

Camera module bundle for STM32 boards

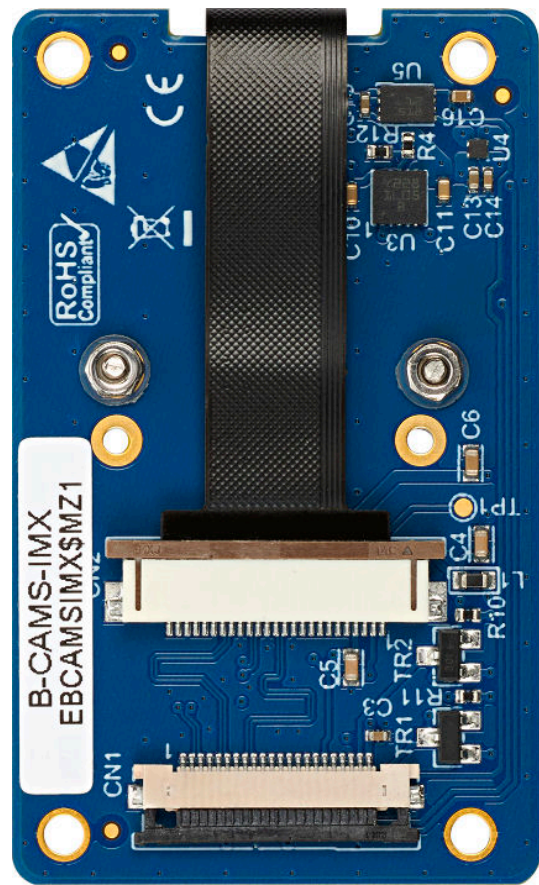
Introduction

The B-CAMS-IMX camera module provides a compelling hardware set to handle multiple computer vision scenarios and use cases. It features a high-resolution 5-Mpx RGB CMOS image sensor, an inertial motion unit, and a Time-of-Flight sensor. It can be used with any STM32 boards featuring a MIPI CSI-2[®] interface with a 22-pin FFC connector to enable full-featured computer vision on STM32 microcontrollers and microprocessors easily.

Figure 1. B-CAMS-IMX top view without FFC



Figure 2. B-CAMS-IMX bottom view without FFC



Pictures are not contractual.

1 Features

- Camera module accessory board (MB1854) including:
 - Dual-lane MIPI CSI-2[®] data output supporting Sony 5-Mpx RGB CMOS image sensor
 - M12 × 0.5 lens holder for a variety of commercially available, ready-to-use M12 lenses
 - Supplied M12 lens: Manual focus, 87° FOV
 - Inertial motion unit
 - Multizone direct Time-of-Flight sensor
 - 3.3 V power
 - Board connector:
 - 0.5 mm-pitch, 22-pin flexible flat cable (FFC) connector
 - 22-pin flexible flat cable

2 Ordering information

To order the B-CAMS-IMX camera module, refer to [Table 1](#). Additional information is available from the datasheet and reference manual of the target STM32.

Table 1. Ordering information

Order code	Content and references	Target STM32 boards
B-CAMS-IMX	<ul style="list-style-type: none"> MB1854⁽¹⁾ FFC⁽²⁾ 	STM32 boards featuring a 22-pin camera FFC connector

1. Camera module accessory board
2. Flexible flat cable.

The STM32 Discovery kits and Evaluation boards feature STM32 32-bit microcontrollers or microprocessors based on the Arm[®] Cortex[®] processor.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2.1 Codification

The meaning of the codification is explained in [Table 2](#).

Table 2. Codification explanation

B-XXXX-YYY	Description	Example: B-CAMS-IMX
B	Board kind	Accessory board
XXXX	Board type	CAMS: Camera sensor
YYY	Specific features	IMX: Sony CMOS RGB image sensor

3 Laser safety consideration

The Time-of-Flight and gesture-detection sensor contains a laser emitter and the corresponding 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 (third edition). The laser output remains within Class 1 limits as long as the STMicroelectronics recommended device settings are used and the operating conditions specified in the datasheets are respected. The laser output power must not be increased by any means and no optics are used to focus the laser beam. Figure 3 shows the warning label for Class 1 laser products.

