

Ai-WB2-M1 Specification

Version V1.0.1

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Document resume

Version	Date	Develop/revise content	Edition	Approve
V1.0.0	2022.9.1	First Edition	NanNan Yuan	Ning Guan
V1.0.1	2022.10.31	Add RF OTA parameters	NanNan Yuan	Ning Guan

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1. Product overview

Ai-WB2-M1 is a Wi-Fi&BT module developed by Shenzhen Ai-Thinker Technology Co., LTD. The module is equipped with BL602 chip as the core processor and supports Wi-Fi 802.11b/g/n protocol and BLE 5.0 protocol. The BL602 chip has a low-power 32-bit RISC CPU, 276KB RAM, and a wealth of peripheral interfaces, including SDIO, SPI, UART, I2C, IR Remote, PWM, ADC, DAC, PIR and GPIO etc. It can be widely used in Internet of Things (IoT), mobile devices, wearable electronic devices, smart home and other fields.

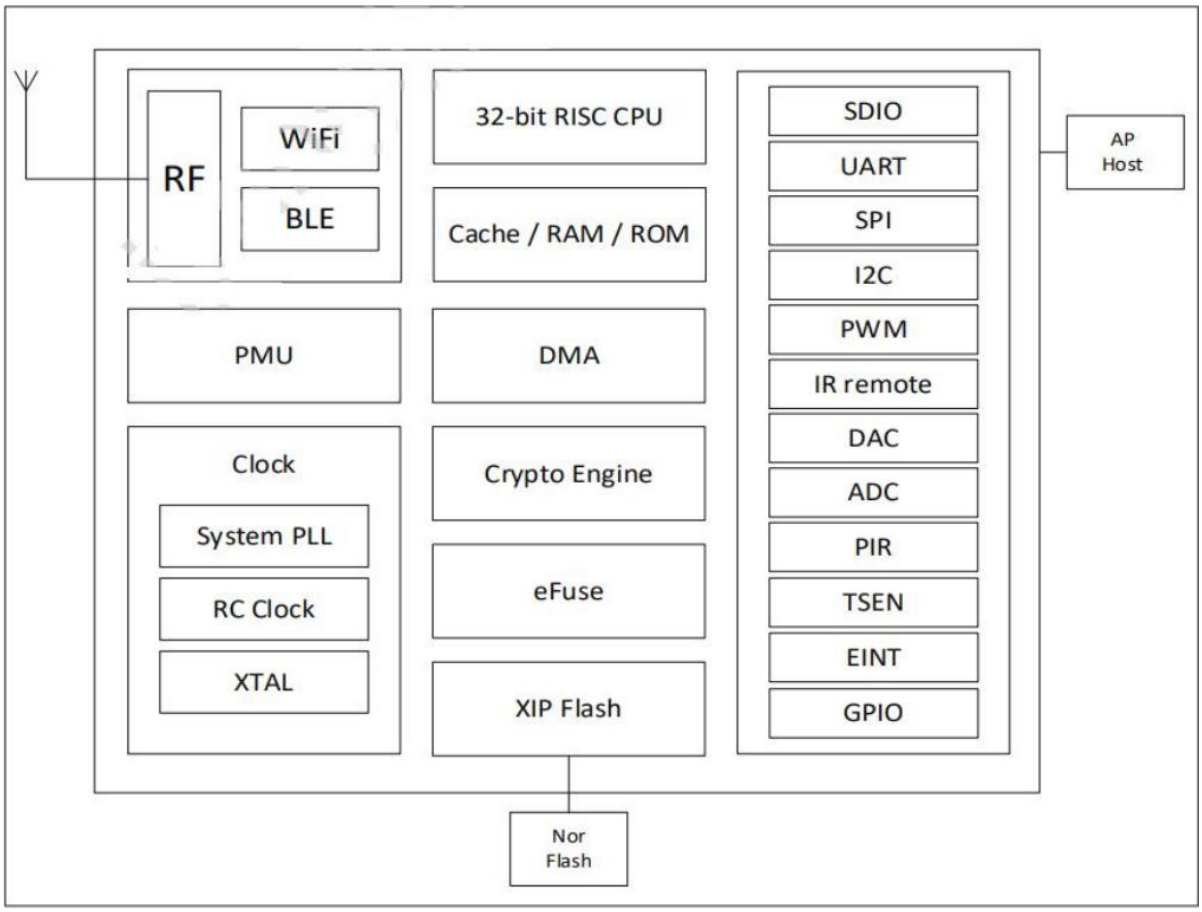


Figure 1 Main chip block diagram

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1.1. Characteristic

- The package is SMD-61
- Support IEEE 802.11 b/g/n protocol
- Wi-Fi Security Support WPS/WEP/WPA/WPA2 Personal/WPA2 Enterprise/WPA3
- Support 20MHz bandwidth and Max rate is 72.2 Mbps
- Bluetooth BLE 5.0, Bluetooth Mesh
- Support Station + BLE mode、Station + SoftAP + BLE mode
- Support 32-bit RISC CPU，276KB RAM
- Secure start-up, supports mirroring with ECC-256 signature
- Support QSPI/SPI Flash On-The-Fly AES Decryption, support AES 128 CTR mode
- Support AES 128/192/256-bit encryption engine
- Support SHA-1/224/256
- Support true Random number generator (TRNG)
- Public key Accelerator (PKA), support large number basic operations, software provides signature, verification and other application program interface
- Support SDIO，SPI，UART，I2C，IR remote，PWM，ADC，DAC，PIR，GPIO etc
- Integrated Wi-Fi MAC/BB/RF/PA/LNA/BT
- Support a variety of sleep modes, deep sleep current 12μA
- Universal AT instruction for quick start
- Support secondary development, integrated Windows, Linux development environment

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2. Main parameters

Table 1 Description of the main parameters

Model	Ai-WB2-M1
Package	SMD-61
Size	16.6*13.2*2.4(±0.2)mm
Antenna	On-board PCB antenna
Frequency	2400~2483.5MHz
Operating temperature	-40℃~85℃
Storage temperature	-40℃~125℃,<90%RH
Power supply	Support voltage 2.7V~3.6V， supply current≥500mA
Interface	UART/GPIO/ADC/PWM/I2C/SPI
IO	15
UART rate	Default 115200 bps
Security	WPS/WEP/WPA/WPA2 Personal/WPA2 Enterprise/WPA3
Flash	Default 4MByte

2.1. Static electricity requirement

Ai-WB2-M1 is an electrostatic sensitive device. Therefore, you need to take special precautions when carrying it.



Figure 2 ESD preventive measures

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2.2. Electrical characteristics

Table 2 Electrical characteristics table

Parameters		Conditio	Min.	Typical value	Max.	Unit
Voltage Supply		VDD	2.7	3.3	3.6	V
I/O	VIL	-	-	-	0.3*VDDIO	V
	VIH	-	0.7*VDDIO	-	-	V
	VOL	-	-	0.1*VDDIO	-	V
	VOH	-	-	0.9*VDDIO	-	V
	IMAX	-	-	-	15	mA

2.3. Wi-Fi RF Performance

Table 3 Wi-Fi RF performance table

Description	Typical value			Unit
Frequency range	2400 ~ 2483.5MHz			MHz
Output Power				
Mode	**Min.**	**Typical value**	**Max.**	**Unit**
11n Mode HT20，PA output power	-	16	-	dBm
11g Mode, PA output power	-	17	-	dBm
11b Mode, PA output power	-	19	-	dBm
Receive Sensitivity				
Mode	**Min.**	**Typical value**	**Max.**	**Unit**
11b，1 Mbps	-	-98	-	dBm
11b, 11 Mbps	-	-90	-	dBm
11g, 6 Mbps	-	-93	-	dBm
11g, 54 Mbps	-	-76	-	dBm
11n，HT20 (MCS7)	-	-73	-	dBm

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2.4. BLE RF Performance

Table 4 BLE RF performance table

Description	Typical value			Unit
Frequency range	2400 ~ 2483.5MHz			MHz
Output Power				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps	-	9	15	dBm
Receive Sensitivity				
Rate Mode	**Min.**	**Typical value**	**Max.**	**Unit**
1Mbps sensitivity@30.8%PER	-	-96	-	dBm

2.5. Power

The following power consumption data are based on a 3.3V power supply, 25°C ambient temperature, and measured using an internal voltage regulator.

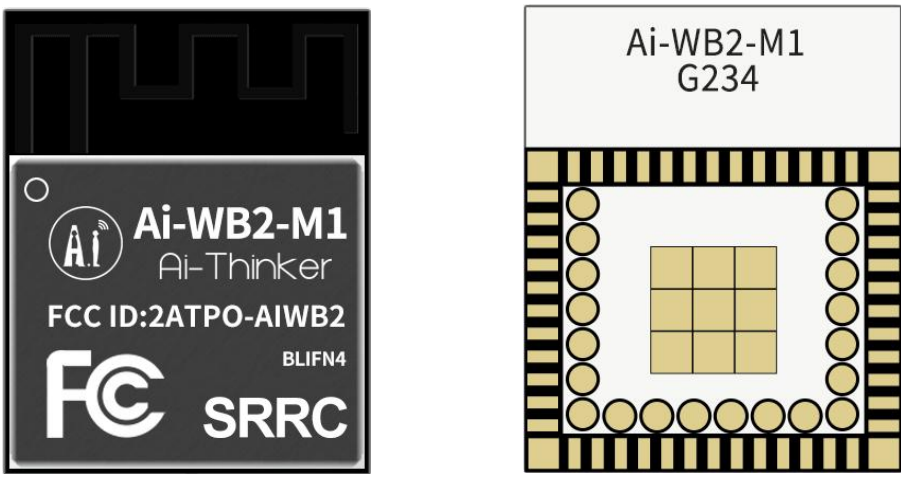
- All measurements are made at the antenna interface with a filter.
- All transmission data are based on 100% duty cycle in continuous transmission mode.

Table 5 Power consumption table

Mode	Min.	AVG	Max.	Unit
Tx 802.11b，11Mbps，POUT=+21dBm	-	260	-	mA
Tx 802.11g，54Mbps，POUT =+18dBm	-	245	-	mA
Tx 802.11n，MCS7，POUT =+17dBm	-	230	-	mA
Rx 802.11b,packet length 1024 byte	-	65	-	mA
Rx 802.11g,packet length 1024 byte	-	65	-	mA
Rx 802.11n,Packet length 1024 byte	-	65	-	mA
Deep-Sleep	-	12	-	μA

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3. Appearance dimensions



Front Back

Figure 3 Appearance diagram (Rendering figure is for reference only,subject to physical objects)

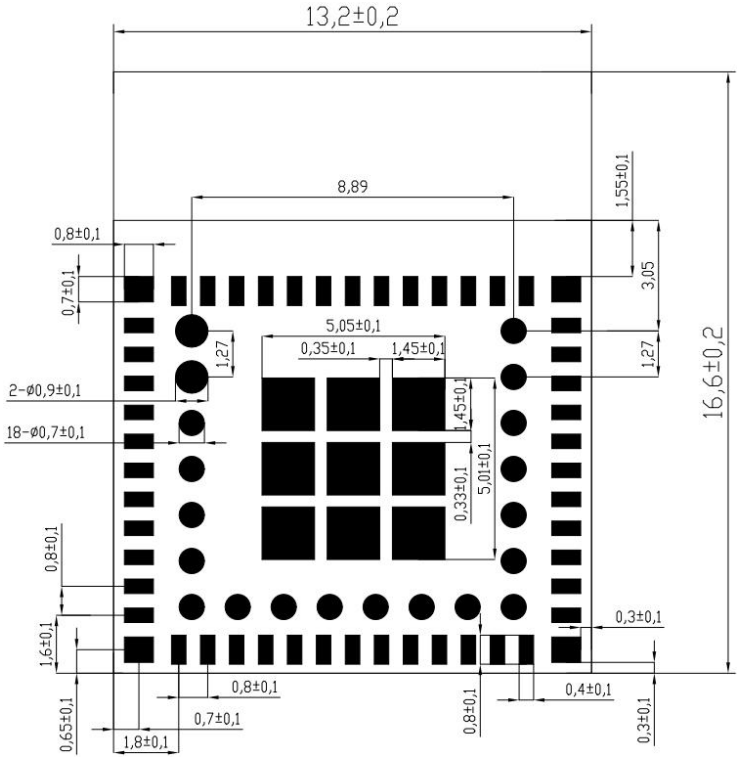


Figure 4 Dimension diagram

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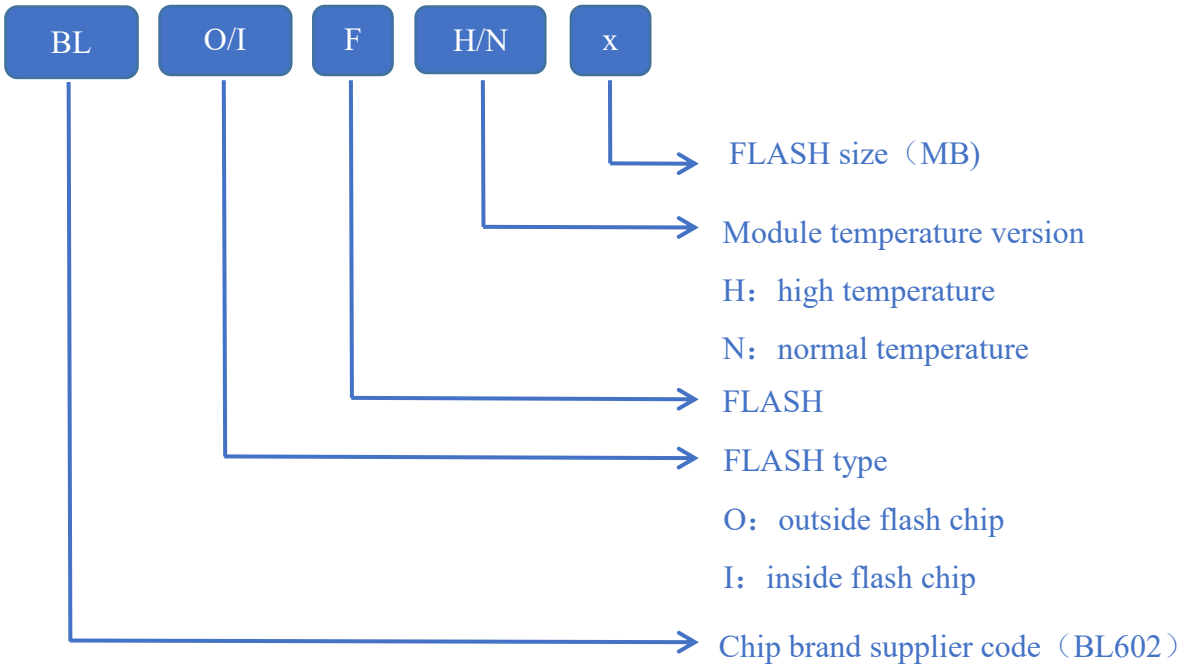


Figure 5 Shield printing information

4. Pin definition

Ai-WB2-M1 module is connected with a total of 61 pins, as shown in the pin schematic diagram, pin function definition table is the interface definition.

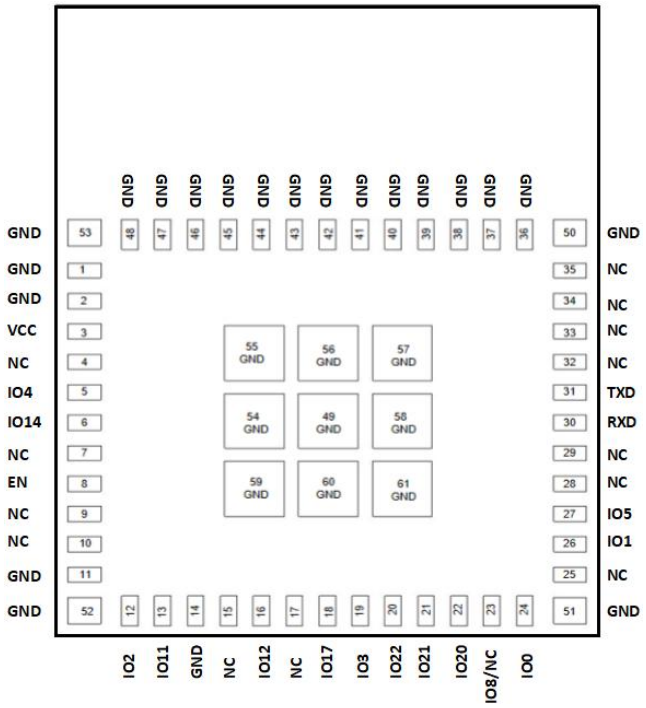


Figure 6 Schematic diagram of module pins

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Table 6 pin function definition table

No.	Name	Function
1,2,11,14, 36-61	GND	Ground
3	VCC	3.3V power supply; It is recommended that the output current of the external power supply be higher than 500mA
4,7,9,10,15 ,17,25,28, 29,32-35	NC	NC, not available to use
5	IO4	GPIO4/SPI_MOSI/MISO/IIC_SCL/PWM_CH4/ADC_CH4
6	IO14	GPIO14/SPI_SS/IIC_SCL/PWM_CH4/ADC_CH2
8	EN	Default chip enable pin, active-high, high level effective.
12	IO2	GPIO2/SPI_SS/IIC_SCL/PWM_CH2
13	IO11	GPIO11/SPI_SCLK/IIC_SDA/ADC_CH10
16	IO12	GPIO12/SPI_MOSI/MISO/IIC_SCL/PWM_CH2/ADC_CH0
18	IO17	GPIO17/SPI_MOSI/MISO/IIC_SDA/PWM_CH2
19	IO3	GPIO3/SPI_SCLK/IIC_SDA/PWM_CH3
20	IO22	GPIO22/SPI_SS/IIC_SCL/PWM_CH2/JTAG_TCK/TMS
21	IO21	GPIO21/SPI_MOSI/MISO/IIC_SDA/PWM_CH1/JTAG_TDI/TDO
22	IO20	GPIO20/SPI_MOSI/MISO/IIC_SCL/PWM_CH0/JTAG_TMS/TCK
23	IO8/NC	NC, unavailable. If you need to use it, please contact Ai-Thinker. Bootstrap/GPIO8/SPI_MOSI/MISO/IIC_SCL/PWM_CH3
24	IO0	GPIO0/SDIO_CLK//SPI_MOSI/MISO/IIC_SCL/PWM_CH0/JTAG_ TMS/TCK
26	IO1	GPIO1/SPI_MOSI/MISO/IIC_SDA/PWM_CH1
27	IO5	GPIO5/SPI_MOSI/MISO/IIC_SDA/PWM_CH0/ADC_CH4
30	RXD	RXD/GPIO7/SPI_SCLK/IIC_SDA/PWM_CH2
31	TXD	TXD/GPIO16/SPI_MOSI/MISO/IIC_SCL/PWM_CH1
Note: 1.At the moment of power-on,if Bootstrap GPIO8 is high, the module enters the programming mode;if Bootstrap GPIO8 is low, the module starts normally.		

