WizFi320 User Manual
(Version 0.1)

FCC ID : 2AKKW-WIZFI320

Document Revision History

Version	Date	Revision Description
0.1	2021/06/10	Initial draft

Contents

1. Overview

WizFi320 is a powerful, generic Wi-Fi+BT+BLE MCU module that targets a wide variety of applications ranging from low-power sensor networks to the most demanding tasks.

At the core of this module is the ESP32-DOWD-V3 chip. The chip embedded is designed to be scalable and adaptive. There are two CPU cores that can be individually controlled, and the CPU clock frequency is adjustable from 80 MHz to 240 MHz. The user may also power off the CPU and make use of the low-power co-processor to constantly monitor the peripherals for changes or crossing of thresholds.

The integration of Bluetooth, Bluetooth LE and Wi-Fi ensures that a wide range of applications can be targeted and that the module is all-around: using Wi-Fi allows a large physical range and direct connection to the Internet through a Wi-Fi router, while using Bluetooth allows the user to conveniently connect to the phone or broadcast low energy beacons for its detection. The sleep current of the ESP32 chip is less than 5 μA, making it suitable for battery powered and wearable electronics applications. The module supports a data rate of up to 150Mbps, and 20 dBm output power at the antenna to ensure the widest physical range. As such the module does offer industry- leading specifications and the best performance for electronic integration, range, power consumption, and connectivity.

The operating system chosen for ESP32 is freeRTOS with LwIP; TLS 1.2 with hardware acceleration is built in as well. Secure (encrypted) over the air (OTA) upgrade is also supported, so that users can upgrade their products even after their release, at minimum cost and effort.

Table 1 provides the specifications of WizFi320.

Table 1: WizFi320 Specifications

Categories	Items	Specications
Certification	RF certification	FCC
	Wi-Fi certification	Wi-Fi Alliance
	Bluetooth certification	BQB
	Green certification	RoHS/REACH
Test	Reliablity	HTOL/HTSL/uHAST/TCT/ESD
Wi-Fi	Protocols	802.11 b/g/n (802.11n up to 150 Mbps)
		A-MPDU and A-MSDU aggregation and 0.4μs guard interval support
	Frequency range	2.4 GHz ~2.5 GHZ
Bluetooth	Protocols	Bluetooth v4.2 BR/EDR and BLE specification
	Radio	NZIF receiver with -94 dBm sensitivity
		Class-1, class-2 and class-3 transmitter

		AFH
	Audio	CVSD and SBC
Hardware	Module interfaces	UART, SPI, SDIO, I²C, I²S, LED PWM, GPIO, ADC, DAC
	On-chip sensor	Hall sensor
	Integrated crystal	40 MHz crystal
	Integrated SPI flash	4MB
	Operating voltage/Power supply	3.0 V~3.6V
	Operating current	Average: 80 mA
	Minimum current delivered by power	500 mA
	Recommended operating temperature	-40℃~ +85℃
	Package size	(16±0.10) mm x (24±0.10) mm x (3±0.10) mm
	Moisture sensitivity level (MSL)	Level 3

2. Pin Definitions
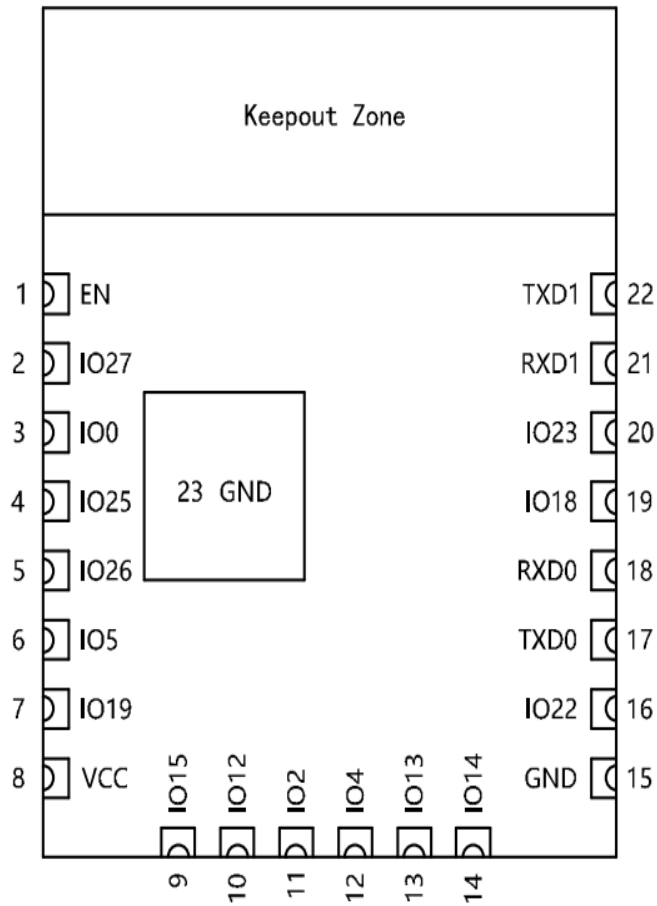
2.1 Pin Layout

Figure 1: WizFi320 Pin Layout (Top View)

2.2 Pin Description

WizFi320 has 38 pins. See pin definitions in Table 2.

Table 2: Pin Definitions

Name	No.	Type	Function
EN	1	I	Module-enable signal. Active high.
IO27	2	I/O	GPIO27, ADC2_CH7, TOUCH7, RTC_GPIO17, EMAC_RX_DV
IO0	3	I/O	PIO0, ADC2_CH1, TOUCH1, RTC_GPIO11, CLK_OUT1, EMAC_TX_CLK
IO25	4	I/O	GPIO25, DAC_1, ADC2_CH8, RTC_GPIO6, EMAC_RXD0
IO26	5	I/O	GPIO26, DAC_2, ADC2_CH9, RTC_GPIO7, EMAC_RXD1
IO5	6	I/O	GPIO5, VSPICS0, HS1_DATA6, EMAC_RX_CLK
IO19	7	I/O	GPIO35, ADC1_CH7, RTC_GPIO5
VCC	8	P	Power supply
IO15	9	I/O	GPIO15, ADC2_CH3, TOUCH3, MTDO, HSPICS0, RTC_GPIO13, HS2_CMD, SD_CMD, EMAC_RXD3
IO12	10	I/O	GPIO12, ADC2_CH5, TOUCH5, RTC_GPIO15, MTDI, HSPIQ, HS2_DATA2, SD_DATA2, EMAC_TXD3
IO2	11	I/O	GPIO2, ADC2_CH2, TOUCH2, RTC_GPIO12, HSPIWP, HS2_DATA0, SD_DATA0
IO4	12	I/O	GPIO4, ADC2_CH0, TOUCH0, RTC_GPIO10, HSPIHD, HS2_DATA1, SD_DATA1, EMAC_TX_ER
IO13	13	I/O	GPIO13, ADC2_CH4, TOUCH4, RTC_GPIO14, MTCK, HSPID, HS2_DATA3, SD_DATA3, EMAC_RX_ER
IO14	14	I/O	GPIO14, ADC2_CH6, TOUCH6, RTC_GPIO16, MTMS, HSPICLK, HS2_CLK, SD_CLK, EMAC_TXD2
GND	15	P	Ground
IO22	16	I/O	GPIO22, VSPIWP, U0RTS, EMAC_TXD1
TXD0	17	I/O	GPIO17, HS1_DATA5, U2TXD, EMAC_CLK_OUT_180
RXD0	18	I/O	GPIO16, HS1_DATA4, U2RXD, EMAC_CLK_OUT
IO18	19	I/O	GPIO18, VSPICLK, HS1_DATA7
IO23	20	I/O	GPIO23, VSPID, HS1_STROBE
RXD1	21	I/O	GPIO1, U0TXD, CLK_OUT3, EMAC_RXD2
TXD1	22	I/O	GPIO3, U0RXD, CLK_OUT2

3. Functional Description

This chapter describes the modules and functions integrated in WizFi320.

