STUSB4531 graphical user interface

Introduction

- The Nucleo firmware needs to be flashed using the binary files included in the zip file to be operational with the GUI.
- Operating system required: Microsoft Windows.

1 Features and description

Features

- Access to the STUSB4531 non-volatile memory using I²C link
- Read and write any I²C register address
- Device dashboard

Description

The STSW-STUSB020 is a free graphical user interface (GUI) aimed at seamlessly customizing the STUSB4531 device through direct access to the non-volatile-memory (NVM).

The tool allows the NVM to be read, configured, and written without dedicated software skills, thanks to the GUI.

The utility also provides a basic panel to read and write STUSB4531 I²C registers regardless of its selected device address.

The software can be used with the evaluation boards of the STUSB4531 device stacked on a NUCLEO-C071RB or NUCLEO-F072RB controller board.

2 Hardware configuration

2.1 Main elements list

Table 1. Main elements list

Main elements	
NUCLEO-C071RB	STM32 Nucleo-64 development board with ARM Cortex M0+
Or NUCLEO-F072RB	STM32 Nucleo-64 development board with ARM Cortex M0
USB-C Cable	With USB data support
Or Mini-B USB Cable	With USB data support
STSW-STUSB020	STUSB4531 Graphical User Interface
EVAL-SCS007V1	STUSB4531 evaluation board
Or EVAL-SCS006V1	STUSB4531 reference design board
Operating System	Window OS

2.2 Nucleo boards

Figure 1. NUCLEO-C071RB

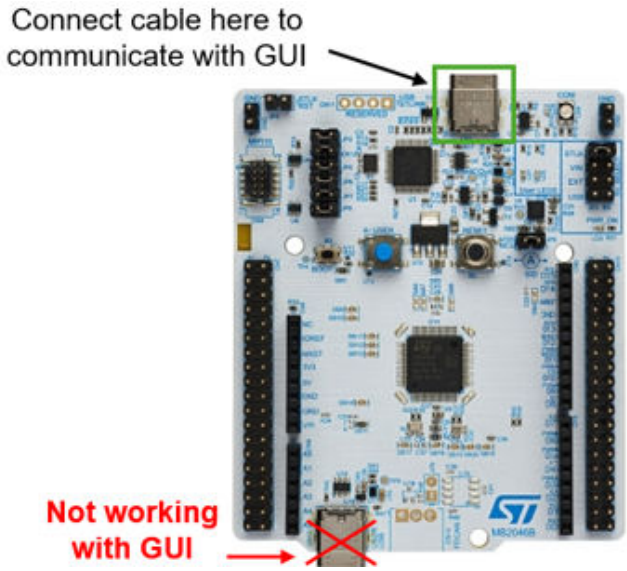
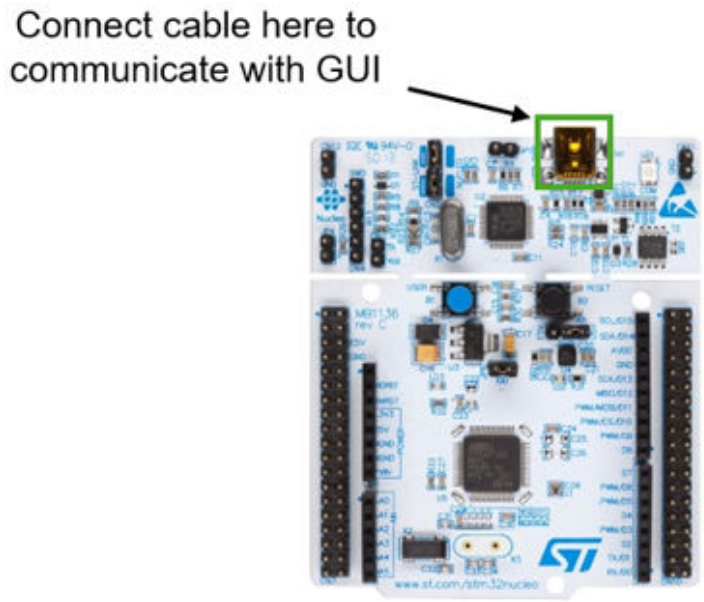


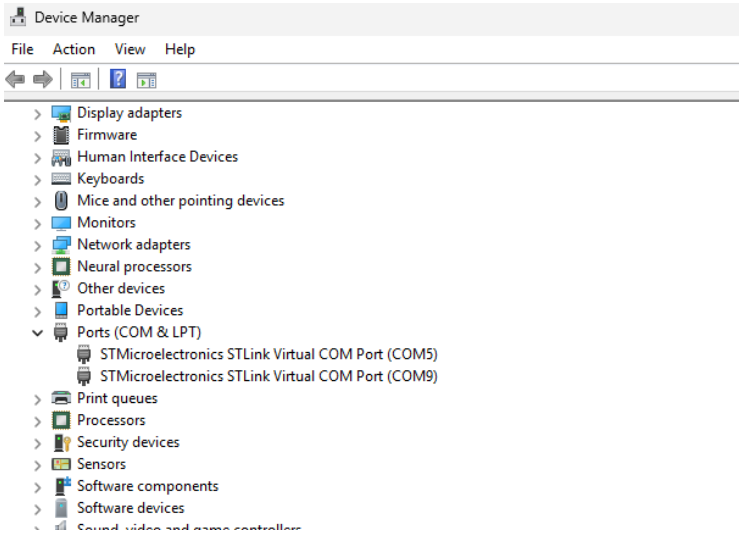
Figure 2. **NUCLEO-F072RB**



Note: Please ensure that Nucleo STLink firmware is correctly installed and up-to-date before starting, using https://www.st.com/en/development-tools/stsw-link007.html.

STLink installation can be checked in Device Manager:
“STMicroelectronics STLink Virtual COM Port (COMx)” shall be listed, as mentioned in Figure 3.

