HM-MT2401
EVB User Manual

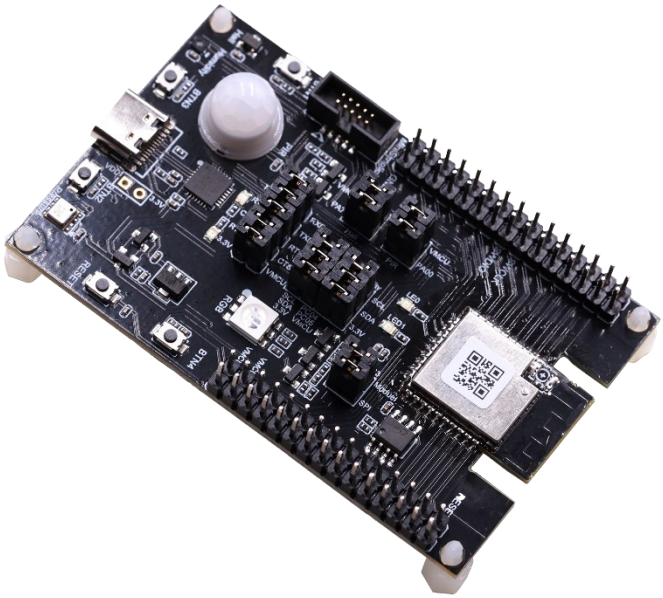


Table of Contents

1 Introduction

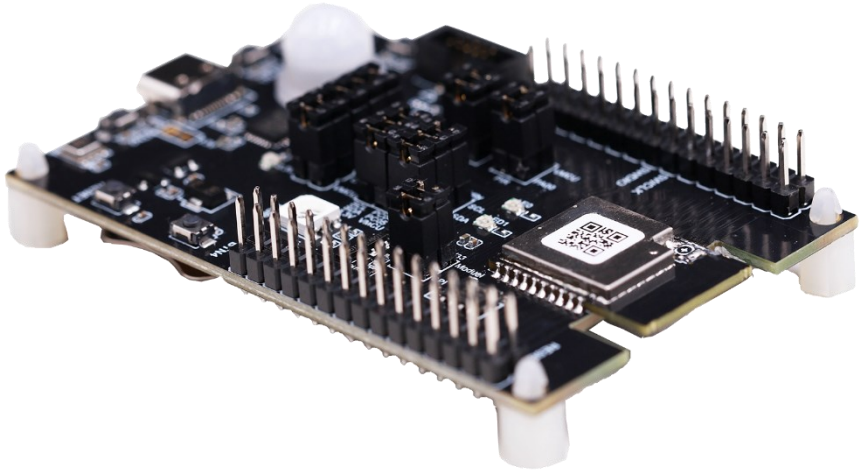


Figure 1.1 Solid diagram of HM-MT 2401 EVB board

The HM-MT2401 EVB board provides an easy-to-use Matter over Thread, device evaluation platform, as shown in Figure 1.1. The board integrates the HOPERF's HM-MT2401 module and the EVB baseboard. The EVB base board contains rich sensor peripherals, including temperature and humidity sensors, a pressure sensor, a contact sensor, a PIR sensor, an RGB light and two monochrome LED lights, and four buttons and a 1 MB external SPI Flash for OTA upgrades with external Flash. HM-MT2401 EVB board reserves software debugging and programming interface to facilitate developers to develop and debug Matter software.

Using the HM-MT2401 EVB board, developers can quickly develop Matter over Thread product prototypes, evaluate the functions of Matter end devices, quickly build Matter device demos and demonstrate their functions, etc. Based on the HM-MT2401 EVB board, can help developers shorten the development cycle of Matter devices and accelerate the product launch.

1.1 HM-MT2401 Module

The HM-MT2401 is a Matter over Thread wireless communication module based on the 2.4 GHz frequency band. It includes a high-performance, highly integrated RF processing

chip EFR32MG24 with a low-power 32-bit ARM® Cortex®-M33 kernel, 1536kB Flash, 256kB RAM, as well as rich peripheral resources, equipped with integrated PCB antenna and external antenna seat, support Matter, Thread, BLE and other wireless communication technologies, can be used for the development of Matter over Thread end devices, to easily upgrade the original wireless devices to smart home devices that meet the Matter standard.

