

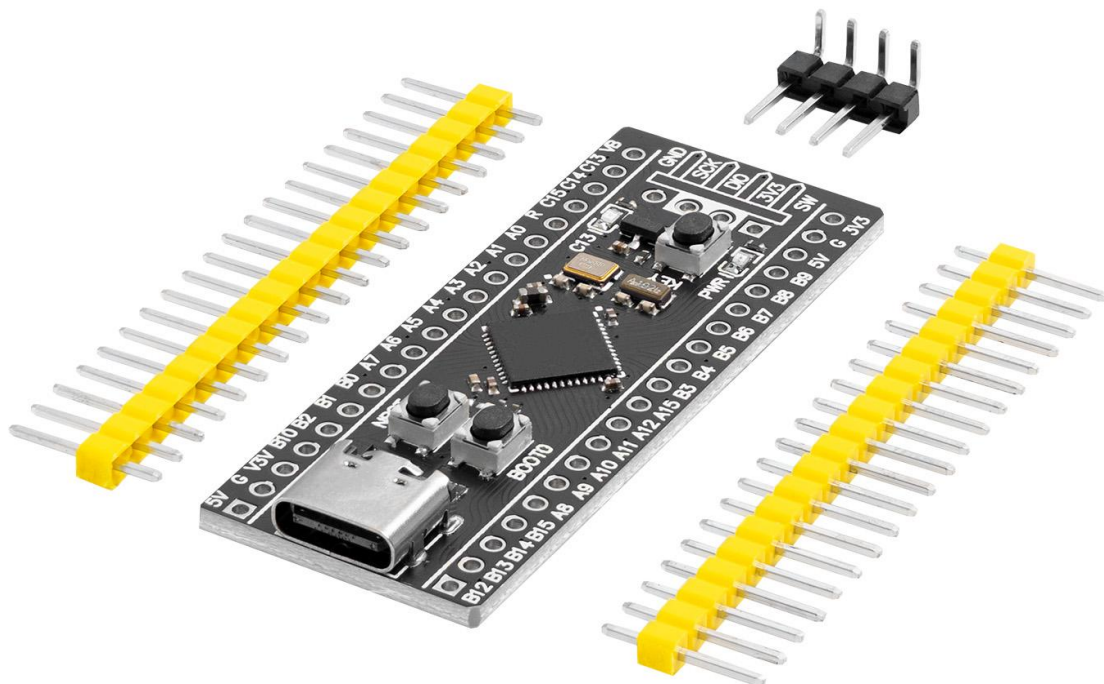
STM32F401 – Development Board

e-book

STM32F401CCU6

Development Learning Board

V 3.0



STM32F401 – Development Board

Description	3
Pinout	5
Install STM32CubeProg	6
Installation of the Arduino IDE	6
Install STM32 Add-on to Arduino IDE	11
Enable DFU bootloader	15
Upload sketch	16

Description

The STM32F401 Blackpill is based on the high-performance M4 32-bit RISC core operating at a frequency of up to 84 MHz.

The microcontroller features a floating point unit (FPU) single precision, which supports all Arm single-precision data-processing instructions and data types. It also implements a full set of DSP instructions and a memory protection unit (MPU) which enhances application security.

The STM32F401 incorporate high-speed embedded memories (up to 256 Kbytes of Flash memory, up to 64 Kbytes of SRAM), and an extensive range of enhanced I/Os and peripherals connected to two APB buses, two AHB buses and a 32-bit multi-AHB bus matrix.

All devices offer one 12-bit ADC, a low-power RTC, six general-purpose 16-bit timers including one PWM timer for motor control, two general-purpose 32-bit timers.

They also feature standard and advanced communication interfaces.

- Up to three I2Cs
- Up to four SPIs
- Two full duplex I2Ss. To achieve audio class accuracy, the I2S peripherals can be clocked via a dedicated internal audio PLL or via an external clock to allow synchronization.
- Three USARTs
- SDIO interface
- USB 2.0 OTG full speed interface

The STM32F401xB/STM32F401xC operate in the - 40 to + 125 °C temperature range from a 1.7 (PDR OFF) to 3.6 V power supply. A comprehensive set of power-saving modes allows the design of low-power applications.

