

Digital MEMS microphone acquisition and processing software expansion for STM32Cube

Application	X-CUBE-MEMSMIC1		
Middleware	PDM2PCM	USB Device Audio Class	AcousticBF
	AcousticSL		
Hardware Abstraction	STM32Cube Hardware Abstraction Layer (HAL)		
Hardware	STM32 Nucleo expansion boards X-NUCLEO-CCA02M1 (Sense)		
	STM32 Nucleo development board		



Features

- Complete middleware to build applications using MEMS digital microphones ([MP34DT01-M](#))
- Easy portability across different MCU families thanks to [STM32Cube](#)
- Audio input class USB driver to allow the recognition of the device as a standard USB microphone and enable audio streaming
- PC-based streaming using third-party standard audio editors
- Free, user-friendly license terms
- Microphone acquisition sample implementation available on the [X-NUCLEO-CCA02M1](#) board when connected to a [NUCLEO-F401RE](#), [NUCLEO-L476RG](#) or [NUCLEO-F746ZG](#) board
- Advanced processing applications based on ST acoustic libraries for [NUCLEO-F401RE](#), including AcousticBF (real time beamforming) sample and AcousticSL (real time sound source localization) sample

Description

[X-CUBE-MEMSMIC1](#) is an expansion software package for [STM32Cube](#).

The software runs on the STM32 and includes drivers and middleware for audio data acquisition from MEMS digital microphones ([MP34DT01-M](#)) and USB streaming of the recorded signals.

The expansion is built on STM32Cube software technology to ease portability across different STM32 microcontrollers and comes with examples showing [X-NUCLEO-CCA02M1](#) capabilities when connected to [NUCLEO-F401RE](#), [NUCLEO-L476RG](#) or [NUCLEO-F746ZG](#) board.

Product summary	
Digital MEMS microphones acquisition and processing software expansion for STM32Cube	X-CUBE-MEMSMIC1
Digital MEMS microphone, low power, ultra-compact, top-port, omnidirectional	MP34DT01-M
Digital MEMS microphones expansion board based on MP34DT01-M for STM32 Nucleo	X-NUCLEO-CCA02M1

1 Detailed description



What is STM32Cube?

STM32Cube™ is designed by STMicroelectronics to reduce development effort, time and cost across the entire STM32 portfolio.

STM32Cube version 1.x includes:

- STM32CubeMX, a graphical software configuration tool that allows the generation of C initialization code using graphical wizards.
- A comprehensive embedded software platform specific to each series (such as the STM32Cube for the STM32 series), which includes:
 - the STM32Cube HAL embedded abstraction-layer software, ensuring maximized portability across the STM32 portfolio
 - a consistent set of middleware components such as RTOS, USB, TCP/IP and graphics
 - all embedded software utilities with a full set of examples

How does this software complement STM32Cube?

The proposed software is based on the STM32CubeHAL, the hardware abstraction layer for the STM32 microcontroller. The package extends [STM32Cube](#) by providing a board support package (BSP) for the MEMS microphones expansion board and some middleware components for PDM to PCM conversion and USB communication with a PC. The drivers abstract low-level details of the hardware and allow the middleware components and applications to access audio data in a hardware-independent manner. The package also includes a sample application that developers can use to start experimenting with the code. The sample application was developed to enable device recognition as a standard multichannel USB microphone and audio streaming on a PC. For this purpose, a Windows PC utility is needed (not included in the package) in order to record and save the audio stream. Any freeware or commercial audio recording software can be used.

Revision history

Table 1. Document revision history

Date	Version	Changes
21-May-2015	1	Initial release.
27-Jan-2016	2	Updated cover page Features Updated cover page Description
29-Jan-2016	3	Updated cover page image
11-Jul-2016	4	Updated cover page Features Updated cover page Description
09-May-2017	5	Updated cover page image and features.
18-Apr-2018	6	Updated cover image. Removed references to NUCLEO-F072RB and NUCLEO-L053R8 boards.

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