UM3671

User manual

EVB-VIC6A evaluation board

Introduction

The EVB-VIC6A is a standalone evaluation board for Teseo VI, based on the Teseo-VIC6A module.

The Teseo-VIC6A GNSS receiver from STMicroelectronics is designed with high-performance Arm® Cortex®-M7 with an RF front end able to support Galileo (E1, E5a, E5b, E6), GPS (L1, L2C, L5), GPSIII (L1C), GLONASS (L1OF, L2OF), QZSS, QZSS LEX, BeiDou, BeiDou2 (B1C, B2a, B2b, B3i), NavIC (former IRNSS) satellites.

The EVB-VIC6A is designed to support an operating temperature range from -40°C to 105°C.

Scope

This document is a guide for the EVB-VIC6A rev C, and covers two different model numbers: EVB-VIC6A-C2 and EVB-VIC6A-C1 (refer to Section 6.5: RF input configuration for more details).

Audience

The target audience includes all end users of the board for evaluation, validation, or system development activities.

1 Features

Teseo VI devices embed the Arm® Cortex®-M7.

For information on the Arm® Cortex®-M7, refer to the technical reference manuals, available from the www.arm.com website.

arm

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The EVB-VIC6A provides various interfaces for the user. All functions necessary to evaluate GNSS performance are accessible through the front and rear panels (user interface). Some specific functions, however, require opening the enclosure to access internal features.

User interface

- RF input, SMA connector
- USB Type-C® connector used for board power supply and communication interface with the PC
- 2 UARTs with hardware flow control via USB interface
- Power ON/OFF button
- Reset button
- 14-pin connector with:
  - I²C (in alternate of UART RTS/CTS)
  - PPS_OUT
  - Full UART or SPI
  - Wheel tick for car speed
  - Reverse signal for car direction
  - Current measurement (VCC and back-up)
  - Wake-up sensor signal
- LED indicator:
  - ON_OFF
  - PPS
  - Antenna power supply state
  - Dead reckoning fix state (if supported by software)

Internal features

- Rechargeable backup battery (not mounted)
  - Reference example: MS920SE from SEIKO INSTRUMENTS
- Current measurement headers
- PPS micro FL connector
- 3.3 V antenna power supply with current sense monitoring and current limiter
- Internal UART connector
- MEMS expansion connector
- Standby/wake-up button

2 Safety recommendations

2.1 Targeted audience

This product targets users with at least basic electronics or embedded software development knowledge like engineers, technicians, or students.

This board is not a toy and is not suited for use by children.

2.2 Handling the board

This product contains a bare printed circuit board. As for all products of this type, the user must be careful about the following points:

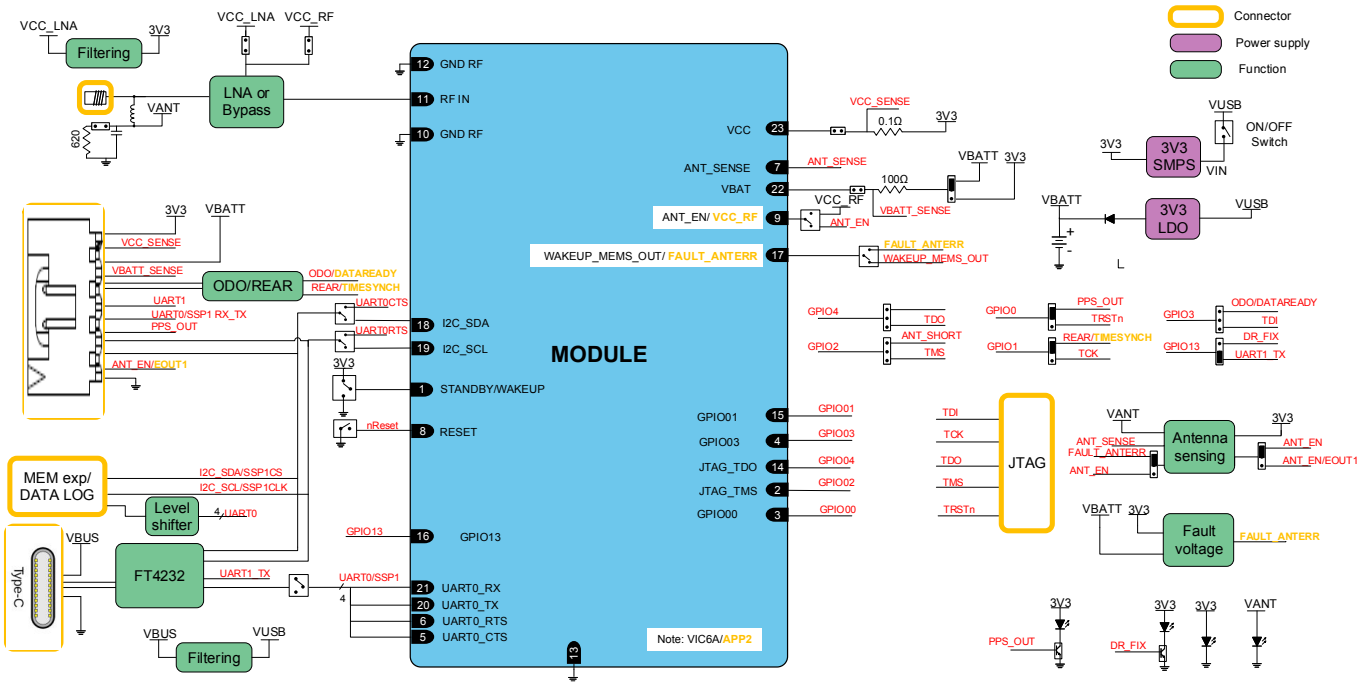
- The connection pins on the board might be sharp. Handle the board carefully to avoid getting hurt.
- This board contains static-sensitive devices. To avoid damaging it, handle the board in an ESD-proof environment.
- While powered, do not touch the electric connections on the board with fingers or anything conductive. The board operates at voltage levels that are not dangerous, but some components might be damaged when shorted.
- Do not put any liquid on the board; avoid operating it close to water or at a high humidity level.
- Do not operate the board if it is dirty or dusty.