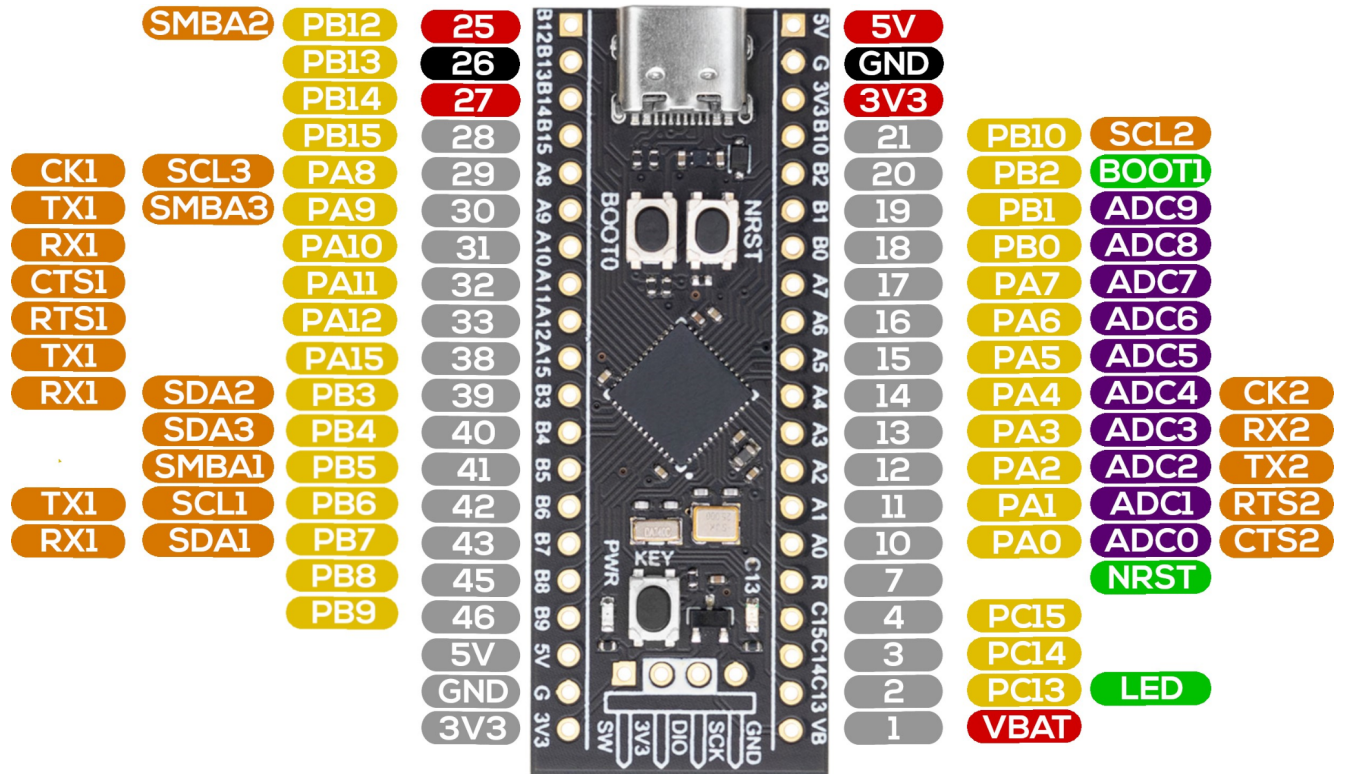
STM32F401 – Development Board

These features make the STM32F401 microcontrollers suitable for a wide range of applications:

- Motor drive and application control
- Medical equipment
- Industrial applications: PLC, inverters, circuit breakers
- Printers, and scanners
- Alarm systems, video intercom, and HVAC
- Home audio appliances
- Mobile phone sensor hub

STM32F401 – Development Board

Pinout



Install STM32CubeProg

Download and install STM32CubeProg from ST.com:

<https://www.st.com/en/development-tools/stm32cubeprog.html>

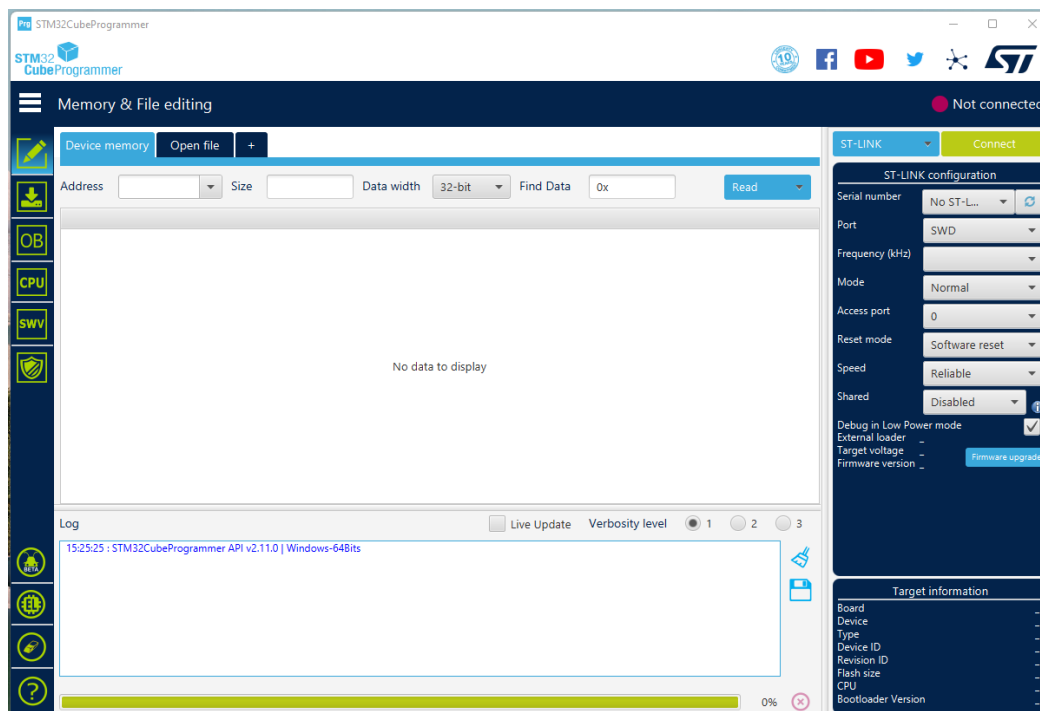
STM32CubeProg ACTIVE Save to MyST

STM32CubeProgrammer software for all STM32

[Get Software](#) [Download databrief](#)

	Part Number	General Description	Supplier	Download	All versions
+	STM32CubePrg-Lin	STM32CubeProgrammer software for Linux	ST	Get latest	Select version ▾
+	STM32CubePrg-Mac	STM32CubeProgrammer software for Mac	ST	Get latest	Select version ▾
+	STM32CubePrg-W32	STM32CubeProgrammer software for Win32	ST	Get latest	Select version ▾
+	STM32CubePrg-W64	STM32CubeProgrammer software for Win64	ST	Get latest	Select version ▾

Start the STM32CubeProg. It will look like this:



Close the STM32CubeProg.

