



# **ESP8266 AT Command Examples**

**Version 0.4**

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## 1. Preambles

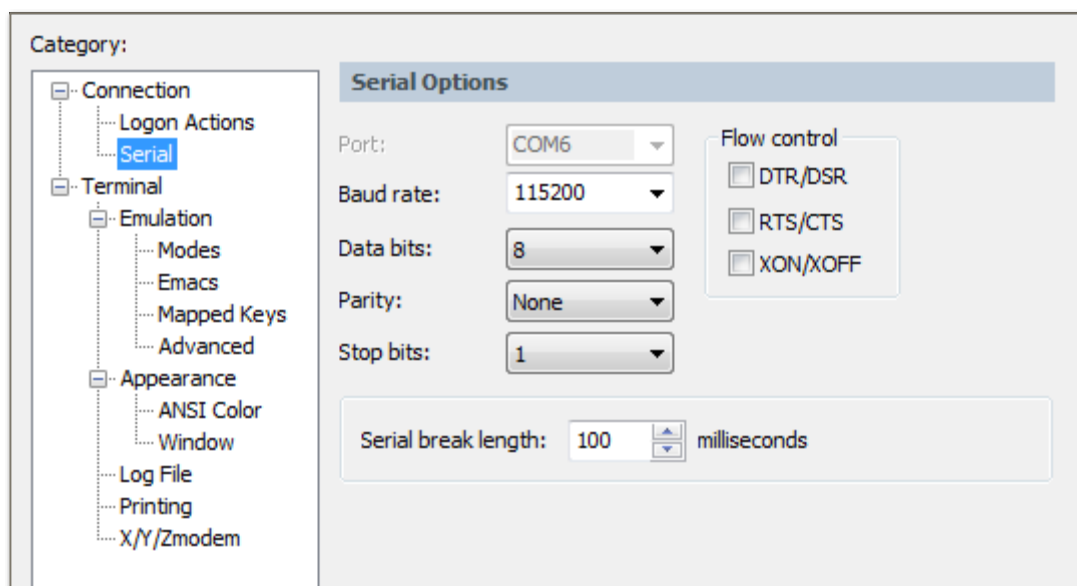
Herein we introduces some specific examples on the usage of Espressif AT Commands. For more information about the complete instruction set, please refer to Espressif AT Instruction Set documentation.

If you have any questions about AT, please contact us: [support-at@espressif.com](mailto:support-at@espressif.com)

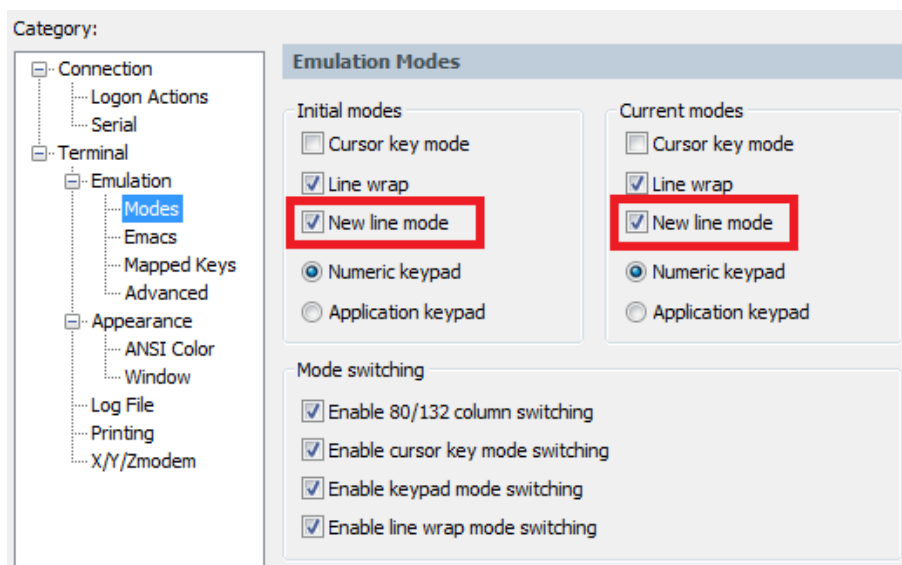
## 2. User Guide

(1) First flash in blank.bin (contains default Wi-Fi parameter settings) into the ESP8266 device, then flash in the BIN program that supports AT commands ([/esp\\_iot\\_sdk/bin/at](#)).