2.3 Delivery recommendations

Before the first use, check the board for any damage that might have occurred during shipment, and check that all socketed components are firmly fixed in their sockets and none is lost in the plastic bag.

3 Platform block diagram

Figure 1. **Board block diagram**



4 Board overview

4.1 Hardware overview

Figure 2. EVB-VIC6A–Top view

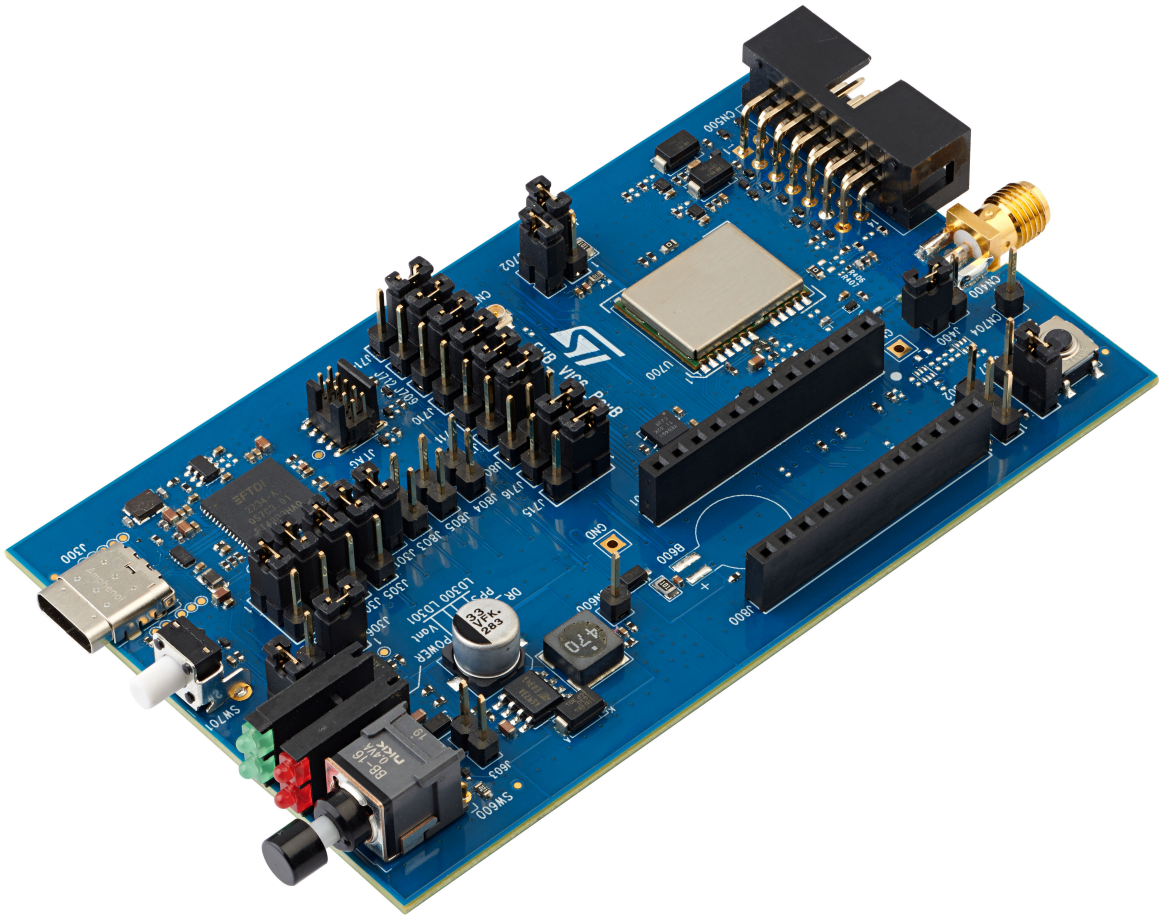
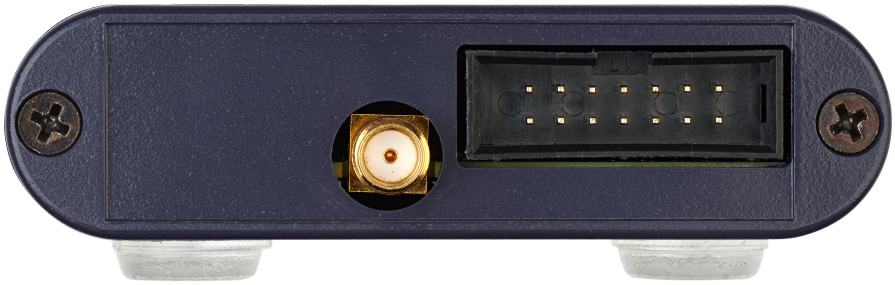


