Makerfabs UWB AT Module

AT Command Manual

V1.0.6

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Time：2023/10/13

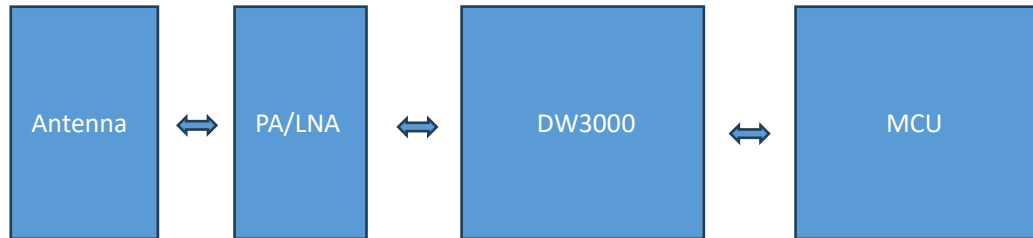| 日期 Date	版本	版本描述	作者
20230815	v1.0.0	使用介绍&功能介绍	Jerry
20230823	V1.0.1	1)　修改笔误 2)　Anchor&Tag 软件融合 3)　完善 Run Led 引脚说明 4)　完善 Tx Led 引脚说明 5)　完善 Rx Led 引脚说明 6)　完善 UART2 RX/RESET/WAKEUP 引脚说明	Jerry
20230829	V1.0.2	1)　增加 850K 速率 2)　增加信号强度 3)　修改开机日志 4)　修改命令，AT+SETCFG 5)　修改命令，AT+GETCFG? 6)　修改命令，AT+RANGE	Jerry
20230926	V1.0.3	1)　完善文档 2)　增加硬件应用电路	Jerry
20230926	V1.0.4	1)　增加封装尺寸图	Jerry
20231013	V1.0.5	翻译初版	Vincent
20240227	V1.0.6	最大标签数增加至 64	Vincent

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1 Product description

1.1 Introduction

This module describes the high-precision real-time positioning module developed by our company based on Qorvo DW3000 series chips. The module integrates MCU and all RF circuits, antennas, power management and clock circuits. The module can be quickly configured and used by AT command. The target readers are software and hardware engineers, UWB learners and users. This module is based on TOF (TWR) two-sided distance measurement and a variety of filtering algorithms to achieve distance calculation. After combination and collocation between multiple modules, it can be adapted to most of the location application scenarios, which is convenient for users to learn and research and rapid product application. Its ranging accuracy may be less than 10cm; And the module supports data transfer rates of up to 6.8Mbps.

1.2 Feature

1) Comply with IEEE802.15.4-2011 ultra-wideband standard;

2) Easy to integrate without additional RF design;

3) Support CH5 (6489.6MHZ) RF band;

4) Strong resistance to multi-path fading;

5) Two modes of data transmission rate of 850kbps and 6.8Mbps;

6) The maximum packet length is 1023 bytes, which meets the application requirements of high data volume exchange;

7) The system supports 8 Anchor 64 tags.

8) The module supports free configuration of refresh rate, up to 100Hz;

9) Module serial port communication baud rate 115200;

10) Module (Tag) deep hibernation working current as low as 35uA, working current 34mA;

11) Support AT command;

