

# ShenZhen Gather Genius Technology Limited



**MMBQ11 Wi-Fi Module**

FCC ID: 2ALLFMMBQ11

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## 1. GENERAL DESCRIPTION

The MMBQ11 module supports standard IEEE802.11 b/g/n protocol, TCP/IP stack and support STA, AP, STA+AP work mode. It can be used in the present device for additional Wi-Fi feature, or to design standalone network controller.

MMBQ11 is a total solution for Wi-Fi network, which can be used separately. It can boot from external flash directly and designed to work with external MCU. In this case, MMBQ11 can be added to any micro-controller system through UART interface.

MMBQ11 is highly integrated with antenna switch, BALUN, PA, PMU. It just needs a few components for external circuit, which help to save the PCB room and cost furthest.

### 1.1. Features

- Support 802.11 b/g/n;
- Embedded TCP/IP protocol stack;
- Integrated TR switch/Balun/LNA/PA/antenna;
- MCU clock frequency up to 160M, internal cache 8kB;
- Integrated 16Mbits flash;
- **Supply voltage range: 4.75V~5.25VDC, single 5V is recommended to use.**
- Support OTA firmware upgrade, which can be initiated with mobile phone APP and AT command;
- Support STA, AP, AP+STA mode;
- Support Smart Link;
- Support WEP/TKIP/WPA/WPA2 protocol;
- Support 802.11e and WMM/WMM PS;
- Support UART;
- Support HT20/40;

	parameter	description
Hardware feature	<i>General description</i>	
	Network standard	802.11 b/g/n
	Frequency range	2.4GHz-2.5GHz (2400M-2483.5M)
	<b>Supply voltage</b>	<b>4.75~5.25V ( single 5V is recommended )</b>
	Operating current	Max: 330mA
	MCU operation frequency	160MHz
	FLASH	16M ( bits )
	SRAM	192KByte ( 120 KB available to users )
	Package	15mm * 20mm * 9.5mm
	Pin type and number	DIP , 5 pin
	Antenna	In PCB
	Operation temperature range	-20°~85°C
	Storage temperature range	-40°~125°C
	<i>Hardware interface</i>	
	UART	Support 1 UART, for download
Software feature	Work mode	STA/AP
	Security mechanism	WEP/WPA-PSK/WPA2-PSK
	Encryption type	WEP/TKIP/WPA/WPA2
	Firmware upgrade	UART/OTA
	Network protocol	TCP/UDP/DHCP/ARP/ICMP
	Customer configuration	AT+ Instruction Set, Smart LinkAPP

Table 1 Major hardware and software features

## 2. Pin assignment

There are 4pins in MMBQ11 module, Figure1 is the pin assignment, Table 2 is the pin definition.



Figure 1MMBQ11 pin assignment

PIN	Signal Name	Description
1	VCC	Supply Input Pin
2	RXD	UART receive data
3	TXD	UART transmit data
4	GND	GND
5	GND	GND

Table 2 MMBQ11 pin definition

### 3. Package and dimensions

The dimensions of MMBQ11 module is 15mm \* 20mm \* 9.5mm ( Figure 3), and it integrates 16Mb SPI Flash and 0 dBi PCB antenna.