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5. Schematic

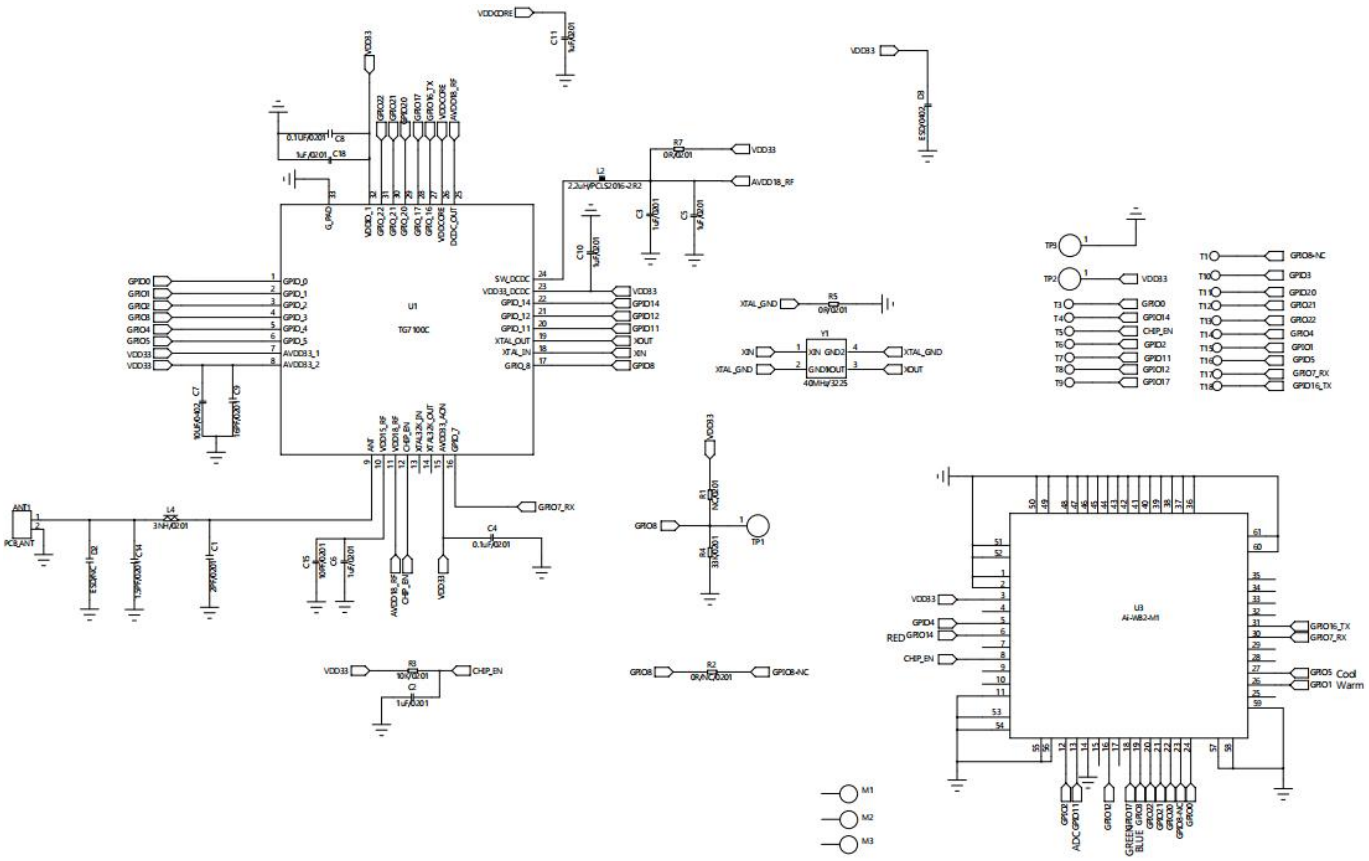


Figure 7 Module schematic

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6. Antenna parameters

6.1. Antenna test prototype signal

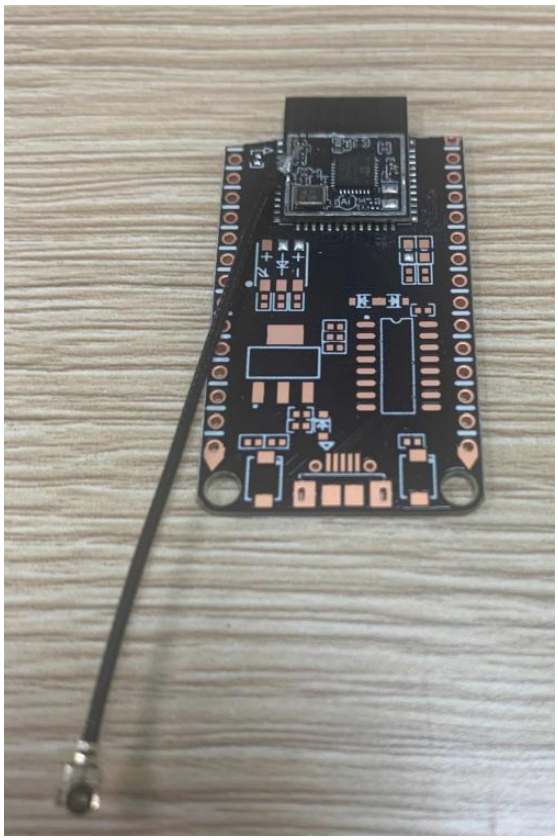


Figure 8 Schematic diagram of the antenna test prototype

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6.2. Antenna S parameters

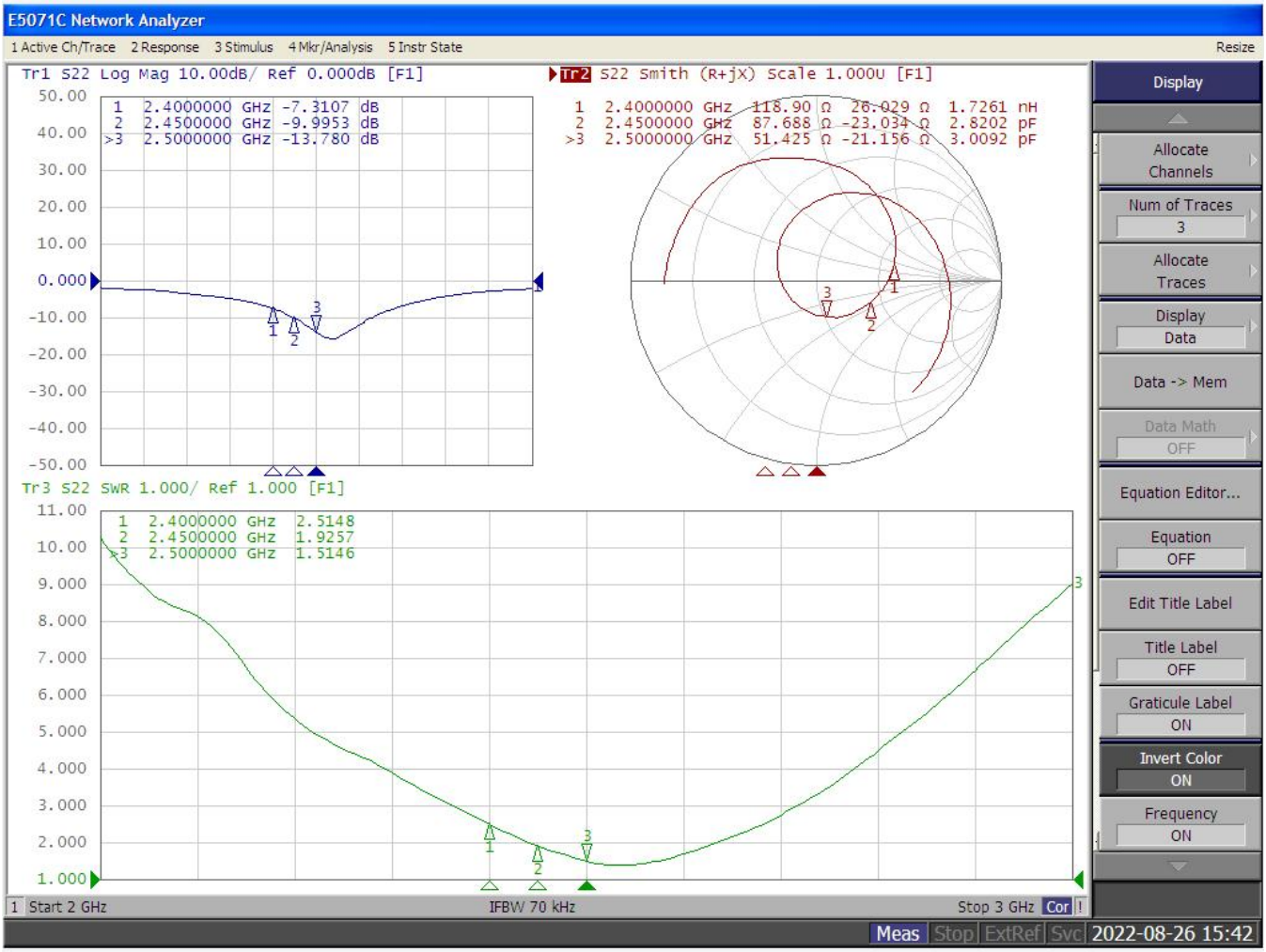


Figure 9 Antenna S parameters

6.3. Antenna gain and efficiency

Table 7 Antenna Gain and Efficiency

Frequency ID	1	2	3	4	5	6	7	8	9	10	11
Frequency(MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Gain(dBi)	0.92	0.97	0.99	1.17	1.45	1.59	1.62	1.51	1.34	1.49	1.45
Efficiency(%)	62.58	62.89	61.99	63.61	66.06	67.52	68.91	69.57	69.48	70.15	69.18

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6.4. Antenna field diagram

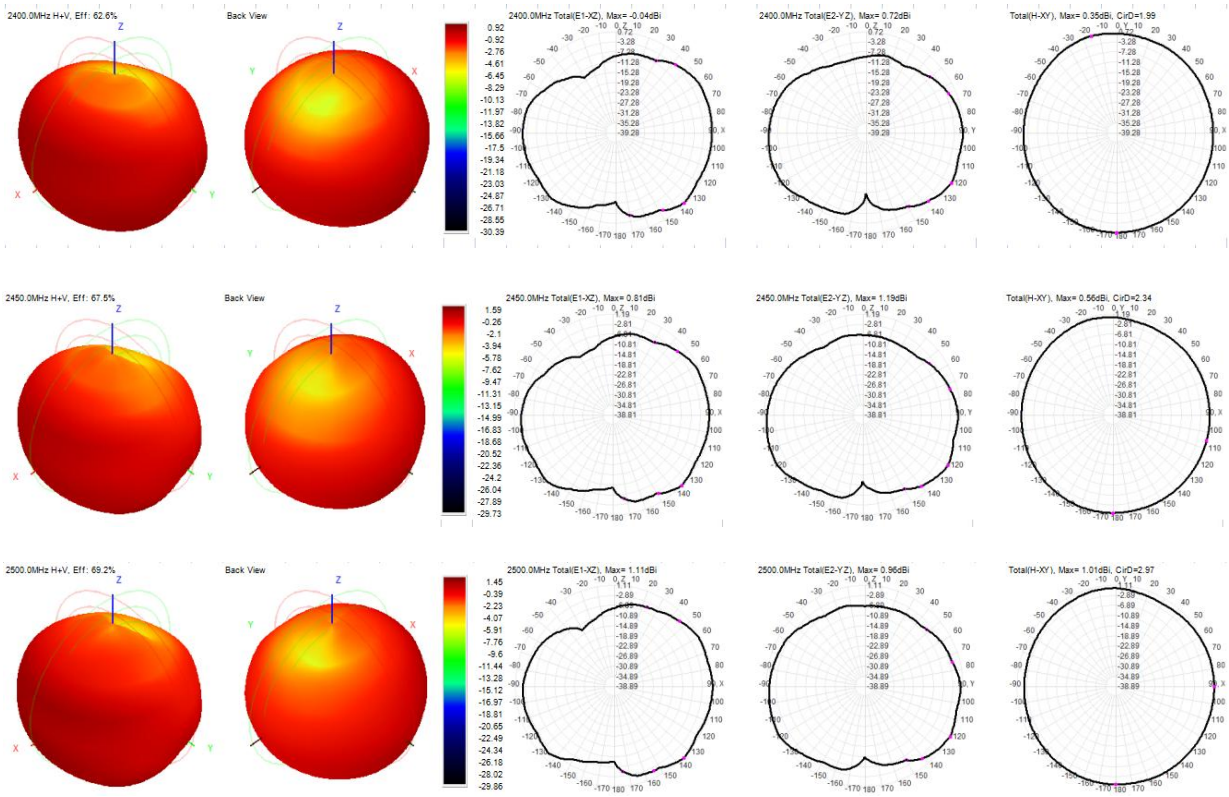


Figure 10 Antenna field type diagram

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6.5. RF OTA parameters

Table 8 RF OTA parameters

Item	Mode	Rate(Mbps)	Channel	Fre.(MHz)	Data(dBm)
TRP	11b	11	1	2412	16.47
			6	2437	15.76
			13	2472	15.36
	11g	54	1	2412	14.25
			6	2437	13.66
			13	2472	12.93
	HT20	MCS7	1	2412	13.65
			6	2437	12.59
			13	2472	12.09
TIS	11b	11	1	2412	-86.02
			6	2437	-85.4
			13	2472	-85.9
	11g	54	1	2412	-71.39
			6	2437	-72.22
			13	2472	-71.04
	HT20	MCS7	1	2412	-64.12
			6	2437	-64.79
			13	2472	-65.34

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7. Design guidance

7.1. Application circuit

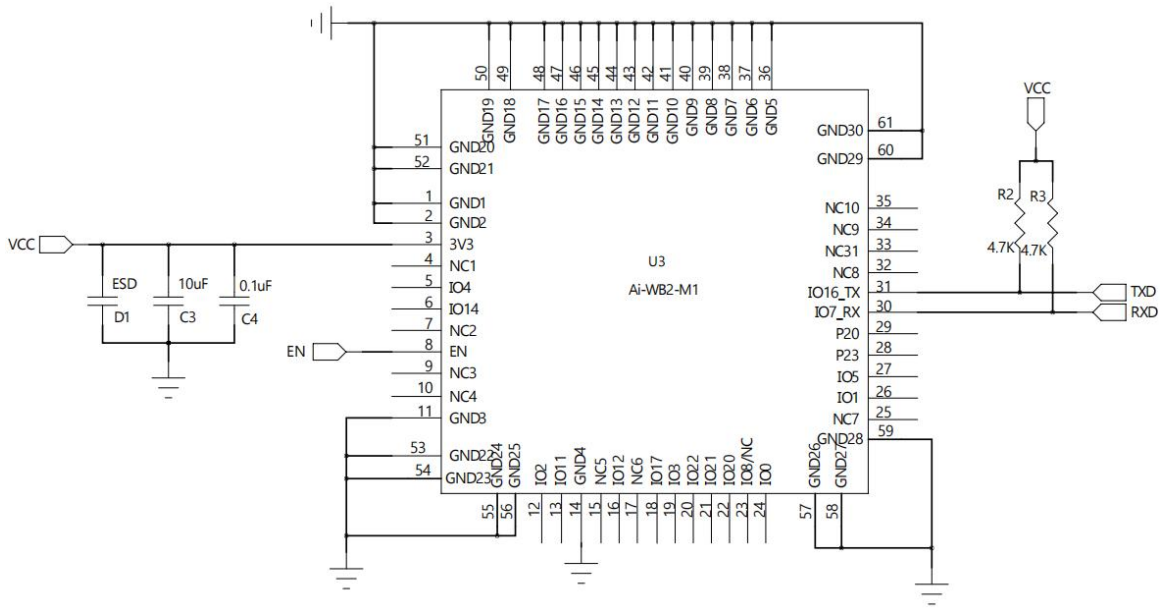


Figure 11 Application guidance circuit

- If the IO port is used as PWM, it is recommended to reserve a 4.7K pull-down resistor around the module. Especially in the application of light control, it can prevent the flashing light phenomenon at the moment of power-on start.
- IO8/NC pin, which are not available by default.If you need to use it, please contact Ai-Thinker.

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7.2. Recommend PCB footprint size

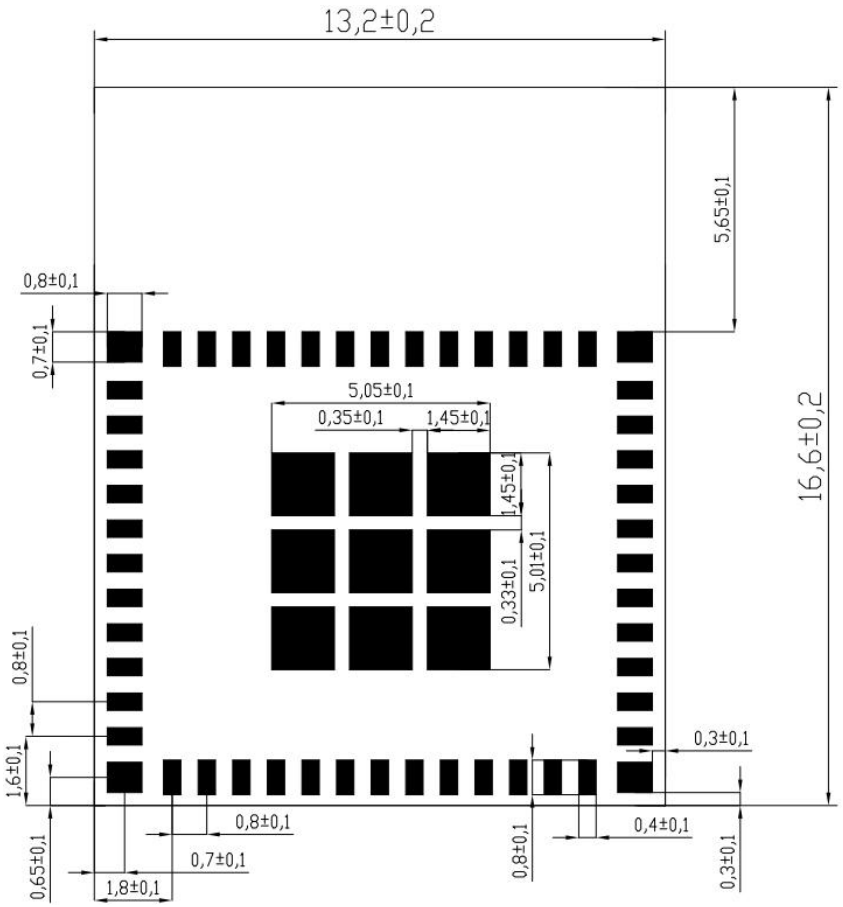


Figure 12 Recommend PCB footprint size

- When making the PCB patch package, please pay attention to the welding pad does not shrink into the module inside, to prevent a short circuit to the back test point and leading to poor patch.

7.3. Antenna layout requirements

- The following two methods are recommended for the installation position on the mainboard:

Option 1: put the module on the edge of the motherboard, and the antenna area extends out of the edge of the motherboard.

Option 2: put the module on the edge of the motherboard, the edge of the motherboard at the antenna position hollowed out an area.

- In order to meet the performance of onboard antenna, it is forbidden to place metal parts around the antenna and keep away from high frequency devices.

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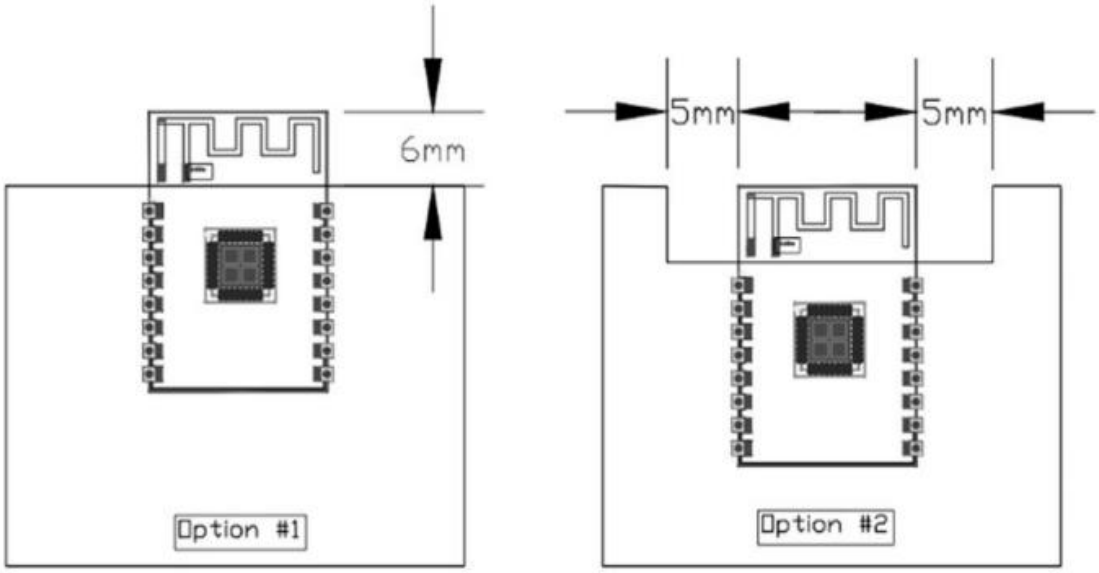


Figure 13 Antenna layout diagram

7.4. Power supply

- Recommended 3.3V voltage,peak current over 500mA.
- Power supply is recommend to use LDO; if the DC-DC is used, the ripple is recommended to be controlled within 30mV
- DC-DC power supply circuit proposes to reserve the dynamic response capacitance to optimize the output ripple with large load changes.
- It is recommended to add ESD devices to the 3.3V power interface.

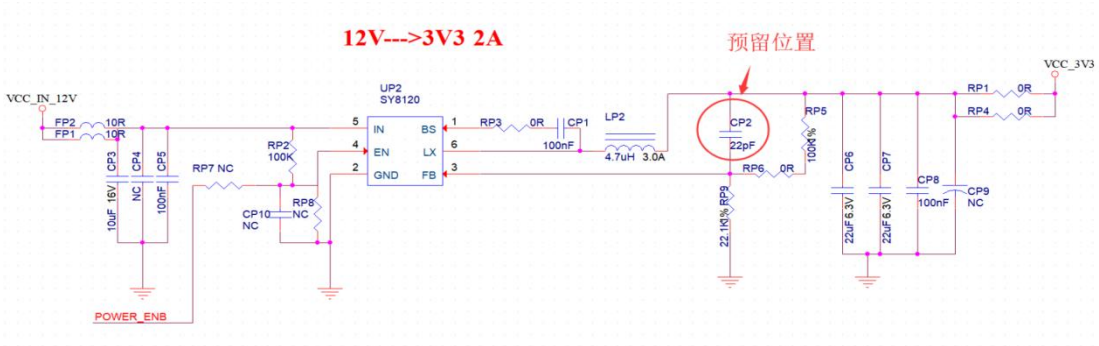


Figure 14 DC-DC step-down circuit diagram

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7.5. GPIO

- There are some IO ports on the periphery of the module. If you need to use it, it is recommended to connect a 10-100 ohm resistor in series with the IO port. This inhibits overshoot and makes both sides level more stable. It is helpful for EMI and ESD.
- For special I/O ports to be pulled up and down, refer to the usage instructions in the specifications, which may affect the module startup configuration.
- The IO port of the module is 3.3V. If the IO level of the main control and the module do not match, a level conversion circuit needs to be added.
- If the I/O port is directly connected to a peripheral port or terminals, for example, a pin row, reserve an ESD device near the terminal of the I/O cable.

