Boards (/platforms/) » NUCLEO-H743ZI2
(https://os.mbed.com)

NUCLEO-H743ZI2

STM32 Nucleo-144 development board with STM32H743ZI MCU, supports Arduino, ST Zio and morpho connectivity

To compile a program for this board using Mbed CLI, use **NUCLEO_H743ZI2** as the target name.

Board Partner

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Overview

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.

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.

ⓘ Table of Contents

Mbed Enabled

- Advanced
- Baseline

Mbed OS support

- Mbed OS 5.14
- Mbed OS 5.15
- Mbed OS 6.0
- Mbed OS 6.1
- Mbed OS 6.10
- Mbed OS 6.11
- Mbed OS 6.12
- Mbed OS 6.13
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Microcontroller key features

- Core
  - 32-bit Arm® Cortex®-M7 core with double-precision FPU and L1 cache:
    - 16 Kbytes of data and 16 Kbytes of instruction cache
  - Frequency up to 400 MHz
  - MPU
  - 856 DMIPS/ 2.14 DMIPS/MHz (Dhrystone 2.1)
  - DSP instructions
- Memories
  - Up to 2 Mbytes of Flash memory with read-while-write support
  - 1 Mbyte of RAM: 192 Kbytes of TCM RAM (inc. 64 Kbytes of ITCM RAM + 128 Kbytes of DTCM RAM for time critical routines), 864 Kbytes of user SRAM, and 4 Kbytes of SRAM in Backup domain
  - Dual mode Quad-SPI memory interface running up to 133 MHz
  - Flexible external memory controller with up to 32-bit data bus: SRAM, PSRAM, SDRAM/LPSDR SDRAM, NOR/NAND Flash memory clocked up to 133 MHz in Synchronous mode
  - CRC calculation unit
- Security
  - ROP, PC-ROP, active tamper
- General-purpose input/outputs
  - Up to 168 I/O ports with interrupt capability
- Reset and power management
  - 3 separate power domains which can be independently clock-gated or switched off:
    - D1: high-performance capabilities
    - D2: communication peripherals and timers
    - D3: reset/clock control/power management
  - 1.62 to 3.6 V application supply and I/Os

- POR, PDR, PVD and BOR
- Dedicated USB power embedding a 3.3 V internal regulator to supply the internal PHYs
- Embedded regulator (LDO) with configurable scalable output to supply the digital circuitry
- Voltage scaling in Run and Stop mode (5 configurable ranges)
- Backup regulator (0.9 V)
- Voltage reference for analog peripheral/VREF+
- Low-power modes: Sleep, Stop, Standby and VBAT supporting battery charging
- Low-power consumption
  - Total current consumption down to 4 µA
- Clock management
  - Internal oscillators: 64 MHz HSI, 48 MHz HSI48, 4 MHz CSI, 32 kHz LSI
  - External oscillators: 4-48 MHz HSE, 32.768 kHz LSE
  - 3× PLLs (1 for the system clock, 2 for kernel clocks) with Fractional mode
- Interconnect matrix
- 4 DMA controllers to unload the CPU
  - 1× high-speed master direct memory access controller (MDMA) with linked list support
  - 2× dual-port DMAs with FIFO
  - 1× basic DMA with request router capabilities
- Up to 35 communication peripherals
  - 4× I2Cs FM+ interfaces (SMBus/PMBus)
  - 4× USARTs/4x UARTs (ISO7816 interface, LIN, IrDA, up to 12.5 Mbit/s) and 1x LPUART
  - 6× SPIs, 3 with muxed duplex I2S audio class accuracy via internal audio PLL or external clock, 1x I2S in LP domain (up to 133 MHz)
  - 4x SAIs (serial audio interface)
  - SPDIFRX interface
  - SWPMI single-wire protocol master I/F
  - MDIO Slave interface
  - 2× SD/SDIO/MMC interfaces (up to 125 MHz)
  - 2× CAN controllers: 2 with CAN FD, 1 with time-triggered CAN (TT-CAN)
  - 2× USB OTG interfaces (1FS, 1HS/FS) crystal-less solution with LPM and BCD
  - Ethernet MAC interface with DMA controller
  - HDMI-CEC
  - 8- to 14-bit camera interface (up to 80 MHz)
- 11 analog peripherals
  - 3× ADCs with 16-bit max. resolution (up to 36 channels, 4.5 MSPS at 12 bits)
  - 1× temperature sensor
  - 2× 12-bit D/A converters (1 MHz)
  - 2× ultra-low-power comparators
  - 2× operational amplifiers (8 MHz bandwidth)
  - 1× digital filters for sigma delta modulator (DFSDM) with 8 channels/4 filters
- Graphics
  - LCD-TFT controller up to XGA resolution
  - Chrom-ART graphical hardware Accelerator™ (DMA2D) to reduce CPU load
  - Hardware JPEG Codec
- Up to 22 timers and watchdogs
  - 1× high-resolution timer (2.5 ns max resolution)
  - 2× 32-bit timers with up to 4 IC/OC/PWM or pulse counter and quadrature (incremental) encoder input (up to 200 MHz)
  - 2× 16-bit advanced motor control timers (up to 200 MHz)
  - 10× 16-bit general-purpose timers (up to 200 MHz)
  - 5× 16-bit low-power timers (up to 200 MHz)
  - 2× watchdogs (independent and window)
  - 1× SysTick timer
  - RTC with sub-second accuracy & HW calendar
- Debug mode
  - SWD & JTAG interfaces
  - 4-Kbyte Embedded Trace Buffer
- True random number generators (3 oscillators each)
- 96-bit unique ID

