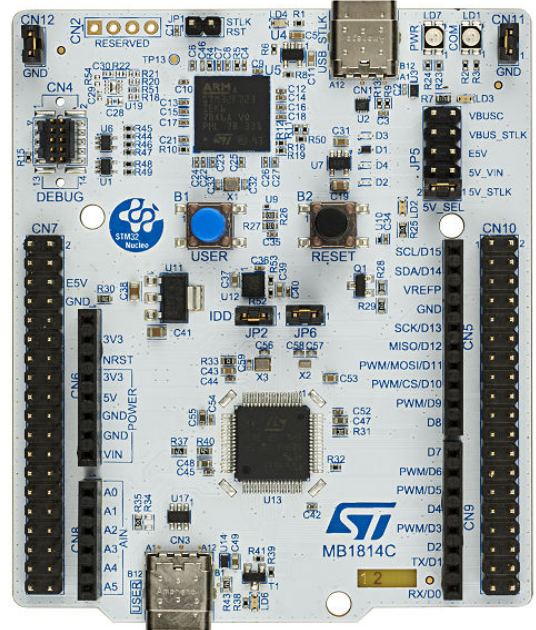
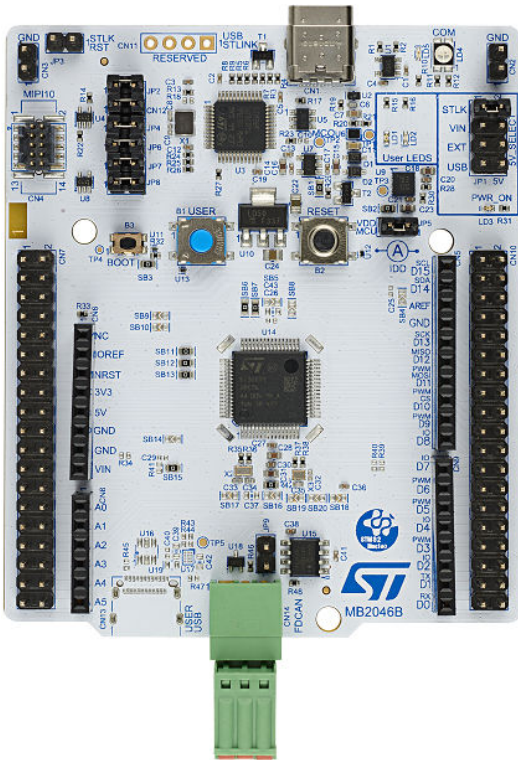




NUCLEO-xxxxCx NUCLEO-xxxxRx NUCLEO-xxxxRx-P NUCLEO-xxxxRx-Q

Data brief

STM32 Nucleo-64 boards



DT69681V3

NUCLEO-C092RC (left) and NUCLEO-H533RE (right) examples. Boards with different references show different layouts. Pictures are not contractual.

| |
|--|
| Product status link |
| NUCLEO-xxxxCx |
| NUCLEO-C031C6, NUCLEO-C051C8 |
| NUCLEO-xxxxRx |
| NUCLEO-C071RB, NUCLEO-C092RC, 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-G070RB, NUCLEO-G071RB, NUCLEO-G0B1RE, NUCLEO-G431RB, NUCLEO-G474RE, NUCLEO-G491RE, NUCLEO-H503RB, NUCLEO-H533RE, NUCLEO-L010RB, NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE, NUCLEO-L452RE, NUCLEO-L476RG, NUCLEO-U031R8, NUCLEO-U083RC |
| NUCLEO-xxxxRx-P |
| NUCLEO-L412RB-P, NUCLEO-L433RC-P, NUCLEO-L452RE-P |
| NUCLEO-xxxxRx-Q |
| NUCLEO-U385RG-Q, NUCLEO-U545RE-Q |

