MAKE THINGS HAPPY !

IoTsmart RP2040

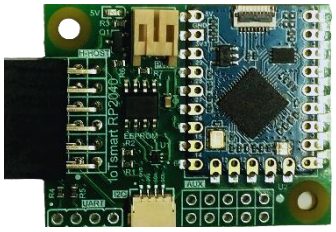
IoTsmart RP2040 Module

Introducing the **IoTsmart RP2040** module, featuring the **Raspberry Pi RP2040** microcontroller. This powerful module boasts a dual-core Arm Cortex M0+ processor with a flexible clock up to 133 MHz, 264KB of SRAM, and 2MB of onboard flash memory.
Designed for effortless compatibility, the **IoTsmart RP2040** connects seamlessly with **IoTextra** series expansion boards (mezzanines) via a 12-pin **HOST** connector. Essentially, this module converts standard mezzanines into intelligent, programmable smart modules.

The module offers two orientations for the **HOST** connector:

- **H-HOST** (horizontal connector), mounted on the **top-side** of the module, designed for **vertical** mezzanine installation
- **V-HOST** (vertical connector), mounted on the **bottom-side** of the module, designed for **horizontal** mezzanine installation

*Note: Some mezzanines, such as certain versions of the **IoTextra Relay2**, are too tall for the **V-HOST** connector.*



IoTsmart RP2040 module with **H-HOST** connector (**top-side**)

IoTsmart RP2040 module with **V-HOST** connector (**bottom-side**)

In version 1-01 of the **IoTsmart RP2040** module, the connector was consistently referred to as "**HOST**" and was always installed horizontally, i.e., on the **top-side**.

The module features a Qwiic© connector for **I²C** communication and supports optional **UART** and **AUX** connectors. These can be used to connect external sensors, devices, or access additional GPIO signals.

An onboard EEPROM (8 Kbit or 16 Kbit) stores configuration and user data and is accessible via **I²C** with default addresses 0x54–0x57 by default.

The module incorporates Waveshare RP2040-Tiny, which provides:

- Dual-core ARM Cortex M0+ processor (up to 133 MHz)
- 264KB SRAM, 2MB flash memory
- USB Type-C interface via the Tiny Adapter Board
- FPC 8-pin connector

The module is powered from a +5VDC input supply.

The **IoTsmart RP2040** module dimensions are 31 x 40 mm.

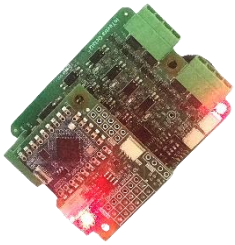
Common applications:

- Industrial automation
- Remote data logging and PLC
- HVAC and lighting control
- Transport systems
- Smart home solutions
- Consumer appliances

QUICK START

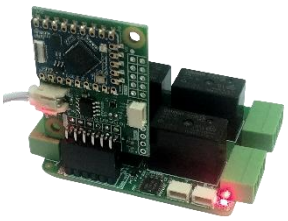
The **IoTsmart RP2040** module is primarily designed for use with **IoTextra** series mezzanines. This combination allows the **IoTsmart RP2040** module and a mezzanine to easily function as a standalone smart device.

The photos below illustrate the **IoTsmart RP2040** module paired with various mezzanines and demonstrate both horizontal (**H-HOST**) and vertical (**V-HOST**) installation of the **HOST** connector:

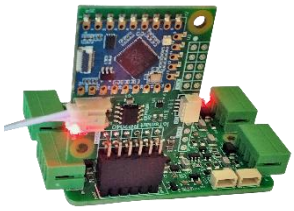


Horizontal **IoTsmart RP2040** with **IoTextra Octal2**

IoTsmart RP2040 with **IoTextra Input**

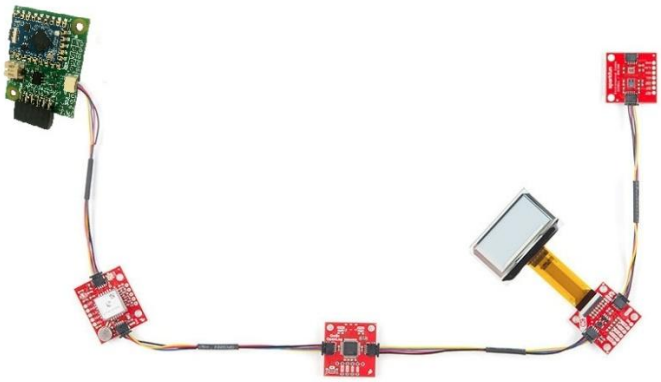


IoTsmart RP2040 with **IoTextra Relay2**



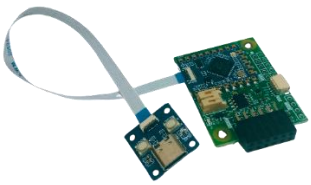
IoTsmart RP2040 with **IoTextra Analog**

The **IoTsmart RP2040** also readily connects to numerous **Qwiic©** compatible sensors, peripherals and modules via the **I²C** connector:

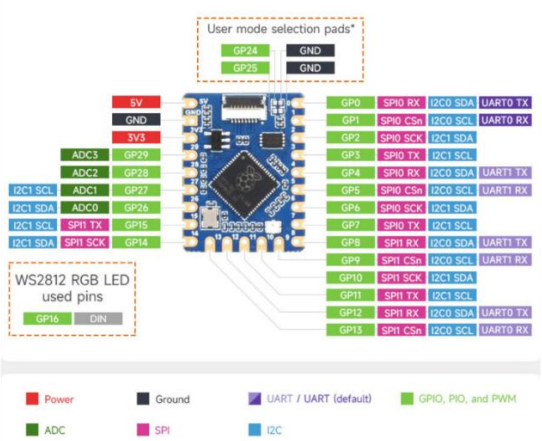


WAVESHARE RP2040-TINY

The **IoTsmart RP2040** module utilizes the **Waveshare RP2040-Tiny**, which incorporates the RP2040 microcontroller - a dual-core ARM Cortex M0+ processor with flexible clock (up to 133 MHz).
The **Waveshare RP2040-Tiny** features 264KB of SRAM, and 2MB of onboard flash memory.
It also includes an on-board FPC 8-pin connector, which adapts the USB Type-C port via the **Tiny Adaptor Board**.
The following photo displays the **Tiny Adaptor Board** with a cable; however, these are not included with the **IoTsmart RP2040** and must be purchased separately:



For your information, here is the pinout of the **Waveshare RP2040-Tiny**:

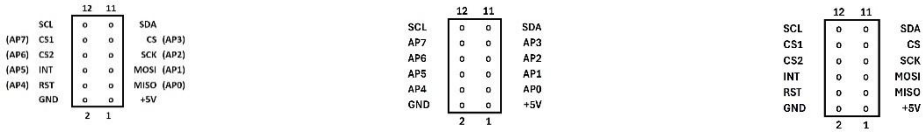


CONNECTORS

The module is equipped with the following connectors:

- A horizontal (right-angle) **H-HOST** connector installed on the top-side or a vertical **V-HOST** connector installed on the **bottom-side** of the **IoTsmart RP2040** module, depending on the required mezzanine installation orientation (**vertical** or **horizontal**, respectively).
- An **I2C** connector for connecting external sensors and devices via the I²C bus
- An optional 10-pin **AUX** connector, providing access to additional GPIO signals of the microcontroller (not pre-installed)
- An optional **UART** connector (not pre-installed)
- A **PWR** connector (+5VDC input)

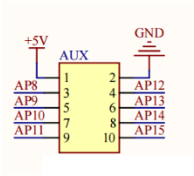
HOST connector. Pinout of the **HOST** connectors:



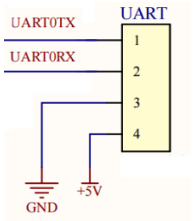
HOST on the **IoTsmart** module	**HOST-P12** on the mezzanine	**HOST-S** on the mezzanine

The **HOST** connector of the **IoTsmart RP2040** module is inserted into the **HOST-12** or **HOST-S** connector on the **IoTextra** mezzanine. Therefore, the pinout for the **HOST-P12** and **HOST-S** connectors on the mezzanines is also shown in the figure to compare the connector signals.

