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Zero4U

4-Port USB Hub for Raspberry Pi Zero

User Manual (revision 1.20)

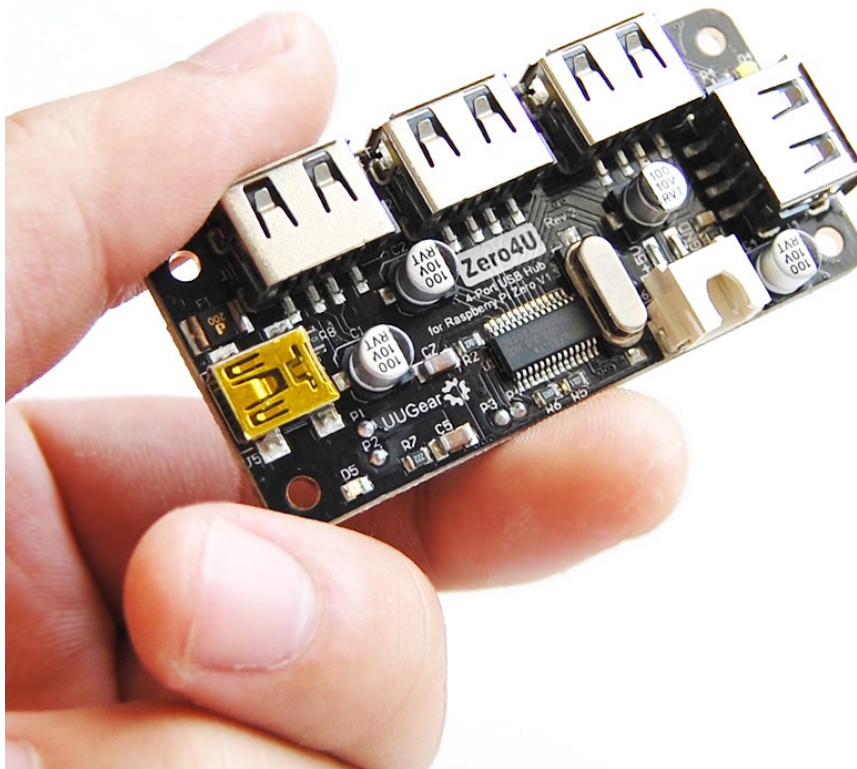


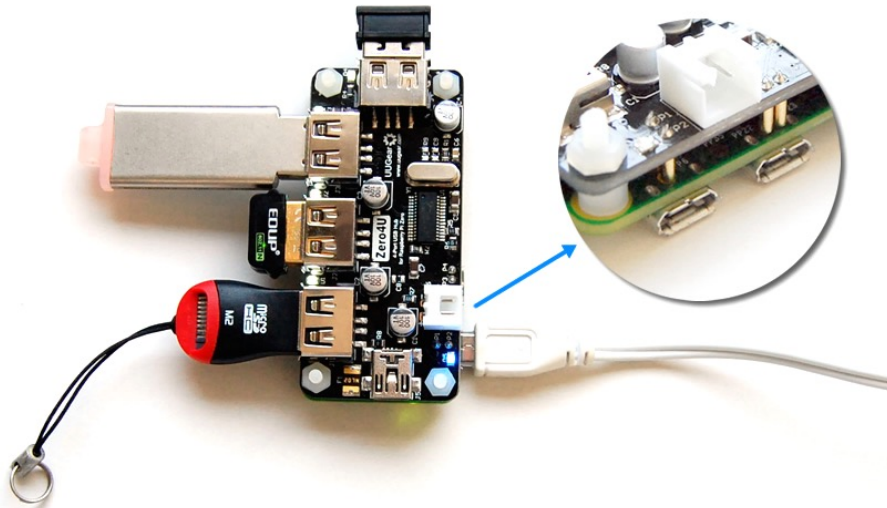
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Product Overview

Zero4U is a 4-Port USB hub designed for Raspberry Pi Zero. It extends the only data micro USB port on Raspberry Pi Zero and gives you 4 standard USB ports, which allows you to connect more USB devices to your Raspberry Pi Zero.

