



YKUSH 3

Yepkit USB 3.1 Switchable Hub

User Manual

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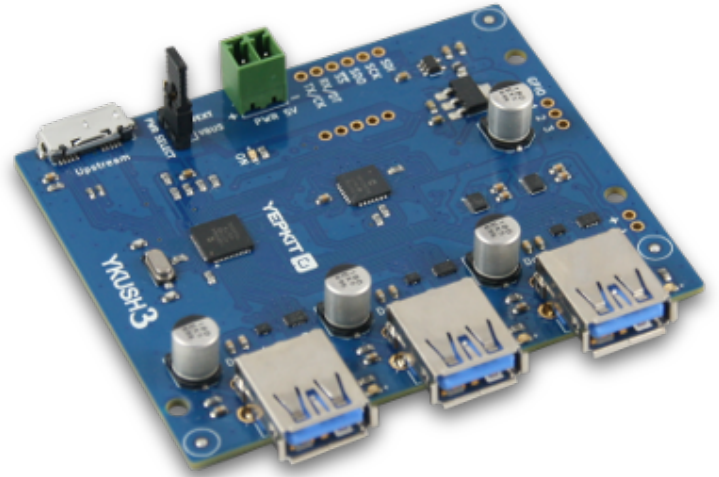
PRODUCT OVERVIEW

CONTROL YOUR USB DEVICES

Yepkit USB 3.1 Switchable Hub

Being able to connect/disconnect USB devices without having to physically plug/unplug is quite helpful for recurrent processes. Bellow are some example of use cases where this capability is quite advantageous:

- Data backup systems using USB HDDs
- Data access control by emulating the physical plug/unplug by connecting/disconnecting the USB device (Both power and data lines) containing or relaying the data
- Power saving schemes for solutions with USB powered systems or devices



The control is achieved by sending UP/ON and DOWN/OFF commands to the on-board microcontroller, visible to the host system as an HID USB device. The commands are based in a very simple protocol detailed in Control Protocol section of this manual.

Key Features:

- Three USB 3.1 Gen1 downstream ports
- Selectable USB bus powered or Self/Externally powered
- Full downstream ports switching (both VBUS power and data lines)
- ICSP programming interface for loading new firmwares
- Loaded with a Bootloader for firmware updates/programming through USB

Key Benefits:

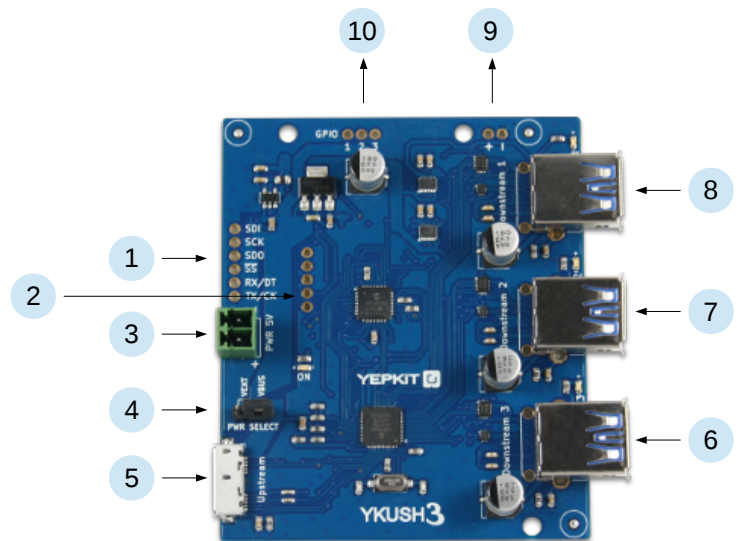
- Full control over your USB device ON/OFF
- Remote switching of USB devices
- Bus powered for ease of use
- Self/Externally powered for higher current devices
- High flexibility of use and integration brought by a user application layer control software
- Open source control software allowing customization
- High speed of USB 3.1 Gen1

CONNECTING AND SETUP

CONNECTING AND SETUP

YKUSH 3 board terminals

- 1 MCU additional interfaces breakouts
- 2 ICSP programming interface
- 3 External power input terminal
- 4 External / Bus Power Mode select jumper
- 5 Upstream Port (connect to the host)
- 6 Downstream Port 3
- 7 Downstream Port 2
- 8 Downstream Port 1
- 9 5V switchable power output
- 10 GPIOs



The hardware setup to start using YKUSH 3 is quite simple, it's connected exactly as any other USB Hub, just connect the upstream port to the host system (eg., a PC USB port).

At this point YKUSH 3 is working as Bus Powered Hub (takes the power input from the host USB port). This powering mode should only be used when just low power USB devices are to be connected. If higher power USB devices (e.g., external USB HDD) are to be connected then the Self/External Powered mode (external power supply) is recommended.

To use the advanced board functionalities a software component must be installed in the host system (or custom developed by the user). We make available for download our control software, the **ykushcmd**. This software component implements the communication protocol with the YKUSH 3 in-board microcontroller that controls the board functionalities.

The control application is provided as Open Source software and can be downloaded from the YKUSH 3 product page at www.yepkit.com.

