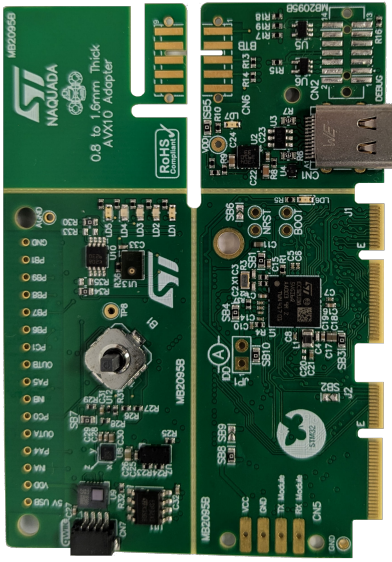## MicroMod-compatible reference design with STM32U385VG MCU

STDES-MB2095 global view. Picture is not contractual. PCB color may differ.

Product status
STDES-MB2095

Features

Includes ST state-of-the-art patented technology

Main features

- STM32U385VGI6Q ultralow-power microcontroller (96 MHz, 1-Mbyte flash memory, 256-Kbyte SRAM, BGA100 package)
- 3.3 V linear regulator (can be changed to 1.8 V with soldering rework)
- 6 user LEDs, of which 4 are PWM-dimmable
- Power LED
- 5-way analog joystick (connected to an STM32 ADC channel pin)
- Ultralow-power 3-axis MEMS accelerometer with embedded temperature sensor
- 1×1 Time-of-Flight (ToF) sensor with extended range measurement
- Low-power, high-sensitivity infrared (IR) sensor
- Omnidirectional digital microphone (connected to STM32U3 audio digital filter (ADF))
- 32-Mbit Quad-SPI EEPROM
- Dual OPAMP (can be used with a breadboard, or as a voltage follower to an ADC input or DAC output)
- USB-C® support
- Manually breakable board, composed of three main parts:
    - Peripheral board
    - SparkFun MicroMod-compatible MCU board
    - USB power adapter board with a linear regulator and debug connectors

Connectors

- 16-pin header to connect a solderless prototyping board or an electronic paper with silver pen
- Generic 3.3 V RS232 serial interface connector with power and ground
- 3.3 V Qwiic expansion connector
- SparkFun MicroMod M.2 expansion connector
- Board-to-board debug connector for STLINK-V3MINIE
- ST M.2 connector
- USB Type-C® power input connector
- STDC14 debug connector (unsoldered)

Software

- Comprehensive free software libraries and examples available with the STM32CubeU3 MCU Package
- Support of a wide choice of integrated development environments (IDEs), including IAR Embedded Workbench®, MDK-ARM, and STM32CubeIDE.

Description

The main objective of the STDES-MB2095 reference design is to provide a board for exploring and demonstrating the different possibilities offered by the STM32U3 series.

The board has a strong educational focus and consists of different, separable parts that can be used as standalone boards. It includes various STMicroelectronics components and can be used on its own or connected to a solderless breadboard, Qwiic boards, or selected SparkFun MicroMod carrier boards.

Using LEDs, a programmable demo displays the built-in sensors in standalone mode and allows control through a USB cable connected to a console application. Programming ARDUINO® and C applications is possible through USB or with an STLINK-V3MINIE debugger (not included).

1 General information

The STDES-MB2095 reference design uses an STM32U385VGI6Q microcontroller, which is based on the Arm® Cortex®-M33 processor.

Note: *Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.*

arm

1.1 EDA resources

All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the corresponding product page at *www.st.com*.

1.2 Laser safety consideration

The Time-of-Flight and gesture-detection sensor contains a laser emitter and the corresponding drive circuitry. The laser output is designed to remain within Class 1 laser safety limits under all reasonably foreseeable conditions including single faults in compliance with IEC 60825-1:2014 (third edition). The laser output remains within Class 1 limits if the recommended STMicroelectronics device settings are used and the operating conditions specified in the data sheet are followed. The laser output power must not be increased and no optics must be used with the intention of focusing the laser beam. Figure 1 shows the warning label for Class 1 laser products.