The board size of this USB hub is exactly the same with Raspberry Pi Zero, and can be firmly attached under Raspberry Pi Zero back-to-back. There are 4 pogo pins on the USB hub board and they will attach the +5V, GND, USB D+ and USB D- testing pad at the back of Raspberry Pi Zero, so you don't either need soldering wires, or the USB-OTG cable and USB – mini USB cable to connect the USB hub and Raspberry Pi Zero.

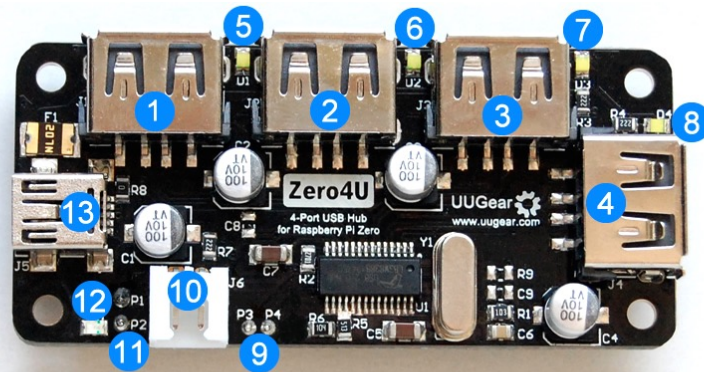


Although it is designed for Raspberry Pi Zero, you can still use it as a normal USB hub for other models of Raspberry Pi, or any computer that has USB port.

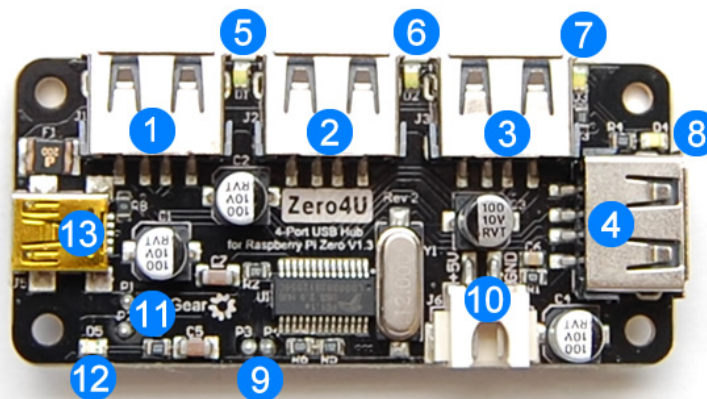
There are two versions of Zero4U, one is for Raspberry Pi Zero V1.2 (without camera connector) and the other is for Raspberry Pi Zero V1.3 (with camera connector). They have the same functionality but the location of pogo pins are slightly different.

Also there are two revisions for V1.3. The second revision uses more surface mounted components (the crystal and the XH2.54 connector).

The figures below show how they look like:



Reversion 1 (for V1.2 and V1.3)



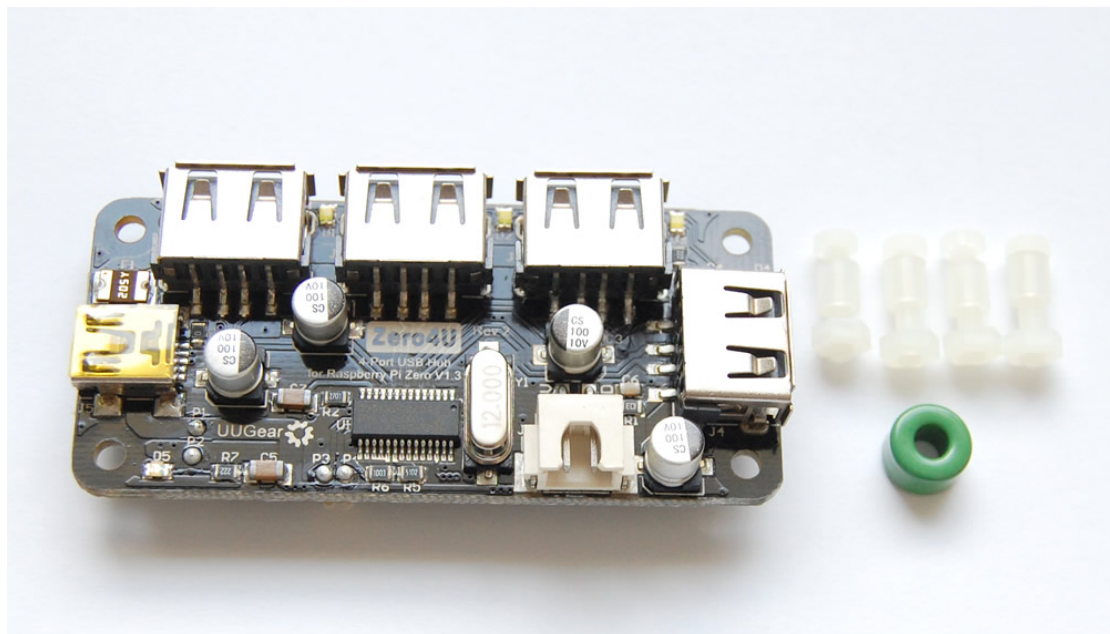
Reversion 2 (for V1.3 only)

