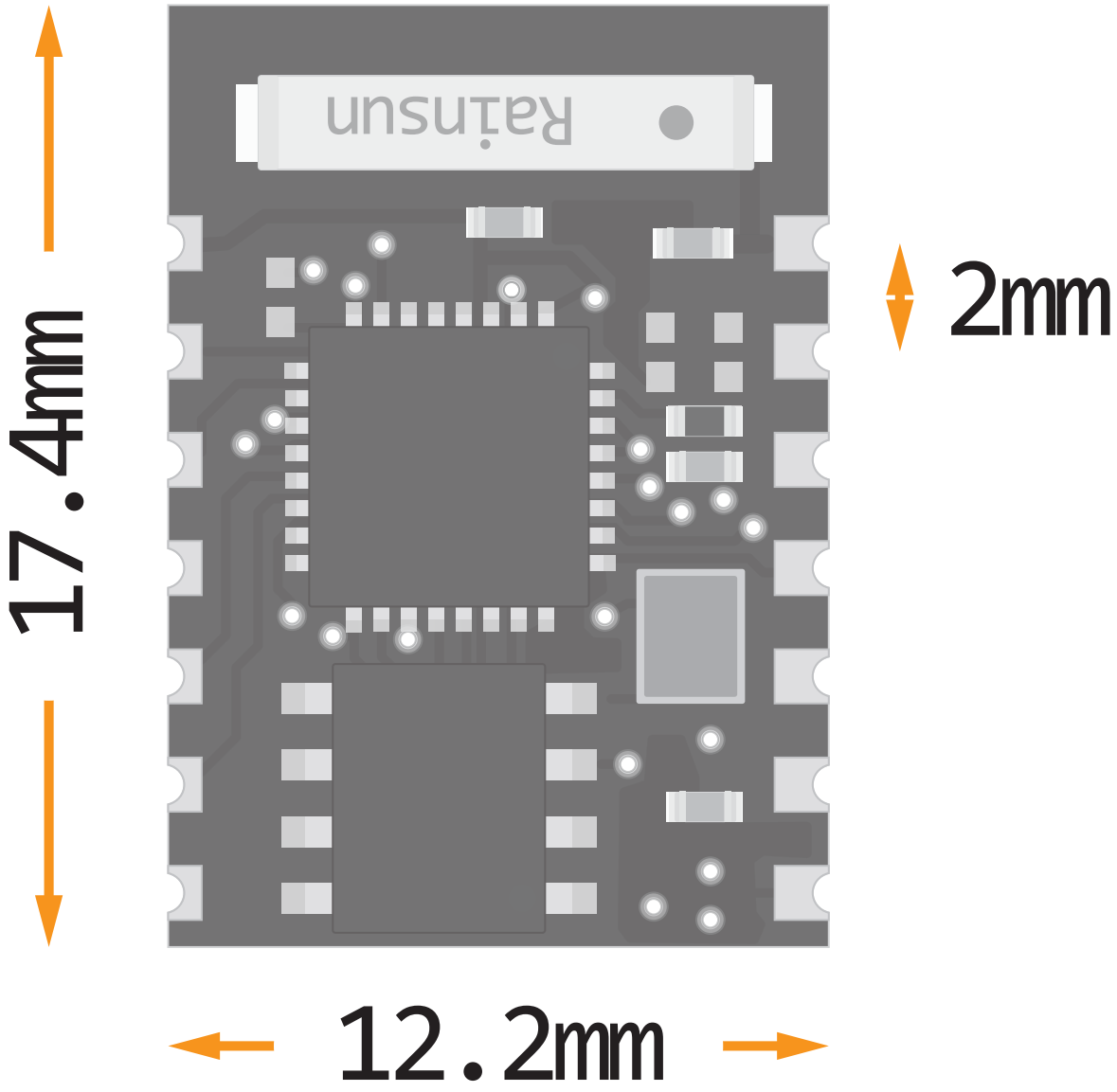
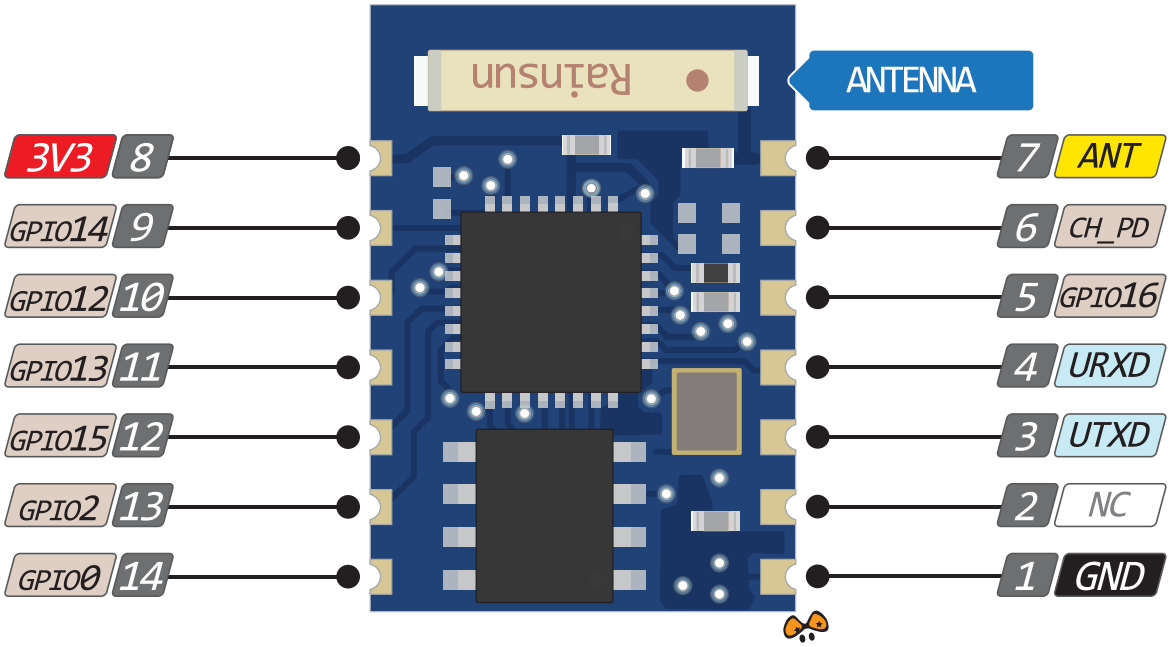
ESP8266

