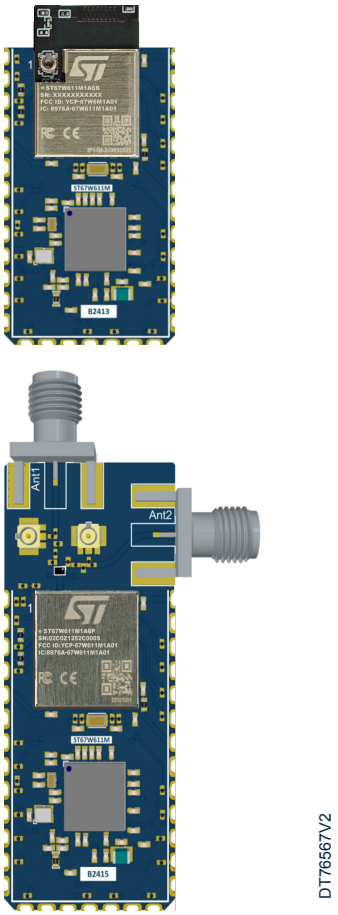
STDES-67W61xx-U5

Data brief

Reference designs for ST67W611M1 Wi-Fi 6 coprocessor with STM32U575AI microcontroller



STDES-67W61BU-U5 (top view with PCB antenna) and STDES-67W61P2-U5 (bottom view with RF switch for antenna diversity). Designs with different references show different layouts. Picture is not contractual. PCB color may differ.

Product status
STDES-67W61xx-U5
STDES-67W61BU-U5 STDES-67W61P1-U5 STDES-67W61P2-U5

Features

Includes ST state-of-the-art patented technology

Reference designs

- Fully open hardware platforms
- Based on the ST67W611M1 network coprocessor module
- Suitable for rapid prototyping of end nodes using Wi-Fi 6 and Bluetooth® LE protocols with the STM32U575AI host microcontroller

ST67W611M1A6B/U/P coprocessor module

- PCB antenna or MHF4 connector:
  - ST67W611M1A6B module with PCB antenna in a 32-pin, 4-side LGA 1.27 mm pitch (17.28 × 12.28 × 2.37 mm) package
  - ST67W611M1A6U module with MHF4 connector in a 32-pin, 4-side LGA 1.27 mm pitch (12.28 × 12.28 × 2.37 mm) package
  - ST67W611M1A6P module with MHF4 connector in a 32-pin, 4-side LGA 1.27 mm pitch (12.28 × 12.28 × 2.37 mm) package
- 1 × 1 2.4 GHz Wi-Fi 6/Bluetooth® LE combo all-in-one SoC
- Wi-Fi 6, coprocessor IEEE 802.11 b/g/n/ax
- Single-band 2.4 GHz
- Low-power Wi-Fi® with various sleep modes

STM32U575AII6Q host microcontroller

- Ultra-low-power Arm® Cortex®-M33 32-bit MCU with Arm® TrustZone® and FPU
- 240 DMIPS, 2 Mbytes of flash memory, 786 Kbytes of SRAM
- BGA169 (7 × 7 mm) package
- Dedicated pinout supporting SMPS step-down converter

Description

The main objective of the ST67W611M1 reference designs, STDES-67W61BU-U5 (B and U versions, with STM32U5), STDES-67W61P1-U5 (P version, single antenna, with STM32U5), and STDES-67W61P2-U5 (P version with antenna diversity, with STM32U5), is to recommend layouts and associated BOMs for dedicated applications (these boards are not for sale).

The other objective is to show the good coexistence of the ST67W611M1 coprocessor module with the STM32U575AI host microcontroller in a small board form factor. Performance has been assessed and FCC and CE certification checks have been done by an independent test laboratory.

These reference designs can be manufactured from files available for download from the *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.

Utilizing the reference designs for user applications helps achieve suitable RF performance and aids in passing certification.

1 General information

The ST67W611M1 reference designs for Wi-Fi 6 and Bluetooth® LE connectivity feature an STM32U5 microcontroller based on the Arm® Cortex®-M33 processor with Arm® TrustZone®.

