EWM104-BT62SP User Manual

Bluetooth Audio Transceiver Module



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CONTENTS

DISCLAIMER AND COPYRIGHT NOTICE **2**
1 OVERVIEW **3**
1.1 PRODUCT INTRODUCTION 3
1.2 FEATURES AND FUNCTIONS 3
1.3 APPLICATION SCENARIOS 3
2 SPECIFICATIONS **4**
3 MECHANICAL DIMENSIONS AND PIN DEFINITIONS **5**
4 FUNCTION DESCRIPTION **7**
4.1 BLUETOOTH AUDIO RECEPTION 7
4.2 BLUETOOTH AUDIO TRANSMISSION 7
4.3 SUPPORTS SD CARD PLAYBACK 7
5 AT COMMANDS **7**
5.1 INSTRUCTION DESCRIPTION 7
5.2 AT COMMAND TABLE 7
5.3 INSTRUCTION DESCRIPTION 9
6 HARDWARE DESIGN **15**
7 FREQUENTLY ASKED QUESTIONS **16**
7.1 TRANSMISSION DISTANCE IS NOT IDEAL 16
7.2 MODULE IS EASILY DAMAGED 16
7.3 THE BIT ERROR RATE IS TOO HIGH 16
8 WELDING OPERATION INSTRUCTIONS **17**
8.1 REFLOW SOLDERING TEMPERATURE 17
8.2 REFLOW SOLDERING PROFILE 18
REVISION HISTORY **18**
ABOUT US **18**

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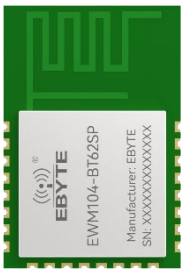
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1 Overview

1.1 Product Introduction



The EWM104-BT62SP module is a Bluetooth audio module based on the Bluetooth V5.3 protocol, conforming to the Bluetooth V5.3 BR+EDR+BLE specification. It integrates Bluetooth stereo audio reception and transmission, providing USB sound card input, SD card input , dual-channel analog signal input/output interfaces, and a UART serial port. Users can modify the Bluetooth name and control audio playback via ART commands . In transmit mode, it can connect to Bluetooth headsets and Bluetooth speakers to play audio; in receive mode, it can connect to Bluetooth devices such as mobile phones and computers to listen to audio.

1.2 Features and Functions

- Bluetooth audio transceiver module, supporting audio transmission and reception;
- Supports Bluetooth 5.3 protocol;
- It operates in the global unlicensed ISM 2.4 GHz band;
- Maximum transmit power 6dBm;
- Supports SBC/AAC decoding;
- Sampling rates of 8kHz / 11.025kHz / 16kHz / 22.05kHz / 24kHz / 32kHz / 44.1kHz / 48kHz ;
- Provides analog signal input/output interfaces for left and right channels;
- The module supports AT command configuration;
- Supports playback of audio from SD cards;
- The EWM104-BT62SP comes with a built-in PCB antenna, a 1.27mm stamp hole package, and measures 13 * 19 mm.
- The communication range can reach up to 100 meters (in a clear, open environment).

1.3 Application scenarios

- Bluetooth stereo speaker
- Bluetooth audio receiver
- Bluetooth audio transmitter

