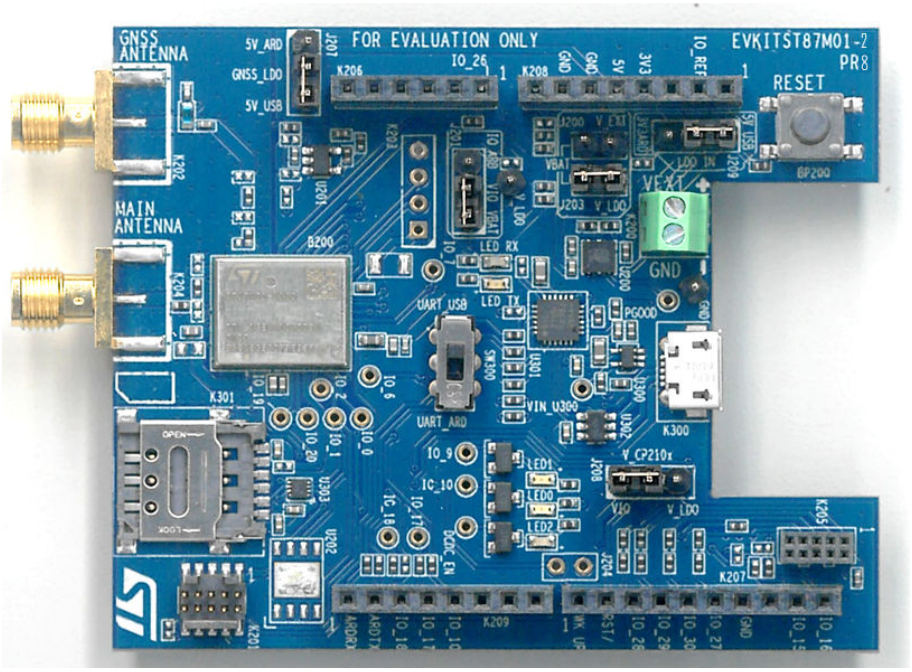
Getting started with the EVKITST87M01-2

Introduction

The EVKITST87M01-2 board is an evaluation board for the ST87M01 module. The EVKITST87M01-2 board is designed as an X-Nucleo Shield form factor compatible with Arduino® connector.

Besides, two HOST connections to the ST87M01 are possible: PC or associated board.

Figure 1. ST87M01 module on EVKITST87M01-2 board



1 General information

1.1 Acronyms and terms

Table 1. Acronyms and terms

Term	Definition
PA	Power amplifier
SIM / eSIM	Subscriber identity module / embedded subscriber identity module
LDO regulator	Low dropout regulator
RF	Radio frequency
SoC	System on a chip
PC	Personal computer

1.2 Reference documents

Table 2. Reference documents

Reference	Document
[1]	Datasheet ST87M01

2 ST87M01 product description

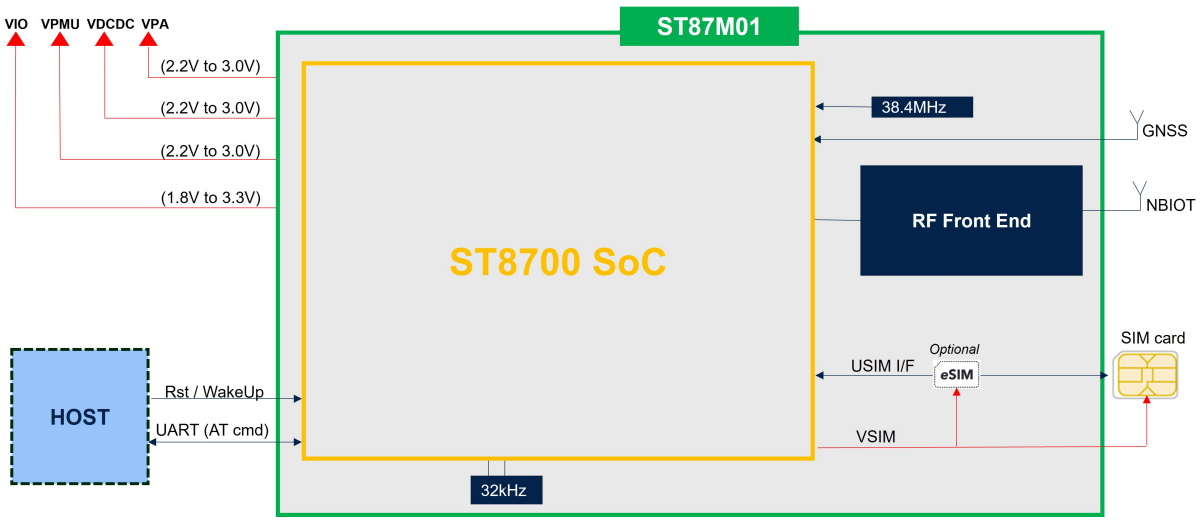
2.1 Module description

ST87M01 is the name of the module, which includes the following parts:

- ST8700 SoC
- RF front end (RF-FE)
- Low speed oscillator
- High frequency oscillator
- eSIM GSMA (optional)

2.2 Module block diagram

Figure 2. ST87M01 Block diagram



2.3 Module features

See document Section 1.2, at line nbr [1], to find the features of the ST87M01 module.