Figure 3. EVB-VIC6A–Front panel

Figure 4. **EVB-VIC6A–Rear panel**



4.2 Kit description

The EVB-VIC6A kit is composed of several elements:

- EVB-VIC6A populated with the Teseo-VIC6A module and mounted into a metallic casing
- USB cable (Type-C® to Type-A®) for power supply and PC connection
- One-page quick start guide

Figure 5. **Kit content**

5 User interfaces

5.1 USB connector

Figure 6. **USB Type-C® position**

5.1.1 Power by USB

The USB Type-C® connector is used to supply power to the board.

5.1.2 External trace by USB

The USB Type-C® connector is also used to download firmware to the module (refer to UART download) and receive GNSS messages (NMEA or RTCM format). The USB Type-C® connection is symmetrical, allowing it to be connected in any orientation on the EVB.

The UART/USB bridge converter functions as a virtual COM port (VCP), enabling the device to appear to the PC's application software as a standard COM port. Data transfer between the PC/laptop and the EVB is performed serially through the USB interface.

5.1.3 Prerequisite

- Before using the UART/USB bridge FT4232, the user needs to install the appropriate driver. It can be downloaded from FTDI: https://ftdichip.com/drivers/vcp-drivers/

Note: The URL belongs to a third party. It is active at document publication, however STMicroelectronics shall not be liable for any change, move, or inactivation of the URL or the referenced material.

- Install terminal or control software
  - Tera Term or an equivalent terminal program
  - ST TESEO-SUITE is a powerful PC tool able to manage all the capabilities of ST Teseo GNSS solution
    - Register and download at: https://www.st.com/en/embedded-software/teseo-suite.html#overview

5.1.4 Serial COM port configuration

Table 1. **UART configuration**

Communication default parameters					
Baud rate	**Data bits**	**Stop bits**	**Parity**	**Handshake**	**Flow control**
3000000 Bauds	8 bits	1 bit	None	None	Hardware

5.2 Antenna current monitoring

The RF_IN signal on the SMA connector is powered by VANT, a 3.3 V power supply generated on the EVB-VIC6A. This power supply includes protection against short circuits and overheating.

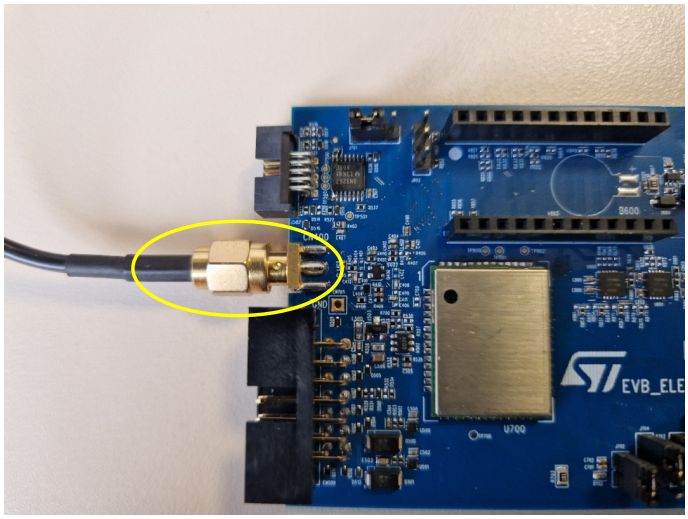
The current drawn by the active antenna through the RF SMA connector is monitored by an internal current monitoring circuit embedded into the EVB-VIC6A. The circuit has two purposes:

1. Limit the maximum current at ~112 mA during a short circuit and switch-off antenna voltage in case of over temperature or reverse voltage condition
2. Provide a voltage proportional to the antenna current (current sense circuit) to the Teseo-module to determine the antenna status (open, normal, short circuit, thermal shutdown or reverse current) if the antenna sensing feature is enabled on software application.

