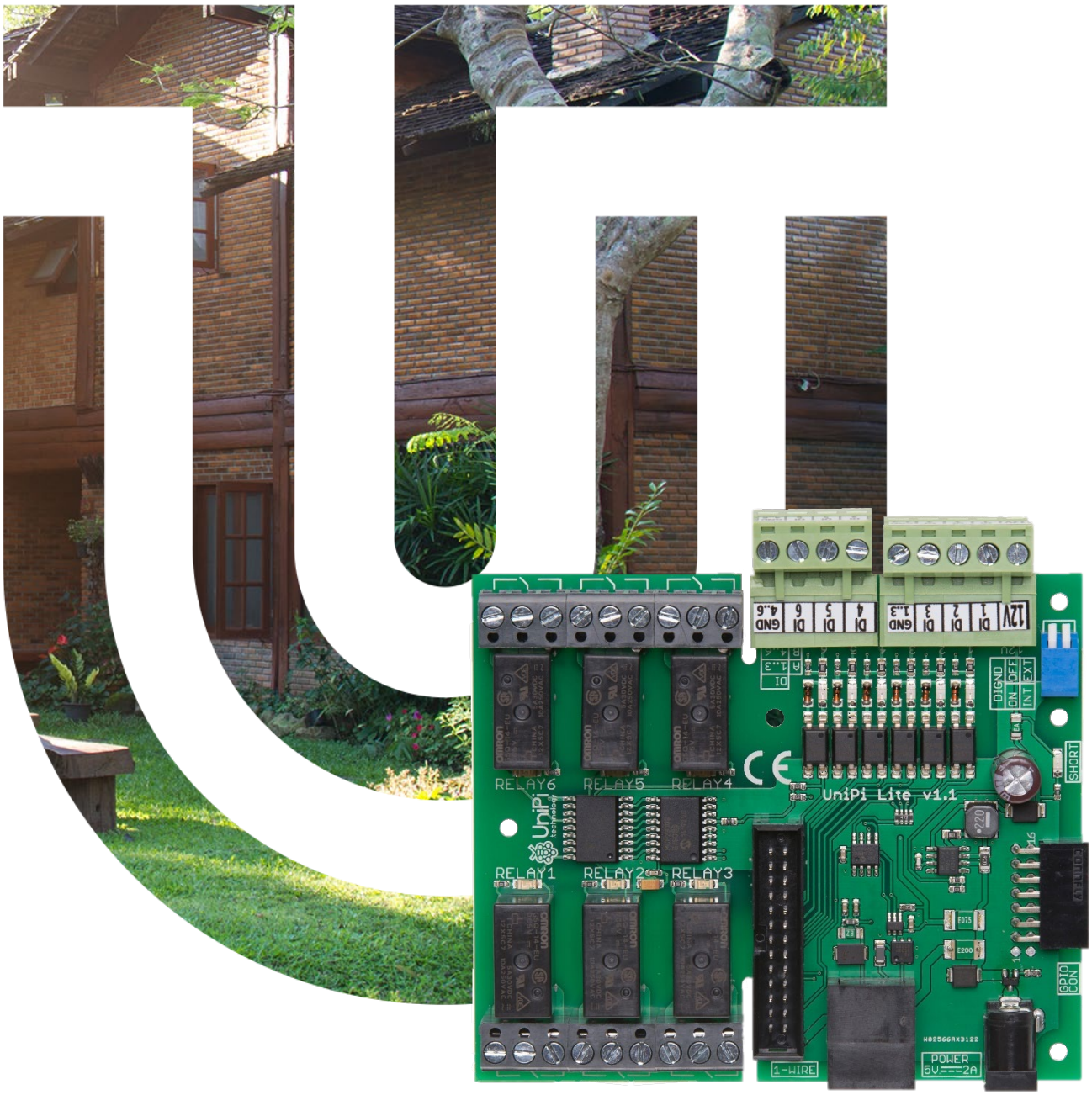
Automation Monitoring and control Remote access and management HVAC



Unipi 1.1 Lite

Extension board for Raspberry Pi computer

unipi technology

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1 Introduction

Unipi 1.1 Lite is an add-on board for Raspberry Pi, with which it forms a simple programmable control unit, which can be used for simple projects like smart home management, measuring and regulation and develop innovations in IoT world. The device is equipped with 6 digital inputs, 6 changeover relays and integrated 1-Wire channel.

Digital inputs and relay outputs are equipped with signal LEDs. Power for digital inputs is supplied by 12V DC internal power supply limited to 100mA and featuring a short-circuit protection. It is also possible to use digital inputs with an external power supply (see below).