Installation of the Arduino IDE

You can download the free Arduino IDE development environment from the following link: <https://www.arduino.cc/en/Main/Software>

Windows users should definitely use one of the first two download options for the Arduino IDE. The "Windows App" version from the Windows Store will cause connection problems, especially when using third party board definitions.



Arduino IDE 1.8.19

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.

Refer to the [Getting Started](#) page for Installation instructions.

SOURCE CODE

Active development of the Arduino software is [hosted by GitHub](#). See the instructions for [building the code](#). Latest release source code archives are available [here](#). The archives are PGP-signed so they can be verified using [this](#) gpg key.

DOWNLOAD OPTIONS

Windows Win 7 and newer
Windows ZIP file

Windows app Win 8.1 or 10 [Get](#)

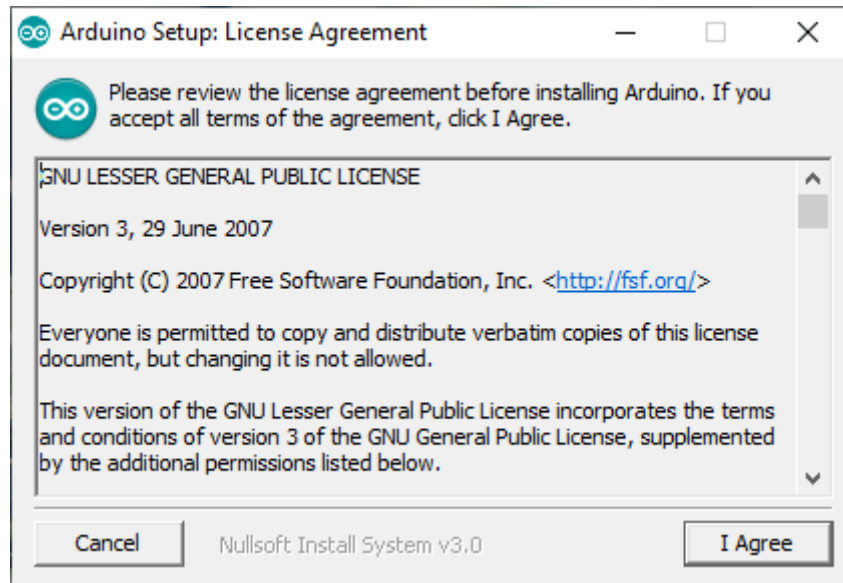
Linux 32 bits
Linux 64 bits
Linux ARM 32 bits
Linux ARM 64 bits

Mac OS X 10.10 or newer

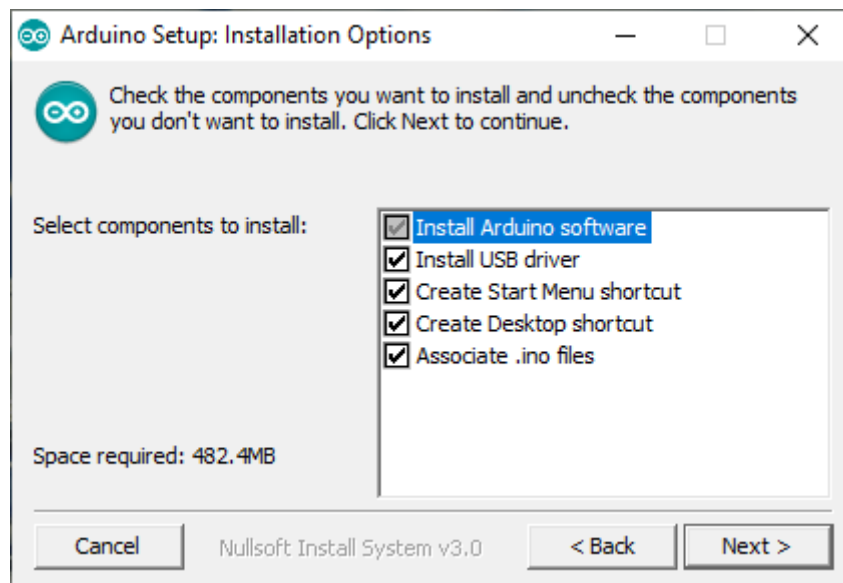
[Release Notes](#)

[Checksums \(sha512\)](#)

After starting the Arduino IDE installation file "arduino-1.X.X-windows.exe" the license conditions of the software must be read and accepted:



In the next step, different options can be selected for installation.

