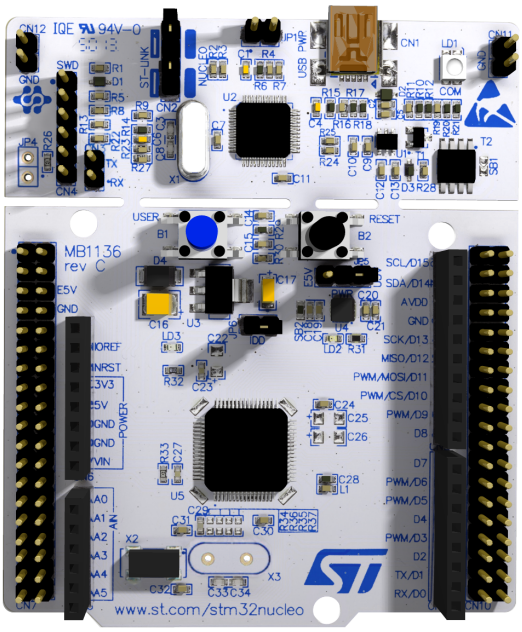
UM1724
User manual

STM32 Nucleo-64 boards (MB1136)

Introduction

The STM32 Nucleo-64 boards based on the MB1136 reference board (NUCLEO-F030R8, NUCLEO-F070RB, NUCLEO-F072RB, NUCLEO-F091RC, NUCLEO-F103RB, NUCLEO-F302R8, NUCLEO-F303RE, NUCLEO-F334R8, NUCLEO-F401RE, NUCLEO-F410RB, NUCLEO-F411RE, NUCLEO-F446RE, NUCLEO-L010RB, NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE, NUCLEO-L452RE, NUCLEO-L476RG) provide an affordable and flexible way for users to try out new concepts and build prototypes with the STM32 microcontrollers in the LQFP64 package, choosing from the various combinations of performance, power consumption, and features. The ARDUINO® Uno V3 connectivity support and the ST morpho headers provide an easy means of expanding the functionality of the Nucleo open development platform with a wide choice of specialized shields. The STM32 Nucleo boards do not require any separate probe as they integrate the ST-LINK/V2-1 debugger and programmer. The STM32 Nucleo boards come with the comprehensive free software libraries and examples available with the STM32Cube MCU Packages.

Figure 1. STM32 Nucleo-64 board



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1 Features

The STM32 Nucleo board offers the following features:

- Arm® Cortex®(a) core-based STM32 microcontroller in LQFP64 package
- Three LEDs:
  - USB communication (LD1), user LED (LD2), power LED (LD3)
- Two push-buttons: USER and RESET
- Two types of extension resources
  - ARDUINO® Uno V3 connectivity
  - ST morpho extension pin headers for full access to all STM32 I/Os
- Flexible board power supply:
  - USB VBUS or external source (3.3 V, 5 V, 7-12 V)
  - Power management access point
- On-board ST-LINK/V2-1 debugger and programmer with SWD connector
  - Selection-mode switch using the kit as a standalone ST-LINK/V2-1
- USB re-enumeration capability. Three different interfaces are supported on USB:
  - Virtual COM port
  - Mass storage
  - Debug port
- Comprehensive free software libraries and examples available with the STM32Cube MCU Package

a. Arm and Cortex are registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2 Ordering information

To order an STM32 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 reference	Targeted STM32
NUCLEO-F030R8	MB1136	STM32F030R8T6
NUCLEO-F070RB		STM32F070RBT6
NUCLEO-F072RB		STM32F072RBT6
NUCLEO-F091RC		STM32F091RCT6
NUCLEO-F103RB		STM32F103RBT6
NUCLEO-F302R8		STM32F302R8T6
NUCLEO-F303RE		STM32F303RET6
NUCLEO-F334R8		STM32F334R8T6
NUCLEO-F401RE		STM32F401RET6
NUCLEO-F410RB		STM32F410RBT6
NUCLEO-F411RE		STM32F411RET6
NUCLEO-F446RE		STM32F446RET6
NUCLEO-L010RB		STM32L010RBT6
NUCLEO-L053R8		STM32L053R8T6
NUCLEO-L073RZ		STM32L073RZT6
NUCLEO-L152RE		STM32L152RET6
NUCLEO-L452RE		STM32L452RET6
NUCLEO-L476RG		STM32L476RGT6

2.1 Codification

The meaning of the codification is explained in *Table 2*.

Table 2. Codification explanation

NUCLEO-XXYYRT	Description	Example: NUCLEO-L452RE
XX	MCU series in STM32 Arm Cortex MCUs	STM32L4 Series
YY	STM32 product line in the series	STM32L452
R	STM32 package pin count	64 pins
T	STM32 flash memory size: – 8 for 64 Kbytes – B for 128 Kbytes – C for 256 Kbytes – E for 512 Kbytes – G for 1 Mbyte – Z for 192 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 Micro-B cable, or USB Type-A or USB Type-C® to Mini-B cable, or USB Type-A or USB Type-C® to USB Type-C® cable (depending on the board reference)

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®(a)
- Keil®: MDK-ARM(a)
- STMicroelectronics - STM32CubeIDE

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 corresponding product page at *www.st.com*.

a. On Windows® only.

4 Conventions

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

Table 3. ON/OFF conventions

Convention	Definition
Jumper JP1 ON	Jumper fitted
Jumper JP1 OFF	Jumper not fitted
Solder bridge SBx ON	SBx connections closed by solder or 0-ohm resistor
Solder bridge SBx OFF	SBx connections left open

In this document, the references are “STM32 Nucleo board” and “STM32 Nucleo boards” for all information that is common to all sale types.

5 Safety recommendations

5.1 Targeted audience

This product targets users with at least basic electronics or embedded software development knowledge such as 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 hurting yourself.
- 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 the board close to water or at a high humidity level.
- Do not operate the board if dirty or dusty.

6 Quick start

The STM32 Nucleo board is a low-cost and easy-to-use development platform used to quickly evaluate and start development with an STM32 microcontroller in an LQFP64 package.

Before installing and using the product, accept the Evaluation Product License Agreement from the www.st.com/epla web page.

For more information on the STM32 Nucleo board and to access the demonstration software, visit www.st.com/stm32nucleo website.

6.1 Getting started

Follow the sequence below to configure the STM32 Nucleo board and launch the demo software:

1. Check the jumper position on the board, JP1 off, JP5 (PWR) on U5V, JP6 on (IDD), CN2 on (NUCLEO) selected.
2. For correct identification of all device interfaces from the host PC, install the Nucleo USB driver available from the www.st.com/stm32nucleo web page, before connecting the board.
3. Connect the STM32 Nucleo board to a PC with a USB cable ‘Type-A to Mini-B’ through USB connector CN1 to power the board. The red LED LD3 (PWR) and LD1 (COM) must light up. LD1 (COM) and green LED LD2 must blink.
4. Press button B1 (left button).
5. Observe the blinking frequency of LED LD2 at different frequencies, by clicking on the button B1.
6. The demonstration software and several software examples on how to use the STM32 Nucleo board features are available at the www.st.com/stm32nucleo web page.
7. Develop the application using the available examples.

6.2 Hardware configuration variants

The board can be delivered with different configurations of the oscillator of the target STM32. For all the details concerning high-speed configurations of the oscillator refer to *Section 7.7.1*. For all the details concerning low-speed configurations of the oscillator refer to *Section 7.7.2*.

7 Hardware layout and configuration

The STM32 Nucleo board is designed around the STM32 microcontrollers in a 64-pin LQFP package.

Figure 2 shows the connections between the STM32 and its peripherals (ST-LINK/V2-1, push-button, LED, ARDUINO® connectors, and ST morpho connector).

Figure 3 and *Figure 4* show the location of these features on the STM32 Nucleo board. *Figure 5* shows the mechanical dimension of the STM32 Nucleo board.

Figure 2. Hardware block diagram

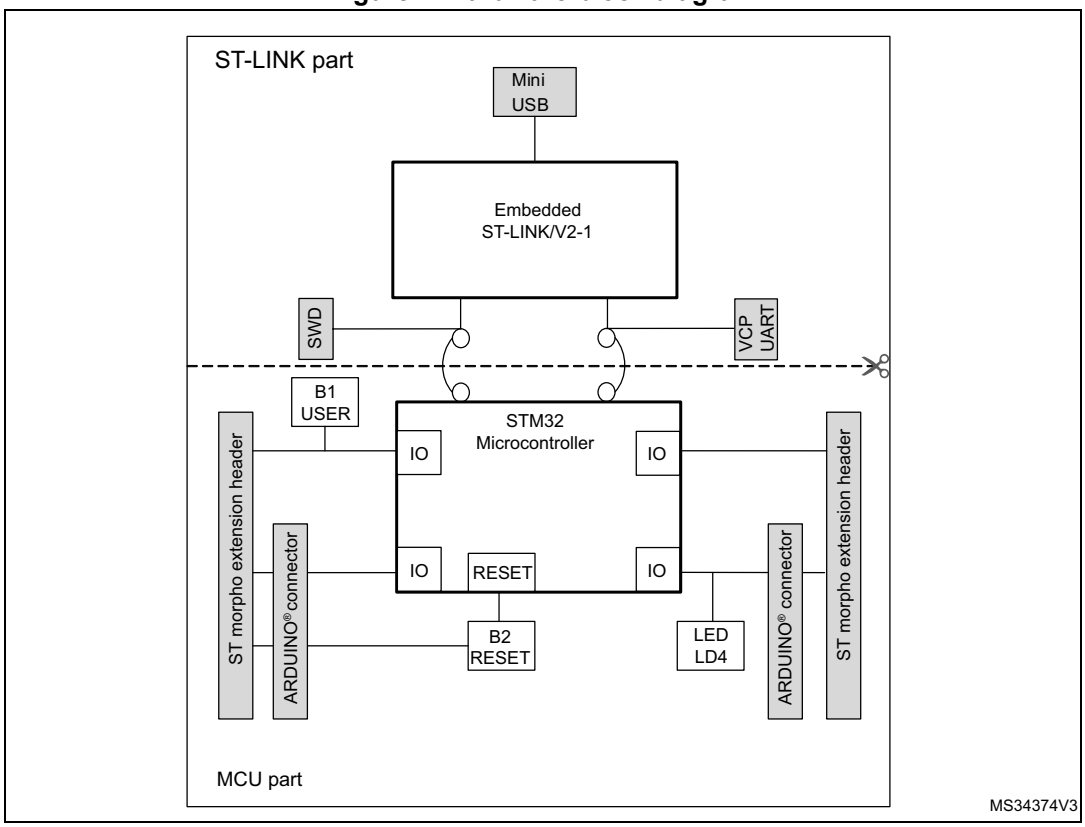
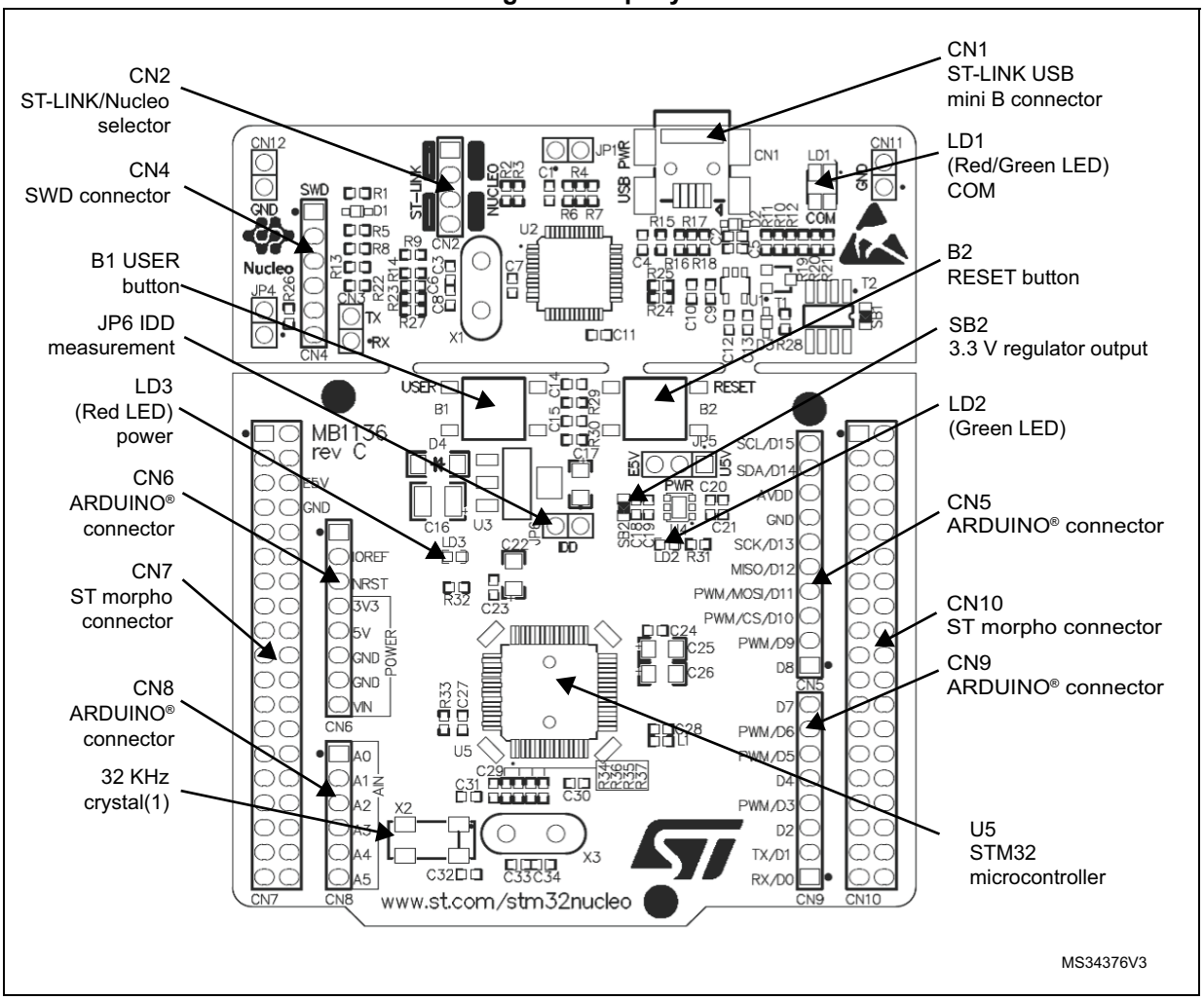