Software application note reference: UM3572 Teseo VI–Antenna current monitor.

5.3 GNSS RF input

Figure 7. GNSS RF input with antenna connected



The GNSS RF input is available through an SMA female connector. Thanks to the internal EVB on-board low noise amplifier (LNA) with a gain of 22 dB, it is possible to connect directly to a passive antenna or a GNSS simulator.

Caution: *Use a DC block when connecting a passive antenna, an active antenna with supply other than 3.3 V, or GNSS simulator connected to the EVB-VIC6A.*

A 3.3V DC power supply for an active antenna is also available on the SMA connector, with a current limitation of 112 mA to protect against short circuits.

5.4 ON/OFF switch

Figure 8. **ON/OFF button position**

The ON/OFF switch is a push button with a latch. When the button is in the down position, the board turns ON and PWR LED turns ON (refer to Section 5.6: LED indicators).

When the button is in the up position, the main power supply (VCC) of the Teseo-module is OFF. In this condition, only the always-on domain (VBATT) of the module is supplied if the USB is connected, or a backup battery is soldered on PCB (not mounted by default).

5.5 Reset

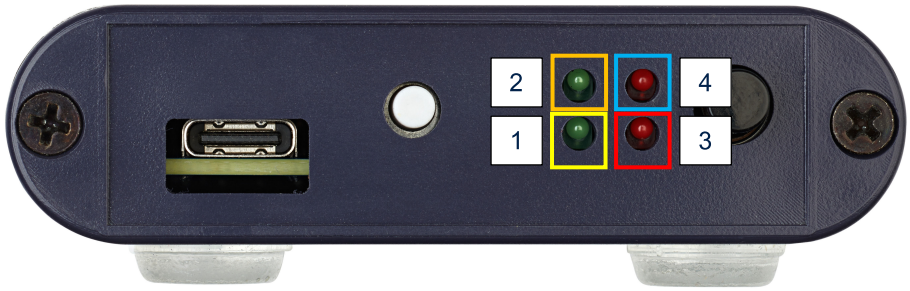
A reset button located on the front panel resets the Teseo module when pressed.

Figure 9. **Reset button position**

5.6 LED indicators

EVB-VIC6A offers four LED indicators:

Figure 10. **LED indicators position**



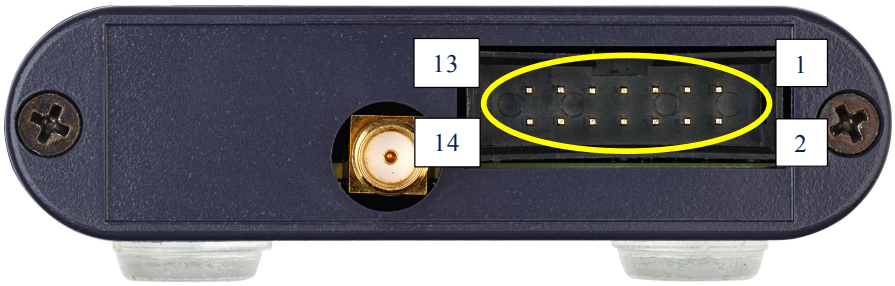
1. *PPS (GREEN LED): when the GNSS software is running, the PPS LED is blinking otherwise it is always ON.*
2. *DR fix (GREEN LED): when DR fix is achieved, the DR LED is ON (if supported by software)*

3. *PWR ANT (RED LED): when antenna power supply (3.3 V) is present on the SMA connector, the PWR ANT LED is ON (default state)*
4. *PWR (RED LED): when the power ON/OFF push button is in the down position, the PWR LED is ON*

5.7 External 14-pin connector

5.7.1 Main function

Figure 11. 14-pin connector



The EVB-VIC6A offers an external connector for accessing input or output signals from the Teseo module. For more details, refer to Table 2.