1.3 Functional block diagram

1.4 Product size
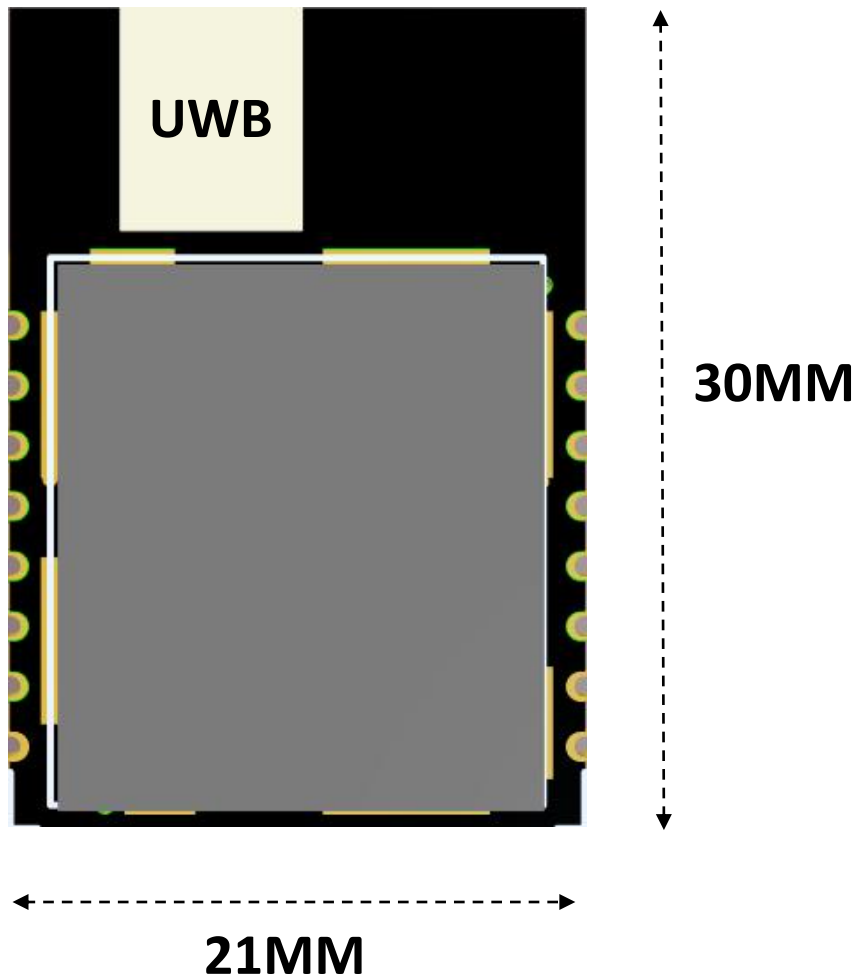
2 Module hardware description

2.1 Module hardware pin definition

1	3V3	RUN LED	9
2	3V3	UART2TX	10
3	I2CSDA	UART2RX	11
4	I2CSCL	TX LED	12
5	SWCLK	RX LED	13