REFERENCE

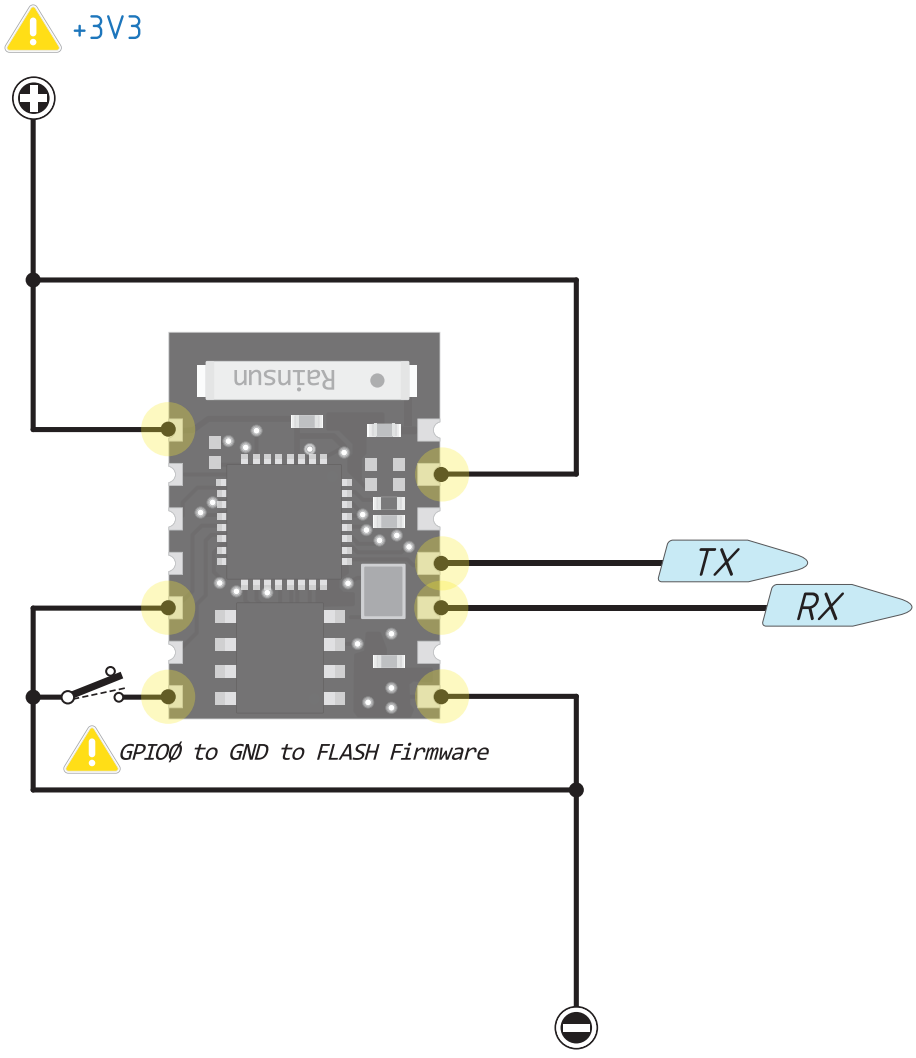
ESP8266 Dimensions



ESP8266 Pinout



ESP8266 Basic connect



AT Instruction Set
Overview

This is the documentation for ESP8266 AT command instruction set and usage. Instruction set is divided into: **Basic AT commands**, **WiFi function**, **AT commands**, **TCP/IP** Toolbox AT commands.

Version Info

Date	Version	Author	Changes
09 Dec 2014	1.0	Pighixxx	Draft

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Instruction Description

Each instruction set contains four types of AT commands.

Type	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”

AT Instruction Listing

Instruction	Description
Basic	
AT	Test AT startup
AT+RST	Restart
AT+GMR	View version info
AT+GSLP	Enter deep-sleep mode
ATE	AT commands echo
WiFi	
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
TCP/IP	
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	Force OTA(upgrade through network)
Data RX	
+IPD	Data received from network

Basic AT Instruction Set
Overview

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 on/off

Instructions

AT – Test AT startup	
Instruction: **AT**	Response: **OK** _____ Param description: null

AT+RST – Restart Module	
Instruction: **AT+RST**	Response: **OK** _____ Param description: null

AT+GMR – View version Info	
Instruction: **AT+GMR**	Response: **<number>** **OK** _____ Param description: <number> Version Info, length: 8bytes
Note: response is 0017xxxxxx, then 0017 means the AT version.	

WiFi Functions
Overview

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 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

Instructions

AT+CWMODE – WiFi mode(station/softAP/station+softAP)	
Type: **test** Function: **Get value scope of WiFi mode.** Instruction: **AT+CWMODE=?**	Response: **+CWMODE:(value scope of <mode>)** **OK** Param description: <mode> 1 – Station Mode 2 – AP Mode 3 – AP + Station Mode
Type: **query** Function: **Query ESP8266's current wifi mode.** Instruction: **AT+CWMODE?**	Response: **+CWMODE:<mode>** **OK** Param description: <mode> 1 – Station Mode 2 – AP Mode 3 – AP + Station Mode