Figure 3. Top layout



1. Crystal might be present or not depending on the board version. Refer to *Section 7.7.2*.

Figure 4. Bottom layout

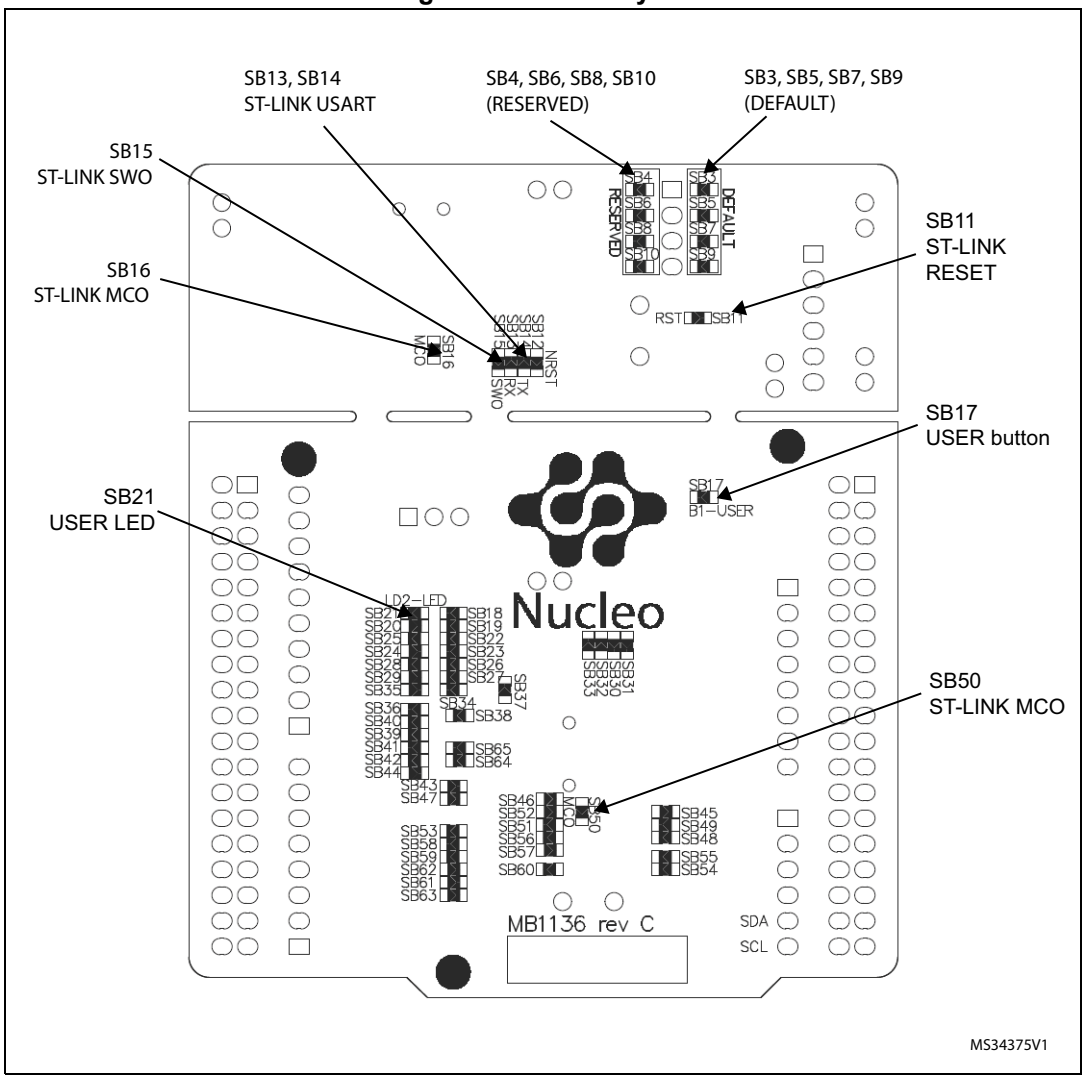
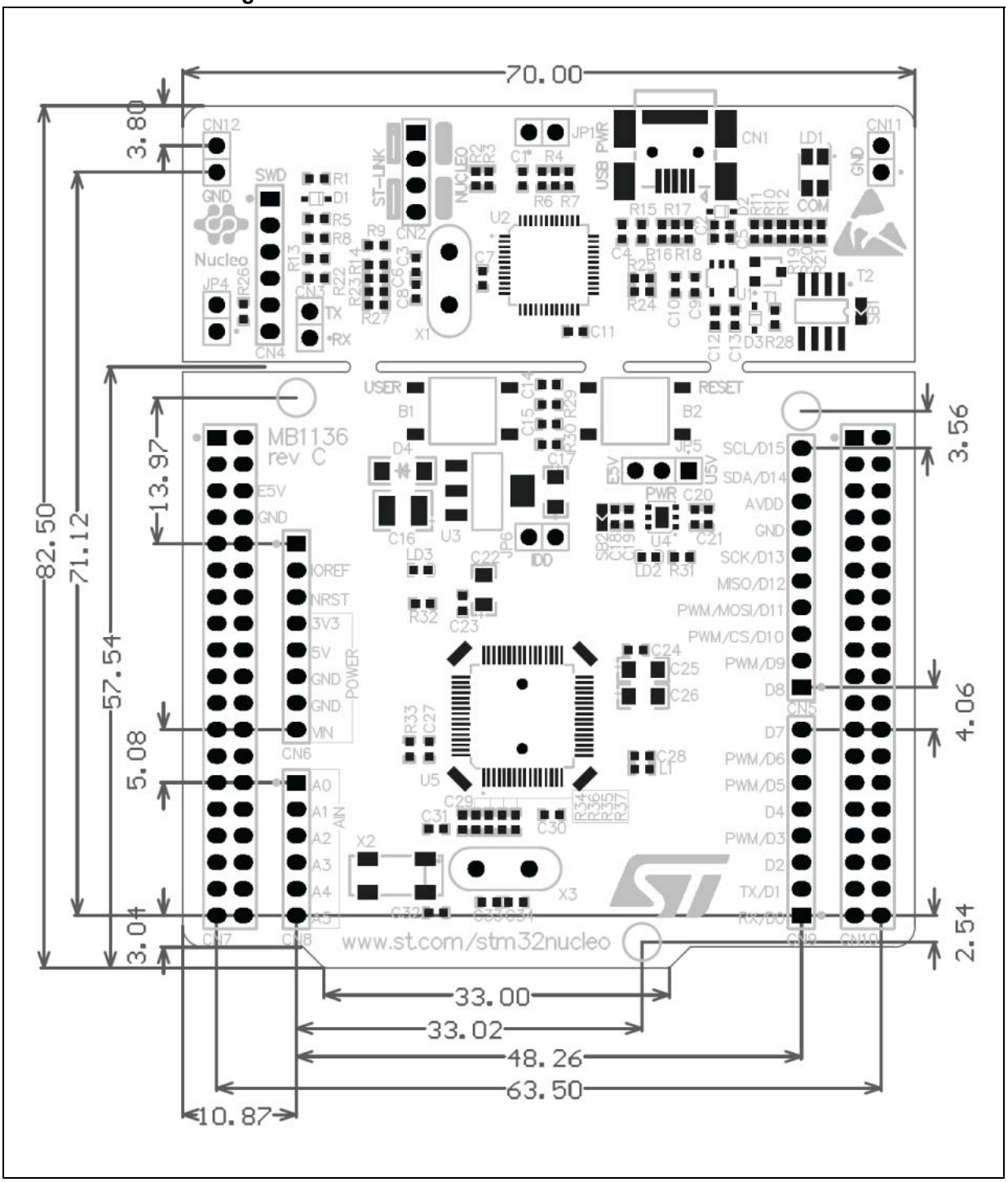


Figure 5. STM32 Nucleo board mechanical dimensions



7.1 Pre-cut PCB

The STM32 Nucleo board is divided into two parts: the ST-LINK part and the target STM32 part. The ST-LINK part of the PCB can be cut out to reduce the board size. In this case, the remaining target STM32 part can only be powered by VIN, E5V, and +3.3V on the ST morpho connector CN7, or VIN and +3.3V on ARDUINO® connector CN6. It is still possible to use the ST-LINK part to program the main STM32 using wires between CN4 and SWD signals available on the ST morpho connector (SWCLK CN7 pin 15 and SWDIO CN7 pin 13).

7.2 Embedded ST-LINK/V2-1

The ST-LINK/V2-1 programming and debugging tool is integrated into the STM32 Nucleo board.

The embedded ST-LINK/V2-1 supports only SWD for STM32 devices. For information about debugging and programming features, refer to the user manual *ST-LINK/V2 in-circuit debugger/programmer for STM8 and STM32* (UM1075), which describes in detail all the ST-LINK/V2 features.

The changes versus the ST-LINK/V2 version are listed below.

- New features supported on ST-LINK/V2-1:
  - USB software re-enumeration
  - Virtual COM port interface on USB
  - Mass storage interface on USB
  - USB power management request for more than 100 mA power on USB
- Features not supported on ST-LINK/V2-1:
  - SWIM interface
  - Minimum supported application voltage limited to 3 V

There are two different ways to use the embedded ST-LINK/V2-1 depending on the jumper states (see *Table 4* and *Figure 7.2.1*):

- Program/debug the on-board STM32 (*Section 7.2.2*)
- Program/debug an MCU in an external application board using a cable connected to SWD connector CN4 (*Section 7.2.5*).

Table 4. Jumper states

Jumper state	Description
Both CN2 jumpers ON	ST-LINK/V2-1 functions enabled for on-board programming (default)
Both CN2 jumpers OFF	ST-LINK/V2-1 functions enabled for external CN4 connector (SWD supported)

7.2.1 Driver

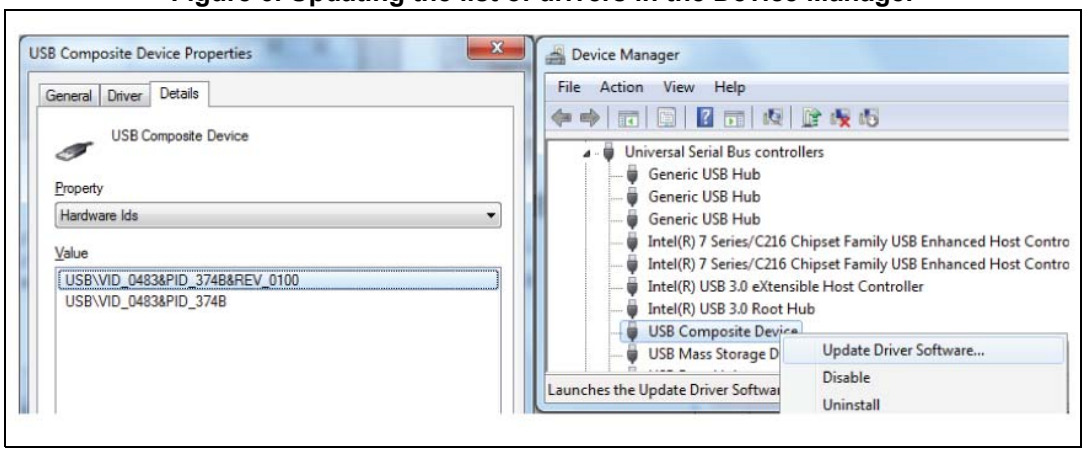
Before connecting the Nucleo-64 board to a Windows® PC via USB, a driver for ST-LINK/V2-1 must be installed. It can be downloaded from the *www.st.com* website.

In case the STM32 Nucleo-64 board is connected to the PC before installing the driver, the PC device manager might report some Nucleo interfaces as “Unknown”.

To recover from this situation, after installing the dedicated driver, the association of “Unknown” USB devices found on the STM32 Nucleo-64 board to this dedicated driver, must be updated in the device manager manually.

Note: It is recommended to proceed using a USB Composite Device, as shown in Figure 6.

Figure 6. Updating the list of drivers in the Device Manager



7.2.2 ST-LINK/V2-1 firmware upgrade

The ST-LINK/V2-1 embeds a firmware upgrade mechanism for the in-situ upgrade through the USB port. As the firmware might evolve during the lifetime of the ST-LINK/V2-1 product (for example new functionality, bug fixes, support for new microcontroller families), it is recommended to visit *www.st.com* website before starting to use the STM32 Nucleo board and periodically, to stay updated with the latest firmware version.

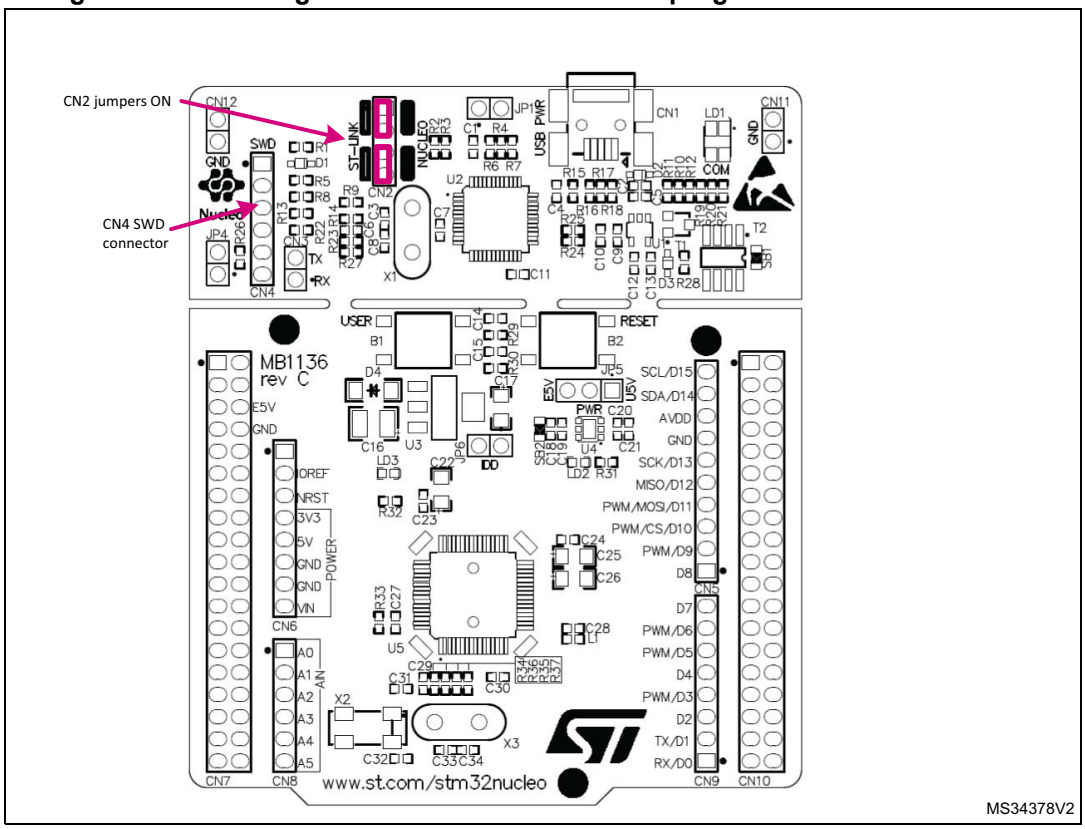
7.2.3 Mass storage interface

The ST-LINK/V2-1 provides an optional mass storage interface, allowing the user to program a target application (binary or hex file) through a virtual mass storage disk. The availability of this interface can be selected during the firmware upgrade, as detailed in the technical note *Overview of ST-LINK derivatives* (TN1235). Make sure that the host PC system (including antivirus applications) allows the mass storage disk before activating the interface.

7.2.4 Using the ST-LINK/V2-1 to program and debug the STM32 on board

To program the STM32 on the board, plug in the two jumpers on CN2, as shown in red in *Figure 7*. Do not use the CN4 connector as this could disturb communication with the STM32 microcontroller of the STM32 Nucleo board.