3.1 CPU and Internal Memory

ESP32-DOWD-V3 contains two low-power Xtensa® 32-bit LX6 microprocessors. The internal memory includes:

• 448 KB of ROM for booting and core functions.

• 520 KB of on-chip SRAM for data and instructions.

• 8 KB of SRAM in RTC, which is called RTC FAST Memory and can be used for data storage; it is

accessed by the main CPU during RTC Boot from the Deep-sleep mode

• 8 KB of SRAM in RTC, which is called RTC SLOW Memory and can be accessed by the co- processor during the Deep-sleep mode

• 1 Kbit of eFuse: 256 bits are used for the system (MAC address and chip configuration) and the remaining m768 bits are reserved for customer applications, including flash-encryption and chip- ID.

3.2 External Flash

WizFi320 integrates a 4 MB SPI flash, which is connected to GPIO6, GPIO7, GPIO8, GPIO9, GPIO10 and GPIO11 of ESP32.

3.3 Crystal Oscillators

The module uses a 40-MHz crystal oscillator.

3.4 RTC and Low-Power Management

With the use of advanced power-management technologies, ESP32 can switch between different power modes. For details on ESP32's power consumption in different power modes, please refer to section "RTC and Low-Power Management".

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Stresses beyond the absolute maximum ratings listed in Table 3 below may cause permanent damage to the device. These are stress ratings only, and do not refer to the functional operation of the device that should follow the recommended operating conditions.

Table 3: Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
VDD33	Power supply voltage	−0.3	3.6	V
I_{output}[1]	Cumulative IO output current	−	1200	mA
I_{store}	Storage temperature	−40	82	℃

1. The module worked properly after a 24-hour test in ambient temperature at 25 °C, and the IOs in three domains (VDD3P3_RTC, VDD3P3_CPU, VDD_SDIO) output high logic level to ground. Please note that pins occupied by flash and/or PSRAM in the VDD_SDIO power domain were excluded from the test.
2. Please see Appendix IO_MUX of ESP32 Datasheet for IO's power domain.

4.2 Recommended Operating Conditions

Table 4: Recommended Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit
VDD33	Power supply voltage	2.3	3.3	3.6	V
I_{VDD}	Current delivered by external power supply	0.5	−	−	A
T	Operating temperature	−40	−	85	°C

4.3 DC Characteristics (3.3 V, 25 °C)

Table 5: DC Characteristics (3.3 V, 25 °C)

Symbol	Parameter		Min	Typ	Max	Unit
C_{IN}	Pin capacitance		-	2	-	pF
V_{IH}	High-level input voltage		0.75×VDD[1]	-	VDD[1]+0.3	V
V_{IL}	Low-level input voltage		−0.3	-	0.25×VDD[1]	V
I_{IH}	High-level input current		-	-	50	nA
I_{IL}	Low-level input current		-	-	50	nA
V_{OH}	High-level output voltage		0.8×VDD[1]	-	-	V
V_{OL}	Low-level output voltage		-	-	0.1×VDD[1]	V
I_{OH}	High-level source current (VDD[1] = 3.3 V, V_{OH} >= 2.64 V, output drive strength set to the maximum)	VDD3P3_CPU power domain [1, 2]	-	40	-	mA
		VDD3P3_RTC power domain [1, 2]	-	40	-	mA
		VDD_SDIO power domain [1, 3]	-	20	-	mA

Symbol	Parameter	Min	Typ	Max	Unit
I_{OL}	Low-level sink current (VDD^1 = 3.3 V, V_{OL} = 0.495 V, output drive strength set to the maximum)	-	28	-	mA
R_{PU}	Resistance of internal pull-up resistor	-	45	-	kΩ
R_{PD}	Resistance of internal pull-down resistor	-	45	-	kΩ
V_{IL_nRST}	Low-level input voltage of CHIP_PU to power off the chip	-	-	0.6	V

Notes:

1. Please see Appendix IO_MUX of ESP32 Datasheet for IO's power domain. VDD is the I/O voltage for a

particular power domain of pins.

2. For VDD3P3_CPU and VDD3P3_RTC power domain, per-pin current sourced in the same domain is gradually reduced from around 40 mA to around 29 mA, $V_{OH} \geq 2.64$ V, as the number of current-source pins increases. 3. Pins occupied by flash and/or PSRAM in the VDD_SDIO power domain were excluded from the test.

4.4 Wi-Fi Radio

Table 6: Wi-Fi Radio Characteristics

Parameter	Condition	Min	Typical	Max	Unit
Operating frequency range [1]	–	2412	–	2462	MHz
Output inpedance[2]	–	–	note 2	–	Ω
Tx power[3]	11n, MCS7	12	13	14	dBm
	11b mode	18.5	19.5	20.5	dBm
Sensitivity	11b, 1 Mbps	–	– 98	–	dBm
	11b, 11 Mbps	–	– 88	–	dBm
	11g, 6 Mbps	–	– 93	–	dBm
	11g, 54 Mbps	–	– 75	–	dBm
	11n, HT20, MCS0	–	– 93	–	dBm
	11n, HT20, MCS7	–	– 73	–	dBm
	11n, HT40, MCS0	–	– 90	–	dBm
	11n, HT40, MCS7	–	– 70	–	dBm
Adjacent channel rejection	11g, 6 Mbps	–	27	–	dB
	11g, 54 Mbps	–	13	–	dB
	11n, HT20, MCS0	–	27	–	dB
	11n, HT20, MCS7	–	12	–	dB

1. Device should operate in the frequency range allocated by regional regulatory authorities. Target operating frequency range is configurable by software.

2. For the modules that use IPEX antennas, the output impedance is 50 Ω. For other modules without IPEX antennas, users do not need to concern about the output impedance.

3. Target TX power is configurable based on device or certification requirements.

4.5 BLE Radio

4.5.1　Receiver

Table 7: Receiver Characteristics - BLE

PARAMETER	CONDITION	MINI	VALUE	MAX	UNIT
Sensitivity @0.1% BER	-	-90	-89	-88	dBm
Maximum received signal @0.1% BER	-	0	-	-	dBm
Co-channel rejection ratio C/I	-	-	+7	-	dB
Adjacent channel rejection ratio C/I	F = F0 + 1 MHz	-	-	-6	dB
	F = F0 - 1 MHz	-	-	-6	dB
	F = F0 + 2 MHz	-	-	-25	dB
	F = F0 - 2 MHz	-	-	-33	dB
	F = F0 + 3 MHz	-	-	-25	dB
	F = F0 - 3 MHz	-	-	-45	dB
Out-of-band blocking	30 MHz ~ 2000 MHz	-10			dBm
	2000 MHz ~ 2400 MHz	-27			dBm
	2500 MHz ~ 3000 MHz	-27			dBm
	3000 MHz ~ 12.5 GHz	-10			dBm
Intermodulation	-	-36			dBm

4.5.2 Trans mitter

Table 8: Transmitter Characteristics - BLE

PARAMETER	CONDITION	MINI	VALUE	MAX	UNIT
RF transmit power	-	-	0	-	dBm
Gain control step	-	-	3	-	dB
RF power control range	-	-12	-	+9	dBm
20dB bandwidth	-	-	0.9	-	MHz
Adjacent channel transmit power	F = F0 ± 2 MHz	-	-47	-	dBm
	F = F0 ± 3 MHz	-	-55	-	dBm
	F = F0 ± > 3 MHz	-	-60	-	dBm
Δ f1avg	-	-	-	155	kHz
Δ f2max	-	133.7	-	-	kHz
Δ f2avg/Δ f1avg	-	-	0.92	-	-
ICFT	-	-	-7	-	kHz
Drift rate	-	-	0.7	-	kHz/50 μs
Offset			6		kHz