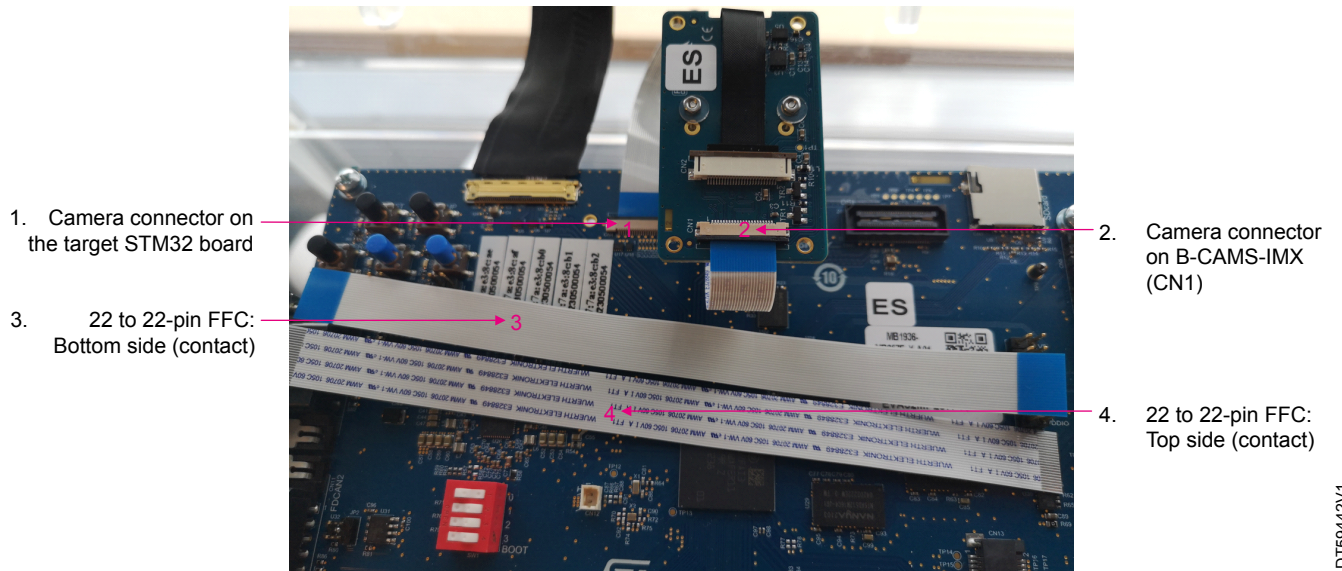
Figure 3. Class 1 laser product label



4 Quick start guide

This section describes how to start development quickly using the B-CAMS-IMX camera module.

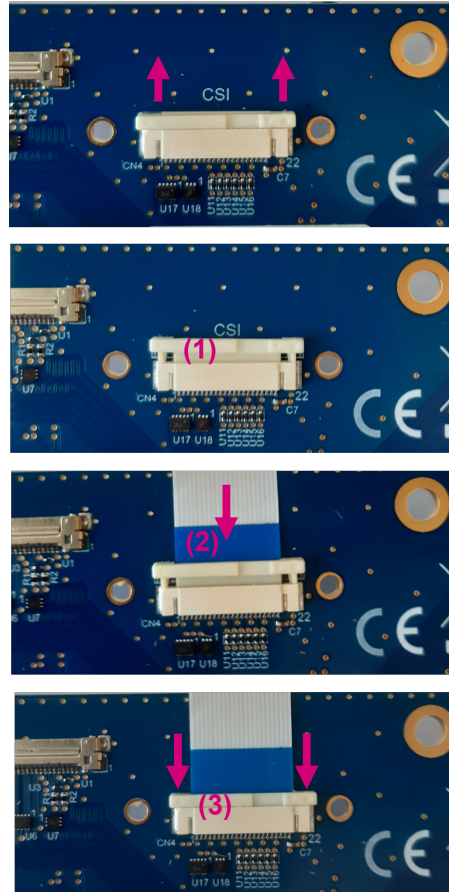
Figure 4. B-CAMS-IMX connected to a target STM32 board



- Make sure that the target STM32 board is not powered.
- Find the camera connector on the target STM32 board (Figure 4.1) and the one on MB1854 (CN1 Figure 4.2).

