Overview of ST-LINK derivatives

Introduction

In this document, ST-LINK is a generic name that refers to the different implementations of a debugger/programmer probe interface for STMicroelectronics microcontrollers. ST-LINK is also the part number of the first implementation of this probe (now obsolete), which is further called ST-LINK/V1 in this document to avoid confusion.

This technical note provides an overview of all ST-LINK versions for standalone or embedded implementations:

- Standalone probes
  - ST-LINK/V1 (obsolete)
  - ST-LINK/V2
  - STLINK-V3SET
    - B-STLINK-VOLT additional module for STLINK-V3SET
    - B-STLINK-ISOL additional module for STLINK-V3SET
  - STLINK-V3MINI (obsolete)
  - STLINK-V3MINIE
  - STLINK-V3MODS
  - STLINK-V3PWR
- Embedded interface in development boards
  - STM32 Nucleo boards
  - STM32 Discovery kits
  - STM32 Eval boards
  - STM8 MCU Eval boards

It also refers to the ST-LINK firmware upgrade application (STSW-LINK007), and ST-LINK USB driver (STSW-LINK009).

1 Overview of the ST-LINK versions

1.1 Brief history of the ST-LINK versions

The several ST-LINK coexisting versions result from the incremental addition of new functionalities over time, starting from the first ST-LINK/V1 version. This section presents a brief history of the incremental changes in the naming of the versions.

The first two versions of ST-LINK are both standalone and embedded in STMicroelectronics Discovery and Eval boards. These versions are:

- ST-LINK/V1 (now obsolete)
- ST-LINK/V2

A third ST-LINK version, ST-LINK/V2-1, is an evolution of ST-LINK/V2, with the addition of USB interfaces (mass storage interface and Virtual COM port), and better power management control for the STM32 microcontroller in the application board. ST-LINK/V2-1 is deployed on some STMicroelectronics Discovery, Eval, and Nucleo boards.

Two other versions, derived from the ST-LINK/V2 version, have been implemented afterwards to support some of the functionalities of the ST-LINK/V2-1:

- ST-LINK/V2-A, for mass storage
- ST-LINK/V2-B, for mass storage and Virtual COM port

Finally, an STLINK-V2EC version completes the ST-LINK/V2 generation with a USB Type-C® connection provided on the most recent boards in this generation.

STLINK-V3 is the most recent and powerful ST-LINK generation. It is firstly introduced as a modular standalone probe (STLINK-V3SET) adapted as more compact derivatives (STLINK-V3MODS, STLINK-V3MINI (now obsolete), and STLINK-V3MINIE), and may also be embedded into demonstration boards (STLINK-V3E, and STLINK-V3EC managing a USB Type-C® connection). STLINK-V3 features a specially developed multipath USB bridge function.

The ability to provide and measure power to the target is introduced into the STLINK-V3PWR probe.

The various ST-LINK implementations embed an STM32 32-bit microcontroller based on the Arm® Cortex®-M processor.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.

1.2 ST-LINK USB interfaces

1.2.1 Overview

ST-LINK/V1 and ST-LINK/V2 embed a unique interface (STMicroelectronics debug) with the USB. When powered up, the boards are in the firmware-upgrade mode (also called DFU for "device firmware upgrade”), allowing firmware to be updated through the USB. Dedicated commands switch the ST-LINK from the firmware upgrade to the STM8 or STM32 debug mode (depending on firmware capability). There is no similar command to switch back to the firmware-upgrade mode (a power cycle is required).

ST-LINK/V2-1, ST-LINK/V2-A, ST-LINK/V2-B, and STLINK-V2EC are composite USB devices with a mass storage and a Virtual COM port interface to the USB, in addition to the STMicroelectronics debug interface. They directly run the firmware when powered up. The firmware-upgrade mode is entered through a dedicated command managed by the ST-LINK upgrade applications.

STLINK-V3 is also a composite USB device. Similarly to the ST-LINK/V2-x versions, it features mass storage, Virtual COM port, and the STMicroelectronics proprietary debug interface; additionally, it can also present a bridge interface and a second Virtual COM port (for STLINK-V3SET and STLINK-V3MODS; refer to their corresponding user manuals UM2448 and UM2502). The bridge interface can be used through the STLINK-V3-BRIDGE host software package provided on *www.st.com*.

STLINK-V3PWR uses one USB Virtual COM port for target power monitoring and control. Another USB Virtual COM port is available for debugging, in addition to the standard STMicroelectronics debug interface and bridge interface.

1.2.2 USB interface selection

On ST-LINK/V2-1 boards, it is possible to disable and restore the mass storage interface by means of the STLinkUpgrade applications (refer to Figure 1), while on STLINK-V3SET and STLINK-V3MODS it is possible to replace the mass storage interface by a second Virtual COM port (refer to Figure 2).

