User manual

Teseo-V Evaluation Board

Introduction

The EVB-T5 evaluation board is a complete standalone evaluation platform for Teseo-V STA8100GA GNSS Receiver IC.

The EVB-T5 board is a complete standalone evaluation platform for Teseo-V STA8100GA GNSS Multi Band Receiver with STA5635A RF Front-End IC solution.

Teseo-V embeds the high performance ARM Cortex-M7 microprocessor with RF front-end able to support different bands (L1, L2 and L5), UART communication interfaces.

The STA5635A is a fully integrated RF front-end, able to support different bands (L2 and L5) with a programmable IF Bandwidth (7 or 13 MHz).

The EVB-T5 is designed for top performance Teseo-V GNSS IC.

1 Features

The EVB-T5 has the following features:

- USB Power Supply
- Internal backup battery placing (battery not provided)
- Push buttons to switch ON and OFF
- Reset button
- Boot button
- UART by USB connector
- ODO/CAN connector
- Leds:
  - PPS output LED
  - Power output LED
  - Antenna powered LED
- ST ASM330LHH MEMS

2 EVB-T5 general presentation

The EVB-T5 kit is composed of several elements:

- EVB-T5 Evaluation Board
- USB cable
- EVB-T5 Quick starting guide

3 Interfaces

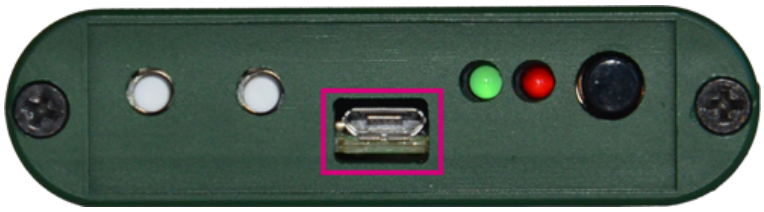
The EVB-T5 offers different interfaces to the user:

- ON/OFF button
- Reset button
- Boot button
- µUSB use for interface with UART of Teseo-V
- Supply by USB (5 V)
- GNSS antenna input
- LED indicators

3.1 Power by USB

The micro USB connector (highlighted in pink, see Figure 1) allows supplying the board.

Figure 1. USB power input



In the Table 1 below, the USB pin description:

Table 1. USB "J301" pin description

Pin	Connector signal	Comment
1	5 V USB	USB +5 V power supply
2	USB_DM	Differential Serial Data -
3	USB_DP	Differential Serial Data +
4	Not Connected	-
5	GND	Signal Ground

3.2 ON/OFF switch

When button (see Figure 2) is lifted, if the user presses the ON/OFF switch the board turns ON and the power LED turn on too.

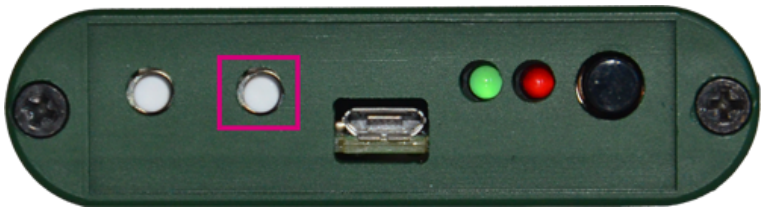
When ON/OFF switch is lifted, VBAT is connected to GND, the board is switched OFF.

Figure 2. ON/OFF switch

3.3 Reset

The reset button (see Figure 3) is present on the front panel of the case, it resets the Teseo-V solution.

Figure 3. Reset button



3.4 Boot

A boot button (see Figure 4) is present on the front panel of the case, it's used during the Programming procedure.

Figure 4. Boot button

3.5 LED indicators

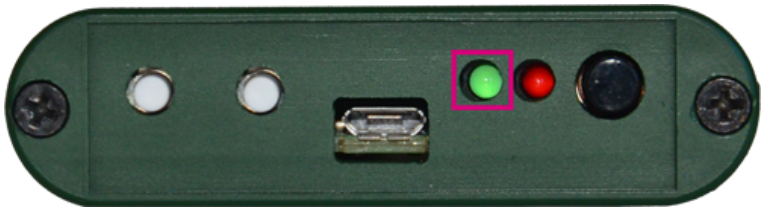
The EVB-T5 offers three LED Indicators as shown below:

- The PWR Red LED (see Figure 5) indicator shows whether the unit is ON (led is turned on) or OFF (led is turned off).

