• Bluetooth® Radio

- Fully embedded Bluetooth® v4.2 single mode
- TX power +7 dbm,-92dbm RX sensitivity@1M
- 128-bit encryption security
- Range up to 50m
- Integrated on board PCB antenna
- Multipoint capability(master and slave at the same time)

• Support Profiles

- BLE (Master and slave)
- The generic attribute profile (GATT)
- Health care, Sports and fitness, Proximity sensing profiles
- Alerts and timer profiles

• User Interface

- Send AT command over UART
- Firmware upgrade over the air (OTA)
- Transmit data: 300kbps transmission speed (UART)
- I2C interface (Master)
- USB
- PWM (6 channel)

• General I/O

- 10 general purpose I/Os
- 7 analogue I/O (14bit ADC)

• FCC/RED/IC/RoHs qualified

• Single voltage supply: 1.9--3.6V typical

• Small form factor: 18.10 x 12.05x 2.2mm

• Operating temperature range: -40 °C to 85 °

Nov 23, 2016

VERSION HISTORY

Version	Comment
V1.0	Current consumption added

Confidential and Proprietary – Ehong Technology Co.,Ltd

1. Contents

2. Table of Tables

3. Table of Figures

1. Description

EH-MC20 Bluetooth® low energy single mode module is a single mode device targeted for low power sensors and accessories.

The module offers all Bluetooth® low energy features: radio, stack, profiles and application space for customer applications, so no external processor is needed. The module also provides flexible hardware interfaces to connect sensors, simple user interfaces or even displays directly to the module.

The module internal integration 32bit MCU and 128KB flash, external interface is rich （AIO,PWM,UART,USB）, and the price is cheap.

After buying Bluetooth® module, we provide free technical support APP of iOS system or APP Android system.

2. Applications

- ➢ Sports and fitness
- ➢ Healthcare
- ➢ Home entertainment
- ➢ Office and mobile accessories
- ➢ Automotive
- ➢ Commercial
- ➢ Watches
- ➢ Human interface devices

3. Product numbering

EH-MC20

———— Company name(Ehong)

———— Module Name

4. Electrical Characteristics

4.1. Recommended Operation Conditions

Operating Condition	Min	Typical	Max	Unit
Operating Temperature Range	-40	--	+85	°C
Battery (VDD_BAT) operation	1.9	--	+3.6	V
I/O Supply Voltage (VDD_PIO)	1.9	--	+3.6	V
AIO input	0	-	+1.9	V
Frequency Range	2402		2480	MHz

Table 1:   Recommended Operation Conditions

4.2. Absolute Maximum Rating

Rating	Min	Max	Unit
Storage Temperature	-65	+150	°C
Battery (VBAT) operation*	-0.3	3.9	V
I/O supply voltage	-0.3	+VDD+0.3	V

Table 2：Absolute Maximum Rating

4.3. Input/Output Terminal Characteristics

Input Voltage Levels	Min	Typical	Max	Unit
V_{IL} input logic level low	VSS	-	0.3VDD	V
V_{IH} input logic level high	0.7 x VDD	-	VDD	V
Output Voltage Levels	Min	Typical	Max	Unit
V_{OL} output logic level low, I_{OL} = 4.0mA	VSS	-	0.3VDD	V
V_{OH} output logic level high, I_{OH} = -4.0mA	VDD-0.3	-	VDD	V

Table 3:   Digital I/O Characteristics

Input Voltage Levels	Min	Typical	Max	Unit
AIO	0	-	3.3	V

Table 4:   AIO Characteristics

4.4. Power Consumption

The current consumption are measured at the VBAT

Item	Sym	Min	Typ	Max	Unit	condition
TX	I_{Tx}		15		mA	Continuous Tx Transmission 0db output power
RX	I_{RX}		12		mA	Continuous Tx reception
Suspend Current	I_{susp}	-	10	50	uA	IO wakeup
	I_{susp}	-	12	52	uA	Timer wakeup
Deep sleep Current	I_{deep}	-	2	5	uA	