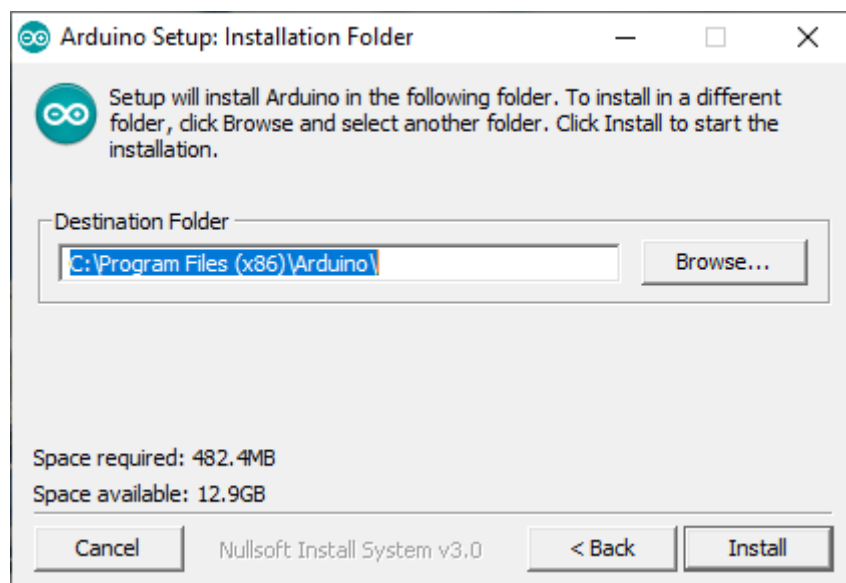


A brief overview of the different options follows, with a brief explanation of each option:

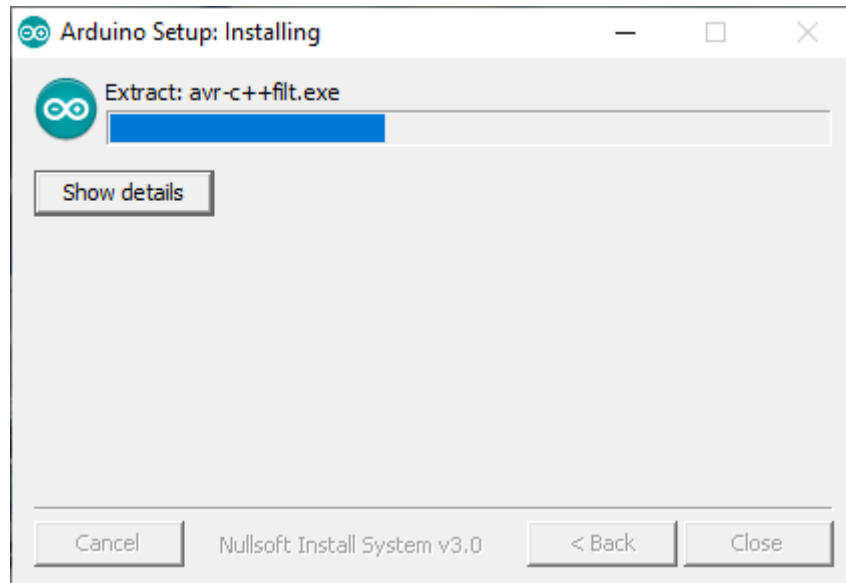
STM32F401 – Development Board

Option	Explanation
Install Arduino Software	Installs the Arduino IDE – This option can not be deselected
Install USB Driver	Installs USB drivers for various other microcontrollers. These are not required to use the software with the STM32F401, but we strongly recommend installing them if you also use other microcontrollers
Create Start Menu shortcut	Creates a shortcut in the Windows Start menu (optional)
Create Desktop shortcut	Creates a shortcut on the workstation (Optional)
Associate .ino files	Creates a filename extension for files with the extension .ino and links it to the Arduino IDE

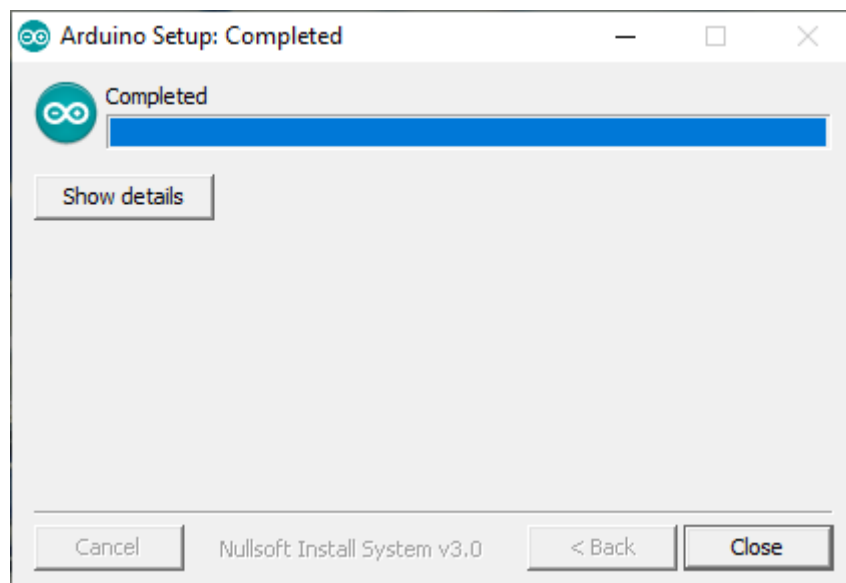
Finally, the destination folder must be specified. The installation requires about 500 MB of free disk space.



Click “Install” to start the installation.



