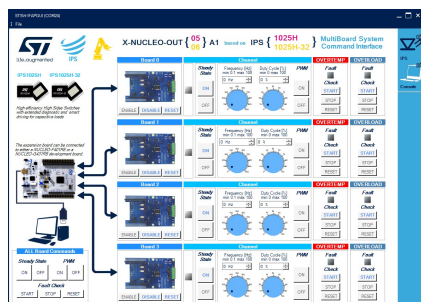


Evaluation firmware for NUCLEO-F401RE enabling STSW-IFAPGUI on STDES-OUT05DO4 and STDES-OUT06DO4 digital output modules



Features

- Full control of the [STDES-OUT05DO4](#) and [STDES-OUT06DO4](#) quad digital output modules via the [STSW-IFAPGUI](#) graphical user interface
- Control of:
 - channel activation
 - output channel switching frequency and duty cycle configuration
 - visualization of diagnostic signals (overload and overtemperature diagnostic)

Description

The [STSW-OUT5D4F4](#) firmware runs on the [NUCLEO-F401RE](#) development board. It allows controlling the [STDES-OUT05DO4](#) or [STDES-OUT06DO4](#) reference designs using the [STSW-IFAPGUI](#) graphical user interface.

The [STSW-OUT5D4F4](#) contains the software routines that enable the USB-based communication between the [NUCLEO-F401RE](#) and the system where the [STSW-IFAPGUI](#) runs, and the control of the [STDES-OUT05DO4](#) or [STDES-OUT06DO4](#).

The firmware can control up to four expansion boards ([X-NUCLEO-OUT05A1](#) or [X-NUCLEO-OUT06A1](#)).

The [STSW-IFAPGUI](#) is based on a common engine and several plug-ins designed to communicate through the USB connection with the application layer that runs on the [NUCLEO-F401RE](#) development board stacked with the expansion board.

Product summary	
Evaluation firmware for NUCLEO-F401RE enabling STSW-IFAPGUI on STDES-OUT05DO4 and STDES-OUT06DO4 digital output modules	STSW-OUT5D4F4
60 V/10 A industrial quad digital output based on X-NUCLEO-OUT05A1	STDES-OUT05DO4
60 V/20 A industrial quad digital output based on X-NUCLEO-OUT06A1	STDES-OUT06DO4
STM32 Nucleo-64 development board with STM32F401RE MCU, supports Arduino and ST morpho connectivity	NUCLEO-F401RE
Graphical user interface for the industrial IPS and IO-Link transceiver evaluation boards based on STM32 Nucleo	STSW-IFAPGUI
Applications	Industrial Safety Industrial Tools

1 How to control up to four expansion boards

This application scenario is based on the multiboard configuration of the on-board switch and resistors of **STDES-OUT05DO4** (or **STDES-OUT06DO4**). The following table summarizes the multiboard setup.

Table 1. Configuration of a stack of four expansion boards

Board number	IN1	FLT1	FLT2
Board 0	R101	R103	R114
Board 1	R102	R104	R117
Board 2	R115	R116	R107
Board 3	R120	R119	R118

Step 1. Connect the **STDES-OUT05DO4** (or **STDES-OUT06DO4**) to your PC or laptop USB port through a mini-USB cable.

The STM32 is supplied via USB (3.3 V) and the flashed firmware starts running.

Press the black button on the **NUCLEO-F401RE** board to reset the firmware.

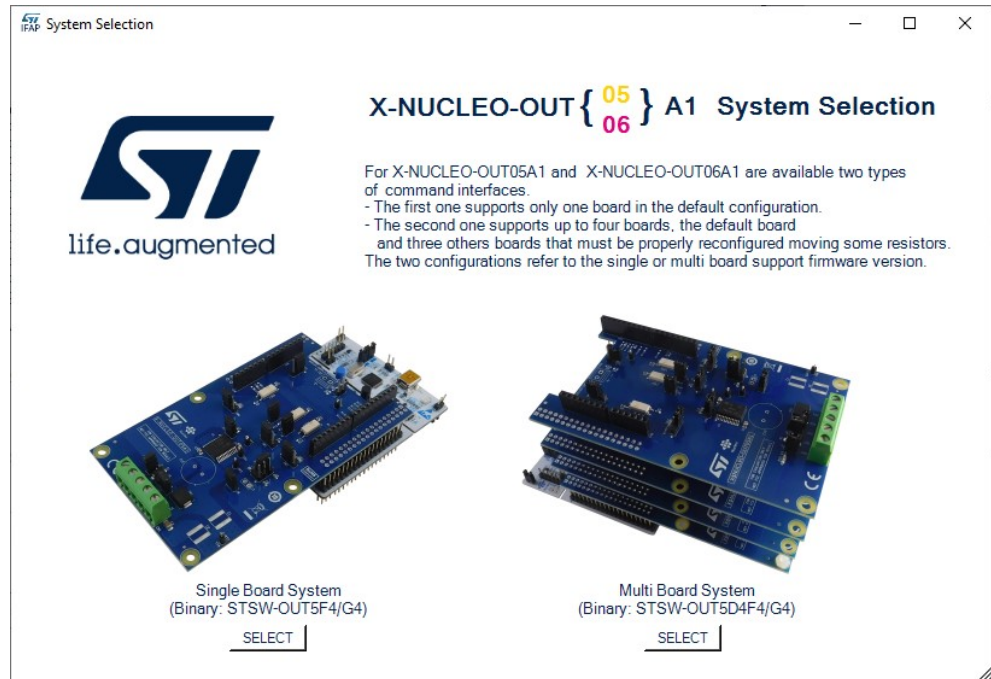
Step 2. Launch the **STSW-IFAPGUI**.

