

BLE Module

MS53SF1

Datasheet

V 1.1.0

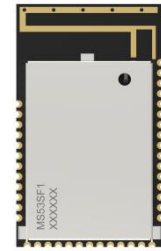
Applicable Product Model
MS53SF1-BlueNRG-355MC

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Michelle	2023.7.4	
1.1.0	Style change	Michelle	2023.8.30	

MS53SF1-BlueNRG-355MC

Long distance, supporting master-slave synchronous connection, multi master-slave working mode, Bluetooth 5.2 module with external antenna connection



PCB

The MS53SF1 multi master slave module adopts the BlueNRG-355M chip, which can connect multiple slave devices, with a maximum of 20 connections. It can automatically scan and connect multiple devices through instructions, or make specified device connections. The device defaults to host mode, and a device can set the master mode or slave mode through instructions. In slave mode, transparent transmission is achieved with mobile phones/tablets and other hosts. In main mode, the specified MAC address device can be connected through instructions and data can be transmitted transparently.

■ Features

- Support multiple device connections, up to 20 slave device connections
- Supporting master-slave switching
- Support serial port instruction configuration

■ Application

Smart home,
 smart wearable devices,
 consumer electronics,
 smart healthcare,
 security equipment,
 automotive equipment,
 sports and fitness equipment,
 instruments and meters

■ Key Parameter

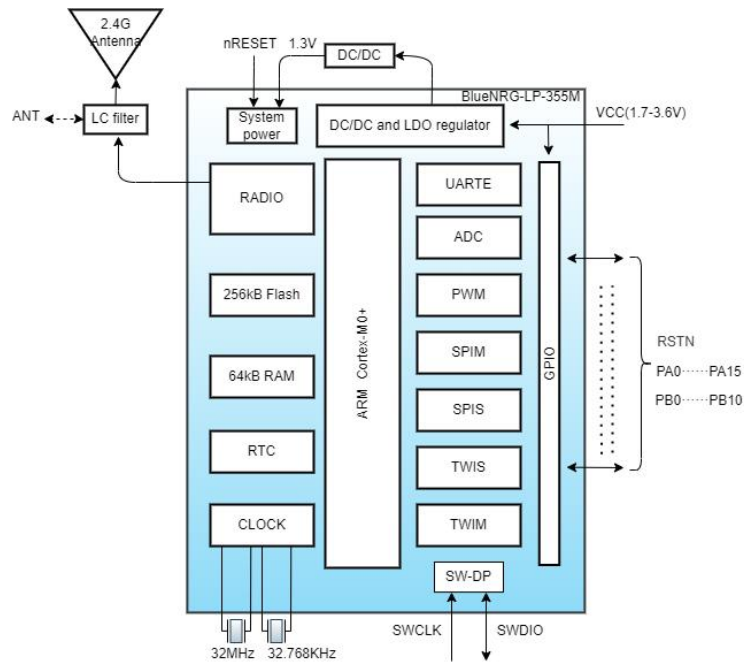
Chip Model	BlueNRG-355M	Antenna	PCB
Module Size	20×12×2mm	GPIO	25
Flash	256kB	RAM	64KB
Receiver Sensitivity	-97dBm	Transmitting Power	-20~ +8dBm
Emission Current	0dBm-4.3mA	Receiving Current	3.4mA
Firmware	Master slave switch transparent firmware		

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1 Block Diagram



2 Electrical Specification

Parameter	Values	Notes
Working Voltage	1.7V-5.5V	To ensure RF work, supply voltage suggest not lower than 3V
Working Temperature	-40°C~+85°C	Storage temperature is -40°C~+125°C
Transmission Power	-20 ~ +8dBm	Configurable
Module Dimension	20*12*2mm	
Quantity of IO Port	25	

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 host mode and the slave mode is inconsistent.

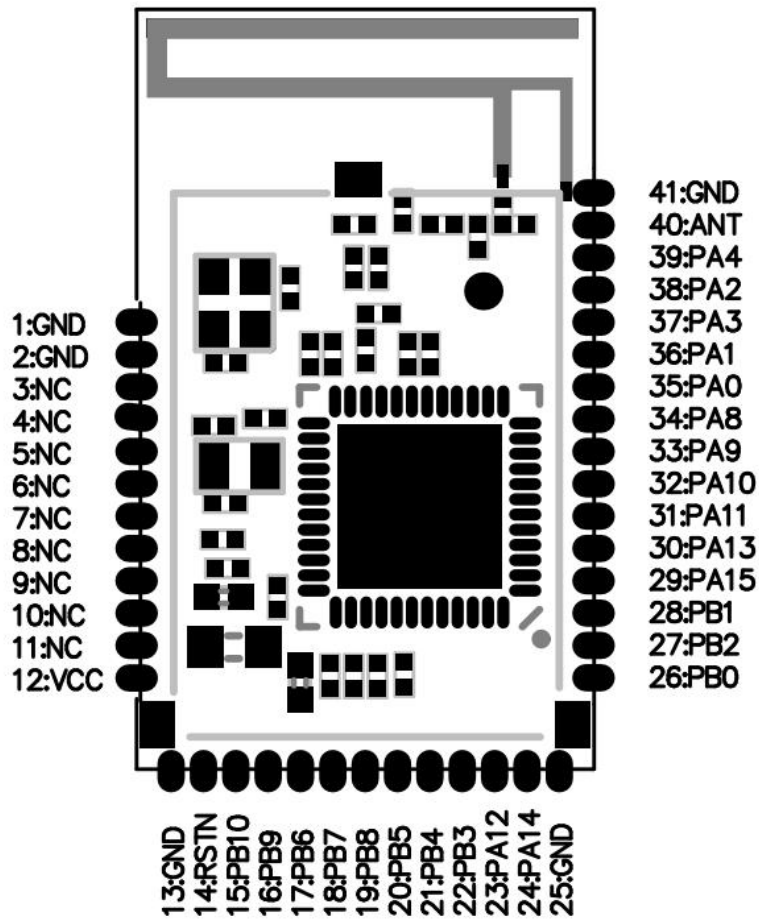
When in mode, the power consumption is as follows: (broadcast interval is 1s, maximum and minimum connection interval is 20-40ms).

Status	Consumption	Peak(mA)	Avg(mA)
	Average current in sleep state (SLP pulled high, BTDATA pulled low)	4.09	0.009
	Broadcast average current (SLP pin is connected to GND, BTDATA is pulled high)	5.63	0.11
	Transparent transmission average current (SLP, BTDATA pins are connected to GND, connected to mobile phones)	6.41	2.96

When in host mode, the power consumption is as follows: (The maximum and minimum connection interval is 20-40ms, and the transmission power is 0dBm)

Status	Consumption	Peak(mA)	Avg(mA)
	Average current in sleep state (SLP pulled high, BTDATA pulled low)	4.18	0.0092
	Transparent transmission average current (SLP, BTDATA pins are connected to GND)	11.44	3.54

