# STM32C5 Nucleo-64 board (MB2213)

## Introduction

The STM32C5x2 Nucleo-64 based on the MB2213 reference board (order codes NUCLEO-C542RC and NUCLEO-C562RE) provides an affordable and flexible way for users to try out new concepts and build prototypes by choosing from the various combinations of performance and power-consumption features, provided by the STM32C5 microcontroller.

The ARDUINO® Uno V3 and ST morpho connectors provide easy expansion of the functionality of the STM32 Nucleo open development platform with a wide choice of specialized shields. The board does not require any separate probes as it integrates the STLINK-V3EC debugger/programmer.

The STM32C5x2 Nucleo-64 board comes with the comprehensive free STM32 software libraries and examples available with the STM32CubeC5 MCU Package.

**Figure 1. NUCLEO-C562RE top view**

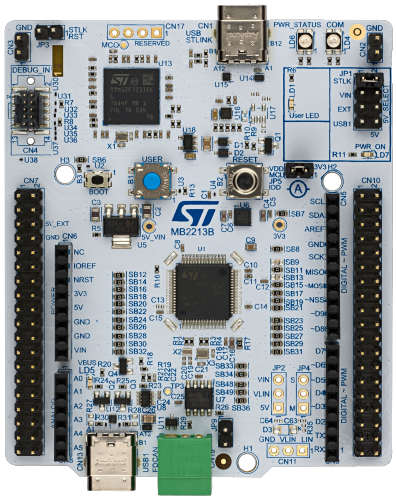
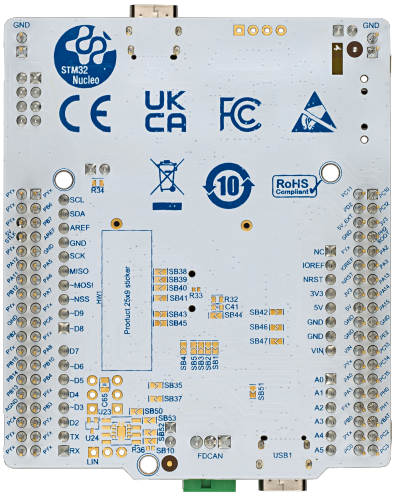


**Figure 2. NUCLEO-C562RE bottom view**



*Pictures are not contractual.*

# 1 Features

- STM32C5 microcontroller based on the Arm® Cortex®-M33 core in an LQFP64 package:
  - STM32C542RCT6 for NUCLEO-C542RC, featuring 256 Kbytes of flash memory and 64 Kbytes of RAM
  - STM32C562RET6 for NUCLEO-C562RE, featuring 512 Kbytes of flash memory and 128 Kbytes of RAM
- 32.768 kHz LSE crystal oscillator
- 24 MHz HSE crystal oscillator
- One user LED
- Three push-buttons: user, reset, and boot
- USB Type-C® (USB full speed, Device mode)
- CAN FD transceiver
- Board connectors:
  - USB Type-C® connector
  - MIPI10 connector for debugging (SWD, JTAG)
  - CAN FD connector
  - ARDUINO® Uno V3 connector
  - ST morpho expansion connectors for full access to the STM32 I/Os
- Flexible power-supply options: ST-LINK USB $V_{BUS}$, USB connector, or external sources
- On-board STLINK-V3EC debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
- Comprehensive free software libraries and examples available with the STM32CubeC5 MCU Package
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR Embedded Workbench®, MDK-ARM, and STM32CubeIDE

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# 2 Ordering information

To order the STM32C5x2 Nucleo-64 board, refer to Table 1. Additional information is available from the datasheet and reference manual of the target STM32.

**Table 1. Ordering information**

| Order code | Board references | Target STM32 |
|---|---|---|
| NUCLEO-C562RE | MB2213(1) | STM32C562RET6 |
| NUCLEO-C542RC | | STM32C542RCT6 |

1. *Subsequently called main board in the rest of the documentation.*

## 2.1 Codification

The meaning of the codification is explained in Table 2.

**Table 2. Codification explanation**

| NUCLEO-XXYYZT | Description | Example: NUCLEO-C562RE |
|---|---|---|
| XX | MCU series in STM32 32-bit Arm Cortex MCUs | STM32C5 series |
| YY | MCU product line in the series | STM32C55x/562 product line |
| Z | STM32 package pin count:<br>• R for 64 pins | 64 pins |
| T | STM32 flash memory size:<br>• E for 512 Kbytes<br>• C for 256 Kbytes | 512 Kbytes |

# 3 Development environment

## 3.1 System requirements

- Multi-OS support: Windows® 10 or 11, Linux® 64-bit, or macOS®
- USB Type-A or USB Type-C® to USB Type-C® cable

*Note: macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.*

*Linux® is a registered trademark of Linus Torvalds.*

*Windows is a trademark of the Microsoft group of companies.*

## 3.2 Development toolchains

- IAR Systems® - IAR Embedded Workbench®(1)
- Keil® - MDK-ARM(1)
- STMicroelectronics - STM32CubeIDE

1. *On Windows® only.*

## 3.3 Demonstration software

The demonstration software, included in the STM32Cube MCU Package corresponding to the on-board microcontroller, is preloaded in the STM32 flash memory for easy demonstration of the device peripherals in standalone mode. The latest versions of the demonstration source code and associated documentation can be downloaded from *www.st.com*.

## 3.4 EDA resources

All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the NUCLEO-C562RE and NUCLEO-C542RC product pages at *www.st.com*.

# 4 Conventions

Table 3 provides the conventions used for the ON and OFF settings in the present document.

**Table 3. ON/OFF convention**

| Convention | Definition |
|---|---|
| Jumper JPx ON | Jumper fitted |
| Jumper JPx OFF | Jumper not fitted |
| Jumper JPx [1-2] | Jumper fitted between pin 1 and pin 2 |
| Solder bridge SBx ON | SBx connections closed by 0 Ω resistor |
| Solder bridge SBx OFF | SBx connections left open |
| Resistor Rx ON | Resistor soldered |
| Resistor Rx OFF | Resistor not soldered |
| Capacitor Cx ON | Capacitor soldered |
| Capacitor Cx OFF | Capacitor not soldered |

# 5 Safety recommendations

## 5.1 Targeted audience

This product targets users with at least basic electronics or embedded software development knowledge like engineers, technicians, or students.

This board is not a toy and is not suited for use by children.

## 5.2 Handling the board

This product contains a bare printed circuit board and like all products of this type, the user must be careful about the following points:

- The connection pins on the board might be sharp. Be careful when handling the board to avoid injury.
- This board contains static sensitive devices. To avoid damaging it, handle the board in an ESD-proof environment.
- While powered, do not touch the electric connections on the board with your fingers or anything conductive. The board operates at a voltage level that is not dangerous, but components might be damaged when shorted.
- Do not put any liquid on the board and avoid operating it close to water or at a high humidity level.
- Do not operate the board if it is dirty or dusty.
- The pins of the board are exposed and must not come into contact with a metal surface, as this can produce a short circuit and damage the board.

## 5.3 Delivery recommendations

Before the first use, inspect the board for any damage that may have occurred during shipment. Ensure that all socketed components are securely fixed in their sockets and that nothing is loose in the plastic bag.

## 5.4 Power supply

A power supply unit or auxiliary equipment complying with the EN 62368-1:2014+A11:2017 standard (or the one replacing it) and safety extralow voltage (SELV/ES1) with limited power capability (LPS/PS2) must power this equipment.

# 6 Quick start

The STM32C5x2 Nucleo-64 board is a low-cost, easy-to-use development board that enables rapid evaluation and development with an STM32C5 microcontroller in an LQFP64 package.

Before installing and using the product, accept the evaluation product license agreement from the *www.st.com/epla* webpage. For more information on the board and demonstration software, visit the *www.st.com/stm32nucleo* webpage.

## 6.1 Getting started

Follow the sequence below to configure the STM32C5x2 Nucleo-64 board and launch the demonstration application (refer to Figure 5 for component locations):

1. Check the jumper position on the board (refer to Section 6.2 for the default board configuration).
2. Connect the STM32C5x2 Nucleo-64 board to a PC using a USB cable (USB Type-A or USB Type-C® to USB Type-C®) and the ST-LINK USB connector (CN1) to power the board.
3. The PWR_ON (LD7), COM (LD4), and PWR STATUS (LD6) LEDs light up and the user LED (LD1) is blinking.
4. Press the blue user button (B1) and observe how the blinking of the green LED (LD1) changes.
5. Download the demonstration software and several software examples to use the STM32 Nucleo features, available from the *st.com* website.
6. Develop a custom application using the available examples.

## 6.2 Default board configuration

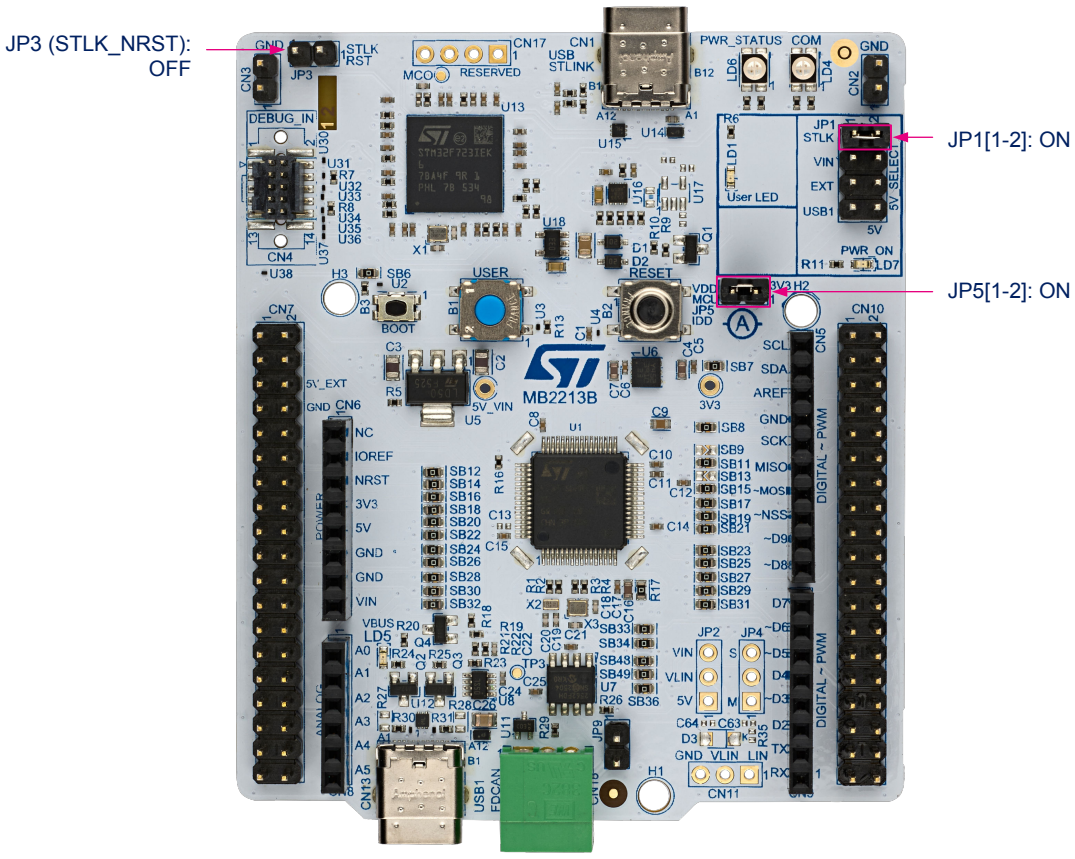
By default, the board is configured for an STLINK-V3EC power supply, as illustrated by Figure 3. The different jumper configurations and voltage settings are shown in Table 4.

**Table 4. Jumper configuration**

| Jumper | Definition | Position(1) | Comment(1) |
|---|---|---|---|
| JP1 | 5 V power selection (user USB power source selection) (2) | **ON [1-2]** | **5 V from STLINK-V3EC** |
| | | ON [3-4] | 5 V source from ARDUINO® VIN 7-12 V |
| | | ON [5-6] | 5 V source from ST morpho connector 5V_EXT |
| | | ON [7-8] | 5 V source from USB Type-C® |
| | | OFF | No 5 V power source; configuration when external 3V3 power source is used |
| JP3 | STLK_RST | ON [1-2] | Used to keep the STLINK-V3EC MCU in reset state when an external debug probe is used |
| | | **OFF** | **Normal mode: uses STLINK-V3EC debug probe** |
| JP5 | IDD measurement | **ON [1-2]** | **VDD_MCU = VDD** |
| | | OFF | Use ammeter to measure VDD_MCU power consumption, or external 3V3 source can be connected to pin 2 (STLINK-V3PWR tools with STM32CubeMonitor-Power or ULPBench probe, for example) |
| JP9 | CAN FD termination mode | ON | 120 ohm resistor termination is connected. |
| | | **OFF** | **120 ohm resistor termination is not connected.** |

1. *The default configuration is shown in bold.*
2. *It is recommended to select only one 5 V power source.*

**Figure 3. Default board configuration**



# 7 Hardware layout and configuration

The STM32C5x2 Nucleo-64 board is designed around an STM32C5 microcontroller in an LQFP64 package. Figure 4 shows the connections between the microcontroller and its peripherals. Figure 5 shows the location of these features on the board. The mechanical dimensions of the board are shown in Figure 7.

