KAmodRPi UART RS485 ISO

Spis treści

Description

[KAmodRPi UART RS485 ISO](#) is an RS485 bus transceiver controlled from the UART interface, compatible with the Raspberry Pi SBC family. On the RS485 bus side, the MAX13487 system is used, which has an automatic transmission direction control function. This solution requires only 2 signals - RXD and TXD for correct, bidirectional communication using the standard UART interface. The control signals are connected via circuits providing galvanic separation. Additionally, the module is equipped with overvoltage protection on the RS485 bus lines and allows the connection of a 120 Ω resistance acting as an RS485 bus terminator.
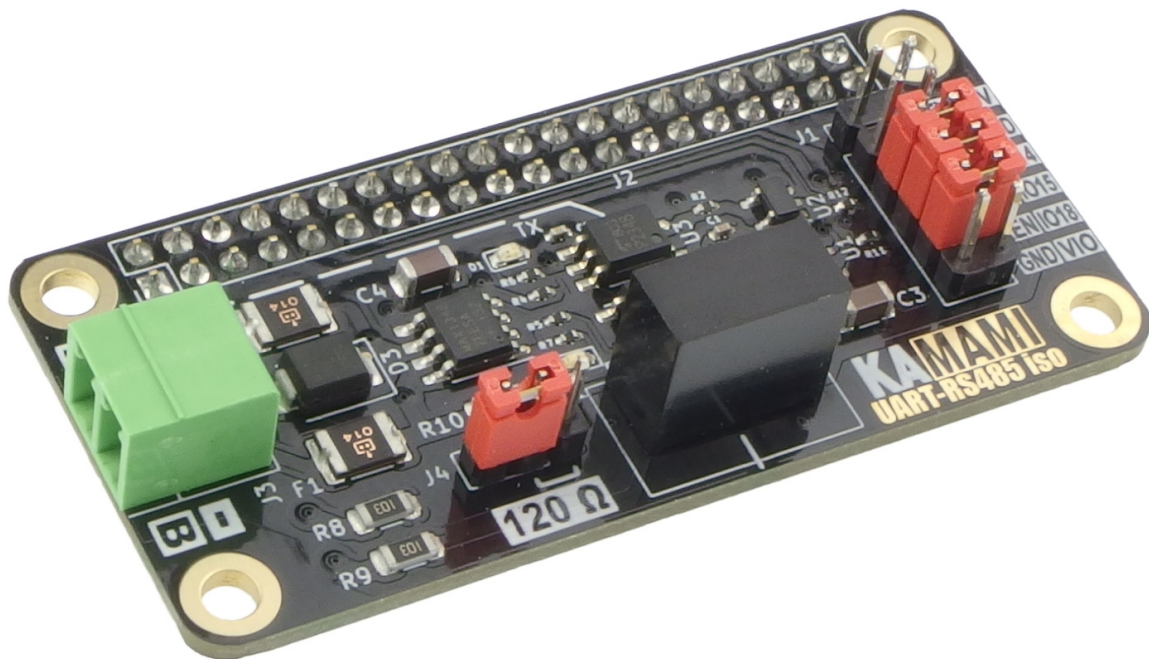
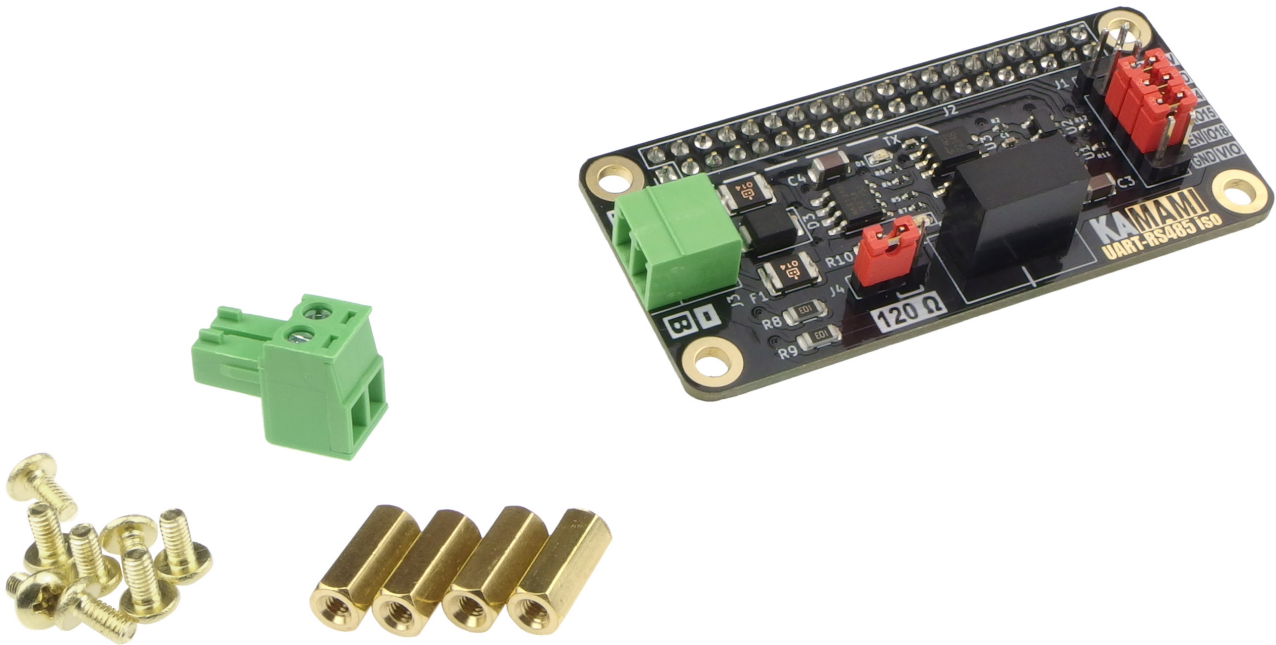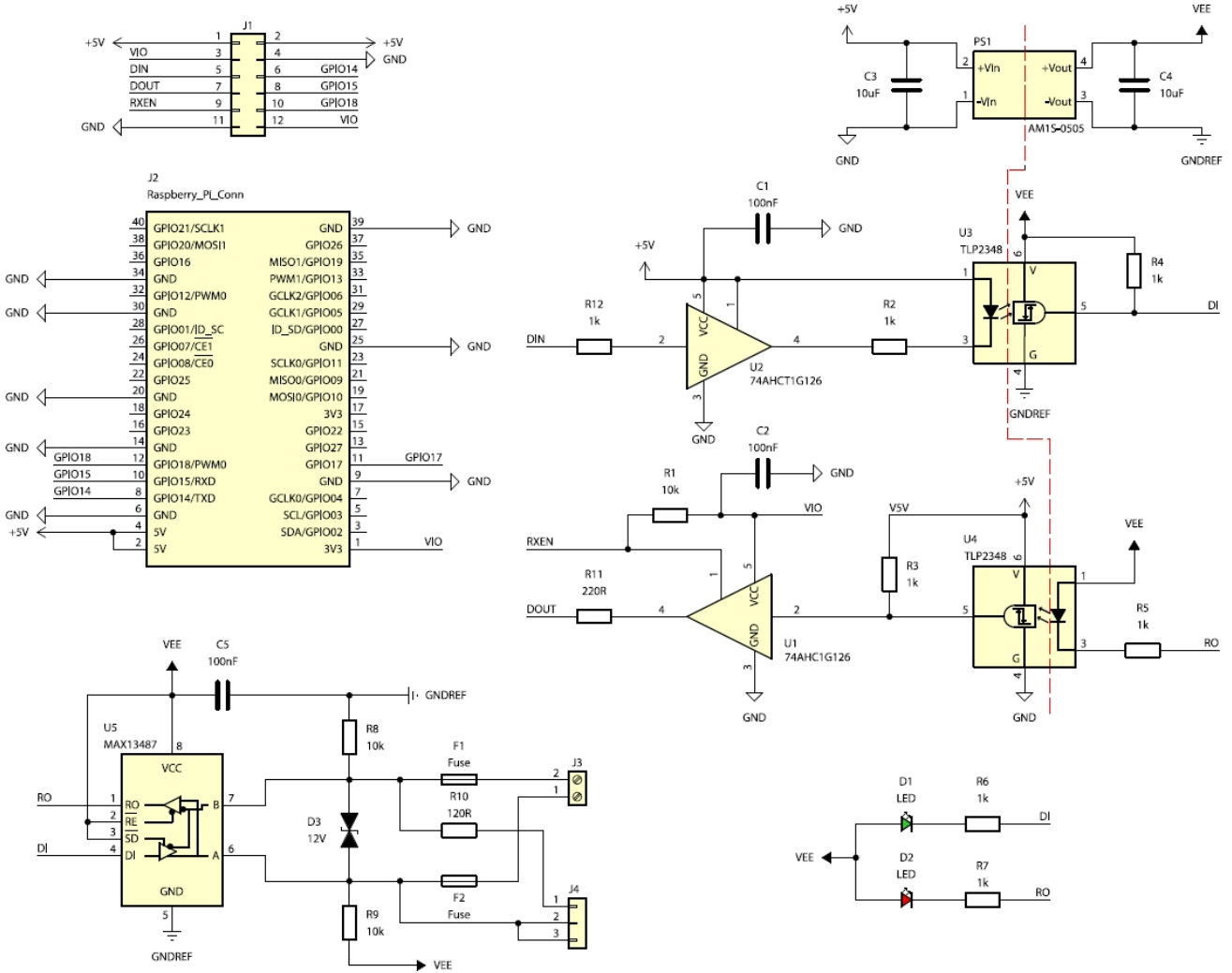
Basic features and parameters