Figure 1. ST-LINK/V2-1 mass storage interface activation

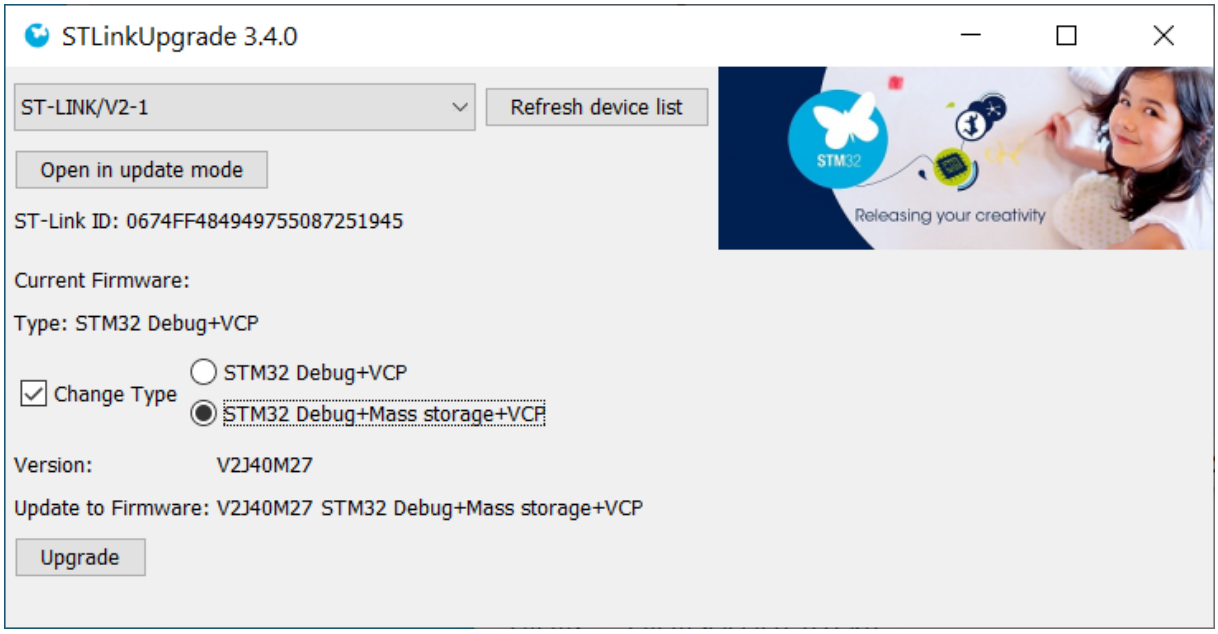
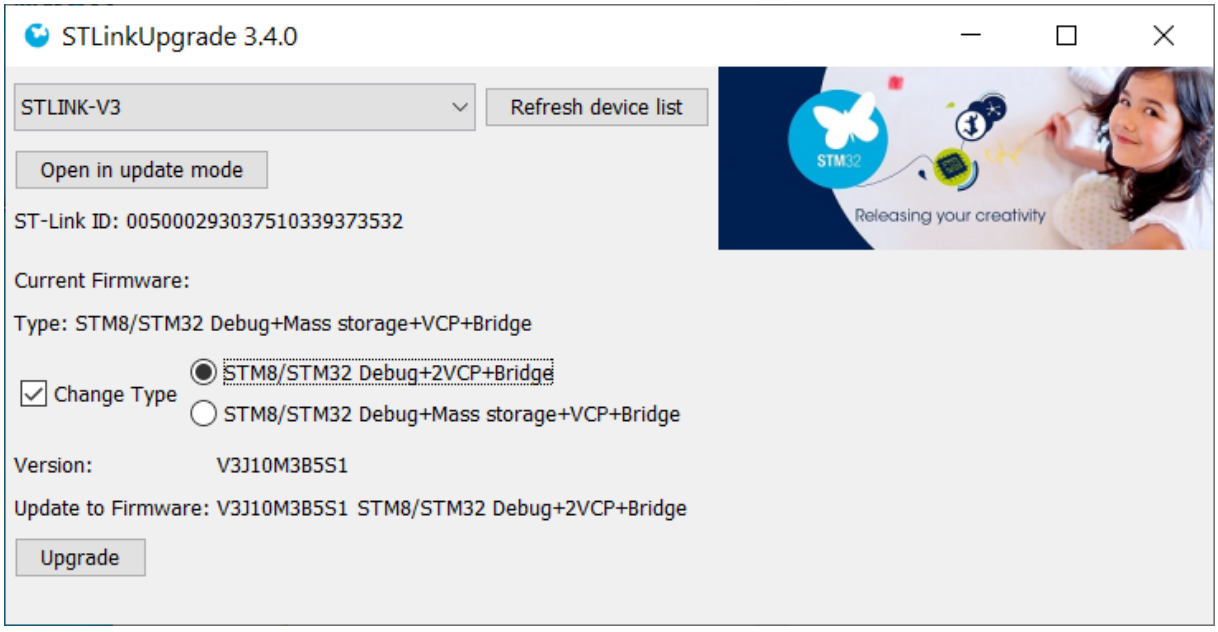
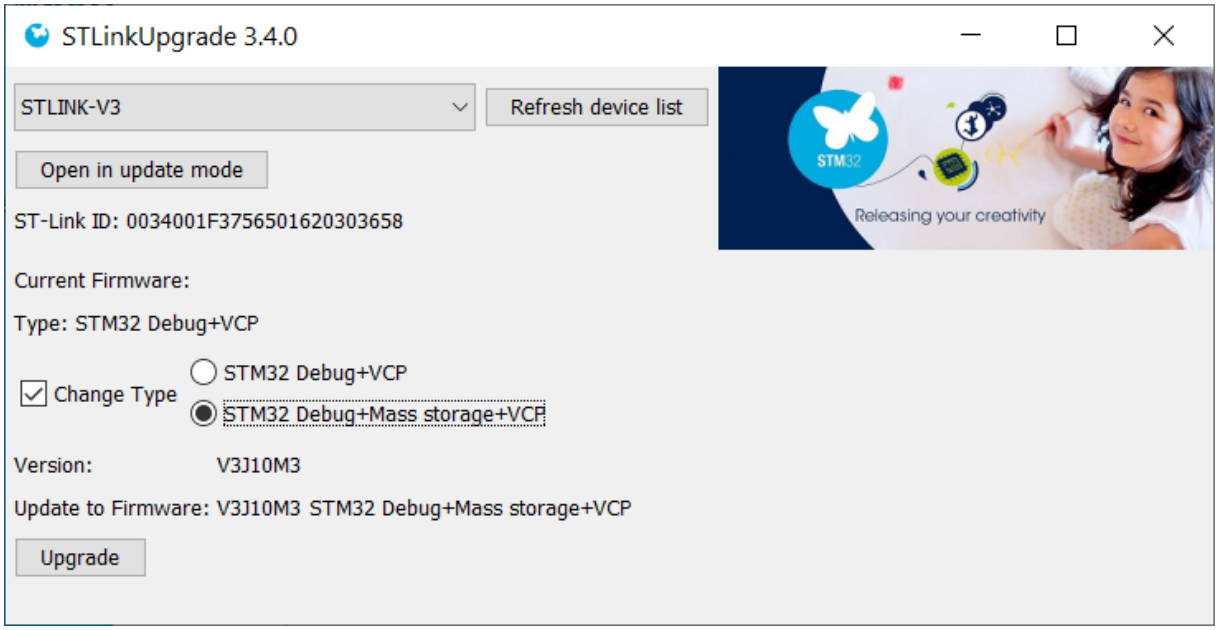