- On each connector, carefully:

Figure 5. B-CAMS-IMX/target STM32 board connection



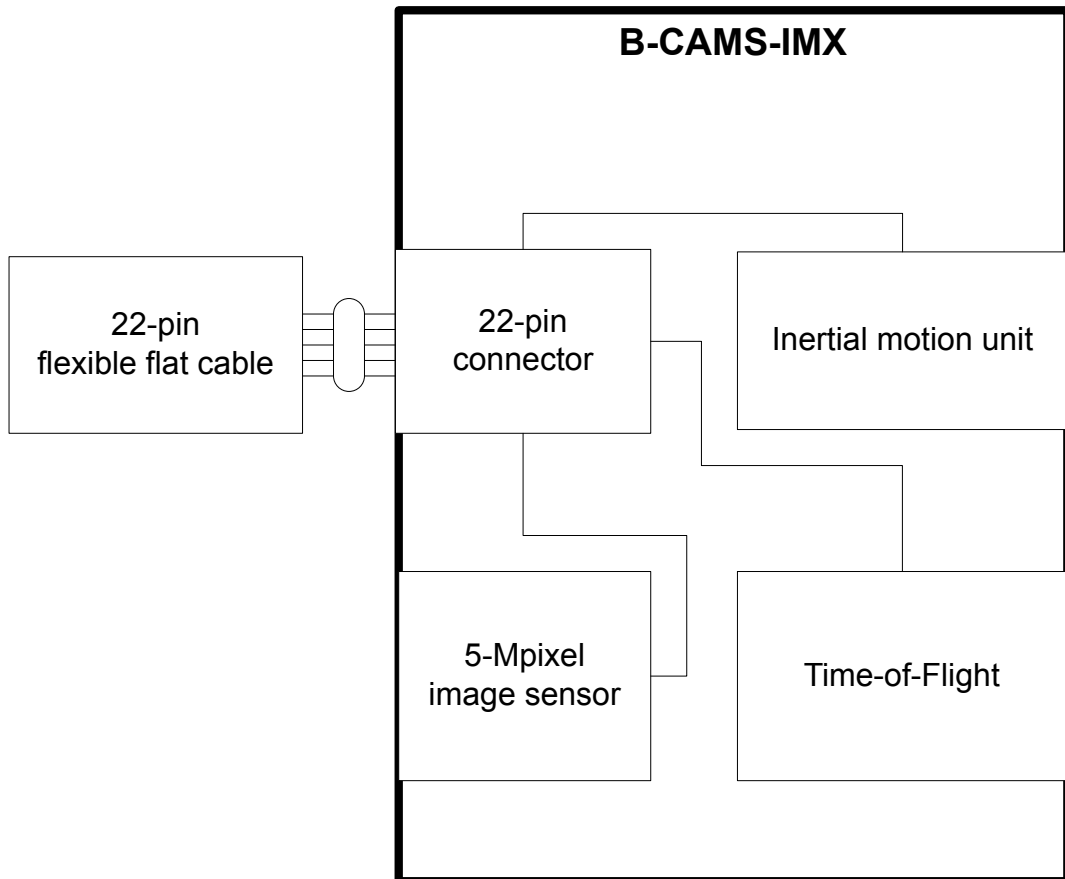
- Lightly pull the black plastic [Figure 5 \(1\)](#) to insert the contact side of the FFC towards the board [Figure 5 \(2\)](#).
 - Push the black plastic to hold the FFC [Figure 5 \(3\)](#).
- Download the code example and the full set of documentation from www.st.com and program the target STM32 board.
 - Evaluate computer vision possibilities on STM32 devices and develop your application.
 - The lens is interchangeable. B-CAMS-IMX accepts the various M12-mount lenses available on the market.

5 Hardware layout and configuration

5.1 Hardware block diagram

The B-CAMS-IMX camera module is designed around the 5-Mpx RGB CMOS image sensor, an inertial motion unit (IMU), and a Time-of-Flight (ToF) sensor. The hardware block diagram is illustrated in Figure 6.