Table 5: Current Consumption

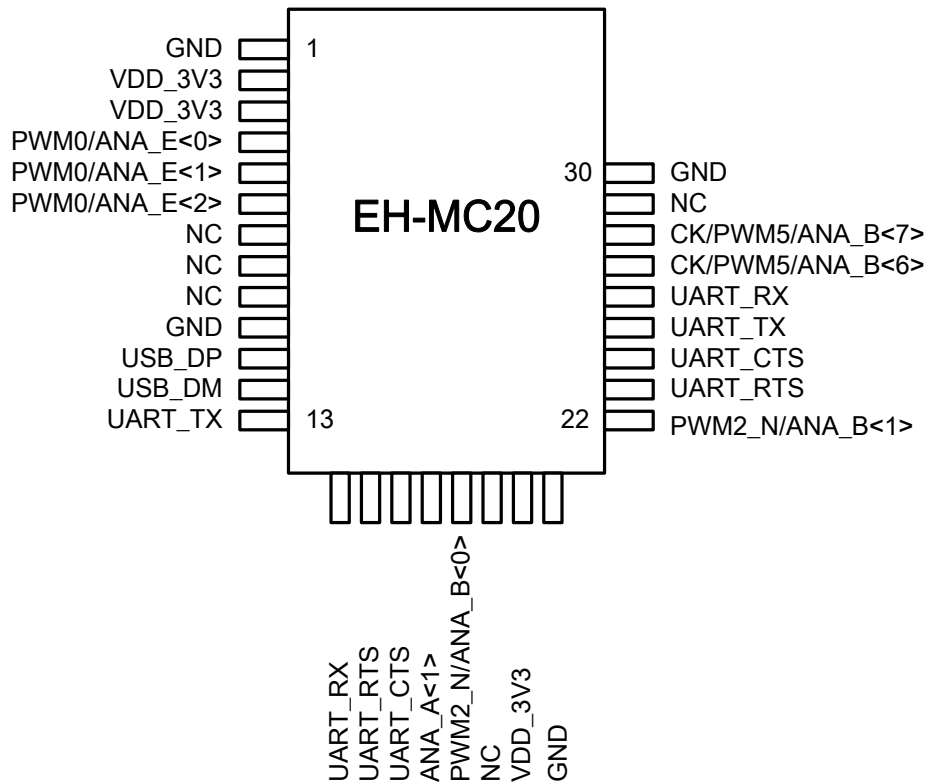# 5. Pin out and Terminal Description

5.1. Pin Configuration

Figure 1： Pinout of EH-MC20

Symbol	Pin	PAD Type	Description
GND	1	Ground	Ground
VDD_3V3	2	Power supply	Button cell battery or DC 1.8V to 3.6V
VDD_3V3	3	Power supply	Button cell battery or DC 1.8V to 3.6V
PWM0/ANA_E(0)	4	Digital I/O	PWM0/GPIO/ANA_E0
PWM1/ANA_E(1)	5	Digital I/O	PWM1/GPIO/ANA_E1
PWM0/ANA_A(1)	6	Digital I/O	PWM0/GPIO/ANA_A1
NC	7	NC	NC
NC	8	NC	NC
NC	9	NC	NC
GND	10	Ground	Ground
USB_DP	11	Digital I/O	USB data positive/GPIO/ANA_E3
USB_DM	12	Digital I/O	USB data Minus/GPIO/ANA_E3
UART_TX	13	Digital I/O	UART_TX/PWM2/GPIO/ANA_C2 Optional 32KHz crystal output
UART_RX	14	Digital I/O	UART_TX/PWM3/GPIO/ANA_C3 Optional 32KHz crystal input
UART_RTS	15	Digital I/O	UART_RTS/PWM3/GPIO/ANA_C4
UART_CTS	16	Digital I/O	UART_RTS/PWM4/GPIO/ANA_C4
ANA_A(1)	17	Digital I/O	ANA_A1
PWM2/SW/ANA_B(0)	18	Digital I/O	PWM2/single wire slave/GPIO/ANA_B(0)
NC	19	NC	NC
VDD_3V3	20	Power Supply	Button cell battery or DC 1.8V to 3.6V
GND	21	Ground	Ground
PWM2_N/ANA_B(1)	22	Digital I/O	PWM2 inverting/GPIO/ANA_B1
UART_RTS	23	Digital I/O	UART_RTS/PWM3/GPIO/ANA_C4
UART_CTS	24	Digital I/O	UART_RTS/PWM4/GPIO/ANA_C4
UART_TX	25	Digital I/O	UART_TX/PWM2/GPIO/ANA_C2 Optional 32KHz crystal output
UART_RX	26	Digital I/O	UART_TX/PWM3/GPIO/ANA_C3 Optional 32KHz crystal input
DI/PWM5/ANA_B(6)	27	Digital I/O	I2C_SDA/PWM5/GPIO/ANA_B6
CK/PWM5/ANA_B(7)	28	Digital I/O	I2C_CLK/PWM5 inverting/GPIO/ANA_B7
NC	29	NC	NC
GND	30	Ground	Ground