Figure 2. STLINK-V3 firmware selection for a second Virtual COM port



On STLINK-V3MINIE, the mass storage interface is disabled by default. It can be enabled back (refer to Figure 3).

Figure 3. STLINK-V3MINIE mass storage interface activation



2 Overview of features

The user manual is the reference document to know which ST-LINK version is embedded in a given board (Nucleo, Discovery, or Eval). The next sections in this chapter present an overview of the features supported by each ST-LINK version.

2.1 ST-LINK/V1 key features (now obsolete)

- 5 V power supplied by a USB connector
- USB 2.0 full-speed compatible interface
- USB Type-A to Mini-B cable provided
- SWIM-specific feature: 1.65 V to 5.5 V application voltage support on the SWIM interface
- SWIM low-speed and high-speed modes support
- SWIM programming speed rates: 9.7 kbyte/s in low speed, 12.8 kbyte/s in high speed
- SWIM cable for connection to an application with an ERNI standard connector
  - Vertical connector reference: 284697 or 214017
  - Horizontal connector reference: 214012
- SWIM cable for connection to an application with pin headers or 2.54 mm pitch connector
- JTAG/Serial Wire Debug (SWD) specific features: 3 V to 3.6 V application voltage support on the JTAG/SWD interface and 5 V tolerant inputs
- JTAG/SWD cable provided for connection to a standard JTAG 20-pin 2.54 mm pitch connector
- Device firmware upgrade support (DFU)
- Status LED blinking during the communication with the PC
- Operating temperature from 0 °C to 50 °C