Example of plug connector reference for connection to CN500: SAMTEC - HCSD-07-D-05.00-01-T-N-RW

Table 2. 14-pin connector pin out

Pin#	Schematic signal name	Signal type	Comment
1	VCC_SENSE	Power 3.3 V	Sense current measurement pin (-) on module side. VCC power supply
2	VCC	Power 3.3 V	Main 3.3 V power supply. Sense pin(+)
3	FORWARD	Input	Reverse (direction) signal from car (compatible with car signal, low voltage detection)
4	WHEELTICK	Input	Wheel tick signal from car (odometer) (compatible with car or simulator signal, low voltage detection)
5	VBATT_SENSE	Power 3.3 V	Sense current measurement pin (-) on module side. VBATT power supply
6	VBATT	Power 3.3 V	3.3 V backup voltage (+)
7	I2C_SCL	Output 3.3 V	I2C_SCL/SSP CLK alternate I/O function
8	I2C_SDA	Input 3.3 V	I2C_SDA/SSP chip select alternate I/O function
9	UART0_RX	Input 3.3 V	UART0 received signal/SSP Rx alternate I/O function
10	UART0_TX	Output 3.3 V	UART0 transmits signal/SSP TX alternate I/O function
11	PPS_OUT	Output 3.3 V	PPS_OUT signal
12	WAKEUP_MEMS_OUT	Output 3.3 V	WAKEUP sensor signal
13	GND	Ground	Ground signal
14	GND	Ground	Ground signal

5.7.2 Current measurements of VCC and VBATT

Two pairs of pin of 14-pin connector can be used to measure current on VCC and/or VBATT without opening the EVB-VIC6A casing.

The voltage measured between pin 1 (-) and 2 (+) is proportional to the current consumed by Teseo module on VCC pin: 10 mV measured on a voltmeter corresponds to 100 mA.

The voltage measured between pin 5 (-) and 6 (+) is proportional to the current consumed by Teseo module on VBATT pin: 10 mV measured on a voltmeter corresponds to 100 µA.

Note: The measurement is not accurate under 1 mV.

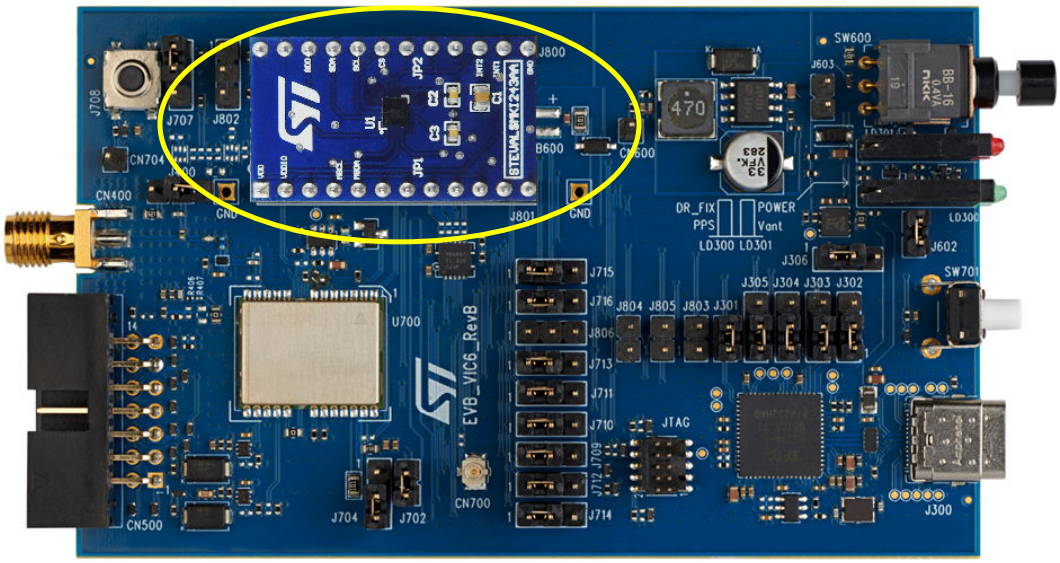
6 Internal specific function

6.1 MEMS expansion connector

The EVB-VIC6A includes a DIL24 connector (J800 + J801) for connecting additional sensors. For example, see the support board: STEVAL-MKI193V1

The control interface used is I²C.

Figure 12. MEMS expansion connector



6.2 Standby/Wake-up

This button can be used to force hardware standby (active low level) or wake-up from software standby. The configuration should be activated in software between standby and wake-up active high or wake-up active low (disabled by default).