4 Pin Description



5 Pin Definition

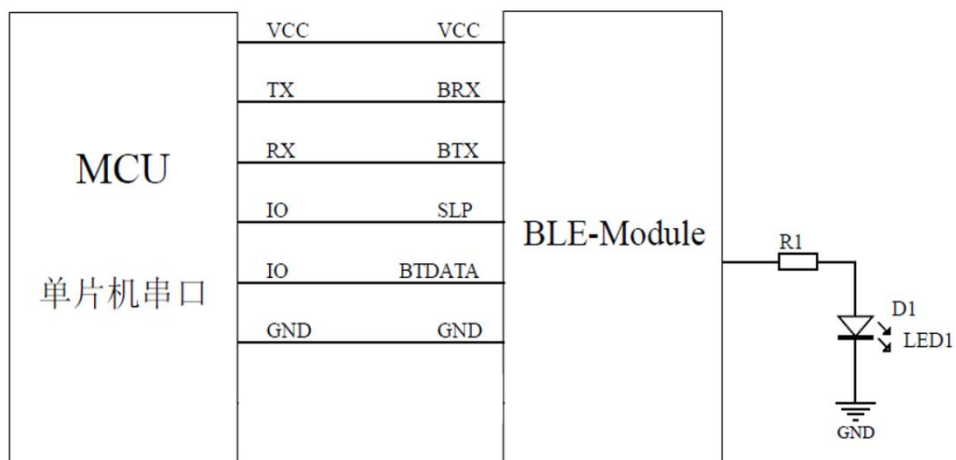
Pin Number	Symbol	Type	Definition	Note
1-2	GND	GND	Ground	
3~11	NC			
12	VCC	VCC	Power Supply	Power supply, 1.7V-3.6V, use this pin for power supply
13	GND	GND	Ground	
14	RSIT	RSIT	I/O, asynchronous reset pin	I/O pin reuse, reset
15-16	PB9-PB10	GPIO	GPIO	Not used in UART, floating
17	PB6	BTX	UART TX	TX of Bluetooth Module
18	PB7	BRX	UART RX	RX of Bluetooth Module
19-24	PB8/PB5/ PB3/PA12 /PA14	GPIO	GPIO	Not used in UART, floating
25	GND	GND	Ground	
26	PB0	CON_IND	Connection indication	Sleep state: low level Broadcast status: Low level Connection status: High level
27-31	PB2/PB1/ PA15/PA13/ PA11	GPIO	GPIO	Not used in UART, floating
32	PA10	SLP	Sleep/Awake	Low level to wake-up, high level to sleep, no floating
33	PA9	BTDATA	Active/Close UART	Serial port on / off to control pin, no floating 0: serial port open, can send and receive serial port data 1: Serial port off
34-36	PA8/PA0/ PA1	GPIO	GPIO	Not used in UART, floating
37	PA3	SWCLK	Burn clock pin	Used for burning firmware
38	PA2	SWDIO	Burn data pin	Used for burning firmware
39	PA4	GPIO	GPIO	Not used in UART, floating
40	ANT	ANT	External antenna pins	Using the module's built-in antenna, this pin is directly suspended in the air. If the module's built-in antenna is not used, the antenna can be externally connected through this pin. When connecting the antenna, the resistor connected to the antenna needs to be horizontally welded to this pin
41	GND	GND	Ground	

6 Module Operation Instruction

6.1 Tool

PC serial port assistant: Baidu "Friendly Serial Port Assistant" can be downloaded. The PC serial port assistant is used to debug the UART interface of the module.

6.2 Demonstration of module application



6.2.1 Power Supply

The SoC working voltage is 1.7V-3.6V, to ensure a stable function, supply voltage should be 3.0V-3.6V.

6.2.2 SLP(Sleep/Awake)

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.

In the test,module TX and RX can be connected with an UART to USB module's RX and TX pin, then send command through Serial Port Utility App from PC.

Note : The TX and RX of 2 modules can be connected reversed, each module connect with a smart phone, then transfer date over BLE between each smart phone.

6.2.5 CON_IND

CON_IND is used to indicate module status, high level in connection mode, low level in sleep or broadcast mode to wake up MCU and save power.

6.2.6 Command instruction

After connecting VCC and GND, the SLP and BTDATA pins are directly grounded. At this time, the module is in an unconnected state, that is, the module is in command mode and the serial port is turned on. Instructions can be sent to set and query parameters.

For all device instructions, the returning result is the same:

54544D3A4F4B0D0A00(TTM:OK\r\n\0) is returned after command sent successfully

54544D3A4552500D0A00 (TTM:ERP\r\n\0) is returned after command failed

After sending the correct setting command, the parameters take effect immediately (the baud rate only takes effect after sending the reset command), and the power outage will not be saved at this time. Only after sending the reset command will it be saved to flash.

Below is the list of setup instructions:

Note: The first line in the command list should be sent by Hex format, the second line should be sent by ASCII format. When checking the parameter, the returned result are all hexadecimal numbers, so you need to use hexadecimal numbers to parse the command.

After SLP and BTDATA are grounded, the device is in the host state, and the host related parameters include scan timeout, scan interval, and connection interval. The command to set the connection interval is effective for both the host mode and the slave mode. Scan timeout and scan interval are only valid under the host module:

Function	Command (hex/ASCII)	Description
Setting the scan timeout	54544D3A5343542D <Para>	Length: 1 Byte, Values: 0-36, Para*5S, 0 means scanning all the time and output scanning result in real time.
	TTM:SCT-<Para>	
Query Scan Timeout	54544D3A5343543F	ReturnTTM:SCT-<Para>\r\n\0,Para: Hexadecimal
	TTM:SCT?	
Setting the scanning interval	54544D3A5349572D <Para>	Length: 1 Byte,Value: 0-100,Para*10S
	TTM:SIW-<Para>	
Query Scan Interval	54544D3A5349573F	ReturnTTM:SIW-<Para>\r\n\0,Para: Hexadecimal
	TTM:SIW?	
Setting up RSSI filtering	54544D3A5253492D <Para>	Value: -120 ~ -30dBm, if less than -100dbm, then disable RSSI filtering.
	TTM:RSI-<Para>	
Query RSSI Filtering	54544D3A5253493F	Return TTM:RSI-<Para>\r\n\0, Para: Hexadecimal
	TTM:RSI?	
Setting broadcast name filtering	54544D3A414E462D <Para>	Length: 1-16 Byte, value: ASCII code
	TTM:ANF-<Para>	
Query Broadcast Name Filtering	54544D3A404E463F	ReturnTTM:ANF-<Para>\r\n\0,Para: Hexadecimal
	TTM:ANF?	
Cancel broadcast name filtering	54544D3A404E462D	Cancel broadcast name filtering
	TTM:ANF-	
Setting up MAC address filtering	54544D3A4D41462D <Para>	Device information will only be output when the scanned device MAC address matches the set one When MAC address filtering is enabled, the scanning results are output in real-time, with the output format being: 0xAA+MAC+RSSI+adv_ Data+0x0D0A If no filtering device is scanned, it will output: TTM: NO EVICE r\n\0 Length: 6 Byte, value: hexadecimal number
	TTM:MAF-<Para>	
Query MAC Address Filtering	54544D3A4D41463F	Return TTM:MAF-<Para>\r\n\0, Para: Hexadecimal
	TTM:MAF?	

Cancel MAC address filtering	54544D3A4D41462D	Cancel MAC address filtering
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Note: RSSI, broadcast name and MAC address filtering are added to make it easier to locate the device; only one of MAC address filtering and broadcast name filtering can be effective at the same time; when MAC address filtering is turned on, broadcast name filtering will be turned off automatically; when broadcast name filtering is turned on, MAC address filtering will be turned off automatically.

As a host, you need to send relevant commands to let the device enter the Bluetooth state, such as scanning and initiating a connection to a certain device, and after connecting, when transmitting data, you will judge all the data whether it is a disconnect command.

