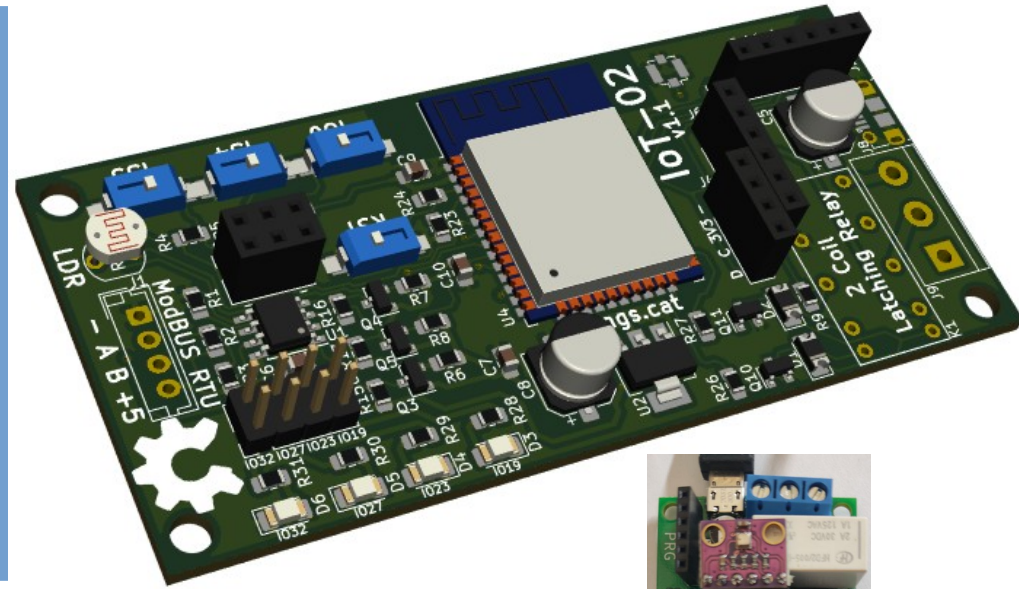


IoT-02 Board



Introduction

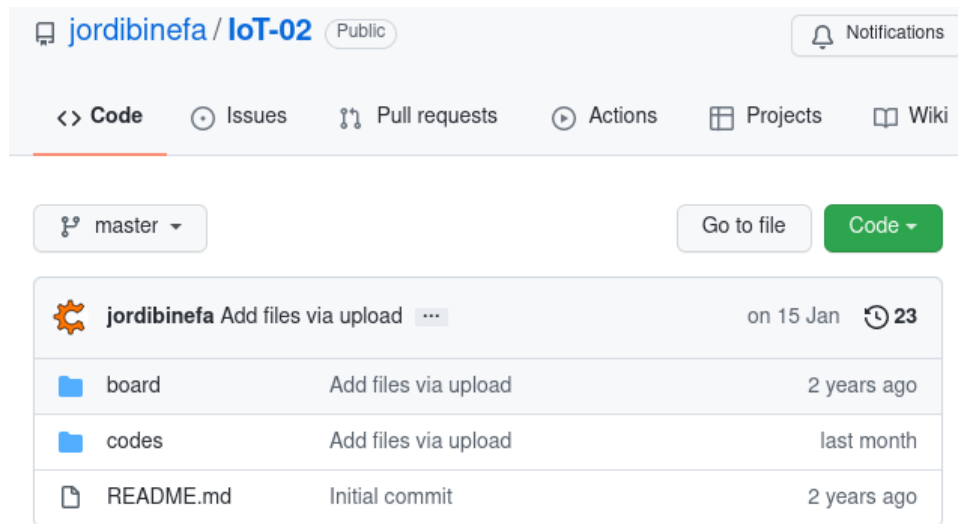


IoT-02 Board

- Project repository
- Electronic schematic
- Key components
- Arduino IDE settings
- Firmware programming

