

# Espressif: AT Instruction Set

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## Version Info

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2014.7.11	0.11	XuJingjie	Unvarnished transmission added
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2014.11.27	0.20	XuJingjie	1、 Added set and get APIP/APMAC/STAIP /STAMAC 2、 Added start and stop DHCP

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# 1 Overview

This is the documentation for Espressif AT command instruction set and usage.

Instruction set is divided into: Basic AT commands, Wifi function, AT commands, TCP / IP Toolbox AT commands.

Note: Please make sure that correct BIN(\esp\_iot\_sdk\bin\at) is already in the chip (ESP8266) before the AT commands listed in this documentation can be used.

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## 2 Instruction Description

Each instruction set contains four types of AT commands.

Type	Instruction Format	Description
Test	AT+<x>=?	Query the Set command or internal parameters and its range values.
Query	AT+<x>?	Returns the current value of the parameter.
Set	AT+<x>=<...>	Set the value of user-defined parameters in commands and run.
Execute	AT+<x>	Runs commands with no user-defined parameters.

Note:

1. Not all AT instruction has four commands.
2. [] = default value, not required or may not appear
3. String values require double quotation marks, for example:  
AT+CWSAP="ESP756190","21030826",1,4
4. Baud rate = 115200
5. AT instruction ends with "\r\n"

### 3 AT Instruction Listing

Instructions	Description
<b>Basic</b>	
AT	Test if AT startup
AT+RST	Restart
AT+GMR	View version info
AT+GSLP	Enter deep-sleep mode
ATE	AT commands echo
<b>Wi-Fi</b>	
AT+CWMODE	WIFI mode (station/softAP/station+softAP)
AT+CWJAP	Connect to AP
AT+CWLAP	Lists available APs
AT+CWQAP	Disconnect from AP
AT+CWSAP	Set parameters under AP mode
AT+CWLIF	Get stations' ip which are connected to ESP8266 softAP
AT+CWDHCP	Enable/Disable DHCP
AT+CIPSTAMAC	Set mac address of ESP8266 station
AT+CIPAPMAC	Set mac address of ESP8266 softAP
AT+CIPSTA	Set ip address of ESP8266 station
AT+CIPAP	Set ip address of ESP8266 softAP
<b>TCP/IP</b>	
AT+CIPSTATUS	Get connection status
AT+CIPSTART	Establish TCP connection or register UDP port
AT+CIPSEND	Send data
AT+CIPCLOSE	Close TCP/UDP connection
AT+CIFSR	Get local IP address
AT+CIPMUX	Set multiple connections mode
AT+CIPSERVER	Configure as server
AT+CIPMODE	Set transmission mode
AT+CIPSTO	Set timeout when ESP8266 runs as TCP server
AT+CIUPDATE	For OTA (upgrade through network)
<b>Data RX</b>	
+IPD	Data received from network

## 4 Basic AT Instruction Set

### 4.1 Overview

Basic	
Instruction	Description
AT	Test AT startup
AT+RST	Restart module
AT+GMR	View version info
AT+GSLP	Enter deep-sleep mode
ATE	AT commands echo or not

### 4.2 Instructions

#### 4.2.1 AT – Test AT startup

AT – Test AT startup	
Type: execute Instruction: <b>AT</b>	Response:  OK
	Param description: null

#### 4.2.2 AT+RST – Restart module

AT+RST – Restart module	
Type : execute Instruction: <b>AT+RST</b>	Response:  OK
	Param description: null

#### 4.2.3 AT+GMR – View version info

AT+GMR – View version info	
Type : execute Instruction: <b>AT+GMR</b>	Response: <number> OK
	Param description: < number > version info, length: 8 bytes



Note	For example, response is 0017xxxxxx, then 0017 means the AT version.
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#### 4.2.4 AT+GSLP – Enter deep-sleep mode

AT+GSLP – Enter deep-sleep mode	
Type : set Instruction: <b>AT+GSLP=&lt;time&gt;</b>	Response: <time> OK
	Param description: < time > ms , set the sleep time of ESP8266 in ms. ESP8266 will wake up after X ms in deep-sleep.
Note	Hardware has to support deep-sleep wake up (XPD_DCDC connects to EXT_RSTB with OR).