Figure 7. Connecting the STM32 Nucleo board to program the on-board STM32



7.2.5 Using ST-LINK/V2-1 to program and debug an external STM32 application

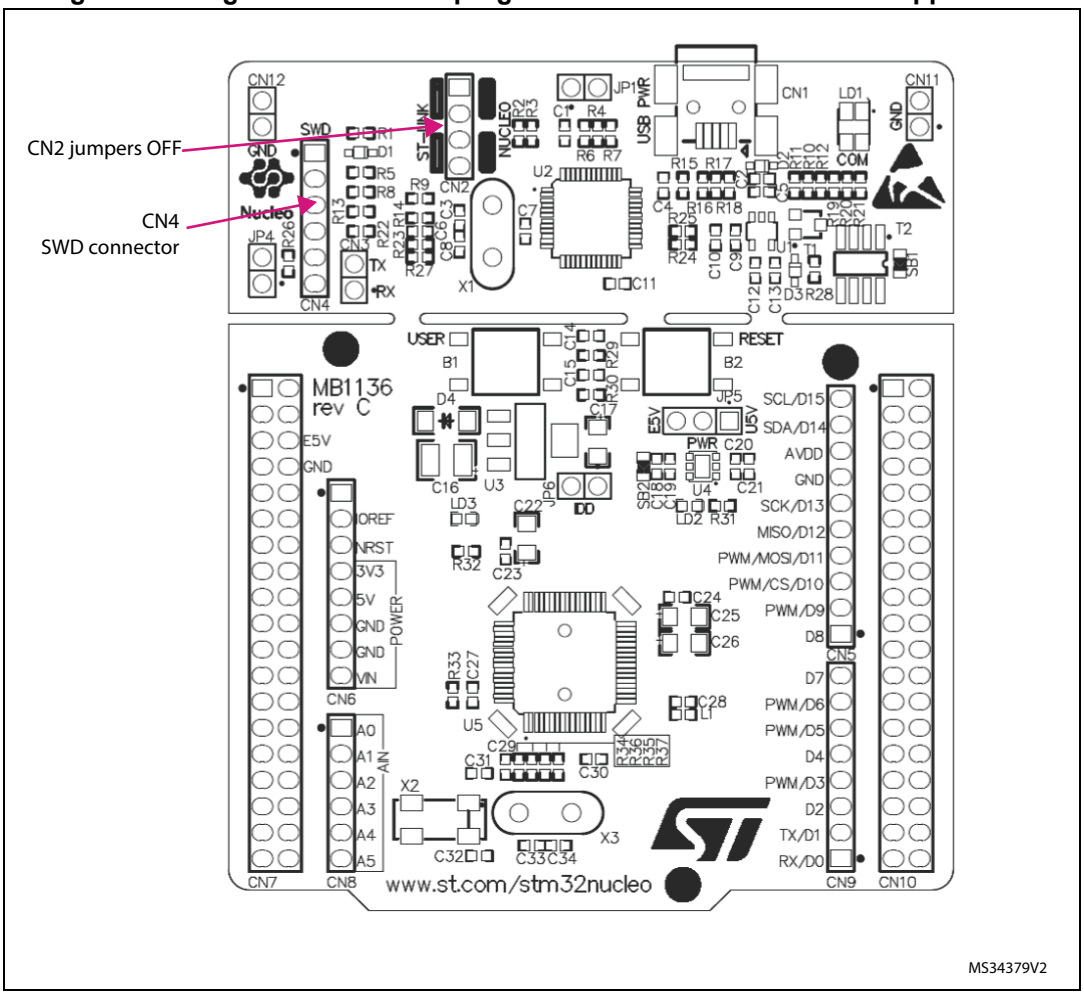
It is very easy to use the ST-LINK/V2-1 to program the STM32 on an external application. Simply remove the two jumpers from CN2 as illustrated in *Figure 8: Using ST-LINK/V2-1 to program the STM32 on an external application*, and connect the application to the CN4 debug connector according to *Table 5*.

Note: SB12 NRST (target STM32 RESET) must be OFF if CN4 pin 5 is used in the external application.

Table 5. Debug connector CN4 (SWD)

Pin	CN4	Designation
1	VDD_TARGET	VDD from application
2	SWCLK	SWD clock
3	GND	ground
4	SWDIO	SWD data input/output
5	NRST	RESET of target STM32
6	SWO	Reserved

Figure 8. Using ST-LINK/V2-1 to program the STM32 on an external application



7.3 Power supply and power selection

The power supply is provided either by the host PC through the USB cable, or by an external source: VIN (From 7 V to 12 V), E5V (5 V), or +3.3V power supply pins on CN6 or CN7. In case VIN, E5V, or +3.3V is used to power the STM32 Nucleo board, using an external power supply unit or auxiliary equipment, this power source must comply with the standard EN-62368-1: 2014/A11:2017, and must be safety extralow voltage (SELV) with limited power capability.

7.3.1 Power supply input from the USB connector

The ST-LINK/V2-1 supports USB power management allowing to request more than 100 mA current to the host PC.

All parts of the STM32 Nucleo board and shield can be powered from the ST-LINK USB connector CN1 (U5V or VBUS). Note that only the ST-LINK part is power supplied before the USB enumeration as the host PC only provides 100 mA to the board at that time. During the USB enumeration, the STM32 Nucleo board requires 300 mA of current to the host PC. If the host can provide the required power, the targeted STM32 microcontroller is powered and the red LED LD3 is turned ON, thus the STM32 Nucleo board and its shield can consume a maximum of 300 mA current, not more. If the host is not able to provide the required current, the targeted STM32 microcontroller and the MCU part including the extension board are not power supplied. As a consequence, the red LED LD3 remains turned OFF. In such a case it is mandatory to use an external power supply as explained in the next *Section 7.3.2: External power supply inputs: VIN and E5V*.

When the board is power supplied by USB (U5V) a jumper must be connected between pin 1 and pin 2 of JP5 as shown in *Table 8*.

JP1 is configured according to the maximum current consumption of the board when powered by USB (U5V). JP1 jumper can be set in case the board is powered by USB and maximum current consumption on U5V does not exceed 100 mA (including an eventual extension board or ARDUINO® shield). In such a condition, USB enumeration always succeeds since no more than 100 mA is requested from the PC. Possible configurations of JP1 are summarized in *Table 6*.

Table 6. JP1 configuration table

Jumper state	Power supply	Allowed current
JP1 jumper OFF	USB power through CN1	300 mA max
JP1 jumper ON		100 mA max

Warning: If the maximum current consumption of the NUCLEO and its extension boards exceeds 300 mA, it is mandatory to power the NUCLEO using an external power supply connected to E5V or VIN.

Note: In case the board is powered by a USB charger, there is no USB enumeration, so the led LD3 remains set to OFF permanently and the target STM32 is not powered. In this specific case, the jumper JP1 needs to be set to ON, to allow target STM32 to be powered anyway.

7.3.2 External power supply inputs: VIN and E5V

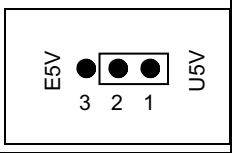
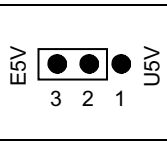
The external power sources VIN and E5V are summarized in *Table 7.* When the board is power supplied by VIN or E5V, the jumper configuration must be the following:

- Jumper on JP5 pin 2 and pin 3
- Jumper removed on JP1

Table 7. External power sources

Input power name	Connectors pins	Voltage range	Max current	Limitation
VIN	CN6 pin 8 CN7 pin 24	7 V to 12 V	800 mA	From 7 V to 12 V only and input current capability is linked to input voltage: 800 mA input current when Vin = 7 V 450 mA input current when 7 V < Vin <= 9 V 250 mA input current when 9 V < Vin <= 12 V
E5V	CN7 pin 6	4.75 V to 5.25 V	500 mA	-

Table 8. Power-related jumper

Jumper	Description
JP5	U5V (ST-LINK VBUS) is used as a power source when JP5 is set as shown below (Default setting) 
	VIN or E5V is used as a power source when JP5 is set as shown below. 

Using VIN or E5V as an external power supply

VIN or E5V can be used as an external power supply in case the current consumption of the STM32 Nucleo and extensions boards exceeds the allowed current on USB. In this condition, it is still possible to use the USB for communication, programming, or debugging only, but it is mandatory to power supply the board first using VIN or E5V and then connect the USB cable to the PC. Proceeding this way ensures that the enumeration occurs thanks to the external power source.

The following power sequence procedure must be respected:

1. Connect the jumper between pin 2 and pin 3 of JP5
2. Check that JP1 is removed
3. Connect the external power source to VIN or E5V
4. Power on the external power supply 7 V< VIN < 12 V to VIN, or 5 V for E5V
5. Check that LD3 is turned ON
6. Connect the PC to USB connector CN1

If this order is not respected, the board might be supplied by VBUS first then by VIN or E5V, and the following risks might be encountered:

1. If more than 300 mA current is needed by the board, the PC might be damaged or the current supply can be limited by the PC. As a consequence, the board is not powered correctly.
2. 300 mA is requested at enumeration (since JP1 must be OFF) so there is a risk that the request is rejected and the enumeration does not succeed if the PC cannot provide such current. Consequently, the board is not power supplied (LED LD3 remains OFF).

7.3.3 External power supply input: +3.3V

It can be of interest to use the +3.3V (CN6 pin 4 or CN7 pin 12 and pin 16) directly as power input for instance in case the 3.3V is provided by an extension board. When the STM32 Nucleo board is power supplied by +3.3V, the ST-LINK is not powered, thus the programming and debug features are unavailable. The +3.3V external power source is summarized in *Table 9.*

Table 9. +3.3 V external power source

Input power name	Connectors pins	Voltage range	Limitation
+3.3V	CN6 pin 4 CN7 pin 12 and pin 16	3 V to 3.6 V	Used when the ST-LINK part of the PCB is cut or SB2 and SB12 OFF

Two different configurations are possible when using +3.3V to power the board:

- ST-LINK is removed (PCB cut) or
- SB2 (3.3V regulator) and SB12 (NRST) are OFF.

7.3.4 External power supply output

When powered by USB, VIN, or E5V, the +5V (CN6 pin 5 or CN7 pin 18) 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 7* must be respected.

The +3.3V (CN6 pin 4 or CN7 pin 12 and 16) can be used also as power supply output. The current is limited by the maximum current capability of the regulator U4 (500 mA max).

7.4 LEDs

The tricolor LED (green, orange, red) LD1 (COM) provides information about ST-LINK communication status. LD1 default color is red. LD1 turns to green to indicate that communication is in progress between the PC and the ST-LINK/V2-1, with the following setup:

- Slow blinking Red/Off: at power-on before USB initialization
- Fast blinking Red/Off: after the first correct communication between the PC and ST-LINK/V2-1 (enumeration)
- Red LED On: when the initialization between the PC and ST-LINK/V2-1 is complete
- Green LED On: after a successful target communication initialization
- Blinking Red/Green: during communication with the target
- Green On: communication finished and successful
- Orange On: Communication failure

User LD2: the green LED is a user LED connected to ARDUINO® signal D13 corresponding to STM32 I/O PA5 (pin 21) or PB13 (pin 34) depending on the STM32 target. Refer to *Table 11* to *Table 23* when:

- the I/O is HIGH value, the LED is on
- the I/O is LOW, the LED is off

LD3 PWR: the red LED indicates that the STM32 part is powered and +5V power is available.

7.5 Push-buttons

B1 USER: the user button is connected to the I/O PC13 (pin 2) of the STM32 microcontroller.

B2 RESET: this push-button is connected to NRST, and is used to RESET the STM32 microcontroller.

Note: The blue and black plastic hats that are placed on the push-buttons can be removed if necessary, for example, when a shield or an application board is plugged into the top of the Nucleo board. This will avoid pressure on the buttons and consequently a possible permanent target STM32 RESET.

7.6 JP6 (IDD)

Jumper JP6, labeled IDD, is used to measure the STM32 microcontroller consumption by removing the jumper and connecting an ammeter:

- Jumper ON: STM32 microcontroller is powered (default).
- Jumper OFF: an ammeter must be connected to measure the STM32 microcontroller current. If there is no ammeter, the STM32 microcontroller is not powered.

7.7 OSC clock

7.7.1 OSC clock supply

There are four ways to configure the pins corresponding to the external high-speed clock (HSE):

- **MCO from ST-LINK**: MCO output of ST-LINK MCU is used as an input clock. This frequency cannot be changed, it is fixed at 8 MHz and connected to PF0/PD0/PH0-OSC_IN of the STM32 microcontroller.

  The following configuration is needed:
  - SB55 OFF and SB54 ON
  - SB16 and SB50 ON
  - R35 and R37 removed
- **HSE oscillator on-board from X3 crystal (not provided):** for typical frequencies and its capacitors and resistors, refer to the STM32 microcontroller datasheet. Refer to the AN2867 Application note for oscillator design guide for STM32 microcontrollers.The X3 crystal has the following characteristics: 8 MHz, 16 pF, 20 ppm, and DIP footprint. It is recommended to use 9SL8000016AFXHF0 manufactured by Hong Kong X'tals Limited.

  The following configuration is needed:
  - SB54 and SB55 OFF
  - R35 and R37 soldered
  - C33 and C34 soldered with 20 pF capacitors
  - SB16 and SB50 OFF
- **Oscillator from external PF0/PD0/PH0**: from an external oscillator through pin 29 of the CN7 connector.

  The following configuration is needed:
  - SB55 ON
  - SB50 OFF
  - R35 and R37 removed
- **HSE not used**: PF0/PD0/PH0 and PF1/PD1/PH1 are used as GPIOs instead of clocks

  The following configuration is needed:
  - SB54 and SB55 ON
  - SB16 and SB50 (MCO) OFF
  - R35 and R37 removed

There are two possible default configurations of the HSE pins, depending on the version of the STM32 Nucleo board hardware.

The board version MB1136 C-01 or MB1136 C-02 is mentioned on the sticker, placed on the bottom side of the PCB.

The board marking MB1136 C-01 corresponds to a board, configured as HSE not used.

The board marking MB1136 C-02 (or higher) corresponds to a board, configured to use ST-LINK MCO as the clock input.

Note: For NUCLEO-L476RG and NUCLEO-L452RE the ST-LINK MCO output is not connected to OSCIN to reduce power consumption in low power mode. Consequently, NUCLEO-L476RG and NUCLEO-L452RE configurations correspond to HSE not used.

7.7.2 OSC 32 KHz clock supply

There are three ways to configure the pins corresponding to the low-speed clock (LSE):

- **On-board oscillator:** X2 crystal. Refer to the *Oscillator design guide for STM8S, STM8A and STM32 microcontrollers* application note *(*AN2867) for oscillator design guide for STM32 microcontrollers. It is recommended to use ABS25-32.768KHZ-6-T, manufactured by Abracon Corporation.
- **Oscillator from external PC14**: from external oscillator through the pin 25 of CN7 connector.

  The following configuration is needed:
  - SB48 and SB49 ON
  - R34 and R36 removed
- **LSE not used**: PC14 and PC15 are used as GPIOs instead of low-speed clocks.

  The following configuration is needed:
  - SB48 and SB49 ON
  - R34 and R36 removed

There are three possible default configurations of the LSE depending on the version of the STM32 Nucleo board hardware.

The board version MB1136 C-01 or MB1136 C-02 is mentioned on the sticker placed on the bottom side of the PCB.

The board marking MB1136 C-01 corresponds to a board configured as LSE not used.

The board marking MB1136 C-02 (or higher) corresponds to a board configured with an on-board 32 KHz oscillator.

The board marking MB1136 C-03 (or higher) corresponds to a board using a new LSE crystal (ABS25) and C26, C31, and C32 value update.