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2 Specifications

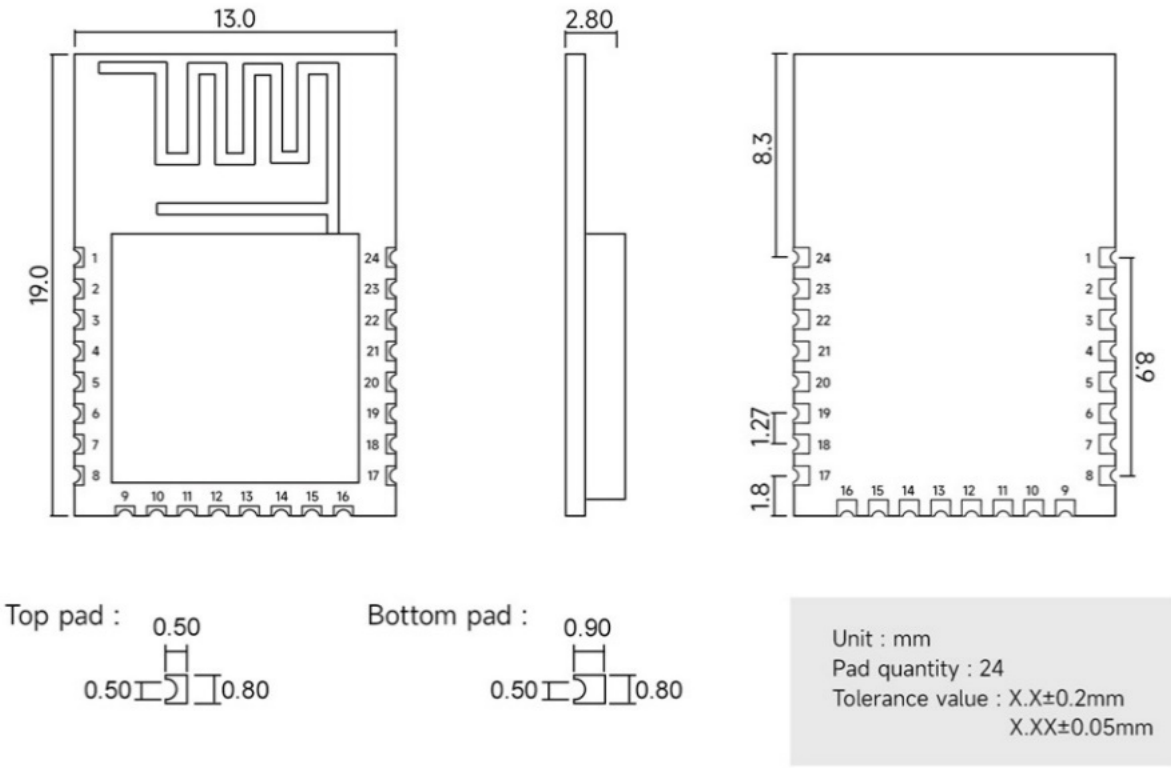
Main parameters		Performance			Remark
		Minimum value	Typical value	Maximum value	
VBAT operating voltage (V)		3.4	5	5.5	A voltage below 3.4V will produce background noise .
Operating temperature (° C)		-20	-	+70	-
Operating frequency band (MHz)		2400	-	2480	-
Power consumption	Transmit power consumption (mA)	-	44	-	Average power consumption during audio playback
	Receiver power consumption (mA)	-	18	-	Average power consumption during audio playback
Transmit power (dBm)		-	-	6	-
Receiver sensitivity (dBm)		-	-90	-	-

Main parameters	Description	Remark
Communication distance	100m	Transmit power 6dBm, clear and open environment, height 1.5 meters.
Bluetooth protocol	V5.3	-
Communication interface	UART serial port	-
Packaging method	patch	-
Interface method	1.27 mm	Stamp perforation
External dimensions	13*19 mm	PCB antenna
Product weight	1.0g	±0.1g
Antenna Interface	PCB onboard antenna	-

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3 Mechanical Dimensions and Pin Definitions



Pin No.	Pin Definitions	Pin direction	Pin Function	Illustration
1	GND	-	Ground	Power ground
2	MODE	I	Transmit/Receive Mode Selection	The transmit/receive mode selection pin is floating by default in receive mode , and low level in transmit mode.
3	LED1	O	Transmit indicator GPIO	For connecting indicator lights (lit in transmit mode , off in receive mode): When Bluetooth is not connected/connecting: fast, even flashing (100ms on, 100ms off). When Bluetooth is successfully connected: flashes twice every 5 seconds (5 seconds off, 100ms on, 100ms off, 100ms on).
4	LED2	O	Receive indicator GPIO	Used for indicator lights (lit in receive mode , off in transmit mode): When Bluetooth is not connected: fast, even flashing (100ms on, 100ms off). When Bluetooth is successfully connected: flashes twice every 5 seconds (5 seconds off, 100ms on, 100ms off, 100ms on).