1.2 EVB Base Board

HM-MT2401 EVB base board contains rich peripheral resources, such as temperature and humidity sensors, pressure sensors, door magnetic sensor, PIR sensor and RGB three-color lights, monochrome LED lights, buttons, SPI Flash, etc., including debugging, programming interface, battery holder, USB to serial port, etc. The HM-MT2401 module can control a wide variety of sensor peripherals to quickly build different Matter end devices.

2 Hardware Overview

The hardware layout of the HM-MT2401 EVB board includes the HM-MT2401 module and EVB baseboard. Specific hardware resources are shown in Figure 2.1. The external extended I/O port layout of the EVB baseboard is shown in Figure 2.2.

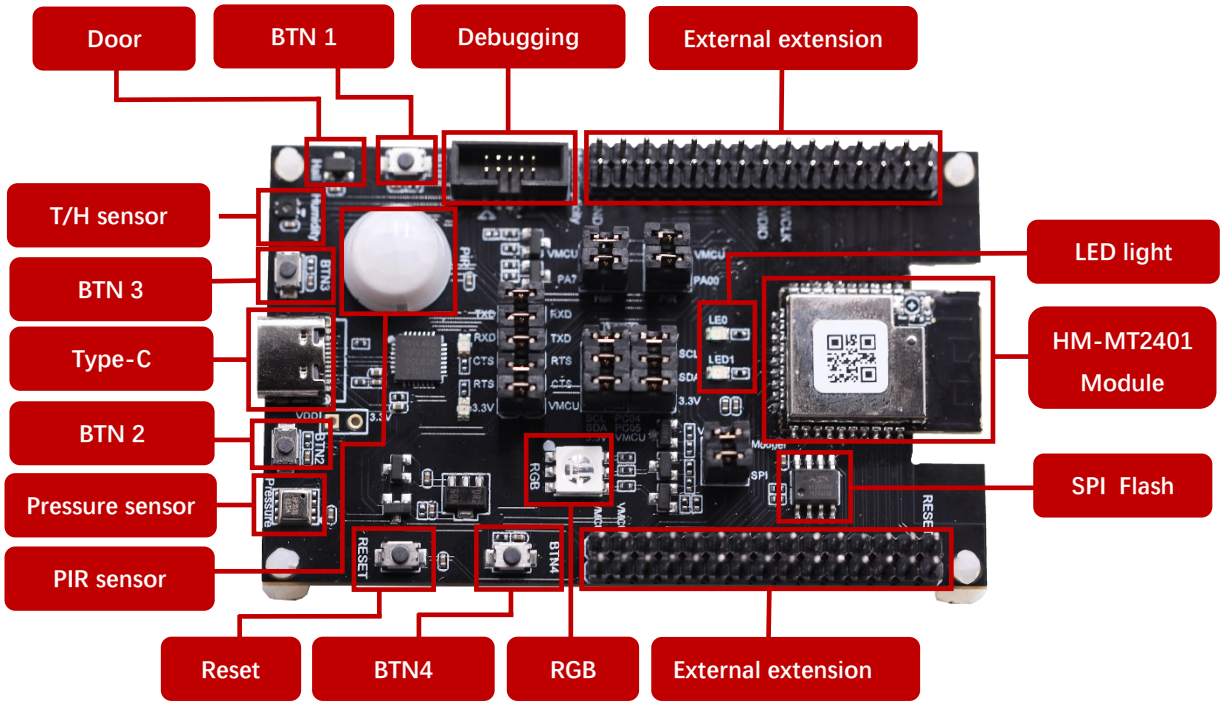


Figure 2.1 Hardware layout of the HM-MT2401 EVB board

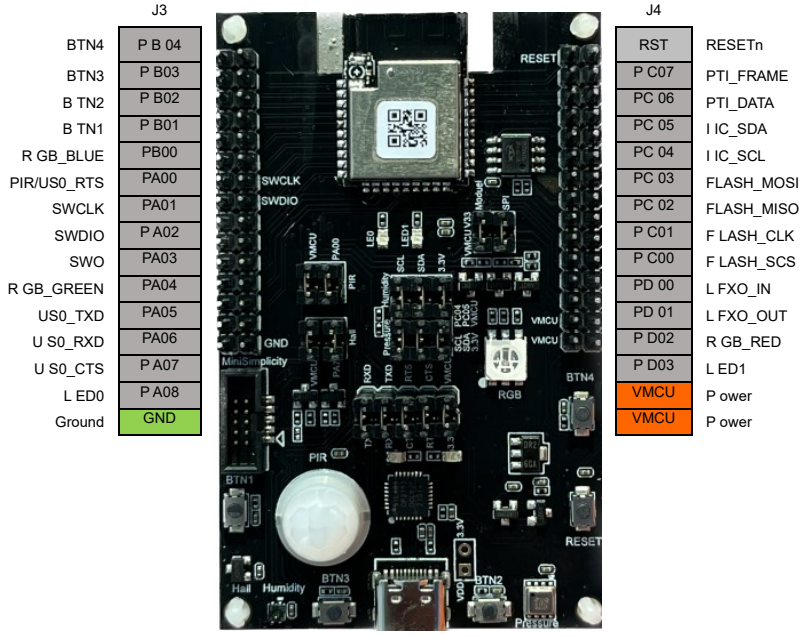


Figure 2.2 HM-MT2401 EVB board extended I/O port layout

The list of hardware resources of the HM-MT2401 EVB board and the description of each function are shown in Table 2.1.

Table 2.1 List of the hardware resources of the HM-MT2401 EVB board

No.	Hardware Resource	Description
1	Debugging burn interface	10 Pin Mini-Connector interface, available for software debugging and programming
2	External extension of the I/O resources	The extended I / O port of the HM-MT2401 module facilitates hardware debugging
3	BTN 1	The user button can be enabled in the Matter software
4	BTN 2	The user button can be enabled in the Matter software
5	BTN 3	The user button can be enabled in the Matter software
6	BTN 4	The user button can be enabled in the Matter software
7	Reset	HM-MT2401 module reset button
8	Door magnetic sensor	Door magnetic sensor that can be used in Matter Contact Sensor application
9	Temperature and humidity sensor	Temperature and humidity sensor that can be used in the Matter Thermostat application
10	Type-C interface	Type-C interface, which can be used for EVB power supply and serial port input and output