Figure 13. Wake-up button position

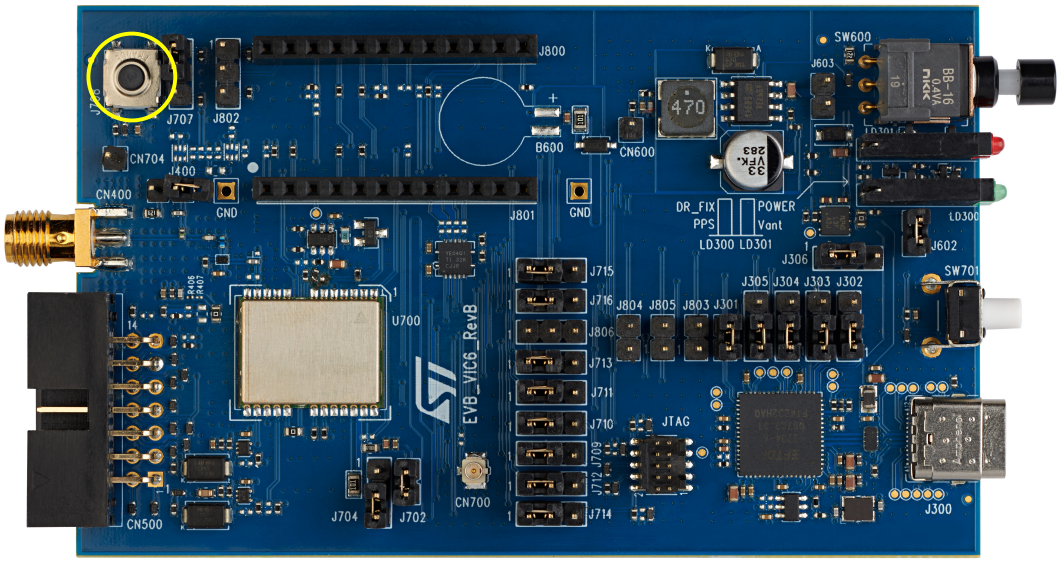


Figure 14. **J707 position**

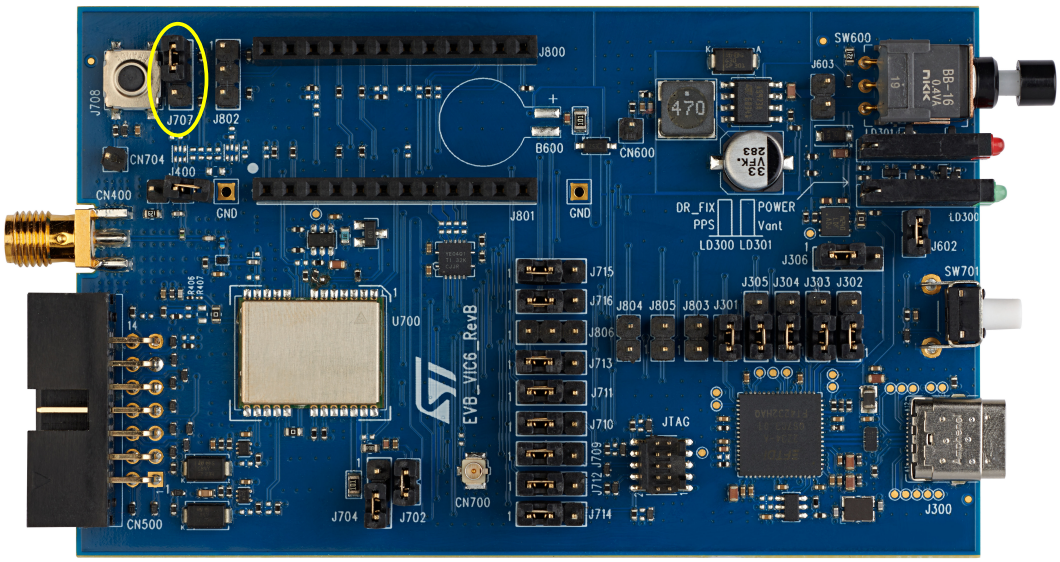
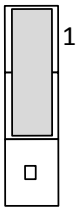
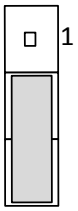


Table 3. **Wake-up level selection**

Wake-up high-level selection	Wake-up low-level selection
 J707	 J707

6.3 GPIO13

The evaluation board offers in option of GPIO13 signal to choose between UART1_TX and DR_FIX.