## 7.1 Hardware layout

**Figure 4. NUCLEO-C5x2Rx block diagram**

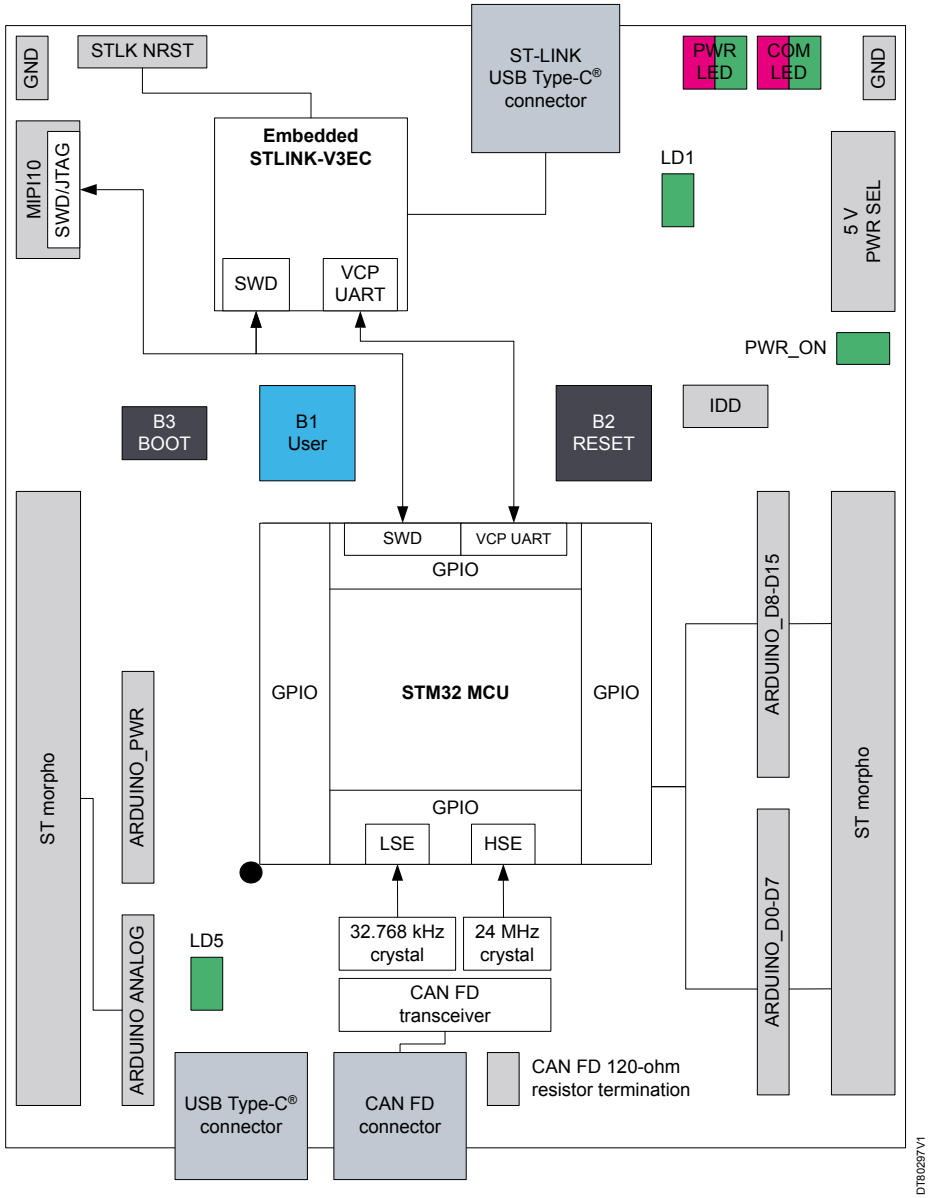


**Figure 5. NUCLEO-C562RE top layout**

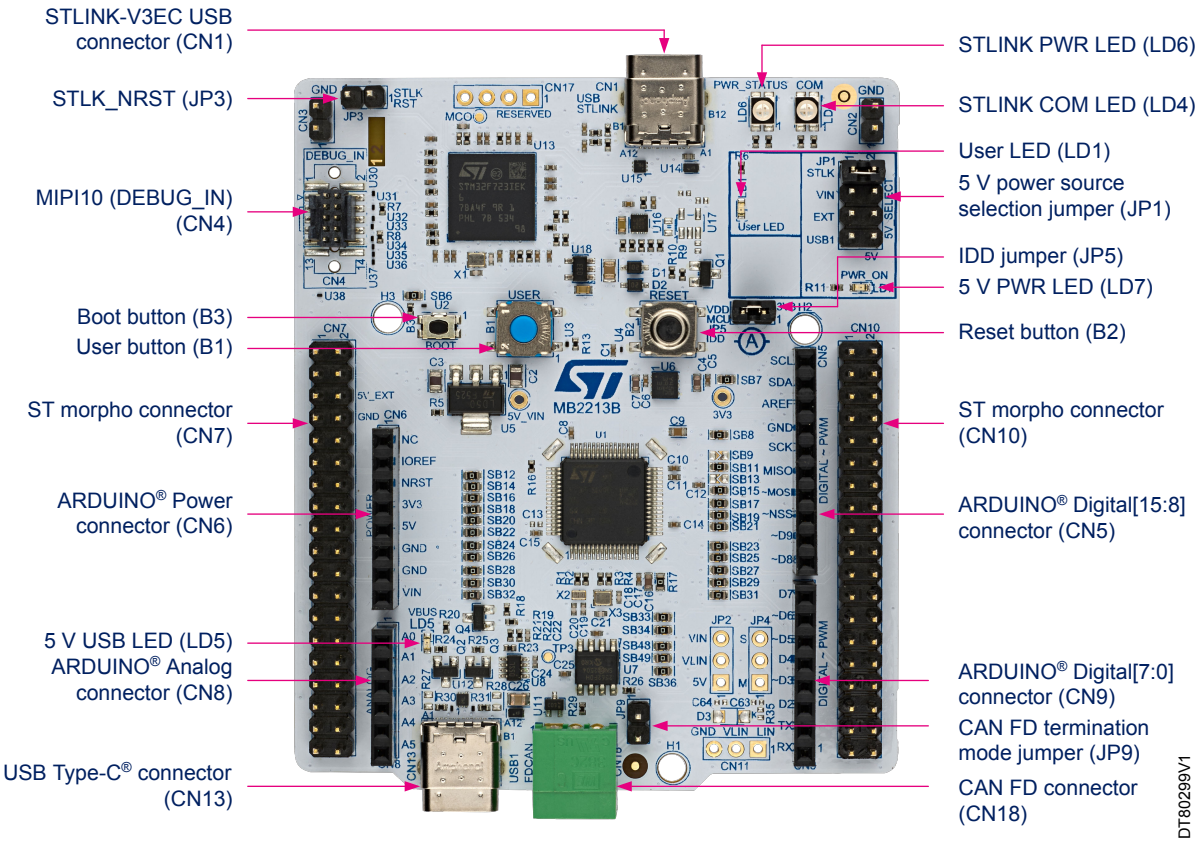
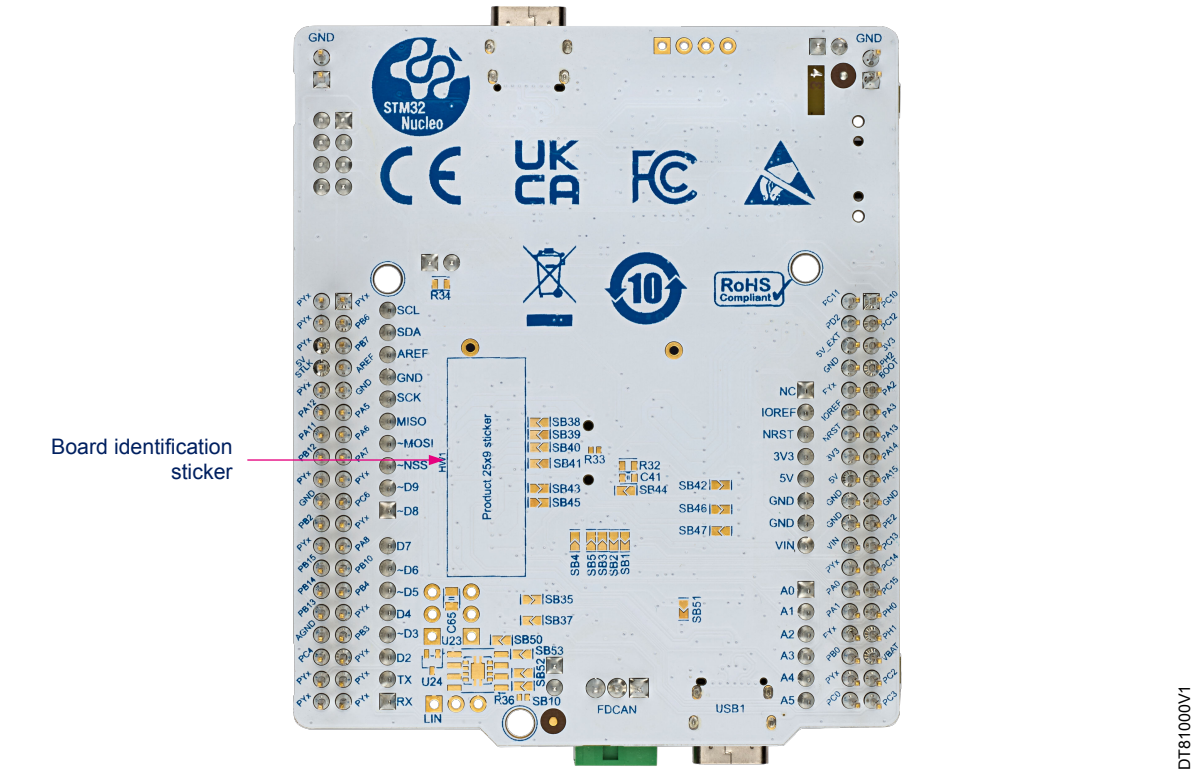
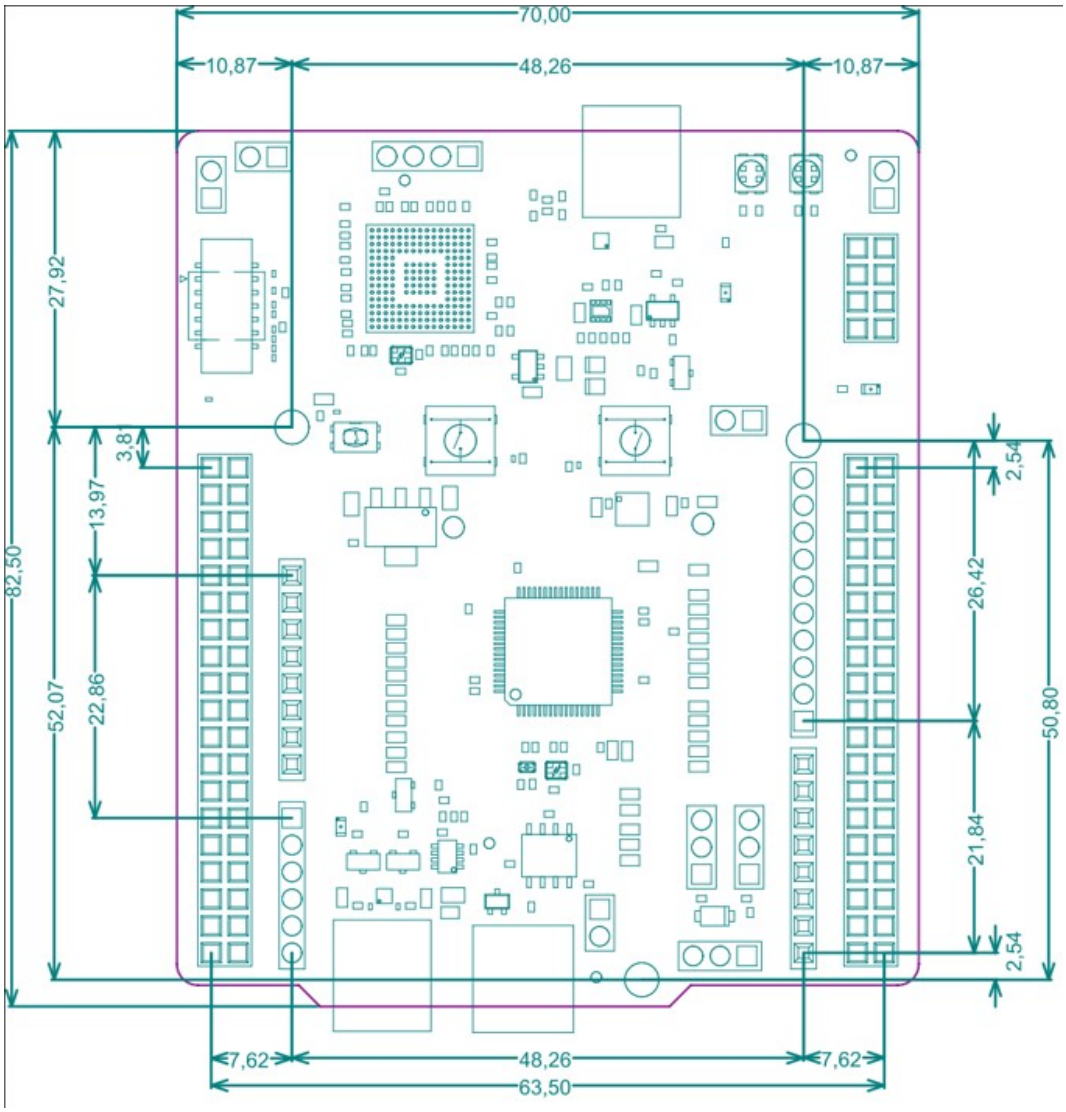



**Figure 6. NUCLEO-C562RE bottom layout**



## 7.2 Mechanical dimensions

Figure 7. **Board mechanical drawing (in millimeters)**



## 7.3 Embedded STLINK-V3EC

This chapter provides information about the implementation of the embedded STLINK-V3EC on this STM32C5x2 Nucleo-64 board.