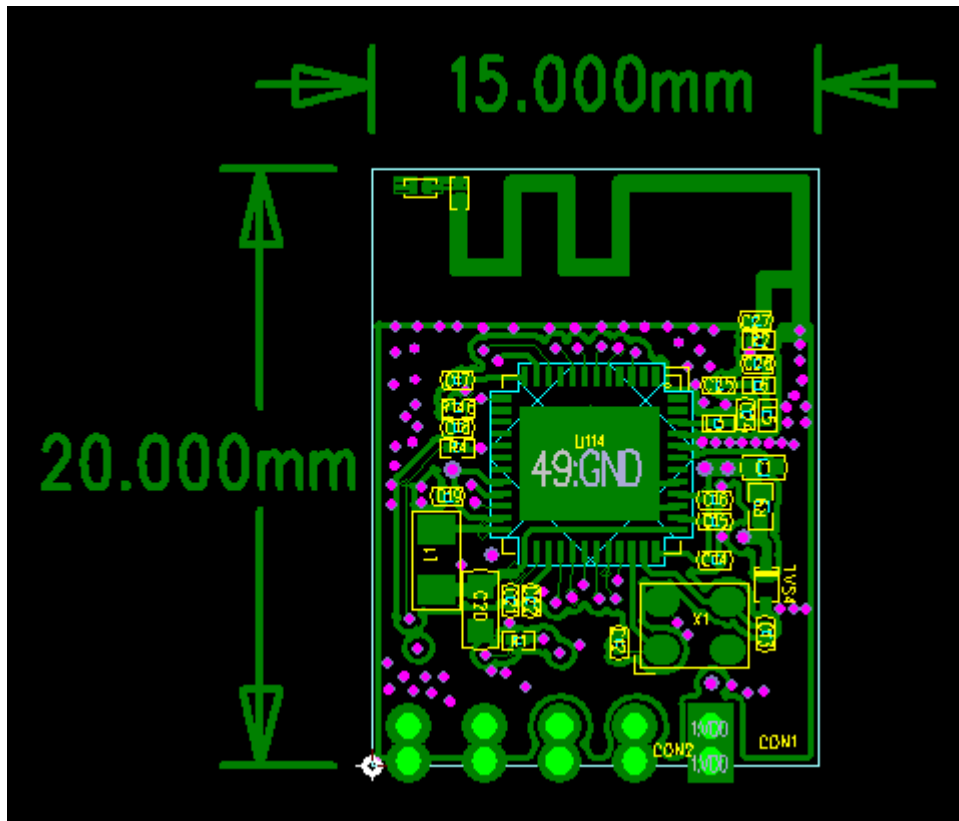


Figure 2 MMBQ11 module exterior

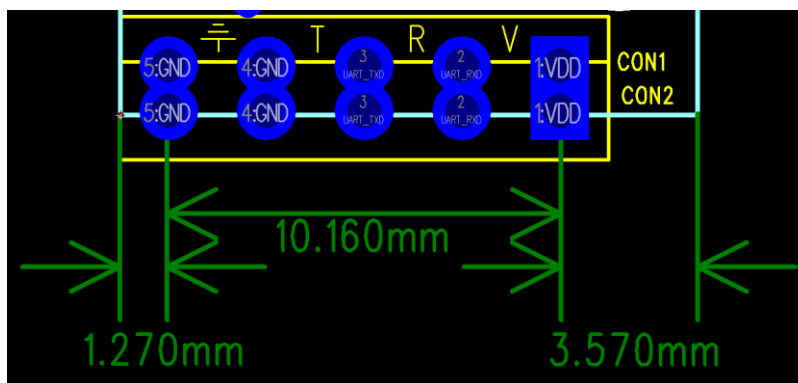


Figure 3 MMBQ11 module dimensions

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## 4. Main function description

### 4.1. MCU

The MCU of MMBQ11 is a low-power single chip, it supply integrated solution for embedded smart family system. It integrated 2.4 GHz WLAN CMOS PA and LNA. The RF front-end is single-ended double-direction. Also, it integrates LDO and DC-DC converter, which can separate digital circuit and analog circuit for lower noise.

### 4.2. Memory

#### 4.2.1. Built- in SRAM

MMBQ11 integrates 192KB SRAM.

#### 4.2.2. SPI Flash

MMBQ11 module collocates 16Mb FLASH.

### 4.3. Interface

#### 4.3.1. UART

It support two UART supported which maximum baud rate up to 6 Mbps.