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5	LINK	O	Indicator GPIO	This indicator light is used to implement the following logic: Connectivity status pin: 3.3V output when Bluetooth is connected, 0V output when not connected.
6	PAIR	I	Button GPIO	Pairing button , floating by default, active low. A short press disconnects the connection and allows for re-pairing; Press and hold for 5 seconds to clear all devices from the whitelist.
7	DM	-	USB	DM data cable interface (used to connect to a computer's USB port as a sound card)
8	DP	-	USB	DP data cable interface (used to connect to a computer's USB port to function as a sound card)
9	RXD2	I	serial port	Serial port receiver (extension pin, used for configuring Bluetooth-related information via serial port)
10	TXD2	O	serial port	Serial port transmitter (extension pin, used for configuring Bluetooth-related information via serial port)
11	GND	-	Ground	Power ground
12	LIN/OUT_R	I/O	Right channel input/output	Audio signal right channel input/output dual-function port (inputs audio signal when configured for transmit mode, outputs audio signal when configured for receive mode)
13	LIN/OUT_L	I/O	Left channel input/output	Audio signal left channel input/output dual-function port (inputs audio signal when configured for transmit mode, outputs audio signal when configured for receive mode)
14	AGND		Audio	Audio
15	NC	-	Reserved pins	Reserved pins, users don't need to worry about them.
16	NC	-	Reserved pins	Reserved pins, users don't need to worry about them.
17	VBAT		Power supply	Power supply pin
18	GND		Ground	Power ground
19	NC	-	Reserved pins	Reserved pins, users don't need to worry about them.
20	SD_PWR	O	External SD card	Reserved SD card power supply pin, 3.3V
21	SD_CMD	I/O	External SD card	Reserved SD card command/response pins
22	SD_CLK	O	External SD card	Reserved SD card clock pin
23	SD_DAT	I/O	External SD card	Reserved SD card data pins
24	NC	-	Reserved pins	Reserved pins, users don't need to worry about them.

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4 Function Description

4.1 Bluetooth audio reception

In receive mode, it can connect to mobile phones or computers via Bluetooth to play audio.

4.2 Bluetooth audio transmission

In transmit mode, it can transmit audio via Bluetooth to modules configured in receive mode, and can also connect to some Bluetooth headsets and Bluetooth speakers to send audio to playback devices via Bluetooth.

Because there are many Bluetooth headset and speaker brands on the market with different underlying protocols, the transmission mode may be incompatible with some brands of headsets, speakers or other Bluetooth receiving devices.

4.3 Supports SD card playback

It provides an SD card reading interface, which can play audio built into the SD card and supports audio formats: MP3, G729, WMA, MAV, SBC, and CVSD.

5 AT Commands

5.1 Instruction Description

1. The module's serial port supports a default baud rate of 1000000bps and 8N1 format.

2. AT commands end with <\R> or <\F>, which will not be repeated in the following description. <\R>: Carriage return character; <\F>: Newline character.

3. Errors are responded to with ERROR.

5.2 AT Command Table

No.	Command	Description
1	AT	AT communication link check
2	AT+RESET	Reset command
3	AT+RESTORE	Factory reset instructions
4	AT+VER?	Query current version
5	AT+MODE?	Query current mode
6	AT+MAC?	Query local MAC address

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7	AT+CHANNEL?	Query current audio source channel
8	AT+STATUS?	Check the current Bluetooth connection status
9	AT+LIST?	Query the current auto-connect record table
10	AT+CLRLIST	Clear all automatic connection record tables
11	AT+VOL	Query/Set Current Volume
12	AT+BTNAME	Query/Set Bluetooth Name
13	AT+BAUD	Query/Set Current Baud Rate
14	AT+ADDNAME	Add a Bluetooth name for automatic connection
15	AT+ DEL NAME	Delete the Bluetooth name that connects automatically
16	AT+ADDMAC	Add Bluetooth MAC address for automatic connection
17	AT+ DEL MAC	Delete the Bluetooth MAC address that connects automatically
18	AT+PAIR	The pairing command disconnects the current connection and re-pairs (MAC address method).
19	AT+NAMEPAIR	The pairing command disconnects the current connection and re-pairs (using Bluetooth name).
20	AT+PPLAY	Set audio to pause playback
21	AT+PREV	Switch to the previous song on the SD card
22	AT+NEXT	Switch to the next song on the SD card
23	AT+PREVDIR	Switch to the previous folder on the SD card
24	AT+NEXTDIR	Switch to the next folder on the SD card

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5.3 Instruction Description

5.3.1 AT Test Commands

Command	Response	Example
AT	OK	Send: AT Return: OK
Note: AT link test		

5.3.2 AT+RESET Reset Command

Command	Response	Example
AT+RESET	R EBOOTING...	Send: AT+RESET Return: Re- EBOOTING...
Note: 1. AT reset command, resets 10ms after being sent;		

5.4.3 AT+RESTORE factory reset command

Command	Response	Example
AT+RESTORE	OK R EBOOTING WITH FACTORY SETTINGS...	Send: AT+RESTORE Return: OK R EBOOTING WITH FACTORY SETTINGS...
Note: 1. AT reset to factory settings, resets 20ms after input; 2. During the factory reset process, any form of resetting is prohibited, and power should not be cut off before the operation is completed.		