After successful installation, the installation program can be closed via the "Close" button:



STM32F401 – Development Board

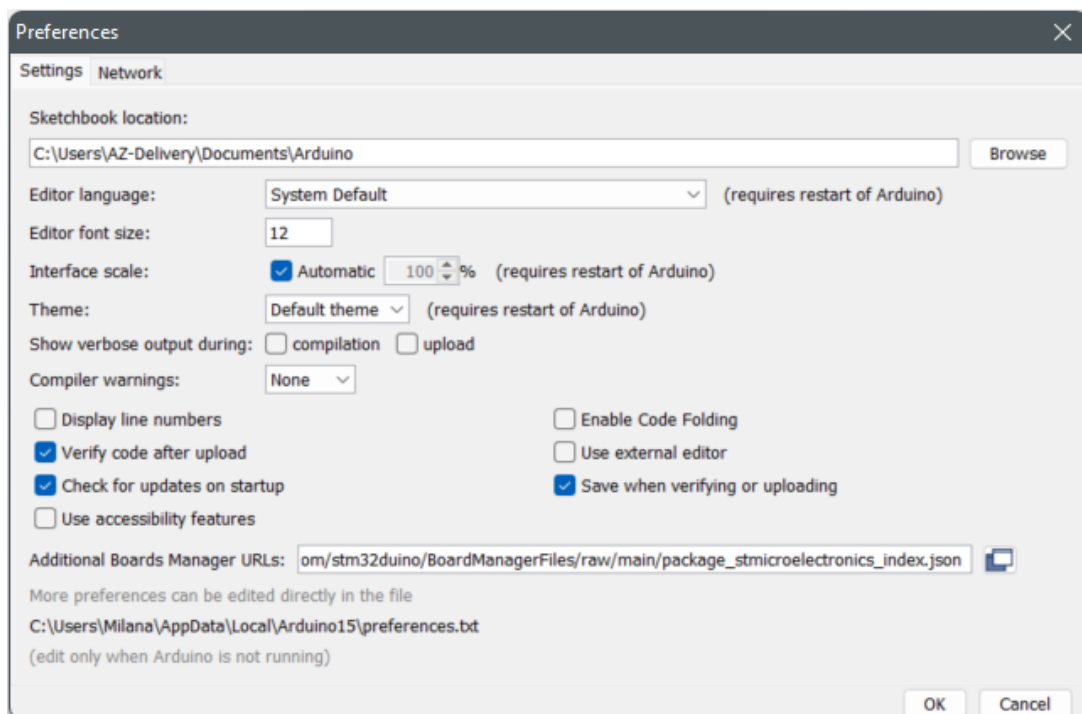
Install STM32 Add-on to Arduino IDE

In your Arduino IDE, go to **File > Preferences**

Add the URL below to Additional Board Manager URLs text box:

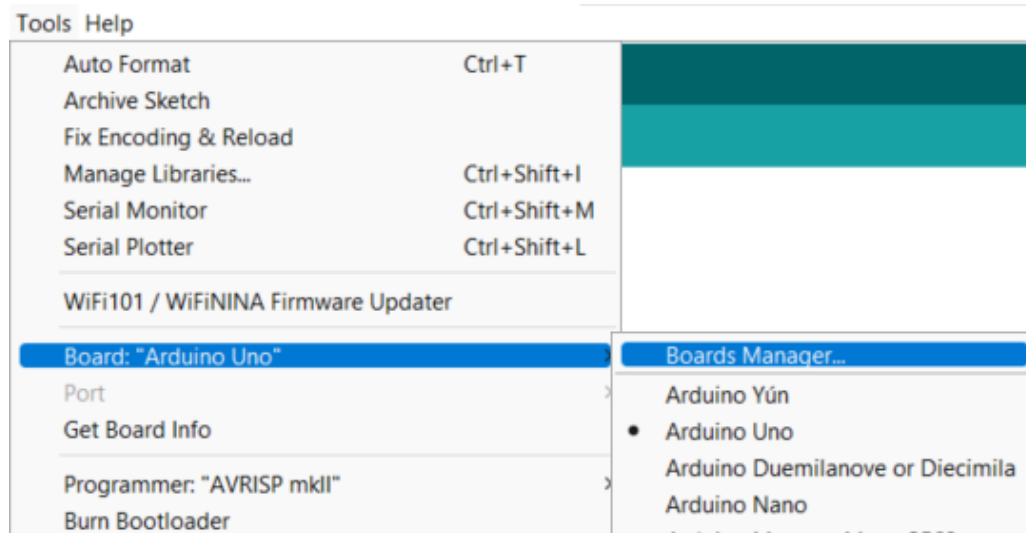
```
https://github.com/stm32duino/BoardManagerFiles/raw/main/package_stm  
icroelectronics_index.json
```

If the text box is not empty, you can separate the URLs with a comma.

