Quick Start Guide

Digital MEMS Microphones expansion board based on MP34DT01-M for STM32 Nucleo (X-NUCLEO-CCA02M1)

Version 1.0 (Jun 15, 2015)

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Overview

1. Introduction to the STM32 Open Development Environment
2. STM32 Nucleo Digital MEMS microphone expansion board
   - Hardware overview
   - Software overview
3. Documents & related resources
4. Setup & demo examples

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STM32 Open Development Environment

Lowering the barriers for “developers”

Easy access to technology

Idea

Device prototype

Application software development

Form-factor device

Field testing

Final device

Commercial software

Market

Fast, flexible, affordable and based on commercial components

Scalable software for faster time to market

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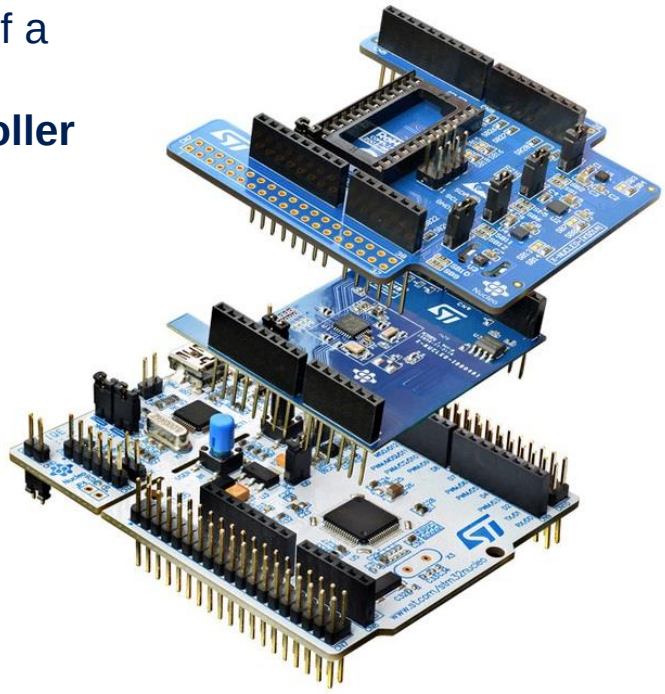
STM32 Open Development Environment

The STM32 Open Development Environment consists of a set of **modular developer boards** and a **software environment** designed around the **STM32 microcontroller** family



STM32 Nucleo development boards

STM32Cube development software

STM32 Nucleo expansion boards

STM32Cube expansion software

Compatibility with multiple development environments

STM32 Nucleo

STM32 Cube

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STM32 Open Development Environment

Building block approach

The building blocks	Your need	Our answer

Accelerometer, gyroscope, inertial modules, magnetometer, pressure, temperature, humidity, UV, proximity, microphone

Sense — COLLECT

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

Connect — TRANSMIT

Audio amplifier
Touch controller
Operation amplifier

Translate — ACCESS

Stepper motor driver
DC & BLDC motor driver

Move / Actuate — CREATE

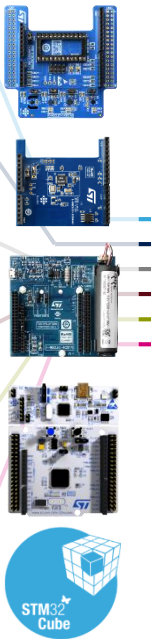
Energy management & battery

Power — POWER

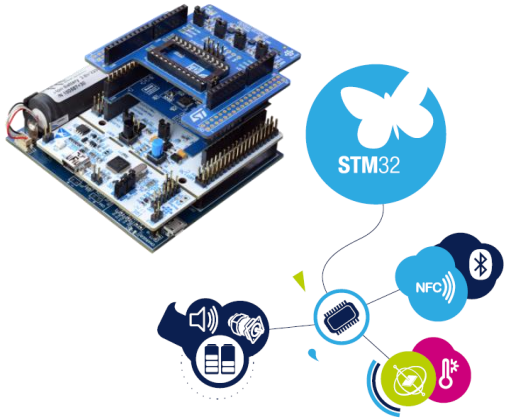
General-purpose microcontrollers
Secure microcontrollers

