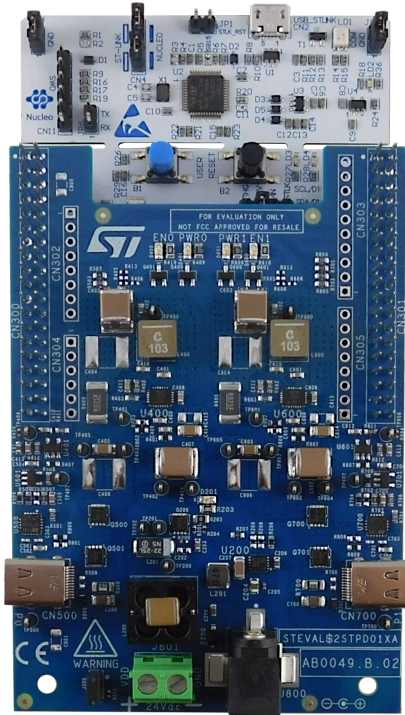


USB Type-C™ Power Delivery dual port adapter based on the STPD01 programmable buck converter



Features

- Two USB Type-C and Power Delivery Source ports
- Output power up to 120 W-rated (60 W per port), managed through power sharing algorithm
- Up to four output PDOs for each port (5 V@3 A, 9 V@3 A, 15 V@3 A, 20 V@3 A)
- Compliant with USB Type-C 2.1 and PD 3.1 specifications
- Two **STPD01PUR** DC-DC converters dynamically set by I²C, suitable to implement power sharing in USB PD applications
- Two on-board **TCPPO2-M18** protections for USB Type-C and PD Source applications
- OVP, UVP, OC, short-circuit and OTP protections
- Surge protection (8/20 μs) and system level ESD protection on V_{BUS}
- System level ESD protection on CC lines as per IEC61000-4-2 level 4 (±8 kV contact discharge)
- RoHS compliant

Description

The **STEVAL-2STPD01** is an evaluation kit composed of an expansion board containing two Type-C ports and integrating two **STPD01PUR** programmable buck converters for USB Power Delivery, and the **NUCLEO-G071RB** STM32 Nucleo-64 development board.

The kit exploits the characteristics of the **STPD01PUR** programmable buck regulator controlled through I²C interface, and the UCPD peripheral embedded in the **STM32G071RBT6** microcontroller supported by a dedicated firmware stack to implement a USB Type-C and PD dual port source adapter with power sharing capability.

Once the input power rate is fixed, the kit is able to balance the power on the two ports, supporting the requests sent by the USB PD devices connected to each port.

Taking advantage of **STPD01PUR** characteristics to output several voltage levels, the solution is able to manage up to 120 W (60 W for each port) according to the DC input power.

The expansion board has been specifically developed to be stacked on the **NUCLEO-G071RB** development board using the capability of its microcontroller to manage two UCPD peripherals at the same time. It also embeds the **TCPPO2-M18** USB Type-C port protection for Source applications and the **L7983PU50R** synchronous step-down switching regulator.

To fully demonstrate the USB Type-C and Power Delivery functionalities of the solution, the **STSW-2STPD01** software package, containing the demo application example, has been designed for the **NUCLEO-G071RB** STM32 Nucleo development board.

The solution is compliant with USB Type-C 2.1 and PD 3.1 specifications.

Product summary	
USB Type-C™ Power Delivery dual port adapter kit based on the STPD01	STEVAL-2STPD01
Software package for STEVAL-2STPD01	STSW-2STPD01
Programmable buck converter for USB power delivery	STPD01PUR
Mainstream Arm Cortex-M0+ MCU	STM32G071RBT6
USB Type-C™ protection for source applications	TCPPO2-M18
60 V, 300 mA synchronous step-down switching regulator with 10 μA quiescent current	L7983PU50R
Applications	USB Type C and Power Delivery

1 Schematic diagrams

Note: The schematic diagrams below refer to the expansion board included in the STEVAL-2STPD01 evaluation kit. For the schematic diagrams of the NUCLEO-G071RB development board, see the related web page.