2.2 ST-LINK/V2 key features

- 5 V power supplied by a USB connector
- USB 2.0 full-speed compatible interface
- USB Type-A to Mini-B cable provided
- SWIM-specific feature: 1.65 V to 5.5 V application voltage support on the SWIM interface
- SWIM low-speed and high-speed modes support
- SWIM programming speed rates: 9.7 kbyte/s in low speed, 12.8 kbyte/s in high speed
- SWIM cable for connection to an application with an ERNI standard connector
  - Vertical connector reference: 284697 or 214017
  - Horizontal connector reference: 214012
- SWIM cable for connection to an application with pin headers or 2.54 mm pitch connector
- JTAG/Serial Wire Debug (SWD) specific features: 1.65 V to 3.6 V application voltage support on the JTAG/SWD interface and 5 V tolerant inputs
- JTAG cable for connection to a standard JTAG 20-pin 2.54 mm pitch connector
- JTAG support
- SWD and Serial Wire Viewer (SWV) communication support
- Device firmware upgrade support (DFU)
- Status LED blinking during the communication with the PC
- Operating temperature from 0 °C to 50 °C
- 1000 Vrms high isolation voltage (ST-LINK/V2-ISOL only)

2.3 ST-LINK/V2-1 key features

The changes versus ST-LINK/V2 are listed below:

- New features supported by ST-LINK/V2-1:
  - USB software re-enumeration
  - Virtual COM port interface on USB
  - Mass storage interface on USB
  - USB power management request for more than 100 mA power-on USB
- Features not supported by ST-LINK/V2-1:
  - SWIM interface
  - Minimum supported application voltage depends on hardware implementation. For details, refer to the user manual of the board.

2.4 ST-LINK/V2-A key features

The changes versus ST-LINK/V2 are listed below:

- New features supported by ST-LINK/V2-A:
  - Virtual COM port interface on USB, under conditions: refer to the user manual of the board for details.
  - Mass storage interface on USB
- Features not supported by ST-LINK/V2-A:
  - SWIM interface
  - Minimum supported application voltage limited to 3 V
  - USB power management request for more than 100 mA power-on USB

2.5 ST-LINK/V2-B key features

The changes versus ST-LINK/V2 are listed below:

- New features supported by ST-LINK/V2-B:
  - Virtual COM port interface on USB
  - Mass storage interface on USB
- Features not supported by ST-LINK/V2-B:
  - SWIM interface
  - Minimum supported application voltage limited to 3 V
  - USB power management request for more than 100 mA power-on USB

2.6 STLINK-V2EC key features

- Self-powered through a USB Type-C® connector
- USB 2.0 full-speed interface
- Probe firmware upgrade through USB
- Optional drag-and-drop flash memory programming of binary and hexadecimal files
- Communication bicolor LED
- JTAG communication support depending on the board implementation (refer to the corresponding board user manual)
- SWD (Serial Wire Debug) communication support and SWV (Serial Wire Viewer) support
- VCP (Virtual COM port) support
- 1.65 V to 3.6 V application voltage support depending on the board implementation (refer to the corresponding board user manual)

2.7 STLINK-V3SET key features

- Standalone probe with modular extensions
- Self-powered through a USB connector (Micro-B)
- USB 2.0 high-speed compatible interface

- Device firmware upgrade support (DFU)
- JTAG/Serial Wire Debug (SWD) specific features:
  - 3 V to 3.6 V application voltage support and 5 V tolerant inputs
  - Flexible flat cables STDC14 to MIPI10/STDC14/MIPI20 (connectors with 1.27 mm pitch)
  - JTAG communication support
  - SWD and Serial Wire Viewer (SWV) communication support
- SWIM-specific features (only available with the adapter board MB1440):
  - 1.65 V to 5.5 V application voltage support
  - SWIM header (2.54 mm pitch)
  - SWIM low-speed and high-speed modes support
- Virtual COM port (VCP) specific features:
  - 3 V to 3.6 V application voltage support on the UART interface and 5 V tolerant inputs
  - VCP frequency up to 15 MHz
  - Available on the STDC14 debug connector (not available on MIPI10)
- Multipath bridge USB to SPI/UART/I^2C/CAN/GPIOs specific features:
  - 3 V to 3.6 V application voltage support and 5 V tolerant inputs
  - Signals available on the adapter board only (MB1440)
- Drag-and-drop flash memory programming of binary file
- Two color LEDs: communication, power

2.8 B-STLINK-VOLT additional module for STLINK-V3SET

- 1.65 V to 3.3 V voltage adapter board for STLINK-V3SET
- Input/output level shifters for the STM32 debug SWD, SWV, and JTAG signals
- Input/output level shifters for the VCP Virtual COM port port (UART) signals
- Input/output level shifters for the bridge (SPI / UART / I^2C / CAN / GPIOs) signals
- Closed casing when using the STDC14 connector (STM32 SWD, SWV, and VCP)
- Compatible with the STLINK-V3SET adapter board (MB1440) for STM32 microcontrollers JTAG and bridge

