MINEWSEMI

Bluetooth LE Module

ME52BS02

Datasheet

V 1.0.0

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Owen, Leo	2024.10.25	

Part Number

Model	Hardware Code
ME52BS02	1N26TI

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https://en.minewsemi.com/file/ME52BS02-OM6626_Datasheet_M_EN.pdf

ME52BS02-OM6626

Bluetooth master-slave pass-through module that supports master-slave switching, serial command configuration, and iBeacon broadcast mode

The ME52BS02 is a master-slave module that can switch between master and slave modes through commands. The master and slave modes cannot work simultaneously and only support one-to-one connections. By default, the device operates in master mode. In master mode, it can scan and connect to devices through commands. The scan can be configured to filter by broadcast name or MAC address to locate relevant devices. Connections can only be initiated by specifying the MAC address. The device communicates with an MCU via a UART interface. In command mode, the UART can be used to send commands to modify parameters such as scan interval, scan timeout, connection interval, broadcast interval, custom broadcast data, and baud rate. The MCU can send a command through UART to switch to slave mode. In slave mode, the device can be in broadcast or connection state, allowing the master device to connect and serve as a bridge for transparent data transmission between the master and the MCU.

FEATURES

- Supports master-slave switching
- Maximum transmission speed up to 11kB/s
- Supports serial command configuration
- One-to-one connection
- Supporting iBeacon broadcast mode

KEY PARAMETERS

ME52BS02-OM6626			
Chip Model	OnMicro OM6626	**Antenna**	PCB
Module Size	15.8×12×2mm	**GPIO**	15
Flash	1MB	**RAM**	80KB
Receiving Sensitivity	-99dBm	**Transmitting Power**	-30~ +8dBm
Emission Current	0dBm-4.2mA	**Receiving Current**	3.4mA
Firmware	Master-slave switching pass-through firmware		

APPLICATION

Smart Home

Consumer Electronics

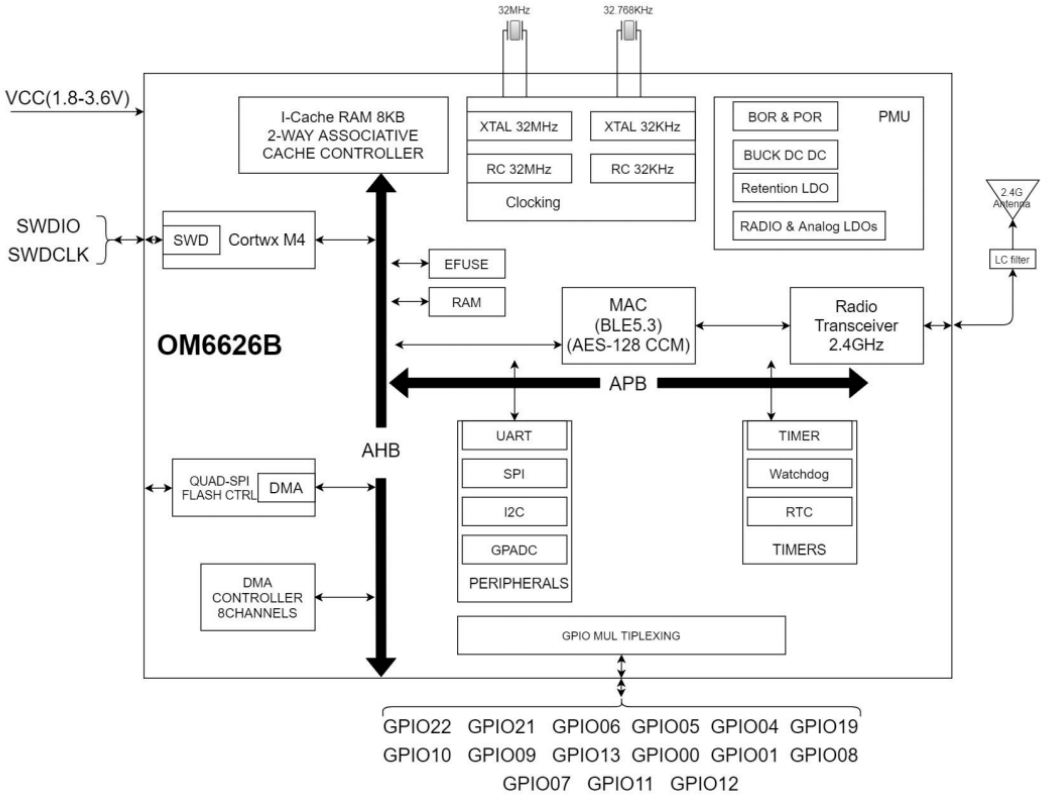
Intelligent Medical Care

Security Equipment

Automotive Equipment

INDEX

1 BLOCK DIAGRAM



2 ELECTRICAL SPECIFICATION

Parameters	Value	Notes
Working Voltage	1.8V-3.6V	
Working Temperature	-40℃~+85℃	Storage temperature is -40℃~+105℃
Transmission Power	-30 ~ +8dBm	Configurable
Receiving Current	3.4mA	RF reception current in 1Mbps mode
Emission Current	4.2mA	RF emission current in 0dB mode
Module Dimension	15.8*12*2mm	
Quantity of IO Port	15	

3 CURRENT CONSUMPTION CHARACTERISTICS

The following power consumption test is conducted at room temperature with a power supply voltage of 3.3V. The power consumption of the master mode and the slave mode is inconsistent.

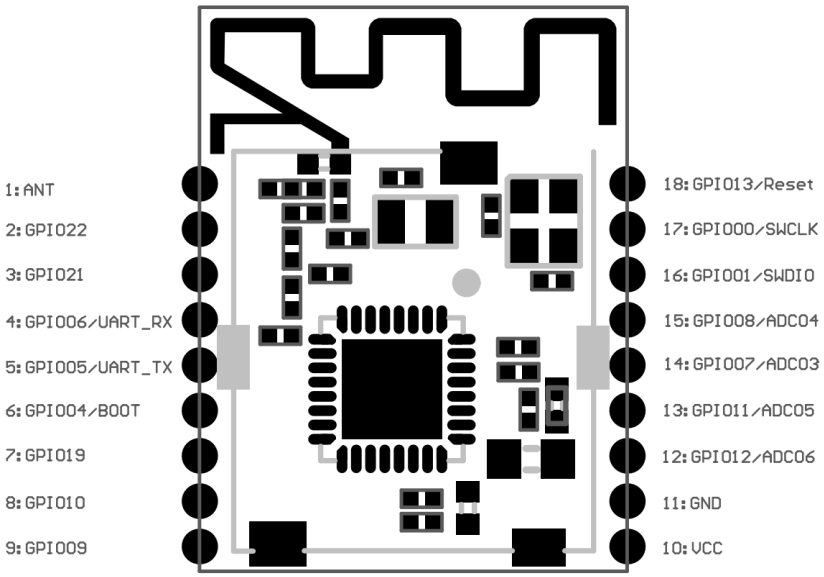
When in slave mode, the power consumption is as follows: (broadcast interval is 1s, maximum and minimum connection interval is 20-40ms).