The device also provides easy access to the GPIO, I^2C, UART, 5V, 3V3 GND pins via onboard side connector labelled `GPIO CON`.

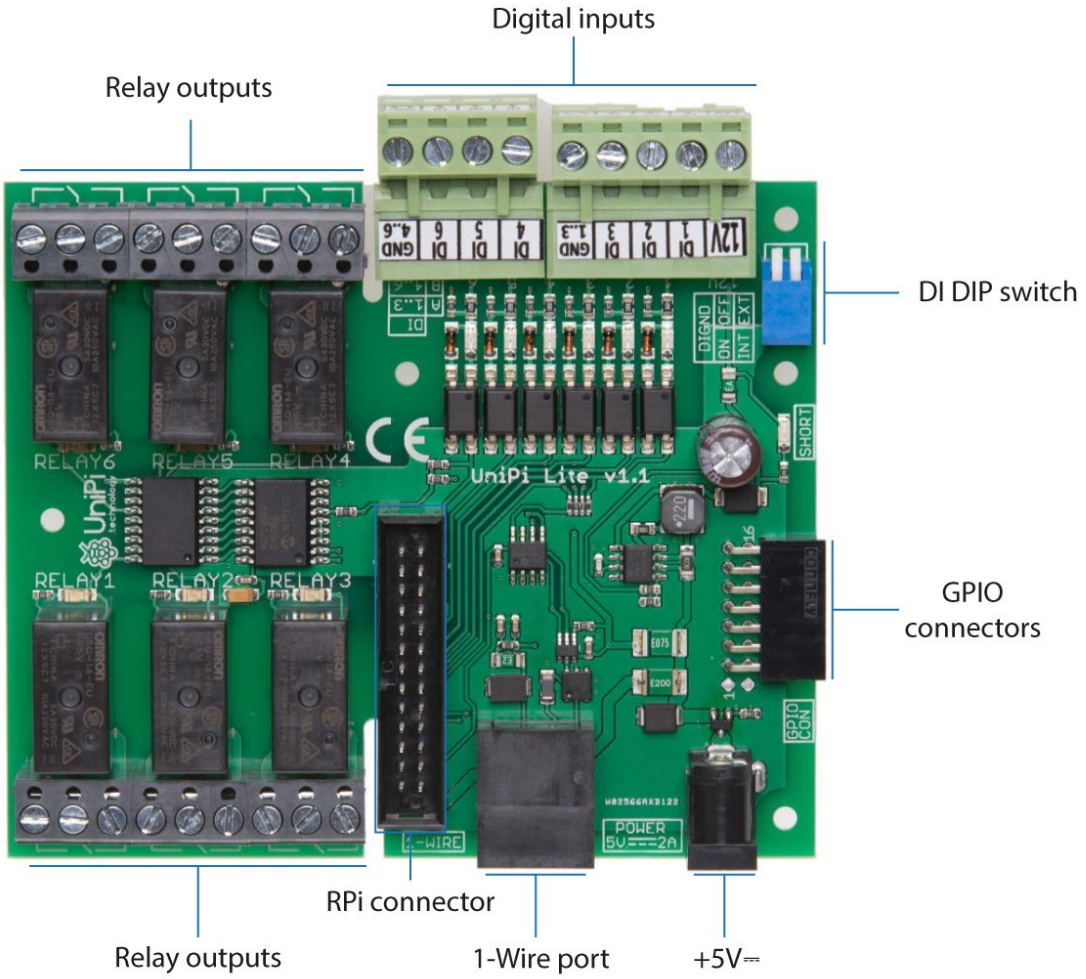
Unipi 1.1 Lite is compatible with many software products. It is recommended to use one of our supported platforms like EVOK opensource API or automation platform Mervis. Visit our Knowledge Base for more information.

Unipi 1.1 Lite is compatible with the following Raspberry Pi models:

- **Raspberry Pi model B+**
- **Raspberry Pi 2 Model B**
- **Raspberry Pi 3 Model B**
- **Raspberry Pi 3 Model B+**
- *** Raspberry Pi 4 Model B**

*** Note**: Raspberry Pi 4, unlike previous versions, requires a 5 V / 3 A power supply. Unipi Lite is primarily designed for Raspberry Pi 2 and 3, which have lower power consumption. The Raspberry Pi 4 can still be operated with the board, but the USB output is limited to 400 mA total and the instructions in chapter 2.3 must be followed.

