NUCLEO-F446RE

Affordable and flexible platform to ease prototyping using a STM32F446RET6 microcontroller.

To compile a program for this board using Mbed CLI, use **nucleo_f446re** as the target name.

Board Partner

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A world leader in providing the semiconductor solutions that make a positive contribution to people's lives, both today and in the future.

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Table of Contents

Overview

The STM32 Nucleo board provides an affordable and flexible way for users to try out new ideas and build prototypes with any STM32 microcontroller line, choosing from the various combinations of performance, power consumption and features.

The Arduino™ connectivity support and ST Morpho headers make it easy to expand the functionality of the STM32 Nucleo open development platform with a wide choice of specialized shields.

The STM32 Nucleo board does not require any separate probe as it integrates the ST-LINK/V2-1 debugger/programmer.

Microcontroller features

- STM32F446RET6 in LQFP64 package
- ARM®32-bit Cortex®-M4 CPU with FPU
- Adaptive real-time accelerator (ART Accelerator™) allowing 0-wait state execution from Flash memory
- 180 MHz max CPU frequency
- VDD from 1.7 V to 3.6 V
- 512 KB Flash
- 128 KB SRAM System
- 4 KB SRAM Backup
- Timers General Purpose (10)
- Timers Advanced-Control (2)
- Timers Basic (2)
- SPI (4)
- I2S (2)
- USART (4)
- UART (2)
- USB OTG Full Speed and High Speed
- CAN (2)
- SAI (2)
- SPDIF-Rx (4)
- HDMI-CEC (1)
- Quad-SPI (1)
- Camera Interface
- GPIO (50) with external interrupt capability
- 12-bit ADC (3) with 16 channels
- 12-bit DAC with 2 channels

Mbed Enabled

- Baseline

Mbed OS support

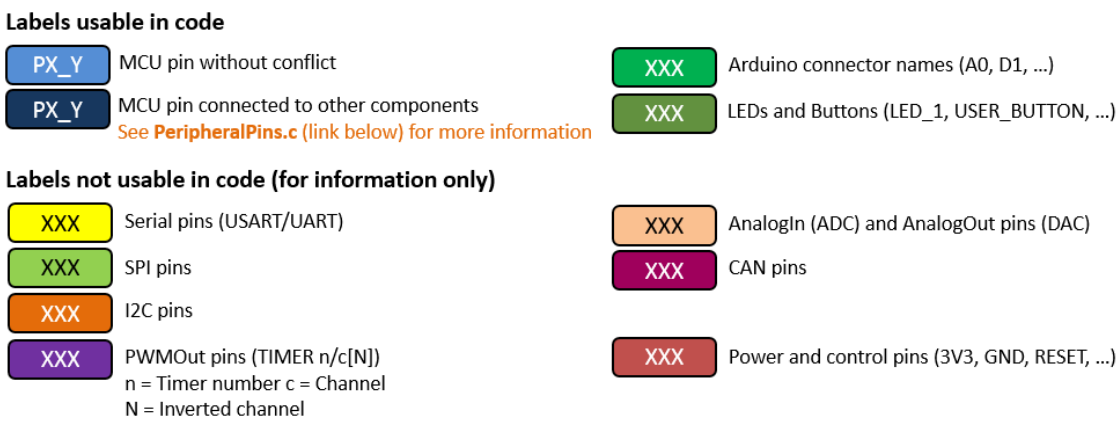
- Mbed OS 2
- Mbed OS 5.10
- Mbed OS 5.11
- Mbed OS 5.12
- Mbed OS 5.13
- Mbed OS 5.14
- Mbed OS 5.15
- Mbed OS 5.4
- Mbed OS 5.5
- Mbed OS 5.6
- Mbed OS 5.7
- Mbed OS 5.8
- Mbed OS 5.9
- Mbed OS 6.0
- Mbed OS 6.1
- Mbed OS 6.10
- Mbed OS 6.11
- Mbed OS 6.12
- Mbed OS 6.13
- Mbed OS 6.14

Nucleo 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/V2-1 debugger/programmer with SWD connector
  - Selection-mode switch to use the kit as a standalone ST-LINK/V2-1
- Flexible board power supply
  - USB VBUS or external source (3.3 V, 5 V, 7 - 12 V)
  - Power management access point
- User LED (LD2)
- 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