Figure 3. **STLink correctly installed**



2.3 STUSB4531 boards

Figure 4. **EVAL-SCS007V1**

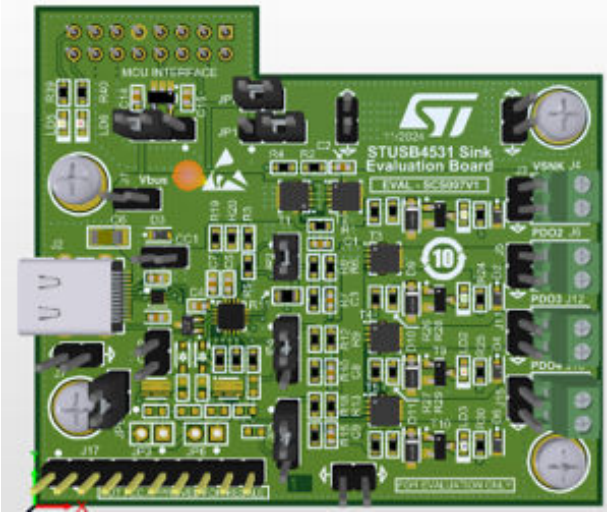
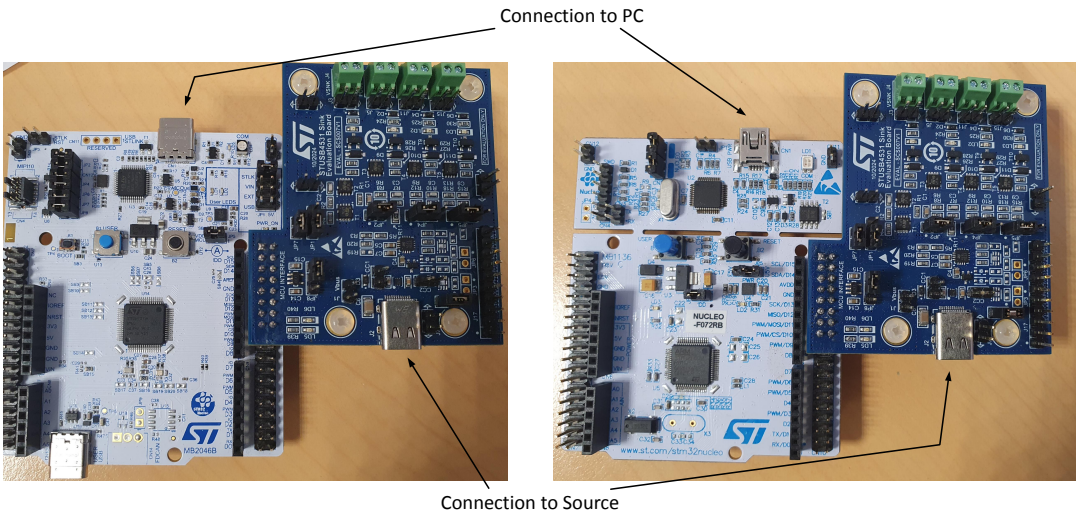


Figure 5. **EVAL-SCS006V1**

2.4 STUSB4531 board connection to Nucleo

The EVAL-SCS007V1 can be directly plugged onto the Nucleo-F072RB or Nucleo-C071RB:

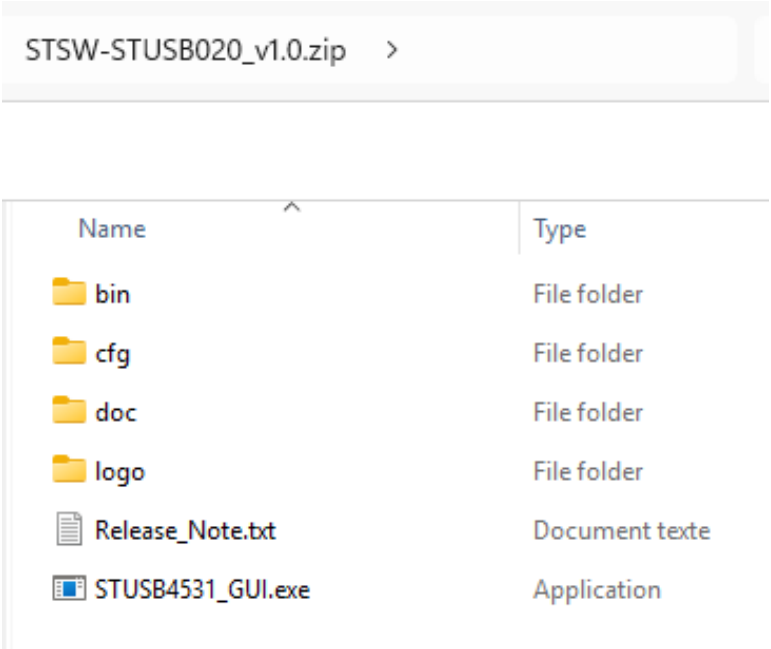
Figure 6. **Eval-SCS007V1 connected to Nucleo**



3 Software package content

The package folder structure is the following:

Figure 7. Package folder structure



The **bin** directory contains binary files necessary to flash Nucleo:

- Nucleo_C071RB_STUSB_UART_NVM_config_C.bin for **NUCLEO-C071RB**
- Nucleo_F072RB_STUSB_UART_NVM_config_F.bin for **NUCLEO-F072RB**

The **cfg** directory contains config files corresponding to the 2 different configs described in the STUSB4531 datasheet:

- Datasheet_4531_deadbattery.nvm (P/N: **STUSB4531QTR** and **STUSB4531BJR**)
- Datasheet_4531_no_deadbattery.nvm (P/N: **STUSB4531Q2TR**)

The **doc** directory contains GUI documentations.

The **logo** directory contains the icon and logo used by the GUI.

STUSB4531_GUI.exe is the Windows executable file to launch the GUI.

Release_Note.txt provides information about the GUI version in the current package.