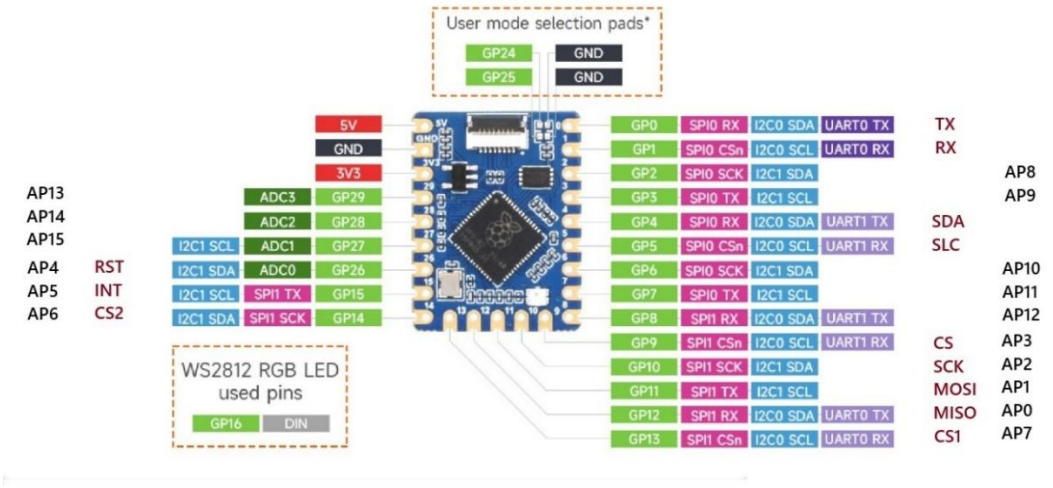
Auxiliary connector **AUX**. The structure of this connector is as follows:



UART connector. The contacts of this connector are shown in the figure:



The **HOST**, **AUX** and **UART** connector signals correspond to the **Waveshare RP2040-Tiny** signals as follows:



EEPROM

To store configuration and other user information, the **IoTsmart RP2040** module includes an onboard **EEPROM** (8 Kbit or 16 Kbit). This **EEPROM** is accessible via the I²C bus and is visible at addresses 0x54-0x57 by default.

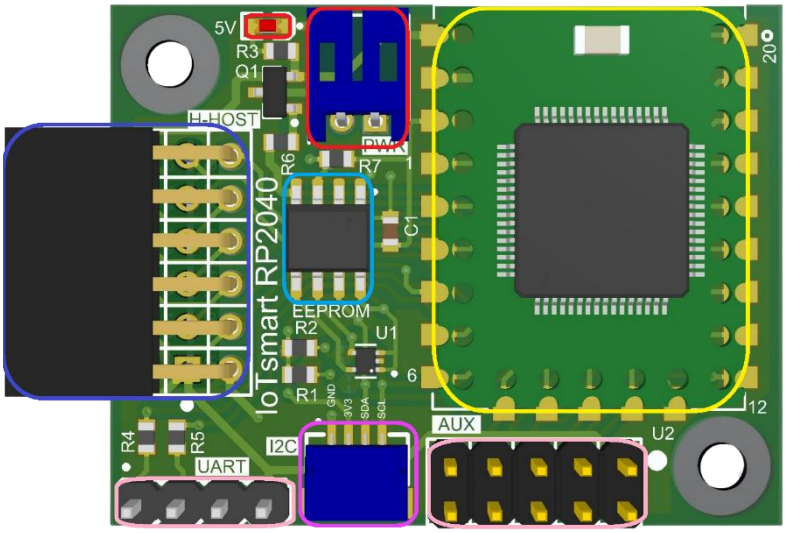
POWER SUPPLY

The module operates from a 5VDC power input supply. The power supply can be connected via a 2-pin **PWR** connector (JST S2B-PH-K-S, 2.00 mm pitch) or through the **Tiny Adapter Board**.