- RS485 bus transceiver module controlled from the UART interface
- MAX13487 RS485 bus transceiver
- Automatic switching between transmitting/receiving data
- Only 2 RXD and TXD signals needed for correct, bidirectional communication (does not require the TX ENABLE signal)
- Half-duplex communication
- Transmission speed - max 500 kbps
- Number of modules connected to the bus - max 128
- Independent power supply for RXD and TXD line circuits enabling cooperation with systems operating with a voltage in the range of 2.0-5.5 V (does not require additional voltage translators)
- Data transmission/receiving signaling - diodes LED
- Connected resistance 120 Ω (bus terminator)
- Possibility of blocking data reception (blocking the RXD signal)
- Galvanic isolation up to 1 kV
- Overvoltage protection on RS485 bus lines
- RS485 bus connector type Phoenix Contact MC 3.81 mm
- 5 V power supply via RPi Zero standard connector or goldpin pins
- Current consumption max 100 mA
- Operating temperature: -40°C ~ 85°C
- Board and connector in Raspberry Pi Zero standard
- Dimensions: 65 mm x 30 mm x 20 mm

Standard equipment

Code	Description
KAmodRPi UART RS485 ISO	• Assembled and powered up module
4 x Mounting sleeve 8 x Mounting screw	• A kit that allows you to screw the overlay to the Raspberry board

Wiring diagram

J1

+5V	VIO	1	2	+5V
	DIN	3	4	GND
	DIN	5	6	GPIO14
	DOUT	7	8	GPIO15
	RXEN	9	10	GPIO18
GND		11	12	VIO

J2
Raspberry_PI_Conn

40	GPIO21/SCLK1	GND	39	GND
38	GPIO20/MOSI1	GPIO26	37	
36	GPIO16	MISO1/GPIO19	35	
34	GND	PWM1/GPIO13	33	
32	GPIO12/PWM0	GCLK2/GPIO06	31	
30	GND	GCLK1/GPIO05	29	
28	GPIO01/ID_SC	ID_SD/GPIO00	27	
26	GPIO07/CE1	GND	25	GND
24	GPIO08/CE0	SCLK0/GPIO11	23	
22	GPIO25	MISO0/GPIO09	21	
20	GND	MOSI0/GPIO10	19	
18	GPIO24	3V3	17	
16	GPIO23	GPIO22	15	
14	GND	GPIO27	13	
12	GPIO18/PWM0	GPIO17	11	GPIO17
10	GPIO15/RXD	GND	9	GND
8	GPIO14/TXD	GCLK0/GPIO04	7	
6	GND	SCL/GPIO03	5	
4	5V	SDA/GPIO02	3	
2	5V	3V3	1	VIO

GPIO18, GPIO15, GPIO14, GND, +5V

PS1 AM1S-0505
+5V, VEE
C3 10uF, C4 10uF
+Vin, +Vout, -Vin, -Vout
GND, GNDREF

C1 100nF, GND, +5V
U2 74AHCT1G126
R12 1k, DIN
R2 1k
U3 TLP2348
R4 1k, DI
GND, GNDREF, VEE

C2 100nF, GND
R1 10k, VIO, RXEN
R11 220R, DOUT
U1 74AHC1G126
R3 1k, V5V
U4 TLP2348
R5 1k, RO
+5V, VEE, GND

U5 MAX13487
C5 100nF, VEE
GNDREF
RO, RE, SD, DI
VCC, B, A, GND
R8 10k, **R9** 10k
D3 12V
R10 120R
F1 Fuse, **F2** Fuse
J3, **J4**
VEE, GNDREF