11	Pressure sensor	Pressure sensor that can be used for Matter pressure sensor application
12	PIR sensor	A PIR sensor that can be used for the Matter human detection routine
13	RGB light	The RGB three-color lamp, which can be used in the Matter Lighting application
14	Monochrome LED light	Monochrome LED lights that can be used in the Matter Lighting application
15	SPI Flash	SPI Flash, which can be used for the Matter OTA firmware upgrade application
16	CR2032 Battery holder	Install a CR2032 battery for low-power device application
17	HM-MT2401 Matter module	The HM-MT2401 module, used for running the Matter application

Note: GPIO port reuse instructions

- PIR Sensor and UART RTS pins reuse the PA 00 port
- HALL Sensor and UART CTS pins reuse PA 07 ports
- LFXO (32.768K Hz) is not default in the HM-MT 2401 module

The functions of the HM-MT2401 EVB board are selected by jumper caps, as shown in Figure 2.3. Each jumper cap description is shown below.

- The jumper cap J1 is the PIR signal
- The jumper cap J2 is the PIR current
- The jumper cap J3 is the door magnetic sensor signal
- The jumper cap J4 is the door magnetic sensor power supply
- The jumper cap J5 is the power supply input of the module
- The jumper cap J6 is the SPI power supply
- Jumper cap J7 temperature and humidity sensor SCL signal
- The jumper cap J8 is the temperature and humidity sensor SDA signal
- The jumper cap J9 is the power supply of the temperature and humidity sensor
- The jumper cap J10 is the air pressure sensor SCL signal
- The jumper cap J11 is the air pressure sensor SDA signal
- The jumper cap J12 is powered by the air pressure sensor
- The jumper cap J13 is the MCU serial port RX signal
- The jumper cap J14 is the MCU serial port TX signal
- The jumper cap J15 is the MCU serial port RTS signal
- The jumper cap J16 is the MCU serial port CTS signal
- The jumper cap J17 provides the USB power supply input