The typical power consumption of the module with the **Waveshare RP2040-Tiny** is approximately 25 mA (measured without additional connected peripherals or expansion boards). The maximum total current consumption (module + mezzanine) must not exceed 1000 mA.

LAYOUT

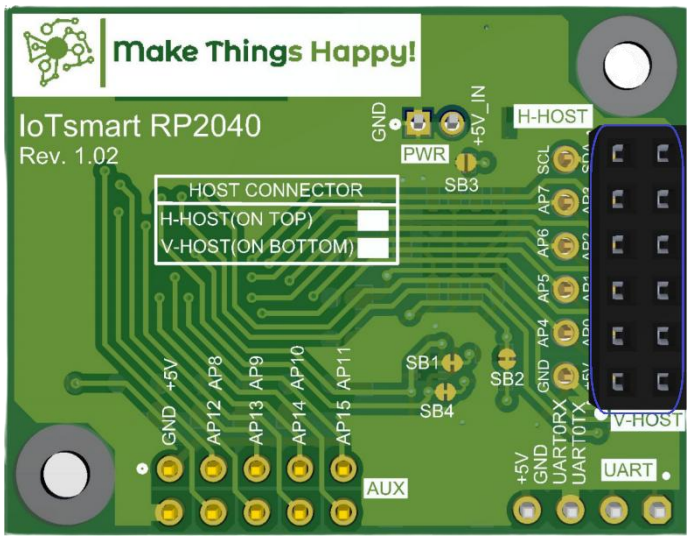
Below is the layout of the elements on the **top-side** of the **IoTsmart RP2040** module when using the **HOST-H** connector:



In this picture:

- Power-related elements (external power connector, named **PWR**, and **LED**) are highlighted in **red**
- The soldered **Waveshare RP2040-Tiny** is highlighted in **yellow**
- The **HOST-H** connector is highlighted in **dark blue**
- **UART** and **AUX** connectors not installed during production are highlighted in **pink**
- The **Qwiic©** connector for connecting peripherals via the **I²C** bus is highlighted in **purple**
- EEPROM is highlighted in **light blue**

Below is the layout of the **IoTsmart RP2040** module **bottom-side** when using the **HOST-V** connector (highlighted in **dark blue**):



JUMPERS

Jumpers are located on the underside of the module:

- **SB1**, **SB4** – Connect pull-up resistors to **I²C** SCL and SDA (enabled by default)
- **SB2** – Disables +3.3V for **I²C** devices when open (default: closed)
- **SB3** – Sets EEPROM **I²C** address:

b7	b6	b5	b4	b3	b2	b1	b0
1	0	1	0	1	x	x	R/W

CONFIGURATION TABLES

The **bottom-side** of the module provides information about the type of **HOST** connector installed:

- **H-HOST** - horizontal (right-angle) connector, **top-side** mounted, used for **vertical** mezzanine installation.
- **V-HOST** - vertical connector, **bottom-side** mounted, used for **horizontal** mezzanine installation.

COMPATIBILITY WITH MEZZANINES

The **IoTsmart RP2040** is compatible with all **IoTextra** mezzanines, including

- **IoTextra Input**
- **IoTextra Relay2**
- **IoTextra SSR Small**
- **IoTextra Octal2**
- **IoTextra Analog**
- **IoTextra Combo**

ACCESSORIES

Recommended accessories:

- 2-pin power connector
- **Tiny Adapter Board** with USB Type-C
- **Qwiic©** **I²C** cable (connector on both ends)