Note: Arm and TrustZone are registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

2 Main features

Reference board content

- ST67W611M1A6B, ST67W611M1A6P, or ST67W611M1A6U Wi-Fi 6 - Bluetooth® LE combo coprocessor module and STM32U575AII6Q host microcontroller
- External 32 kHz crystal for the ST67W611M1 (optional) and 32 kHz crystal for the STM32U575AI
- Decoupling capacitors
- RF switch (STDES-67W61P2-U5 only)
- SMA connectors (STDES-67W61P1-U5 and STDES-67W61P2-U5 only)
- U.FL/MHF4 connectors (footprint compatibility)

Standard Wi-Fi®, IEEE 802.11b/g/n/ax

- Maximum Tx power (11b, 1 Mbit/s): +21 dBm
- Tx power (HE40 and MCS9): +16 dBm
- Rx sensitivity (HE40 and MCS9): -67 dBm

Standard Bluetooth® LE

- Maximum Tx power:
  - Bluetooth® LE (2 Mbit/s): +10 dBm
  - Bluetooth® LE (1 Mbit/s): +10 dBm
- Rx sensitivity:
  - Bluetooth® LE (2 Mbit/s): -96.5 dBm
  - Bluetooth® LE (1 Mbit/s): -99 dBm

Board characteristics

- Four-layer FR4 PCB in a small form factor compatible with the STM32U575AI BGA package:
  - STDES-67W61BU-U5 (B2413): 20.32 × 34 mm
  - STDES-67W61P1-U5 (B2414): 20.32 × 44.91 mm
  - STDES-67W61P2-U5 (B2415): 20.32 × 48.65 mm
- All components are placed on the board top face

3 ST67W611M1 reference designs and codification

Table 1. ST67W611M1 coprocessor reference designs

Reference design	Board reference	Coprocessor part number	Coprocessor package	Number of layers
STDES-67W61BU-U5	B2413	ST67W611M1A6B	LGA36 (32 pins + 4 pads) 17.28 × 12.28 × 2.37 mm	4
		ST67W611M1A6U	LGA36 (32 pins + 4 pads) 12.28 × 12.28 × 2.37 mm	
STDES-67W61P1-U5	B2414	ST67W611M1A6P	LGA36 (32 pins + 4 pads) 12.28 × 12.28 × 2.37 mm	4
STDES-67W61P2-U5	B2415	ST67W611M1A6P	LGA36 (32 pins + 4 pads) 12.28 × 12.28 × 2.37 mm	4

Table 2. ST67W611M1 reference design codification

Example: STDES- 67W 6 1 BU -U5

Device family

STDES- = STMicroelectronics reference design

Wireless product

67W = Wi-Fi® product

Wireless protocol

6 = Wi-Fi 6

Application type

1 = Network coprocessor

Antenna

BU = PCB antenna (B) or MHF4 connector (U)

P1 = Pin version with single antenna

P2 = Pin version with Rx diversity

STM32 host microcontroller

-U5 = STM32U5 microcontroller

4 Hardware description

4.1 EDA resources

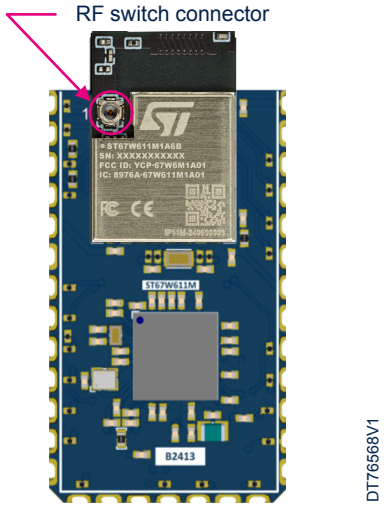
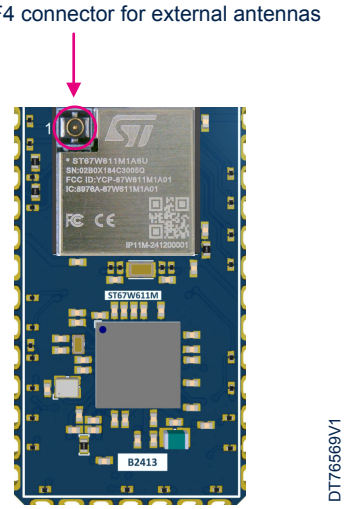
All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the corresponding product page at *www.st.com*.

