E611-900NW20S Product Specifications

Star Networking SMD Type 915MHz Wireless Module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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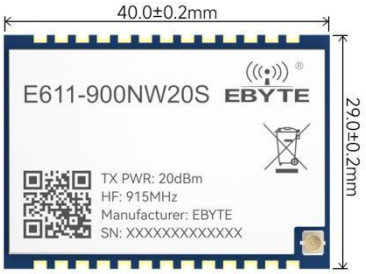
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1 Overview

1.1 Introduction



The E611-900NW20S module is a long-distance image transmission + data transmission module developed by Chengdu Ebyte Electronic Technology Co., Ltd. It has a transmission rate of 16Mbps , can transmit 4 channels of 1080p video , and can also transparently transmit the network port + serial port at the same time. It works in the 863MHz~928MHz frequency band, and the maximum RF transmission power is 20 dBm.

E611-900NW20S module uses universal AT commands, which is simple and fast to operate. The module can be widely used in smart wearables, home automation, home security, smart home appliances, wireless flight control, automobiles, industrial Internet, smart data acquisition, smart control and other fields.

1.2 Features

- Support star networking, with a maximum of 31 sub- nodes;
- maximum transmission rate can reach 16Mbps , which can realize the transmission of 4-channel 1080p video ;
- The module supports transparent transmission of network port + serial port at the same time ;
- Support image transmission + data transmission in one ;
- The master-slave mode switch is simple, and one-touch pairing is possible, making it easy to use;
- Ideally, the maximum transmission distance can reach 1km;
- Support relay networking function;
- Equipped with AT commands to facilitate module parameter settings ;
- The operating frequency band is: 863MHz~928MHz, and the default frequency band is 915MHz.

1.3 Application scenario

- Smart home and industrial sensors, etc.
- Smart Wear
- Home Security
- Smart Home Appliances
- Wireless flight control
- Wireless Sensing
- Intelligent Control

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2 Specifications

2.1 Basic parameters

Main parameters		Performance Description			Remark
		Minimum	Typical Value	Maximum	
Operating voltage (V)		5	5/12	15	Power supply can be selected 5V or 12V
Communication level (V)		-	3.3	-	Using 5V level may cause burnout
Operating temperature (℃)		- 40	-	85	Industrial-grade design
Operating frequency band (MHz)		863	-	928	-
Transmit power (dBm)		19.5	20	20.5	-
Power consumption	Emission current (mA)	-	500	-	Peak transient current @ 20 dBm
	Receive current (mA)	-	84	-	-
Receiving sensitivity (dBm)		-	- 107	-	1M MCS10
Communication distance (m)		-	500	1000	Clear and open environment, height 1 meter, @ 20 dBm, transmission rate 16 Mbps .

2.2 Hardware parameters

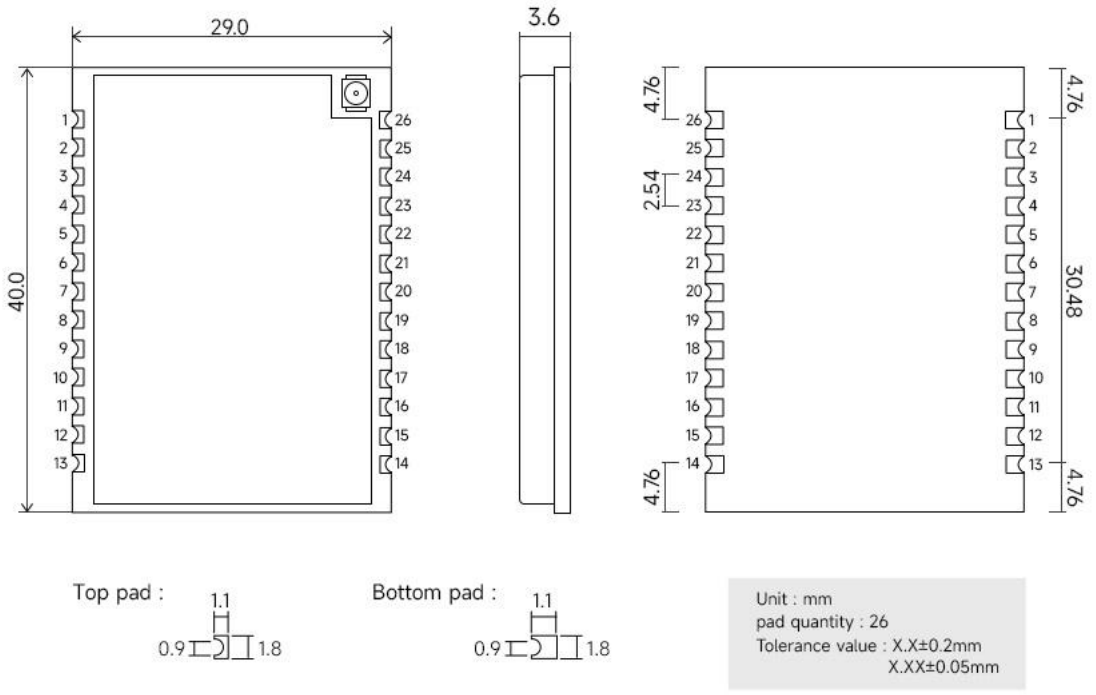
Main parameters	describe	Remark
Crystal frequency	32MHz	-
Communication interface	UART /PHY	Serial port parameters (non-modifiable): baud rate 115200, frame format 8N1
Packaging	SMD	-
FLASH	8MB	-
S RAM	704 KB	-
Dimensions (IPEX)	40 * 29 mm	Tolerance range ±0.2mm
Antenna interface	IPEX /Stamp Holes	Equivalent impedance is about 50Ω
Product Net Weight	6.1g	Tolerance range ±0.2g

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3 Mechanical Dimensions and Pin Definition

3.1 E611-900NW20S pin definition



Pin number	name	Function	Remark
1	GND	-	Module GND
2	DebugIO	I/0	RSSI signal strength indicator I/O, Low level effective
3	DebugCLK	I/0	RSSI signal strength indicator I/O, Low level effective
4	PA7	I/0	RSSI signal strength indicator I/O, Low level effective
5	PA6	I/0	Connection indication I/O, Low level effective
6	PA8	I/0	Mode selection control I/O，high level is master mode, low level is slave mode.
7	PA9	I/0	The module is pulled up internally and paired with control I/O. Users can refer to the schematic diagram recommended by the official website for design.
8	PB1	I/0	-
9	LED0	-	PHY Indicator
10	LED1	-	PHY Indicator
11	3V3	-	The internal 3.3V of the connection module is connected, and the user does not need to worry about it.

