Quick Start Guide

Digital MEMS microphone expansion board based on MP34DT06J for STM32 Nucleo

(X-NUCLEO-CCA02M2)

Version 1.0 (Jan 31, 2020)
Quick Start Guide Contents

- X-NUCLEO-CCA02M2: Digital MEMS microphone expansion board
  Hardware and Software overview

- Setup & Demo Examples
  Documents & Related Resources

- STM32 Open Development Environment: Overview
Digital MEMS microphone expansion board (X-NUCLEO-CCA02M2)

Hardware Description

• The X-NUCLEO-CCA02M2 is an expansion board that has been designed around MP34DT06J digital MEMS microphone. It is compatible with the ST morpho connector layout and with digital microphone coupon boards such as STEVAL-MIC001V1, STEVAL-MIC002V1 and STEVAL-MIC003V1.

• The X-NUCLEO-CCA02M2 embeds two MP34DT06J microphones and allows synchronized acquisition and streaming of up to 4 microphones through I²S, SPI, DFSDM or SAI peripherals.

Key Products on board

MP34DT06J
ultra-compact, low-power, omnidirectional, digital MEMS microphone built with a capacitive sensing element and an IC interface.

Latest info available at www.st.com X-NUCLEO-CCA02M2
Digital MEMS microphone expansion board (X-NUCLEO-CCA02M2)

Software overview

X-CUBE-MEMSMIC1 software description

- The X-CUBE-MEMSMIC1 software provides the complete STM32 middleware to build applications using analog and digital MEMS microphones. The software expands the STM32Cube range of solutions and is easily ported across different MCU families.
- Microphone acquisition sample implementation are available on the X-NUCLEO-CCA02M2 expansion board when connected to a P-NUCLEO-WB55, NUCLEO-F401RE, NUCLEO-L476RG or NUCLEO-F746ZG development board.

Key features

- Complete middleware to build applications using MEMS digital microphones (MP34DT06J) and analog microphones (MP23ABS1)
- 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
Quick Start Guide Contents

X-NUCLEO-CCA02M2: Digital MEMS microphone expansion board
Hardware and Software overview

Setup & Demo Examples
Documents & Related Resources

STM32 Open Development Environment: Overview
Setup & Demo Examples

HW prerequisites

- 1x Digital MEMS microphone expansion board (X-NUCLEO-CCA02M2)
- 1x STM32 Nucleo development board (P-NUCLEO-WB55 or NUCLEO-F401RE or NUCLEO-L476RG or NUCLEO-F746ZG)
- 1x USB type A to Mini-B USB cable to connect the X-NUCLEO-CCA02M2 to the PC for USB streaming
- Optional: microphone coupon board to allow acquisition of four microphones
  - Compatible with:
    - STEVAL-MIC001V1
    - STEVAL-MIC002V1
    - STEVAL-MIC003V1
Setup & Demo Examples

SW prerequisites

- **STSW-LINK008**: ST-LINK/V2-1 USB driver

- **STSW-LINK007**: ST-LINK/V2-1 firmware upgrade

- **X-CUBE-MEMSMIC1** ([Link](#))
  - The package will contain source code example (Keil, IAR, STM32CubeIDE) based on P-NUCLEO-WB55, NUCLEO-F401RE, NUCLEO-L476RG or NUCLEO-F746ZG performing audio acquisition and USB streaming
  - When the system is flashed and connected to the PC by means of the X-NUCLEO-CCA02M2 USB connector, it is recognized as a standard multichannel USB microphone

- Generic third party software for audio acquisition
  - **Audacity®** is a free, open source, cross-platform software for recording and editing sounds. It can be a suitable choice to allow PC-based audio capture.
  - In Windows 7, the official version of Audacity can only record up to 2 microphone. In order to support more microphone on Windows seven you can have a look to the ASIO Audio interface.
Digital MEMS microphone expansion board (X-NUCLEO-CCA02M2)  
Start coding in just a few minutes with X-CUBE-MEMSMIC1

1. Go to www.st.com/x-nucleo
2. Select X-NUCLEO-CCA02M2
3. Download & unpack X-CUBE-MEMSMIC1
4. Download & install STM32 Nucleo ST-LINK/V2-1 USB driver
5. Open project example Microphone Streaming
6. Modify, build application

X-CUBE-MEMSMIC1 package

- Nucleo & X-NUCLEO-CCA02M2 docs
- MEMS digital microphone BSP driver
- PDM to PCM library, USB Audio Class
- Application example