4.2 Board description

Reference board

The STDES-67W61BU-U5 reference design corresponds to the B2413 reference board, available in two variants: one with a PCB antenna and the other one with an MHF4 connector. Both variants share the same ST67W611M1 and STM32U575AI pinouts but feature distinct antenna connectors and require specific cables.

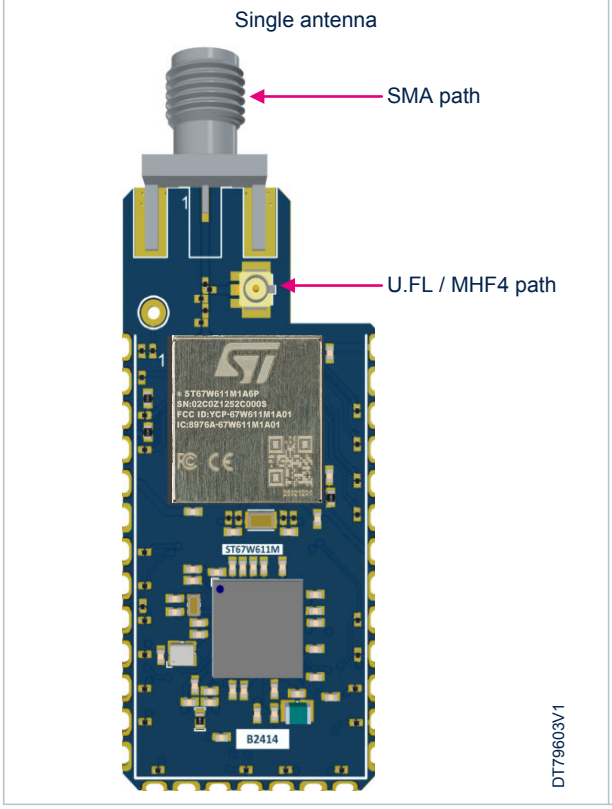
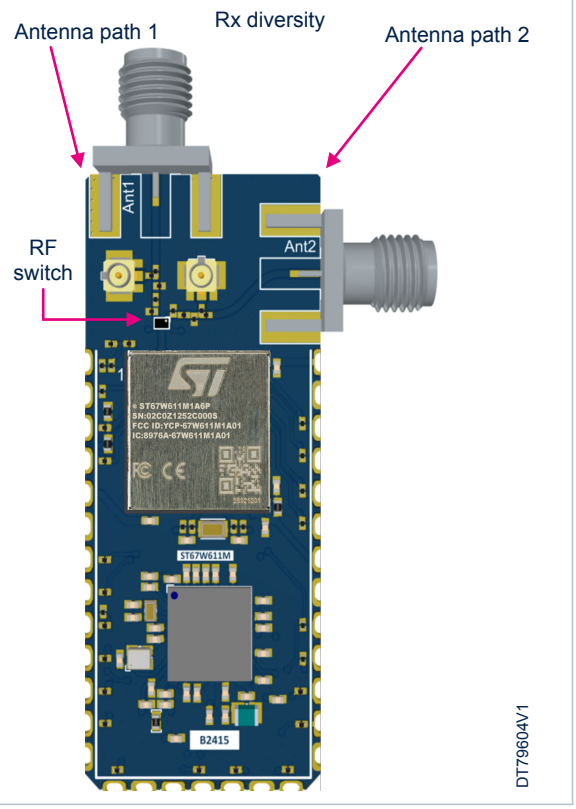
Table 3. Top views of the B2413 reference board

With PCB antenna	With MHF4 connector
	
Antenna cable examples	
Murata cable reference MXHQ87WJ3000	MHF4 cable CSJ-RGFB-100-MHF4

Note: On the variant with a PCB antenna, the RF switch connector is used only for conducted measurements, for test purpose only.