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12	GND	-	Module GND
13	VCC	-	Power input 5V ~ 12V
14	GND	-	Module GND
15	RX-	-	Receive Data -
16	RX+	-	Receive Data+
17	TX-	-	Transceiver Data-
18	TX+	-	Transceiver Data+
19	GND	-	Module GND
20	UART_RX	I/0	RXD is the receiving pin, TTL level
twenty one	UART_TX	I/0	TX is the transmit pin, TTL level
twenty two	GND	-	Module GND
twenty three	GND	-	Module GND
twenty four	GND	-	Module GND
25	GND	-	Module GND
26	ANT	-	Antenna interface, equivalent impedance is about 50Ω

Note: The RSSI model strength indicator is triggered sequentially in the following order: PA7→DebugCLK→DebugIO.

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4 Module Parameter Description

4.1 Role description

The module supports the following 4 working modes:

Serial number	Working Mode	Mode Details
1	Host mode ap	The central role of star networking
2	Slave mode sta	Slave Role
3	Multicast mode group	Multicast, see multicast command for details
4	Relay mode apsta	The device in relay mode acts as a slave to connect to the upper-level host, and also acts as a host to provide connection services to other slaves.

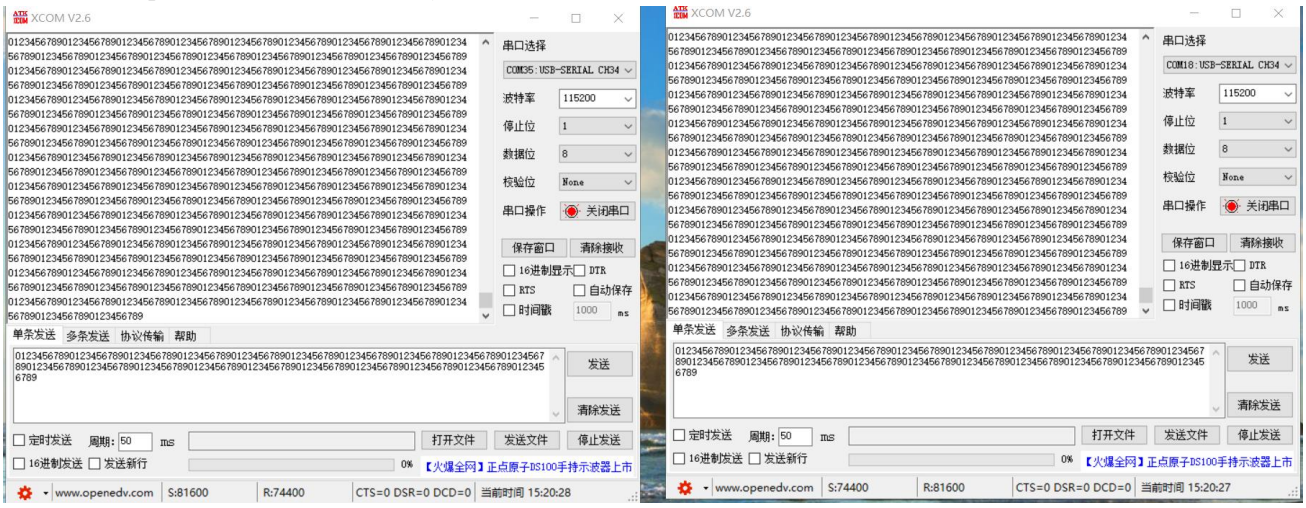
Note: Host mode ap and slave mode sta can be controlled by pin PA8. Please refer to the pin definition description for details.

5 Usage Examples

The following is a test demonstration using our baseboard

5.1 Module 1 to 1 connection serial port transparent transmission

1. Prepare two E611 modules and install the antennas
2. Type C connects to PC.
3. Press and hold the CON button on both modules at the same time, wait for 2 seconds and then release it. You can see that the connection indicator and RSSI signal indicator light are always on.
4. Open the XCOM serial port assistant and open the serial port accordingly (note the serial port parameters 115200 , 8N1)
5. The serial port can send data directly . As shown in the figure below :



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5.2 Module 1 to 1 connection as a bridge to connect two PCs

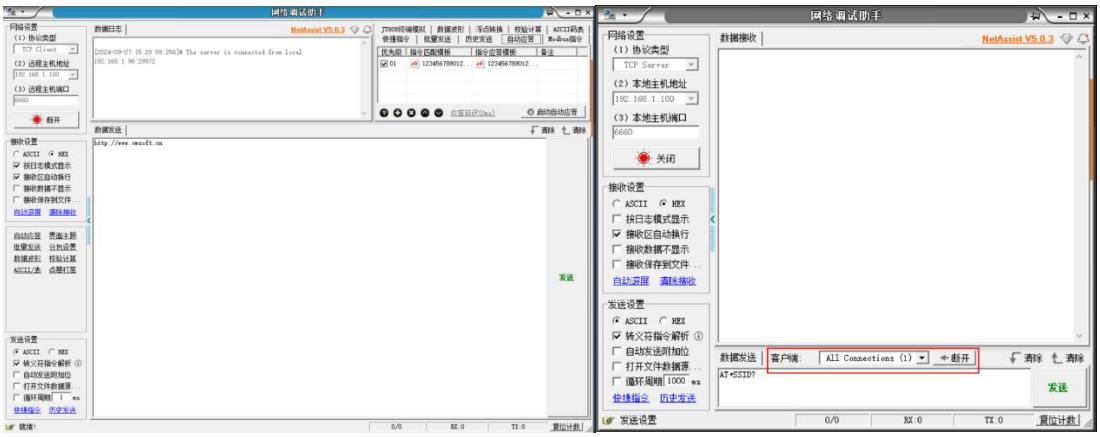
1. Prepare two E611 modules and install the antennas
2. Ethernet connection to PC
3. After the module is correctly connected and powered on, you can see that the phy0 indicator is always on and an unknown network appears in the computer network interface.



4. Manually modify the corresponding static IP addresses of the PCs on both sides. Note that the IP addresses of the devices on both sides need to be in the same network segment, and disable firewall and other software to avoid communication failure.
5. With the help of the network debugging assistant, start the TCP server on a PC, as shown in the figure below. Note that the IP address is the IP address of the modified Ethernet.