4.6 Reflow Profile

Ramp-up zone — Temp.: <150°C Time: 60 – 90s Ramp-up rate: 1 – 3°C/s
Preheating zone — Temp.: 150 – 200°C Time: 60 – 120s Ramp-up rate: 0.3 – 0.8°C/s
Reflow zone — Temp.: >217°C Time: 60 – 90s; Peak Temp.: 235 – 250°C (<245°C recommended) Time: 30 – 70s
Cooling zone — Peak Temp. – 180°C Ramp-down rate: -1 – -5°C/s
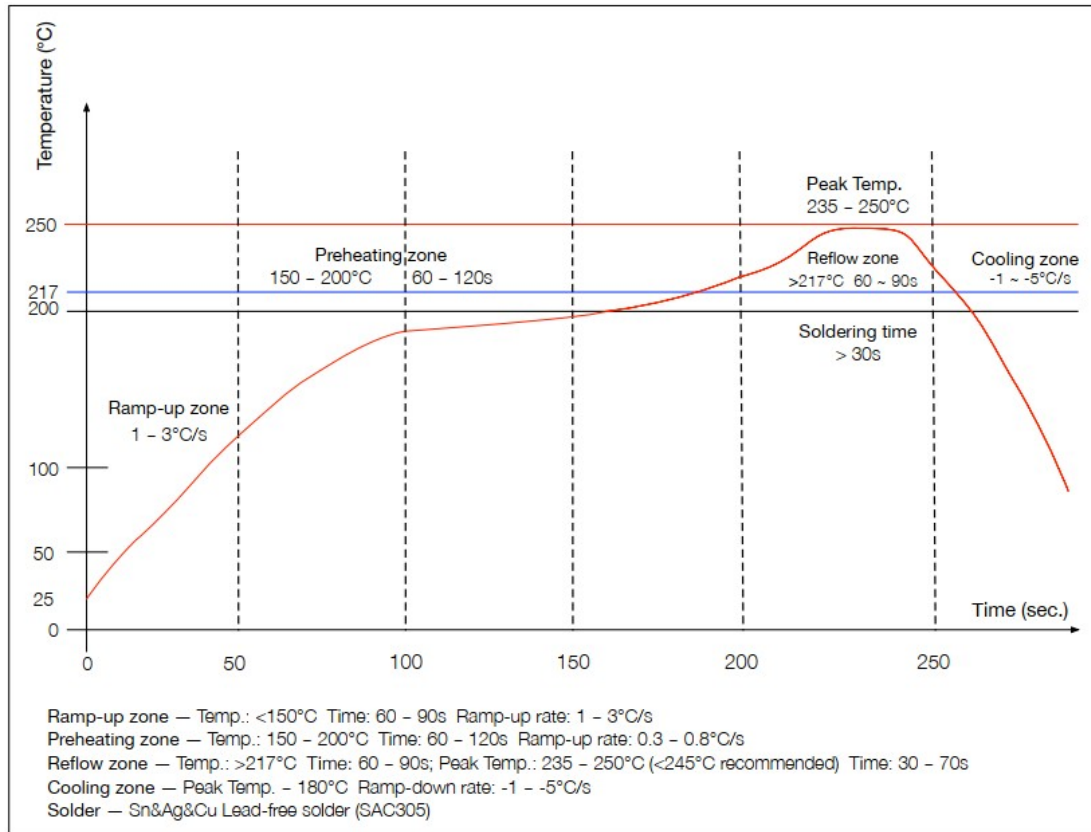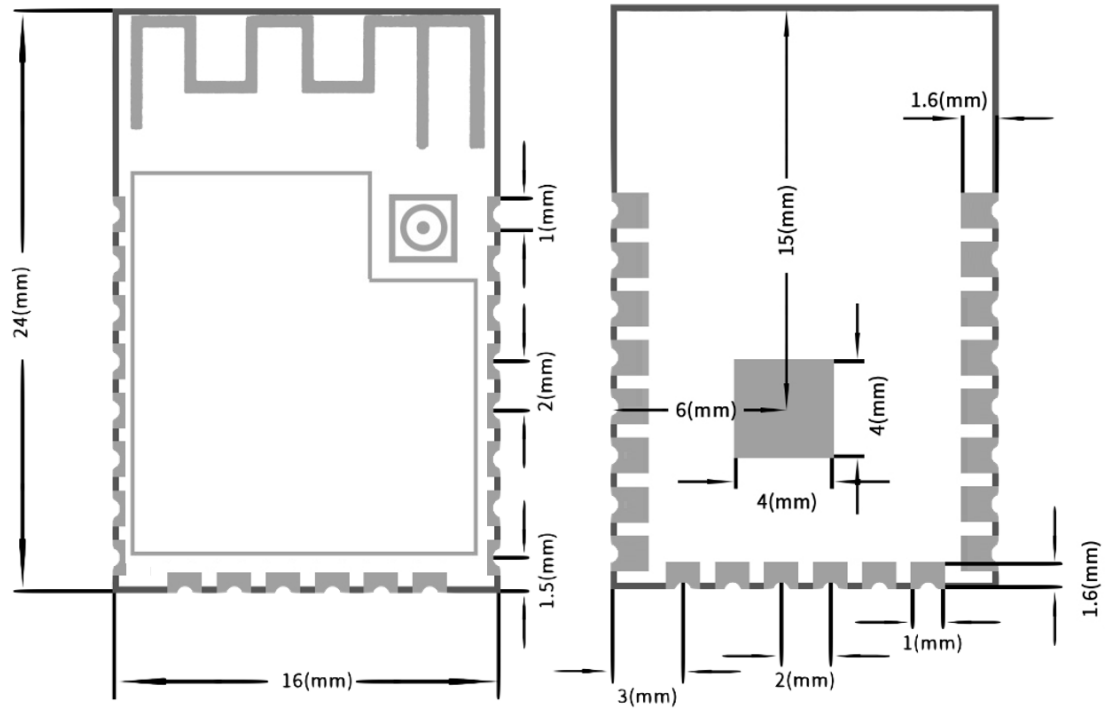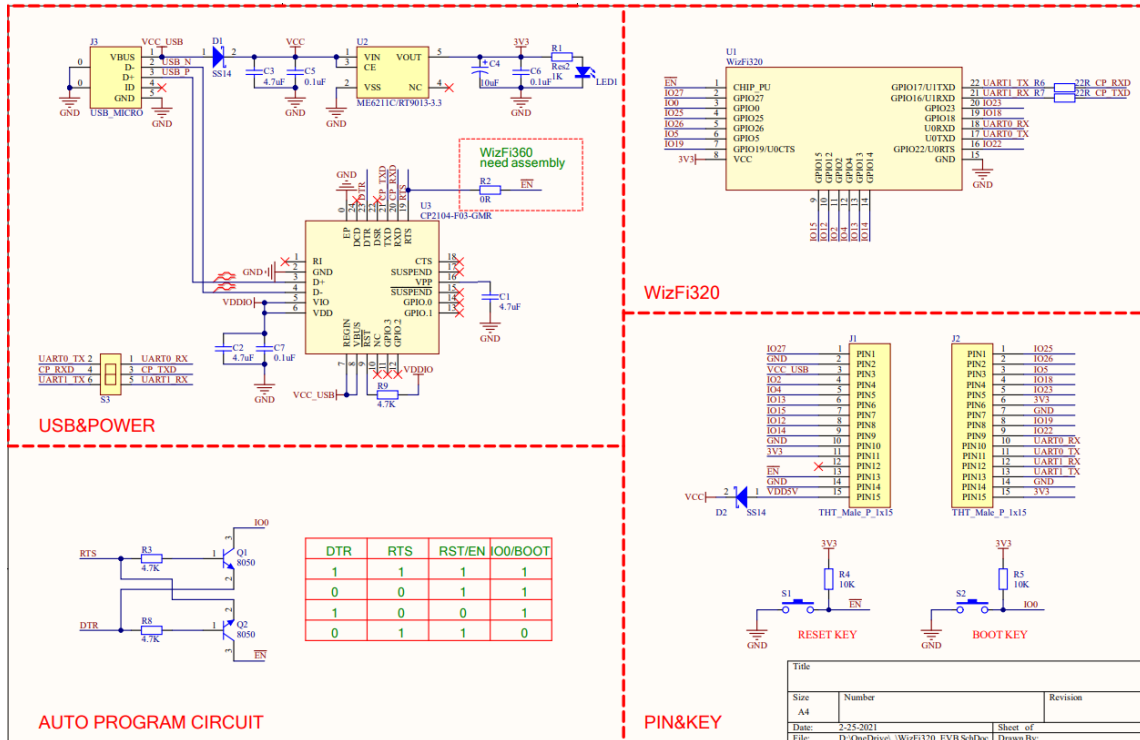Solder — Sn&Ag&Cu Lead-free solder (SAC305)