Figure 1. **Class 1 laser product label**

2   STDES-MB2095 codification
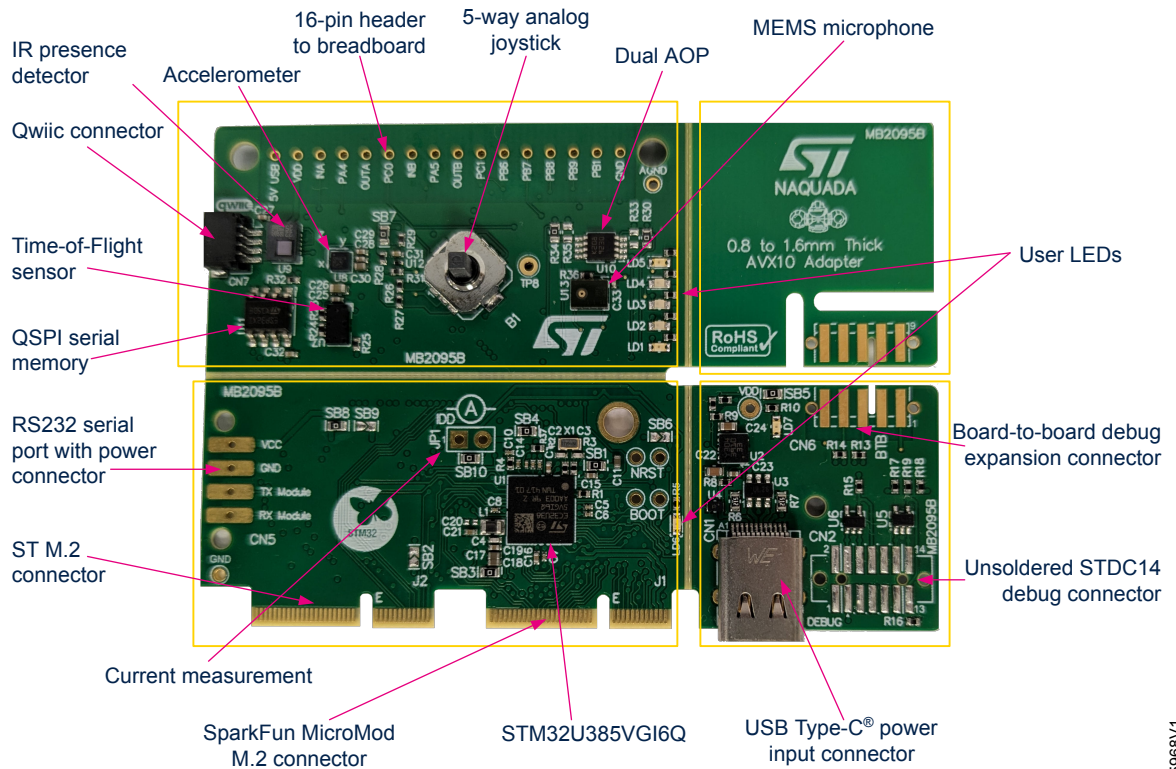
Table 1. STDES-MB2095 reference design codification

Example:	STDES-	MB	2095
Device family			
STDES- = STMicroelectronics reference design			
Board type			
MB = Main board			
Board number			
2095			

3 Hardware layout and configuration

3.1 Board layout

Figure 2 shows a top view of the MB2095 main board with its different elements.

Figure 2. MB2095 top view

The yellow rectangles indicate the different separable parts of the board

3.2 MEMS modules

The MB2095 board contains several STMicroelectronics MEMS modules:

- Omnidirectional digital microphone (IMP34DT05TR), connected to the STM32U385VGI6Q audio digital filter (ADF).
- Time-of-flight (ToF) sensor with extended range measurement (VL53L4CX), connected to the STM32U385VGI6Q I^{2}C.
- Low-power, high-sensitivity infrared (IR) sensor (STHS34PF80), connected to the STM32U385VGI6Q I^{2}C.
- Ultralow-power accelerometer with antialiasing and motion detection (LIS2DU12), connected to the STM32U385VGI6Q I^{2}C.

Revision history

Table 2. Document revision history

Date	Revision	Changes
09-Sep-2025	1	Initial release.

IMPORTANT NOTICE – READ CAREFULLY