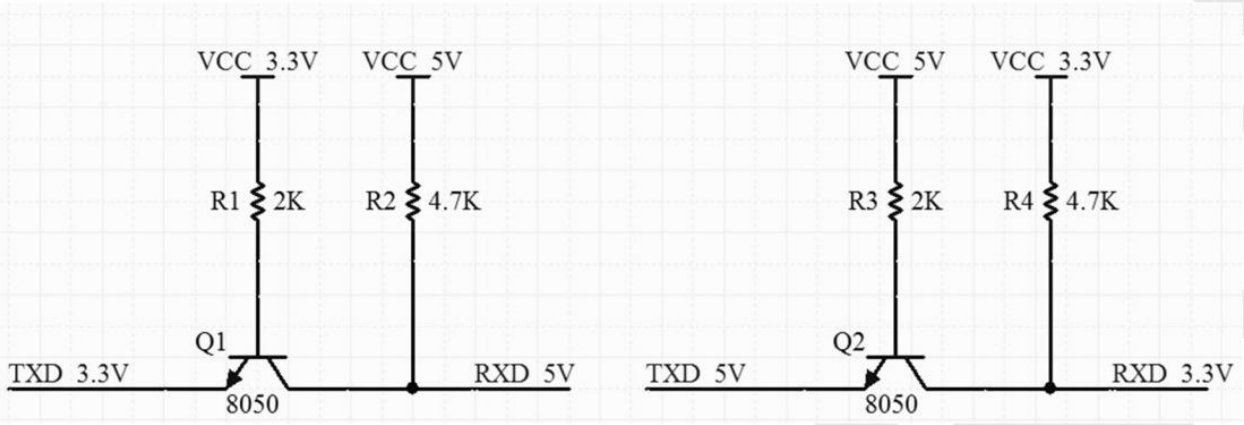


Figure 15 Level convert circuit

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8. Storage conditions

Products sealed in moisture-proof bags should be stored in a non-condensing atmosphere of <40 ° C /90%RH.

The module has a moisture sensitivity rating of MSL 3.

After the vacuum bag is opened, it must be used within 168 hours at 25±5°C/60%RH, otherwise it needs to be baked before it can be put on line again.

9. Reflow welding curve diagram

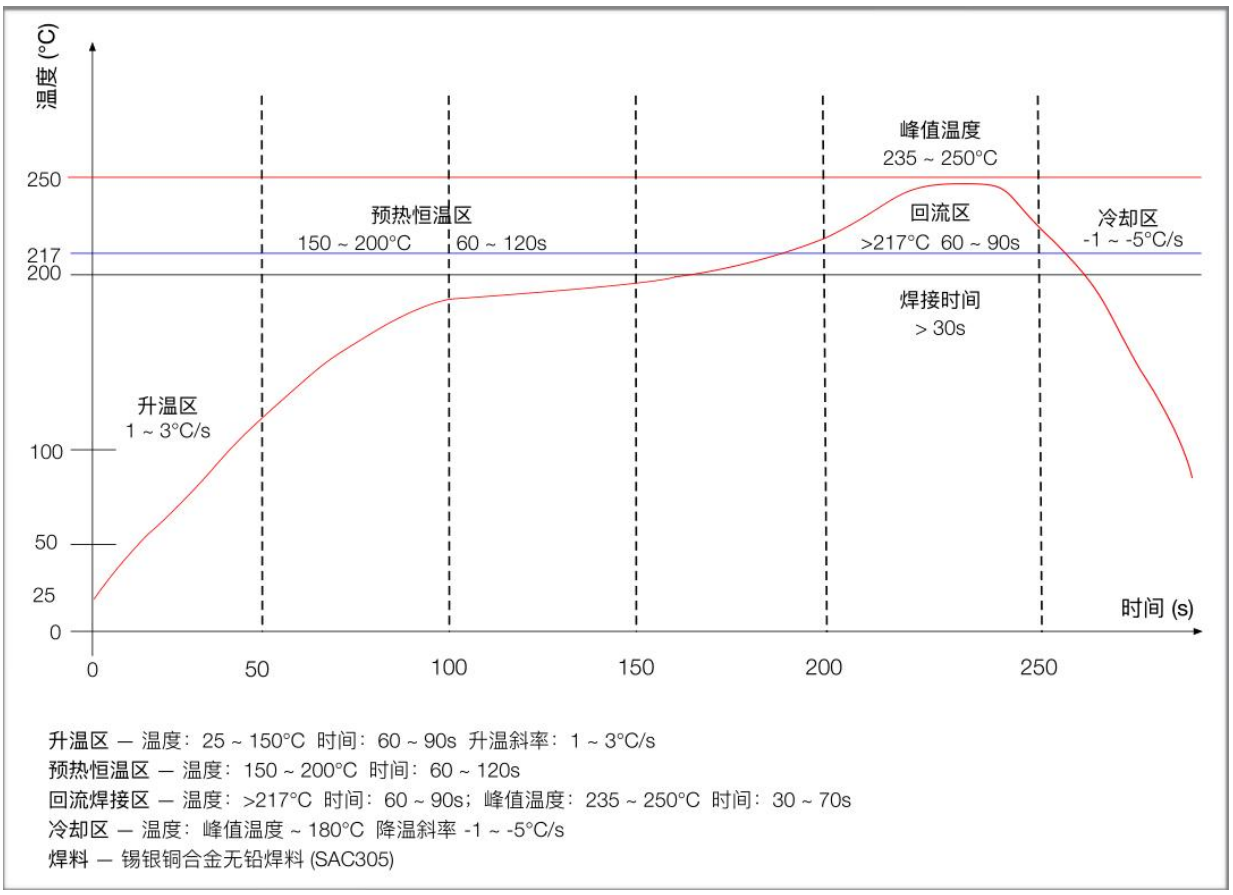


Figure 16 Reflow welding diagram

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10.Product packaging information

Ai-WB2-M1 module was packaged in a tape，900pcs/reel. As shown in the below image：



Figure 17 Package and packing diagram

11.Contact us

Ai-Thinker official website　Office forum　Develop DOCS

LinkedIn　Tmall shop　Taobao shop　Alibaba shop

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Domestic business cooperation：sales@aithinker.com

Overseas business cooperation：overseas@aithinker.com

Company Address：Room 403,408-410, Block C, Huafeng Smart Innovation Port, Gushu 2nd Road, Xixiang, Baoan District, Shenzhen.

Tel：+86-0755-29162996

WeChat mini program

WeChat official account

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Combo Command List

Version

V4.18P_3.8.0

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Revision History

Document Version	Update time	Updater	Reviewer	Important changes
DOC - V 0.0.0 (Not published)	2021/8/10	Yang Bin	Software Department+Xu Hong	Preliminary review of combo v2 version AT command set
DOC-V0.0.1 (Not published)	2021/8/17	Yang Bin	Chen Zifeng	Add Bluetooth related instructions and modify the format
DOC-V0.0.2 (Not published)	2021/8/24	Yang Bin	Chen Zifeng	Modified URC data definition Added detailed descriptions of some nouns (no functional changes) Add some error codes AT+WJAP? Change the query encryption mode to string display and delete the execution operation AT+WAUTOCONN deletes the execution operation +EVENT:SocketDown add data option AT+SOCKETDEL Modify the description string Add AT+SOCKETSENDLINE, AT+SOCKETRECVCFG
DOC-V1.0.0 (combo-v2.0.0)	2021/10/8	Yang Bin	Chen Zifeng	Add MQTT, HTTP related instructions, add URC data and error return code
DOC-V1.0.0 (combo-v2.1.0)	2021/11/1	Yang Bin	Chen Zifeng	Added Bluetooth URC data and error codes AT+BLEMODE adds Bluetooth off state Added AT+WCOUNTRY command Modify the Bluetooth power display content and add the maximum and minimum value display Modify the Bluetooth transparent transmission channel description Modify the AT+BLECONINTV

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				parameter unit Modify the AT+BLEADVINTV parameter unit
DOC-V1.1.0 (combo-v2.2.0)	2021/11/26	Yang Bin	Chen Zifeng	Added Bluetooth setting precautions description Added Realtek precautions description MQTT adds the Retained option (the previous version was not released so no major version will be updated this time)
DOC-V1.2.0 (combo-v2.3.0)	2021/12/7	Yang Bin	Chen Zifeng	MQTT adds will message
DOC - V1.3.0	2021/ 12 / 21	Xiong Wenqiang	Chen Zifeng	Simplified I O , serial port , pwm command , synchronous 8258 , 6212 , 6252 series Bluetooth
DOC-V1.4.0 (combo-v2.4.0)	2021/12/24	Xiong Wenqiang Yang Bin	Chen Zifeng	1. Serial port configuration command AT+UARTCFG cancels the flow control setting (the default configuration is no flow control) 2. Delete IO read and write commands AT+SYSIOSETCFG AT+SYSIOGETCFG 3. The AT+SYSGPIOWRITE command is executed once by default to set the GPIO to output mode. 4. The AT+SYSGPIOREAD command is executed once by default and the GPIO is set to floating input mode 5.AT+PWMCFG duty cycle use time control 6. Added AT+PWMCFGS command (use 100% to indicate duty cycle) 7.AT+PWMDUTYSET duty cycle usage time control 8. Added AT+PWMDUTYSETS (use duty cycle) 9. Modify the AT+WAPDHCP command parameters. Disabling

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				DHCP also requires setting IP information. 10. Add AT+BLECONNECT single Bluetooth connection 11. Added error codes
DOC-V1.5.0 (combo-v2.5.0)	2021/12/31	Xiong Wenqiang Yang Bin	Chen Zifeng	1. Bluetooth scanning format correction 2. Automatically enter transparent transmission mode after Bluetooth connection 3. AT+ BLEIBCNDATA new query command 4. AT+PWMCFGS and AT+PWMDUTYSETS command description issues 5. Change the Bluetooth query MAC format to lowercase 6. Modify the Bluetooth slave broadcast data
DOC-V1.6.0 (combo-v2.7.0)	2022/1/24	Yang Bin	Chen Zifeng	1. Add mobile phone network configuration instructions 2. Serial port configuration command AT+UARTCFG cancels flow control settings (the code was updated last time but the document was not updated) 3. AT+WAP? Check the added client list display
DOC-V1.7.0 (combo-v2.8.0)	2022/2/9	Yang Bin	Chen Zifeng	1. Start the log to add the default processing when the MAC and serial number are empty 2. Added prompt information when client connection is disconnected in AP mode
DOC-V1.7.1 (combo-v2.8.0)	2022/2/21	Xiong Wenqiang	Chen Zifeng	1. Update Bluetooth notes information
DOC-V1.7.2 (combo-v2.10.0)	2022/2/22	Yang Bin	Chen Zifeng	1. Modify UDP transparent transmission logic, single UDP client and single UDP server support original port transparent transmission mode 2. AT+SOCKETTT adds setting

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				command 3. GPIO command pin sorting changed to start from 1 (previously started from 0) 4. AT+SOCKET adds SSL server/client options 5. New error code type 6. Modify the prompt information after the socket connection is successful
DOC- V1.7.3 (combo-v2. 1 1 .0)	2 022/7/7	Yang Bin		1. Added AT+MQTTPUBRAM command 2. AT+LEDTEST command adds extended parameters
DOC- V1.7.4 (combo-v2. 1 2 . 2)	2 022/8/22	Yang Bin		1. Fixed the AT+MQTTPUB RAW command writing error 2. Delete AT+WCONFIG Note about B W16 only supporting WiFi network configuration
DOC - V1.8.0 (combo-v2. 1 3 . 0)		Yang Bin		1. Added Ai -WB2 series module P WM pin restriction description 2. AT+SOCKET adds the specified conid option
DOC -V4.18P_1.9 .0 (combo-V4. 18_P2.15.0)		Yang Bin		1. Delete the AT+GPIOTEST command 2. AT+MQTT adds reconnection function 3. New error code 4. Add unsubscribe command AT+MQTTUNSUB 5. Fix some writing errors
DOC-V4.18P _1.9.1 (combo-V4. 18_P2.15.0)		Yang Bin		1. AT+RESTORE will reset the MAC settings by default
DOC-V4.18P _1.10.0 (combo-V4. 18_P2.17.0)		Yang Bin		1. AT+WCONFIG adds AirKiss network configuration parameters 2. AT+SOCKET additional parameter description 3. Added AT+SOCKETAUTOTT command

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DOC-V4.18P_1.11.0 (combo-V4.18_P2.18.0)		Yang Bin		1. Add AT+SSLCRET command
DOC-V4.18P_1.1 2.0 (combo-V4.18_P2.18.0)		Lin Qiwei		1.AT +WSACN adds scanning parameters 2. Added AT+WSACNOPT command
DOC-V4.18P_1.13.0 (combo-V4.18_P2.19.1)		Yang Bin		1. Add +EVENT:SocketAutoDel,<ConID> URC data 2. AT+WCONFIG adds the network configuration protocol corresponding to the specific module
DOC-V4.18P_1.13.1 (combo-V4.18_P2.19.3)		Yang Bin		1. Add description of Bluetooth UUID corresponding attributes
DOC-V4.18P_1.13. 2 (combo-V4.18_P2.19.4)		Lin Qiwei		1. New command AT+WRSSI
DOC-V4.18P_1.14.0 (combo-V4.18_P2.21.0)		Yang Bin		1. Modify the sending and receiving rules description of UDP server and client 2. Bluetooth network configuration adds custom name parameters
DOC-V4.18P_1.15.0 (combo-V4.18_P2.22.0)		Yang Bin		1. AT+SLEEP adds sleep configuration parameters 2. URC data WIFI_CONNECTED is changed to WIFI_CONNECT
DOC-V4.18P_1.16.0 (combo-V4.18_P2.24.0)		Yang Bin		1. AT+WAUTOCONN adds the function of saving the parameters of reconnecting to WiFi after power-on without verifying the WiFi connection
DOC-V4.18P_1.17.0 (combo-V4.18_P2.29.0)		Yang Bin		1. Added URC data SocketReconnect 2. Add SNTP related commands 3. MQTT adds SSL connection

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				support
DOC-V4.18P_1.18.0 (combo-V4.18_P2.31.0)	2023/6/28	Yang Bin		1. Add IOMap mapping tables for each model 2. Add DNS commands AT+WDOMAIN, AT+WDNS
DOC-V4.18P_1.19.0 (combo-V4.18_P2.33.0)	2023/8/22	Yang Bin		1. Added socket ConID data type description 2. Fix AT+WDNS title writing error 3. Added AT+WDISCONNECT command 4. AT+HTTPCLIENTLINE add example
DOC-V4.18P_2.0.0 (combo-V4.18_P2.38.0)	2023/9/25	Yang Bin		1. Add AT+BLESENDRAW command 2. Add AT+WJEAP command 3. AT+TRANSENTER Add setting whether to automatically enter transparent transmission configuration 4. Add AT+SYSMSG command 5. New URC data +EVENT:WIFI_GOT_IP +EVENT:WIFI_SCAN_DON 6. Fix some writing errors 7. Add AT+STAINFO command 8. Add AT+HTTPRAW command
DOC-V4.18P_3.0.0 (combo-V4.18_P2.38.4)	2023/11/1	Yang Bin		1. Add AT+STAINFO example 2. AT+WCONFIG adds WPS configuration parameters 3. AT+SOCKET modification status definition
DOC-V4.18P_3.1.0(combo-V4.18_P2.39.0)	2023/11/15	Yang Bin		1. Added length limit description for AT+SOCKETSENDLINE 2. Added description of subscription limit 3. Added description of data length that can be cached in socket passive mode 4. Added IOMap setting instructions for

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				Ai-M62-M01L-BLI in the attachment 5. Added AT+MQTTVER command
DOC-V4.18P_3.2.0(combo-V4.18_P2.41.0)	2023/11/23	Yang Bin		1. Added IOMap setting instructions for Ai-M61-32S-BLIAll in the attachment 2. Add active scanning command AT+WSCANACTIV 3. New command AT+SOCKETSENDHEX
DOC-V4.18P_3.3.0(combo-V4.18_P2.42.3)	2023/12/8	Yang Bin		1. AT+SOCKET adds sample code 2. AT+SOCKETSENDLINE Add sample code 3. AT+SOCKET adds task deletion status 4. AT+WCONFIG adds blufi network configuration parameters 5. AT+ WCONFIG unified parameters, BL602mode=9 also activates blufi network configuration
DOC-V4.18P_3.4.0		Yang Bin		1. Added Bluetooth UUID support for 16-bit mode 2. Added Bluetooth UUID mode support list description 3. Add AT+MQTTDISCONN command 4. New command: AT+MQTTBUF 5. Add event +EVENT:MQTT_MALLOC_ERROR 6. New command: AT+MQTTKEEPALIVE 7. New command AT+WAPINFO
DOC-V4.18P_3.4.1	2024/1/9	Chen Cong		1. AT+SLEEP adds GPIO wake-up mode
DOC-V4.18P_3.5.0	2024/1/31	Yang Bin		1. Modify the transparent transmission description (SSL does not support transparent

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				transmission yet) 2. Add AT+MQTTCRET command 3. New command AT+SOCKET2 4. New command AT+FLASHID
DOC-V4.18P_3.5.1	2024/2/21	Yang Bin		1. New command AT+UARTFLOWCONTROL 2. Updated AT+UARTCFG command description
DOC-V4.18P_3.6.0	2024/3/1	Yang Bin		1. BW16 adds support for airkiss network configuration
DOC-V4.18P_3.6.1	2024/10/17	Yang Bin		1. Modify writing errors (AT+SOCKET2) 2. Updated the production test LED test command (AT+LEDTEST) to distinguish between normal combo and middleware combo
DOC-V4.18P_3.6.2	2024/10/17	Chen Cong		1. Add AT+TICKLESS command
DOC-V4.18P_3.6.3	2024/11/28	Yang Bin		1. AT+WJEAP adds compatible model description 2. Added IOMAP instructions for BW20-12F/07S
DOC-V4.18P_3.7.0	2024/11/29	Lin Sheng		1. Add A T+BLUFISEND command, + BLUFIDATA event
DOC-V4.18P_3.8.0	2024/12/10	Yang Bin		1. AT+ WCONFIG adds web configuration instructions

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1. Instruction format and default configuration description

1.1 Serial port default configuration

If there is no special instruction, the AT command serial port and the download serial port use the same serial port, configured as 115200, 8N1

1.2 Startup Information

##

arch:<chip model>,<chip version serial number> //If there is no serial number, it will be displayed as NULL
company:Ai-Thinker|B&T
ble_mac:<Bluetooth MAC> //eg: 94c960123456 (lowercase letters) If this line is not present, it will not be printed
wifi_mac:<WIFI STA MAC> //eg: 94c960123456 (lowercase letters) If this line is not present, it will not be printed.
sdk_version:<SDK version number> //Chip original SDK version number (displayed according to the original SDK version number)
firmware_version:<firmware version number> //Firmware version number, format "release/v1.0.0"

If it is a debug version, you need to change release to debug;
Version lowercase v
Three fields of version number

- The first one indicates that an interface has been deleted or an existing interface has been changed, and other modifications that may cause compatibility issues (fixing printing errors in published content, adding functions or new response content to existing instructions, and adding URC instructions are all incompatible modifications);
- The second version number indicates that content has been added (usually a new instruction has been added), which does not affect compatibility;
- The third field indicates that the bug has been fixed or the logic has been optimized, and there is no modification to the command interface (for example, the status displayed by AT+WJAP? is wrong, but after fixing the bug, it can be displayed normally according to the document regulations).

compile_time: <compile time: month/day/year/hour/minute/second>

ready

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##

Remark:

(1) Use \r\n for line breaks

(2) Customers recommend checking ready to check startup information, and do not recommend checking the firmware version number and compile time (subsequent versions may be updated)

(3) Firmware version number

The firmware version number in the startup information indicates the firmware version number of the module, not the version number of the combo command. The version number of the combo framework needs to be checked through the version query command.

The format is three-part format v major version number.minor version number.iteration number

When the major version number changes, it indicates an incompatible modification (such as deleting an instruction or modifying an existing instruction).

The minor version number indicates that a new interface has been added (new AT commands or backward compatible modifications).