Function	Command (hex/ASCII)	Description
Turn on scanning	54544d3a5343414e TTM:SCAN	Command correctly return: TTM:SCANNING\r\n\r\n0, error return TTM:ERP\r\n\r\n0, 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 (computing)	54544d3a5343414e2d53544f50 TTM:SCAN-STOP	The instruction returns correctly: TTM:SCAN-STOP\r\n\r\n0, incorrectly returns TTM:ERP\r\n\r\n0
Connect to the specified MAC	54544D3A434F4E4E2D <MAC> TTM:CONN-<MAC>	Command return: TTM:CONNING\r\n\r\n0, indicating connection in progress TTM:CONN-TOUT\r\n\r\n0, connection timeout TTM:NO-DEVICE\r\n\r\n0, device not found TTM:CONN-MAC-XXXXXXXXXXXXXXXX\r\n\r\n0, connected TTM:MAC-DCON-XXXXXXXXXXXXXXXX\r\n\r\n0, Disconnect TTM:ERP\r\n\r\n0, Command Error
Disconnect all connections	54544D3A444953432D414C4C TTM:DISC-ALL	Correctly return TTM:DISC-XXXXXXXXXXXXXXX\r\n\r\n0, incorrectly return TTM:ERP\r\n\r\n0

<p>Disconnect the specified device</p>	<p>54544D3A444953432D <Para> TTM:DISC-<Para></p>	<p>Disconnect the specified device, and the command can also be executed in the connected state Para is the MAC address of the disconnected device, represented in hexadecimal Response: TTM: MAC-DCON XXXXXXXXXXXXX r\n\0 indicates that it has been disconnected from the Response: TTM: MAC-NO-DEVICE r\n\0 indicates that the device is not connected</p>
<p>Specify receiving data instructions from the slave end</p>	<p>54544D3A53454E442D<Para> TTM:SEND-<Para></p>	<p><Para>is the MAC address of the specified slave device to receive data, represented in hexadecimal Response: TTM: OK r\n\0 indicates successful setting of the specified device Response: TTM: MAC-NO-DEVICE r\n\0 indicates that the device is not connected This command is only valid after connection</p>
<p>Specify all data instructions received from the slave end</p>	<p>54544D3A53454E442D414C4C TTM:SEND-ALL</p>	<p>Response: TTM: OK r\n\0 indicates that all specified slave devices have successfully received data This command is only valid after connection</p>
<p>Obtain the number of connected slaves on the host side</p>	<p>54544D3A4E554D2D3F or 54544D3A4E554D3F TTM:NUM-? or TTM:NUM?</p>	<p>Return: TTM: NUM - [X] r\n\0 The X returned is represented in hexadecimal</p>

Note: The above instructions are only valid in host mode. When the device role is not a host, sending these instructions will return TTM: ERP\r\n\0.

In addition to the above four instructions, all other device instructions, whether in main or slave mode, will return TTM: OK\r\n\0 as long as they meet the parameter range requirements, and the parameters will take effect at the corresponding role.

If automatic multi connection has been enabled, the scanning command will be executed to filter the customized broadcast content to achieve automatic connection. The automatic connection will be made after scanning to devices with consistent customized broadcast content. After completion, the scanning connection will continue until the specified filtering device cannot be found or the maximum number of connections is reached. During this process, the scanning timeout value is 20S, And the command can still be used when the host side is connected to the slave device.

A master device can initiate a connection to a slave device with a specified MAC and enter connection mode. When the MAC address of the desired connected device is known, the connection command can be sent directly without scanning.

When the device is switched from master mode to slave mode, it is necessary to first ensure that the device is in the unconnected state, call the set role command, and then call the reset command, which can successfully switch to the slave role, and vice versa.

Function	Command (hex/ASCII)	Description
Setting up the role	54544D3A524F4C2D <Para>	Length: 1 Byte, Values: 0-1, 0 for slave mode, 1 for master mode
	TTM:ROL-<Para>	
Query Role	54544d3a524f4c3f	Return to TTM:ROL-<Para>\r\n\0, Para: Hexadecimal
	TTM:ROL?	
Query Role	54544D3A524F4C3F	Returns TTM: ROL -<Para> \r\n\0, Para: hexadecimal
	TTM:ROL?	
Set to enable automatic multi connection command	54544D3A4155542D<Para>	Para can represent 0x00~0x01 in hexadecimal or 0~1 in string, with a length of 1 byte, 0: Turn off automatic multi connection, 1: Turn on automatic multi connection, other invalid
	TTM:AUT-<Para>	
Query whether automatic multi connection is enabled	54544D3A4155543F	Return: TTM: AUT - [X] \r\n\0 The Para returned is represented in hexadecimal
	TTM:AUT?	

Note: If automatic multi connection is enabled and the host uses the enable scanning command for scanning operations, it will directly scan the filtered devices. After the connection is successful, it will continue to scan the connection until the filtered devices cannot be scanned or the host's connection limit is reached. Moreover, after automatic multi connection is enabled, scanning strategies such as broadcast name filtering and Mac address filtering will be ignored, Complete multi connection processing only after scanning.

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
Setting the broadcast name	54544D3A52454E2D <Para>	Length: 1-16 Byte, Value: ASCII
	TTM:REN-<Para>	
Query broadcast	54544d3a52454e3f	Return TTM:REN-<Para>\r\n\0, Para is ASCII

Name	TTM:REN?	
Setting the broadcast interval	54544D3A4144502D <Para>	Length: 1 Byte, value: 1-20, corresponding to broadcast interval 1*100ms.
	TTM:ADP-<Para>	
Query broadcast interval	54544D3A4144503F	Return TTM:ADP-<Para>\r\n\0, Para: Hexadecimal
	TTM:ADP?	
Setting the transmit power	54544D3A54504C2D <Para>	Length: 1 Byte, Values: 0-8, corresponding to -40, -20, -16, -12, -8, -4, 0, +4, +8 (unit: dB)
	TTM:TPL-<Para>	
Query Transmit Power	54544D3A54504C3F	Return TTM:TPL-<Para>\r\n\0, Para: Hexadecimal
	TTM:TPL?	
Setting the broadcast data	54544D3A4144442D <Para>	Length: 1-16 Byte, value: any hexadecimal number
	TTM:ADD-<Para>	
Query Broadcast Data	54544D3A4144443F	Return TTM:ADD-<Para>\r\n\0, Para: Hexadecimal
	TTM:ADD?	
Setting the factory ID	54544D3A5049442D <Para>	Length: 2 Byte, value: any hexadecimal number
	TTM:PID-<Para>	
Query Factory ID	54544D3A5049443F	Return TTM:PID-<Para>\r\n\0, Para: Hexadecimal
	TTM:PID?	
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	Return TTM:UID-<Para>\r\n\0, Para: Hexadecimal
	TTM:UID?	

Whether in host mode or slave mode, all setting instructions require reset instructions to take effect, while query instructions will return relevant parameters, and instruction errors will return TTM: ERP\r\n\0. For the entire device, the baud rate and connection interval instructions will take effect regardless of whether it is in master mode or slave mode.

Function	Command (hex/ASCII)	Description
Setting the Baud Rate	54544D3A4250532D <Para>	Length: 1 Byte, Values: 0-4, corresponding to 9600/ 19200/38400/57600/115200 (unit: bps) respectively.
	TTM:BPS-<Para>	
Query Baud Rate	54544D3A4250533F	Return TTM:BPS-<Para>\r\n\0, Para: Hexadecimal
	TTM:BPS?	
	TTM:CIT?	
Retrieve MAC Address	54544D3A4D4143(2D)3F	Return TTM:MAC-<Para>\r\n\0, Para: Hexadecimal
	TTM:MAC-? or TTM:MAC?	
Read version Information	54544D3A564552(2D)3F	Return TTM:VER-<Para>\r\n\0, Para: ASCII
	TTM:VER-? or TTM:VER?	
Restore factory setting	54544D3A5253542D464143	Consistent with the return of the setup command
	TTM:RST-FAC	
Reset (a dislocated joint, an electronic device etc)	54544D3A5253542D535953 TTM:RST-SYS	Success will return TTM:OK\r\n\0
Set Check Bit	54544D3A5041522D<Para>	0: Not on, 1: On; Para: it can be hexadecimal to represent 0x00~0x01 or string to represent "0"~"1", the length is 1byte
	TTM:PAR-<Para>	
Query Check Digit	54544D3A5041523F	Return TTM:PAR-[X]\r\n\0; Para: Hexadecimal
	TTM:PAR?	