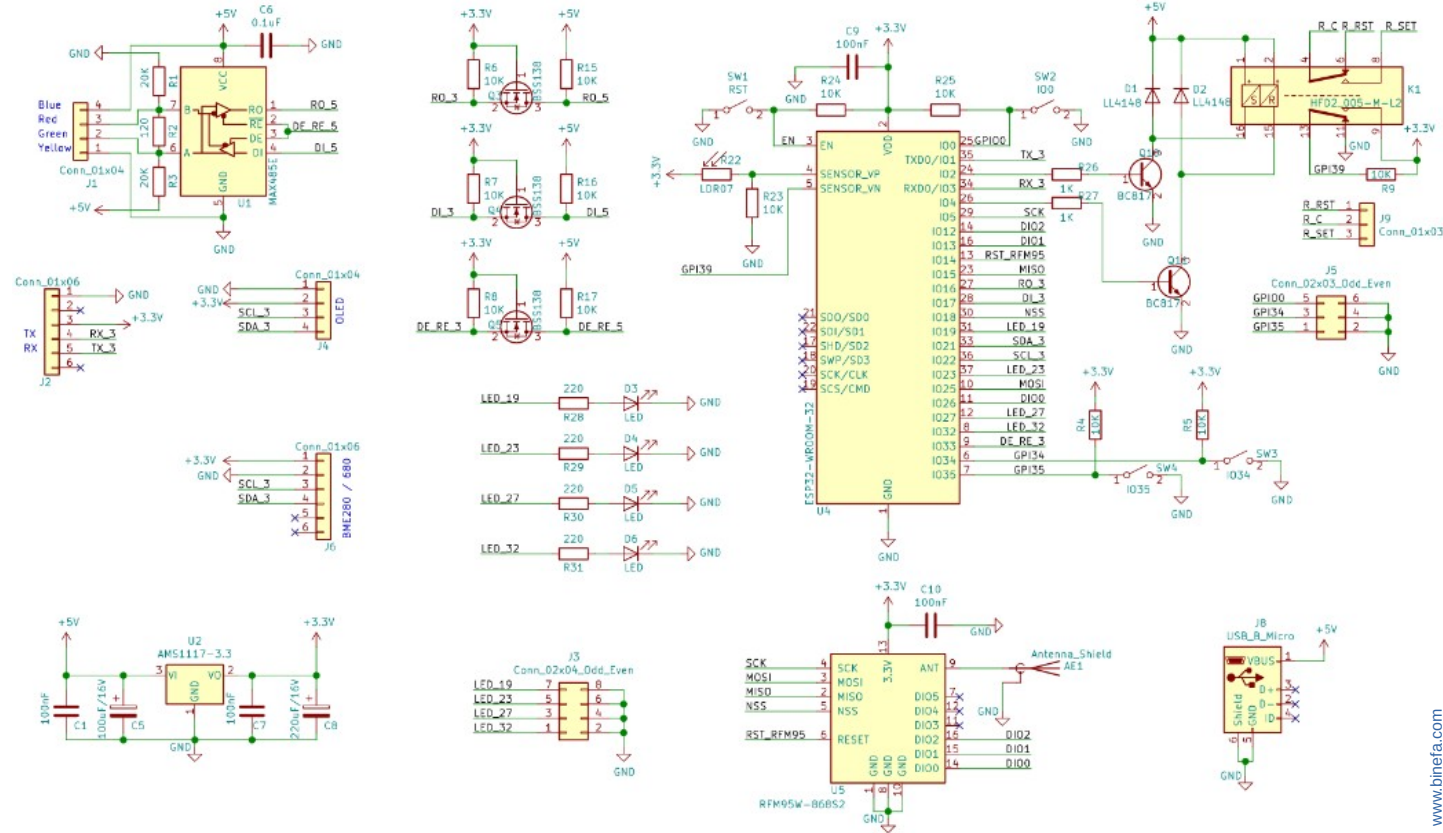
IoT-02 Board

- Project repository:
<https://github.com/jordibinefa/IoT-02>



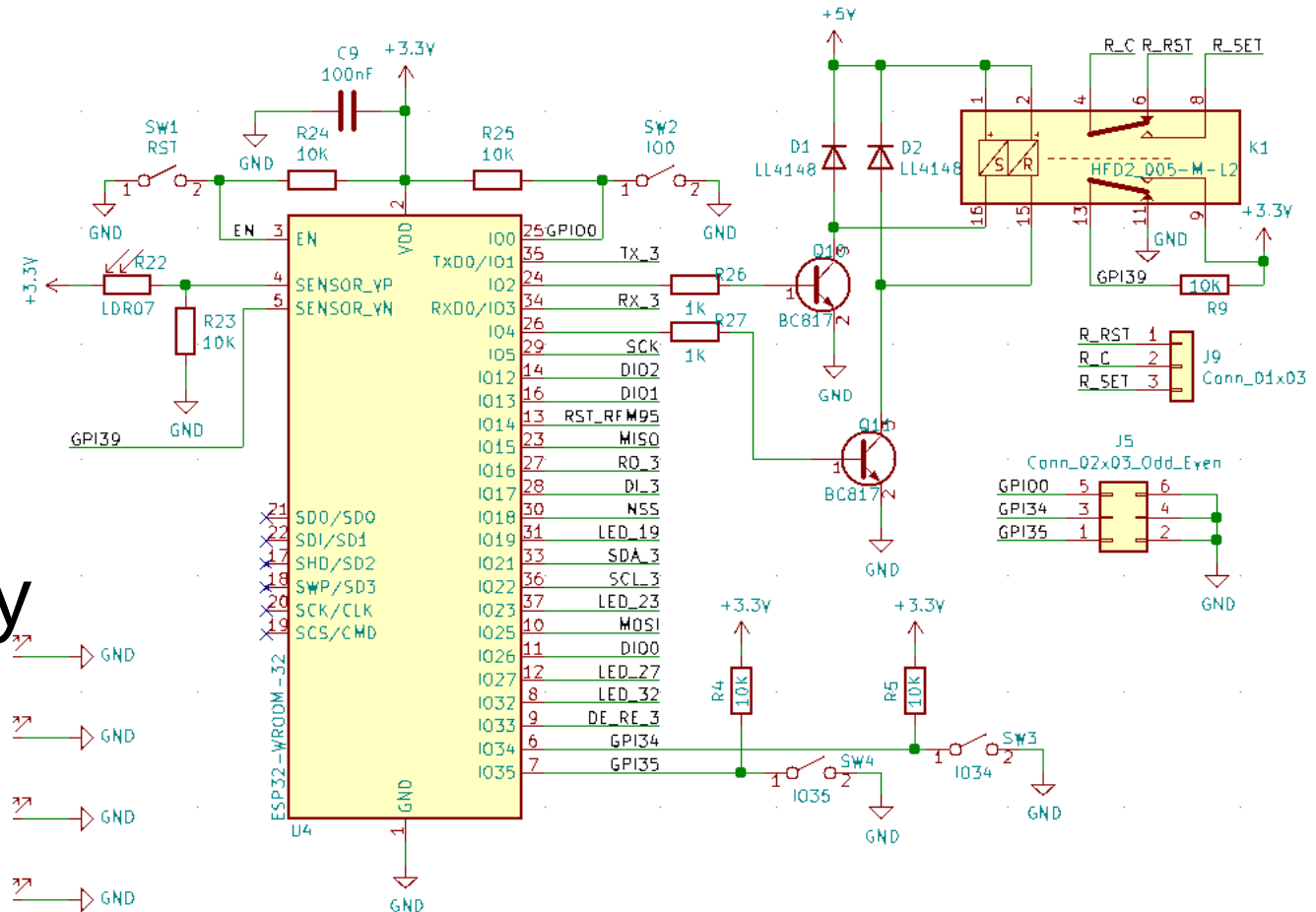