D1 LED, **R6** 1k, DI
D2 LED, **R7** 1k, RO
VEE

Pinout

J1 (goldpin 2x5, 2.54 mm pitch)

Pin number	Designation	Function
1, 2	+5V	5 V power input
3, 12	VIO	Power input defining the voltage level on the UART interface
4, 11	GND	Power ground input
5	DIN	Data input - from the UART interface
6	GPIO14	Transferred GPIO14 (TXD) signal from RPi connector
7	DOUT	Data output - to UART interface
8	GPIO15	Transferred GPIO15 (RXD) signal from RPi connector
9	RXEN	Data reception blocking input: 1 – reception active, 0 – reception blocked (internally pulled up to 1)
10	GPIO18	GPIO18 signal transferred from RPi connector

J2 (goldpin 2x20, 2.54 mm pitch)

Connector type	Function
40-pin connector standard Raspberry Pi	• Supplies 5V from RPi board to power module • Supplies 3.3V from RPi board to VIO circuit, which determines voltage level on UART interface • Transfers GPIO14 (TXD), GPIO15 (RXD) and GPIO18 signals to J1 connector pins

J3 (Phoenix Contact MC 3.81 mm)

Pin No.	Designation	Function
1	A, +	RS485 transceiver **positive** output/input recessive state A>B, dominant state A<B
2	B, -	RS485 transceiver **negative** output/input recessive state A>B, dominant state A<B

J4 (goldpin 1x3, 2.54 mm pitch)

| Connector type	Function
Goldpin + jumper	• Jumper on pins 1-2: 120 Ω resistor connected to RS485 line • Jumper on pins 2-3 (or no jumper): RS485 lines without connected resistor

Bus terminator

The module allows you to connect a 120 Ω resistor to the RS485 bus line, acting as a so-called bus terminator. This solution should only be used when the module is located at one of the ends of the RS485 bus. The function is active when the jumper is located on pins 1-2 **J4**.
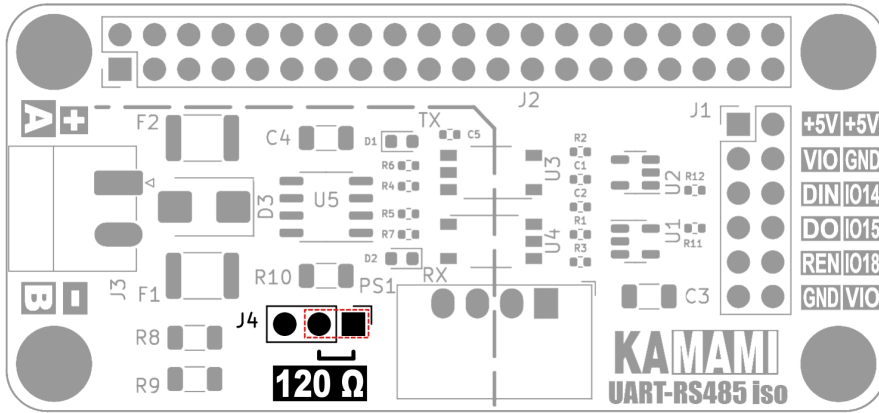
UART data input/output