For further details on ST-LINK capabilities, LED management, and driver and firmware for STLINK-V3EC, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).

For more information about the debugging and programming features of STLINK-V3EC, refer to the user manual *STLINK-V3SET debugger/programmer for STM8 and STM32* (UM2448).

### 7.3.1 Description

There are two different ways to program and debug the onboard STM32 MCU:

- Using the embedded STLINK-V3EC.
- Using an external debug tool connected to the STDC14/MIPI10 connector (CN4).

Refer to Table 4 for details on how to switch between STLINK-V3EC and an external debug probe using JP3.

The STLINK-V3EC tool for debugging and programming is integrated into this STM32C5x2 Nucleo-64 board. It provides the following features:

- 5 V/500 mA power supplied by the USB Type-C® connector (CN1)
- USB 2.0 high-speed compatible interface
- JTAG and Serial Wire Debug (SWD) with Serial Wire Viewer (SWV)
- Virtual COM port (VCP)
- 3.3 V application voltage
- Tricolor (green, orange, and red) COM status LED (LD4) that blinks during communication with the PC
- Tricolor (green, orange, and red) power status LED (LD6) that provides information about the STLINK-V3EC target power
- USB Type-C® overvoltage protection (U16) with current limitation

### 7.3.2 Drivers

Driver installation is not required for Windows® 10 or later. However, installing the driver assigns an ST-specific name to the ST-LINK COM port in the system device manager.

### 7.3.3 Firmware upgrade

STLINK-V3EC includes a firmware upgrade mechanism (stsw_link007) through the USB port. The firmware can change during the STLINK-V3EC lifetime, to add new features, correct errors, and support new microcontroller families. Visit the www.st.com website regularly and before using this board to stay up to date with the latest firmware version.

### 7.3.4 Using an external debug tool to program and debug the on-board STM32

When using the external debug connector (CN4), it is possible to supply power to the STM32 Nucleo-64 board through the STLINK-V3EC USB connector (CN1) or another power supply source, as described in Section 7.4: Power supply.

It is not mandatory to set the STLINK-V3EC to reset mode (JP3: ON) when using an external debug probe on CN4. However, it is possible to set the STLINK-V3EC to reset mode by putting a jumper on JP3. This configuration makes it impossible to power the board through the STLINK-V3EC USB connector (CN1) or to debug using the STLINK-V3EC. Select another 5 V power source on JP1 and connect an external debugger to CN4.

Figure 8 shows the location of the different STLINK-V3EC components on the STM32C5x2 Nucleo-64 board required for connecting an external debug tool. Table 5 provides the pinout for the MIPI10 debug connector.

**Figure 8. Connecting an external debug tool**

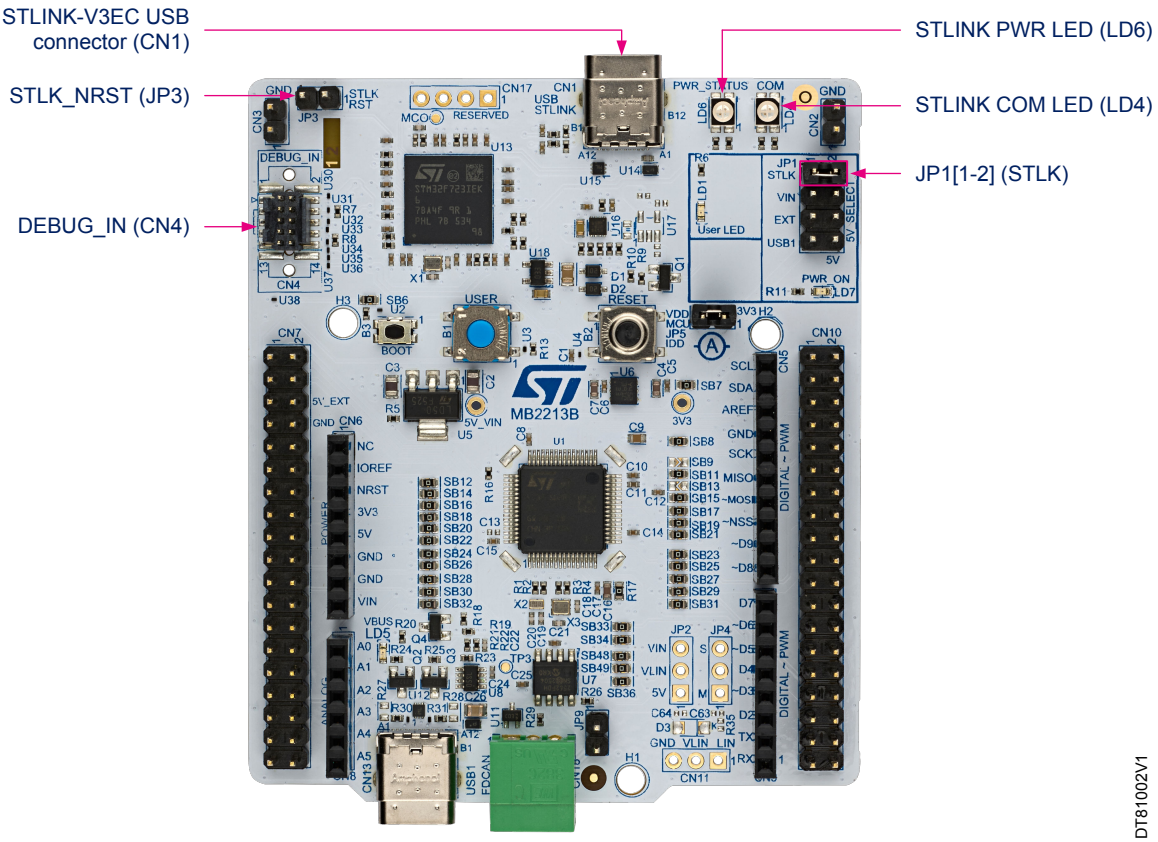


**Table 5. MIPI10 debug connector (CN4) pinout**

| MIPI10 pin | STDC14 pin | CN4 | Designation |
|---|---|---|---|
| - | 1 | NC | Reserved(1) |
| - | 2 | NC | Reserved(1) |
| 1 | 3 | VDD | Target VDD(2) |
| 2 | 4 | JTMS / DBG.SWDIO | Target SWDIO using SWD protocol or Target JTMS using JTAG protocol |
| 3 | 5 | GND | Ground |
| 4 | 6 | JTCK / DBG.SWCLK | Target SWCLK using SWD protocol or target JTCK using JTAG protocol |
| 5 | 7 | GND | Ground |
| 6 | 8 | JTDO / DBG.SWO | Target SWO using SWD protocol or Target JTDO using JTAG protocol(3) |
| 7 | 9 | JRTCK | JRTCK(4)/Opt(5) |
| 8 | 10 | JTDI / DBG.JTDI | Not used by SWD protocol, Target JTDI using JTAG protocol |
| 9 | 11 | GNDDetect | GND detect for plug indicator(6) |
| 10 | 12 | NRST | Target NRST |
| - | 13 | DBG.VCP_RX | Target Rx used for VCP (with UART supporting bootloader)(7) |
| - | 14 | DGB.VCP_TX | Target Tx used for VCP (with UART supporting bootloader)(2) |

1. *Not connected on the STM32 Nucleo-64 board.*
2. *Input for external debug tools; output for the STM32 Nucleo-64 board.*
3. *SWO is optional; required only for Serial Wire Viewer (SWV) trace.*
4. *Optional loopback of JTCK on the MCU.*
5. *Not required for the SWD connection; optional configuration on the STM32 Nucleo-64 board.*
6. *Tied to GND; can be used by the target for tool detection.*
7. *Output for external debug tools; input for the STM32 Nucleo-64 board.*

## 7.4 Power supply

### 7.4.1 Power source selection

The STM32C5x2 Nucleo-64 board can take any of the following sources as its power supply:

- A host PC or a wall charger connected to CN1 through a USB cable (STLK default configuration).
- An external 7 to 12 V power supply from the ARDUINO Uno V3 (CN6) or ST morpho (CN7) connector (VIN), with a 5 V adaptation from LDO (U5).
- An external 5 V power supply from the ST morpho connector (CN7 pin 6; 5V_EXT).
- A host PC connected to the USB Type-C® connector (CN13).
- 3V3 from the ST morpho connector (CN7 pin 5, or the 3.3 V test point).

The power supply for the STM32 Nucleo-64 board can be provided by the host PC through the USB cable, or by an external source: VIN (7 to 12 V), E5V (5 V), or 3.3 V power supply pins on CN6 or CN7. If the power supply is 3.3 V, STLINK-V3EC is not powered and cannot be used.

*Note: To power the STM32 Nucleo-64 board and the associated shield, use a power source that supports up to 5 V at 500 mA, or 3.3 V at 500 mA for the 3.3 V use case.*

The power supply capabilities are summarized in Table 6.

**Table 6. Power source capability**

| Power supply | Connector pins | Voltage range | Recommended current | Limitation |
|---|---|---|---|---|
| 5V_STLK | CN1 USB connector<br>JP1[1-2] | 4.75 to 5.25 V | 500 mA | The maximum current depends on the presence or absence of USB enumeration:<br>• 100 mA without enumeration.<br>• 500 mA with enumeration. |
| VIN/5V_VIN | CN6 pin 8<br>CN7 pin 24<br>JP1[3-4] | 7 to 12 V | 500 mA | From 7 to 12 V only; input current capability is linked to input voltage:<br>• 800 mA input current when $V_{IN}$=7V.<br>• 450 mA input current when 7 V < $V_{IN}$ < 9 V.<br>• 250 mA input current when 9 V < $V_{IN}$ < 12 V. |
| 5V_EXT | CN7 pin 6<br>JP1[5-6] | 4.75 to 5.5 V | 1 A | The maximum current depends on the power source. 1 A maximum is recommended for this board. |
| USB1 | CN13 USB connector<br>JP1[7-8] | 4.75 to 5.5 V | 1 A | The maximum current depends on the presence or absence of USB enumeration and the USB power source capacity used to power the board. |
| External 3V3 | CN7 pin 5<br>3V3 test point | 3 to 3.6 V | 500 mA | The maximum current depends on the 3V3 source.<br>With external 3.3 V, STLINK-V3EC is not powered and cannot be used. |
| VDD_MCU | JP5 pin 2 | 2.7 to 3.6 V | 500 mA | It is possible to power only the MCU power supply pins by applying a voltage source on JP5 pin 2 (VDD_MCU). External functions, like debug, LEDs, or expansion connectors are not powered. This option can be used for MCU power consumption measurement. |

### 5V_STLK

The STM32C5x2 Nucleo-64 board and shield can be powered from the STLINK-V3EC connector CN1 (5 V, 500 mA).To select the 5V_STLK power source, fit the 5 V power selection jumper (JP1) on pins 1 and 2 (STLK), as shown in Figure 9. This is the default configuration.