IoT-02 Board

- Schematic



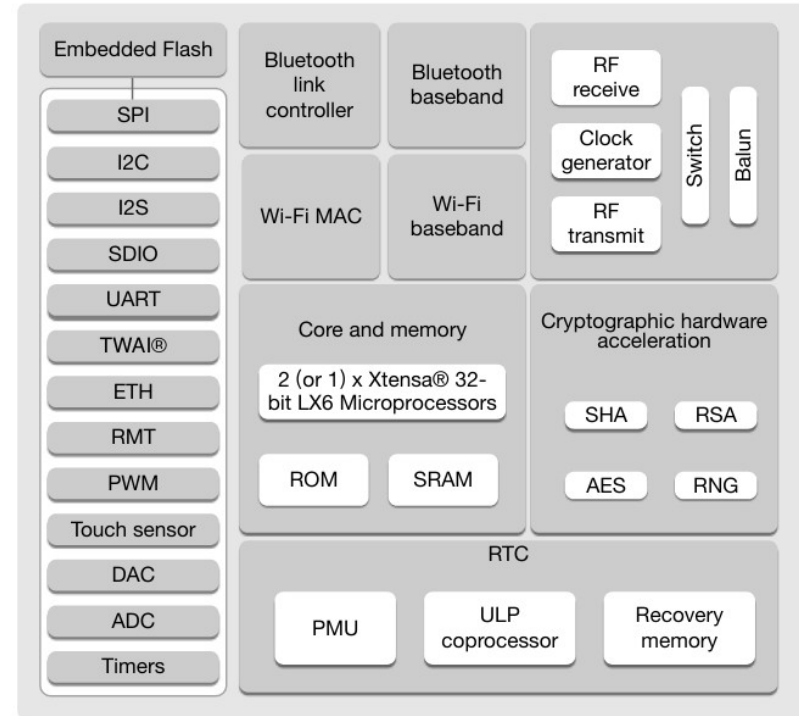
IoT-02 Board

- CPU (ESP32)
- LDR
- Buttons
- Latching Relay



IoT-02 Board

- CPU (ESP32)