Process — PROCESS

Software



STM32 Open
Development Environment



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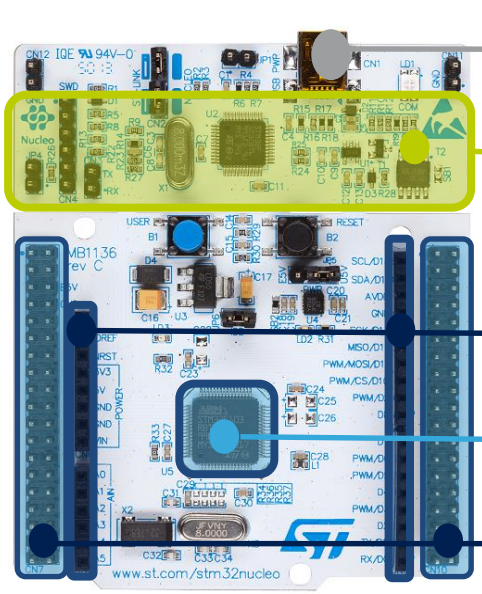
STM32 Nucleo development board

- Based on ST's 32-bit ARM® Cortex® -M -based STM32 microcontrollers
  - Development board with 1 STM32 MCU and hardware to program/debug
- Two connectors for companion chip boards
- For all STM32 families



STM32 L0 STM32 L1 STM32 F0 STM32 F1 STM32 F2 STM32 F3 STM32 F4 STM32 F7

Complete product range
from ultra-low power to high-performance

(*) Thanks to its electrical compatibility, it can be used as a shield for Arduino UNO R3 or similar.

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Digital MEMS microphone expansion board