Status / Consumption	Peak(mA)	Avg(mA)
Sleep mode average current (SLP pulled high、BTDATA pulled low)	1.1	0.00254
Broadcast average current (SLP pin is connected to GND, BTDATA is pulled high)	5.54	0.01735
Connected state average current (SLP pin is connected to GND, BTDATA is pulled high)	4.09	0.10975
Pass-through mode average current (SLP, BTDATA pins connected to GND, connected to mobile phones)	6.07	1.5

When in master mode, the power consumption is as follows: (The maximum and minimum connection interval is 20-40ms)

Status / Consumption	Peak(mA)	Avg(mA)
Sleep mode average current (SLP pulled high、BTDATA pulled low)	1.1	0.00254
Pass-through mode average current (SLP, BTDATA pins are connected to GND)	6.72	1.15

4 PIN DESCRIPTION



5 PIN DEFINITION

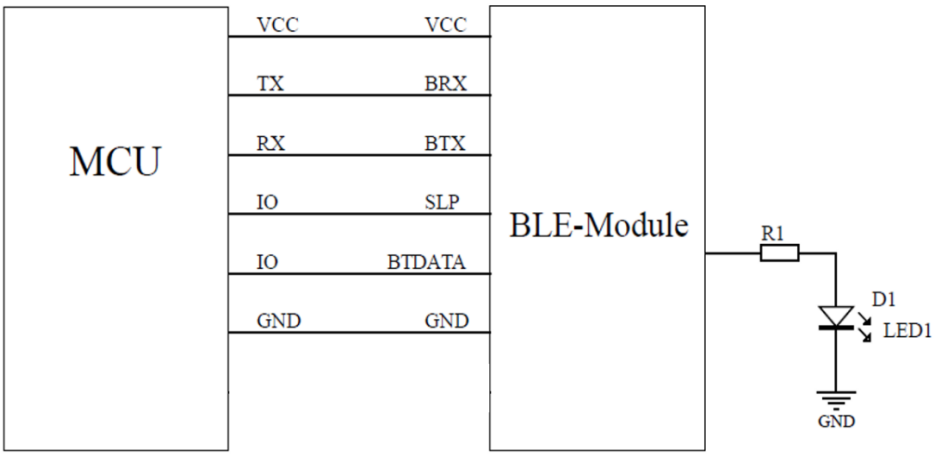
Pin Number	Symbol	Type	Definition	Notes
1	ANT	External antenna pins		By default, the module uses its built-in antenna, and this pin can remain unconnected. If you do not wish to use the built-in antenna, an external antenna can be connected via this pin. In the case of using an external antenna, the internal resistor connected to the built-in antenna must be reconfigured to connect to this pin. Please consult with the sales team to confirm these configuration requirements.
2	GPIO22	Digital I/O	GPIO	Not used in UART, floating
3	GPIO21	Digital I/O	GPIO	Not used in UART, floating
4	GPIO06/UART_RX	Digital I/O	Burn firmware	I/O Pin multiplexing, GPIO 06 /UART_RX;
5	GPIO05/UART_TX	Digital I/O	Burn firmware	I/O Pin multiplexing, GPIO 05 /UART_TX;
6	GPIO044/BOOT	Digital I/O	BOOT	Digital GPIO/BOOT
7	GPIO19	Digital I/O	GPIO	Not used in UART, floating
8	GPIO10	Digital I/O	UART TX	TX of Bluetooth Module
9	GPIO09	Digital I/O	UART RX	RX of Bluetooth Module
10	VCC	VCC	Power supply	
11	GND	GND	Ground	
12	GPIO12/ADC06	CON_IND	Connection indication	Sleep state: low level Broadcast status: Low level Connection status: High level
13	GPIO11/ADC05	FIFO_FULL	Transmission space full	Check transmission space availability 0: Bluetooth module has available space, data can be transmitted. 1: Master stops transmission, awaiting space to become available.
14	GPIO07/ADC03	Digital/Analog I/O	Sleep/Wake	Low level to wake-up, high level to sleep, no floating
15	GPIO08/ADC04	Digital/Analog I/O	Serial port control	Serial port on / off to control pin, no floating 0: serial port open, can send and receive serial port data 1: Serial port off
16	GPIO01/SWDIO	Digital I/O	Burn clock pin	Used for burning firmware
17	GPIO00/SWCLK	Digital I/O	Burn data pin	Used for burning firmware
18	GPIO13/Reset	Digital I/O		Digital GPIO/Reset

6 MODULE OPERATION INSTRUCTION

6.1 Tool

PC serial port assistant: Search and download "Serialport Utility" in your browser. The PC serial port assistant is used to debug the UART interface of the module.

6.2 Wiring



6.2.1 Power supply

The Module working voltage is 1.8V-3.6V.

6.2.2 SLP(Sleep/Wake)

When pull SLP low, the module in broadcast mode. BLE device can be found by smartphone APP, Device name: Minew_Vxxxxx(default) name, module can be connected with smartphone and enters connection mode. When pull SLP high, device will enter sleep mode.

> ⚠ Note: This pin cannot be left floating to avoid unpredictable errors.

6.2.3 BTDATA(UART Control)

The BTDATA pin is only valid when SLP is low. SLP is low, BTDATA is low, and when the module is in a broadcast state, all UART data will be considered as instructions. When the module is connected, all data is considered transparent.

> ⚠ Note: This pin cannot be left floating to avoid unpredictable errors.

6.2.4 UART Interface:TX and RX

When both SLP and BTDATA in low level, UART port will be activated, the module TX and RX should be connected to MCU RX and TX, then start to communicate through UART.
During module testing, the TX and RX pins can be connected to a USB-to-UART module. This allows sending and receiving UART data through a PC serial port assistant.

> Note: If a USB-to-UART module is not available, you can connect the TX and RX pins of two Bluetooth modules in reverse. Then, connect each module to a separate phone, and you can test data pass-through between the two devices.

6.2.5 CON_IND

CON_IND is used to indicate the connection status. It outputs a high level when connected and a low level in other states. This pin can be used to wake up the connected MCU, helping to save power.

6.2.6 FIFO_FULL

FIFO_FULL is used to indicate whether the cache is full or not. When sending large amount of data from MCU to module, this pin can be used for status checking. If it is high, then the FIFO is full, and UART data should not be transmitted further to avoid packet loss.

6.2.7 Command Instructions

After connecting VCC and GND, grounding the SLP and BTDATA pins places the module in an unconnected state, meaning the module is in command mode with the UART enabled. Commands can be sent to set and query parameters.

For all device commands, the return messages are consistent:
A successful command returns: 54544D3A4F4B0D0A00 (TTM\r\n\0)
A failed command returns: 54544D3A4552500D0A00 (TTM\r\n\0)

After sending a valid setting command, parameters are applied immediately (note: baud rate settings only apply after a reset command is issued). However, these parameters are not retained on power down unless the reset command is sent, which saves them to flash memory.
Below is the list of setting commands:

> Note: The first and second lines of the command correspond to the HEX format and ASCII format, respectively. When querying parameters, all returned values are in hexadecimal, so commands need to be parsed using hexadecimal numbers.

When SLP and BTDATA are grounded, the device operates in master mode. The relevant parameters for the master mode include scan timeout, scan interval, and connection interval. The command for setting the connection interval applies to both master and slave modes. However, scan timeout and scan interval are only effective in master mode.

Function	Command（hex/ASCII）	Description
Set scan Timeout	54544D3A5343542D<Para> TTM:SCT-<Para>	Length: 1 Byte, Values: 0-29, Para*5S, 0 means scanning all the time and output scanning result in real time.
Set Scan Timeout	54544D3A5343543F TTM:SCT?	Return TTM:SCT-<Para>\r\n\0, Para: Hexadecimal
Set Scan Interval	54544D3A5349572D<Para> TTM:SIW-<Para>	Length: 1 Byte,Value: 0-100,Para*10S
Query Scan Interval	54544D3A5349573F TTM:SIW?	Return TTM:SIW-<Para>\r\n\0, Para: Hexadecimal
Set RSSI Filtering	54544D3A5253492D<Para> TTM:RSI-<Para>	Value: -120 ~ -30dBm, if less than -100dbm, then disable RSSI filtering.
Query RSSI Filtering	54544D3A5253493F TTM:RSI?	Return TTM:RSI-<Para>\r\n\0, Para: Hexadecimal
Set Broadcast Name Filtering	54544D3A404E462D<Para> TTM:AVF-<Para>	Length: 16 Byte, Value: ASCII code
Query Broadcast Name Filtering	54544D3A404E463F TTM:ANF?	Return TTM:ANF-<Para>\r\n\0, Para: Hexadecimal
Cancel Broadcast Name Filtering	54544D3A404E462D TTM:ANF-	Cancel broadcast name filtering
Setting MAC Address Filtering	54544D3A4D41462D<Para> TTM:MAF-<Para>	Length: 6 Byte, value: hexadecimal number
Query MAC Address Filtering	54544D3A4D41463F TTM:MAF?	Return TTM:MAF-<Para>\r\n\0, Para: Hexadecimal
Cancel MAC address filtering	54544D3A4D41462D	Cancel MAC address filtering

Note: To make it easier to find the device, RSSI, broadcast name, and MAC address filtering features have been added. Only one of MAC address filtering or broadcast name filtering can be active at a time. Enabling MAC address filtering will automatically disable broadcast name filtering, and enabling broadcast name filtering will automatically disable MAC address filtering.