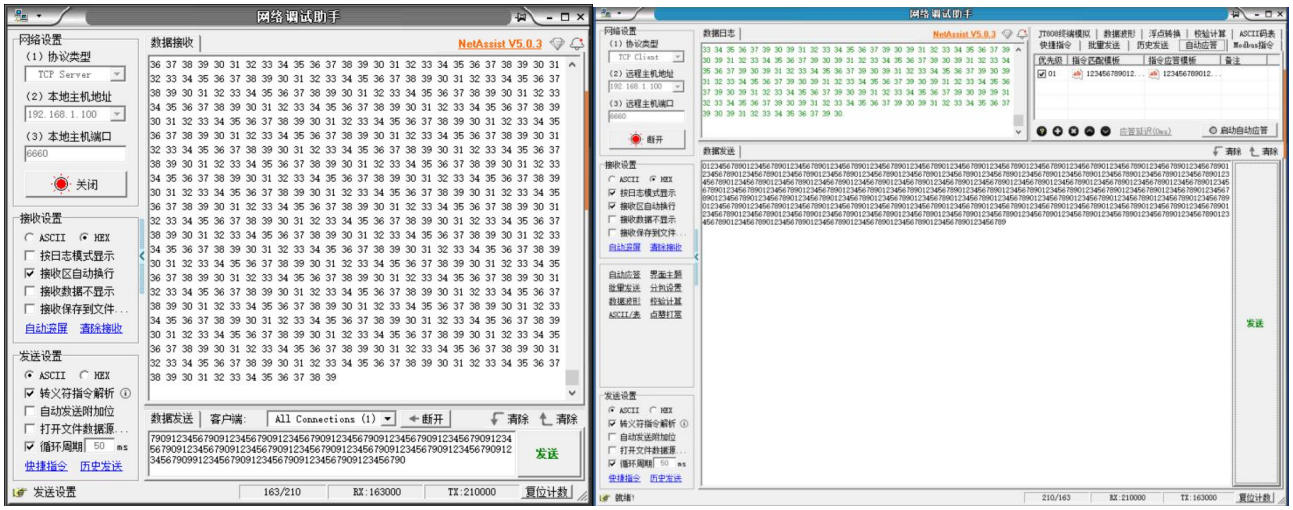
6. Connect another device to the corresponding IP port, and you can see that the connection is successful.



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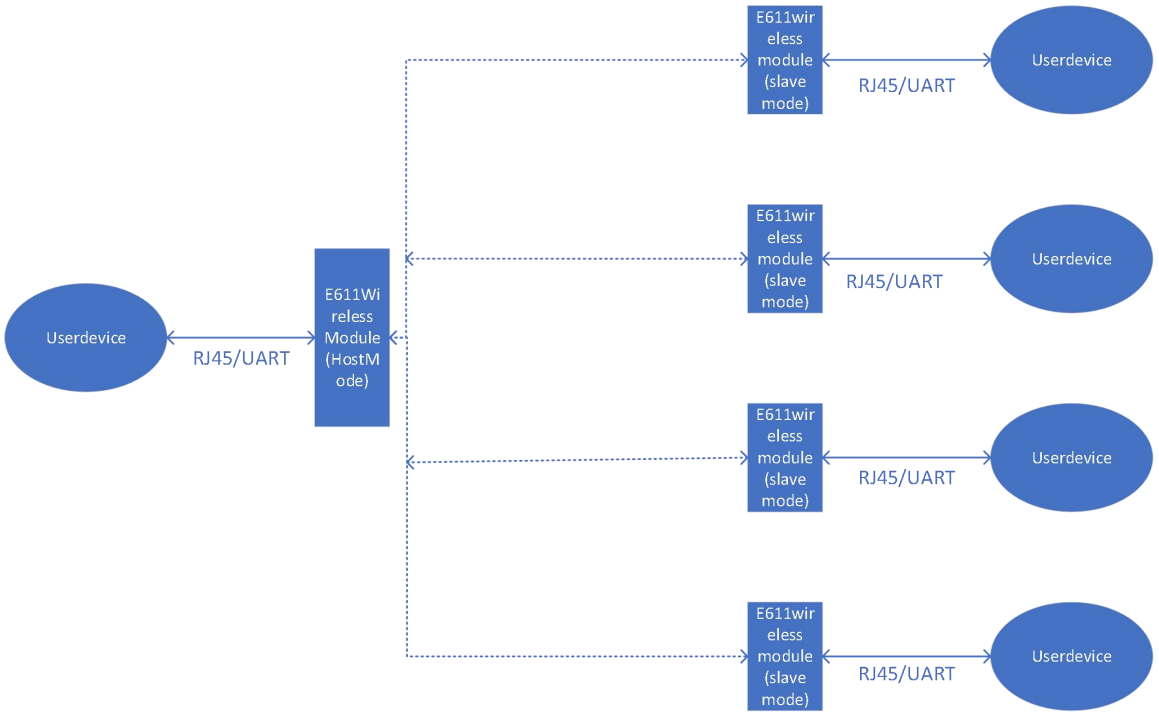
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7. Data test , 50ms packet interval, each packet is 1000 bytes. The following figure shows the data of both server and client



5.3 Module 1 to many star networking

The network topology is as follows :