(2) Power on device and set serial baud rate to 115200. Enter AT commands.



**Note:** Please pay attention to the new line mode, AT command need `"/r/n"` to be the end.





## 2.1. Single Connection as TCP Client

- Set WiFi mode:

```
AT+CWMODE=3      // softAP+station mode
Response :OK
```

- Connect to router:

```
AT+CWJAP="SSID", "password"    // SSID and password of router
Response :OK
```

- Query device's IP:

```
AT+CIFSR
Response :192.168.3.106    // Device got an IP from router.
```

- Connect PC to the same router that ESP8266 is connected to.

Using a network tool (eg: "[NetAssist.exe](#)") on the computer to create a server.





- **ESP8266 connect to server as a client:**

```
AT+CIPSTART="TCP", "192.168.3.116", 8080 //protocol, server IP & port
Response :OK
```

- **Send data:**

```
AT+CIPSEND=4 // set data length which will be sent, such as 4 bytes

>DGFY // enter the data, no CR
Response :SEND OK
```

**Note:** If the number of bytes sent is bigger than the size defined (**n**), will reply busy, and after sending n number of bytes, reply **SEND OK**.

- **Receive data:**

```
+IPD, n: xxxxxxxxxxx // received n bytes, data=xxxxxxxxxxx
```

## 2.2. Transparent Transmission

Transparent transmission is enabled only when ESP8266 is working as a single connection.

An example of how ESP8266 execute transparent transmission when it is working in station mode is shown here. When ESP8266 is working in softAP mode, it can execute transparent transmission in the similar way as AT commands. For more information about this, please refer to document ["ESP8266 AT Instruction Set"](#).

- **Set WiFi mode :**

```
AT+CWMODE=3 // softAP+station mode
Response :OK
```

- **Connect to router:**

```
AT+CWJAP="SSID", "password" // SSID and password of router
Response :OK
```

- **Query device's IP:**

```
AT+CIFSR
Response :192.168.101.105 // Device's IP that got from router.
```

- Connect PC to the same router that ESP8266 is connected to.



Using a network tool (eg: "NetAssist.exe") on the computer to create a server.



- **Device connect to server:**

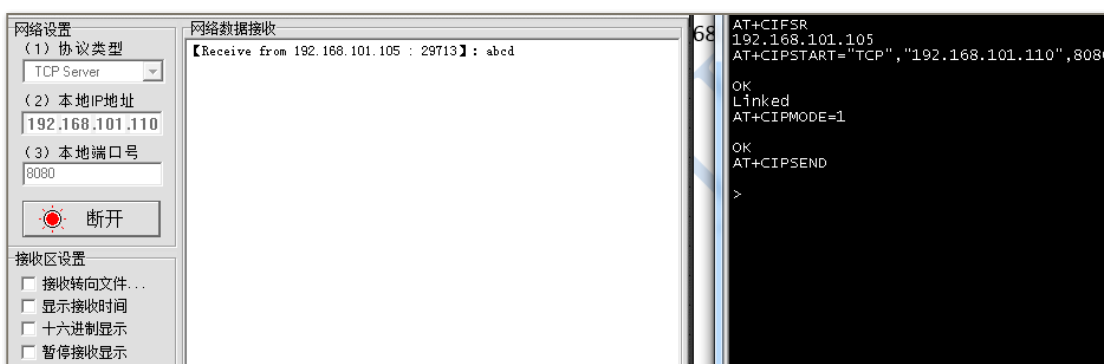
```
AT+CIPSTART="TCP", "192.168.101.110", 8080 // protocol、server IP & port
Response :OK
        Linked
```