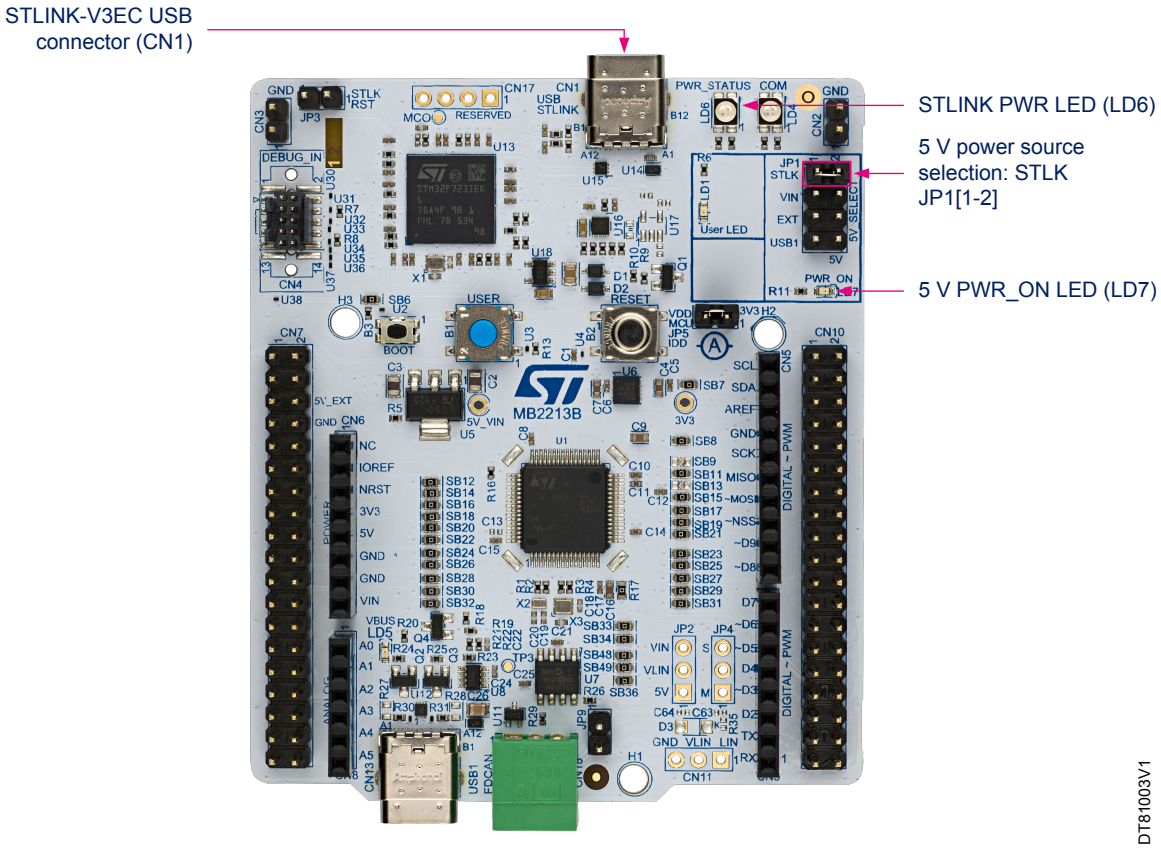
If the USB enumeration succeeds, the 5V_STLK power is enabled by asserting the T_PWR_EN signal from STLINK-V3EC. This pin is connected to a power switch (U16), which powers the board. This power switch also features a current limitation, to protect the PC in case of an onboard short circuit. If an overcurrent condition (current greater than 500 mA) occurs, the POWER status LED (LD6) lights up in red.

The STM32C5x2 Nucleo-64 board and its shield can be powered by the STLINK-V3EC USB connector (CN1). If the host can provide the required power, the power switch (U16) is enabled and the green LED (LD7) is turned on. The board and its shield can consume up to 500 mA.

If the host is unable to provide the requested current, enumeration fails. The power switch (U16) remains OFF, and the MCU, including the extension board, is not powered. Consequently, the green LED (LD7) remains off. In this case, use an external power supply.

**Warning:** *If the maximum current consumption of the STM32C5x2 Nucleo-64 board and its shield boards exceeds 500 mA, power the board using an external power supply connected to VIN, EXT, or USB1.*

Figure 9. **JP1 [1-2]: 5V_STLK power source**

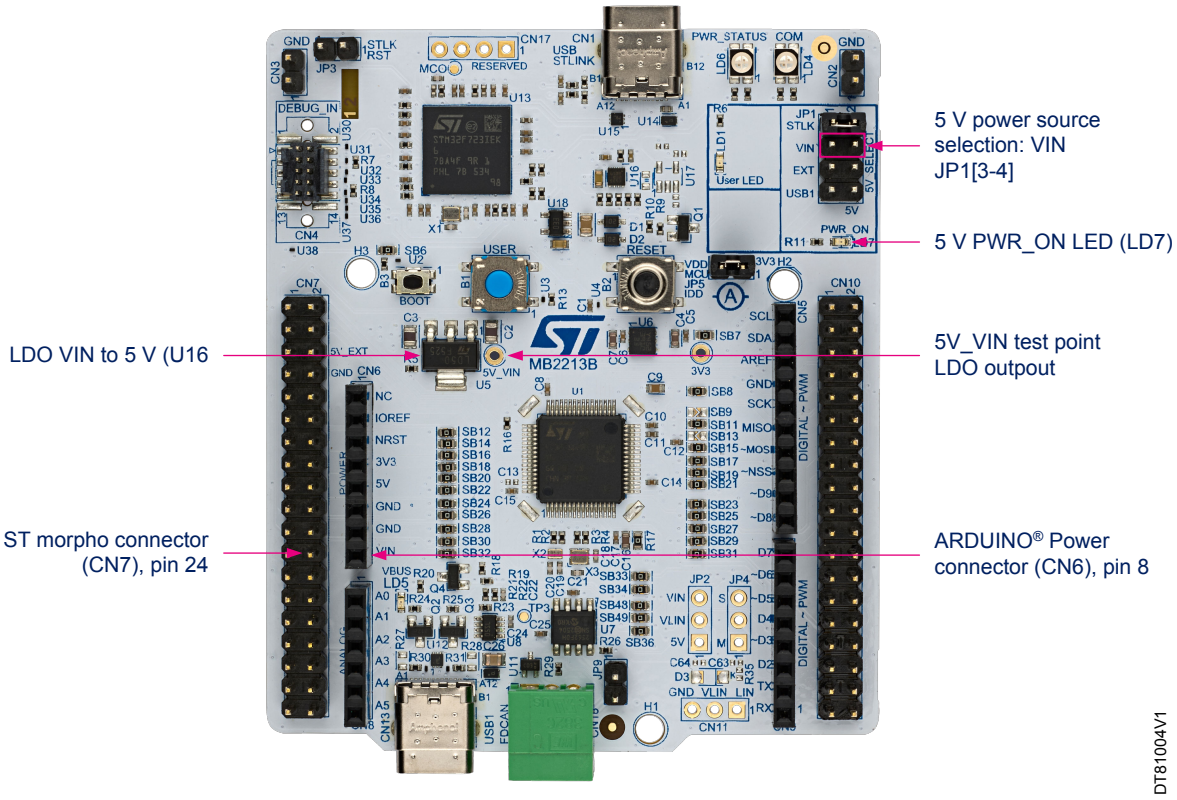


### VIN (5V_VIN)

VIN (5V_VIN) is the 7 to 12 V DC power from the ARDUINO® connector (CN6) pin 8 (VIN) or from the ST morpho connector (CN7) pin 24. An onboard LDO (U5) provides a fixed 5 V supply from VIN (7 to 12 V).

For a 5V_VIN power supply, the JP1 jumper is fitted on [3-4] (VIN), as shown in Figure 10.

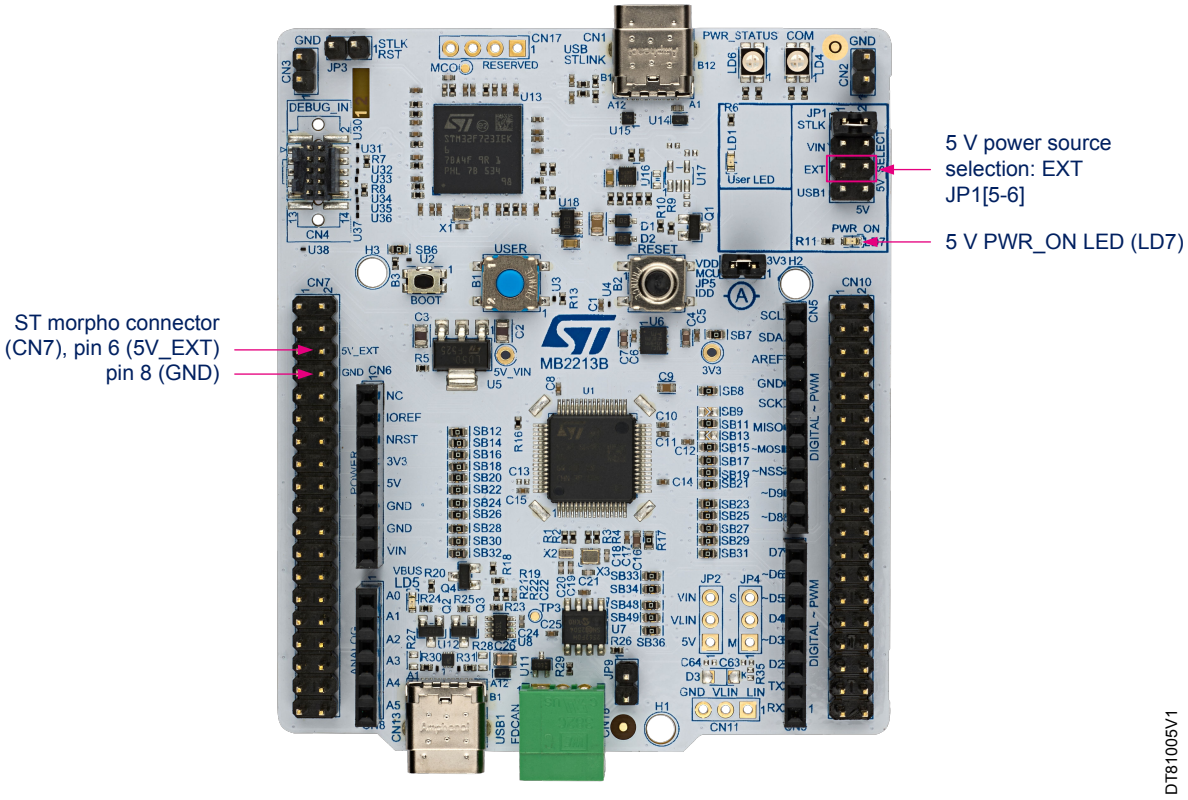
**Figure 10. JP1 [3-4]: 5V_VIN power source**



### 5V_EXT

5V_EXT is the DC power coming from an external 5 V DC power source from the ST morpho connector (CN7) pin 6. The 5V jumper selection (JP1) must be fitted on [5-6] (EXT) to select the 5V_EXT power source on the JP1 connector, and it must be configured as shown in Figure 11.

**Figure 11. JP1[5-6]: 5V_EXT power source**

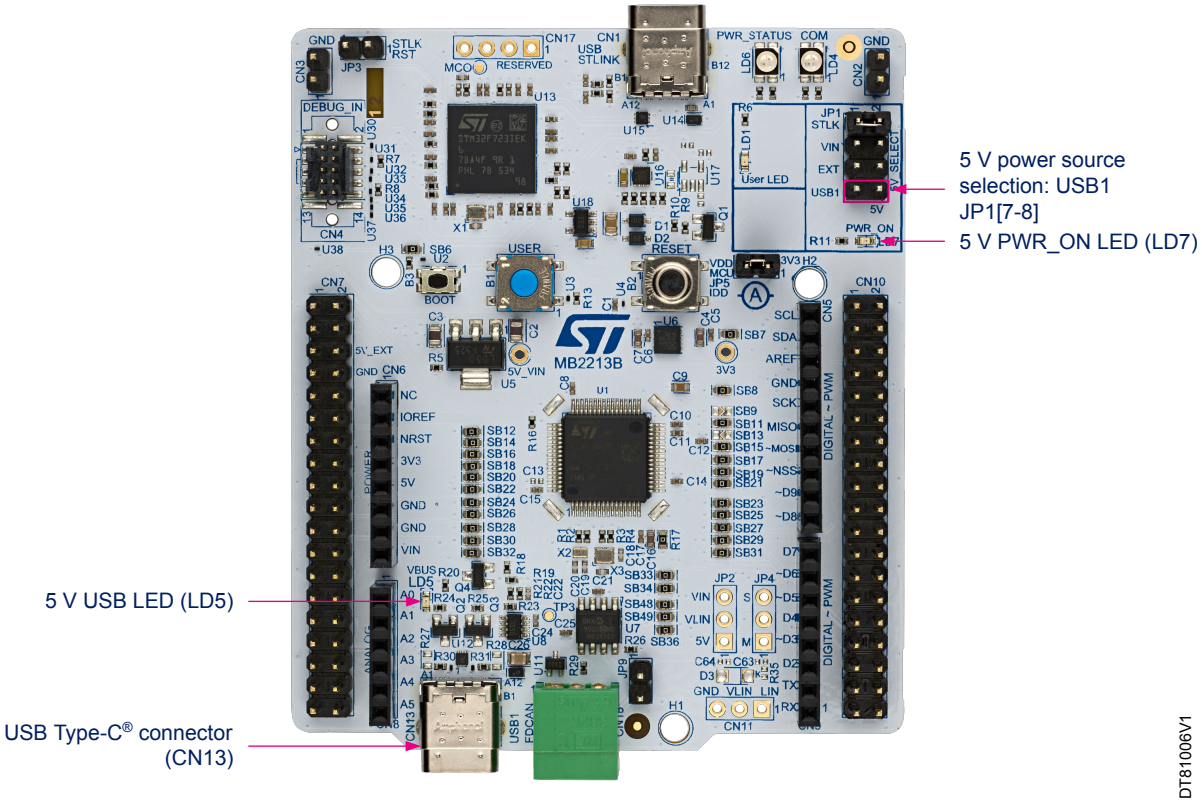


### USB1

USB1 is the DC power supply from the USB Type-C® user connector (CN13, 5 V/500 mA).