4 GUI functionality

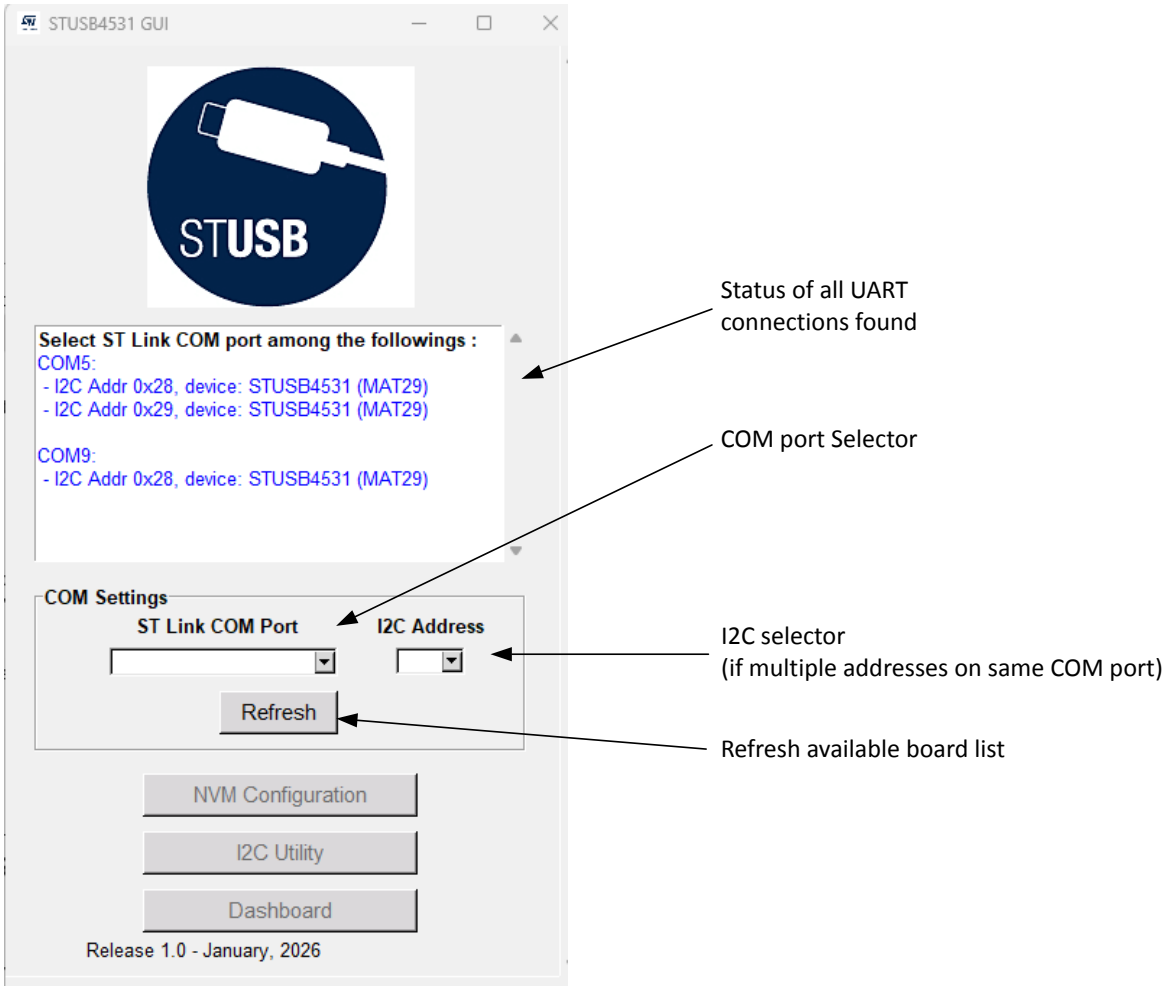
This chapter describes how to use the different functions of the STUSB4531 graphical user interface step by step.

4.1 GUI startup

When the GUI opens, it gives the status of all COM ports connected to the Windows PC used.

In the picture below, the GUI has found 2 Nucleo boards (COM5 and COM9) and another COM port, which is either not a Nucleo board or a Nucleo with outdated firmware. Each Nucleo board has a single STUSB4531 device, but uses two different I²C addresses.

Figure 8. Main window example after GUI startup



The refresh button can be pressed to refresh the list of available boards, when all secondary windows are closed.

