



Category:HW probes

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A quality version of this page, approved on *17 June 2020*, was based off this revision.

This category groups together all articles related to the hardware probes useful for the trace and debug of the STM32 MPUs microprocessor devices and boards.



Pages in category "HW probes"

This category contains only the following page.

- [ST-LINK](#)

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This article describes the ST-LINK hardware probes.

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1 Introduction

The **ST-LINK^[1]** is an in-circuit debugger and programmer for the STM8 and STM32 microcontroller families.

ST-LINK is a USB device and has to be connected to a PC host. It can be either embedded on ST boards or provided as standalone dongle.

ST-LINK can support different debug protocols depending on ST-LINK hardware version and on its embedded firmware version:

- SWIM: debug protocol for STM8 microcontrollers
- SWD/JTAG: debug protocol for STM32 microcontrollers and microprocessors

and communication interfaces:

- UART
- I2C
- SPI
- CAN
- GPIO



2 Hardware versions

Several versions of ST-LINK exist: ST-LINK/V1^[1], ST-LINK/V2^[2], ST-LINK/V2-A, ST-LINK/V2-B, ST-LINK/V2-1 and STLINK-V3SET^[3].

For details about the different versions, please refer to technical note^[4] of ST-LINK derivatives.

To find out the ST-LINK version that is embedded in your ST board, refer to the [Category:STM32 MPU boards](#) page, and then select your hardware board.



3 Getting started

3.1 Installing the USB driver

Two USB drivers are associated to ST-LINK, depending of ST-LINK version: one for the debugger itself, and one for the serial communication port from (**ST-LINK/V2-1**).

The serial communication port uses standard CDC ACM USB Class, which is usually present by default on all PC operating systems. The USB driver for the debugger can differ depending of the PC operating system:

- **MS Windows®**

A driver must be installed before connecting ST-LINK to a Windows® 7, Windows® 7 8, or Windows® 10 PC via the USB.

The driver is automatically installed by the toolsets supporting ST-LINK. It is also available from www.st.com ^[5].

- **Linux®**

Users must be granted with rights for accessing ST-Link USB devices. Rules must then be added into `/etc/udev/rules.d`.

All information and files for installing the udev rules are provided in the **STSW-LINK007**^[6] package available from www.st.com (see `stsw-link007\AllPlatforms\StlinkRulesFilesForLinux\Readme.txt` file).

- **Mac OS®**

No specific installation is required.

3.2 Connecting JTAG/SWD for debugging

- Embedded ST-LINK

A JTAG/SWD link is available from the USB link provided by the ST-LINK. The USB device is mounted on the host PC and ready to be used.

- Standalone ST-LINK

Pins are available on the ST-LINK to connect the JTAG/SWD signals. Refer to [Hardware versions](#) for connection details.

- **JTAG**: VCC, JTDI, JTMS, JCLK, JRCLK, JTDO, NRST and GDN signals must be connected to the JTAG/SWD connector.
- **SWD**: VCC, SWCLK, SWDIO, NRST, SWO and GND signals must be connected to the JTAG/SWD connector (on some ST-LINK hardware version, a dedicated SWD port can also be available).

3.3 Connecting UART port (from **ST-LINK/V2-1**)

- Embedded ST-LINK

A UART serial port is available from the USB link provided by the ST-LINK. The USB device is mounted on the host PC and ready to be used.

- Standalone ST-LINK

Pins are available on the ST-LINK to connect the Rx/Tx and GND signals. Refer to [Hardware versions](#) for connection details.



4 To go further

4.1 Updating the embedded firmware

All information are given in the STSW-LINK007^[6] software package available from www.st.com.

Warning

The firmware update application embeds the latest firmware version, so do not hesitate to get the latest version of the executable STSW-LINK007^[6] software package

4.2 How to bypass the embedded ST-LINK

To use a newest version of ST-LINK standalone probe or another debug probe, ST-LINK can be bypassed for ST boards that already embed it.

- Deactivating the embedded ST-LINK

Please refer to the board description and schematic for how to put the embedded ST-LINK in reset mode if available.

- Bypassing the embedded ST-LINK signals and connecting an external hardware probe

Connect the relevant signals depending on the interface available on the new hardware probe. Please refer to [Connecting JTAG /SWD for debug](#) and [Connecting UART port for standalone external ST-LINK](#).



5 References

- 1.01.1 <https://www.st.com/en/development-tools/st-link.html>
- <https://www.st.com/en/development-tools/st-link-v2.html>
- <https://www.st.com/en/development-tools/stlink-v3set.html>
- https://www.st.com/resource/en/technical_note/dm00290229.pdf
- https://www.st.com/content/st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-utilities/stsw-link009.html
- 6.06.16.2 https://my.st.com/content/my_st_com/en/products/development-tools/software-development-tools/stm32-software-development-tools/stm32-programmers/stsw-link007.html

Single Wire Interface Module (debug protocol for STM8 microcontrollers)

Serial Wire Debug

debug and test protocol, named from the Joint Test Action Group that developed it

Universal Asynchronous Receiver/Transmitter

Inter-Integrated Circuit (Bi-directional 2-wire bus standard for efficient inter-IC control.)

Serial Peripheral Interface

Controller Area Network (robust bus mainly used for automotive applications)

General-Purpose Input/Output (A realization of open ended transmission between devices on an embedded level. These pins available on a processor can be programmed to be used to either accept input or provide output to external devices depending on user desires and applications requirements.)

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spelling for older versions of STLink, ST in-circuit debugger and programmer for the STM8 and STM32 microcontroller families

Operating System