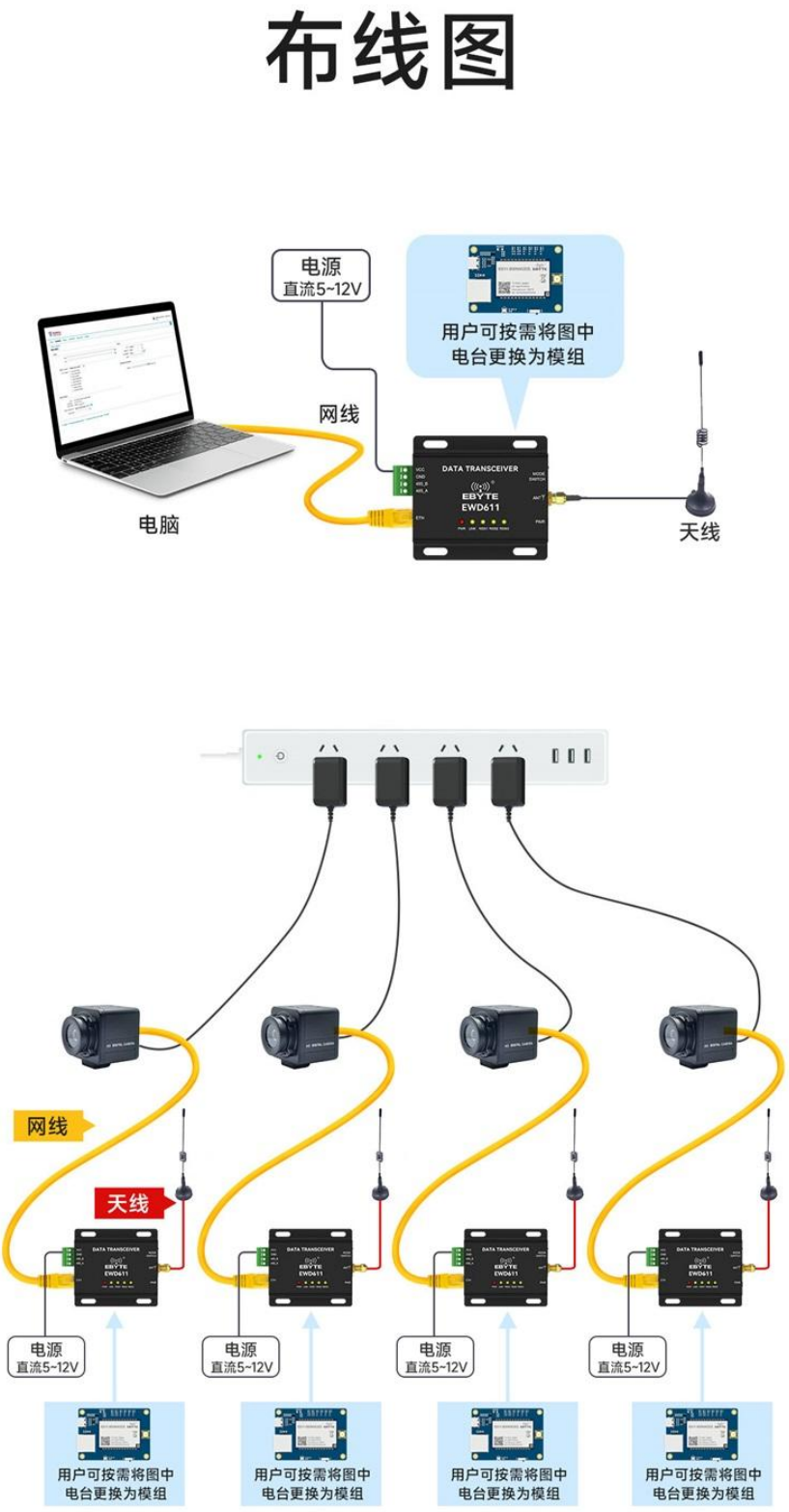


The actual networking type of this product is star networking, which consists of a host device and several slave nodes. A single host node can support 31 slave devices. For specific networking demonstration examples, please refer to the official website video.

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5.3.1 Reference wiring diagram



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5.4 AT command usage examples

5.4.1 Basic instructions for module connection establishment

Use the at command to initialize the E611 module, including frequency setting, bandwidth setting, ssid and password setting.
Host module configuration:
1) AT+CHAN_LIST=9080,9160,9240 to set 3 frequencies
2) AT+BSS_BW=8 sets the bandwidth to 8M
3) AT+SSID=hgic_ah_test Set SSID
4) AT+KEYMGMT=WPA-PSK to enable encryption
5) AT+PSK=baa58569a9edd7c3a55e446bc658ef76a7173d023d256786832474d737756a82 to set the encryption password
6) AT+MODE=ap sets the module to host mode
Slave module configuration:
Except AT+MODE=sta, the rest of the configuration is consistent with the host.

5.4.2 Configuring relay network instructions

Host module:
1) Configure the ssid of the AP. Each AP should have a different configuration. You can consider increasing it by ssid1 and ssid2. For example:
at+ssid=ssid1
2) Configure without encryption (To simplify the configuration, we will take the example of without encryption for the time being)
at+keymgmt=none

Relay module:
1) at+mode=apsta
2) Configure non-encrypted
at+keymgmt=none
3) Configure the relay's r_ssid , which is used to connect the relay to the host. It should be the same as the host you want to connect to. The ssid is consistent with that of the
at+r_ssid=ssid1
4) Configure the relay's ssid , which is used to connect the relay to the slave. For ease of management, you can consider the previous
The ssid is the same, with a suffix added to the end, such as ssid1_r1 , ssid1_r2 , ssid2_r1 , etc. For example : at+ssid=ssid1_r1
Slave module:
1） Configure the ssid of sta to connect the slave and the relay. It should be consistent with the ssid of the connected relay, for example: at+ssid=ssid1_r1
2) Configure no encryption at+keymgmt=none

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6 AT Commands

Note: Before sending operation instructions, first ensure that the module is in wake-up mode, otherwise it will not be able to receive configuration instructions!

6.1 Instruction description

Instruction Type	Instruction Format	describe
Query command	AT+[X]?	This command is used to query the parameters of the setting command.
Setting Instructions	AT+[X]=<…>	This command is used to set user-defined parameters.
Execute Instructions	AT+[X]	Used for instructions without parameters, such as module reset.

6.2 Use the network port to configure the module

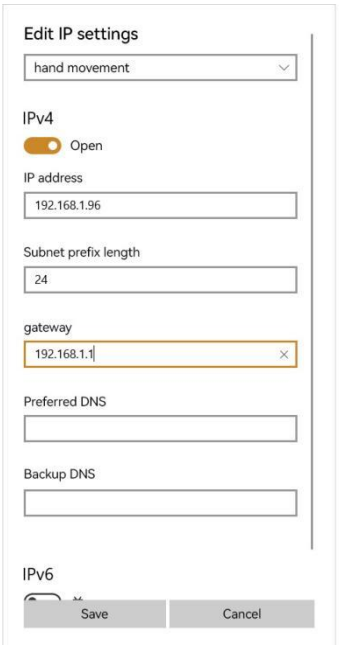
6.2.1 Module network cable connected to PC