3 EVKITST87M01-2 block diagram

Figure 3. **EVKITST87M01-2 Block diagram**

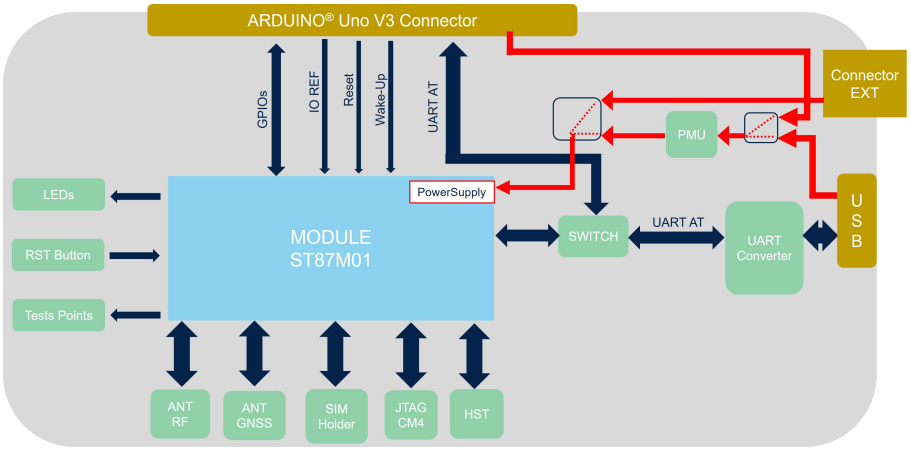
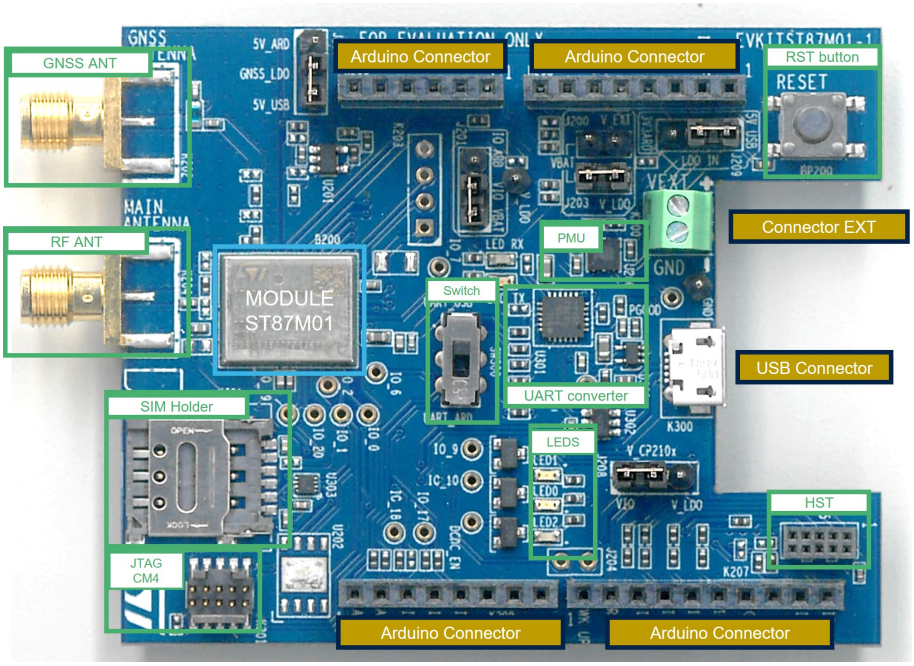


Figure 4. **EVKITST87M01-2 board - Main functions position on board**

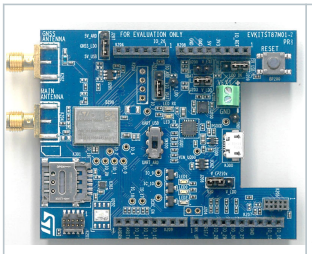


4 EVLST87M01

EVLST87M01 is a ready-to-use evaluation kit for the ST87M01 module applications.

4.1 EVLST87M01 content

- EVKITST87M01-2 board
- GNSS antenna
- RF antenna
- Micro-B USB cable

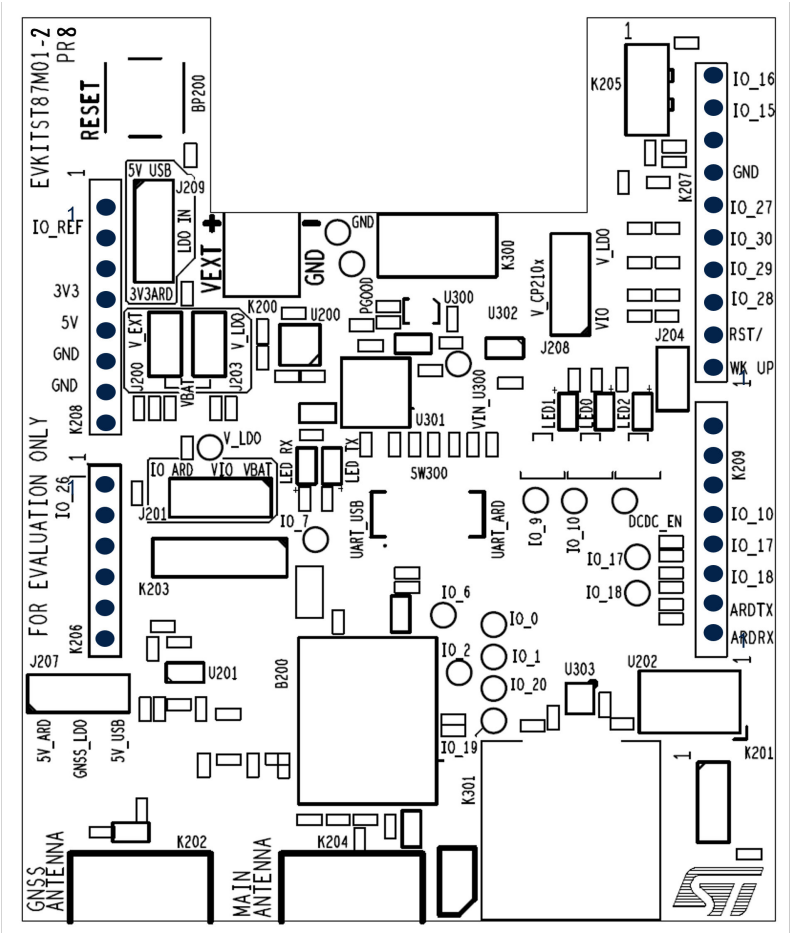
			
EVKITST87M01-2 board	GNSS antenna	RF antenna	USB cable

5 Arduino ® connectors

Figure 5. **EVKITST87M01-2 Board - Arduino® connectors**

K208	
1	NC
2	IO_REF
3	NC
4	3V3
5	5V0
6	GND
7	GND
8	NC

K206	
1	MOD_GPIO_26
2	NC
3	NC
4	NC
5	NC
6	NC



K207	
10	I2C_SCL
9	I2C_SDA
8	NC
7	GND
6	SPI_SCK
5	SPI_MISO
4	SPI_MOSI
3	SPI_CS
2	MODEM_RESETn
1	MODEM_WAKE-UP

K209	
8	NC
7	NC
6	NC
5	MOD_GPIO_10
4	MOD_GPIO_17
3	MOD_GPIO_18
2	UART_TXD
1	UART_RXD

6 Power supply

6.1 Architecture

Different power supply configurations are described in the next sections:

- USB connector power supply
- Arduino® connector power supply
- External connector power supply – variable voltages [2.2;3.0 V]
- External connector power supply – power consumption measurements [2.5 V]

6.2 Default power supply configuration

6.2.1 USB connector power supply

In this configuration, a 5V dc power supply comes from the PC. All the power supplies of the ST87M01 are 2.5 V, provided by the output of the linear voltage regulator *LD39050* on the board.

Figure 6. Micro-USB power supply configuration

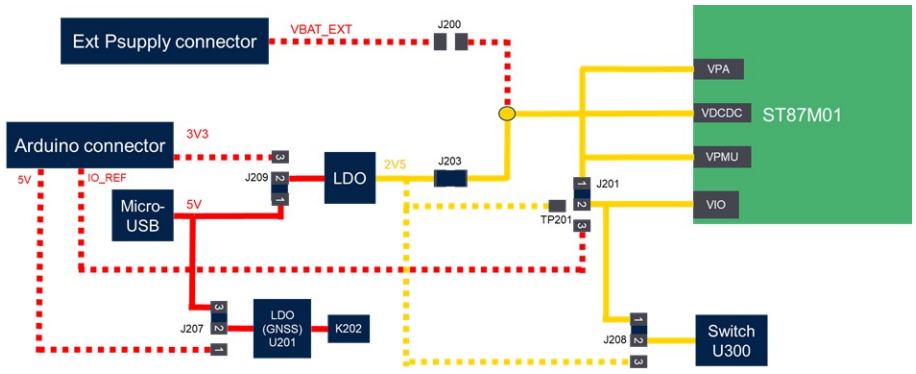
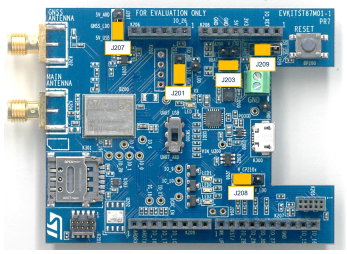


Table 3. Micro-USB power supply configuration

Ref	Configuration	Picture
J200	OPEN	
J201	1-2 CLOSED	
J203	CLOSED	
J207	2-3 CLOSED	
J208	1-2 CLOSED	
J209	1-2 CLOSED	

6.3 Other power supply configurations

6.3.1 Arduino® connector power supply

In this configuration, an associated board, Arduino® connector compatible, must be plugged under the EVKITST87M01-2 board. Besides, the associated board must output 3.3 V dc and 5.0 V dc supplies on the Arduino® connector, EVKITST87M01-2-K208 pin4, and pin5 (See Section 5).

The IO_REF pin is used to have the same I/O voltage level.

Figure 7. Arduino® connector power supply configuration

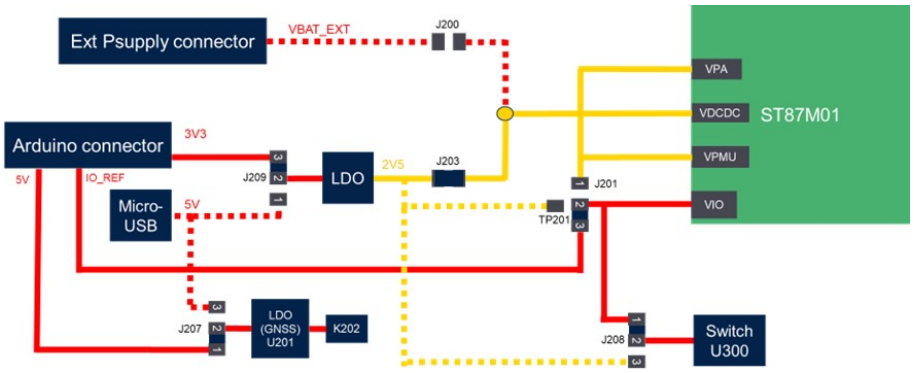
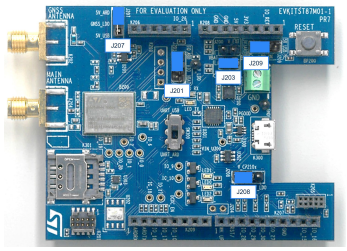


Table 4. Arduino® connector power supply configuration

Ref	Configuration	Picture
J200	OPEN	
J201	2-3 CLOSED	
J203	CLOSED	
J207	1-2 CLOSED	
J208	1-2 CLOSED	
J209	2-3 CLOSED	

6.3.2 External connector power supply variable voltages

In this configuration, an external power supply with the range [2.2;3.0 V dc] must be used.

Figure 8. External connector power supply variable voltage configuration

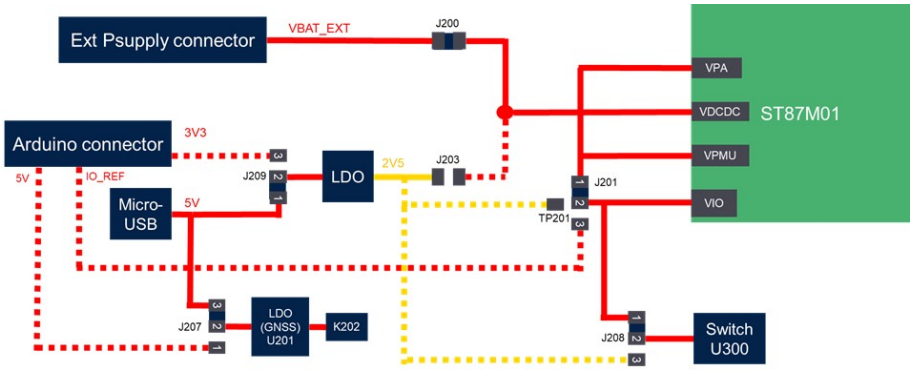
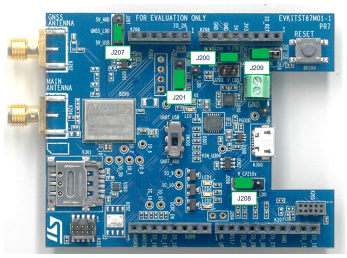


