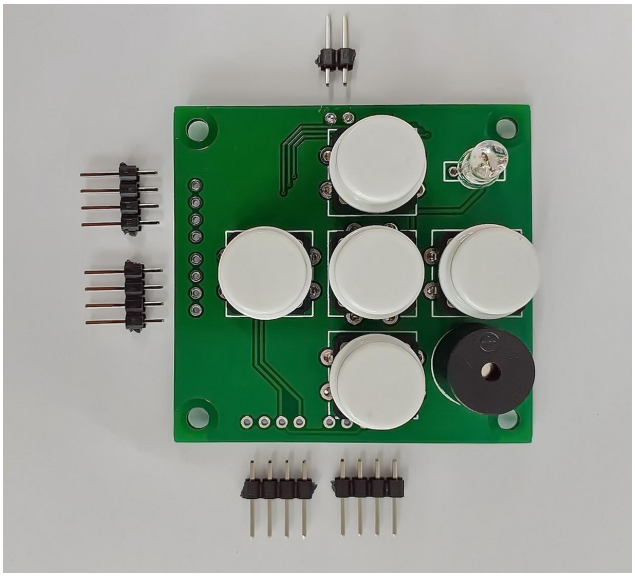
I2CUI4_V1 - User Interface I2C module with 5-keys, RGB-LED and buzzer



Functionality

The module connects to the main controller via a 4-wire I2C bus interface and provides the following functions:

- Data entry with a five-button keyboard (left, right, down, up, OK);
- Data output to RGB LED;
- Output of sound sequences to the active indicator of the buzzer type;
- I2C bus input and output through ports. Input for connection to MCU and output - for connection of any external devices that support the I2C specification.

Thanks to the use of the I2C bus and the MCP23017 port expander, GPIO savings of the main controller and the ability to input and output information in a user-friendly way are achieved. The rest of 7 GPIOs are connected to separate pin connectors for additional I / O signals connection according to the user's design.

Int A & Int B output signals are available - can be used for interrupt processing when the state of the module inputs changes.

Description

I2CUI4_V1 module - user interface module for on premise IoT device management.

Compatible with ARDUINO, ESP12.OLED_V1 controllers, NodeMCU board (based on ESP8266-12), modules on the ESP8266EX, ESP32 chip or others, which are powered by a voltage in the range from 1.8 to 5.5 V.

Application

I2CUI4_V1 will be convenient to use as a control panel and status display in user devices:

- electronic clocks,
- radiation level dosimeters,
- smart outlets,
- thermostats,
- multimedia and audio devices,
- weather stations and others.

Compatibility

Compatible with controllers and platforms:

- ARDUINO,
- ESP12.OLED_V1,
- NodeMCU board (based on ESP8266-12),
- modules on the ESP8266EX chip,
- ESP32,
- or others powered by 1.8 - 5.5 V;
- integration into Home Assistant (with ESP Home plugin), Blynk, OpenHab, Node-RED is possible.

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Minor and major versions of the module

Unlike the minor version I2CUI3_V1, the I2CUI4_V1 user interface module uses a widely supported 16-bit MCP23017 port expander. This makes it possible to use this module in IoT devices for easy integration in Home Assistant, Arduino and many others.

Chips of user interface modules:

- I2CUI3_V1 - 8-bit, I2C, PCA9538, 2^3 GPIOs;
- I2CUI4_V1 - 16-bit, I2C, MCP23017, 2^4 GPIOs.

The major version of I2CUI4_V1 has the following features:

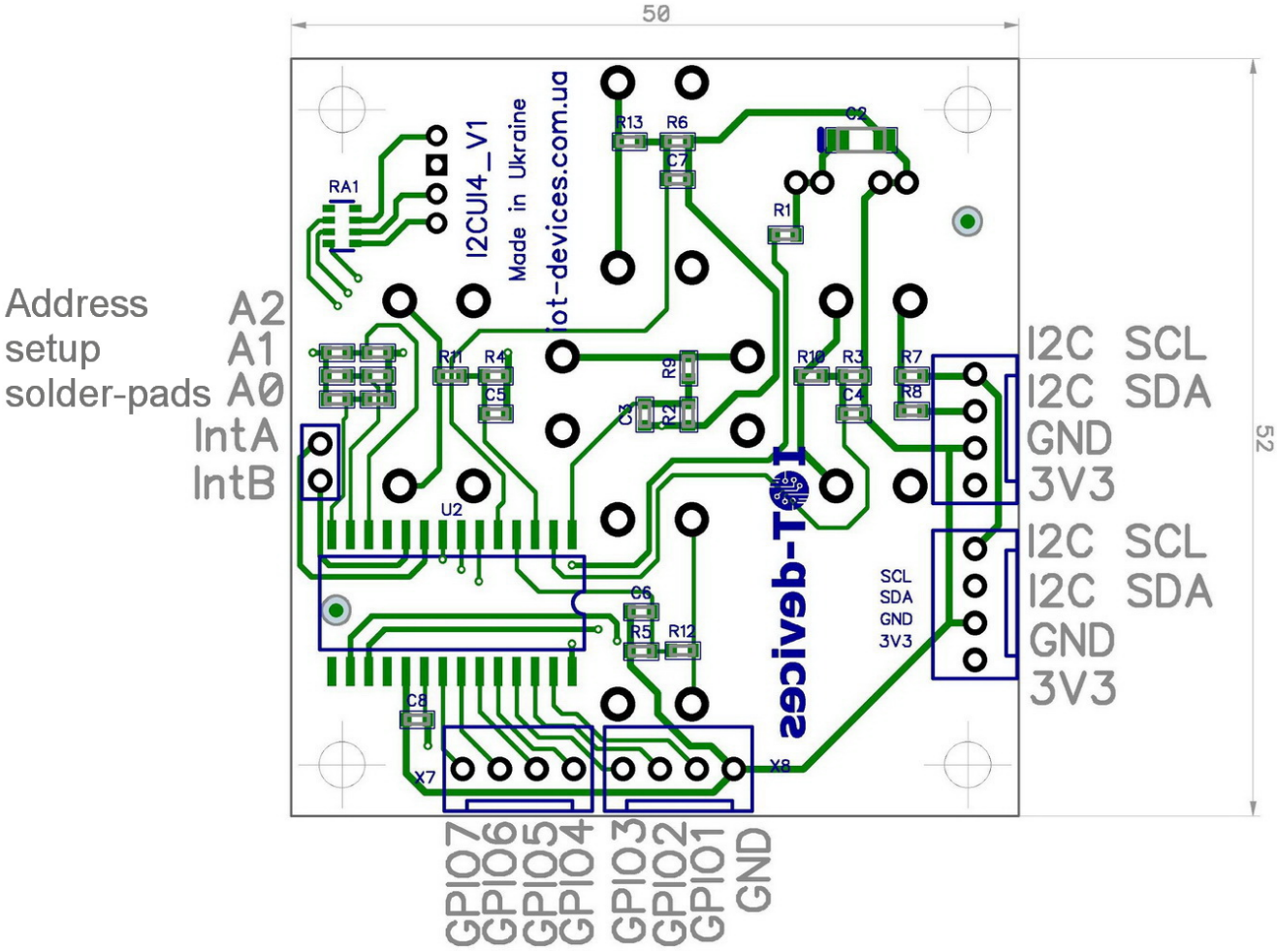
- single digital interface - 2 x I2C (input / output) ports;
- 5 “joystick” buttons; sound indicator; RGB LED indicator;
- selection of one of 8 module addresses on the I2C bus via solred-pads;
- 7 free GPIOs are connected to separate pin connectors.

Driver-level support

Support for the MCP23017 chip at the driver level is stated in particular by the following platforms:

Platform	**API or Documentation Link**
NodeMCU / Lua	https://nodemcu.readthedocs.io/en/latest/lua-modules/mcp23017/
OpenHab	https://www.openhab.org/addons/bindings/mcp23017/
Home Assistant	https://www.home-assistant.io/integrations/mcp23017/
ESP Home	https://esphome.io/components/mcp230xx.html
Arduino	https://www.arduino.cc/reference/en/libraries/mcp23017/
Blynk	https://community.blynk.cc/t/using-the-mcp23017-io-expansion-board/44525/3
Node-RED	https://flows.nodered.org/node/node-red-contrib-mcp23017

Assignment of module ports



The following ports are provided on the I2CUI4_V1 module board:

Port Name	Assignment	Logic
GPIO 0 (GPB0)	Buzzer on board	3V3 or 5V active high
GPIO 1 (GPB1)	Free, for user extensions	3V3 or 5V active low
GPIO 2 (GPB2)	Free, for user extensions	3V3 or 5V active low
GPIO 3 (GPB3)	Free, for user extensions	3V3 or 5V active low
GPIO 4 (GPB4)	Free, for user extensions	3V3 or 5V active low
GPIO 5 (GPB5)	Free, for user extensions	3V3 or 5V active low
GPIO 6 (GPB6)	Free, for user extensions	3V3 or 5V active low
GPIO 7 (GPB7)	Free, for user extensions	3V3 or 5V active low
GPIO 8 (GPA0)	LED - Blue on board	3V3 or 5V active high

