

## STM32Cube embedded software for STM32F4 Series including HAL, low-layer drivers and STM32F4-dedicated middleware

Data brief

### Features

- Consistent and complete embedded software offer that frees the user from dependency issues
- Maximized portability between all STM32 series supported by STM32Cube
- Hundreds of examples for easy understanding
- High quality HAL and low-layer API drivers using CodeSonar® static analysis tool
- STM32F4-specific middleware including USB Host and Device and TCP/IP stack
- Free user-friendly license terms
- Update mechanism that can be enabled by the user to be notified of new releases

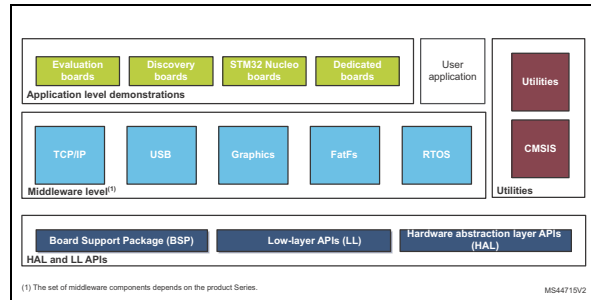
### Description

STM32Cube™ is an STMicroelectronics original initiative to ease developers' life by reducing development efforts, time and cost. STM32Cube covers STM32 portfolio.

STM32Cube includes STM32CubeMX which is a graphical software configuration tool that allows generating C initialization code using graphical wizards.

It also comprises the STM32CubeF4 platform composed of STM32Cube HAL and low-layer (LL) APIs, plus consistent set of middleware components (RTOS, USB, FatFs, graphics and TCP/IP). All embedded software utilities come with a full set of examples running on STMicroelectronics boards.

STM32Cube HAL is an STM32 embedded software stack that ensures maximized portability across STM32 portfolio, while LL APIs make up a fast, light-weight, expert-oriented layer which is closer to the hardware than HAL. HAL and LL APIs can be used simultaneously with a few restrictions.



Both HAL and LL drivers are production-ready and have been developed in compliance with MISRA-C 2004 guidelines. Furthermore, ST specific validation processes add a deeper-level qualification.

STM32CubeF4 gathers in one single package all the generic embedded software components required to develop an application on STM32F4 microcontrollers. Following STM32Cube initiative, this set of components is highly portable, not only to STM32F4 Series but also to other STM32 series. In addition, low-layer APIs provide an alternative, high-performance, low-footprint solution to STM32CubeF4 HAL at the cost of portability and simplicity.

STM32CubeF4 is fully compatible with STM32CubeMX code generator that allows generating initialization code. The package includes a low level hardware abstraction layer (HAL) that covers the microcontroller hardware, together with an extensive set of examples running on STMicroelectronics boards. HAL and LL APIs are available in open-source BSD license for user convenience.



## STM32CubeF4 package

STM32CubeF4 package also contains a set of middleware components with the corresponding examples. They come in very permissive license terms:

- CMSIS-RTOS implementation with FreeRTOS™ open source solution
- TCP/IP stack based on open source LwIP solution
- FAT File System based on open source FatFs solution supporting NAND Flash memory accesses
- STemWin, a professional graphical stack solution available in binary format and based on our partner solution SEGGER emWin
- Full USB Host and Device stack supporting many classes

A demonstration implementing all these middleware components is also provided in the STM32CubeF4 package.

## Ordering Information

STM32CubeF4 is available for free download from <http://www.st.com/stm32cube>.

## Revision history

**Table 1. Document revision history**

Date	Revision	Changes
20-Feb-2014	1	Initial release.
19-Mar-2015	2	Updated STM32CubeF4 block diagram on cover page. Updated <a href="#">Section : Description</a> . Removed figure 1 <i>STM32Cube package block diagram</i> . Updated URL in <a href="#">Section : Ordering Information</a>
28-Aug-2015	3	Updated STM32CubeF4 block diagram on cover page.
23-Jun-2017	4	Updated STM32CubeF4 firmware component schematic on cover page. Added low-layer API drivers. Updated document title.

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