Figure 1. STEVAL-2STPD01 circuit schematic (1 of 7)

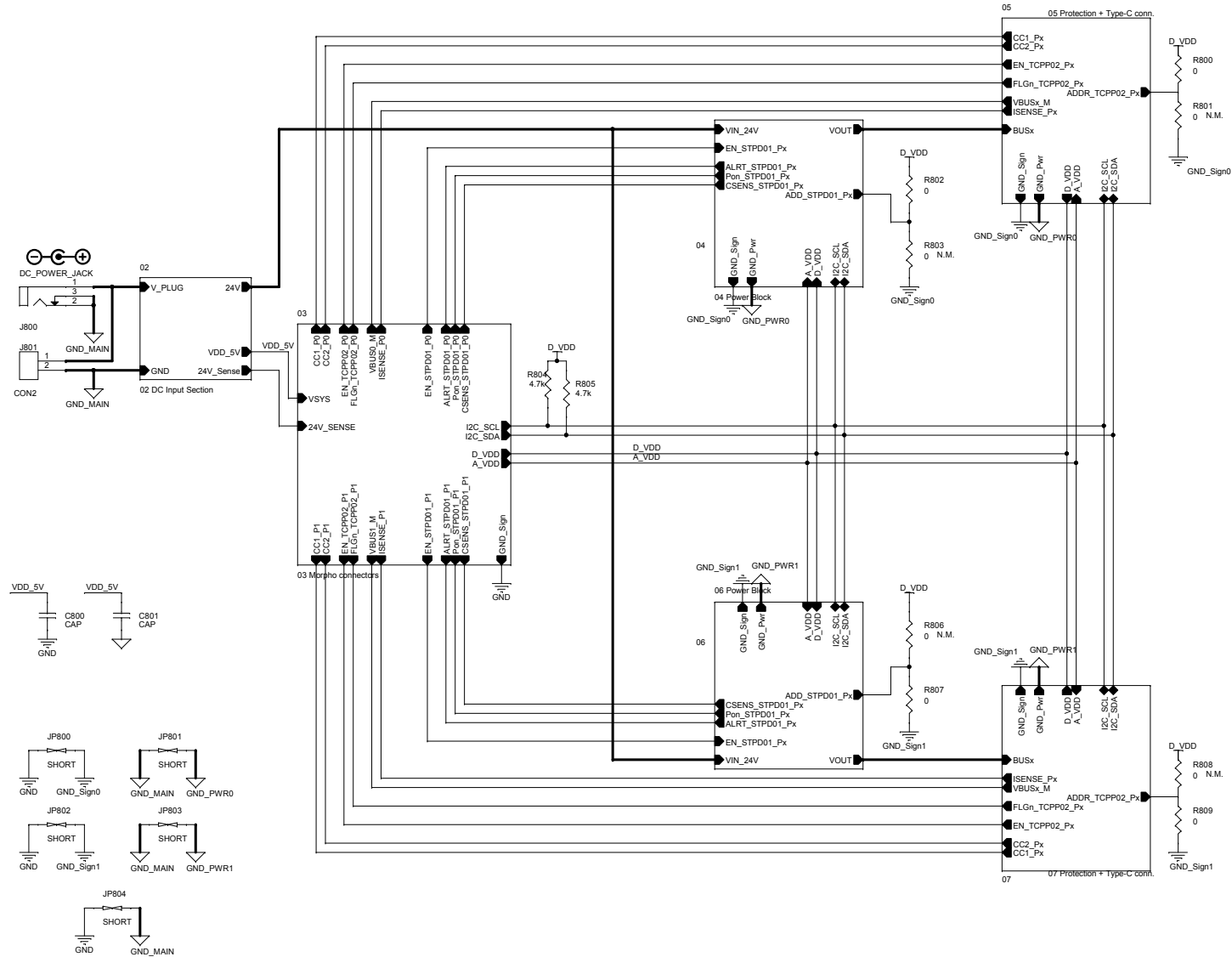


Figure 2. STEVAL-2STPD01 circuit schematic (2 of 7)

