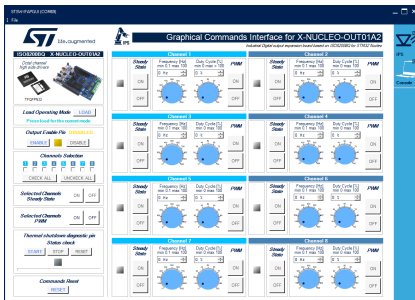# Demonstration firmware for NUCLEO-G431RB enabling STSW-IFAPGUI on X-NUCLEO-OUT01A2 expansion board

Features

- Full control of the X-NUCLEO-OUT01A2 expansion board via the STSW-IFAPGUI graphical user interface
- Control of:
  - output channel switching frequency and duty cycle configuration
  - visualization of diagnostic signal (common overtemperature/communication error)
  - both Direct Control Mode and Synchronous Control Mode management

Description

The STSW-OUT1G4 firmware runs on the NUCLEO-G431RB development board and allows controlling the X-NUCLEO-OUT01A2 expansion board using the STSW-IFAPGUI graphical user interface.

The STSW-OUT1G4 contains the software routines that enable the USB-based communication between the NUCLEO-G431RB and the system where the STSW-IFAPGUI runs, and the control of a single X-NUCLEO-OUT01A2.

The STSW-IFAPGUI is based on a common engine and several plug-ins designed to communicate through the USB connection with the application layer running on the NUCLEO-G431RB development board stacked with the expansion board.

Product summary	
Demonstration firmware for NUCLEO-G431RB enabling STSW-IFAPGUI on X-NUCLEO-OUT01A2 expansion board	STSW-OUT1G4
Industrial digital output expansion board based on ISO8200BQ for STM32 Nucleo	X-NUCLEO-OUT01A2
STM32 Nucleo-64 development board with STM32G431RB MCU	NUCLEO-G431RB
Graphical user interface for the industrial IPS evaluation boards based on STM32 Nucleo	STSW-IFAPGUI
Applications	Industrial Safety Industrial Tools

DB5051 - Rev 1 - October 2023
For further information contact your local STMicroelectronics sales office.

www.st.com

1 How to control a single expansion board with IFAPGUI

This application scenario is based on the default on-board switches and resistors configuration of the X-NUCLEO-OUT01A2.

Step 1. Stack the X-NUCLEO-OUT01A2 on the NUCLEO-G431RB board flashed with the STSW-OUT1G4 firmware through the Arduino connectors.

Step 2. Connect the two stacked boards to your PC or laptop USB port through a micro-USB cable.
The STM32 is supplied via USB (3.3 V) and the flashed firmware starts running.
Press the black button on the NUCLEO-G431RB board to reset the firmware.

Step 3. Launch the STSW-IFAPGUI.
When the application starts, the firmware running on the STM32 is automatically detected and a COM port is opened for communication.

Figure 1. STSW-IFAPGUI COM port opened

Step 4. Click on the GUI STM32 Nucleo icon after it turns blue (it remains green until the firmware identification is complete).
The STSW-IFAPGUI appears on the screen.