5.4.4 AT+VER? Query version information

Command	Response	Example
AT+VER?	<Firmware version number>	Send: AT+VER? Returns: <Firmware version number>
Note: None		

5.4.5 AT+MODE? Query the current mode

Command	Response	Example
AT+MODE?	MODE: <mode>	Send: AT+MODE?

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Note	<mode>	Description		Return: MODE:EMITTER
	EMITTER	Launch mode		
	RECEIVER	Receive mode		

5.4.6 AT+MAC? Query the local machine's MAC address

Command	Response	Example
AT+MAC?	MAC:XX:XX:XX:XX:XX:XX	Send: AT+MAC? Returned: MAC:11:22:33:44:55:66
Note: None		

5.4.7 AT+CHANNEL? Query audio source channel

Command		Response	Example
AT+CHANNEL?		CHANNEL:<channel>	
Note	<channel>	Description	Send: AT+CHANNEL? Return to: CHANNEL:PC
	PC	USB sound card channel input	
	LINEIN	AUX channel input	
	BT	Bluetooth channel input	
	MUSIC	SD card channel input	

5.4.8 AT+STATUS? Query Bluetooth status

Command		Response	Example
AT+STATUS?		BT_STATUS:<status>	
Note	<status>	Description	Send: AT+STATUS? Returns: BT_STATUS:CONNECTED
	WATTING_CONNECTION	Waiting for connection	
	CONNECTED	Connected	
	OFF	Not connected	

5.4.9 AT+LIST? Queries the current auto-join record table.

Command	Response	Example
AT+LIST?	Stored MAC Addresses: Index 0: E4:6C:C3:34:97:7A Index 1: <empty> Index 2: <empty>	Send：AT+LIST? Return：Stored MAC Addresses: Index 0: E4:6C:C3:34:97:7A Index 1: <empty>

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AT+LIST?	Index 3: <empty> Index 4: <empty> Index 5: <empty> Index 6: <empty> Index 7: <empty> Index 8: <empty> Index 9: <empty> Stored Bluetooth Names: Index 0: ebyte_bt_emitter_977A Index 1: ABCHDEE Index 2: <empty> Index 3: <empty> Index 4: <empty> Index 5: <empty> Index 6: <empty> Index 7: <empty> Index 8: <empty> Index 9: <empty> **Current Pair Index: 0** **Current Name Pair Index: 0**	Index 2: <empty> Index 3: <empty> Index 4: <empty> Index 5: <empty> Index 6: <empty> Index 7: <empty> Index 8: <empty> Index 9: <empty> Stored Bluetooth Names: Index 0: ebyte_bt_emitter_977A Index 1: ABCHDEE Index 2: <empty> Index 3: <empty> Index 4: <empty> Index 5: <empty> Index 6: <empty> Index 7: <empty> Index 8: <empty> Index 9: <empty> **Current Pair Index: 0** **Current Name Pair Index: 0**
Note: This command is used to query the whitelist. Bluetooth devices with names or MAC addresses in the whitelist can be automatically connected first. 1. Empty spaces will be displayed as <empty>; 2. Current Pair Index: 0, Current Name Pair Index: 0, used to display the serial numbers of currently connected devices;		

5.4.10 AT+CLRLIST Clears the automatic connection record table

Command	Response	Example
AT+CLRLIST	CLRLIST OK	Send: AT+CLEAR Return: CLRLIST OK
Note: Clears all stored Bluetooth device information, including Bluetooth name and MAC address.		

5.4.11 AT+VOL setting/querying current volume

Command		Response	Example
Query	AT+VOL?	VOL: 70%	Send: AT+VOL? Return: VOL:70%
Set up	AT+VOL=<value>	OK	Send: AT+VOL=70 Return: OK
Note	The volume range for <vol> can be set from 0 to 100;		

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	The initial volume is 50; 3. If the set volume is less than 0 or greater than 100, it will return ERROR Range (0-100) turn to 0/100. If it is less than 0, it will be set to 0, and if it is greater than 100, it will be set to 100.