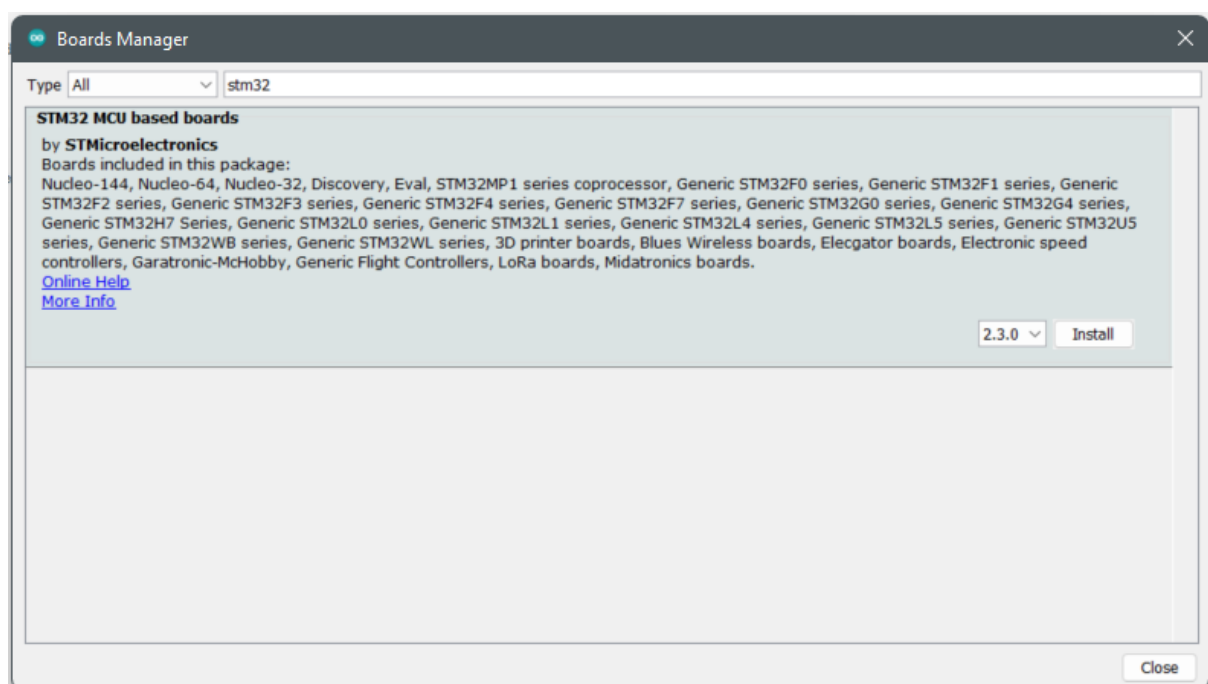


Go to **Tools > Board > Boards Manager**

STM32F401 – Development Board

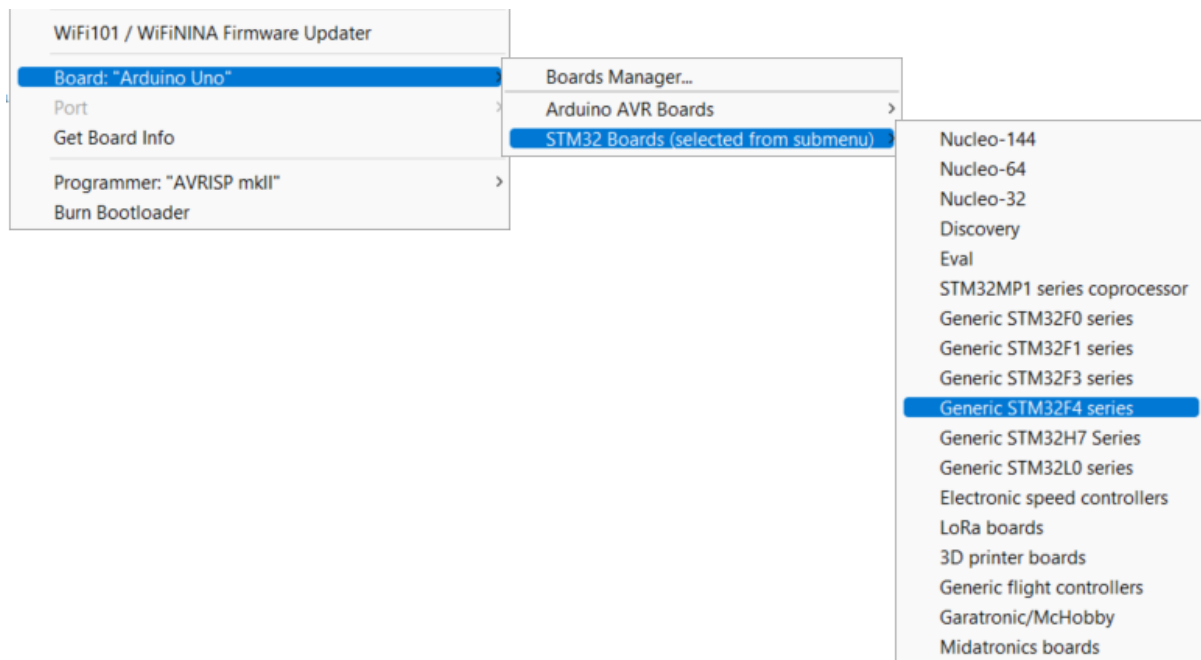


Search for STM32, select the latest version and click Install.