Figure2: Reflow Profile

4.7 Recommended PCB Land Pattern

5. testing Guide line

5.1 Peripheral Circuit Reference Design

5.2 Wi-Fi AT Commands

- **AT+CWMODE**: Set the Wi-Fi mode (Station/SoftAP/Station+SoftAP).
- **AT+CWSTATE**: Query the Wi-Fi state and Wi-Fi information.
- **AT+CWJAP**: Connect to an AP.
- **AT+CWRECONNCFG**: Query/Set the Wi-Fi reconnecting configuration.
- **AT+CWLAPOPT**: Set the configuration for the command AT+CWLAP.
- **AT+CWLAP**: List available APs.
- **AT+CWQAP**: Disconnect from an AP.
- **AT+CWSAP**: Query/Set the configuration of an ESP SoftAP.
- **AT+CWLIF**: Obtain IP address of the station that connects to an ESP SoftAP.
- **AT+CWQIF**: Disconnect stations from an ESP SoftAP.
- **AT+CWDHCP**: Enable/disable DHCP.
- **AT+CWDHCPS**: Query/Set the IP addresses allocated by an ESP SoftAP DHCP server.
- **AT+CWAUTOCONN**: Connect to an AP automatically when powered on.
- **AT+CWAPPROTO**: Query/Set the 802.11 b/g/n protocol standard of SoftAP mode.
- **AT+CWSTAPROTO**: Query/Set the 802.11 b/g/n protocol standard of station mode.
- **AT+CIPSTAMAC**: Query/Set the MAC address of an ESP station.
- **AT+CIPAPMAC**: Query/Set the MAC address of an ESP SoftAP.
- **AT+CIPSTA**: Query/Set the IP address of an ESP station.
- **AT+CIPAP**: Query/Set the IP address of an ESP SoftAP.
- **AT+CWSTARTSMART**: Start SmartConfig.
- **AT+CWSTOPSMART**: Stop SmartConfig.
- **AT+WPS**: Enable the WPS function.
- **AT+MDNS**: Configure the mDNS function.
- [ESP32 Only] **AT+CWJEAP**: Connect to a WPA2 Enterprise AP.
- **AT+CWHOSTNAME**: Query/Set the host name of an ESP station.
- **AT+CWCOUNTRY**: Query/Set the Wi-Fi Country Code.

AT+CWMODE: Query/Set the Wi-Fi Mode (Station/SoftAP/Station+SoftAP)

Query Command

Function:

Query the Wi-Fi mode of ESP devices.

Command:

```
AT+CWMODE?
```

Response:

```
+CWMODE:<mode>
OK
```

Set Command

Function:

Set the Wi-Fi mode of ESP devices.

Command:

```
AT+CWMODE=<mode>[,<auto_connect>]
```

Response:

```
OK
```

Parameters

- **<mode>**:
  - 0: Null mode. Wi-Fi RF will be disabled.
  - 1: Station mode.
  - 2: SoftAP mode.
  - 3: SoftAP+Station mode.
- **<auto_connect>**: Enable or disable automatic connection to an AP when you change the mode of the ESP device from the SoftAP mode or null mode to the station mode or the SoftAP+Station mode. Default: 1. If you omit the parameter, the default value will be used, i.e. automatically connecting to an AP.
  - 0: The ESP device will not automatically connect to an AP.
  - 1: The ESP device will automatically connect to an AP if the configuration to connect to the AP has already been saved in flash before.

Note

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.

Example

```
AT+CWMODE=3
```

AT+CWSTATE: Query the Wi-Fi state and Wi-Fi information

Query Command

Function:

Query the Wi-Fi state and Wi-Fi information of ESP devices.

Command:

```
AT+CWSTATE?
```

Response:

```
+CWSTATE:<state>,<"ssid">

OK
```

Parameters

- **<state>**: current Wi-Fi state.
    - 0: ESP station has not started any Wi-Fi connection.
    - 1: ESP station has connected to an AP, but does not get an IPv4 address yet.
    - 2: ESP station has connected to an AP, and got an IPv4 address.
    - 3: ESP station is in Wi-Fi connecting or reconnecting state.
    - 4: ESP station is in Wi-Fi disconnected state.
- **<"ssid">**: the SSID of the target AP.

Note

- When ESP station is not connected to an AP, it is recommended to use this command to query Wi-Fi information; after ESP station is connected to an AP, it is recommended to use AT+CWJAP to query Wi-Fi information.

AT+CWJAP: Connect to an AP

Query Command

Function:

Query the AP to which the ESP Station is already connected.

Command:

```
AT+CWJAP?
```

Response:

```
+CWJAP:<ssid>,<bssid>,<channel>,<rssi>,<pci_en>,<reconn_interval>,<listen_interval>,
<scan_mode>,<pmf>
OK
```

Set Command

Function:

Connect an ESP station to a targeted AP.

Command:

```
AT+CWJAP=[<ssid>],[<pwd>][,<bssid>][,<pci_en>][,<reconn_interval>][,<listen_interval
>][,<scan_mode>][,<jap_timeout>][,<pmf>]
```

Response:

```
WIFI CONNECTED
WIFI GOT IP

OK
[WIFI GOT IPv6 LL]
[WIFI GOT IPv6 GL]
```

or

```
+CWJAP:<error code>
ERROR
```

Execute Command

Function:

Connect an ESP station to a targeted AP with last Wi-Fi configuration.

Command:

```
AT+CWJAP
```

Response:

```
WIFI CONNECTED
WIFI GOT IP

OK
[WIFI GOT IPv6 LL]
[WIFI GOT IPv6 GL]
```

or

+CWJAP:<error code>
ERROR

Parameters

- **<ssid>**: the SSID of the target AP.

  - Escape character syntax is needed if SSID or password contains special characters, such `,`, `"`, or `\\`.

- **<pwd>**: password, MAX: 64-byte ASCII.
- **<bssid>**: the MAC address of the target AP. It cannot be omitted when multiple APs have the same SSID.
- **<channel>**: channel.
- **<rssi>**: signal strength.
- **<pci_en>**: PCI Authentication.

  - 0: The ESP station will connect APs with all encryption methods, including OPEN and WEP.
  - 1: The ESP station will connect APs with all encryption methods, except OPEN and WEP.

- **<reconn_interval>**: the interval between Wi-Fi reconnections. Unit: second. Default: 1. Maximum: 7200.

  - 0: The ESP station will not reconnect to the AP when disconnected.
  - [1,7200]: The ESP station will reconnect to the AP at the specified interval when disconnected.

- **<listen_interval>**: the interval of listening to the AP's beacon. Unit: AP beacon intervals. Default: 3. Range: [1,100].
- **<scan_mode>**:

  - 0: fast scan. It will end after finding the targeted AP. The ESP station will connect to the first scanned AP.
  - 1: all-channel scan. It will end after all the channels are scanned. The device will connect to the scanned AP with the strongest signal.

- **<jap_timeout>**: maximum timeout for AT+CWJAP command. Unit: second. Default: 15. Range: [3,600].
- **<pmf>**: Protected Management Frames. Default: 0.

  - 0 means disable PMF.

  o bit 0: PMF capable, advertizes support for protected management frame. Device will prefer to connect in PMF mode if other device also advertizes PMF capability.

  o bit 1: PMF required, advertizes that protected management frame is required. Device will not associate to non-PMF capable devices.

- **<error code>**: (for reference only)

  o 1: connection timeout.

  o 2: wrong password.

  o 3: cannot find the target AP.

  o 4: connection failed.

  o others: unknown error occurred.

