



ESP-14 WiFi Module

Version1.0

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1. Preambles

ESP8266-14 WIFI-MCU is a low-cost communication and control module, built-in ESP8266 WIFI communication IC and STM8s003F3P6 microcontroller.

ESP-14 module has a built-in powerful STMs8003F3P6 chips, pick out all the pins, serial port can connected to the serial port of the ESP8266, users can write STM8 program, through the AT command control WIFI Internet capability.

1.1. Features

- 802.11 b/g/n
- Embed STM8s003F3P6 MCU and ESP8266 IC.
- MCU – STMicro STMS003F3P6 8-bit MCU @ 16 MHz with 1KB RAM, 8KB flash, and 128 bytes EEPROM
- STM8S controls ESP8266 by AT commands and all but one of the I/Os are directly connected to STM8S
- I/Os: STM8: 15 GPIOs also supporting I2C, SPI, UART, and up to 5 10-bit ADC
ESP8266: E_GPIO0 to select operating mode (running or download)
- Power supply:3.3v
- Power Consumption – System Standby mode 70 mA; 0.5 μ A shutdown @3.3V
- Support STA/AP/STA+AP operation modes
- Support Smart Link Function for both Android and iOS devices

1.2. Parameters

Table 1 Parameters

Categories	Items	Values
WiFi Paramters	WiFi Protocles	802.11 b/g/n
	Frequency Range	2.4GHz-2.5GHz (2400M-2483.5M)
Hardware Paramaters	Peripheral Bus	UART/HSPI/I2C/I2S/Ir Remote Contorl
		GPIO/PWM
	Operating Voltage	3.0~3.6V
	Operating Current	Average value: 80mA
	Operating Temperature Range	-40°~125°
	Ambient Temperature Range	Normal temperature
	Package Size	14.3mm*24.8mm*3mm
	External Interface	N/A
Software Paramaters	Wi-Fi mode	station/softAP/SoftAP+station
	Security	WPA/WPA2
	Encryption	WEP/TKIP/AES
	Firmware Upgrade	UART Download / OTA (via network) / download and write firmware via host
	Ssoftware Development	Supports Cloud Server Development / SDK for custom firmware development
	Network Protocols	IPv4, TCP/UDP/HTTP/FTP
	User Configuration	AT Instruction Set, Cloud Server, Android/iOS App

2. Pin Descriptions

There are altogether 22 pin counts, the definitions of which are described in Table 2 below.

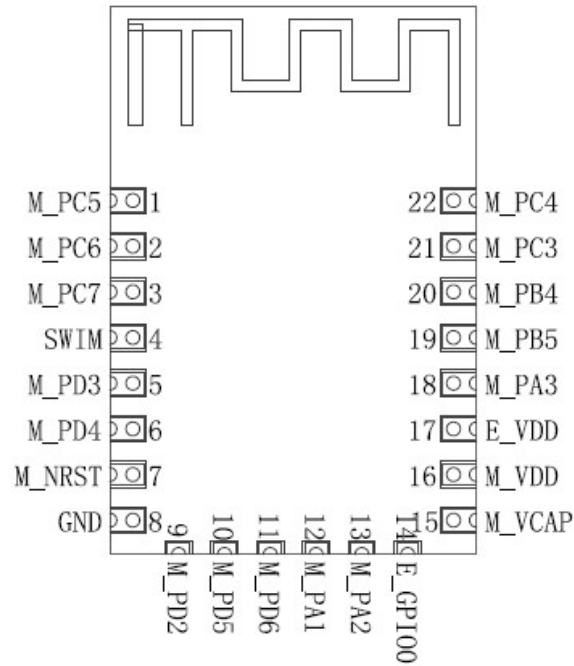


Table 2 Pin Design

Table 3 Pin Descriptions

NO	Pin Name	Function
1	M_PC5	STM8 PC5
2	M_PC6	STM8 PC6
3	M_PC7	STM8 PC7
4	SWIM	Download interface Pin
5	M_PD3	STM8 PD3
6	M_PD4	STM8 PD4
7	M_NRST	STM8 NRST