Figure 15. J713 position

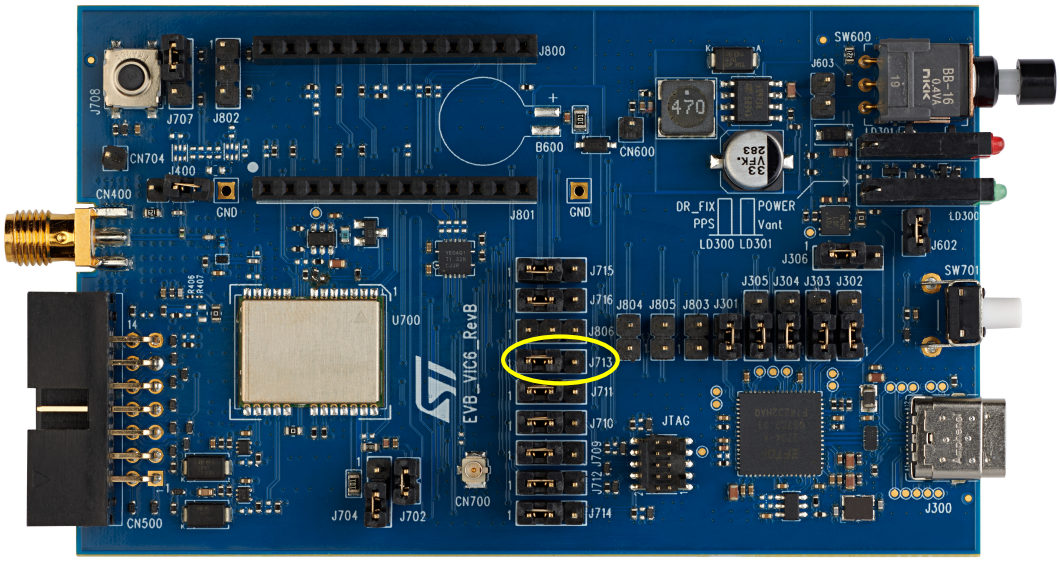
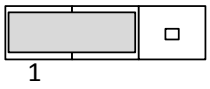
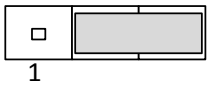


Table 4. J713 option selection

UART1_TX (default)	DR_FIX
 J713	 J713

6.4 14-pin connector option configuration

Three options are possible on the 14-pin connector (for more detail see Table 7, Table 8 and Table 9):

1. I²C + UART0 Rx and Tx (default)
2. SSP1
3. Full UART0

Each configuration depends on the firmware module configuration.

Figure 16. 14-pin connector option selection

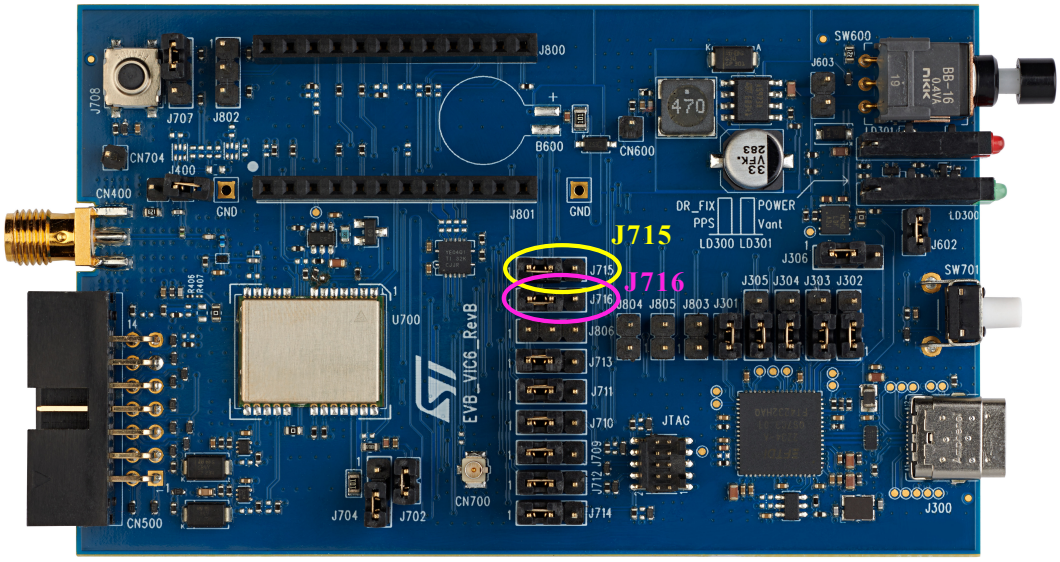


Table 5. J715 option selection

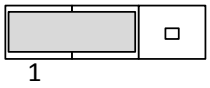
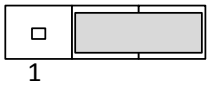
I2C_SDA or SSP_CS (default)	UART0_CTS
 J715	 J715

Table 6. J716 option selection

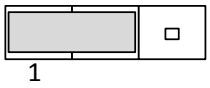
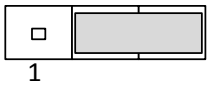
I2C_SCL or SSP_CLK (default)	UART0_RTS
 J716	 J716

Table 7. Option1 for 14-pin connectors I²C+UART0 without flow control (default)