Figure 9. **Main menu after COM port selection with 2 boards**

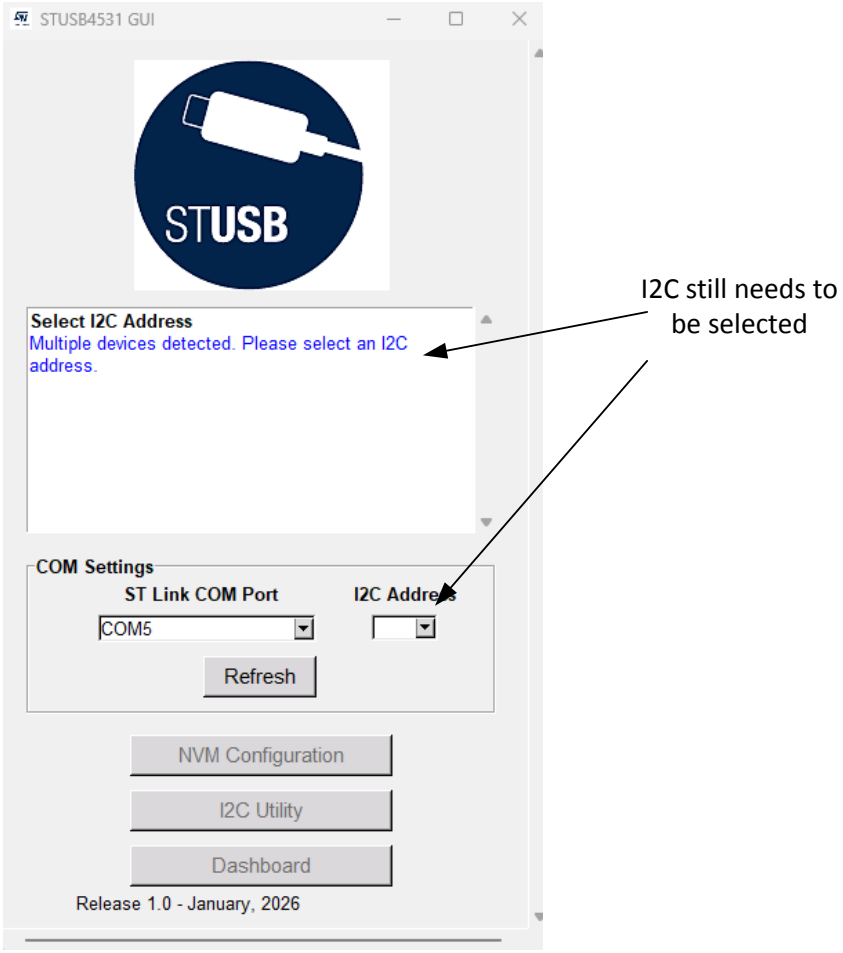
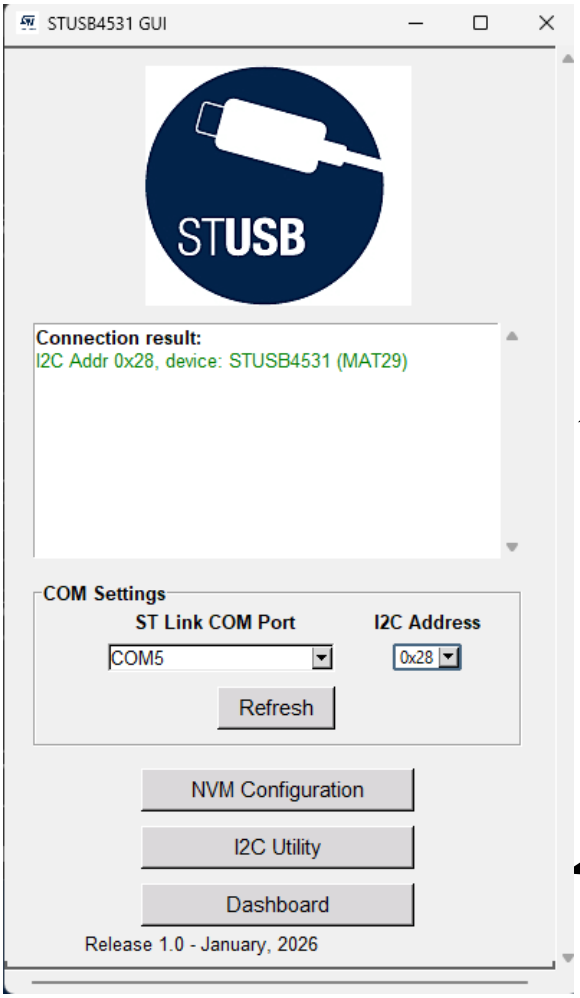


Figure 9 shows the main window when 2 STUSB4531 boards are connected to a single Nucleo board. The I²C address remains to be selected.

Figure 10 shows COM5 selected versus the 2 given possibilities with the STUSB4531 shown in Figure 8.

Figure 10. Main window example after COM port selection



After COM port and I²C Address selection, the GUI allows the user to access 3 further windows:

- NVM configuration window
- I²C utility
- Real Time Dashboard

Note: ST Link COM port is locked and cannot be changed if at least one of the 3 windows (NVM Configuration, I²C Utility or Dashboard) are open.

Those windows need to be closed, since otherwise it is not possible to change the selected ST Link COM port or I²C address (when 2 devices are using the same COM port).

4.2 NVM configuration window

4.2.1 NVM bitfield configuration

This window provides access to the various bitfields of the NVM memory that define the features or functions of the STUSB4531 device. The system automatically performs an NVM read operation when the window opens, provided that the STUSB4531 device is present and communication is operational. In this case, the data displayed in the GUI are those read from the device.