Figure 2. STSW-IFAPGUI main control panel
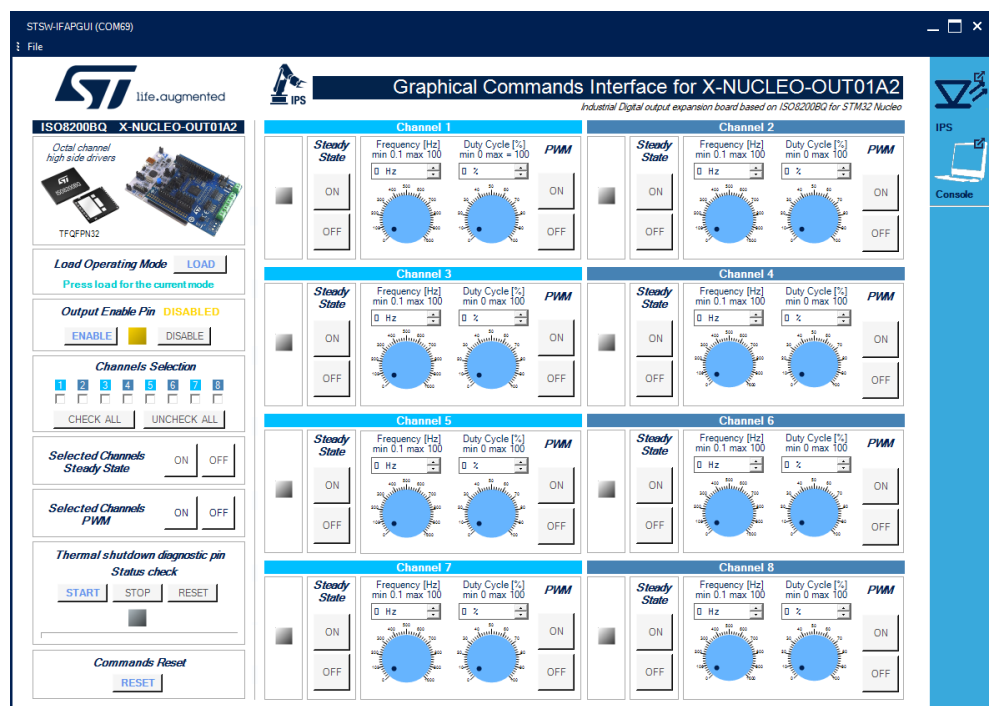
Step 5. Use the dedicated section of the GUI for the desired channel of ISO8200BQ to:
- – Manage channel steady state (the left part in each channel section).
- – Manage channel PWM settings (the right part in each channel section).

Use the bottom left side of the GUI to:
- – Select the Control Mode to be used (DCM or SCM, last one is the default).
- – Enable/disable outputs, properly setting the Output Enable pin.
- – Enable/disable and reset diagnostic pin polling activity.
- – Reset all channel features to OFF state.

Step 6. Connect the load and supply the power stage of the X-NUCLEO-OUT01A2 with a 24 V rail via the CN1 connector.

Step 7. Select the desired switching frequency and duty cycle of the desired output channel through the [**Pulse Width Modulation**] controls in the right part of desired channel section.

Step 8. The desired output channel steady state can be activated/deactivated by clicking on the [**ON/OFF**] buttons in the left part of the desired channel section in the [**Steady State**] sub-section.

Step 9. Click on the [**START**] button in the [**Thermal shutdown diagnostic pin Status check**] area on the bottom left side of the GUI to monitor the on/off status on the FAULT pin on ISO8200BQ.

You can stop monitoring the fault status by clicking on the [**STOP**] button in the same section. Press the [**RESET**] button to reset the fault status.

Step 10. Click on [**Enable**] button in [**Output Enable Pin**] section to drive the output pins. Click on [**Disable**] in the same section to turn off all output pins.

Step 11. Click on [**RESET**] button in [**Commands Reset**] section to reset any channel setting and also the diagnostic pin status monitoring.