Nucleo pinout

Pins Legend



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**)

https://github.com/ARMmbed/mbed-os/blob/master/targets/TARGET_STM/TARGET_STM32F4/TARGET_STM32F446xE/TARGET_NUCLEO_F446RE/ (https://github.com/ARMmbed/mbed-os/blob/master/targets/TARGET_STM/TARGET_STM32F4/TARGET_STM32F446xE/TARGET_NUCLEO_F446RE/)

- mbed-dev library in developer.mbed.org (source files of the mbed library used on **mbed compiler IDE**)

https://developer.mbed.org/users/mbed_official/code/mbed-dev/file/default/targets/TARGET_STM/TARGET_STM32F4/TARGET_STM32F446xE/TARGET_NUCLEO_F446RE/ (https://developer.mbed.org/users/mbed_official/code/mbed-dev/file/default/targets/TARGET_STM/TARGET_STM32F4/TARGET_STM32F446xE/TARGET_NUCLEO_F446RE/)

- Mbed OS 6.15
- Mbed OS 6.2
- Mbed OS 6.3
- Mbed OS 6.4
- Mbed OS 6.5
- Mbed OS 6.6
- Mbed OS 6.7
- Mbed OS 6.8
- Mbed OS 6.9

Example programs

Mbed 2 deprecated
IDW01M1_Cloud_IBM (/teams/ST/code/IDW01M...
25 (/teams/ST/code/IDW01M1_Cloud_IBM/)s
11753 (/teams/ST/code/IDW01M1_Cloud_IBM/)

Connect through Wifi to IBM MQTT cloud https://quickstart.internetofthings

Last updated: 24 Nov 2016 (24 Nov 2016)

Mbed 2 deprecated
HelloWorld_IDW01M1v2 (/teams/ST/code/HelloWor...
13 (/teams/ST/code/HelloWorld_IDW01M1v2
9733 (/teams/ST/code/HelloWorld_IDW

Simple test application for the STMicroelectronics X-NUCLEO-IDW01M1 Wi-Fi expansion board.

Nucleo (/search/?q=Nucleo), stm32 (/search/?q=stm32), Wi-Fi (/search/?q=Wi-Fi), X-NUCLEO-IDW01M1 (/search/?q=X-NUCLEO-IDW01M1)

Last updated: 16 Jan 2017 (16 Jan 2017)

Mbed 2 deprecated
STM32_ADC_InternalChan... (/teams/ST/code/STM32_A...
9 (/teams/ST/code/STM32_ADC_InternalCha
49840 (/teams/ST/code/STM32_ADC_InternalCha

ADC internal channels read example.

Internal Channels (/search/?q=Internal Channels), stm32 (/search/?q=stm32), temperature sensor (/search/?q=temperature sensor), VBAT (/search/?q=VBAT)

Last updated: 17 Aug 2017 (17 Aug 2017)

CMSIS support

Arduino-compatible headers

Find documentation, software examples and the CMSIS Board Support Pack.

NUCLEO-F446RE on keil.arm.com (https://www.keil.arm.com/boards/stm nucleo-f446re-revc-fb1ab08/)

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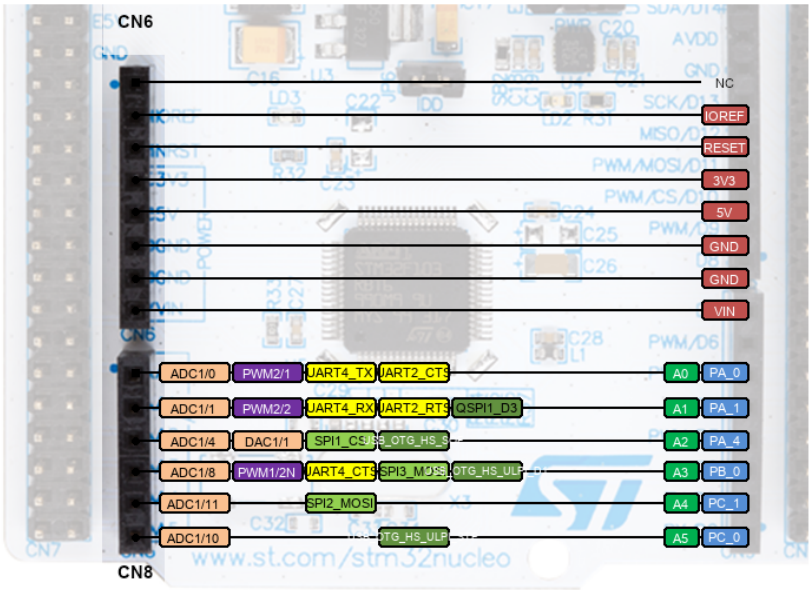
NUCLEO-F446RE
ARDUINO HEADER
(top left side)



