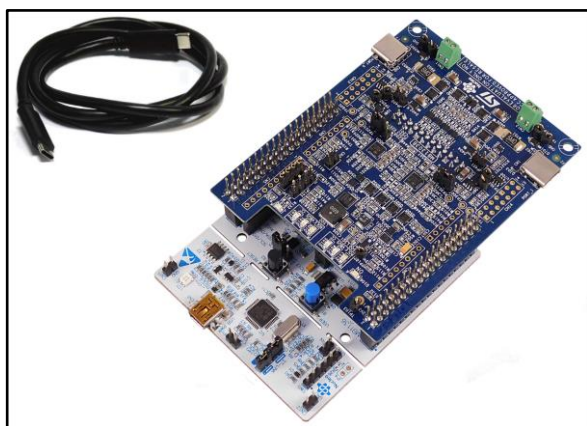## USB Type-C™ and Power Delivery™ Nucleo pack with NUCLEO-F072RB expansion board based on STUSB1602

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.

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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
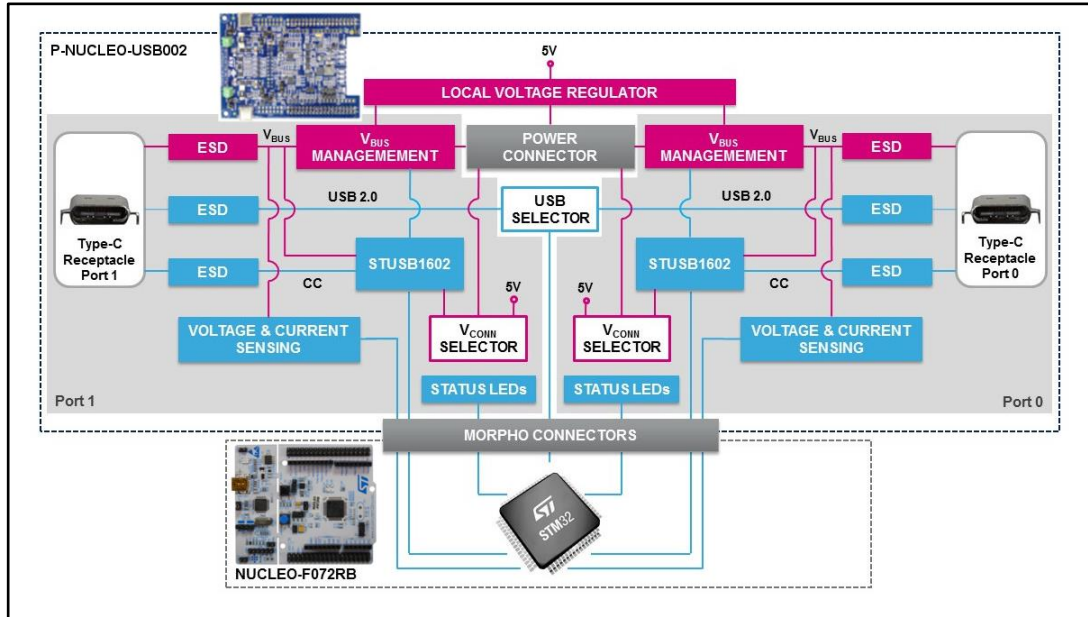
The Power Delivery expansion board is equipped with:

*   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 µm
    −   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

2 Revision history

Table 1: Document revision history

Date	Version	Changes
09-May-2017	1	Initial release.

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