E103-W12 AT Commands Manual



成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.

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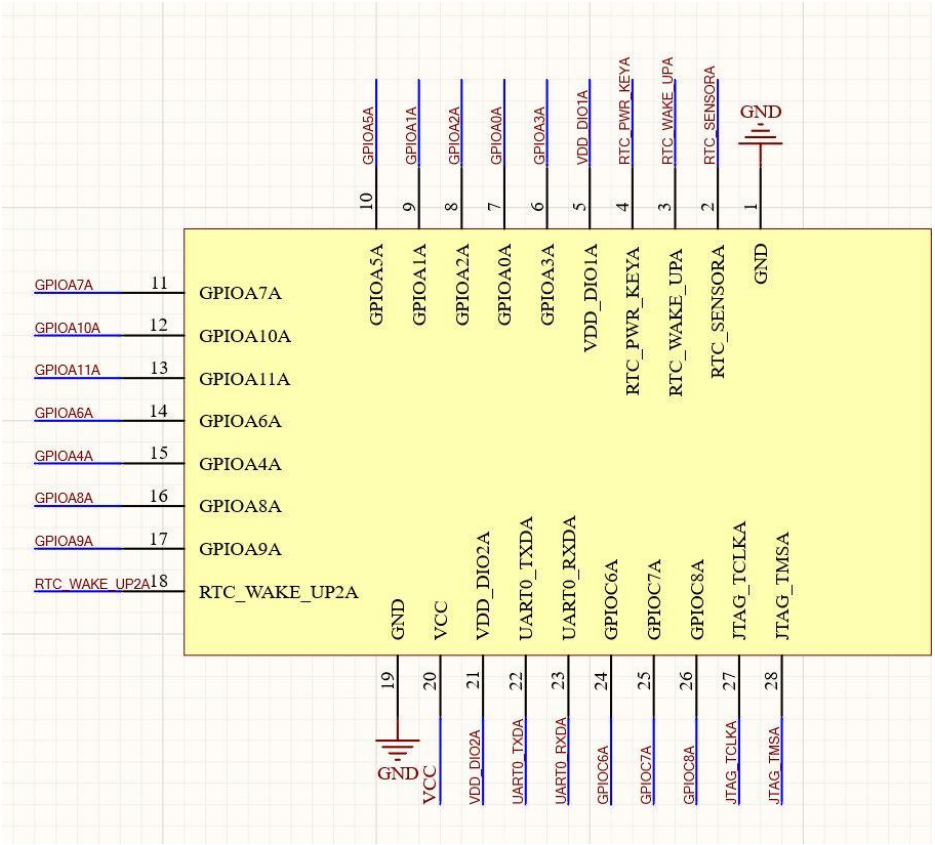
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1 Overview

This article describes the meaning, syntax, responses, and examples of the AT commands for the W12 series products from Chengdu Ebyte Electronic Technology Co., Ltd.

2 Pin Definitions



Pin Number	Pin Name	Pin Type	Pin Functions
1	GND	-	Ground wire, connected to the power supply reference ground
2	NC	-	-
3	WAKE_UP	-	sleep2/sleep3 external wake-up pin
4	PWR_KEY	-	Power enable pin: High level enables power, low level disables power in Sleep1 mode
5	VDD_DIO1	I/O	GPIOA1–GPIOA11 are powered by 1.8 V–3.3 V; the GPIO output voltage corresponds to this