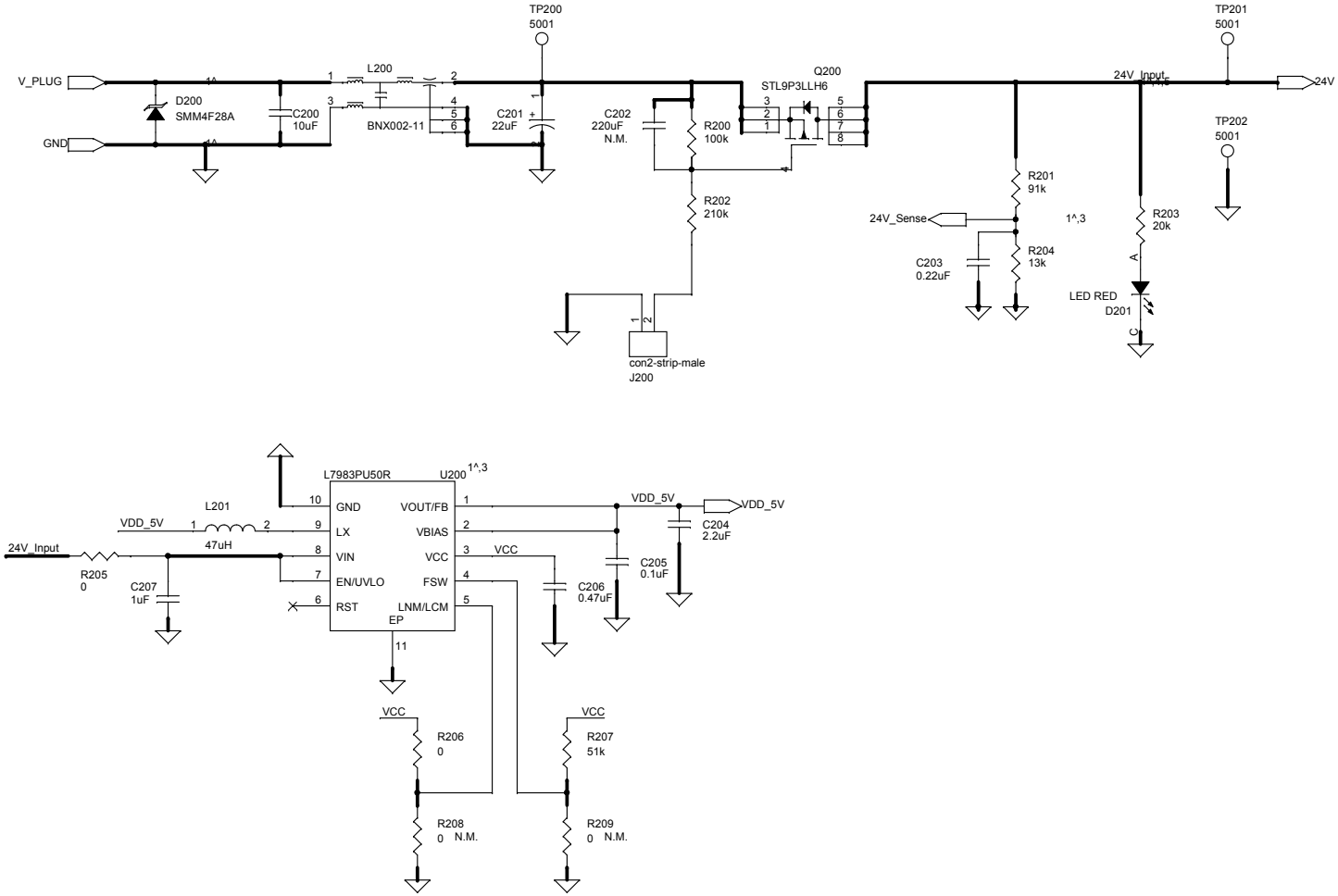


Figure 3. STEVAL-2STPD01 circuit schematic (3 of 7)