GPIO 9 (GPA1)	LED - Green on board	3V3 or 5V active high
GPIO 10 (GPA2)	LED - Red on board	3V3 or 5V active high
GPIO 11 (GPA3)	Key Up on board	3V3 or 5V active high
GPIO 12 (GPA4)	Key Down on board	3V3 or 5V active high
GPIO 13 (GPA5)	Key Left on board	3V3 or 5V active high
GPIO 14 (GPA6)	Key Right on board	3V3 or 5V active high
GPIO 15 (GPA7)	Key OK on board	3V3 or 5V active high
A0	I2C address bit 0	GND=0; VDD=1, by default 0
A1	I2C address bit 1	GND=0; VDD=1, by default 0
A2	I2C address bit 2	GND=0; VDD=1, by default 0
IntA	Interrupt for GPIO group A	3V3 or 5V active low
IntB	Interrupt for GPIO group B	3V3 or 5V active low
I2C SDA	I2C I/O	3V3 or 5V active low
I2C SCL	I2C I/O	3V3 or 5V active low
3V3	Power	1.8-5.5 V
GND	Common ground	

Power supply and consumption

Power supply of the module is possible in the range of voltages of 1.8 - 5,5 volts. The current consumption of the I2CUI4 module at rest is about 1 microampere. In the case of simultaneous data output to R + G + B + buzzer, the maximum current consumption can reach 20 milliamperes.

Addressing on the I2C bus

The address of the module has a fixed and variable part:

Fixed address part				Variable (selectable) address part		
0	1	0	0	A2	A1	A0

The address of the module I2CUI4_V1 is selected in accordance with the documentation on the chip MCP23017, because it is this chip of the module that interacts with the main controller via the I2C bus.

Interrupt handling

The module has two interrupt channels: Int A and Int B. All processing and logic (active-low) corresponds to the documentation for the MCP23017 chip. Interrupt processing is provided for the master controller to monitor changes in GPIO states set to input mode.

Note: When you want to process interrupts from one combined INT and not from each separately INTA and INTB, the client must solder to connect the INTA and INTB pads.

According to the design of the interface module I2CUI4_V1, input mode:

- must be set for:
  - GPIO 11 (GPA3) - Key Up on board
  - GPIO 12 (GPA4) - Key Down on board
  - GPIO 13 (GPA5) - Key Left on board
  - GPIO 14 (GPA6) - Key Right on board
  - GPIO 15 (GPA7) - Key OK on board
- can be set for spare GPIO ports if used by the user as inputs: GPIO 1 (GPB1), GPIO 2 (GPB2), GPIO 3 (GPB3), GPIO 4 (GPB4), GPIO 5 (GPB5), GPIO 6 (GPB6)), GPIO 7 (GPB7).

Ports GPIO 0 (GPB0) Buzzer on board, GPIO 8 (GPA0) LED - Blue on board, GPIO 9 (GPA1) LED - Green on board, GPIO 10 (GPA2) LED - Red on board - work on the module as outputs.

Module dimensions

- The dimensions of the module board are 50 x 52 mm.
- Module height (Z): 15 mm.

Product kit sets

The module is delivered in the following sets:

- **Basic set**
  - 1 pc - I2CUI4_V1 user interface module.

- **Basic + Connectors and Cables set** (**Note**: The user receives a module with installed connectors and selected cables when ordering.)
  - 1 pc - I2CUI4_V1 user interface module;
  - Cable 4-pin JST - JST to choose from:
    - 0 - 4 pcs - JST XH 2.54 4P female - JST XH 2.54 4P female, 20 cm;
  - Cable 4-pin JST - Dupon to choose from:
    - 0 - 4 pcs - JST XH 2.54 4P female - Dupont 4x1P female, 20 cm;
  - 1 pc - Cable 2-pin to choose from:
    - Cable JST XH 2.54 2P female - JST XH 2.54 2P female, 20 cm;
    - Cable JST XH 2.54 2P female - Dupont 2x1P female, 20 cm.

References

Manufacturer site	https://iot-devices.com.ua
Shop on Tindie for international orders	https://www.tindie.com/stores/iotdev/
Shop for local orders within Ukraine	https://iot-devices.com.ua/shop/
Facebook	https://www.facebook.com/IoT-devices-114746816966582
Twitter	https://twitter.com/iotdevicescomua
YouTube	https://www.youtube.com/channel/UCHpPOVVlbbdtYtvLUDt1NZw
Email	info@iot-devices.com.ua

The port expander chip used in the module:

Microchip MCP23017 16-Bit I2C I/O Expander with Serial Interface	https://www.microchip.com/wwwproducts/en/mcp23017

Manufacturer message

Dear Reader! Thank you for your interest in our products. We hope that you enjoy this device.
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