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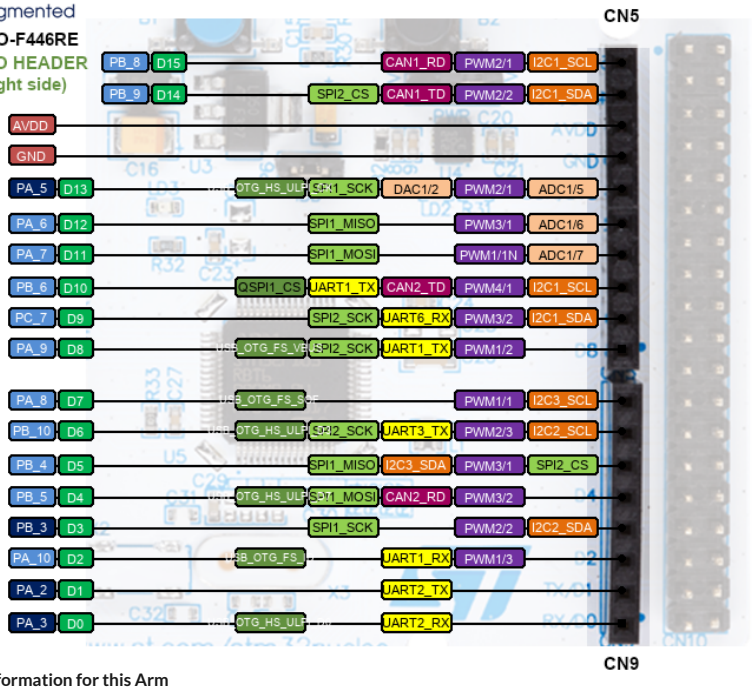
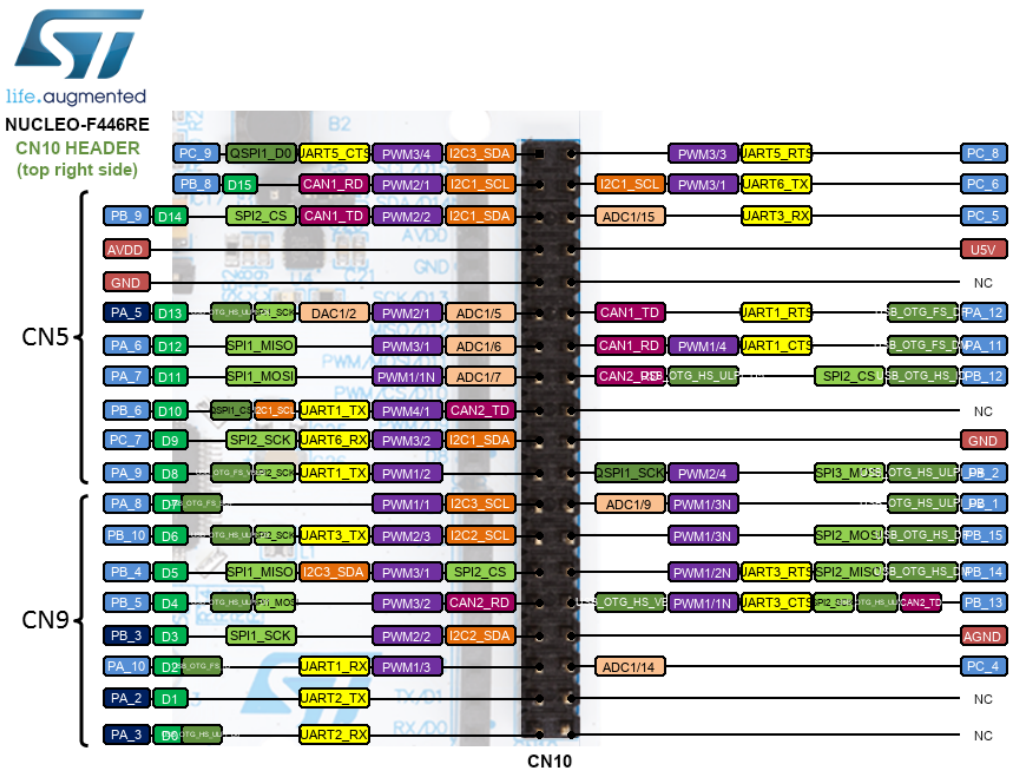
NUCLEO-F446RE
ARDUINO HEADER
(top right side)