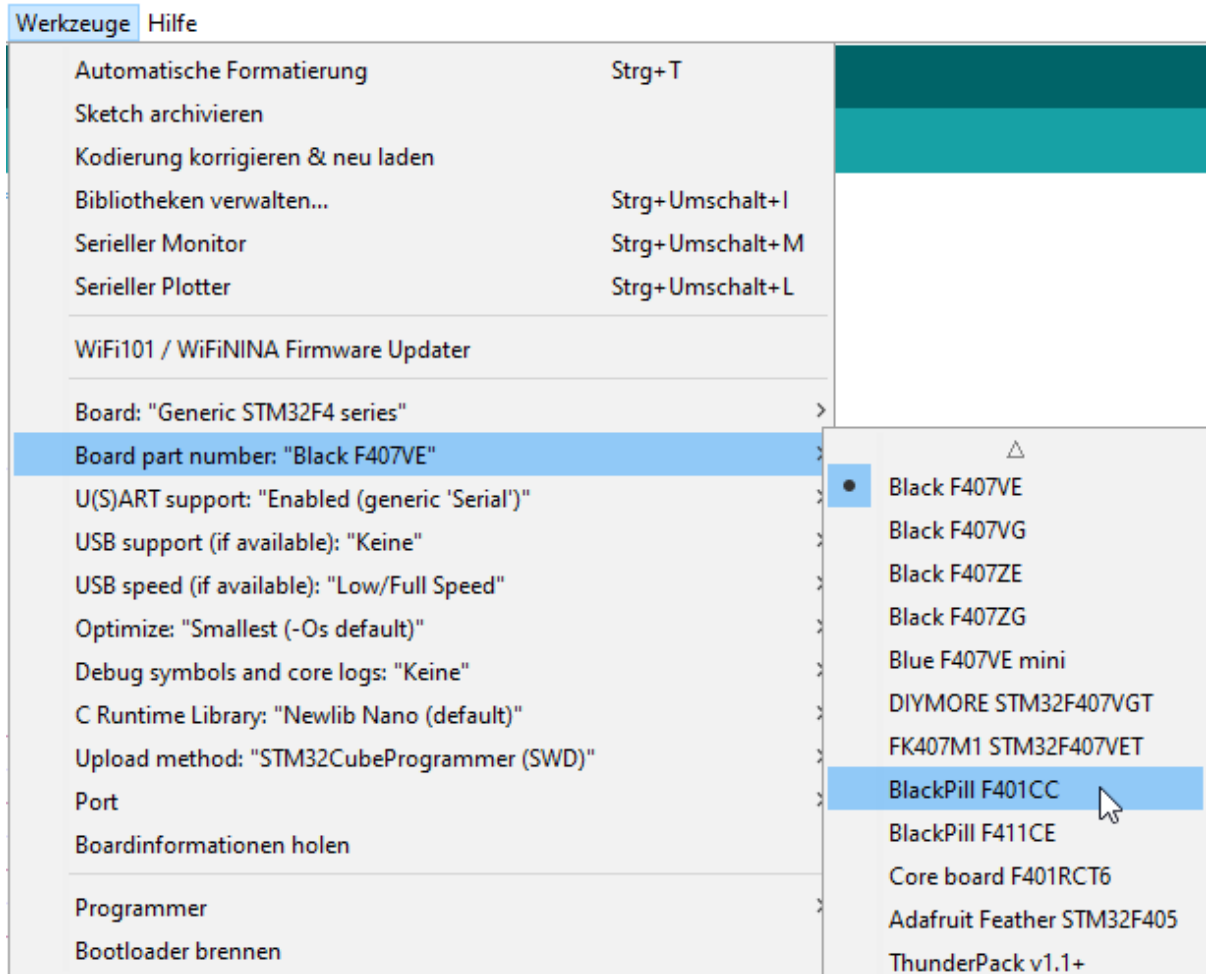
There are a few megabytes of data to download and install, so be patient. Once the installation is completed, quit and restart the Arduino IDE.

STM32F401 – Development Board



Select Tools > Board Part Number > BlackPill F411CE

STM32F401 – Development Board

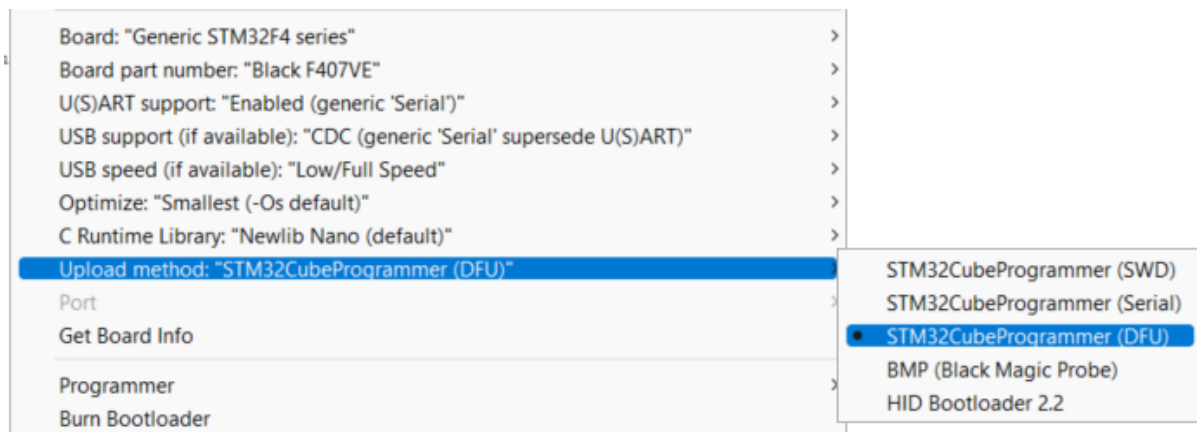


Under USB Support, select CDC (generic "Serial" supersede U(S)ART)

