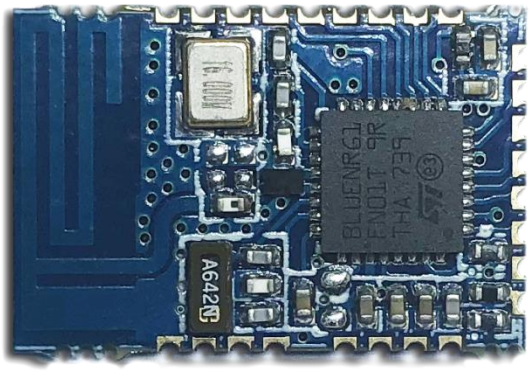
Bluetooth Low Energy (BLE) Pass-through Module Specification

HM-BT800B



1 Product Overview

HM-BT800B BLE is a wireless data pass-through module based on ST BlueNRG-1 low-power Bluetooth 5.0 chip which from Shenzhen Hope Microelectronics Co., Ltd.It supports AT instruction set, OTA upgrading and users can change serial port baud rate, device name, paired password and other parameters according to their needs.Users can configure specific port output through APP.

2 Module Features

- Low Power Bluetooth 5.0 Data Pass-through Module
- Integrating 32-bit Cortex-M0 processor
- Receiving sensitivity: -88dBm
- Supports configuration of module parameters through UART
- Small Size: 18mm(L)*12.2mm(W)*2.3mm(H)

3 Applications

The HM-BT800B module is mainly used in short distance wireless data transmission. It can easily connect with PC, tablet, mobile phone and other devices through Bluetooth, and also can realize the data exchange between two modules, avoid the tedious cable connection, and the serial line can be replaces directly.

- Wireless Data Transmission
- Wireless Data Acquisition
- Industrial Remote Control & Measurement
- POS System & Bank System
- Automatic Data Acquisition System
- Building Automation, Security, Intelligent Door Lock
- Smart Home & Industrial Control

4 Physical Characteristics

Operating Frequency Band	2.4GHz ISM Band
Bluetooth Specification	Bluetooth Low Energy(BLE) V5.0
Output Power Class	Class 2
Operating Voltage	3.3V
Host Interface	UART
Dimension	18mm(L)*12mm(W)*2.3mm(H)

5 Electrical Characteristics

Table 1 Recommended Operating Conditions

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
VCC	Power supply	Relative to GND	2.4	3.0	3.6	V
TA	Operating temperature		-40	+25	+85	℃

Table2 DC Characteristics (Typical Values are Ta=25℃and VCC = 3.3V)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Icc	Current consumption	Sleep mode		TBD		uA
		RX mode		TBD		mA
		TX mode(+4dBM)		TBD		mA
INTERFACE						
V(OH)	High level output voltage		0.9*Vcc			V
V(OL)	Low level output voltage				0.1*Vcc	V
V(IH)	High level input voltage		0.7*Vcc			V
V(IL)	Low level input voltage				0.3*Vcc	V

Table3 RF Rx and Tx Characteristics (Typical Values are Ta=25℃and VCC = 3.3V)

SYMBOL	PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNIT
	RX sensitivity (Non DC-DC)			-85		dBm
	Maximum input signal level			0		dBm
	Adjacent-channel rejection(C/I)	±1MHz		-1		dB
	Adjacent-channel rejection(C/I)	±2MHz		-40		dB
F	Frequency range		2400		2483.5	MHz
P(TX)	Output power		-18		8	dBm

6 Pass-through Profile

The pass-through profile service of HM-BT800B module includes 1 service(UUID: A001), and includes 11characteristics. Among them, 3 Characteristics are used for data transmission and 8 Characteristics are used to configure module parameters on the mobile terminal.