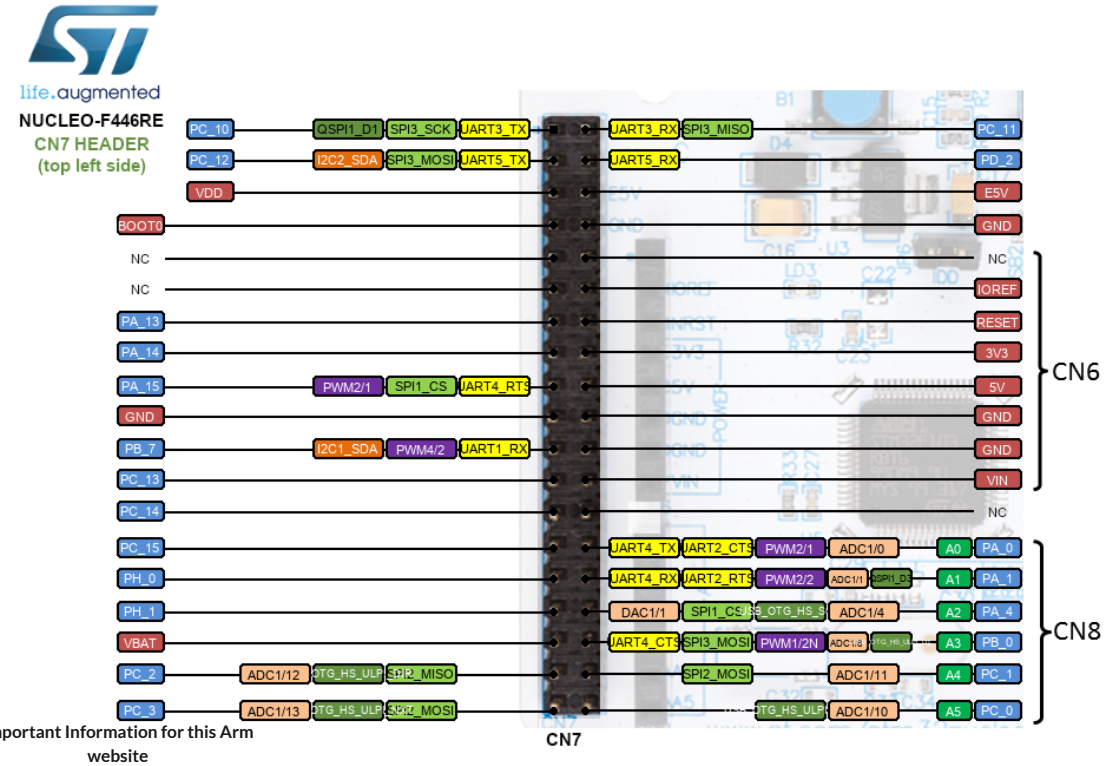


Important Information for this Arm website

Morpho headers

These headers give access to all STM32 pins.





Supported shields

ST X-NUCLEO boards

See Matrix of tested boards (https://developer.mbed.org/teams/ST/wiki/Matrix-of-tested-boards).

Other Non-ST boards

See here (https://developer.mbed.org/teams/ST/wiki/Supported-shields).

Getting started

This video shows how to get started with ARM mbed Integrated Development Environment using STM32 Nucleo platform:

Nucleo ST-LINK/V2 driver installation and firmware upgrade

- Install the ST-LINK/V2 driver before connecting the Nucleo board to your PC the first time. Follow this **LINK (/teams/ST/wiki/ST-Link-Driver)** for all details.
- For optimum performances, ensure that the Nucleo ST-LINK/V2 firmware is upgraded to the latest version. Follow this **LINK (/teams/ST/wiki/Nucleo-Firmware)** for all details.

Technical references

For more information, please refer to:

- STM32F446RE microcontroller (http://www.st.com/web/catalog/mmc/FM141/SC1169/SS1577/LN1875/PF260537?s_searchtype=partnumber)
- Nucleo board (http://www.st.com/stm32nucleo)

- SDK changes log (/teams/ST/wiki/SDK-changes-log)

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.