8	GND	GND
9	M_PD2	STM8 PD2
10	M_PD5	STM8 PD5(UART1_TX) OR ESP8266_RXD0
11	M_PD6	STM8 PD6(UART1_RX) OR ESP8266_TXD0
12	M_PA1	STM8 PA1OR Crystal input port
13	M_PA2	STM8 PA2 OR Crystal output port
14	E_GPIO0	ESP8266 GPIO0 1) WiFi Status: WiFi led control signal 2) working mode selection: Pull up: Flash boot, working mode Pull down: UART download, Download mode
15	M_VCAP	STM8 VCAP
16	M_VDD	STM8 powered foot
17	E_VDD	ESP8266 powered foot
18	M_PA3	M_PA3
19	M_PB5	M_PB5
20	M_PB4	M_PB4
21	M_PC3	M_PC3
22	M_PC4	M_PC4

3. Packaging and Dimension

The external size of the module is 24mm*16mm*3mm, as is illustrated in Figure 3 below. The type of flash integrated in this module is an SPI flash, the capacity of which is 1 MB, and the package size of which is SOP-210mil. The antenna applied on this module is a PCB-on-board antenna.

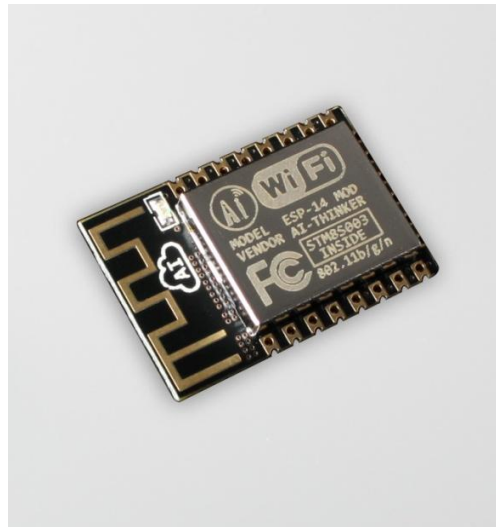


Figure 2 [Module Pin Counts, 22 pin, 24 mm x 16 mm x 3.0 mm]

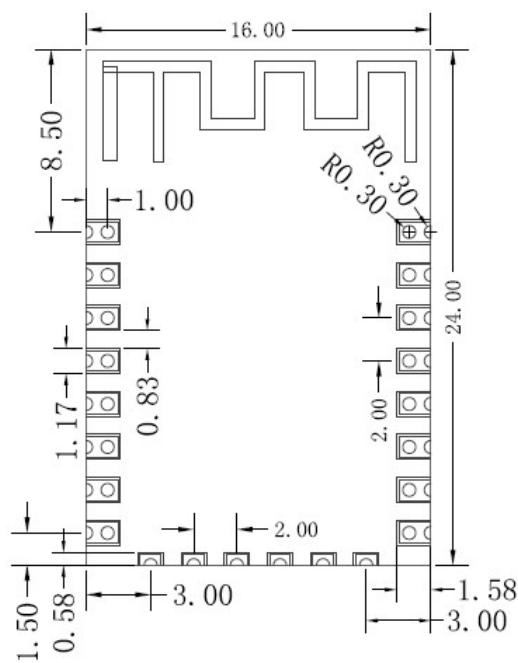


Figure 3 Top View of ESP-14 WiFi Module

Table 4 Dimension of ESP-14 WiFi Module

Length	Width	Height	PAD Size(Bottom)	Pin Pitch
24mm	16mm	3 mm	0.9 mm x 1.7 mm	2mm

4. RF Performance

Table 5 RF Performance

Description	Min	Typ.	Max	Unit
Input frequency	2400		2483.5	MHz
Input impedance		50		ohm
Input impedance			-10	dB
Output power of PA for 72.2Mbps	15.5	16.5	17.5	dBm
Output power of PA for 11b mode	19.5	20.5	21.5	dBm
Sensitivity				
CCK, 1 Mbps		-98		dBm
CCK, 11 Mbps		-91		dBm
6 Mbps (1/2 BPSK)		-93		dBm
54 Mbps (3/4 64-QAM)		-75		dBm
HT20, MCS7 (65 Mbps, 72.2 Mbps)		-72		dBm

Adjacent Channel Rejection				
OFDM, 6 Mbps		37		dB
OFDM, 54 Mbps		21		dB
HT20, MCS0		37		dB
HT20, MCS7		20		dB