When functioning as a master, the device needs to send specific commands to enable Bluetooth operations, such as scanning and initiating a connection to a particular device. Once connected, during data transmission, all data packets are checked to determine if they contain a disconnect command.

Function	Command（hex/ASCII）	Description
Turn On Scanning	54544d3a5343414e TTM:SCAN	Command correctly return: TTM:SCAN-NING\r\n\0, error return TTM:ERP\r\n\0, after scanning to the device serial port output 10 RSSI value of the strongest device, scanning timeout is 0 or MAC address filtering scanning output results format 0xAA + MAC + RSSI + adv_data + 0x0D0A, the rest of the output for MAC + broadcast name
Stop Scanning	54544d3a5343414e2d53544f50 TTM:SCAN-STOP	The command returns correctly: TTM:S-CAN-STOP\r\n\0, incorrectly returns TTM:ERP\r\n\0
Connect to the Specified MAC	54544D3A434F4E4E2D <MAC> TTM:CONN-<MAC>	Command return: TTM:CONNING\r\n\0, indicating connection in progress TTM:CONN-TOUT\r\n\0, connection timeout TTM:NO-DEVICE\r\n\0, device not found TTM:CONN-MAC-XXXXXXXXXXXXX\r\n\0, connected TTM:MAC-DCON-XXXXXXXXXXXXX\r\n\0, Disconnect TTM:ERP\r\n\0, Command Error
Disconnect All Connections	54544D3A444953432D414C4C TTM:DISC-ALL	Correctly return TTM:DISC-XXXXXXXXXXXXXXX\r\n\0, incorrectly return TTM:ERP\r\n\0

> ⚠ Note: The above commands are only effective in master mode. If the device is not in master mode, sending these commands will return TTM:ERP\r\n\0.
> For all other device commands, regardless of whether in master or slave mode, as long as the parameter requirements are met, the response will be TTM:OK\r\n\0, and the parameters will take effect in the corresponding role.

In master mode, the device can initiate a connection to a specified slave device using its MAC address, entering connection mode directly. When the MAC address of the target device is known, scanning is not necessary; you can simply send the connection command.

When switching from master mode to slave mode, the device must first ensure it is in an unconnected state. You should invoke the command to set the role, followed by the reset command to successfully switch to the slave role, and vice versa.

Function	Command（hex/ASCII）	Description
Set Role	54544D3A524F4C2D <Para> TTM:ROL-<Para>	Length: 1 Byte,Values: 0-1, 0 for slave mode, 1 for master mode
Query Role	54544d3a524f4c3f TTM:ROL?	Return to TTM:ROL-<Para>\r\n\0, Para: Hexadecimal

When in slave mode, you can set and query many parameters of the broadcast process and connection process as follows:

Function	Command（hex/ASCII）	Description
Set Broadcast Name	54544D3A52454E2D <Para> TTM:REN-<Para>	Length: 1-16 Byte,Value: ASCII
Query Broadcast Name	54544d3a52454e3f TTM:REN?	Return TTM:REN-<Para>\r\n\0, Para is ASCII
Set Broadcast Interval	54544D3A4144502D <Para> TTM:ADP-<Para>	Length: 1 Byte, value: 1-20, corresponding to broadcast interval 1*100ms.
Query Broadcast Interval	54544D3A4144503F TTM:ADP?	Return TTM:ADP-<Para>\r\n\0, Para: Hexadecimal
Set Transmitting Power	54544D3A54504C2D <Para> TTM:TPL-<Para>	Length: 1 Byte, Values: 0-8, corresponding to -40, -20, -16, -12, -8, -4, 0, +4, +8 (unit: dB)
Query Transmitting Power	54544D3A54504C3F TTM:TPL?	Return TTM:TPL-<Para>\r\n\0, Para: Hexadecimal
Set Broadcast Data	54544D3A4144442D <Para> TTM:ADD-<Para>	Length: 1-16 Byte, value: any hexadecimal number
Query Broadcast Data	54544D3A4144443F TTM:ADD?	Return TTM:ADD-<Para>\r\n\0, Para: Hexadecimal
Set Factory ID	54544D3A5049442D <Para> TTM:PID-<Para>	Length: 2 Byte, value: any hexadecimal number
Query Factory ID	54544D3A5049443F TTM:PID?	Return TTM:PID-<Para>\r\n\0, Para: Hexadecimal
Setting the Service UUID	54544D3A5549442D <Para> TTM:UID-<Para>	Length: 6Byte, (2 Byte service uuid+2 Byte rx UUID+2 Byte tx UUID) Values: Any hexadecimal number, service, rx, tx UUID can't be the same.
Query Service UUID	54544D3A5549443F TTM:UID?	Return TTM:UID-<Para>\r\n\0, Para: Hexadecimal

Function	Command（hex/ASCII）	Description
Set Broadcast Mode	54544D3A4D4F442D <Para> TTM:MOD-<Para>	Set device broadcast packet format: 0: pass-through broadcast packet 1: iBeacon broadcast packet, you can see the specific broadcast packet format instructions
Query Broadcast Mode	54544d3a4d4f443f TTM:MOD?	Return TTM:MOD-<Para>\r\n\0, Para: Hexadecimal
Setting the UUID	54544D3A4149442D <Para> TTM:AID-<Para>	Length: 16 bytes, value: any hexadecimal number
Query UUID	54544D3A4149443F TTM:AID?	Return TTM:AID-<Para>\r\n\0, Para: Hexadecimal
Set Major	54544D3A4D414A2D<Para> TTM:MAJ-<Para>	Length: 2 bytes, value: any hexadecimal number
Query Major	54544D3A4D414A3F TTM:MAJ?	Return to TTM:MAJ-<Para>\r\n\0, Para: Hexadecimal
Set Minor	54544D3A4D494E2D <Para> TTM:MIN-<Para>	Length: 2 bytes, value: any hexadecimal number
Query Minor	54544d3a4d494e3f TTM:MIN?	Return TTM:MIN-<Para>\r\n\0, Para: Hexadecimal
Set Connection Mode	54544D3A5057452D <Para> TTM:PWE-<Para>	Whether the device requires a password to connect, 0: no password required to connect 1: Connection password required
Query Connection Mode	54544D3A5057453F TTM:PWE?	Return TTM:PWE-<Para>\r\n\0, Para: Hexadecimal
Set Connection Password	54544D3A5057442D <Para> TTM:PWD-<Para>	Length: 1-8 bytes, value: ASCII, the correct password must be entered within 5s on the connection, otherwise the connection will be disconnected
Query Connection Password	54544D3A5057443F TTM:PWD?	Return to TTM:PWD-<Para>\r\n\0, Para:ASCII

Regardless of whether in master mode or slave mode, all configuration commands require a reset command to take effect. Query commands will return the relevant parameters, while erroneous commands will return TTM:ERP\r\n\0.