2 Product description



- **Relay outputs**: 6 × changeover relay – for use with controlled devices (e.g., door locks, lights)
- **Digital inputs**: 6 × galvanically isolated (2 × 3) digital input for reading signals from external devices (e.g., magnetic contacts, motion sensors)
- **1-Wire channel**: Integrated channel for 1-Wire bus available via RJ45 port for connecting 1-Wire devices (e.g., digital thermometers)
- **Power supply 5 V DC**: 2.1 mm for power supply connection
- **RPi connector**: 26-pin connector for Raspberry Pi connection
- **+12V**: Integrated power supply 12 V DC / 100 mA – for use with digital inputs only
- **DIP switch**: For selection between an internal or external power supply for digital inputs

2.1 GPIO pins use

2.1.1 Unipi Lite P1 header map

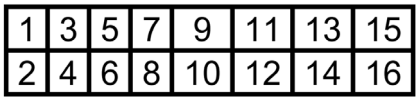
Unipi	RPi BCM	Function
DI01	GPIO04	Digital input
DI02	GPIO17	Digital input
DI03	GPIO27	Digital input
DI04	GPIO23	Digital input
DI05	GPIO22	Digital input
DI06	GPIO24	Digital input

2.1.2 MCP23008 pin map

Relay	MCP23008
6	GP2
5	GP3
4	GP4
3	GP5
2	GP6
1	GP7

2.2 GPIO connector

The unused GIPOs or RPi are wired out via the side connector labelled `GPIO CON`. You can see pins description on next picture and table.



2.2.1 GPIO CON pin map

GPIO	Description
1	GND
2	GND
3	GND
4	GND
5	+5V
6	+3V3
7	TX
8	RX
9	SCL
10	SDA
11	GPIO10
12	GPIO18
13	GPIO11
14	GPIO09
15	GPIO07
16	GPI08

2.3 Power requirements

Unipi 1.1 Lite power supply connector is standard with 2.1 inner and 5.5 mm outer diameter with +5V connected on the centre.

5 V DC / 2.4 A power supply is recommended. Unipi 1.1 Lite can supply power for Raspberry Pi up to 1.5 A, the power supply is realized by flat connecting cable and not use USB power connector on RPi.

In combination with **Raspberry Pi 4** it is advisable to increase the (no-load) voltage of the power supply to 5.3 – 5.4 V DC.

Caution:
Supplying power for Unipi 1.1 Lite from Raspberry Pi is not recommended, as it could cause damage to Raspberry Pi or Unipi 1.1 Lite.

2.4 Mount Raspberry Pi to Unipi 1.1 Lite

To mount Raspberry Pi to Unipi 1.1 Lite do the following:

1. Screw the spacers to the holes in the circuit board, dedicated for Raspberry Pi
2. Use the attached flat cable to interconnect RPi and Unipi 1.1 Lite
3. Screw the Raspberry Pi to the spacers
4. Connect the power supply to the Unipi 1.1 Lite device

3 Connecting and installation

3.1 Relay outputs

The relay outputs are located on the terminals marked with the schematic mark of the switch, they are used to switch two-state devices and can switch AC or DC voltage. The COM terminal is typically common, the voltage is then at the NO or NC terminal, depending on the relay state.

- NO - in the default state (no voltage), contacts are open
- NC - in the default state (no voltage), contacts are closed

The state (On/Off) of each relay is indicated by a LED with a corresponding label. Overload and overvoltage protection should be provided externally by a circuit breaker (ideally one for each output). Nominal current and circuit breaker type should be selected according to the load and its characteristics concerning the maximum current on the output.