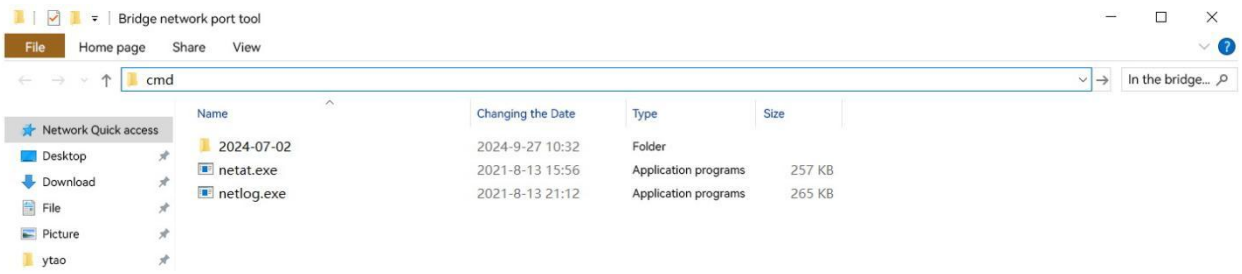
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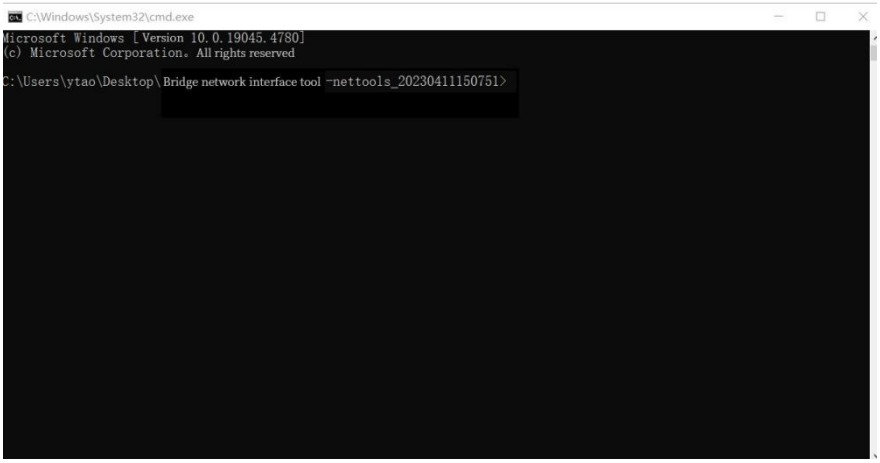
6.2.2 Manually modify the corresponding network IP to a static IP



6.2.3 Open the network port tool folder and enter cmd in the search bar



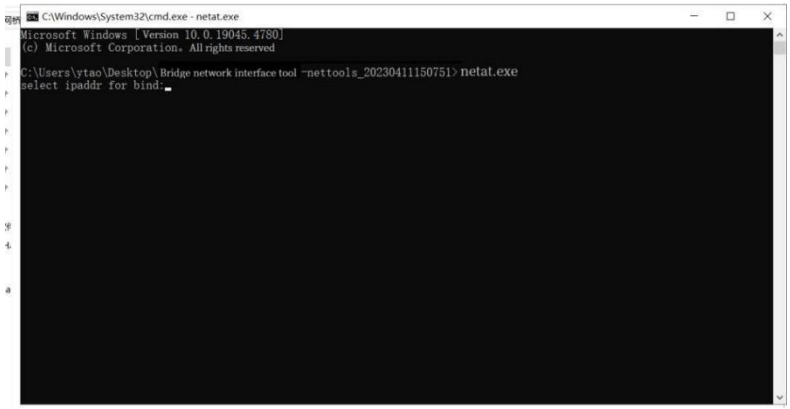
6.2.4 Press Enter to enter the command line interface



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6.2.5 Enter netat.exe and press Enter



6.2.6 Enter the IP address you just modified , and then you can send the corresponding command configuration normally.



6.3 Instruction table

6.3.1 Working mode

instruction	**AT+MODE?**	**response**	**+MODE:<mode> OK**
describe	Read module working mode		
parameter	<mode>: ap/sta/group/apsta 4 modes		
instruction	**AT+MODE=<mode>**	response	**Success: OK Failed: ERROR**
describe	Configurate module working mode		
parameter	<MODE>: ap/sta/group/apsta 4 modes		
Example	AT+MODE=AP sets the module to work in AP mode		
Explain	AT+MODE=<mode>The command only saves power-off settings for AT+MODE=APSTA.		

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6.3.2 Setting SSID

instruction	**AT+SSID?**	**response**	**+SSID:<ssid>** **OK**
describe	Read the SSID of the module in host mode		
parameter	<ssid>: ssid name of the host		
instruction	**AT+SSID=<ssid>**	response	**Success: OK** **Failed: ERROR**
describe	Set the SSID name in the module host mode		
parameter	<ssid>: character type, length is less than 32 characters		
Example	AT+SSID=ebyte_test		

6.3.3 Setting the encryption method

instruction	**AT+KEYMGMT?**	**response**	**+KEYMGMT:<enc>** **OK**
describe	Read module encryption mode		
parameter	<enc>:WPA-PSK to enable encryption/NONE to disable encryption		
instruction	**AT+KEYMGMT=<enc>**	response	**Success: OK** **Failed: ERROR**
describe	Set module encryption mode		
parameter	<MODE>: WPA-PSK turns on encryption/NONE turns off encryption		
Example	AT+KEYMGMT=WPA-PSK		

6.3.4 Setting the encryption password

instruction	**AT+PSK?**	**response**	**+PSK:<psk>** **OK**
describe	Read module encryption password		
parameter	<psk>: 64 hex characters		
instruction	**AT+PSK=<psk>**	response	**Success: OK** **Failed: ERROR**
describe	Set module encryption password		
parameter	<MODE>: 64 hex characters		
Example	AT+PSK =baa58569a9edd7c3a55e446bc6 58ef76a7173d023d256786832474d7377 56a82		

6.3.5 Pairing Control

instruction	**AT+PAIR=<pair>**	**response**	**OK**

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describe	When the SSID is not set, the command can realize fast pairing and networking. When starting pairing: 1. The AP is configured with SSID and password, but the STA is not configured: During the pairing process, the STA will obtain The SSID and password of the AP. 2. Neither the AP nor the STA is configured with an SSID and password: During the pairing process, the AP will Generate a random password. After pairing is successful, a PAIR SUCCESS message will be generated, but pairing will not be automatically terminated. Run AT+PAIR=0 to stop pairing. The connection will be automatically established after pairing stops. If both AP and STA have set SSID and other parameters, there is no need to start PAIR. Parameters are automatically connected.
parameter	<psk>:0/1
Example	AT+PAIR=1 // Start pairing AT+PAIR=0 // Stop pairing

6.3.6 Setting BSS bandwidth

instruction	**AT+BSS_BW?**	**response**	**+BSS_BW:<bw> OK**
describe	Read module bss bandwidth		
parameter	<bw>: 1:1MHz 2:2MHz 4:4MHz 8:8MHz		
instruction	**AT+BSS_BW=<bw>**	response	**Success: OK Failed: ERROR**
describe	Set module bss bandwidth		
parameter	<bw>: 1:1MHz 2:2MHz 4:4MHz 8:8MHz		
Example	AT+BSS_BW=4 Set the bandwidth to 4MHz		

6.3.7 Setting the operating frequency range

instruction	**AT+ FREQ_RANGE ?**	**response**	**+ FREQ_RANGE:<start>-<end> OK**
describe	Read the working frequency range		
parameter	<start>: starting frequency		

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	<end>: End frequency		
instruction	**AT+FREQ_RANGE=<start>,<end>**	response	**Success: OK** **Failed: ERROR**
describe	Set the operating frequency range		
parameter	1. This command is used to set the frequency range for continuous use, specify the starting center frequency and the ending center frequency, and the AH module will automatically calculate the frequency list. 2. start and end are the center frequency *10.		
Example	AT + FREQ_RANGE = 9080,9240 set up start freq=908MHz end freq=924MHz The generated channel list is 908M. 916M,924M Note that if AT+CHAN_LIST is set at the same time, The parameters set in CHAN_LIST take precedence.		