Iterative version numbers indicate bug fixes (does not involve interface modifications)

1.3 Instruction Format

The command CMD[opt][param1,param2,...] ends with a carriage return and line feed (\r\n) (the actual detection is the \n end ASCII code 0x0D, the preceding \r will be ignored)

All line breaks are unified using \r\n

		describe	Example
CMD		Command name (case insensitive)	AT
opt	NA	Without any parameters, the specified command is executed directly.	AT
	?	Query Status	AT?
	=param1,param2,...	Instructions with parameters, multiple parameters are separated by commas. If a parameter contains a comma, it must be enclosed in double quotes (\n cannot appear in the parameter, and the first and last parameters must be enclosed in double quotes if they are empty)	AT=1

1.4 Command response format

1.4.1 Command execution success response format

\r\nOK\r\n //No other messages can be printed in the middle (other messages can be printed in the log port)

1.4.2 Command execution error response format

\r\n+<CMD>:<error_code>\r\nERROR\r\n

//errorno indicates the error code (supported by some platforms). The AT serial port cannot print any other error information (other messages can be printed on the log port)

1.4.3 Query function execution success response format

\r\nQuery result (this is the response field for viewing specific commands, which must be strictly defined and cannot be modified)\r\nOK\r\n

1.4.4 Unknown command response format

Response when no command is matched

Unknown cmd: <all contents of the serial port input, including parameters>

Eg: For example, if ATAA does not exist, then

Entering ATAA\r\n will return Unknown cmd:ATAA

Entering ATAA=123\r\n will return Unknown cmd:ATAA=123

1.5 URC Active Data

//WIFI event

+EVENT:WIFI_DISCONNECT //WIFI disconnected

+EVENT:WIFI_GOT_IP //Get IP

+EVENT:WIFI_CONNECT //wifi connection

+EVENT:WIFI_APCLIENTDISCONNECT:<MAC> //AP mode client disconnects, followed by the MAC address, lowercase without colon

+EVENT:WIFI_APCLIENTCONNECTED:<MAC> //AP mode has a new client connection, followed by the MAC address, lowercase without colon

+EVENT:WIFI_SCAN_DONE //WIFI scan is finished

+BLUFIDATA: <length> ,<data> // Receive custom data for Bluetooth network configuration

//SOCKET event

+EVENT:SocketDown,<ConID>,<length>[,<data>] //Receive socket data

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+ EVENT:Socket Seed , <seed ConID> , <server ConID> //Receive new client connection
+EVENT:SocketDissconnect,<ConID> //socket disconnected
+EVENT:SocketReconnect,<ConID> //socket disconnected and reconnected successfully
+EVENT:SocketAutoDel,<ConID> //socket automatically deleted
//MQTT events
+EVENT:MQTT_MALLOC_ERROR //MQTT malloc error
+EVENT:MQTT_CONNECT //MQTT connection successful
+EVENT:MQTT_DISCONNECT //MQTT connection disconnected
+EVENT:MQTT_SUB,<Topic>,<len>,<data> //Received subscription message
//Bluetooth data
+EVENT:BLE_DISCONNECT //Bluetooth disconnect status
+EVENT:BLE_CONNECTED //Bluetooth connection successful
+DATA :<len>,<data> //Receive Bluetooth transparent data in host mode

//Cloud
aliGenie_data //Data sent by Tmall Genie
+EVENT:CloudDown,<type>,<data>

//Production test
##boot //Development board button trigger signal

1.6 errorno Error code description

//System framework related error code

0: Success

1: The command is not supported (the combo framework contains the command but the current platform has not transplanted or adapted to support it)

2: The command parameters contain unsupported operations (the current platform only supports some operations on this command)

3: Instruction format error (this refers to the wrong number of parameters, for example, two parameters are required, but only one parameter is entered)

4: Parameter error (the parameter content is wrong, for example, a number from 0 to 9 is required, but 10 or xyz is passed in, which is a parameter error)

5: Parameter length error (the command length exceeds the maximum supported length)

31: The current command has not ended and the status needs to be asynchronously reported. This value is used by the state machine to determine the use of the command and no message is returned.

32: Unknown error (or unhandled error type)

//Common error codes

33: malloc error

34 : Failed to read buf

35 : Failed to write buf

36: Configuration error (the configuration loaded from the memory is wrong. For example, if we set the port for OTA upgrade to -1 and check the port error when executing AT+OTA, a

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configuration error will be reported.)

37: Failed to create task

38: Flash read/write failure

39: Serial port configuration error, unsupported baud rate

40: Serial port configuration error, unsupported data bit

41: Serial port configuration error, unsupported stop bit

42: Serial port configuration error, unsupported parity bit

43: Serial port configuration error, unsupported flow control

44: Serial port configuration failed

45: Username/password error

46: Low power mode error or unsupported low power mode

47: Uninitialized configuration data error (including io mapping data)

63: General error code (without other information)

//wifi related error code

6 4: Wi-Fi is not initialized or initialization fails

6 5: Wi-Fi mode error (unable to connect to Wi-Fi in single AP mode)

6 6: Wi-Fi connection failed

6 7: Wi-Fi connection successful, error in obtaining IP (DHCP)

6 8: Failed to obtain encryption method

69 : The specified AP was not scanned.

70: WiFi scan startup failed

71: Wi-Fi scan timeout

72: Failed to open AP hotspot

73: Failed to obtain the router's wifi information or the AP information that you enabled yourself

74: Network card (STA/AP) is not running

75: Wi-Fi country code error (unsupported Wi-Fi country code)

76: Current network configuration mode is wrong

95 : Wi-Fi connection unknown error

//socket related error code

96 : Failed to create socket

97 : Socket connection failed

98 : DNS failed

99 : Socket status error (for example, TCP is not connected yet)

100 : Socket type error

101 : Socket send failed

102 : Socket receive failed

103: Socket monitoring thread creation failed

104: socket bind error

105 : The current connection cannot be transparently linked (wrong socket type or number)

106 : PING test failed (all packets lost)

107 : PING test has some packet loss

108: SSL Config Error

109: SSL verification error (usually caused by unsupported SSL encryption type or certificate

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error)

127 : Unknown socket error

//GPIO control related error code

128: GPIO mode error (for example, input is configured, and then output instruction is executed)

129: The IO being operated is not burned into the GPIO mapping table (for example, if the IO mapping of pins 0 to 4 is set, this error will be reported when operating pin 5)

130: NC pin, cannot be controlled (for example, serial port, VCC, GND, etc. are controlled by AT commands)

131: Pin mode setting error or unsupported mode

132: Error in setting GPIO pull-up or pull-down mode is not supported)

133: PWM period not supported by hardware

159: GPIO operation unknown error

//HTTP(S) related error codes

160: HTTP(S) response header format error

191: HTTP(S) request unknown error

//MQTT related

192: MQTT connection mode error

193: MQTT connection failed

194: MQTT configuration error

195: Failed to publish MQTT message

196: The MQTT message subscription list is full

197: MQTT did not receive a response

198: MQTT is busy or the connection has timed out

199: MQTT unsubscribe failed

224: MQTT unknown error

//BLE Bluetooth related

225: Bluetooth startup or shutdown error

226: Failed to set Bluetooth MAC (226: Set Bluetooth MAC; 237: Failed to get Bluetooth MAC)

227: Modifying Bluetooth MAC is not supported

228: Unsupported state or the operation being performed is not allowed in the current state

229: Bluetooth disconnection failed

230: Bluetooth MTU setting failed (236 Failed to obtain MTU)

231: Bluetooth data sending failed

232: Set the Bluetooth slave broadcast status

233: Bluetooth host scan failed

234: The specified Bluetooth was not scanned.

235: Bluetooth connection failed

236: Failed to obtain MTU (230 Failed to set MTU)

237: Failed to obtain Bluetooth MAC (226: Set Bluetooth MAC; 237: Failed to obtain Bluetooth MAC)

255: Unknown Bluetooth error

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2. Basic instructions

2.1 AT test command

AT	
describe	Instructions to test whether the AT framework is working properly
response	OK
Example	AT OK
Description information in HELP	
response	Test cmd

2.2 AT+HELP View AT command set

AT+HELP	
describe	Query AT command set list
response	<command name>:<comment> ... <command name>:<comment> OK
Example	
Description information in HELP	
response	Show cmd list

2.3 AT+RST module restart command

AT+RST	
describe	Restart module
response	OK
Example	
Description information in HELP	
response	Soft restart

2.4 AT+RESTORE restores factory settings

AT+RESTORE	
describe	Restore to factory mode and erase configuration information (except triplet and IO mapping)

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response	OK
Remark	Automatically restart after success Default parameters:
Example	
Description information in HELP	
response	Restore setting

2.5 ATE1 turns on echo

ATE1	
describe	Turn on echo
response	OK
Example	ATE1 OK
Description information in HELP	
response	Enable echo
Notes	P B series default echo is on TB series default echo is on

2.6 ATE0 turns off the echo

ATE0	
describe	Turn off echo
response	OK
Example	ATE0 OK
Description information in HELP	
response	Disable echo

2.7 AT+SYSMSG query or set system prompt information

AT+SYSMSG?	
describe	Query URC data printing mask
response	+SYSMSG: <mode1>,<mask1> ... <modeN>,<maskN> OK

Example	AT+SYSMSG? +SYSMSG: 1,FFFFFFFF OK
AT+SYSMSG=<mode>,<mask>,<saveFlash>	
describe	Set URC data printing mask
parameter	mode: specifies the mode in which the mask needs to be set 1: Transparent transmission mode (including socket transparent transmission and Bluetooth transparent transmission) mask: print mask, this is a hexadecimal data of u32 (string length is 8), each bit represents a message, 0 means prohibit printing, 1 means allow printing Bit0: +EVENT:WIFI_DISCONNECT Bit1: +EVENT:WIFI_CONNECT Bit2: +EVENT:WIFI_APCLIENTDISCONNECT:<MAC> Bit3: +EVENT:WIFI_APCLIENTCONNECTED:<MAC> Bit4：+EVENT:SocketDown,<ConID>,<length>[,<data>] Bit5：+EVENT:SocketSeed,<seed ConID>,<server ConID> Bit6：+EVENT:SocketDissconnect,<ConID> Bit7：+EVENT:SocketReconnect,<ConID> Bit8：+EVENT:SocketAutoDel,<ConID> Bit9：+EVENT:MQTT_CONNECT Bit10：+EVENT:MQTT_DISCONNECT Bit11：+EVENT:MQTT_SUB,<Topic>,<len>,<data> Bit12：+EVENT:BLE_DISCONNECT Bit13：+EVENT:BLE_CONNECTED Bit14：+DATA:<len>,<data> Bit15: +EVENT:WIFI_GOT_IP Bit16: +EVENT:WIFI_SCAN_DON saveFlash: 0: effective this time, not saved to flash 1: This time it takes effect and is saved to flash
Example	AT+SYSMSG=1,2468abcd,0 OK
Description information in HELP	
response	Query and set system message

2.8 AT+GMR query version information

AT+GMR	
describe	Query version information
response	<at version:>: AT version information (combo version) <sdk version:>: SDK version information

	<firmware version:>: Firmware version OK
Example	AT+GMR at version:release/v2.0.0 sdk version:amebaD-6.2c firmware version:release/v1.2.3 OK
Description information in HELP	
response	Show version info

2.9 AT+FLASHID query FLASH ID

AT+FLASHID	
describe	Query FLASH ID
response	Flash Manufacturer ID:0xXX Flash Device ID:0xXX Flash Capacity ID:0xXX(XMB) OK
Example	
Description information in HELP	
response	Query FLASH ID
Remark	Compatible models BW16

2.10 AT+SLEEP sleep mode

AT+SLEEP=<mode>[,<wakeup source>,<param1>,<param2>]	
describe	Set Sleep Mode
paramete r	Mode: 0: Enter light sleep mode, power on and do not enter light sleep mode automatically 1: Enter light sleep, automatically enter light sleep when powered on 2: Enter deep sleep state 3: Normal mode wakeup source: Set the wakeup source (valid only when mode=0/1/2) 0: Timer wake-up 2: GPIO wake-up param1: Only valid when wakeup source=0/2 When wakeup source=0, it indicates the use of timed wakeup. This parameter indicates the timer time in ms.

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	wakeup source=2 means using GPIO for wakeup. This parameter indicates the sequence number of the wakeup pin (counterclockwise from the upper left corner of the module, the pin number starts from 1) Param2: Only valid when wakeup source=2, indicating the wakeup level when GPIO wakes up 0: Low level wake-up 1: High level wake-up 2: Falling edge wake-up 3: Rising edge wake-up 4: Double edge wake-up
response	OK
Remark	Wake up the module by sending arbitrary data to the serial port
Example	
Description information in HELP	
response	Set low power mode
Notes	P B series is 3, normal mode The default mode of TB series is 3, normal mode Ai-WB2 series supports mode 2/3, the default is 3 Note: When configuring the GPIO wake-up of the Ai-WB2 series, the pin specified by param1 is not mapped, that is, the actual pin of the chip, and only supports the IO7 pin (IO7 is the RX pin, so for serial port wake-up, we generally set the IO7 low level environment, that is, AT+SLEEP=2,2,7,0)

2.11 AT+UARTCFG serial port setting command

AT+UARTCFG?	
describe	Query AT serial port configuration
response	+UARTCFG: <baudrate>,<databits>,<stopbits>,<parity> OK
Example	
AT+UARTCFG=<baudrate>,<databits>,<stopbits>,<parity>	
describe	Set AT serial port configuration command, 6 212 , 6 252 , 8 258 only support baudrate Flow control is off by default, use "AT+UARTFLOWCONTROL" to set
parameter	baudrate : serial port baud rate databits: data bits 5: 5 data bits 6: 6 data bits 7: 7 data bits 8: 8 data bits stopbits : stop bits

	1 : 1 stop bit 2 : 1.5 bit stop bit 3 : 2 stop bits parity : check digit 0: None 1 : Odd 2 : Even
Notes	PB series only supports baudrate TB series only supports baudrate

2.12 AT+UARTFLOWCONTROL serial port flow control settings

AT+UARTFLOWCONTROL?	
describe	Query AT serial port flow control configuration
response	+ UARTFLOWCONTROL : <flowcontrol> OK
Example	AT+UARTFLOWCONTROL? +UARTFLOWCONTROL:0 OK
AT+UARTFLOWCONTROL=<flowcontrol>	
describe	Set AT serial port flow control
parameter	flowcontrol: flow control 0: No flow control 1: Enable RTS 2: Enable CTS 3: Enable RTS and CTS at the same time
response	OK //Note that the OK message is only sent after the setting is successful. If flow control is enabled, the receiving end also needs to configure flow control before receiving data.
Example	AT+UARTFLOWCONTROL=3 OK
Notes	Compatible models BW16 Series (RTS:PA_14/CTS:PA_15)

2.13 AT+SETDOWNLOADMODE enters download mode

AT+SETDOWNLOADMODE=<mode>	
describe	Enter download mode
parameter	Mode: 1: Enter serial port download mode
response	OK
Example	
Description information in HELP	
response	Set download mode

2.14 AT+OTA online upgrade command

AT+OTA	
describe	Start an OTA upgrade Note: The upgrade is asynchronous. The OK message only indicates that the startup task is successful, not that the upgrade is successful. After the upgrade is successful, the module will restart and switch to the new firmware.
response	OK
Example	
AT+OTA?	
describe	Query OTA parameters
response	+OTA:<Mode> , < H ost_name > , < P ort > , <R oute > OK //Status description reference setting parameters
Example	
AT + OTA = <Mode> , <Host_name> , < P ort > , <Route>	
describe	Set OTA related parameters
parameter	Mode : Download method 1: HTTP 2: HTTPS Host_name : Server domain name Port : Server port number R oute : the resource address to be downloaded
response	OK
Example	
Description information in HELP	
response	Firmware OTA

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2.15 AT+TICKLESS queries or sets the interval for listening to AP beacons in light sleep mode

AT+TICKLESS?	
describe	Query the interval for entering light sleep mode to monitor AP beacons
response	+ TICKLESS : <tickless> OK
Example	AT+TICKLESS? +TICKLESS:10 OK
AT+TICKLESS=<tickless>	
describe	Set the interval for entering light sleep mode to monitor AP beacons
parameter	The interval for listening to AP beacons when entering light sleep mode . The unit is AP beacon interval . The default value is 10. The range is [1,100].
response	OK
Example	AT+TICKLESS=10 OK AT+SLEEP=0,2,22,2 OK
Notes	1. Compatible models BL616/618 Series Modules 2. Need to be used with AT+SLEEP command

3. IO control instructions

3.1 AT+SYSIOMAP queries or sets the IO mapping table

AT+ SYSIOMAP?	
describe	Query the IO pin mapping table
response	+ SYSIOMAP:PinNumber:<PinNumber>,PinMap:< pin 1 >,<pin 2 > ,... ,<pin N > //Status introduction

	PinNumber: indicates how many groups of data there are in the current mapping table
Example	#AT+SYSIOMAP? +SYSIOMAP:PinNumber:6,PinMap:NC,5,20,NC,15,NC OK
AT+ SYSIOMAP = <PinNumber>,< pin 1 >,<pin 2 > ,... ,<pin N >	
describe	Set IO pin mapping
parameter	pinNumber: The total number of IOs to be set pin xx: The chip pin number corresponding to the module IO pin (counterclockwise from the upper left corner of the module, the pin number starts from 1) (1~254, this can be determined according to the pin number in the chip manual) If the module does not have a corresponding chip pin, set it to NC
response	OK
Example	#AT+SYSIOMAP=4,3,5,NC,1 OK This instruction means A total of 4 IO mapping relationships are set Pin 1 of the module corresponds to pin 3 of the chip; Pin 2 of the module corresponds to pin 5 of the chip; Pin 3 of the module is not connected to the chip or the pin is prohibited from being controlled by AT commands. Pin 4 of the module corresponds to pin 1 of the chip For the IOMap mapping table of each model, please refer to **Appendix 1 IOMap table of each model module**
Description information in HELP	
response	Query and set IO map

3.2 AT+SYSGPIOWRITE sets the GPIO output level

AT+SYSGPIOWRITE=<pin>,<level>	
describe	Set the GPIO output level. The level is 1 , which is pulled up by default . The level is 0, which is pulled down by default.
parameter	pin: module IO pin number (sorted counterclockwise from the upper left corner of the module, the pin number starts from 1) level ： 0: Low level 1: High level
response	OK
Example	
Description information in HELP	

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response	Set GPIO out level

3.3 AT+SYSGPIOREAD reads GPIO level

AT+SYSGPIOREAD=<pin>	
describe	Read GPIO level, floating by default
parameter	pin: module IO pin number (sorted counterclockwise from the upper left corner of the module, the pin number starts from 1)
response	+SYSGPIOREAD:<pin>,<level> OK Status Field Description pin: module IO pin number (sorted counterclockwise from the upper left corner of the module, the pin number starts from 1) level: the level read 0: Low level 1: High level
Example	
AT+ SYSGPIOREAD =?	
response	Get GPIO level
Example	

3.4 AT+PWMCFG configures PWM function

AT+PWMCFG=<pin> , < c ycle> , <duty>	
describe	Configuring P WM Function
Notice	Ai -WB2 series modules have 5 P WMs in total . When they are enabled at the same time, it is important to note that the I O numbers of the chip pins cannot be repeated modulo 5, otherwise only one will take effect. For example, if I O1/2/6 is set , only I O2/6 will take effect, and I O1 will be covered by I O6 .
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) cycle : pwm cycle duty: duty cycle time
response	OK
Example	
Description information in HELP	
response	Set PWM config
Remark	The unit of this command setting is the chip's cycle register. The same parameter may have different effects on different modules. If the accuracy can meet the requirements, it is recommended to use AT+PWMCFGS setting. The effect of the same parameter of this command on different modules will be basically consistent (different chips may have a difference of a few us)

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3.5 AT+P WMCFGS configures the PWM function

AT+PWMCFG S =<pin> , < c ycle> , <duty>	
describe	
Notice	Refer to AT+PWMCFG to configure the PWM function Notes
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) cycle : pwm cycle, unit: us duty: integer 0~100 represents the percentage of duty cycle
response	OK
Example	
Description information in HELP	
response	Set PWM config

3.6 AT+PWMSTOP turns off the PWM function

AT+PWMSTOP=<pin>	
describe	Disable PWM function
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1)
response	OK
Example	
Description information in HELP	
response	Stop PWM function

3.7 AT+PWMDUTYSET updates the PWM duty cycle

AT+PWMDUTYSET=<pin>,<duty>	
describe	Update the PWM duty cycle of the specified pin
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) duty: duty cycle time, unit: us
response	OK
Example	
Description information in HELP	
response	Update PWM duty

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3.8 AT+PWMDUTYSET S Update PWM duty cycle

AT+PWMDUTYSET S =<pin>,<duty>	
describe	Update the PWM duty cycle of the specified pin
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) duty: integer 0~100 represents the percentage of duty cycle
response	OK
Example	
Description information in HELP	
response	Update PWM duty