- 1~4) Downstream USB ports
- 5~8) White LEDs as activity indicators
 - 9) Two pogo pins at back for data connection
- 10) Alternative DC 5V power in
- 11) Two pogo pins at back for power connection
- 12) Blue LED as power indicator
- 13) Upstream mini USB port

Package Content

Each package of this USB hub contains:

- 4-port USB hub board x 1
- Plastic spacer x 4
- M2.5 x 10mm screws x 4
- M2.5 nuts x 4
- Ferrite Ring x 1 (for V1.3 only)



Specifications

Dimension:	65mm x 30mm x 9mm
Weight	14g (net weight without any accessory)
Standards	USB Specification Revision 2.0 and 1.1 compatibility Single Transaction Translator (STT)
Data Speed	USB v1.1: 12 Mbps USB v2.0: 480 Mbps
USB Ports	Upstream: 1 (mini-USB or via pogo pins) Downstream: 4
LED Indicators	Power: 1 (blue) Port Activity: 4 (white)
Power Mode	On Raspberry Pi Zero: Self-Power On Other Models: Bus-Power or Self-Power
Output Voltage	DC 5V
Output Current	Bus-Power: maximum 500mA for all ports Self-Power: maximum 2A for all ports
Static Current	~1mA
Operating Temperature	0°C~70°C
Storage Temperature	-20°C~80°C
Humidity	0~80%RH, no condensing

Remarks: when using Zero4U with Raspberry Pi Zero, Ethernet gadget should be disabled, or the USB hub could not be recognized.

About Powering Mode

A USB hub could be powered by the USB bus (bus-power mode), or be powered by the power supply (self-power mode). Bus-power mode is simpler as it does not need to have external power supply, but it has quite limited ability to power the devices on the USB hub. When you are trying to power more devices with higher current, it is recommended to use the self-power mode.

This USB hub supports both bus-power mode and self-power mode.

Self-Power Mode

This USB hub in self-power mode can output up to 2,000mA current for all USB ports.

When you attach this USB hub to Raspberry Pi Zero, it will take power from the Zero and work in self-power mode.

If you use a USB - mini USB cable to connect this USB hub to other models of Raspberry Pi, and you connect power supply to the USB hub (via the white JST XH2.54 2-pin connector on board), then it is still working in self-power mode. For Raspberry Pi A, B or A+, it will also back-power the Raspberry Pi, unless you remove the resistor R8 on board.