### 4.4. Absolute maximum ratings

	conditions	range	unit
Storage temperature	-	-40 to 125	°C
Highest temperature for soldering	-	250	°C
<b>Supply voltage</b>	-	<b>-0.3 to +3.6</b>	<b>V</b>

Table 3 absolute maximum ratings



## 4.5. Recommended operating range

Operation condition	name	Min.	Type	Max.	Unit
Temperature		-20	20	85	°C
<b>Voltage</b>	<b>VDD</b>	<b>4.75</b>	<b>5</b>	<b>5.25</b>	<b>V</b>

Table 4 recommended work conditions

## 5. RF specification

Parameter	Min.	Type	Max.	Unit
<b>General parameter</b>				
Frequency	2412		2484	MHz
Input impedance		50		Ω
<b>Transmit power</b>				
Output power ( 802.11b@11Mbps )	17	18	19	dBm
Output power ( 802.11g@54Mbps )	14	15	16	dBm
Output power ( 802.11n@HT20,MCS7 )	14	15	16	dBm
<b>Receive sensitivity</b>				
Sensitivity ( 802.11b@11Mbps,CCK )	-86.0	-87.0	-88.0	dBm
Sensitivity ( 802.11g@54Mbps,OFDM )	-70	-72	-73.5	dBm
Sensitivity ( 802.11n@HT20,MCS7 )	-68	-70	-72	dBm
<b>Adjacent channel rejection</b>				
OFDM, 6 Mbps		37		dB
OFDM, 54 Mbps		21		dB
HT20, MCS0		37		dB

HT20, MCS7		20		dB
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Table 5 RF specification

## 6. Power consumption

Mode	Min	Type	Max	Unit
Transmit 802.11b, CCK 11Mbps, P <sub>OUT</sub> = +18.5dBm		250		mA
Transmit 802.11g, OFDM 54Mbps, P <sub>OUT</sub> = +15dBm		220		mA
Transmit 802.11n, MCS7, P <sub>OUT</sub> = +15dBm		220		mA
Receive 802.11b,CCK,1Mbps		60		mA
Receive 802.11g,OFDM,54Mbps		60		mA
Receive 802.11n,HT20,MCS7		60		mA
RX Power Saving, DTIM=1		2		mA
Sleep Mode		0.2		mA
Operating Mode		75		mA
Power Off		4		uA

Table 6 power consumption ( The data are based on 3.3V VCC. )