Figure 3. STSW-IFAPGUI in action
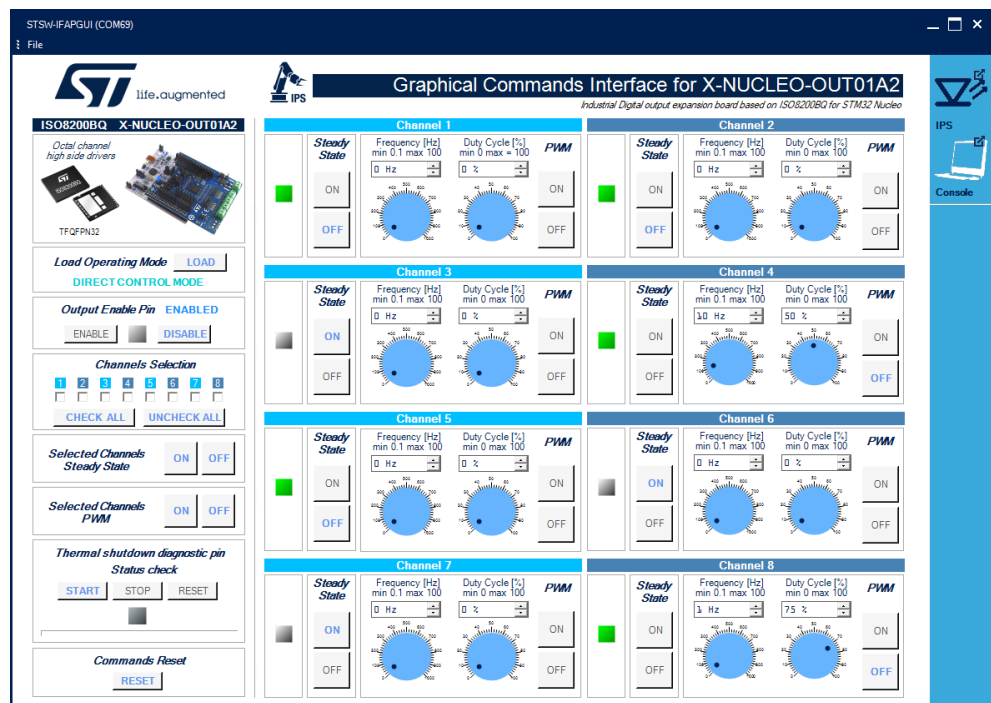
2 How to control a single expansion board with Command Line Interface

This application scenario is based on the default on-board switches and resistors configuration of X-NUCLEO-OUT01A2.

Step 1. Plug the X-NUCLEO-OUT01A2 expansion board on top of the NUCLEO-G431RB board, flashed with the STSW-OUT1G4 firmware, through the Arduino connectors.

Step 2. Connect the two stacked boards to your PC or laptop USB port through a micro-USB cable. The STM32 is supplied via USB (3.3 V) and the flashed firmware starts running. Press the black button on the NUCLEO-G431RB board to reset the firmware.

Step 3. Launch the serial communication terminal application (TeraTerm in our notes). When the application starts, the serial communication must be configured as follows:

Figure 4. Tera Term: select serial communication method
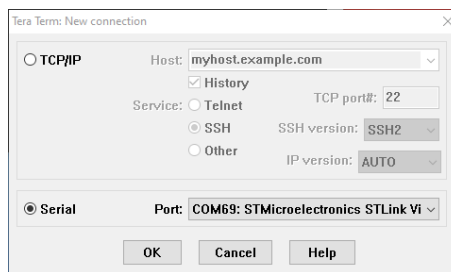
Figure 5. Tera Term: Setup / Terminal…
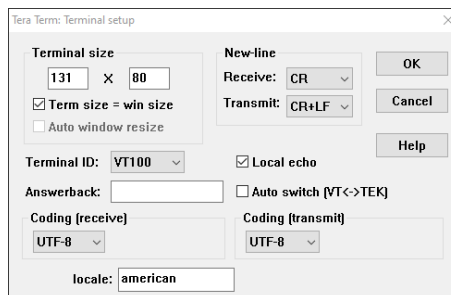
Figure 6. Tera Term: Setup / Serial port…
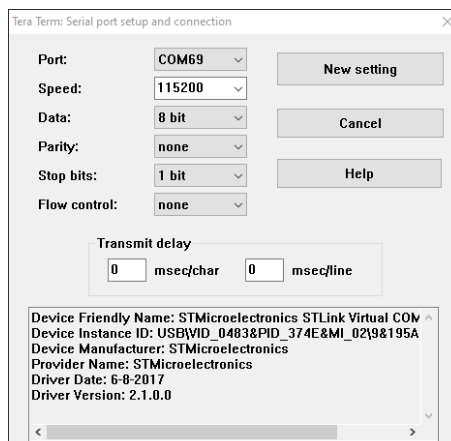
Step 4. Press Enter and then type 'h' for help:

Figure 7. CLI help

Step 5. Type 'w?' for a list of commands available:

Figure 8. Command list

Step 6. Initialize the device as first action using **w0** command:

Figure 9. Device init

Step 7. Continue to interact with the device using commands from the available command list (see above).

Revision history

Table 1. Document revision history

Date	Revision	Changes
06-Oct-2023	1	Initial release.

IMPORTANT NOTICE – READ CAREFULLY