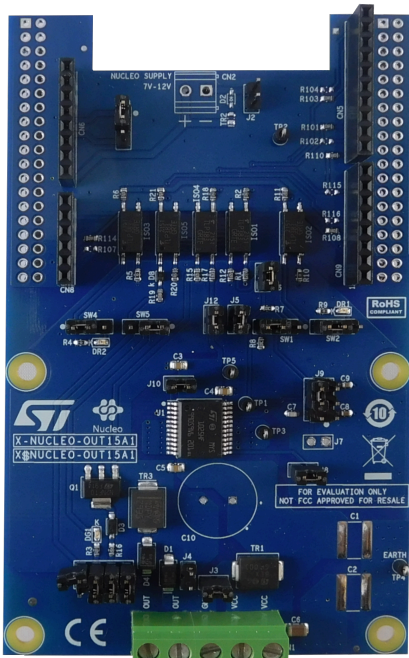


## Industrial digital output expansion board based on IPS1025HF for STM32 Nucleo



### Features

- Based on the **IPS1025HF** single high-side switch, which features:
  - Operating range up to 60 V
  - Low-power dissipation ( $R_{ON(MAX)} = 25\text{ m}\Omega$ )
  - Propagation delay at startup  $< 60\ \mu\text{s}$
  - Fast decay for inductive loads
  - Smart driving of capacitive load
  - Under-voltage lock-out
  - Overload and overtemperature protection
  - PowerSSO 24 package
- Application board operating range: 8-33 V/0-2.5 A
- Extended voltage operating range (J3 open) up to 60 V
- Green LED for output on/off status (J11 close 3-4 and SW5 close 1-2)
- Red LEDs for overload and overheating diagnostics (SW2 and SW4 close 2-3)
- Output voltage on/off status feedback (J11 close 1-2)
- Control signal for fast discharge of output voltage (J11 close 5-6, J12 close)
- External fast discharge circuitry for huge inductive loads (J11 close 7-8)
- 5 kV galvanic isolation
- Supply rail reverse polarity protection
- Compatible with **STM32 Nucleo** development boards
- Equipped with Arduino® UNO R3 connectors
- CE certified
- Not FCC approved for resale
- RoHS and China RoHS compliant

### Description

The **X-NUCLEO-OUT15A1** is an industrial digital output expansion board for **STM32 Nucleo**. It provides a powerful and flexible environment for the evaluation of the driving and diagnostic capabilities of the **IPS1025HF** single high-side, smart power, solid-state relay in a digital output module connected to 2.5 A industrial loads.

The **X-NUCLEO-OUT15A1** interfaces with the microcontroller on the **STM32 Nucleo** via 5 kV optocouplers driven by the GPIO pins and Arduino® UNO R3 connectors.

The expansion board can be connected to either a **NUCLEO-F401RE** or a **NUCLEO-G431RB** development board.

You can also evaluate a system consisting of an **X-NUCLEO-OUT05A1** stacked on an **X-NUCLEO-OUT15A1** expansion board.

Supplying the **X-NUCLEO-OUT05A1** through the main supply rail and the **X-NUCLEO-OUT15A1** through the output of the **X-NUCLEO-OUT05A1**, you can achieve the typical architecture of a single channel digital output for safety systems. The process stages of the two expansion boards result cascaded. The load connected to the **X-NUCLEO-OUT15A1** output can be supplied only when both cascaded systems are properly working.

Product summary	
Industrial digital output expansion board based on IPS1025HF for STM32 Nucleo	<b>X-NUCLEO-OUT15A1</b>
Software expansion for STM32Cube driving industrial digital output based on intelligent power switch (IPS)	<b>X-CUBE-IPS</b>
High efficiency, high-side switch with extended diagnostics, smart driving for capacitive loads, and short propagation delay at power-on	<b>IPS1025HF</b>
Applications	Programmable Logic Controllers

# 1 Schematic diagrams

Figure 1. X-NUCLEO-OUT15A1 circuit schematic (1 of 2)

