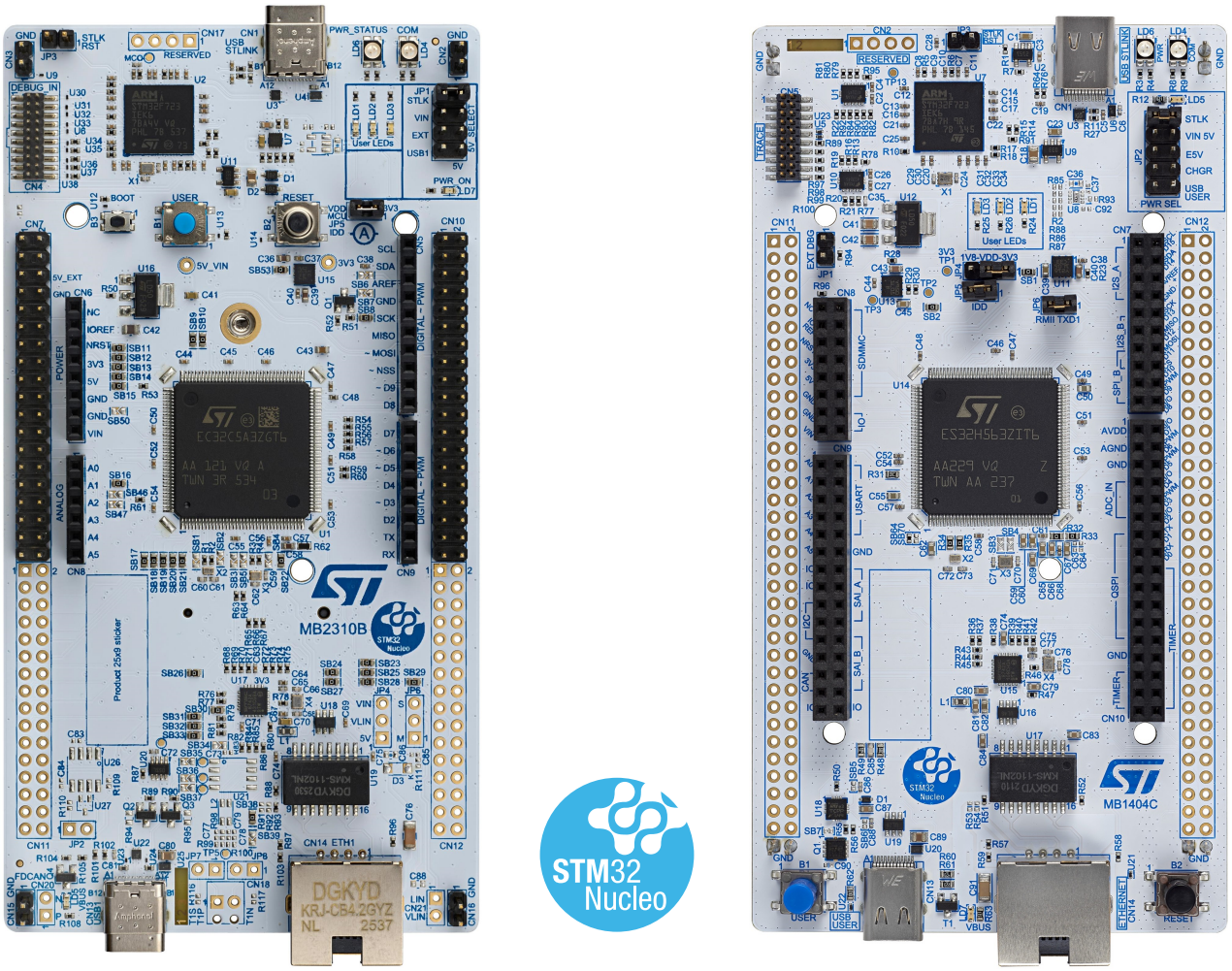
NUCLEO-xxxxLx/xxxxXx/xxxxZx(-P/Q)

Data brief

STM32 Nucleo-144 boards



NUCLEO-C5A3ZG (left) and NUCLEO-H563ZI (right) examples. Boards with different references show different layouts. Pictures are not contractual.