6	SWDIO	UART1TX	14
7	GND	UART1RX	15
8	GND	GND	16
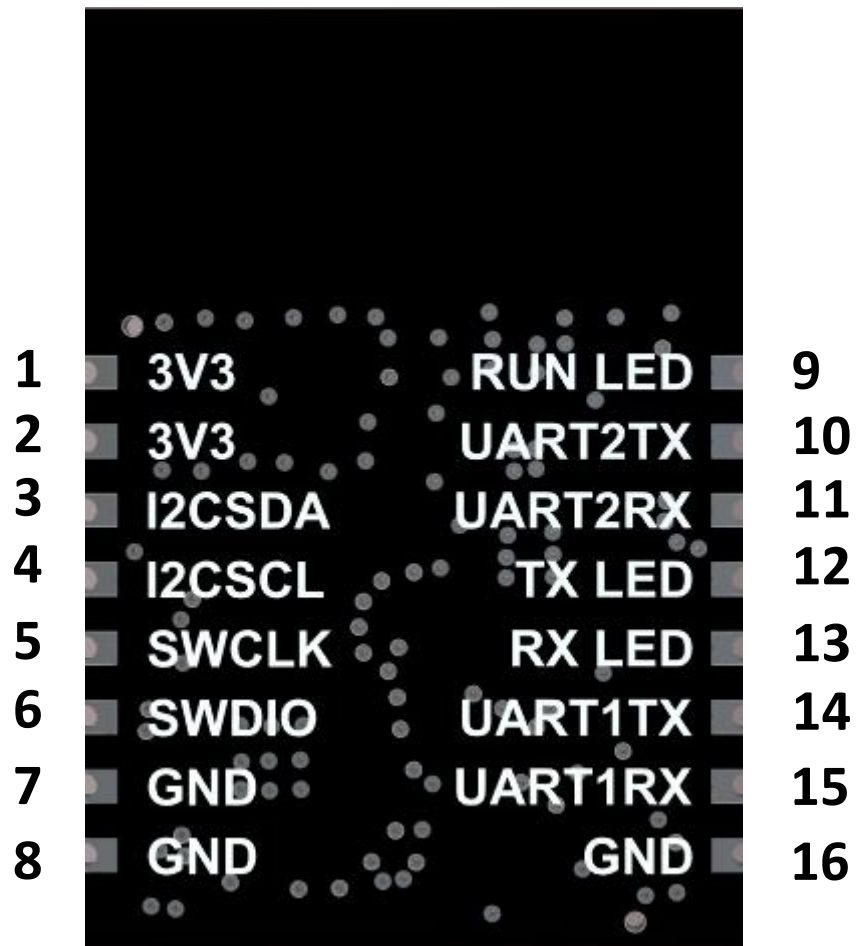
Index	Pin	Function
1	3V3	Power 3.3v
2	3V3	Power 3.3v
3	I2CSDA	Reserve pin(NC)
4	I2CSCL	Reserve pin(NC)
5	SWCLK	Module download port
6	SWDIO	Module download port

