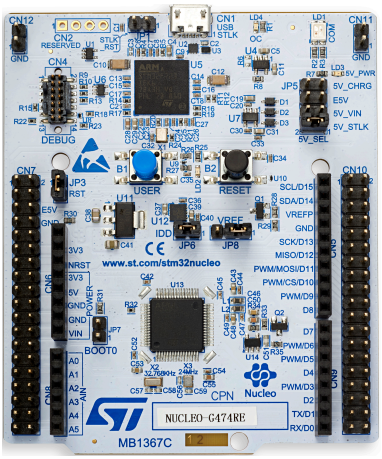
# NUCLEO-XXXXRX NUCLEO-XXXXRX-P

Data brief

## STM32 Nucleo-64 boards




*NUCLEO-G474RE example. Boards with different references show different layouts. Picture is not contractual.*

| Product status link |
|---|
| **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-G431RB, NUCLEO-G474RE, NUCLEO-L010RB, NUCLEO-L053R8, NUCLEO-L073RZ, NUCLEO-L152RE, NUCLEO-L452RE, NUCLEO-L476RG. |
| **NUCLEO-XXXXRX-P** |
| NUCLEO-L412RB-P, NUCLEO-L433RC-P, NUCLEO-L452RE-P. |

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## Features

- Common features
  - STM32 microcontroller in LQFP64 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™, Keil® and GCC-based IDEs
- Board-specific features
  - External SMPS to generate $V_{core}$ logic supply
  - 24 MHz HSE
  - Board connectors:
    - External SMPS experimentation dedicated connector
    - Micro-AB or Mini-AB USB connector for the ST-LINK
    - MIPI® debug connector
  - Arm® Mbed Enabled™ compliant

## Description

The STM32 Nucleo-64 boards provide 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.

# 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-F030R8 | MB1136 | UM1724 | STM32F030R8T6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F070RB | | | STM32F070RBT6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F072RB | | | STM32F072RBT6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F091RC | | | STM32F091RCT6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F103RB | | | STM32F103RBT6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F302R8 | | | STM32F302R8T6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F303RE | | | STM32F303RET6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F334R8 | | | STM32F334R8T6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F401RE | | | STM32F401RET6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F410RB | | | STM32F410RBT6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F411RE | | | STM32F411RET6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-F446RE | | | STM32F446RET6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-G070RB | MB1360 | UM2324 | STM32G070RBT6 | • ST-LINK/V2-1 on Micro-AB USB connector |
| NUCLEO-G071RB | | | STM32G071RBT6 | • ST-LINK/V2-1 on Micro-AB USB connector |

| Order code | Board reference | User manual | Target STM32 | Differentiating features |
|---|---|---|---|---|
| NUCLEO-G431RB | MB1367 | UM2505 | STM32G431RBT6U | • STLINK-V3E on Micro-AB USB connector<br>• 24 MHz HSE<br>• MIPI® debug connector |
| NUCLEO-G474RE | | | STM32G474RET6U | • STLINK-V3E on Micro-AB USB connector<br>• 24 MHz HSE<br>• MIPI® debug connector |
| NUCLEO-L010RB | MB1136 | UM1724 | STM32L010RBT6 | • ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-L053R8 | | | STM32L053R8T6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-L073RZ | | | STM32L073RZT6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-L152RE | | | STM32L152RET6 | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-L412RB-P | MB1319 | UM2206 | STM32L412RBT6PU | • ST-LINK/V2-1 on Micro-AB USB connector<br>• External SMPS |
| NUCLEO-L433RC-P | | | STM32L433RCT6PU | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Micro-AB USB connector<br>• External SMPS |
| NUCLEO-L452RE | MB1136 | UM1724 | STM32L452RET6U | • ST-LINK/V2-1 on Mini-AB USB connector |
| NUCLEO-L452RE-P | MB1319 | UM2206 | STM32L452RET6PU | • ST-LINK/V2-1 on Micro-AB USB connector<br>• External SMPS |
| NUCLEO-L476RG | MB1136 | UM1724 | STM32L476RGT6U | • Arm® Mbed Enabled™<br>• ST-LINK/V2-1 on Mini-AB USB connector |

## 1.1 Product marking

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 design or in production.