6.1 Service UUID：16 Bytes, 0XA001

Characteristic UUID (TX Channel): 16 Bits, A002, Characteristics: Notify

Characteristic UUID (RX Channel):16 Bits, A003, Characteristics: Write Without Response

Characteristic UUID: 16 Bits, A004, Characteristics: Notify

Characteristic UUID (Name Channel): 16 Bits, A005, Characteristics: Read|Write

Characteristic UUID (TX Power Channel):16 Bits, A006, Characteristics: Read|Write

Characteristic UUID (Baud Rate Channel): 16 Bits, A007, Characteristics: Read | Write

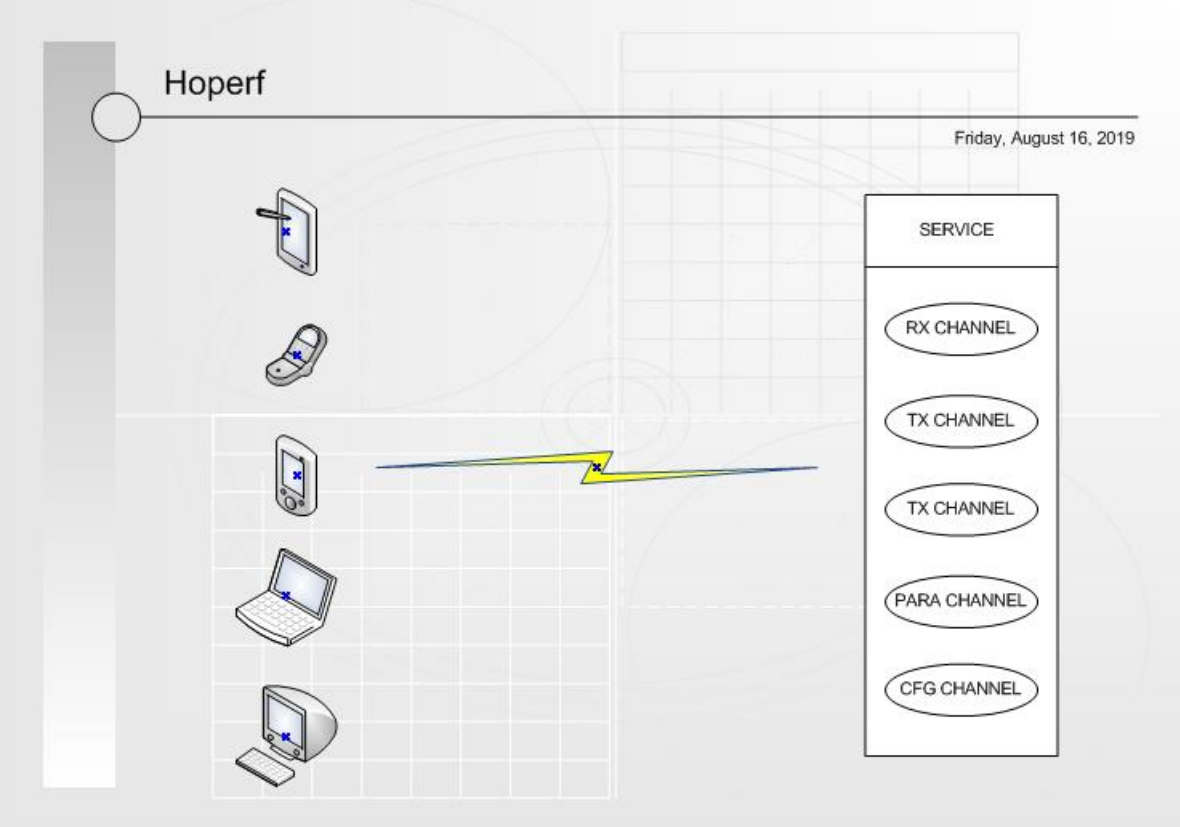
Characteristic UUID (Version Channel): 16 Bits, A008, Characteristics: Read

Characteristic UUID (Interval Parameter Channel): 16 Bits, A009, Characteristics: Read|Write

Characteristic UUID (IO OutCfg Channel): 16 Bits, A00A, Characteristics: Read|Write

Characteristic UUID (Address Channel): 16 Bits, A00B, Characteristics: Read|Write

Characteristic UUID(Password Channel):16 Bits, A00C, Characteristics: Read | Write



6.2 Data Transmission from Mobile App to BLE Module

The Mobile APP sends data to the module through RX Channel. The maximum length of a packet is 20 bytes, and more than 20 bytes need to be unpacked for sending.