4. WIFI Instructions

4.1 Basic instructions

4.1.1 AT+WMODE query or set WIFI working mode

AT+WMODE?	
describe	Query WIFI working mode
response	+WMODE:<MODE> OK
Example	
AT+WMODE= <MODE> ,<save_flash>	
describe	Set the WiFi working mode
parameter	MODE: WiFi working mode 0: Wi-Fi is not initialized or turned off 1: STA 2: AP 3: AP+STA save_flash: 0: Do not save to flash 1: Save to flash
response	OK

Example	
Notice	If Realtek series (BW16/BW15) has multiple wireless types enabled, they need to be enabled in the specified order. If you enable AP+STA+Bluetooth triple mode, or AP+STA mixed mode, you need to turn on AP first, then connect STA and Bluetooth (there is no requirement for the order of Bluetooth and STA, but AP must be turned on first)
Description information in HELP	
response	Query an set WIFI mode
Notes	BW16 When save_flash==1, MODE does not support 0 (turn off WIFI) when saving falsh

4.1.2 AT+WDISCONNECT disconnects the Wi-Fi connection

AT+WDISCONNECT	
describe	Disconnect the wifi connection. This command will turn off the wifi first and then start it again. It is equivalent to executing AT+WMODE=0,0 first and then AT+WMODE=x,0 (x indicates the wifi status before the command is executed)
response	OK
Description information in HELP	
response	Disconnect wifi connect

4.1.3 AT+WSCAN scan WIFI list

AT+WSCAN ?	
describe	Scan WIFI list
response	+WSCAN:index SSID,CH,SECURITY,RSSI,BSSID <index> <SSID>,<CH>,<SECURITY>,<RSSI>,<BSSID> ...
Example	AT+WSCAN +WSCAN:index SSID,CH,SECURITY,RSSI,BSSID 1 IoT-Connect,9,WPA/WPA2 Mixed,-19,cc:81:da:1f:45:80 2 IoT-Connect_5G,44,WPA/WPA2 Mixed,-30,cc:81:da:1f:45:88 3 super_2G,1,WPA/WPA2 AES,-32,54:75:95:4f:74:5e 4 guo123,11,WPA/WPA2 AES,-34,cc:08:fb:eb:f1:28

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	5 super_5G,157,WPA/WPA2 AES,-38,54:75:95:4f:74:60 6 aiot@xuhongv,3,WPA/WPA2 Mixed,-41,d8:c8:e9:05:c4:d8 7 MR4519,1,WPA/WPA2 AES,-43,94:d9:b3:20:3f:7f 8 HAP_D96015182,11,WPA2 AES,-44,ec:9c:32:2e:e6:13 9 aiot@xuhongv_5G,36,WPA/WPA2 Mixed,-44,d8:c8:e9:05:c4:e0 10 Aithinker-Visitor1,11,WPA/WPA2 AES,-45,6c:e8:73:aa:2b:e0 11 RAK7258_1A77,6,Open,-46,ac:1f:09:05:1a:77 12 FAE@Seahi,6,WPA/WPA2 AES,-46,b8:f8:83:0d:9e:2a 13 AIOT@FAE,1,WPA/WPA2 Mixed,-47,9c:9d:7e:59:3e:83 14 zifeng,6,WPA/WPA2 Mixed,-48,ec:41:18:4f:fe:d5 15 B&T,1,WPA/WPA2 Mixed,-50,f8:8c:21:b4:4a:38 16 123456789,11,WPA2 AES,-50,2a:3a:4d:88:7e:51 17 AXK,11,WPA/WPA2 Mixed,-50,80:8f:1d:b5:ab:b1 18 xiaomi,11,WPA/WPA2 Mixed,-56,28:6c:07:3c:49:0d 19 MR4519_5G,149,WPA/WPA2 AES,-56,94:d9:b3:20:3f:81 20 B&T,48,WPA/WPA2 Mixed,-58,f8:8c:21:b4:4a:39 21 ChinaNet-HHZm,2,WPA/WPA2 AES,-59,48:a0:f8:46:b2:bd 22 aiDM_LB02K_E7DD,6,Open,-60,3c:71:bf:18:e7:dd 23 MEETING,149,WPA/WPA2 Mixed,-62,ee:26:ca:94:c5:e8 24 Aithinker-Visitor3,6,WPA/WPA2 Mixed,-63,bc:d1:77:4a:b1:56 25 xiaomi,157,WPA/WPA2 Mixed,-64,28:6c:07:3c:49:0e 26 PADS 9.5,13,WPA/WPA2 AES,-65,38:3e:5b:0d:b3:5c 27 PADS 9.5,56,WPA/WPA2 AES,-66,3a:3e:5b:8d:b3:5c 28 ChinaNet-4tcm,1,WPA/WPA2 Mixed,-67,f0:92:b4:84:d2:a1 29 LIU5,153,WPA/WPA2 Mixed,-68,00:90:4c:32:64:d2 30 ChinaNet-JuME,11,WPA/WPA2 AES,-69,6c:38:45:75:66:5d 31 ChinaNet-uL5X,1,WPA/WPA2 Mixed,-71,ca:50:e9:8b:5a:0c OK #
Example	
Description information in HELP	
response	Scan WIFI list
AT+WSCAN=[<ssid>,<mac>,<channel>,<rssi>]	
describe	WIFI scan with filter parameters
parameter	illustrate: 1, empty means skipping the parameter. 2. Can be used in combination with AT+WSCANOPT. ssid: scan the specified SSID mac: scan the specified mac address

	channel: scan the specified channel number rssi: filter out APs whose signal strength is lower than the rssi parameter value, unit: dBm, default value: -100, range: [-100,40]
respo nse	+WSCAN:index SSID,CH,SECURITY,RSSI,BSSID <index> <SSID>,<CH>,<SECURITY>,<RSSI>,<BSSID> ...
Exam ple	AT+WSCAN=AXK +WSCAN:index,SSID,CH,SECURITY,RSSI,BSSID 1,AXK,149,WPA/WPA2 Mixed,-50,f8:8c:21:b4:40:22 2,AXK,48,WPA/WPA2 Mixed,-57,f8:8c:21:b4:4a:39 3,AXK,161,WPA/WPA2 Mixed,-75,f8:8c:21:b4:3f:62 4,AXK,157,WPA/WPA2 Mixed,-84,f8:8c:21:b4:2d:89 OK

4.1.4 AT+WSCANACTIVE scans the specified SSID in active mode

AT+ WSCANACTIVE =<ssid>	
descr ibe	Active mode scans the specified SSID
para mete r	ssid: SSID to be scanned
respo nse	+WSCANACTIVE: SSID,CH,SECURITY,RSSI,BSSID ... OK Response meaning SSID : The scanned SSID CH : Scan the specified channel number SECURITY: Encryption method RSSI : Signal strength BSSID: AP's MAC
Exam ple	AT+WSCANACTIVE=test +WSCANACTIVE:test,44,WPA/WPA2 TKIP,-31, 11 : 22 : 33 : 44 : 55 : 66 OK
Rema rk	Compatible models BW16

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4.1.5 AT+WSDHCP queries or sets DHCP parameters in STA mode

AT+WSDHCP?	
describe	Query DHCP settings in STA mode (information will be saved to flash)
response	+WSDHCP:<MODE>[,<IP>,<MASK>,<GATEWAY>] OK
Example	#AT+WSDHCP? +WSDHCP:0,192.168.31.199,255.255.255.0,192.168.31.1
AT+WSDHCP=<MODE>[,<IP>,<MASK>,<GATEWAY>]	
describe	Set DHCP parameters in STA mode
parameter	MODE: IP acquisition mode 0: Disable DHCP and use static IP 1: Use DHCP to obtain an IP address IP: IP address of the module, which needs to be set for static IP MASK: Subnet mask, required for static IP GATEWAY: Gateway, needs to be set when static IP
response	OK
Example	//Set static IP #AT+WSDHCP=0,192.168.31.199,255.255.255.0,192.168.31.1 OK
Description information in HELP	
response	Query and set STA DHCP

4.1.6 AT+WJAP connects to AP

AT+WJAP? (It is recommended to use AT+STAINFO query. If there is a comma in the SSID or password, it will cause parsing errors)	
describe	Query wifi network information (this is the current status obtained from the hardware, not directly reading our setting value)
response	+WJAP: <status>, <ssid>, <pwd>, <bssid> ,<Security>,<MAC>,<ch>,<IP>,<gateway> OK

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	Parameter Introduction status: connection status 0: Not connected to Wi-Fi (initial state or STA mode is not enabled) 1: Connecting to Wi-Fi or reconnecting to Wi-Fi 2: Connected to wifi, but no IP is obtained 3: Connect to wifi and obtain IP 4: Wi-Fi connection failed (exceeded the number of reconnections and still failed to connect) s sid , bssid , pwd: refer to the setting parameter description Security: Encryption method Open //Open network WEP WPA-TKIP WPA AES WPA Mixed WPA2 AES WPA2 TKIP WPA2 Mixed WPA/WPA2 TKIP WPA/WPA2 AES WPA/WPA2 Mixed WPA2 Enterprise WPA/WPA2 Enterprise WPA3-ASE AES UnknownType //Unknown type MAC: Wi-Fi module MAC address (lowercase characters, separated by colons) ch: connection channel IP: module IP (dot notation) gateway: Gateway address (dot-part format)
Example	
AT+WJAP=<ssid>,<pwd>[,<bssid>]	
describe	Connect to a specific AP
parameter	ssid: SSID of the connected AP pwd: connection password bssid: mac address of the connected AP, in lowercase hexadecimal, separated by colons (when there are multiple SSIDs with the same name, bssid can be used to distinguish them, eg: 94:c9:60:12:34:56)
response	OK
Example	# AT+WJAP=super_2G,123456798 OK
Description information in HELP	

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respo nse	Join AP

4.1.7 AT+STAINFO? Query wifi connection information

AT+STAINFO?	
descr ibe	Query wifi network information (this is the current status obtained from the hardware, not directly reading our setting value)
respo nse	+ STAINFO : <status> SSID: <ssid> Password:<pwd> <bssid> ,<Security>,<MAC>,<ch>,<IP>,<gateway> OK Parameter Introduction status: connection status 0: Not connected to Wi-Fi (initial state or STA mode is not enabled) 1: Connecting to Wi-Fi or reconnecting to Wi-Fi 2: Connected to wifi, but no IP is obtained 3: Connect to wifi and obtain IP 4: Wi-Fi connection failed (exceeded the number of reconnections and still failed to connect) ssid: SSID of the connected AP pwd: connection password bssid: mac address of the connected AP, in lowercase hexadecimal, separated by colons (when there are multiple SSIDs with the same name, bssid can be used to distinguish them, eg: 94:c9:60:12:34:56) Security: Encryption method Open //Open network WEP WPA-TKIP WPA AES WPA Mixed WPA2 AES WPA2 TKIP WPA2 Mixed WPA/WPA2 TKIP WPA/WPA2 AES WPA/WPA2 Mixed WPA2 Enterprise WPA/WPA2 Enterprise WPA3-ASE AES UnknownType //Unknown type MAC: Wi-Fi module MAC address (lowercase characters, separated by colons)

	ch: connection channel IP: module IP (dot notation) gateway: Gateway address (dot-part format)
Example	AT+STAINFO? +STAINFO:3 SSID:test Password:123456789 e1:f9:8a:aa:fc:4f,WPA/WPA2 TKIP,b2:e3:41:c2:b3:42,5,192.168.3.125,192.168.3.1 OK
response	Query Sta info

4.1.8 AT+WJEAP connects to enterprise authentication hotspot

AT+WJEAP=<type>,<ssid>,<identity>,<pwd>	
describe	Connect to a specific AP
parameter	type: EAP encryption method 1: PEAP 2: TLS 3: TTLS 4: FAST ssid: SSID of the connected AP identity: login username pwd: user password
response	OK
Example	AT+WJEAP=1,EAP TEST,test,test +EVENT:WIFI_CONNECT +EVENT:WIFI_GOT_IP OK
Description information in HELP	
response	Join EAP
Adapted platform	BW16: Adaptive encryption method 1: PEAP, 2: TLS, 3: TTLS, 4: FAST BW20: Adaptive encryption method 1: PEAP, 2: TLS, 3: TTLS, 4: FAST

4.1.9 AT+WAUTOCONN Automatically reconnect to wifi after power on

AT+WAUTOCONN?	
describe	Check whether the power-on automatic connection function is enabled
response	+WAUTOCONN:<status> //0: do not connect automatically, 1: connect automatically OK
Example	
AT+WAUTOCONN=<status>[,<ssid>,<pwd>,[<bssid>]]	
describe	Enable/disable the power-on auto-connect function
parameter	status 0: Disable 1: Enable ssid: SSID of the connected AP pwd: connection password bssid: mac address of the connected AP, in lowercase hexadecimal, separated by colons (when there are multiple SSIDs with the same name, bssid can be used to distinguish them, eg: 94:c9:60:12:34:56) Note: The wifi specified by this command does not check the connection. Even if the information is wrong, it will be automatically saved as automatic connection on power-on. It is generally recommended to use AT+WJAP to successfully connect, verify the connection information is correct, and then use AT+WAUTOCONN=1 to set automatic connection instead of directly saving the connection information.
response	OK

Example	//Configure the last successfully connected wifi information to automatically connect on power on
	AT+WAUTOCONN=1
	//Save SSID and password for automatic reconnection on power on
	AT+WAUTOCONN=1,test01,12345678
	//Save SSID and password for automatic reconnection on power on
	AT+WAUTOCONN=1,test01,12345678,94:c9:60:12:34:56

AT+WAUTOCONN=?	
response	Set WIFI auto connect

4.1.10 AT+WAPDHCP query or set DHCP parameters in AP mode

AT+WAPDHCP?	
describe	Query the DHCP settings of AP mode (the information will be saved to flash)
response	+WAPDHCP:<MODE>[,<start_ip>,<end_ip>,<GATEWAY>] OK
Example	
AT+WAPDHCP=<MODE>,<start_ip>,<end_ip>,<GATEWAY>	
describe	Set DHCP parameters in AP mode
parameter	MODE: 0: Disable DHCP 1: Enable DHCP start_ip: DHCP starting address. Eg: 192.168.43.100 end_ip: DHCP end address. Eg: 192.168.43.200 GATEWAY: Gateway IP (the module IP is the gateway IP when using DHCP), which needs to be set when DHCP is enabled. Eg: 192.168.43.1
response	OK
Example	
AT+WAPDHCP=?	
response	Query and set AP DHCP OK
Example	

4.1.11 AT+WAP queries or sets AP mode WiFi parameters

AT+WAP?	
describe	Query AP parameter information (this is the current status obtained from the hardware, not directly reading our setting value)
response	+WAP:<ssid>,<pwd> ,<security> ,<channel>,<max conn>,<ssid hidden> ,<mac>,<IP>,<Gateway> Client Num: <client number> //Number of client connections (the query result will be accurate only after AP is turned on, otherwise the query may be wrong) Client <id> MAC:<xx:xx:xx:xx:xx:xx> //Client ID and MAC address (lowercase separated by

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	colon) (The query result will be accurate only after AP is turned on, otherwise the query may be wrong) OK //Response description Security: Encryption method, refer to AT+WJAP command Mac: The MAC address of the network card that the module uses to open the AP hotspot IP: module's own IP (in dot notation) Gateway: Gateway IP (dot-notation format)
Example	
AT+WAP=<ssid>,<pwd>,<channel>,<max conn>,<ssid hidden>	
describe	Set AP parameters
parameter	ssid : Wi-Fi name pwd: wifi password, an empty string means no password channel: channel max conn: Maximum number of connections (default is 3 if not specified) ssid hidden: whether to hide the SSID , 0 is not hidden, 1 is hidden
response	OK
Example	
Description information in HELP	
response	Query and set AP config

4.1.12 AT+WAPINFO query or set AP information

AT+WAPINFO?	
describe	Query AP parameter information (this is the current status obtained from the hardware, not directly reading our setting value)
response	+WAP:<ssid>,<pwd> ,<security> ,<channel>,<max conn>,<ssid hidden> ,<mac>,<IP>,<Gateway> Client Num: <client number> Client <id> MAC:<xx:xx:xx:xx:xx:xx>,IP:<xxx.xxx.xxx.xxx> OK //Response description Security: Encryption method, refer to AT+WJAP command Mac: The MAC address of the network card that the module uses to open the AP hotspot IP: module's own IP (dot notation) Gateway: Gateway IP (dot-notation format) client number: the number of client connections (the query result will be accurate only after the AP is turned on, otherwise the query may be wrong)

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	Id: Client ID MAC: MAC address (lowercase letters separated by colons) (This query result will be accurate only after the AP is turned on, otherwise the query may be wrong) IP: Client IP, this is only valid in DHCP mode, not in static IP
Example	
Description information in HELP	
response	Query AP info
Notes	This directive is added to the middleware repository

4.1.13 AT+PING: Ping operation

AT+PING=<addr> [,<count>]	
describe	Ping
parameter	addr : IP or domain name Count: ping times, the default is 3 times, loop means pinging does not return (the only option is to restart the module)

response	//success
	+PING: <time>
	OK
	//fail
	+PING:TIMEOUT
	ERROR
	
	//Return value description
	time: average delay

Example	
Description information in HELP	
response	Ping test

4.1.14 AT+CIPSTAMAC_DEF query and modify the wifi station MAC address

AT+CIPSTAMAC_DEF

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describe	Same as AT+CIPSTAMAC_DEF?
AT+CIPSTAMAC_DEF?	
describe	Query the MAC address of the WiFi station
response	+CIPSTAMAC_DEF:<MAC> //MAC format 84f3ebdd9e63 (lowercase without separator) OK
Example	
AT+CIPSTAMAC_DEF=<MAC>	
describe	Set the MAC address of the wifi station (not supported yet)
parameter	MAC: The MAC address to be set. The MAC format is 84f3ebdd9e63 (lowercase letters without separators).
response	OK
Example	
Description information in HELP	
response	Query and set WIFI station MAC

4.1.15 AT+WCOUNTRY query or set the WiFi country code

AT+WCOUNTRY?	
describe	Query the configured country code
response	+ WCOUNTRY :< country_code > OK
Example	
AT+ WCOUNTRY =< country_code >	
describe	Set country code (effective after restart)
parameter	country_code: country code 0 : // Do not specify a country code, use the SDK default configuration 1: JP Japan 2: American Samoa 3: CA Canada 4: US 5: CN China 6: HK Hong Kong, China

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	7 : TW Taiwan 8: MO Macau , China 9: IL Israel 10: Singapore 11: KR Korea 12: TR Turkey 13: AU Australia 14: ZA South Africa 15: BR Brazil
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set WIFI country code

4.1.16 AT+WCONFIG turns on/off mobile phone network configuration

AT+WCONFIG?	
descr ibe	Query the network status
respo nse	+ WCONFIG :< status > OK
Exam ple	
AT+ WCONFIG =< status > [,<name>]	
descr ibe	Set the mobile phone network configuration status
para mete r	status: 0 : Disable mobile phone network configuration task 1: Enable WiFi network configuration once (network configuration is successful/network configuration timeout will automatically return to the closed state) 2: Enable Bluetooth network configuration once (network configuration is successful/network configuration timeout will automatically return to the closed state) 3: Enable AirKiss network configuration 9: Enable blufi network configuration 10: WPS network configuration name: This is used to customize the network broadcast name. Currently only the esp BluFi protocol supports this parameter.

