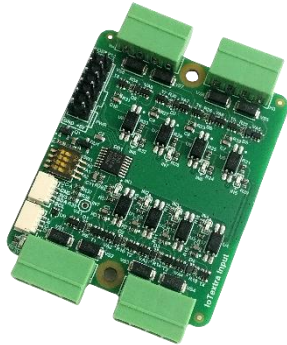# IoTextra Input

Digital Input Module

The **IoTextra Input** Module (version 3.02) is an 8-channel digital input module with individual channel isolation.

The maximum digital input voltage is 36 VDC.

All channels have individual galvanic isolation with a dielectric strength of 3750 V_{RMS}.

The module provides an indication of the digital input channel status with an LED indicator.

There are two modes for using the **IoTextra Input** module:

- _**GPIO Mode**_. In this mode, the input signal states are read using the **AP0-AP7** signals on the **HOST-P** connector.
- _**I²C Mode**_. In this mode, the input signal states are read via the **I²C** bus using the I/O expander installed on the module (**TCA9534** or a compatible one). Up to 16 modules can be connected to one **I²C** bus.

**Combined Use**: It is also possible to use the **AP0-AP7** signals for some channels via the **HOST-P** connector and for the rest via the I/O expander.

Main Applications of the module:

- Industrial Applications
- Field Devices
- Agriculture
- Smart Home
- Ventilation and Heating

- PLC
- Environmental Control
- Transportation
- Consumer Electronics and Devices
- Lighting
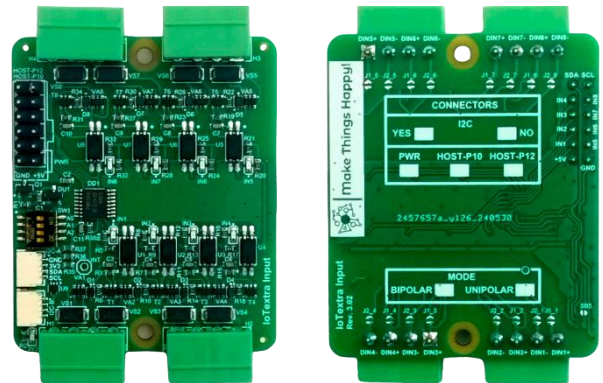
FEATURES:

- Compatibility with major known microcontrollers
- Module power supply is 5VDC, which feeds a 3V3 regulator for powering the logic section
- A 3V3V Indicator LED is also present
- Protection against reverse power supply polarity is included
- 8 independent, optically isolated digital input signals with TVS protection on inputs
- Insulation strength for input signals (opto-coupler characteristic) from the module's logic section is 3750Vrms
- Digital input voltage is up to 36VDC:
    - 0…2V – opto-coupler is off, output is a logic "1"
    - 4…36V – opto-coupler is on, output is a logic "0"
- The module features LED indicators for the status of digital input channels (the LED lights up when the opto-coupler output is a logic "0" signal)
- The status of input signals is read using **AP0-AP7** signals (**IN1-IN8**) via the **HOST-P** connector and/or over the **I²C** serial bus via an I/O expander

- The I/O expander used in the module is [TCA9534](#) or a compatible chip
- The expander's **I²C** address (**A2-A0**) is set using DIP microswitch:

TCA9534	0	1	0	0	A2	A1	A0	x
TCA9534A	0	1	1	1	A2	A1	A0	x

- Connection to the module via the **I²C** bus is done through [**Qwiic**©](#) connectors or through pins 11 (**SDA**) and 12 (**SCL**) of the **HOST-P12** connector
- Transient suppression and electrostatic discharge protection of signals on **Qwiic**© connectors is provided by a TVS diode assembly (ESD protection)
- Module size: 47x56 mm. The module has mounting holes that allow it to be installed on a base module or a Raspberry Pi

HOST-P CONNECTOR:

Depending on the version of the **IoTextra Input** module can have either a 12-pin (**HOST-P12**) or a 10-pin (**HOST-P10**) connector:

The pinouts for these connectors are shown in the image below:

The **HOST-P** connector is used differently depending on how the microcontroller interacts with the **IoTextra Input** module:

1) *Standalone Use:* In this mode, the input signal states are available through the **HOST-P10** (**HOST-P12**) connector or via the **I²C** bus using the I/O expander.

2) *Smart Use:* In this mode, an **IoTsmart** microcontroller module is vertically inserted into the **HOST-P12** connector. Reading the input signals' states and the 5V module power supply is done through the **HOST-P12** connector. Power is supplied from the **IoTsmart** module. Below is a photo of the **IoTextra Input** module with the **IoTsmart** module:
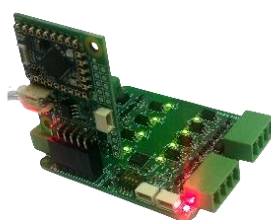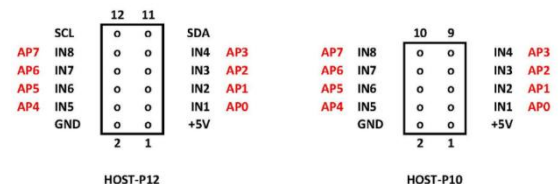