Features

Common features

- STM32 microcontroller in an LQFP64 or LQFP48 package
- 1 user LED shared with ARDUINO®
- 1 user and 1 reset push-buttons
- 32.768 kHz crystal oscillator
- Board connectors:
 - ARDUINO® Uno V3 expansion connector
 - ST morpho extension pin headers for full access to all STM32 I/Os
- Flexible power-supply options: ST-LINK USB V_{BUS} or external sources
- Comprehensive free software libraries and examples available with the STM32Cube MCU Package
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR Embedded Workbench®, MDK-ARM, and STM32CubeIDE

Features specific to some of the boards

(refer to the ordering information section of the data brief for details)

- Second user LED
- External or internal SMPS to generate V_{core} logic supply
- 24 MHz or 48 MHz HSE
- User USB Device full speed, or USB SNK/UFP full speed
- Cryptography
- CAN FD transceiver
- Board connectors:
 - External SMPS experimentation dedicated connector
 - USB Type-C®, Micro-B, or Mini-B connector for the ST-LINK
 - USB Type-C® user connector
 - MIPI® debug connector
 - CAN FD header
- On-board ST-LINK (STLINK/V2-1, STLINK-V3E, STLINK-V2EC, or STLINK-V3EC) debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port



Description

The STM32 Nucleo-64 board 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 STM32 microcontroller. For the compatible boards, the internal or external SMPS significantly reduces power consumption in Run mode.

The ARDUINO® Uno V3 connectivity support and the ST morpho headers allow the easy expansion of the functionality of the STM32 Nucleo open development platform with a wide choice of specialized shields.

The STM32 Nucleo-64 board does not require any separate probe as it integrates the ST-LINK debugger/programmer.

The STM32 Nucleo-64 board comes with the STM32 comprehensive free software libraries and examples available with the STM32Cube MCU Package.

1 Ordering information

To order an STM32 Nucleo-64 board, refer to [Table 1](#). For a detailed description of each board, refer to its user manual on the product web page. Additional information is available from the datasheet and reference manual of the target STM32.

Table 1. List of available products

| Order code | Board reference | User manual | Target STM32 | Differentiating features |
|---------------|-----------------|-------------|---------------|---|
| NUCLEO-C031C6 | MB1717 | UM2953 | STM32C031C6T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector 48 MHz HSE LQFP48 |
| NUCLEO-C051C8 | | | STM32C051C8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector 48 MHz HSE LQFP48 |
| NUCLEO-C071RB | MB2046 | UM3353 | STM32C071RBT6 | <ul style="list-style-type: none"> Second user LED USB FS (device only) on USB Type-C® connector STLINK-V2EC on USB Type-C® connector MIPI® debug connector 48 MHz HSE LQFP64 |
| NUCLEO-C092RC | | | STM32C092RCT6 | <ul style="list-style-type: none"> Second user LED CAN FD STLINK-V2EC on USB Type-C® connector MIPI® debug connector 48 MHz HSE LQFP64 |
| NUCLEO-F030R8 | MB1136 | UM1724 | STM32F030R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F070RB | | | STM32F070RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F072RB | | | STM32F072RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F091RC | | | STM32F091RCT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F103RB | | | STM32F103RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F302R8 | | | STM32F302R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F303RE | | | STM32F303RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |

| Order code | Board reference | User manual | Target STM32 | Differentiating features |
|---------------|-----------------|-------------|---------------|--|
| NUCLEO-F334R8 | MB1136 | UM1724 | STM32F334R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F401RE | | | STM32F401RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F410RB | | | STM32F410RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F411RE | | | STM32F411RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-F446RE | | | STM32F446RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-G070RB | MB1360 | UM2324 | STM32G070RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector LQFP64 |
| NUCLEO-G071RB | | | STM32G071RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector LQFP64 |
| NUCLEO-G0B1RE | | | STM32G0B1RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector LQFP64 |
| NUCLEO-G431RB | MB1367 | UM2505 | STM32G431RBT6 | <ul style="list-style-type: none"> STLINK-V3E on USB Micro-B connector 24 MHz HSE MIPI® debug connector LQFP64 |
| NUCLEO-G474RE | | | STM32G474RET6 | <ul style="list-style-type: none"> STLINK-V3E on USB Micro-B connector 24 MHz HSE MIPI® debug connector LQFP64 |
| NUCLEO-G491RE | | | STM32G491RET6 | <ul style="list-style-type: none"> STLINK-V3E on USB Micro-B connector 24 MHz HSE MIPI® debug connector LQFP64 |
| NUCLEO-H503RB | MB1814 | UM3121 | STM32H503RBT6 | <ul style="list-style-type: none"> USB FS (device only) on USB Type-C® connector STLINK-V3EC on USB Type-C® connector MIPI® debug connector LQFP64 |
| NUCLEO-H533RE | | | STM32H533RET6 | <ul style="list-style-type: none"> USB FS (device only) on USB Type-C® connector STLINK-V3EC on USB Type-C® connector MIPI® debug connector Cryptography LQFP64 |