Notes

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- This command requires Station mode to be enabled.
- The parameter `<reconn_interval>` of this command is the same as `<interval_second>` of the command AT+CWRECONNCFG. Therefore, if you omit `<reconn_interval>` when running this command, the interval between Wi-Fi reconnections will use the default value 1.
- If the `<ssid>` and `<password>` parameter are omitted, AT will use the last configuration.
- Execute command has the same maximum timeout to setup command. The default value is 15 seconds, but you can change it by setting the parameter `<jap_timeout>`.
- To get an IPv6 address, you need to set AT+CIPV6=1.
- Response `OK` means that the IPv4 network is ready, but not the IPv6 network. At present, ESP-AT is mainly based on IPv4 network, supplemented by IPv6 network.
- `WIFI GOT IPv6 LL` represents that the linklocal IPv6 address has been obtained. This address is calculated locally through EUI-64 and does not require the participation of the AP. Because of the parallel timing, this print may be before or after `OK`.
- `WIFI GOT IPv6 GL` represents that the global IPv6 address has been obtained. This address is combined by the prefix issued by AP and the suffix calculated internally, which requires the participation of the AP.

Because of the parallel timing, this print may be before or after `OK`, or it may not be printed because the AP does not support IPv6.

Example

```
// If the target AP's SSID is "abc" and the password is "0123456789", the command
should be:
AT+CWJAP="abc","0123456789"

// If the target AP's SSID is "ab\,c" and the password is "0123456789"\", the
command should be:
AT+CWJAP="ab\\\,c","0123456789\"\\"

// If multiple APs all have the SSID of "abc", the target AP can be found by BSSID:
AT+CWJAP="abc","0123456789","ca:d7:19:d8:a6:44"

// If esp-at is required that connect to a AP by protected management frame, the
command should be:
AT+CWJAP="abc","0123456789",,,,,,,3
```

AT+CWRECONNCFG: Query/Set the Wi-Fi Reconnecting Configuration

Query Command

Function:

Query the configuration of Wi-Fi reconnect.

Command:

```
AT+CWRECONNCFG?
```

Response:

```
+CWRECONNCFG:<interval_second>,<repeat_count>
OK
```

Set Command

Function:

Set the configuration of Wi-Fi reconnect.

Command:

```
AT+CWRECONNCFG=<interval_second>,<repeat_count>
```

Response:

```
OK
```

Parameters

- **<interval_second>**: the interval between Wi-Fi reconnections. Unit: second. Default: 0. Maximum: 7200.

- o 0: The ESP station will not reconnect to the AP when disconnected.
- o [1,7200]: The ESP station will reconnect to the AP at the specified interval when disconnected.
- **<repeat_count>**: the number of attempts the ESP device makes to reconnect to the AP. This parameter only works when the parameter `<interval_second>` is not 0. Default: 0. Maximum: 1000.
  - o 0: The ESP station will always try to reconnect to AP.
  - o [1,1000]: The ESP station will attempt to reconnect to AP for the specified times.

Example

```
// The ESP station tries to reconnect to AP at the interval of one second for 100
times.
AT+CWRECONNCFG=1,100

// The ESP station will not reconnect to AP when disconnected.
AT+CWRECONNCFG=0,0
```

Notes

- The parameter `<interval_second>` of this command is the same as the parameter `[<reconn_interval>]` of the command AT+CWJAP.
- This command works for passive disconnection from APs, Wi-Fi mode switch, and Wi-Fi auto connect after power on.

AT+CWLAPOPT: Set the Configuration for the Command AT+CWLAP

Set Command

Command:

```
AT+CWLAPOPT=<reserved>,<print mask>[,<rssi filter>][,<authmode mask>]
```

Response:

```
OK
```

or

```
ERROR
```

Parameters

- **<reserved>**: reserved item.
- **<print mask>**: determine whether the following parameters are shown in the result of AT+CWLAP. Default: 0x7FF. If you set them to 1, it means

---

showing the corresponding parameters; if you set them as 0, it means NOT showing the corresponding parameters.

- o bit 0: determine whether <ecn> will be shown.
- o bit 1: determine whether <ssid> will be shown.
- o bit 2: determine whether <rssi> will be shown.
- o bit 3: determine whether <mac> will be shown.
- o bit 4: determine whether <channel> will be shown.
- o bit 5: determine whether <freq_offset> will be shown.
- o bit 6: determine whether <freqcal_val> will be shown.
- o bit 7: determine whether <pairwise_cipher> will be shown.
- o bit 8: determine whether <group_cipher> will be shown.
- o bit 9: determine whether <bgn> will be shown.
- o bit 10: determine whether <wps> will be shown.

- **[<rssi filter>]**: determine whether the result of the command AT+CWLAP will be filtered according to `rssi filter`. In other words, the result of the command will **NOT** show the APs whose signal strength is below `rssi filter`. Unit: dBm. Default: –100. Range: [–100,40].

- **[<authmode mask>]**: determine whether APs with the following authmodes are shown in the result of AT+CWLAP. Default: 0xFF. If you set `bit x` to 1, the APs with the corresponding authmode will be shown. If you set `bit x` to 0, the APs with the corresponding authmode will NOT be shown;

  - o bit 0: determine whether APs with `OPEN` authmode will be shown.
  - o bit 1: determine whether APs with `WEP` authmode will be shown.
  - o bit 2: determine whether APs with `WPA_PSK` authmode will be shown.
  - o bit 3: determine whether APs with `WPA2_PSK` authmode will be shown.
  - o bit 4: determine whether APs with `WPA_WPA2_PSK` authmode will be shown.
  - o bit 5: determine whether APs with `WPA2_ENTERPRISE` authmode will be shown.
  - o bit 6: determine whether APs with `WPA3_PSK` authmode will be shown.
  - o bit 7: determine whether AP with `WPA2_WPA3_PSK` authmode will be shown.

Example

```
// The first parameter is 1, meaning that the result of the command AT+CWLAP will be
ordered according to RSSI;
// The second parameter is 31, namely 0x1F, meaning that the corresponding bits of
<print mask> are set to 1. All parameters will be shown in the result of AT+CWLAP.
AT+CWLAPOPT=1,31
AT+CWLAP

// Just show the AP which authmode is OPEN
AT+CWLAPOPT=1,31,-100,1
AT+CWLAP
```

AT+CWLAP: List Available APs
Set Command
Function:

Query the APs with specified parameters, such as the SSID, MAC address, or channel.

Command:

```
AT+CWLAP=[<ssid>,<mac>,<channel>,<scan_type>,<scan_time_min>,<scan_time_max>]
```

Execute Command
Function:

List all available APs.

Command:

```
AT+CWLAP
```

Response:

```
+CWLAP:<ecn>,<ssid>,<rssi>,<mac>,<channel>,<freq_offset>,<freqcal_val>,<pairwise_cip
her>,<group_cipher>,<bgn>,<wps>
OK
```

Parameters

- **<ecn>**: encryption method.
    - 0: OPEN
    - 1: WEP
    - 2: WPA_PSK
    - 3: WPA2_PSK
    - 4: WPA_WPA2_PSK
    - 5: WPA2_ENTERPRISE
    - 6: WPA3_PSK
    - 7: WPA2_WPA3_PSK