Note: After successfully resetting the settings, the upper computer (serial port assistant) also needs to modify the settings to even parity

6.3 Example of Operation

6.3.1 Factory Default Parameters

Serial port baud rate: 9600bps,8N1

Transmit power: 0dBm

Minimum and maximum connection interval: 260ms - 280ms

Device Role: Host

Scan automatically for multiple connections: not enabled

Scan broadcast name filtering: not enabled

Scan MAC address filtering: not enabled

Serial port check bit: not enabled

Default parameters related to host mode:

Scanning timeout: 10s

Scanning interval: 100ms

Default parameters related to slave mode:

Broadcast Name: Minew_Vxxxxx

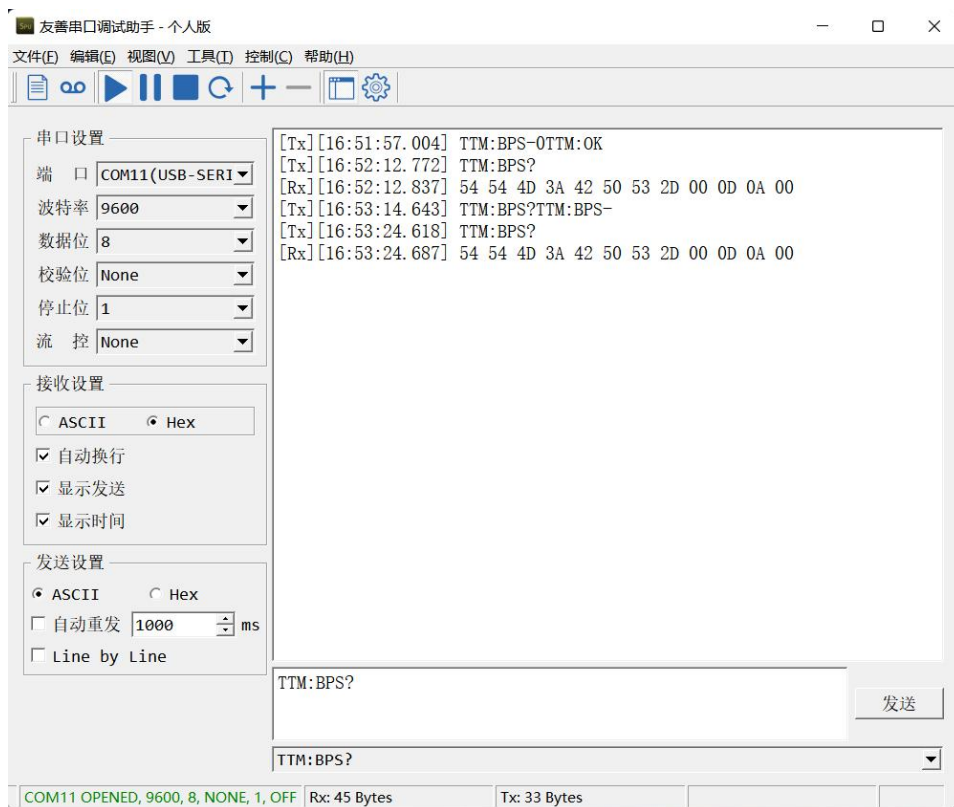
Broadcast interval: 1s

Custom data: Minew Tech

6.3.2 Example of Modifying Parameters

Connect all the pins according to the wiring, ground SLP and BTDATA, the device enters the unconnected state, at this time you can set the parameters, whether it is the host mode or the slave mode, all the parameters can be set, the parameters take effect immediately. Parameters after taking effect can only be reflected under the corresponding role. For example, if the broadcast name of the device is changed in the host mode, the parameters will take effect, but only when the device is switched to the slave mode will you see that the broadcast name has been changed. After sending the reset command, all the parameters are powered down and saved.

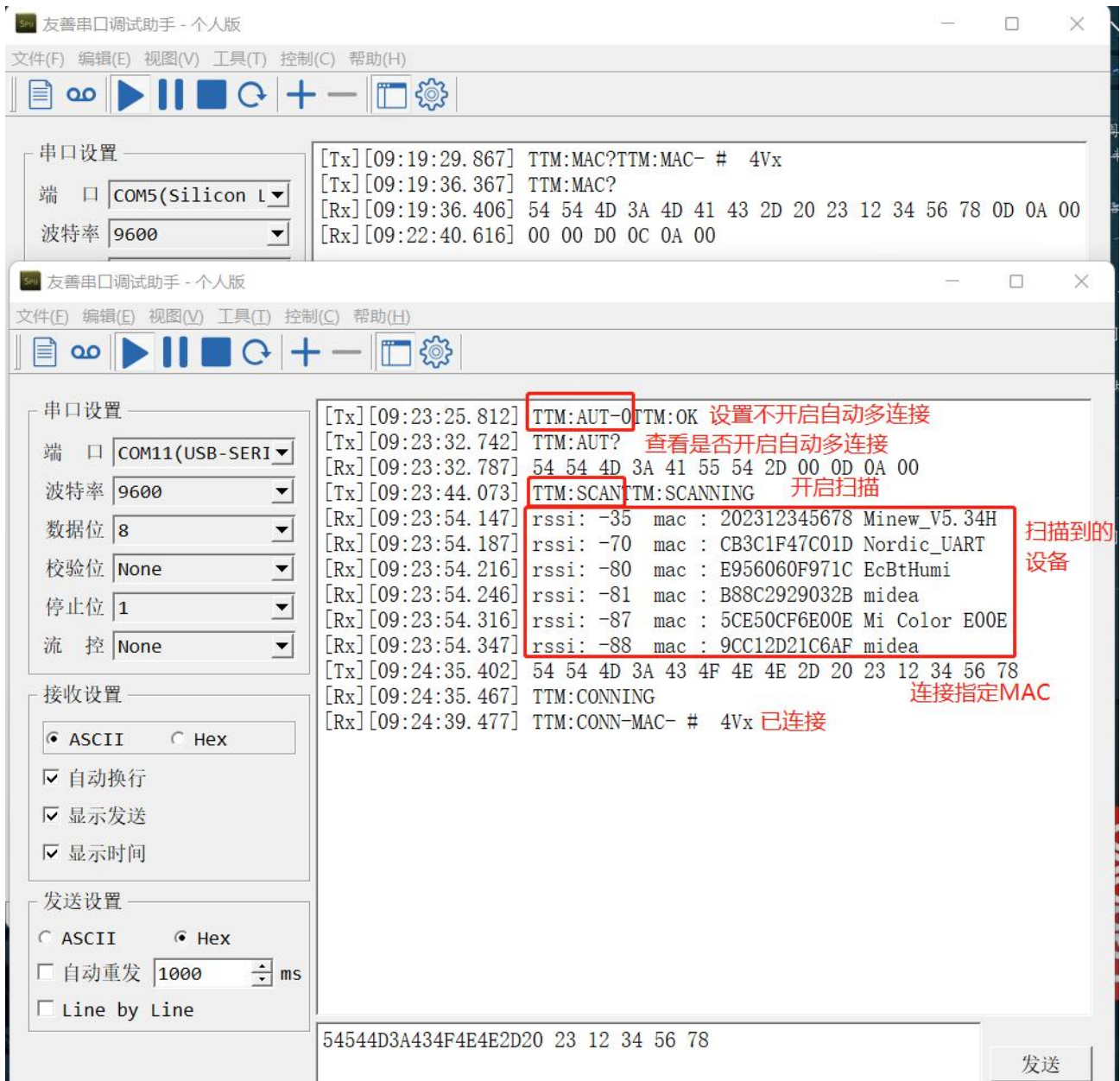
Note: When you need to modify multiple parameters, you can send all the setting commands first and then send the reset command.



