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)

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.
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

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 \( \mu \)m
  - 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 STM32F072RB76 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 VBUS 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

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<th>Date</th>
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<tbody>
<tr>
<td>09-May-2017</td>
<td>1</td>
<td>Initial release.</td>
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<tr>
<td>18-Apr-2018</td>
<td>2</td>
<td>Updated Section ● Applications and Section ● Description.</td>
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<tr>
<td>02-May-2018</td>
<td>3</td>
<td>Updated Section ● Description and Section 1 P-NUCLEO-USB002 system architecture.</td>
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