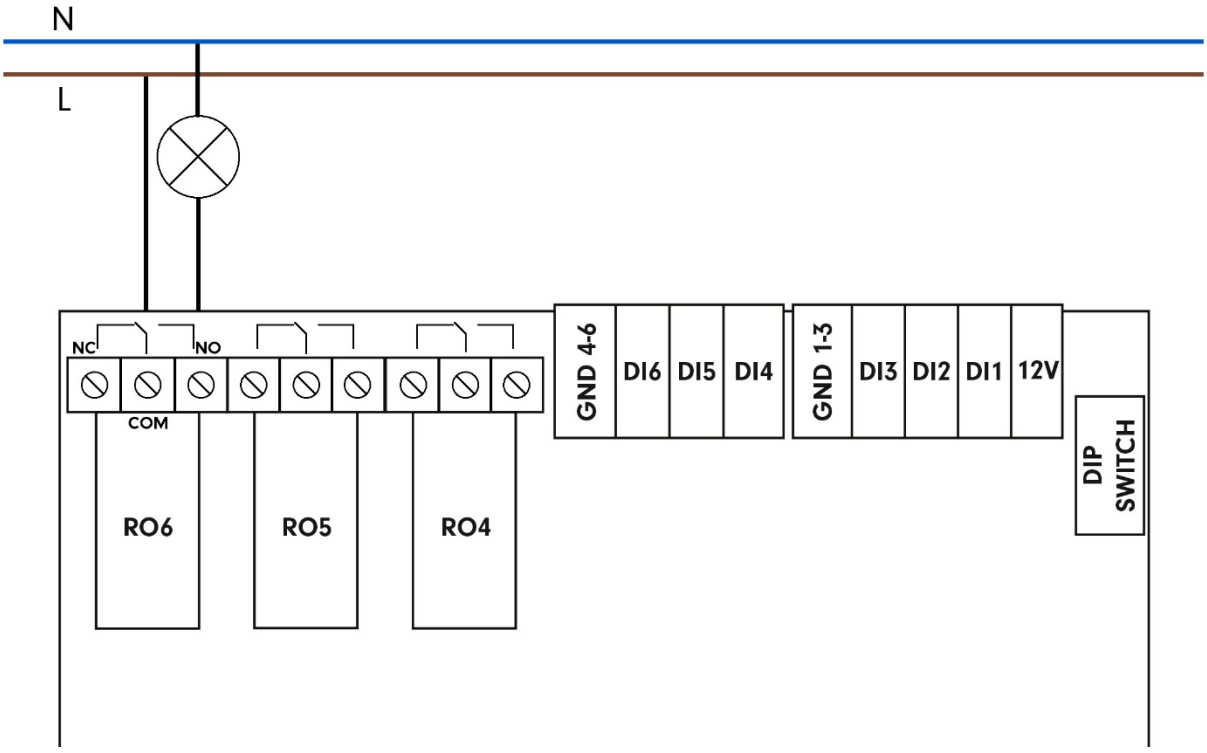
Caution:
If an inductive load is connected (e.g., electric motors, relay coils, contactors, or even the cables in extensive electric installations), it is necessary to protect the relay outputs with a corresponding external element (e.g., varistor, RC circuit, or a suitable diode).

If a capacitive load is connected (e.g., power sources of LED lights), it is necessary to protect the relay contacts against inrush current by connecting a corresponding thermistor to the relay's output.

Relays are controlled by MCP23008 (I2C 0x20 address), more information about connection relays with MCP chip GPIO is in chapter 2.1.2. Each relay has an indicator LED.

3.1.1 Connection

This illustration depicts connection of ohmic (resistance) load with alternating voltage to Unipi 1.1 Lite relay output:

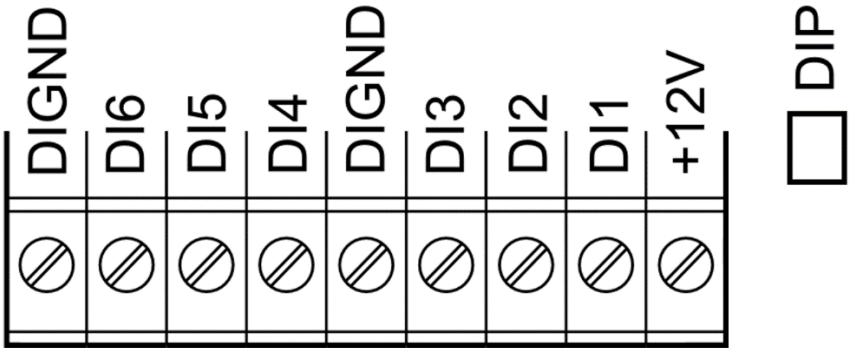


3.2 Digital inputs

Signal for digital inputs must be in the range of 7 to 24 V DC. Each input provides an LED indicating the state of the input. The device is equipped 6 digital inputs which are divided into two galvanically isolated groups: A and B. Group A contains inputs 1-3, group B contains inputs 4-6.

Note:
The Unipi 1.1 Lite board is equipped with hardware pull-up resistors, and it is therefore not necessary to set software pull-up resistors on the Raspberry Pi as on the Unipi 1.1.

3.2.1 Digital inputs description



3.2.2 Selecting power supply of digital inputs

Signal to digital inputs can be supplied using an internal 12 V power supply or using external 7–24 V DC power supply. The onboard DIP switch is used to select between these two supplies.be done by internal power supply +12 V or external power supply. Each group has one connector for connecting the negative pole of the external power supply (Is not used when using the internal 12).