Figure 11. NVM configuration panel

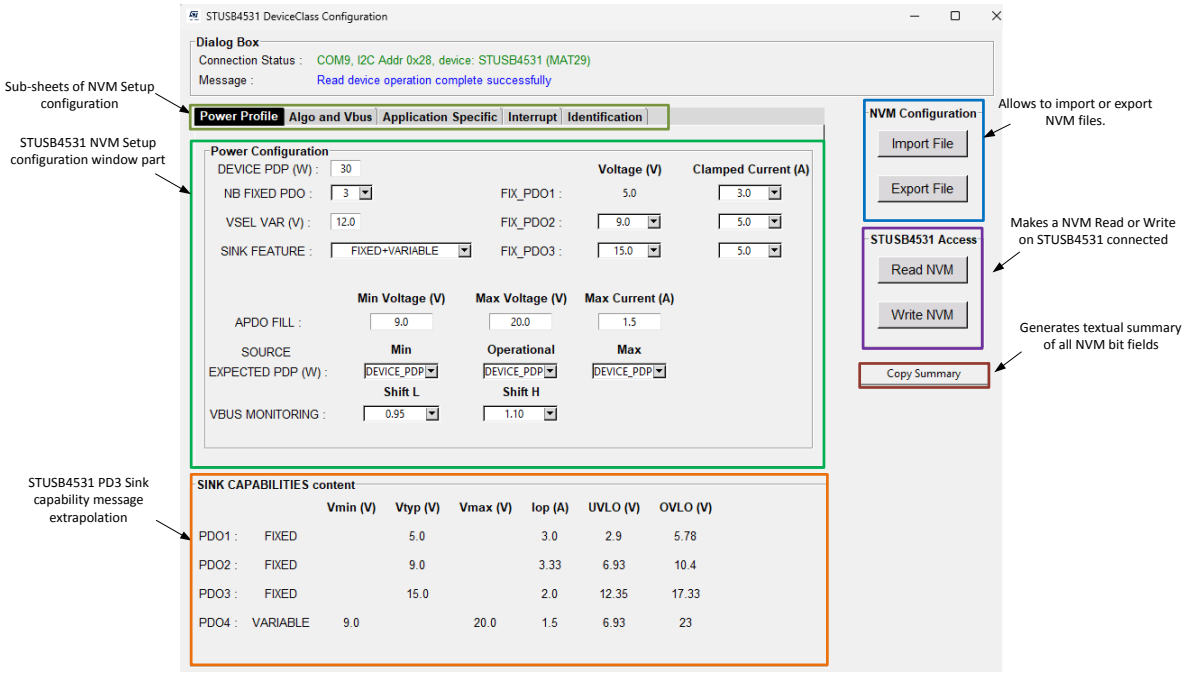
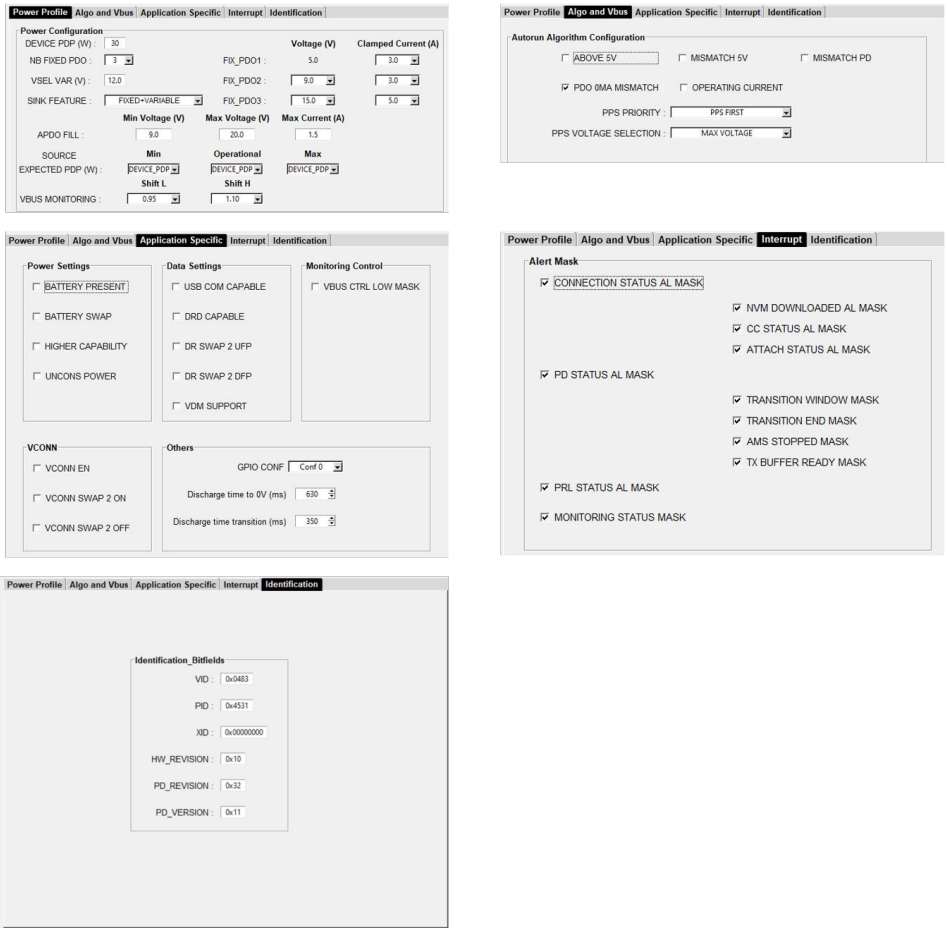


Figure 12 shows all windows to access the NVM bit settings, as described in the startup configuration chapter of the STUSB4531 datasheet.