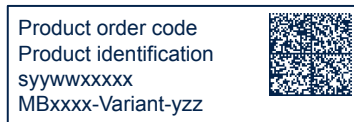
| Order code | Board reference | User manual | Target STM32 | Differentiating features |
|-----------------|-----------------|-------------|----------------|---|
| NUCLEO-L010RB | MB1136 | UM1724 | STM32L010RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-L053R8 | | | STM32L053R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-L073RZ | | | STM32L073RZT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-L152RE | | | STM32L152RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-L412RB-P | MB1319 | UM2206 | STM32L412RBT6P | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector External SMPS LQFP64 |
| NUCLEO-L433RC-P | | | STM32L433RCT6P | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector External SMPS LQFP64 |
| NUCLEO-L452RE | MB1136 | UM1724 | STM32L452RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-L452RE-P | MB1319 | UM2206 | STM32L452RET6P | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Micro-B connector External SMPS LQFP64 |
| NUCLEO-L476RG | MB1136 | UM1724 | STM32L476RGT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on USB Mini-B connector LQFP64 |
| NUCLEO-U031R8 | MB1932 | UM3256 | STM32U031R8T6 | <ul style="list-style-type: none"> STLINK-V2EC on USB Type-C[®] connector MIPI[®] debug connector LQFP64 |
| NUCLEO-U083RC | | | STM32U083RCT6 | <ul style="list-style-type: none"> STLINK-V2EC on USB Type-C[®] connector MIPI[®] debug connector Cryptography LQFP64 |
| NUCLEO-U385RG-Q | MB1841 | UM3062 | STM32U385RGT6Q | <ul style="list-style-type: none"> USB SNK/UFP (FS mode) on USB Type-C[®] connector STLINK-V3EC on USB Type-C[®] connector Cryptography Internal SMPS LQFP64 |
| NUCLEO-U545RE-Q | | | STM32U545RET6Q | <ul style="list-style-type: none"> USB SNK/UFP (FS mode) on USB Type-C[®] connector STLINK-V3EC on USB Type-C[®] connector Cryptography Internal SMPS LQFP64 |

1.1 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-yyz*” 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.

1.2 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

| NUCLEO-XXYYZT NUCLEO-XXYYZT-P NUCLEO-XXYYZT-Q | Description | Example: NUCLEO-L452RE |
|---|--|------------------------|
| XX | MCU series in STM32 32-bit Arm Cortex MCUs | STM32L4 Series |
| YY | MCU product line in the series | STM32L452 |
| Z | STM32 package pin count <ul style="list-style-type: none"> • C for 48 pins • R for 64 pins | 64 pins |
| T | STM32 flash memory size: <ul style="list-style-type: none"> • 6 for 32 Kbytes • 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 |
| -P | STM32 has an external SMPS function | No SMPS |
| -Q | STM32 has an internal SMPS function | |

2 Development environment

STM32 32-bit microcontrollers are based on the Arm® Cortex®-M processor.

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



2.1 System requirements

- Multi-OS support: Windows® 10, 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.

2.2 Development toolchains

- IAR Systems® - IAR Embedded Workbench®⁽¹⁾
- Keil® - MDK-ARM^{(1) (2)}
- STMicroelectronics - STM32CubeIDE

1. On Windows® only.

2. Free MDK-ARM for Arm® Cortex®-M0/M0+ cores.

2.3 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.