The TX signal coming out of the UART interface should be connected to the **DIN** J1 pin. The RX signal that will go to the UART interface should be connected to the **DO** J1 pin.
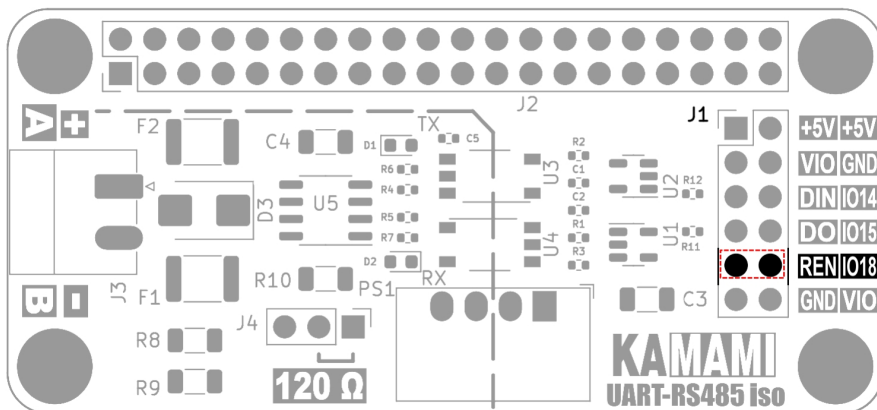
If the module is connected to a Raspberry Pi SBC, it is enough to put on 2 jumpers connecting the DIN-IO14 and DO-IO15 pins to connect the module to the RPi computer's UART interface - GPIO14 (TXD) and GPIO15 (RXD) pins.
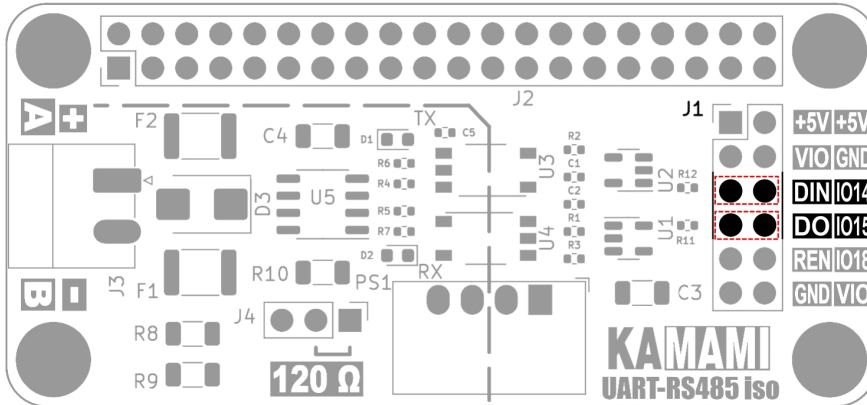
Possibility of blocking data reception (blocking the RXD signal)

The RX signal that will reach the UART interface from the **DO** J1 pin can be blocked (e.g. when the application is starting and is not ready to receive data). The data reception blocking input is the **REN** J1 pin. When it is in the high state "1" - data reception works normally; when it is in the low state "0" - data reception is blocked, the output is in a high impedance state. The REN signal is internally pulled up to "1". If the module is connected to a Raspberry Pi SBC, simply place a jumper on the REN-IO18 pins to connect the REN signal to the GPIO18 pin of the RPi computer.

Powering the module

The module can be used without connecting to a Raspberry Pi SBC. In this case, you should connect a 5V power supply (min 100mA) to the **+5V** and **GND** pins of the J1 connector. In addition, a power supply with a voltage in the range of 2.0...5.5V (approx. 10 mA) should be supplied to the **VIO** and **GND** contacts. The VIO voltage determines the voltage level of the DIN and DO signals that will be connected to the TX and RX lines of the UART interface. The **+5V**, **GND** and **VIO** contacts appear twice on the connector, but they are the same signals (it is enough to connect 5V to one of the **+5V** contacts).
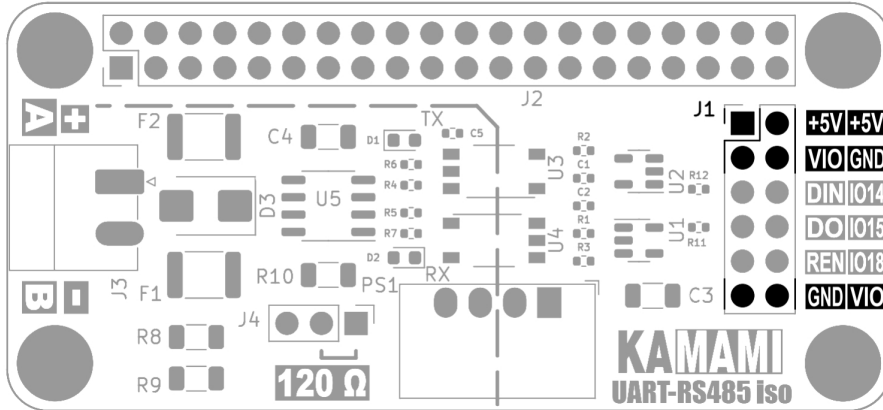
RS485 bus connector