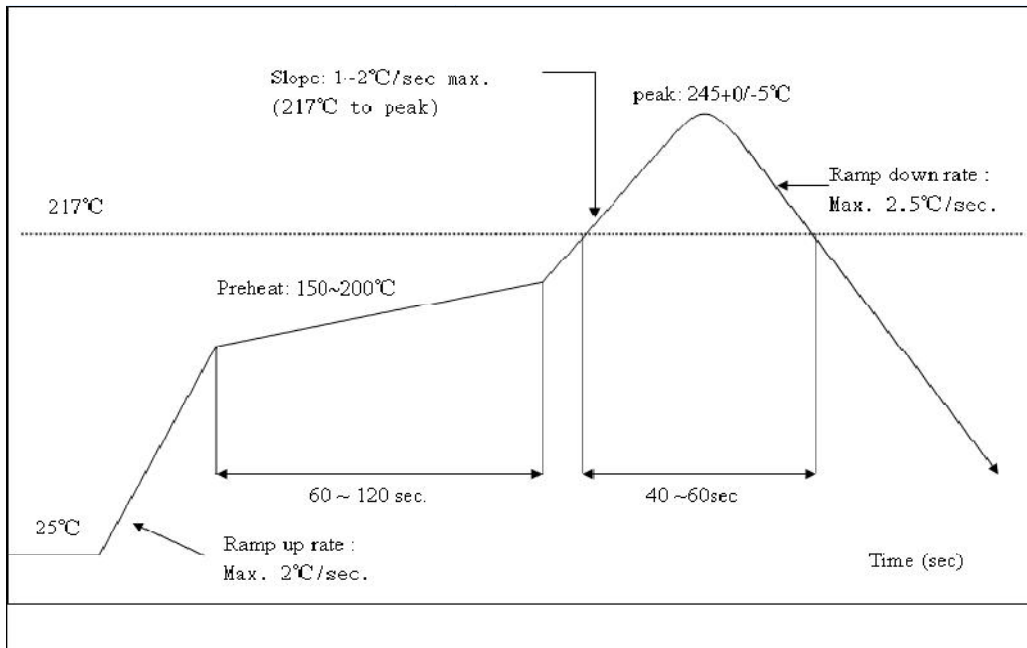
5. Power Consumption

Table 6 Power Consumption

Parameters	Min	Typical	Max	Unit
Tx802.11b, CCK 11Mbps, P OUT=+19.5dBm		215		mA
Tx 802.11g, OFDM 54Mbps, P OUT =+18.5dBm		197		mA
Tx 802.11n, MCS7, P OUT =+16dBm		145		mA
Tx 802.11n, MCS7, P OUT =+14dBm		135		
Rx 802.11b, 1024 bytes packet length , -80dBm		100		mA
Rx 802.11g, 1024 bytes packet length , -70dBm		100		mA
Rx 802.11n, 1024 bytes packet length , -65dBm		102		mA
System standby mode		70		mA
Power off		0.5		mA

6. Reflow Oven Temperatur

Refer to IPC/JEDEC standard; Peak Temperature : $<250^{\circ}\text{C}$; Number of Times: ≤ 2 times;