To select this power supply source, the JP1 jumper must be on [7-8], as shown in Figure 12. The green LED (LD5) is turned on.

**Figure 12. JP1 [7-8]: 5V_USB_SNK power source**




### External 3V3

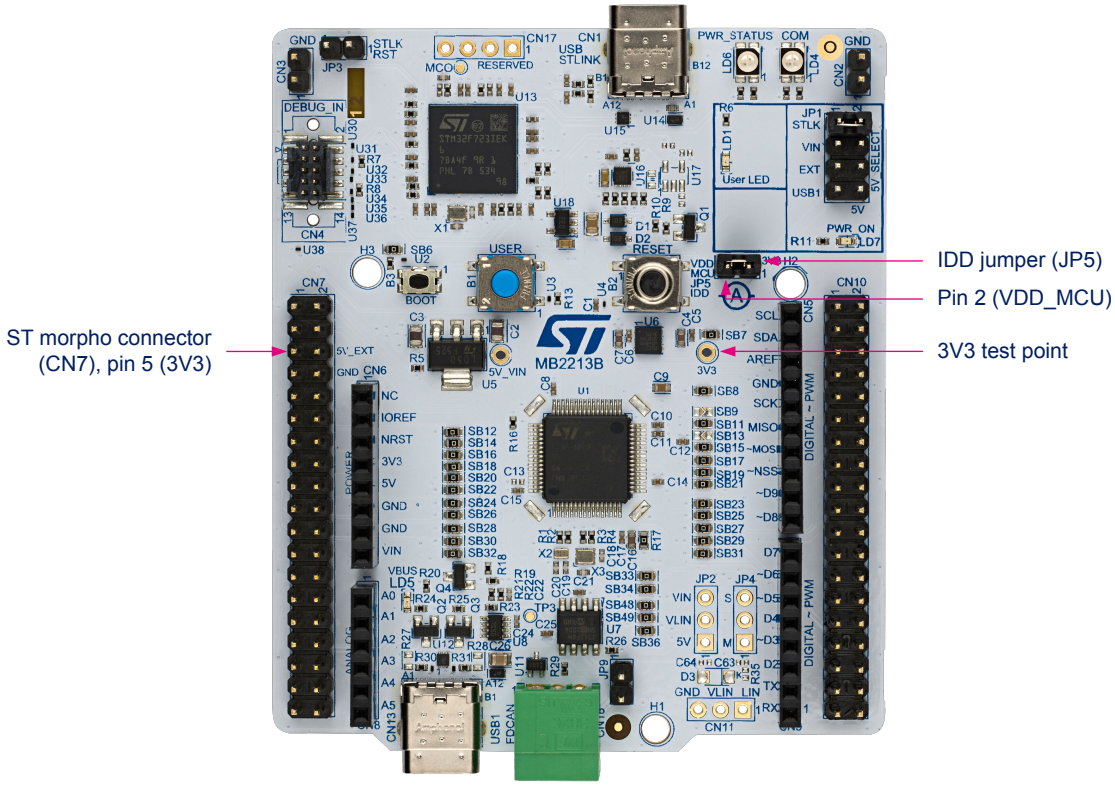
In certain scenarios, like when the 3.3 V supply is provided by an extension board, it can be interesting to use an external 3.3 V source on the 3V3 input (CN7 pin 5 or 3.3 V test point). When the STM32C5x2 Nucleo-64 board is powered by a 3.3 V source only, STLINK-V3EC is not powered and programming and debugging are unavailable.

**Warning:** *When using the 3V3 input, the STLINK-V3EC part is not supplied. For this configuration, it is recommended to remove SB7 to avoid backward voltage through U6.*

### VDD_MCU

In certain scenarios, it can be interesting to use an external power source from 2.7 to 3.6 V, to power only the MCU power supply pins (JP5 pin 2). In this configuration, external functions like debug, LEDs, or the expansion connector are not powered. This option can be used to optimize MCU power consumption measurement.

**Figure 13. 3V3 power source**



### 7.4.2 Programing/debugging when the power supply is not from STLINK-V3EC (5V_STLK)

When powered by VIN, EXT, or USB1, it is still possible to use STLINK-V3EC for Virtual COM port (VCP), programming, or debugging. The following power sequence procedure must be followed:

1. Set the JP1 jumper according to the selected 5 V external power source.
2. Connect the external power source as per the JP1 configuration.
3. Turn on the external power supply.
4. Verify that the 5 V green LED (LD7) is illuminated.
5. Connect the PC to the USB connector (CN1) for programming and debugging.

If this sequence is not respected, VBUS from STLINK-V3EC might power the board first, and the following risks can occur:

- If the board requires more current than the STLINK-V3EC can provide, the PC may be damaged, or the current can be limited by the PC. Therefore, the board is not powered correctly.
- 500 mA is requested at enumeration. There is a risk that the request is rejected, and enumeration fails because the PC cannot provide this current.

### 7.4.3 Power supply output

#### 5V

Regardless of the power source (5V_STLK, 5V_VIN, 5V_EXT, or USB1), the 5 V generated is available on CN6 pin 5 or CN7 pin 18. It can be used as an output power supply for an ARDUINO® shield or an extension board. In this case, the maximum current of the power source specified in Table 6 must be adhered to.

#### 3V3

The internal 3V3 on CN6 pin 4 or CN7 pin 16 can also be used as a power supply output. The current is limited by the maximum current capability of the U6 regulator.

### 7.4.4 Measurement of the microcontroller current consumption

The IDD jumper (JP5) is used to measure the current consumption of the STM32 microcontroller. To perform the measurement, remove the jumper and connect an ammeter or another current measurement tool.

- Jumper ON: the STM32 microcontroller is powered by the internal 3.3 V source (default).
- Jumper OFF: connect an ammeter or an external 3.3 V power source to power and measure the STM32 microcontroller current consumption.

## 7.5 Clock sources

Three clock sources are available:

- LSE: 32.768 kHz crystal for the STM32 embedded RTC.
- MCO: 8 MHz clock from STLINK-V3EC for the STM32 microcontroller.
- HSE: 24 MHz oscillator for the STM32 microcontroller.

### 7.5.1 LSE clock references

There are three methods to set up the pins associated with the low-speed clock (LSE), which are detailed below. Refer to the application note *Guidelines for oscillator design on STM8AF/AL/S and STM32 MCUs/MPUs* (AN2867) for further details, such as typical frequencies, capacitors, and resistors.

#### LSE on-board oscillator X2 crystal (default configuration)

The X2 crystal has the following characteristics: 32.768 kHz, 9 pF, and 20 ppm. The following configuration is needed:

- R1 and R2 ON
- SB1 and SB2 OFF

#### External oscillator on PC14

The input clock comes from an external oscillator via the PC14 signal on the ST morpho connector (CN7 pin 25). This clock requires the following configuration:

- SB1 ON for connection from the ST morpho connector (CN7) pin 25
- R1 and R2 OFF
- SB2 is optional

#### LSE not used

PC14 and PC15 are used as GPIOs instead of low-speed clocks. This requires the following configuration:

- R1 and R2 OFF
- SB1 and SB2 ON

### 7.5.2 HSE clock references

There are four ways to configure the pins corresponding to the external high-speed clock (HSE), which are detailed below. Refer to the application note *Guidelines for oscillator design on STM8AF/AL/S and STM32 MCUs/MPUs* (AN2867) for further details, such as typical frequencies, capacitors, and resistors.

#### HSE onboard oscillator X3 crystal (default configuration)

The X3 crystal has the following characteristics: 24 MHz, 6 pF, and 20 ppm. The following configuration applies:

- R3 and R4 ON
- SB3, SB4, and SB5 OFF

#### MCO from STLINK-V3EC

The MCO output of the STLINK-V3EC MCU is used as an input clock. By default, its frequency is fixed at 8 MHz and it is connected to the PH0 OSC_IN pin of the STM32 microcontroller. The frequency may be changed during an ST-LINK firmware upgrade (refer to RN0093 for further details). The use of this clock source requires the following configuration:

- R3 and R4 OFF
- SB5 (MCO) ON
- SB3 and SB4 OFF

The resistor (R44) and capacitor (C28) can be adapted for the CLK shape.

By default, this clock is not connected.

#### External oscillator on PH0

The input clock comes from an external oscillator through PH0, on the extension connector (CN7) pin 29. The following configuration is required:

- R3 and R4 OFF
- SB5 (MCO) OFF
- SB3 ON for connection from the ST morpho connector (CN7), pin 29.
- SB4 optional

By default, this clock is not connected.

#### HSE not used

PH0 and PH1 are used as GPIOs instead of clocks. This requires the following configuration:

- R3 and R4 OFF
- SB5 (MCO) OFF
- SB3 and SB4 ON

By default, this clock is not connected.

## 7.6 Boot modes

There is one BOOT (PH2-BOOT0) pin connected on this board to select the boot modes:

- **BOOT0 = 0: boot from user flash memory (default configuration).**
- BOOT0 = 1: boot from system memory (bootloader).

The BOOT0 pin is pulled down with an external resistor. To achieve a high voltage level, there are two options:

- Press the button (B3) to pull BOOT0 to a high voltage level. When the button is released, BOOT0 returns to a low level.
- Use a jumper to short CN7 pin 5 and pin 7 (BOOT0 is shorted to VDD).

## 7.7 Reset sources

The reset signal of the STM32C5x2 Nucleo-64 board is active LOW. The reset sources include:

- Reset button (B2)
- Embedded STLINK-V3EC (CN1)
- ARDUINO® connector (CN6 pin 3)
- ST morpho connector (CN7 pin 14)

## 7.8 LEDs

The STM32C5x2 Nucleo-64 board contains five LEDs:

- One user LED (LD1). This green LED is a user LED connected to GPIO PA5 (SB8 ON), which corresponds to the ARDUINO® D13 signal. To light LD1, write a high logic state ("1") to GPIO PA5. A transistor drives LD1.
  The function of the user LED (LD1) can be modified and programmed to indicate another status signal relevant to the board. LD1 consumption does not affect the VDD_MCU power measurement, because LD1 is isolated from this power supply.
- Two STLINK-V3EC tricolor (green, orange, and red) LEDs (LD4 and LD6). These LEDs provide information about the STLINK-V3EC communication (LD4) and power (LD6) status. For detailed information about these LEDs, refer to the technical note *Overview of STLINK derivatives* (TN1235).
- USB Type-C® 5 V power LED (LD5). This green LED indicates the presence of $V_{BUS}$ on CN13.
- 5V_PWR LED (LD7). This green LED indicates that the STM32 part is powered by a 5 V source.

Table 7 provides an overview of the different LEDs on the STM32C5x2 Nucleo-64 board. Refer to Figure 5 to locate the LEDs on the board.

**Table 7. NUCLEO-C5x2Rx LEDs**

| Color | Reference | System element monitored |
|---|---|---|
| Green | LD1 | Free for user function |
| Green, orange, red | LD4 | Onboard STLINK-V3EC communication status |
| Green | LD5 | $V_{BUS}$ presence indicator on USB1 user connector (CN13) |
| Green, orange, red | LD6 | Onboard STLINK-V3EC power status |
| Green | LD7 | +5 V power indicator, board powered |

## 7.9 Push-buttons

Three push-buttons are available on the STM32C5x2 Nucleo-64 board:

- Blue user button (B1)
- Black reset button (B2)
- Black boot mode button (B3)

Refer to Figure 5 to locate the push-buttons on the board.

### Blue user button (B1)

The user button connects to the PC13 STM32 I/O pin by default. Depending on the supported microcontroller, this pin can support a wake-up function and a tamper function.

A pull-down resistor supports the tamper function. Remove this resistor if the I/O pin is used only in wake-up mode. In this case, the software must set an internal I/O pull-up in the microcontroller.

When the button is pressed, the logic state is HIGH. Otherwise, the logic state is LOW.

There is no hardware filter. The user must program a filter by software if needed. This reduces the bill of materials (BOM) cost by eliminating the external hardware debounce filter (capacitor).

**Warning:** *Set the PC13 I/O for the user button to input mode with debounce. Do not set PC13 to output mode or drive it to a low level. This prevents a short circuit when the user button is pressed.*

### Black reset button (B2)

This push-button connects to NRST and resets the microcontroller. When the button is pressed, the logic state is low; otherwise, the logic state is high.

### Black boot mode button (B3)

This push-button connects to the BOOT pin and selects the boot mode during the reset phase. When the button is pressed, the logic state is high; otherwise, an external pull-down resistor drives the logic state low.

- No button press during the reset phase: BOOT pin is at level 0. Boot from user flash memory.
- Button press during the reset phase: BOOT pin is at level 1. Boot from system memory.