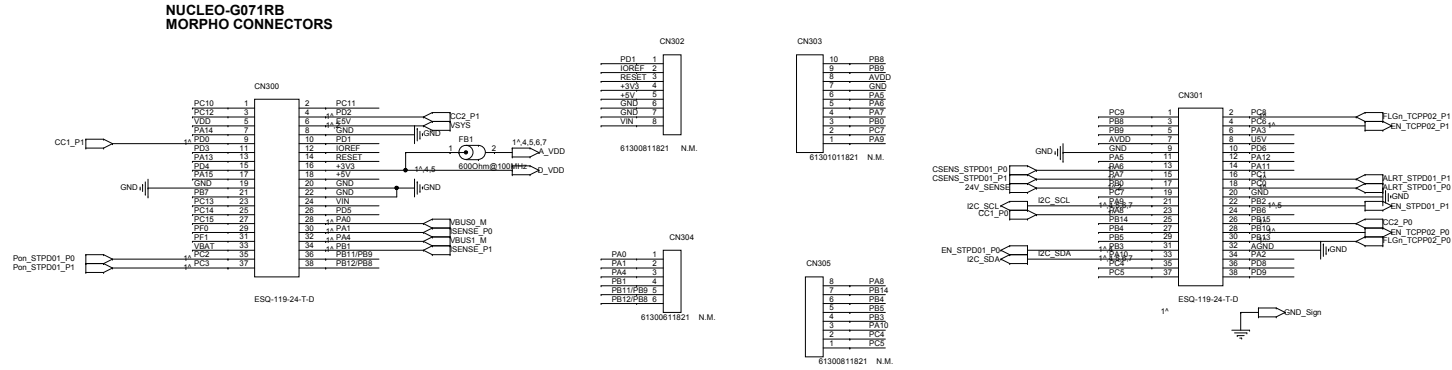


Figure 4. STEVAL-2STPD01 circuit schematic (4 of 7)