5.4.12 AT+BTNAME query/set Bluetooth name

Command		Response	Example
Query	AT+BTNAME?	BT_NAME:<name>	Send: AT+BTNAME? Returned: BT_NAME:NEW_NAME
Set up	AT+BTNAME=<name>	OK	Send: AT+BTNAME=NEW_NAME Return: OK
Note	The name should not exceed 32 characters.		

5.4.13 AT+BAUD query/set baud rate

Command		Response	Example
Query	AT+BAUD?	BAUD:<baud>	Send: AT+BAUD? Return: BAUD:115200
Set up	AT+BAUD=<baud>	OK	Send: AT+BAUD=115200 Return: OK
Note	Supported baud rates : 9600, 14400, 19200, 38400, 115200, 921600, 1000000; 2. Restart after setting for the changes to take effect.		

5.4.14 Add a Bluetooth name for automatic connection using AT+ADDNAME

Command	Response	Example
AT+ADDNAME=<name>	ADDNAME OK	Send: AT+ADDNAME=NEW_NAME Return: ADDNAME OK
Note: 1. The name must be at most 32 bytes; any part exceeding 32 bytes will be truncated. 2. Storing more than ten items will result in an error: NAMEADD FULL; 3. Only one Bluetooth device with the same name can be stored;		

5.4.15 AT+ DELNAME Delete the Bluetooth name that automatically connects.

Command	Response	Example
AT+ DEL NAME=<name>	NAME DEL OK	Send: AT+ DEL NAME=NEW_NAME Return: NAME DEL OK
Note: Deleting a Bluetooth name will also delete the MAC address associated with that name. If no device with the specified name is found, the deletion will fail and return "NAME NOT FOUND".		

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5.4.16 AT+ADDMAC Add the Bluetooth MAC address for automatic connection

<table>
<tr><th>Command</th><th>Response</th><th>Example</th></tr>
<tr><td>AT+ADDMAC=<mac></td><td><description></td><td rowspan="2">Send: AT+ADDMAC=112233445566
Return: OK</td></tr>
<tr><td>Note</td><td colspan="2">
<table>
<tr><th><description></th><th>Description</th></tr>
<tr><td>OK</td><td>Added successfully</td></tr>
<tr><td>ERROR: MAC address already exists</td><td>Duplicate MAC address</td></tr>
<tr><td>ERROR: Device list is full (max 10)</td><td>MAC addresses are full.</td></tr>
</table>
1. Add the first empty space found from index 0 to 9;
2. Maximum of ten can be added;
3. Devices with the same MAC address cannot be added;
</td></tr>
</table>

5.4.17 AT+ DEL MAC Delete the MAC address of automatically connected Bluetooth devices

Command	Response	Example
AT+DELMAC = <mac>	DELMAC OK	Send: AT+DELMAC=112233445566 Return: DELMAC OK
Note: 1. Deleting a MAC address will also delete the Bluetooth name associated with that MAC address. 2. If no device with the specified MAC address is found, deletion will fail and return "MAC ADDRESS NOT FOUND"; 3. If the format is incorrect, "ERROR: Invalid hex digit" will be displayed.		

5.4.18 AT+PAIR Disconnect the currently paired device and prioritize pairing the MAC address of the device that will automatically connect.

Command	Response	Example
AT+PAIR	PAIRING...	Send: AT+PAIR Return: PAIRING...
1. Note: 2. Only pair with devices in the MAC storage area (maximum 10). 3. Disconnect the current connection each time you use it.		

5.4.19 AT+NAMEPAIR Disconnect the currently paired device and prioritize pairing with the Bluetooth name that will automatically connect.

Command	Response	Example

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AT+NAMEPAIR	NAME PAIRING...	Send: AT+NAMEPAIR Return: NAME PAIRING...
Note: 1.Pair only with devices in the Bluetooth name storage area (maximum 10). 2.Disconnect the current connection each time you use it.		

5.4.20 AT +PPLAY setting to pause audio playback

Command	Response	Example
AT+PPLAY	PP OK	Send: AT+PPLAY Return: PP OK
Note : None		

5.4.21 AT +PREV to switch to the previous song on the SD card

Command	Response	Example
AT+PREV	Return: PREV OK	Send: AT+PREV Return: PREV OK
Note: This only applies when playing music from an SD card.		