6.3 Data Transmission from BLE Module to Mobile App

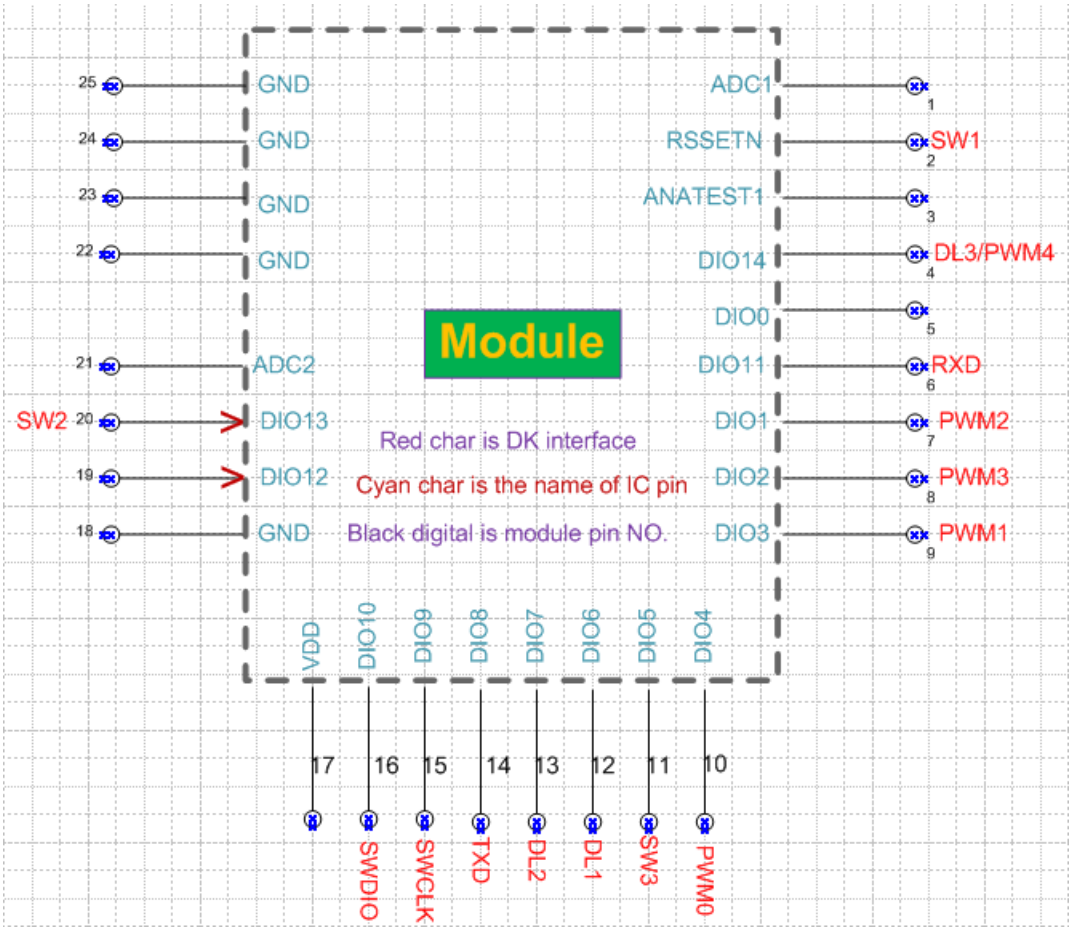
The external MCU can send data to the module through UART, and the data will be transmitted to the BLE host device in the form of notify by module, such as mobile APP.

6.4 UART AT Instructions & Pass-through Data Mode

1) AT Instruction Mode: Users can input AT instructions to get or configure module parameters through UART.
2) Data Pass-through Mode: In this mode, all data input through UART interface will be regarded as transmitted data, which will be transmitted directly to the Bluetooth master device.
3) Automatic Mode Switching: When the module is powered on and connected

to the Bluetooth main device, the module will automatically switch to data transmission mode.