Pin number	Signal name	Comment
7	I2C_SCL	I2C_SCL (J716 1-2)
8	I2C_SDA	I2C_SDA (J715 1-2)
9	UART0_RX	UART0 received a signal
10	UART0_TX	UART0 transmit signal

Table 8. Option2 for 14-pin connectors SSP1

Pin number	Signal name	Comment
7	SSP_CLK	SSP CLK alternate I/O function (J716 1-2)
8	SSP_CS	SSP chip select alternate I/O function (J715 1-2)
9	SSP_RX	SSP Rx alternate I/O function
10	SSP_TX	SSP TX alternate I/O function

Table 9. Option3 for 14-pin connectors full UART

Pin number	Signal name	Comment
7	UART0_RTS	UART0 request to send received signal (J715 2-3)
8	UART0_CTS	UART0 Clear to send received signal (J716 2-3)
9	UART0_RX	UART0 received a signal
10	UART0_TX	UART0 transmit signal

6.5 RF input configuration

The EVB-VIC6A RF input supports two configurations, each requiring a dedicated EVB model:

- EVB-VIC6A-C2: in this model, the LNA is bypassed to use an active antenna. Ensure that the antenna gain is between 20 dB and 40 dB.
- EVB-VIC6A-C1: in this model, the LNA is connected between the EVB-VIC6A RF input and the RF_IN pin of the module. This configuration is recommended for use with GNSS simulators or passive antenna.

Important: If used with an active antenna, ensure that the antenna gain does not exceed 20 dB.

7 Default jumper and solder pads configuration

Detailed jumper configuration:

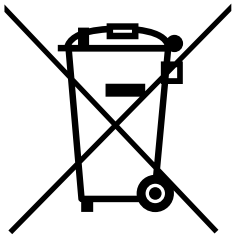
Table 10. Jumper description

Jumper reference	Signal selection	Comment
J301	nReset	Connection for automation
J302	UART0_RX	UART0_RX or SSP_CLK selection
J303	UART0_TX	UART0_TX or SSP_RX selection
J304	UART0_CTS	UART0_CTS or SSP_TX selection
J305	UART0_RTS	UART0_RTS or SSP_CS selection
J306	VALWON	FTDI power supply on always on domain
J400	Resistance to ground	Purpose of this jumper is to drive a minimum current on antenna current monitoring circuit to avoid error when an active antenna is not connected
J602	Enable U602	Enable VBATT power supply
J603	VON to VIN connection	Bypass ON/OFF button
J702	3V3	Main 3.3 V current measurement
J704	VBATT	VBATT current measurement and selection between always domain and common 3.3 V with main supply
J707	GND	Wake up level selection
J709	ANTEN_EOUT1	Antenna enable or JTAG TDO selection
J710	ODO	Odo or JTAG TDI selection
J711	PPS0_OUT	PPS0_OUT or JTAG TRSTn selection
J712	REAR	Rear or JTAG TCK selection
J713	UART1_TX	UART1_TX or DR_FIX selection
J714	ANTSHORT_EOUT0	Antenna error or JTAG TMS selection
J715	I2C_SDA	I2C_SDA or SSP CS selection
J716	I2C_SCL	I2C_SCL or SSP CLK selection
J802	-	Reserved
J803	-	UART_CTS
J804	-	UART_RTS
J805	-	UART Rx
J806	-	UART Tx

8 Product disposal

Disposal of this product: WEEE (Waste Electrical and Electronic Equipment)

(Applicable in Europe)



This symbol on the product, accessories, or accompanying documents indicates that the product and its electronic accessories must not be disposed of with household waste at the end of their working life.

To prevent possible harm to the environment and human health from uncontrolled waste disposal, separate these items from other types of waste and recycle them responsibly at a designated collection point to promote the sustainable reuse of material resources.

Household users:

Contact the retailer that you purchased the product from or your local authority for details of your nearest designated collection point.

Business users:

Contact your dealer or supplier for further information.

Appendix A Acronyms

Acronyms

CTS	Clear to send
DC	Direct current
EVB	Evaluation board
ESD	Electrostatic discharge
GNSS	Global navigation satellite system
GPS	Global positioning system
I²C	Inter-integrated circuit
I/O	Input/output signals
LED	Light emitting diode
MEMS	Micro-Electro-Mechanical-Systems
PPS	Pulse per second
QZSS	Quasi-zenith satellite system
RTS	Request to send
Rx	Reception
SSP	Synchronous serial port
SPI	Serial peripheral interface
SW	Software
Tx	Transmission
UART	Universal asynchronous receiver transmitter
USB	Universal serial bus

Revision history

Table 11. **Document revision history**

Date	Revision	Changes
22-May-2026	1	Initial release.

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