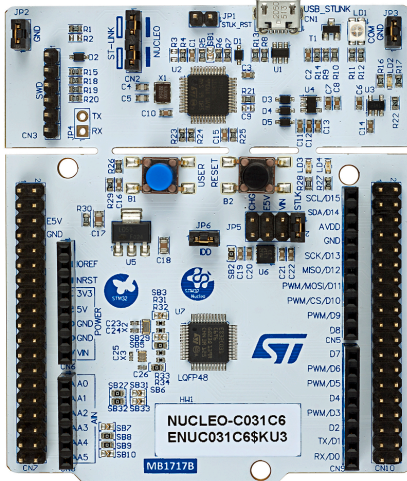


STM32 Nucleo-64 boards



NUCLEO-C031C6 example. Boards with different references show different layouts. Picture is not contractual.

Features

- Common features
 - STM32 microcontroller in 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
 - On-board ST-LINK debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
 - 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
- Board-specific features
 - External SMPS to generate V_{core} logic supply
 - 24 MHz or 48 MHz HSE
 - Board connectors:
 - External SMPS experimentation dedicated connector
 - Micro-B or Mini-B USB connector for the ST-LINK
 - MIPI® debug connector

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 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.

| |
|--|
| Product status link |
| NUCLEO-XXXXCX |
| NUCLEO-C031C6 |
| NUCLEO-XXXXRX |
| 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-L010RB, NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE, NUCLEO-L452RE, NUCLEO-L476RG |
| NUCLEO-XXXXRX-P |
| NUCLEO-L412RB-P, NUCLEO-L433RC-P, NUCLEO-L452RE-P |



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 Micro-B USB connector 48 MHz HSE LQFP48 |
| NUCLEO-F030R8 | MB1136 | UM1724 | STM32F030R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F070RB | | | STM32F070RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F072RB | | | STM32F072RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F091RC | | | STM32F091RCT6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F103RB | | | STM32F103RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F302R8 | | | STM32F302R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F303RE | | | STM32F303RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F334R8 | | | STM32F334R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F401RE | | | STM32F401RET6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F410RB | | | STM32F410RBT6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F411RE | | | STM32F411RET6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-F446RE | | | STM32F446RET6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-G070RB | MB1360 | UM2324 | STM32G070RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Micro-B USB connector LQFP64 |

| Order code | Board reference | User manual | Target STM32 | Differentiating features |
|-----------------|-----------------|-------------|-----------------|--|
| NUCLEO-G071RB | MB1360 | UM2324 | STM32G071RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Micro-B USB connector LQFP64 |
| NUCLEO-G0B1RE | | | STM32G0B1RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Micro-B USB connector LQFP64 |
| NUCLEO-G431RB | MB1367 | UM2505 | STM32G431RBT6U | <ul style="list-style-type: none"> STLINK-V3E on Micro-B USB connector 24 MHz HSE MIP1® debug connector LQFP64 |
| NUCLEO-G474RE | | | STM32G474RET6U | <ul style="list-style-type: none"> STLINK-V3E on Micro-B USB connector 24 MHz HSE MIP1® debug connector LQFP64 |
| NUCLEO-G491RE | | | STM32G491RET6U | <ul style="list-style-type: none"> STLINK-V3E on Micro-B USB connector 24 MHz HSE MIP1® debug connector LQFP64 |
| NUCLEO-L010RB | MB1136 | UM1724 | STM32L010RBT6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-L053R8 | | | STM32L053R8T6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-L073RZ | | | STM32L073RZT6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-L152RE | | | STM32L152RET6 | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-L412RB-P | MB1319 | UM2206 | STM32L412RBT6PU | <ul style="list-style-type: none"> ST-LINK/V2-1 on Micro-B USB connector External SMPS LQFP64 |
| NUCLEO-L433RC-P | | | STM32L433RCT6PU | <ul style="list-style-type: none"> ST-LINK/V2-1 on Micro-B USB connector External SMPS LQFP64 |
| NUCLEO-L452RE | MB1136 | UM1724 | STM32L452RET6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |
| NUCLEO-L452RE-P | MB1319 | UM2206 | STM32L452RET6PU | <ul style="list-style-type: none"> ST-LINK/V2-1 on Micro-B USB connector External SMPS LQFP64 |
| NUCLEO-L476RG | MB1136 | UM1724 | STM32L476RGT6U | <ul style="list-style-type: none"> ST-LINK/V2-1 on Mini-B USB connector LQFP64 |

1.1 Product marking

The stickers located on the top or bottom side of the PCB provide product information:

- Product order code and product identification for the first sticker
- Board reference with revision, and serial number for the second sticker

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

On the second sticker, the first line has the following format: "MBxxx-Variant-yyz", where "MBxxx" is the board reference, "Variant" (optional) identifies the mounting variant when several exist, "y" is the PCB revision and "zz" is the assembly revision, for example B01. The second line shows the board serial number used for traceability.

Evaluation tools marked as "ES" or "E" are not yet qualified and therefore not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference designs or in production.

"E" or "ES" 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.

In order to use the same commercial stack in his application, a developer may 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 | Description | Example: NUCLEO-L452RE |
|----------------------------------|--|------------------------|
| XX | MCU series in STM32 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 external SMPS function | No SMPS |

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 (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.

All other trademarks are the property of their respective owners.

2.2 Development toolchains

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

1. On Windows® only.

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> . |
| 9-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> . |
| 8-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 |
| 8-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 List of available products . Removed the references to Arm® Mbed™. |