## 7. Recommended Reflow Profile

Peak Temperature: <250°C

Number of Times: ≤2 times

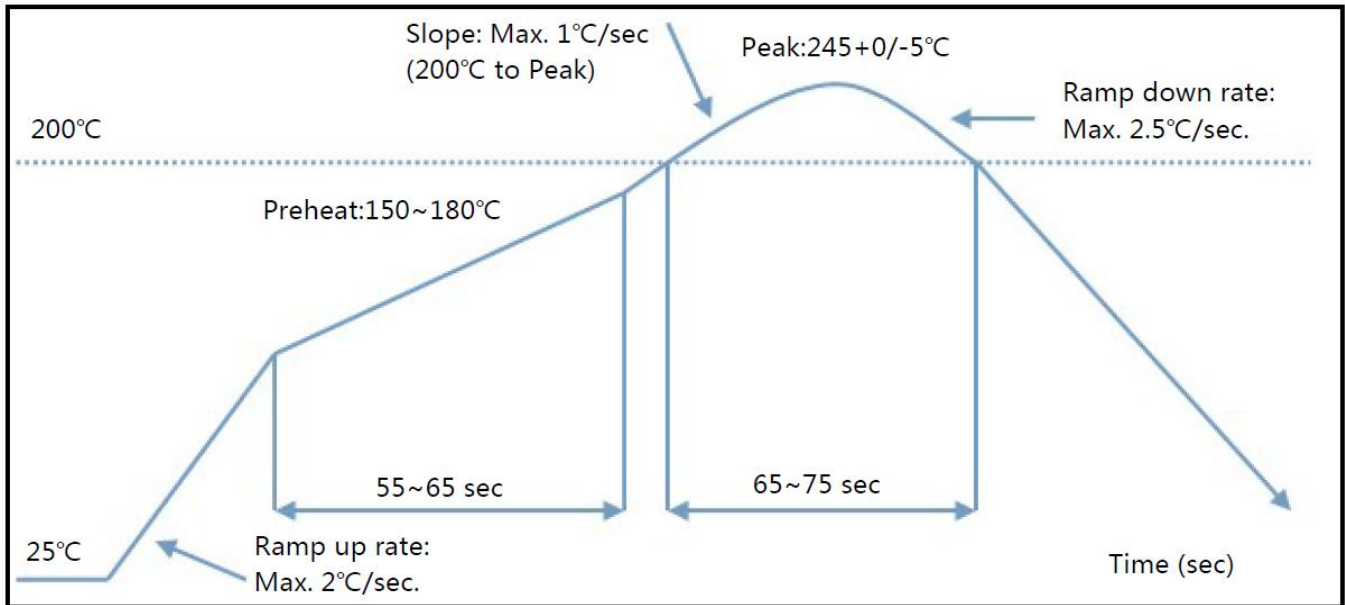


Figure 4 Soldering temperature curve

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## 8. AT instruction

### 8.1. General AT instruction description

#### 8.1.1. Reset

Instruction	AT+REBOOT
parameter	N
return	N

#### 8.1.2. Read firmware version

Instruction	AT+VERSION=?
parameter	N
return	The firmware version number
example	ssv6060>:AT+VERSION=? +VERSION:SSV6060.Z0.799.0

#### 8.1.3. Read manufacture information

Instruction	AT+MF_INFO=?
parameter	N
return	Manufacture information
example	ssv6060>:AT+MF_INFO=? +MF_INFO:iComm Company AT+VERSION=OK

#### 8.1.4. Read MAC

Instruction	AT+RADIO_READ_MAC=?
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parameter	N
return	Media Access Control Address
example	ssv6060>:AT+GET_LOCALMAC=? local_mac = 00:23:45:67:87:a5

### 8.1.5. Remove

Instruction	AT+REMOVE_CONF
parameter	N
return	Remove result.
example	ssv6060>:AT+REMOVE_CONF remove_sysconfig rlt = 0

## 8.2. Operation instruction description

### 8.2.1. Read network configuration

Instruction	AT+GET_CONFIG=?
parameter	N
return	+GET_CONFIG= wifi_mode, AP_SSID, key, key number, dhcp, IP, Submask ,Gateway
example	If dhcp =1 +GET_CONFIG=0, 7298A, 12345678, 8, 1, 0.0.0.0, 0.0.0.0, 0.0.0.0 If dhcp =0 +GET_CONFIG=0, 7298A, 12345678, 8, 0, 192.168.55.243, 255.255.255.0, 192.168.55.1

### 8.2.2. Set network configuration manually

Instruction	AT+SET_IFCONFIG= <dhcp> , <IP> , <Submask> , <Gateway>
parameter	<dhcp>: 1:Auto , 0: manual <IP>:xxx.xxx.xxx.xxx (if Dhcp =0) <Submask >: xxx.xxx.xxx.xxx (if Dhcp =0)

	<Gateway>: xxx.xxx.xxx.xxx (if Dhcp =0)
return	AT+SET_IFCONFIG =OK
example	AT+SET_IFCONFIG=0, 192. 168. 55. 243, 255. 255. 255. 0, 192. 168. 55. 1 AT+SET_IFCONFIG=1

### 8.2.3. Set Wi-Fi configuration

Instruction	AT+SET_WIFICONFIG= <mode>, <AP_SSID>, <Key>
parameter	<mode>: 0: STA-mode <AP_SSID> : AP name <Key> : AP password
return	AT+SET_WIFICONFIG=OK
example	AT+SET_WIFICONFIG=0, 7298A, 88888888