For the device as a whole, commands for baud rate and connection interval are effective in both master and slave modes.

Function	Command（hex/ASCII）	Description
Set Baud Rrate	54544D3A4250532D <Para> TTM:BPS-<Para>	Length: 1 Byte, Values: 0-4, corresponding to 9600/ 19200/38400/57600/115200 (unit: bps) respectively.
Query baud	54544D3A4250533F TTM:BPS?	Return TTM:BPS-<Para>\r\n\0, P ara: Hexadecimal
Set Connection Interval	54544D3A4349542D <Para> TTM:CIT-<Para>	Length: 1 Byte, value: 1-100, corresponding to the minimum connection interval 1*10ms, maximum connection interval = minimum connection interval + 10ms.
Query connection interval	54544D3A4349543F TTM:CIT?	Return to TTM:CIT-<Para>\r\n\0, Para: Hexadecimal
Read MAC Address	54544D3A4D4143(2D)3F TTM:MAC-? or TTM:MAC?	Return TTM:MAC-<Para>\r\n\0, Para: Hexadecimal
Read Version Information	54544D3A564552(2D)3F TTM:VER-? or TTM:VER?	Return to TTM:VER-<Para>\r\n\0, Para:ASCII
Restore Factory Settings	54544D3A5253542D464143 TTM:RST-FAC	Consistent with the return of the setup command
Reset	54544D3A5253542D535953 TTM:RST-SYS	Success will return TTM:OK\r\n\0

6.3 Operation Examples

6.3.1 Factory Default Parameters

Broadcast Name: Minew_Vxxxxx
Serial port baud rate: 9600bps,8N1
Transmit power: 0dBm
Minimum and maximum connection interval: 20ms - 40ms
Device Role: Master
Default parameters related to master mode:
Scanning timeout: 10s
Scanning interval: 100ms

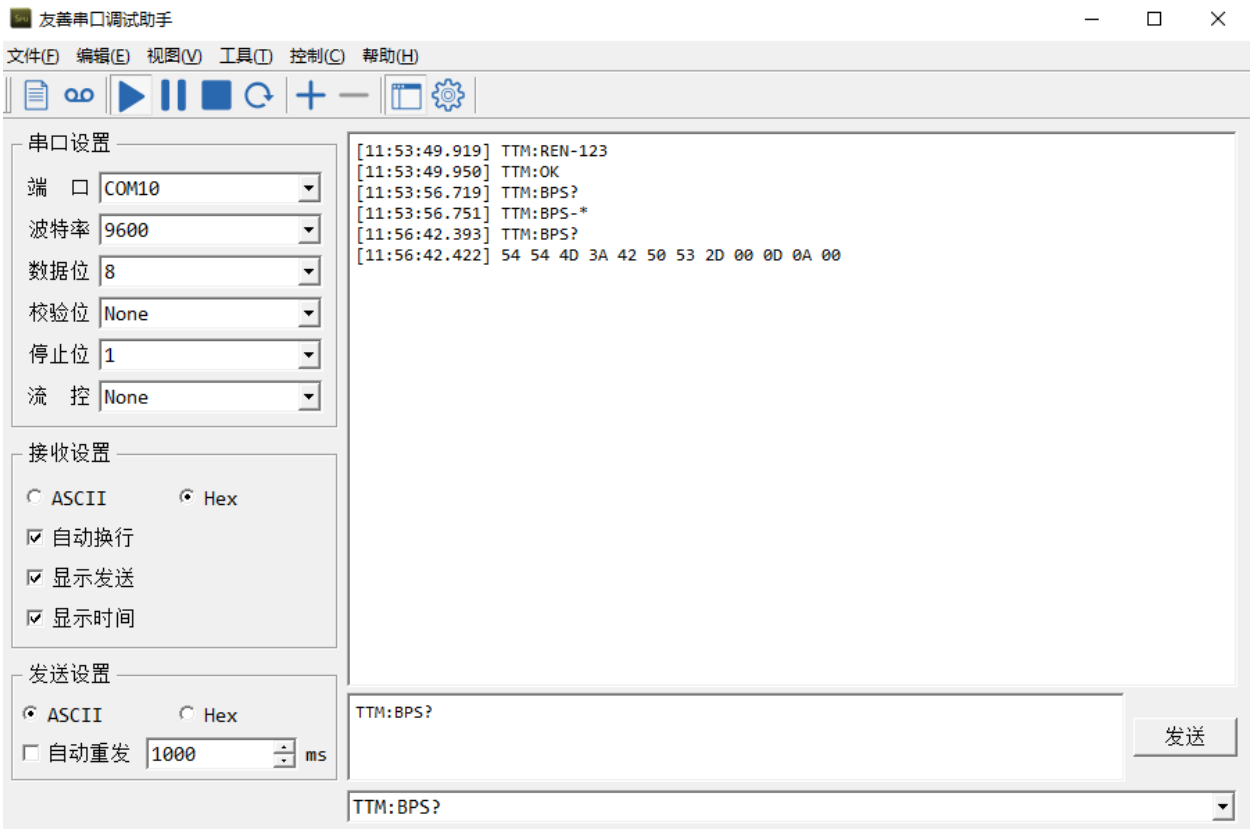
Default parameters related to slave mode:
Broadcast interval: 1s
Broadcast mode: transparent broadcast package
Custom data: Minew Tech
Connection password enable: not enabled
Connection password: minew123
Major: 0x1234
minor: 0x1235
UUID: 74278BDA-B644-4520-8F0C-720EAF059935
DC_ RC: No DCDC, internal 32k

6.3.2 Parameter Modification Example

Connect all pins according to the wiring diagram, grounding SLP and BTDATA to put the device in an unconnected state. At this point, parameters can be set, and regardless of whether in master mode or slave mode, all parameters can be configured, taking effect immediately.

However, the effective parameters will only be reflected in the corresponding role. For example, if the broadcast name is modified while in master mode, the change will take effect, but it will only be visible when the device switches to slave mode. After sending the reset command, all parameters will be saved during power off.