Table 5. **External connector power supply variable voltage configuration**

Ref	Configuration	Picture
J200	CLOSED	
J201	1-2 CLOSED	
J203	OPEN	
J207	2-3 CLOSED	
J208	1-2 CLOSED	
J209	1-2 CLOSED	

6.3.3 External connector power supply – Consumption measurements

In this configuration, the external power supply must be at 2.5 V dc

Figure 9. **External connector power supply consumption measurements configuration**

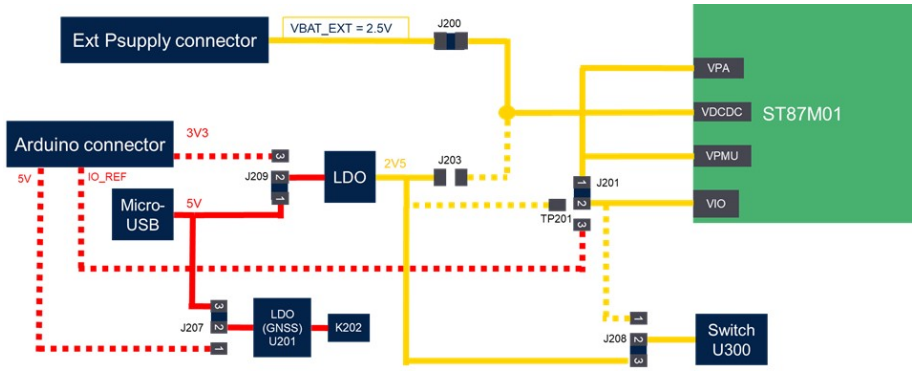
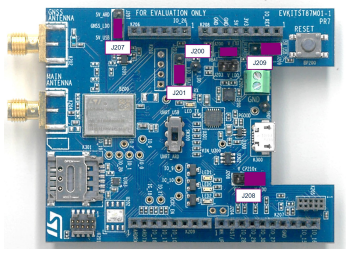


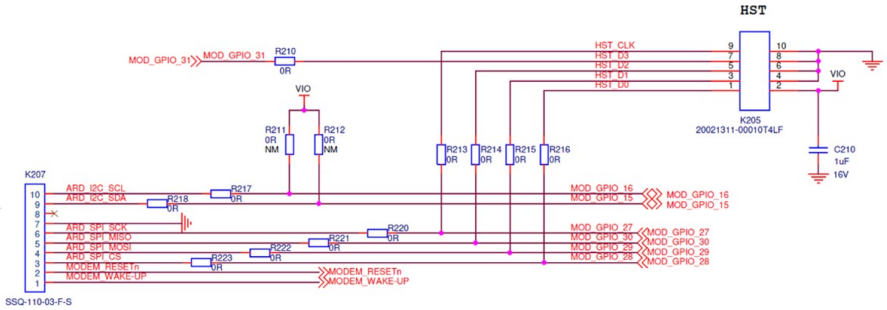
Table 6. **External connector power supply consumption measurements configuration**

Ref	Configuration	Picture
J200	CLOSED	
J201	1-2 CLOSED	
J203	OPEN	
J207	2-3 CLOSED	
J208	2-3 CLOSED	
J209	1-2 CLOSED	

7 HST interface

Note: The SPI function of the Arduino® connector K207 and the HST trace function cannot be used at the same time.

Figure 10. SPI and HST functions connection to K205 and K207 connectors



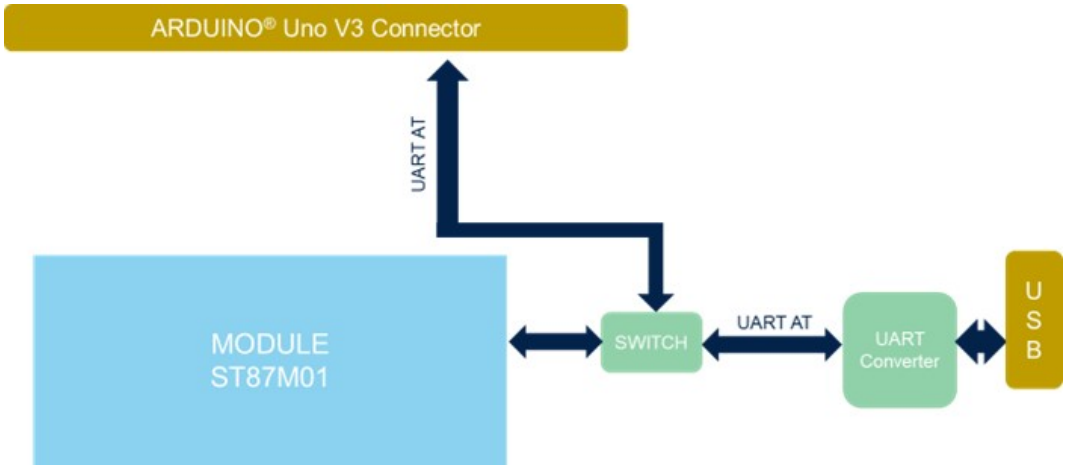
HST (High speed interface) is available to output firmware data log from the application and modem.

This interface, which supports high data rate (up to 25 Mb/s), requires an external hardware TPA device (named: Dongle HST Logger) to recover the data flow for ST analysis.

8 UART

The ST87M01 module on EVKITST87M01-2 board can have two hosts : PC or Associated board

Figure 11. UART Switch diagram



8.1 USB to UART converter

To convert USB to UART signals, the CP2105-F01-GM converter is used on EVKITST87M01-2 board. To supply its VIO pin, two options are offered for choosing the voltage source by means of jumper J208:

- VIO
- VBAT_LDO (used in Section 6.3.3)

Note: It is mandatory to supply the VIO pin of U301 to communicate through the USB connector.