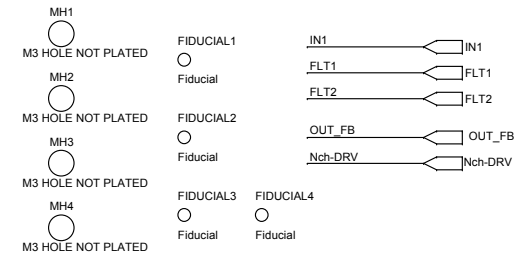
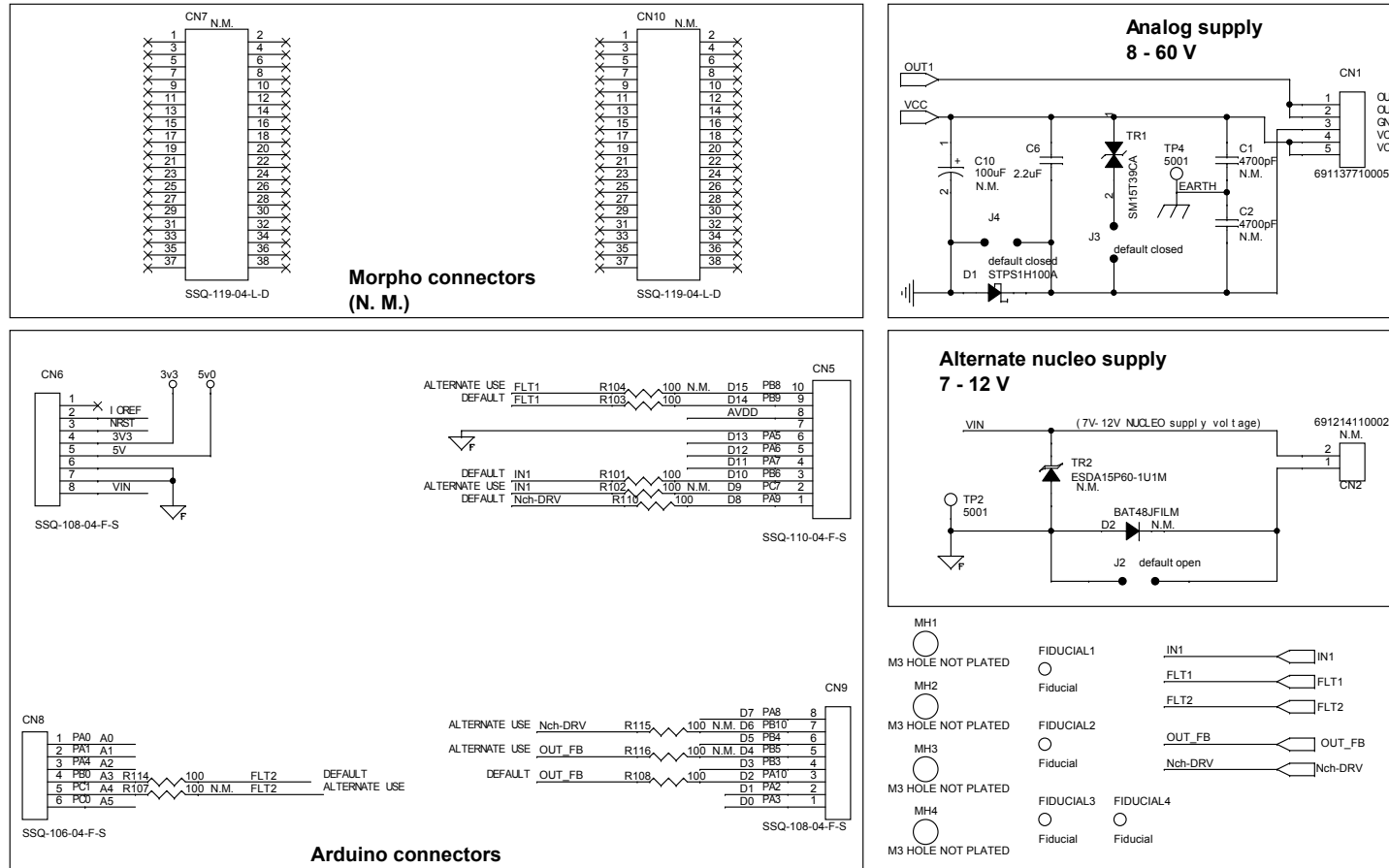
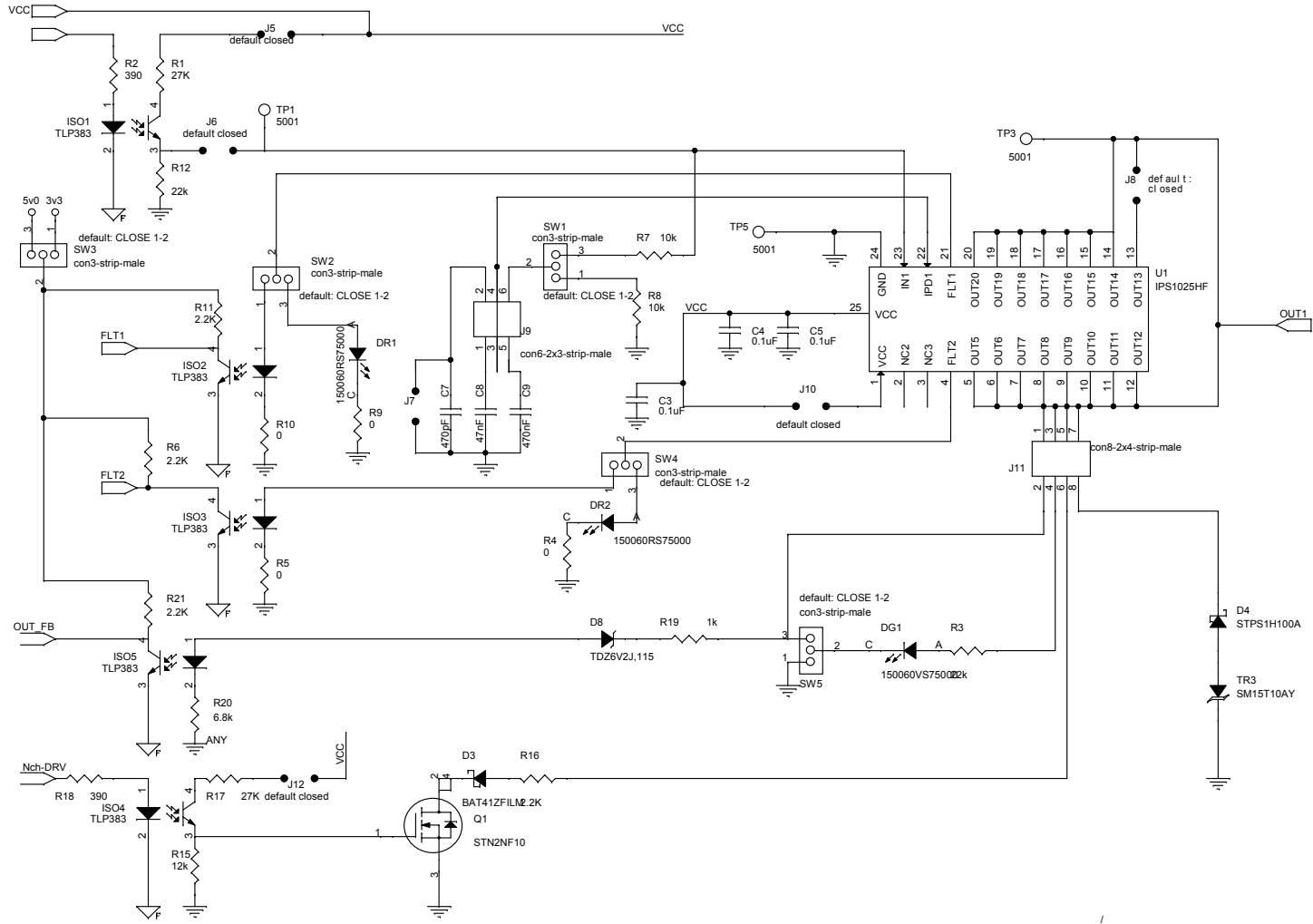


Figure 2. X-NUCLEO-OUT15A1 circuit schematic (2 of 2)



## 2 Board versions

**Table 1. X-NUCLEO-OUT15A1 versions**

PCB version	Schematic diagrams	Bill of materials
X\$NUCLEO-OUT15A1 <sup>(1)</sup>	X\$NUCLEO-OUT15A1 schematic diagrams	X\$NUCLEO-OUT15A1 bill of materials

1. This code identifies the X-NUCLEO-OUT15A1 evaluation board first version. It is printed on the board PCB.

## Revision history

**Table 2. Document revision history**

Date	Revision	Changes
09-Jun-2022	1	Initial release.
15-Jun-2022	2	Minor text changes.
16-Jun-2022	3	Updated cover page features.

**IMPORTANT NOTICE – READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2022 STMicroelectronics – All rights reserved