When the application starts, the firmware running on the STM32 is automatically detected and a COM port is opened for communication.

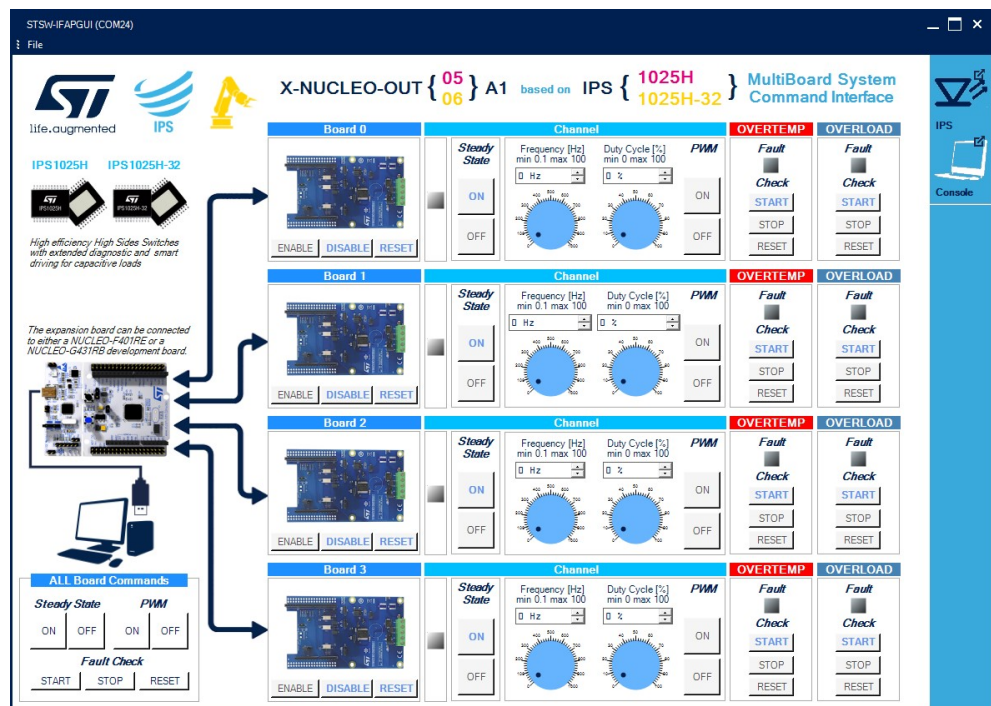
Figure 1. STSW-IFAPGUI COM port opened



- Step 3.** Click on the GUI STM32 Nucleo icon after it turns blue (it remains green until the firmware identification is complete).
A popup window appears to let you choose the proper system configuration:

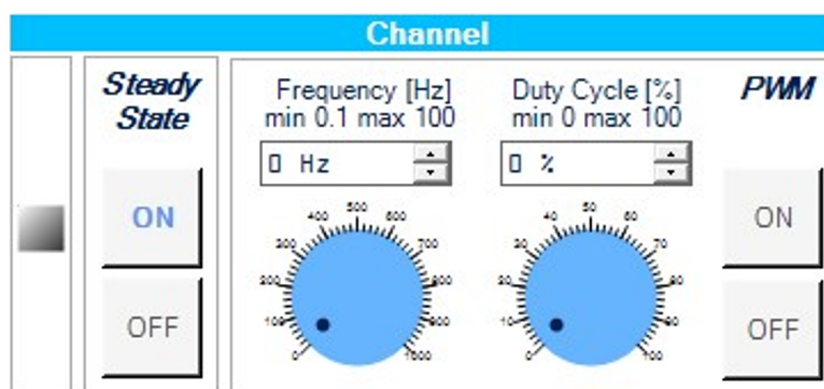
Figure 2. System configuration selection panel


- Step 4.** Select [Multi Board System] and the STSW-IFAPGUI appears on the screen.

