YoctoHub-Shield

User's Guide

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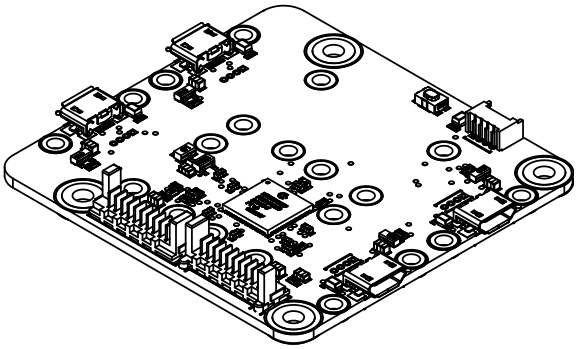
1. Introduction

The YoctoHub-Shield is a 50x58mm electronic module enabling you to add 4 ports to a YoctoHub-Ethernet or to a YoctoHub-Wireless. You can cascade several of these YoctoHub-Shields on the same hub. As all Yoctopuce products, the YoctoHub-Shield is plug-and-play: you only need to connect it to a hub for its ports to start working immediately. No configuration is required.



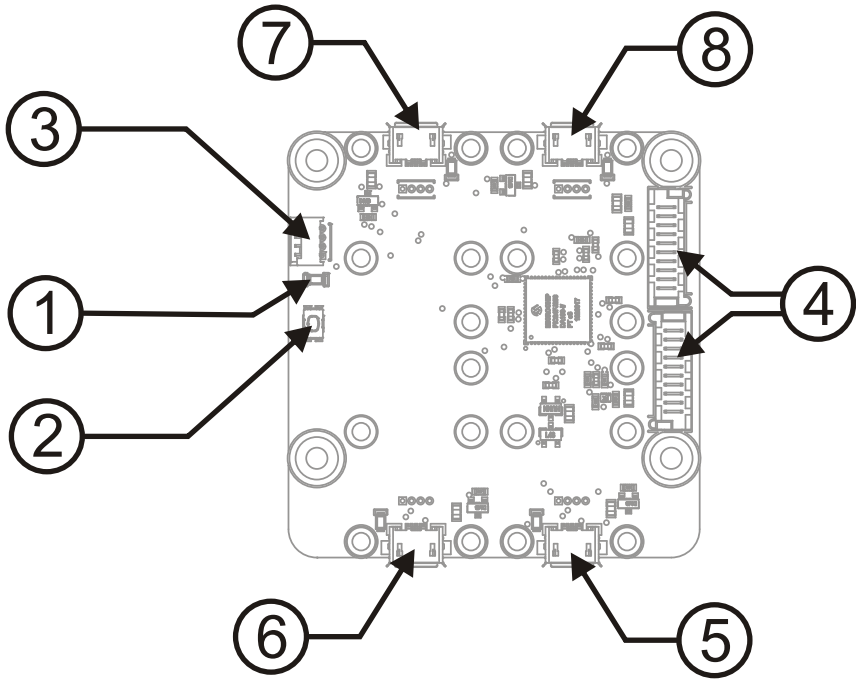
The YoctoHub-Shield

The YoctoHub-Shield is not a USB hub. While using micro-USB type connectors, its down ports use a proprietary protocol, simpler than USB. Therefore, you cannot drive, or even power, USB devices other than Yoctopuce modules.

Yoctopuce thanks you for buying this YoctoHub-Shield and sincerely hopes that you will be satisfied with it. The Yoctopuce engineers have put a large amount of effort to ensure that your YoctoHub-Shield is easy to install anywhere and easy to drive in all circumstances. If you are nevertheless disappointed with this module, do not hesitate to contact Yoctopuce support[1].

[1] support@yoctopuce.com

2. Presentation



1: Yocto-led
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Yocto-button

The Yocto-button has two functionalities. First, it can activate the Yocto-beacon mode (see below under Yocto-led). Second, if you plug in a Yocto-module while keeping this button pressed, you can then reprogram its firmware with a new version. Note that there is a simpler UI-based method to update the firmware, but this one works even in case of severely damaged firmware.