| 7	GND	GND
8	GND	GND
9	RUN LED	Module running indicator,Anchor/Tag universal (except for Tag entering Sleep) Configuration status: Blinking slowly (1 second) Working status: Blinking at short intervals (0.1 seconds)
10	UART2 TX	Reserve pin(NC)
11	UART2 RX/RESET/WAKEUP	Function 1: Pull down 3 seconds reset (reset function) Function 2: Tag low power state, pull down any time to wake up (wake up function, only valid Tag)
12	TX LED	Module UWB transmit indicator (Anchor valid,Tag invalid)
13	RX LED	Module UWB acceptance indicator (Anchor valid,Tag invalid)
14	UART1 TX	Module serial TX port
15	UART1 RX	Module serial RX port
16	GND	GND

2.2 Module hardware package size

RUN LED	3V3
UART2TX	3V3
UART2RX	I2CSDA
TX LED	I2CSCL
RX LED	SWCLK
UART1TX	SWDIO
UART1RX	GND
GND	GND

30MM

2.2MM

3MM

1.1MM

2.2MM

21MM
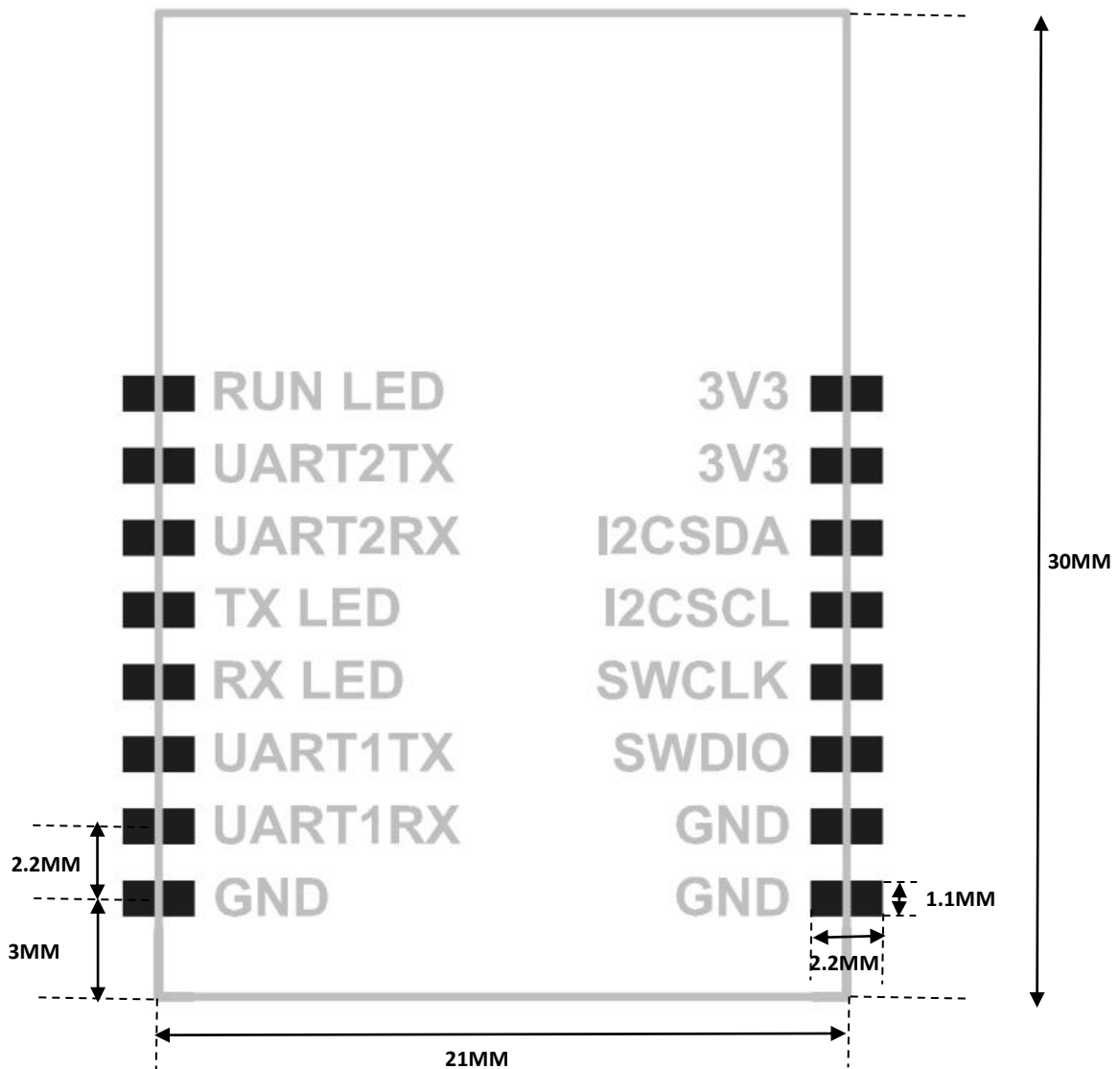
2.2 Power interface

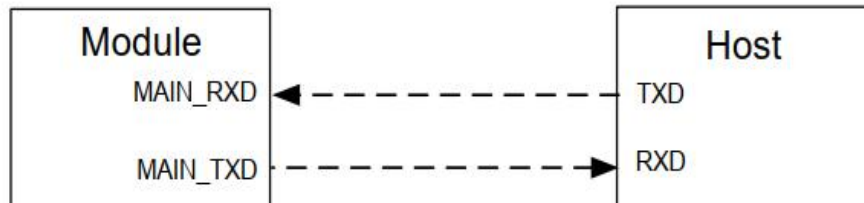| Index	Pin	Function
1 2	3V3	Power supply 3.3V (Note: If the power supply voltage exceeds 3.3, the module will be damaged)
7 8 16	GND	GND