Figure 5. Power LED indicator

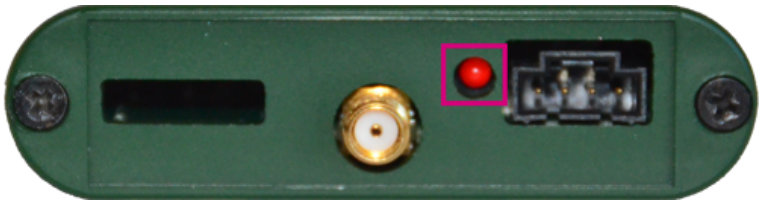
- The PPS Green LED (see Figure 6) indicator blinking every second indicates that Teseo-V is up and running.

Figure 6. PPS LED indicator



- The Antenna Power Led (see Figure 7) indicates if the antenna is powered (led on) or not powered (led off).

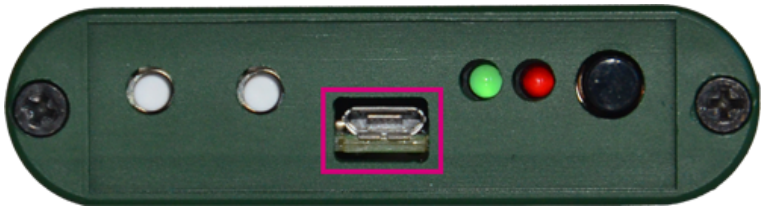
Figure 7. **Antenna LED indicator**



3.6 UART by USB

UART interface (see Figure 8) is provided via USB connector.

Figure 8. **USB/UART connector**



UART interface is used to trace NMEA messages and for upload binary file on system.

Before using UART/USB bridge, the user needs to install the VCP driver. It can be downloaded from Silabs web page (silabs.com).

The Virtual COM Port (VCP) device drivers allow the UART2USB device on EVB-T5 to appear to the PC's application software as a standard COM port. Application software running on the PC accesses the device as it would access a standard hardware COM port configured as shown in Table 2. However, actual data transfer between the PC and the device is performed over the USB interface

Table 2. **UART configuration**

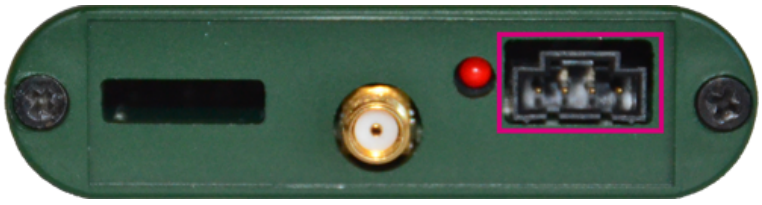
Baud rate	Data Bits	Stop Bits	Parity	Handshake
460800	8	1	none	none

Take care that on Windows10 the Universal Serial Driver has to be removed before installing the Silabs VCP driver.

3.7 ODO/CAN interface

The 4-pin connector (J500) provides CAN/ODO bus signals as shown in Figure 9.

Figure 9. **ODO/CAN connector**



The signals CAN, ODO and REAR are muxed with I^2C (use for MEMs) and MMC signals (see Section 4.8 GPIOs for muxing description).

The CAN Physical Layer Device (U503) is part of the evaluation board, thus a direct connection to a physical CAN bus is possible. CAN is configured in High speed 1 MHz.

ODO/REAR signal use VIO power supply, by default VIO is at 3.3 V. If Teseo-V is powered at 1.8 V please change VIO to 1.8 V (see Section 4.8 GPIOs).

Table 3. ODO/CAN "J500" pin description

Pin	Connector signal	Comment
1	REAR	Max. 15 V
2	ODO	Active tied to ground
3	CAN H	Connects to CAN line
4	CAN L	Connects to CAN line

This header allows connection of an external Odometer signal and/or CAN bus to the EVB-T5.