#### 4.2.5 ATE – AT commands echo

ATE – AT commands echo	
Type : set Instruction: <b>ATE</b>	Response: OK
	Param description: ATE0 : Disable echo ATE1 : Enable echo

## 5 WIFI functions

### 5.1 Overview

WIFI	
Instruction	Description
AT+CWMODE	WIFI mode (station/softAP/station+softAP)
AT+CWJAP	Connect to AP
AT+CWLAP	Lists available APs
AT+CWQAP	Disconnect from AP
AT+CWSAP	Set parameters under AP mode
AT+CWLIF	Get station's ip which is connected to ESP8266 softAP
AT+CWDHCP	Enable/Disable DHCP
AT+CIPSTAMAC	Set mac address of ESP8266 station

AT+CIPAPMAC	Set mac address of ESP8266 softAP
AT+CIPSTA	Set ip address of ESP8266 station
AT+CIPAP	Set ip address of ESP8266 softAP

## 5.2 Instructions

### 5.2.1 AT+CWMODE – WIFI mode

AT+CWMODE - WIFI mode (station/softAP/station+softAP)	
Type: test Function: Get value scope of wifi mode. Instruction: <b>AT+CWMODE=?</b>	Response: +CWMODE:( value scope of <mode>)  OK  Param description: <mode>1 means Station mode 2 means AP mode 3 means AP + Station mode
Type: query Function: Query ESP8266's current wifi mode. Instruction: <b>AT+CWMODE?</b>	Response: +CWMODE:<mode>  OK  Param description: The same as above.
Type: set Function: Set ESP8266 wifi mode Instruction: <b>AT+CWMODE=&lt;mode&gt;</b>	Response:  OK  Param description: The same as above.

### 5.2.2 AT+CWJAP – Connect to AP

AT+CWJAP – Connect to AP	
Type: query Function: Query AP's info which is connect by ESP8266. Instruction: <b>AT+ CWJAP?</b>	Response: + CWJAP:<ssid>  OK  Param description: <ssid> string, AP's SSID

## ESP8266EX AT Instruction Set

Type: set Function: Set AP's info which will be connect by ESP8266. Instruction: <b>AT+ CWJAP =&lt;ssid&gt;,&lt; pwd &gt;</b>	Response:  OK ERROR  Param description: <ssid> string, AP's SSID <pwd> string, MAX: 64 bytes
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### 5.2.3 AT+CWLAP – List available APs

AT+CWLAP - Lists available APs	
Type: set Function: Search available APs with specific conditions. Instruction: <b>AT+ CWLAP =</b>  <b>&lt;ssid&gt;,&lt; mac &gt;,&lt;ch&gt;</b>	Response:  + CWLAP: <ecn>,<ssid>,<rssi>,<mac>  OK ERROR  Param description: The same as below.
Type : execute Function: Lists all available APs. Instruction: <b>AT+CWLAP</b>	Response:  + CWLAP: <ecn>,<ssid>,<rssi>,<mac>  OK ERROR  Param description: < ecn >0 OPEN 1 WEP 2 WPA_PSK 3 WPA2_PSK 4 WPA_WPA2_PSK  <ssid> string, SSID of AP <rssi> signal strength <mac> string, MAC address

### 5.2.4 AT+CWQAP – Disconnect from AP

AT+CWQAP - Disconnect from AP	
Type: test Function: Only for test Instruction:	Response:  OK  Param description:

<b>AT+CWQAP=?</b>	
Type : execute Function: Disconnect from AP. Instruction:	Response:  OK
<b>AT+ CWQAP</b>	Param description:

### 5.2.5 AT+CWSAP – Configuration of softAP mode

AT+ CWSAP – Configuration of softAP mode	
Type: Query Function: Query configuration of softAP mode. Instruction:	Response: + CWSAP:<ssid>,<pwd>,<chl>,<ecn>
<b>AT+ CWSAP?</b>	Param description: The same as below.
Type: Set Function: Set configuration of softAP mode. Instruction:	Response: OK ERROR
<b>AT+ CWSAP=</b>  <b>&lt;ssid&gt;,&lt;pwd&gt;,&lt;chl&gt;,&lt;ecn&gt;</b>	Note: This CMD is only available when softAP mode enable, and need to follow by AT+RST to make it works. Param description: <ssid> string, ESP8266 softAP' SSID <pwd> string, MAX: 64 bytes <chl> channel id < ecn >0 OPEN 2 WPA_PSK 3 WPA2_PSK 4 WPA_WPA2_PSK

### 5.2.6 AT+CWLIF – IP of stations

AT+ CWLIF - ip of stations which are connected to ESP8266 softAP	
Type : execute Function: Get ip of stations which are connected to ESP8266 softAP	Response: <ip addr>  OK
	Param description:

Instruction: <b>AT+CWLIF</b>	<ip addr> ip address of stations which are connected to ESP8266 softAP
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### 5.2.7 AT+CWDHCP – Enable/Disable DHCP

AT+ CWDHCP – Enable/Disable DHCP	
Type : set Function: Enable/Disable DHCP.	Response: OK
Instruction: <b>AT+CWDHCP=&lt;mode&gt;,&lt;en&gt;</b>	Param description: <mode> 0 : set ESP8266 softAP 1 : set ESP8266 station 2 : set both softAP and station <en> 0 : Enable DHCP 1 : Disable DHCP

### 5.2.8 AT+CIPSTAMAC – Set mac address of station

AT+ CIPSTAMAC – Set mac address of ESP8266 station	
Type : query Function: Get mac address of ESP8266 station.	Response: +CIPSTAMAC:<mac> OK
Instruction: <b>AT+CIPSTAMAC?</b>	Param description: <mac> string, mac address of ESP8266 station
Type : set Function: Set mac address of ESP8266 station.	Response: OK
Instruction: <b>AT+CIPSTAMAC=&lt;mac&gt;</b>	Param description: <mac> string, mac address of ESP8266 station

### 5.2.9 AT+CIPAPMAC – Set mac address of softAP

AT+ CIPAPMAC – Set mac address of ESP8266 softAP	
Type : query Function: Get mac address of ESP8266 softAP. Instruction: <b>AT+CIPAPMAC?</b>	Response: +CIPAPMAC:<mac>  OK  Param description: <mac> string, mac address of ESP8266 softAP
Type : set Function: Set mac address of ESP8266 softAP. Instruction: <b>AT+CIPAPMAC=&lt;mac&gt;</b>	Response:  OK  Param description: <mac> string, mac address of ESP8266 softAP

### 5.2.10 AT+ CIPSTA – Set ip address of station

AT+ CIPSTA – Set ip address of ESP8266 station	
Type : query Function: Get ip address of ESP8266 station. Instruction: <b>AT+CIPSTA?</b>	Response: +CIPSTA:<ip>  OK  Param description: <ip> string, ip address of ESP8266 station
Type : set Function: Set ip address of ESP8266 station. Instruction: <b>AT+CIPSTA=&lt;ip&gt;</b>	Response:  OK  Param description: <ip> string, ip address of ESP8266 station

### 5.2.11 AT+ CIPAP – Set ip address of softAP

AT+ CIPAP – Set ip address of ESP8266 softAP	
Type : query Function:	Response: +CIPAP:<ip>