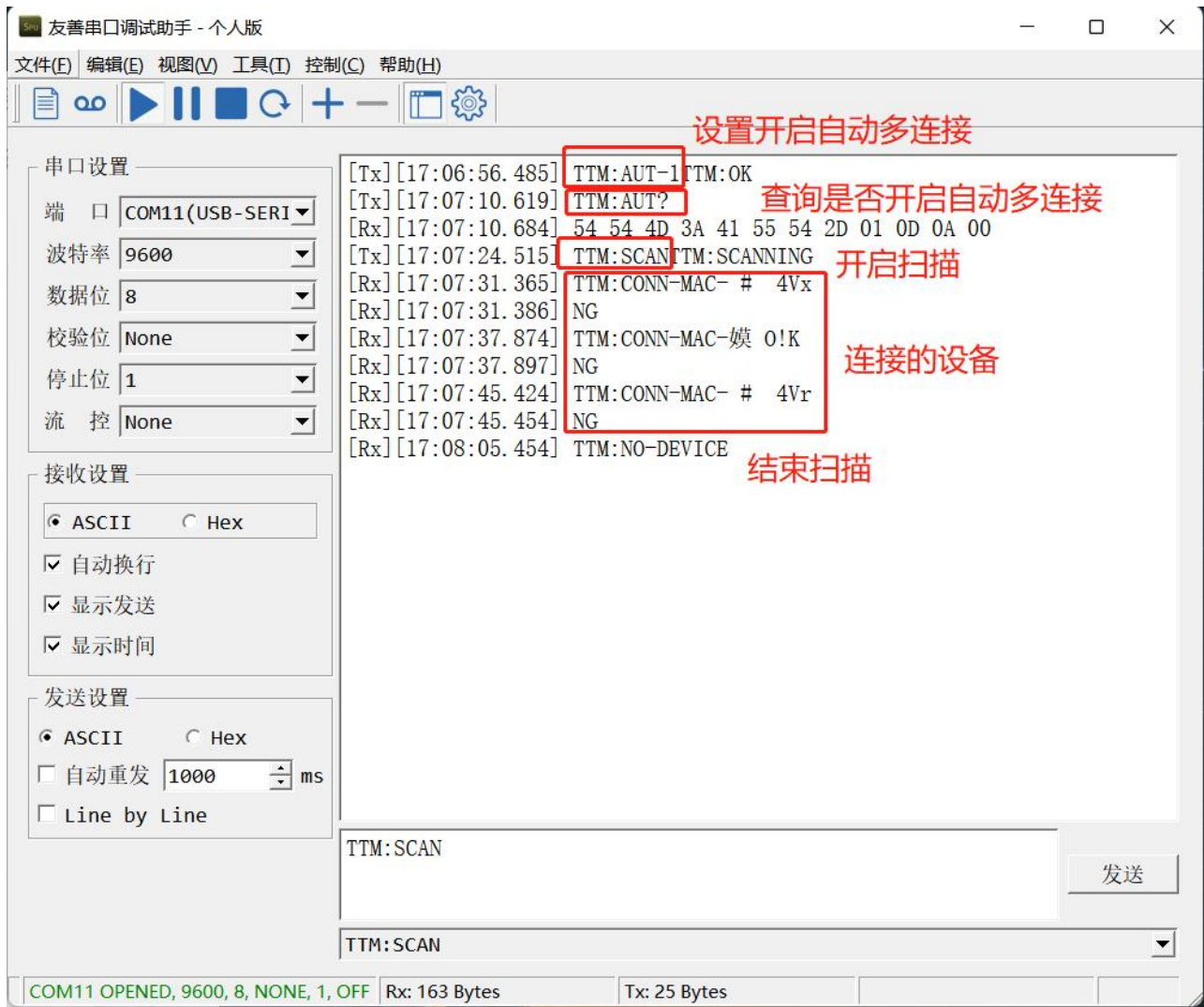
When querying the device parameters, because the parameters are hexadecimal numbers, when selecting the ASCII display, the parameter position may be garbled, at this time, you need to set to HEX display, the parameters correspond to the position after 2D, see the above figure, query the baud rate, you need to use the HEX display to view the specific parameters.

6.3.3 Scanning Devices and Connections

When automatic multi connection is turned off (TTM: AUT-0), sending the 54544D3A5343414E (TTM: SCAN) command to scan devices will obtain the MAC address of nearby devices. The scanned device will return MAC+broadcast name information. Send the 54544D3A434F4E4E2D202312345678 instruction, and the module will connect to the device with MAC address 20:23:12:34:56:78. The device connection will return TTM: CONN-MAC-XXXXXXXXXXXX r\n\0. Due to the MAC being a hexadecimal number, the entire instruction is sent in hexadecimal. Once connected, data transmission can proceed.



After turning on automatic multi connection (TTM: AUT-1), send the 54544D3A5343414E (TTM: SCAN) command to scan the device, which will automatically connect nearby unconnected slave devices, return the MAC of the connected device, and return TTM: NO-DEVICE until the scanning is completed. Connect to the device for data transmission.



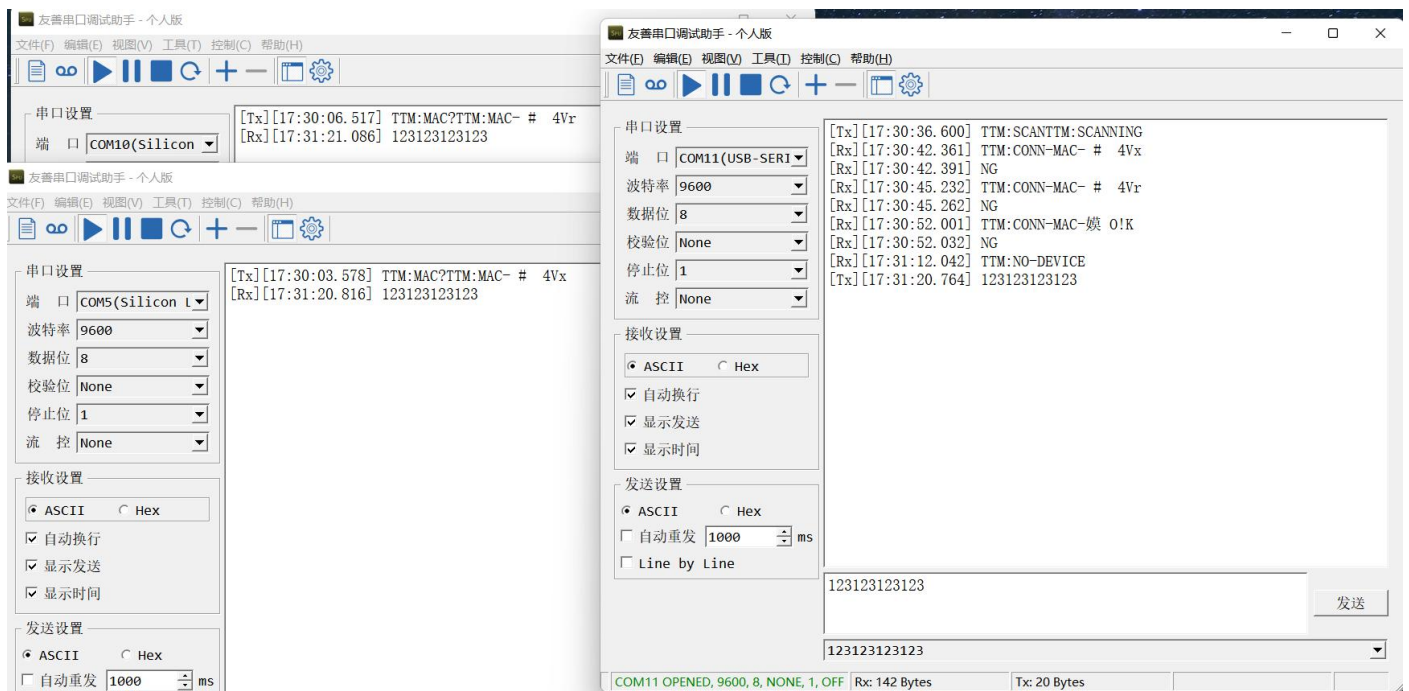
6.3.4 Master Passthrough

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	Note
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.

