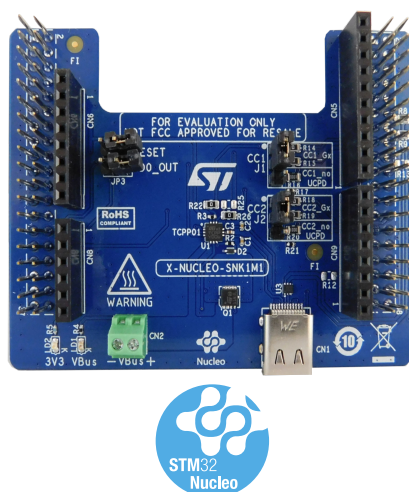


USB Type-C® Power Delivery Sink expansion board based on TCPP01-M12 for STM32 Nucleo



Features

- On-board **TCPP01-M12** protection for USB Type-C® and PD Sink applications
- Compliant with the latest USB Type-C® and Power Delivery specification, including the Programmable Power Supply (PPS) feature
- USB-IF certified (Test ID certification: 5205)
- 100 W-rated solution
- 6 V overvoltage protection (OVP) on CC lines against short-to- V_{BUS} when the connector is unplugged
- Up to 22 V adjustable overvoltage protection (OVP) on V_{BUS} line against charger failure
- Surge protection (8/20 μ s) and system-level ESD protection on V_{BUS}
- Common mode filter and ESD protection on USB 2.0 High Speed data lines
- System level ESD protection on CC lines as per IEC61000-4-2 level 4 (± 8 kV contact discharge)
- Low power mode for battery operation allowing zero current consumption when no cable is attached
- Integrated dead battery management when the device battery is fully depleted
- Overtemperature protection (OTP)
- RoHS compliant

Description

The **X-NUCLEO-SNK1M1** expansion board allows evaluating the features of **TCPP01-M12** and the USB Type-C® overvoltage protection for V_{BUS} and CC lines suitable for Sink applications.

The expansion board is designed to be stacked on top of any STM32 Nucleo-64 development board exploiting the characteristics of the USB Type-C® and Power Delivery (UCPD) peripheral embedded in their microcontrollers.

It can also be stacked on other STM32 Nucleo development boards not supporting the UCPD peripheral to demonstrate the USB Type-C® basic operations (attach, detach and power supply current capability recognition).

The **X-NUCLEO-SNK1M1** provides an effective demonstration of the dead battery operation, thanks to the integrated **ST715PU33R** LDO linear regulator that supplies the connected **STM32 Nucleo development board** when a Source is attached via a USB Type-C® connector.

The **X-NUCLEO-SNK1M1** is compliant with the latest USB Type-C® and Power Delivery specifications and is also USB-IF certified as a 100 W solution supporting Programmable Power Supply (PPS) function.

The companion software package (**X-CUBE-TCPP**) contains the application examples for development boards embedding UCPD-based microcontrollers (**NUCLEO-G071RB**, **NUCLEO-G474RE** and **NUCLEO-G0B1RE**) and for non-UCPD ones (**NUCLEO-L412RB-P**).

Product summary	
USB Type-C® Power Delivery Sink expansion board based on TCPP01-M12 for STM32 Nucleo	X-NUCLEO-SNK1M1
USB Type-C® software expansion for STM32Cube	X-CUBE-TCPP
USB Type-C® port protection	TCPP01-M12
STM32 Nucleo-64 development boards with STM32G071RB/ STM32G474RE/ STM32G0B1RE/ STM32L412RB MCUs	NUCLEO-G071RB/ NUCLEO-G474RE/ NUCLEO-G0B1RE/ NUCLEO-L412RB-P
Applications	USB Type-C® and Power Delivery

1 Resistor settings for OVP

The current X-NUCLEO-SNK1M1 setup is compliant with the USB Type-C® and Power Delivery specifications. It is certified by USB-IF, with TID certification no. 5205.

The overvoltage trigger value is determined by resistors.