Open project example

Modify, build application
Digital MEMS microphone expansion board (X-NUCLEO-CCA02M2)
Evaluate audio streaming using X-CUBE-MEMSMIC1 and Audacity (1/2)

1. Download & install STM32 Nucleo ST-LINK/V2-1 USB driver

2. Install the open source audio recording software Audacity from http://web.audacityteam.org/

3. Move JP5 jumper on NUCLEO board on the U5V position

4. Connect USB cable to the STM32 Nucleo USB connector

5. From X-CUBE-MEMSMIC1 SW resource package
   Drag and drop Microphones_Streaming.bin on Nucleo drive
Digital MEMS microphone expansion board (X-NUCLEO-CCA02M2)

Evaluate audio streaming using X-CUBE-MEMSMIC1 and Audacity (2/2)

6. Move JP5 jumper on NUCLEO board on the E5V position

7. Connect USB cable to the X-NUCLEO-CCA02M2 USB connector and be sure that J1 on the same board is closed

8. The board is recognized as a standard 2 channels USB microphone

9. Open Audacity and start recording
All documents are available in the DESIGN tab of the related products webpage

X-NUCLEO-CCA02M2:
- Gerber files, BOM, and schematics
- **DB4016**: Digital MEMS microphone expansion board based on MP34DT06J for STM32 Nucleo – [Data brief](#)
- **UM2631**: Getting started with the digital MEMS microphone expansion board based on MP34DT06J for STM32 Nucleo – [User Manual](#)

X-CUBE-MEMSMIC1:
- **DB2599**: Analog and digital MEMS microphone acquisition and processing software expansion for STM32Cube – [Data brief](#)
- **UM1901**: Getting started with the software package for analog and digital MEMS microphones in X-CUBE-MEMSMIC1 expansion for STM32Cube – [User Manual](#)
- Software setup file

Consult www.st.com for the complete list
Quick Start Guide Contents

X-NUCLEO-CCA02M2: Digital MEMS microphone expansion board
Hardware and Software overview

Setup & Demo Examples
Documents & Related Resources

STM32 Open Development Environment: Overview
The STM32 Open Development Environment (ODE) consists of a set of stackable boards and a modular open SW environment designed around the STM32 microcontroller family.
STM32 Nucleo Development Boards (NUCLEO)

• A comprehensive range of affordable development boards for all the STM32 microcontroller series, with unlimited unified expansion capabilities and integrated debugger/programmer functionality.
STM32 Nucleo Expansion Boards (X-NUCLEO)

- Boards with additional functionality that can be plugged directly on top of the STM32 Nucleo development board directly or stacked on another expansion board.

Example of STM32 expansion board (X-NUCLEO-IKS01A1)

- Sense
- Connect
- Power
- Move/Actuate
- Interact

Motion MEMS sensors
Environmental sensors
DIL24 support for new devices

www.st.com/x-nucleo
STM32 Open Development Environment
Software components

- **STM32Cube software (CUBE)** - A set of free tools and embedded software bricks to enable fast and easy development on the STM32, including a Hardware Abstraction Layer and middleware bricks.

- **STM32Cube expansion software (X-CUBE)** - Expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework. It provides abstracted access to expansion board functionality through high-level APIs and sample applications.

- **Compatibility with multiple Development Environments** - The STM32 Open Development Environment is compatible with a number of IDEs including IAR EWARM, Keil MDK, and GCC-based environments. Users can choose from three IDEs from leading vendors, which are free of charge and deployed in close cooperation with ST. These include Eclipse-based IDEs such as Ac6 System Workbench for STM32 and the MDK-ARM environment.

---

**OPEN LICENSE MODELS:** STM32Cube software and sample applications are covered by a mix of fully open source BSD license and ST licenses with very permissive terms.

www.st.com/stm32cube
www.st.com/x-cube
STM32 Open Development Environment
Building block approach

The building blocks

- **Sense**
  - Accelerometer, gyroscope
  - Inertial modules, magnetometer
  - Pressure, temperature, humidity
  - Proximity, microphone

- **Connect**
  - Bluetooth LE, Sub-GHz radio
  - NFC, Wi-Fi, GNSS

- **Translate**
  - Audio amplifier
  - Touch controller
  - Operation Amplifier

- **Move / Actuate**
  - Stepper motor driver
  - DC & BLDC motor driver
  - Industrial input / output

- **Power**
  - Energy management & battery

- **Process**
  - General-purpose microcontrollers
  - Secure microcontrollers

- **Software**

Your need

Our answer

COLLECT

TRANSMIT

ACCESS

CREATE

POWER

PROCESS

www.st.com/stm32ode