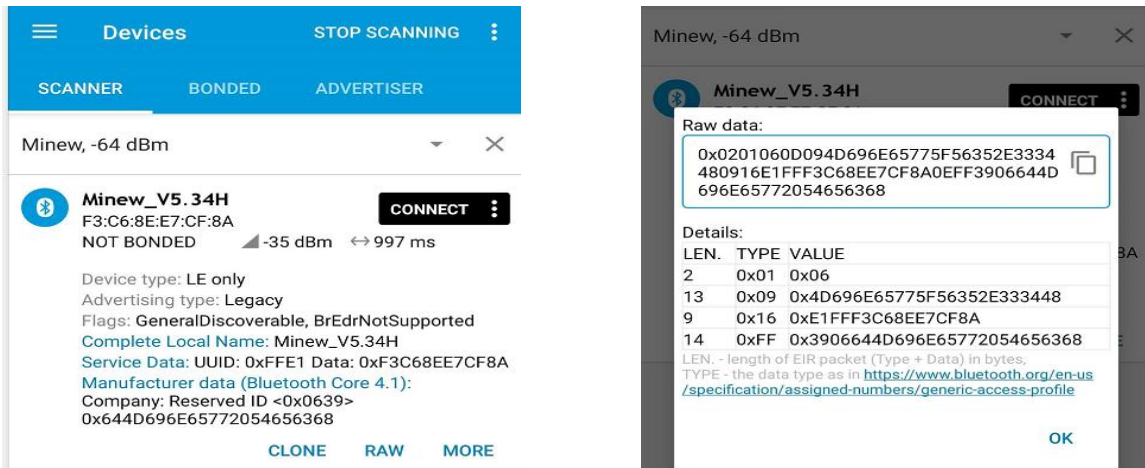


6.3.5 Slave Broadcast

After setting the device role to slave mode with the command TTM:ROL-0, data can be transmitted to and from the cell phone. With the SLP pin low, the device is in broadcast state. Use nrf connect to scan the device, click Raw after scanning to the device, Raw data is the unparsed data of the scanned device. After parsing the data according to BLE data type, see Detail section, BLE broadcast data has a certain format: length + type + content.

The content is changeable, the type is fixed and the length is determined by the content. There are two broadcast formats for the device, the pass-through broadcast packet and the iBeacon broadcast packet. Both formats contain four types: flag(0x01), broadcast name(0x09), service data(0x16), and manufacturer data(0xFF).

The following figure shows the transmitting broadcast packet: flag, broadcast name, service data is put in the broadcast packet, manufacturer data is put in the reply packet. The service data content is: service data UUID(E1FF) + MAC address. manufacturer data content consists of company id(3906) + battery level information(1 byte) + custom data.



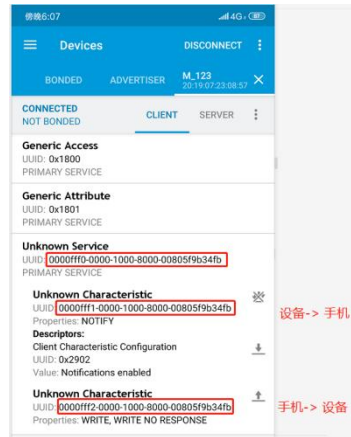
Note: The IOS side can not get the content of the MAC address field, so the MAC address is put back into the broadcast packet to ensure that the IOS side can get the device MAC address. In addition, the WeChat applet can't get the reply packet, so the MAC is put into the service data of the broadcast packet to ensure that the IOS side can also get the device MAC address using the WeChat applet connection.

6.3.6 Slave Passthrough

Based on 7.2, connect to the device using the mobile app and keep the BTDATA pin low to perform data passthrough. when BTDATA is not low, it does not affect the broadcasting and connecting of the device, just that passthrough is not possible. Using nRF connect, you can see the specific service, characteristic and corresponding properties.

The UUID consists of the alias UUID (2 byte, 3.4 byte on the left in the figure) + the base UUID (the remaining 14 byte).

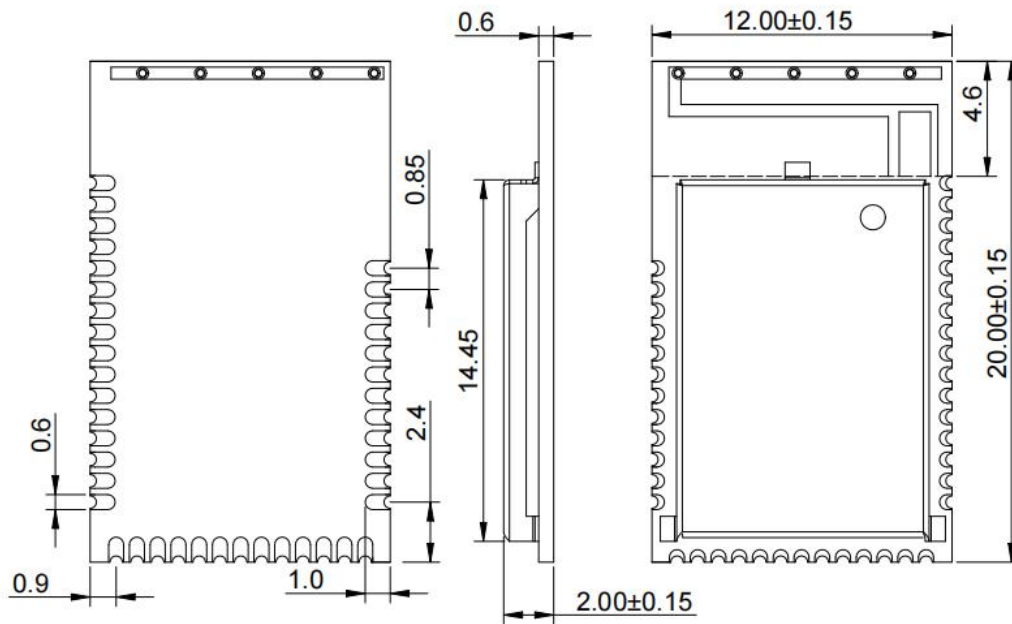
The base UUID used for services, features in the passthrough program is standard and is illustrated below with the alias UUID.



FFF0 is the service UUID, FFF1 is the cell phone receives data and the module sends data; FFF2 is the cell phone sends data and the module receives data.