Hardware overview

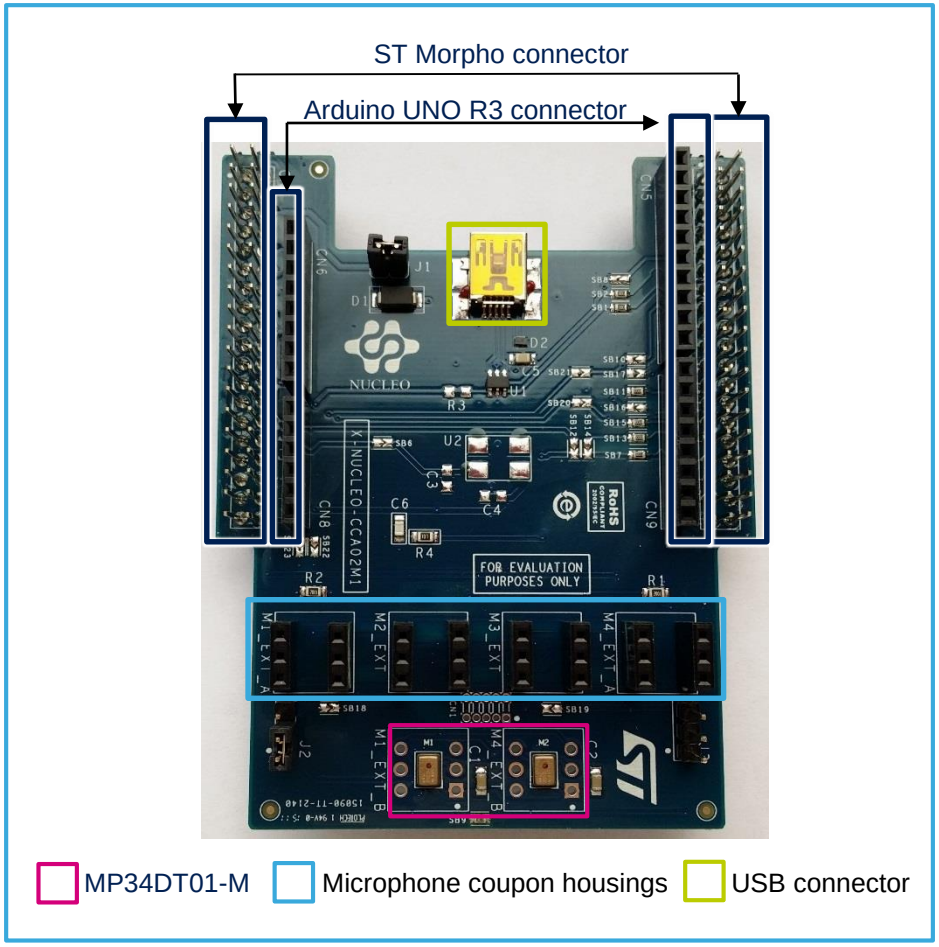
Hardware description

- The X-NUCLEO-CCA02M1 is an evaluation board based on digital MEMS microphones. It has two MP34DT01–M microphones soldered on the board and offers the possibility to plug in additional microphones using MP34DT01-based coupon evaluation boards (STEVAL-MKI129V* or STEVAL-MKI155V*).
- The X-NUCLEO-CCA02M1 enables the acquisition and streaming of up to 4 microphones using both I^2S and SPI busses available on ST Morpho connector.

Key products on board

MP34DT01-M

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



Order Code: X-NUCLEO-CCA02M1

Latest info available at
X-NUCLEO-CCA02M1

* is used as a wildcard character for related part number

Digital MEMS microphone expansion board
STM32Cube expansion software

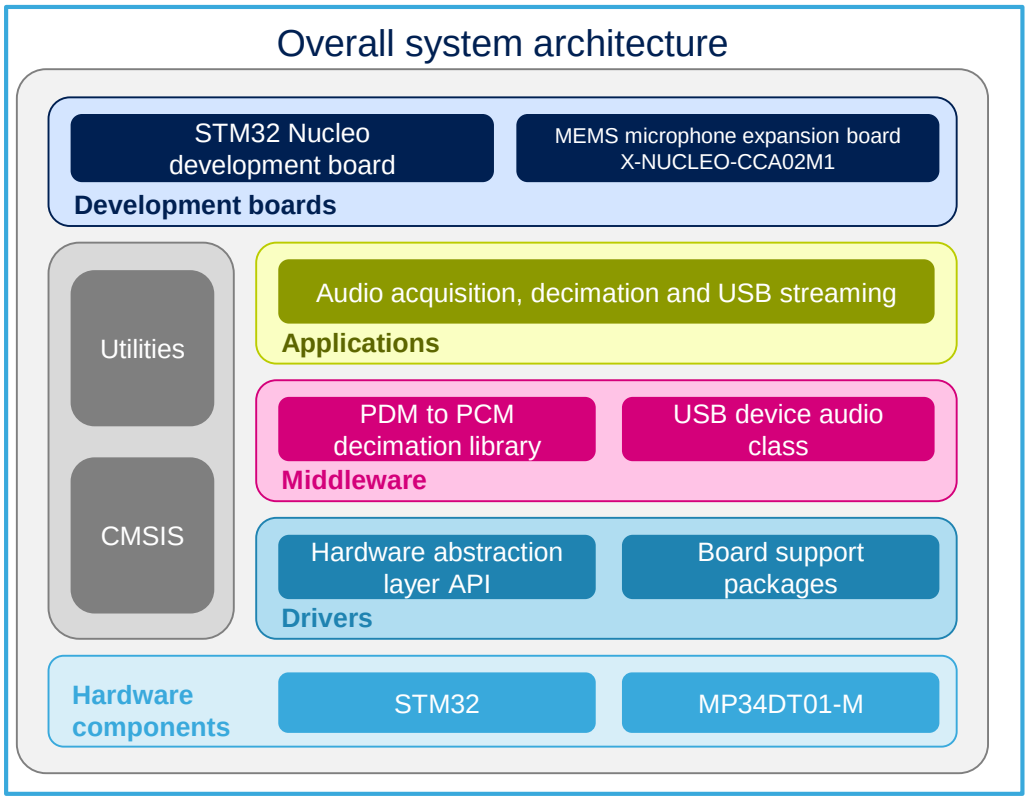
X-CUBE-MEMSMIC1 software description

- The software running on the STM32 MCU includes drivers and middleware for audio data acquisition from the MEMS digital microphones (MP34DT01-M) and USB streaming of the recorded signals.
- Implementation examples are available showing X-NUCLEO-CCA02M1 capabilities when connected to a NUCLEO-401RE, NUCLEO-F072RB or NUCLEO-L053R8 Nucleo board.
- It represents an easy and fast solution for the development of microphone-based applications as well as a starting point for audio algorithm implementation.