IoT-02 Board

Latching Relay

HFD2

SUBMINIATURE DIP RELAY



cus

File No.:E133481

Features

- High sensitive: 150mW
- Matching standard 16 pin IC socket
- High switching capacity 60W/125VA
- Bifurcated contacts
- Epoxy sealed for automatic wave soldering and cleaning
- Single side stable and latching type available
- Environmental friendly product available (RoHS compliant)
- Outline Dimensions: 20.2 x 10.0 x 10.6 mm

CONTACT DATA

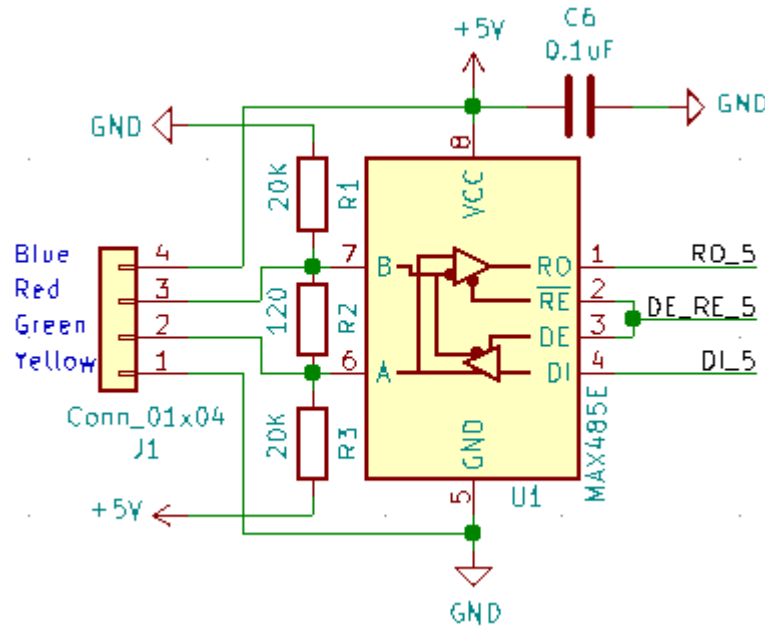
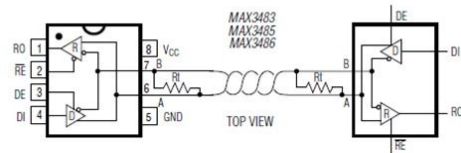
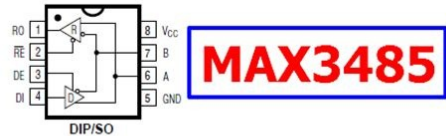
Contact arrangement	2C
Initial contact resistance	50mΩ
Contact material	see ordering info.
Contact rating (Res. load)	2A 30VDC 1A 125VAC
Max. switching power	60W / 125VA
Max. switching voltage	220VDC / 250VAC
Max. switching current	2A
Min. applicable load	10mV 10μA
Electrical life	1 x 10 ⁵ OPS (at 2A 30VDC) 5 x 10 ⁵ OPS (at 1A 30VDC)
Mechanical life	1 x 10 ⁸ OPS

CHARACTERISTICS

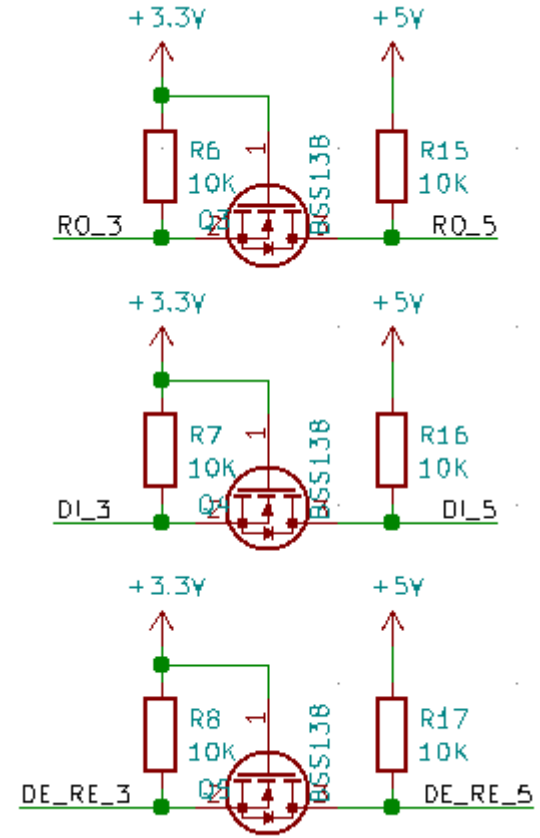
Initial insulation resistance		1000MΩ (at 500VDC)
Dielectric strength	Contacts to coil	1coil: 1500VAC 1min. 2coil: 1000VAC 1min.
	Contacts to contact	1000VAC 1min.
Operate time (at nomi. volt.)		Max. 4ms
Release time (at nomi. volt.)		Max. 3ms
Set time (latching)		3ms
Reset time (latching)		3ms
Bounce time		1.5ms
Ambient temperature		-40 °C to +85 °C
Humidity		5 to 85% RH
Vibration resistance		10 to 55Hz 196m/s ² (20g)
Shock resistance	Functional	490m/s ² (50g)
	Destructive	980m/s ² (100g)
Capacitance	Contact to contact	2.0pF
	Contact set to contact	1.5pF
	Contact to coil	5.0pF
Termination		PCB (DIP)
Unit weight		4.5g
Construction		Sealed IP67