Type: **set** Function: **Set ESP8266 wifi mode.** Instruction: **AT+CWMODE=<mode>**	Response: **OK** Param description: <mode> 1 – Station Mode 2 – AP Mode 3 – AP + Station Mode

AT+CWJAP – Connect to AP

Type: **test** Function: **Query AP's info which is connect by ESP8266.** Instruction: **AT+CWJAP?**	Response: **+CWJAP:<ssid>** **OK** Param description: <ssid> string, AP's SSID
Type: **set** Function: **Set AP's info which will be connect by ESP8266.** Instruction: **AT+CWJAP=<ssid>,<pwd>**	Response: **OK** **ERROR** Param description: <ssid> string, AP's SSID <pwd> string, MAX: 64bytes

AT+CWLAP – List available APs

Type: **set** Function: **Search available APs with specific conditions.** Instruction: **AT+ CWLAP = <ssid>,<mac>,<ch>**	Response: **+CWLAP:<ecn>,<ssid>,<rssi>,<mac>** **OK** **ERROR** Param description: <ssid> string, AP's SSID
Type: **execute** Function: **Lists all available APs.** Instruction: **AT+CWLAP**	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, AP's SSID <rssi> signal strength <mac> string, MAC address

AT+CWQAP – Disconnect from AP

Type: **test** Function: **Only for test.** Instruction: **AT+CWQAP=?**	Response: **OK** Param description: null
Type: **execute** Function: **Disconnect from AP.** Instruction: **AT+CWQAP**	Response: **OK** Param description: *null*

AT+CWSAP – Configuration of softAP mode

Type: **query** Function: **Query configuration of softAP mode.** Instruction: **AT+ CWSAP?**	Response: **+CWSAP:<ssid>,<pwd>,<chl>,<ecn>** **OK** **ERROR** Param description: *The same as below*
Type: **set** Function: **Set configuration of softAP mode.** Instruction: **AT+CWSAP=<ssid>,<pwd>,<chl>,<ecn>**	Response: **OK** **ERROR** Param description: <ecn> 0 – OPEN 1 – WEP 2 – WPA_PSK 3 – WPA2_PSK 4 – WPA_WPA2_PSK <ssid> string, AP's SSID <pwd> string, MAX: 64bytes <chl> channel ID

Note: This CMD is only available when softAP mode enable, and need to follow by AT+RST to make it works.