Figure 12. **NVM configuration windows**



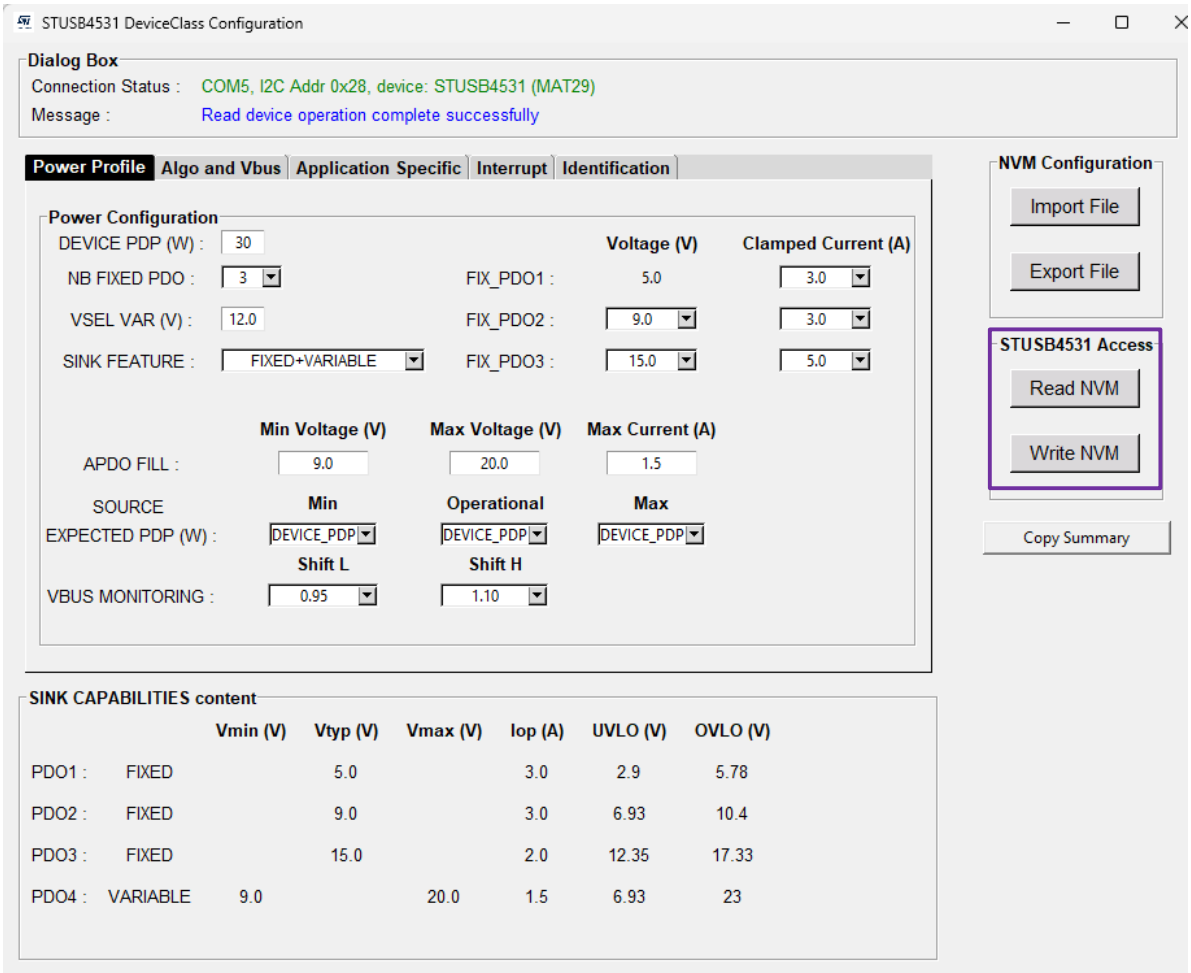
4.2.2 Read or flash STUSB4531

Using this graphical user interface, the STUSB4531 nonvolatile memory (NVM) content can be read and modified as required by the application and then written to the device.

Note that the NVM content is loaded into the STUSB4531 during power-up.

Writing the STUSB4531 NVM without performing a power cycle does not change its auto-run behaviour.

Figure 13. NVM read and write access

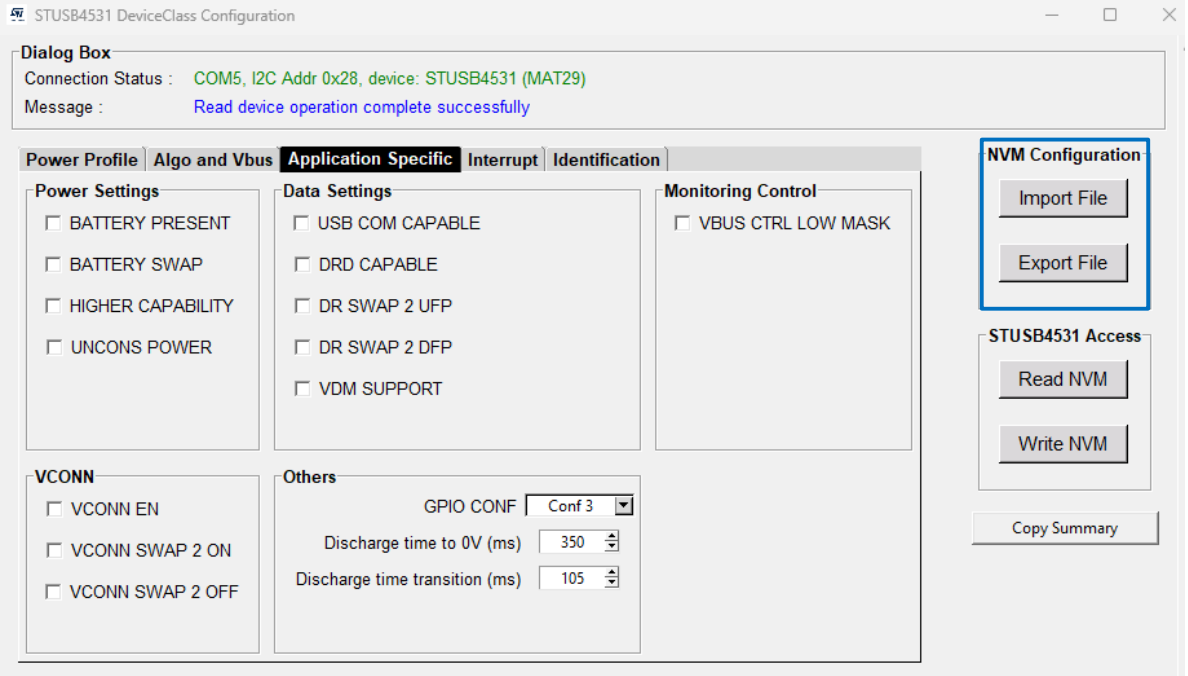


4.2.3 Import or generate an STUSB4531 NVM file

The graphical user interface can import a nonvolatile memory (NVM) file to provide an overview of the bitfield settings.

Use the “Export” button to generate an NVM file. For example, generate an NVM file to store the STUSB4531 configuration before modifying it, or to use it with the STUSB4531 command-line flasher tool.

Figure 14. NVM import or export file



4.2.4 Working in offline mode

OFFLINE mode can be selected even if the STUSB4531 is listed in the main window as shown in Figure 15.

Figure 16 shows the main window after OFFLINE mode is selected.

When in OFFLINE mode, the NVM configuration panel (Figure 17) displays configuration mainly based on bit fields set to ‘0’.