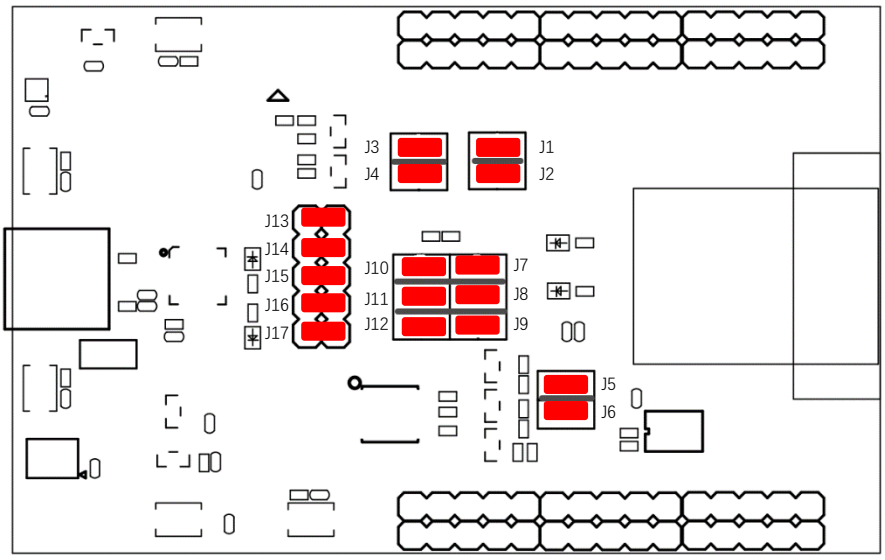


Figure 2.3 Location position of jumper cap

2.1 Contact Sensor

The HM-MT2401 EVB board has a door magnetic sensor called the CC6207M. The sensor is I/O triggered, and the VOut foot position outputs a high-level signal when close to a strong magnet. Before using the sensor, confirm that the jumper caps J3/J4 are connected and disconnect the jumper cap J16.

For the detailed parameters of the sensor, refer to the specification CC6207M.

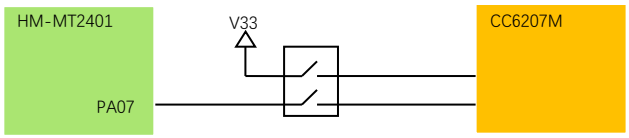


Figure 2.4 Schematic diagram of the contact sensor electrical connection

2.2 Temperature and Humidity Sensor

The HM-MT2401 EVB board is equipped with a new high-precision temperature and humidity sensor model of TH09C, which can easily measure the indoor temperature and humidity environment simultaneously. The sensor is connected to the module using an I2C interface. First, confirm that the jump caps J7/J8/J9 are connected. The temperature measurement accuracy is ± 0.15°C and the measurement range is 40°C to 100°C. The humidity measurement accuracy is ± 2.0% RH and ranges from 0% to 100%. Low standby power consumption leads to 40 nA.

For the detailed parameters of the sensor, refer to the specification TH09C

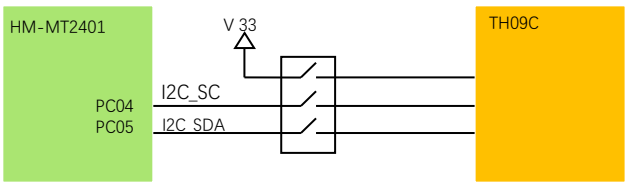


Figure 2.5 Schematic diagram of the temperature and humidity sensor electrical connection

2.3 Pressure Sensor

The HM-MT2401 EVB board is equipped with a high-precision HP303B digital pressure sensor that measures pressure and temperature. Pressure measurement ranges up to 300-1200 hPa. The sensor is connected to the module using an I2C interface. Before using the sensor, confirm that the jump caps J10/J11/J12 are connected. For the detailed parameters of the sensor, refer to the specification HP303B.