### 8.2.4. Scan Wi-Fi router

Instruction	AT+SCAN=?
parameter	N
return	+SCAN:7298A, SSV-AP5_2.4G, QA.DIR524, SSV_AP2, TP-LINK_45FE5E, D-Link_DIR-Jay, APET, test, 00X, for.interchannel.wr845n, for.interchannel.c8, Eric_Fw, SSV_AP2, icomm-softap-002345678916, Winnie_NB-PC, EnGenius_wpa2aes, AT+SCAN=OK

### 8.2.5. Connect Wi-Fi router

Instruction	AT+WIFICONNECT
parameter	N
return	AT+WIFICONNECT=OK
example	If dhcp =1 Got IP address 192.168.43.16 Got netmask 255.255.255.0

	Got DNS server 192.168.43.1 Got default router 192.168.43.1
--	----------------------------------------------------------------

### 8.2.6. Disconnect Wi-Fi router

Instruction	AT+WIFIDISCONNECT
parameter	N
return	N

### 8.2.7. Show the AP information

Instruction	AT+SHOWCONNECTAP
parameter	N
return	[0]7298A, ch: 1, rssi: -29 dBm, rssiLevel: 4, security_type = WPA2/AES , HT-MM SGI MCS7

### 8.2.8. Show all AP

Instruction	AT+SHOWALLAP
parameter	N
return	[0]7298A ch: 1, rssi: - 26 dBm, rssiLevel: 4, security_type = WPA2/AES [1]AP5_2.4G ch: 1, rssi: - 42 dBm, rssiLevel: 4, security_type = WPAWPA2/AES [2]QA.DIR524 ch: 1, rssi: - 47 dBm, rssiLevel: 4, security_type = OPEN/NONE [3]D-Link_DIR-Jay ch: 2, rssi: - 80 dBm, rssiLevel: 2, security_type = OPEN/NONE

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## 8.3. TCP/UDP port

### 8.3.1. Set TCP port

Instruction	AT+TCPCONNECT=<IP>, <PORT>
parameter	IP : xxx. xxx. xxx. xxx, ex:192. 168. 112. 10 PORT : xxxx, ex:2000
return	socket number : create socket:0

### 8.3.2. TCP transmission

Instruction	AT+TCPSEND=<socket number>, <data>
parameter	socket number : the socket number got through TCPCONNECT data : string, ex:12345678
return	AT+TCPSEND=OK

### 8.3.3. Clear TCP port

Instruction	AT+TCPDISCONNECT=<socket>
parameter	N
return	AT+TCPDISCONNECT=OK
example	ssv6060>:AT+TCPDISCONNECT=0 ssv6060>:socket:0 closed AT+TCPDISCONNECT=OK

### 8.3.4. Set up TCP SERVER link

Instruction	AT+TCPLISTEN=<PORT>
parameter	PORT: number ; ex :2000
return	AT+TCPLISTEN=OK
example	ssv6060>:AT+TCPLISTEN=2000 AT+TCPLISTEN=OK ssv6060>:new connected to listen port(2000), socket:0



### 8.3.5. Clear TCP SERVER link

Instruction	AT+TCPUNLISTEN=<PORT>
parameter	PORT: number ; ex :2000
return	AT+TCPUNLISTEN=OK

### 8.3.6. Set up UDP port

Instruction	AT+UDPCREATE=<PORT>
parameter	PORT: number ; ex :2000
return	Socket number : create socket:12
example	ssv6060>:AT+UDPCREATE=2000 create socket:12 AT+UDPCREATE=OK

### 8.3.7. UDP transmission

Instruction	AT+UDPSEND=<socket>, <Client IP>, <port>, <Data>
parameter	<socket> : the socket number got through UDPCREATE <Client IP> : xxx.xxx.xxx.xxx;ex: 192.168.112.10 <port>: port number <Data>: string
return	N
example	AT+UDPSEND=12,192.168.43.23,11111,asdfgh ssv6060>:UDP socked:12 recvdata:fgshfshfh from 192.168.43.23:61148