Table 1 describes the resistor values as a function of the maximum required Vbus voltage

Table 1. Resistor values

VBUS max	Max	Resistor reference	Value
6 V	15 W	R29	24 k
10 V	27 W	R30	12.4 k
13 V	36 W	R31	9.1 k
17 V	45 W	R32	7.15 k
22 V	100 W	R33	5.36 k

2

Figure 1. X-NUCLEO-SNK1M1 circuit schematic (1 of 2)

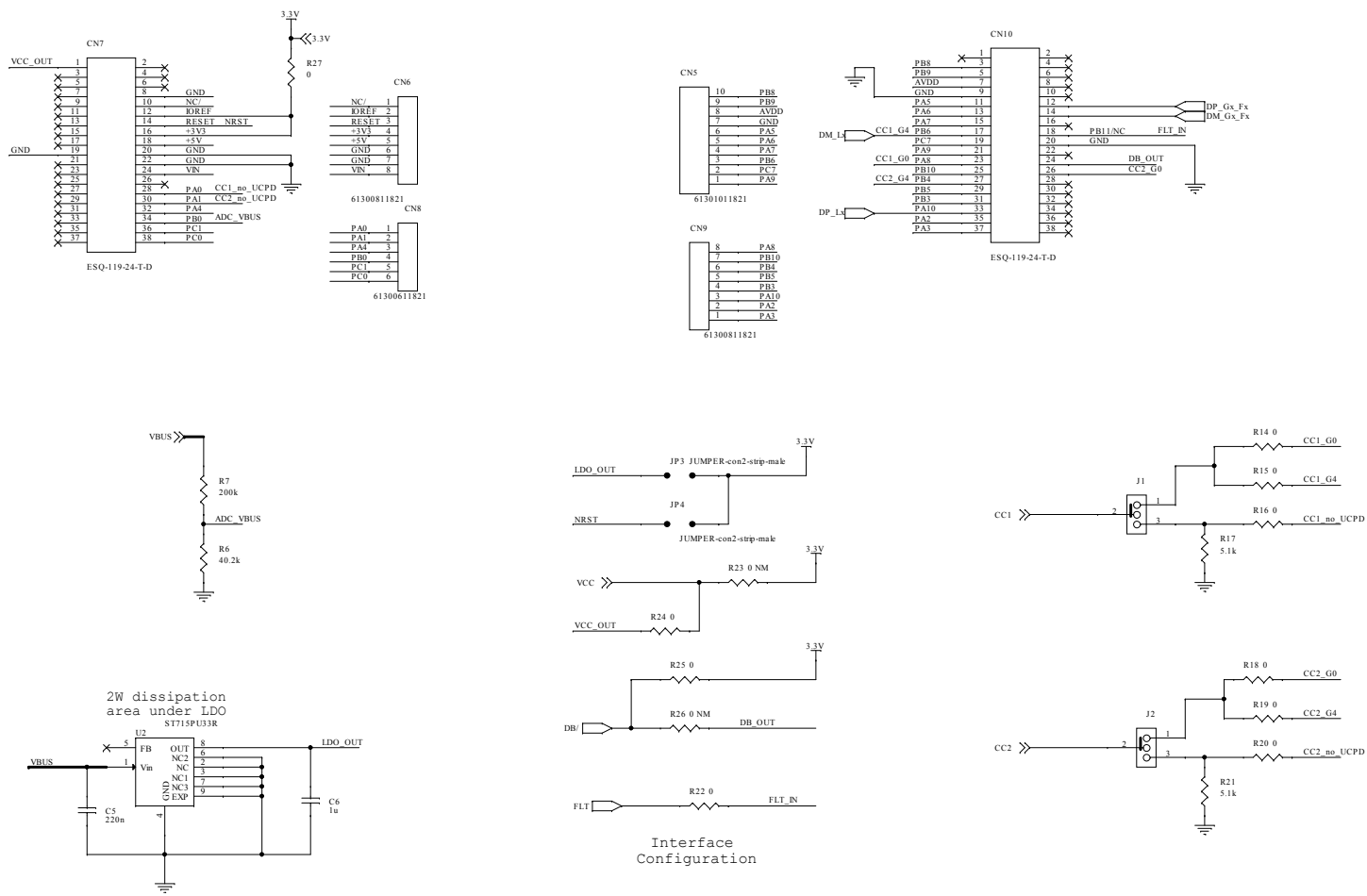
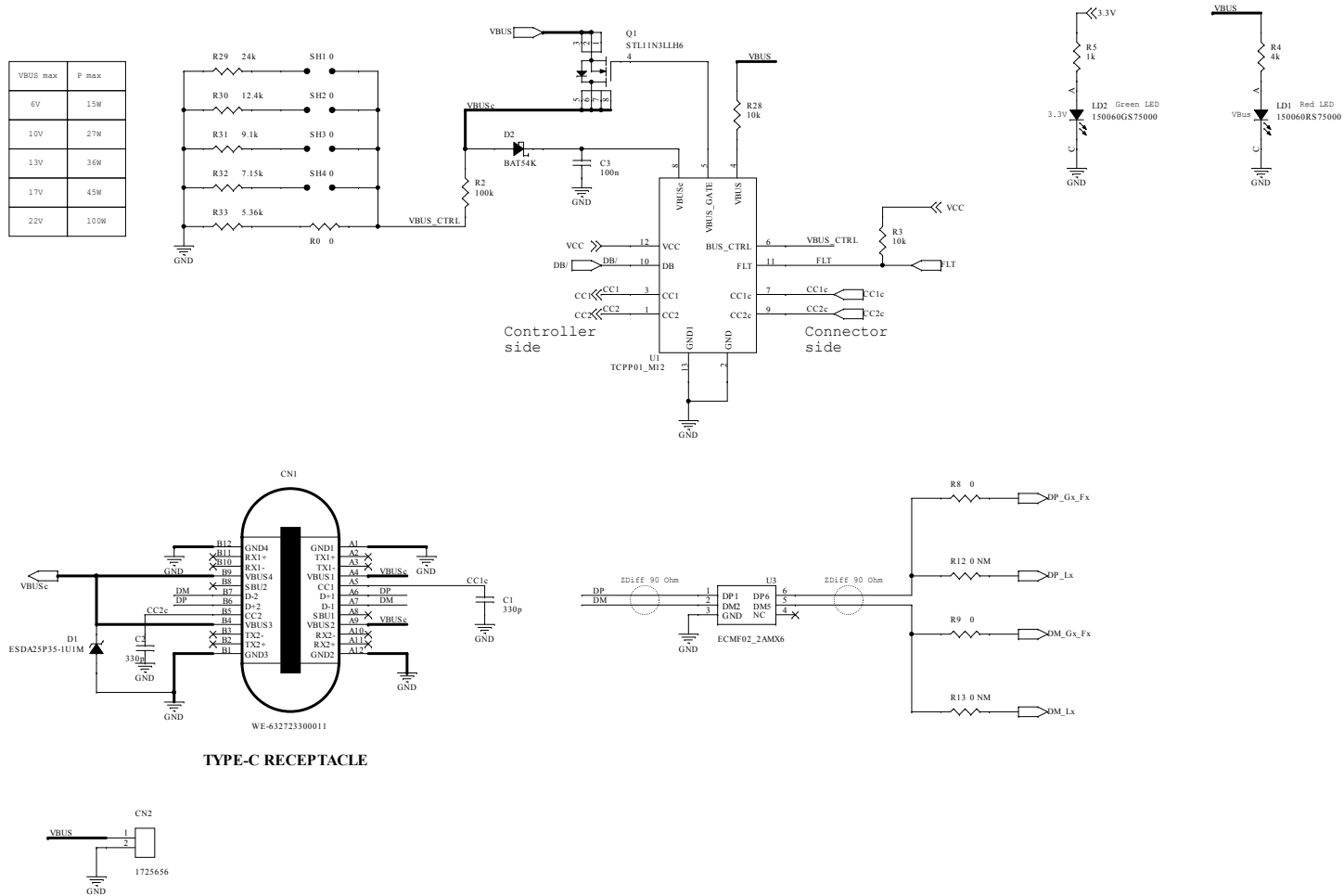