Table 6：PIN Terminal Description

Note:

A. UART_TX > PIN13 and PIN25 are the same PIN and feature.

B. UART_RX>PIN14 and PIN26 are the same PIN and feature.

C. UART_RTS>PIN15 and PIN23 are the same PIN and feature.

D. UART_CTS>PIN16 and PIN24 are the same PIN and feature

6. Physical Interfaces

6.1. Power Supply

- The module power supply 3v coin cell batteries or DC 3.3v
- Power supply pin connection capacitor to chip and pin as far as possible close
- Capacitor decouples power to the chip
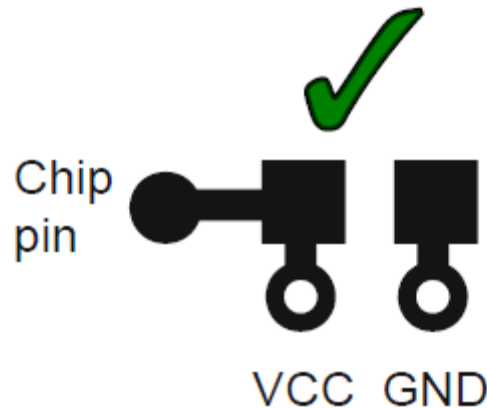- Capacitor prevents noise coupling back to power plane.

-

Figure 2： Power Supply PCB Design

6.2. PIO

14 PIOs are provided. They are powered from VDD.PIO lines are software-configurable as weak pull-up, weak pull-down, strong pull-up or strong pull-down.
Note:
At reset all PIO lines are inputs with weak pull-downs.

6.3. AIO

14 AIOs are provided. They can be connected to internal 14 bits ADC. Their functions depend on software.

6.4. PWM

6 PIOs can be driven by internal PWM module. The PWM module also works while the module is sleep. So it can be used as a LED flasher. These functions are controlled by special firmware.

6.5. UART

This is a standard UART interface for communicating with other serial devices and Support UART hardware flow control. The UART interface provides a simple mechanism for communicating with other serial devices using the RS232 protocol.

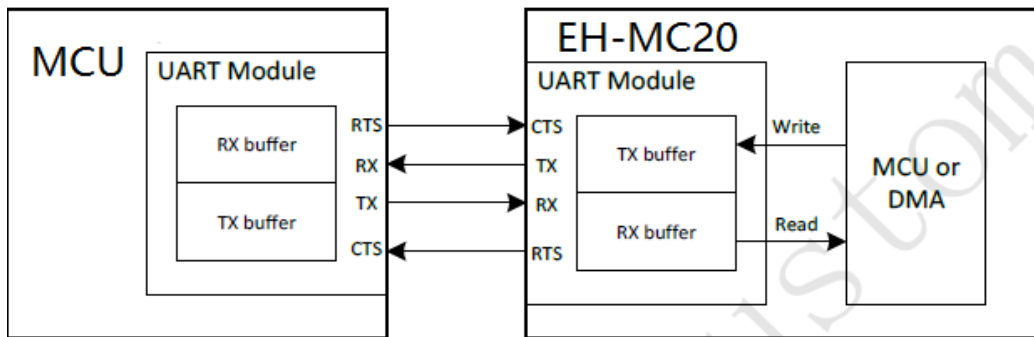| Parameter		Possible Values
Baud Rate	Minimum	1200 baud (≤2%Error)
		9600 baud (≤1%Error)
	Maximum	2M baud (≤1%Error)
Flow Control		RTS/CTS
Parity		None, Odd or Even
Number of Stop Bits		1 or 2
Bits per Byte		8

Table 7:   Possible UART Settings

Figure 3：   Connection To Host device

6.6. USB interface

 USB interface compatible with USB 2.0 full speed mode, support 9 endpoints, support ISP (In-system programming) Via USB port.

6.7. I²C Master

The module can act as an I^{2}C master when configured by software. The module PIN27 and PIN28 two PIOs can be configured as I^{2}C_SCL and I^{2}C_SDA.