Bus-Power Mode

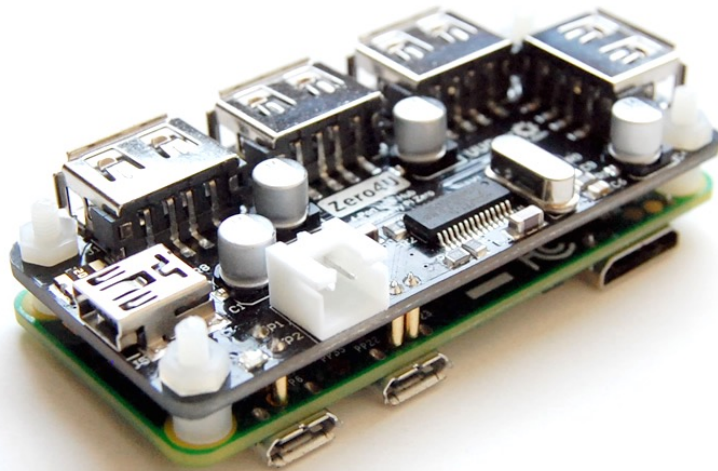
This USB hub in bus-power mode can output up to 500mA current for all USB ports. If you are using the first revision of Raspberry Pi A/B, the maximum output current for all USB ports is only about 100mA, because the USB port on Raspberry Pi (first revision) has a 140mA polyfuse.

If you use a USB - mini USB cable to connect this USB hub to other models of Raspberry Pi, and you don't connect power supply to the USB hub, then it will work in bus-power mode, and it will draw power from the USB bus.

Usage Guide

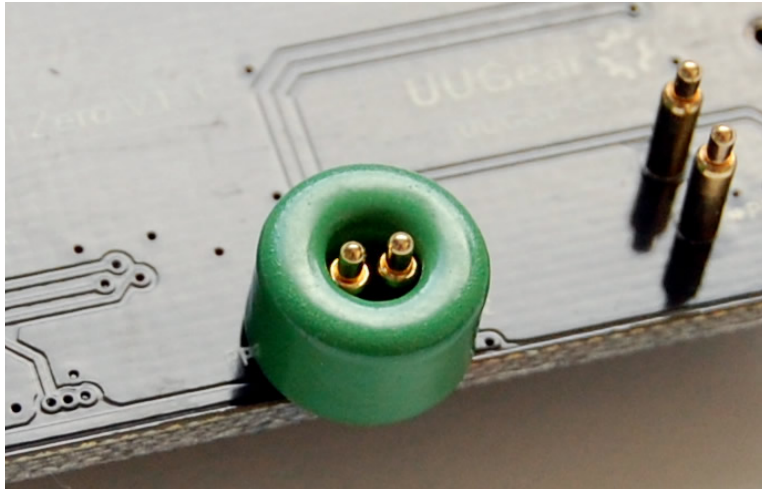
To attach this USB hub to Raspberry Pi Zero, simply put them back-to-back together and place the plastic standoff between them, then use the plastic screws and nuts to firmly fix the 4 corners.

Please make sure to attach in the correct direction, so the 4 pogo pins on the USB hub can accurately contact to the PP1, PP6, PP22 and PP23 testing pads on the back of Raspberry Pi Zero.

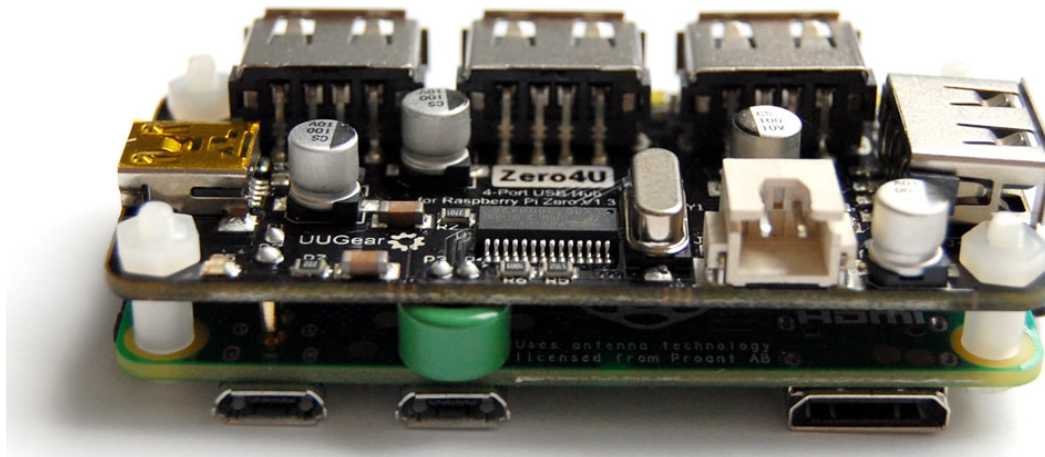


Now you can connect power supply to Raspberry Pi Zero, either micro USB port will do, then you will see both Raspberry Pi Zero and the USB hub are powered. If you plug a USB device into any of the 4 USB ports, the port activity LED (white) will light up.