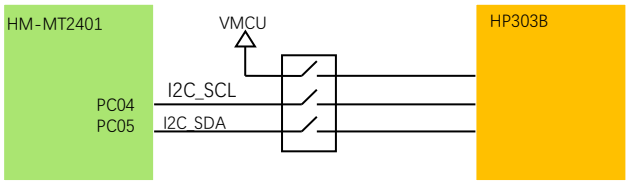


Figure 2.6 Schematic diagram of the pressure sensor electrical connection

2.4 PIR Sensor

The HM-MT2401 EVB board is equipped with an RDB223 digital infrared sensor, which produces a high-level signal when the body is moving. Before using the sensor, confirm that the jumper cap J1/J2 is connected and disconnect the jumper cap J15.

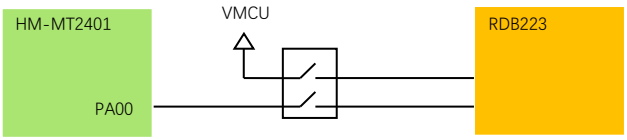


Figure 2.7 Schematic diagram of the PIR sensor electrical connection

2.5 RGB Light and LED

The HM-MT2401 EVB board is equipped with one RGB three-color LED light and two monochrome LED lights. The RGB lights can be used as dimmers. Monochrome LED lights can be used as status lights.

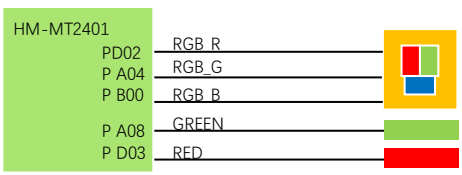


Figure 2.8 Schematic diagram of the LED lamp electrical connection

2.6 SPI Flash

The HM-MT2401 EVB board is equipped with a model W25Q80DVSNIG SPI Flash with a capacity of 1M Byte. This SPI Flash can be used as external data storage or as an OTA storage. Before using this feature, confirm that the jump cap J6 is connected.

Note: When testing low-power devices, if the SPI Flash function is not used, the jumper cap can be removed to reduce electricity leakage.

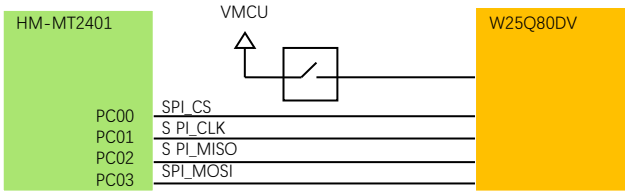


Figure 2.9 Schematic diagram of SPI Flash electrical connection

2.7 USB to Serial Port

To expand functionality or facilitate debugging, the HM-MT2401 EVB board is equipped with a CP2102 USB to serial port chip. Users can be configured with hardware, flow control, or no flow control function through the jumper cap. Before using this function, confirm that the jump caps J13/J14/J15/J16 are connected.

Note: The MCU_CTS/MCU_RTS foot position is reused with the PIR sensor/contact sensor. If the PIR sensor is already used, disconnect the J15. If a contact sensor is used, break the J16.

In addition, when the USB interface is used for the power supply, the jumper cap J17 should be connected.

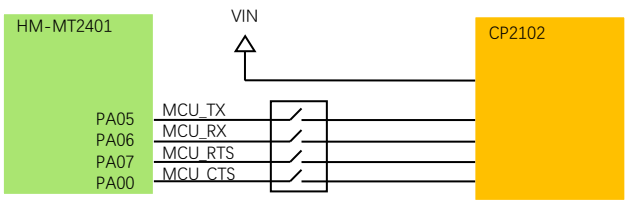


Figure 2.10 Schematic diagram of the SPI Flash electrical connection

2.8 Button

The HM-MT2401 EVB board has four user function buttons and one reset button. The corresponding GPIO ports are shown in Table 2.1.

Table 2.1 Button and the corresponding GPIO ports

Button	GPIO
BTN1	PB01
BTN2	PB02
BTN3	PB03
BTN4	PB04

3 Hardware Connection Diagram

When the Matter software of the HM-MT2401 EVB board needs to be debugged or programmed, its hardware connection diagram is shown in Figure 3.1.