2.9 B-STLINK-ISOL additional module for STLINK-V3SET

- 2.5 kV rms insulation rating; 300 V rms basic insulation working voltage per IEC 62368-1:2014
- Input/output isolation and level shifters for the STM32 debug SWD, SWV, and JTAG signals
- Input/output isolation and level shifters for the VCP Virtual COM port port (UART) signals
- Input/output isolation and level shifters for the bridge (SPI / UART / I^2C / CAN / GPIOs) signals
- Closed casing when using the STDC14 connector (STM32 SWD, SWV, and VCP)
- Connection compatible with the STLINK-V3SET adapter board (MB1440) for STM32 microcontrollers JTAG and bridge

2.10 STLINK-V3MINI key features (now obsolete)

- Standalone probe
- Approximately 15 × 30 mm^2 high-density integration PCB
- Delivered with 1.27 mm pitch STDC14 debug connector and STDC14 to STDC14 flexible flat cable
- Self-powered through a USB connector (Micro-B)
- USB 2.0 high-speed compatible interface
- Device firmware upgrade support (DFU)
- JTAG/Serial Wire Debug (SWD) specific features:
  - 3 V to 3.6 V application voltage support and 5 V tolerant inputs
  - JTAG communication support
  - SWD and Serial Wire Viewer (SWV) communication support

- Virtual COM port (VCP) specific features:
  - 3 V to 3.6 V application voltage support on the UART interface and 5 V tolerant inputs
  - VCP frequency up to 15 MHz
- Drag-and-drop flash memory programming of binary file
- Two color LEDs: communication, power
- Includes STDC14 signals protection

2.11 STLINK-V3MODS key features

- Modular probe with small size: approximately 15 × 30 mm^2
- Direct-to-PCB implementation by 2 × 16-pin 1.27 mm edge castellated vias with all signals available in the minimum PCB surface required
- Self-powered through a USB connector (Micro-B)
- USB 2.0 high-speed compatible interface
- Device firmware upgrade support (DFU)
- JTAG/Serial Wire Debug (SWD) specific features:
  - 3 V to 3.6 V application voltage support and 5 V tolerant inputs
  - JTAG communication support
  - SWD and Serial Wire Viewer (SWV) communication support
- Virtual COM port (VCP) specific features:
  - 3 V to 3.6 V application voltage support on the UART interface and 5 V tolerant inputs
  - VCP frequency up to 15 MHz
- Multipath bridge USB to SPI/UART/I^2C/CAN/GPIOs specific features:
  - 3 V to 3.6 V application voltage support on the UART interface and 5 V tolerant inputs
- Drag-and-drop flash memory programming of binary file
- Two color LEDs: communication, power

2.12 STLINK-V3MINIE key features

- Tiny 15 mm × 42 mm standalone debugging and programming probe for STM32 microcontrollers
- Self-powered through a USB Type-C® connector
- USB 2.0 high-speed interface
- Probe firmware update through USB
- Optional drag-and-drop flash memory programming of binary files
- Communication bicolor LED
- JTAG communication support up to 21 MHz
- SWD (Serial Wire Debug) and SWV (Serial Wire Viewer) communication support up to 24 MHz
- VCP (Virtual COM port) up to 15 Mbit/s
- 1.65 V to 3.6 V application voltage support
- Board connectors:
  - 1.27 mm pitch STDC14 debug connector with STDC14 to STDC14 flexible flat cable
  - 2.0 mm pitch on-board pads for board-to-board (BTB) card edge connector

2.13 STLINK-V3EC key features

- Self-powered through a USB Type-C® connector
- USB 2.0 high-speed interface
- Probe firmware upgrade through USB
- Optional drag-and-drop flash memory programming of binary and hexadecimal files
- Communication bicolor LED
- USB power status bicolor LED

- JTAG communication support depending on the board implementation (refer to the corresponding board user manual)
- SWD (Serial Wire Debug) communication support and SWV (Serial Wire Viewer) support
- VCP (Virtual COM port) support
- 1.65 V to 3.6 V application voltage support depending on the board implementation (refer to the corresponding board user manual)

2.14 STLINK-V3PWR key features

- 1-quadrant source measurement unit with high resolution, and measurement flexibility:
  - Programmable voltage source from 1.6 V to 3.6 V
  - Output current rating 500 mA with overcurrent protection (OCP) at 550 mA
  - Programmable sampling rate from 1 sample/s to 100 ksample/s
  - Dynamic measurement:
    - A few nA to 550 mA current
    - Up to 1.65 W power measurements
    - 50 kHz bandwidth / 1.6 MHz acquisition / down to ±0.5% accuracy
    - Compatible with EEMBC® ULPMark™ tests
- Auxiliary output voltage source from 1.6 V to 3.6 V under up to 2 A (no current measurement, OCP at 2.5 A)
- Debugging of embedded applications:
  - JTAG / Serial Wire Debug (SWD):
    - SWD (Serial Wire Debug) and SWV (Serial Wire Viewer) communication support up to 10 MHz
    - JTAG communication support up to 20 MHz
  - UART interface on Virtual COM port (VCP) with frequency up to 12 MHz
  - Multipath bridge USB to SPI / I^2C / CAN / GPIOs
  - Integrated level shifter I/O voltage 1.6 V to 3.6 V adaptable
- Four bicolor LEDs providing probe state
- Three STDC14 to MIPI10 / STDC14 / MIPI20 flat cables with 1.27 mm pitch connectors
- Four cables (two male/male and two male/female)
- USB Type-C® connector:
  - Powered through USB Type-C® (5 V / 1.5 A maximum)
  - USB 2.0 high-speed interface
  - Probe firmware update through USB
- Direct support from the STM32CubeMonitor-Power (STM32CubeMonPwr) software tool