IoTextra Input with a vertically mounted **IoTsmart RP2350** module

IoTextra Input with a horizontally mounted **IoTsmart ESP32-S3** module

3) _**Mezzanine Use:**_ In this mode, the **IoTextra Input** module is installed in the base module and the input signals' states are available through the **HOST-P12** connector. Photo of the **IoTextra Input** module installed in **IoTbase** modules below.
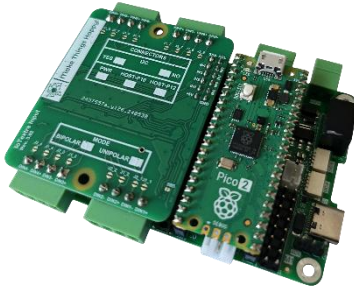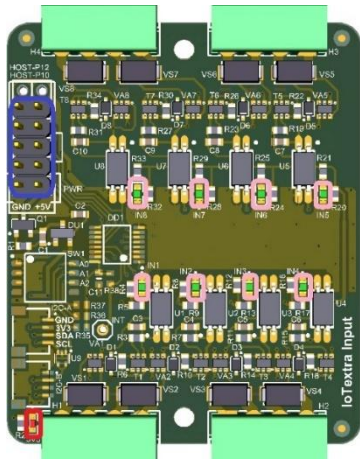

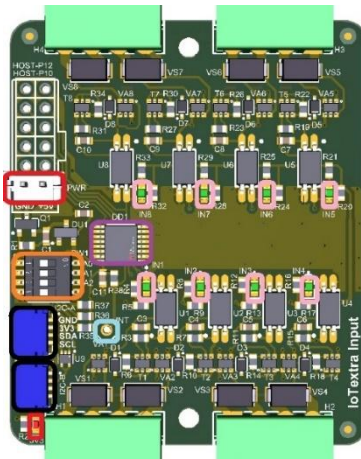
IoTbase PICO with the **IoTextra Input** module installed

IoTbase Nano with the **IoTextra Input** module installed
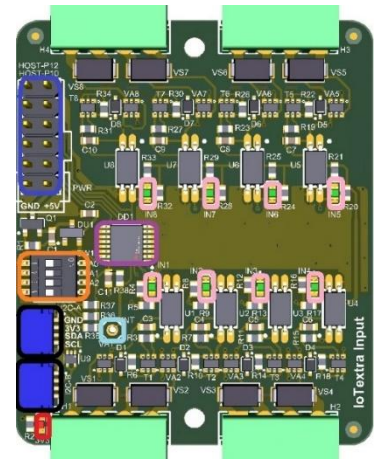
COMPONENT LAYOUT:

There are three versions of the **IoTextra Input** module, and accordingly, each with a different **top-side** component layout:

HOST-P10

PWR and Qwiic©

HOST-P12 and Qwiic©

It is possible to read digital input signals' status via the **HOST-P** connector (highlighted in blue).
The **Qwiic©** connectors are highlighted in black.
The I/O expander is highlighted in purple.
The DIP microswitch for setting the I/O expander's **I^{2}C** address is highlighted in orange. The purpose of the microswitches (for setting A0, A1, and A2) is written on the **top-side** of the module. The "ON" position of the microswitch corresponds to a "0" value in the respective address bit (A0, A1, and A2) for the I/O expander. The "OFF" position corresponds to a "1" value.
It's possible to get an interrupt signal from the I/O expander (the corresponding hole is highlighted in light blue).
The digital signal status indicators are also on the **top-side** and are highlighted in pink.
If the module does not have a **HOST-P** connector, the 5VDC power for the module is supplied via the **PWR** connector. There is a 3V3 power indicator. The **PWR** connector and power indicator are highlighted in red in the **top-side** image.

JUMPERS:

The image below shows the component and marking layout on the **bottom-side** of the **IoTextra Input** module:
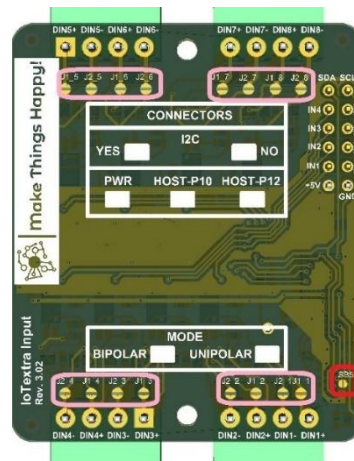
The **bottom-side** of the **IoTextra Input** module has *jumpers for setting unipolar mode*. Setting these jumpers allows the use of unipolar signals, their absence means that the module can input bipolar signals. By default, the jumpers are not installed. For each input channel, there are two jumpers – **J1_i** and **J2_i**, where **i** is the digital input channel. In the image of the **bottom-side** of the module, these jumpers are highlighted in pink. The **bottom-side** of the **IoTextra Input** module has a *jumper that allows powering devices connected through the Qwiic© connector*. It is highlighted in red. By default, the jumper is absent.

CONFIGURATION TABLES:

The **bottom-side** of the module contains information about the digital signal input mode (bipolar or unipolar).

It also provides information on whether the following connectors are present:

- **Qwiic©** connectors for **I²C**
- **PWR** power connector
- **HOST-P10** or **HOST-P12** connector for reading the status of digital input signals
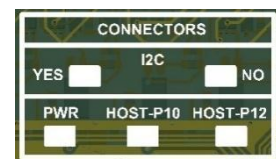
EXTERNAL SIGNALS CONNECTION:

Removable 3.5mm pitch terminal blocks are recommended for connecting external input signals to the **H1-H4** connectors on the module. The pin layout is marked on the **bottom-side** of the module.

Caution! When using **unipolar** mode, it's important to observe polarity when connecting external input signals.

ACCESSORIES:

The following accessories may be required for using the module:

- A set of four removable terminal blocks with a 3.5mm pitch for terminal blocks **H1-H4**
- A set of two standoffs and four screws for mounting the module into the **IoTbase** series base module.
- Cable for the **HOST-P10** connector
- Cable for the **Qwiic©** connector
- Cable for the **PWR** connector