If you want to use Zero4U on Raspberry Pi Zero W, only the Zero4U for V1.3 has the possibility, as the positions for PP1, PP6, PP22 and PP23 testing pads are the same for Raspberry Pi Zero V1.3 and Raspberry Pi W. You will also need to use the ferrite ring (included in the package) to protect the pogo pins from WiFi interference. More details about the interference from on-board antenna could be found [here](#).

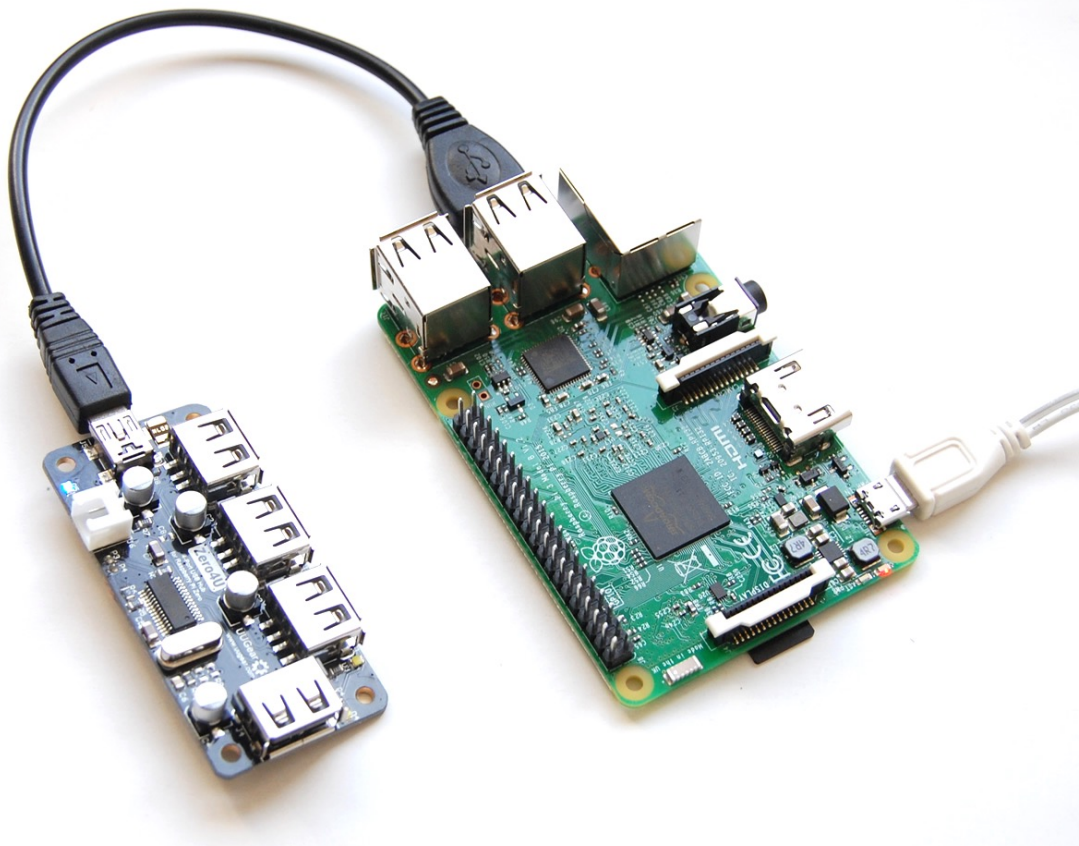


The picture below shows how to mount Zero4U on Raspberry Pi Zero W, with the ferrite ring between them.