3 Firmware naming rules

There is a multiplicity of ST-LINK firmware, because of the multiplicity of hardware boards and functionalities.

The firmware version gives an indication of the functionalities supported according to the following rules:

- V: major version ID
  - 1 for ST-LINK/V1
  - 2 for ST-LINK/V2, ST-LINK/V2-1, ST-LINK/V2-A, ST-LINK/V2-B, and STLINK-V2EC
  - 3 for STLINK-V3SET, STLINK-V3MINI, STLINK-V3MINIE, STLINK-V3MODS, STLINK-V3E, and STLINK-V3EC
  - 4 for STLINK-V3PWR
- J: version for STM32 debug interface (JTAG and SWD protocols). A value of 0 means that the interface is not supported (as for STM8 Discovery boards)
- S: version for STM8 debug interface (SWIM protocol). A value of 0 means that the interface is not supported (as for some STM32 Discovery and Eval boards)
- M: version for mass storage and Virtual COM port interfaces
- B: version for bridge interface
- P: version for power interface. A value of 0 means that the interface is not supported

The following examples illustrate the naming rules:

- V1J13S4 is a version for the ST-LINK/V1 standalone probe
- V2J27S6 is a version for the ST-LINK/V2 standalone probe (with both STM32 and STM8 debug interfaces)
- V2J27S0 is a version for the 32F401CDISCOVERY board (STM32 debug interface, no STM8 debug interface, no mass storage interface, and no Virtual COM port)
- V2J27M15 is a version for Nucleo boards and other ST-LINK/V2-1, ST-LINK/V2-A, ST-LINK/V2-B, and STLINK-V2EC boards (STM32 debug interface, mass storage interface, Virtual COM port)
- V3J1M1B1S1 is a version for STLINK-V3SET (STM8 and STM32 debug interface, mass storage interface, Virtual COM port, and bridge interface)
- V4J4B1P5 is a version for STLINK-V3PWR (STM32 debug interface, Virtual COM port, bridge interface, and power interface)

The type of firmware is closely linked to the hardware. For this reason, it is not possible to change the type of firmware for a given board (from V2J27S6 to V2J27M15 for instance). It is just possible to update the version of the same type of firmware (V2J25M14 to V2J27M15 for instance).

4 ST-LINK firmware upgrade

ST-LINK embeds a firmware upgrade mechanism for in-place upgrade through the USB port. As firmware may evolve during the lifetime of the ST-LINK product (for example new functionalities, bug fixes, support for new microcontroller families), it is recommended to visit the STSW-LINK007 page at the STMicroelectronics website periodically, to stay up to date with the latest firmware version.

ST-LINK firmware upgrade is possible through the USB by means of two dedicated applications:

- *STLinkUpgrade.exe*: historical version for Windows®
- *STLinkUpgrade.jar*: Java® version for Windows®, Linux®, and macOS®

Both applications contain the latest version of all ST-LINK firmware types. They identify the connected board and automatically select the corresponding firmware.

Important: Any issue, tentative of falsification, or both, during this phase can lead to unpredictable results, making the board arduously recoverable, or even at worst unusable.

Note: Java is a registered trademark of Oracle and/or its affiliates.

macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.

All other trademarks are the property of their respective owners.