### 8.3.8. Close UDP

Instruction	AT+UDPCLOSE =<socket>
parameter	<socket> : the socket number got through UDPCREATE
return	AT+UDPCLOSE=OK

example	ssv6060>:AT+UDPCLOSE=12 AT+UDPCLOSE=OK
---------	-------------------------------------------

### 8.3.9. NSLOOKUP

Instruction	AT+NSLOOKUP=<domain name>
parameter	<domain name> : the URL domain name
return	The ip address of domain name.
example	ssv6060>:AT+NSLOOKUP=www.163.com start nslookup www.163.com ssv6060>:AT+NSLOOKUP=218.92.220.55

## 8.4. GPIO/PWM instructions description

### 8.4.1. Set GPIO direction

Instruction	AT+SET_GPIO=<id>,<mode>
parameter	<id>: GPIO ID. <mode>: 0:input ; 1:output.
return	+OK
example	ssv6060>:AT+SET_GPIO=2,1

### 8.4.2. Write GPIO

Instruction	AT+WRITE_GPIO=<id>,<value>
parameter	<id>: GPIO ID. <value>: 0:low ; 1:high.
return	+OK
example	ssv6060>:AT+WRITE_GPIO=2,1

### 8.4.3. Read GPIO

Instruction	AT+READ_GPIO=<Number>
parameter	<Number>
return	On: 1 ; Off: 0
example	ssv6060>:AT+READ_GPIO=3 +GPIO:1

### 8.4.4. Set PWM

Instruction	AT+SET_PWM=<id>,<Enable>,<Cycle>
parameter	<id>:GPIO ID = 5 (default GPIO8) <Enable>: 0 , 1 <Cycle>: 0 ~ 10
return	ssv6060>:AT+SET_PWM=5, 1, 0 +OK

## 8.5. SMART LINK instruction description

### 8.5.1. Change mode

Instruction	AT+ENABLE_SMARTREBOOT=<type>
parameter	<type> : 0 : NO Smart Link 1 : ICOMM Smart Link 2 : WECHAT 3 : USER
return	N
Note	Need reset to change the mode

## 8.6. SOFT AP instructions description

### 8.6.1. Enter AP mode

Instruction	AT+AP
-------------	-------

parameter	N
return	[At_AP] : +++

### 8.6.2. Exit AP mode

Instruction	AT+AP_EXIT
parameter	N
return	[At_AP_EXIT] : +++

### 8.6.3. Set SSID name in AP mode

Instruction	AT+SET_AP_SSID=<name>
parameter	<name>:SSID
return	<gconfig_set_softap_ssid> new_softap_ssid=ABC <gconfig_set_softap_ssid> i_config.softap_ssid=ABC
example	ssv6060>:AT+SET_AP_SSID=ABC [At_SET_AP_SSID] : +++ <gconfig_set_softap_ssid> new_softap_ssid=ABC <gconfig_set_softap_ssid> i_config.softap_ssid=ABC

## 8.7. RF instructions description

### 8.7.1. Start RF test mode

Instruction	AT+RADIO_RF_START=<range>
parameter	<range> = 0
return	N
example	AT+RADIO_RF_START=0

---

### 8.7.2. SET CHANNEL

Instruction	AT+RADIO_CHANNEL=<range>
parameter	<range> =1~13
return	N
example	AT+RADIO_CHANNEL=12

### 8.7.3. Wi-Fi PACKET FORMAT

Instruction	AT+RADIO_RF_RATE=<range>
parameter	<range>:0~30
return	N
example	AT+RADIO_RF_RATE=22

### 8.7.4. G/N MODE GAIN

Instruction	AT+RADIO_RF_GNGAIN= <range>
parameter	<range>:5~15
return	N
example	AT+RADIO_RF_GNGAIN=7

### 8.7.5. B MODE GAIN

Instruction	AT+RADIO_RF_BGAIN= <range>
parameter	<range>:5~15
return	N
example	AT+RADIO_RF_BGAIN=2

### 8.7.6. Read IC temperature

Instruction	AT+RADIO_RF_READ_TEMPCS=?
parameter	N
return	temperature ° C Ex: AT+RADIO_RF_READ_TEMPCS=28
example	AT+RADIO_RF_READ_TEMPCS=?