7.8 USART communication

The USART2 interface available on PA2 and PA3 of the STM32 microcontroller can be connected to ST-LINK MCU, ST morpho connector, or ARDUINO® connector. The choice can be changed by setting the related solder bridges. By default, the USART2 communication between the target STM32 and ST-LINK MCU is enabled, to support virtual COM port (SB13 and SB14 ON, SB62 and SB63 OFF). If the communication between the target STM32 PA2 (D1) or PA3 (D0) and shield or extension board is required, SB62 and SB63 must be ON, while SB13 and SB14 must be OFF. In such a case, it is possible to connect another USART to the ST-LINK MCU using flying wires between the ST morpho connector and CN3. For instance, on NUCLEO-F103RB it is possible to use USART3 available on PC10 (TX) and PC11 (RX). Two flying wires need to be connected as follows:

- PC10 (USART3_TX) available on CN7 pin 1 to CN3 pin RX
- PC11 (USART3_RX) available on CN7 pin 2 to CN3 pin TX

7.9 Solder bridges

Table 10. Solder bridges

Bridge	State(1)	Description
SB54, SB55 (X3 crystal)(2)	OFF	X3, C33, C34, R35, and R37 provide a clock as shown in electrical schematics PF0/PD0/PH0, PF1/PD1/PH1 are disconnected from CN7.
	ON	PF0/PD0/PH0 and PF1/PD1/PH1 are connected to CN7. (R35, R37, and SB50 must not be fitted).
SB3, SB5, SB7,SB9 (DEFAULT)	**ON**	Reserved, do not modify.
SB4,SB6, SB8,SB10 (RESERVED)	OFF	Reserved, do not modify.
SB48, SB49 (X2 crystal)(3)	OFF	X2, C31, C32, R34, and R36 deliver a 32 KHz clock. PC14 and PC15 are not connected to CN7.
	ON	PC14 and PC15 are only connected to CN7. Remove only R34 and R36.
SB17 (B1-USER)	**ON**	B1 push button is connected to PC13.
	OFF	B1 push button is not connected to PC13.
SB12 (NRST)	ON	The NRST signal of the CN4 connector is connected to the NRST pin of the STM32.
	OFF	The NRST signal of the CN4 connector is not connected to the NRST pin of the STM32.
SB15 (SWO)	ON	The SWO signal of the CN4 connector is connected to PB3.
	OFF	The SWO signal is not connected.
SB11 (STM_RST)	**OFF**	No incidence on STM32F103CBT6 (ST-LINK MCU) NRST signal.
	ON	STM32F103CBT6 (ST-LINK MCU) NRST signal is connected to GND.
SB1 (USB-5V)	OFF	USB power management is functional.
	ON	USB power management is disabled.
SB2 (3.3 V)	ON	Output of voltage regulator LD39050PU33R is connected to 3.3V.
	OFF	Output of voltage regulator LD39050PU33R is not connected.
SB21 (LD2-LED)	ON	Green user LED LD2 is connected to D13 of ARDUINO® signal.
	OFF	Green user LED LD2 is not connected.
SB56,SB51 (A4 and A5)	ON	PC1 and PC0 (ADC in) are connected to A4 and A5 (pin 5 and pin 6) on ARDUINO® connector CN8 and ST morpho connector CN7. Thus SB46 and SB52 must be OFF.
	OFF	PC1 and PC0 (ADC in) are disconnected to A4 and A5 (pin 5 and pin 6) on ARDUINO® connector CN8 and ST morpho connector CN7.
SB46,SB52 (I2C on A4 and A5)	OFF	PB9 and PB8 (I2C) are disconnected to A4 and A5 (pin 5 and pin 6) on ARDUINO® connector CN8 and ST morpho connector CN7.
	ON	PB9 and PB8 (I2C) are connected to A4 and A5 (pin 5 and pin 6) on ARDUINO® connector CN8 and ST morpho connector CN7 as I2C signals. Thus SB56 and SB51 must be OFF.

Table 10. Solder bridges (continued)

Bridge	State(1)	Description
SB45 (VBAT/VLCD)	ON	VBAT or VLCD on STM32 is connected to VDD.
	OFF	VBAT or VLCD on STM32 is not connected to VDD.
SB57 (VDDA/VREF+)	ON	VDDA/VREF+ on STM32 is connected to VDD.
	OFF	VDDA/VREF+ on STM32 is not connected to VDD and can be provided from pin 8 of CN5 (Used for external VREF+ provided by ARDUINO® shield)
SB62, SB63 (USART)	**OFF**	PA2 and PA3 on STM32 are disconnected to D1 and D0 (pin 2 and pin 1) on ARDUINO® connector CN9 and ST morpho connector CN10.
	ON	PA2 and PA3 on STM32 are connected to D1 and D0 (pin 2 and pin 1) on ARDUINO® connector CN9 and ST morpho connector CN10 as USART signals. Thus SB13 and SB14 must be OFF.
SB13, SB14 (ST-LINK-USART)	**ON**	PA2 and PA3 on STM32F103CBT6 (ST-LINK MCU) are connected to PA3 and PA2 on STM32 to have USART communication between them. Thus SB61, SB62, and SB63 must be OFF.
	OFF	PA2 and PA3 on STM32F103CBT6 (ST-LINK MCU) are disconnected to PA3 and PA2 on STM32.
SB16,SB50(MCO)(2)	OFF	MCO on STM32F103CBT6 (ST-LINK MCU) are disconnected to PF0/PD0/PH0 on STM32.
	ON	MCO on STM32F103CBT6 (ST-LINK MCU) are connected to PF0/PD0/PH0 on STM32.

1. The default SBx state is shown in bold.
2. The default configuration depends on the board version. Refer to *Section 7.7.1: OSC clock supply* for details.
3. The default configuration depends on the board version. Refer to *Section 7.7.2: OSC 32 KHz clock supply* for details.

All the other solder bridges present on the STM32 Nucleo board are used to configure several I/Os and power supply pins for compatibility of features and pinout with STM32 supported.

All STM32 Nucleo boards are delivered with the solder-bridges configured according to the target supported STM32.

7.10 Extension connectors

Figure 9 to *Figure 25* show the signals connected by default to ARDUINO® Uno V3 connectors (CN5, CN6, CN8, CN9) and to ST morpho connector (CN7 and CN10), for each STM32 Nucleo board.