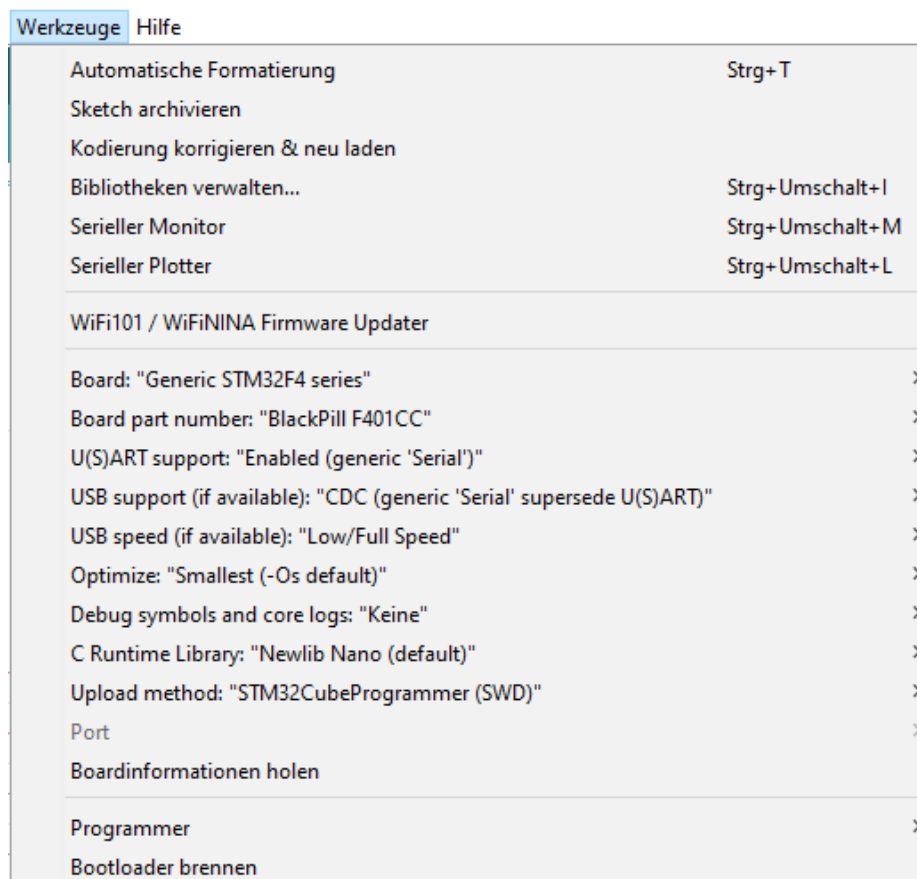


STM32F401 – Development Board

Under Upload method, select SMT32CubeProgrammer(DFU)



These are your Tool configurations:



Connect the STM32 board to your computer USB port.

Enable DFU bootloader

Use the onboard BOOT0 and NRST button to put the board into bootloader mode:

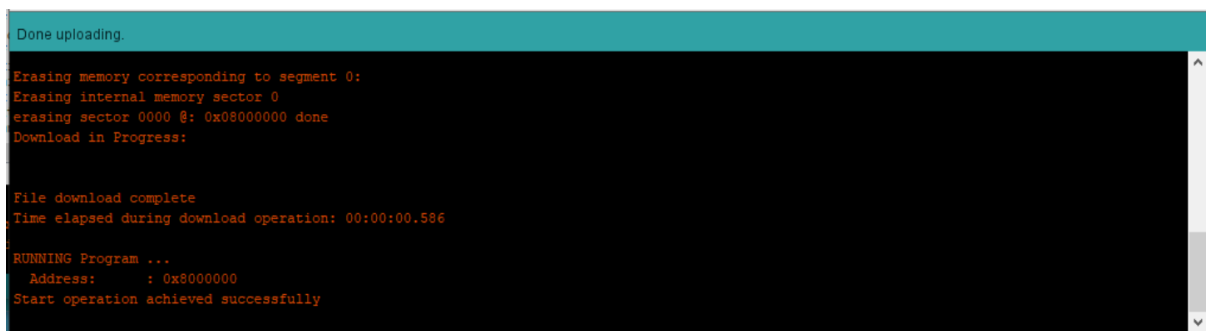
- press and hold the BOOT0 button
- press and release NRST (reset) button to power cycle the processor
- release BOOT0 button

Upload sketch

Create new sketch and copy / paste the code below:

```
void setup() {  
  pinMode(PC13, OUTPUT); // LED connect to pin PC13  
}  
void loop() {  
  digitalWrite(PC13, HIGH); // turn the LED on  
  delay(1000); // wait for 1000mS  
  digitalWrite(PC13, LOW); // turn the LED off  
  delay(1000); // wait for 1000mS  
}
```

Click on the upload button to compile and upload the code to the STM32 board.



```
Done uploading.  
  
Erasing memory corresponding to segment 0:  
Erasing internal memory sector 0  
erasing sector 0000 @: 0x08000000 done  
Download in Progress:  
  
File download complete  
Time elapsed during download operation: 00:00:00.586  
  
RUNNING Program ...  
Address:      : 0x8000000  
Start operation achieved successfully
```

You should see the blue LED blink at 1 second interval.

<https://az-delivery.de>

Have Fun!

Impressum

<https://az-delivery.de/pages/about-us>