## ESP8266EX AT Instruction Set

Get ip address of ESP8266 softAP. Instruction: <b>AT+CIPAP?</b>	OK Param description: <ip> string, ip address of ESP8266 softAP
Type : set Function: Set ip address of ESP8266 softAP. Instruction: <b>AT+CIPAP=&lt;ip&gt;</b>	Response: OK Param description: <ip> string, ip address of ESP8266 softAP

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## 6 TCP/IP Related

### 6.1 Overview

TCP/IP	
Instruction	Description
AT+CIPSTATUS	Get connection status
AT+CIPSTART	Establish TCP connection or register UDP port
AT+CIPSEND	Send data
AT+CIPCLOSE	Close TCP/UDP connection
AT+CIFSR	Get local IP address
AT+CIPMUX	Set multiple connections mode
AT+CIPSERVER	Configure as server
AT+CIPMODE	Set transmission mode
AT+CIPSTO	Set timeout when ESP8266 runs as TCP server

### 6.2 TCP/IP

#### 6.2.1 AT+ CIPSTATUS – Information about connection

AT+ CIPSTATUS – Information about connection	
Type : execute Function: Get information about connection. Instruction: <b>AT+ CIPSTATUS</b>	Response: STATUS:<stat> + CIPSTATUS:<id>,<type>,<addr>,<port>,<tetype>  OK  Param description: <stat> 2: Got IP 3: Connected 4: Disconnected <id> id of the connection (0~4), for multi-connect <type> string, “TCP” or “UDP” <addr> string, IP address. <port> port number <tetype> 0: ESP8266 runs as client 1: ESP8266 runs as server



## 6.2.2 AT+CIPSTART – Start connection

AT+CIPSTART – Establish TCP connection or register UDP port, start connection	
Type : test Function: Get the information of param. Instruction: <b>AT+CIPSTART=?</b>	Response: 1) If AT+CIPMUX=0 +CIPSTART:(<type>),( <IP address>),( <port>)[ ,( <local port>),( <mode>)] +CIPSTART:(<type>),( <domain name>),( <port>)[ ,( <local port>),( <mode>)]  OK 2) If AT+CIPMUX=1 +CIPSTART:(id),( <type>),( <IP address>),( <port>)[ ,( <local port>),( <mode>)] +CIPSTART: (id), ( <type>),( <domain name>),( <port>)[ ,( <local port>),( <mode>)]  Param description: null
Type : Set Function: Start a connection as client. Instruction: 1)Single connection <b>(+CIPMUX=0)</b> <b>AT+CIPSTART=</b> <b>&lt;type&gt;,&lt;addr&gt;,&lt;port&gt;</b> <b>[,( &lt;local port&gt;),( &lt;mode&gt;)]</b> 2)Multiple connection <b>(+CIPMUX=1)</b> <b>AT+CIPSTART=</b> <b>&lt;id&gt;&lt;type&gt;,&lt;addr&gt;,&lt;port&gt;</b> <b>[,( &lt;local port&gt;),( &lt;mode&gt;)]</b>	Response: OK or ERROR If connection already exists, returns ALREAY CONNECT  Param description: <id> 0-4 , id of connection <type> string, “TCP” or “UDP” <addr> string, remote ip <port> string, remote port [ <local port>] for UDP only [ <mode>] for UDP only 0 : destination peer entity of UDP will not change. 1 : destination peer entity of UDP can change once. 2 : destination peer entity of UDP is allowed to change.  Note: [ <mode>] can only be used when [ <local port>] is set.