lDO voltage regulator chip is used to increase 100UF tantalum capacitor and 100NF capacitor to stabilize voltage and reduce interference caused by power supply.
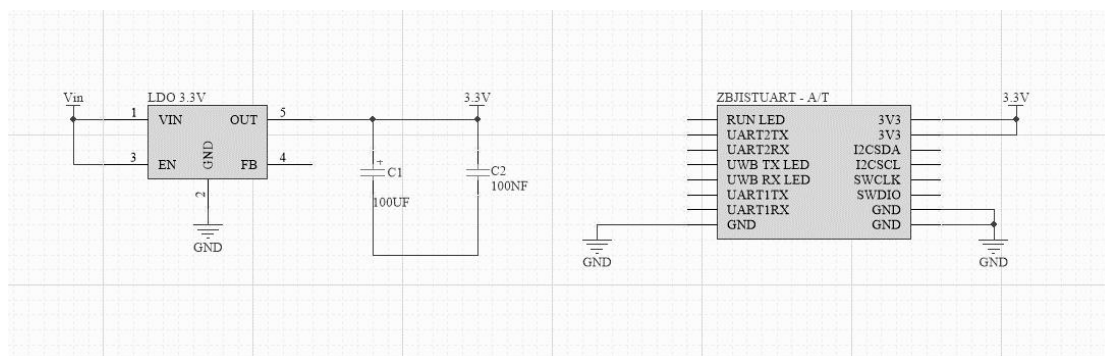
2.3 UART application circuit

Index	Pin	Function
14	UART1 TX	Moudle TX
15	UART1 RX	Module RX

Serial port communication level is 3.3VTTL, different level systems should do level matching.

2.4 LED application circuit

Index	Pin	Function
9	RUN LED	Module running indicator,Anchor/Tag universal (except for Tag entering Sleep) Configuration status: Blinking slowly (1 second) Working status: Blinking at short intervals (0.1 seconds)
12	TX LED	Module UWB transmit indicator (Anchor valid,Tag invalid)
13	RX LED	Module UWB acceptance indicator (Anchor valid,Tag invalid)

LED output High level LED is on, low level LED is off.
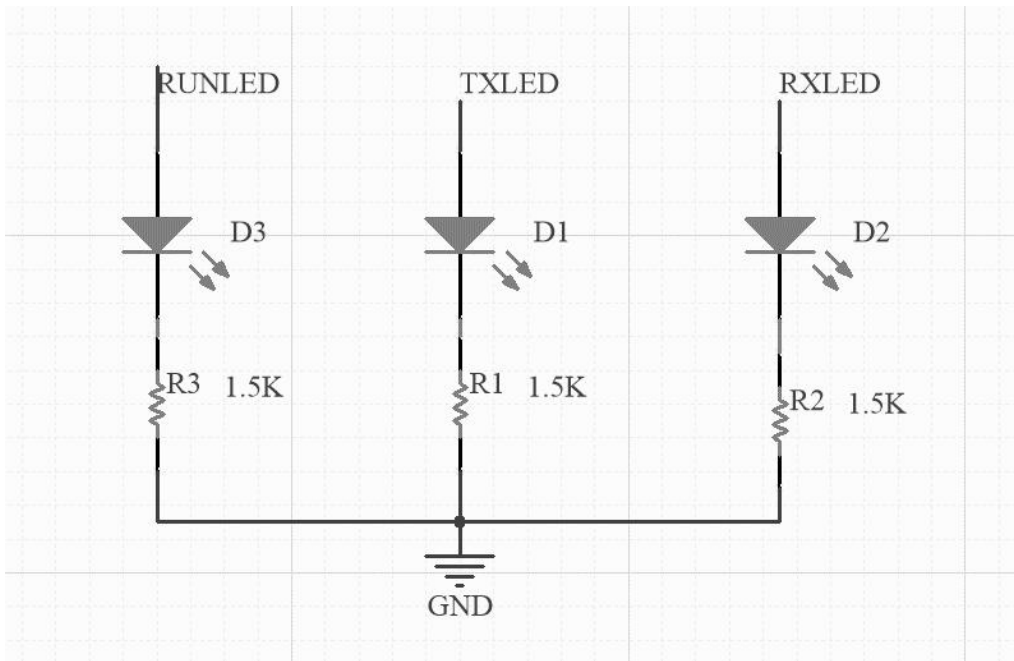
2.5 Reset interface