Key features

- Complete middleware to build applications using the digital MEMS microphone network processor
- Easy portability across different MCU families, thanks to the STM32Cube
- Sample applications that the developer can use to start experimenting with the code
- Free, user-friendly license terms

Latest software available at
X-CUBE-MEMSMIC1



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Documents & related resources

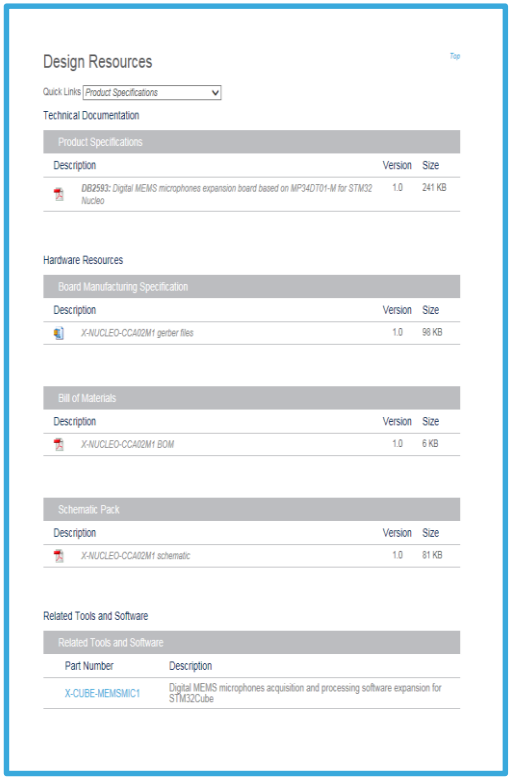
All documents are available in the Design Resources tab of the MEMS microphone expansion board webpage

X-NUCLEO-CCA02M1: Product webpage (Link)

- Gerber files, BOM, schematics
- DB2593: Digital MEMS microphones expansion board based on MP34DT01-M for STM32 Nucleo - Databrief
- UM1900: Getting started with the digital MEMS microphones expansion board based on MP34DT01-M for STM32 Nucleo – User manual

X-CUBE-MEMSMIC1: Product webpage (Link)

- DB2599: Digital MEMS microphone acquisition and processing software expansion for STM32Cube - Databrief
- UM1901: Getting started with the software package for digital MEMS microphones in X-CUBE-MEMSMIC1 expansion for STM32Cube – User manual
- Software setup file



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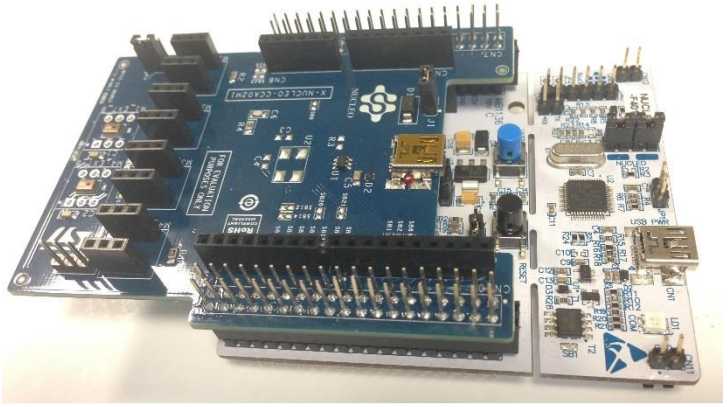
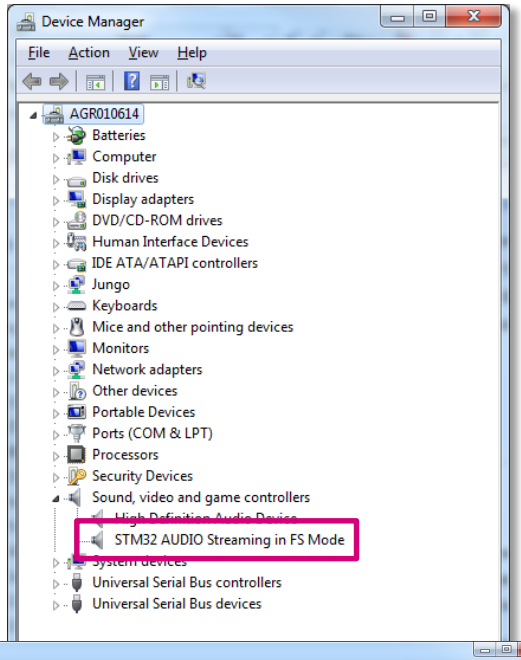
Setup & demo examples
Hardware prerequisites