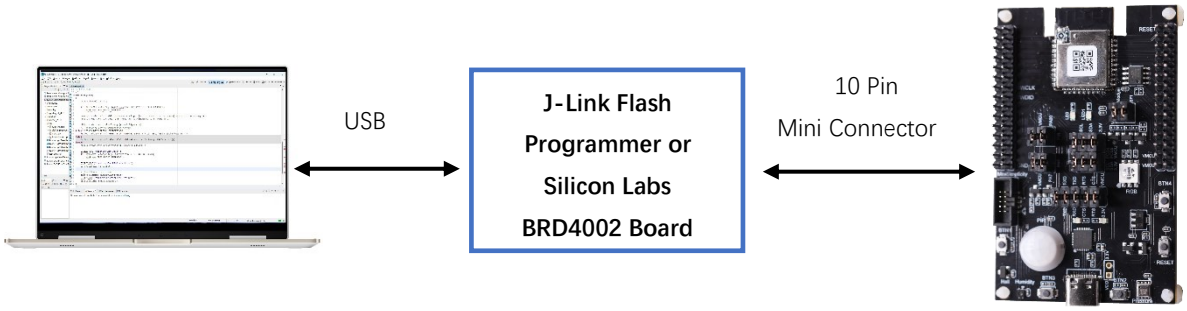


Figure 3.1 Hardware connection diagram of the HM-MT2401 EVB board in debugging mode

The debugging and programming interface of the HM-MT2401 EVB board is shown in Figure 3.2, which includes serial debugging interface SWD, SWO, PTI package trace interface, serial port, and reset.

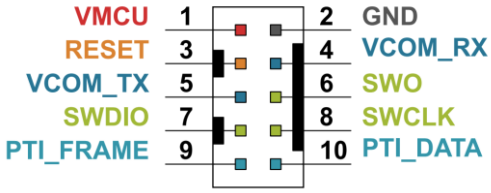


Figure 3.2 The Mini Simplicity Connector Interface

The interface description of the Mini Simplicity Connector is shown in Table 3.1.

Table 3.1 Description of the Mini Simplicity Connector

No.	The Pin foot function	Description
1	VMCU	Power
2	GND	Ground
3	RST	Module reset Pin
4	RX	Receive pin for serial port
5	TX	Send pin for serial port
6	SWO	Serial line output
7	SWDIO	debugging interface
8	SWCLK	Serial line clock
9	PTI_FRAME	PTI frame signal
10	PTI_DATA	PTI data signal

After programming the Matter firmware, it can be supplied through the USB port of the HM-MT2401 EVB board. The hardware connection diagram is shown in Figure 3.3. For low-power Matter devices, a battery can be used.