Nucleo board features

- Two types of extension resources
  - Arduino Uno Revision 3 connectivity
  - STMicroelectronics Morpho extension pin headers for full access to all STM32 I/Os
- On-board ST-LINK/V3 debugger/programmer with SWD connector
- Flexible board power supply: ST-LINK, USB VBUS or external sources
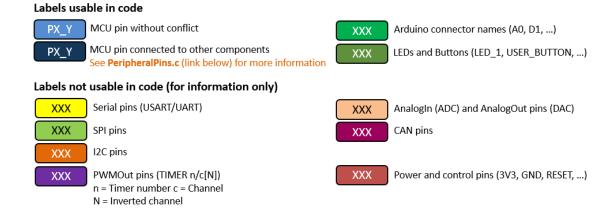
- Three User LEDs
- Two push buttons: USER and RESET
- USB re-enumeration capability: three different interfaces supported on USB
  - Virtual Com port
  - Mass storage (USB Disk drive) for drag'n'drop programming
  - Debug port
- Ethernet 10/100Mbps
- USART

Board pinout

Pins Legend

Labels usable in code

PX_Y	MCU pin without conflict
PX_Y	MCU pin connected to other components See **PeripheralPins.c** (link below) for more information

XXX	Arduino connector names (A0, D1, ...)
XXX	LEDs and Buttons (LED_1, USER_BUTTON, ...)

Labels not usable in code (for information only)

XXX	Serial pins (USART/UART)
XXX	SPI pins
XXX	I2C pins
XXX	PWMOut pins (TIMER n/c[N]) n = Timer number c = Channel N = Inverted channel

XXX	AnalogIn (ADC) and AnalogOut pins (DAC)
XXX	CAN pins
XXX	Power and control pins (3V3, GND, RESET, ...)

You can find more details on the available pins and labels in the **PeripheralPins.c** and **PinNames.h** files.

These files can be found in:

- ARMmbed/mbed-os repository on GitHub (**up-to-date** version, used with **mbed CLI commands**)

Zio and Arduino-compatible headers

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CN8

NC	PWM3/3	UART5_RTS			PC_8
IOREF	PWM3/4	UART5_CTS	I2C3_SDA	QSPI1_D0	PC_9
NRST	SPI3_SCK	UART3_TX		QSPI1_D1	PC_10
3V3	SPI3_MISO	UART3_RX			PC_11
5V	SPI3_MOSI	UART5_TX			PC_12
GND		UART5_RX			PD_2
GND					PG_2
VIN					PG_3