Figure 15. OFFLINE part of COM port list

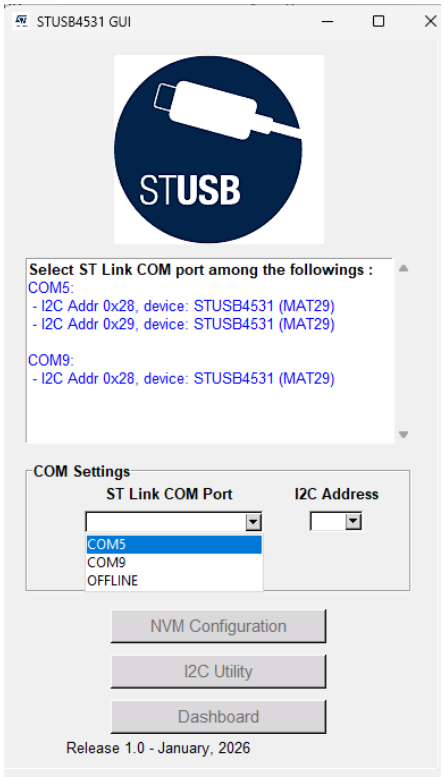


Figure 16. **Offline main menu**

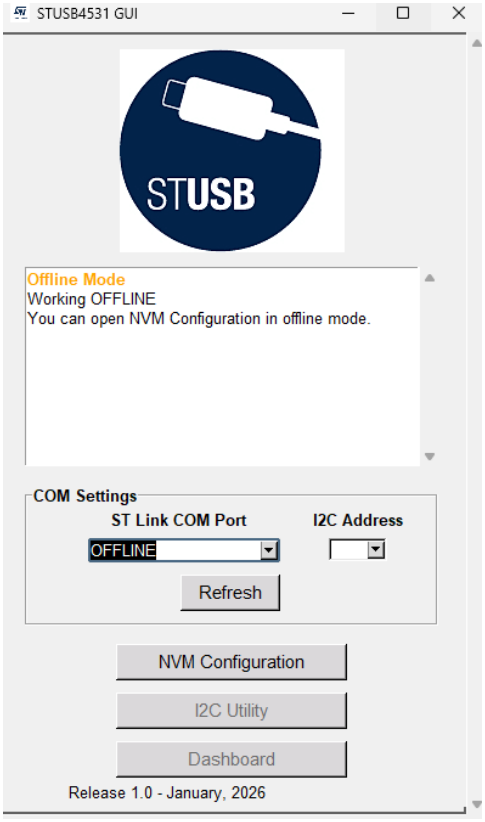
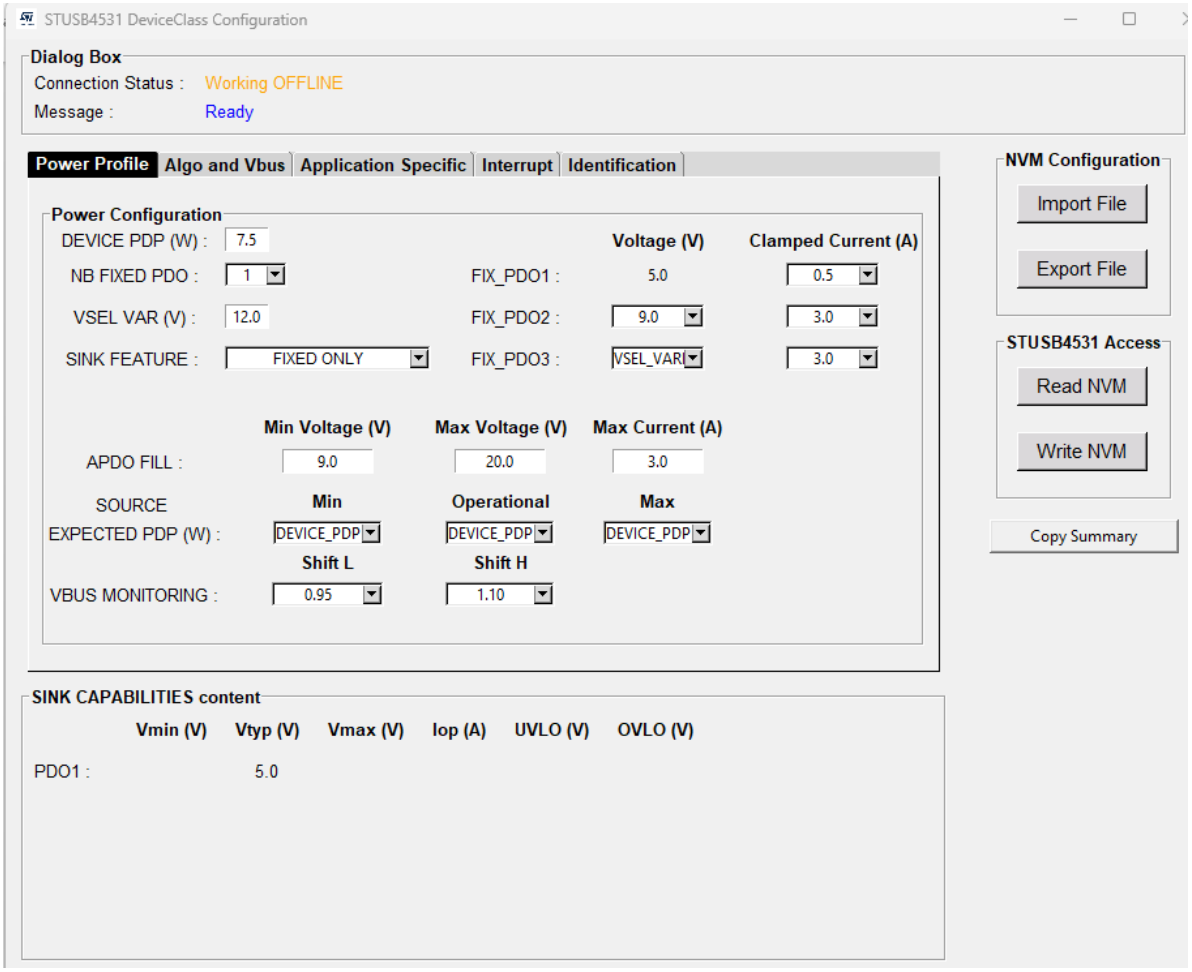


Figure 17. **NVM configuration panel in offline mode**

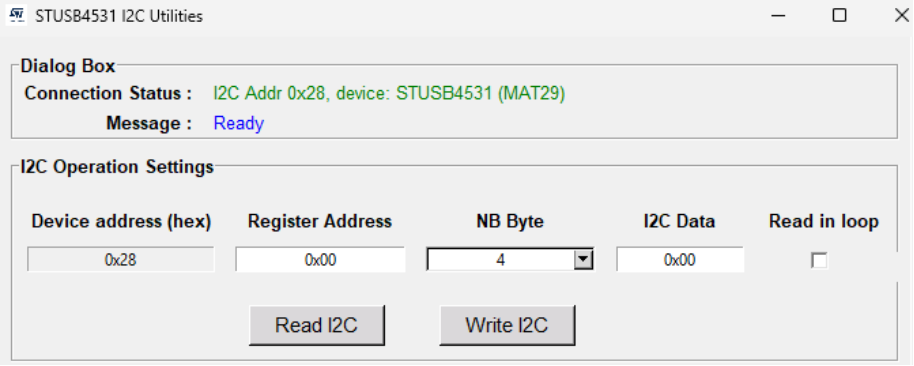


When in offline, the import file button can be pressed to load a datasheet configuration (from ./cfg directory) or any configuration the user has already stored.