Figure 2. X-NUCLEO-SNK1M1 circuit schematic (2 of 2)



3 Board versions

Table 2. X-NUCLEO-SNK1M1 versions

Finished good	Schematic diagrams	Bill of materials
X\$NUCLEO-SNK1M1A ⁽¹⁾	X\$NUCLEO-SNK1M1A schematic diagrams	X\$NUCLEO-SNK1M1A bill of materials
X\$NUCLEO-SNK1M1B ⁽²⁾	X\$NUCLEO-SNK1M1B schematic diagrams	X\$NUCLEO-SNK1M1B bill of materials

1. This code identifies the X-NUCLEO-SNK1M1 expansion board first version.
2. This code identifies the X-NUCLEO-SNK1M1 expansion board second version.

Revision history

Table 3. Document revision history

Date	Version	Changes
15-Mar-2021	1	Initial release.
06-Apr-2021	2	Added NUCLEO-G0B1RE development board compatibility information.
07-Mar-2022	3	Updated Section 1 Schematic diagrams.
02-Aug-2022	4	Added Non compliant adapters. Updated Schematic diagrams.
27-Sep-2022	5	Updated Section 1 Non compliant adapters. Updated Section 2: Schematic diagrams.
16-Jul-2024	6	Updated Section 2: Schematic diagrams.
20-May-2025	7	Updated Section 2: Schematic diagrams.
07-May-2026	8	Updated Section 1: Resistor settings for OVP and Section 2: Schematic diagrams . Added Section 3: Board versions .

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