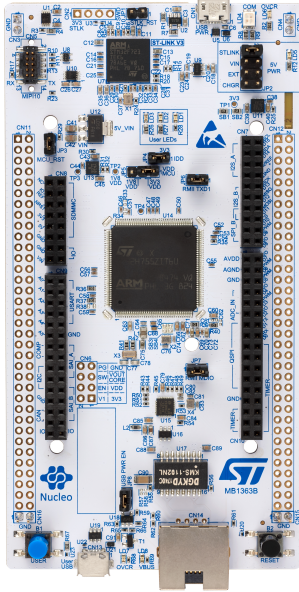


## STM32 Nucleo-144 boards



*NUCLEO-H755ZI-Q example. Boards with different references show different layouts. Picture is not contractual.*

### Product status link

#### NUCLEO-XXXXZX

NUCLEO-F207ZG, NUCLEO-F303ZE, NUCLEO-F412ZG, NUCLEO-F413ZH, NUCLEO-F429ZI, NUCLEO-F439ZI, NUCLEO-F446ZE, NUCLEO-F722ZE, NUCLEO-F746ZG, NUCLEO-F756ZG, NUCLEO-F767ZI, NUCLEO-H743ZI, NUCLEO-H753ZI, NUCLEO-L496ZG, NUCLEO-L4A6ZG, NUCLEO-L4R5ZI.

#### NUCLEO-XXXXZX-P

NUCLEO-L496ZG-P, NUCLEO-L4R5ZI-P.

#### NUCLEO-XXXXZX-Q

NUCLEO-H745ZI-Q, NUCLEO-H755ZI-Q, NUCLEO-L552ZE-Q.

**arm** MBED

## Features

- Common features
  - STM32 microcontroller in LQFP144 package
  - 3 user LEDs
  - 2 user and reset push-buttons
  - 32.768 kHz crystal oscillator
  - Board connectors:
    - SWD
    - ST Zio expansion connector including Arduino™ Uno V3
    - ST morpho expansion connector
  - 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 or internal SMPS to generate  $V_{core}$  logic supply
  - Ethernet compliant with IEEE-802.3-2002
  - USB OTG full speed or device only
  - Board connectors:
    - USB with Micro-AB or USB Type-C™
    - Ethernet RJ45
  - Arm® Mbed Enabled™ compliant

## Description

The STM32 Nucleo-144 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 internal or external SMPS significantly reduces power consumption in Run mode.

The ST Zio connector, which extends the Arduino™ Uno V3 connectivity, 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-144 board does not require any separate probe as it integrates the ST-LINK debugger/programmer.

The STM32 Nucleo-144 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-144 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-F207ZG	MB1137	UM1974	STM32F207ZGT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F303ZE			STM32F303ZET6	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Device-only USB on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F412ZG			STM32F412ZGT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F413ZH			STM32F413ZHT6U	<ul style="list-style-type: none"> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F429ZI			STM32F429ZIT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F439ZI			STM32F439ZIT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> <li>• Cryptography</li> </ul>
NUCLEO-F446ZE			STM32F446ZET6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F722ZE			STM32F722ZET6U	<ul style="list-style-type: none"> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-F746ZG			STM32F746ZGT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>

Order code	Board reference	User manual	Target STM32	Differentiating features
NUCLEO-F756ZG	MB1137	UM1974	STM32F756ZGT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> <li>• Cryptography</li> </ul>
NUCLEO-F767ZI			STM32F767ZIT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• On-board USB OTG</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-H743ZI			STM32H743ZIT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-H743ZI2	MB1364	UM2407	STM32H743ZIT6U	<ul style="list-style-type: none"> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• STLINK-V3E</li> </ul>
NUCLEO-H753ZI			STM32H753ZIT6U	<ul style="list-style-type: none"> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• STLINK-V3E</li> <li>• Cryptography</li> </ul>
NUCLEO-H745ZI-Q	MB1363	UM2408	STM32H745ZIT6U	<ul style="list-style-type: none"> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• STLINK-V3E</li> <li>• Internal SMPS</li> </ul>
NUCLEO-H755ZI-Q			STM32H755ZIT6U	<ul style="list-style-type: none"> <li>• Ethernet</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• STLINK-V3E</li> <li>• Internal SMPS</li> <li>• Cryptography</li> </ul>
NUCLEO-L496ZG	MB1312	UM2179	STM32L496ZGT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-L496ZG-P			STM32L496ZGT6PU	<ul style="list-style-type: none"> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> <li>• External SMPS</li> </ul>
NUCLEO-L4A6ZG			STM32L4A6ZGT6U	<ul style="list-style-type: none"> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> <li>• Cryptography</li> </ul>
NUCLEO-L4R5ZI			STM32L4R5ZIT6U	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> </ul>
NUCLEO-L4R5ZI-P			STM32L4R5ZIT6PU	<ul style="list-style-type: none"> <li>• Arm® Mbed Enabled™</li> <li>• USB OTG FS on Micro-AB connector</li> <li>• ST-LINK/V2-1</li> <li>• External SMPS</li> </ul>