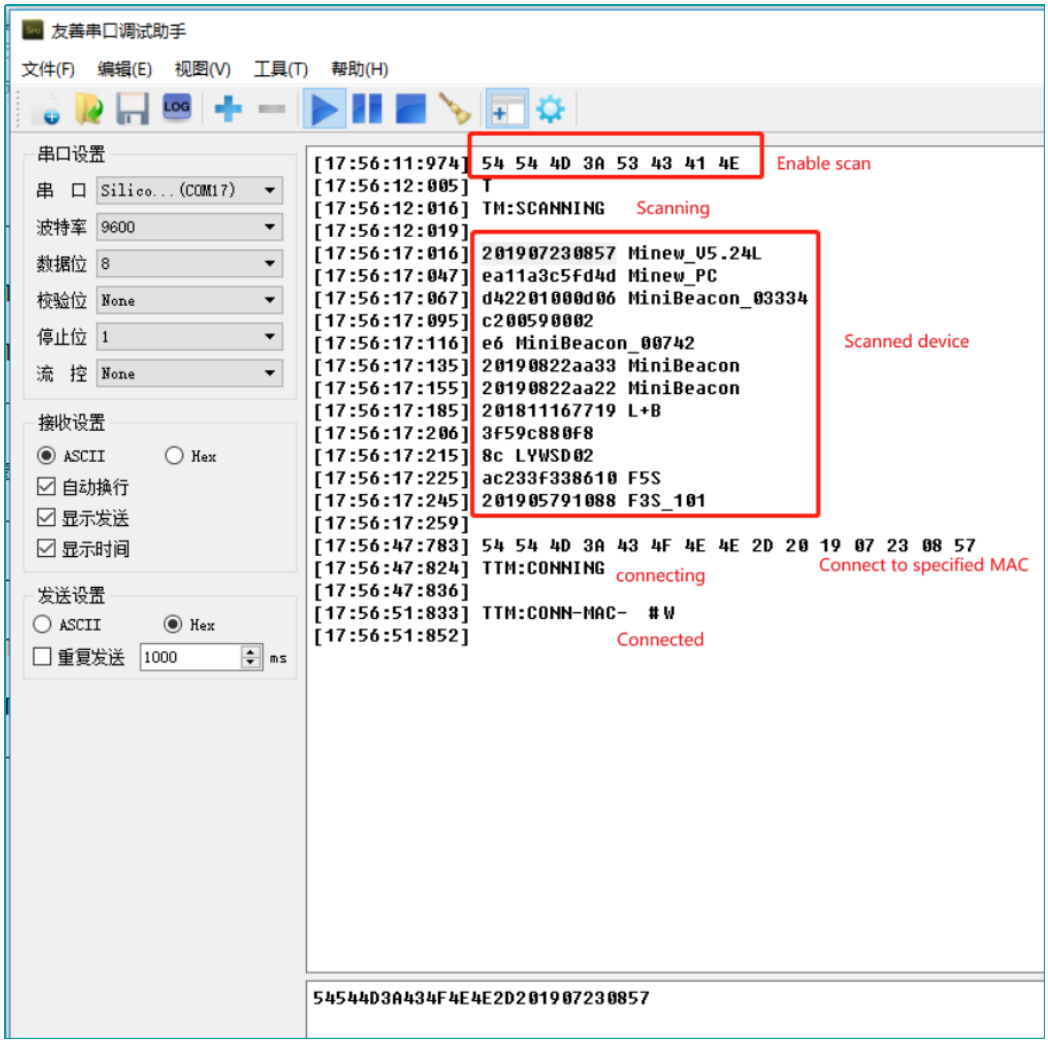
> Note: When you need to modify multiple parameters, you can send all the setting commands first and then send the reset command.



When querying device parameters, the values are in hexadecimal format. If ASCII display is selected, the parameter positions may appear as garbled text. In this case, you should set it to HEX display. The parameters will correspond to the positions after "2D" in the output. To check the baud rate, make sure to use HEX display to view the specific parameters.

6.3.3 Scanning and Connecting to Devices

Send the 54544D3A5343414E (TTM:SCAN) command to scan for a device and obtain its MAC address. The scanned device returns MAC + broadcast name information. Send the 54544D3A434F4E4E2D201907230857 command and the module will connect the device with MAC address 20:19:07:23:08:57. The device connected will return TTM:CONN-MAC-XXXXXXXXXXXX\r\n\0. Since MAC is a hexadecimal number, the entire command is sent as a hexadecimal number. Once connected you can perform data passthrough.



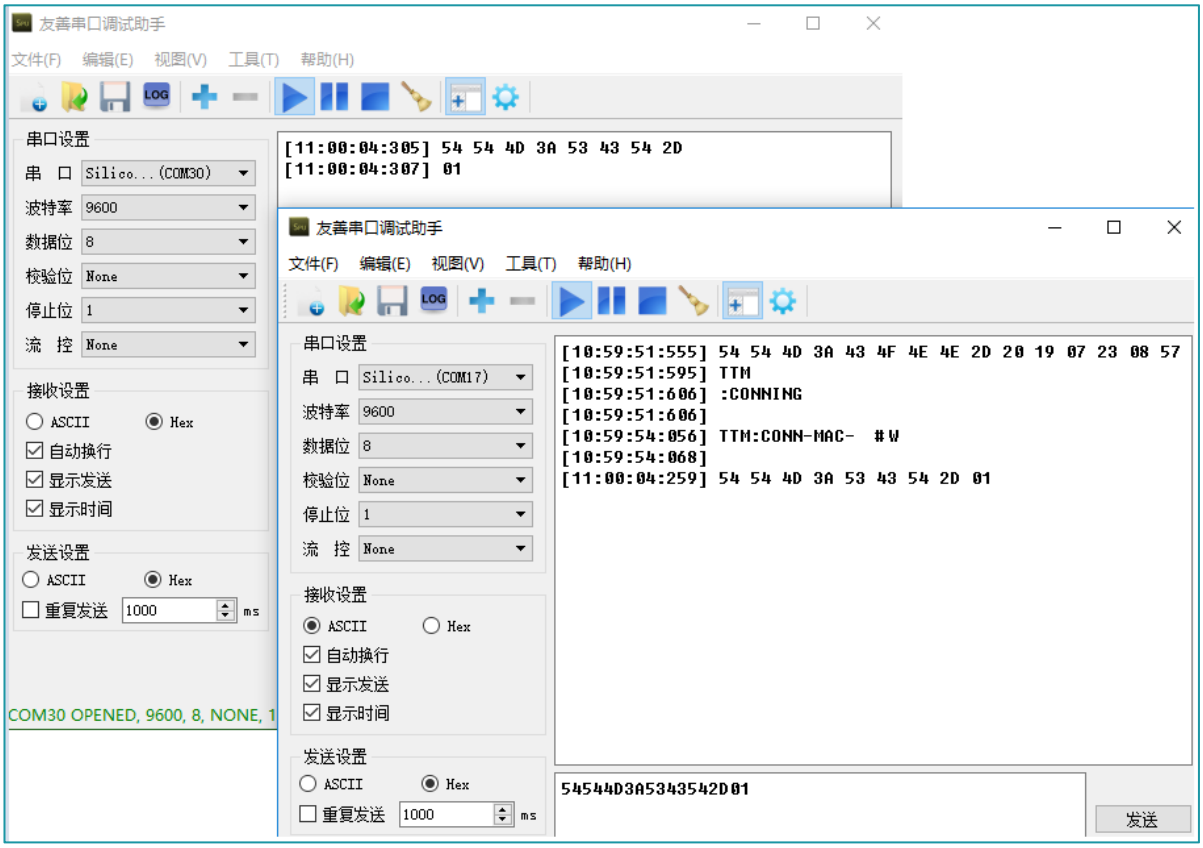
6.3.4 Master Pass-Through

Data passthrough is possible after the connected command is returned in step 7.3 The prerequisite for correct communication between the module and the slave device is that the slave device must have the same services, features, and their UUIDs and attributes as the module.

Relevant information is provided below:

Eigenvalue UUID	Executable Operation	Packet Length	Notes
FFF1	notify	244	Module data reception, the data sent from the device to the module shall not exceed 244 Byte per packet.
FFF2	write	244	Module data sending, the module has to do automatic packetization, data more than 244 Byte will be automatically divided into 244 packets sent to the slave device.

As an example, the master module connects to the passthrough slave module, and then sends the data after connecting.



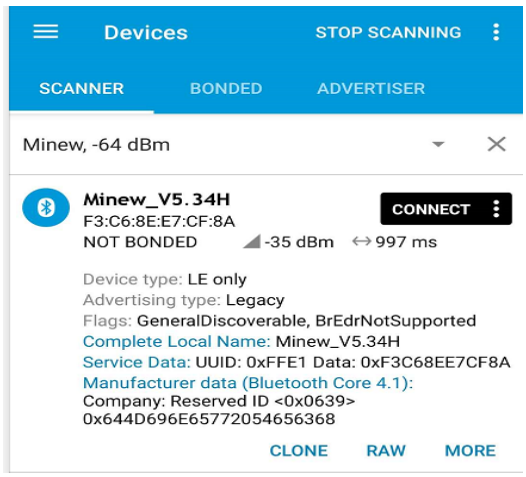
6.3.5 Slave Broadcastin

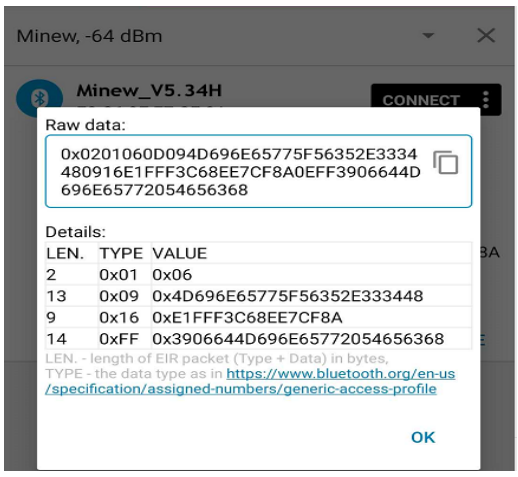
After setting the device role to slave mode using the command TTM:ROL-0, data pass-through can occur with a mobile phone. When the SLP pin is low, the device is in broadcast mode.