Index	Pin	Function
11	UART2 RX/RESET/WAKEUP	1: Pull down 3 seconds reset (reset function) 2: Label low power state, pull down any time to wake up (wake up function, only valid label)

It is recommended to use an open set or open drain drive circuit to control RESET.
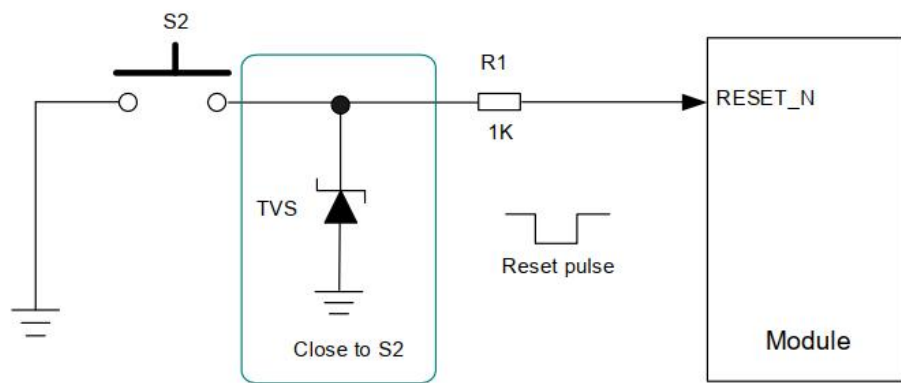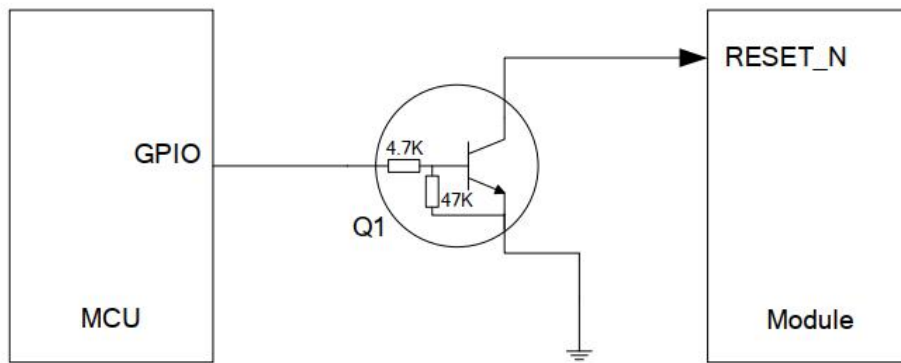
2.6 Download interface

Index	Pin	Function
5	SWCLK	Module download port
6	SWDIO	Module download port

Firmware upgrades for hardware modules can be performed via ST-LINK.
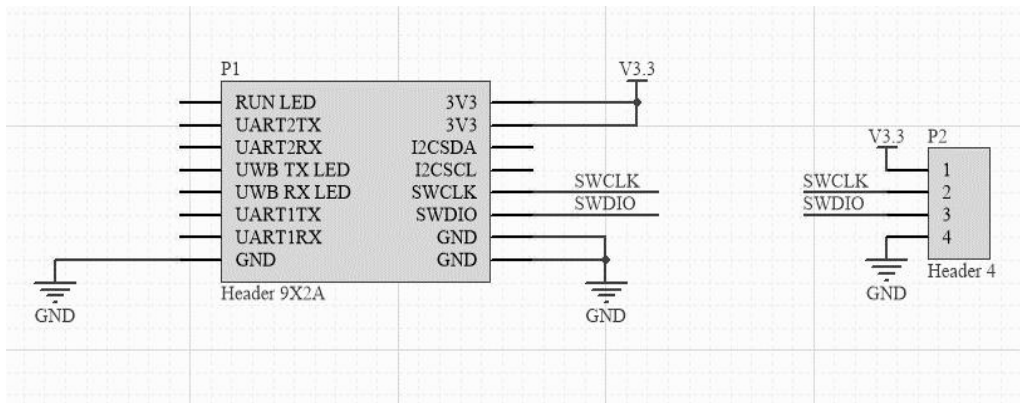
3 Description of the module AT command