Figure 6. B-CAMS-IMX hardware block diagram

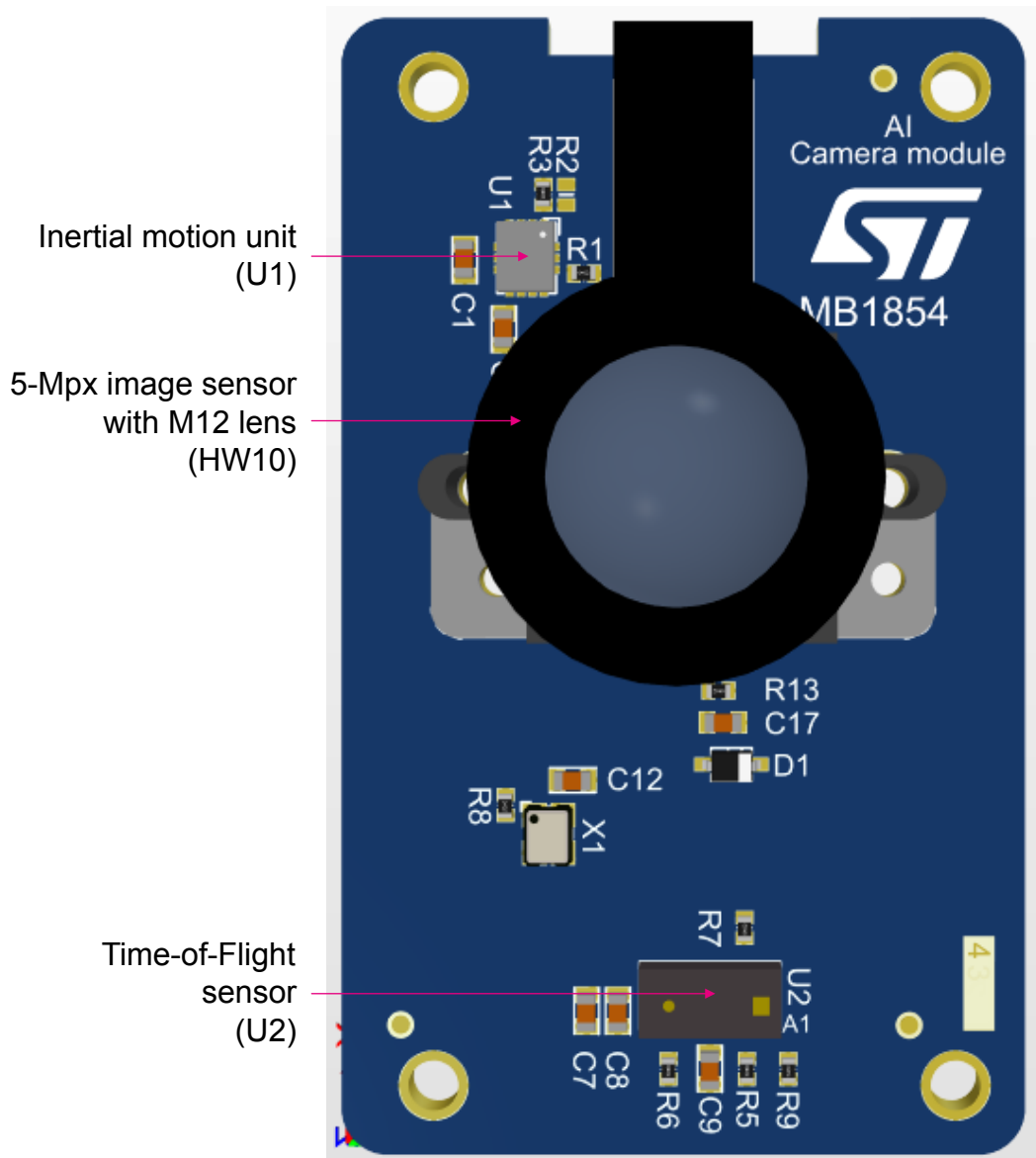


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5.2 Hardware board layout

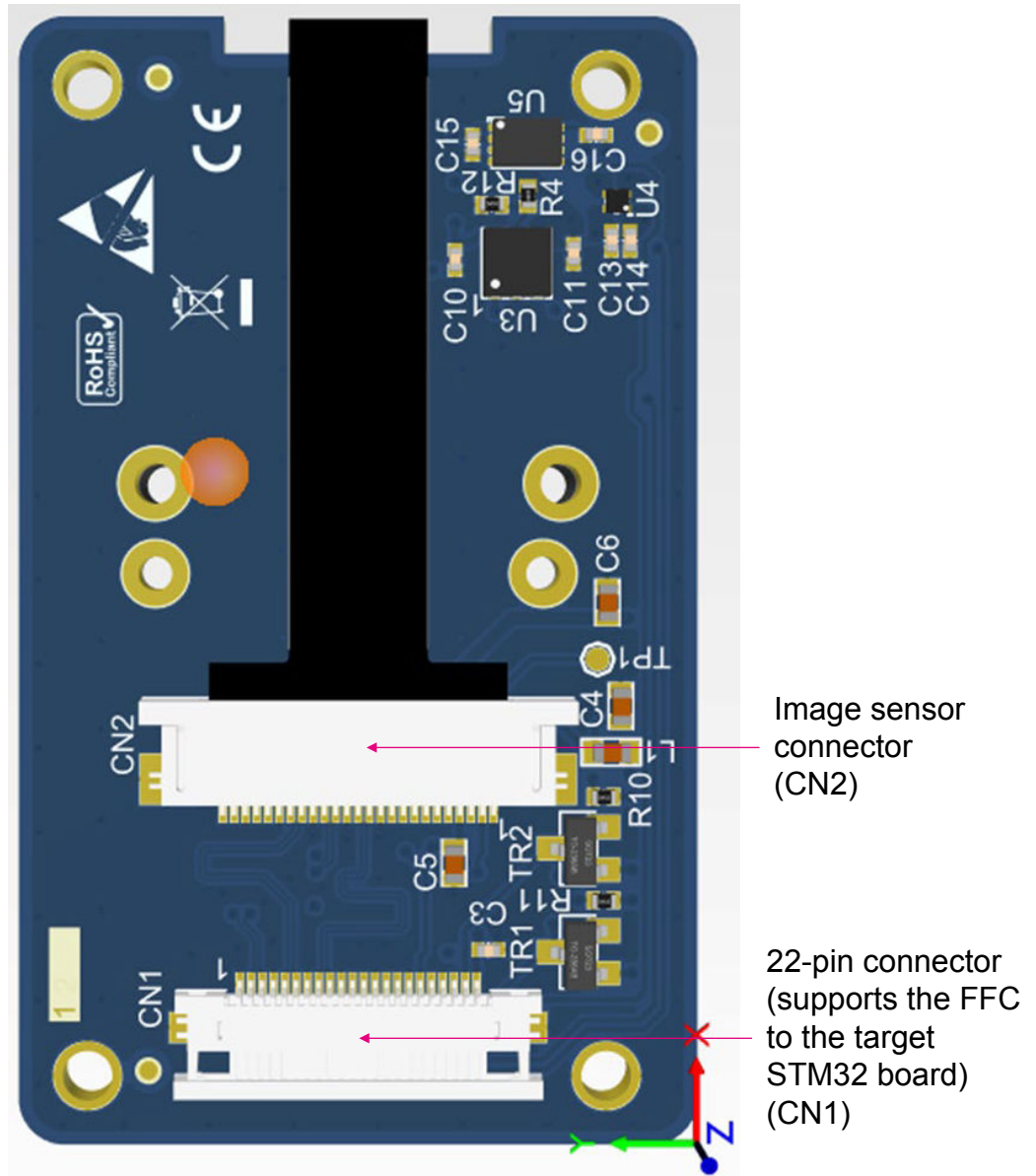
Figure 7 and Figure 8 help users locate these features on the B-CAMS-IMX board.

Figure 7. B-CAMS-IMX PCB layout (top view)



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Figure 8. B-CAMS-IMX PCB layout (bottom view)

