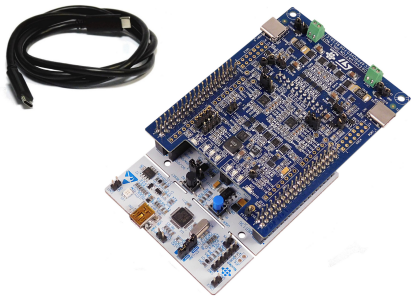# USB Type-C™ and Power Delivery™ Nucleo pack with NUCLEO-F072RB expansion board based on the STUSB1602

Features

- 32-bit ARM® Cortex®-M0-based microcontroller STM32F072RB with 128 kB Flash and 16 kB SRAM
- Dual port solution based on certified USB Type-C™ port controller STUSB1602, featuring:
  - Type-C FSM with attach/detach and cable orientation detection
  - USB PD PHY and BMC transceiver
  - High voltage (20 V) technology
  - V_{BUS} voltage monitoring
  - 600 mA V_{CONN} power switch
  - V_{BUS} and V_{CONN} discharge paths
  - Dead-battery support
  - 22 V CC line protection
  - V_{BUS} switch gate drivers
- Power connector to interface with external power supply (not included)
- USB 2.0 full speed data communication interface
- RoHS compliant

Applications

- USB type-C™ cable and connector spec. (rev 1.3)
- USB Power Delivery spec. (rev 2.0 and 3.0)

Product status link
P-NUCLEO-USB002

Description

The STM32 Nucleo pack is designed for USB Type-C™ and Power Delivery specifications.

Used with the embedded X-CUBE-USBPD certified software, the P-NUCLEO-USB002 represents a development tool enabling fast prototyping of USBPD applications leveraging ready-to-use ST componentry and software.

The P-NUCLEO-USB002 kit is designed to exploit the performance of the STM32F072 32-bit microcontroller based on ARM® Cortex®-M0 and two STUSB1602 USB Type-C™ port controllers, to develop applications managing up to two USB Type-C™ ports.

The STUSB1602 is a Type-C™ controller designed with 20-V technology that integrates a fully-featured USB Type-C state machine and a USBPD PHY + BMC driver. This analog front end features: Type-C™ attach and cable orientation detection; source / sink / DRP power role configuration; integrated V_{CONN} power switch; integrated V_{BUS} and V_{CONN} discharge path; high voltage protection (including CC pins); V_{BUS} switch gate drivers.

The P-NUCLEO-USB002 is fully configurable and ready to support different power roles such as: provider, consumer or DRP.

The X-CUBE-USBPD is compliant with the USB Type-C™ 1.3 and USB Power Delivery 2.0 and 3.0 specifications.

1 P-NUCLEO-USB002 system architecture

The USB Type-C™ and Power Delivery kit is composed of:

1. The NUCLEO-F072RB development board that acts as the control board where the X-CUBE-USB-PD software is running
2. Power Delivery expansion board with two embedded STUSB1602 Type-C™ controllers
3. A USB Type-C™ fully-featured and certified cable

Figure 2. P-NUCLEO-USB002 kit
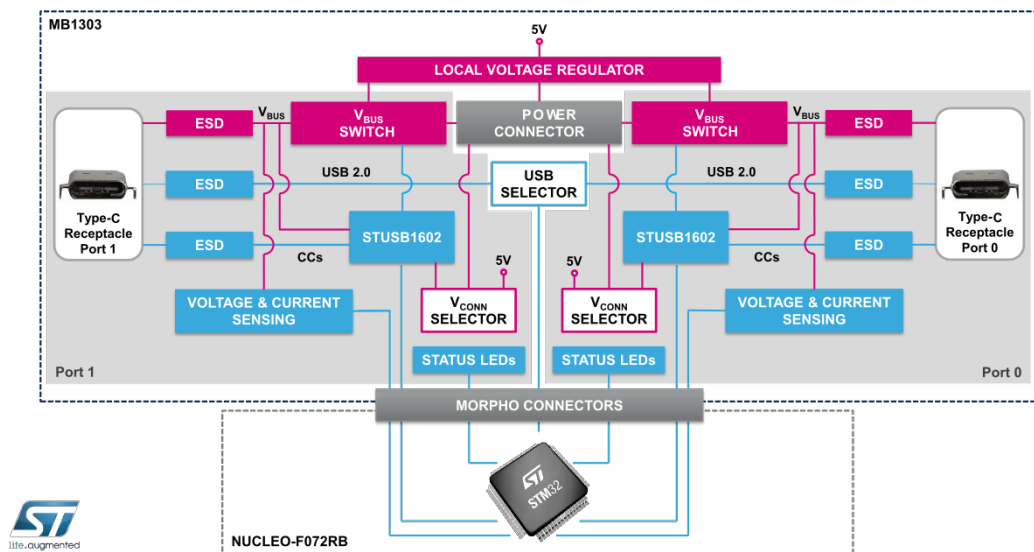
The Power Delivery expansion board is equipped with:

- Two DRP USB Type-C™ ports managed by two STUSB1602 Type-C™ port controllers
- Optional V_{BUS} current sensing (and discrete voltage monitoring)
- Dedicated power connector to interface with an external power supply (not included in the kit) to provide different profiles as well as V_{CONN} (5 V) if necessary
- On-board power management that is able to supply internal voltages
- Six status LEDs for the USBPD ports and a user LED
- USB 2.0 interface available on both Type-C™ port
- RoHS compliant
- PCB type and size:
    - material: FR4
    - four-layer
    - copper thickness: 35 μm
    - total expansion board dimensions: 74 mm x 98 mm

Note: *The USB 2.0 peripheral can be alternatively mapped on one port or in pass-through configuration.*

The NUCLEO-F072RB development board includes:

- The STM32F072RBT6 32-bit microcontroller based on the ARM Cortex-M0 with 128 kB Flash memory, 16 kB of SRAM, USB 2.0 full speed data interface in LQFP64 package
- Two types of extension resources:
    - Arduino Uno revision 3 connectivity
    - ST morpho extension pin headers for full access to all STM32 I/Os
- On-board ST-LINK/V2-1 debugger/programmer with SWD connector:

- – selection-mode switch to use the kit as a standalone ST-LINK/V2-1
- Flexible board power supply:
  - – USB V_{BUS} on mini-B connector or external source
  - – Power management access point
- Three LEDs:
  - – USB communication (LD1), user LED (LD2) and power LED (LD3)
- Two push buttons: USER and RESET
- USB re-enumeration capability: three different interfaces supported on USB
  - – Virtual com port (the NUCLEO-F072RB in the kit has a different solder bridge configuration to the standalone board)
  - – Mass storage
  - – Debug port
- Supported by a wide range of integrated development environments (IDEs), including IAR™, Keil® and GCC

Revision history

Table 1. Document revision history

Date	Version	Changes
09-May-2017	1	Initial release.
18-Apr-2018	2	Updated Section ● Applications and Section ● Description.
02-May-2018	3	Updated Section ● Description and Section 1 P-NUCLEO-USB002 system architecture.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

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