The EVB-T5 offers interconnection to a CAN bus and/or to Odometer Pulses and a “reverse gear indication”. These signals can be applied using connector J500.

User can or cannot connect the 120 Ω ended of CAN Bus using the connector J501 as descripted in Table 4

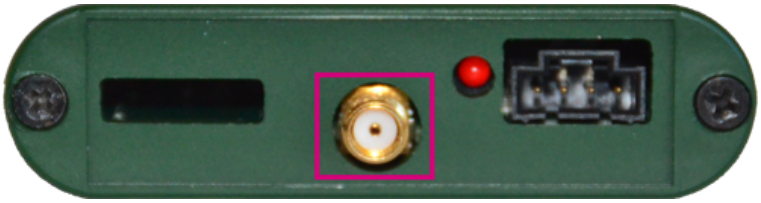
Table 4. 120 Ω ended configuration

Connector J501	
Open (switch not fitted)	120 Ω ended disconnected
Closed (switch fitted)	120 Ω ended connected

3.8 GNSS input antenna

GNSS input (see Figure 10) is available through a SMA female connector.

Figure 10. GNSS SMA connector



Passive or active antenna can be used on EVB-T5.

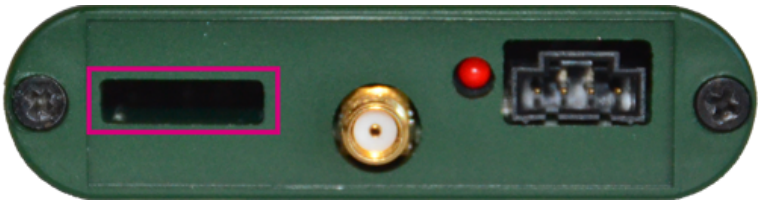
The DC power supply for active antenna is 3.3 V with current limitation in case of short circuit.

Note: Please use DC blocker for passive or simulator connected to EVB-T5.

3.9 MMC/SD_Interface

The EVB-T5 offers a “Micro-SD Card Connector” which can be used to record GPS/GLONASS Logs if an appropriate firmware is installed.

Figure 11. MMC/SD interface



The SD/MMC signals are muxed with REAR and ODO signals (see Section 4.8 GPIOs for muxing description). SD/MMC connector is described in Table 5:

Table 5. MMC/SD "J404" pin description

Pin	Connector signal	Comment
1	Data 2	SD card Data Line (Bit 2)
2	Data 3	SD card Data Line (Bit 3)
3	CMD	Command Strobe
4	3.3 V	3.3 V Power Supply
5	CLK	SD Card Clock
6	GND	Signal Ground
7	Data 0	SD card Data Line (Bit 0)
8	Data 1	SD card Data Line (Bit 1)
A	SD_DETECT	Card Detect Signal (when inserted)
B	GND	Signal Ground

Note: Please choose at least a micro SD card class 4 to support baud rate of signal.

4 Internal function

4.1 ST ASM330LHH MEMS sensor

The EVB-T5 has the LSM6DSR (or the AMS330LHH for the automotive grade version) on board, it is a system-in-package featuring a 3D digital accelerometer and a 3D digital gyroscope with an extended full-scale range for the gyroscope, up to 4000 dps, and high stability in temperature. The device is interfaced through I^2C.

4.2 Extra IMU sensor

The EVB-T5 has a DIL24 connector (J502 + J503) that allows to use new sensors release.

The connector J502 is described in Table 6.

The connector J503 is described in Table 7.