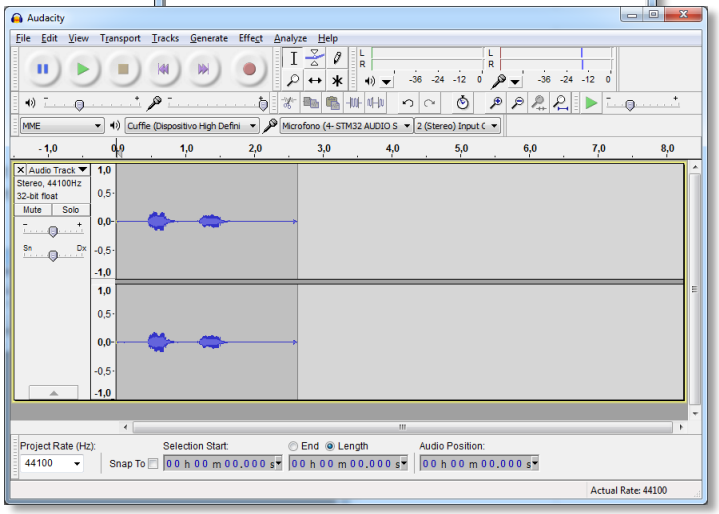
- STM32 Nucleo Digital MEMS microphone expansion board (X-NUCLEO-CCA02M1)
- STM32 Nucleo development board (NUCLEO-F401RE, NUCLEO-F072RB or NUCLEO-L053R8)
- One USB type A to mini-B USB cable to connect the X-NUCLEO-CCA02M1 to the PC for USB streaming
- PC based on Windows, Linux or OSX operating systems
- Optional: microphone coupon board to allow acquisition of four microphones
  - Compatible with:
    - STEVAL-MKI155V1, STEVAL-MKI155V2, and STEVAL-MKI155V3
    - STEVAL-MKI129V1, STEVAL-MKI129V2, and STEVAL-MKI129V3



Software prerequisites

- ST-LINK/V2-1 USB driver (Link)
- ST-LINK/V2-1 firmware upgrade (Link)
- X-CUBE-MEMSMIC1 (Link)
  - The package contains source code examples (Keil, IAR, SW4STM32) based on NUCLEO-F401RE, NUCLEO-F072RB or NUCLEO-L053R8 performing audio acquisition and USB streaming
  - When the system is flashed and connected to the PC by means of the X-NUCLEO-CCA02M1 USB connector, it is recognized as a standard multichannel USB microphone
- Generic third-party software for audio acquisition
  - Audacity® is free, open-source, cross-platform software for recording and editing sounds. It can be a suitable choice for PC-based audio capture.
  - In Windows 7, the Audacity version is capable of recording sound from up to 2 microphones





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Digital MEMS microphone expansion board

Start coding in just a few minutes with X-CUBE-MEMSMIC1

1 Go to www.st.com/x-nucleo

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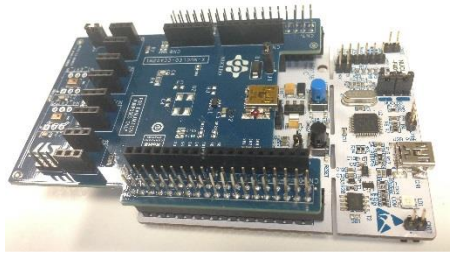
2 Select
X-NUCLEO-CCA02M1

3 Download & unpack
X-CUBE-MEMSMIC1

X-CUBE-MEMSMIC1 package

- _htmresc
- Documentation — Nucleo & X-NUCLEO-CCA02M1 docs
- Drivers — MEMS digital microphone BSP driver
- Middlewares — PDM to PCM library, USB Audio Class
- Projects — Application example
- package.xml
- Release_Notes.html

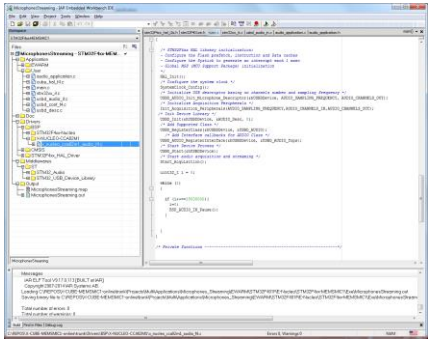
4 Download & install STM32
Nucleo ST-LINK/V2-1 USB driver