IoT-02 Board

- ModBus



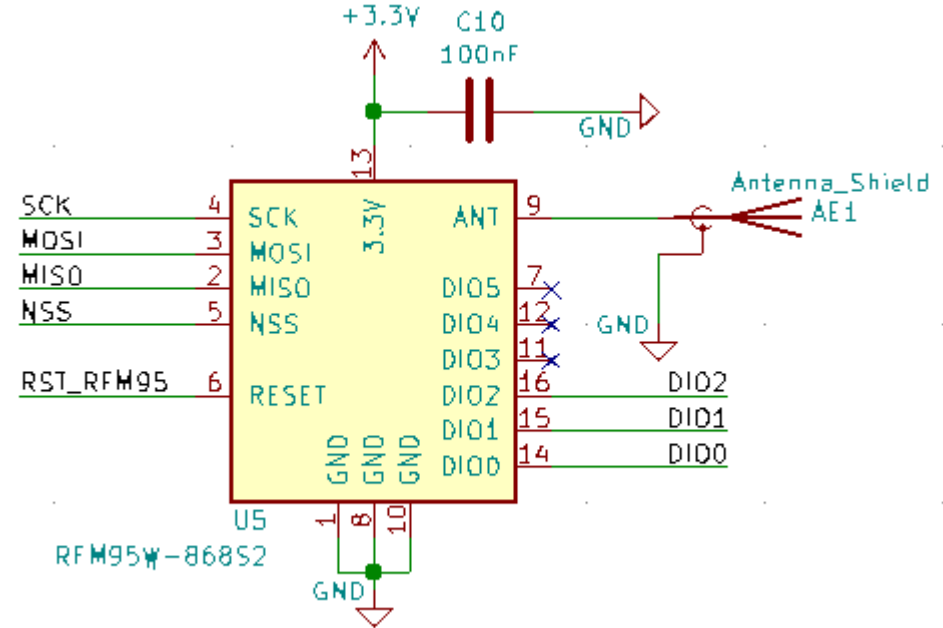
USB to RS485 Converter:



ProSoft Technology video explaining ModBus RTU and ModBus TCP

IoT-02 Board

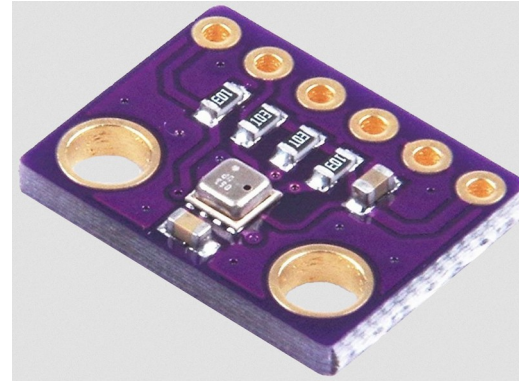
- LoRa Module (SPI)