Table 6. Core Module Connector "J502" pin description

Pin	Connector signal	Comment
1	Power Supply	3.3 V
2	Power Supply	3.3 V
3	N.C.	Not Connected
4	N.C.	Not Connected
5	N.C.	Not Connected
6	N.C.	Not Connected
7	N.C.	Not Connected
8	N.C.	Not Connected
9	N.C.	Not Connected
10	N.C.	Not Connected
11	N.C.	Not Connected
12	N.C.	Not Connected

Table 7. **Core Module Connector "J503" pin description**

Pin	Connector signal	Comment
1	N.C.	Not Connected
2	N.C.	Not Connected
3	N.U.	Not Connected
4	SDO_SDA	I^2C Data
5	I^2C_SCL	I^2C Colck
6	N.C.	Not Connected
7	N.C.	Not Connected
8	N.C.	Not Connected
9	N.C.	Not Connected
10	N.C.	Not Connected
11	N.C.	Not Connected
12	GND	Ground

4.3 PPS

The PPS is driven by the GNSS SW and provides a Pulse Per Second and is powered by 3.3 V domain.

The EVB-T5 offers two ways to route the PPS signal:

- To use the LED indicator, as described in Section 3.5 LED indicators (selection is done by resistor).
- To use the SMA connector, selection is done by resistor R305 not mounted by default. (Ex. Ref SMA cable: MULTICOMP - R-632G7210100CB).

4.4 Wakeup

The EVB-T5 offers a push button on WAKE_UP signal for some test.

When Teseo V is in standby the WAKE_UP pin permits to exit the standby mode.

4.5 Standby_N

The EVB-T5 offers a jumper to change mode of the board. When the standby is active the power down for the internal voltage regulators is activated, the isolation always between region and switchable region is activated, and the reset to the switchable region is activated. Output notification of standby status is given through the pin STANDBY_OUT (level signal, active low).

Table 8. **Teseo-V mode configuration**

Connector J302	
Open (switch not fitted)	Teseo-V in normal mode
Closed (switch fitted)	Teseo-V in standby mode

4.6 Antenna power supply

For short circuit protection, the antenna has its switch on the power supply for current limitation. Power supply is switched off by software by GPIO ANT_EN. Power supply for antenna can have two values 5 V or 3.3 V.
Voltage selection can be done following the configuration in Table 9.

Table 9. Antenna voltage selection description

Voltage	J306	J314
3.3 V	**Open** (switch not fitted)	**Closed** (switch fitted)
5 V	**Closed** (switch fitted)	**Open** (switch not fitted)

4.7 I/O Voltage

On EVB-T5 the I/O Voltage can be selected. EVB-T5 supports VIO at 1.8 V or 3.3 V. Selection can be done using the connector J505 as described in Table 10.

Table 10. I/O Voltage "J505" configuration

VIO	Jumper Position
1.8 V	[1:2]
3.3 V (default)	[2:3]

4.8 GPIOs

The EVB-T5 provides five GPIOs. User can select which signal can be routed on a GPIO using a specific switch.

4.8.1 GPIO-0

Table 11. GPIO-0 "J313" configuration

Signal	Jumper Position
JTAG TRSTn	[2:3]
PPS_OUT (default)	[1:2]

4.8.2 GPIO-5

Table 12. GPIO-5 "J301" configuration

Signal	Jumper Position
CAN0 TX configuration	[2:3]
I²C SCL configuration (default)	[1:2]

4.8.3 GPIO-6

Table 13. GPIO-6 "J312" configuration

Signal	Jumper Position
CAN0 RX configuration	[2:3]
I²C SDA configuration (default)	[1:2]

4.8.4 GPIO-28

Table 14. **GPIO-28 "J308" configuration**

Signal	Jumper Position
MMC_DAT0 configuration	[2:3]
ODO configuration (default)	[1:2]

4.8.5 GPIO-29

Table 15. **GPIO-29 "J307" configuration**

Signal	Jumper Position
MMC_DAT1 configuration	[2:3]
REAR configuration (default)	[1:2]

4.9 Power enable

On the EVB-T5 the 3.3 V and 1.1 V power supply are on switchable domain, the EVB-T5 offers the possibility to force power switchable always on, always off or drive by STDBY_OUT using jumpers J600 and J601 (see Table 16).