5 Open project example
Microphone streaming

KEIL Tools by ARM — IAR SYSTEMS — ac6 Assistance Conseil Systemes

6 Modify and build application



Digital MEMS microphone expansion board

Evaluate audio streaming using X-CUBE-MEMSMIC1 and Audacity (1/2)

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

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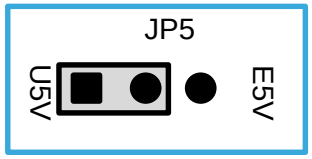
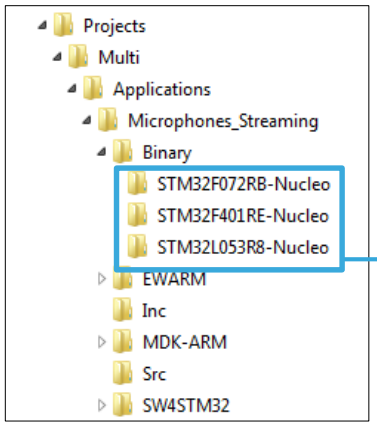
2 Install the open-source audio recording software Audacity from http://web.audacityteam.org/

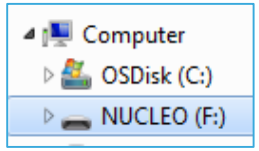
3 Move JP5 jumper on NUCLEO board to the U5V position



4 Connect USB cable to the NUCLEO USB connector

5 From X-CUBE-MEMSMIC1 SW resource package Drag and drop MicrophonesStreaming_2Channels_16kHz.bin on Nucleo drive

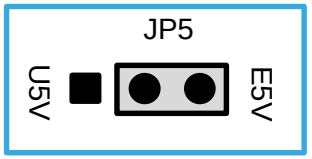


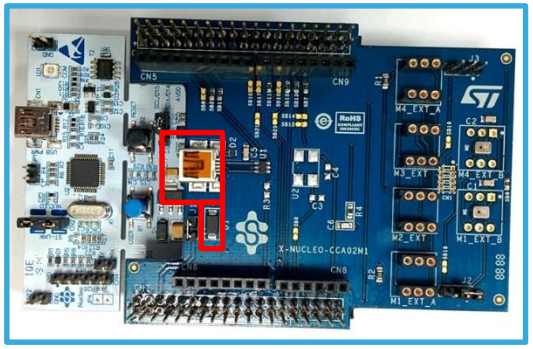


Digital MEMS microphone expansion board

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

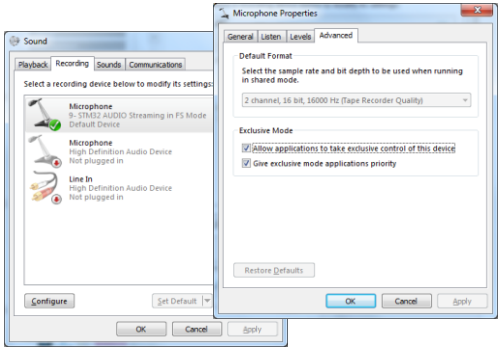
6 Move JP5 jumper on NUCLEO board to the E5V position