CN9

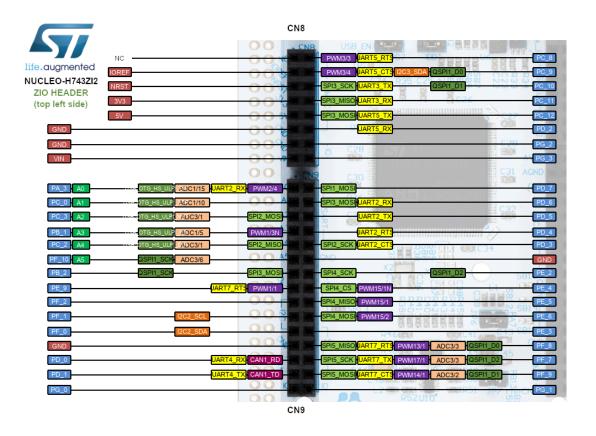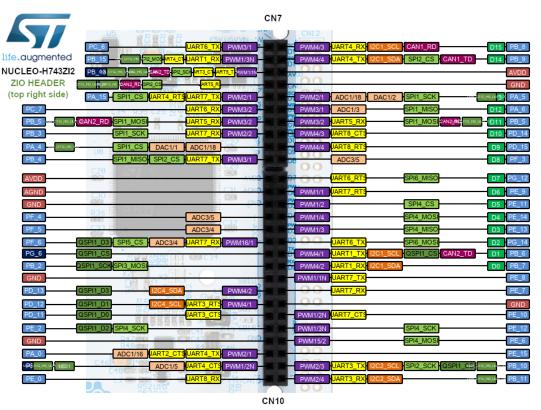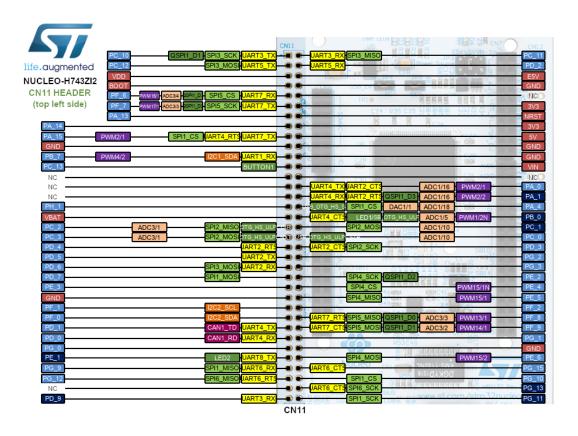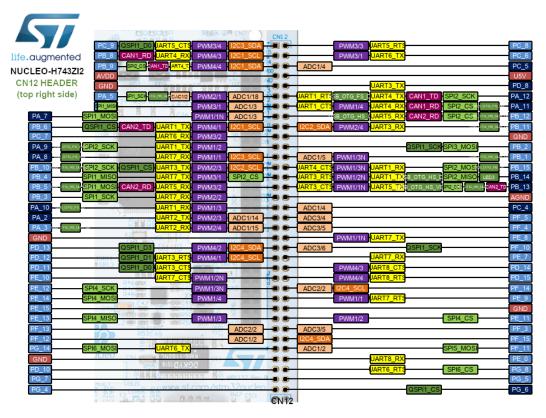|								
PA_3	A0	OTG_HS_ULP	ADC1/15	UART2_RX	PWM2/4	SPI1_MOSI		PD_7
PC_0	A1	OTG_HS_ULP	ADC1/10			SPI3_MOSI	UART2_RX	PD_6
PC_3	A2	OTG_HS_ULP	ADC3/1		SPI2_MOSI		UART2_TX	PD_5
PB_1	A3	OTG_HS_ULP	ADC1/5		PWM1/3N		UART2_RTS	PD_4
PC_2	A4	OTG_HS_ULP	ADC3/1		SPI2_MISO	SPI2_SCK	UART2_CTS	PD_3
PF_10	A5	QSPI1_SCK	ADC3/6					GND
PB_2		QSPI1_SCK				SPI4_SCK	QSPI1_D2	PE_2
PE_9				UART7_RTS	PWM1/1	SPI4_CS	PWM15/1N	PE_4
PF_2						SPI4_MISO	PWM15/1	PE_5
PF_1				I2C2_SCL		SPI4_MOSI	PWM15/2	PE_6
PF_0				I2C2_SDA				PE_3
GND						SPI5_MISO	UART7_RTS	PWM13/1	ADC3/3	QSPI1_D0	PF_8
PD_0				UART4_RX	CAN1_RD	SPI5_SCK	UART7_TX	PWM17/1	ADC3/3	QSPI1_D2	PF_7
PD_1				UART4_TX	CAN1_TD	SPI5_MOSI	UART7_CTS	PWM14/1	ADC3/2	QSPI1_D1	PF_9
PG_0											PG_1

NUCLEO-H743ZI2 — ZIO HEADER (top right side)