SPI bus explanation

IoT-02 Board

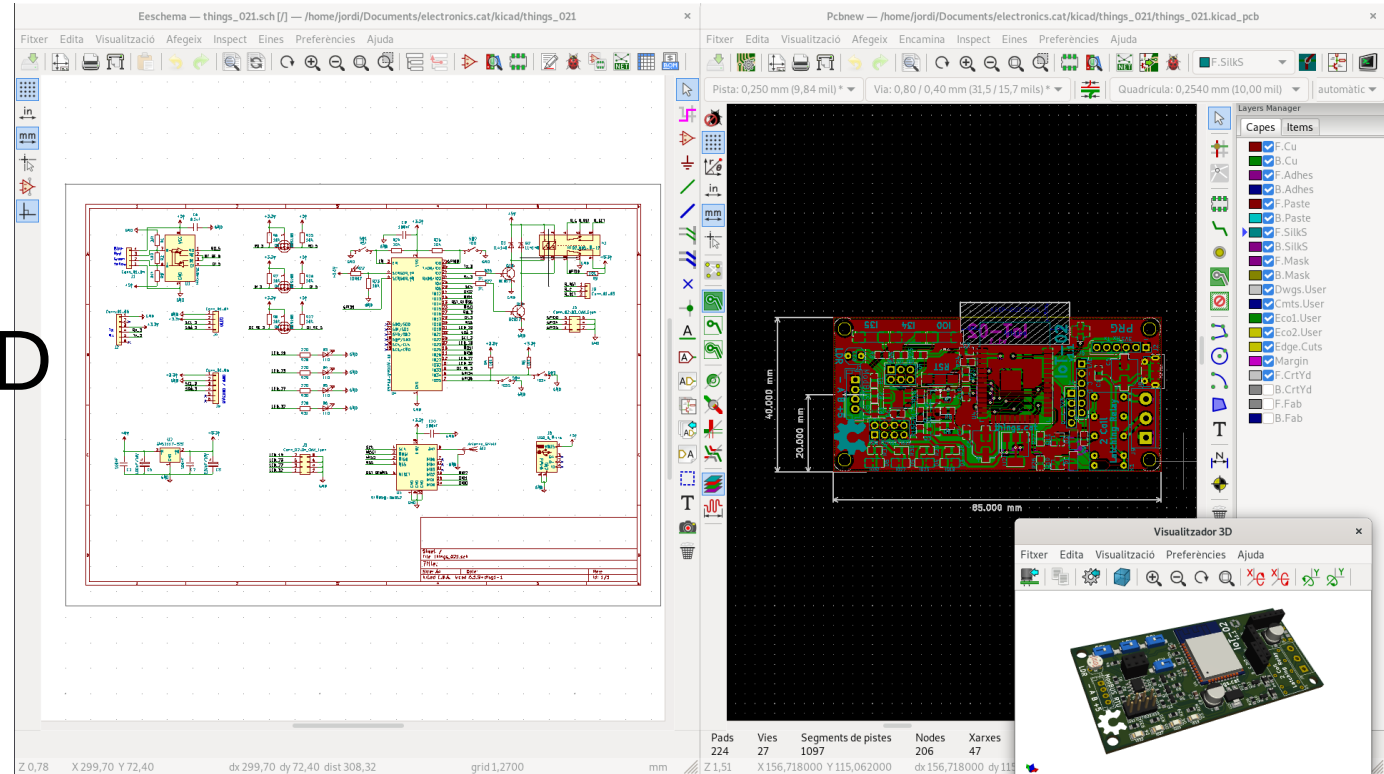
- I2C (BME280)
- I2C (OLED 0.96")