Product link
NUCLEO-xxxxLx, NUCLEO-xxxxXx-Q
NUCLEO-H7S3L8, NUCLEO-N657X0-Q
NUCLEO-xxxxZx
NUCLEO-C5A3ZG, NUCLEO-F207ZG, NUCLEO-F303ZE, NUCLEO-F412ZG, NUCLEO-F413ZH, NUCLEO-F429ZI, NUCLEO-F439ZI, NUCLEO-F446ZE, NUCLEO-F722ZE, NUCLEO-F746ZG, NUCLEO-F756ZG, NUCLEO-F767ZI, NUCLEO-H553ZG, NUCLEO-H563ZI, NUCLEO-H5E5ZJ, NUCLEO-H723ZG, NUCLEO-H743ZI, NUCLEO-H753ZI, NUCLEO-L496ZG, NUCLEO-L4A6ZG, NUCLEO-L4P5ZG, NUCLEO-L4R5ZI
NUCLEO-xxxxZx-P, NUCLEO-xxxxZx-Q
NUCLEO-H745ZI-Q, NUCLEO-H755ZI-Q, NUCLEO-H7A3ZI-Q, NUCLEO-L496ZG-P, NUCLEO-L4R5ZI-P, NUCLEO-L552ZE-Q, NUCLEO-U3C5ZI-Q, NUCLEO-U575ZI-Q, NUCLEO-U5A5ZJ-Q

Features

Common features

- STM32 microcontroller in an LQFP144, TFBGA225, or VFBGA264 package
- 3 user LEDs
- 1 user push-button and 1 reset push-button
- 32.768 kHz crystal oscillator
- Board connectors:
  - SWD
  - ST morpho expansion connector
- Flexible power-supply options: ST-LINK USB V_{BUS}, USB connector, 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)

- External or internal SMPS to generate V_{core} logic supply
- Ethernet compliant with IEEE-802.3-2002
- USB Device only, USB OTG full speed, or USB SNK/UFP (full-speed or high-speed mode)
- Boot push-button
- Board connectors:
  - ARDUINO® Uno V3 connector or ST Zio expansion connector including ARDUINO® Uno V3
  - Camera module FPC
  - MIPI20 compatible connector with trace signals
  - USB with Micro-AB or USB Type-C®
  - Ethernet RJ45
  - M.2 Key A serial memory connector
  - CAN FD header
- On-board ST-LINK (ST-LINK/V2-1, STLINK-V3E, or STLINK-V3EC) debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port

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 STM32 Nucleo-144 board offers easy means to expand the functionality of the Nucleo open development platform with a wide choice of specialized shields through several expansion connectors:

- ARDUINO® Uno V3 connector, which is extended as part of ST Zio expansion connector on some boards
- ST morpho headers providing access to the microcontroller's I/O pins

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-C5A3ZG	MB2310	UM3616	STM32C5A3ZGT6	• ARDUINO® Uno V3 connector • M.2 Key A serial memory connector • USB SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3EC • Cryptography • Boot push-button • LQFP144
NUCLEO-F207ZG	MB1137	UM1974	STM32F207ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F303ZE			STM32F303ZET6	• ST Zio expansion connector including ARDUINO® Uno V3 • Device-only USB on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F412ZG			STM32F412ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F413ZH			STM32F413ZHT6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F429ZI			STM32F429ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F439ZI			STM32F439ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • Cryptography • LQFP144
NUCLEO-F446ZE			STM32F446ZET6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144

Order code	Board reference	User manual	Target STM32	Differentiating feature
NUCLEO-F722ZE	MB1137	UM1974	STM32F722ZET6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F746ZG			STM32F746ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-F756ZG			STM32F756ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • Cryptography • LQFP144
NUCLEO-F767ZI			STM32F767ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-H553ZG	MB2321	UM3651	STM32H553ZGT6	• ARDUINO® Uno V3 connector • Ethernet • M.2 Key A serial memory connector • USB SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3EC • Boot push-button • LQFP144
NUCLEO-H563ZI	MB1404	UM3115	STM32H563ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3EC • LQFP144
NUCLEO-H5E5ZJ	MB2129	UM3601	STM32H5E5ZJT6	• ARDUINO® Uno V3 connector • Ethernet • M.2 Key A serial memory connector • USB SNK/UFP (HS mode) on USB Type-C® connector • STLINK-V3EC • Boot push-button • LQFP144
NUCLEO-H723ZG	MB1364	UM2407	STM32H723ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • LQFP144

Order code	Board reference	User manual	Target STM32	Differentiating feature
NUCLEO-H743ZI[1]	MB1137	UM1974	STM32H743ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-H743ZI2	MB1364	UM2407	STM32H743ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • LQFP144
NUCLEO-H745ZI-Q	MB1363	UM2408	STM32H745ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • Internal SMPS • LQFP144
NUCLEO-H753ZI	MB1364	UM2407	STM32H753ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • Cryptography • LQFP144
NUCLEO-H755ZI-Q	MB1363	UM2408	STM32H755ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB OTG FS on Micro-AB connector • STLINK-V3E • Internal SMPS • Cryptography • LQFP144
NUCLEO-H7A3ZI-Q			STM32H7A3ZIT6Q	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • STLINK-V3E • Internal SMPS • LQFP144
NUCLEO-H7S3L8	MB1737	UM3276	STM32H7S3L8H6	• ST Zio expansion connector including ARDUINO® Uno V3 • Ethernet • USB SNK/UFP (HS mode) on USB Type-C® connector • STLINK-V3EC • Cryptography • TFBGA225
NUCLEO-L496ZG	MB1312	UM2179	STM32L496ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144

