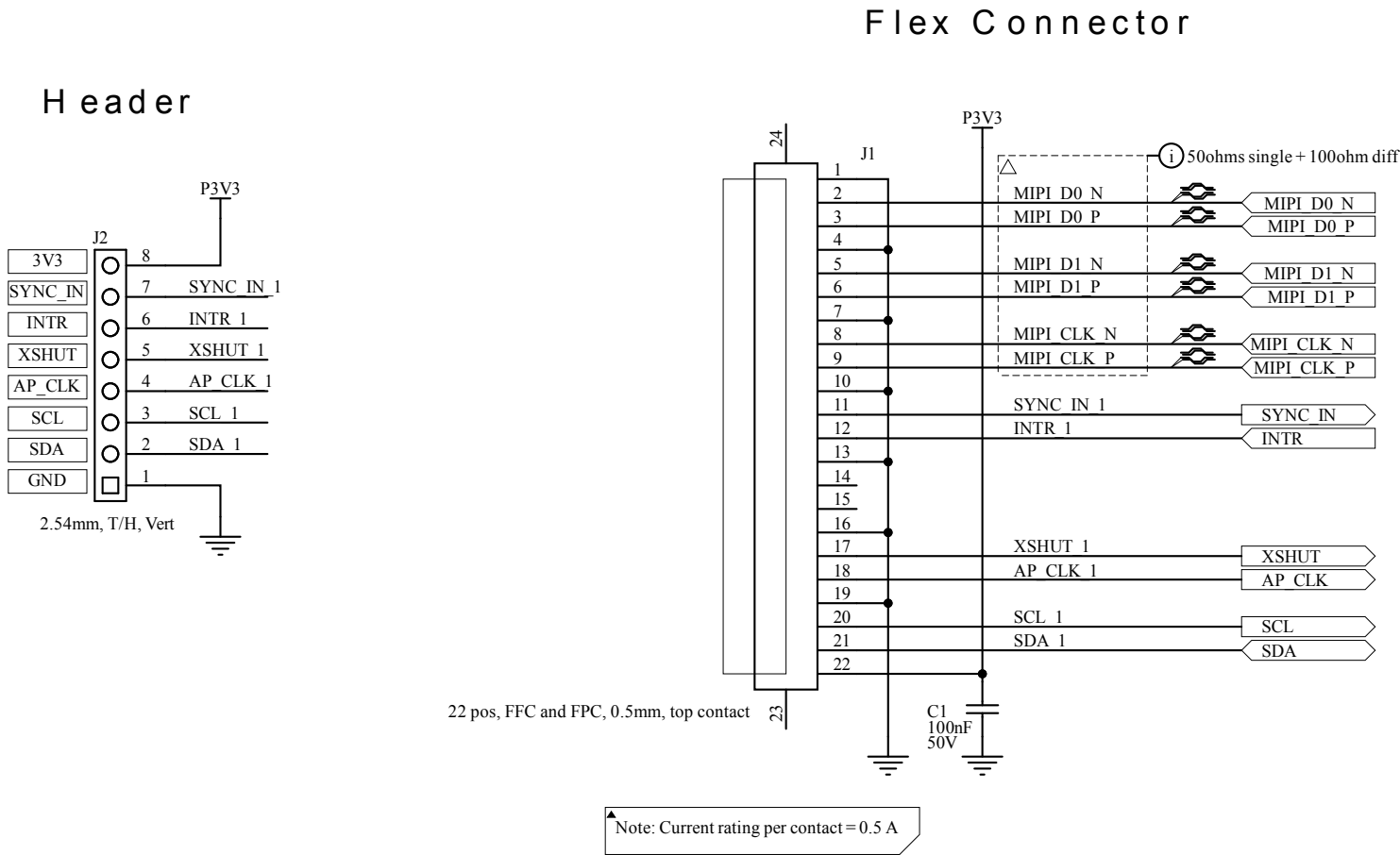
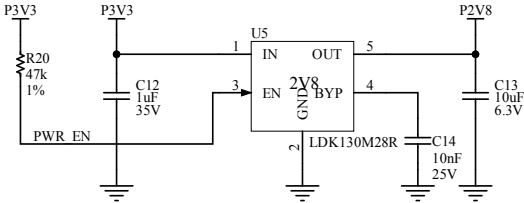


Figure 22. STEVAL-VL53L9 circuit schematic (3 of 6)

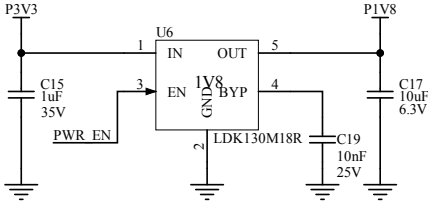
Power Supplies

2V8 Gen

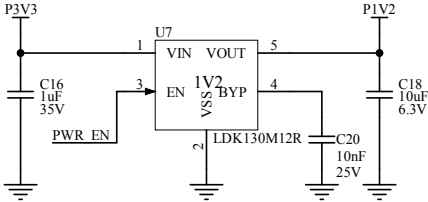
3V3 supplied from flex connector.