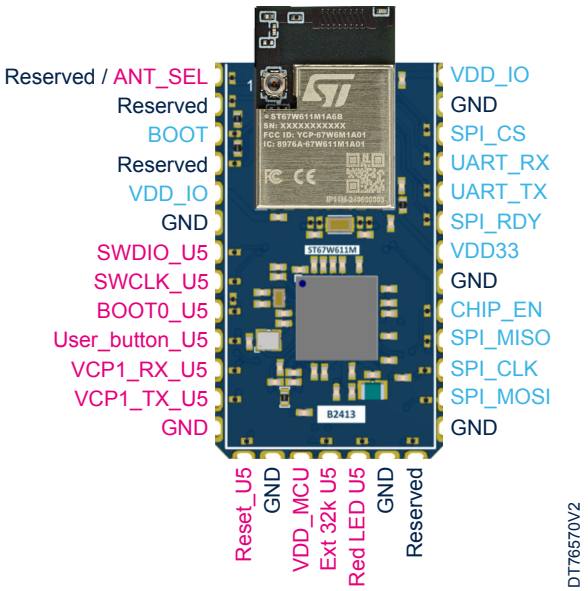
The STDES-67W61P1-U5 reference design corresponds to the B2414 reference board while the STDES-67W61P2-U5 reference design corresponds to the B2415 reference board. Both boards can be connected to antennas either by SMA or U.FL/MHF4 connectors (footprint is compatible for both).

Table 4. Top views of the B2414 and B2415 reference boards

B2414	B2415
	

The pinout of the reference boards is shown in Figure 1, using the PCB antenna variant of the B2413 as an example. The ST67W611M1 signals are shown in light blue, while the STM32U575AI signals are shown in pink. The pinout is the same for all the reference designs except for the ANT_SEL signal, which is only used on the STDES-67W61P2-U5 to control the RF switch

Figure 1. Pinout of the reference boards



Interface board

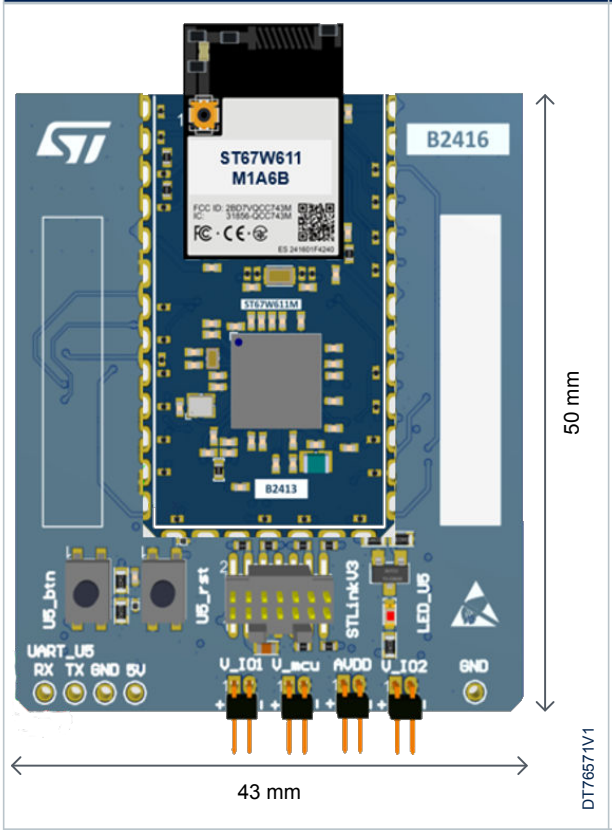
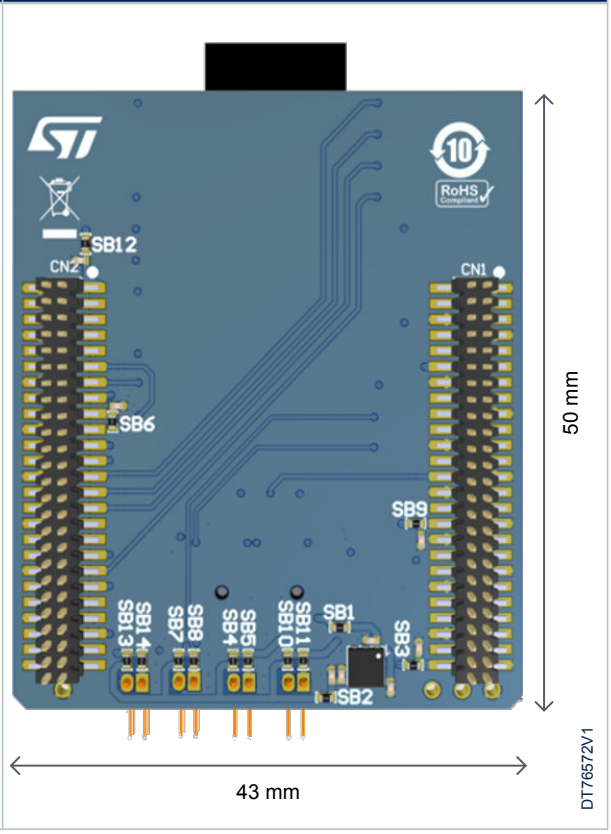
The B2413, B2414, and B2415 reference boards can each be soldered on the B2416 interface board. This interface board embeds:

- One STDC14 connector for the STLINK-V3
- One reset button
- One user button
- One UART link for the STM32U575AI

The interface board allows external control of the power supply.

EDA resources for this board are also available for download.

Table 5. B2416 interface board

B2416 top view	B2416 bottom view
	

4.3 ST67W611M1 32 kHz reference configuration

The 32 kHz reference of the ST67W611M1 can be configured using any of the following three solutions:

- ST67W611M1 internal 32.768 kHz
- External crystal
- 32.768 kHz from the STM32U575AI host microcontroller

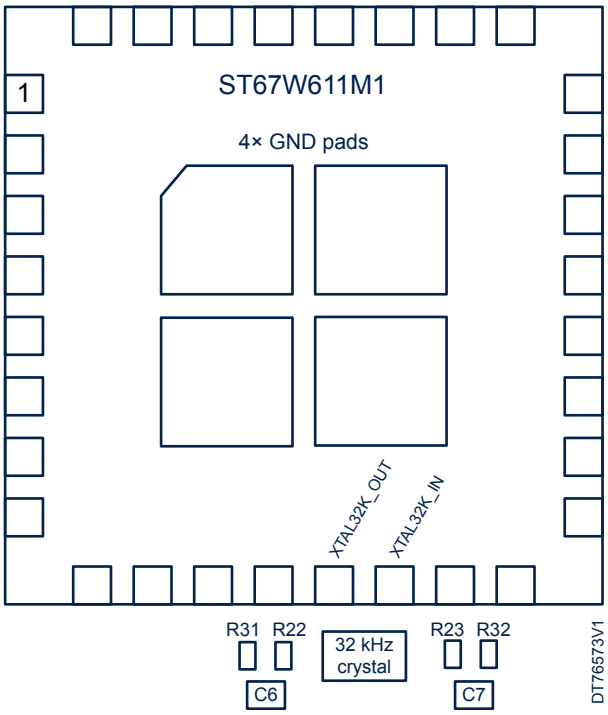
Refer to Table 6 and Figure 2 for the 32 kHz reference configuration of the ST67W611M1.

Table 6. 32 kHz solder bridge configuration

32 kHz source	Solder bridge resistors			
	R22	R23	R31	R32
Internal 32.768 kHz	OFF(1)	OFF(1)	ON(2)	ON(2)
External 32.768 kHz crystal	ON(2)	ON(2)	OFF(1)	OFF(1)
External 32.768 kHz from the STM32U575AI	OFF(1)	OFF(1)	ON(2)	OFF(1)

1. *Connection left open.*
2. *Connection closed by a 0 Ω resistor.*

Figure 2. 32 kHz configuration top view



4.4 Power supply configurations

Power supply pins:

- The ST67W611M1 has two power supplies:
  - VDDIO
  - VDD33
- All VDD pins of the STM32U575AI are connected to one single VDD_mcu