Figure 9. NUCLEO-F030R8

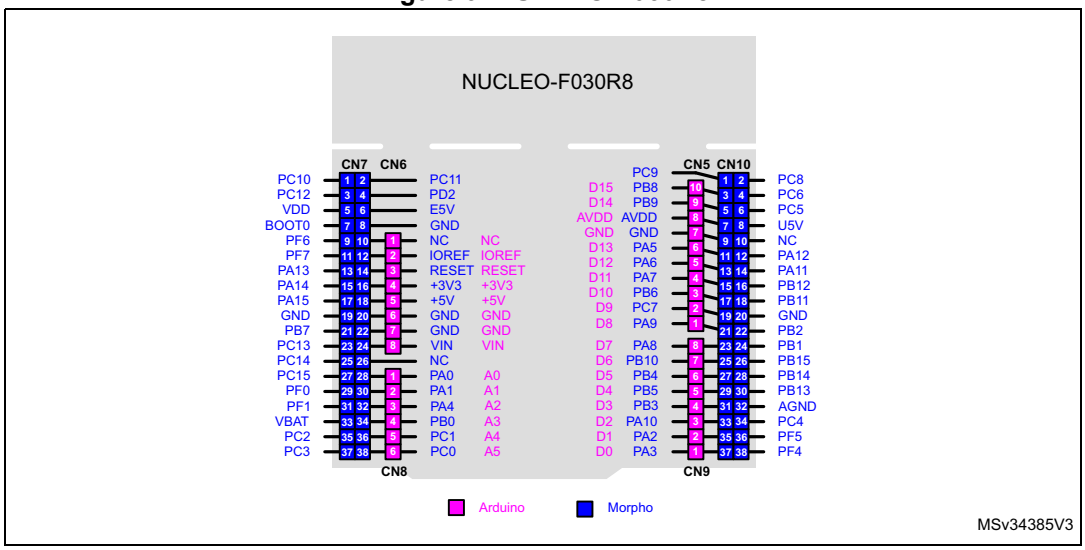


Figure 10. NUCLEO-F070RB

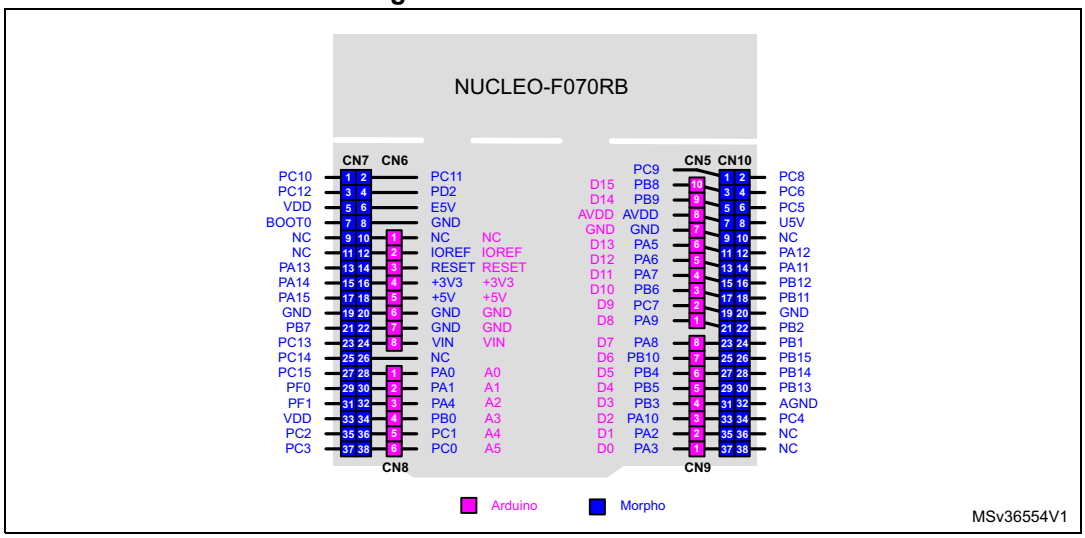


Figure 11. NUCLEO-F072RB

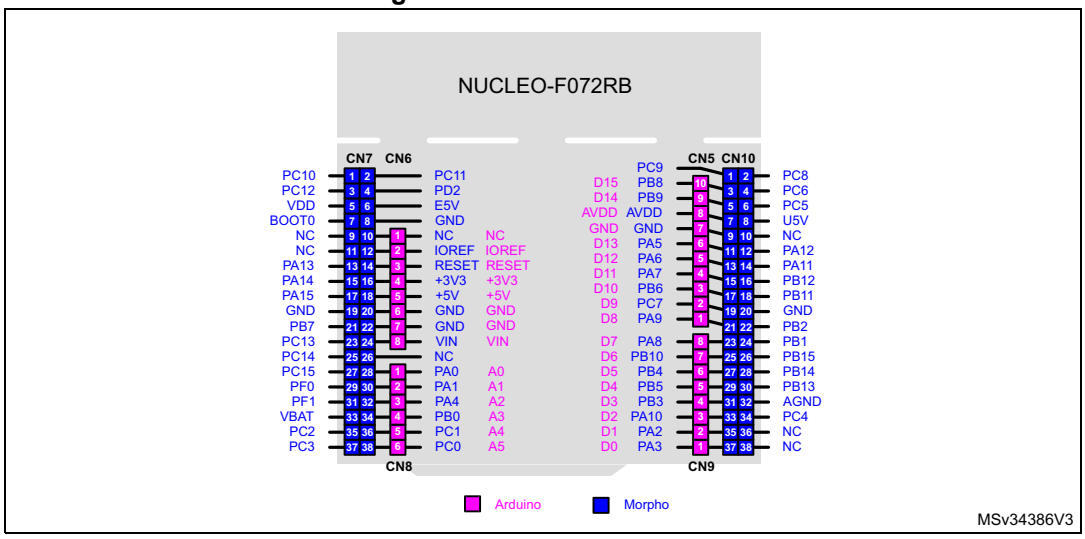


Figure 12. NUCLEO-F091RC

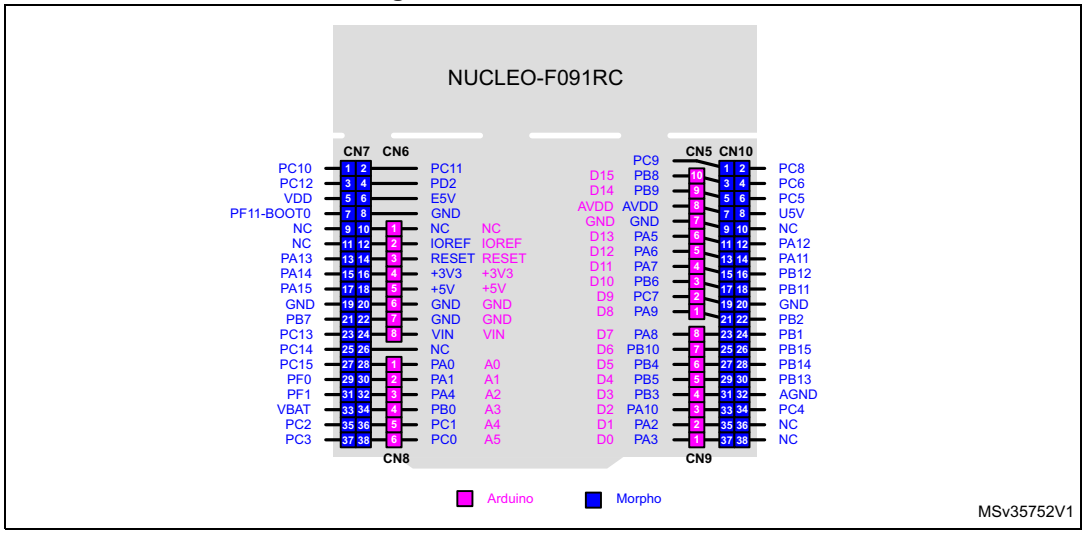


Figure 13. NUCLEO-F103RB

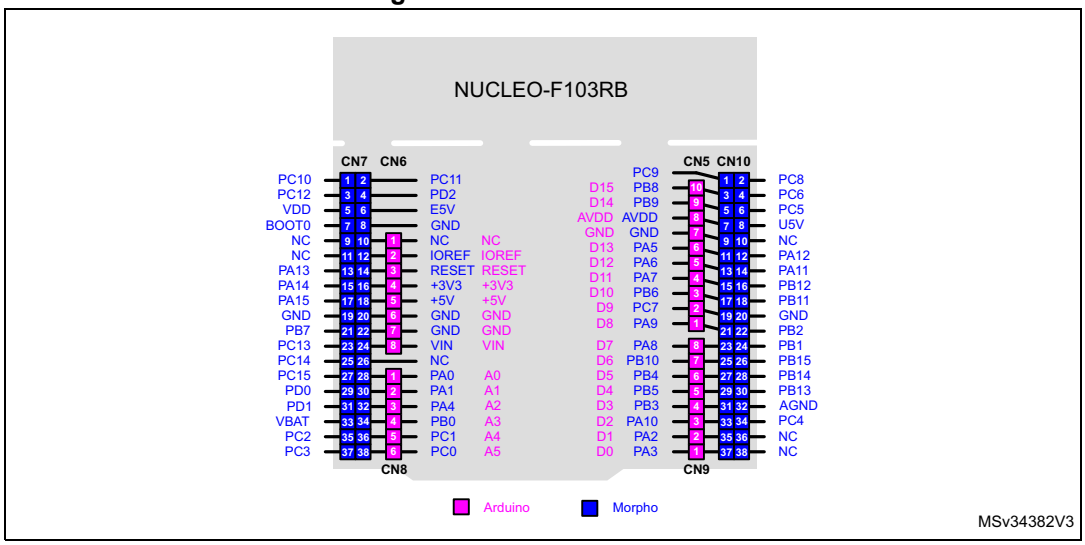


Figure 14. NUCLEO-F302R8

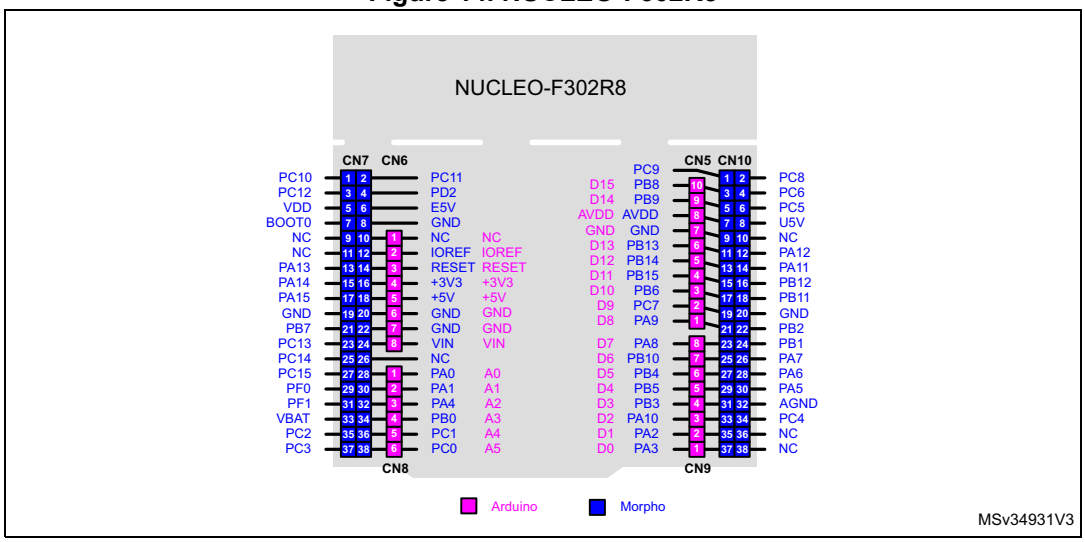


Figure 15. NUCLEO-F303RE

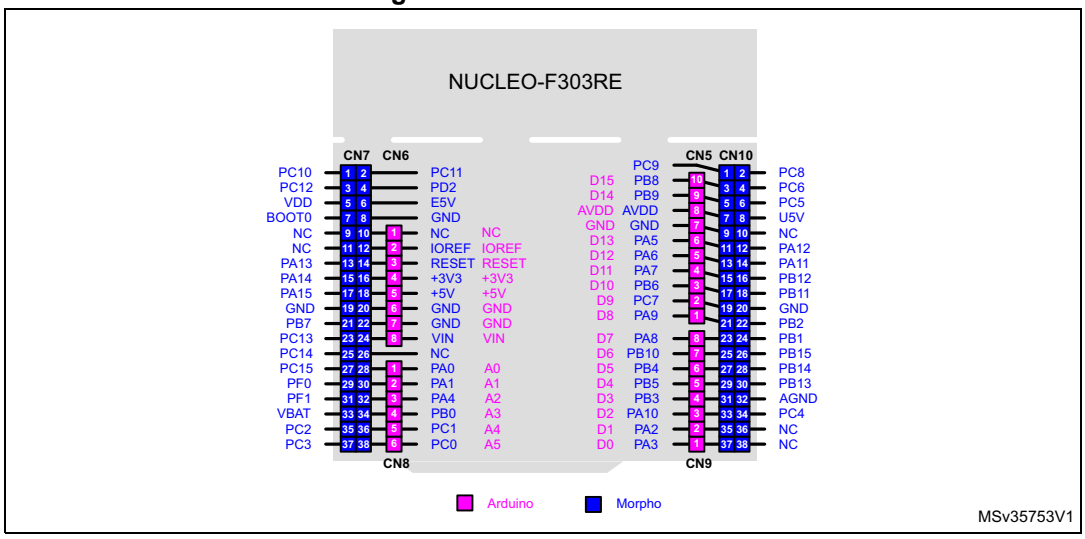


Figure 16. NUCLEO-F334R8

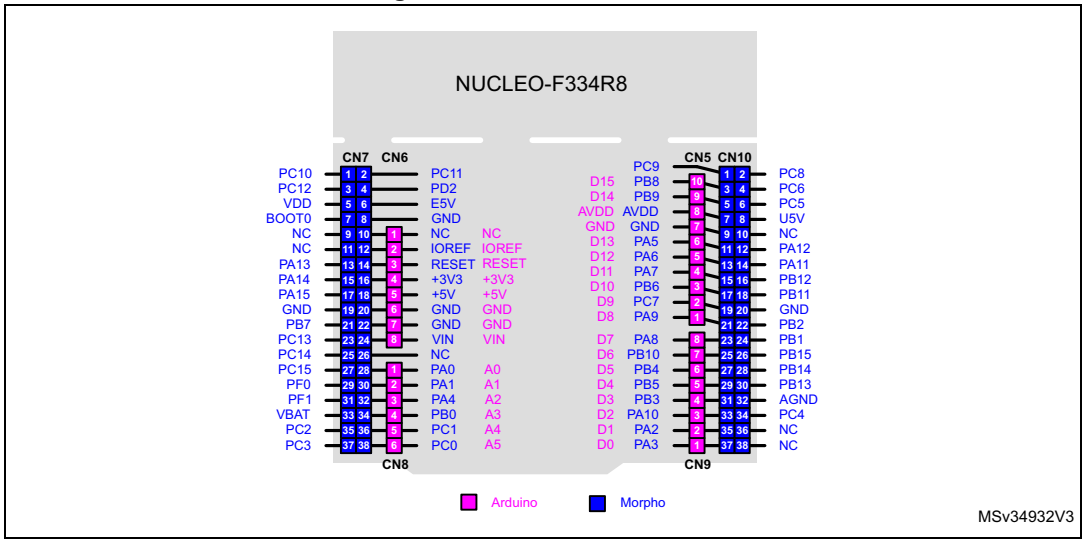


Figure 17. NUCLEO-F401RE

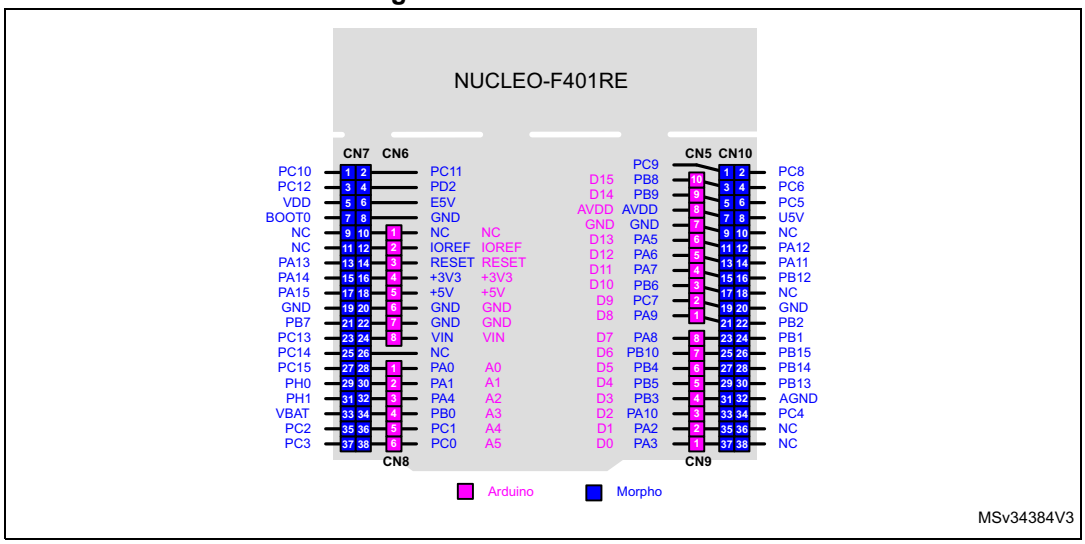


Figure 18. NUCLEO-F411RE

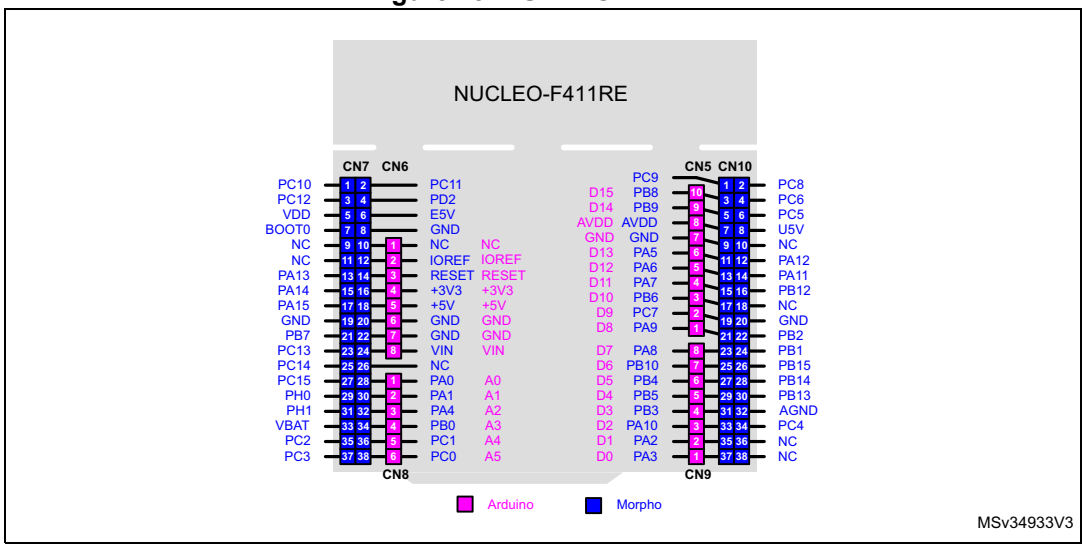


Figure 19. NUCLEO-L053R8

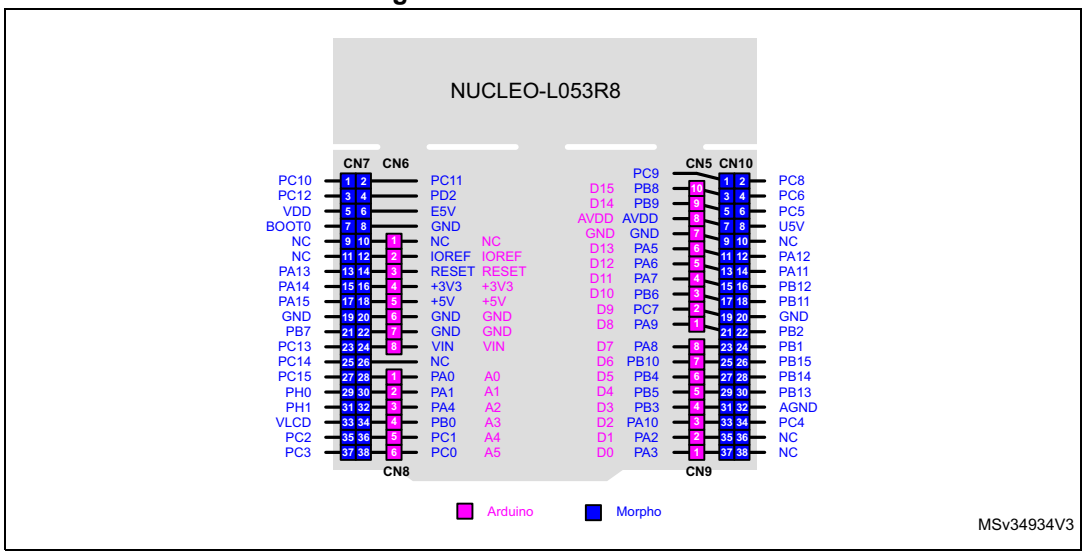


Figure 20. NUCLEO-L073RZ and NUCLEO-L010RB

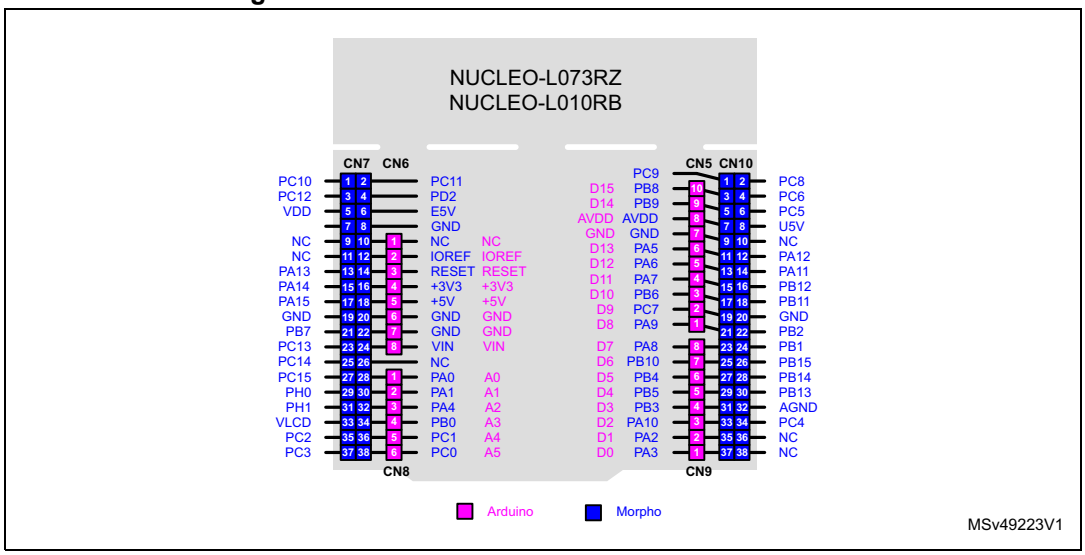


Figure 21. NUCLEO-L152RE

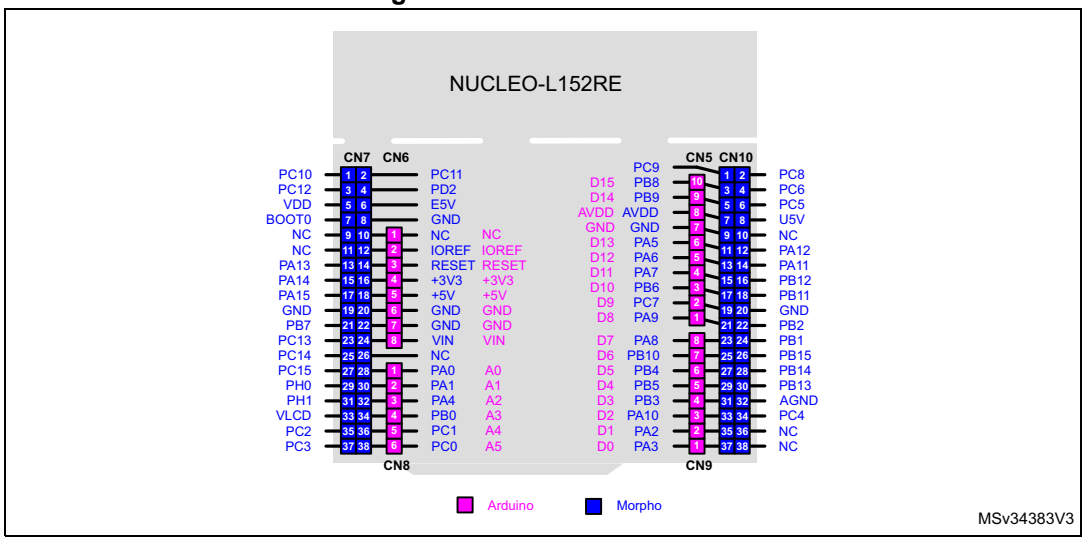


Figure 22. NUCLEO-L452RE

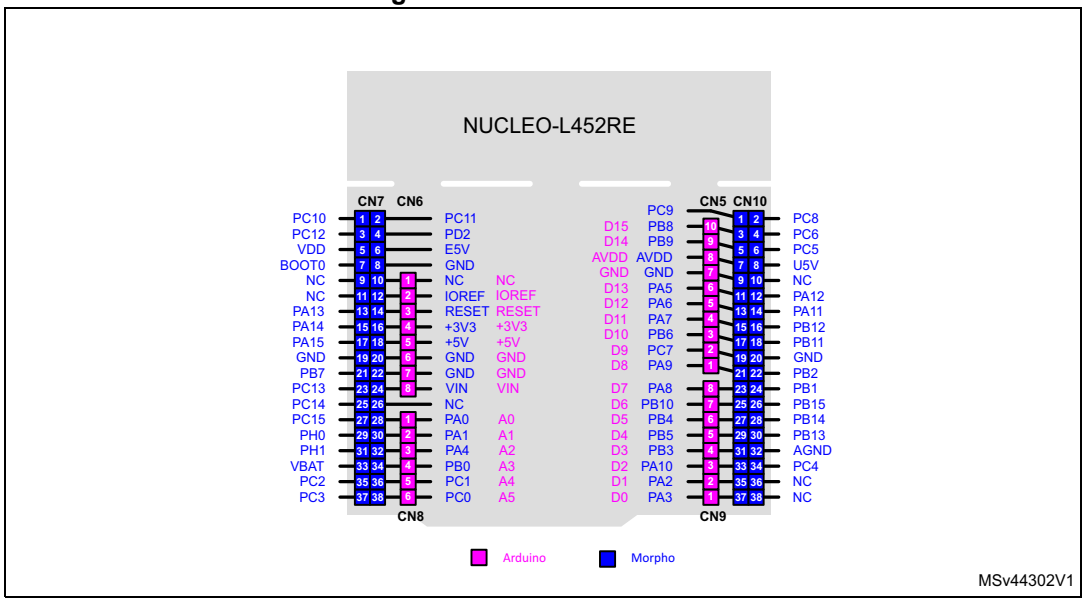


Figure 23. NUCLEO-L476RG

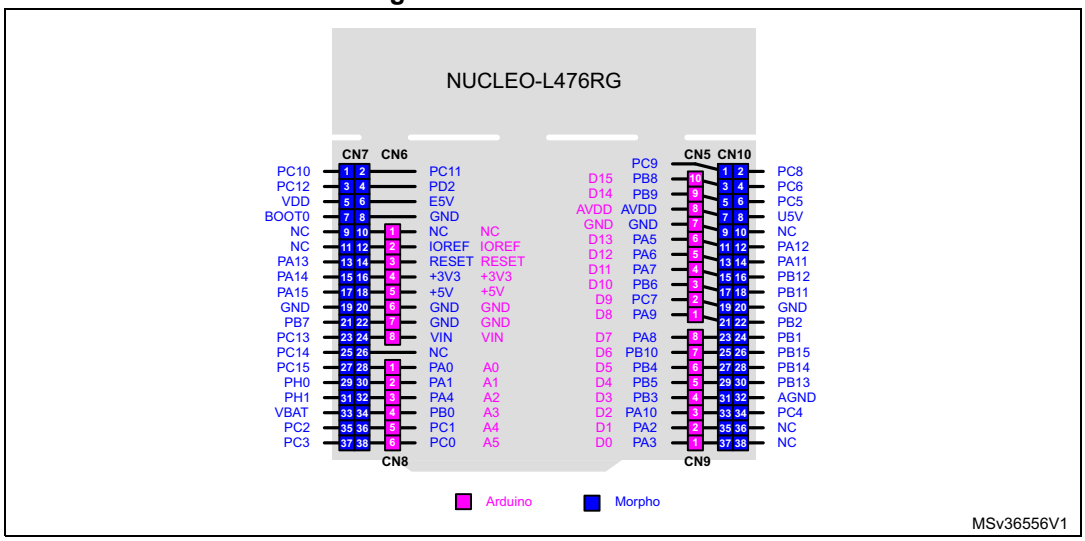


Figure 24. NUCLEO-F446RE

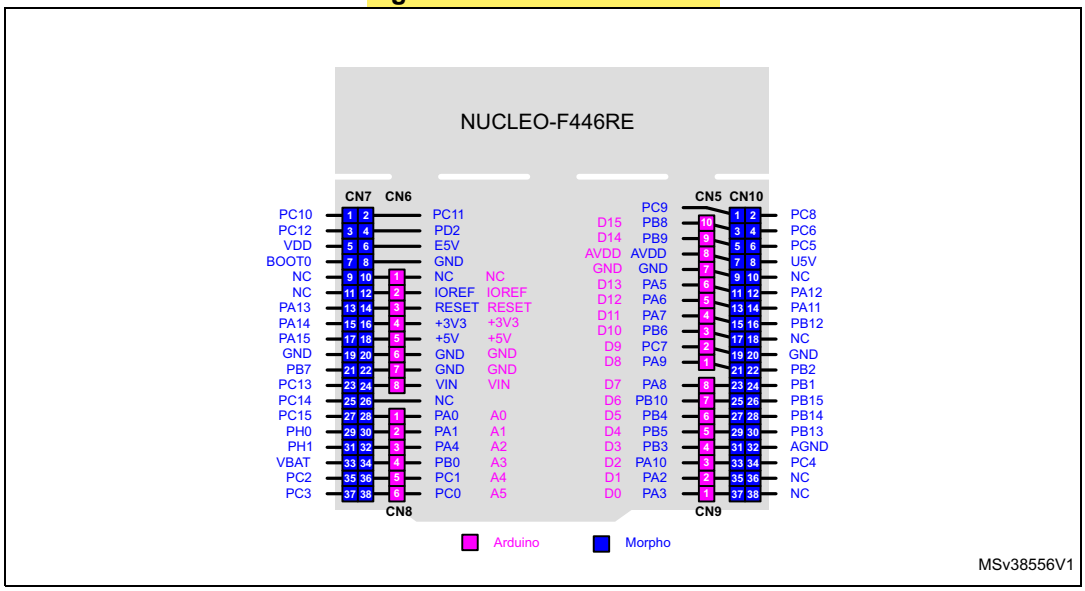
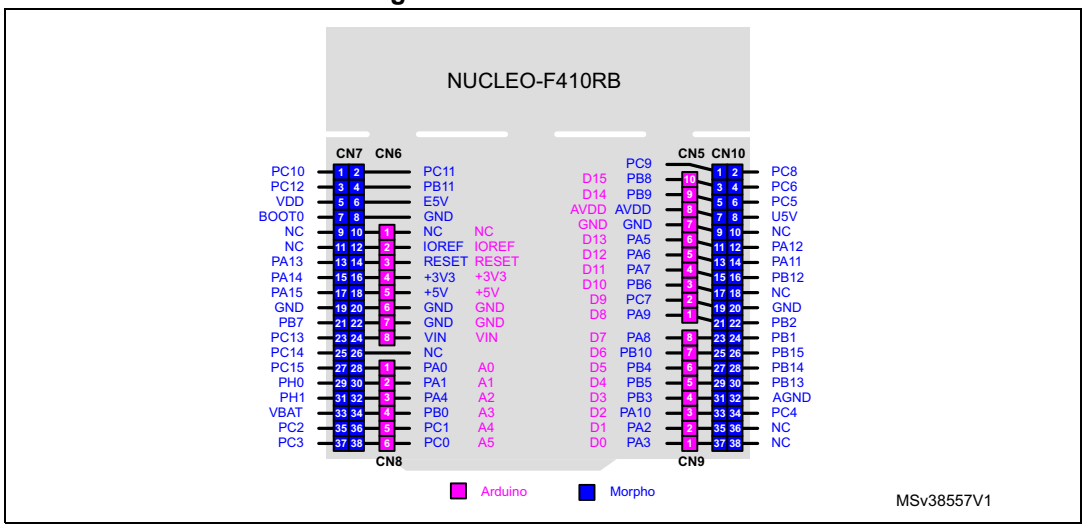


Figure 25. NUCLEO-F410RB



7.11 ARDUINO® connectors

CN5, CN6, CN8, and CN9 are female connectors compatible with ARDUINO® standard. Most shields designed for ARDUINO® can fit the STM32 Nucleo boards.

The ARDUINO® connectors on the STM32 Nucleo board support the ARDUINO® Uno V3.

For compatibility with ARDUINO® Uno V1, apply the following modifications:

- SB46 and SB52 must be ON,
- SB51 and SB56 must be OFF to connect I^2C on A4 (pin 5) and A5 (pin 6 of CN8).

Caution 1: The I/Os of the STM32 microcontroller are 3.3 V compatible instead of 5 V for ARDUINO® Uno V3.

Caution 2: SB57 must be removed before implementing the ARDUINO® shield with VREF+ power being provided on CN5 pin 8. Refer to *Table 10: Solder bridges* for details on SB57.

Table 11 to *Table 23* show the pin assignment of each main STM32 microcontroller on ARDUINO® connectors.

Table 11. ARDUINO® connectors on NUCLEO-F030R8, NUCLEO-F070RB, NUCLEO-F072RB, NUCLEO-F091RC

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC_IN0
	2	A1	PA1	ADC_IN1
	3	A2	PA4	ADC_IN4
	4	A3	PB0	ADC_IN8
	5	A4	PC1 or PB9(1)	ADC_IN11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_IN10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground

Table 11. ARDUINO® connectors on NUCLEO-F030R8, NUCLEO-F070RB, NUCLEO-F072RB, NUCLEO-F091RC (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN5 digital	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM17_CH1 or SPI1_MOSI
	3	D10	PB6	TIM16_CH1N or SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3(2)
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2(3)
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.
2. PWM is not supported by D6 on STM32F030 and STM32F070 since the timer is not available on PB10.
3. PWM is not supported by D3 on STM32F030 and STM32F070 since the timer is not available on PB3.

Table 12. ARDUINO® connectors on NUCLEO-F103RB

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF		3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V		5V output
	6	GND		ground
	7	GND		ground
	8	VIN		Power input
CN8 analog	1	A0	PA0	ADC_0
	2	A1	PA1	ADC_1
	3	A2	PA4	ADC_4
	4	A3	PB0	ADC_8
	5	A4	PC1 or PB9(1)	ADC_11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND		ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM3_CH2 or SPI1_MOSI
	3	D10	PB6	TIM4_CH1 or SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Table 13. ARDUINO® connectors on NUCLEO-F302R8

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC_IN1
	2	A1	PA1	ADC_IN2
	3	A2	PA4	ADC_IN5
	4	A3	PB0	ADC_IN11
	5	A4	PC1 or PB9(1)	ADC_IN7 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_IN6 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PB13	SPI2_SCK
	5	D12	PB14	SPI2_MISO
	4	D11	PB15	TIM15_CH2 or SPI2_MOSI
	3	D10	PB6	TIM16_CH1N or SPI2_CS
	2	D9	PC7	-
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM16_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Warning: PWM is not supported by D9 on STM32F302 since the timer is not available on PC7.

Table 14. ARDUINO® connectors on NUCLEO-F303RE