I2C bus explanation

IoT-02 Board

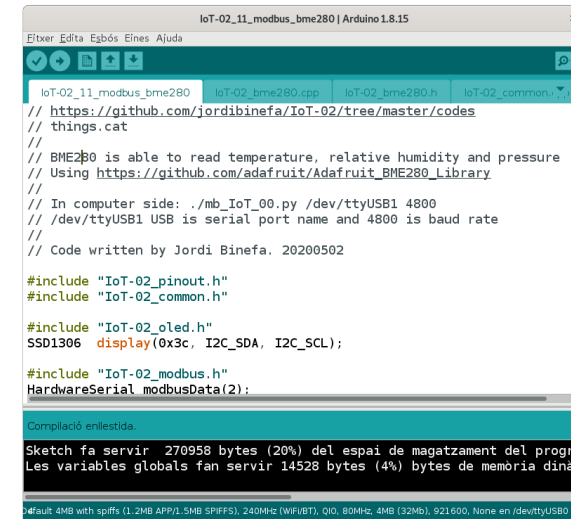
- Made with KiCAD



IoT-02 Board

Programmable with

- Arduino IDE
- Platform IO



```
IoT-02_11_modbus_bme280 | Arduino 1.8.15
Fixer Edita Esbós Eines Ajuda

IoT-02_11_modbus_bme280 IoT-02_bme280.cpp IoT-02_bme280.h IoT-02_common.h
// https://github.com/jordibinefa/IoT-02/tree/master/codes
// things.cat
//
// BME280 is able to read temperature, relative humidity and pressure
// Using https://github.com/adafruit/Adafruit_BME280_Library
//
// In computer side: ./mb_IoT_00.py /dev/ttyUSB1 4800
// /dev/ttyUSB1 USB is serial port name and 4800 is baud rate
//
// Code written by Jordi Binefa. 20200502

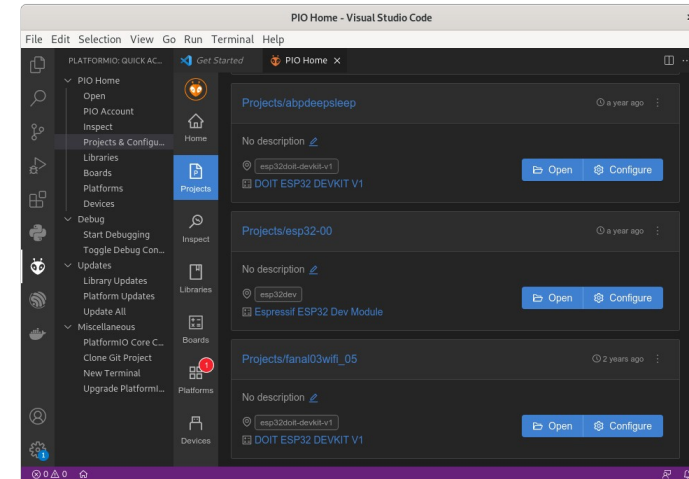
#include "IoT-02_pinout.h"
#include "IoT-02_common.h"

#include "IoT-02_oled.h"
SSD1306 display(0x3c, I2C_SDA, I2C_SCL);

#include "IoT-02_modbus.h"
HardwareSerial modbusData(2);

Complació enllestida.

Sketch fa servir 270958 bytes (20%) del espai de magatzament del progr.
Les variables globals fan servir 14528 bytes (4%) bytes de memòria dinàmica.
Default 4MB with spiffs (1.2MB APP/1.5MB SPIFFS), 240MHz (WiFi/BT), QIO, 80MHz; 4MB (32MB), 921600, None en /dev/ttyUSB0
```



IoT-02 Board

Installing ESP32 Add-on in Arduino IDE

- In your Arduino IDE, go to **File / Preferences**. Enter the following into the **Additional Board Manager URLs** :

https://dl.espressif.com/dl/package_esp32_index.json

- Open the Boards Manager. Go to **Tools / Board: "..."** / **Boards Manager ...** Search for **ESP32** and press install button for the **ESP32 by Espressif Systems** . Approximately 300MB are automatically downloaded.
- Once it is installed, close the board installation popup. Select **Tools / Board: "..."** / **ESP32 Dev Module**. Select the Port at **Tools / Port / /dev/ttyUSB0** (in Windows the port is **COMx**)

IoT-02 Board

Arduino IDE libraries (493MB)

- These libraries are for compiling **code examples**

Download all GitHub codes and Arduino IDE libraries on your computer. Libraries must be placed in the **libraries** directory inside **Arduino** folder (**/home/user** in GNU / Linux and **My Documents** in Windows)

IoT-02 Board


Sequence to select programming mode on IoT-02 board:

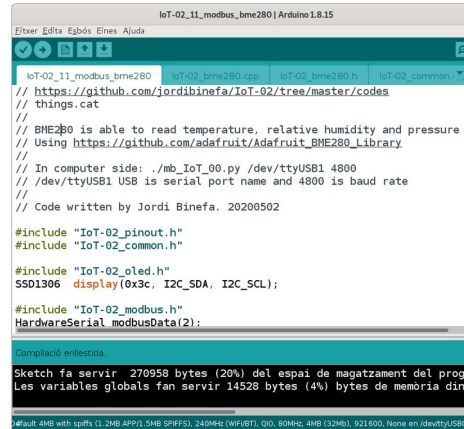
- Press the red button (***RST***)
- Press the ***IOO*** white button
- Stop pressing the red button (***RST***)
- Stop pressing the ***IOO*** white button

IoT-02 Board

Uploading example firmware

From Arduino IDE, open
[IoT-02_07_SSD1306_BME280.ino](#) file,
previously downloaded with other example
codes.