## 7.10 USB Type-C® FS

The STM32C5x2 Nucleo-64 board supports USB full-speed (USB FS) communication through a USB Type-C® connector (CN13). The board also supports USB Device mode and can be powered by the USB Type-C® connector, with a 500 mA current limitation.

The green USB power LED (LD5) lights up when VBUS is powered by a USB Host and the board works as a USB Device.

### USB FS Device

When the USB stack is integrated in the STM32 microcontroller, and a USB Host connection to the USB Type-C® connector (CN13) on the board is detected, the STM32C5x2 Nucleo-64 board operates as a USB Device. Depending on the power capability of the USB Host, the board can be powered by the connector VBUS terminal. This configuration corresponds to position [7-8] (USB1) on the 5 V power source selection jumper (JP1). The board supports any USB-compliant 5 V voltage. Table 8 shows the hardware configuration for the USB FS interface.

**Table 8. Hardware configuration for the USB interface**

| I/O | Solder bridge | Setting(1) | Configuration(1) |
|---|---|---|---|
| PA11 | SB23 | OFF | PA11 used as USB_FS_N diff pair interface.<br>No other muxing. |
| | | **ON** | **PA11 can be used as USB data interface and PA11 is also available on the ST morpho connector.**<br>**USB function can be used, but performances may be impacted due to the track length on the expansion module and track impedance mismatch.** |
| PA12 | SB25 | OFF | PA12 used as USB_FS_P diff pair interface.<br>No other muxing. |
| | | **ON** | **PA12 can be used as USB data interface and PA12 is also available on the ST morpho connector.** |

| I/O | Solder bridge | Setting(1) | Configuration(1) |
|---|---|---|---|
| PA12 | SB25 | | **USB function can be used, but performances can be impacted due to the track length on the expansion module and track impedance mismatch.** |
| PC4 | SB33 | OFF | PC4 is not used for USB.<br>PC4 is available on the extension connector CN10, pin 34. |
| | | **ON** | **PC4 is used for VBUS detection.**<br>**PC4 is also available on the extension connector CN10, pin 34.** |

1. *The default configuration is shown in bold.*

### USB power mode

The STM32C5x2 Nucleo-64 board can be used in two USB power modes:

- In Self-powered mode, transistors Q2 and Q3 are fitted. They are driven by the onboard 3.3 V supply. In OFF mode, the 5.1 kΩ Rd resistors are not present on the connector CCx lines. (This is the default configuration.)
- In Bus-powered mode, resistors R27 and R28 are fitted. They are used in dead-battery mode and at the USB Host plug to start enumeration. (This configuration is optional; R27 and R28 must be soldered manually)

*Note: SB51 can demonstrate MCU USB Host mode capabilities through the USB Type-C® connector. This mode is intended for testing purposes and is not USB Type-C® certifiable or compliant in its current state. The objective is to provide 5 V on the USB Type-C® user connector (CN13) to enable connection of a device as mass storage. In this mode, never connect a source or dual-role power (DRP) peripheral, such as a PC. Negotiation through the CC lines is not possible. Device detection is not available, so the MCU USB controller must be forced into USB Host mode. The power budget of the board does not support delivering current on the 5 V line of the USB Type-C® connector. Depending on the connected device, the product might not operate correctly. Use of this USB host mode must be performed with full knowledge and under the responsibility of the user.*

## 7.11 CAN FD

The STM32C5x2 Nucleo-64 board supports one CAN FD interface compliant with ISO 11898-1:2015. The three-pin header provides a CAN FD interface. The screwless push-in connector enables connection to the CAN FD connector (CN18) and the flying cable for the application.

Jumper JP9 can fit a CAN termination resistor (R29). Table 9 describes the hardware configuration for the CAN FD interface.

Table 10 shows the CAN FD connector pinout to the transceiver and two connected CAN FD interfaces, and Figure 14 shows the location of the CAN FD connector on the board.

**Table 9. Hardware configuration for the CAN FD interface**

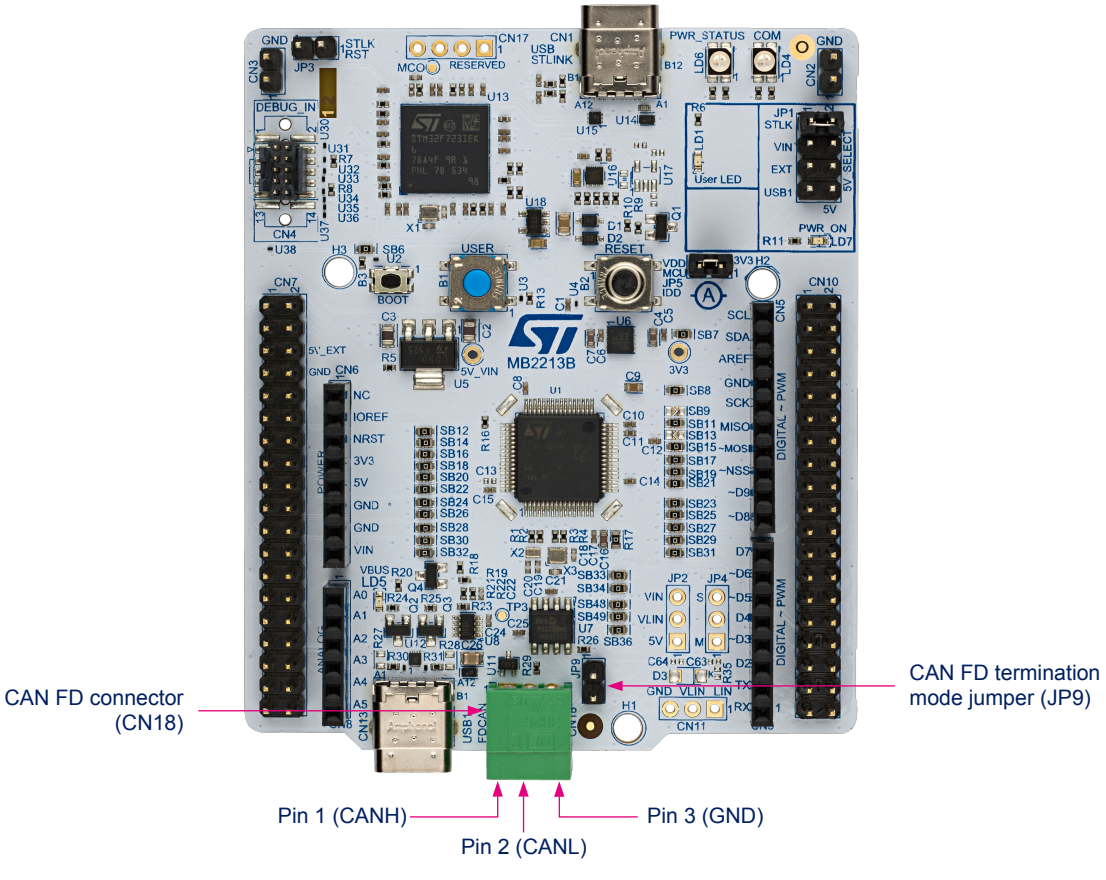
| I/O | Solder bridge | Setting(1) | Configuration(1) |
|---|---|---|---|
| PE2 | SB32 | **ON** | **PE2 can drive the CAN FD transceiver mode:**<br>• **1: CAN transceiver is in standby mode**<br>• **0: transceiver operates in high-speed mode** |
| | | OFF | PE2 is not used to drive the CAN FD transceiver |
| PB8 | SB36 | **ON** | **PB8 is used from the STM32 MCU terminal as CAN_RX** |
| | | OFF | PB8 is not used for CAN transceiver |
| PB9 | SB34 | **ON** | **PB9 is used from the STM32 MCU terminal terminal as CAN_TX** |
| | | OFF | PB9 is not used for CAN transceiver |

1. *The default configuration is shown in bold.*

**Table 10. CAN FD connector (CN18) pinout**

| CAN FD device 1 | | | CAN FD device 2 | | |
|---|---|---|---|---|---|
| CN18 pin | U22 transceiver | Board function | Board function | U22 transceiver | CN18 pin |
| 1 | CANH | CAN_P | CAN_P | CANH | 1 |
| 2 | CANL | CAN_N | CAN_N | CANL | 2 |
| 3 | GND | GND | GND | GND | 3 |

**Figure 14. CAN FD connector**




## 7.12 Virtual COM port (VCP)

An STM32 serial interface connects to the STLINK-V3EC debug interface as a Virtual COM port (VCP). The interface supports bootloader mode.

Table 11 shows the VCP and solder bridge configuration.

**Table 11. USART VCP configuration**

| VCP interface configuration | Solder bridge configuration | USART selection |
|---|---|---|
| USART2 (PA2/PA3) connected to STLINK-V3EC VCP | SB12, SB26 ON<br>SB46 OFF | USART2 (PA2/PA3) connected to STLINK-V3EC VCP |

# 8 Board connectors

## 8.1 ARDUINO® Uno V3 connectors (CN5, CN6, CN8, CN9)

The ARDUINO® connectors (CN5, CN6, CN8, and CN9) are female connectors supporting the ARDUINO® Uno V3 standard.

*Note: Most STM32 MCU I/O pins are 5 V tolerant. However, some pins are only compatible with 3.6 V. The ARDUINO® Uno V3 connector is 5 V compatible. For details on I/O structures, refer to the STM32 MCU data brief and datasheet.*

Figure 15 indicates where the connectors are situated on the board and tables 12, 13, 14, and 15 provide their pinout configurations.

**Figure 15. ARDUINO® Uno V3 connectors**

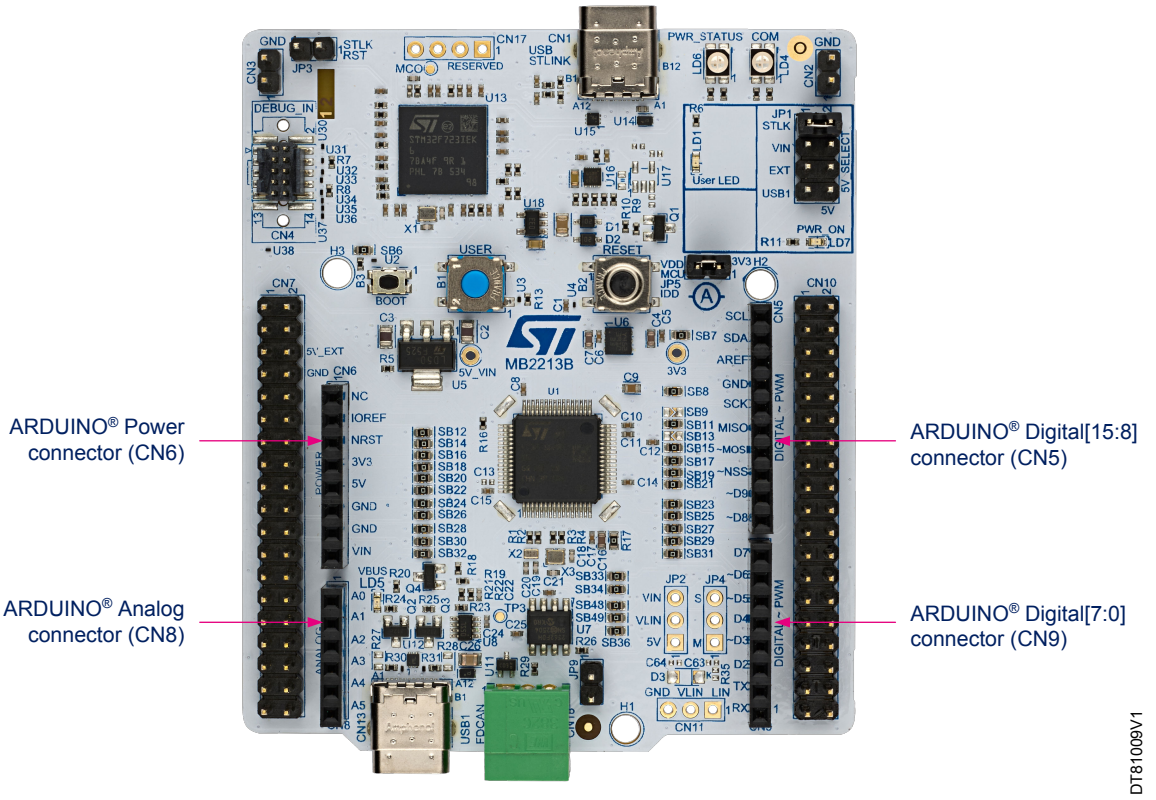



**Table 12. ARDUINO® Power connector (CN6) pinout**

| Pin | Pin name | Signal name | MCU pin | Power function |
|---|---|---|---|---|
| 1 | NC | - | - | RESERVED |
| 2 | IOREF | IOREF | - | 3V3 IO REF OUT |
| 3 | NRST | NRST | NRST | RESET |
| 4 | 3V3 | 3V3 | - | 3V3 OUT |
| 5 | 5V | 5V | - | 5 V OUT |
| 6 | GND | GND | - | GND |
| 7 | GND | GND | - | GND |
| 8 | VIN | VIN | - | VIN (7-12 V, input) |