### 6.2.3 AT+CIPSEND – Send data

AT+CIPSEND – Send data	
Type : test Function: Only for test. Instruction: <b>AT+CIPSEND=?</b>	Response:  OK  Param description: null
Type : Set Function: Set length of the data that will be sent. For normal send. Instruction:  1) For single connection: (+CIPMUX=0) <b>AT+CIPSEND=&lt;length&gt;</b>  2) For multiple connection: (+CIPMUX=1) <b>AT+CIPSEND=</b> <b>&lt;id&gt;,&lt;length&gt;</b>	Wrap return “>” after set command. Begins receive of serial data, when data length is met, starts transmission of data.  If connection cannot be established or gets disconnected during send, returns <b>ERROR</b> If data is transmitted successfully, returns <b>SEND OK</b>  Note: This CMD Param description: <id> ID no. of transmit connection <length> data length, MAX 2048 bytes
Type : execute Function: Send data. For unvarnished transmission mode. Instruction: <b>AT+CIPSEND</b>	Response:  Wrap return “>” after execute command. Enters unvarnished transmission, 20ms interval between each packet, maximum 2048 bytes per packet. When single packet containing “+++” is received, it returns to command mode.  This command can only be used in unvarnished transmission mode which require to be single connection mode.

### 6.2.4 AT+CIPCLOSE – Close TCP or UDP connection

AT+CIPCLOSE – Close TCP or UDP connection	
Type : test Function:	Response:

Only for test. Instruction: <b>AT+CIPCLOSE=?</b>	OK
Type : Set Function: Close TCP or UDP connection. Instruction: For multiply connection mode <b>AT+CIPCLOSE=&lt;id&gt;</b>	Response: No errors, returns OK If connection <id> is disconnected, returns Link is not Param description: <id> ID no. of connection to close, when id=5, all connections will be closed. (id=5 has no effect in server mode)
Type : execute Instruction: For single connection mode <b>AT+CIPCLOSE</b>	Response: OK or If no such connection, returns ERROR Prints UNLINK when there is no connection

### 6.2.5 AT+CIFSR – Get local IP address

AT+CIFSR – Get local IP address	
Type : Test Function: Only for test. Instruction: <b>AT+CIFSR=?</b>	Response: OK
Type : Execute Function: Get local IP address. Instruction: <b>AT+ CIFSR</b>	Response: + CIFSR:<IP address> + CIFSR:<IP address> OK ERROR Param description: <IP address> IP address of ESP8266 softAP IP address of ESP8266 station

### 6.2.6 AT+ CIPMUX – Enable multiple connections

AT+ CIPMUX – Enable multiple connections or not	
Type : Query Function: Get param config. Instruction: <b>AT+ CIPMUX?</b>	Response: + CIPMUX:<mode>  OK  Param description: The same as below.
Type : Set Function: Set connection mode. Instruction: <b>AT+ CIPMUX=&lt;mode&gt;</b>	Response:  OK If already connected, returns Link is builded  Param description: <mode>0 single connection 1 multiple connection
Note	This mode can only be changed after all connections are disconnected. If server is started, reboot is required.

### 6.2.7 AT+ CIPSERVER – Configure as TCP server

AT+ CIPSERVER – Configure as TCP server	
Type : Set Function: Set TCP server. Instruction: <b>AT+ CIPSERVER= &lt;mode&gt;[,&lt;port&gt;]</b>	Response:  OK  Param description: <mode> 0 Delete server (need to follow by restart) 1 Create server <port> port number, default is 333
Note	1、Server can only be created when AT+CIPMUX=1 2、Server monitor will automatically be created when Server is created. 3、When a client is connected to the server, it will take up one connection, be gave an id.

### 6.2.8 AT+ CIPMODE – Set transfer mode

#### AT+ CIPMODE – Set transfer mode

Type : Query Function: Query transfer mode. Instruction: <b>AT+ CIPMODE?</b>	Response: + CIPMODE:<mode>  OK  Param description: The same as below.
Type : Set Function: Set transfer mode. Instruction: <b>AT+CIPMODE=&lt;mode&gt;</b>	Response:  OK If already connected, returns Link is builded  Param description: <mode>0 normal mode 1 unvarnished transmission mode