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Pin Number	Pin Name	Pin Type	Pin Functions
6	GPIOA3	I/O	General-purpose I/O pin, can be used as ADC channel 3
7	GPIOA0	I/O	General-purpose I/O pin, can be used as ADC channel 0
8	GPIOA2	I/O	General-purpose I/O pin, can be used as ADC channel 2
9	GPIOA1	I/O	General-purpose I/O pin, can be used as ADC channel 1
10	GPIOA5	I/O	AT Command Serial Port UART_RX
11	GPIOA7	I/O	General-purpose I/O port
12	GPIOA10	I/O	General-purpose I/O pin, with multiplexed PWM output
13	GPIOA11	I/O	General-purpose I/O pin; data notification pin in sleep3 mode
14	GPIOA6	I/O	General-purpose I/O port
15	GPIOA4	I/O	AT command on UART1_TX
16	GPIOA8	I/O	General-purpose I/O port
17	GPIOA9	I/O	General-purpose I/O port
18	RTC_WAKE_UP2	I/O	Ground via pull-down
19	GND	I/O	Ground wire, connected to the power supply reference ground
20	VCC	I/O	Module power supply, 3.3 V
21	VDD_DIO2	I/O	GPIOC6–GPIOC8 supply voltage: 1.8 V–3.3 V; the GPIO output voltage corresponds to this range
22	UART0_TXD	I/O	Debugging the serial port TX; users do not need to worry about this
23	UART0_RXD	I/O	Debugging the serial port RX; users do not need to worry about this
24	GPIOC6	I/O	General-purpose I/O port
25	GPIOC7	I/O	General-purpose I/O port
26	GPIOC8	I/O	General-purpose I/O port
27	JTAG_TCLK	-	JTAG emulation pins; users do not need to worry about them
28	JTAG_TMS	-	JTAG emulation pins; users do not need to worry about them

3 Features

- Supports multiple baud rates
- Supports TCP Server, TCP Client, UDP, and MQTT
- Three operating modes: STATION, AP, and STATION&AP
- Supports transparent serial transmission
- Supports multiple encryption methods
- Supports configuration via AT commands over the module's serial port
- Parameters retained after power loss
- Supports multiple low-power modes

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4 Technical Specifications

4.1 Limit parameters

Key Specifications	Name	Min	Typical	Max
Supply voltage	VDD	2.1	3.3	3.6
Storage Temperature Range	T_{STR}	-40℃	-	+125℃
Operating temperature range	T_{OPR}	-40℃	-	+85℃

4.2 RF Power Consumption Parameters

Mode	Typical	Unit
Transmit IEEE 802.11b at 1 Mbps POUT = +19.4 dBm	240	mA
Transmit IEEE802.11b 11Mbps POUT = +19.3dBm	240	mA
Transmit IEEE802.11b 54Mbps POUT = +14.7dBm	190	mA
Transmit IEEE802.11n MCS7 POUT = +12dBm	180	mA
Receive IEEE802.11b/g/n	95	mA

4.3 Wi-Fi RF

Parameters	Typical	Unit
Input frequency	2.4~2.4835	GHz
Transmit Power		
IEEE802.11b 11Mbps	19±2	dBm
IEEE802.11g 54Mbps	16±2	dBm
IEEE802.11n MCS7 HT20	13±2	dBm

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5 Instructions

AT commands can be classified into the following four types：

Type	Command Format	Description
Query Command	AT+<x>=?	This command is used to return the current value of the parameter
Configuration Command	AT+<x>=<…>	This command is used to set user-defined parameter values
Execute command	AT+<x>	This command is used to execute immutable functions with variable arguments that are controlled by the module's internal routines

Note：

- Not every AT command supports all three of these command types.
- [] Values in parentheses are defaults; they may be left blank or may not be displayed.
- The default baud rate is 115200.
- Commands are not case-sensitive.
- End with a carriage return and line feed (CRLF). Please make sure to set your serial port tool to “New Line Mode.”

5.1 List of System Control Commands

Instructions	Description
AT	Test AT startup
AT+HELP	View all commands
AT+RST	Restart Module
AT+SDKVER	Check Version Information
AT+VER	Read the version number
ATE	Turn echo back on or off
ATQ	Command Output
AT+RESTORE	Restore Factory Settings
AT+UART	Set the default UART configuration and save it to flash
AT+UART_CUR	Set the current temporary UART configuration; do not save to flash
AT+UART_DEF	Set the default UART configuration and save it to flash
AT+DEFAP	Set the default AP
AT+TIME	Set/Get the current time
SYSRUNTIME	Get the system uptime