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	Network distribution protocol middleware 1: smartconfig 2: Blufi 3: AirKiss 4: Web network configuration Non-middleware BW16 1: Realtek Simple Config 2: Realtek WiFi Config 3: WeChat AirKiss network configuration 9: Blufi network configuration 10: WPS network configuration Ai-WB2 1: WiFi network configuration (esp touch) 2: Bluetooth network configuration (esp BluFi) 3: WeChat AirKiss network configuration 9: Blufi network configuration
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set WIFI config

4.1.17 AT+WSCANOPT filters WIFI scan display information

AT+ WSCANOPT ?	
descr ibe	Query the set WIFI scan display information
respo nse	+WSCANOPT:<option> OK
Exam ple	AT+WSCANOPT? +WSCANOPT:0xff OK
AT+WSCANOPT=<option>	
descr ibe	Set WIFI scan display information
para mete	option : Whether the WIFI scan result displays the following parameters, default value: 0xFF, if a bit is set to 1, the corresponding parameter will be displayed, if it is set to 0, the

r	corresponding parameter will not be displayed. There are two ways to input option (hexadecimal 0xXY format and decimal format). • bit 0: whether to display <ssid> • bit 1: whether to display <channel> • bit 2: whether to display <security> • bit 3: whether to display <rssi> • bit 4: whether to display <MAC>
respo nse	+WSCANOPT:<option> OK
Exam ple	AT+WSCANOPT=15 +WSCANOPT:0x0f OK AT+WSCANOPT=0x0f +WSCANOPT:0x0f OK

4.1.18 AT+WRSSI query wifi connection signal strength

AT+ WRSSI or AT+ WRSSI?	
descr ibe	Query Wi-Fi connection signal strength
respo nse	+WRSSI :<rssi> OK
Exam ple	AT+WRSSI +WSCANOPT:-50 OK

4.1.19 AT+BLUFISEND sends Bluetooth network configuration custom data

AT+BLUFISEND = <length>	
descr ibe	Send Bluetooth network configuration custom data
respo	> //After receiving this character, start entering the data to be sent

nse	OK // When the specified byte data is received, the data will be sent (it can be any data) , and OK will be displayed when the sending is completed
Example	AT+BLUFISEND=5 > hello OK

4.2 TCP-IP Instructions

4.2.1 +EVENT:SocketDown sends data through the socket

+EVENT:SocketDown,<ConID>,<length>[,<date>]	
describe	This is URC active data, indicating that the data sent by SOCKET has been received.
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that the TCPServer connection cannot send or receive data, and can only send or receive data through the seed created after the client connects to the TCPServer; the UDP Client can only send data, not receive data) length: received data length date: If the socket is in active reading mode, the received data will be printed directly. In passive reading, no data will be printed. Active reading is required to obtain data.
Example	

4.2.2 +EVENT:SocketSeed When TCPServer receives a new connection, it will print this data

+ EVENT:Socket Seed ,<seed ConID> , <server ConID>	
describe	This is URC active data. When the TCP server connects to a new client, it will receive this message.
parameter	seed ConID: ConID of the newly connected client connection) Server ConID: This refers to the server ConID corresponding to the seed ConID
Example	#+Seed:2,

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4.2.3 AT+SOCKET creates a socket connection

AT+SOCKET	
describe	Same as AT+SOCKET?
AT+SOCKET?	
describe	Query the created socket link information
response	<ConID> ,<type>, <status>, < remote host >,<remote port>,<local port> ,<server ConID > OK //Status details Type : 1: UDP Server 2: UDPClient 3: TCP Server 4: TCPClient 5: TCPSeed (TCPServer created locally. When other users connect to it using tcpclient, a TCPSeed will be generated) 6: SSLServer 7: SSLClient 8: SSLSeed (an SSLSeed is created when a client connects to the module's SSL server) Status: 0: Not connected/disconnected 1: Connecting 3: Connection successful 4: Connection failed 127: Connection being deleted remote host: The remote address of the client mode connection. The server mode is not set yet. remote port : The remote port for client mode connection. The server mode is not set yet, and the default value -1 is displayed. local port : server mode displays the local listening port. Client mode is not set yet, and the default value -1 is displayed. server ConID: When type is TCPSeed, this indicates which TCP server the connection was created from. For other types, the default value is -1
Example	
AT+SOCKET=<type>[,<remote host>],<port>[,<keep alive> ,<conID>]	
describe	Create a socket connection
parameter	type: socket type 1: UDPServer

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r	2: UDPClient 3: TCPServer 4: TCPClient 5: TCPSeed (placeholder type, unavailable. This type is generated when the client connects to the module TCP server and cannot be created actively) 6: SSLServer 7: SSLClient 8: SSLSeed (placeholder type, unavailable, this type is generated when the client connects to the module SSL server and cannot be created actively) remote host: When type is client, this parameter is mandatory, indicating the domain name or IP of the server to be connected. It does not need to be set when it is server (skip directly, eg: AT+SOCKET=3,10086) port: When type is client, it indicates the port number of the server to connect to; when type is server, it indicates the port number that the local server needs to listen to. keep alive: TCP keep-alive interval, 0 means disabled, 1~7200 means detection interval, unit: seconds (reserved function, not implemented yet) conID : specifies the Con ID of the new connection . The value is u32 type data.
respo nse	connect success ConID=<ConID> OK

Exam ple	//Connect to wifi
	AT+WJAP=specter,12345678909
	
	+EVENT:WIFI_CONNECT
	
	OK
	
	+EVENT:WIFI_GOT_IP
	//Create UDPServer
	AT+SOCKET=1,10086
	
	connect success ConID=1
	OK
	//Create UDPClient
	AT+SOCKET=2,192.168.3.10,10086
	connect success ConID=1
	OK
	//Use the domain name to create a tcp client connection
	//Use IP to create a tcp client connection

Description information in HELP	
respo nse	Create socket

4.2.4 AT+SOCKET2 creates a socket connection

AT+SOCKET2	
describe	Same as AT+SOCKET?
AT+SOCKET2?	
describe	Same as AT+SOCKET?
AT+SOCKET2=<type>,<remote host>,<remotePort>[,<localPort>,<keep alive> ,<conID>]	
describe	Create a socket connection
parameter	type: socket type 1: Placeholder 2: UDPClient 3: Placeholder 4: TCPClient 5: Placeholder 6: Placeholder 7: Placeholder 8: Placeholder remote host: the domain name or IP of the server to be connected remotePort: The port number of the remote server to connect to localPort: The local port number that needs to be bound. If no binding is required, set it to -1 (randomly bind the local port number) keep alive: TCP keep-alive interval, 0 means disable, 1~7200 means detection interval, unit: second (this parameter is invalid in UDP mode) conID : specifies the Con ID of the new connection . The value is u32 type data.
response	connect success ConID=<ConID> OK
Example	
Description information in HELP	
response	Create socket

4.2.5 AT+SOCKETSEND sends data through socket (long data mode)

AT+SOCKETSEND=<ConID>,<length>	
descr	Send data to the specified connection. When the command is executed, a ">" symbol will

ibe	appear in the second line. After this symbol appears, you can start entering data (you can enter any data, regardless of the data content). When length bytes of data are received, it will stop receiving and start sending (if the length exceeds the maximum length of a single packet, the data will be divided into packets. By default, the data will be divided into packets when it exceeds 1024 bytes) Features: This mode can send data of any length (if it is too long, it will be divided into packets), and can receive any characters
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that TCPServer connections cannot be sent, and data can only be sent to the seed created after the client connects to TCPServer; the UDP server must first receive client data before it can send, and the sending object is the object that receives data for the first time) length: the length of the data to be sent After the command is executed, a " > " will be displayed. After receiving this symbol, you can start to enter the data to be sent (you can enter any HEX data, not limited to strings). After receiving length data, it will start to send data.
response	OK
Example	AT+SOCKETSEND=1,3 >123 OK
Description information in HELP	
response	Socket send data

4.2.6 AT+SOCKETSENDLINE sends data through socket (single line mode)

AT+SOCKETSENDLINE=<ConID>,<length>,<data>	
describe	Send data to the specified connection Features: This mode is relatively simple to use, but the length is limited (the maximum length of an AT command is limited). If there are special characters, the entire parameter needs to be enclosed in double quotes. If there are double quotes in the parameter, escape characters need to be added.
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that TCPServer connections cannot be sent, and data can only be sent to the seed created after the client connects to TCPServer; the UDP server must first receive client data before it can send, and the sending object is the object that receives data for the first time) length: the length of the data to be sent data: data to be sent
respo	OK

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nse	

Example	//Connect to wifi
	AT+WJAP=specter,12345678909
	
	+EVENT:WIFI_CONNECT
	
	OK
	
	+EVENT:WIFI_GOT_IP
	//Create UDPClient
	AT+SOCKET=2,192.168.3.10,10086
	connect success ConID=1
	OK
	//Send data to ConID1
	AT+SOCKETSENDLINE=1,5,12345
	
	OK

Description information in HELP	
response	Socket sends data in one line
Example	
Notes	The length of data sent in single-line mode is limited, and the total length of the instruction cannot exceed the total length limit of one instruction. The total length of a command is 1023 by default. When ConID is a single digit, the total length of data that can be sent is 1023-26 command format data = 997 bytes

4.2.7 AT+SOCKETSENDHEX sends HEX data through socket single-line mode

AT+SOCKETSENDHEX=<ConID>,<length>,<data>	
describe	Send data to the specified connection
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that TCPServer connections cannot be sent, and data can only be sent to the seed created after the client connects to TCPServer; the UDP server must first receive client data before it can send, and the sending object is the object that receives data for the first time) length: the length of the data to be sent data: data to be sent (the data is hex data in string form)
response	OK

Example	
Description information in HELP	
response	Socket send data in one line by hex
Example	AT+WJAP=test,12345678 +EVENT:WIFI_CONNECT +EVENT:WIFI_GOT_IP OK AT+SOCKET=4,192.168.3.10,10086 connect success ConID=1 OK //Send 2 bytes of hex data 0x31 0x32 to conid 1 AT+SOCKETSENDHEX=1,2,3132 OK
Notes	The length of data sent in single-line mode is limited, and the total length of the instruction cannot exceed the total length limit of one instruction. The total length of a command is 1023 by default. When ConID is a single digit, the total length of data that can be sent is 1023-26 instruction format data = 997 bytes. Two bytes of hex string represent one hex data, so the maximum length of data that can be sent is 997/2=498.

4.2.8 AT+SOCKETREAD reads data from the socket

AT+SOCKETREAD=<ConID>	
describe	Read data from the specified connection Note: When reading, it is read by package, one package of data is read at a time
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that the TCPServer connection cannot send or receive data, and can only send or receive data to the seed created after the client connects to the TCPServer; the UDP Client needs to send data once before the server obtains the local port before it can send data to the UDP client)
response	+SOCKETREAD:<ConID>,<len>,<data> OK
Example	
Description information in HELP	
respo	Socket read data

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nse	

4.2.9 AT+SOCKETDEL deletes the specified socket connection

AT+SOCKETDEL=<ConID>	
describe	Delete the specified socket connection Note: Since the seed is initiated by the client, the server cannot reconnect, so you need to manually delete the connection after the seed is disconnected (the received data will also be cleared after deleting the connection)
parameter	ConID: The connection ID to be deleted
response	OK
Example	#AT+SOCKETDEL=9 OK
Description information in HELP	
response	Delete socket

4.2.10 AT+SOCKETRECVCFG sets the socket receiving mode

AT+SOCKETRECVCFG=<mode>	
describe	Set the print mode of the socket receiving data
parameter	mode: 0: Passive mode (default). In this mode, after receiving data, only the prompt +EVENT:SocketDown,<ConID>,<length> is printed without printing the data content. 1: Active mode. In this mode, the received socket data is directly printed in the following format +EVENT:SocketDown,<ConID>,<length>,<date>
response	OK
Example	
Description information in HELP	
response	Set socket recive mode
Notes	The data that can be cached in passive mode is stored in RAM in the form of a linked list. If it is not read, it will occupy the memory. When the memory is insufficient, the data cannot be cached anymore and the newly received data will be discarded.

4.2.11 AT+SOCKETTT enters socket transparent transmission mode

AT+SOCKETTT	
describe	Enter SOCKET transparent mode Note: The default transparent transmission object of the UDP server is the client client of the first communication
response	> // Receiving this means that transparent transmission is turned on and data can be sent and received OK // Enter three plus signs in succession to exit transparent transmission. When exiting transparent transmission, print \r\nOK\r\n
Remark	To enter transparent mode, one of the following conditions must be met: Currently there is only one client connection (through client transparent transmission) There is only one server and one seed connection (the seed generated by the client connecting to the module server can be transparently transmitted. This mode must be entered manually and cannot be entered automatically) Only one UDPClient There is only one UDPServer (note that it is not recommended to use UDP server in transparent transmission mode. The default transparent transmission object is the first connected client. If other connections initiate communication with the module, subsequent transparent transmission objects may fail.) After entering +++, you can exit the transparent transmission mode and enter the AT command mode
Example	#AT+WJAP= test ,123456789 //Connect to wifi OK #AT+SOCKET=4,192.168.31.98,18 //Create tcp client connect success ConID=1 OK #AT+SOCKETTT //Enter transparent transmission mode >send to module //The data sent at this time will be transparently transmitted to the target, and the data sent by the target will be transparently transmitted to the local OK // Exit transparent transmission mode after entering three consecutive plus signs #
AT+SOCKETTT=UDPServerTTMode	
describe	Set the UDP server transparent mode and enter the transparent mode. The current setting mode is only valid when there is only one UDP server.
parameter	UDPServerTTMode: Set the UDP server transparent transmission mode 0: The target of transparent transmission is fixed to the client of the first communication, and the communication target will not be changed if there are other clients communicating later.

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	2: The transparent transmission object will be dynamically modified to the client of the last communication
response	> // Receiving this means that transparent transmission is enabled and data can be sent and received OK // Enter three plus signs in succession to exit transparent transmission. When exiting transparent transmission, print \r\nOK\r\n
Example	
Description information in HELP	
describe	Start socket transparent transmission

4.2.12 AT+SOCKETAUTOTT automatically enters socket transparent transmission configuration

AT+SOCKETAUTOTT	
describe	Same as AT+SOCKETAUTOTT?
AT+SOCKETAUTOTT?	
describe	Query the current automatic transparent transmission configuration information
response	+SOCKETAUTOTT: <type> , < remote host >,<remote port> OK //Status details Type : 0: Disable automatic entry into transparent mode 1: Automatically enter UDPServer transparent transmission mode 2: Automatically enter UDPClient transparent transmission mode 3: Placeholder type, unavailable 4: Automatically enter TCPClient transparent transmission mode 5: Placeholder type, unavailable 6: Placeholder type, unavailable 7: Placeholder type, unavailable 8: Placeholder type, unavailable remote host: The remote address of the client mode connection, which is not set for server mode. remote port : The remote port for client mode connection. The server mode is not set yet, and the default value -1 is displayed. local port : server mode displays the local listening port. Client mode is not set yet, and the default value -1 is displayed. server ConID: When type is TCPSeed, this indicates which TCP server the connection was created from. For other types, the default value is -1
Exam	

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ple	
AT+SOCKETAUTOTT=<type>[,<remote host>],<port>	
describe	Automatically enter transparent mode after creating the corresponding socket connection After this command is set, it needs to be used with AT+WAUTOCONN. After the configuration is completed, reset to take effect Automatically connect to wifi after power on (AT+WAUTOCONN configuration) After the Wifi connection is successful, a socket connection is automatically created. After the socket is successfully created, it automatically enters the transparent transmission mode (this command sets it)
parameter	type: socket type 0: Disable automatic entry into transparent mode 1: Automatically enter UDPServer transparent transmission mode 2: Automatically enter UDPClient transparent transmission mode 3: Placeholder type, unavailable 4: Automatically enter TCPClient transparent transmission mode 5: Placeholder type, unavailable 6: Placeholder type, unavailable 7: Placeholder type, unavailable 8: Placeholder type, unavailable remote host: When type is client, this parameter is mandatory, indicating the domain name or IP of the server to be connected. It does not need to be set when it is server (skip this parameter, eg: AT+SOCKETAUTOTT=1,10086) port: When type is client, it indicates the port number of the server to connect to; when type is server, it indicates the port number that the local server needs to listen to.
response	OK
Example	AT+SOCKETAUTOTT=4,www.baidu.com,80
Description information in HELP	
response	Set socket auto transparent transmission

4.2.13 AT+SSLCRET query and set SSL certificate

AT+SSLCRET=<type>[,<length>]	
describe	Query and set SSL certificate When there is only one parameter, it means to query the content of the currently set certificate. When there are two parameters, it means that the certificate needs to be set. When the certificate is empty, the client does not load the certificate and obtains it automatically
parameter	type: the certificate type of the operation 1: CA root certificate

r	2: Client public key 3: Client private key length: certificate length. When this parameter is omitted, it means querying the corresponding certificate. When this parameter is changed, it means the length of the certificate to be set.
respo nse	Query Mode +SSLCRET:<type>,<length>,<certificate content> OK Setting Mode > //Receiving this symbol means you can start writing the certificate OK
Exam ple	Setting up certificates AT+SSLCRET=1,10 >1234567890 OK Check certificate AT+SSLCRET=1 +SSLCRET:1,10,1234567890 OK
Description information in HELP	
respo nse	Query and set SSL Cret

4.2.14 AT+WDOMAIN domain name resolution

AT+WDOMAIN=<server name>	
descr ibe	DNS resolves domain name
respo nse	+WDOMAIN:<IP> OK
Exam ple	AT+WDOMAIN=www.baidu.com +WDOMAIN:14.119.104.189 OK
Description information in HELP	
respo nse	Input host name to get IP

4.2.15 AT+WDNS sets the DNS server

AT+WDNS?	
descr	Query DNS resolution server

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ibe	
respo nse	+WDNS:<DNS IP1>,<DNS IP2> OK
Exam ple	AT+WDNS? +WDNS:192.168.3.1,0.0.0.0 OK
AT+WDNS=<"DNS IP1">[,<"DNS IP2">]	
descr ibe	Set up DNS domain name resolution server
para mete r	DNS IP1/DNS IP2: Domain name resolution server
respo nse	+WDNS:<DNS IP1>[,DNS IP2] OK
Exam ple	AT+WDNS=114.114.114.114 +WDNS:114.114.114.114 OK
Description information in HELP	
respo nse	Query and set DNS Server

4.3 MQTT Commands

4.3.1 AT+MQTT MQTT configuration and connection

AT+ MQTT	
descr ibe	Connecting MQTT Note: You need to set the MQTT parameters before executing the connection. If the current MQTT task has been started, it will reconnect if it is executed again (if you change the server, it is recommended to delete all subscriptions and then reconnect)
respo nse	OK Note: This is an asynchronous connection. The OK display only means that the MQTT task has started. The connection status needs to be queried via AT+MQTT? or by waiting for the receipt of URC data "+EVENT:MQTT_CONNECT"
Exam ple	AT+MQTT=1,192.168.202.10 //Set domain name OK #AT+MQTT=2,1883 //Set the port number OK

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	#AT+MQTT=3,1 //Set the connection mode OK #AT+MQTT=4,client_id //Set user ID OK #AT+MQTT=5,admin //Set MQTT username OK #AT+MQTT=6,public //Set the MQTT password OK #AT+MQTT? //Query MQTT connection and configuration +MQTT:0,192.168.202.10,1883,1,client_id,admin,public OK #AT+MQTT //Connect to MQTT OK # +EVENT:MQTT_CONNECT //MQTT connection successful
AT+MQTT?	
describe	Query MQTT parameters
response	+MQTT:<MQTT_status> , <H ost_name > , <P ort > , <scheme>,<client_id>,<username>,<password>,<LWT_topic>,<LWT_qos>,<LWT_Retained>,<LWTpayload> OK //Status description MQTT_status: MQTT connection status 0: Initial state 1: Connecting 2: Subscribing to messages 3: Connection successful Host_name : Server domain name Port : Server port number scheme: connection method 1: TCP connection 2: SSL connection client_id: MQTT user ID Username: MQTT username password: MQTT password LWT_topic: Will topic LWT_qos: Will QOS

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	LWT_Retained: Will retained LWTpayload: Will message content
Example	#AT+MQTT? //Query MQTT connection and configuration +MQTT:0,192.168.202.10,1883,1,client_id,admin,public,LWTTOPIC,0,1,123456 OK
AT+MQTT=<key>,<data>	
describe	Setting MQTT parameters Note: Different keys have different settings, so you need to perform multiple settings to set all the parameters.
parameter	key： 1: Set the domain name or IP to connect to 2: Set the server port number 3: Set the connection mode (1: Use TCP connection; 2: Use SSL connection) 4: Set the client ID 5: Set the user name (maximum length 63 bytes) 6: Set password (maximum length 63 bytes) 7: Set the will message, the format is AT+MQTT=7,<LWT_topic>,<LWT_qos>,<LWT_Retained>,<LWTpayload> LWT_topic: Will topic (no will is required, set this to "") LWT_qos: Will QOS (0/1/2) LWT_Retained： Will retained(0/1) LWTpayload: Will message content data: the value to be set
response	OK
Example	AT+MQTT=1,192.168.202.10 //Set domain name OK #AT+MQTT=2,1883 //Set the port number OK #AT+MQTT=3,1 //Set the connection mode OK #AT+MQTT=4,client_id //Set user ID OK #AT+MQTT=5,admin //Set MQTT username OK #AT+MQTT=6,public //Set the MQTT password OK

	#AT+MQTT=7,"LWTTOPIC",0,1,"123456" //Set the will topic LWTTOPIC, qos0, enable retained, and the load message is 123456; Note: If you do not want a will message, set it to AT+MQTT=7,"",0,0,"" OK
Description information in HELP	
respo nse	Config and connect MQTT
Note s	The default MQTT version is MQTT3.1

4.3.2 AT+MQTTVER Query and set the MQTT version

AT+MQTTVER?	
descr ibe	Query the current MQTT version
respo nse	+MQTTVER:<version> OK
Exam ple	AT+MQTTVER? +MQTTVER:3 +OK
AT+MQTTVER=<version>	
descr ibe	Setting the MQTT version
para mete r	version: 3: MQTT 3.1 4: MQTT3.1.1
respo nse	OK
Exam ple	AT+MQTTVER=4 OK
Description information in HELP	
respo nse	Query and set MQTT version

4.3.3 AT+MQTTBUF Query and set the MQTT send and receive buf size

AT+MQTTBUF?