7.Schematics

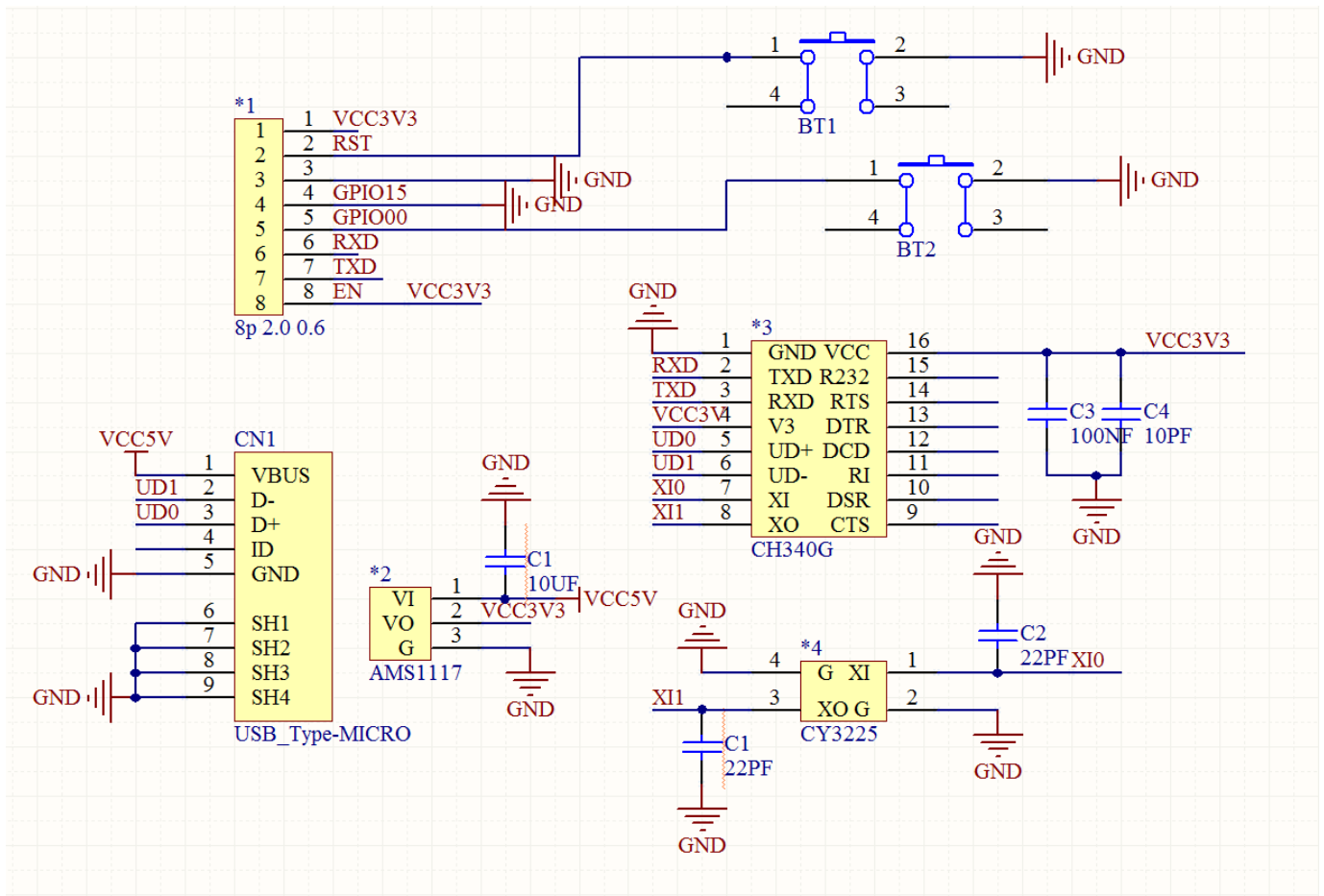


Figure 4 Schematics of ESP-14 WiFi Module

8. AT Command

8.1. Basic AT Command

The rules:

CMD type	Rule	return and state
Carry our CMD	AT	OK

8.2.WiFi function AT Command

8.2.1 Choose WiFi Application mode: AT+CWMODE

The rules:

CMD type	Rule	Return and state
Set CMD	AT+CWMODE = <mode>	OK
		Effective CMD need to restart (AT+RST)
Search CMD	AT+CWMODE?	+CWMODE:<mode>
		OK
Test CMD	AT+CWMODE?	Which mode in current?
		+CWMODE:(<mode>value list)
		OK
		Which mode can be support in current?

Parameter Definition:

parameter	Definition	value	Value instruction
<mode>	WiFi application mode	1	Station mode
		2	AP mode
		3	AP+Station mode

8.2.2. List the available access points: AT+CWLAP

The rules:

CMD type	rule	Return and state
Set CMD	AT+CWLAP	+CWLAP: <ecn>,<ssid>,<rssi>[,<mode>]
		OK
		This CMD return AP list

Parameter definition:

parameter	Definition	value	Value instruction
<ecn>	Data encryption	0	OPEN
		1	WEP
		2	WPA_PSK
		3	WPA2_PSK
		4	WPA_WPA2_PSK
<ssid>	Name of access point		Parameter of character string
<rssi>	Signal intensity		
<mode>	Access mode	0	Manual connection
		1	Automatic connection