Yocto-led

Normally, the Yocto-led is used to indicate that the module is working smoothly. The Yocto-led then emits a low blue light which varies slowly, mimicking breathing. The Yocto-led stops breathing when the module is not communicating any more, as for instance when powered by a USB hub which is disconnected from any active computer.

When you press the Yocto-button, the Yocto-led switches to Yocto-beacon mode. It starts flashing faster with a stronger light, in order to facilitate the localization of a module when you have several identical ones. It is indeed possible to trigger off the Yocto-beacon by software, as it is possible to detect by software that a Yocto-beacon is on.

The Yocto-led has a third functionality, which is less pleasant: when the internal software which controls the module encounters a fatal error, the Yocto-led starts emitting an SOS in morse [1]. If this happens, unplug and re-plug the module. If it happens again, check that the module contains the latest version of the firmware, and, if it is the case, contact Yoctopuce support[2].

Trunk bus connector

The trunk bus connector is used to connect the YoctoHub-Shield to the master hub and to chain shields. It is based on 10 pole Picoflex connectors.

Debugging connector

This connector enables you to access the YoctoHub-Shield directly by USB with the appropriate cable. It behaves exactly like any other Yoctopuce module. Because using the YoctoHub-Shield is totally transparent, you most likely will never need to use this debugging port.

Down ports

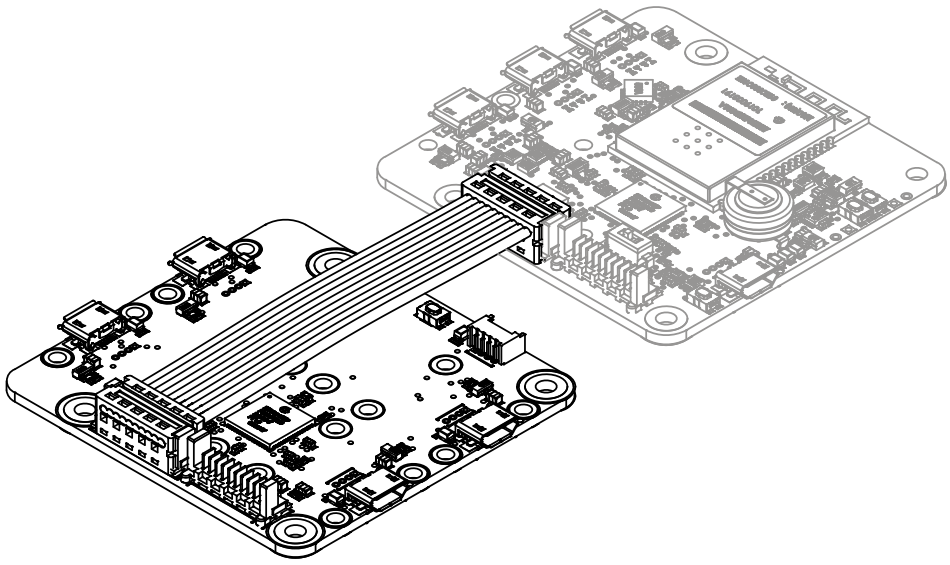
You can connect up to four Yoctopuce modules on these ports. They are then available as if they were connected directly to the master YoctoHub. Beware, the protocol used between the YoctoHub-Shield and the Yoctopuce modules is not USB, but a lighter proprietary protocol. Therefore, the YoctoHub-Shield cannot manage devices other than Yoctopuce modules. In particular, you cannot add ports to a YoctoHub-Shield by using a standard USB hub[3].

Warning: the YoctoHub-Shield USB connectors are simply soldered in surface and can be pulled out if the USB plug acts as a lever. In this case, if the tracks stayed in position, the connector can be soldered back with a good iron, using flux to avoid bridges. Alternatively, you can solder a USB cable directly in the 1.27mm-spaced holes near the connector.

[1] short-short-short long-long-long short-short-short
[2] support@yoctopuce.com
[3] The Micro-USB-Hub made by Yoctopuce is a standard USB hub and does not work with the YoctoHub-Shield.