6.8. SPI Debug

The module support single wire interface SWM(single wire master) and SWS(single wire slave) represent the master and slave device of the single wire communication system developed by Ehong. The maximum data rate can be up to 2Mbps.
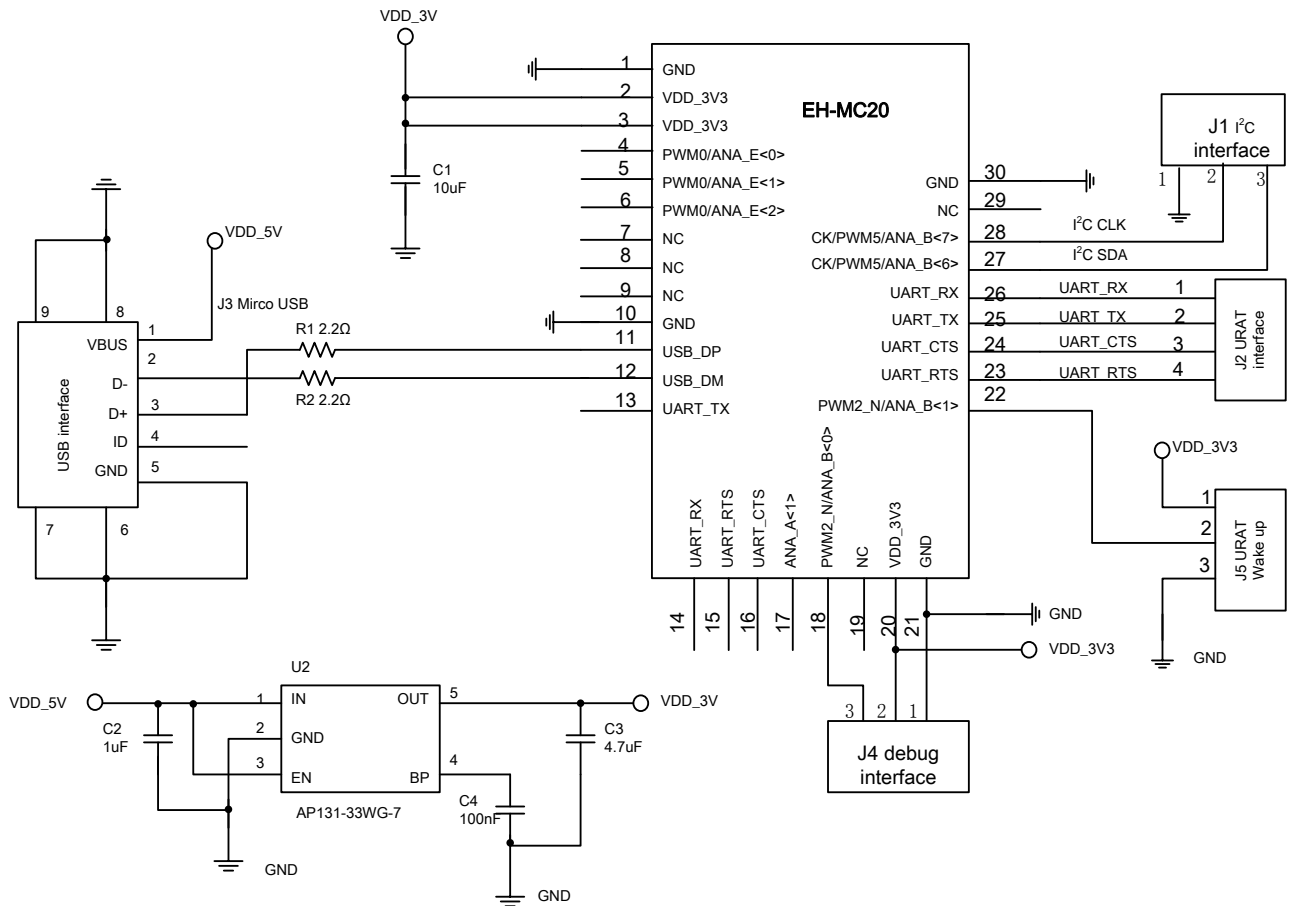
7. Reference Design

Figure 4： Reference Design

Note: Please keep pulling up the WAKE pin during sending data to the module.