1V8 Gen



1V2 Gen



Host IO Select Header

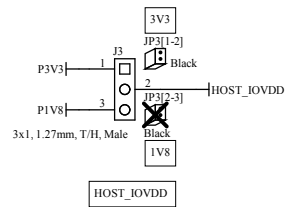


Figure 23. STEVAL-VL53L9 circuit schematic (4 of 6)

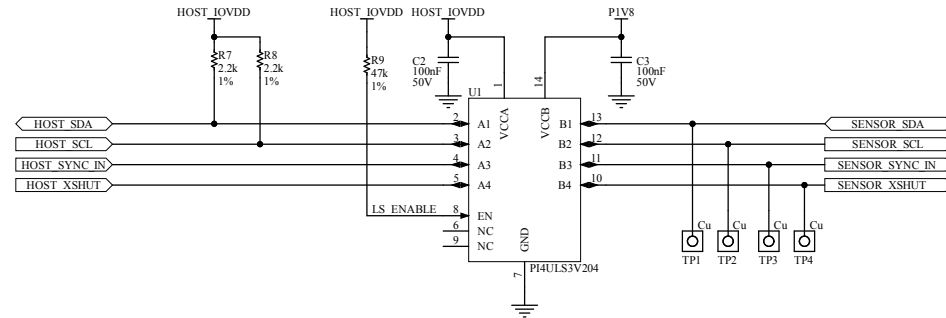
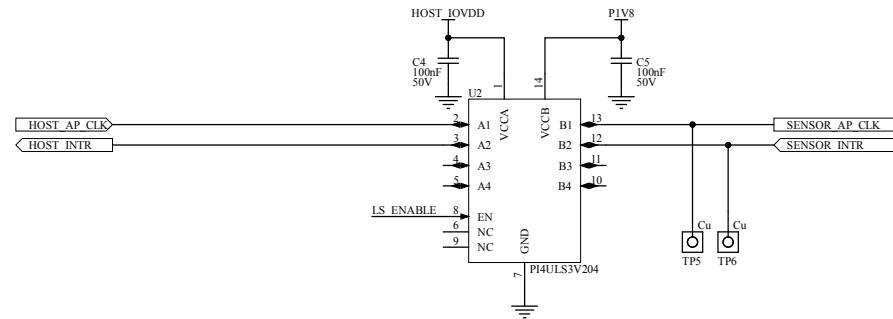
Level Shifter
HOST IOVDD <--> 1.8 VLevel Shifter
HOST IOVDD <--> 1.8 V

Figure 24. STEVAL-VL53L9 circuit schematic (5 of 6)