Order code	Board reference	User manual	Target STM32	Differentiating features
NUCLEO-L552ZE-Q	MB1361	UM2581	STM32L552ZET6QU	<ul style="list-style-type: none"> <li>• Device-only USB FS on USB Type-C™ connector</li> <li>• ST-LINK/V2-1</li> <li>• Internal SMPS</li> </ul>

## 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](http://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 NUCLEO-XXYYZT-Q	Description	Example: NUCLEO-L496ZG-P
XX	MCU series in STM32 Arm Cortex MCUs	STM32L4 Series
YY	MCU product line in the series	STM32L496
Z	STM32 package pin count	144 pins
T	STM32 Flash memory size: <ul style="list-style-type: none"> <li>• E for 512 Kbytes</li> <li>• G for 1 Mbyte</li> <li>• H for 1.5 Mbytes</li> <li>• I for 2 Mbytes</li> </ul>	1 Mbyte
-P	STM32 has external SMPS function	External SMPS
-Q	STM32 has internal SMPS function	-

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



## 2 Development environment

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### 2.1 System requirements

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

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

### 2.2 Development toolchains

- Keil® MDK-ARM<sup>(1)</sup>
- IAR™ EWARM<sup>(1)</sup>
- GCC-based IDEs
- Arm® Mbed™<sup>(2)</sup> online<sup>(3)</sup> (see [mbed.org](https://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](https://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](https://www.st.com).

## Revision history

**Table 3. Document revision history**

Date	Version	Changes
15-Feb-2017	1	Initial version.
16-Mar-2017	2	Document now scopes NUCLEO-L496ZG and NUCLEO-L496ZG-P products. Updated: <ul style="list-style-type: none"> <li>cover page features (to cover LL APIs)</li> <li>cover page description</li> <li>Table 2: Ordering information</li> <li>Table 3: Codification explanation</li> </ul>
08-Aug-2017	3	Document now also scopes NUCLEO-L4R5ZI product. Added Table 1: Device summary. Updated: <ul style="list-style-type: none"> <li>Support of a wide choice of Integrated Development Environments (IDEs) including IAR™, Keil®, GCCbased IDEs</li> <li>cover page description</li> <li>Table 2: Ordering information</li> <li>Table 3: Codification explanation</li> </ul>
30-Aug-2017	4	Updated Table 2: Ordering information.
3-Nov-2017	5	Document scope extended to the NUCLEO-F207ZG, NUCLEO-F303ZE, NUCLEO-F412ZG, NUCLEO-F413ZH, NUCLEO-F429ZI, NUCLEO-F446ZE, NUCLEO-F722ZE, NUCLEO-F746ZG, NUCLEO-F767ZI, and NUCLEO-H743ZI products. Updated: <ul style="list-style-type: none"> <li>Features</li> <li>Development toolchains</li> <li>Table 1: Device summary</li> <li>Table 2: Ordering information</li> </ul>
15-Dec-2017	6	Document scope extended to the NUCLEO-L4A6ZG, NUCLEO-F439ZI and NUCLEO-F756ZG products. Updated: <ul style="list-style-type: none"> <li>Features</li> <li>System requirements</li> <li>Table 1: Device summary</li> <li>Table 2: Ordering information</li> </ul>
1-Feb-2018	7	Document scope extended to the NUCLEO-L4R5ZI-P product: updated Table 1: Device summary and Table 2: Ordering information.
8-Apr-2019	8	Revised the entire document to accommodate to multiple feature combinations: <ul style="list-style-type: none"> <li>Reorganized Features</li> <li>Updated Description</li> <li>Added Ordering information and Development environment</li> <li>Updated Table 1. List of available products and Table 2. Codification explanation</li> </ul> Extended document scope to the NUCLEO-H743ZI2, NUCLEO-H745ZI-Q, NUCLEO-H753ZI, and NUCLEO-H755ZI-Q boards.
18-Apr-2019	9	Extended document scope to the NUCLEO-L552ZE-Q board.



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