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC1_IN1
	2	A1	PA1	ADC1_IN2
	3	A2	PA4	ADC2_IN1
	4	A3	PB0	ADC3_IN12
	5	A4	PC1 or PB9(1)	ADC12_IN7 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC12_IN6 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM17_CH1 or SPI1_MOSI
	3	D10	PB6	TIM4_CH1 or SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-

Table 14. ARDUINO® connectors on NUCLEO-F303RE (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX

1. Refer to *Table 10: Solder bridges* for details.

Table 15. ARDUINO® connectors on NUCLEO-F334R8

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC1_IN1
	2	A1	PA1	ADC1_IN2
	3	A2	PA4	ADC2_IN1
	4	A3	PB0	ADC1_IN11
	5	A4	PC1 or PB9(1)	ADC_IN7 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_IN6 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM17_CH1 or SPI1_MOSI
	3	D10	PB6	TIM16_CH1N or SPI1_CS

Table 15. ARDUINO® connectors on NUCLEO-F334R8 (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN5 digital	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Table 16. ARDUINO® connectors on NUCLEO-F401RE and NUCLEO-F411RE

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC1_0
	2	A1	PA1	ADC1_1
	3	A2	PA4	ADC1_4
	4	A3	PB0	ADC1_8
	5	A4	PC1 or PB9(1)	ADC1_11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC1_10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground

Table 16. ARDUINO® connectors on NUCLEO-F401RE and NUCLEO-F411RE (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN5 digital	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM1_CH1N or SPI1_MOSI
	3	D10	PB6	TIM4_CH1 or SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Table 17. ARDUINO® connectors on NUCLEO-L053R8

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC_IN0
	2	A1	PA1	ADC_IN1
	3	A2	PA4	ADC_IN4
	4	A3	PB0	ADC_IN8
	5	A4	PC1 or PB9(1)	ADC_IN11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_IN10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM12_CH2 or SPI1_MOSI
	3	D10	PB6	SPI1_CS
	2	D9	PC7	TIM12_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM12_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Warning: PWM is not supported by D10 on STM32L053 since the timer is not available on PB6.

Table 18. ARDUINO® connectors on NUCLEO-L010RB and NUCLEO-L073RZ

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC_IN0
	2	A1	PA1	ADC_IN1
	3	A2	PA4	ADC_IN4
	4	A3	PB0	ADC_IN8
	5	A4	PC1 or PB9(1)	ADC_IN11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_IN10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM22_CH2 or SPI1_MOSI
	3	D10	PB6	SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-

Table 18. ARDUINO® connectors on NUCLEO-L010RB and NUCLEO-L073RZ (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Warning: PWM is not supported by D10 on STM32L010 and STM32L073 since the timer is not available on PB6.

Table 19. ARDUINO® connectors on NUCLEO-F446RE

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC123_IN0
	2	A1	PA1	ADC123_IN1
	3	A2	PA4	ADC12_IN4
	4	A3	PB0	ADC12_IN8
	5	A4	PC1 or PB9(1)	ADC123_IN11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC123_IN10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA

Table 19. ARDUINO® connectors on NUCLEO-F446RE (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN5 digital	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM14_CH1 || SPI1_MOSI
	3	D10	PB6	TIM4_CH1 || SPI1_CS
	2	D9	PC7	TIM8_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Table 20. ARDUINO® connectors on NUCLEO-F410RB

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC1_0
	2	A1	PA1	ADC1_1
	3	A2	PA4	ADC1_4
	4	A3	PB0	ADC1_8
	5	A4	PC1 or PB9(1)	ADC1_11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC1_10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	PB8	D15	I2C1_SCL
	9	PB9	D14	I2C1_SDA
	8	-	AREF	AVDD
	7	-	GND	ground
	6	PA5	D13	SPI1_SCK
	5	PA6	D12	SPI1_MISO
	4	PA7	D11	TIM1_CH1N || SPI1_MOSI
	3	PB6	D10	SPI1_CS
	2	PC7	D9	-
	1	PA9	D8	-
CN9 digital	8	PA8	D7	-
	7	PB10	D6	-
	6	PB4	D5	-
	5	PB5	D4	-
	4	PB3	D3	-
	3	PA10	D2	-
	2	PA2	D1	USART2_TX
	1	PA3	D0	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Warning: PWM is not supported by D3, D5, D6, D9 and D10 on STM32F410RB since timer is not available on PB6, PC7, PB10, PB4, PB3.