AT+CWLIF — ip of stations which are connected to ESP8266 softAP

Type: **execute**

Function:

Get ip of stations which are connected to ESP8266 softAP.

Instruction:

AT+CWLIF

Response:

<ip addr>
OK

Param description:

<ip addr>
ip address of stations which are connected to ESP8266 softAP

AT+CWDHCP — Enable/Disable DHCP

Type: **set**

Function:

Enable/Disable DHCP.

Instruction:

AT+CWDHCP=<mode>,<en>

Response:

OK

Param description:

<mode>
1 - Station Mode
2 - AP Mode
3 - AP + Station Mode
<en>
0 - enable DHCP
1 - disable DHCP

AT+CIPSTAMAC — Set mac address of station

Type: **query**

Function:

Get mac address of ESP8266 station.

Instruction:

AT+CIPSTAMAC?

Response:

+CIPSTAMAC:<mac>
OK

Param description:

<mac>
string, mac address of station

Type: **set**

Function:

Set mac address of ESP8266 station.

Instruction:

AT+CIPSTAMAC=<mac>

Response:

OK

Param description:

<mac>
string, mac address of station

AT+CIPAPMAC – Set mac address of softAP

Type: **query** Function: **Get mac address of ESP8266 softAP.** Instruction: **AT+CIPAPMAC?**	Response: **+CIPAPMAC:<mac>** **OK** Param description: <mac> string, mac address of softAP
Type: **set** Function: **Set mac address of ESP8266 softAP.** Instruction: **AT+CIPAPMAC=<mac>**	Response: **OK** Param description: <mac> string, mac address of softAP

AT+CIPSTA – Set ip address of ESP8266 station

Type: **query** Function: **Get ip address of ESP8266 station.** Instruction: **AT+CIPSTA?**	Response: **+CIPSTA:<ip>** **OK** Param description: <ip> string, ip address of station
Type: **set** Function: **Set ip address of ESP8266 station.** Instruction: **AT+CIPSTA=<ip>**	Response: **OK** Param description: <ip> string, ip address of station

AT+CIPAP – Set ip address of ESP8266 softAP

Type: **query** Function: **Get ip address of ESP8266 softAP.** Instruction: **AT+CIPAP?**	Response: **+CIPAP:<ip>** **OK** Param description: <ip> string, ip address of softAP
Type: **set** Function: **Set ip address of ESP8266 softAP.** Instruction: **AT+CIPAP=<ip>**	Response: **OK** Param description: <ip> string, ip address of softAP

TCP/IP Related
Overview

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
AT+CIUPDATE	Force OTA(upgrade through network)

Instructions

AT+CIPSTATUS – Information about connection

Type: **execute**

Function:

Get information about connection

Instruction:

AT+CIPSTATUS

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>
    “TCP” or “UDP”
<addr>
    string, IP address
<port>
    port number
<tetype>
    0 – ESP8266 run as a client
    1 – ESP8266 run as a server

AT+CIPSTART
Establish TCP connection or register UDP port, start connection

Type: **test** Function: **Get the information of param.** Instruction: **AT+CIPSTART=?**	Response: **If AT+CIPMUX=0** **+CIPSTART:(<type>),(<IPaddress>),(<port>)[,(<localport>),(<mode>)]** **+CIPSTART:(<type>),(<domainname>),(<port>)[,(<localport>),(<mode>)]** **OK** **If AT+CIPMUX=1** **+CIPSTART:(id),(<type>),(<IPaddress>),(<port>)[,(<localport>),(<mode>)] +CIPSTART:(id),(<type>),(<domain name>),(<port>)[,(<localport>),(<mode>)]** **OK** Param description: null
Type: **set** Function: **Start a connection as client.** Instruction: SINGLE CONNECTION **(+CIPMUX=0)** **AT+CIPSTART=<type>,<addr>,<port> [,(<localport>),(<mode>)]** MULTIPLE CONNECTIONS **(+CIPMUX=1)** **AT+CIPSTART=<id><type>,<addr>,<port> [,(<localport>),(<mode>)]**	Response: **OK** **ERROR** **ALREADY CONNECT** Param description: <id> ID of connection (0–4) <type> “TCP” or “UDP” <addr> string, remote IP <port> string, remote port [<localport>] 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.