Using the nRF Connect app, you can scan for devices. Once the device is detected, click on "Raw" to view the raw data, which is the unparsed data from the scan. After parsing according to BLE data types, you can refer to the Details section.

BLE broadcast data follows a specific format: Length + Type + Content. The content can vary, while the type is fixed, and the length is determined by the content. The device has two broadcast formats: pass-through broadcast packets and iBeacon broadcast packets. Both formats include four types: Flag (0x01), Broadcast Name (0x09), Service Data (0x16), and Manufacturer Data (0xFF).

The diagram below shows the pass-through broadcast packet: Flag, Broadcast Name, and Service Data are included in the broadcast data packet, while Manufacturer Data is found in the response data packet. The content of the Service Data includes the Service Data UUID (E1FF) and MAC Address. The Manufacturer Data consists of the Company ID (3906), Battery Level Information (1 byte), and Custom Data.





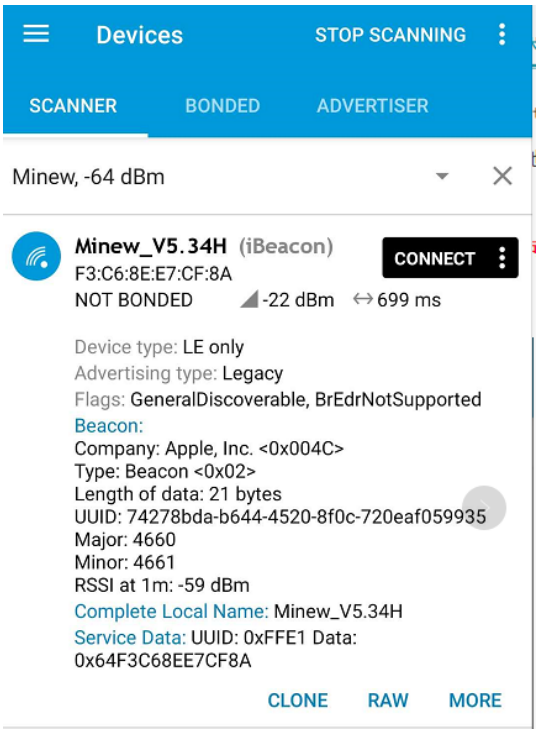
Note: The iOS side cannot access the MAC address field, so the MAC address is placed back into the broadcast packet to ensure that the iOS app can retrieve the device's MAC address. Additionally, WeChat Mini Programs cannot access the response data packet, so the MAC address is included in the service data of the broadcast packet to ensure that iOS devices using WeChat Mini Programs can also obtain the device's MAC address.

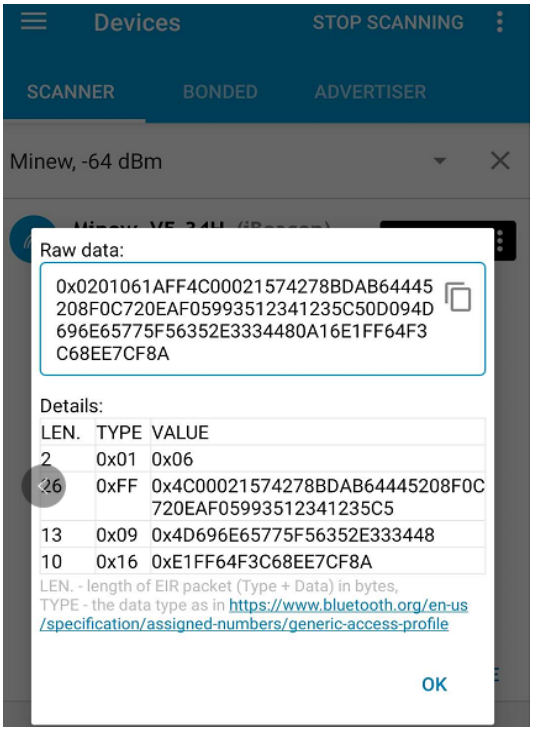
The diagram below shows the iBeacon broadcast packet: Flag and Manufacturer Data are included in the broadcast data packet, while Service Data and Broadcast Name are found in the response data packet. The broadcast data packet must follow this fixed format to comply with the iBeacon protocol definition.

In the Manufacturer Data, 4C 00 represents Apple's Company ID, and 02 15 is the fixed format for iBeacon, followed by the Proximity UUID (16 bytes), Major (2 bytes), Minor (2 bytes), and Measured Power (1 byte).

In iBeacon broadcast mode, the Manufacturer Data can only have the Proximity UUID, Major, and Minor values modified.

The Service Data consists of the Service Data UUID (FFE1), Battery Level Information, and MAC Address.



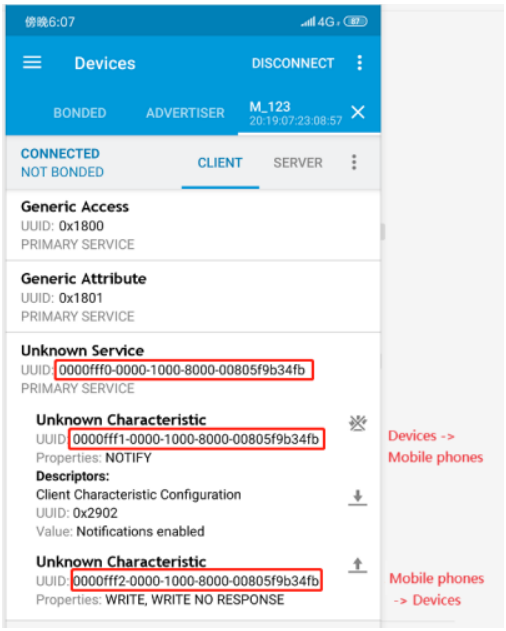


6.3.6 Slave Pass-Through

Based on 6.3.5, when connecting the device using a mobile app, keep the BTDATA pin low to enable data pass-through. If BTDATA is not low, it does not affect the device's broadcasting and connection capabilities; it simply prevents pass-through functionality.

Using nRF Connect, you can view the specific Service, Characteristic, and their corresponding Properties.