The module is equipped with a Phoenix Contact MC 3.81 mm RS485 bus connector. It provides easy assembly of cables and allows for quick connection/disconnection.
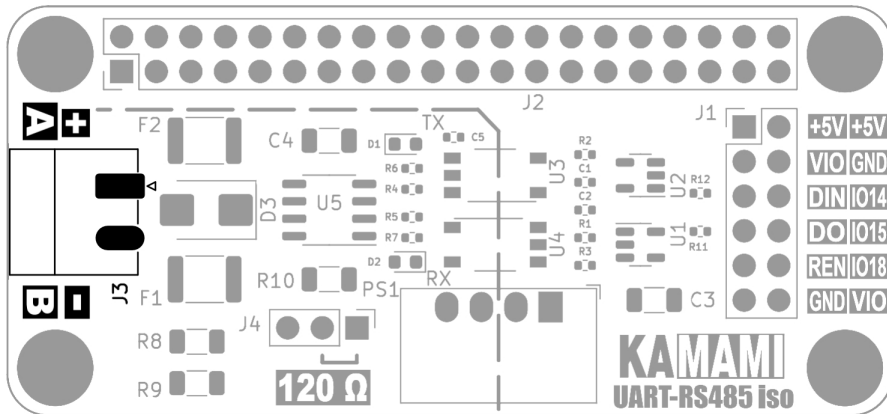
Transmit/receive signaling

The module signals the transmission/reception of data to/from the RS485 bus using miniature LED indicators, marked on the board as TX and RX, respectively.
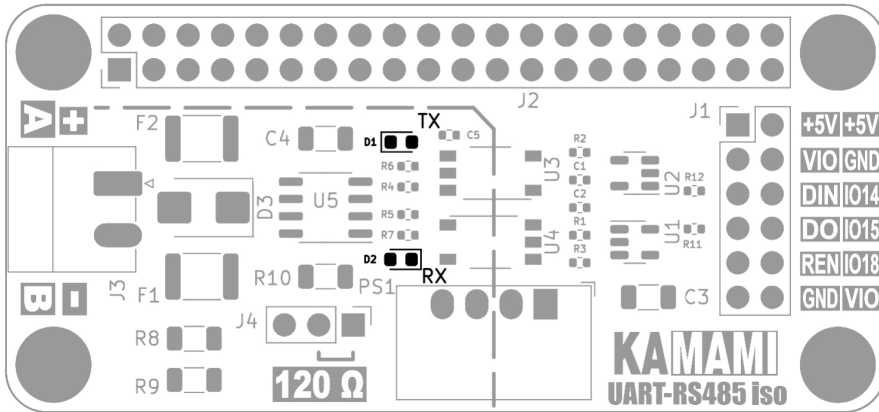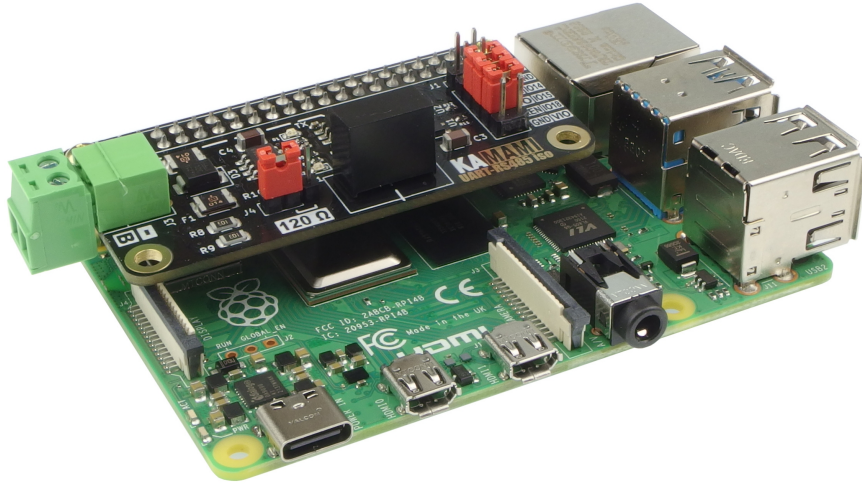
GPIO connector compatible with Raspberry Pi SBCs