Table 21. ARDUINO® connectors on NUCLEO-L152RE

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC_IN0
	2	A1	PA1	ADC_IN1
	3	A2	PA4	ADC_IN4
	4	A3	PB0	ADC_IN8
	5	A4	PC1 or PB9(1)	ADC_IN11 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC_IN10 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM11_CH1 or SPI1_MOSI
	3	D10	PB6	TIM4_CH1 or SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-

Table 21. ARDUINO® connectors on NUCLEO-L152RE (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN9 digital	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Table 22. ARDUINO® connectors on NUCLEO-L452RE

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC1_IN5
	2	A1	PA1	ADC1_IN6
	3	A2	PA4	ADC1_IN9
	4	A3	PB0	ADC1_IN15
	5	A4	PC1 or PB9(1)	ADC1_IN2 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC1_IN1 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM1_CH1N or SPI1_MOSI
	3	D10	PB6	TIM16_CH1N or SPI1_CS
	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-

Table 22. ARDUINO® connectors on NUCLEO-L452RE (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN9 digital	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

Table 23. ARDUINO® connectors on NUCLEO-L476RG

Connector	Pin	Pin name	STM32 pin	Function
Left connectors				
CN6 power	1	NC	-	-
	2	IOREF	-	3.3V Ref
	3	RESET	NRST	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V output
	6	GND	-	ground
	7	GND	-	ground
	8	VIN	-	Power input
CN8 analog	1	A0	PA0	ADC12_IN5
	2	A1	PA1	ADC12_IN6
	3	A2	PA4	ADC12_IN9
	4	A3	PB0	ADC12_IN15
	5	A4	PC1 or PB9(1)	ADC123_IN2 (PC1) or I2C1_SDA (PB9)
	6	A5	PC0 or PB8(1)	ADC123_IN1 (PC0) or I2C1_SCL (PB8)
Right connectors				
CN5 digital	10	D15	PB8	I2C1_SCL
	9	D14	PB9	I2C1_SDA
	8	AREF	-	AVDD
	7	GND	-	ground
	6	D13	PA5	SPI1_SCK
	5	D12	PA6	SPI1_MISO
	4	D11	PA7	TIM17_CH1 or SPI1_MOSI
	3	D10	PB6	TIM4_CH1 or SPI1_CS

Table 23. ARDUINO® connectors on NUCLEO-L476RG (continued)

Connector	Pin	Pin name	STM32 pin	Function
CN5 digital	2	D9	PC7	TIM3_CH2
	1	D8	PA9	-
CN9 digital	8	D7	PA8	-
	7	D6	PB10	TIM2_CH3
	6	D5	PB4	TIM3_CH1
	5	D4	PB5	-
	4	D3	PB3	TIM2_CH2
	3	D2	PA10	-
	2	D1	PA2	USART2_TX
	1	D0	PA3	USART2_RX

1. Refer to *Table 10: Solder bridges* for details.

7.12 ST morpho connector

The ST morpho connector consists of male pin headers (CN7 and CN10) accessible on both sides of the board. They can be used to connect the STM32 Nucleo board to an extension board or a prototype/wrapping board placed on the top or bottom side of the STM32 Nucleo board. All signals and power pins of the STM32 are available on the ST morpho connector. This connector can also be probed by an oscilloscope, logical analyzer, or voltmeter.

Table 24 to *Table 33* show the pin assignments of each STM32 on the ST morpho connector.

Table 24. ST morpho connector on NUCLEO-F030R8

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	PF6	-	10	9	GND	-	10
11	PF7	IOREF	12	11	PA5	PA12	12
13	PA13	RESET	14	13	PA6	PA11	14
15	PA14	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22

Table 24. ST morpho connector on NUCLEO-F030R8 (continued)

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
23	PC13(3)	VIN	24	23	PA8	PB1	24
25	PC14(3)	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PF0	PA1	30	29	PB5	PB13	30
31	PF1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	PF5	36
37	PC3	PC0 or PB8(4)	38	37	PA3	PF4	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7. Two unused jumpers are available on CN11 and CN12 (bottom side of the board).
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 25. ST morpho connector on NUCLEO-F070RB

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PF0	PA1	30	29	PB5	PB13	30
31	PF1	PA4	32	31	PB3	AGND	32
33	VDD	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7.
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.

3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 26. ST morpho connector on NUCLEO-F072RB, NUCLEO-F091RC, NUCLEO-F303RE, NUCLEO-F334R8

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)(2)	GND	8	7	AVDD	U5V(3)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(4)	RESET	14	13	PA6	PA11	14
15	PA14(4)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PF0	PA1	30	29	PB5	PB13	30
31	PF1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(5)	36	35	PA2	-	36
37	PC3	PC0 or PB8(5)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7. Two unused jumpers are available on CN11 and CN12 (bottom side of the board).
2. CN7 pin 7 (BOOT0) can be configured by engineering byte as PF11 on NUCLEO-F091RC.
3. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
4. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
5. Refer to *Table 10: Solder bridges* for details.

Table 27. ST morpho connector on NUCLEO-F103RB

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	**Name**	**Name**	**Pin**	**Pin**	**Name**	**Name**	**Pin**
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PD0	PA1	30	29	PB5	PB13	30
31	PD1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7. Two unused jumpers are available on CN11 and CN12 (bottom side of the board).
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5 V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 28. ST morpho connector on NUCLEO-F302R8

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PB13	PA12	12
13	PA13(3)	RESET	14	13	PB14	PA11	14
15	PA14(3)	+3.3V	16	15	PB15	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PA7	26
27	PC15	PA0	28	27	PB4	PA6	28
29	PF0	PA1	30	29	PB5	PA5	30
31	PF1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7. Two unused jumpers are available on CN11 and CN12 (bottom side of the board).
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 29. ST morpho connector on NUCLEO-F401RE, NUCLEO-F411RE, NUCLEO-F446RE

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	-	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PH0	PA1	30	29	PB5	PB13	30
31	PH1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7. Two unused jumpers are available on CN11 and CN12 (bottom side of the board).
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 30. ST morpho connector on NUCLEO-L010RB, NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PH0	PA1	30	29	PB5	PB13	30
31	PH1	PA4	32	31	PB3	AGND	32
33	VLCD	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7. Two unused jumpers are available on CN11 and CN12 (bottom side of the board).
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 31. ST morpho connector on NUCLEO-L452RE

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	**Name**	**Name**	**Pin**	**Pin**	**Name**	**Name**	**Pin**
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	PH3 / BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PH0	PA1	30	29	PB5	PB13	30
31	PH1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pins 5-7 of CN7.
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 32. ST morpho connector on NUCLEO-L476RG

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	**Name**	**Name**	**Pin**	**Pin**	**Name**	**Name**	**Pin**
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PD2	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	PB11	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PH0	PA1	30	29	PB5	PB13	30
31	PH1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7.
2. U5V is 5 V power from ST-LINK/V2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

Table 33. ST morpho connector on NUCLEO-F410RB

CN7 odd pins		CN7 even pins		CN10 odd pins		CN10 even pins	
Pin	Name	Name	Pin	Pin	Name	Name	Pin
1	PC10	PC11	2	1	PC9	PC8	2
3	PC12	PB11	4	3	PB8	PC6	4
5	VDD	E5V	6	5	PB9	PC5	6
7	BOOT0(1)	GND	8	7	AVDD	U5V(2)	8
9	-	-	10	9	GND	-	10
11	-	IOREF	12	11	PA5	PA12	12
13	PA13(3)	RESET	14	13	PA6	PA11	14
15	PA14(3)	+3.3V	16	15	PA7	PB12	16
17	PA15	+5V	18	17	PB6	-	18
19	GND	GND	20	19	PC7	GND	20
21	PB7	GND	22	21	PA9	PB2	22
23	PC13	VIN	24	23	PA8	PB1	24
25	PC14	-	26	25	PB10	PB15	26
27	PC15	PA0	28	27	PB4	PB14	28
29	PH0	PA1	30	29	PB5	PB13	30
31	PH1	PA4	32	31	PB3	AGND	32
33	VBAT	PB0	34	33	PA10	PC4	34
35	PC2	PC1 or PB9(4)	36	35	PA2	-	36
37	PC3	PC0 or PB8(4)	38	37	PA3	-	38

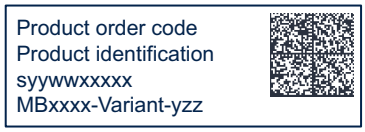
1. The default state of BOOT0 is LOW. It can be set to HIGH when a jumper is on pin5-7 of CN7.
2. U5V is 5 V power from the ST-LINKV2-1 USB connector and it rises before +5V.
3. PA13 and PA14 share with SWD signals connected to ST-LINK/V2-1, it is not recommended to use them as IO pins if the ST-LINK part is not cut.
4. Refer to *Table 10: Solder bridges* for details.

8 Nucleo-64 boards information

8.1 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 evaluation tool ordering part number 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.

8.2 Product history

Table 34. Product history

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F030R8	NUCLEOF030R8/	MCU: – STM32F030R8T6 silicon revision ‘B’ or ‘2’ or ‘1’	Initial revision	No limitation
		MCU errata sheet: – *STM32F030x4/x6/x8/xC device errata* (ES0219)		
		Boards: – MB1136-F030R8-C01 – MB1136-F030R8-C03 – MB1136-F030R8-C04 (main board)		
	NUF030R8$AU1	MCU: – STM32F030R8T6 silicon revision ‘B’ or ‘2’ or ‘1’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F030x4/x6/x8/xC device errata* (ES0219)		
		Boards: – MB1136-F030R8-C04 (main board)		
	NUF030R8$KU1	MCU: – STM32F030R8T6 silicon revision ‘B’ or ‘2’ or ‘1’	– Board stickers format changed	No limitation
		MCU errata sheet: – *STM32F030x4/x6/x8/xC device errata* (ES0219)		
		Boards: – MB1136-F030R8-C04 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F072RB	NUCLEOF072RB/	MCU: – STM32F072RBT6 silicon revision ‘Y’ or ‘1’	Initial revision	No limitation
		MCU errata sheet: – *STM32F072x8/xB device errata* (ES0223)		
		Boards: – MB1136-F072RB-C01 – MB1136-F072RB-C03 – MB1136-F072RB-C04 (main board)		
	NUF072RB$AU1	MCU: – STM32F072RBT6 silicon revision ‘Y’ or ‘1’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F072x8/xB device errata* (ES0223)		
		Boards: – MB1136-F072RB-C05 (main board)		
	NUF072RB$KU1	MCU: – STM32F072RBT6 silicon revision ‘2’	– MCU silicon revision changed – Board sticker format changed	No limitation
		MCU errata sheet: *STM32F072x8/xB device errata* (ES0223)		
		Boards: MB1136-F072RB-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F103RB	NUCLEOF103RB/	MCU: – STM32F103RBT6 silicon revision ‘X’ or ‘2’	Initial revision	No limitation
		MCU errata sheet: – *STM32F101x8/B, STM32F102x8/B and STM32F103x8/B medium-density device limitations* (ES096)		
		Boards: – MB1136-F103RB-C01 – MB1136-F103RB-C02 – MB1136-F103RB-C03 – MB1136-F103RB-C04 (main board)		
	NUF103RB$AU1	MCU: – STM32F103RBT6 silicon revision ‘X’ or ‘2’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F101x8/B, STM32F102x8/B and STM32F103x8/B medium-density device limitations* (ES096)		
		Boards: – MB1136-F103RB-C05 (main board)		
	NUF103RB$KU1	MCU: – STM32F103RBT6 silicon revision ‘X’ or ‘2’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32F101x8/B, STM32F102x8/B and STM32F103x8/B medium-density device limitations* (ES096)		
		Boards: – MB1136-F103RB-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F302R8	NUCLEOF302R8/	MCU: – STM32F302R8T6 silicon revision ‘Z’	Initial revision	No limitation
		MCU errata sheet: – *STM32F302x6/x8 device errata* (ES0247)		
		Boards: – MB1136-F302R8-C01 – MB1136-F302R8-C02 – MB1136-F302R8-C03 – MB1136-F302R8-C04 (main board)		
	NUF302R8$AU1	MCU: – STM32F302R8T6 silicon revision ‘Z’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F302x6/x8 device errata* (ES0247)		
		Boards: – MB1136-F302R8-C04 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F401RE	NUCLEOF401RE/	MCU: – STM32F401RET6 silicon revision ‘Z’ or ‘1’	Initial revision	No limitation
		MCU errata sheet: – *STM32F401xD and STM32F401xE device errata* (ES0299)		
		Boards: – MB1136-F401RE-C01 – MB1136-F401RE-C02 – MB1136-F401RE-C03 – MB1136-F401RE-C04 (main board)		
	NUF401RE$AU1	MCU: – STM32F401RET6 silicon revision ‘Z’ or ‘1’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F401xD and STM32F401xE device errata* (ES0299)		
		Boards: – MB1136-F401RE-C04 (main board)		
	NUF401RE$KU1	MCU: – STM32F401RET6 silicon revision ‘Z’ or ‘1’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32F401xD and STM32F401xE device errata* (ES0299)		
		Boards: – MB1136-F401RE-C04 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-L053R8	NUCLEOL053R8/	MCU: – STM32L053R8T6 silicon revision ‘X’	Initial revision	No limitation
		MCU errata sheet: – *STM32L05xxx/L06xxx device errata* (ES0251)		
		Boards: – MB1136-L053R8-C01 – MB1136-L053R8-C02 – MB1136-L053R8-C03 – MB1136-L053R8-C04 (main board)		
	NUL053R8$AU1	MCU: – STM32L053R8T6 silicon revision ‘X’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32L05xxx/L06xxx device errata* (ES0251)		
		Boards: – MB1136-L053R8-C05 (main board)		
	NUL053R8$KU1	MCU: – STM32L053R8T6 silicon revision ‘X’ or ‘P’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32L05xxx/L06xxx device errata* (ES0251)		
		Boards: – MB1136-L053R8-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-L152RE	NUCLEOL152RE/	MCU: – STM32L152RET6 silicon revision ‘Z’	Initial revision	No limitation
		MCU errata sheet: – *STM32L15xxE STM32L15xVD-X STM32L162xE STM32L162xVD-X device errata* (ES0242)		
		Boards: – MB1136-L152RE-C01 – MB1136-L152RE-C02 – MB1136-L152RE-C03 – MB1136-L152RE-C04 (main board)		
	NUL152RE$AU1	MCU: – STM32L152RET6 silicon revision ‘Z’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32L15xxE STM32L15xVD-X STM32L162xE STM32L162xVD-X device errata* (ES0242)		
		Boards: – MB1136-L152RE-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F091RC	NUCLEOF091RC/	MCU: – STM32F091RCT6 silicon revision ‘A’	Initial revision	No limitation
		MCU errata sheet: – *STM32F091xB/xC device errata* (ES0282)		
		Boards: – MB1136-F091RC-C02 – MB1136-F091RC-C03 – MB1136-F091RC-C04 (main board)		
	NUF091RC$AU1	MCU: – STM32F091RCT6 silicon revision ‘A’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F091xB/xC device errata* (ES0282)		
		Boards: – MB1136-F091RC-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F303RE	NUCLEOF303RE/	MCU: – STM32F303RET6 silicon revision ‘Y’	Initial revision	No limitation
		MCU errata sheet: – *STM32F303xD STM32F303xE Rev Y device limitations* (ES0261)		
		Boards: – MB1136-F303RE-C02 – MB1136-F303RE-C03 – MB1136-F303RE-C04 (main board)		
	NUF303RE$AU1	MCU: – STM32F303RET6 silicon revision ‘Y’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F303xD STM32F303xE Rev Y device limitations* (ES0261)		
		Boards: – MB1136-F303RE-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F334R8	NUCLEOF334R8/	MCU: – STM32F334R8T6 silicon revision ‘Z’	Initial revision	No limitation
		MCU errata sheet: – *STM32F334x4/x6/x8 Rev Z device limitations* (ES0258)		
		Boards: – MB1136-F334R8-C02 – MB1136-F334R8-C03 – MB1136-F334R8-C04 (main board)		
	NUF334R8$AU1	MCU: – STM32F334R8T6 silicon revision ‘Z’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F334x4/x6/x8 Rev Z device limitations* (ES0258)		
		Boards: – MB1136-F334R8-C05 (main board)		
	NUF334R8$KU1	MCU: – STM32F334R8T6 silicon revision ‘Z’ or ‘1’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32F334x4/x6/x8 Rev Z device limitations* (ES0258)		
		Boards: – MB1136-F334R8-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F411RE	NUCLEOF411RE/	MCU: – STM32F411RET6 silicon revision ‘A’	Initial revision	No limitation
		MCU errata sheet: – *STM32F411xC/xE device errata* (ES0287)		
		Boards: – MB1136-F411RE-C02 – MB1136-F411RE-C03 – MB1136-F411RE-C04 (main board)		
	NUF411RE$AU1	MCU: – STM32F411RET6 silicon revision ‘A’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F411xC/xE device errata* (ES0287)		
		Boards: – MB1136-F411RE-C04 (main board)		
	NUF411RE$KU1	MCU: – STM32F411RET6 silicon revision ‘A’ or ‘1’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32F411xC/xE device errata* (ES0287)		
		Boards: – MB1136-F411RE-C04 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F410RB	NUCLEOF410RB/	MCU: – STM32F410RBT6 silicon revision ‘A’	Initial revision	No limitation
		MCU errata sheet: – *STM32F410x8 STM32F410xB device errata* (ES0325)		
		Boards: – MB1136-F410RB-C03 – MB1136-F410RB-C04 (main board)		
	NUF410RB$AU1	MCU: – STM32F410RBT6 silicon revision ‘A’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F410x8 STM32F410xB device errata* (ES0325)		
		Boards: – MB1136-F410RB-C04 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F446RE	NUCLEOF446RE/	MCU: – STM32F446RET6 silicon revision ‘A’	Initial revision	No limitation
		MCU errata sheet: – *STM32F446xC/xE device errata* (ES0298)		
		Boards: – MB1136-F446RE-C03 – MB1136-F446RE-C04 (main board)		
	NUF446RE$AU1	MCU: – STM32F446RET6 silicon revision ‘A’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F446xC/xE device errata* (ES0298)		
		Boards: – MB1136-F446RE-C04 (main board)		
	NUF446RE$KU1	MCU: – STM32F446RET6 silicon revision ‘A’ or ‘1’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32F446xC/xE device errata* (ES0298)		
		Boards: – MB1136-F446RE-C04 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-F070RB	NUCLEOF070RB/	MCU: – STM32F070RBT6 silicon revision ‘1’	Initial revision	No limitation
		MCU errata sheet: – *STM32F070x6/xB device errata* (ES0291)		
		Boards: – MB1136-F070RB-C03 – MB1136-F070RB-C04 (main board)		
	NUF070RB$AU1	MCU: – STM32F070RBT6 silicon revision ‘1’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32F070x6/xB device errata* (ES0291)		
		Boards: – MB1136-F070RB-C05 (main board)		
	NUF070RB$KU1	MCU: – STM32F070RBT6 silicon revision ‘2’	– Board stickers format changed – MCU silicon revison changed	No limitation
		MCU errata sheet: – *STM32F070x6/xB device errata* (ES0291)		
		Boards: – MB1136-F070RB-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-L073RZ	NUCLEOL073RZ/	MCU: – STM32L073RZT6 silicon revision ‘Z’	Initial revision	No limitation
		MCU errata sheet: – *STM32L07xxx/L08xxx device errata* (ES0292)		
		Boards: – MB1136-L073RZ-C03 – MB1136-L073RZ-C04 (main board)		
	NUL073RZ$AU1	MCU: – STM32L073RZT6 silicon revision ‘Z’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32L07xxx/L08xxx device errata* (ES0292)		
		Boards: – MB1136-L073RZ-C05 (main board)		
	NUL073RZ$KU1	MCU: – STM32L073RZT6 silicon revision ‘Z’ or ‘P’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32L07xxx/L08xxx device errata* (ES0292)		
		Boards: – MB1136-L073RZ-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-L452RE	NUCLEOL452RE/	MCU: – STM32L452RET6 silicon revision 'Y'	Initial revision	No limitation
		MCU errata sheet: – *STM32L452xx device errata* (ES0388)		
		Boards: – MB1136-L452RE-C03 – MB1136-L452RE-C04 (main board)		
	NUL452RE$AU1	MCU: – STM32L452RET6 silicon revision 'Y'	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32L452xx device errata* (ES0388)		
		Boards: – MB1136-L452RE-C05 (main board)		
	NUL452RE$KU1	MCU: – STM32L452RET6 silicon revision 'Y'	Board sticker format changed	No limitation
		MCU errata sheet: – *STM32L452xx device errata* (ES0388)		
		Boards: – MB1136-L452RE-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-L476RG	NUCLEOL476RG/	MCU: – STM32L476RGT6 silicon revision ‘4’	Initial revision	No limitation
		MCU errata sheet: – *STM32L476xx/STM32L486xx device errata* (ES0250)		
		Boards: – MB1136-L476RG-C03 – MB1136-L476RG-C04 (main board)		
	NUL476RG$AU1	MCU: – STM32L476RGT6 silicon revision ‘4’	– Main board revision changed – Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32L476xx/STM32L486xx device errata* (ES0250)		
		Boards: – MB1136-L476RG-C05 (main board)		
	NUL476RG$KU1	MCU: – STM32L476RGT6 silicon revision ‘4’	Board stickers format changed	No limitation
		MCU errata sheet: – *STM32L476xx/STM32L486xx device errata* (ES0250)		
		Boards: – MB1136-L476RG-C05 (main board)		