8. PCB Layout

For optimal performance of the antenna place the module at the corner of the PCB as shown in the figure 3. Do not place any metal (traces, components, battery etc.) within the clearance area of the antenna. Connect all the GND pins directly to a solid GND plane. Place the GND vias as close to the GND pins as possible. Use good layout practices to avoid any excessive

noise coupling to signal lines or supply voltage lines. Avoid placing plastic or any other dielectric material closer than 6 mm from the antenna. Any dielectric closer than 6 mm from the antenna will detune the antenna to lower frequencies.
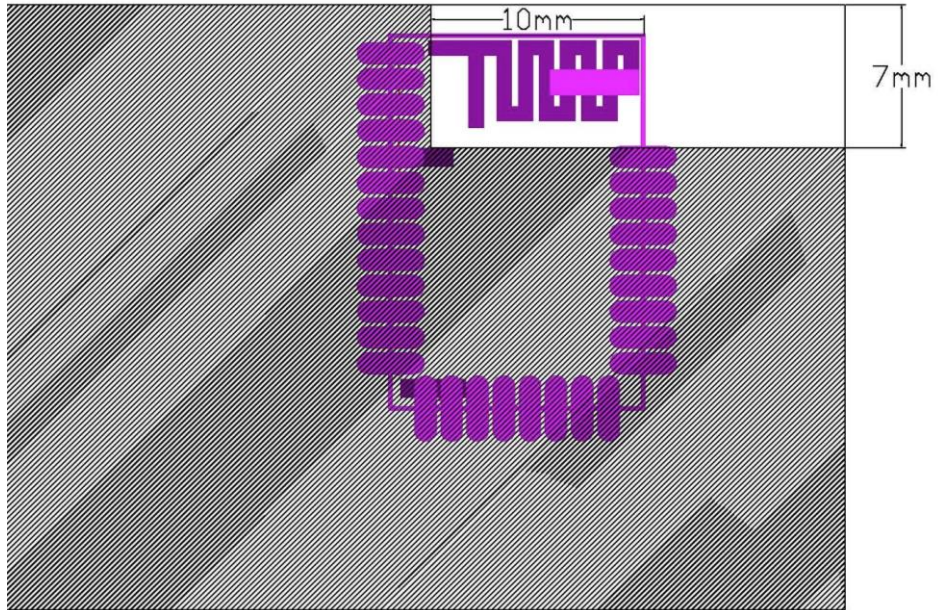

Figure 5:   Clearance area of antenna

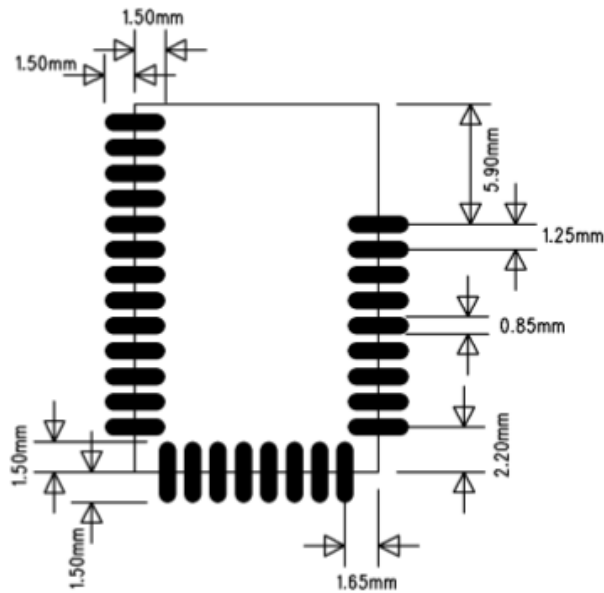## 9. Mechanical and PCB Footprint Characteristics

Figure 6 ：Physical Dimensions and Recommended Footprint (Unit: mm, Deviation:0.02m)
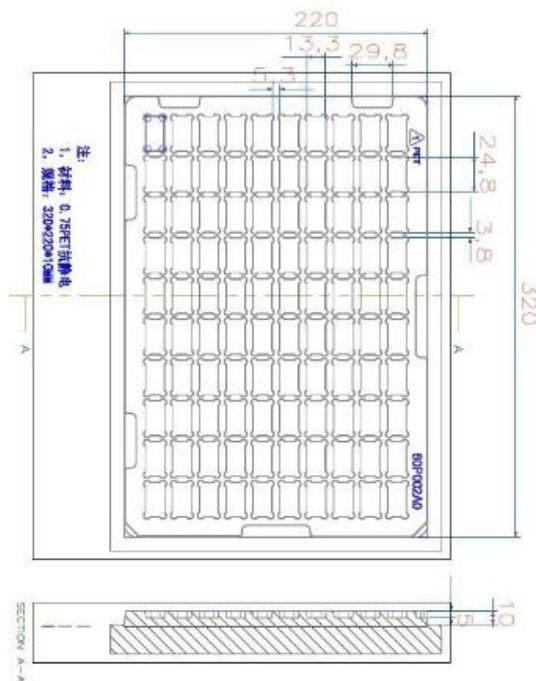
10. Packaging