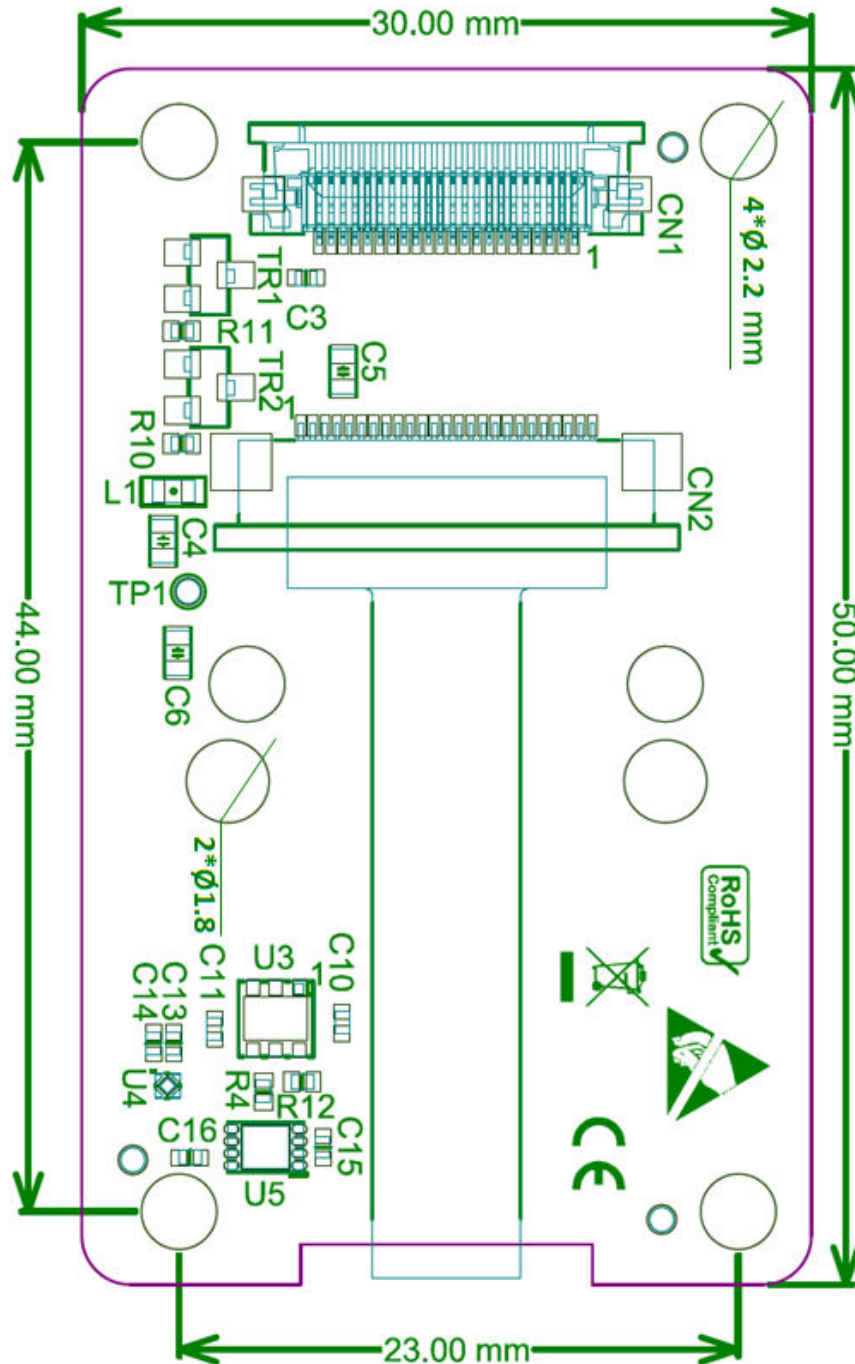


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5.3 Mechanical drawing

All measurements are in millimeters.

Figure 9. B-CAMS-IMX board mechanical dimensions (bottom view, in millimeters)



6 FFC connector to the target STM32 board

This is the 22-pin connector supporting the FFC connected to the target STM32 board, 3V3 signaling. Twenty-two pins are necessary to connect all the needed signals to get the full features of B-CAMS-IMX, as described in [Table 3](#).

Table 3. FFC connector (CN1) assignment

CN1 pin number	Assignment	Description
1	GND	-
2	CSI_D0_N	MIPI CSI-2 [®] data output, first lane
3	CSI_D0_P	MIPI CSI-2 [®] data output, first lane
4	GND	-
5	CSI_D1_N	MIPI CSI-2 [®] data output, second lane
6	CSI_D1_P	MIPI CSI-2 [®] data output, second lane
7	GND	-
8	CSI_CLK_N	MIPI CSI-2 [®] clock output
9	CSI_CLK_P	MIPI CSI-2 [®] clock output
10	GND	-
11	TOF_LPn	ToF I ² C enabled in LP mode, input, active high
12	TOF_INT	ToF interrupt, output, active low
13	GND	-
14	IMU_INT1	IMU, programmable interrupt1, output
15	IMU_INT2	IMU, programmable interrupt2, output
16	GND	-
17	NRST_CAM	Camera module reset, input, active low
18	EN_MODULE	Enable the camera module regulators, input, active high
19	GND	-
20	I2C_SCL	I ² C clock input, shared with the image sensor, IMU, and ToF
21	I2C_SDA	I ² C data I/O, shared with the image sensor, IMU, and ToF
22	3V3	Power supply, input

7 Board functions

This section explains all the functions of the board. Refer to the [Hardware board layout](#) in [Figure 7](#) and [Figure 8](#), B-CAMS-IMX top and bottom layout views.