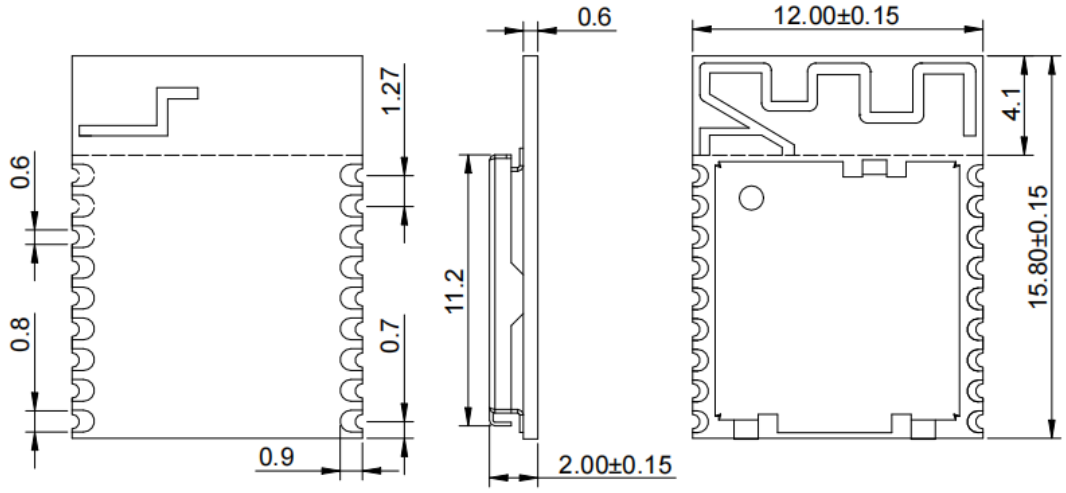
The UUID consists of an Alias UUID (2 bytes, located at the 3rd and 4th bytes in the figure) combined with a Base UUID (the remaining 14 bytes). In the pass-through program, the services and characteristics utilize a standard base UUID, and the following explanation will use the Alias UUID for clarification.



FFF0 is the Service UUID.
FFF1 is for data received by the phone, with the module sending data.
FFF2 is for data sent by the phone, with the module receiving data

Eigenvalue UUID	Executable Operation	Maximum Packet Length	Notes
FFF1	notify	244	When sending data to the module via the serial interface, the module will forward it to the phone. The phone must enable notifications to receive the data. The maximum packet size that the module can send in one transmission is 244 bytes. Note: The firmware automatically handles packet fragmentation, so there is no need to manually divide the data into packets based on the maximum length. However, each packet must not exceed 10 kB, and you should consider the transmission rate to avoid issues such as packet loss or disconnection.
FFF2	write	244	The phone sends data to the module and forwards it to the serial port. When using the API interface function to write data, the maximum length of data written at one time is 244 bytes

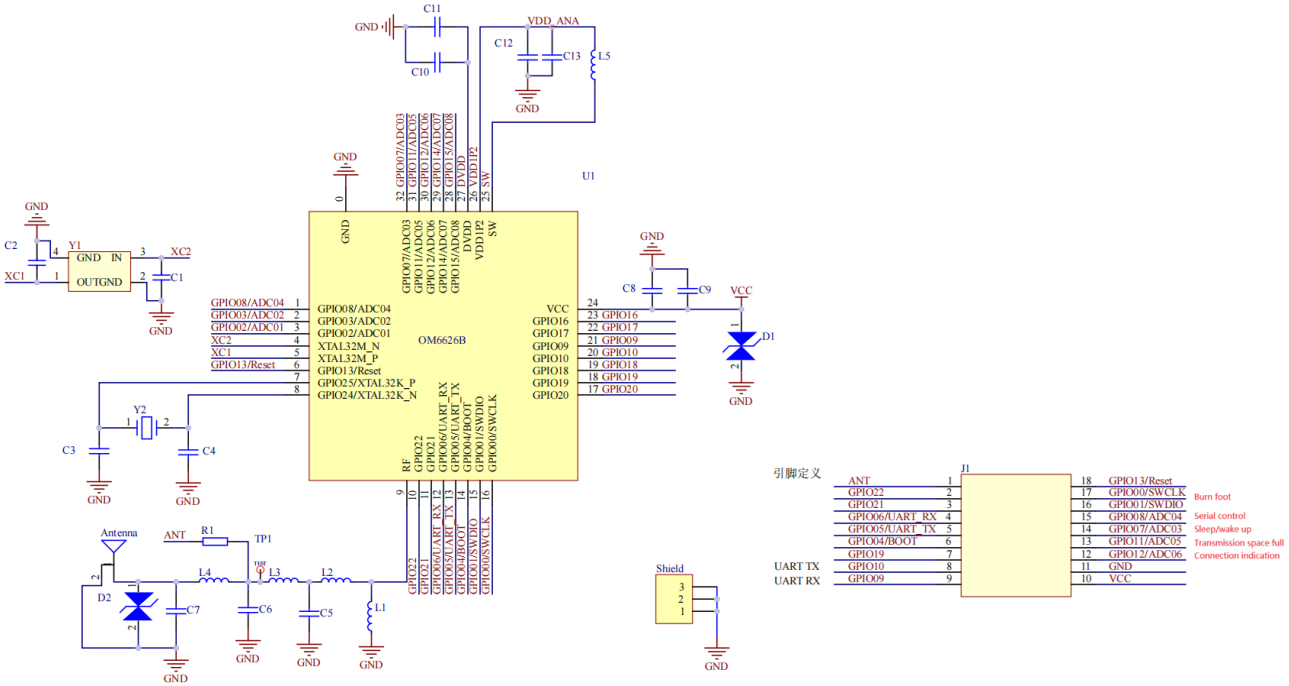
7 MECHANICAL DRAWING



Default unit: mm Default tolerance: ±0.15

Note: The recommended pad size is 1.8 x 0.8 mm, with the pad extending 0.5 mm outward.

8 ELECTRICAL SCHEMATIC



Notice: Before placing an order, please confirm the specific configuration required with the salesperson.

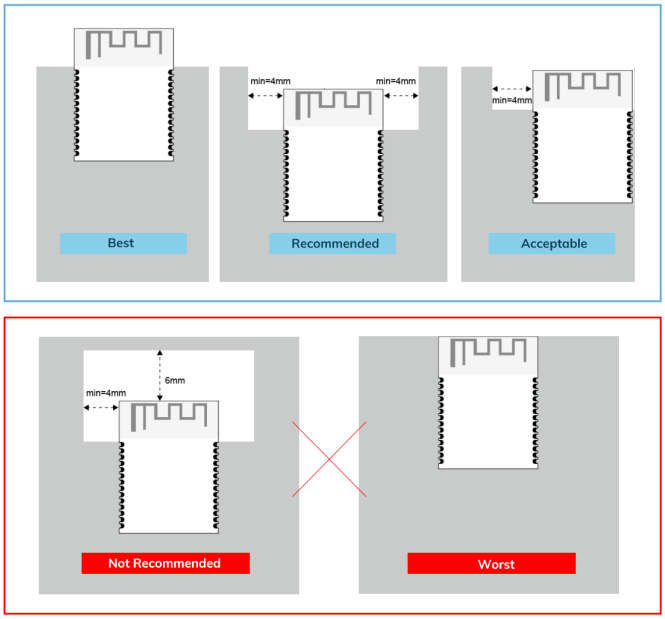
9 PCB LAYOUT

There should be no GND plane or metal cross wiring in the module antenna area, and no components should be placed nearby. It is best to make a hollow or clear area, or place it on the edge of the PCB board. The reference example is as follows:

> Notice: It is strongly recommended to use the first design method. The module antenna design is debugged according to the first wiring.

Layout Notes:

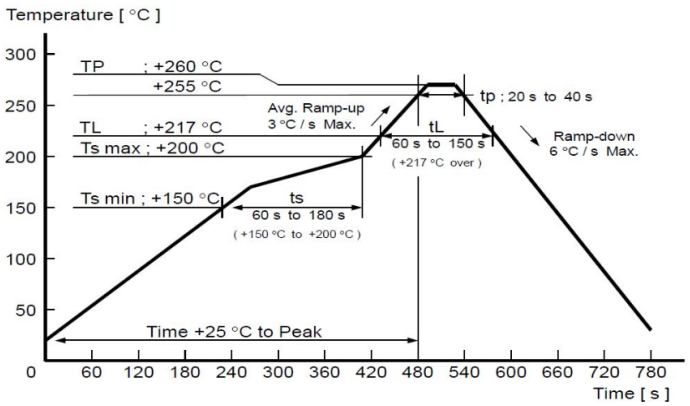
1)The module's antenna area should be completely clear of any metal obstructions to avoid affecting antenna performance (as shown in the diagram).
2)Outside the module's antenna area, try to maintain a solid copper pour to minimize interference from the mainboard signal lines or other sources.
3)A clear area of at least 4 mm should surround the module's antenna (including its casing) to reduce interference with the antenna.
4)Ensure good grounding for components to minimize parasitic inductance.
5)Do not place copper under the module's antenna to prevent interference with signal radiation, which could affect transmission distance.
6)The antenna should be kept away from other circuits to maintain radiation efficiency and avoid impacting the normal operation of other circuits.
7)Position the module as close to the edge of the circuit board as possible, away from other circuitry.
8) It is recommended to use a ferrite bead for isolation when connecting the module to the power supply.