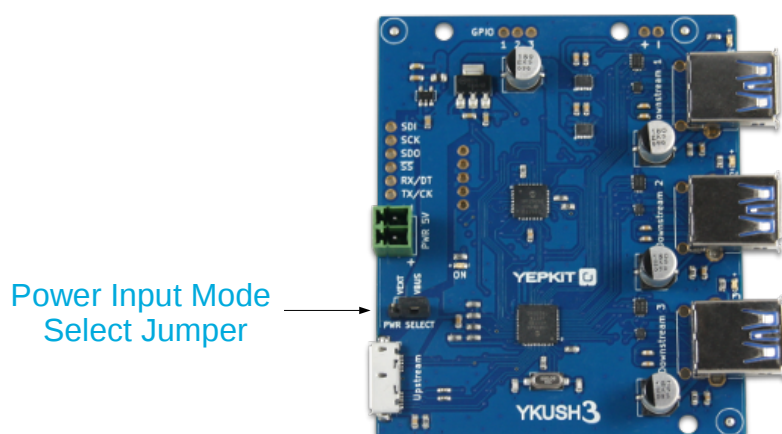
The software provided sends commands from the host system to YKUSH 3 to perform the following actions:

- Switch ON (bring UP) a downstream port
- Switch OFF (bring DOWN) a downstream port
- Get downstream port status
- List the serial numbers of the YKUSH 3 boards connected

To make these commands available in the host system follow the instructions in the setup guide by following the link for your system in the product page.

CONNECTING AND SETUP

Selecting power input mode (Bus/Externally Powered)



The power input mode is selected through the on-board jumper indicated in this picture.

The boards are set at factory with the jumper in the Bus Powered position (**VBUS**). If the board is intended to be powered by an external 5V power supply the user should move the jumper to the Externally Powered position (**VEXT**).

For most use cases the External Powered mode is preferable to avoid instabilities due to insufficient power due to upstream port power constraints on the host side. Use Bus Powered mode when only low consumption USB devices are to be connected to the downstream ports of the YKUSH 3.

Bus Powered (VBUS)

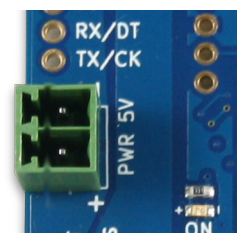
In Bus Powered mode (jumper at VBUS position), all power necessary to source the YKUSH 3 internal circuitry and the power demands from the USB devices connected to YKUSH 3 downstreams is sourced from the Upstream VBUS. This has obvious limitations imposed by the current sourcing capability of the Host port to which the YKUSH 3 upstream is connected, and should only be used when just low powered devices are to be connected to the YKUSH 3.



Self/Externally Powered (VEXT)

In Externally Powered mode (jumper at VEXT position), all power is sourced from an external 5V power supply. This external power supply must have enough current capacity to source the internal YKUSH 3 circuitry and all USB devices attach to the downstream ports.

Ensure the external power supply output voltage **does not exceed 5.4VDC**.



USING IT

USING YOUR YKUSH 3

Now that everything is set up you can start using the full capabilities of YKUSH 3. If you are using our software (ykushcmd), the commands have the following structure and options.

The command structure

```
ykushcmd ykush3 [-s serial_number] -<option> <port_number> [value]
```

[] → Optional

< > → Variable

option:

u	Turns up/on the downstream port with number <i>port_number</i>
d	Turns down/off the downstream port number <i>port_number</i>
g	Gets the status of the downstream port number <i>port_number</i>
l	List the serial number of the connected boards
on	Turns ON the 5V power output
off	Turns OFF the 5V power output
w	Write GPIO
r	Read GPIO
c	Configure port default state
reset	Reset device

port_number:

1	Downstream port 1
2	Downstream port 2
3	Downstream port 3
a	All downstream ports
e	Additional 5V switchable power output

value Value to be written/used

The [-s *serial_number*] parameter is optional and only relevant when more than one YKUSH 3 board is connected to the same host. This option addresses a specific board with the unique serial number *serial_number*.

Note that in Windows operating system the command is **ykushcmd.exe** instead of **ykushcmd**.

USING IT

Some examples

Switch OFF/DOWN the downstream port 1.

```
ykushcmd ykush3 -d 1
```

Switch ON/UP the downstream port 1.

```
ykushcmd ykush3 -u 1
```

Get status of downstream port 2.

```
ykushcmd ykush3 -g 2
```

List the serial numbers of the connected boards.

```
ykushcmd ykush3 -l
```

Switch OFF/DOWN the downstream port 2 of the board with serial number YK00001.

```
ykushcmd ykush3 -s YK00001 -d 2
```

CONTROL PROTOCOL

UNDERSTANDING THE PROTOCOL

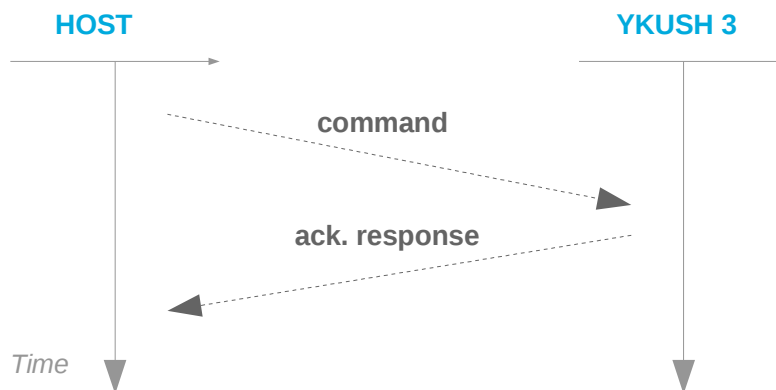
YKUSH 3 board has an in-board microcontroller that handles the control communication with the host system and performs the switching of the downstream USB ports.

This in-board microcontroller is visible to the host system as an HID USB device with the following details:

Vendor ID (VID): 0x04D8
Product ID (PID): 0xF11B

The communication protocol

The communication protocol between the host system and YKUSH 3 in-board microcontroller is a 64 byte packet (HID report) based command/acknowledge interaction.



For detailed protocol listing refer to the [*ykush3_protocol_tables.pdf*](#) document.

APPENDIX: REVISION HISTORY

Revision 1.0.0 (10/2017)

Initial release.