3.1 Command summary description

Index	Command	Function	Role
1	AT?	Serial port test	Tag/Anchor

2	AT+GETVER?	Get version	Tag/Anchor
3	AT+RESTART	Restart module	Tag/Anchor
4	AT+RESTORE	Restore configuration	Tag/Anchor
5	AT+SAVE	Save configuration	Tag/Anchor
6	AT+SETCFG	Set role message	Tag/Anchor
7	AT+GETCFG?	Get role message	Tag/Anchor
8	AT+SETANT	Set antenna delay	Tag/Anchor
9	AT+GETANT?	Get antenna delay	Tag/Anchor
10	AT+SETCAP	Set the Anchor/Tag capacity of the system	Tag/Anchor
11	AT+GETCAP?	Get the Anchor/Tag capacity of the system	Tag/Anchor
12	AT+SETRPT	Set the automatic reporting status	Tag/Anchor
13	AT+GETRPT?	Get the automatic reporting status	Tag/Anchor
14	AT+RANGE	Active reporting command	Tag/Anchor
15	AT+SLEEP	Sleep command	Tag

3.2 **Command**: AT?

Command	AT?
Parameter	

Return	
Example	AT? OK
Function	Verify that the serial port communication of the module is normal

3.3 **Command**：AT+GETVER?

Command	AT+GETVER?
Parameter	
Return	x1: indicates the software version x2: Hardware version
Example	AT+GETVER? AT+GETVER=software:v01_00_000,hardware:v01_03_000
Function	Obtain the module software version and hardware version

3.4 **Command**：AT+RESTART

Command	AT+RESTART
Parameter	
Return	
Example	AT+RESTART OK
Function	Reset module

3.5 **Command**：AT+RESTORE

Command	AT+RESTORE

Parameter	
Return	
Example	AT+RESTORE OK
Function	Restore factory mode (clear all configuration information)

3.6 **Command**：AT+SAVE

Command	AT+SAVE
Parameter	
Return	
Example	AT+SAVE OK
Function	Save the configuration parameters (after configuring the information, be sure to save and write to the flash)

3.7 **Command**：AT+SETCFG

Command	AT+SETCFG=(x1),(x2),(x3),(x4)
Parameter	x1:Device ID(Anchor 0-7，Tag 0-63) x2:Device Role(0:Tag / 1:Anchor) x3:Equipment communication rate(0:850K/1:6.8M，Default:6.8M) x4:Range filtering is enabled(0:Close / 1:Open)
Return	
Example	AT+SETCFG=0,1,1,1 OK
Function	Set basic module parameters

3.8 **Command**：AT+GETCFG?

Command	
Parameter	
Return	x1:Device ID(Anchor 0-7，Tag 0-63) x2:Device Role(0:Tag / 1:Anchor) x3:Equipment communication rate(0:850K/1:6.8M，Default:6.8M) x4:Range filtering is enabled(0:Close / 1:Open)
Example	AT+GETCFG? AT+GETCFG=0,0,1,1
Function	Obtain basic module parameters

3.9 **Command**：AT+SETANT

Command	AT+SETANT=(x1)
Parameter	x1:Device antenna delay
Return	
Example	AT+SETANT=16536 OK
Function	Set module antenna delay (antenna delay is used to: calibrate distance values)

3.10 **Command**：AT+GETANT?