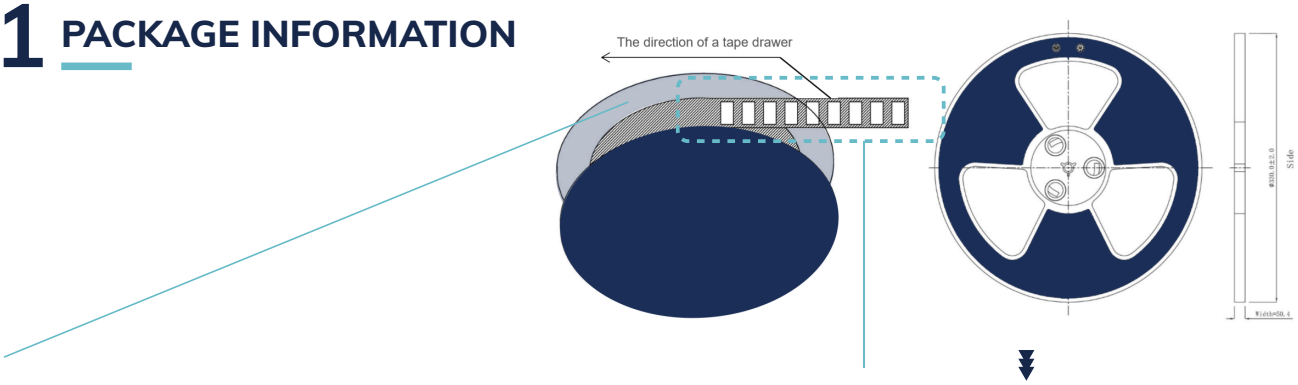
10 REFLOW AND SOLDERING

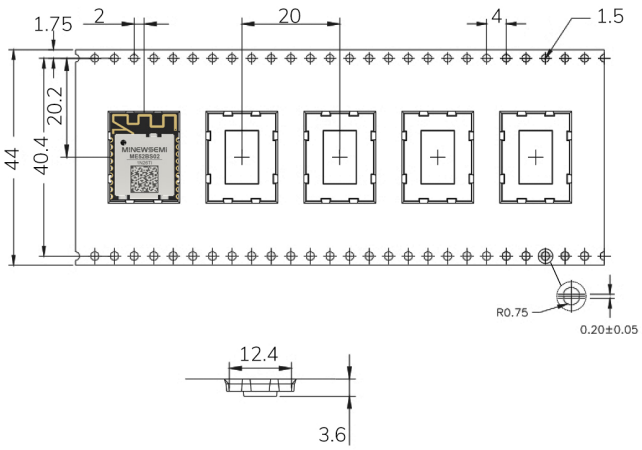
Perform SMT according to the reflow oven temperature profile provided below, with a maximum temperature of 260°C;
2)Follow IPC/JEDEC standards; Peak temperature: < 260°C; Number of reflows: ≤2 times; For SMT involving double-sided placement, it is recommended that the module side undergoes reflow soldering only once. For any special processes, please contact our company.

3)For module SMT, it is recommended to use a local stepped stencil with a thickness of 0.2 mm, and then open the area by 0.8 mm.
4)After opening, if the entire package is not used at once, it should be stored in a vacuum to prevent long-term exposure to air, which can cause moisture absorption and pad oxidation. If there is a gap of 7 to 30 days before reuse, it is recommended to bake the tape at 65-70°C for 24 hours without unrolling it before returning to SMT.
5) ESD protection measures should be implemented before using SMT.



11 PACKAGE INFORMATION





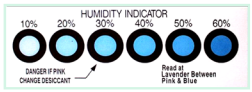
Inner carton(*5)
355*345*65mm，±5mm

Outer carton
370*358*350mm，±10mm

Remarks

General material list for FCL packaging:

Carrier tape packaging tray



Humidity Indicator
(1 pcs/bag)

Desiccant
(placed in a vacuum bag)

Vacuum bag

Inner carton(*5)
355*345*65mm，±5mm

Outer carton
370*358*350mm，±10mm

Other:

Moisture-proof label (attached to the vacuum bag)

Certification label (attached to the vacuum bag)

Outer box label

Default unit：mm Default tolerance：±0.1

Packing Detail	Specification	Net Weight	Gross Weight	Dimension
ME52BS02	850PCS	425g	1185g	W=44mm，T=0.35mm

Note: Default weight tolerance all are within 10g（except the special notes）

12 STORAGE CONDITIONS

- **Please use this product within 6 months after signing the receipt.**
  - This product should be stored without opening the package at an ambient temperature of 5~35°C and a humidity of 20~70%RH.
  - This product should be left for more than 6 months after receipt and should be confirmed before use.
  - The product must be stored in a non-corrosive gas (Cl2, NH3, SO2, NOx, etc.).
  - To avoid damaging the packaging material, do not apply any excessive mechanical shocks, including but not limited to sharp objects adhering to the packaging material and product dropping.

- **This product is suitable for MSL2 (based on JEDEC standard J-STD-020).**
  - After opening the package, the product must be stored at ≤30°C/<60%RH. It is recommended to use the product within 3-6 months after opening the package.
  - When the color of the indicator in the package changes, the product should be baked before welding.

- **Baking is not required for one year if exposure is limited to <30°C and 60%RH. Refer to MSL2 for exposure criteria for moisture sensitivity level. If exposed to (≥168h@85°C/60%RH) conditions or stored for more than one year, recommended baking conditions.**
  1. 120 +5/-5°C, 8 hours, 1 time
  Products must be baked individually on heat-resistant trays because the materials (base tape, reel tape, and cover tape) are not heat-resistant, and the packaging material may be deformed at temperatures of 120℃;
  2、90℃ +8/-0℃, 24hours, 1times
  The base tape can be baked together with the product at this temperature. Please pay attention to the uniformity of heat.

13 HANDLING CONDITIONS

• Be careful in handling or transporting products because excessive stress or mechanical shock may break products.
• Handle with care if products may have cracks or damages on their terminals. If there is any such damage, the characteristics of products may change. Do not touch products with bare hands that may result in poor solder ability and destroy by static electrical charge.

14 QUALITY

Cognizant of our commitment to quality, we operate our own factory equipped with state-of-the-art production facilities and a meticulous quality management system. We hold certifications for ISO9001, ISO14001, ISO27001, OHSA18001, BSCI.

Every product undergoes stringent testing, including transmit power, sensitivity, power consumption, stability, and aging tests. Our fully automated module production line is now in full operation, boasting a production capacity in the millions, capable of meeting high-volume production demands.

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16 RELATED DOCUMENTS

- nRF52805_Chip_Datasheet
  https://en.minewsemi.com/file/nRF52805_Chip_Datasheet_EN.pdf
- MinewSemi_Product_Naming_Reference_Manual_V1.0
  https://en.minewsemi.com/file/MinewSemi_Product_Naming_Reference_Manual_EN.pdf
- MinewSemi_Connectivity_Module_Catalogue
  https://en.minewsemi.com/file/MinewSemi_Connectivity_Module_Catalogue_EN.pdf

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