**Table 13. ARDUINO® Analog connector (CN8) pinout**

| Pin | Pin name | Signal name | MCU pin | MCU function(1) |
|---|---|---|---|---|
| 1 | A0 | ADC | PA0 | ADCx_INPy |
| 2 | A1 | ADC | PA1 | ADCx_INPy |
| 3 | A2 | ADC | PA4 | ADCx_INPy |
| 4 | A3 | ADC | PB0 | ADCx_INPy |
| 5 | A4 | ADC | PC5 | ADCx_INPy |
| 6 | A5 | ADC | PC0 | ADCx_INPy |

1. *The alternate function depends on the target MCU. Refer to the product datasheet to determine the alternate functions available on the ARDUINO® Uno V3 connector.*

**Table 14. ARDUINO® Digital[7:0] connector (CN9) pinout**

| Pin | Pin name | Signal name | MCU pin | MCU function(1) |
|---|---|---|---|---|
| 1 | D0 | UART_RX | PB15 | USARTx_RX |
| 2 | D1 | UART_TX | PB14 | USARTx_TX |
| 3 | D2 | IO | PA10 | GPIO |
| 4 | D3 | PWM | PB3 | TIM2_CH2 |
| 5 | D4 | IO | PC1 | GPIO / WKUPx |
| 6 | D5 | PWM | PB4 | TIMx_CHy |
| 7 | D6 | PWM | PB10 | TIM2_CH3 |
| 8 | D7 | IO | PA8 | GPIO |

1. *The alternate function depends on the target MCU. Refer to the product datasheet to determine the alternate functions available on the ARDUINO® Uno V3 connector.*

**Table 15. ARDUINO® Digital[15:8] connector (CN5) pinout**

| Pin | Pin name | Signal name | MCU pin | MCU function(1) |
|---|---|---|---|---|
| 1 | D8 | IO | PA9 | GPIO |
| 2 | D9 | PWM | PC6 | TIMx_CHy |
| 3 | D10 | SPI_NSS(2) / PWM | PC9 | SPI_NSS(2) / TIMx_CHy |
| 4 | D11 | SPI_MOSI / PWM | PA7 | SPI_MOSI / TIMx_CHy |
| 5 | D12 | SPI_MISO | PA6 | SPI_MISO |
| 6 | D13 | SPI_SCK | PA5 | SPI_SCK |
| 7 | GND | - | - | - |
| 8 | AREF | AREF | VREFP | VREFP(3) |
| 8 | D14 | I2C_SDA / I3C_SDA | PB7 | I2C_SDA / I3C_SDA |
| 10 | D15 | I2C_SCL / I3C_SCL | PB6 | I2C_SCL / I3C_SCL |

1. *The alternate function depends on the target MCU. Refer to the product datasheet to determine the alternate functions available on the ARDUINO® Uno V3 connector.*
2. *Due to muxing constraints, SPI_NSS may not be available as an alternate function on the I/O pin, depending on the STM32 Nucleo-64 configuration. In this case, use a standard GPIO to drive the SPI_NSS function and perform the chip select operation.*

3. *A solder bridge (SB13) is used to disconnect the STM32 VREFP from the ARDUINO® Uno V3 connector CN5 pin 8.*
   - *SB13 OFF: the STM32 input power pin VREFP is not connected to the ARDUINO® Uno V3 connector CN5 pin 8 (AREF, default configuration). The STM32 input power pin VREFP is directly connected to the internal 3.3 V through R17, which must be ON.*
   - *SB13 ON: the STM32 input power pin VREFP is connected to the ARDUINO® Uno V3 connector CN5 pin 8 (AREF) for an external analog reference. R17 must be OFF.*

## 8.2 ST morpho connectors (CN7, CN10)

The ST morpho connectors consist of the CN7 and CN10 2.54-pitch male pin headers. They can be used to connect the STM32C5x2 Nucleo-64 board to any of the following:

- Extension board
- Prototype/wrapping board
- Oscilloscope
- Logic analyzer
- Voltmeter

The default shields compatible with the Nucleo-64 ST morpho connector pinout are:

- X-NUCLEO-IHM16M1 for motor control
- X-NUCLEO-GFX01M2 for graphics user interface and SPI memory

Figure 16 shows the location of the ST morpho connectors on the board. Table 16 and Table 17 show the pin assignments for the connectors.

*Note: Alternate function availability depends on the target microcontroller. Refer to the product datasheet to determine the alternate functions available to the ST morpho connector.*

**Figure 16. ST morpho connectors**

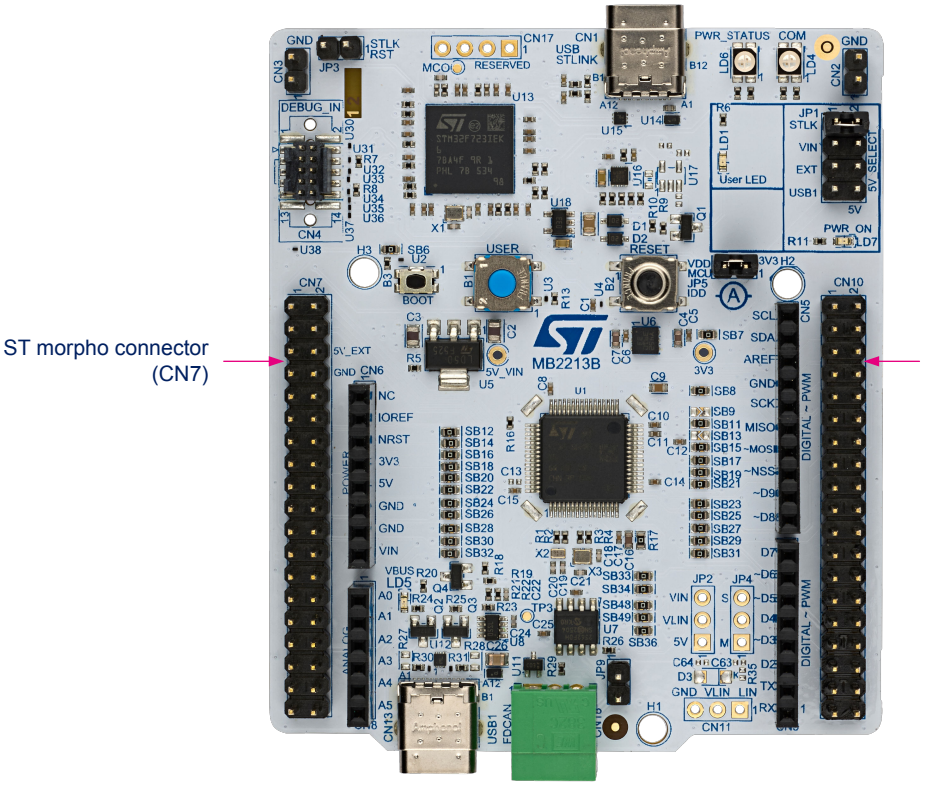


**Table 16. ST morpho connector (CN7, left) pinout**

| MCU | | ST morpho connector | | MCU | |
|---|---|---|---|---|---|
| GPIO | Function(1) | Pin number | Pin number | Function(1) | GPIO |
| PC10 | ~~SDMMCx_DAT2~~ / I2Sx_CK / GPIO | 1 | 2 | ~~SDMMCx_DAT3~~ / I2Sx_SDI / GPIO | PC11 |
| PC12 | ~~SDMMCx_CLK~~ / I2Sx_SDO / GPIO | 3 | 4 | ~~SDMMCx_CMD~~ / GPIO | PD2 |
| - | 3V3 | 5 | 6 | 5V_EXT | - |
| PH2_BOOT0 | BOOT0 / GPIO | 7 | 8 | - | GND |
| PA2 | GPIO | 9 | 10 | ~~GPIO~~ | - |
| PA3 | GPIO | 11 | 12 | IOREF | - |
| PA13(2) | SWDIO / GPIO | 13 | 14 | NRST | NRST |
| PA14(2) | SWCLK / GPIO | 15 | 16 | 3V3 | - |
| PA15(2) | JTDI, TIM2_CH1, I2Sx_WS / GPIO | 17 | 18 | 5 V | - |
| - | GND | 19 | 20 | GND | - |
| PE2 | GPIO | 21 | 22 | GND | - |
| PC13 | WKUPx / GPIO | 23 | 24 | VIN | - |
| PC14 | OSC32_IN / GPIO | 25 | 26 | ~~GPIO~~ | - |
| PC15 | OSC32_OUT / GPIO | 27 | 28 | ADCx_INPy / GPIO | PA0 |
| PH0 | OSC_IN / GPIO | 29 | 30 | ADCx_INPy / GPIO | PA1 |
| PH1 | OSC_OUT / GPIO | 31 | 32 | ADCx_INPy / DACx_OUTy / GPIO | PA4 |
| - | ~~VBAT~~ | 33 | 34 | ADCx_INPy / GPIO | PB0 |
| PC2 | ADCx_INPy / SPIB_MISO / GPIO | 35 | 36 | ADCx_INPy / GPIO | PC5 |
| PC3 | ADCx_INPy / SPIB_MOSI / GPIO | 37 | 38 | ADCx_INPy / GPIO | PC0 |

1. *Alternate function availability depends on the STM32 Nucleo configuration. Functions shown in strikethrough are not available for the STM32C5x configuration.*
2. *PA13, PA14, and PA15 are shared with SWD signals connected to STLINK-V3EC (SB14, SB16, and SB18 ON).*

**Table 17. ST morpho connector (CN10, right) pinout**

| MCU | | ST morpho connector | | MCU | |
|---|---|---|---|---|---|
| GPIO | Function(1) | Pin number | Pin number | Function(1) | GPIO |
| - | ~~SDIO_DATx~~ / ~~GPIO~~ | 1 | 2 | ~~SDIO_DATx~~ / GPIO | PC8 |
| PB6 | I2Cx_SCL / I3Cx_SCL / GPIO | 3 | 4 | GPIO | PC7 |
| PB7 | I2Cx_SDA / I3Cx_SDA / GPIO | 5 | 6 | GPIO | PB5 |
| VREFP(2) | VREFP | 7 | 8 | 5V_STLINK(3) | - |
| - | GND | 9 | 10 | ~~GPIO~~ | - |
| PA5 | SPIA_SCK / GPIO | 11 | 12 | USB_DP / GPIO | PA12(4) |
| PA6 | SPIA_MISO / GPIO | 13 | 14 | USB_DM / GPIO | PA11(4) |
| PA7 | SPIA_MOSI / TIMx_CHy / GPIO | 15 | 16 | TIM1_BKIN / GPIO | PB12 |
| PC9 | SPIA_NSS(5) / TIMx_CHy / GPIO | 17 | 18 | GPIO | PB1 |
| PC6 | TIMx_CHy / GPIO | 19 | 20 | GND | - |
| PA9 | TIM1_CH2 / GPIO | 21 | 22 | GPIO | PB2 |
| PA8 | TIM1_CH1 / GPIO | 23 | 24 | ~~GPIO~~ | - |

| MCU | | ST morpho connector | | MCU | |
|---|---|---|---|---|---|
| GPIO | Function(1) | Pin number | Pin number | Function(1) | GPIO |
| PB10 | TIM2_CH3 / GPIO | 25 | 26 | TIM1_CH3N / GPIO | PB15(6) |
| PB4 | TIMx_CHy / GPIO | 27 | 28 | TIM1_CH2N / GPIO | PB14(6) |
| PC1 | WKUPx / GPIO | 29 | 30 | TIM1_CH1N / SPIB_SCK / GPIO | PB13 |
| PB3 | SWO / TIM2_CH2 / GPIO | 31 | 32 | VREF- | AGND |
| PA10 | TIM1_CH3 / GPIO | 33 | 34 | ADCx_INPy / GPIO | PC4 |
| PB14(6) | UARTx_TX / GPIO | 35 | 36 | ~~UARTx_RTS / GPIO~~ | - |
| PB15(6) | UARTx_RX / GPIO | 37 | 38 | ~~UARTx_CTS / GPIO~~ | - |

1. *Alternate function availability depends on the STM32 Nucleo configuration. Functions shown in strikethrough are not available for the STM32C5x configuration.*
2. *A solder bridge (SB13) is used to disconnect the STM32 VREFP from the ARDUINO® Uno V3 connector CN5 pin 8.*
   - *SB13 OFF: the STM32 input power pin VREFP is not connected to the ARDUINO® Uno V3 connector CN5 pin 8 (AREF, default configuration). The STM32 input power pin VREFP is directly connected to the internal 3.3 V through R17, which must be ON.*
   - *SB13 ON: the STM32 input power pin VREFP is connected to the ARDUINO® Uno V3 connector CN5 pin 8 (AREF) for an external analog reference. R17 must be OFF.*
3. *5V_STLK is the 5 V power signal, coming from the STLINK-V3EC USB connector. It rises before the 5 V signal of the board.*
4. *PA11 and PA12 are shared with USB signals that connect to the USB Type-C® connector when SB23 and SB25 are ON.*
5. *Due to muxing constraints, SPI_NSS may not be available as an alternate function on the I/O pin, depending on the STM32 Nucleo-64 configuration. In this case, use a standard GPIO to drive the SPI_NSS function and perform the chip select operation.*
6. *Due to muxing constraints, PB14 is present on CN10 pins 35 and 28, and PB15 is present on CN10 pins 37 and 26. Do not use both configurations for these pins simultaneously.*

## 8.3 Solder bridge configuration for connectors

Table 18 provides an overview of the solder bridge configuration for the STM32C5x2 Nucleo-64 board.