Command	AT+GETANT?
Parameter	
Return	x1:Device antenna delay
Example	AT+GETANT? AT+GETANT=16536
Function	Get module antenna delay (antenna delay for: calibrating distance values)

3.11 **Command：** AT+SETCAP

Command	AT+SETCAP=(x1),(x2)
Parameter	x1:Tag capacity (default: 10, maximum: 64) x2: Time of a single time slot (6.8M not less than 10ms,850K not less than 15ms) (Note: The refresh rate relationship is as follows: label capacity x single slot time, Example 1: If x1=10 and x2=10, the refresh rate is 10Hz Example 2: If x1=5 and x2=10, the refresh rate is 20Hz Example 3: x1=1 x2=10, then refresh rate = 100Hz)
Return	
Example	AT+SETCAP=10,10 OK
Function	Set system base station/label capacity (refresh rate)

3.12 **Command：** AT+GETCAP?

Command	AT+GETCAP?
Parameter	
Return	x1:Tag capacity (default: 10, maximum: 64) x2: Time of a single time slot (6.8M not less than 10ms,850K not less than 15ms) (Note: The refresh rate relationship is as follows: label capacity x single slot time, Example 1: If x1=10 and x2=10, the refresh rate is 10Hz Example 2: If x1=5 and x2=10, the refresh rate is 20Hz Example 3: x1=1 x2=10, then refresh rate = 100Hz)
Example	AT+GETCAP? AT+GETCAP=10,10
Function	Get system base station/label capacity (refresh rate)

3.13 **Command：** AT+SETRPT

Command	AT+SETRPT=(x1)
Parameter	x1: Whether the report is reported automatically (0: off 1: on)
Return	

Example	AT+SETRPT=1 OK
Function	Enable whether the module actively reports distance data.

3.14 **Command**: AT+GETRPT?

Command	AT+GETRPT?
Parameter	x1: Whether the report is reported automatically (0: off 1: on)
Return	
Example	AT+GETRPT? AT+GETRPT=1
Function	Enable whether the module actively reports distance data.

3.15 **Command**: AT+RANGE

Command	AT+RANGE=tid:x1,mask:x2,seq:x3,range:(x4,x5,x6,x7,x8,x9,x10,x11), rssi:(x12,x13,x14,x15,x16,x17,x18,x19)
Parameter	
Return	tid:x1(Tag ID, in decimal format) mask:x2(Significance bit, in hexadecimal format) seq:x3(Tag communication sequence, in decimal format) range0:x4(The distance from Tag to Abchor0 ,in cm, in decimal format) range1:x5(Tag to Anchor 1) range2:x6(Tag to Anchor 2) range3:x7(Tag to Anchor 3) range4:x8(Tag to Anchor 4) range5:x9(Tag to Anchor 5) range6:x10(Tag to Anchor 6) range7:x11(Tag to Anchor 7) rssi0:x12(Signal strength value from Tag to Anchor 0, in dBm, floating point type) rssi1:x13(Signal strength value from Tag to Anchor 1) rssi2:x14(Signal strength value from Tag to Anchor 2) rssi3:x15(Signal strength value from Tag to Anchor 3) rssi4:x16(Signal strength value from Tag to Anchor 4) rssi5:x17(Signal strength value from Tag to Anchor 5) rssi6:x18(Signal strength value from Tag to Anchor 6)

	rssi7:x19(Signal strength value from Tag to Anchor 7)
Example	AT+RANGE=tid:0,mask:80,seq:197,range:(0,0,0,0,0,0,0,0), rssi:(0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00)
Function	After the 3.12 command is set, the distance value is actively reported (common to Tag and Anchor).

3.16 Command：AT+SLEEP

Command	AT+SLEEP=(x1)
Parameter	x1: Sleep time(Unit : ms)[Range: 0-65535,65535=Forever] (Wake up mode: ① serial port wake up (send any data) ②UART2 RX drop-down wake up at any time)
Return	OK
Example	AT+SLEEP=1000 OK
Function	Set the device sleep time (valid for Tags only)