6.3.8 Set the working frequency list

instruction	**AT+CHAN_LIST?**	**response**	**+AT+CHAN_LIST:<freq1>,<freq2>, … <freq16>** **OK**
describe	Read the operating frequency		
parameter	1. The specified frequency value is the center frequency *10. 2. Supports up to 16 frequency points, separated by commas		
instruction	**AT+CHAN_LIST=<freq1>,<freq2>, … ,<freq16>**	response	**Success: OK** **Failed: ERROR**
describe	Set the operating frequency		
parameter	1. This command is used to set a non-continuous frequency list. 2. The specified frequency value is the center frequency *10 . 3. 16 frequency points are supported , separated by commas.		
Example	AT + CHAN_LIST =9080,9240 sets 2 frequencies: 908MHz, 924MHz		

6.3.9 Check the device signal quality

instruction	**AT+RSSI?**	**response**	**+RSSI:<rssi>** **OK**
describe	Query the device rssi value		
parameter	AT+RSSI=index/mac_addr index: specifies the device index to be queried, starting from 1. mac_addr: specifies the mac address of the device to be queried.		
Example	AT+RSSI // If no parameters are specified, query the RSSI of the first device AT+RSSI=1 // Specify the RSSI of the first device to query		

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	AT+RSSI=f4:de:09:68:6c:20 // Specify RSSI query based on MAC address

6.3.10 Check the connection status

instruction	AT+CONN_STATE	response	+CONNECTED //Connected +DISCONNECT //Not connected
describe	View connection status		
parameter			
Example	AT+CONN_STATE		

6.3.11 View device parameter information

instruction	AT+WNBCFG	response	
describe	View device parameter information		
parameter			
Example	AT+WNBCFG		

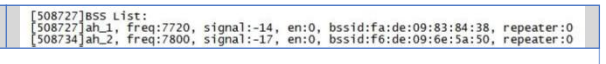
6.3.12 View sta information

instruction	AT+STA_INFO=<id>	response	
describe	View the sta information of the corresponding id		
parameter			
Example	View the LMAC statistics of the STA with the corresponding ID, including RSSI, EVM and other information; AP can use this command, but STA does not need this command; ID is the serial number of STA, starting from 1; When using this command, you can first turn off the default LMAC printing: AT+SYSDBG=LMAC		

6.3.13 Scan surrounding AP information

instruction	AT+SCAN_AP=2	response	OK
describe	Scan surrounding AP information		
parameter			
Example	Execute this command in STA mode to scan surrounding AP information. After scanning, use the following BSSLIST command to query the results .		

6.3.14 Get the scanned AP list

instruction	AT+BSSLIST=2	response	
describe	Get surrounding AP information		

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parameter	
Example	After executing the scan_ap command, you can use this command to get the scanned AP list (the AP must have SSID set to be scanned)

6.3.15 Setting the maximum transmit power

instruction	**AT+TXPOWER?**	**response**	**+TXPOWER:<pwr>dbm** **OK**
describe	Query the maximum transmit power		
parameter	<pwr>: Maximum transmit power		
instruction	**AT+TXPOWER=<pwr>**	response	**Success: OK** **Failed: ERROR**
describe	Set the maximum transmit power		
parameter	<pwr>: Maximum transmit power, range 6~20		
Example	AT+TXPOWER=20		

6.3.16 Setting the ACK TIMEOUT

instruction	**AT+ACKTMO?**	**response**	**+ACKTMO:<time>** **OK**
describe	Query the ACK timeout time of the WiFi protocol		
parameter	<time>: timeout period		
instruction	**AT+ACKTMO=<time>**	response	**Success: OK** **Failed: ERROR**
describe	Set the ACK timeout time of the WiFi protocol		
parameter	<time>: timeout period Set to increase the AH module WiFi protocol parameter acktimeout value, in microseconds, the default is 0 . This parameter needs to be set only when the communication distance exceeds 1km . The calculation formula is 10* (distance in kilometers - 1), for example, if the distance is 2km, set acktmo=10. Modified value is saved after power off;		
Example	AT+ACKTMO=100 increases the ACK packet timeout by 100us		

6.3.17 Setting tx mcs

instruction	**AT+TX_MCS?**	**response**	**+TX_MCS:<mcs>** **OK**
describe	Query module mcs value		
parameter	<mcs>: mcs index value		
instruction	**AT+TX_MCS=<mcs>**	response	**Success: OK** **Failed: ERROR**
describe	Set the module mcs index value		

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parameter	Set tx mcs , the range is 0~7 or 10 in 1M mode means fixed to a certain mcs , other values mean mcs automatically adjusted; this command will be saved when power is off;
Example	AT+TX_MCS=2

6.3.18 Setting the heartbeat packet interval

instruction	**AT+HEART_INT?**	**response**	**+HEART_INT:<time> OK**
describe	Query the heartbeat packet interval		
parameter	<time>: heartbeat packet interval, in ms		
instruction	**AT+HEART_INT=<time>**	response	**Success: OK Failed: ERROR**
describe	Set the heartbeat packet interval		
parameter	Set the heartbeat packet interval in mS , with a minimum setting of 500. The more STAs there are, the longer the heartbeat packet interval is recommended to be. The appropriate length of the heartbeat packet is STA_count*500. Earlier software versions require the AP and STA to be set to the same heartbeat packet interval, otherwise there will be connection problems. This command will be saved when the power is turned off. Starting from V1.6.2 , you only need to set the AP 's heartbeat packet interval, and the AP will automatically synchronize it to the STA . This command is invalid for STA .		
Example	AT+HEART_INT=2000 Set the heartbeat packet interval to 2s		