### 8.7.7. Exit RF test mode

Instruction	AT+RADIO_RF_STOP
parameter	N
return	N
example	AT+RADIO_RF_STOP

### 8.7.8. Reset

Instruction	AT+REBOOT
parameter	N
return	N
example	AT+REBOOT

### 8.7.9. Close compensation table

Instruction	AT+RADIO_RF_ENABLE_TCSR=<on/off>
parameter	<on/off>: 0:Off ; 1:On
return	N
example	AT+RADIO_RF_ENABLE_TCSR=0

### 8.7.10. Frequency offset compensation

Instruction	AT+RADIO_RF_FREQOFFSET=<p range>, <n range>
parameter	<p range>:1~16 <n range>:1~16
return	N
example	AT+RADIO_RF_FREQOFFSET=7, 7

### 8.7.11. List ALL RF compensation

Instruction	AT+RADIO_RF_DUMP
parameter	N
return	List ALL RF compensation Ex: ===== channel = 1 B power = 11 G/N power = 9 Freq. Offset = 2, 2 LDO = 4b661c PA1 = 3d5e84ff PA2 = 1457d79 PA3 = fccccce27 Boundary = 0, 0 =====
example	AT+RADIO_RF_DUMP

### 8.7.12. RF\_LDO TUNING

Instruction	AT+RADIO_RF_LDO=<n range>, <m range>
parameter	<n range>:1~8 <m range>:5~8
return	N
example	AT+RADIO_RF_LDO=7, 7

### 8.7.13. RF\_PA1 TUNING

Instruction	AT+RADIO_RF_PA1= <range>
parameter	<range>:6~12
return	N
example	AT+RADIO_RF_PA1=8

### 8.7.14. RF\_PA2 TUNING

Instruction	AT+RADIO_RF_PA2= <range>
parameter	<range>:1~7
return	N
example	AT+RADIO_RF_PA2=1

### 8.7.15. RF\_PA3 TUNING

Instruction	AT+RADIO_RF_PA3= <range>
parameter	<range>:7~14
return	N
example	AT+RADIO_RF_PA3=14

### 8.7.16. RF\_IQ PHASE

Instruction	AT+RADIO_RF_IQPHASE=<range>
parameter	<range>: (-7~7)
return	N
example	AT+RADIO_RF_IQPHASE=0



### 8.7.17. RF\_IQ AMP

Instruction	AT+RADIO_RF_IQAMP=<range>
parameter	<range>: (-7~7)
return	N
example	AT+RADIO_RF_IQAMP=0

## 8.8. Other description

### 8.8.1. Uart to Wi-Fi transfer

Instruction	AT+WIFIUART_DEMO=<en>
parameter	<en>: (enable, disable)
return	N. After enable WIFIUART mode, user use smart phone app or PC program connect to this module , the socket port is 12345, then, user can transfer data to wifi network by Data_Uart. The data string must be end with hex value 0x0D, or the length of string is equal to 128, then the datas will be sent out.
example	ssv6060>:AT+WIFIUART_DEMO=enable Call AT_WIFIUART_DEMO wifiUartDemo_process begin tcp_server_wifiUartProcess begin

#### Installation warning statement

(a)product should not collocate with other radio

(b) The MMBQ11 Wi-Fi Module is designed to comply with the ID statement. FCC ID is 2ALLFMMBQ11. The host system using MMBQ11 Wi-Fi Module, should have label indicated FCC ID 2ALLFMMBQ11

(c) If you buy this module,you only use the the PCB antenna(ANT Gain:0dBi) of WIFI modular,Do not use the other antenna

(d): The MMBQ11 Wi-Fi Module is Only applicable for the mobile device.

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## **FCC Statement**

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception,

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## **FCC RF Radiation Exposure Statement**

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.