8.2 UART0 (AT)

To switch the UART0 AT TX/Rx path between ST87M01 and PC (USB connector) or the associated board (Arduino® connector), a mechanical switch is used.

Figure 12. UART switch position for PC host

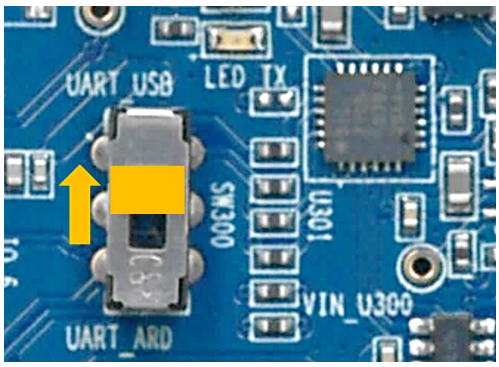
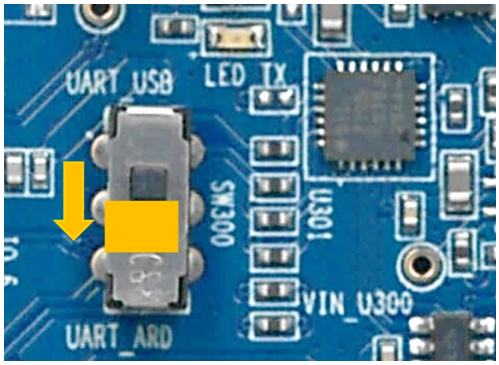


Figure 13. UART switch position for associate board host

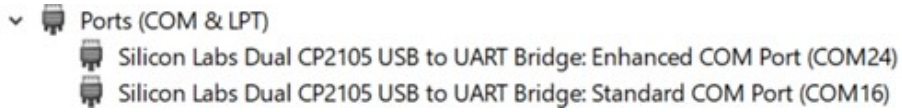


The COM port settings for the UART0 AT communication are:

Baud rate	115200
Data bits	8
Parity	None
Stop bits	1
Flow control	None

The COM port that must be selected for UART0 AT communication is the standard COM port.

Figure 14. UART0 (AT)COM port selection



9 LEDs

Figure 15. **LEDs schematic**

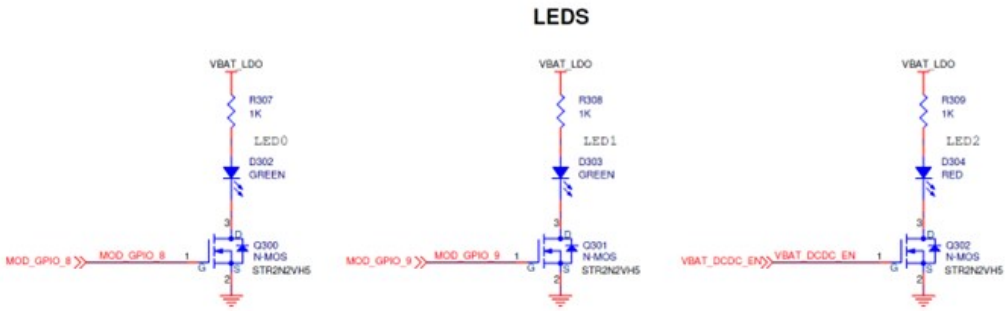
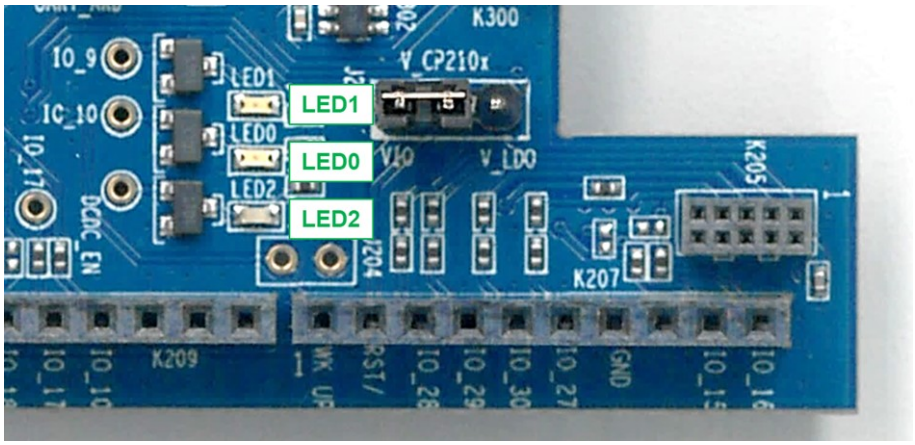


Table 7. **LEDs behavior description**

LED number	Signal control	Color	Status
LED0	MOD_GPIO8	GREEN	BLINK = S87M01 is running normally
LED1	MOD_GPIO9	GREEN	BLINK = S87M01 is running normally Section 1.2: Reference documents
LED2	VBAT_DCDC_EN	RED	ON = Active mode OFF = Sleep or Low-Power mode

1. *See Section 1.2, line nbr [1], for blinking behaviors.*

Figure 16. **LEDs identification on EVKITST87M01-2 board**



10 Wake-up and reset

10.1 Wake-up

The wake-up function of the module can be activated through two options:

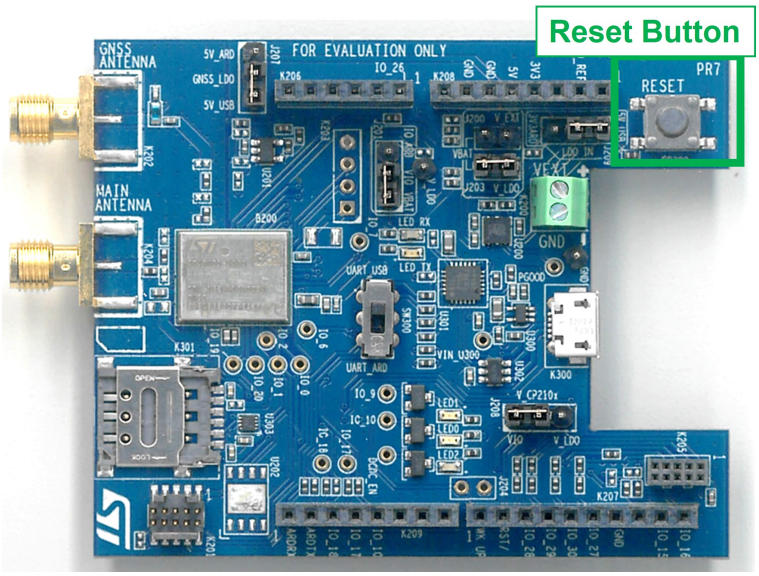
- UART: See ST87MXX_UM_AT commands description (see Section 1.2)
- Wake-up pin: From the Arduino® connector, with signal on pin 1 of K207 (see ST87MXX_UM_AT commands description (reference documents)

10.2 Reset

The reset function of the module is an active low input, two options are available to activate it:

- A press-button

Figure 17. Reset press-button position on EVKITST87M01-2 board



- From the Arduino® connector, the board plugged on Arduino® connector can activate the reset with a signal on pin 2 of K207.

11 Double antenna mode - GNSS

The ST87M01 module has a GNSS receiver that allows it to support multiple satellite constellations to address high accuracy localization applications. In the double antenna mode, the GNSS antenna is connected on the EVKITST87M01-2 to the GNSS receiver through the K202 connector.

The EVKITST87M01-2 board offers the possibility to use an active antenna by mounting the L200 inductor. Then, the power supply source can be chosen depending on the 0R resistor mounted:

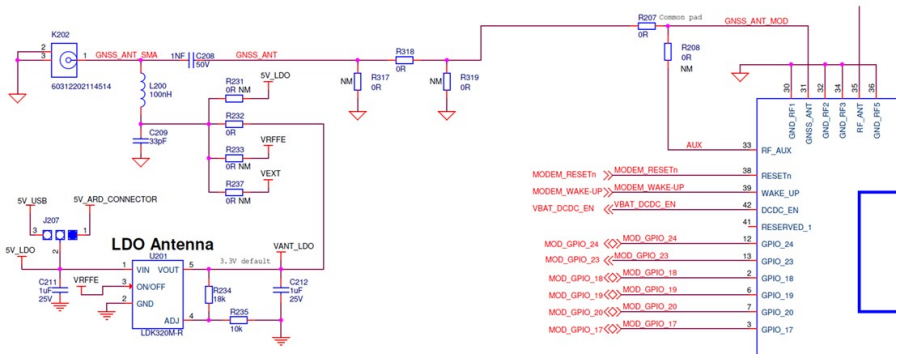
- 5V_LDO
- VANT_LDO
- VRFFE
- VEXT

For the default configuration, R232 is mounted, With VANT_LDO (3.3 V power supply) being the power supply source.

Note: In case the EVKITST87M01-2 is used in Section 14.1, the 5 V input of the voltage regulator U201 can be the 5V_USB from the USB connector.

A GNSS active antenna reference is given in Section 13.2.

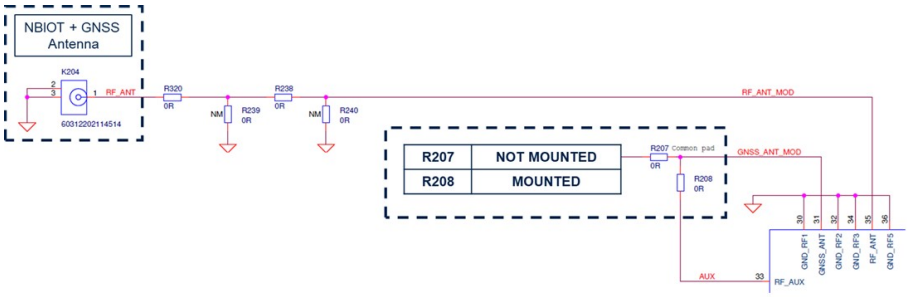
Figure 18. Double antenna mode - GNSS schematic



12 Single antenna mode - GNSS

The ST87M01 module has a GNSS receiver that allows it to support multiple satellite constellations to address high accuracy localization applications. In the single antenna mode, the antenna used for NBIOT and GNSS receiver is the same one connected on the K204 connector. Besides, the R208 resistor must be mounted and R207 unsoldered.

Figure 19. Single antenna mode - GNSS



13 Antennas

13.1 RF antenna

The RF antenna that you can find in the EVKITST87M01-2 is:
Manufacturer: MOLEX
Series number: 2203550001

Figure 20. RF antenna *Molex*

13.2 GNSS antenna

Possible active GNSS antenna compatible with Figure 18:

Manufacturer: ABRACON
Part number: APAMPG-117

Figure 21. GNSS antenna *Abracon*

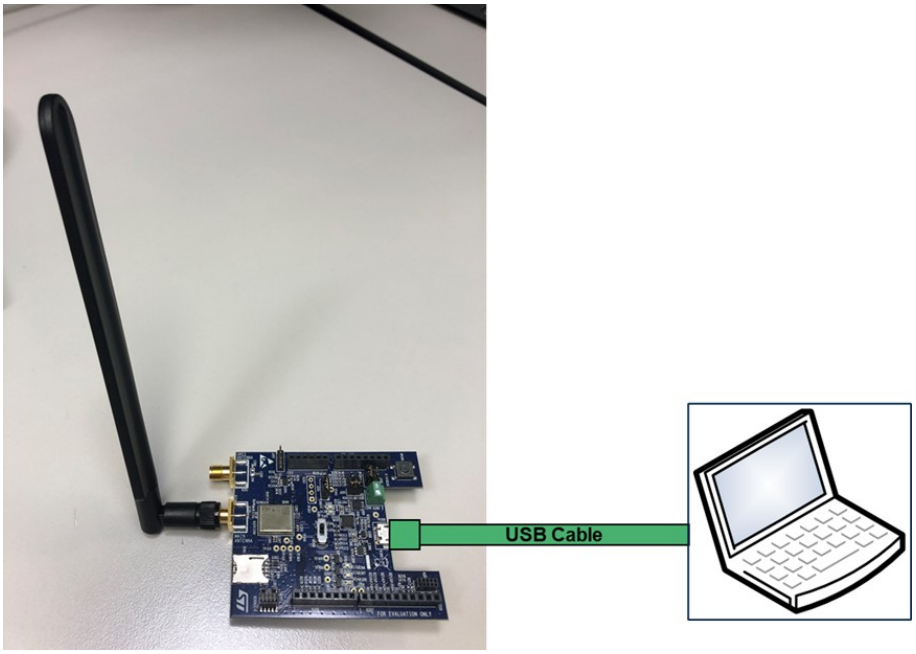
14 Using EVKITST87M01-2

14.1 Standalone configuration

In the standalone configuration, here is the list of hardware parts needed:

- EVKITST87M01-2 Board
- PC
- Micro-USB cable
- Antenna

Figure 22. EVKITST87M01-2 Board standalone configuration



14.1.1 Power supply

The power supply configuration is Section 6.2
USB connector power supply, described in Section 6.2

14.1.2 UART switch position

The UART switch must be in the PC host position, see .

14.1.3 SIM card

An NBIOT SIM – NanoSIM format - should be plugged in the K301 connector to enable modem network connection

14.1.4 Antenna connection

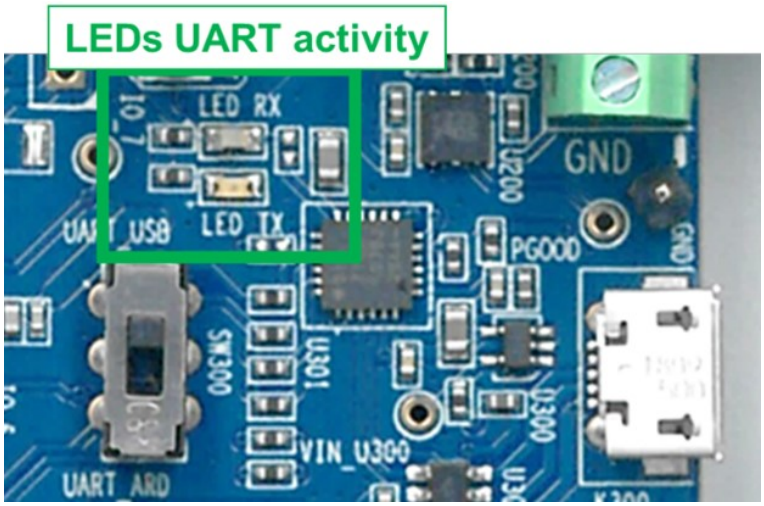
Connect the antenna to the K204 connector.

14.1.5 Drivers installation

To connect the EVKITST87M01-2 to the PC, install Virtual COM port drivers for the SiLabs CP2105 device (which converts data between the PC USB port and ST87M01 UART0). The latest drivers are available at:
https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers

The LEDs D300 and D301 show the UART TX and Rx activity. LEDs can be programmed by means of *SiliconLabs* tool.

Figure 23. LEDs UART activity



14.1.6 Verification procedure

1. Connect MicroUSB cable from PC to K300 (USB Connector) connector.
2. Verify that the Virtual COM ports have been installed.
3. Verify that the LED0 and LED1 are blinking green, and that LDE2 is continuously red.

14.2 Associated board configuration

In the associated board configuration, here is the list of hardware parts needed:

- EVKITST87M01-2 Board
- Associated board – Arduino® connector compatible board with 3.3 V power supply.
- PC
- Antenna

14.2.1 Power supply

The power supply configuration is described in Section 6.3

14.2.2 UART switch position

The UART switch must be in the PC host position, see Figure 13

14.2.3 SIM card

An NBIOT SIM – NanoSIM format - should be plugged in the K301 connector to enable modem network connection

14.2.4 Antenna connection

Connect the antenna to the K204 connector.

14.2.5 EVKITST87M01-2 connection

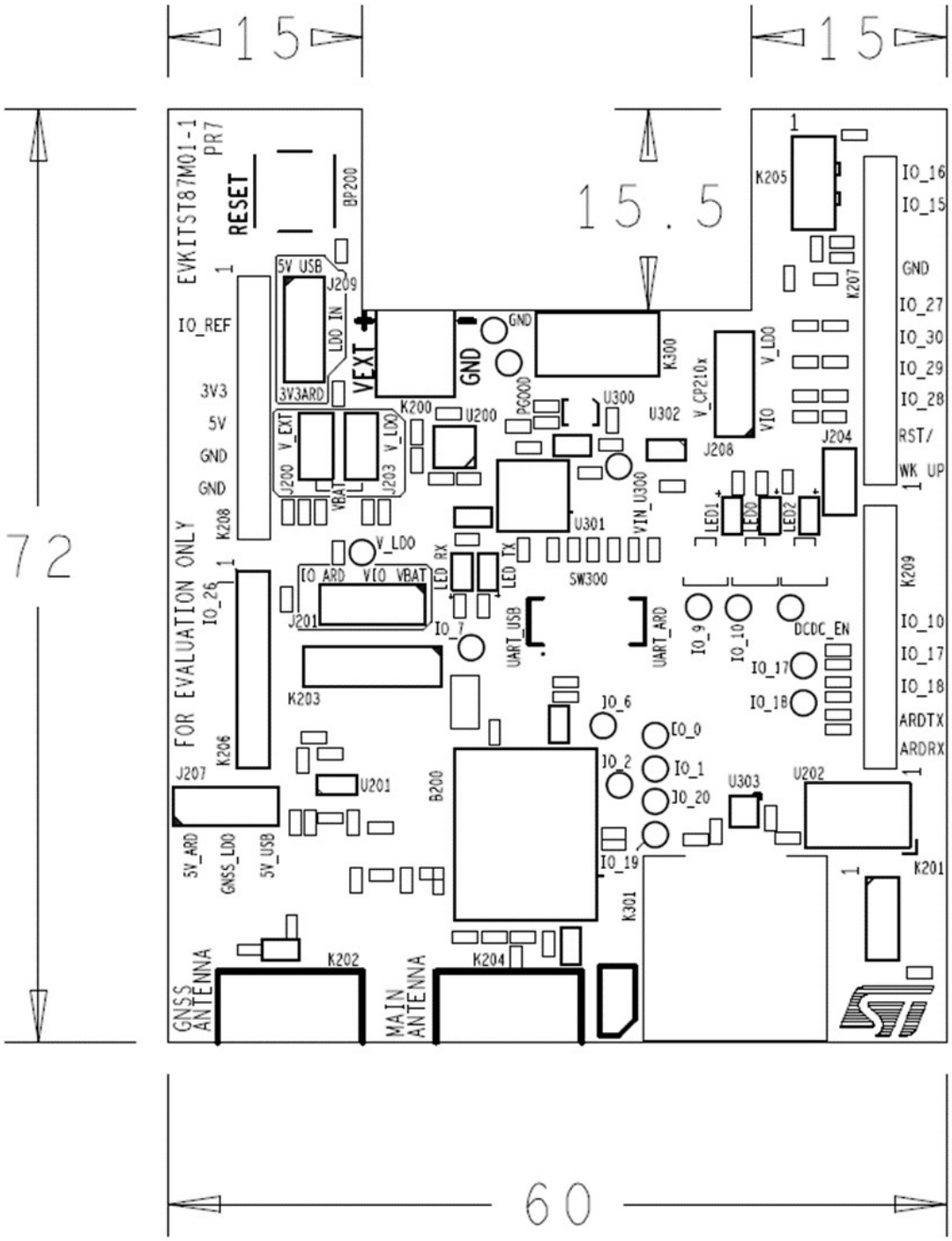
Plug the EVKITST87M01-2 board into the associated board connectors.