AT+CIPSEND – Send data

Type: **test** Function: **Only for test.** Instruction: **AT+CIPSEND=?**	Response: **OK** Param description: null
Type: **set** Function: **Set length of the data that will be sent. For normal send.** Instruction: SINGLE CONNECTION **(+CIPMUX=0)** **AT+CIPSEND=<length>** MULTIPLE CONNECTIONS **(+CIPMUX=1)** **AT+CIPSEND=<id>,<length>**	Response: 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 **ERROR** If data is transmitted successfully, returns **SEND OK** Param description: <id> ID of transmit connection <length> data length, MAX 2048 bytes
Type: **execute** Function: **Send data. For unvarnished transmission mode.** Instruction: **AT+CIPSEND**	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.

AT+CIPCLOSE – Close TCP or UDP connection

Type: **test** Function: **Only for test.** Instruction: **AT+CIPCLOSE=?**	Response: **OK** Param description: null
Type: **set** Function: **Close TCP or UDP connection.** Instruction: MULTIPLE CONNECTIONS **AT+CIPCLOSE=<id>**	Response: 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 **ERROR** If data is transmitted successfully, returns **SEND OK** Param description: <id> ID no. of connection to close, when id=5, all connections will be closed.
Type: **execute** Function: **For single connection mode** Instruction: **AT+CIPCLOSE**	Response: **OK** If no such connection, returns **ERROR** **UNLINK** when there is no connection.
Note: id=5 has no effect in server mode	

AT+CIFSR – Get local IP address

Type: **test** Function: **Only for test.** Instruction: **AT+CIFSR=?**	Response: **OK** Param description: null
Type: **execute** Function: **Get local IP address.** Instruction: **AT+CIFSR**	Response: **+CIFSR:<IP address>** **OK** **ERROR** Param description: <IP address> IP address of ESP8266

Note: <IP address> for softAP or station

AT+CIPMUX – Enable multiple connections or not

Type: **query** Function: **Get param config.** Instruction: **AT+CIPMUX?**	Response: **+CIPMUX:<mode>** **OK** Param description: The same as below
Type: **set** Function: **Set connection mode.** Instruction: **AT+CIPMUX=<mode>**	Response: **OK** If already connected, returns **LINK IS BUILDED** Param description: <mode> 0 – Single connection 1 – Multiple connections

Note: This mode can only be changed after all connections are disconnected. If server is started, reboot is required.

AT+CIPSERVER – Configure as TCP server

Type: **set** Function: **Set TCP server.** Instruction: **AT+CIPSERVER= <mode>[,<port>]**	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.

AT+CIPMODE – Set transfer mode

Type: **query** Function: **Query transfer mode.** Instruction: **AT+CIPMODE?**	Response: **+CIPMODE:<mode>** **OK** Param description: The same as below
Type: **set** Function: **Set transfer mode.** Instruction: **AT+CIPMODE=<mode>**	Response: **OK** If already connected, returns **LINK IS BUILDED** Param description: <mode> 0 – Normal mode 1 – unvarnished transmission mode

AT+CIPSTO – Set server timeout

Type: **query** Function: **Query server timeout.** Instruction: **AT+CIPSTO?**	Response: **+CIPSTO:<time>** **OK** Param description: The same as below
Type: **set** Function: **Set server timeout.** Instruction: **AT+CIPSTO=<time>**	Response: **OK** Param description: <time> server timeout, range 0–7200 seconds

AT+CIUPDATE – update through network

Type: **execute** Function: **Start upgrade.** Instruction: **AT+CIPMODE?**	Response: **+CIPUPDATE:<n>** **OK** Param description: <mode> 0 – found server 1 – connect to server 2 – download firmware 4 – flash firmware

+IPD – Receive network data

Instruction:	Param description:
SINGLE CONNECTION **(+CIPMUX=0)** **+IPD,<len>:<data>** MULTIPLE CONNECTIONS **(+CIPMUX=1)** **+IPD,<id>,<len>:<data>**	<id> number ID of connection <len> data length <data> data received

Note: When the module receives network data, it will send the data through the serial port using +IPD command