Figure 7:   Packaging

Remark: Packaging for the pallet, one packaging quantity is 100 P

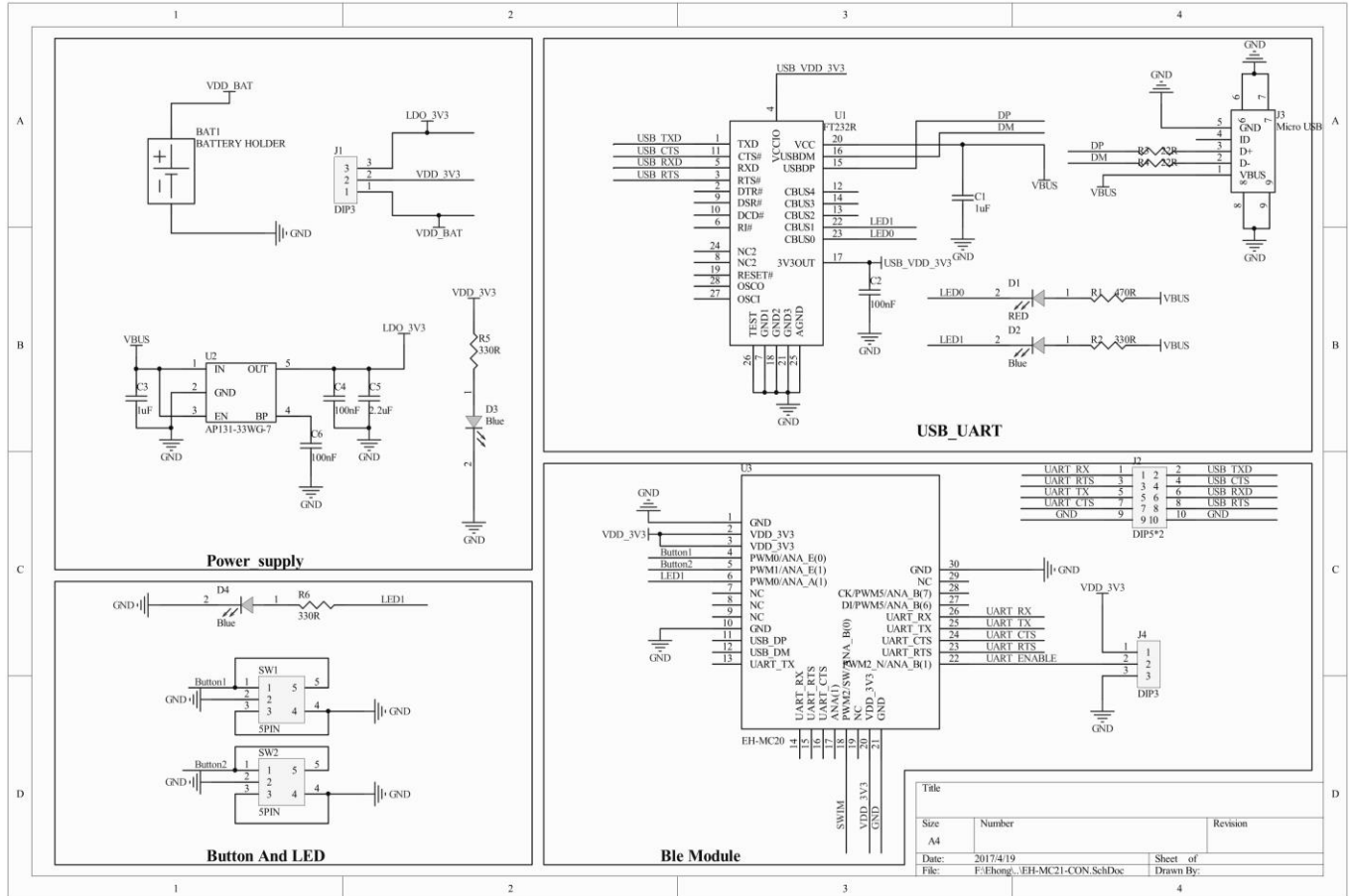## 11. EH-MEVK-MC20

11.1. EH-MEVK-MC20-SCH

Figure 8: EH-MEVK-MC20-SCH
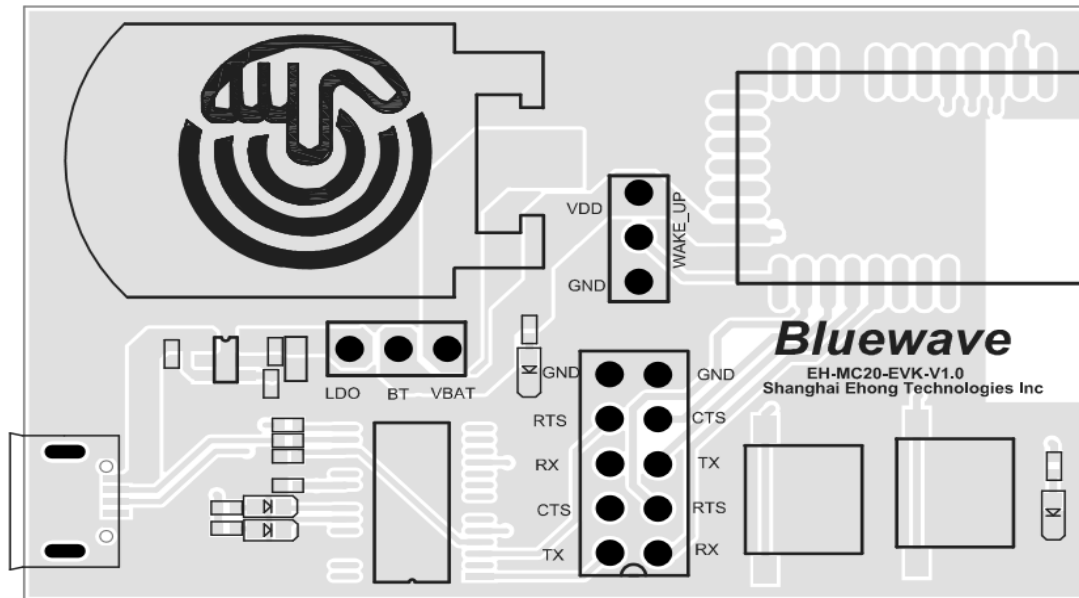
11.2. EH-EVK-MC20 PCB

Figure 9: EH-MEVK-MC20-PCB

12. Soldering Recommendations

EH-MC20 is compatible with industrial standard reflow profile for Pb-free solders. The reflow profile used is dependent on the thermal mass of the entire populated PCB, heat transfer efficiency of the oven and particular type of solder paste used. Consult the datasheet of particular solder paste for profile configurations.

SMT stencil making requirements

- If bluetooth module PIN pitch ≥ **0.25mm** and other component PIN pitch ≥ **0.25mm** ,so you choose SMT stencil thickness **0.15mm**。
- If bluetooth module PIN pitch ≥ **0.25mm** and other component PIN pitch ≤ **0.25mm** ,so you choose SMT Ladder stencil Bluetooth module thickness **0.15mm** other component thickness **0.13mm.**
- Solder pad open via ratio **Length 1:1.2, width 1:1.**

13. Certifications

EH-MC20 is compliant to following specifications.

13.1. FCC and IC

EH-MC20 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

✧ This device may not cause harmful interference;

✧ This device must accept any interference received, including interference that may cause undesired operation.

Contains FCC ID: 2ACCRMC20

Contains IC: 20625-EHMC20

13.2.   RED

EH-MC20 is in conformity with the essential requirements and other relevant requirements of the EU-RED Directive (2014/53/EU). The product is conformity with the following standards and/or normative documents.

✧EMC (immunity only) EN 301 489-1 V.2.2.0 in accordance with EN 301 489-17 V3.2.0

✧Radiated emissions EN 300 328 V2.1.1

✧Safety EN60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

13.3.   RoHS

EH-MC20 is in conformity with the essential requirements and other relevant requirements of the EC Council 2011/65/EU (RoHS 2.0), The applied standards: IEC 62321 Ed 1.0:2013

14.   Contact Information

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