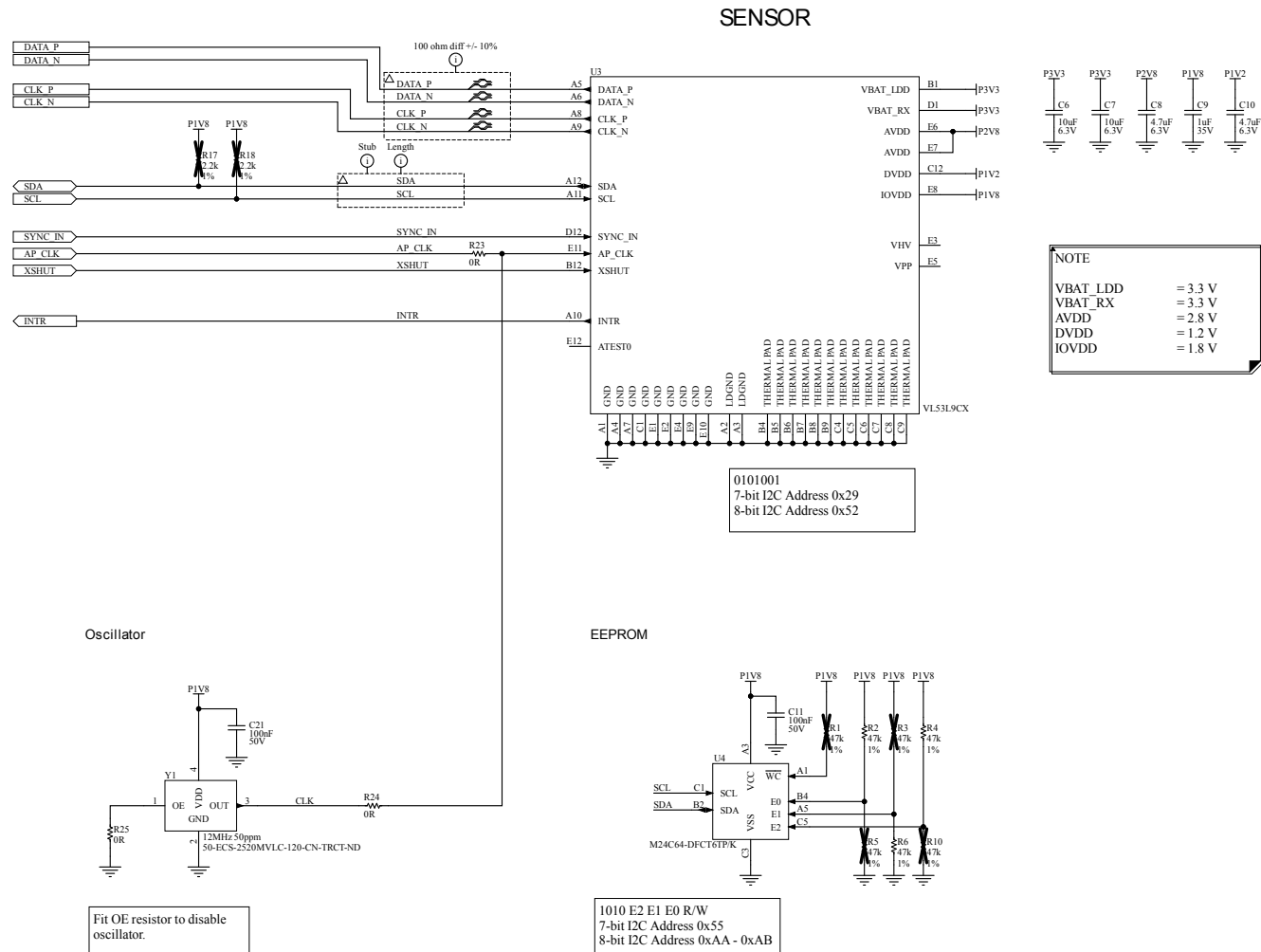
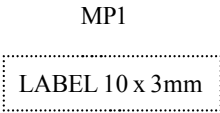
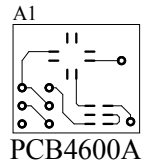
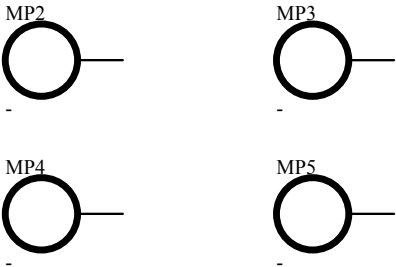


Figure 25. STEVAL-VL53L9 circuit schematic (6 of 6)