**Table 18. Solder bridge configuration**

| Definition | Bridge | Setting(1)(2) | Comments(1)(2) |
|---|---|---|---|
| LSE / OSC32 / PC14 / PC15 | SB1 / SB2 | **OFF** | **PC14/PC15 connected to the embedded crystal for LSE function (R1/R2 ON).** |
| | | ON | PC14/PC15 connected to ST morpho connector. 32 kHz crystal not used (R1/R2 must be OFF). |
| HSE / OSC / PH0 / PH1 | SB3 / SB4 | **OFF** | **PH0/PH1 connected to the embedded crystal for HSE function (R3/R4 ON).** |
| | | ON | PH0/PH1 connected to ST morpho connector. 24 MHz crystal not used (R3/R4 must be OFF). |
| | SB5 | **OFF** | **STLK_MCO is not connected to the STM32 PH0 - OSC_IN and cannot be used as HSE reference CLK.** |
| | | ON | STLK_MCO is connected to the STM32 PH0 - OSC_IN and STLK output MCO can be used as reference clock for the STM32 PH0 – OSC_IN. |
| DEBUG SWD / JTAG (PA13 / PA14 / PA15 / PB3) | SB14 / SB16 / SB18 / SB20 | OFF | GPIOs used for debugging are not connected to expansion connectors. Only the SWD/JTAG interface with STLINK-V3EC is connected. This configuration avoids conflicts between STLINK-V3EC and the external interface on the expansion connector. |

| Definition | Bridge | Setting(1)(2) | Comments(1)(2) |
|---|---|---|---|
| DEBUG SWD / JTAG (PA13 / PA14 / PA15 / PB3) | SB14 / SB16 / SB18 / SB20 | **ON** | **GPIOs used for debugging are shared between expansion connectors and the SWD/ JTAG interface. This configuration helps to probe the SWD/JTAG interface on the expansion connector.** |
| PH2_BOOT0 | SB6 | OFF | Boot button is not connected to the STM32 PH2 – BOOT0. BOOT0 can be driven by the extension connector CN7 pin 7. |
| | | **ON** | **Boot button is connected to the STM32 PH2 – BOOT0 for BOOT mode function.** |
| VDD power supply | SB7 | OFF | U6 LDO output 3.3 V is not connected to the STM32 Nucleo-64 VDD power supply. An external VDD power supply is needed. |
| | | **ON** | **U6 LDO output 3.3 V is connected to the STM32 Nucleo-64 VDD power supply as the main 3.3 V power supply.** |
| PA5: green LED (LD1) / ARDUINO® Uno V3D13 | SB8 | OFF | PA5 is not used to drive the green LED LD1; PA5 is used only for the ARDUINO® Uno V3 D13 as SPI_CLK. Configuration used in case of CLK issue link to the SPI frequency. |
| | | **ON** | **PA5 is shared to drive the green LED LD1 and the ARDUINO® Uno V3 D13 as SPI_CLK.** |
| PA3: DBGIN.UART_VCP | SB12 | OFF | PA3 is not connected to the DBGIN.VCP_RX function.<br>PA3 is available on the extension connector CN7 pin 11 as GPIO. |
| | | **ON** | **PA3 is connected to the DBGIN.VCP_RX function as UART2/3_RX; PA3 is also available on the extension connector as GPIO.** |
| PA2: DBGIN.UART_VCP | SB26 | OFF | PA2 is not connected to the DBGIN.VCP_TX function.<br>PA2 is available on the extension connector CN7 pin 9 as GPIO. |
| | | **ON** | **PA2 is connected to the DBGIN.VCP_TX function as UART2_TX, PA2 is also available on the extension connector as GPIO.** |
| PA4: DBGIN.UART_VCP / ADC_DAC | SB24 | OFF | PA4 is not connected to the extension connector CN7 pin 32, or ARDUINO® Uno V3 A2 as ADC/ DAC. In GPIO configuration, A PA4 is reserved for DBGIN.VCP_TX. |
| | | **ON** | **PA4 is connected to the extension connector CN7 pin 32, or ARDUINO® Uno V3 A2 as ADC/ DAC.** |
| ARDUINO® Uno V3 VREFP | SB13 | **OFF** | **The STM32 VREFP pin 13 is connected to VDD_MCU with the resistor R17.** |
| | | ON | The STM32 VREFP pin 13 is connected to the AREF ARDUINO® Uno V3 reference from CN5 pin 8 or from the extension connector CN10 pin 7 (the resistor R17 must be removed). |
| PA11 / PA12 USB FS | SB23 / SB25 | OFF | PA11/PA12 are not connected to the extension connector CN10 pin 12/14. PA11/PA12 are reserved for user USB. |
| | | **ON** | **PA11/PA12 are connected to the extension connector CN10 pin 12/14 and shared with the user USB as USB-DP/DM interface.** |

| Definition | Bridge | Setting(1)(2) | Comments(1)(2) |
|---|---|---|---|
| PA11 / PA12<br>USB FS | SB23 / SB25 | | **USB function can be used, but performances may be impacted due to the track length on the expansion module and track impedance mismatch.** |
| PC4 / VBUS_DETECT | SB33 | OFF | PC4 is not connected to the embedded user USB for VBUS detection. PC4 is reserved for extension connector CN10 pin 34. |
| | | **ON** | **PC4 is connected to the extension connector CN10 pin 34 and shared with the embedded user USB for VBUS detection.** |
| PB8/PB9/PE2<br>CAN FD | SB36 / SB32 / SB34 | OFF | The PB8/PB9/PE2 pins are disconnected from the CAN FD transceiver. |
| | | **ON** | **The PB8/PB9/PE2 pins are connected to the CAN FD transceiver.** |
| PB14/PB15<br>ARDUINO® Uno V3<br>UART | SB48 / SB49 | OFF | PB14/PB15 not used for the ARDUINO® Uno V3 UART.<br>PB14/PB15 are available only on CN10 pin 26/28. |
| | | **ON** | **PB14/PB15 are used for the ARDUINO® Uno V3 UART.**<br>**PB14/PB15 are sharing with CN10 pins 26/28 and 35/37.**<br>**Do not use both configurations for these pins simultaneously.** |

1. *The default configuration is shown in bold.*
2. *All STM32 Nucleo-64 boards are delivered with solder bridges configured according to the target microcontroller.*

# 9 NUCLEO-C5x2Rx product information

## 9.1 Product marking

The product and each board composing the product are identified with one or several stickers. The stickers, located on the top or bottom side of each PCB, provide product information:

- Main board featuring the target device: product order code, product identification, serial number, and board reference with revision.

  Single-sticker example:

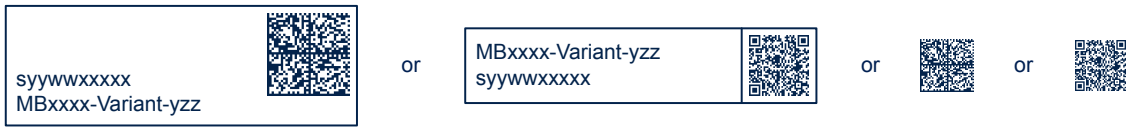
  
  

  Dual-sticker example:

- Other boards if any: board reference with revision and serial number.

  Examples:

On the main board sticker, the first line provides the product order code, and the second line the product identification.

On all board stickers, the line formatted as *"MBxxxx-Variant-yzz"* shows the board reference *"MBxxxx"*, the mounting variant *"Variant"* when several exist (optional), the PCB revision *"y"*, and the assembly revision *"zz"*, for example B01. The other line shows the board serial number used for traceability.

Products and parts labeled as *"ES"* or *"E"* are not yet qualified or feature devices that are not yet qualified. STMicroelectronics disclaims any responsibility for consequences arising from their use. Under no circumstances will STMicroelectronics be liable for the customer's use of these engineering samples. Before deciding to use these engineering samples for qualification activities, contact STMicroelectronics' quality department.

*"ES"* or *"E"* marking examples of location:

- On the targeted STM32 that is soldered on the board (for an illustration of STM32 marking, refer to the STM32 datasheet *Package information* paragraph at the *www.st.com* website).
- Next to the ordering part number of the evaluation tool that is stuck, or silk-screen printed on the board.

Some boards feature a specific STM32 device version, which allows the operation of any bundled commercial stack/library available. This STM32 device shows a *"U"* marking option at the end of the standard part number and is not available for sales.

To use the same commercial stack in their applications, the developers might need to purchase a part number specific to this stack/library. The price of those part numbers includes the stack/library royalties.

## 9.2 NUCLEO-C5x2Rx product history

Table 19. **Product history**

| Order code | Product identification | Product details | Product change description | Product limitations |
|---|---|---|---|---|
| NUCLEO-C562RE | NUC562RE$KR1 | MCU:<br>STM32C562RET6 silicon revision "Z" | Initial revision | No limitation |
| | | MCU errata sheet:<br>*STM32C551xx, STM32552xx, and STM32562xx device errata* (ES0661) | | |
| | | Board:<br>MB2213-C562RE-B02 (main board) | | |
| NUCLEO-C542RC | NUC542RC$KR1 | MCU:<br>STM32C542RCT6 silicon revision "Z" | Initial revision | No limitation |
| | | MCU errata sheet:<br>*STM32C531xx, STM32C532xx, and STM32C542xx device errata* (ES0661) | | |
| | | Board:<br>MB2213-C542RC-B02 (main board) | | |

## 9.3 Board revision history

Table 20. **Board revision history**

| Board reference | Board variant and revision | Board change description | Board limitations |
|---|---|---|---|
| MB2213 (main board) | C562RE-B02 | Initial revision | No limitation |
| MB2213 (main board) | C542RC-B02 | Initial revision | No limitation |

# 10 Compliance statements and conformity declarations

## 10.1 Federal Communications Commission (FCC) compliance statement

**Part 15.19**

These devices comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices 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 Class B digital devices, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

*Note: Use only shielded cables.*

**Responsible Party - U.S. Contact Information:**

Francesco Doddo
STMicroelectronics, Inc.
200 Summit Drive | Suite 405 | Burlington, MA 01803
USA
Telephone: +1 781-472-9634

## 10.2 Innovation, Science and Economic Development Canada (ISED) compliance statement

**These products comply with the ICES-003 standard class B of the ISED regulation.**

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

*Note: Use only shielded cables.*

**Ces produits sont conformes à la norme NMB-003 classe B de la ISDE.**

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

*Note: Utiliser uniquement des câbles blindés.*

## 10.3 UKCA conformity

**Simplified UK declaration of conformity**

Hereby, the manufacturer STMicroelectronics, declares that the equipment types NUCLEO-C562RE and NUCLEO-C542RC are in compliance with the UK Electromagnetic Compatibility Regulations 2016 (UK SI 2016 No. 1091) and with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (UK SI 2012 No. 3032).

*Note: Use only shielded cables.*

## 10.4 CE conformity

### 10.4.1 Simplified EU declaration of conformity

Hereby, STMicroelectronics declares that the equipment types NUCLEO-C562RE and NUCLEO-C542RC are in compliance with directives 2011/53/EU and 2015/863/EU (RoHS), and 2014/30/EU (EMC).

*Note:*
- *RoHS: Restriction of hazardous substances*
- *EMC: Electromagnetic compatibility*

*Note: Use only shielded cables.*

### 10.4.2 Déclaration de conformité UE simplifiée

STMicroelectronics déclare que les équipements électriques des types NUCLEO-C562RE et NUCLEO-C542RC sont conformes aux directives 2011/53/UE et 2015/863/UE (LdSD), et à la directive 2014/30/UE (CEM).

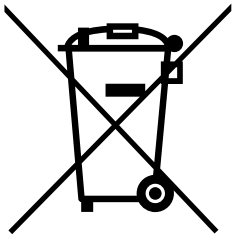
*Note:*
- *LdSD : directive sur la limitation de l'utilisation des substances dangereuses*
- *CEM : compatibilité électromagnétique*

*Note: Utiliser uniquement des câbles blindés.*

# 11 Product disposal

**Disposal of this product: WEEE (Waste Electrical and Electronic Equipment)**

(Applicable in Europe)



This symbol on the product, accessories, or accompanying documents indicates that the product and its electronic accessories must not be disposed of with household waste at the end of their working life.

To prevent possible harm to the environment and human health from uncontrolled waste disposal, separate these items from other types of waste and recycle them responsibly at a designated collection point to promote the sustainable reuse of material resources.

Household users:

Contact the retailer that you purchased the product from or your local authority for details of your nearest designated collection point.

Business users:

Contact your dealer or supplier for further information.

# Revision history

Table 21. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 27-Feb-2026 | 1 | Initial release. |

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