MAKE THINGS HAPPY !

IoTextra SSR Small

Solid State Relay Module

IoTextra SSR Small Module (version 3.02) has eight Solid State Relays (SSR).

Contact form: **SPST-NO (1 Form A)**. Low on-resistance (from 0.05Ω to 30Ω depending on the installed SSR type). Current If = 5mA, voltage Vf up to 1.5V.

All channels have individual galvanic isolation with a dielectric strength 5000Vrms.

The module provides an indication of the relays' state.

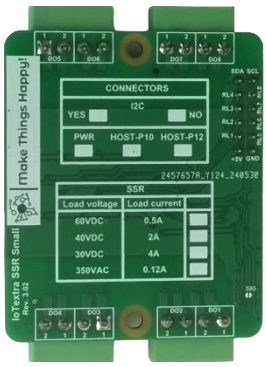
The maximum switching voltage and current depend on the SSR model and are listed in the table below:

Load voltage, V	Load current, A	On-resistance, Ω
60	0,5	2.5
40	2	0.1
30	4	0.05
350	0,12	30

There are two modes for using the **IoTextra SSR Small** module:

- ***GPIO Mode***. In this mode, the SSR state is controlled using the **AP0-AP7** signals in the **HOST-P** connector.
- ***I²C Mode***. In this mode, the SSR state is controlled 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 through the **HOST-P** connector and for the rest via the I/O expander.



Main Applications of the **IoTextra SSR Small** module:

- Industrial applications
- Consumer electronics and devices
- Data acquisition systems (DAS) and PLC
- Heating, Ventilation, & Air Conditioning (HVAC)
- Lighting systems
- Equipment control
- Smart Home
- DC motor control
- Power On / Off switches

FEATURES:

- Compatibility with major known microcontrollers
- Module power supply is 5VDC, which feeds a 3V3 regulator for powering the logic section
- 3V3 Indicator LED
- Protection against reverse power supply polarity
- 8 independent solid state relays, type **SPST-NO (1 Form A)**

- The maximum switching voltage and current depend on the SSR model and are listed in the table below:

Load voltage, V	Load current, A	On-resistance, Ω
60	0,5	2.5
40	2	0.1
30	4	0.05
350	0,12	30

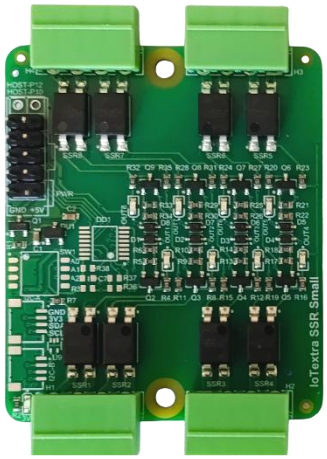
- Current If=5mA
- Voltage Vf up to 1,5V
- The dielectric strength of the insulation is 5000Vrms
- When working with the module, logical “1” (2.5-5V) is the SSR off, logical “0” (0-1.1V) is the SSR on
- Module features LED indicators for the SSR channel status: the LED lights up when the SSR is on
- The SSR is controlled using **AP0-AP7** signals (**RL1-RL8**) 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 a **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

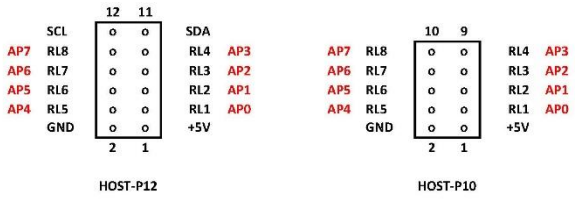
- Connection to the module via the **I²C** bus is done through **Qwiic©** connectors or through pins 11 (**SDA**) and 12 (**SCL**) of the **HOST-P12** connector
- Transient suppression and electrostatic discharge protection (ESD protection) of signals on Qwiic connectors is done using a TVS diode assembly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

HOST-P CONNECTOR:

Depending on the version of the **IoTextra SSR Small** module can have either a 12-pin (**HOST-P12**) or a 10-pin (**HOST-P10**) **HOST-P** connector.



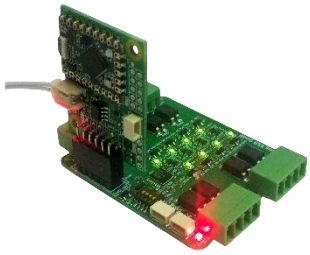
The pinouts for these connectors are shown in the image below.