Remarks: this USB hub has only one transaction translator (TT) for all downstream USB ports. Please try not to connect any USB 1.1 device to the USB hub; otherwise all devices on the hub will be slowed down to the USB 1.1 speed (12 Mbps). If you only connect USB 2.0 devices to this USB hub, all of devices on the hub can work with USB 2.0 high speed (480 Mbps), if they support USB 2.0 standard.

If you want to connect this USB hub to other Raspberry Pi models, you will need a USB - mini USB cable (not included in the package).



In the picture, the power supply is connected to Raspberry Pi, and the USB hub is powered by the USB bus. This will limit the output current to 500mA for all USB ports on the hub.

If you also connect an alternative power supply to the USB hub (via the white connector on board), the USB hub will work in self-power mode and it can output up to 2A current for USB ports.

Troubleshooting: USB Hub Not Recognized

After you connect Zero4U to Raspberry Pi Zero, the blue LED should light up when you power your Raspberry Pi Zero. If you connect USB device to the USB port on Zero4U, the white LED should light up accordingly. If you type “lsusb” command in the console, you should see the 4-port USB hub get listed:

```
pi@raspberrypi:~ $ lsusb
Bus 001 Device 002: ID 1a40:0101 Terminus Technology Inc. 4-Port HUB
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
pi@raspberrypi:~ $
```

What to do if your Zero4U (USB hub) is not recognized?

If you are mounting Zero4U on Raspberry Pi Zero, please make sure the **4 pogo pins are all well contacted to testing pads** on the Raspberry Pi Zero. Use tweezers to gently adjust the pogo pins if necessary.

Have you ever **enabled the “Ethernet Gadget” on your Raspberry Pi Zero?** ([tutorial is here](#)) The USB port on Raspberry Pi could work in either host mode or slave mode. By default, the USB port is in host mode, which allows you to connect Zero4U (a USB hub) to it; If you enable the Ethernet Gadget, the USB port is in slave mode, and the connected Zero4U will not be recognized.

If it is the case, there are two solutions:

1. Disable Ethernet Gadget via Software

You can disable Ethernet Gadget by commenting out the “**dtoverlay=dwc2**” in the **/boot/config.txt** file, and then reboot. As for the cmdline.txt file, you can keep it as it is.

2. Disable Ethernet Gadget via Hardware

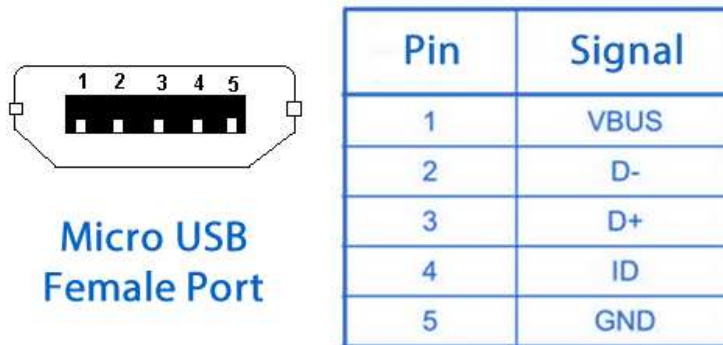
You can also disable Ethernet Gadget by **connecting an OTG adapter** to the “USB” micro USB port on Raspberry Pi Zero (not the power port). An OTG adapter is something like this:



OR



Why connecting OTG adapter will help? It is because the OTG adapter has the “ID” signal pin connected to the GND pin internally, which explicitly disables the Ethernet Gadget and lets the USB port on Raspberry Pi Zero to stay in host mode, that way Zero4U could be recognized successfully.



Please notice that, shorting ID pin to ground can override the software configuration. Even if you keep the “dtoverlay=dwc2” in the /boot/config.txt file, you can still disable the Ethernet Gadget by plugging an OTG adapter to the “USB” port on Raspberry Pi Zero. This is convenience if you just want to disable the Ethernet Gadget temporarily.

Revision History

Revision	Date	Description
1.00	2016.04.04	Initial revision
1.10	2017.01.23	Update pictures for second revision of Zero4U v1.3
		Add troubleshooting of "hub not recognized" issue.
1.20	2017.03.21	Add description for the newly added ferrite ring.