- **\<ssid\>**: string parameter showing SSID of the AP.
- **\<rssi\>**: signal strength.
- **\<mac\>**: string parameter showing MAC address of the AP.
- **\<channel\>**: channel.
- **\<scan_type\>**: Wi-Fi scan type:
    - o   0: active scan
    - o   1: passive scan
- **\<scan_time_min\>**: the minimum active scan time per channel. Unit: millisecond. Range [0,1500]. If the scan type is passive, this parameter is invalid.
- **\<scan_time_max\>**: the maximum active scan time per channel. Unit: millisecond. Range [0,1500]. If this parameter is 0, the firmware will use the default time: 120 ms for active scan; 360 ms for passive scan.
- **\<freq_offset\>**: frequency offset (reserved item).
- **\<freqcal_val\>**: frequency calibration value (reserved item).
- **\<pairwise_cipher\>**: pairwise cipher type.
    - o   0: None
    - o   1: WEP40
    - o   2: WEP104
    - o   3: TKIP
    - o   4: CCMP
    - o   5: TKIP and CCMP
    - o   6: AES-CMAC-128
    - o   7: Unknown
- **\<group_cipher\>**: group cipher type, same enumerated value to `<pairwise_cipher>` .
- **\<bgn\>**: 802.11 b/g/n. If the corresponding bit is 1, the corresponding mode is enabled; if the corresponding bit is 0, the corresponding mode is disabled.
    - o   bit 0: bit to identify if 802.11b mode is enabled or not
    - o   bit 1: bit to identify if 802.11g mode is enabled or not
    - o   bit 2: bit to identify if 802.11n mode is enabled or not
- **\<wps\>**: wps flag.
    - o   0: WPS disabled
    - o   1: WPS enabled

Example

```
AT+CWLAP="Wi-Fi","ca:d7:19:d8:a6:44",6,0,400,1000

// Search for APs with a designated SSID:
```

AT+CWLAP="Wi-Fi"

AT+CWQAP: Disconnect from an AP

Execute Command

Command:

AT+CWQAP

Response:

OK

AT+CWSAP: Query/Set the configuration of an ESP SoftAP

Query Command

Function:

Query the configuration parameters of an ESP SoftAP.

Command:

AT+CWSAP?

Response:

+CWSAP:<ssid>,<pwd>,<channel>,<ecn>,<max conn>,<ssid hidden>
OK

Set Command

Function:

Set the configuration of an ESP SoftAP.

Command:

AT+CWSAP=<ssid>,<pwd>,<chl>,<ecn>[,<max conn>][,<ssid hidden>]

Response:

OK

Parameters

- **<ssid>**: string parameter showing SSID of the AP.
- **<pwd>**: string parameter showing the password. Length: 8 ~ 64 bytes ASCII.
- **<channel>**: channel ID.
- **<ecn>**: encryption method; WEP is not supported.
    - o 0: OPEN

- 2: WPA_PSK
- 3: WPA2_PSK
- 4: WPA_WPA2_PSK
- **[<max conn>]**: maximum number of stations that ESP SoftAP can connect. Range: [1,10].
- **[<ssid hidden>]**:
  - 0: broadcasting SSID (default).
  - 1: not broadcasting SSID.

Notes

- This command works only when AT+CWMODE=2 or AT+CWMODE=3.
- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.

Example

```
AT+CWSAP="ESP","1234567890",5,3
```

AT+CWLIF: Obtain IP Address of the Station That Connects to an ESP SoftAP

Execute Command

Command:

```
AT+CWLIF
```

Response:

```
+CWLIF:<ip addr>,<mac>

OK
```

Parameters

- **<ip addr>**: IP address of the station that connects to the ESP SoftAP.
- **<mac>**: MAC address of the station that connects to the ESP SoftAP.

Note

- This command cannot get a static IP. It works only when DHCP of both the ESP SoftAP and the connected station are enabled.

AT+CWQIF: Disconnect Stations from an ESP SoftAP

Execute Command

Function:

Disconnect all stations that are connected to the ESP SoftAP.

Command:

```
AT+CWQIF
```

Response:

```
OK
```

Set Command

Function:

Disconnect a specific station from the ESP SoftAP.

Command:

```
AT+CWQIF=<mac>
```

Response:

```
OK
```

Parameter

- **<mac>**: MAC address of the station to disconnect.

AT+CWDHCP: Enable/Disable DHCP

Query Command

Command:

```
AT+CWDHCP?
```

Response:

```
<state>
```

Set Command

Function:

Enable/disable DHCP.

Command:

```
AT+CWDHCP=<operate>,<mode>
```

Response:

```
OK
```

Parameters

- **<operate>**:
  - 0: disable
  - 1: enable
- **<mode>**:
  - Bit0: Station DHCP
  - Bit1: SoftAP DHCP
- **<state>**: the status of DHCP
  - Bit0:
    - 0: Station DHCP is disabled.
    - 1: Station DHCP is enabled.
  - Bit1:
    - 0: SoftAP DHCP is disabled.
    - 1: SoftAP DHCP is enabled.
  - Bit2 (ESP32 only):
    - 0: Ethernet DHCP is disabled.
    - 1: Ethernet DHCP is enabled.

Notes

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- This Set Command correlates with the commands that set static IP, such as AT+CIPSTA and AT+CIPAP:
  - If DHCP is enabled, static IP address will be disabled;
  - If static IP address is enabled, DHCP will be disabled;
  - The last configuration overwrites the previous configuration.

Example

```
// Enable Station DHCP. If the last DHCP mode is 2, the current DHCP mode will be 3.
AT+CWDHCP=1,1

// Disable SoftAP DHCP. If the last DHCP mode is 3, the current DHCP mode will be 1.
AT+CWDHCP=0,2
```

AT+CWDHCPS: Query/Set the IP Addresses Allocated by an ESP SoftAP DHCP Server

Query Command

Command:

```
AT+CWDHCPS?
```

Response:

```
+CWDHCPS=<lease time>,<start IP>,<end IP>
OK
```

Set Command

Function:

Set the IP address range of the ESP SoftAP DHCP server.

Command:

```
AT+CWDHCPS=<enable>,<lease time>,<start IP>,<end IP>
```

Response:

```
OK
```

Parameters

- **<enable>**:
  - 1: Enable DHCP server settings. The parameters below have to be set.
  - 0: Disable DHCP server settings and use the default IP address range.
- **<lease time>**: lease time. Unit: minute. Range [1,2880].
- **<start IP>**: start IP address of the IP address range that can be obtained from ESP SoftAP DHCP server.
- **<end IP>**: end IP address of the IP address range that can be obtained from ESP SoftAP DHCP server.

Notes

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- This AT command works only when both SoftAP and DHCP server are enabled for ESP devices.
- The IP address should be in the same network segment as the IP address of ESP SoftAP.

Example

```
AT+CWDHCPS=1,3,"192.168.4.10","192.168.4.15"

AT+CWDHCPS=0 // Disable the settings and use the default IP address range.
```

AT+CWAUTOCONN: Automatically Connect to an AP When Powered on

Set Command

Command:

```
AT+CWAUTOCONN=<enable>
```

Response:

```
OK
```

Parameters

- **<enable>**:
    - o 1: Enable automatic connection to an AP when powered on. (Default)
    - o 0: Disable automatic connection to an AP when powered on.

Note

- The configuration changes will be saved in the NVS area.

Example

```
AT+CWAUTOCONN=1
```

AT+CWAPPROTO: Query/Set the 802.11 b/g/n Protocol Standard of SoftAP Mode

Query Command

Command:

```
AT+CWAPPROTO?
```

Response:

```
+CWAPPROTO=<protocol>
OK
```

Set Command

Command:

```
AT+CWAPPROTO=<protocol>
```

Response:

```
OK
```

Parameters

- **<protocol>**:
    - o bit0: 802.11b protocol standard.
    - o bit1: 802.11g protocol standard.
    - o bit2: 802.11n protocol standard.

Note

- Currently ESP devices only support 802.11b or 802.11bg or 802.11bgn mode.
- By default, PHY mode of ESP8266 device is 802.11bg mode, and PHY mode of non ESP8266 device is 802.11bgn mode.

AT+CWSTAPROTO: Query/Set the 802.11 b/g/n Protocol Standard of Station Mode

Query Command

Command:

```
AT+CWSTAPROTO?
```

Response:

```
+CWSTAPROTO=<protocol>
OK
```

Set Command

Command:

```
AT+CWSTAPROTO=<protocol>
```

Response:

```
OK
```

Parameters

- **<protocol>**:
  - o bit0: 802.11b protocol standard.
  - o bit1: 802.11g protocol standard.
  - o bit2: 802.11n protocol standard.