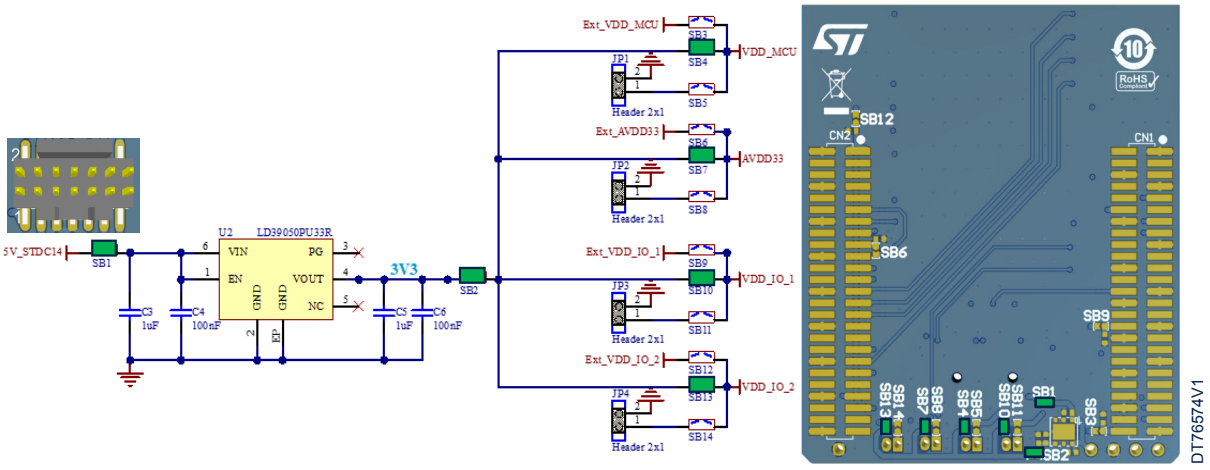
The B2413, B2414, and B2415 reference boards can be powered by any of the two following solutions through the B2416 interface board:

- STLINK-V3 through one LDO
- Separate connectors

4.4.1 Power supply from ST-LINK

Pin 1 of the STDC14 connector (ST-LINK) provides a 5 V supply to the LDO, which then generates the 3.3 V supply for all the VDD pins.

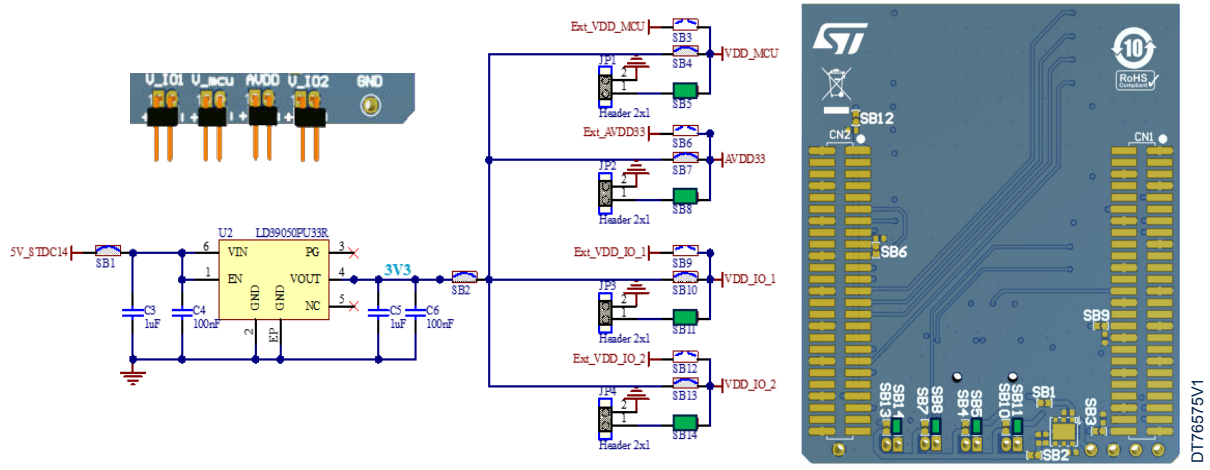
Figure 3. Solder bridges for the power supply from ST-LINK



4.4.2 Power supply from connectors

Each VDD can be supplied by the test points connectors or by the 3.3 V from the LDO.