Figure 3. STSW-IFAPGUI main control panel


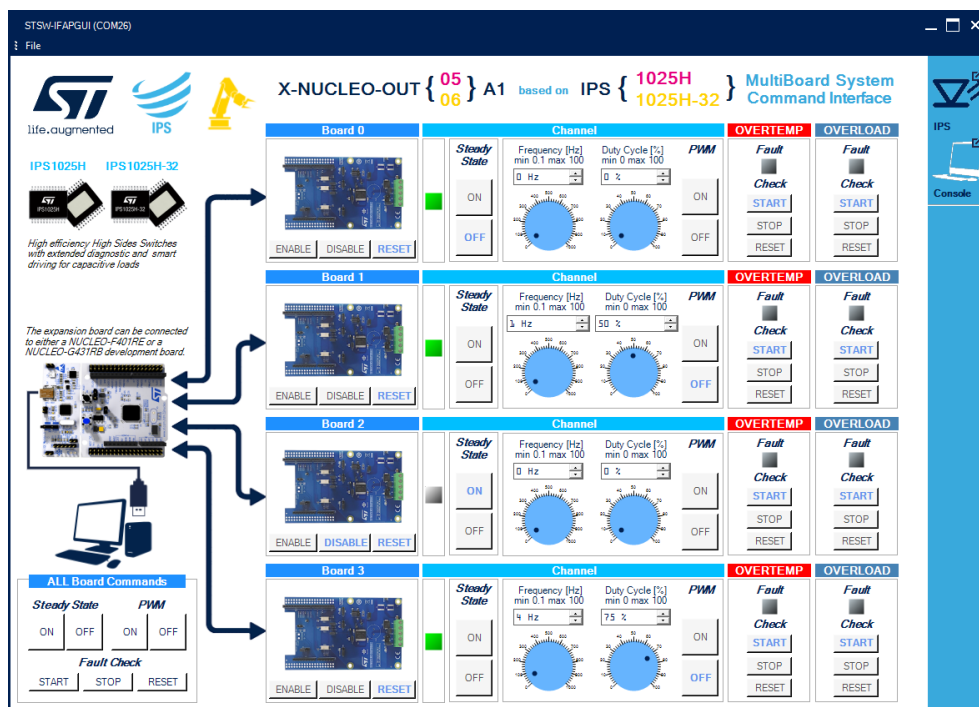
- Step 5.** If all four boards are not physically connected, it is possible to disable the commands on the unconnected boards using the **[Disable]** button on the relevant boards. Pressing the same button, you can re-enable the board once connected.
- Step 6.** The main control panel is divided in four rows, one for each board. Each row is divided in two columns, one per each channel of the on-board device. All the buttons with the blue text are related to the currently active functions.
- For each channel:
- Use the left part of the GUI section to manage the channel steady state for **IPS1025H** (or **IPS1025H-32**)
 - Use the right part of the GUI section to manage its PWM settings.
- The figure below shows a detailed view of the GUI section for each channel.

Figure 4. STSW-IFAPGUI channel section



- Step 7.** Connect the load and supply the power stage of each **X-NUCLEO-OUT05A1** (or **X-NUCLEO-OUT06A1**) present with a 24 V rail via the CN1 connectors.
- Step 8.** Select the desired switching frequency and duty cycle of the output channel through the dedicated controls of the desired board. Use the **[ON]** and **[OFF]** buttons under **[PWM]** to start and stop the PWM function. The button that starts the PWM is activated after selecting a frequency and a duty cycle.
- Step 9.** To activate the output channel steady state, use the **[ON]** button under **[Steady State]**. Use **[OFF]** to deactivate it.

- Step 10.** Click on the **[Start]** button under **[Fault Check]** on the right side of the GUI channel section to monitor the on/off status on the channel FAULT pins on **IPS1025H** (or **IPS1025H-32**) of the desired board. You can stop monitoring the fault status by clicking on the related **[STOP]** button. Press the **[RESET]** button to reset the related fault status.

Figure 5. STSW-IFAPGUI in action


Revision history

Table 2. Document revision history

Date	Revision	Changes
25-May-2022	1	Initial release.

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