5 ST-LINK drivers

5.1 Drivers on Windows®

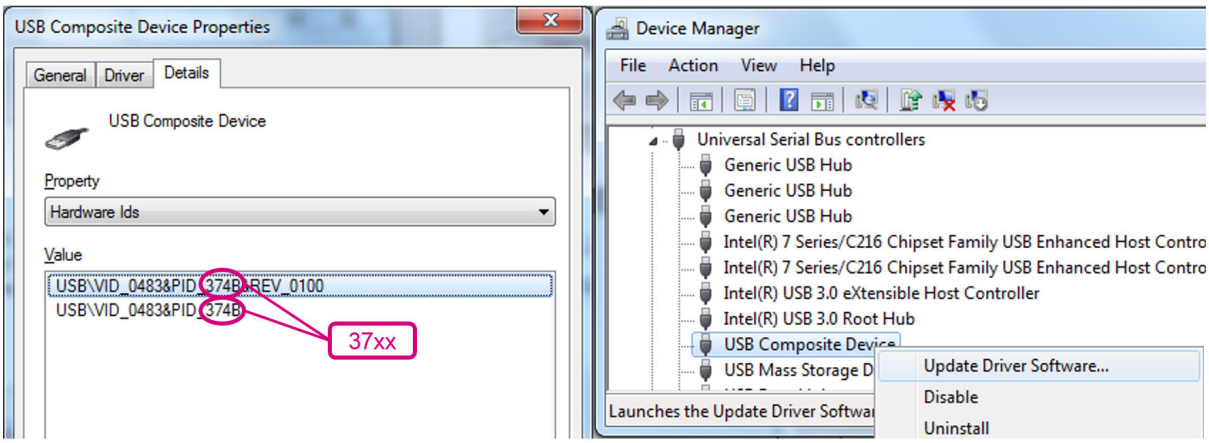
A driver must be installed before connecting an ST-LINK/V2 or an ST-LINK/V2-1 board with a Windows® 10 or Windows® 11 PC via the USB. This installation is not mandatory for the STLINK-V3 boards, but allocates an ST-specific name to the ST-LINK COM ports in the system device manager (refer to Figure 4). The driver is automatically installed by the toolsets supporting ST-LINK. It is also available from the STSW-LINK009 dedicated page at the STMicroelectronics website.

Figure 4. STLINK-V3SET COM ports in Windows® device manager after STSW-LINK009 installation

If the ST-LINK is connected with the PC before the driver is installed, some ST-LINK interfaces may be declared as *"unknown"* in the PC device manager. In such a case, the user must install the driver files, and update the driver of the connected device from the device manager, as shown in Figure 5, with:

- 37xx = 374B or 3752 for ST-LINK/V2-1
- 37xx = 374E or 3754 for STLINK-V3 without bridge functions
- 37xx = 374F or 3753 for STLINK-V3 with bridge functions
- 37xx = 3757 for STLINK-V3PWR

Figure 5. USB composite device



Note: Prefer the use of the "USB Composite Device" handle for a full recovery.

Note: Windows is a trademark of the Microsoft group of companies.

5.2 Drivers on Linux®

On Linux®, the users must be granted rights for accessing the ST-LINK USB devices. For that purpose, the users might need to install one of the `udev-rules` packages (depending on the Linux® version) provided with the ST-LINK firmware upgrade application (STSW-LINK007).

Typical host applications for debug and bridge features also require `libusb-1.0`, which must be installed separately. For instance, on Ubuntu®, this is done through the command `sudo apt-get install libusb-1.0`.

The toolset installation setups may manage all the points mentioned above automatically.

The Virtual COM port interface can be accessed through the Linux® native drivers.

Note: Linux® is a registered trademark of Linus Torvalds.
Ubuntu® is a registered trademark of Canonical Ltd.

5.3 Drivers on macOS®

On macOS®, the ST-LINK USB devices connect natively without any specific action. The libraries required to have access to the debug and bridge features are provided with the host applications.

The Virtual COM port interface can be accessed through the macOS® native drivers.

Note: macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.

6 ST-LINK COM LED

All the ST-LINK boards since ST-LINK/V2 implement an LED labeled *"COM"* (either on the casing or on the PCB). This LED shows the ST-LINK status, whatever the connection type:

- The LED is **blinking red**: the first USB enumeration with the PC is taking place. If an STLinkUpgrade application is running, the firmware is being programmed.
- The LED is **red**: the ST-LINK is in the idle state (the USB enumeration with the PC is finished and the ST-LINK is waiting for an application to connect).
- The LED is **blinking green and red alternately**: data is being exchanged between the target and the PC.
- The LED is **green**: the last communication with the target has been successful.
- The LED is **orange**: the last communication with the target has failed.
- The LED is **blinking red then orange**: USB port detection failure. Check the USB connectors and cable.

7 ST-LINK PWR_STATUS LED

The description of the LED labeled *"PWR_STATUS"* applies to the boards with the STLINK-V3EC interface (based on the USB Type-C® connector). This LED indicates the power budget provided by the host PC compared to the board requirement.

- The LED is **OFF**: the target is not powered by the ST-LINK.
- The LED is **orange**: The requested board power budget is higher than the USB power budget. The ST-LINK starts working normally, but there is a risk to exceed the USB budget to supply the ST-LINK and the target application. Connect the board to a more powerful USB port for correct functioning.
- The LED is **green**: The requested board power budget is less than or equal to the USB power budget.
- The LED is **red**: an overcurrent is detected on the board and the target power is switched off automatically (overcurrent protection). The cause of the overcurrent must be investigated, or the board must be connected to a more powerful USB port.
- The LED is **blinking red**: internal error; update the board with the most recent firmware available at *www.st.com*. If the issue persists, contact the STMicroelectronics support.