4.3 I²C utilities window

I²C utilities enables read and write of any STUSB4531 I²C register. Read can be done in 1, 2 or 4 bytes.

Figure 18. I²C utilities window



4.4 Dashboard window

The dashboard gives an overview of the STUSB4531 real-time connection status. It also provides:

- Source capabilities received to perform the last explicit contract, when connected to Source PD
- Source Type-C power when connected to Source Type-C or legacy USB port using legacy to Type-C cable
- Summary of current sink capabilities and Vbus_En_Sink management

Figure 19. STUSB4531 supplied but not connected to source

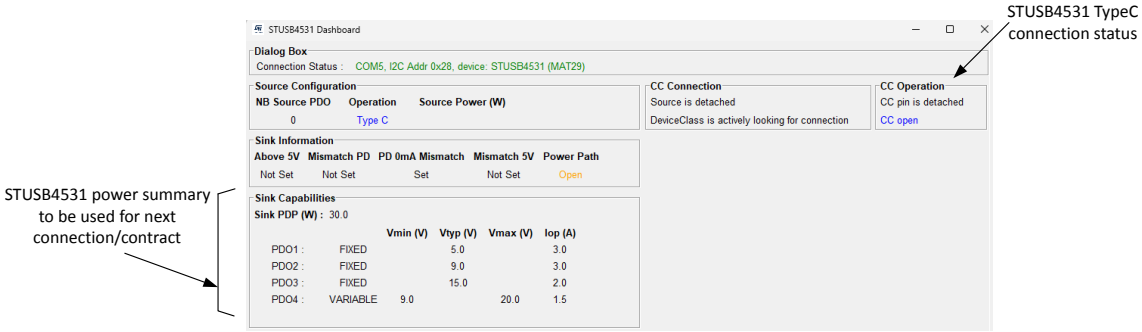


Figure 20. STUSB4531 connected to USBPD source

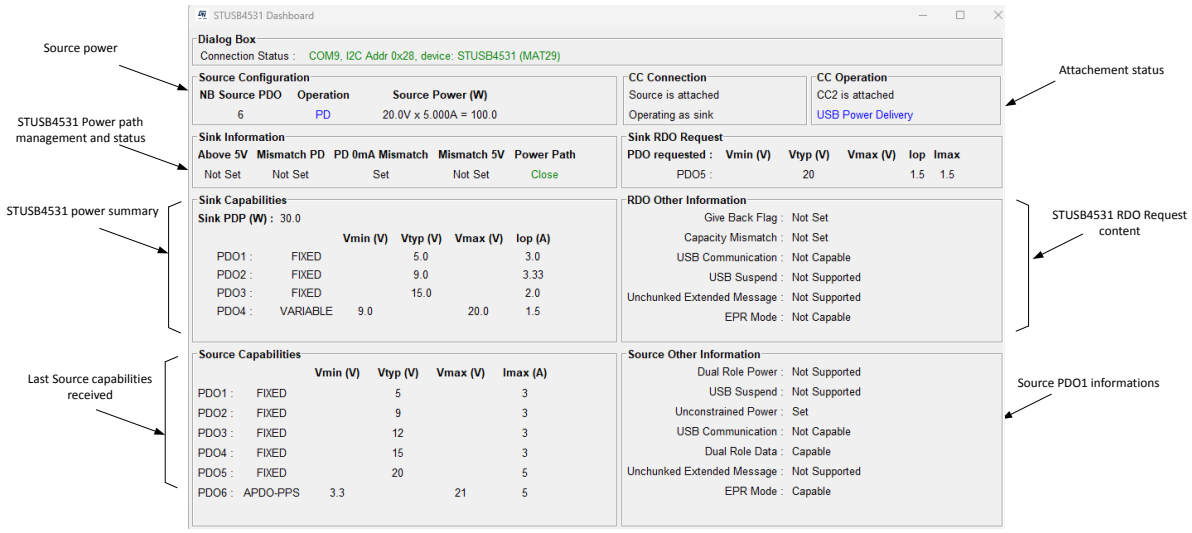
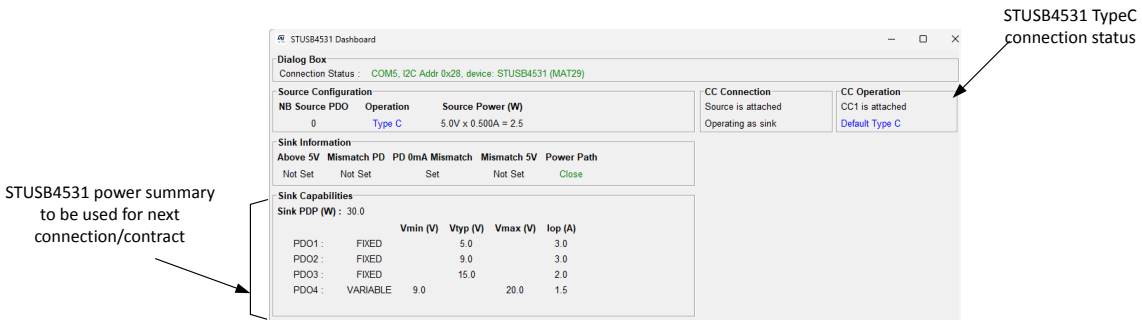


Figure 21. STUSB4531 connected to Type-C or Legacy USB source port



Revision history

Table 2. **Document revision history**

Date	Version	Changes
17-Feb-2026	1	Initial release.

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