Eigenvalue UUID	Executable operation	Maximum Packet Length	Note
FFF1	notify	244	The serial port sends data to the module, which is forwarded to the phone. The cell phone enables notify before it can get the data. The maximum number of bytes the module can send in a packet is 244 byte. Note: This process is automatically subcontracted by the firmware, and there is no need to subcontract according to the length of a package.
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

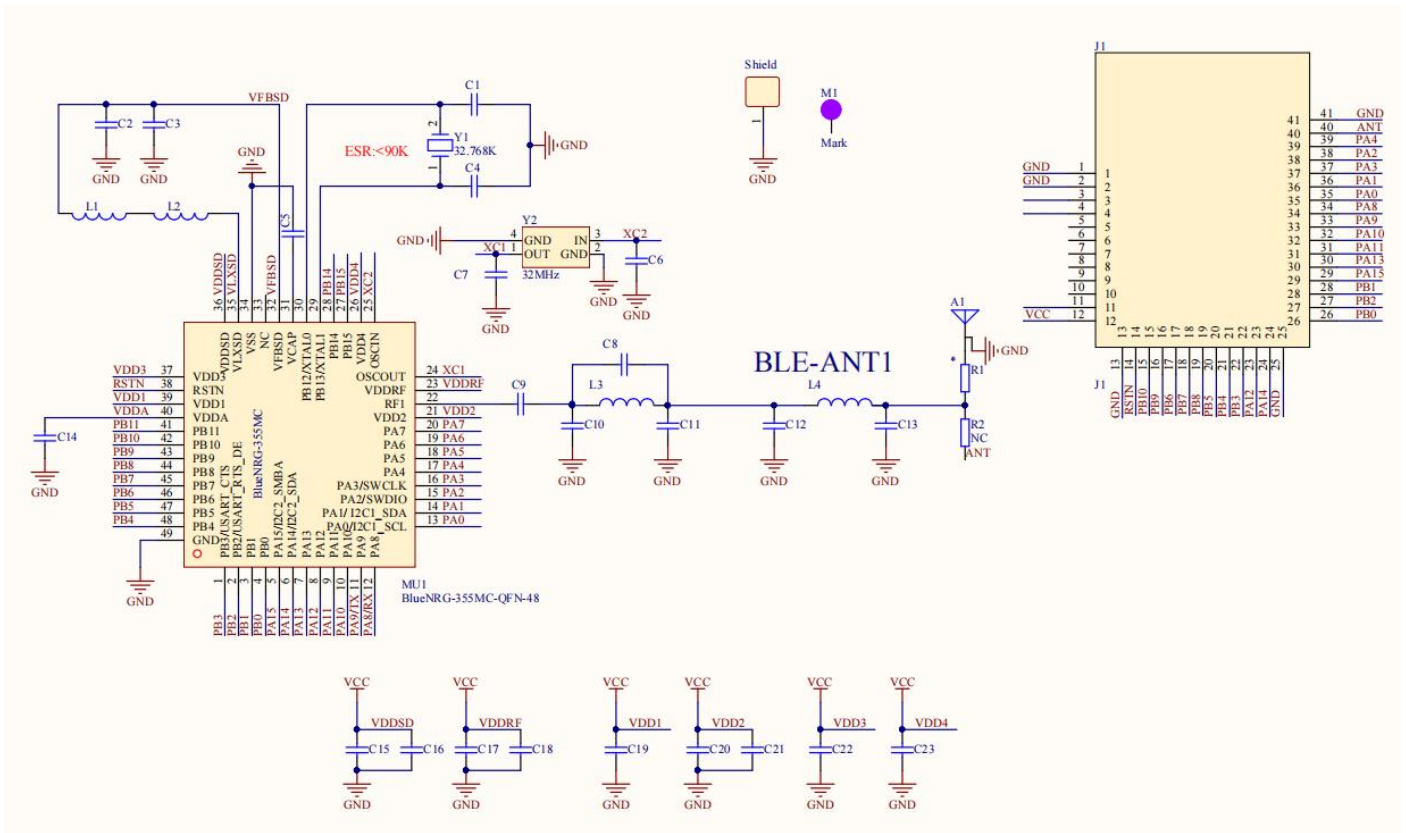
7 Mechanical Drawing



(Default unit: mm Default tolerance: ±0.1)

Note: Recommended pad size 1.8*0.8mm, pad extends outward 0.5mm

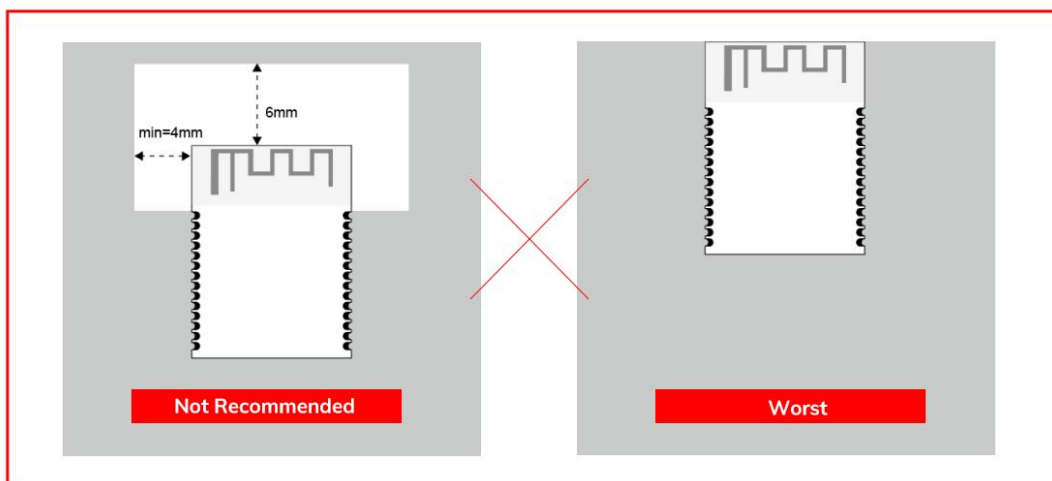
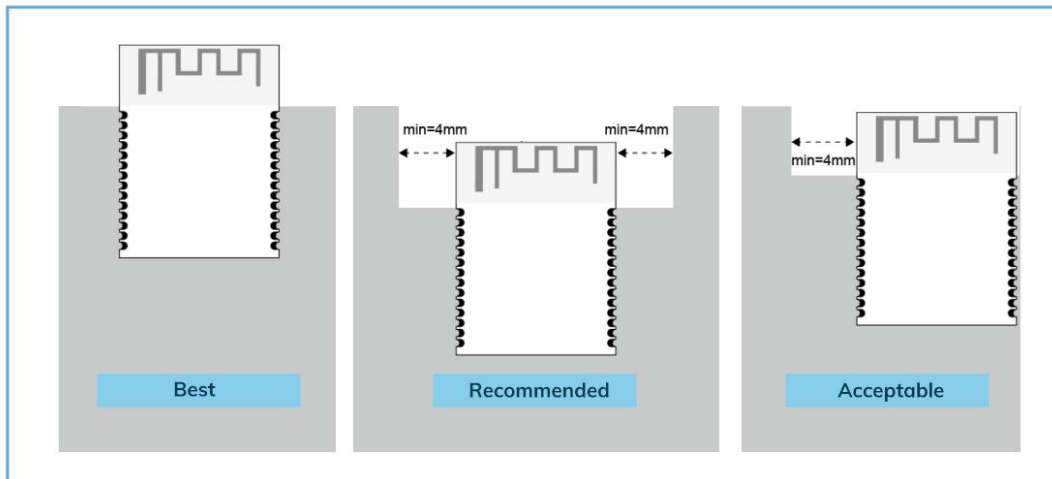
8 Electrical Schematic



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

9 PCB Layout

Module antenna area can not have GND plane or metal cross wiring, can not be placed near the components, it is best to do skeletonization or headroom area processing, or placed on the edge of the PCB board. Reference examples are as follows **it is strongly recommended to use the first design, the module antenna design in accordance with the first wiring for debugging.**