DIGND	
ON	OFF
INT	EXT

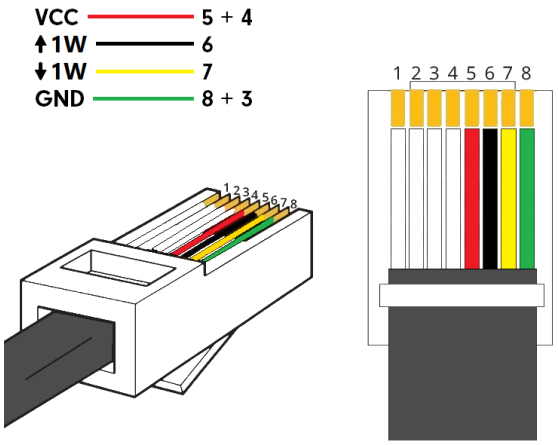
The dip switch has two positions – each position allows selecting power supply mode for one of the DI groups and is marked by the corresponding label. By default, both positions are set to **OFF** state. By switching it to **ON** state internal power supply is selected.

3.3 1-Wire channel

The device has one integrated channel for the 1-Wire bus (DS2482-100, address: 0x18). The bus is wired out via RJ45 connector. The description of pins is described in the following table. The data line has overvoltage protection and the power of the line is protected with TVS protection and current is limited to 50 mA.

3.3.1 RJ45 pins function

RJ45 pin	Function
1	-
2	-
3	GND
4	$5V_{cc}$
5	$5V_{cc}$
6	-
7	DATA
8	GND



4 Technical specification

4.1 Connected I²C integrated circuits

All of the connected I²C chips are connected to the main bus.

Chip type	Address	Use
MCP23008	0x20	Relay outputs
DS2482-100	0x18	1-Wire master
24C02ASN	0x50-0x57	EEPROM

4.2 EEPROM

Unipi 1.1 Lite device has integrated EEPROM memory (24C02) for storage important information of size 2 kb organized to one block 256*8-bit.

Address space 0xe0 – 0xff is reserved. Other address space is left for user use.

4.2.1 Memory organization

Starting address	Number of bytes	Example	Definition
0xe0	2	fa-55	Unipi identification
0xe2	2	1.1	Unipi version

4.3 Relay outputs

Output type	Electromechanic non-shielded relay
Designation on the board	RELAYx (where **x** represents the relay number
Number of terminals per relay	3
Terminal designation	Schematic (on the board)
Common terminal (COM)	Middle terminal
Closed without voltage (NC)	Terminal engaged according to scheme
Open without voltage (NO)	Terminal disengaged according to scheme
Contact/Output type	Switchable NO/NC (SPDT)
Number and type of relays	6 × Omron G5Q-14-EU
Switching voltage	250 V AC 24 V DC
Max. switching current for V∿	10 A (NO) 3 A (NC)
Max. switching current for V⎓	5 A (NO) 3 A (NC)
Mechanical life (cycles)	10 000 000
Electrical life (cycles)	Up to 100 000 (according to the connected load)
Switching time	10 ms / 5 ms
Designed for load character	Resistive
Load handling	External (RC, varistor, diode, thermistor)
Short circuit protection	No
Overvoltage protection	No
Galvanic isolation	Yes
Insulation voltage	4 000 V

4.4 Digital inputs

Input type	SINK
Input terminal	DIx (when **x** represents the terminal's number)
One common ground for DI1-3, second common ground for DI4-6	DIGND (serves as a negative pole for external power supply)
Number of inputs	6
Maximum voltage for log. 0	3 V DC
Minimum voltage for log. 1	7 V DC
Maximum voltage	24 V DC
Power supply switches for DI	A, B
Internal 12 V⎓ power supply positive pole	12 V
Galvanic isolation	Yes (if external power supply is used)

4.5 Power supply

Main power connector	Standard 2.1 mm inner diameter, 5.5 mm outer diameter
Nominal supply voltage & current	5 V DC / 2.4 A
Power cord requirements	Minimum 18. AWG (0.75 mm2 cross section)

Note
Currently, Unipi 1.1 Lite can supply Raspberry Pi with a current of max. 1.5 A. In combination with Raspberry Pi 4, see chapter 1.

4.6 Dimensions

Width	105 mm
Height	88 mm
Depth	20 mm (40 mm with mounted RPi, cable, and spacers)
Weight	0.21 kg

5 Conclusion

More information at Unipi technology and Knowledge base.

Compliance information
Unipi 1.1 Lite complies with the requirements of EMC, LVD, and RoHS regulations relevant for European Union states.

WEEE Directive Statement for the European Union
Unipi 1.1 Lite cannot be disposed of as household waste. Different rules for handling electric waste may apply in other jurisdictions.

Revision

Date	Version
2/2021	V 1.0
8/2024	V 1.1