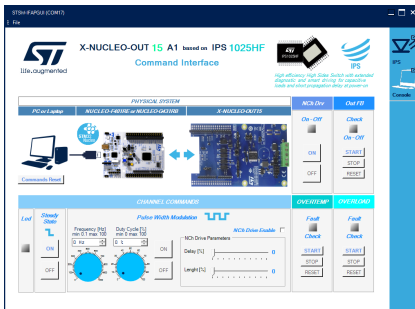


Demonstration firmware for NUCLEO-F401RE enabling STSW-IFAPGUI on X-NUCLEO-OUT15A1 expansion board



Features

- Full control of the X-NUCLEO-OUT15A1 expansion board via the STSW-IFAPGUI graphical user interface
- Control of:
 - channel applications
 - output channel switching frequency and duty cycle configuration
 - visualization of diagnostic signals (overload and overtemperature diagnostic) and output feedback
 - output fast discharge circuitry (Nch-DRV)

Description

The STSW-OUT15F4 firmware runs on the NUCLEO-F401RE development board and allows controlling the X-NUCLEO-OUT15A1 expansion board using the STSW-IFAPGUI graphical user interface.

The STSW-OUT15F4 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 X-NUCLEO-OUT15A1.

The firmware can control a single X-NUCLEO-OUT15A1 expansion board.

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-F401RE development board stacked with the expansion board.

Product summary	
Demonstration firmware for NUCLEO-F401RE enabling STSW-IFAPGUI on X-NUCLEO-OUT15A1 expansion board	STSW-OUT15F4
Industrial digital output expansion board based on IPS1025HF for STM32Nucleo	X-NUCLEO-OUT15A1
STM32 Nucleo-64 development board with STM32F401RE MCU	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 a single expansion board

This application scenario is based on the default on-board switches and resistors configuration of the X-NUCLEO-OUT15A1.

- Step 1.** Stack the X-NUCLEO-OUT15A1 on the NUCLEO-F401RE board flashed with the STSW-OUT15F4 firmware through the Arduino connectors.
- Step 2.** Connect the two stacked boards 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 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



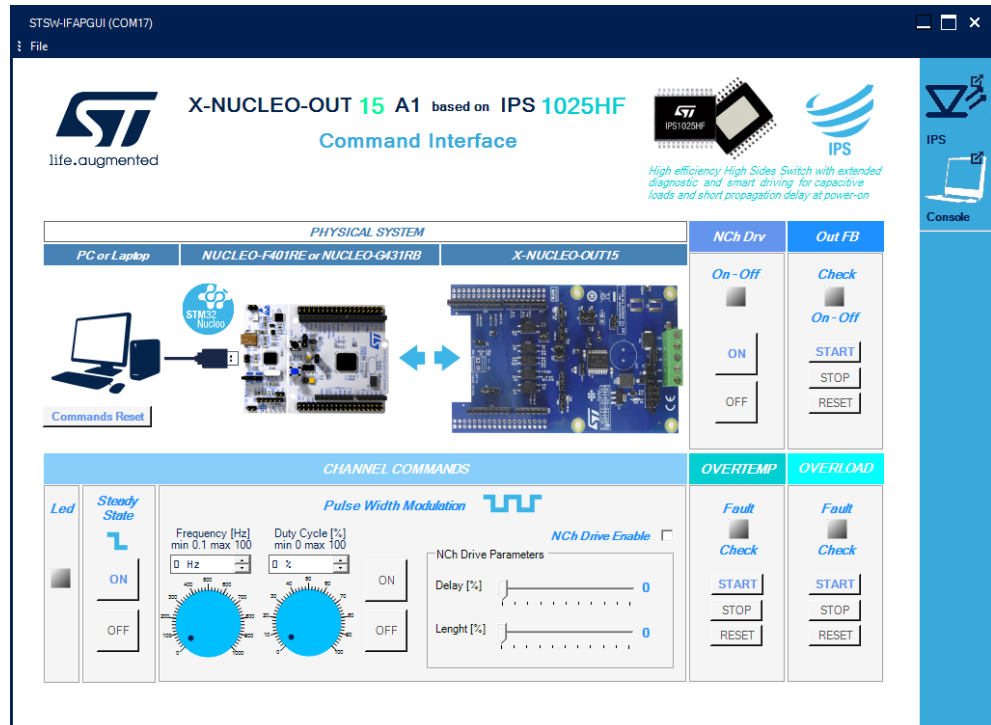
- Step 4.** Click on the GUI STM32 Nucleo icon after it turns blue (it remains green until the firmware identification is complete). A popup window appears to choose the proper system configuration.