5.4.2 2 AT+NEXT to switch to the next song on the SD card

Command	Response	Example
AT+NEXT	Return: NEXT OK	Send: AT+NEXT Return: NEXT OK
Note : This only applies when playing music from an SD card.		

5.4.2 3 AT+PREVDIR Switch to the previous folder on the SD card

Command	Response	Example
AT+PREDIR	Return: PREV DIR OK	Send: AT+PREVDIR Return: NEXT PRE OK
Note: This only applies when playing music from an SD card.		

5.4.2 4 AT+NEXTDIR Switch to the next folder on the SD card

Command	Response	Example
AT+NEXTDIR	Return: NEXT DIR OK	Send: AT+NEXTDIR Return: NEXT DIR OK
Note: This only applies when playing music from an SD card.		

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6 Hardware Design

- It is recommended to use a DC regulated power supply to power this module, with the power supply ripple coefficient as small as possible, and the module must be reliably grounded;
- Please ensure the correct connection of the power supply positive and negative terminals. Reversing the connection may cause permanent damage to the module.
- Please check the power supply and ensure it is within the recommended voltage range. Exceeding the maximum value will cause permanent damage to the module.
- Please check the power supply stability; the voltage should not fluctuate significantly or frequently.
- When designing power supply circuits for modules, it is often recommended to retain a margin of more than 30% to ensure long-term stable operation of the entire unit.
- The module should be kept as far away as possible from power supplies, transformers, high-frequency traces, and other parts with high electromagnetic interference.
- High-frequency digital traces, high-frequency analog traces, and power traces must avoid the area under the module. If it is absolutely necessary to run the traces under the module, assuming the module is soldered on the Top Layer, lay ground copper on the Top Layer of the module contact area (all copper and well grounded), and run the traces close to the digital part of the module on the Bottom Layer .
- Assuming the module is soldered or placed in the Top Layer, it is also wrong to arbitrarily route traces in the Bottom Layer or other layers, as this will affect the module's stray emissions and receiver sensitivity to varying degrees .
- If there are devices around the module that cause significant electromagnetic interference, it will greatly affect the module's performance. Depending on the intensity of the interference, it is recommended to keep them away from the module. If possible, appropriate isolation and shielding can be implemented.
- If there are traces around the module that cause significant electromagnetic interference (high-frequency digital, high-frequency analog, power supply traces), it will greatly affect the module's performance. Depending on the intensity of the interference, it is recommended to keep them away from the module. If possible, appropriate isolation and shielding can be implemented.
- If the communication line uses a 5V level, a 1k-5.1k resistor must be connected in series (not recommended, as there is still a risk of damage) ;
- Try to stay away from TTL protocols that also use a physical layer of 2.4GHz, such as USB 3.0;
- The antenna mounting structure has a significant impact on module performance; therefore, it is essential to ensure that the antenna is exposed, ideally vertically upwards. When the module is installed inside the housing, a high-quality antenna extension cable can be used to extend the antenna to the outside of the housing.
- Antennas should never be installed inside a metal casing, as this will greatly reduce the transmission distance.

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7 Frequently Asked Questions

7.1 Transmission distance is not ideal

- When there are obstacles in line-of-sight communication, the communication distance will be reduced accordingly ;
- Temperature, humidity, and co-channel interference can all lead to increased packet loss rates in communications .
- The ground absorbs and reflects radio waves, and the test results are poor when the ground is close to the ground .
- Seawater has a strong ability to absorb radio waves, so testing results are poor at the seaside .
- If there are metal objects near the antenna, or if it is placed inside a metal casing, the signal attenuation will be very severe .
- Power register settings are incorrect; air speed setting is too high .
- At room temperature, the power supply voltage is lower than the recommended value; the lower the voltage, the lower the power output .
- The antenna may be poorly matched with the module or have quality issues.

7.2 Module is easily damaged

- Please check the power supply and ensure it is within the recommended voltage range. Exceeding the maximum value will cause permanent damage to the module .
- Please check the power supply stability; the voltage should not fluctuate significantly or frequently .
- Please ensure anti-static operation during installation and use, as high-frequency devices are sensitive to electrostatic discharge .
- Please ensure that the humidity is not too high during installation and use, as some components are humidity-sensitive .
- Unless there are special requirements, it is not recommended to use it at excessively high or low temperatures.