Revision history

Table 3. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 10-Feb-2014 | 1 | Initial release. |
| 13-Feb-2014 | 2 | Added <i>Table 1: Device summary</i> and updated <i>Table 2: Ordering information</i> . |
| 11-Apr-2014 | 3 | Extended the applicability to NUCLEO-F302R8. Updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . |
| 26-May-2014 | 4 | Extended the applicability to NUCLEO-L053R8, NUCLEO-F072RB, NUCLEO-F334R8, and NUCLEO-F411RE. Updated <i>Table 1</i> and <i>Table 2</i> . |
| 09-Sep-2014 | 5 | Extended the applicability to NUCLEO-F091RC and NUCLEO-F303RE. Updated <i>Features</i> . Updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . |
| 16-Dec-2014 | 6 | Extended the applicability to NUCLEO-F070RB, NUCLEO-L073RZ, and NUCLEO-L476RG. Updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . |
| 08-Jul-2015 | 7 | Extended the applicability to NUCLEO-F410RB, NUCLEO-F446RE. Updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . |
| 29-Nov-2016 | 8 | Extended the applicability to NUCLEO-L452RE. Updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . Added <i>Table 3: Codification explanation</i> . |
| 16-Nov-2017 | 9 | Extended document scope to the NUCLEO-L452RE-P and NUCLEO-L433RC-P boards: <ul style="list-style-type: none"> Updated <i>Features</i> Updated <i>Table 1: Device summary</i>, <i>Table 2: Ordering information</i>, and <i>Table 3: Codification explanation</i> Updated <i>System requirement</i>, <i>Development toolchains</i>, and <i>Demonstration software</i> |
| 15-Dec-2017 | 10 | Updated <i>Features</i> , <i>Description</i> , and <i>System requirement</i> . Extended document scope to the NUCLEO-L010RB board: updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . |
| 24-Aug-2018 | 11 | Extended document scope to the NUCLEO-L412RB-P board: updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> . |
| 22-Oct-2018 | 12 | Extended document scope to the NUCLEO-G070RB and NUCLEO-G071RB boards: <ul style="list-style-type: none"> Updated <i>Table 1: Device summary</i> and <i>Table 2: Ordering information</i> Added NUCLEO-GXXXRX top view on the cover page |
| 08-Apr-2019 | 13 | Revised the entire document to accommodate to multiple feature combinations: <ul style="list-style-type: none"> Reorganized <i>Features</i> Updated <i>Description</i> Added <i>Ordering information</i> and <i>Development environment</i> Updated <i>Table 1. List of available products</i> and <i>Table 2. Codification explanation</i> Extended document scope to the NUCLEO-G431RB and NUCLEO-G474RE boards. |
| 25-Oct-2020 | 14 | Extended document scope to the NUCLEO-G0B1RE and NUCLEO-G491RE: updated <i>List of available products</i> . |

| Date | Revision | Changes |
|-------------|----------|--|
| 17-Dec-2021 | 15 | Extended document scope to the NUCLEO-C031C6. Updated ST-LINK USB connectors in <i>List of available products</i> . Removed the references to Arm® Mbed™. |
| 06-Feb-2023 | 16 | Extended document scope to the NUCLEO-H503RB. Added board-specific user USB in <i>Features</i> . Updated ST-LINK USB connector range in <i>Features</i> and <i>System requirements</i> . Updated <i>Product marking</i> . |
| 20-Feb-2023 | 17 | Extended document scope to the NUCLEO-U545RE-Q. |
| 19-Feb-2024 | 18 | Extended document scope to the NUCLEO-H533RE, NUCLEO-U031R8, and NUCLEO-U083RC boards. Updated <i>Features</i> with additional details in the section related to the board-specific features. |
| 24-Jun-2024 | 19 | Extended document scope to the NUCLEO-C071RB board. |
| 22-Nov-2024 | 20 | Extended document scope to the NUCLEO-C051C8 and NUCLEO-C092RC boards. Updated <i>Features</i> and <i>Product marking</i> . |
| 08-Jan-2025 | 21 | Extended document scope to the NUCLEO-U385RG-Q. |



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