### 6.2.9 AT+ CIPSTO – Set server timeout

AT+ CIPSTO – Set server timeout	
Type : Query Function: Query server timeout. Instruction: <b>AT+CIPSTO?</b>	Response: + CIPSTO:<time>  OK  Param description: The same as below.
Type : Set Function: Set server timeout. Instruction: <b>AT+CIPSTO=&lt;time&gt;</b>	Response:  OK  Param description: < time> server timeout, range 0~7200 seconds

### 6.2.10 AT+ CIUPDATE – Update through network

AT+ CIUPDATE – update through network	
Type : execute Function: Start upgrade. Instruction: <b>AT+ CIUPDATE</b>	Response: +CIPUPDATE:<n>  OK  Param description: <n> 1 found server 2 connect server 3 got edition

### 6.2.11 +IPD – Receive network data

+IPD – Receive network data	
<p>1) Single connection:  <b>(+CIPMUX=0)</b>  <b>+IPD,&lt;len&gt;:&lt;data&gt;</b></p> <p>2) Multiple connection  <b>(+CIPMUX=1)</b>  <b>+IPD,&lt;id&gt;,&lt;len&gt;:&lt;data&gt;</b></p>	<p><b>NOTE:</b>            When the module receives network data, it will send the data through the serial port using +IPD command</p> <p><b>Param description:</b>            &lt;id&gt; id no. of connection            &lt;len&gt; data length            &lt;data&gt; data received</p>

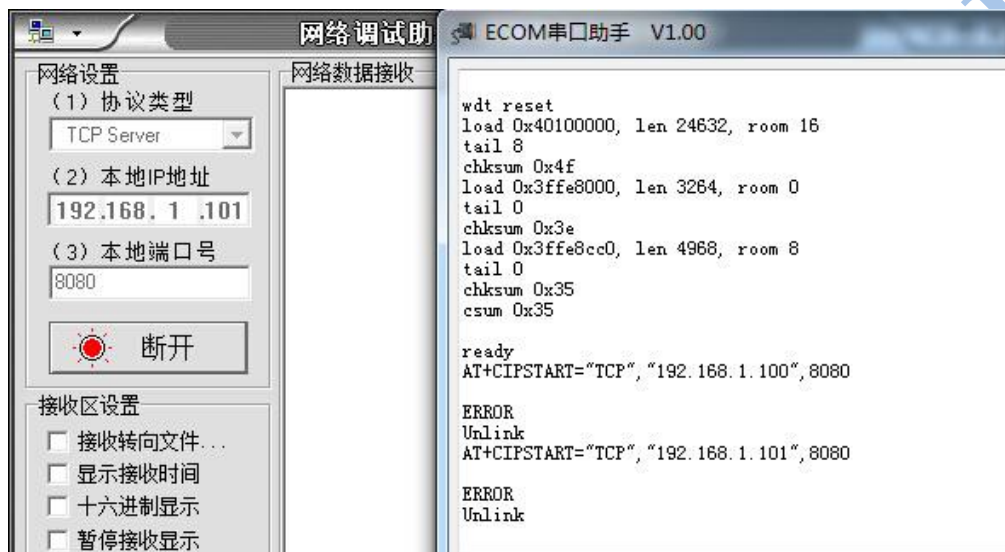
## 7 Q&A

If you have any question about AT instructions, please contact us ([support-at@espressif.com](mailto:support-at@espressif.com)) with information as follows:

(1) Version info of AT

Using “AT+GMR” to get the version info.

(2) Screenshot of the test steps, for example:



(3) Log:

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

load 0x40100000, len 26336, room 16

tail 0

checksum 0xde

load 0x3ffe8000, len 5672, room 8

tail 0

checksum 0x69

load 0x3ffe9630, len 8348, room 8

tail 4

checksum 0xcb

csum 0xcb

SDK version:0.9.1

addr not ack when tx write cmd

mode : sta(18:fe:34:97:d5:7b) + softAP(1a:fe:34:97:d5:7b)