Note

- Currently ESP devices only support 802.11b or 802.11bg or 802.11bgn mode.
- By default, PHY mode of ESP8266 device is 802.11bg mode, and PHY mode of non ESP8266 device is 802.11bgn mode.

AT+CIPSTAMAC: Query/Set the MAC Address of an ESP Station

Query Command

Function:

Query the MAC address of the ESP Station.

Command:

```
AT+CIPSTAMAC?
```

Response:

```
+CIPSTAMAC:<mac>
OK
```

Set Command
Function:

Set the MAC address of an ESP station.

Command:

```
AT+CIPSTAMAC=<mac>
```

Response:

```
OK
```

Parameters

- **<mac>**: string parameter showing MAC address of an ESP station.

Notes

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- The MAC address of ESP SoftAP is different from that of the ESP Station. Please make sure that you do not set the same MAC address for both of them.
- Bit 0 of the ESP MAC address CANNOT be 1. For example, a MAC address can be "1a:…" but not "15:…".
- FF:FF:FF:FF:FF:FF and 00:00:00:00:00:00 are invalid MAC address and cannot be set.

Example
```
AT+CIPSTAMAC="1a:fe:35:98:d3:7b"
```

AT+CIPAPMAC: Query/Set the MAC Address of an ESP SoftAP
Query Command
Function:

Query the MAC address of the ESP SoftAP.

Command:

```
AT+CIPAPMAC?
```

Response:

```
+CIPAPMAC:<mac>
OK
```

Set Command

Function:

Set the MAC address of the ESP SoftAP.

Command:

```
AT+CIPAPMAC=<mac>
```

Response:

```
OK
```

Parameters

- **<mac>**: string parameter showing MAC address of the ESP SoftAP.

Notes

- The configuration changes will be saved in the NVS area
  if AT+SYSSTORE=1.
- The MAC address of ESP SoftAP is different from that of the ESP station.
  Please make sure that you do not set the same MAC address for both of
  them.
- Bit 0 of the ESP MAC address CANNOT be 1. For example, a MAC
  address can be "18:…" but not "15:…".
- FF:FF:FF:FF:FF:FF and 00:00:00:00:00:00 are invalid MAC and cannot
  be set.

Example

```
AT+CIPAPMAC="18:fe:35:98:d3:7b"
```

AT+CIPSTA: Query/Set the IP Address of an ESP Station

Query Command

Function:

Query the IP address of the ESP Station.

Command:

```
AT+CIPSTA?
```

Response:

```
+CIPSTA:ip:<"ip">
+CIPSTA:gateway:<"gateway">
+CIPSTA:netmask:<"netmask">
+CIPSTA:ip6ll:<"ipv6 addr">
+CIPSTA:ip6gl:<"ipv6 addr">

OK
```

Set Command

Function:

Set the IPv4 address of the ESP station.

Command:

```
AT+CIPSTA=<"ip">[,<"gateway">,<"netmask">]
```

Response:

```
OK
```

Parameters

- **<"ip">**: string parameter showing the IPv4 address of the ESP station.
- **<"gateway">**: gateway.
- **<"netmask">**: netmask.
- **<"ipv6 addr">**: string parameter showing the IPv6 address of the ESP station.

Notes

- For the query command, only when the ESP station is connected to an AP or the static IP address is configured can its IP address be queried.
- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- The Set Command correlates with the commands that set DHCP, such as AT+CWDHCP.
  - o If static IP address is enabled, DHCP will be disabled;
  - o If DHCP is enabled, static IP address will be disabled;

o The last configuration overwrites the previous configuration.

Example

```
AT+CIPSTA="192.168.6.100","192.168.6.1","255.255.255.0"
```

AT+CIPAP: Query/Set the IP Address of an ESP SoftAP

Query Command

Function:

Query the IP address of the ESP SoftAP.

Command:

```
AT+CIPAP?
```

Response:

```
+CIPAP:ip:<"ip">
+CIPAP:gateway:<"gateway">
+CIPAP:netmask:<"netmask">
+CIPAP:ip6ll:<"ipv6 addr">
+CIPAP:ip6gl:<"ipv6 addr">

OK
```

Set Command

Function:

Set the IPv4 address of the ESP SoftAP.

Command:

```
AT+CIPAP=<"ip">[,<"gateway">,<"netmask">]
```

Response:

```
OK
```

Parameters

- **<"ip">**: string parameter showing the IPv4 address of the ESP SoftAP.
- **<"gateway">**: gateway.
- **<"netmask">**: netmask.
- **<"ipv6 addr">**: string parameter showing the IPv6 address of the ESP SoftAP.

Notes

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- The set command correlates with the commands that set DHCP, such as AT+CWDHCP.
  - o If static IP address is enabled, DHCP will be disabled;
  - o If DHCP is enabled, static IP address will be disabled;
  - o The last configuration overwrites the previous configuration.

Example

```
AT+CIPAP="192.168.5.1","192.168.5.1","255.255.255.0"
```

AT+CWSTARTSMART: Start SmartConfig

Execute Command

Function:

Start SmartConfig of the type ESP-TOUCH+AirKiss.

Command:

```
AT+CWSTARTSMART
```

Set Command

Function:

Start SmartConfig of a designated type.

Command:

```
AT+CWSTARTSMART=<type>[,<auth floor>]
```

Response:

```
OK
```

Parameters

- **<type>**:
  - o 1: ESP-TOUCH
  - o 2: AirKiss
  - o 3: ESP-TOUCH+AirKiss
- **<auth floor>**: Wi-Fi authentication mode floor. ESP-AT will not connect to the AP whose authmode is lower than this floor.
  - o 0: OPEN (Default)
  - o 1: WEP

- o 2: WPA_PSK
- o 3: WPA2_PSK
- o 4: WPA_WPA2_PSK
- o 5: WPA2_ENTERPRISE
- o 6: WPA3_PSK
- o 7: WPA2_WPA3_PSK

Notes

- For more details on SmartConfig, please see <u>ESP-TOUCH User Guide</u>.
- SmartConfig is only available in the ESP station mode.
- The message `Smart get Wi-Fi info` means that SmartConfig has successfully acquired the AP information. ESP device will try to connect to the target AP.
- Message `Smartconfig connected Wi-Fi` is printed if the connection is successful.
- Use command AT+CWSTOPSMART to stop SmartConfig before running other commands. Please make sure that you do not execute other commands during SmartConfig.

Example

```
AT+CWMODE=1
AT+CWSTARTSMART
```

AT+CWSTOPSMART: Stop SmartConfig
Execute Command
Command:

```
AT+CWSTOPSMART
```

Response:

```
OK
```

Note

- Irrespective of whether SmartConfig succeeds or not, please always call AT+CWSTOPSMART before executing any other AT commands to release the internal memory taken up by SmartConfig.

Example

```
AT+CWMODE=1
AT+CWSTARTSMART
AT+CWSTOPSMART
```

AT+WPS: Enable the WPS Function

Set Command

Command:

```
AT+WPS=<enable>[,<auth floor>]
```

Response:

```
OK
```

Parameters

- **<enable>**:
    - o 1: Enable WPS (Wi-Fi Protected Setup) that uses PBC (Push Button Configuration) mode.
    - o 0: Disable WPS that uses PBC mode.
- **<auth floor>**: Wi-Fi authentication mode floor. ESP-AT will not connect to the AP whose authmode is lower than this floor.
    - o 0: OPEN (Default)
    - o 1: WEP
    - o 2: WPA_PSK
    - o 3: WPA2_PSK
    - o 4: WPA_WPA2_PSK
    - o 5: WPA2_ENTERPRISE
    - o 6: WPA3_PSK
    - o 7: WPA2_WPA3_PSK

Notes

- WPS can only be used when the ESP station is enabled.
- WPS does not support WEP (Wired-Equivalent Privacy) encryption.

Example

```
AT+CWMODE=1
AT+WPS=1
```

AT+MDNS: Configure the mDNS Function

Set Command

Command:

```
AT+MDNS=<enable>[,<hostname>,<service_name>,<port>]
```

Response:

```
OK
```

Parameters

- **<enable>**:
    - 1: Enable the mDNS function. The following three parameters need to be set.
    - 0: Disable the mDNS function. The following three parameters does not need to be set.
- **<hostname>**: mDNS host name.
- **<service_name>**: mDNS service name.
- **<port>**: mDNS port.