The board contains a 40-pin J2 connector compatible with the Raspberry Pi SBC GPIO connector. Signals important for the module's operation are marked in the figure. They are also connected to the appropriate pins on the J1 connector.
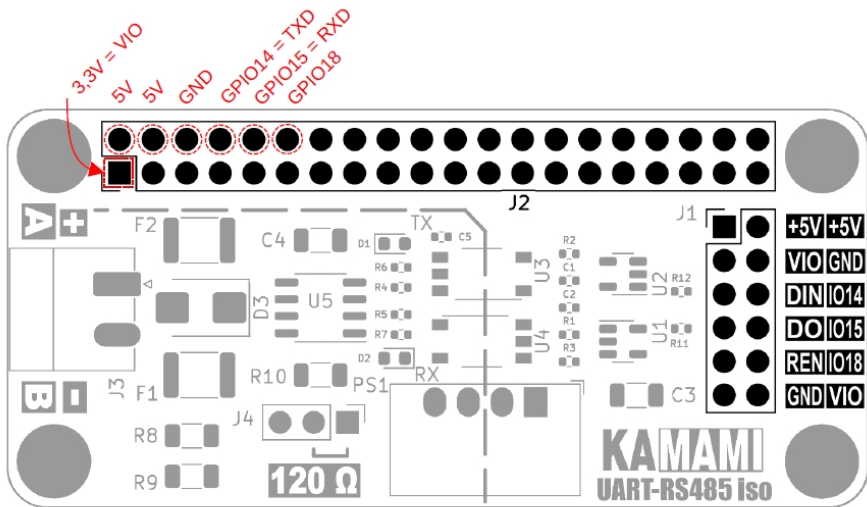
Installing the module on the Raspberry Pi computer connector

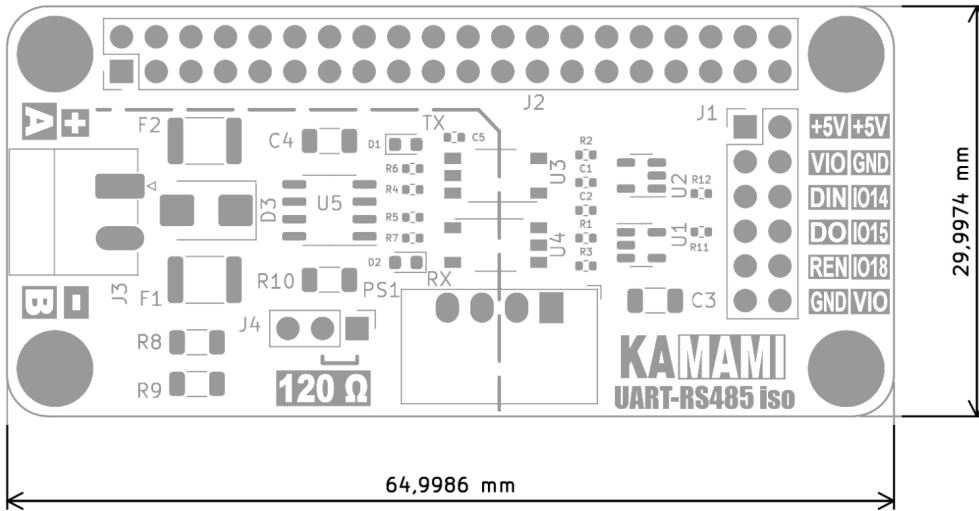Installing the module on the Raspberry Pi computer connector
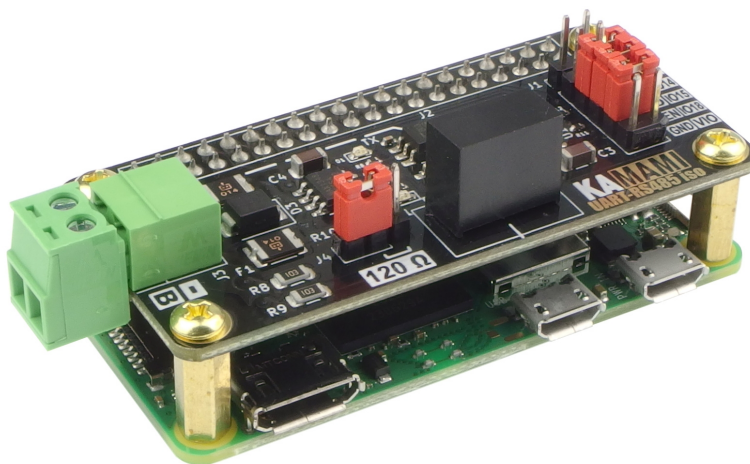
Installing the module on the Raspberry Pi Zero computer connector

The Raspberry Pi computers shown in the pictures are not included in the set.

Dimensions

The board has been designed to match the dimensions and mounting holes of the Raspberry Pi Zero board.

External links

- [Maxim's MAX13487E datasheet](#)