Board Labels



Mounting Holes



6 Bill of materials

Table 1. STEVAL-VL53L9 bill of materials

Item	Q.ty	Ref.	Part/value	Description	Manufacturer	Order code
1	3	R23, R24, R25	0R	RES, 0R, Jumper, 1/16W, 0402	Yageo	RC0402JR-070RL
2	4	C9, C12, C15, C16	1uF	CAP, CER, 1uF, 35V, X5R, 0402	Murata	GRM155R6YA105KE11D
3	2	R7, R8	2.2k	RES, 2.2k, 1%, 1/16W, 0402	Yageo	RC0402FR-072K2L
4	1	J2	2.54mm, T/H, Vert	CONN, HEADER, 08 POS, 8x1, 2.54mm, T/H, VERT	Harwin	M20-9990845
5	1	J3	3x1, 1.27mm, T/H, Male	CONN, HEADER, 3POS, 1.27MM, T/H, MALE	Harwin	M50-3530342
6	2	C8, C10	4.7uF	CAP, CER, 4.7uF, 6.3V, X5R, 0402	TDK	C1005X5R0J475K050BC
7	3	C14, C19, C20	10nF	CAP, CER, 10nF, 25V, X5R, 0402	AVX	04023D103KAT2A
8	5	C6, C7, C13, C17, C18	10uF	CAP, CER, 10uF, 6.3V, X5R, 0402	Murata	GRJ155R60J106ME11D
9	1	Y1	12MHz 50ppm	XTAL OSC XO 12MHZ CMOS SMD	ECS Inc.	ECS-2520MVL-120-CN-TR
10	1	J1	22 way, 0.5 mm Pitch	Connector FFC and FPC 0.5MM 22 POS top contact	Hirose	FH12A-22S-0.5SH(55)
11	5	R2, R4, R6, R9, R20	47k	RES, 47k, 1%, 1/10W, 0402	Panasonic	ERJ2RKF4702X
12	7	C1, C2, C3, C4, C5, C11, C21	100nF	CAP, CER, 100nF, 10%, 50V, X7R, 0402	Murata	GRT155R71H104KE01D
13	1	JP3[1-2]	Black	JUMPER, 1.27MM, BLACK	Harwin	M50-1900005
14	1	U7	LDK130M12R, SOT23-5	IC, REG, LDO, 1.2V, 0.3A, SOT23-5	ST	LDK130M12R
15	1	U6	LDK130M18R, SOT23-5	IC, REG, LDO, 1.8V, 0.3A, SOT23-5	ST	LDK130M18R
16	1	U5	LDK130M28R, SOT23-5	IC, REG, LDO, 2.8V, 0.3A, SOT23-5	ST	LDK130M28R
17	1	U4	M24C64-DFCT6TP/K, WLCSP	IC EEPROM 64KBIT I2C 1MHZ 8WLCSP	ST	M24C64-DFCT6TP/K
18	2	U1, U2	PI4ULS3V204	IC, 4-Bit Bi-directional Level Shifter, TQFN3.5x3.5-14	Diodes Incorporated	PI4ULS3V204ZBEX
19	1	U3	VL53L9CXV0VE/1, OPTICAL LGA 12.1X5.1X4.5MM	VL53L9 ToF Module	ST	VL53L9CXV0VE/1
20	0	R17, R18	2.2k	RES, 2.2k, 1%, 1/16W, 0402	Yageo	RC0402FR-072K2L
21	0	R1, R3, R5, R10	47k	RES, 47k, 1%, 1/10W, 0402	Panasonic	ERJ2RKF4702X
22	0	JP3[2-3]	Black	JUMPER, 1.27MM, BLACK	Harwin	M50-1900005

7 Board versions

Table 2. STEVAL-VL53L9 versions

Finished good	Schematic diagrams	Bill of materials	Core product
STV\$VL53L9A ⁽¹⁾	STV\$VL53L9A schematic diagrams	STV\$VL53L9A bill of materials	VL53L9CX

1. This code identifies the STEVAL-VL53L9 evaluation board first version.

8 Regulatory compliance information

Notice for US Federal Communication Commission (FCC)

For evaluation only; not FCC approved for resale

FCC NOTICE - This kit is designed to allow:

(1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine

whether to incorporate such items in a finished product and

(2) Software developers to write software applications for use with the end product.

This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter 3.1.2.

Notice for Innovation, Science and Economic Development Canada (ISED)

For evaluation purposes only. This kit generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to Industry Canada (IC) rules.

À des fins d'évaluation uniquement. Ce kit génère, utilise et peut émettre de l'énergie radiofréquence et n'a pas été testé pour sa conformité aux limites des appareils informatiques conformément aux règles d'Industrie Canada (IC).

Notice for the European Union

This device is in conformity with the essential requirements of the Directive 2014/30/EU (EMC) and of the Directive 2011/65/EU (RoHS II), including subsequent revisions and additions, as well as amended by the Delegated Directive 2015/863/EU (RoHS III).

Notice for the United Kingdom

This device is in conformity with the essential requirements of the Directive 2014/30/EU (EMC) and of the Directive 2011/65/EU (RoHS II), including subsequent revisions and additions, as well as amended by the Delegated Directive 2015/863/EU (RoHS III).

9 Acronyms and abbreviations

Table 3. Acronyms and abbreviations

Acronym/abbreviation	Definition
CE	European conformity
dToF	direct Time-of-Flight
FoV	field of view
JP/J	jumper
lidar	light detection and ranging
MIPI	mobile industry processor interface
PCB	printed circuit board
ToF	Time-of-Flight
Tx	transmitter
UKCA	UK conformity assessed
USB	universal serial bus

Revision history

Table 4. Document revision history

Date	Version	Changes
28-Apr-2026	1	Initial release.
13-May-2026	2	Updated Section 6: Bill of materials .

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