3. Connections

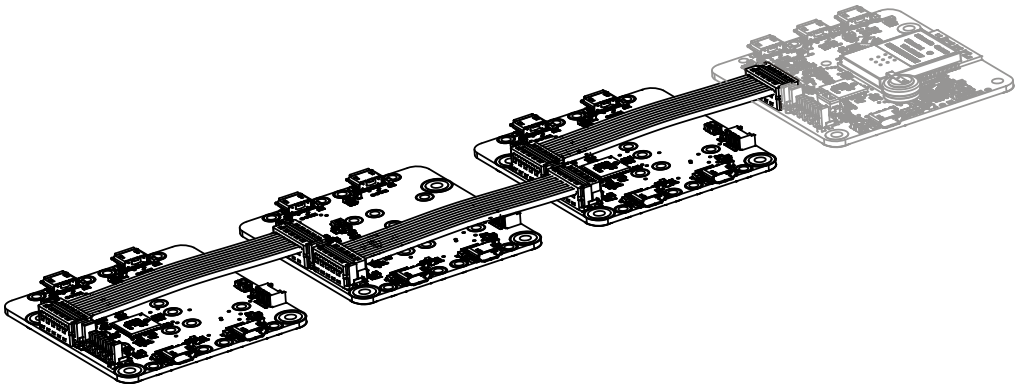
The YoctoHub-Shield is designed to be connected to a master YoctoHub with the provided cable. It is a simple ribbon cable with a 10 pole Picoflex connector at each end.



A YoctoHub-Shield connected to a YoctoHub

The cable provided with the YoctoHub-Shield is very short on purpose. The bus linking all the shields with the master YoctoHub must be as short as possible in order to maintain high quality communications. We recommend that you keep the distance between the master YoctoHub and the most remote YoctoHub-Shield under 75cm. Keep this in mind if you decide to move the YoctoHub-Shield away using your own cables.

Theoretically, you can chain up to 10 YoctoHub-Shields, which makes a total of 43 Yoctopuce modules connected to the same hub. However, the total current a YoctoHub can provide being limited to 2A. Therefore, depending what devices you use, that limit might be reached before you have connected 43 modules. Moreover, the more connected modules you have, the more the whole risks to slow down because of saturation of the bus (especially if you use modules that share a lot of data). Note that you can control each port independently. You can thus optimize power consumption and bandwidth by shutting off the modules that you do not need.



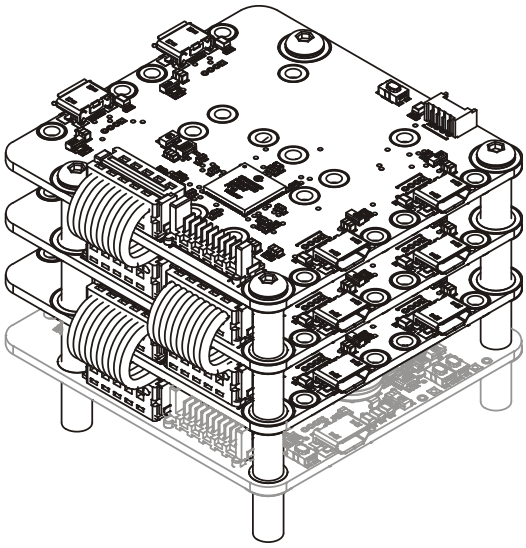
You can chain several YoctoHub-Shields.

You do not need to put the YoctoHub at the end of the chain. Note, however, that the YoctoHub-Wireless has a small design flaw: a tiny capacitor prevents you from pushing down completely the Picoflex connector on one of the headers. Use the other header or take a cutter to notch the ribbon cable connector.

Since the YoctoHub-Shield allows to build huge stacks of devices, it's tempting to have several projects running at the same time on the same shield stack. However, a Yoctopuce hub is able to manage only 8 connections in parallel. An application using the Yoctopuce API to access a hub needs 2 connections, the first one for the set/get functions, and the second one to manage callbacks and plug-and-play events. Therefore, you can have up to 4 applications talking to a hub at the same time. Trying with more will cause a many connection errors. The VirtualHub counts as one application.