describe	Query the MQTT buf size (MQTT needs to be restarted to take effect after modification)
response	+MQTTBUF:<sendBufSize>,<reciveBufSize> OK
Example	AT+MQTTBUF? +MQTTBUF:2048,2048 +OK
AT+MQTTBUF=<sendBufSize>,<reciveBufSize>	
describe	Set the MQTT send and receive buf size Notice: This parameter will take effect the next time you connect (if you are currently connected, you need to disconnect and reconnect before it takes effect) This command only sets the size of buf and does not take effect immediately. It will be allocated when the MQTT connection is executed later. Therefore, it should be set reasonably according to the memory. Otherwise, the MQTT task cannot be started due to insufficient memory even after the setting is successful.
parameter	sendBufSize: MQTT send buf size, in bytes reciveBufSize: MQTT receive buf size, in bytes
response	OK
Example	AT+MQTTBUF=1024,4096 OK
Description information in HELP	
response	Query and set MQTT buffer

4.3.4 AT+MQTTKEEPALIVE queries and sets the MQTT heartbeat interval

AT+MQTTKEEPALIVE?	
describe	Query the current MQTT heartbeat interval (MQTT needs to be restarted to take effect after modification)
response	+MQTTKEEPALIVE:<mqttKeepAliveInterval>,<mqttTcpKeepAliveInterval> OK
Example	AT+MQTTKEEPALIVE? +MQTTKEEPALIVE:60,10 +OK
AT+MQTTKEEPALIVE=<mqttKeepAliveInterval>,<mqttTcpKeepAliveInterval>	
describe	Set the MQTT heartbeat interval (MQTT needs to be restarted to take effect after modification)
para	mqttKeepAliveInterval: MQTT heartbeat interval, unit s

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meter	mqttTcpKeepAliveInterval: MQTT socket heartbeat interval, unit: s
response	OK
Example	AT+MQTTKEEPALIVE=120,5 OK
Description information in HELP	
response	Query and set MQTT keepalive

4.3.5 AT+MQTTCRET query and set MQTT SSL certificate

AT+MQTTCRET=<type>[,<length>]	
describe	Query and set MQTT SSL certificate Notice: 1. The modification is only saved in RAM and will become invalid after the module is restarted if it is not saved in flash. 2. After the modification, you need to restart MQTT to take effect
parameter	When there is only one parameter, it means to query the content of the currently set certificate. When there are two parameters, it means that the certificate needs to be set. If the certificate is empty, length needs to be set to 0. The client does not load the certificate and obtains it automatically. type: the certificate type of the operation 1: CA root certificate 2: Client public key 3: Client private key length: certificate length. When this parameter is omitted, it means querying the corresponding certificate. When this parameter is added, it means the length of the certificate to be set. A length of 0 means clearing the current certificate.
response	Query Mode +MQTTCRET:<type>,<length>,<certificate content> OK Setting Mode > //Receiving this symbol means you can start writing the certificate OK // OK will be returned after the input length is sufficient
Example	Check certificate AT+MQTTCRET=1 +MQTTCRET:1,1758,-----BEGIN CERTIFICATE----- ..... -----END CERTIFICATE----- OK Setting up certificates AT+MQTTCRET=1,1758

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	> //> can send data after it appears -----BEGIN CERTIFICATE----- ... -----END CERTIFICATE----- OK //OK will be returned after receiving
Description information in HELP	
respo nse	Query and set MQTT Cret

4.3.6 AT+MQTTDISCONN Disconnect MQTT connection

AT+ MQTTDISCONN	
descr ibe	Disconnect MQTT
respo nse	OK
Exam ple	AT+MQTT=1,192.168.202.10 //Set domain name OK #AT+MQTT=2,1883 //Set the port number OK #AT+MQTT=3,1 //Set the connection mode OK #AT+MQTT=4,client_id //Set user ID OK #AT+MQTT=5,admin //Set MQTT username OK #AT+MQTT=6,public //Set the MQTT password OK #AT+MQTT? //Query MQTT connection and configuration +MQTT:0,192.168.202.10,1883,1,client_id,admin,public OK #AT+MQTT //Connect to MQTT OK #

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	+EVENT:MQTT_CONNECT //MQTT connection successful

4.3.7 AT+MQTTPUB publishes MQTT message

AT+MQTTPUB=<topic>,<qos>,<Retained>,<payload>	
describe	Publishing MQTT messages
parameter	topic: the topic to be published qos: qos level (0,1,2) Retained : Whether it is a retained message. 0 indicates a normal message. 1 indicates a retained message. payload: payload message
response	OK
Example	AT+MQTTPUB=testtopic,1, 0, 456 OK
Description information in HELP	
response	Publish MQTT message

4.3.8 AT+MQTTPUB RAW publishes an MQTT message of a specified length

AT+MQTTPUB RAW =<topic>,<qos>,<Retained>,<length>	
describe	Publishing MQTT messages
parameter	topic: the topic to be published qos: qos level (0,1,2) Retained : Whether it is a retained message. 0 indicates a normal message. 1 indicates a retained message. length: the length of the data to be sent
response	OK
Example	AT+MQTTPUBRAW=testtopic,1, 0, 10 // Send 10 bytes of data to testtopic > // After receiving this character, start entering the data to be sent OK // When 10 bytes of data are received , the data will be sent (can be any data) , and OK will be displayed when the sending is completed
Description information in HELP	
respo	Publish long MQTT message

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4.3.9 AT+MQTTSUB Subscribe to MQTT messages

AT+MQTTSUB?	
describe	Query subscribed topics and topic status
response	<status>,<Topic> ... OK //Status description status: Subscription status 0: Initialization state 1: Subscribing (first subscription) 2: Subscribing (re-subscribe after disconnection and reconnection) 3: Subscription successful Topic: Subscribed topic
Example	#AT+MQTTSUB=testtopic0,0 OK #AT+MQTTSUB=testtopic1,1 OK #AT+MQTTSUB? 3,testtopic0 3,testtopic1 OK
AT+MQTTSUB=<topic>,<qos>	
describe	Subscribe to a Topic
parameter	topic: the topic to subscribe to qos: qos level (0,1,2)
response	OK
Example	AT+MQTTSUB=testtopic0,0 OK
Description information in HELP	
respo	Subscribe to MQTT Topic

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Notes	The default maximum number of topics that can be subscribed is 5, and each subscription consumes about 100 bytes of memory.

4.3.10 AT+MQTTUNSUB Unsubscribe from MQTT messages

AT+MQTTUNSUB=<topic>	
describe	Unsubscribe from a topic
parameter	topic: the topic to be canceled
response	OK
Example	AT+MQTTSUB=testtopic0 OK
Description information in HELP	
response	Unsubscribe MQTT Topic

4.4 HTTP Directives

4.4.1 AT+HTTPCLIENTLINE Send HTTP/HTTPS request (single line mode)

AT+HTTPCLIENTLINE=<transport_type>,<opt>,<content-type>,<host>,<port>,<path>[,<data>]	
describe	Make an HTTP request
parameter	transport_type: 1: HTTP 2: HTTPS opt: 2: GET 3: POST content-type: (valid only for POST, not for GET, can be any string, reference type is as follows) application/x-www-form-urlencoded application/json multipart/form-data

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	t ext/xml text/ html host: server domain name or IP (eg: www.baidu.com or 192.168.1.100) port: port number (HTTP default value is 80, HTTPS default value is 443) path: HTTP(S) path, default value is "/" data: data carried in the request When opt is GET, this is carried in the patch, and the format complies with the http format requirements (?key1=value1&key2=value2 ...) When opt is POST, this is the body carried by POST
respo nse	Response length:<len> //response body data length <response> //Get the response data OK //Request successful
Exam ple	http get AT+HTTPCLIENTLINE=1,2,,www.baidu.com,, https get AT+HTTPCLIENTLINE= 2,2 ,,www.baidu.com,, http post AT+HTTPCLIENTLINE=1,3,,192.168.2.253,8080,/ test ,"{\"OTP\":\" test \"}"
Description information in HELP	
respo nse	Initiate an http or https request

4.4.2 AT+HTTPRAW sends HTTP/HTTPS request (long data mode)

AT+HTTPRAW=<transport_type>,<opt>,<content-type>,<host>,<port>,<path>,<len>	
descr ibe	Make an HTTP request
para mete r	transport_type: 1: HTTP 2: HTTPS opt: 2: GET (not supported yet) 3: POST content-type: (valid only for POST, not for GET, can be any string, reference type is as follows) application/x-www-form-urlencoded application/json multipart/form-data t ext/xml text/ html host: server domain name or IP (eg: www.baidu.com or 192.168.1.100)

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	port: port number (HTTP default value is 80, HTTPS default value is 443) path: HTTP(S) path, default value is "/" Len: The length of the data to be received data: data carried in the request When opt is GET, this is carried in the patch, and the format complies with the http format requirements (?key1=value1&key2=value2 ...) When opt is POST, this is the body carried by POST
respo nse	> // After receiving this character, start entering the data to be sent <response> //Response data OK //Request successful
Exam ple	http post AT+HTTPRAW=1,3,"application/json",192.168. 1 . 199 ,8080,/ test , 5 > hello // Input 5 bytes of data Test ack //Get response OK //Get completed
Description information in HELP	
respo nse	Initiate an http or https request

4.5 SNTP Commands

4.5.1 AT+SNTPTIME Query SNTP time

AT+SNTPTIME	
descr ibe	Same as AT+SNTPTIME?
AT+SNTPTIME?	
descr ibe	Query SNTP time Note: SNTP is not enabled by default. You need to connect to the Internet and use AT+SNTPTIMECFG to enable it. When it is not enabled, the local RTC time is queried.
respo nse	+SNTPTIME:<week> <month> <day> <HH>:<mm>:<ss> <yyyy> OK week: Week [Mon,Tue,Wed,Thu,Fri,Sat,Sun] month: month [Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec] day: day HH: hours mm: minutes ss: seconds yyyy: year
Exam	AT+SNTPTIMECFG=1,8 // Enable SNTP

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ple	OK AT+SNTPTIME? //Query time after successful synchronization +SNTPTIME:Wed May 03 10:49:41 2023 OK
Description information in HELP	
respo nse	Query SNTP time
Note s	Supported models Ai-WB2 Series

4.5.2 AT+SNTPTIMECFG Query and set SNTP time zone and server

AT+SNTPTIMECFG	
descr ibe	Same as AT+SNTPTIMECFG?
AT+SNTPTIMECFG?	
descr ibe	Query the SNTP service status
respo nse	+SNTPTIMECFG:<enable>,<timezone>[,<SNTP server1>,<SNTP server2>,<SNTP server3>] OK enable: Whether the SNTP refresh service is enabled; 0: not running; 1: running timezone: time zone, value range: -12~+14 SNTP server1/2/3: SNTP server domain name
Exam ple	AT+SNTPTIMECFG? +SNTPTIMECFG:1,8,"cn.ntp.org.cn","ntp.sjtu.edu.cn","us.pool.ntp.org" OK
AT+SNTPTIMECFG=<enable>,<timezone>[,<SNTP server1>,<SNTP server2>,<SNTP server3>]	
descr ibe	Setting SNTP Configuration
para mete r	enable: SNTP refresh service status setting; 0 to disable; 1 to enable timezone: time zone, value range: -12~+14 SNTP server1/2/3: SNTP server domain name. If the default setting is "cn.ntp.org.cn", "ntp.sjtu.edu.cn", "us.pool.ntp.org"
respo nse	OK
Exam ple	AT+SNTPTIMECFG=1,8,cn.ntp.org.cn OK

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Description information in HELP	
response	Query and set SNTP config
Notes	Supported models Ai-WB2 Series

4.5.3 AT+SNTPINTV query and set SNTP refresh interval

AT+SNTPINTV	
describe	Same as AT+SNTPINTV?
AT+SNTPINTV?	
describe	Query the SNTP service refresh interval
response	+SNTPINTV:<interval second> OK interval second: refresh interval, unit S
Example	AT+SNTPINTV? +SNTPINTV:3600 OK
AT+SNTPINTV=<interval second>	
describe	Set the SNTP service refresh interval
parameter	interval second: refresh interval, unit S, value 15~4294967
response	OK
Example	AT+SNTPINTV=15 OK
Description information in HELP	
response	Query and set SNTP refresh interval
Notes	Supported models Ai-WB2 Series

5. BLE proprietary commands

5.1 Basic instructions

5.1.1 AT+BLEMAC Set and query Bluetooth MAC address

AT+BLEMAC?	
describe	Query Bluetooth MAC address
response	+BLEMAC:<MAC> OK
Example	
AT+BLEMAC=<MAC>	
describe	Set Bluetooth MAC address (effective after restart)
parameter	MAC: The Bluetooth MAC address to be set, in lowercase format without separators, eg: ab5f8d9ebb01
response	OK
Example	
Description information in HELP	
response	Query and set BLE MAC

5.1.2 AT+BLEMODE query and set Bluetooth mode

AT+BLEMODE?	
describe	Query working mode
response	+BLEMODE : <mode> OK
Example	
AT+BLEMODE=<mode>	
describe	Set Bluetooth working mode Note: After setting the Bluetooth mode, it will be executed immediately. If you want to start Bluetooth, you need to set the Bluetooth parameters first and then start Bluetooth

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parameter	mode: 0: Slave mode 1: Host mode 2: iBeacon mode 9: Bluetooth off
response	OK
Example	
Notice	If Realtek series (BW16/BW15) has multiple wireless types enabled, they need to be enabled in the specified order. If you enable AP+STA+Bluetooth triple mode, or AP+STA mixed mode, you need to turn on AP first, then connect STA and Bluetooth (there is no requirement for the order of Bluetooth and STA, but AP must be turned on first)
Description information in HELP	
response	Query and set BLE mode
Notes	PB series is 0, slave mode The default mode of TB series is 0, slave mode

5.1.3 AT+BLERFPWR Bluetooth settings or query transmission power

AT+BLERFPWR?	
describe	Query Bluetooth transmission power
response	+BLERFPWR: MAX:<max_power> MIN:<min_power> CURRENT:<cur_power> OK //Parameter description max_power: The maximum Bluetooth transmission power supported by the current module min_power: The minimum Bluetooth transmission power supported by the current module cur_power: Bluetooth transmission power currently set by the module
Example	
AT+BLERFPWR=<power>	
describe	Set the Bluetooth transmission power (need to be set when Bluetooth is turned off)
parameter	power: Bluetooth transmission power, the value is an integer, MAX (maximum transmission power), MIN (minimum transmission power)

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response	OK
Example	
Description information in HELP	
response	Query and set BLE RF power
Notes	the PB series is the maximum transmit power of 10 The default current transmit power of the TB series is the maximum transmit power of 10

5.1.4 AT+BLESTATE to query the connection status

AT+BLESTATE?	
describe	Query Bluetooth connection status
response	+ BLESTATE:< status > OK
parameter	status: 0: Not connected 1: Connected
Example	
Description information in HELP	
response	Query BLE connection status

5.1.5 AT+BLEDISCON disconnects Bluetooth connection

AT+BLEDISCON	
describe	Disconnect Bluetooth
response	OK
Example	
Description information in HELP	
response	Disconnect BLE

5.1.6 AT+BLEMTU query or set MTU

AT+BLEMTU?	
describe	Query Bluetooth MTU
response	+BLEMTU: <MTU> OK
Example	
AT+BLEMTU=<mtu>	
describe	Setting Bluetooth MTU
parameter	mtu: Set the Bluetooth MTU, the value range is 23~250
response	OK
Example	
Description information in HELP	
response	Query and set BLE MTU
Notes	The default MTU of the P B series is 23 MTU of TB series is 247

5.1.7 AT+BLESEND sends data to the Bluetooth transparent channel

AT+BLESEND=<len>,<data>	
describe	Send data to the Bluetooth transparent UUID channel
parameter	len: the length of the data to be sent, in bytes data: data content to be sent, the length should be consistent with len
response	OK
Example	
Description information in HELP	
respo	Send by BLE transparent transmission

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5.1.8 AT+BLESENDRAW sends data to the Bluetooth transparent channel (supports hex data)

AT+BLESEND RAW =<len>	
describe	Send data to the Bluetooth transparent UUID channel
parameter	len: the length of the data to be sent, in bytes
response	> //After receiving this character, start entering the data to be sent OK // When the specified byte data is received, the data will be sent (it can be any data) , and OK will be displayed when the sending is completed
Example	
Description information in HELP	
response	Send by BLE transparent transmission

5.1.9 AT+BLESERUUID query or set service UUID

AT+BLESERUUID?	
describe	Query the UUID of the Bluetooth transparent transmission service
response	+BLESERUUID: <UUID> OK
Example	
AT+BLESERUUID=<UUID>	
describe	Set the Bluetooth transparent transmission service UUID (Bluetooth name can only be set when Bluetooth is turned off)
parameter	UUID: supports two modes: 16-bit and 128-bit mode 128-bit mode (the default is 128-bit mode) String length 32 bits eg:00112233445566778899aabbccddeeff 16-bit mode When the 128-bit UUI is 0000XXXX00001000800000805F9B34FB, bits 17 to 32 will be set to the 16-bit UUID. Eg: 0000FFF100001000800000805F9B34FB means the 16-bit UUID is set to 0XFFF1
respo	OK

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Example	
Description information in HELP	
response	Query and set BLE TT server UUID
Notes	Default primary service UID:55535343fe7d4ae58fa99fafd205e455 Mode support BW16: 128-bit mode WB2 Series 16/128 bit mode

5.1.10 AT+BLETXUUID query or set Bluetooth TX UUID

AT+BLETXUUID?	
describe	Query the UUID of the Bluetooth transparent transmission service TX characteristic
response	+BLETXUUID: <UUID> OK
Example	
AT+BLETXUUID=<UUID>	
describe	Set the Bluetooth transparent transmission service TX characteristic UUID (Bluetooth name can only be set when Bluetooth is turned off)
parameter	UUID: supports two modes: 16-bit and 128-bit mode 128-bit mode (the default is 128-bit mode) String length 32 bits eg:00112233445566778899aabbccddeeff 16-bit mode When the 128-bit UUI is 0000XXXX00001000800000805F9B34FB, bits 17 to 32 will be set to the 16-bit UUID. Eg: 0000FFF100001000800000805F9B34FB means the 16-bit UUID is set to 0XFFF1
response	OK
Example	
Description information in HELP	
response	Query and set BLE TX UUID
Notes	Default TX UUID:49535343884143f4a8d4ecbe34729bb3 The Bluetooth service attribute corresponding to TX is NOTIFY Mode support BW16:

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	128-bit mode WB2 Series 16/128 bit mode

5.1.11 AT+BLERXUUID query or set Bluetooth RX UUID

AT+BLERXUUID?	
describe	Query the RX characteristic UUID of the Bluetooth transparent transmission service
response	+ BLERXUUID : <UUID> OK
Example	
AT+BLERXUUID=<UUID>	
describe	Set the Bluetooth transparent transmission service RX characteristic UUID (Bluetooth name can only be set when Bluetooth is turned off)
parameter	UUID: supports two modes: 16-bit and 128-bit mode 128-bit mode (the default is 128-bit mode) String length 32 bits eg:00112233445566778899aabbccddeeff 16-bit mode When the 128-bit UUI is 0000XXXX00001000800000805F9B34FB, bits 17 to 32 will be set to the 16-bit UUID. Eg: 0000FFF100001000800000805F9B34FB means the 16-bit UUID is set to 0XFFF1
response	OK
Example	
Description information in HELP	
response	Query and set BLE RX UUID
Notes	Default RX UUID:495353431e4d4bd9ba6123c647249616 The Bluetooth attribute corresponding to RX is WRITE Mode support BW16: 128-bit mode WB2 Series 16/128 bit mode

5.1.12 AT+TRANSENTER enters Bluetooth transparent transmission mode

AT+TRANSENTER	
describe	Enter Bluetooth transparent mode
response	OK
Remark	After entering +++, you can exit the transparent transmission mode and enter the AT command mode
Example	
AT+TRANSENTER=<autoEntry>,<saveFlash>	
describe	Configuring automatic connection configuration
parameter	autoEntry: whether to automatically enter transparent transmission mode after connecting 0: Do not automatically enter transparent mode after Bluetooth connection 1: Automatically enter transparent transmission mode after Bluetooth connection saveFlash: Whether to save the configuration to flash 0: Do not save to flash 1: Save to flash
response	OK

5.2 Slave Instructions

5.2.1 + Receive Bluetooth transparent data in DATA host mode

+DATA : <len>,<data>	
describe	In host mode, data sent from the Bluetooth transparent UUID channel is received
parameter	len: received data length, in bytes data: received data content, the length should be consistent with len
Remark	This command is only valid in AT mode. In transparent transmission mode, the original data will be received directly.
Example	

5.2.2 AT+ BLENAME sets the Bluetooth device name

AT+BLENAME?	
describe	Query Bluetooth name
response	+BLENAME : <ble name > OK
Example	
AT+BLENAME=< ble name >	
describe	Set the Bluetooth device name (Bluetooth name can only be set when Bluetooth is turned off) Default name "ai-thinker"
parameter	ble name: Bluetooth name (UTF-8 format, supports Chinese)
response	OK
Example	
Description information in HELP	
response	Query and set BLE name
Notes	Default Bluetooth name: ai-thinker