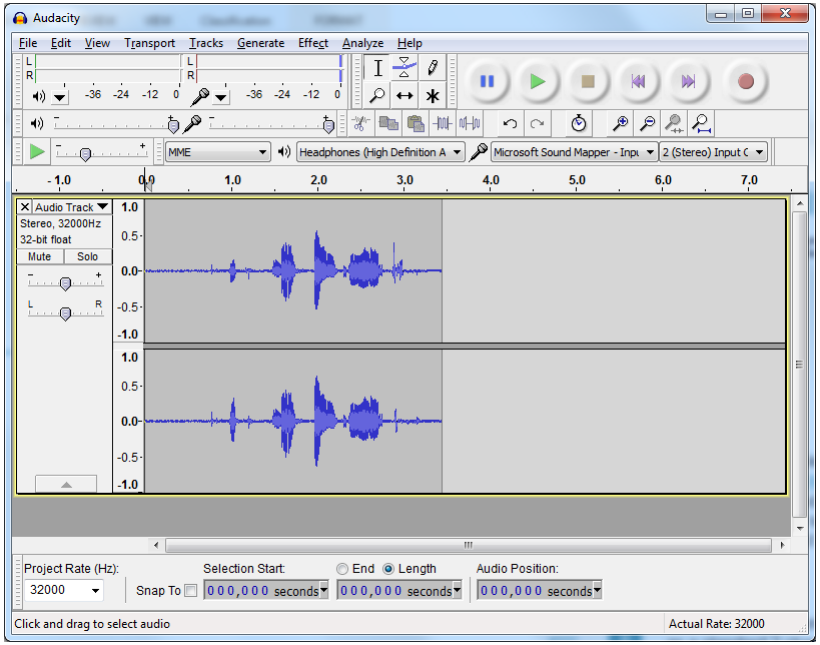




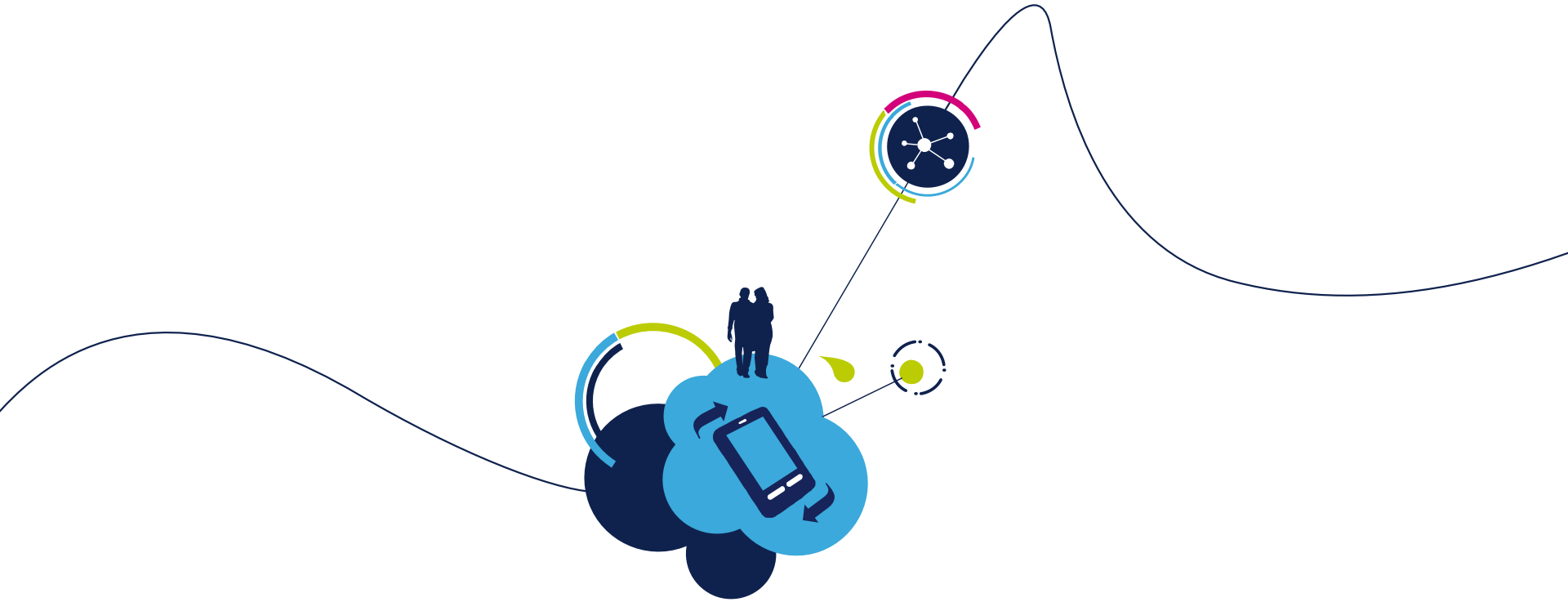
7 Connect USB cable to the X-NUCLEO-CCA02M1 USB connector and ensure that J1 on the same board is closed

8 The board is recognized as a standard 2-channel USB microphone





Open Audacity and start recording 9



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