Table 34. Product history (continued)

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-L010RB	NUCLEOL010RB/	MCU: – STM32L010RBT6 silicon revision ‘Z’	Initial revision	No limitation
		MCU errata sheet: – *STM32L010xx device errata* (ES0483)		
		Boards: – MB1136-L010RB-C03 – MB1136-L010RB-C04 (main board)		
	NUL010RB$AU1	MCU: – STM32L010RBT6 silicon revision ‘Z’	Packaging: plastic blister replaced by a carton box	No limitation
		MCU errata sheet: – *STM32L010xx device errata* (ES0483)		
		Boards: – MB1136-L010RB-C05 (main board)		

8.3 Board revision history

Table 35. Board revision history

Board reference	Board variant and revision	Board change description	Board limitations
MB1136 (main board)	F030R8-C01 F072RB-C01 F103RB-C01 F302R8-C01 F401RE-C01 L053R8-C01 L152RE-C01	Initial revision	No limitation
	F072RB-C02 F091RC-C02 F103RB-C02 F302R8-C02 F303RE-C02 F334R8-C02 F401RE-C02 F411RE-C02 L053R8-C02 L152RE-C02	Add LSE: – X2(32 KHz) – R34 and R36 changed from OFF to 0 Ω – C31 and C32 changed from OFF to 10 pF – SB48 and SB49 changed from ON to OFF Remove HSE: – SB16 and SB50 changed from OFF to ON – SB55 changed from ON to OFF	No limitation
	F030R8-C03 F070RB-C03 F072RB-C03 F091RC-C03 F103RB-C03 F302R8-C03 F303RE-C03 F334R8-C03 F401RE-C03 F410RB-C03 F411RE-C03 F446RE-C03 L010RB-C04 L053R8-C03 L073RZ-C03 L152RE-C03 L452RE-C03 L476RG-C03	– X2 changed to ABS25-32.768KHZ-6-TB – C31 and C32 changed from 10 to 4.3 pF – C26 changed from 2.2 to 4.7 µF	No limitation

Table 35. Board revision history (continued)

Board reference	Board variant and revision	Board change description	Board limitations
MB1136 (main board)	F030R8-C04 F070RB-C04 F072RB-C04 F091RC-C04 F103RB-C04 F302R8-C04 F303RE-C04 F334R8-C04 F401RE-C04 F410RB-C04 F411RE-C04 F446RE-C04 L010RB-C04 L053R8-C04 L073RZ-C04 L152RE-C04 L452RE-C04 L476RG-C04	Reference for transistor (T2) changed from STMICROELECTRONICS STS7PF30L to STMICROELECTRONICS STS9P3LLH6	No limitation
	F070RB-C05 F072RB-C05 F091RC-C05 F103RB-C05 F303RE-C05 F334R8-C05 L010RB-C05 L053R8-C05 L073RZ-C05 L152RE-C05 L452RE-C05 L476RG-C05	– USB connector (CN1) changed – Buttons (B1 and B2) changed – Minor changes in serigraphy	No limitation

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

9.1 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 B digital device, 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 a shielded USB cable with a length of less than 0.5 m and ferrite on the computer side, like WURTH ELEKTRONIK 742 711 12.

Responsible party (in the USA)

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9.2 ISED Compliance Statement

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

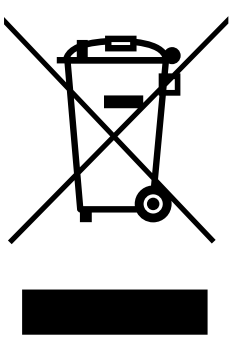
Étiquette de conformité à la NMB-003 d'ISDE Canada : CAN ICES-3 (B) / NMB-3 (B).

Note: Use a shielded USB cable with a length of less than 0.5 m and ferrite on the computer side, like WURTH ELEKTRONIK 742 711 12.

10 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 should 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, please separate these items from other type of waste and recycle them responsibly to the designated collection point to promote the sustainable reuse of material resources.

Household users:

You should contact either the retailer where you buy the product or your local authority for further details of your nearest designated collection point.

Business users:

You should contact your dealer or supplier for further information.

Revision history

Table 36. Document revision history

Date	Revision	Changes
10-Feb-2014	1	Initial release.
13-Feb-2014	2	Updated *Figure 1*, *Chapter 5.5* and *Table 10*.
11-Apr-2014	3	Extended the applicability to NUCLEO-F302R8. Updated *Table 1: Ordering information*, *Section 6.11: Arduino connectors* and *Section 6.12: ST morpho connector*. Updated *Figure 1*
10-June-2014	4	Updated the board figure: *Figure 1*. Updated HSE and LSE configuration description: *Section 6.7.1*, *Section 5.5,* and *Section 6.7.2*. Extended the applicability to NUCLEO-F334R8, NUCLEO-F411RE, and NUCLEO-L053R8.
20-June-2014	5	Updated the electrical schematics figures: *Figure 27*, *Figure 28*, *Figure 29,* and *Figure 30*. Refer to the AN2867 for the oscillator design guide for STM32 microcontrollers in *Section 6.7.1: OSC clock supply* and *Section 6.7.2: OSC 32 KHz clock supply*.
30-Sept-2014	6	Extended the applicability to NUCLEO-F091RC and NUCLEO-F303RE; Updated *Table 1: Ordering information*; Updated *Table 11: Arduino connectors on NUCLEO-F030R8, NUCLEO-F070RB, NUCLEO-F072RB, NUCLEO-F091RC*; Updated *Table 26: ST morpho connector on NUCLEO-F072RB, NUCLEO-F091RC, NUCLEO-F303RE, NUCLEO-F334R8*; Updated *Figure 6: Typical configuration*; Added *Figure 13: NUCLEO-F091RC*; Added *Figure 16: NUCLEO-F303RE*; Updated *Section 6.7.2: OSC 32 KHz clock supply*; Updated *Figure 27: Top and Power(1/4)* ,*Figure 28: STM32 MCU*;

Table 36. Document revision history (continued)

Date	Revision	Changes
19-Jan-2015	7	Extended the applicability to NUCLEO-F070RB, NUCLEO-L073RZ, and NUCLEO-L476RG; Updated *Table 1: Ordering information*; Updated *Section 6.2: Embedded ST-LINK/V2-1*; Updated *Section 6.7.1: OSC clock supply*; Added *Figure 11: NUCLEO-F070RB*; Added *Figure 21: NUCLEO-L073RZ*; Added *Figure 24: NUCLEO-L476RG* Updated *Table 11: Arduino connectors on NUCLEO-F030R8, NUCLEO-F070RB, NUCLEO-F072RB, NUCLEO-F091RC* Added *Table 18: Arduino connectors on NUCLEO-L073RZ* Added *Table 23: Arduino connectors on NUCLEO-L476RG* Added *Table 25: ST morpho connector on NUCLEO-F070RB* Updated *Table 30: ST morpho connector on NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE* Added *Table 32: ST morpho connector on NUCLEO-L476RG* Updated schematics from *Figure 27: Top and Power(1/4)* to *Figure 30: Extension connectors*
08-Jul-2015	8	Extended the applicability to Updated *Table 1: Ordering information*; Added *Figure 25: NUCLEO-F446RE* and *Figure 26: NUCLEO-F410RB* Updated *Section 6.11: Arduino connectors on page 37* and *Section 6.12: ST morpho connector on page 53*
04-Aug-2015	9	Added *Section 5.4: NUCLEO-L476RG bootloader limitations*.
17-Nov-2015	10	Updated *Section 6.9: Solder bridges* and *Section 6.7.1: OSC clock supply*.
29-Nov-2015	11	Updated *Introduction*, *Section 3: Ordering information*, *Section 6.10: Extension connectors*, *Section 6.11: Arduino connectors*, *Section 6.12: ST morpho connector* to add NUCLEO-L452RE.
15-Dec-2017	12	Updated document title and cover page. Updated *Chapter 2: Product marking* and *Section 5.3: Development toolchains*. Expanded document scope to NUCLEO-L010RB: – Updated *Table 1: Ordering information* – Updated *Table 18: Arduino connectors on NUCLEO-L010RB and NUCLEO-L073RZ* – Updated *Table 21: NUCLEO-L073RZ and NUCLEO-L010RB* – Updated *Table 30: ST morpho connector on NUCLEO-L010RB, NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE*
3-Apr-2019	13	Updated document title, *Introduction*, *Chapter 2: Ordering information*, *Section 2.1: Product marking*, *Section 2.2: Codification*, and *Section 5.1: Getting started*. Added *Chapter 3: Development environment* and *Section 3.3: Demonstration software*.

Table 36. Document revision history (continued)

Date	Revision	Changes
19-Aug-2020	14	Updated the connector reference in the description of SB54 and SB55 in *Table 10: Solder bridges*. Removed pin 10 duplicated rows in *Table 11: ARDUINO® connectors on NUCLEO-F030R8, NUCLEO-F070RB, NUCLEO-F072RB, NUCLEO-F091RC*, *Table 12: ARDUINO® connectors on NUCLEO-F103RB*, *Table 16: ARDUINO® connectors on NUCLEO-F401RE and NUCLEO-F411RE*, and *Table 19: ARDUINO® connectors on NUCLEO-F446RE*. Removed electrical schematics. Added *Section 7* including *Product marking*, *Board revision history*, and *Board known limitations*.
14-Apr-2025	15	Added *Section 3.4: EDA resources*, *Section 5: Safety recommendations*, *Table 34: Product history* and *Table 35: Board revision history*, and *Section 9: Federal Communications Commission (FCC) and ISED Canada Compliance Statements*. Updated *Section 3.1: System requirements*, *Figure 2: Hardware block diagram*, *Section 7.2: Embedded ST-LINK/V2-1*, *Section 7.2.1: Driver*, and *Section 8.1: Product marking*. Removed the references to Arm® Mbed™.
19-May-2025	16	Updated *Table 34: Product history*.