5.2.3 AT+BLECONINTV query or set the Bluetooth connection interval

AT+BLECONINTV?	
describe	Query Bluetooth connection interval
response	+BLECONINTV: <min_interval>,< max_interval>,<latency>,< timeout> OK
Example	
AT+BLECONINTV=<min_interval>,< max_interval>,<latency>,< timeout>	
describe	Set the Bluetooth connection interval (only allowed when Bluetooth is turned off)
parameter	min_interval: minimum connection interval , ranging from 6 to 3200 (the actual time is minInterval*1.25ms, and the requirement is 7.5ms to 4s)

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r	max_interval: Maximum connection interval , ranging from 6 to 3200 (the actual time is minInterval*1.25ms, required to be between 7.5ms and 4s) Latency: delay (how many times the connection can be skipped), required to be between 0 and 499 Timeout: timeout , the value range is 10~3200, the actual time is Timeout *10ms, that is, 100ms~32*1000ms and Timeout *10>(1+ Latency)* max_interval *1.25
response	OK
Example	
Description information in HELP	
response	Query and set BLE connect interval
Notes	P B series default parameters: +BLECONINTV:6,12,0,200 TB series default parameters: +BLECONINTV: 8 , 8 , 99 , 4 00

5.2.4 AT+BLEAUTH query or set Bluetooth pairing code

AT+BLEAUTH?	
describe	Query Bluetooth pairing code
response	+BLEAUTH: <pind> OK
Example	
AT+BLEAUTH=<pind>	
describe	Set Bluetooth pairing code (can only be set when Bluetooth is turned off)
parameter	pind: Enable pairing code, set 6 digits eg: 123456 Disable pairing codeDISENABLE
response	OK
Example	
Description information in HELP	
response	Query and set BLE PIN code
Notes	Not enabled by default

5.2.5 AT+BLEADVINTV Query or set the Bluetooth broadcast interval

AT+BLEADVINTV?	
describe	Query Bluetooth broadcast interval
response	+BLEADVINTV: <intv> OK
Example	
AT+BLEADVINTV=<intv>	
describe	Set the Bluetooth broadcast interval (only allowed when Bluetooth is turned off)
parameter	<intv>: broadcast interval, the unit value is 160~16384, the broadcast interval is iNtv*0.625ms
response	OK
Example	
Description information in HELP	
response	Query and set BLE broadcast time
Notes	P B default parameter 320 TB default parameter 800

5.2.6 AT+BLEADVDATA queries or sets Bluetooth broadcast data

AT+BLEADVDATA?	
describe	Query the currently set Bluetooth broadcast data The default broadcast data is 8 bytes, the first 6 bytes are the Bluetooth MAC address + the first two bytes of the transparent service UUID
response	+BLEADVDATA: <data> OK
Example	
AT+BLEADVDATA=<data>	
descr	Set the Bluetooth broadcast data content (only allowed to perform settings when

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ibe	Bluetooth is turned off)
parameter	data: Bluetooth data set (This is hex data in string form, with a maximum length of 32 bytes, eg: 00112233445566778899aabbccddeeff)
response	OK
Example	
Description information in HELP	
response	Query and set BLE broadcast data
Notes	Default parameters: MAC+55e4 (the first four digits of the primary service uuid), for example: 40154641871855e4

5.2.7 AT+BLEADVEN Bluetooth settings or query broadcast enable

AT+BLEADVEN?	
describe	Check whether Bluetooth broadcast is enabled
response	+BLEADVEN: <status> O K
Example	
AT+BLEADVEN=<status>	
describe	Start and stop Bluetooth broadcast (settings can only be performed in Bluetooth slave state)
parameter	status: 0 closed, 1 open
response	OK
Example	
Description information in HELP	
response	Query and set BLE broadcast status
Notes	Enabled by default

5.3 Host Commands

5.3.1 AT+BLESCAN initiates a scan in Bluetooth host mode

AT+BLESCAN	
describe	Initiate scanning in Bluetooth host mode
response	OK //Note that this OK only means that the command was sent successfully, and the scan is not actually completed. Devices Found:id/total //index/total indicates the serial number of the currently scanned Bluetooth device and the total number of scanned devices name:<name> //Bluetooth name, if not available, displays N/A MAC:<MAC> //lowercase without colon rssi:<rssi> Devices Found:<id/total> name:<name>N/A MAC:<MAC> rssi:<rssi> .....
Example	
Description information in HELP	
response	Start BLE scan
Notes	the P B series is 5 seconds, the scan interval is 230*0.625 mSec, and the scan window is 160* 0.625 mSec. The default scanning time of TB series is 2 seconds, the scanning interval is 160 * 0.625 mSec, and the scanning window is 160 * 0.625 mSec.

5.3.2 AT+BLECONNECT The host initiates a connection

AT+BLECONNECT= <MAC>	
describe	Connect to the specified Bluetooth (connection is only allowed in Bluetooth host state) Note: This is only a one-time connection. It will not automatically reconnect after a connection failure, and it will not automatically reconnect after a successful connection.
parameter	MAC: connection target mac address (eg: A4C13812505C)
response	Connecting... ... OK

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Example	
Description information in HELP	
response	Set BLE connect

5.3.3 AT+BLEAUTOCON Set the host to automatically connect to the slave parameters

AT+BLEAUTOCON=< MAC>,<UUID>,<save_flash>	
describe	Connect to the specified Bluetooth (connection is only allowed in Bluetooth host state)
parameter	MAC: connection target mac address (eg: A4C13812505C) UUID: If you need to connect to a specific UUID, set it to the last two digits of the target UUID (eg: E455) Note: Either MAC or UUID can be used to connect (both can be set), if there is no restriction, set it to FALSE. If both MAC and UUID are set to FALSE, automatic connection will be disabled. save_flash: whether to save to flash and set automatic connection at startup, 0 means not to save and only connect this time, 1 means to save to flash and automatically connect next time you start
response	+EVENT:BLE_CONNECTED //If the connection is successful, this message will be displayed +BLEAUTOCON:Wait connect //If the specified Bluetooth is not currently scanned, this message will be displayed (the background will automatically scan and automatically connect when the specified connection is scanned) OK
Example	AT+BLEMODE=1 OK AT+BLEAUTOCON=112233445566,FALSE,1 OK
Description information in HELP	
response	Set BLE auto connect
Notes	After the first successful connection, it will continue to actively connect

5.3.4 AT+BLEDISAUTOCON cancels automatic scanning connection

AT+BLEDISAUTOCON	
describe	Cancel automatic scanning to connect Bluetooth
response	OK
Example	
Description information in HELP	
response	Turn off BLE auto connect

5.4 BLE iBeacon Commands

5.4.1 AT+ BLE IBCNUUID Query or set Bluetooth iBeacon UUID

AT+BLEIBCNUUID?	
describe	Query the iBeacon UUID of the current Bluetooth setting
response	+BLEIBCNIIUD: <iBeacon> OK
Example	
AT+BLEIBCNUUID=<iBeacon>	
describe	Set the Bluetooth iBeacon UUID (only allowed when Bluetooth is turned off)
parameter	iBeacon: UUID to set (16 bytes in length, 32 bits in string length eg: 00112233445566778899aabbccddeeff)
response	OK
Example	
Description information in HELP	
response	Query and set BLE iBeacon UUID

5.4.2 AT+ BLEIBCNDATA sets Bluetooth iBeacon data

AT+ BLEIBCNDATA?	
describe	Query Ibeacon data
response	+BLEIBCNDATA:<companyID>,<major>,<minor>,<power> //The data is in the form of hexadecimal string OK
Example	AT+BLEIBCNDATA? +BLEIBCNDATA:4c00,2774,6b74,c5 OK
AT+ BLEIBCNDATA =<company ID>,<MAJOR>,<MINOR>,<POWER>	
describe	Set Bluetooth iBeacon data (only allowed when Bluetooth is turned off)
parameter	companyID (2-byte hexadecimal data, eg: 11aa) MAJOR (2 bytes of hexadecimal data, eg: 11aa), MINOR (2 bytes of hexadecimal data, eg: 11aa), POWER (1 byte hexadecimal data, eg: aa)
response	OK
Example	
Description information in HELP	
response	Set BLE iBeacon data

5.5 BLE MESH Commands

5.5.1 SIG-MESH instructions

5.5.1.1 AT+PROVISION Bluetooth settings start the network configuration function

AT+PROVISION	
describe	Bluetooth settings start the network configuration function
Remark	When the node is in the unProvisioning state, that is, it has not been provisioned, no broadcast is sent, and the gateway cannot scan this device and connect. If you need to

	connect, you need to use the AT+PROVISION command to enable the node so that the device can be scanned and connected. When the device is in the Provisioning state, that is, it has been provisioned with the gateway, there is no need to enable the node, and the node automatically connects to the mesh network that has been provisioned.
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Start provision

5.5.1.2 AT+MESHSEND SIG-MESH sends data

AT+MESHSEND=<addr>,<opcode>,<data>	
descr ibe	SIG-MESH sends data
para mete r	addr: the address of the target opcode: Operation code The current opcodes for esp32 gateway are as follows 1: set instruction, operation code opcode is D18888 2: get instruction, operation code opcode is D08888 3: ACK instruction, operation code opcode is D38888 4: Delete node instruction opcode is D28888 data: data example: {"mesh_data vendor" : { "daddr" : 3 , "saddr" : 2 , "opcode" : d38888 , "data_len" : 2 , "data" : 0101 (hex string) ret : 1 }}
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	SIG-MESH send data

5.5.1.3 AT+MESHADDR query node address

AT+MESHADDR	
descr ibe	Query node address
respo nse	+MESHADDR:<addr> OK

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Example	
Description information in HELP	
response	Query SIG-MESH addr

5.5.1.4 AT+MESHSTATE checks whether the network configuration is successful

AT+MESHSTATE	
describe	Check whether the network configuration is successful
response	+MESHSTATE:<status> //0: failed; 1: successful OK
Example	
Description information in HELP	
response	Query Mesh status

5.5.2 ALI-MESH Commands

5.5.2.1 aliGenie_data Tmall Genie sends data

aliGenie_data	
describe	Tmall Genie sends data
Format	{ "aliGenie_data" : { "daddr" : %x , "saddr" : %x , "opcode" : %x , "data_len" : %d , "data" : %s }} // The data format is json string d addr : destination address saddr : source address opcode : Operation code data_len : data length data ： data content
Example	

5.5.2.2 AT+AliGenie sets the Tmall Genie triplet

AT+AliGenie= < pid > , < mac > , < secret >	
describe	Set Tmall Genie triplet
parameter	pid : triplet product ID (8 digits) mac : triplet physical address (12 bits) secret : triplet key (32 bits) Note: All are hexadecimal strings.
response	OK
Example	
Description information in HELP	
response	Set Ali key

5.5.2.3 AT+SEND2ALI reports data

AT+SEND2ALI=<opcode>,<param>	
describe	Report data to the Tmall Genie platform
parameter	o pcode : Operation code, length 6 bits/4 bits param : Report parameter, maximum length is 20 characters
response	OK
Example	AT+SEND2ALI=8204,01 reporting status is open
Description information in HELP	
response	Send data to Ali

6. Production test instructions

6.1 Standard instructions

6.1.1 ##boot development board button trigger signal

\r\n##boot\r\n	
describe	When the development board test is enabled, if the key is triggered, this data will be printed on the serial port
Example	

6.1.2 AT+NodeMCUTEST development board test enable

AT+NodeMCUTEST=<start>	
describe	Enable the development board test function
parameter	start: 0: Off 1: On
response	OK
Example	
Description information in HELP	
response	Set development board test function

6.1.3 AT+LEDTEST development board LED test command

6.1.3.1 Old combo frame instructions

AT+LEDTEST=<start> [,<ledLev>,<ledNum>,<ledPin1>,…,<ledPinN>]	
describe	Development board LED test instructions
para	start:

meter	0: Turn off the marquee 1: Start the marquee (red, green, blue, yellow, and white switch, each light for 1000ms) l edLev : LED effective level (supported by some modules) 0 : Low level lights up 1: High level lights up ledNum : (supported by some modules) How many LEDs are there in total ? ledPinX : (supported by some modules) PIO number corresponding to the LED , multiple pins are separated by commas
response	OK
Example	
Description information in HELP	
response	Start test board LED test

6.1.3.2 Middleware version instruction format

AT+LEDTEST=<start> [,< module name >]	
describe	Development board LED test instructions
parameter	start: 0: Turn off the marquee 1: Start the marquee (red, green, blue, yellow, and white switch, each light for 1000ms) module name: (supported by some modules) Configure the module model supported, which is the same as the name in the system Supported module models BW20-12F
response	OK
Example	
Description information in HELP	
response	Start test board LED test

7. appendix

7.1 Appendix 1 IOMap table of each model module

Ai-M61-01-BLO

AT+SYSIOMAP=48,NC,0,1,NC,3,NC,NC,NC,NC,NC,NC,10,11,12,NC,13,14,15,NC,NC,18 ,19,NC,NC,NC,NC,NC,NC,NC,NC,20,21,22,23,24,25,26,NC,27,28,29,30,31,32,33,34,NC

Ai-M61-32S-BLIAll

AT+SYSIOMAP=40,NC,NC,NC,0,1,16,17,12,14,15,18,19,10,13,11,NC,20,4,5,6,7,8,9,NC,NC,23,NC,24,28,26,25,30,30,32,NC,29,NC

Ai-M61-32S-BLO

Ai-M61-32SU-BLO

AT+SYSIOMAP=40,NC,NC,NC,0,1,16,17,12,14,15,18,19,10,13,11,NC,20,NC,NC,NC,NC,NC,NC,NC,23,NC,24,28,26,25,23,32,32,31,NC

Ai-M61-32S-BLOOD

Eye-M61-32SU-BLOOD

AT+SYSIOMAP=40,NC,NC,NC,0,1,16,17,12,14,15,18,19,10,13,11,NC,20,NC,NC,NC,NC,NC,NC,NC,NC,NC,24,28,26,25,27,32,29,NC30

Ai-M62-12F-BLI

AT+SYSIOMAP=22,NC,20,NC,17,29,0,1,NC,15,14,11,12,NC,NC,NC,28,3,NC,30,27,NC,NC

Eye-M62-12F-BLIJ

AT+SYSIOMAP=22,NC,20,NC,17,10,0,1,NC,15,14,11,12,NC,NC,NC,13,3,NC,30,27,NC,NC

The M62-13-BLI

AT+SYSIOMAP=18,NC,NC,1,30,0,28,17,NC,NC,29,NC,NC,NC,27,NC,3,20,NC

Ai-M62-32S-BLI

AT+SYSIOMAP=38,NC,NC,NC,NC,3,11,12,1,30,0,13,14,15,16,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,10,28,17,NC,27,29,NC,NC,NC,NC,20

Ai-M62-M01L-BLI

AT+SYSIOMAP=33,0,3,20,12,NC,13,14,NC,15,10,2,11,17,16,NC,NC,NC,NC,NC,NC,NC,NC,NC,1,30,NC,27,NC,NC,29,28

I-M62-M2-I-BLI

AT+SYSIOMAP=31,16,17,11,NC,12,13,14,15,NC,NC,NC,NC,20,NC,NC,NC,27,28,29,30,NC,NC,NC,NC,0,1,3,10,NC,NC

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Ai-WB2-01F-BLI

AT+SYSIOMAP=18,NC,NC,11,NC,12,14,3,17,20,22,NC,5,1,NC,NC,NC,NC,NC

Ai-WB2-01M-BLI

AT+SYSIOMAP=18,NC,NC,NC,NC,20,12,14,NC,NC,4,3,2,22,21,17,11,1,0

Eye-WB2-01M-THE

AT+SYSIOMAP=18,NC,NC,NC,NC,20,12,14,8,NC,4,3,2,22,21,17,11,1,0

I-WB2-01N-BLI

AT+SYSIOMAP=14,NC,3,NC,20,NC,4,NC,14,21,NC,22,8,1,2

The WB2-01S-BLI

AT+SYSIOMAP=8,NC,4,NC,NC,NC,NC,NC,NC

Eye-WB2-01S-THE

AT+SYSIOMAP=8,NC,4,8,NC,NC,NC,NC,NC

The WB2-01S-BLO

AT+SYSIOMAP=8,NC,4,NC,NC,NC,NC,NC,NC

Ai-WB2-01S-BLOA

AT+SYSIOMAP=8,NC,4,8,NC,NC,NC,NC,NC

I-WB2-05W-BLI

AT+SYSIOMAP=22,NC,NC,NC,8,11,16,7,14,NC,17,20,21,22,NC,0,1,2,3,4,5,12,NC

Eye-WB2-05W-THE

AT+SYSIOMAP=22,NC,NC,NC,NC,11,16,7,14,NC,17,20,21,22,NC,0,1,2,3,4,5,12,NC

Ai-WB2-12F-BLI

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,22,0,NC,NC,20,21,NC,4,2,NC,5,1,NC,NC

Eye-WB2-12F-BLIA

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,22,0,NC,NC,20,21,NC,4,2,8,5,1,NC

Ai-WB2-12F-BLO

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,NC,NC,NC,NC,NC,NC,4,NC,NC,5,NC,NC,NC

Ai-WB2-12F-BLOA

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,NC,NC,NC,NC,NC,NC,4,NC,8,5,NC,NC,NC

Ai-WB2-07S-BLI

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The WB2-12S-BLI

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,2,NC,5,1,NC,NC

Eye-WB2-07S-THE

Eye-WB2-12S-THE

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,2,8,5,1,NC,NC

Ai-WB2-07S-BLO

The WB2-12S-BLO

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,NC,NC,5,NC,NC,NC

Ai-WB2-07S-BLOA

The WB2-12S-BLOA

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,NC,8,5,NC,NC,NC

Eye-WB2-12S-BLIA-J

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,8,4,NC,5,1,NC,NC

Ai-WB2-12S-BLI-J

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,NC,4,NC,5,1,NC,NC

Ai-WB2-12S-BLOA-J

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,8,4,NC,5,NC,NC,NC

Ai-WB2-12S-BLO-J

AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,NC,4,NC,5,NC,NC,NC

The WB2-13-BLI

WB2-13U-BLI

AT+SYSIOMAP=18,NC,NC,14,17,3,4,2,NC,NC,5,NC,NC,NC,1,NC,11,12,NC

Eye-WB2-13-THE

Eye-WB2-13U

AT+SYSIOMAP=18,NC,NC,14,17,3,4,2,8,NC,5,NC,NC,1,NC,11,12,NC

The WB2-13-BLO

The WB2-13U-BLO

AT+SYSIOMAP=18,NC,NC,14,17,3,4,NC,NC,NC,5,NC,NC,NC,NC,11,12,NC

WB2-13-BLOA

The WB2-13U-BLOA

AT+SYSIOMAP=18,NC,NC,14,17,3,4,NC,8,NC,5,NC,NC,NC,NC,11,12,NC

Ai-WB2-32S-BLI

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AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,20,22,0,21,NC,NC,NC,4,2,NC,1,5,NC,NC,NC,NC,12,NC,NC

Eye-WB2-32S-THE

AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,20,22,0,21,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,8,NC,4,2,NC,1,5,NC,NC,NC,NC,12,NC,NC

Ai-WB2-32S-BLO

AT+SYSIOMAP=38,NC,NC,NC,11,NC,NC,14,17,3,NC,NC,NC,NC,NC,NC,NC,4,NC,NC,NC,5,NC,NC,NC,NC,12,NC,NC

Ai-WB2-32S-BLOA

AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,8,NC,4,NC,NC,5,NC,NC,NC,NC,12,NC,NC

I-WB2-M1-BLI

WB2-M1-I-BLI

AT+SYSIOMAP=31,NC,NC,NC,NC,4,14,NC,NC,NC,NC,NC,2,11,NC,NC,12,NC,17,3,22,21,20,NC,0,NC,1,5,NC,NC,NC,NC

Eye-WB2-M1-BLIA

Eye-WB2-M1

AT+SYSIOMAP=31,NC,NC,NC,NC,4,14,NC,NC,NC,NC,NC,2,11,NC,NC,12,NC,17,3,22,21,20,8,0,NC,1,5,NC,NC,NC,NC

PWM-A01-1-BLO

AT+SYSIOMAP=38,NC,NC,NC,NC,NC,NC,NC,17,NC,NC,NC,NC,NC,NC,NC,4,NC,NC,NC,NC,NC,NC,NC,12,NC,NC

BW15

AT+SYSIOMAP=16,17,18,NC,2,15,4,19,NC,NC,20,16,0,3,1,NC,NC

BW16

AT+SYSIOMAP=16,21,34,NC,23,NC,26,29,NC,NC,30,NC,22,27,20,NC,NC

BW20-12F

BW20-07S

AT+SYSIOMAP=22,49,50,NC,51,NC,52,53,NC,8,12,13,16,NC,NC,NC,26,NC,27,30,31,NC,NC

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