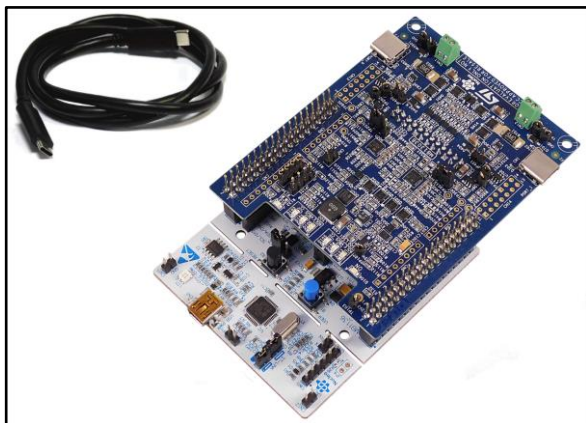


## USB Type-C™ and Power Delivery™ Nucleo pack with NUCLEO-F072RB expansion board based on STUSB1602

Data brief



### Features

- 32-bit ARM® Cortex®-M0-based microcontroller STM32F072RB with 128 kB Flash and 16 kB SRAM
- Dual ports 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
  - $V_{BUS}$  &  $V_{CONN}$  discharge paths
  - Dead-battery support
  - 22 V CC lines 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

### Specifications

- USB type-C™ cable and connector spec. (rev 1.2)
- USB Power Delivery spec. (rev 2.0)

### Description

The STM32 Nucleo pack is designed for USB Type-C™ and Power Delivery specifications. Used with the embedded X-CUBE-USB-PD certified software, the P-NUCLEO-USB002 represents a development tool enabling fast prototyping of USB PD 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, for developing applications that manage 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 USB PD 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  $V_{BUS}$  &  $V_{CONN}$  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 like provider, consumer or DRP.

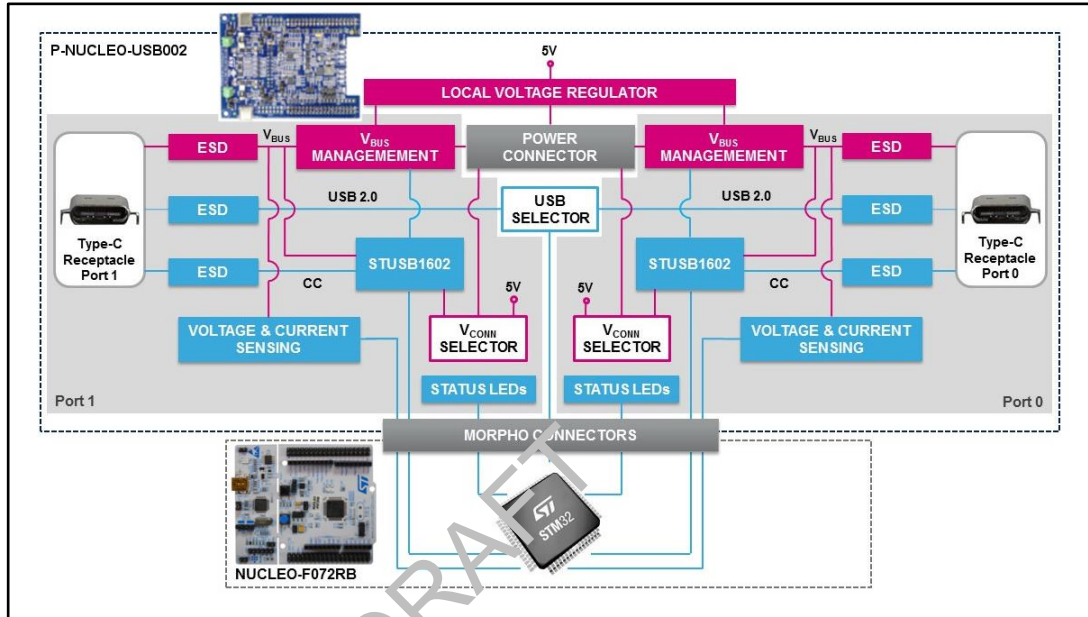
The X-CUBE-USB-PD is compliant with the USB Type-C™ 1.2 and USB Power Delivery 2.0 specifications.

# 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 1: 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 able to supply internal voltages
- Six status LEDs for the USB-PD ports and a user LED
- USB 2.0 interface available on both Type-C™ ports
- RoHS compliant
- PCB type and size:
  - material: FR4
  - four-layer
  - copper thickness: 35  $\mu\text{m}$
  - total expansion board dimensions: 74 mm x 98 mm



The USB 2.0 peripheral can be alternatively mapped on both ports or in pass-through configuration.

The NUCLEO-F072RB development board includes:

- An 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 Type-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

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## 2 Revision history

Table 1: Document revision history

| Date        | Version | Changes          |
|-------------|---------|------------------|
| 03-May-2017 | 1       | Initial release. |

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