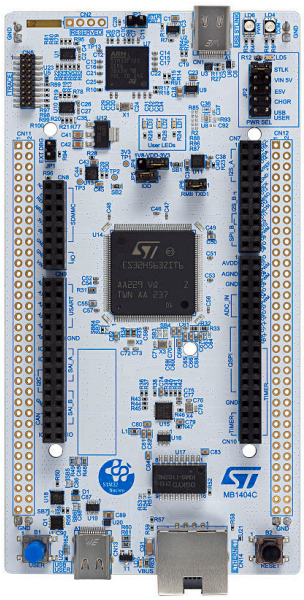
NUCLEO-XXXXZX NUCLEO-XXXXZX-P NUCLEO-XXXXZX-Q

Data brief

STM32 Nucleo-144 boards



NUCLEO-H563ZI 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-H563ZI, NUCLEO-H723ZG, NUCLEO-H743ZI, NUCLEO-H753ZI, NUCLEO-L496ZG, NUCLEO-L4A6ZG, NUCLEO-L4P5ZG, NUCLEO-L4R5ZI
NUCLEO-XXXXZX-P
NUCLEO-L496ZG-P, NUCLEO-L4R5ZI-P
NUCLEO-XXXXZX-Q
NUCLEO-H745ZI-Q, NUCLEO-H755ZI-Q, NUCLEO-H7A3ZI-Q, NUCLEO-L552ZE-Q, NUCLEO-U575ZI-Q, NUCLEO-U5A5ZJ-Q

Features

Common features

- STM32 microcontroller in an 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}, USB connector, 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 or internal SMPS to generate V_{core} logic supply
- Ethernet compliant with IEEE-802.3-2002
- USB OTG full speed or SNK/UFP (full-speed or high-speed mode), depending on the USB connector type
- Board connectors:
  - USB with Micro-AB or USB Type-C®
  - Ethernet RJ45

Description

The STM32 Nucleo-144 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 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 feature
NUCLEO-F207ZG	MB1137	UM1974	STM32F207ZGT6	• Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F303ZE			STM32F303ZET6	• Device-only USB on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F412ZG			STM32F412ZGT6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F413ZH			STM32F413ZHT6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F429ZI			STM32F429ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F439ZI			STM32F439ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • Cryptography
NUCLEO-F446ZE			STM32F446ZET6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F722ZE			STM32F722ZET6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F746ZG			STM32F746ZGT6	• Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-F756ZG			STM32F756ZGT6	• Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • Cryptography
NUCLEO-F767ZI			STM32F767ZIT6	• Ethernet • On-board USB OTG • USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-H563ZI	MB1404	UM3115	STM32H563ZIT6	• Ethernet • SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3EC
NUCLEO-H743ZI(1)	MB1137	UM1974	STM32H743ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-H723ZG	MB1364	UM2407	STM32H723ZGT6	• Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E
NUCLEO-H743ZI2			STM32H743ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E

Order code	Board reference	User manual	Target STM32	Differentiating feature
NUCLEO-H753ZI	MB1364	UM2407	STM32H753ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • Cryptography
NUCLEO-H745ZI-Q	MB1363	UM2408	STM32H745ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • Internal SMPS
NUCLEO-H755ZI-Q			STM32H755ZIT6	• Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • Internal SMPS • Cryptography
NUCLEO-H7A3ZI-Q			STM32H7A3ZIT6Q	• USB OTG FS on Micro-AB connector • STLINK-V3E • Internal SMPS
NUCLEO-L496ZG	MB1312	UM2179	STM32L496ZGT6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-L496ZG-P			STM32L496ZGT6P	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • External SMPS
NUCLEO-L4A6ZG			STM32L4A6ZGT6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • Cryptography
NUCLEO-L4P5ZG			STM32L4P5ZGT6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-L4R5ZI			STM32L4R5ZIT6	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1
NUCLEO-L4R5ZI-P			STM32L4R5ZIT6P	• USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • External SMPS
NUCLEO-L552ZE-Q	MB1361	UM2581	STM32L552ZET6Q	• SNK/UFP (FS mode) on USB Type-C® connector • ST-LINK/V2-1 • Internal SMPS
NUCLEO-U575ZI-Q	MB1549	UM2861	STM32U575ZIT6Q	• SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3E • Internal SMPS
NUCLEO-U5A5ZJ-Q			STM32U5A5ZJT6Q	• SNK/UFP (HS mode) on USB Type-C® connector • STLINK-V3E • Internal SMPS • Cryptography

1. *Replaced with NUCLEO-H743ZI2.*

1.1 Product marking

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

- First sticker: product order code and product identification, generally placed on the main board featuring the target device.
  Example:

  Product order code
  Product identification

- Second sticker: board reference with revision and serial number, available on each PCB.
  Example:

  MBxxxx-Variant-yzz
  syywwxxxxx

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: *"MBxxxx-Variant-yzz"*, where *"MBxxxx"* 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.

Parts marked as *"ES"* or *"E"* are not yet qualified and therefore not approved for use in production. ST is not responsible for any consequences resulting from such use. In no event will ST be liable for the customer using any of these engineering samples in production. ST's Quality department must be contacted prior to any decision to use these engineering samples to run a qualification activity.

"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.

1.2 Codification

The codification composition is detailed 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 32-bit 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: • E for 512 Kbytes • G for 1 Mbyte • H for 1.5 Mbytes • I for 2 Mbytes • J for 4 Mbytes	1 Mbyte
-P	STM32 has external SMPS function	External SMPS
-Q	STM32 has 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 USB Micro-B or USB Type-C® cable

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)
- 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
15-Feb-2017	1	Initial version.
16-Mar-2017	2	Document now scopes NUCLEO-L496ZG and NUCLEO-L496ZG-P products. Updated: • Cover page features (to cover LL APIs) • Cover page description • *Table 2: Ordering information* • *Table 3: Codification explanation*
08-Aug-2017	3	Document now also scopes NUCLEO-L4R5ZI product. Added *Table 1: Device summary*. Updated: • *Support of a wide choice of Integrated Development Environments (IDEs) including IAR™, Keil®, GCCbased IDEs* • Cover page description • *Table 2: Ordering information* • *Table 3: Codification explanation*
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: • *Features* • *Development toolchains* • *Table 1: Device summary* • *Table 2: Ordering information*
15-Dec-2017	6	Document scope extended to the NUCLEO-L4A6ZG, NUCLEO-F439ZI and NUCLEO-F756ZG products. Updated: • *Features* • *System requirements* • *Table 1: Device summary* • *Table 2: Ordering information*
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: • Reorganized *Features* • Updated *Description* • Added *Ordering information* and *Development environment* • Updated *Table 1. List of available products* and *Table 2. Codification explanation* 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.
30-Oct-2019	10	Extended document scope to the NUCLEO-H7A3ZI-Q board.
26-Nov-2019	11	Extended document scope to the NUCLEO-L4P5ZG board.
24-Mar-2020	12	Extended document scope to the NUCLEO-H723ZG board.
3-Apr-2020	13	Updated order code NUCLEO-H743ZI in *List of available products*.

Date	Revision	Changes
24-Jun-2021	14	Extended document scope to the NUCLEO-U575ZI-Q board. Updated *System requirements*.
27-Jan-2023	15	Extended document scope to the NUCLEO-U5A5ZJ-Q board. Removed the references to Arm® Mbed™.
5-Feb-2023	16	Extended document scope to the NUCLEO-H563ZI board. Updated the USB description for the NUCLEO-L552ZE-Q, NUCLEO-U575ZI-Q, and NUCLEO-U5A5ZJ-Q boards.