- **Enable transparent transmission mode:**

```
AT+CIPMODE=1
Response :OK
```

- **Start sending data:**

```
AT+CIPSEND
Response: > //From now on, data received from UART will be
transparent transmitted to server.
```

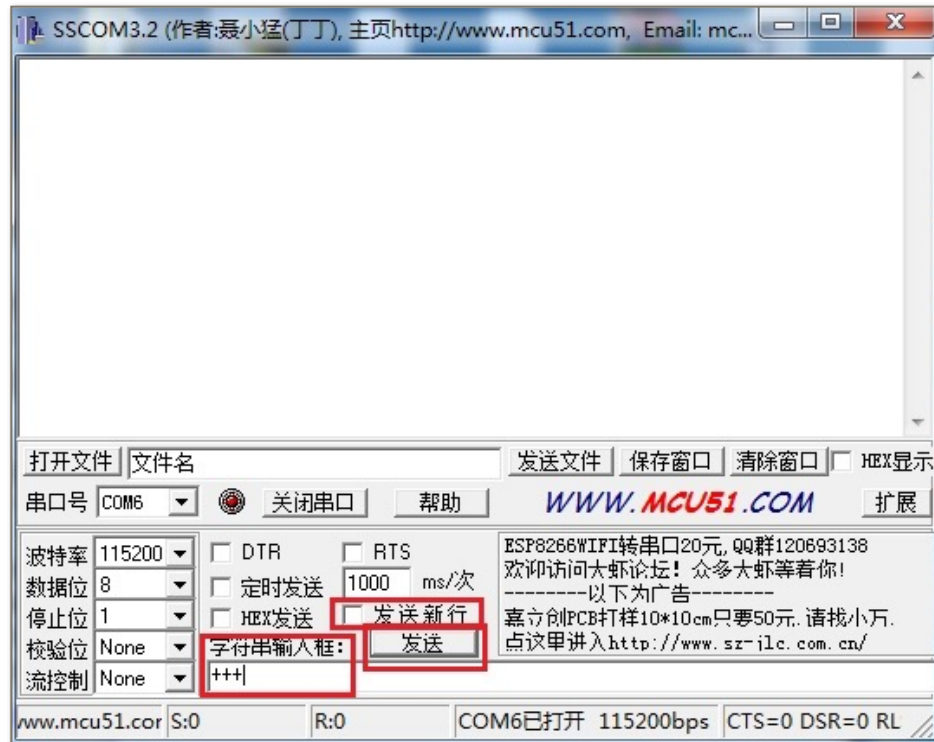


- **Stop sending data:**



If a packet of data that contains only “+++”, then the transparent transmission process will be stopped

Please be noted that if you input “+++” directly by typing, the “+++”, may not be recognised as three consecutive “+” because of the Prolonged time when typing, therefore, it’s suggested that the following tools shall be employed:



Input Characters: +++

New Line Mode : please don't select the New Line Mode

Click “Send”

**Note:** The aim of ending “+++” is to exit transparent transmission and turn back to accept normal AT command, while TCP still remains connected. However, we can also use command “[AT+CIPSEND](#)” to turn back into transparent transmission.

- **Delete TCP connection:**

```
AT+CIPCLOSE
Response :CLOSED  OK
```





## 2.3. Multiple Connection as TCP Server

When ESP8266 is working as a TCP server, a multiple of connections shall be maintained. That is to say, there should be more than one client connecting to ESP8266.

Here is an example showing how TCP server is realized when ESP8266 is working in softAP mode:

- **Set WiFi mode :**

```
AT+CWMODE=3      // softAP+station mode
Response :OK
```

- **Enable multiPle connection:**

```
AT+CIPMUX=1
Response :OK
```

- **Setup server:**

```
AT+CIPSERVER=1    // default port = 333
Response :OK
```

- After PC is connected to the softAP of the device, the PC will connect to device as a client.