CN7

PC_6		UART6_TX	PWM3/1	PWM4/3	UART4_RX	I2C1_SCL	CAN1_RD		D15	PB_8
PB_15	OTG_HS_U	SPI2_MOS	ART4_C	UART1_RX	PWM1/3N	PWM4/4	UART4_TX	I2C1_SDA	SPI2_CS	CAN1_TD	D14	PB_9
PB_13	OTG_HS_	CAN2_TD	SPI2_SCK	ART3_C	ART5_T	PWM1/1N				AVDD
	OTG_HS_	CAN2_RD	SPI2_CS		ART5_R					GND
PA_15	SPI1_CS	UART4_RTS	UART7_TX	PWM2/1	PWM2/1	ADC1/18	DAC1/2	SPI1_SCK		PA_5
PC_7		UART6_RX	PWM3/2	PWM3/1	ADC1/3		SPI1_MISO		D12	PA_6
PB_5	OTG_HS_U	CAN2_RD	SPI1_MOSI	UART5_RX	PWM3/2	PWM3/2	UART5_RX		SPI1_MOSI	CAN2_RD	OTG_HS_U	D11	PB_5
PB_3		SPI1_SCK	UART7_RX	PWM2/2	PWM4/3	UART8_CTS			D10	PD_14
PA_4	OTG_HS	SPI1_CS	DAC1/1	ADC1/18	PWM4/4	UART8_RTS			D9	PD_15
PB_4		SPI1_MISO	SPI2_CS	UART7_TX	PWM3/1	ADC3/5			D8	PF_3
AVDD					UART6_RTS		SPI6_MISO		D7	PG_12
AGND					PWM1/1	UART7_RTS			D6	PE_9
GND					PWM1/2		SPI4_CS		D5	PE_11
PF_4		ADC3/5			PWM1/4		SPI4_MOSI		D4	PE_14
PF_5		ADC3/4			PWM1/3		SPI4_MISO		D3	PE_13
PF_6	QSPI1_D3	SPI5_CS	ADC3/4	UART7_RX	PWM16/1	UART6_TX		SPI6_MOSI		D2	PG_14
PG_6	QSPI1_CS				PWM4/1	UART1_TX	I2C1_SCL	QSPI1_CS	CAN2_TD	D1	PB_6
PB_2	QSPI1_SCK	SPI3_MOSI			PWM4/2	UART1_RX	I2C1_SDA		D0	PB_7
GND					PWM1/1N	UART7_TX			PB_8
PD_13	QSPI1_D3	I2C4_SDA		PWM4/2		UART7_RX			PE_7
PD_12	QSPI1_D1	I2C4_SCL	UART3_RTS	PWM4/1					GND
PD_11	QSPI1_D0		UART3_CTS		PWM1/2N	UART7_CTS			PE_10
PE_2	QSPI1_D2	SPI4_SCK			PWM1/3N		SPI4_SCK		PE_12
GND					PWM15/2		SPI4_MOSI		PE_6
PA_0		ADC1/16	UART2_CTS	UART4_TX	PWM2/1				PE_15
PB_0	OTG_HS_U	LED1	ADC1/5	UART4_CTS	PWM1/2N	PWM2/3	UART3_TX	I2C2_SCL	SPI2_SCK	QSPI1_CS	OTG_HS_U	PB_10
PE_0			UART8_RX		PWM2/4	UART3_RX	I2C2_SDA		PB_11

CN10

CN11 CN12 headers

Technical references

For more information, please refer to:

- https://www.st.com/en/microcontrollers-microprocessors/stm32h743zi.html
  (https://www.st.com/en/microcontrollers-microprocessors/stm32h743zi.html)

- https://www.st.com/en/evaluation-tools/nucleo-h743zi.html (https://www.st.com/en/evaluation-tools/nucleo-h743zi.html)

Known limitations

The following section describes known limitations of the platform. Note that general issues are tracked into the mbed repository (https://github.com/mbedmicro/mbed) available on GitHub.

Tips and Tricks

ST WIKI pages (https://os.mbed.com/teams/ST/wiki/Special:Allpages)

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Questions

1 answer
(/questions/87473/CN12-image-is-missing/) CN12 image is missing (/questions/87473/CN12-image-is-missing/) 👤
(/users/rolandview/) Rolando Yambao (/users/rolandview/)
5 years ago (Wed 13 Nov 2019 15:09)

🏷 NUCLEO-H743ZI2 (/questions/tag/NUCLEO-H743ZI2)

1 answer
(/questions/87263/showing-Internal-command-error-in-keil-w/) showing Internal command error in keil when
flashing (/questions/87263/showing-Internal-command-error-in-keil-w/) 👤 (/users/vampire199669/) raja sharma
(/users/vampire199669/)
5 years ago (Thu 14 Nov 2019 08:15)

🏷 NUCLEO-H743ZI2 (/questions/tag/NUCLEO-H743ZI2)

1 answer
(/questions/87015/NUCLEO-H743ZI2-not-available-as-target-b/) NUCLEO-H743ZI2 not available as target board
(/questions/87015/NUCLEO-H743ZI2-not-available-as-target-b/) 👤 (/users/eliharski/) Eugene Liharski
(/users/eliharski/)
5 years, 1 month ago (Wed 09 Oct 2019 14:21)

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