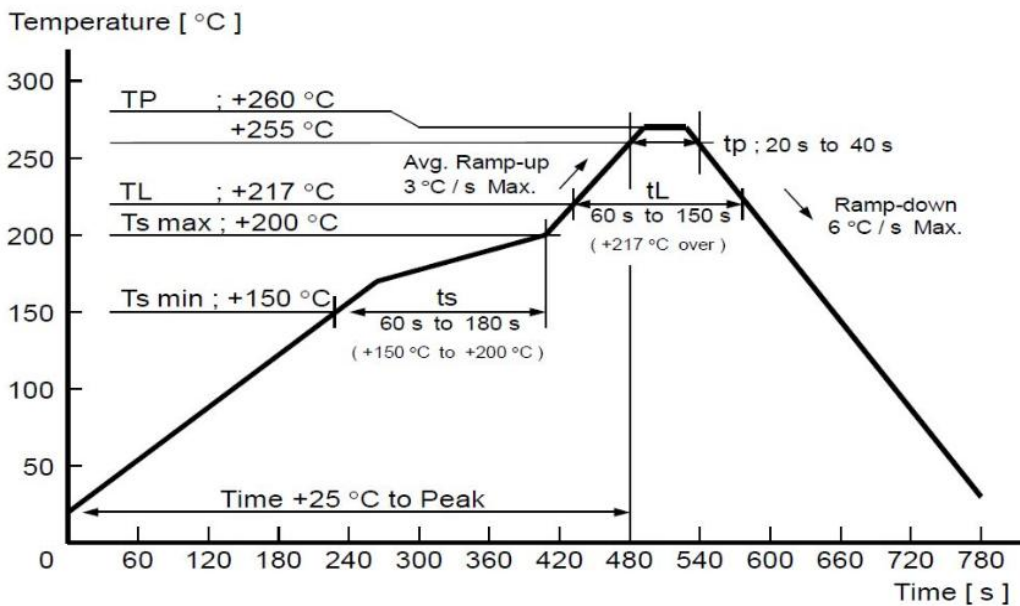


Layout notes:

- 1) Preferred Module antenna area completely clearance and not be prevented by metals, otherwise it will influence antenna's effect (as above DWG. indication).
- 2) Cover the external part of module antenna area with copper as far as possible to reduce the main board's signal cable and other disturbing.
- 3) It is preferred to have a clearance area of 4 square meter or more area around the module antenna (including the shell) to reduce the influence to antenna.
- 4) Device should be grounded well to reduce the parasitic inductance.
- 5) Do not cover copper under module's antenna in order to avoid affect signal radiation or lead to transmission distance affected.
- 6) Antenna should keep far from other circuits to prevent radiation efficiency reduction or affects the normal operation of other lines.
- 7) Module should be placed on edge of circuit board and keep a distance away from other circuits.
- 8) Suggesting to use magnetic beads to insulate module's access power supply.

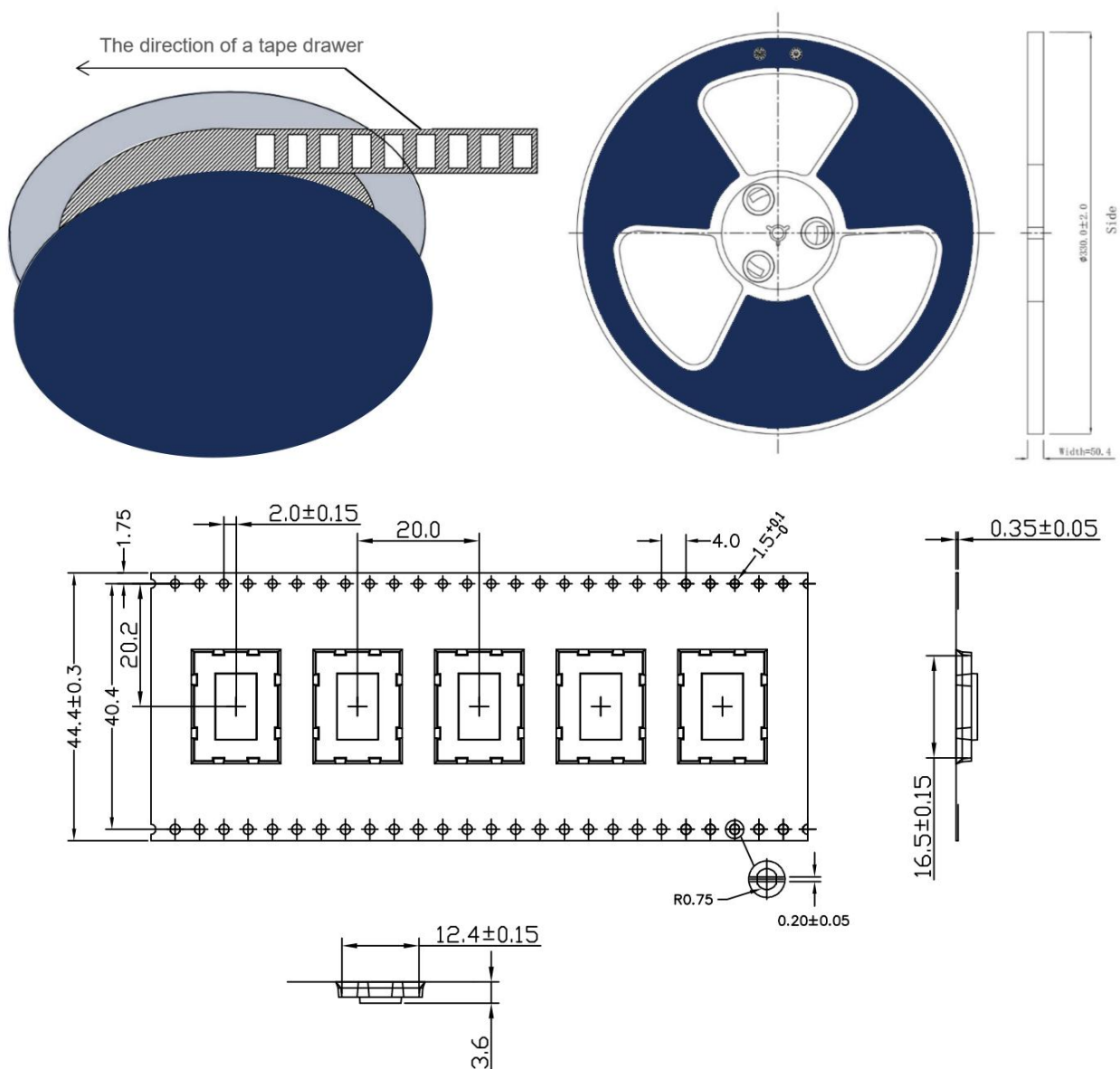
10 Reflow and Soldering

- 1) Do SMT according to above reflow oven temperature deal curve. Max. Temperature is 260°C;
- 2) Refer to IPC/JEDEC standard; Peak TEMP<260°C; Times: ≤2 times, suggest only do once reflow soldering on module surface in case of SMT double pad involved. Contact us if special crafts involved.



- 3)
- 4) Suggesting to make 0.2mm thickness of module SMT for partial ladder steel mesh, then make the opening extend 0.8mm
- 5) After unsealing, it cannot be used up at one time, should be vacuumed for storage, couldn't be exposed in the air for long time. Please avoid getting damp and soldering-pan oxidizing. If there are 7 to 30 days interval before using online SMT, suggest to bake at 65-70 °C for 24 hours without disassembling the tape.
- 6) Before using SMT, please adopt ESD protection measure.

11 Package Information



* (Default unit: mm Default tolerance: ± 0.1)

Packing Detail	Specification	Net weight	Gross Weight	Dimension
Quantity	850PCS	680g	1150g	W: 44mm,T:0.35mm

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

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● Contact Us

Shenzhen Minewsemi Co., Ltd. is committed to swiftly delivering top-quality connectivity modules to our customers. For assistance and support, please feel free to contact our relevant personnel, or contact us as follows:

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Related Documents: Chip Specification

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