- On Nucleo 64-pins boards, the D0 and D1 pins are not available per default as they are used by the STLink Virtual Comm Port. More information HERE (https://os.mbed.com/teams/ST/wiki/Use-of-D0D1-Arduino-pins)

Tips and Tricks

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

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You need to log in (/account/login/?next=/platforms/ST-Nucleo-F446RE/) to post a discussion

Discussion topics

Topic	Replies	Last post
Bar Code Reader (/forum/platform-138-ST-Nucleo-F446RE-community/topic/36118/)	0	30 Aug 2019 (30 Aug 2019) (/forum/platform-138-ST-Nucleo-F446RE-community/post/63049/) by cherry Dalogdog (/users/cherryme/)
PC_1 can be used for SPI3_MOSI (/forum/platform-138-ST-Nucleo-F446RE-community/topic/36092/) F446RE (/search/?q=F446RE&type=Forum), Pin (/search/?q=Pin&type=Forum), pinmap (/search/?q=pinmap&type=Forum), SPI (/search/?q=SPI&type=Forum), SPI2 (/search/?q=SPI2&type=Forum), SPI3 (/search/?q=SPI3&type=Forum)	1	09 Aug 2019 (09 Aug 2019) (/forum/platform-138-ST-Nucleo-F446RE-community/post/62988/) by BlazeX . (/users/BlazeX/)
A question in regards to Nucleo Blink LED / NUCLEO F446RE (/forum/platform-138-ST-Nucleo-F446RE-community/topic/35970/) LED blink (/search/?q=LED blink&type=Forum)	0	11 Jul 2019 (11 Jul 2019) (/forum/platform-138-ST-Nucleo-F446RE-community/post/62810/) by Wilson Baron (/users/Colombian1976/)
NUCLEO-F446RE-BLE with X-NUCLEO-IDB04A1 (/forum/platform-138-ST-Nucleo-F446RE-community/topic/27394/)	0	15 Feb 2017 (15 Feb 2017) (/forum/platform-138-ST-Nucleo-F446RE-community/post/52131/) by Mohammed Taher (/users/prollygeek/)

Questions

0 answers

/questions/86421/Multiple-SPI-Port-not-working-on-Nucleo-/) Multiple SPI Port not working on Nucleo-F446RE

/questions/86421/Multiple-SPI-Port-not-working-on-Nucleo-/) (/users/Arushichaudhry/) Arushi Chaudhry (/users/Arushichaudhry/)

4 years, 8 months ago (Tue 09 Jul 2019 11:40)

NUCLEO-F446RE (/questions/tag/NUCLEO-F446RE)

0 answers

(/questions/86420/Multiple-SPI-Port-not-working-on-Nucleo-/) Multiple SPI Port not working on Nucleo-F446RE (/questions/86420/Multiple-SPI-Port-not-working-on-Nucleo-/) (/users/Arushichaudhry/) Arushi Chaudhry (/users/Arushichaudhry/)

4 years, 8 months ago (Tue 09 Jul 2019 11:40)

NUCLEO-F446RE (/questions/tag/NUCLEO-F446RE) , SPI (/questions/tag/SPI)

3 answers

(/questions/84895/Behavior-of-Serial-pcreadable-on-NUCLEO-/) ✔ Behavior of Serial pc.readable() on NUCLEO-F446RE (/questions/84895/Behavior-of-Serial-pcreadable-on-NUCLEO-/) (/users/fabiofaria/) Fabio Faria (/users/fabiofaria/)

5 years, 1 month ago (Sat 02 Mar 2019 15:23)

NUCLEO-F446RE (/questions/tag/NUCLEO-F446RE)

0 answers

(/questions/82182/USB-FS-Device-CDC-Class/) USB FS Device CDC Class (/questions/82182/USB-FS-Device-CDC-Class/) (/users/eddy_63/) Stefano Lovati (/users/eddy_63/)

5 years, 7 months ago (Fri 31 Aug 2018 14:33)

NUCLEO-F446RE (/questions/tag/NUCLEO-F446RE)

1 answer

(/questions/81542/Where-is-SPI3_SSEL/) Where is "SPI3_SSEL"? (/questions/81542/Where-is-SPI3_SSEL/) (/users/miyaokakazuki/) kazuki miyaoka (/users/miyaokakazuki/)

5 years, 9 months ago (Wed 20 Jun 2018 15:39)

NUCLEO-F446RE (/questions/tag/NUCLEO-F446RE)

See more related questions (/questions/related/72/138/ST-Nucleo-F446RE/)