6.3.19 Set to unpair the specified STA

instruction	**AT+UNPAIR ?**	**response**	**No response**
describe			
parameter			
instruction	**AT+UNPAIR=<mac_addr>**	response	**Success: unpair sta:mac_addr Failed: sta:mac_addr is not exist**
describe	Set to unpair the specified STA		
parameter	<mac_addr>: The other party's mac address		
Example	at+unpair=f6:de:09:75:a3:61		

6.3.20 Restore factory settings

instruction	**AT+LOADDEF=1**	**response**	
describe	Restore factory settings		
parameter			
Example	AT+LOADDEF=1		

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6.3.21 Setting Print Information

instruction	AT+SYSDBG=<type>,<vale>	response	Success: OK
describe	Set to print debug information		
parameter	<type>: LMAC/WNB <vale>: 0 closed/1 open LMAC statistics are turned on by default, and there are a lot of them. You can turn them off if necessary; WNB statistics are not turned on by default.		
Example	AT+SYSDBG=LMAC,0 Turn off printing of LMAC		

6.3.22 Setting the serial port baud rate

instruction	AT+BAUDRATE? (Not supported temporarily)	response	<value>
describe	Query the baud rate of the serial port		
parameter	<value> : baud rate value		
instruction	AT+BAUDRATE=<value> (Not supported temporarily)	response	Success: OK
describe	Set the serial port baud rate		
parameter	<value>: serial port baud rate range 9600-400k		
Example	AT+BAUDRATE=115200		
Explain	This product does not support port rate modification. The port rate is fixed at 115200, Frame format 8N1		

6.3.23 Joining a multicast network

instruction	AT+JOINGROUP=<group_addr>,<aid>	response	Success: OK Failed: ERROR
describe	Set the module to join multicast . After setting the working mode of the WiFi module to group , you can use this command to set the WiFi module to join a multicast network. After joining the multicast network, the WiFi module will only receive data in the multicast network. All data communications are communicated using the multicast address. If the working mode is set to group but the multicast network is not joined, all data communications are sent and received in the form of broadcast. Note that the JOINGROUP command can only be set after the GROUP mode is set .		
parameter	AT+JOINGROUP=group_addr,AIDgroup_addr: The address of the multicast network to be joined . AID : The AID of the device in the multicast network . AID valid values: 1~N (N is the maximum number of STAs supported by the firmware). The AID of each device in the network should be unique. Set effective AID : The WiFi module will periodically send heartbeats in the multicast network to announce its existence to other WiFi modules. Set invalid AID : The WiFi module will not send heartbeats and will not notify other WiFi modules. If all devices set AID to 0 , the maximum STA may not be supported by the firmware .		

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Example	AT+JOINGROUP=11:22:33:44:55:66,3 Join multicast address:11:22:33:44:55:66 AID is set to 3

6.3.24 Setting the intermediate ssid

instruction	**AT+R_SSID?**	**response**	**+R_SSID:<repeater_ssid> OK**
describe	Query the ssid of the AP connected to the upper level in relay mode		
parameter	<value> : ssid of the upper level AP		
instruction	**AT+R_SSID=<repeater_ssid>**	response	**Success: OK Failed: ERROR**
describe	Set the SSID of the intermediate connection to the upper level AP		
parameter	<repeater_ssid>:ssid		
Example	AT+R_SSID=ebyte_test		

6.3.25 Set the encryption password for the relay

instruction	**AT+R_PSK?**	**response**	**+R_PSK:<psk> OK**
describe	Query the encryption password of the AP connected to the upper level in relay mode		
parameter	<psk>: encryption password of the previous AP		
instruction	**AT+R_PSK=<psk>**	response	**Success: OK Failed: ERROR**
describe	Set the psk of the intermediate connection to the upper level ap		
parameter	<psk>: Encryption password, must be 64 hex characters		
Example	AT+R_PSK= baa58569a9edd7c3a55e446bc658ef76a7173d023d256786832474d737756a82		

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7 Hardware Design

- It is recommended to use a DC regulated power supply to power the module. The power supply ripple coefficient should be as small as possible and the module should be reliably grounded.
- Please pay attention to the correct connection of the positive and negative poles of the power supply. Reverse connection may cause permanent damage to the module.
- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged.
- Please check the stability of the power supply. The voltage should not fluctuate greatly or frequently.
- When designing the power supply circuit for the module, it is often recommended to retain more than 30% margin, which is conducive to long-term stable operation of the whole machine;
- The module should be kept as far away as possible from power supplies, transformers, high-frequency wiring and other parts with large electromagnetic interference;
- High-frequency digital routing, high-frequency analog routing, and power routing must avoid the bottom of the module. If it is necessary to pass under the module, assuming that the module is soldered on the Top Layer, ground copper should be laid on the Top Layer of the module contact part (all copper should be laid and well grounded), and it must be close to the digital part of the module and routed on the Bottom Layer ;
- Assuming the module is soldered or placed on the Top Layer, it is also wrong to randomly route the wires on the Bottom Layer or other layers, which will affect the module's spurious signal and receiving sensitivity to varying degrees ;
- If there are devices with large electromagnetic interference around the module, it will also greatly affect the performance of the module. It is recommended to keep them away from the module according to the intensity of the interference. If possible, appropriate isolation and shielding can be performed.
- If there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power traces), it will also greatly affect the performance of the module. It is recommended to keep them away from the module according to the intensity of the interference. If possible, appropriate isolation and shielding can be performed.
- Try to stay away from some TTL protocols whose physical layer is also 2.4GHz, such as USB3.0;
- The antenna installation structure has a great impact on the performance of the module. Make sure the antenna is exposed and preferably vertically upward. When the module is installed inside the housing, use a high-quality antenna extension cable to extend the antenna to the outside of the housing;
- The antenna must not be installed inside a metal shell, as this will greatly reduce the transmission distance.

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8 Firmware Update

- How firmware versions are distinguished on the product:

The E611-900NW20S module comes in two firmware versions: one supporting up to 8 sub-nodes and another supporting up to 31 sub-nodes. Users can distinguish between them based on the production batch number in the module's SN code. Modules with a production batch number greater than 5204574 run the firmware version supporting up to 31 sub-nodes; conversely, those with a production batch number less than 5204574 run the firmware version supporting up to 8 sub-nodes.

SN Code Explanation: S5204574S00001, where 5204574 is the production batch number and 00001 is the serial number.



Example:

1. If a user's module production batch is 5204575 > 5204574, the module with production batch 5204575 supports up to 31 sub-node firmware versions;

2. If the user's module production batch is 5204573 ≤ 5204574, the module with production batch 5204573 supports a maximum of 8 sub-node firmware versions.