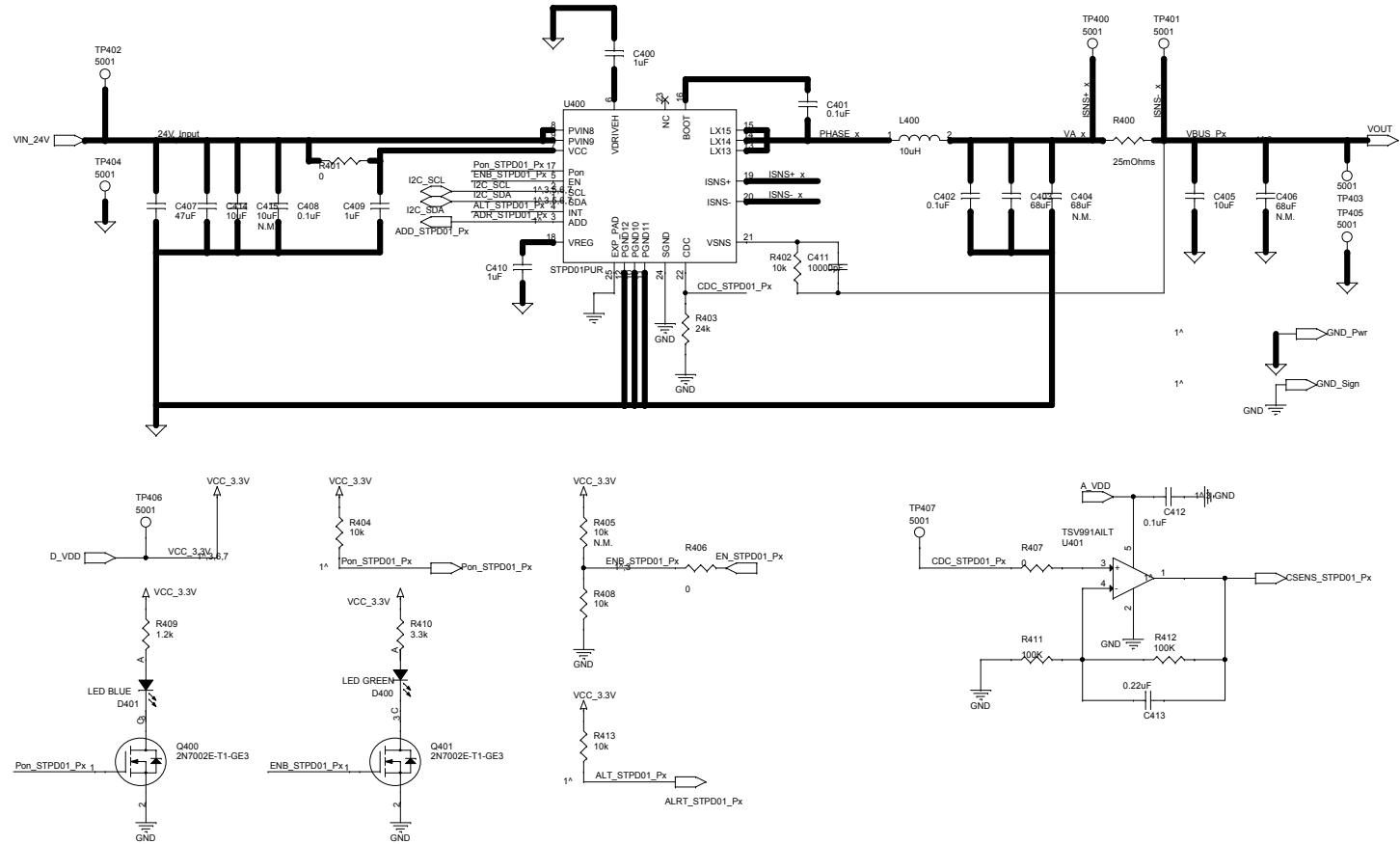


Figure 5. STEVAL-2STPD01 circuit schematic (5 of 7)