7.3 The bit error rate is too high .

- If there is interference from a co-channel signal nearby, move away from the source of interference or change the frequency or channel to avoid the interference.
- An inadequate power supply can also cause garbled characters, so it is essential to ensure the reliability of the power supply.
- Poor quality or excessive length of extension lines or feeders can also lead to a high bit error rate.

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8 Welding Operation Instructions

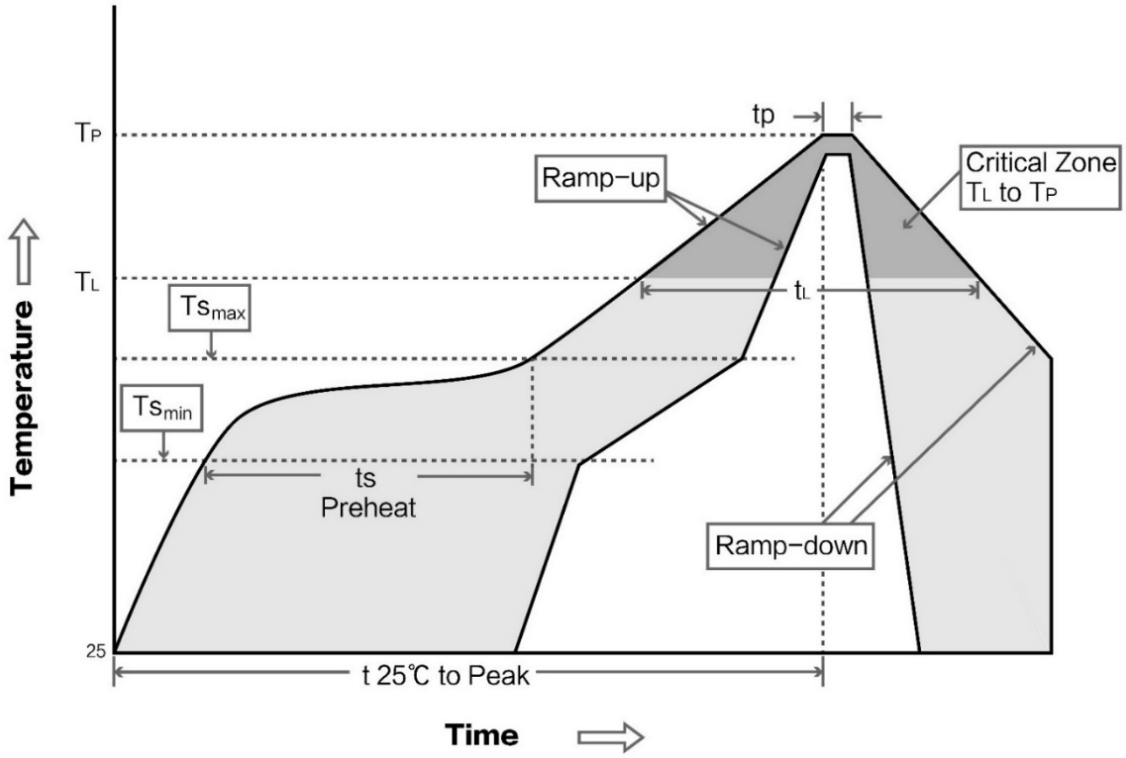
8.1 Reflow soldering temperature

Profile Feature	Curve characteristics	Sn-Pb Assembly	Pb-Free Assembly
Solder Paste	Solder paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min (Tsmin)	Minimum preheating temperature	100 ℃	150 ℃
Preheat temperature max (Tsmax)	Maximum preheating temperature	150 ℃	200 ℃
Preheat Time (Tsmin to Tsmax)(ts)	preheating time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average rate of ascent	3 ℃ /second max	3 ℃ /second max
Liquidous Temperature (TL)	Liquid phase temperature	183 ℃	217 ℃
Time(tL)Maintained Above(TL)	Time above the liquidus line	60-90 sec	30-90 sec
Peak temperature (Tp)	Peak temperature	220-235 ℃	230-250 ℃
Aveage ramp-down rate（Tp to Tsmax）	Average rate of descent	6 ℃ /second max	6 ℃ /second max
Time 25 ℃ to peak temperature	from 25 ℃ to peak temperature	6 minutes max	8 minutes max

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8.2 Reflow Soldering Profile



Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2025-04-15	Initial version	Lei

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