8.2.3 join in access point: AT+CWJAP

rules:

CMD type	rules	returnand state
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Set CMD	AT+CWJAP=<ssid>,<pwd>	OK or ERROR
		Join AP succeed then return OK, failed then return ERROR
Serch CMD	AT+CWJAP?	+CWJAP:<ssid>
		OK
		Return to choose AP in current

Parameter definition:

parameter	definition	value	Value instruction
<ssid>	Name of access point		character string
<pwd>	password		String type, up to 64 bytes, ASCII code

8.2.4 .exit the access point :AT+CWQAP

rules:

CMD type	rules	Return and state
Set CMD	AT+CWQAP	OK
		Means quit AP
Test CMD	AT+CWQAP=?	OK
		Check this CMD can be support or not

8.2.5.The parameter of Set AP mode :AT+CWSAP

rules:

CMD type	rules	Return and state
Set CMD	AT+CWSAP=<ssid>,<pwd>,<chl>, <ecn>	OK
		Succeed parameter
Search CMD	AT+CWSAP?	OK
		Check the parameter current

Parameter definition:

parameter	definition	value	Value instruction
<ecn>	Password	0	OPEN
		1	WEP
		2	WPA_PSK
		3	WPA2_PSK
		4	WPA_WPA2_PSK
<ssid>	Connect access point		character string
<pwd>	password		Check this CMD can be support or not
<chl>	signal		

8.3.TCPIP ATCMD

8.3.1.Bulid TCP/UDP connect: AT+CIPSTART

rules:

Cmd type	rule	Return and state
Set CMD	<p>Signal contact (+CIPMUX=0):</p> <p>AT+CIPSTART=<type>,<addr>,<port></p> <p>Multiple connect (+CIPMUX=1):</p> <p>AT+CIPSTART=<id>,<type>,<addr>,<port></p>	<p>Correct form , return:</p> <p>OK</p> <p>Or return:</p> <p>+CME ERROR: invalid input value</p> <p>succeed, return:</p> <p>CONNECT OK (CIPMUX=0)</p> <p><id>, CONNECT OK (CIPMUX=1)</p> <p>Connection have been succeed, return:</p> <p>ALREADY CONNECT</p> <p>Failed connection :</p> <p>CONNECT FAIL (CIPMUX=0)</p> <p><id>, CONNECT FAIL (CIPMUX=1)</p>

Parameter definition :

parameter	Definition	value	Value instruction
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<id>	Link No.	0~4	Means connection number :0 connect client or server connect, other ID jsut can be used distance server
<type>	Connect type	"TCP"/"UDP"	
<addr>	Distance service IP address		String type
<port>	the port number of Distance service		

8.3.2.Obtain TCP/UDP Connection : AT+CIPSTATUS

rules:

CMD type	rules	Return and state
Set CMD	AT+CIPSTATUS	Single connect (AT+CIPMUX=0), return: OK STATE: <sl_state>
		Multiple connect (AT+CIPMUX=1), return: OK STATE:<ml_state>
		If the configuration for the server: STATE:IP STATUS S: <sid>,<port>,<server state> C:<cid>, <TCP/UDP>, <IP address>, <port>, <client state>

Test CMD	AT+CIPSTATUS=?	return: OK
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Parameter definition:

parameter	Definition	value	Value instruction
<sl_state>	Single connect	IP INITIAL	initialize
		IP STATUS	Obtain local IP statue
		TCP CONNECTING/UDP CONNECTING	TCP connecting/UDP resisting
		CONNECT OK	Connected succeed
		TCP CLOSING/UDP CLOSING	Closing TCP connection , canceling UDP potr
<ml_state>	Multiple connect	IP INITIAL	initialize
		IP STATUS	Obtain IP status
<sid>	Service id	0~1	Value 0 and 1
<server state>	Service status	OPENING	opening
		LISTENING	listening
		CLOSING	closing
<cid>	The client id	0~4	Value 0,1,2,3,4
<IP address>	IP address	-	String type need add quotes
<port>	Server listening port number	-	integer
<client state>	Status of the client	CONNECTED	Connected
		CLOSED	Closed

8.3.3. Start multiple connection : AT+CIPMUX

rules:

CMD type	rule	Return and state
Set cmd	AT+CIPMUX=<mode>	OK
		Multiple status in current, return Link is builded
		Start multiple connect
Serch CMD	AT+CIPMUX?	+CIPMUX:<mode>
		OK
		Confirm multiple connect or not

Parameter definition:

parameter	definition	value	Value instruction
<mode>	Multiple status or not	0	Single connect mode
		1	Multiple connect mode

8.3.4.Sending data: AT+CIPSEND

rules:

CMD type	rules	Return and state

Set order	Single connect (+CIPMUX=0): AT+CIPSEND=<length>	response	change row return before module receive CMD ">", then received data, when data up to length send data Connect fail or not build connect , return ERROR , if send data succeed return SEND OK
	Multiple connect(+CIPMUX=1): AT+CIPSEND=<id>,<length>	State	Send pecify length data
Test order	AT+CIPSEND?	response	Single connect (AT+CIPMUX=0)return : +CIPSEND: <length>
			Multiple (AT+CIPMUX=1)return: +CIPSEND: <0-7>,<length>
Carry out CMD	AT+CIPSEND	state	AT+CIPMODE=1 as client mode, enter the passthrough mode (Need to support hardware flow control. Otherwise, a large number of data will be lost datah mode) change row return before module receive CMD ">", And then will send a serial port receives the data。

Parameter definition:

parameter	definition	value	Value instruction
<length>	Length of data		Units:byte
<id>	Link No.	0~4	Connect number

8.3.5.Close TCP/UDP connect : AT+CIPCLOSE

rules:

CMD type	rules	Return and state
Set CMD	Signal connect AT+CIPCLOSE=<id>	return: CLOSE OK
	Multiple connect AT+CIPCLOSE=<n>[,<id>]	return: <n>,CLOSE OK
Carry out CMD	AT+CIPCLOSE	Closed succeed , back to : CLOSE OK Closed failed , back to : ERROR
Test order	AT+CIPCLOSE?	Back to : OK
Ti	<ul style="list-style-type: none"> ● Carry out CMD only for signal connect , when multiple connect should back to ERROR ● Carry out AT+CIPCLOSE only for TCP/UDP CONNECTING or CONNECT OK closing connection , closed failed will be back to ERROR ● Single connect mode, the status IP CLOSE 	

Parameter definition :

parameter	Definition	value	Value instruction
<id>	Closed mode	0	Slowly closed
		1	Quick closed

<n>	Link No.	0~7	Integer means connection number
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8.3.6.Obtain local IP address: AT+CIFSR

rules:

CMD type	rules	Response and state	
Set CMD	AT+CIFSR	response	+ CIFSR:<IP address> OK or ERROR
Test CMD	AT+CIFSR=?	response	OK

Parameter definition :

parameter	definition	value	Value instruction
<IP address>	Current IP add(station)		

8.3.7.Choose TCPIP application mode: AT+CIPMODE

rules:

CMD type	rule	return
Set CMD	AT+CIPMODE=<mode>	OK
Search CMD	AT+CIPMODE?	+CIPMODE: <mode> OK

Parameter definition :

parameter	Definition	value	Value instruction
<mode>	TCPIP application mode	0	The transparent transmission mode, the default mode
		1	Transparent transmission mode

8.3.8. the time setting of service disconnect overtime : AT+CIPSTO

CMD type	rules	Back and state
Set cmd	AT+CIPSTO=<server timeout >	OK
Search cmd	AT+CIPSTO?	+ CIPSTO:<server timeout> OK

Parameter definition:

parameter	Definition	value	Value instruction
<server timeout >	the time setting of service disconnect overtime	0~28800(s)	This CMD can be used to setting overtime , service will disconnect at that time

8.3.9. Setting baud rate: AT+CIOBAUD

rules:

CMD type	rules	Return and back
Set CMD	AT+CIOBAUD=<rate>	return: OK

Default baud rate is 9600

Parameter definition:

parameter	definition	value	Value instruction
< rate >	Baud rate, Unit:bps	<u>0</u>	Moderate baud rate
		110	
		300	
		1200	
		2400	
		4800	
		9600	
		14400	
		19200	
		28800	
		38400	
		57600	
		115200	
		230400	
		460800	
921600			