Figure 4. Solder bridges for the power supply from connectors

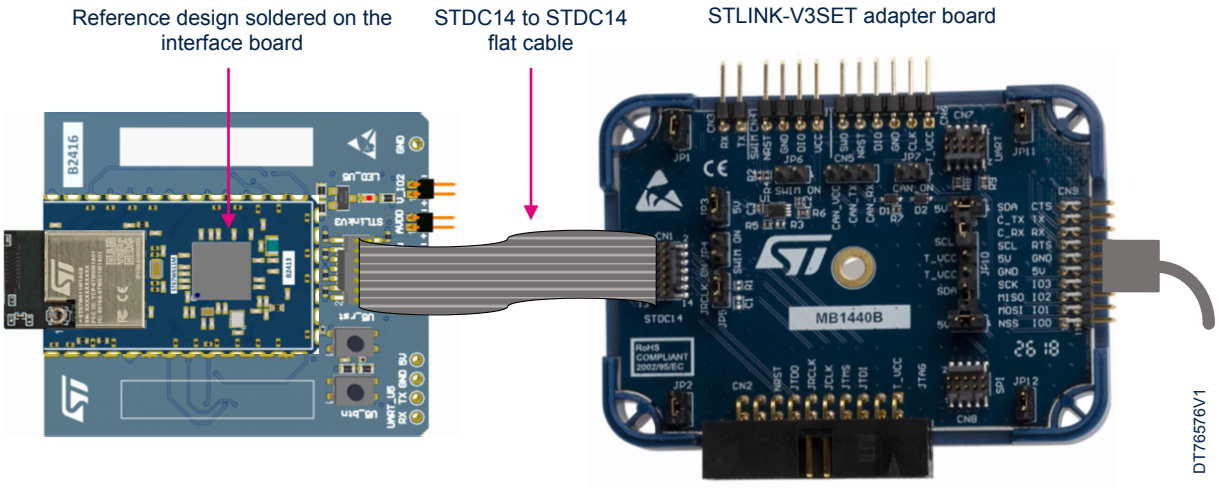


4.5 Firmware programming

The X-CUBE-ST67W61 Expansion Package, available on *www.st.com* for download, is compatible with the STDES-67W61BU-U5, STDES-67W61P1-U5, and STDES-67W61P2-U5 reference designs.

Figure 5 shows the firmware programming setup, where a flexible flat cable connects the STDC14 connectors of the B2416 interface board and of the MB1440 STLINK-V3SET adapter board.

Figure 5. Firmware programming setup with STLINK-V3SET



1. Download the X-CUBE-ST67W61 Expansion Package from the *www.st.com* website.
2. Launch `NCP_update_mission_profile.bat` available in the `ST67W6X_Utilities\Binairies` repository.
3. Connect a UART terminal of the PC to the STLINK-V3SET with the following settings:
   - UART terminal:
     - New line received = auto
     - New line transmit = LF (line feed)
   - Serial port:
     - COM port number
     - 921 600 baud rate
     - 8-bit data
     - No parity
     - One stop bit
     - No flow control
4. Press the reset button of the B2416 interface board, then type “`enter`” in the UART terminal console.
5. Enter “`wifi_scan`” in the UART terminal console to get all available Wi-Fi® networks.

Revision history

Table 7. Document revision history

Date	Revision	Changes
02-Jun-2025	1	Initial release.
03-Oct-2025	2	Document scope extended to the STDES-67W61P1-U5 and STDES-67W61P2-U5 reference designs: • Updated the document title and cover image • Updated *Features* and *Description* • Updated *Main features* and *ST67W611M1 reference designs and codification* • Updated *Board description* • Updated *Power supply configurations* and *Firmware programming* Changed *"MHF4 antenna"* to *"MHF4 connector"* in: • *Features* • *Table 1. ST67W611M1 coprocessor reference designs*
13-Oct-2025	3	Added the differences between the STDES-67W61BU-U5, STDES-67W61P1-U5, and STDES-67W61P2-U5 reference designs in Description.

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