7 Pass-through Module Connecting Scheme

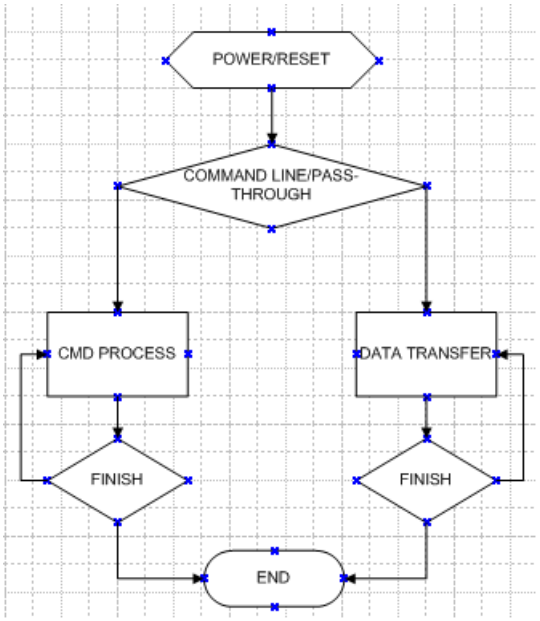


Pin No		Pin Name	Output/Input	Pin Description
2		RSSETN/ SW1	I	Reset, Low Level Effective
4		DL3	O	LED
6		RXD	I	Serial Data Input
11		SW3	I	Key Input(Module run in sleep mode when reset set it high)
12		DL1	O	LED
13		DL2	O	LED
14		TXD	O	Serial Data Output
15		SWCLK	-	Debug interface
16		SWDIO	-	Debug interface
17		VCC	-	Module voltage positive, recommended 3.0/3.3V
18		GND	-	GND
20		SW2	I	Key Input
other		-	-	

8 Sequence Diagram

In pass-through mode, the BLE module RXD starts counting the number of bytes received (8bits) and stamping after receiving the data. When the counter reaches 20 or delays more than 50 MS without receiving data, the data in the buffer will be sent from the BLE channel to the BLE host and counted again.

9 Operational Flowchart of External MCU



10 AT Instructions

Command Format

The instructions are based on ASCII code on the command line. The format of instructions is as follows:

CMD PARAMETER0 PARAMETER1 PARAMETER… \r\n

<CR>: Enter, ASCII code 0x0d('\r');

<LF>: Line feed, ASCII code 0x0a('\n');

<CMD>:Character case-sensitive,Hexadecimal characters are not case-insensitive

Echo command group:
get name: Module name echo
get address: Module address echo
get txp: Modular transmit power echo
get version: Module version number echo
get baudrate: Module UART baudrate echo
help：Printing help

Set the command group:
set name: Setting module name
set address: Setting module address
set txp: Setting Module Transmitting Power
set baudrate: Setting Module UART Baudrate
reset：Reset Module

n：Baud Rate Value, Character Type

0: 9600

1: 38400

2: 76800

3: 115200 (Factory Default)

4: 250000

n：Power Value, Character Type

0: -14dBm
1: -11Bm

2: -8dBm

3: -5dBm

4: -2dBm

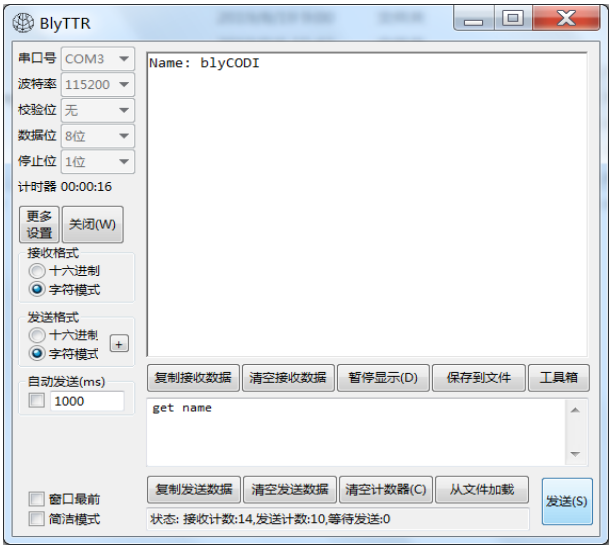
5: 2dBm

6: 4dBm (Factory Default)