Set IoT-02 board in programming mode,
connect the red board, and upload the
firmware by pressing the round button with
right pointing arrow ()



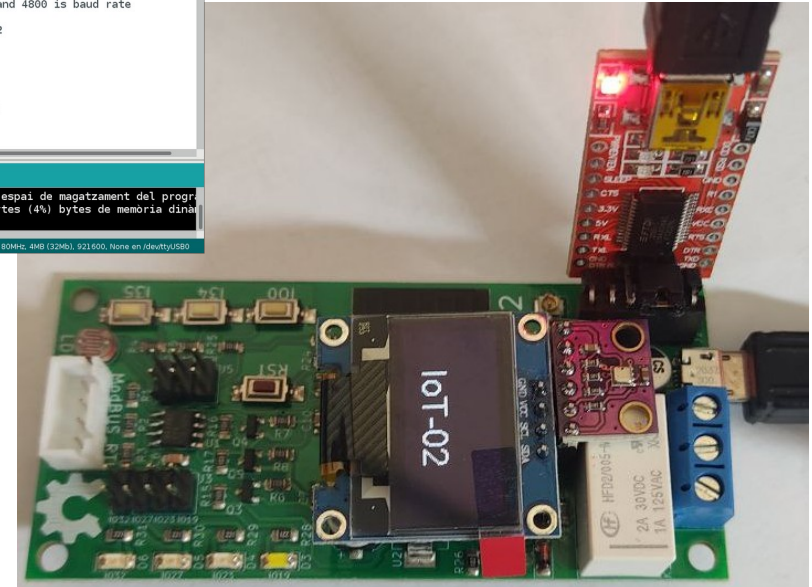
```
IoT-02_11_modbus_bme280 | Arduino 1.8.15
File Edit Esborja Ajuda
IoT-02_11_modbus_bme280 IoT-02_bme280.cpp IoT-02_bme280.h IoT-02_common.h
// https://github.com/jordibinefa/IoT-02/tree/master/codes
// things.cat
//
// BME280 is able to read temperature, relative humidity and pressure
// Using https://github.com/adafruit/Adafruit_BME280_Library
//
// In computer side: ./mb_IoT_00.py /dev/ttyUSB1 4800
// /dev/ttyUSB1 USB is serial port name and 4800 is baud rate
//
// Code written by Jordi Binefa. 20200502

#include "IoT-02_pinout.h"
#include "IoT-02_common.h"

#include "IoT-02_oled.h"
SSD1306 display(0x3c, I2C_SDA, I2C_SCL);

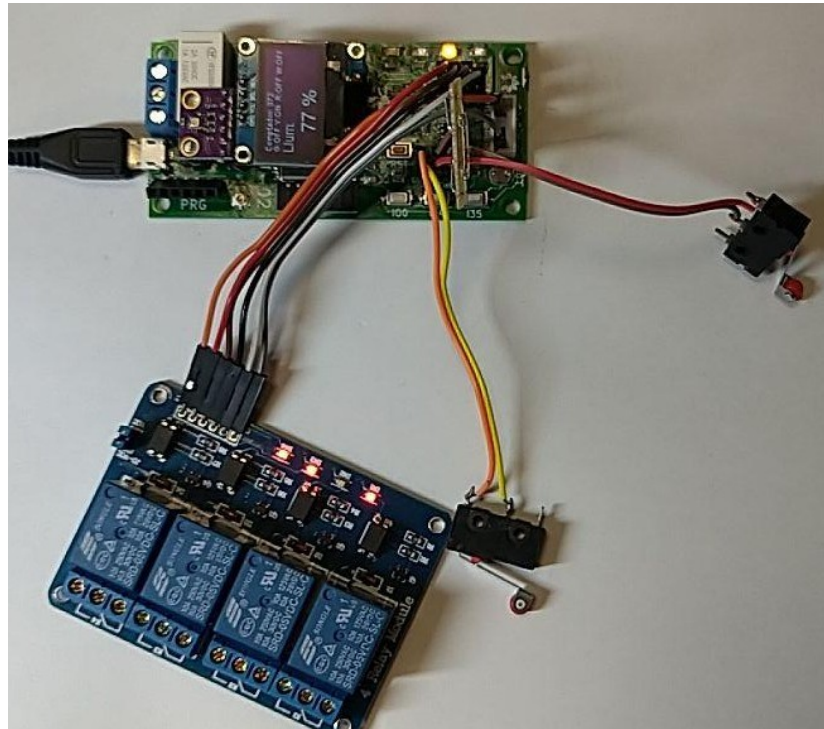
#include "IoT-02_modbus.h"
HardwareSerial modbusData(2);

Compilació finalitzada
Sketch fa servir 270958 bytes (20%) del espai de magatzament del progr
Les variables globals fan servir 14528 bytes (4%) bytes de memòria dina
default 4MB with spi (1.2MB APP), 5MB SPIFFS, 240MHz (WIFI/BT), QIO, 80MHz, 4MB (32MB), 921600, None en ide/ttyUSB0
```



IoT-02 Board

Physical connection with other devices



IoT-02 Board

Practical Demonstration

IoT-02 Board

Question Time