Figure 2. System configuration selection panel



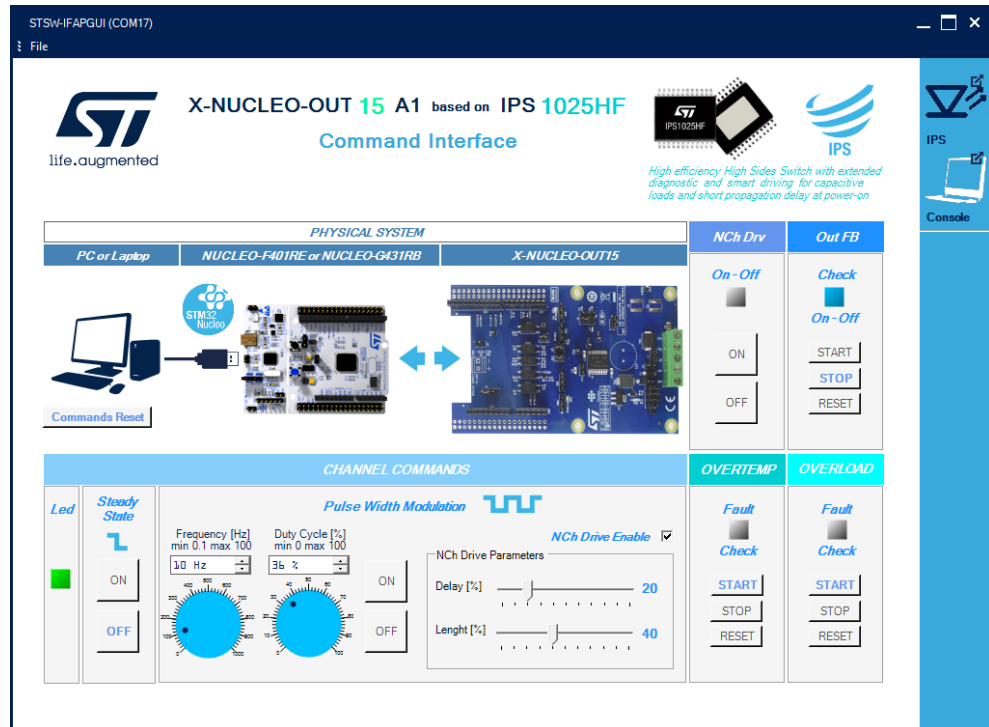
Step 5. Select [X-NUCLEO-OUT15A1 Single Board System] and the STSW-IFAPGUI appears on the screen.

Figure 3. STSW-IFAPGUI main control panel



- Step 6.**
- Use the bottom left side of the GUI to manage the channel steady state for IPS1025HF.
 - Use the bottom center side of the GUI to manage its PWM settings.
 - Use the bottom center side of the GUI to enable and set up Nch-DRV management for output pin fast discharge.
- Step 7.** Connect the load and supply the power stage of the X-NUCLEO-OUT15A1 with a 24 V rail via the CN1 connector.
- Step 8.** Select the desired switching frequency and duty cycle of the output channel through the [Pulse Width Modulation] controls in the bottom center side of the GUI.
- Step 9.** The output channel steady state can be activated/deactivated by clicking on the [ON/OFF] buttons in the bottom left side of the GUI in the [STEADY STATE] section.
- Step 10.** Click on the [START] button in the proper [FAULT CHECK] area on the bottom right side of the GUI to monitor the on/off status on the desired FAULT pin on IPS1025HF (FAULT1 for over-temperature, FAULT2 for overload).
You can stop monitoring the fault status by clicking on the [STOP] button in the proper [FAULT CHECK] section.
Press the [RESET] button to reset the related fault status.
- Step 11.** Click on the [ON/OFF] buttons in the top right side of the GUI in the [Nch Drv] section to activate/deactivate output fast discharge.

- Step 12.** Click on **[START]**, **[STOP]** and **[RESET]** buttons in the **[Out FB]** section to start, stop, and reset output feedback monitoring.

Figure 4. STSW-IFAPGUI in action


Revision history

Table 1. Document revision history

Date	Revision	Changes
30-Jun-2022	1	Initial release.

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