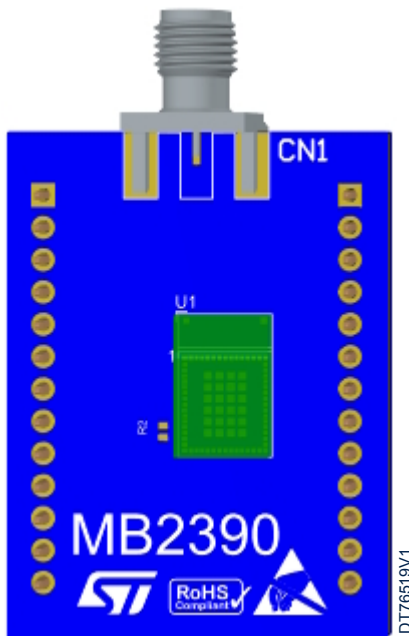


## Reference design for STM32WBxM modules



STDES-WB5M2L top view. Picture is not contractual. PCB color may differ.

### Features

**Includes ST state-of-the-art patented technology**

#### Reference design

- Module RF board

#### STM32WBxM module

- [STM32WB5MMG](#) module in an LGA package
- 2.4 GHz transceiver supporting Bluetooth® specification v5.4
- Dedicated Arm® Cortex®-M0+ processor for real-time radio layer

#### Connectors

- RF SMA for antenna
- Two 13-pin miniboard headers

#### Debugging/Programming

- Suitable for ST-LINK/V2 and STLINK-V3 debuggers/programmers with USB re-enumeration capability: mass storage, Virtual COM port, and debug port

#### Software

- Comprehensive free software libraries and examples available with the [STM32CubeWB](#) 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 STM32WBxM reference design is to recommend a layout and associated BOM for dedicated applications (this board is not for sale).

This reference design can be manufactured from files available for download from the [www.st.com](http://www.st.com) website. The access to all GPIOs allows the prototyping of a complete application.

Sensitive layout parts can be extracted and pasted in any user board design with the same PCB characteristics and feature set.

The STM32WBxM reference design is provided with the STM32WB series comprehensive software HAL library. The [STM32CubeWB](#) MCU Package contains many software examples developed with the STM32WB series Nucleo-64 boards. These examples can be easily adapted for the STM32WBxM reference design.

#### Product status

[STDES-WB5M2L](#)

## 1 General information

The STM32WBxM reference design runs the Bluetooth® LE stack on STM32WBxM modules based on the Arm® Cortex®-M0+ processor.

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



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## 2 Main features

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- STM32WBxM modules
  - Transmitter high output power, programmable up to +6 dBm
  - Rx sensitivity: -96 dBm at 1 Mbit/s, -100 dBm at 125 kbit/s (long range)
- 2-layer PCBs supported

### 3 STM32WBxM reference design and codification

**Table 1. STM32WBxM reference design**

Web reference	Board reference	Module order code	Module package	Number of layers	SMD or IPD
STDES-WB5M2L	MB2390	STM32WB5MMGH6	LGA86	2	SMD

**Table 2. STM32WBxM reference design codification**

Example:	STDES-	WB	5	M	2L
<b>Device family</b>					
STDES- = STMicroelectronics reference design					
<b>Bluetooth® wireless products</b>					
WB = Bluetooth® wireless communication					
<b>Feature level</b>					
5 = Full set of features					
<b>Component type</b>					
M = module					
<b>Reference design number of layers</b>					
2L = Two layers					

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## 4 Hardware layout and configuration

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### 4.1 Schematics and BOM (bill of materials)

All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the [STDES-WB5M2L](#) product page at [www.st.com](http://www.st.com).

### 4.2 IPD (integrated passive device)

- STMicroelectronics develops integrated passive device (IPD) companion chips for optimized matching, filtering, and balun.
- The IPD is integrated in the [STM32WB5MMGH6](#) device.