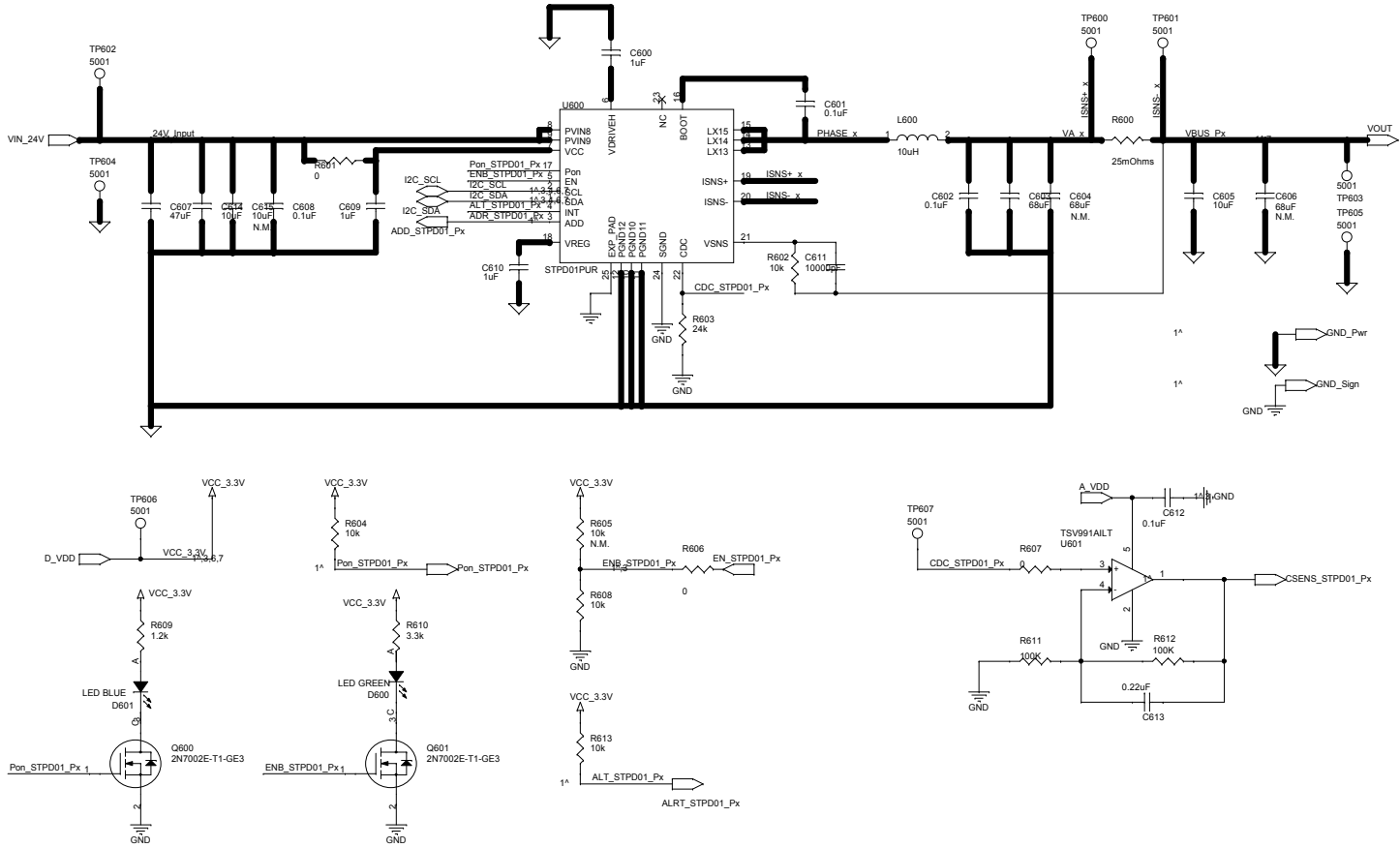
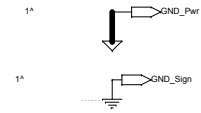
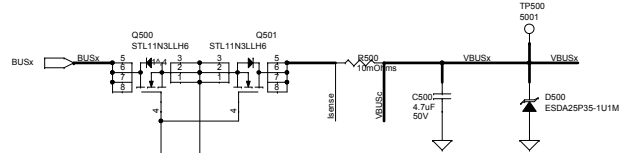
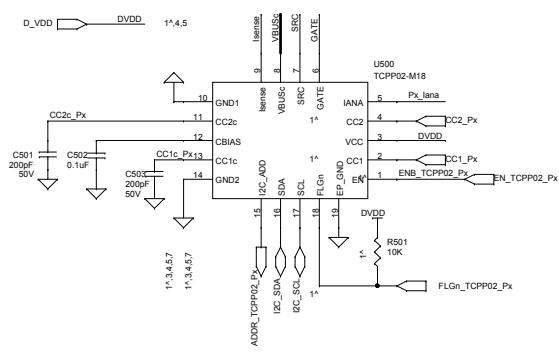
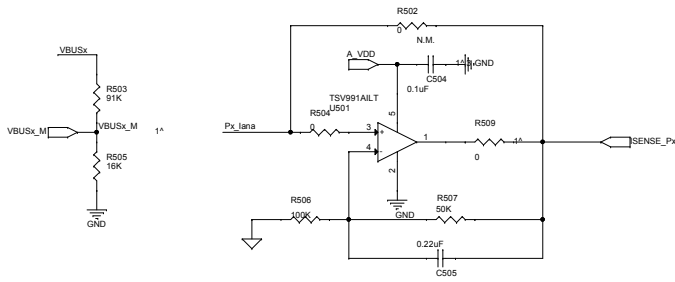