8 MCO selection

The ST-LINK on some boards provides a microcontroller clock output (MCO), which can be used as a target source clock. Refer to the board's user manual to determine if the MCO is available and how to use it. Note that using the MCO might require a hardware modification, such as configuring a solder bridge.

At the ST-LINK level, an onboard programmed parameter controls the output. The ST-LINK firmware uses this parameter at startup. Recent versions of the STLinkUpgrade application can adjust this parameter during the firmware upgrade sequence (see Figure 6 and Figure 7).

Figure 6. ST-LINK MCO output selection on an STLINK-V3E board with STLinkUpgrade 3.15.7

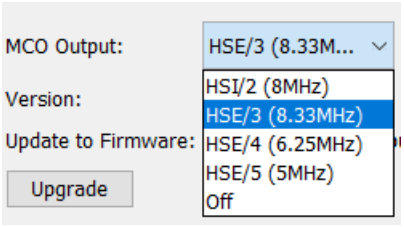
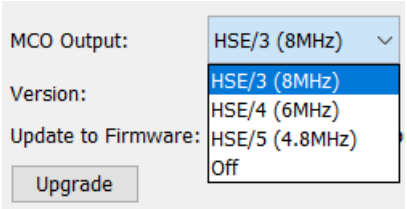


Figure 7. ST-LINK MCO output selection on an STLINK-V3EC board with STLinkUpgrade 3.15.7



If the STLinkUpgrade application does not show an MCO output selection after connecting to an ST-LINK, either the STLinkUpgrade application is not up to date, or the board does not support this modification.

Note that the ST-LINK firmware might temporarily disable the MCO output during phases when USB consumption is restricted. For example, during USB enumeration or firmware upgrade.

Revision history

Table 1. **Document revision history**

Date	Revision	Changes
16-Nov-2016	1	Initial release.
06-Sep-2018	2	Document entirely revisited: • Scope extended to STLINK-V3 • First ST-LINK version referred to as ST-LINK/V1 Added: • *Section 2.6 STLINK-V3SET key features* • *Section 5 ST-LINK drivers* • *Section 6 ST-LINK COM LED*
21-Nov-2019	3	Addition of standalone STLINK-V3 products STLINK-V3MINI and STLINK-V3MODS: • Updated *Introduction*, *Section 1.1 Brief history of the ST-LINK versions*, and *Section 3 Firmware naming rules* • Added *Section 2.7 STLINK-V3MINI key features* and *Section 2.8 STLINK-V3MODS key features* Updated *Section 1.2 ST-LINK USB interfaces* for *ST-LINK/V2-1 mass storage interface activation* and *STLINK-V3 firmware selection for a second Virtual COM port*. Highlighted the obsolescence and maintained the description of ST-LINK/V1.
28-Apr-2022	4	Addition of the STLINK-V3MINIE product: • Updated *Introduction*, *Section 1.1 Brief history of the ST-LINK versions*, *Section 1.2.2 USB interface selection*, and *Section 3 Firmware naming rules* • Added *Section 2.9 STLINK-V3MINIE key features* Updated *Section 5 ST-LINK drivers* and *Section 6 ST-LINK COM LED*.
03-Mar-2023	5	Addition of the STLINK-V3PWR product, of the STLINK-V3EC board interface, and of the B-STLINK-VOLT and B-STLINK-ISOL additional modules for STLINK-V3SET: • Updated *Introduction*, *Section 1.1 Brief history of the ST-LINK versions*, and *Section 1.2.1 Overview* • Added *Section 2.7 B-STLINK-VOLT additional module for the STLINK-V3SET*, *Section 2.8 B-STLINK-ISOL additional module for the STLINK-V3SET*, *Section 2.12 STLINK-V3PWR key features*, and *Section 7 ST-LINK PWR_STATUS LED* Updated *Section 5 ST-LINK drivers*.
08-Mar-2024	6	Addition of the STLINK-V2EC board interface, STLINK-V3EC features, drivers for Linux®, and drivers for macOS®: • Updated *Introduction*, *Section 1.1: Brief history of the ST-LINK versions*, and *Section 1.2.1: Overview* • Updated *Section 2.14: STLINK-V3PWR key features* and *Section 3: Firmware naming rules* • Added *Section 2.6: STLINK-V2EC key features* and *Section 2.13: STLINK-V3EC key features* • Reorganized *Section 5: ST-LINK drivers*: updated *Section 5.1: Drivers on Windows®*, and added *Section 5.2: Drivers on Linux®* and *Section 5.3: Drivers on macOS®* Updated *Section 6: ST-LINK COM LED*. Highlighted the obsolescence and maintained the description of STLINK-V3MINI.
15-Jan-2025	7	Added Section 8: MCO selection.

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