Table 16. **Power enabled jumpers configuration**

Voltage	J600 position	J601 position
Power enable	[1:2]	**Open** (switch not fitted)
Power disable	[2:3]	**Open** (switch not fitted)
From STDBY_OUT	**Open** (switch not fitted)	**Closed** (switch fitted)

4.10 Current measurement

The EVB-T5 offers the possibility to measure current consumption on three input voltages.
Removal jumpers on the following headers can permit to do the current measurement:

Table 17. **Current measuremet**

Header	Signal	Voltage
J309	VCC (pin 25 MOD-T5)	3.3 V
J310	VBAT (pin 25 MOD-T5)	3.3 V
J311	EXT_VCC (pin 25 MOD-T5)	1.2 V or 1.8 V

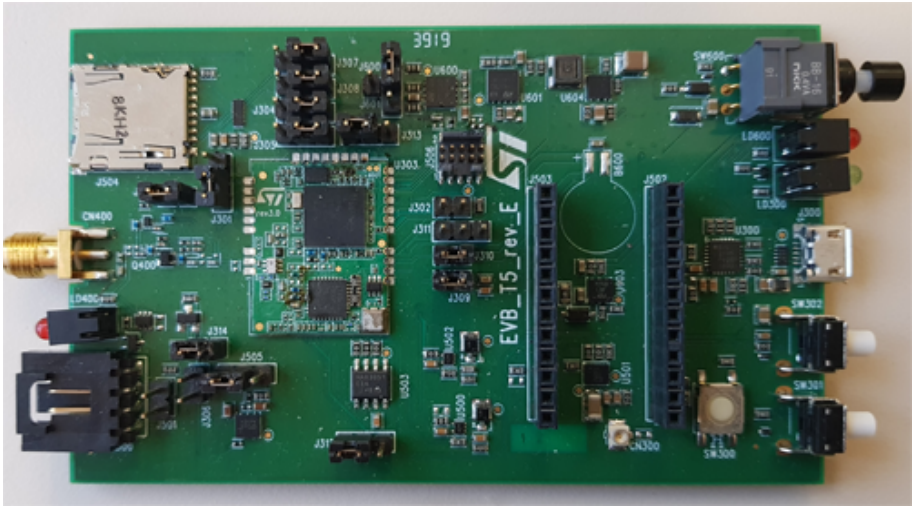
4.11 Reference documents

- Teseo Suite – Data brief (DB3224, DocID030398)

5 Board general view

The EVB-T5 Evaluation Board is shown in Figure 12.

Figure 12. Internal board view



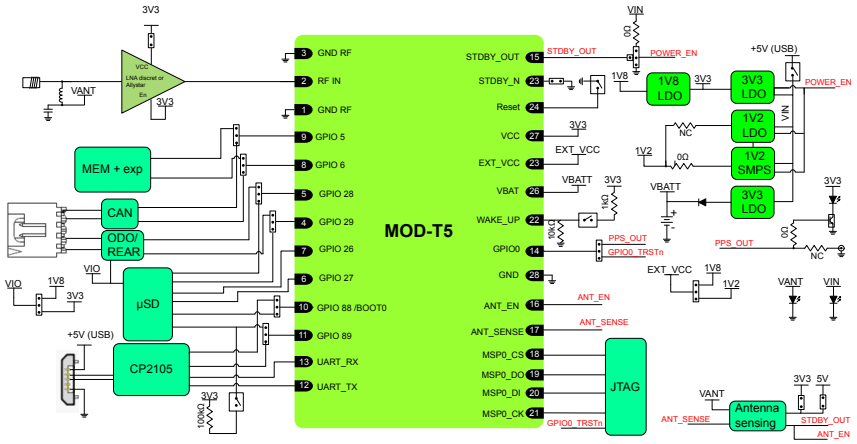
5.1 Default jumper configuration

Table 18. Default jumper configuration

Jumper	Position
J301	[1:2]
J304	[2:3]
J305	[2:3]
J307	[2:3]
J308	[2:3]
J312	[1:2]
J313	[1:2]
J314	[1:2]
J505	[1:2]
J600	[1:2]
J302	Open
J306	Open
J311	Open
J501	Open
J601	Open
J309	Closed
J310	Closed
J400	Closed

5.2 Block diagram overview

Figure 13. **Block diagram**



Revision history

Table 19. **Document revision history**

Date	Version	Changes
14-Feb-2020	1	Initial release.

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