**Note:** When ESP8266 is working as a server, there exists a timeout mechanism. That is to say, if the client is connected to the server, whereas there is no data transmission for a period of time, then the server will stop the connection with the client. To avoid such problems, please set up a data transmission circulation every two seconds.



- **Send data:**

```
// ID number of connection is defaulted to be 0.  
AT+CIPSEND=0, 4 // send 4 bytes to connection NO.0  
  
>iopd // enter the data, no CR  
Response :SEND OK
```

**Note:** If the number of bytes sent is bigger than the size defined (n), will reply busy, and after sending n number of bytes, reply SEND OK.

- **Receive data:**

```
+IPD, 0, n: xxxxxxxxxxxx // received n bytes, data = xxxxxxxxxxxx
```

- **Delete TCP connection:**

```
AT+CIPCLOSE=0 // Delete NO.0 connection.  
Response :0, CLOSED OK
```



## 2.4. UDP Transmission

UDP transmission is established via [AT+CIPSTART](#). There is no such definition as UDP server or UDP client. For more information about how to realize UDP transmission, please refer to document on "[ESP8266 AT Instruction Set](#)".

- **Set WiFi mode :**

```
AT+CWMODE=3      // softAP+station mode
Response :OK
```

- **Connect to router:**

```
AT+CWJAP="SSID", "password"      // SSID and password of router
Response :OK
```

- **Query device's IP:**

```
AT+CIFSR
Response :+CIFSR: STAIP, "192.168.101.104" // IP address of ESP8266 station
```

- Connect PC to the same router as ESP8266 is connected to.

Using a network tool (eg: "[NetAssist.exe](#)") on the computer to create a UDP .



Below is two examples on UDP transmission.



### 1. UDP (remote IP and port are fixed)

In UDP transmission, whether remote IP and port is fixed or not is decided by the last parameter of "AT+CIPSTART". "0" means that the remote IP and port is fixed and cannot be changed. A specific ID is given to such connection, making sure that the data sender and receiver will not be replaced by other devices.

- **Enable multiple connection:**

```
AT+CIPMUX=1
Response :OK
```

- Create a UDP transmission, for example, ID is 4.

```
AT+CIPSTART=4, "UDP", "192.168.101.110", 8080, 1112, 0
Response :4, CONNECT OK
```

**Note :**

"192.168.101.110", 8080 here is the remote IP and port of UDP transmission of the opposite side, i.e., the configuration set by PC.

1112 is the local port of ESP8266. User can self-define this port. The value of this port will be random if it's not defined beforehand.

0 means that the opposite terminal will not be changed though UDP transmission is established and data is transmitted to ESP8266 UDP port 1112. For example, in this case, if another PC also creates a UDP entity and sends data to ESP8266 port 1112. For example, ESP8266 can receive data sent from UDP port 1112, but when data is sent using AT command "AT+CIPSEND=4, X", it will still be sent to the first PC end. If this parameter is not 0, it will send to a new PC.

- **Send data:**

```
AT+CIPSEND=4, 5 // Send 5 bytes to transmission NO.4

>DGFYQ // enter the data, no CR
Response :SEND OK
```

**Note:** If the number of bytes sent is bigger than the size defined (n), will reply busy, and after sending n number of bytes, reply **SEND OK**.

- **Receive data:**

```
+IPD, 4, n: xxxxxxxxxxxx // received n bytes, data=xxxxxxxxxxxx
```

- **Delete UDP transmission NO.4:**

```
AT+CIPCLOSE=4
Response :4, CLOSED OK
```



### 2. UDP (remote IP, port can be changed)

- Create a UDP transmission, last parameter is "2".

```
AT+CIPSTART="UDP", "192.168.101.110", 8080, 1112, 2
Response :CONNECT OK
```

#### Note :

"192.168.101.110", 8080 here refer to the remote IP and port of UDP transmission terminal which is created on PC in step 4;

1112 is the local port of ESP8266. User can self-define this port. The value of this port will be random if it's not defined beforehand.