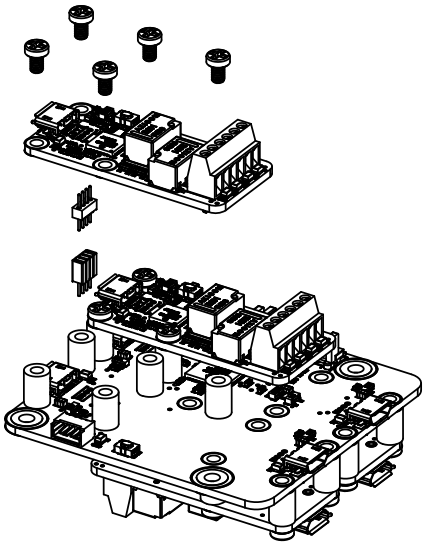
4. Assembly

All the double-width Yoctopuce modules have assembly holes at the same location. You can thus stack several YoctoHub-Shields, which enables you to build very compact hubs with a large number of ports. Make sure nevertheless that the complete device is properly ventilated.



You can stack several YoctoHub-Shields

The YoctoHub-Shield is also designed to enable you to directly fix on it four single-width modules, two on each side. Make sure to assemble the modules on the correct side: assembly holes and square pads must be aligned. If you assemble the modules on the wrong side, polarities are inverted and you risk to damage your equipment.



You can assemble up to four modules directly on a YoctoHub-Shield

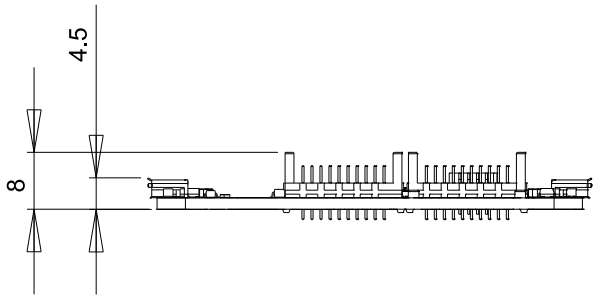
5. Characteristics

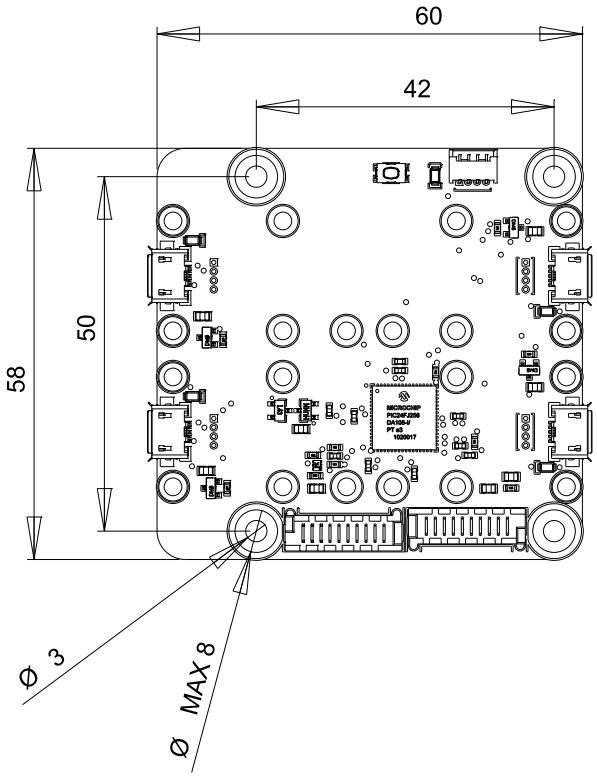
You can find below a summary of the main technical characteristics of your YoctoHub-Shield module.

Product ID	YHUBSHL1
Hardware release†	Rev. B
Width	58 mm
Length	50 mm
Weight	17 g
Channels	4
Protection class, according to IEC 61140	class III
Normal operating temperature	5...40 °C
Extended operating temperature‡	-30...85 °C
RoHS compliance	RoHS III (2011/65/UE+2015/863)
USB Vendor ID	0x24E0
USB Device ID	0x001C
Harmonized tariff code	9032.9000
Made in	Switzerland

† These specifications are for the current hardware revision. Specifications for earlier revisions may differ.

‡ The extended temperature range is defined based on components specifications and has been tested during a limited duration (1h). When using the device in harsh environments for a long period of time, we strongly advise to run extensive tests before going to production.





All dimensions are in mm
Toutes les dimensions sont en mm

YoctoHub-Shield

A4

Scale
1:1
Echelle