Example
```
AT+MDNS=1,"espressif","_iot",8080
AT+MDNS=0
```

[ESP32 Only] AT+CWJEAP: Connect to a WPA2 Enterprise AP

Query Command

Function:

Query the configuration information of the Enterprise AP to which the ESP station is already connected.

Command:

```
AT+CWJEAP?
```

Response:

```
+CWJEAP:<ssid>,<method>,<identity>,<username>,<password>,<security>
OK
```

Set Command

Function:

Connect to the targeted Enterprise AP.

Command:

```
AT+CWJEAP=<ssid>,<method>,<identity>,<username>,<password>,<security>[,<jeap_timeout>]
```

Response:

```
OK
```

or

```
+CWJEAP:Timeout
ERROR
```

Parameters

- **<ssid>**: the SSID of the Enterprise AP.
    - o Escape character syntax is needed if SSID or password contains any special characters, such as `,` , `"` , or `\\` .
- **<method>**: WPA2 Enterprise authentication method.
    - o 0: EAP-TLS.
    - o 1: EAP-PEAP.
    - o 2: EAP-TTLS.
- **<identity>**: identity for phase 1. String limited to 1 ~ 32.
- **<username>**: username for phase 2. Range: 1 ~ 32 bytes. For the EAP-PEAP and EAP-TTLS method, you must set this parameter. For the EAP-TLS method, you don't need to.
- **<password>**: password for phase 2. Range: 1 ~ 32 bytes. For the EAP-PEAP and EAP-TTLS method, you must set this parameter. For the EAP-TLS method, you don't need to.
- **<security>**:
    - o Bit0: Client certificate.
    - o Bit1: Server certificate.
- **[<jeap_timeout>]**: maximum timeout for AT+CWJEAP command. Unit: second. Default: 15. Range: [3,600].

Example

```
// Connect to EAP-TLS mode Enterprise AP, set identity, verify server certificate
and load client certificate
AT+CWJEAP="dlink11111",0,"example@espressif.com",,,3

// Connect to EAP-PEAP mode Enterprise AP, set identity, username and password, not
verify server certificate and not load client certificate
AT+CWJEAP="dlink11111",1,"example@espressif.com","espressif","test11",0
```

Error Code:

The WPA2 Enterprise error code will be prompt as `ERR CODE:0x<%08x>` .

AT_EAP_MALLOC_FAILED	0x8001
AT_EAP_GET_NVS_CONFIG_FAILED	0x8002
AT_EAP_CONN_FAILED	0x8003
AT_EAP_SET_WIFI_CONFIG_FAILED	0x8004
AT_EAP_SET_IDENTITY_FAILED	0x8005

AT_EAP_MALLOC_FAILED	0x8001
AT_EAP_SET_USERNAME_FAILED	0x8006
AT_EAP_SET_PASSWORD_FAILED	0x8007
AT_EAP_GET_CA_LEN_FAILED	0x8008
AT_EAP_READ_CA_FAILED	0x8009
AT_EAP_SET_CA_FAILED	0x800A
AT_EAP_GET_CERT_LEN_FAILED	0x800B
AT_EAP_READ_CERT_FAILED	0x800C
AT_EAP_GET_KEY_LEN_FAILED	0x800D
AT_EAP_READ_KEY_FAILED	0x800E
AT_EAP_SET_CERT_KEY_FAILED	0x800F
AT_EAP_ENABLE_FAILED	0x8010
AT_EAP_ALREADY_CONNECTED	0x8011
AT_EAP_GET_SSID_FAILED	0x8012
AT_EAP_SSID_NULL	0x8013
AT_EAP_SSID_LEN_ERROR	0x8014
AT_EAP_GET_METHOD_FAILED	0x8015
AT_EAP_CONN_TIMEOUT	0x8016
AT_EAP_GET_IDENTITY_FAILED	0x8017
AT_EAP_IDENTITY_LEN_ERROR	0x8018
AT_EAP_GET_USERNAME_FAILED	0x8019
AT_EAP_USERNAME_LEN_ERROR	0x801A
AT_EAP_GET_PASSWORD_FAILED	0x801B
AT_EAP_PASSWORD_LEN_ERROR	0x801C
AT_EAP_GET_SECURITY_FAILED	0x801D
AT_EAP_SECURITY_ERROR	0x801E

AT_EAP_MALLOC_FAILED	0x8001
AT_EAP_METHOD_SECURITY_UNMATCHED	0x801F
AT_EAP_PARAMETER_COUNTS_ERROR	0x8020
AT_EAP_GET_WIFI_MODE_ERROR	0x8021
AT_EAP_WIFI_MODE_NOT_STA	0x8022
AT_EAP_SET_CONFIG_FAILED	0x8023
AT_EAP_METHOD_ERROR	0x8024

Note

- The configuration changes will be saved in the NVS area if AT+SYSSTORE=1.
- This command requires Station mode to be active.
- TLS mode will use client certificate. Please make sure it is enabled.

AT+CWHOSTNAME: Query/Set the Host Name of an ESP Station

Query Command

Function:

Query the host name of ESP Station.

Command:

```
AT+CWHOSTNAME?
```

Response:

```
+CWHOSTNAME:<hostname>

OK
```

Set Command

Function:

Set the host name of ESP Station.

Command:

```
AT+CWHOSTNAME=<hostname>
```

Response:

OK

If the Station mode is not enabled, the command will return:

ERROR

Parameters

- **<hostname>**: the host name of the ESP Station. Maximum length: 32 bytes.

Note

- The configuration changes are not saved in the flash.

Example
```
AT+CWMODE=3
AT+CWHOSTNAME="my_test"
```

AT+CWCOUNTRY: Query/Set the Wi-Fi Country Code

Query Command

Function:

Query Wi-Fi country code information.

Command:

AT+CWCOUNTRY?

Response:

+CWCOUNTRY:<country_policy>,<country_code>,<start_channel>,<total_channel_count>

OK

Set Command

Function:

Set the Wi-Fi country code information.

Command:

AT+ CWCOUNTRY=<country_policy>,<country_code>,<start_channel>,<total_channel_count>

Response:

OK

Parameters

- **<country_policy>**:
  - o   0: will change the county code to be the same as the AP that the ESP device is connected to.
  - o   1: the country code will not change, always be the one set by command.
- **<country_code>**: country code. Maximum length: 3 characters.
- **<start_channel>**: the channel number to start. Range: [1,14].
- **<total_channel_count>**: total number of channels.

Note

- The configuration changes are not saved in the flash.

Example

```
AT+CWMODE=3
AT+CWCOUNTRY=1,"CN",1,13
```

Provide feedback about this document

OEM/integrators Installation Manual

the modules limited to OEM installation only

the OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Instructions to the OEM/integrator

The OEM integrator must include the instructions or statements required by part 15.19 and 15.21 in the user manual.

the OEM integrator must include a separate section in the host user's manual concerning the operating conditions to satisfy RF exposure compliance.

there is requirement that the grantee provide guidance to the host manufacturer for compliance with part 15b requirements.

Caution

THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Exposure to Radio Frequency Radiation.

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

IMPORTANT NOTE : FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This deivice is intended only for OEM integrators under the following conditions:

(1) This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

(2) This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements with this device installed.

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. Revision 1.0 (NOV,2019) 19

This module has been granted modular approval for mobile applications. OEM integrators for host products may use the module in their final products without

additional FCC certification if they meet the following conditions. Otherwise, additional FCC approvals must be obtained.

The host product with the module installed must be evaluated for simultaneous transmission requirements.

The user's manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, use this module only with the included onboard antenna.

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

End Product Labeling
These modules are designed to comply with the FCC single
modular FCC grant,WizFi320.
The host system using this module must display a visible label indicating the following text:
Contains FCC ID: 2AKKW-WIZFI320

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