Order code	Board reference	User manual	Target STM32	Differentiating feature
NUCLEO-L496ZG-P	MB1312	UM2179	STM32L496ZGT6P	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • External SMPS • LQFP144
NUCLEO-L4A6ZG			STM32L4A6ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • Cryptography • LQFP144
NUCLEO-L4P5ZG			STM32L4P5ZGT6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-L4R5ZI			STM32L4R5ZIT6	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • LQFP144
NUCLEO-L4R5ZI-P			STM32L4R5ZIT6P	• ST Zio expansion connector including ARDUINO® Uno V3 • USB OTG FS on Micro-AB connector • ST-LINK/V2-1 • External SMPS • LQFP144
NUCLEO-L552ZE-Q	MB1361	UM2581	STM32L552ZET6Q	• ST Zio expansion connector including ARDUINO® Uno V3 • USB SNK/UFP (FS mode) on USB Type-C® connector • ST-LINK/V2-1 • Internal SMPS • LQFP144
NUCLEO-N657X0-Q	MB1940	UM3417	STM32N657X0H3Q	• ARDUINO® Uno V3 connector • Camera module FPC connector • Ethernet • USB SNK/UFP (HS mode) on USB Type-C® connector • STLINK-V3EC • Internal SMPS • Cryptography • VFBGA264
NUCLEO-U3C5ZI-Q	MB2222	UM3599	STM32U3C5ZIT6Q	• ARDUINO® Uno V3 connector • M.2 Key A serial memory connector • CAN FD header • USB SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3E • Internal SMPS • Cryptography • Boot push-button • LQFP144

Order code	Board reference	User manual	Target STM32	Differentiating feature
NUCLEO-U575ZI-Q	MB1549	UM2861	STM32U575ZIT6Q	• ST Zio expansion connector including ARDUINO® Uno V3 • USB SNK/UFP (FS mode) on USB Type-C® connector • STLINK-V3E • Internal SMPS • LQFP144
NUCLEO-U5A5ZJ-Q			STM32U5A5ZJT6Q	• ST Zio expansion connector including ARDUINO® Uno V3 • USB SNK/UFP (HS mode) on USB Type-C® connector • STLINK-V3E • Internal SMPS • Cryptography • LQFP144

1. *Replaced with NUCLEO-H743ZI2.*

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:

  Product order code
  Product identification
  syywwxxxxx
  MBxxxx-Variant-yzz

  Dual-sticker example:

  Product order code
  Product identification

  and

  MBxxxx-Variant-yzz
  syywwxxxxx

- Other boards if any: board reference with revision and serial number.

  Examples:

  syywwxxxxx
  MBxxxx-Variant-yzz

  or

  MBxxxx-Variant-yzz
  syywwxxxxx

  or

  or

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-yzz"* 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 codification composition is detailed in Table 2.

Table 2. Codification explanation

NUCLEO-XXYYWT NUCLEO-XXYYWT-P NUCLEO-XXYYWT-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
W	STM32 package pin or ball count: • L for 225 pins • X for 264 pins • Z for 144 pins	144 pins
T	STM32 flash memory size: • 0 for 0-1 Kbyte • 8 for 64 Kbytes • 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 an external SMPS function	External SMPS
-Q	STM32 has an internal SMPS function	-

2 Development environment

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

arm

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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*.

2.4 EDA resources

All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the corresponding product page at *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*.
03-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*
01-Feb-2018	7	Document scope extended to the NUCLEO-L4R5ZI-P product: updated *Table 1: Device summary* and *Table 2: Ordering information*.
08-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.
03-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™.
05-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.
05-Jan-2024	17	Extended document scope to the NUCLEO-H7S3L8 board. Updated *Features* with additional details in the section related to the board-specific features. Updated *Table 1. List of available products* with the STM32 package information.
22-Nov-2024	18	Extended document scope to the NUCLEO-N657X0-Q board. Updated *Table 1. List of available products* with information about the ST Zio expansion connectors and ARDUINO® Uno V3 connectors. Updated *Section 1.1: Product marking*.
29-Jan-2026	19	Extended document scope to the NUCLEO-C5A3ZG, NUCLEO-H5E5ZJ, and NUCLEO-U3C5ZI-Q boards. Added the M.2 Key A serial memory connector and the CAN FD header to the list of optional board connectors in *Features*. Added *Section 2.4: EDA resources*. Updated the presentation of expansion connectors in *Description*. Updated the differentiating features of the NUCLEO-N657X0-Q board in *Table 1. List of available products*.
05-May-2026	20	Extended document scope to the NUCLEO-H553ZG board. Updated the differentiating features of the NUCLEO-H553ZG board in Table 1. List of available products.

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