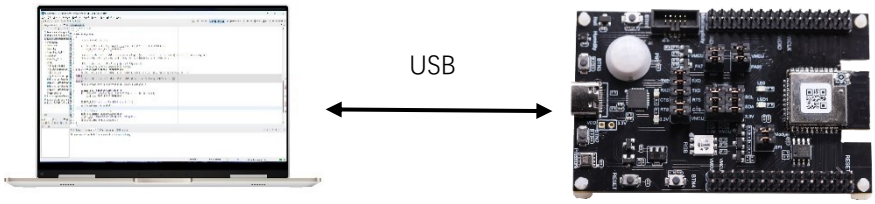
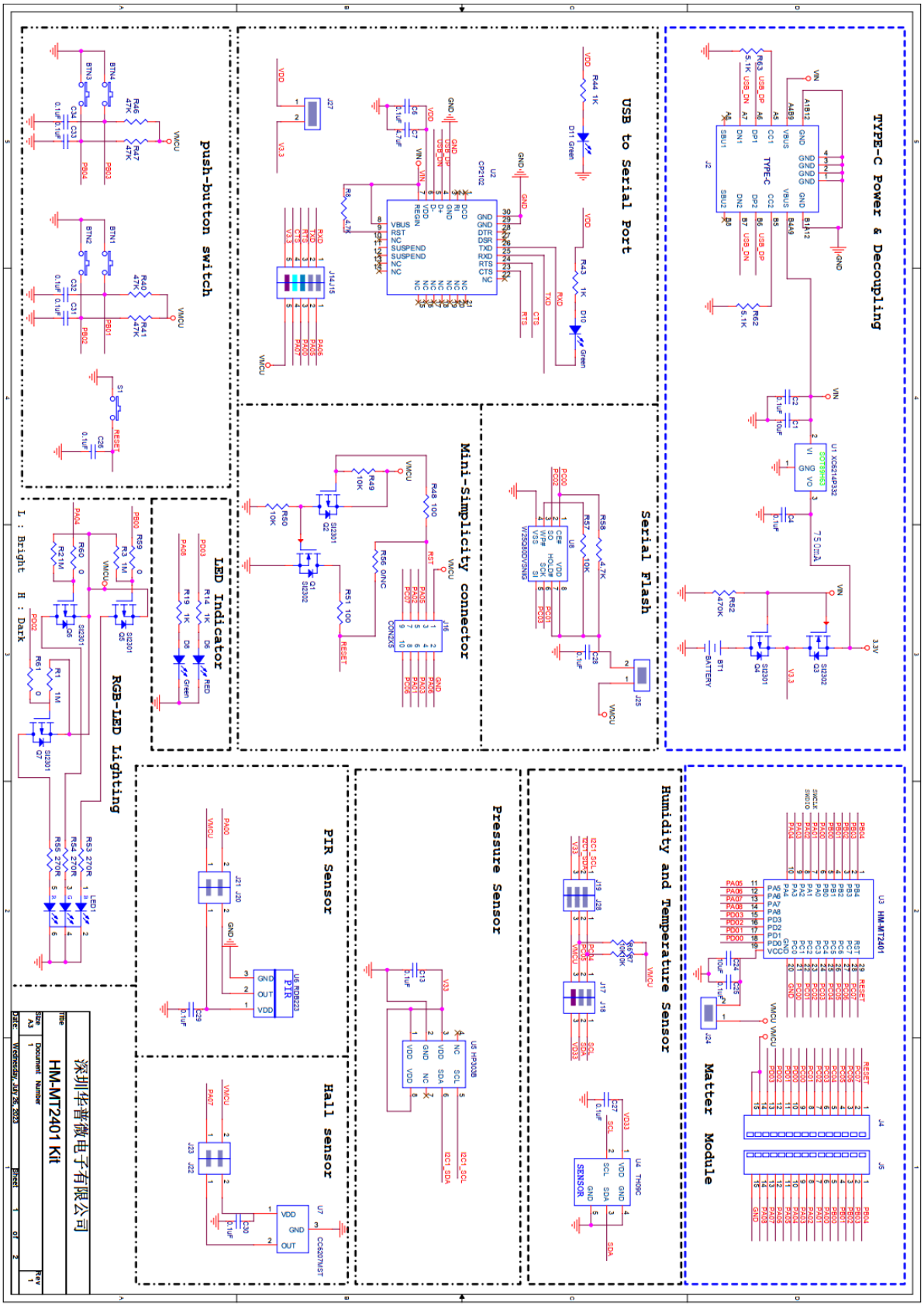


Figure 3.3 Hardware connection diagram of the HM-MT2401 EVB board in working mode

4 Schematic


TYPE-C Power & Decoupling
USB to Serial Port
Serial Flash
Mini-Simplicity connector
push-button switch
LED Indicator
RGB-LED Lighting
PIR Sensor
Pressure Sensor
Hall sensor
Humidity and Temperature Sensor
Matter Module
HM-MT2401
深圳华普微电子有限公司
HM-MT2401 Kit

5 Document Change Record

Table 5.1 Document change record

Document version	Change description	Date
V1.0	First release	2023.8.30

6 Contact Information

Shenzhen Hope Microelectronics Co., Ltd.

Address: 30th floor of 8th Building, C Zone, Vanke Cloud City, Xili Sub-district, Nanshan, Shenzhen, GD, P.R. China

Tel: + 86-0755-82973805

Email: sales@hoperf.com

Website: https://www.hoperf.com/