2 means the opposite terminal of UDP transmission side will change to be the latest one that has been communicating with ESP8266.

- Send data:

```
AT+CIPSEND=5 // Send 5 bytes

>DGFYQ // enter the data, no CR
Response :SEND OK
```

**Note:** If the number of bytes sent is bigger than the size defined (n), will reply busy, and after sending n number of bytes, reply **SEND OK**.

- If you want to send data to any other UDP terminals, please set the IP and port of this terminal.

```
AT+CIPSEND=6, "192.168.101.111", 1000 // Send 6 bytes

>abcdef // enter the data, no CR
Response :SEND OK
```

- Receive data:

```
+IPD, n: xxxxxxxxxxx // received n bytes, data=xxxxxxxxxxx
```

- Delete UDP transmission:

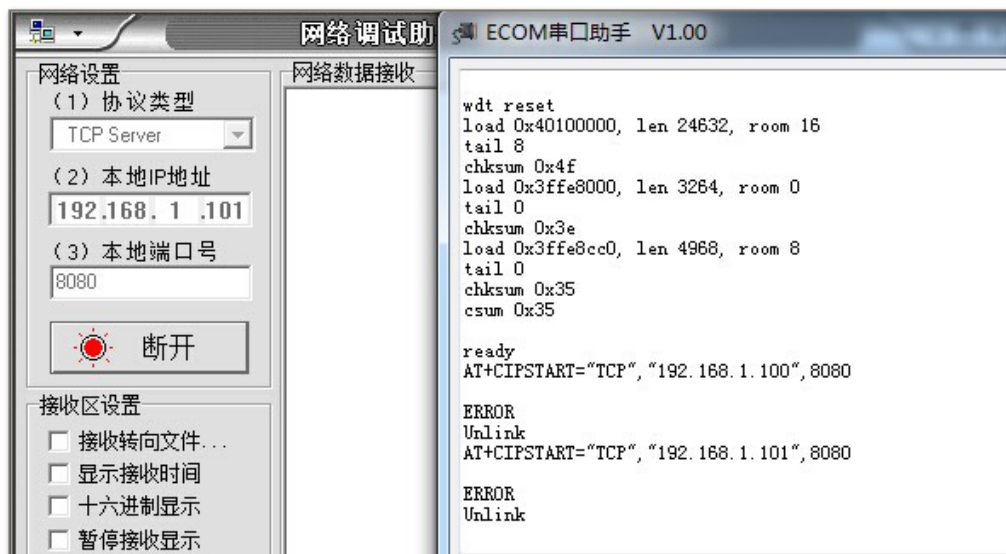
```
AT+CIPCLOSE
Response :CLOSED OK
```



### 3. Questions & Answers

If you have any questions about the execution of AT instructions, please contact [support-at@espressif.com](mailto:support-at@espressif.com). Please describe the issues that you encountered using the following format: with information as follows:

- Version info or AT Command: You can use command "**AT+GMR**" to acquire your current AT command version info.
- Hardware Module info :example AITHINK ESP-01
- Screenshot of the test steps, for example:



- If possible, please provide the printed log information, such as:

```
ets Jan 8 2013, rst cause: 1, boot mode: (3, 3)
```

```
load 0x40100000, len 26336, room 16
```

```
tail 0
```

```
chksum 0xde
```

```
load 0x3ffe8000, len 5672, room 8
```

```
tail 0
```

```
chksum 0x69
```

```
load 0x3ffe9630, len 8348, room 8
```

```
tail 4
```

```
chksum 0xcb
```

```
csum 0xcb
```

```
SDK version: 0.9.1
```

```
addr not ack when tx write cmd
```