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9 Frequently Asked Questions

9.1 The transmission distance is not ideal

- When there is a straight-line communication obstacle, the communication distance will be attenuated accordingly ;
- Temperature, humidity, and co-channel interference can increase the communication packet loss rate ;
- The ground absorbs and reflects radio waves, so the test results are poor when close to the ground ;
- Seawater has a strong ability to absorb radio waves, so the test effect at the seaside is poor ;
- If there are metal objects near the antenna, or the antenna is placed in a metal shell, the signal attenuation will be very serious ;
- The power register is set incorrectly, or the air rate is set too high (the higher the air rate, the closer the distance) ;
- The power supply voltage at room temperature is lower than the recommended value. The lower the voltage, the lower the power output .
- The antenna used does not match the module well or the antenna itself has quality issues.

9.2 Modules are vulnerable to damage

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, the module will be permanently damaged .
- Please check the stability of the power supply. The voltage should not fluctuate greatly or frequently .
- Please ensure anti-static operation during installation and use, as high-frequency components are sensitive to static electricity ;
- Please ensure that the humidity is not too high during installation and use, as some components are humidity sensitive devices ;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

9.3 The bit error rate is too high

- There is interference from the same frequency signal nearby. Stay away from the interference source or change the frequency or channel to avoid interference.
- An unsatisfactory power supply may also cause garbled characters, so the reliability of the power supply must be ensured;
- Extension cables or feeder cables that are of poor quality or are too long can also cause a high bit error rate.

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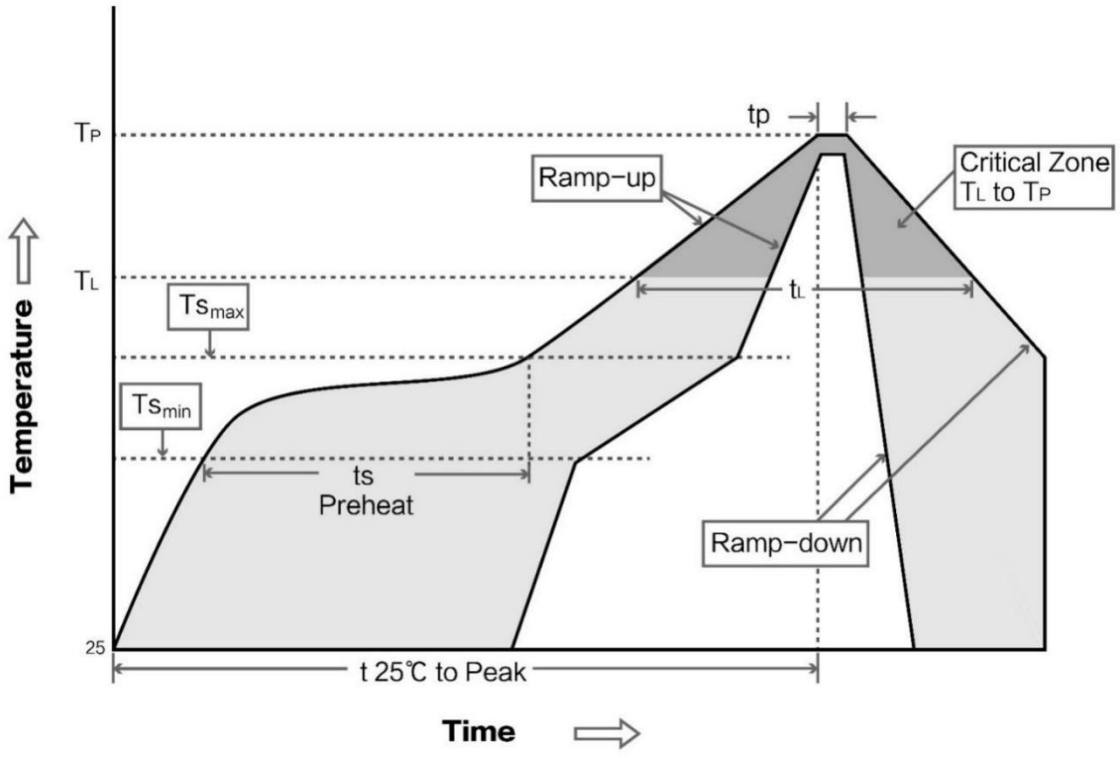
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10 Welding Operation Instructions

10.1 Reflow 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)	Warm-up time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average ascent rate	3 ℃ /second max	3 ℃ /second max
Liquid Temperature (TL)	Liquidus temperature	183 ℃	217 ℃
Time(tL)Maintained Above(TL)	Time above liquidus	60-90 sec	30-90 sec
Peak temperature (Tp)	Peak temperature	220-235 ℃	230-250 ℃
Aveage ramp-down rate（Tp to Tsmax）	Average descent rate	6 ℃ /second max	6 ℃ /second max
Time 25 ℃ to peak temperature	Time from 25 ℃ to peak temperature	6 minutes max	8 minutes max

10.2 Reflow Oven Curve



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11 Related Models

Product Model	Carrier frequency Hz	Transmit power dBm	Test distance (km)	Air speed bps	Packaging	Product dimensions (mm)	Antenna type
E70-433NW14S	433M	14	2.5	2.5k ~ 168k	SMD	16 * 26	IPEX/Stamp Hole
E70-433NW30S	433M	30	6.5	2.5k ~ 168k	SMD	24 * 38.5	IPEX/Stamp Hole

Important Notice

- EBYTE reserves the right to make final interpretations and modifications to all content in this manual.
- Due to ongoing improvements in the product's hardware and software, this manual is subject to change without prior notice; the latest version of the manual shall prevail.
- Users of this product are advised to visit the official website to stay updated on product developments and receive the latest information in a timely manner.

Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2024-9-23	Initial release	Hao
1.1	2025-1-3	Pin definition changes	Hao
1.2	2025-4-18	New wiring diagram	Hao
1.3	2025-8-6	Content modified	Hao
1.4	2025-12-3	Content modified	Hao
1.5	2026-1-20	Content modified	Lan
1.6	2026-3-9	Modified the description of the serial port instructions	Ning
1.7	2026-4-22	Content modified and addition of Chapter 8: Firmware Upgrade and Important Notes	Lan
1.8	2026-5-28	Pin definition signal ground corrected to module GND	Lan
1.9	2026-6-18	Modified the description of the configuration mode instructions	Lan
2.0	2026-7-1	Correct the mechanical dimensions and pin definition descriptions	Lan
2.1	2026-10-8	Modify the pin definition descriptions	Lan

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