7.1 5-Mpx image sensor

The camera module (HW10) has a high-resolution 5-Mpx (type 1/2.8) CMOS RGB image sensor compatible with a M12-mounted lens. The module is provided with the following M12 lens: 1/2.8", EFL 3.24 mm, F/NO 2.7, view angle 87°.

HW10 is inserted into the CN2 connector. The needed signals from the STM32 target board to drive the module are available on the main connector (CN1): I²C, NRST_CAM, EN_MODULE, and a dual-lane MIPI CSI-2[®] (CLK, D0, D1).

I²C address: 0x1A

7.2 Inertial motion unit

U1 is a 6-axis IMU (inertial motion unit), featuring a high-performance 3-axis digital accelerometer and 3-axis digital gyroscope. CN1 controls it via I²C and two interrupt signals.

I²C address: 0xD4

7.3 Time-of-Flight

The Time-of-Flight (ToF) sensor is a laser-ranging sensor. It can be used for gesture control and accurate distance measurements. The ToF sensor (U2) is managed with an I²C, an LPN control line, and an interrupt line. The I²C can be accessed only if the LPn is at a high level.

I²C address: 0x52

8 Federal Communications Commission (FCC) and ISED Canada Compliance Statements

8.1 FCC Compliance Statement

Part 15.19

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

Part 15.105

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Responsible party (in the USA)

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8.2 ISED Compliance Statement

Identification of products: B-CAMS-IMX

Identification du produit : B-CAMS-IMX

Compliance Statement

Notice: This device complies with ISED Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

ISED Canada ICES-003 Compliance Label: CAN ICES-3 (A) / NMB-3 (A).

Déclaration de conformité

Avis: Le présent appareil est conforme aux CNR d'ISDE Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Étiquette de conformité à la NMB-003 d'ISDE Canada: CAN ICES-3 (A) / NMB-3 (A).

9 CE conformity

9.1 Warning

EN 55032 / CISPR32 (2012) Class A product

Warning: this device is compliant with Class A of EN55032 / CISPR32. In a residential environment, this equipment may cause radio interference.

Revision history

Table 4. Document revision history

Date	Revision	Changes
25-Jun-2024	1	Initial release.
27-Sep-2024	2	Removed references.

Contents

1	Features	2
2	Ordering information	3
2.1	Codification	3
3	Laser safety consideration	4
4	Quick start guide	5
5	Hardware layout and configuration	7
5.1	Hardware block diagram	7
5.2	Hardware board layout	8
5.3	Mechanical drawing	10
6	FFC connector to the target STM32 board	12
7	Board functions	13
7.1	5-Mpx image sensor	13
7.2	Inertial motion unit	13
7.3	Time-of-Flight	13
8	Federal Communications Commission (FCC) and ISED Canada Compliance Statements	14
8.1	FCC Compliance Statement	14
8.2	ISED Compliance Statement	14
9	CE conformity	15
9.1	Warning	15
	Revision history	16
	List of tables	18
	List of figures	19

List of tables

Table 1.	Ordering information	3
Table 2.	Codification explanation	3
Table 3.	FFC connector (CN1) assignment	12
Table 4.	Document revision history	16

List of figures

Figure 1.	B-CAMS-IMX top view without FFC	1
Figure 2.	B-CAMS-IMX bottom view without FFC	1
Figure 3.	Class 1 laser product label	4
Figure 4.	B-CAMS-IMX connected to a target STM32 board.	5
Figure 5.	B-CAMS-IMX/target STM32 board connection	6
Figure 6.	B-CAMS-IMX hardware block diagram.	7
Figure 7.	B-CAMS-IMX PCB layout (top view)	8
Figure 8.	B-CAMS-IMX PCB layout (bottom view).	9
Figure 9.	B-CAMS-IMX board mechanical dimensions (bottom view, in millimeters).	10
Figure 10.	Dimensions of the M12-mount lens (in millimeters)	11

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