14.2.6 Verification procedure

1. Connect the power supply to the associated board.
2. Verify that the LED0 and LED1 are blinking green, and that LED2 is continuously red.

15 Mechanical dimensions

Figure 24. **Mechanical dimensions**



Revision history

Table 8. **Document revision history**

Date	Version	Changes
24-Sep-2025	1	Initial release

Contents

1 **General information** 2
1.1 Acronyms and terms 2
1.2 Reference documents 2
2 **ST87M01 product description** 3
2.1 Module description 3
2.2 Module block diagram 3
2.3 **Module features** 3
3 **EVKITST87M01-2 block diagram** 4
4 **EVLST87M01** 5
4.1 EVLST87M01 content 5
5 **Arduino ® connectors** 6
6 **Power supply** 7
6.1 Architecture 7
6.2 Default power supply configuration 7
6.2.1 USB connector power supply 7
6.3 Other power supply configurations 8
6.3.1 Arduino® connector power supply 8
6.3.2 External connector power supply variable voltages 8
6.3.3 External connector power supply – Consumption measurements 9
7 **HST interface** 10
8 **UART** 11
8.1 USB to UART converter 11
8.2 UART0 (AT) 11
9 **LEDs** 13
10 **Wake-up and reset** 14
10.1 Wake-up 14
10.2 Reset 14
11 **Double antenna mode - GNSS** 15
12 **Single antenna mode - GNSS** 16
13 **Antennas** 17
13.1 RF antenna 17
13.2 GNSS antenna 17
14 **Using EVKITST87M01-2** 18

14.1 Standalone configuration . . . 18
14.1.1 Power supply . . . 18
14.1.2 UART switch position . . . 18
14.1.3 SIM card . . . 18
14.1.4 Antenna connection . . . 18
14.1.5 Drivers installation . . . 19
14.1.6 Verification procedure . . . 19
14.2 Associated board configuration . . . 20
14.2.1 Power supply . . . 20
14.2.2 UART switch position . . . 20
14.2.3 SIM card . . . 20
14.2.4 Antenna connection . . . 20
14.2.5 EVKITST87M01-2 connection . . . 20
14.2.6 Verification procedure . . . 20
15 Mechanical dimensions . . . 21
Revision history . . . 22
List of tables . . . 25
List of figures . . . 26

List of tables

Table 1. Acronyms and terms . . . 2
Table 2. Reference documents . . . 2
Table 3. Micro-USB power supply configuration . . . 7
Table 4. Arduino® connector power supply configuration . . . 8
Table 5. External connector power supply variable voltage configuration . . . 9
Table 6. External connector power supply consumption measurements configuration . . . 9
Table 7. LEDs behavior description . . . 13
Table 8. Document revision history . . . 22

List of figures

Figure 1. ST87M01 module on EVKITST87M01-2 board . . . 1
Figure 2. ST87M01 Block diagram . . . 3
Figure 3. EVKITST87M01-2 Block diagram . . . 4
Figure 4. EVKITST87M01-2 board - Main functions position on board . . . 4
Figure 5. EVKITST87M01-2 Board - Arduino® connectors . . . 6
Figure 6. Micro-USB power supply configuration. . . . 7
Figure 7. Arduino® connector power supply configuration . . . 8
Figure 8. External connector power supply variable voltage configuration . . . 8
Figure 9. External connector power supply consumption measurements configuration. . . . 9
Figure 10. SPI and HST functions connection to K205 and K207 connectors . . . 10
Figure 11. UART Switch diagram . . . 11
Figure 12. UART switch position for PC host . . . 11
Figure 13. UART switch position for associate board host . . . 11
Figure 14. UART0 (AT)COM port selection . . . 12
Figure 15. LEDs schematic . . . 13
Figure 16. LEDs identification on EVKITST87M01-2 board . . . 13
Figure 17. Reset press-button position on EVKITST87M01-2 board . . . 14
Figure 18. Double antenna mode - GNSS schematic . . . 15
Figure 19. Single antenna mode - GNSS. . . . 16
Figure 20. RF antenna *Molex*. . . . 17
Figure 21. GNSS antenna *Abracon* . . . 17
Figure 22. EVKITST87M01-2 Board standalone configuration . . . 18
Figure 23. LEDs UART activity. . . . 19
Figure 24. Mechanical dimensions . . . 21

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