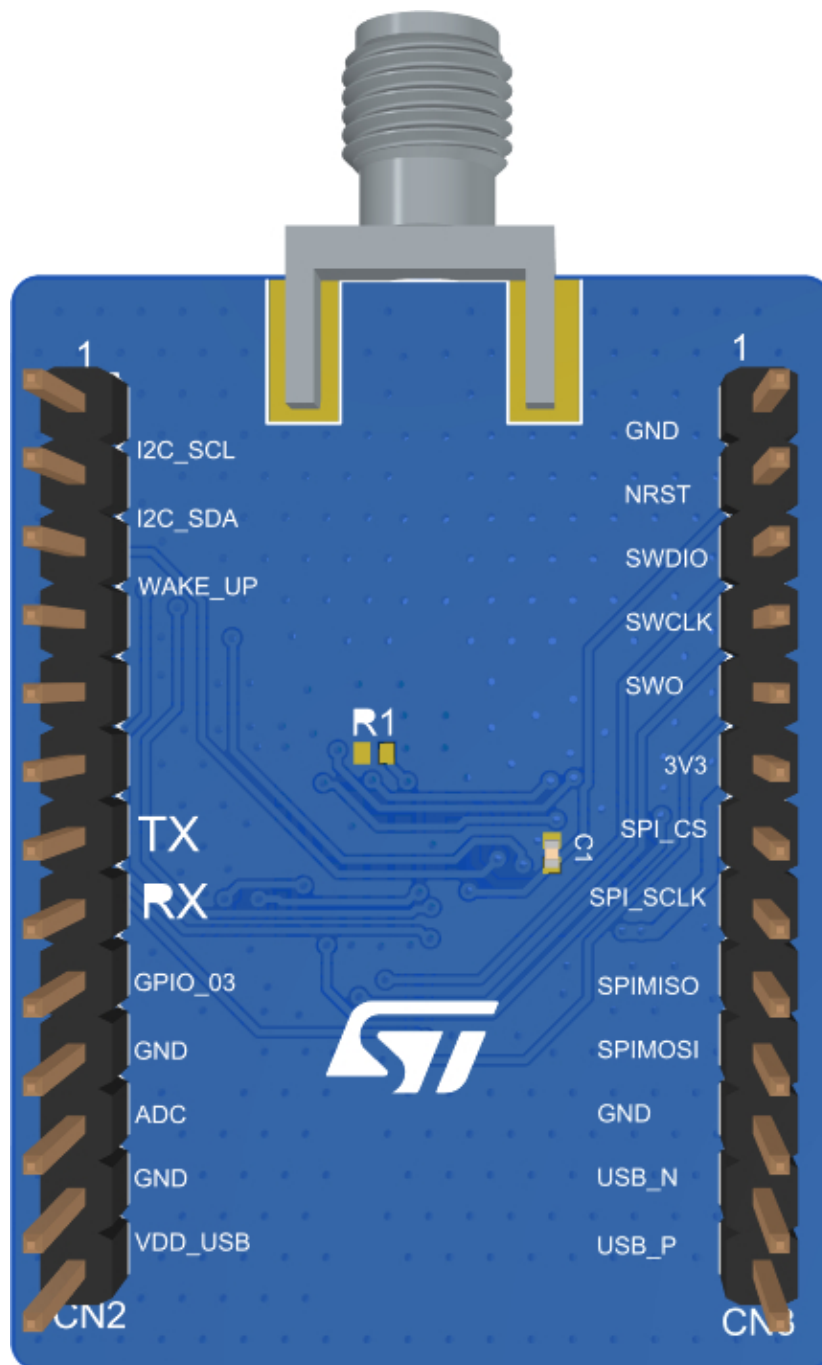
## 5 Firmware programming

To download firmware, it is enough to connect a serial-wire debug port from an external probe. For example, the [STLINK-V3SET](#) can be used to perform the connection easily.

SWDIO is linked to PA2 and SWCLK to PA3.

The SWD pins location in the side connectors is marked on the bottom silkscreen. NRST is indicated as well. The main power supply connections are highlighted as 3V3 and GND. An example is presented below.

**Figure 1. MB2390 SWD and power supply connections (bottom view)**



DT76520V2

## 6 Transparent mode and UART pins

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To test the RF performance using the transparent mode firmware, a UART must be connected. The DUT UART Tx and Rx pins are indicated on the bottom silkscreen (see [Figure 1](#)).

For more information about how to use the transparent mode firmware for performance measurements, refer to the *RF test panel* section of the user manual *STM32CubeMonitor-RF software tool for wireless performance measurements* ([UM2288](#)).

## Revision history

**Table 3. Document revision history**

Date	Revision	Changes
27-Feb-2025	1	Initial release.
24-Oct-2025	2	Updated the MB2390 bottom view in <a href="#">Figure 1</a> .



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