“E” or “ES” marking examples of location:

- On the targeted STM32 that is soldered on the board (for 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-XXYYRT<br>NUCLEO-XXYYRT-P | Description | Example: NUCLEO-L452RE |
|---|---|---|
| XX | MCU series in STM32 Arm Cortex MCUs | STM32L4 Series |
| YY | MCU product line in the series | STM32L452 |
| R | STM32 package pin count | 64 pins |
| T | STM32 Flash memory size:<br>• 8 for 64 Kbytes<br>• B for 128 Kbytes<br>• C for 256 Kbytes<br>• E for 512 Kbytes<br>• G for 1 Mbyte<br>• Z for 192 Kbytes | 512 Kbytes |
| -P | STM32 has external SMPS function | No SMPS |

The order code is mentioned on a sticker placed on the top side of the board.

# 2 Development environment

## 2.1 System requirements

- Windows® OS (7, 8 and 10), Linux® 64-bit, or macOS®
- USB Type-A to Micro-B or USB Type-A 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.*

## 2.2 Development toolchains

- Keil® MDK-ARM(1)
- IAR™ EWARM(1)
- GCC-based IDEs
- Arm® Mbed™(2) online(3) (see mbed.org)

*Notes:*

1. *On Windows® only.*
2. *Arm and Mbed are registered trademarks or trademarks of Arm Limited (or its subsidiaries) in the US and or elsewhere.*
3. *Refer to the www.mbed.com website and to the "Ordering information" section to determine which order codes are supported.*

## 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 | Version | Changes |
|---|---|---|
| 10-Feb-2014 | 1 | Initial release. |
| 13-Feb-2014 | 2 | Added *Table 1: Device summary* and updated *Table 2: Ordering information*. |
| 11-Apr-2014 | 3 | Extended the applicability to NUCLEO-F302R8. Updated *Table 1: Device summary* and *Table 2: Ordering information*. |
| 26-May-2014 | 4 | Extended the applicability to NUCLEO-L053R8, NUCLEO-F072RB, NUCLEO-F334R8 and NUCLEO-F411RE.<br>Updated *Table 1* and *Table 2*. |
| 9-Sep-2014 | 5 | Extended the applicability to NUCLEO-F091RC and NUCLEO-F303RE.<br>Updated *Features*.<br>Updated *Table 1: Device summary* and *Table 2: Ordering information*. |
| 16-Dec-2014 | 6 | Extended the applicability to NUCLEO-F070RB, NUCLEO-L073RZ and NUCLEO-L476RG.<br>Updated *Table 1: Device summary* and *Table 2: Ordering information*. |
| 8-Jul-2015 | 7 | Extended the applicability to NUCLEO-F410RB, NUCLEO-F446RE.<br>Updated *Table 1: Device summary* and *Table 2: Ordering information*. |
| 29-Nov-2016 | 8 | Extended the applicability to NUCLEO-L452RE.<br>Updated *Table 1: Device summary* and *Table 2: Ordering information*.<br>Added *Table 3: Codification explanation*. |
| 16-Nov-2017 | 9 | Extended document scope to the NUCLEO-L452RE-P and NUCLEO-L433RC-P boards:<br>• Updated *Features*<br>• Updated *Table 1: Device summary*, *Table 2: Ordering information* and *Table 3: Codification explanation*<br>• Updated *System requirement*, *Development toolchains* and *Demonstration software* |
| 15-Dec-2017 | 10 | Updated *Features*, *Description* and *System requirement*.<br>Extended document scope to the NUCLEO-L010RB board: updated *Table 1: Device summary* and *Table 2: Ordering information*. |
| 24-Aug-2018 | 11 | Extended document scope to the NUCLEO-L412RB-P board: updated *Table 1: Device summary* and *Table 2: Ordering information*. |
| 22-Oct-2018 | 12 | Extended document scope to the NUCLEO-G070RB and NUCLEO-G071RB boards:<br>• Updated *Table 1: Device summary* and *Table 2: Ordering information*<br>• Added NUCLEO-GXXXRX top view on the cover page |
| 8-Apr-2019 | 13 | Revised the entire document to accommodate to multiple feature combinations:<br>• Reorganized Features<br>• Updated Description<br>• Added Ordering information and Development environment<br>• Updated Table 1. List of available products and Table 2. Codification explanation<br>Extended document scope to the NUCLEO-G431RB and NUCLEO-G474RE boards. |

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**Как с нами связаться**

**Телефон:** 8 (812) 309 58 32 (многоканальный)
**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.