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

1) ***Standalone Use:*** In this mode, the SSR control 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 inserted into the **HOST-P12** connector. SSR control 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 SSR Small** module with the **IoTsmart** module:



IoTextra SSR Small with a vertically mounted **IoTsmart RP2350** module

IoTextra SSR Small with a vertically mounted **IoTsmart ESP32-S3** module

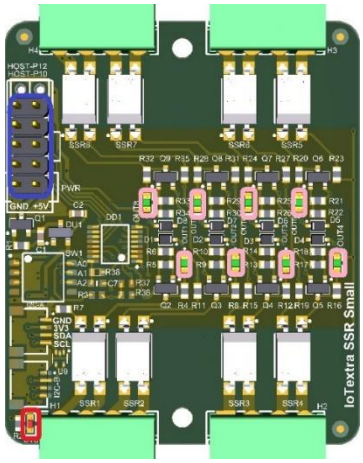
3) ***Mezzanine Use:*** In this mode, the **IoTextra SSR Small** module is installed in the base module and the SSR control and the 5V module power supply are done through the **HOST-P12** connector. Photo of the **IoTextra SSR Small** module installed in **IoTbase** modules below.

IoTbase PICO with the **IoTextra SSR Small** module installed

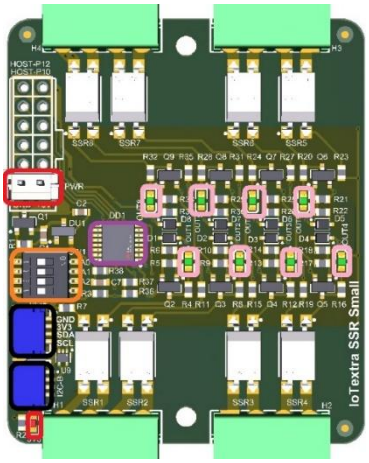
IoTbase Nano with the **IoTextra SSR Small** module installed

COMPONENT LAYOUT:

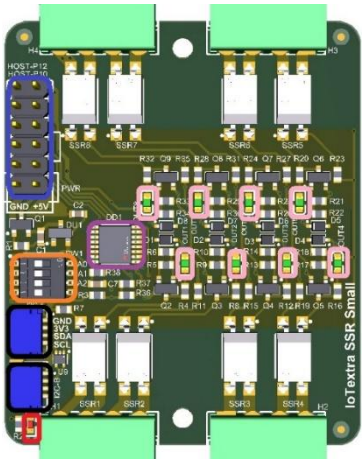
There are three versions of the **IoTextra SSR Small** module, and accordingly, each with a different **top-side** component layout:



HOST-P10



PWR and Qwiic©



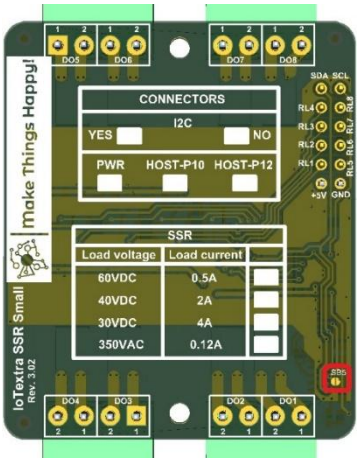
HOST-P12 and Qwiic©

It is possible to control SSR state through 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 **I²C** address is highlighted in orange. 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.
The SSR 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 SSR Small** module:

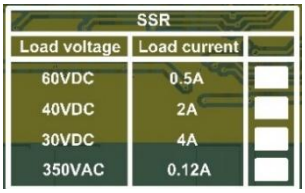


The **bottom-side** of the **IoTextra SSR Small** module has a ***jumper that allows powering devices connected through the Qwiic© connector***. It is highlighted in red. By default, the jumper is absent.

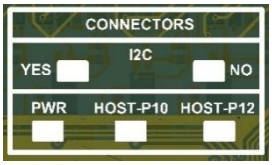
CONFIGURATION TABLES:

The **bottom-side** of the module provides information about the SSR types used:

Load voltage, V	Load current, A	On-resistance, Ω
60	0,5	2.5
40	2	0.1
30	4	0.05
350	0,12	30



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



- **Qwiic©** connectors for **I²C**
- **PWR** power connector
- **HOST-P10** or **HOST-P12** connector for relays control

EXTERNAL SIGNALS CONNECTION:

To connect the load to the SSR, the **H1 – H4** connectors are used. Removable terminal blocks with a 3.5mm pitch are recommended for these connectors. The pin layout is marked on the module's **bottom-side**.

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