Figure 6. STEVAL-2STPD01 circuit schematic (6 of 7)

Port Protection & BUS Control



Port Current & Voltage Sense conditioning stage



Type-C Receptacle

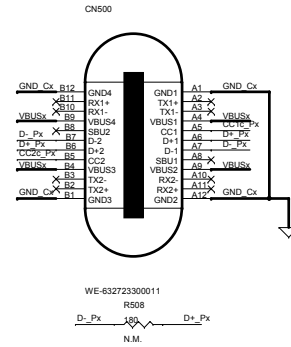
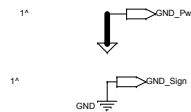
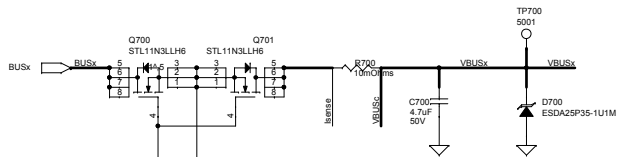
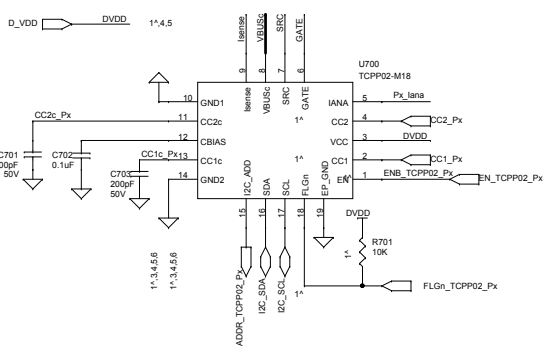
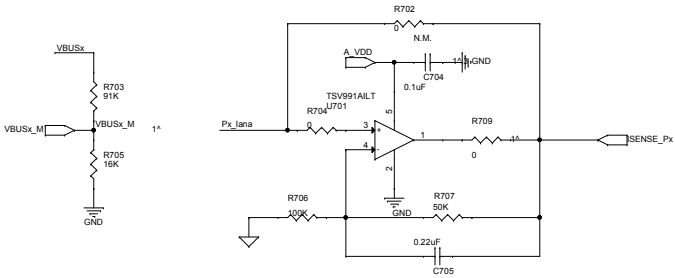


Figure 7. STEVAL-2STPD01 circuit schematic (7 of 7)

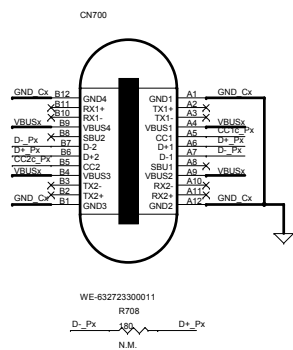
Port Protection & BUS Control



Port Current & Voltage Sense conditioning stage



Type-C Receptacle



2 Kit versions

Table 1. STEVAL-2STPD01 versions

Finished good	Schematic diagrams	Bill of materials
STEVAL\$2STPD01XA ⁽¹⁾	STEVAL\$2STPD01XA schematic diagrams	STEVAL\$2STPD01XA bill of materials
NUG071RB\$AU2 ⁽²⁾	NUG071RB\$AU2 schematic diagrams	NUG071RB\$AU2 bill of materials ⁽³⁾

1. This code identifies the expansion board version.
2. This code identifies the development board version.
3. Refer to MB1360-G071RB-C02_BOM.xlsx included in the zip file.

Revision history

Table 2. Document revision history

Date	Revision	Changes
23-Nov-2021	1	Initial release.

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