7: 8dBm

n：Bluetooth Address, Character Type

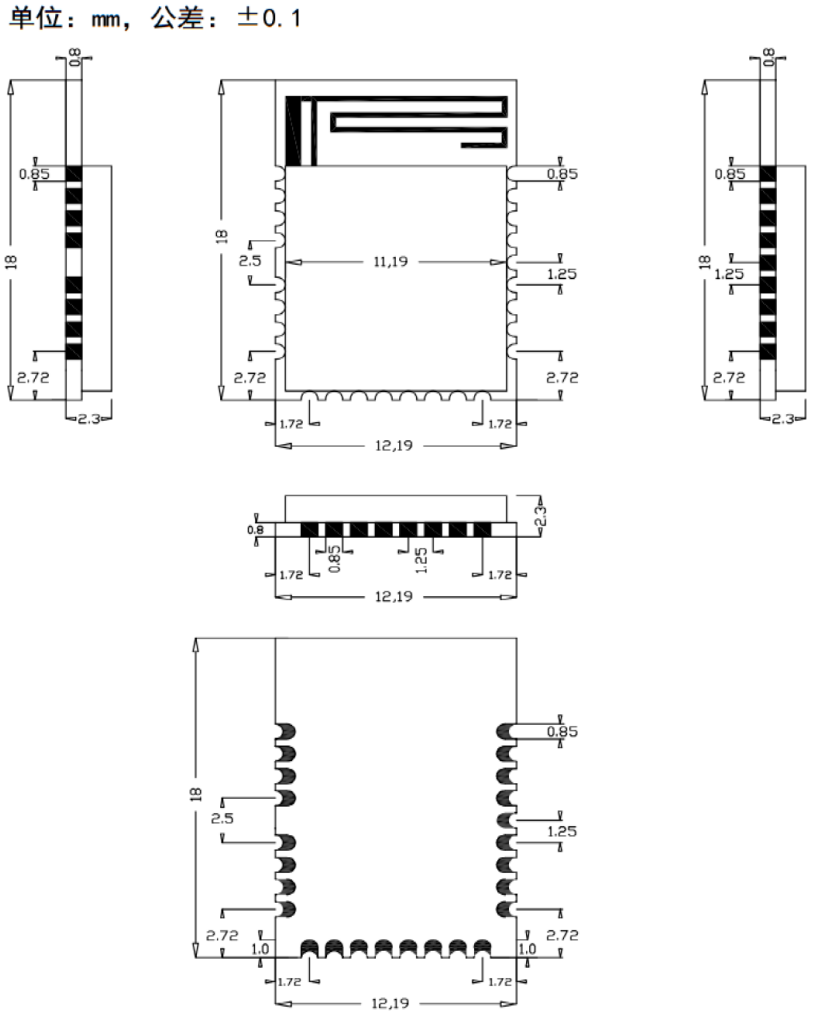
087cBe7b09ce



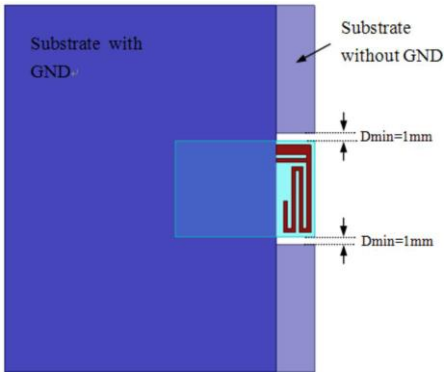
(fig:an example for “get name” command)

11 PCB Package Size &Layout Notes

PCB Package Size



Layout Notes



(PCB Antenna)

As shown in the figure above, when the BLE module performs Layout, the upper and lower parts of the antenna cannot be grounded by copper cladding. At the same time, the bottom part of the antenna should be hollowed out.

Revision History

Date	Version	Description	Writer
2019-08-20	1.1	Second Edition	Billy

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