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5.2 System Control Command Description

5.2.1 AT Test AT startup

Execute	AT
Response	OK
Parameter	-

5.2.2 AT+HELP

Execute command	AT+HELP
Response	AT Commands: ? - Commands list with brief and usage AT+HELP=<command> - Print help message. AT - Attention command .....Command omitted..... OK
Parameter	-

5.2.3 AT+RST Restart Module

Execute command	AT+RST
Response	OK
Parameter Description	-

5.2.4 AT+SDKVER View SDK version information

Execute command	AT+SDKVER
Response	+VER:<main version> OK
Example	AT+SDKVER +SDKVER:3.2.7.1 OK
Parameter Description	-

5.2.5 AT+VER Get version information

Execute Command	AT+VER
Response	+SDKVER;<major>.<minor>.<revision>.<eng_number> OK <major>:SDK Main Number <minor>: SDK Sub-number <revision>: SDK Revision Number <eng_number>: SDK Project Number
Example	AT+VER +VER:FRTOS-GEN01-01-7400-0010 OK
Parameter Description	-

5.2.6 ATE Turn echo back on or off

Commands	Query Command：ATE=?	Execute command：ATE

Response	<ECHO on/off> OK	<ECHO on/off> OK
Example	ATE=? Echo on OK	ATE Echo on OK ATE Echo off OK
Note	The ATE command enables the reverse echo function	
Parameter Description	-	

5.2.7 ATQ Show/Hide Result Code

Commands	Query Command：ATQ=?	Execute Command：ATQ
Response	Display results on/off OK	Display results on/off OK
Example	ATQ=? Display results on OK	ATQ Display results off OK ATQ Display results on OK
Note	The ATQ command toggles the display of the result code	
Parameter Description	-	

5.2.8 AT+RESTORE Restore default settings

Execute Command	AT+RESTORE
Response	+INIT:DONE,0
Example	AT+RESTORE +INIT:DONE,0
Note	This command will clear all saved settings and restore the default settings. Running this command will restart the device.
Parameter Description	-

5.2.9 AT+UART Set the default UART configuration and save it to Flash

Commands	Query Command： AT+UART=?	Configuration Instructions： AT+UART=<baudrate>[,<databits>][,<parity>][,<stopbits>]
Response	+BAUDRATE:<baudrate> OK	OK
Parameter Description	• <baudrate>: UART baud rate • <databits>: Data bit ➢ 5: 5 bit Data bit ➢ 6: 6 bit Data bit ➢ 7: 7 bit Data bit ➢ 8: 8 bit Data bit（Default） • <parity>: Check Digit ➢ 0: None（Default） ➢ 1: Odd ➢ 2: Even	

	• <stopbits>: Stop bit ➢ 1： 1 bit Stop bit(Default) ➢ 2： 2 bit Stop bit
Note	• These settings are stored in flash memory and remain in effect after a reboot or power cycle • Flow control is not supported • can set only the baud rate; there is no need to enter any other parameters Supported baud rates： 9600/19200/38400/57600/115200/230400/460800/921600
Example	AT+UART=115200 OK AT+UART=115200,8,n,1 OK

5.2.10 AT+UART_CUR Set the current temporary UART configuration without saving it to Flash

Instructions	Query Command： AT+UART_CUR=?	Configuration Instructions： AT+UART_CUR=<baudrate>[,<databits>][,<parity>][,<stopbits>]
Response	+BAUDRATE:<baudrate> OK	OK
Parameter Description	• <baudrate>: UART baud rate • <databits>: Data bit ➢ 5: 5 bit Data bit ➢ 6: 6 bit Data bit ➢ 7: 7 bit Data bit ➢ 8: 8 bit Data bit • <stopbits>: Stop bit ➢ 1： 1 bit Stop bit ➢ 2： 1.5 bit Stop bit ➢ 3： 2 bit Stop bit	

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	• <parity>: Check digit ➢ 0: None ➢ 1: Odd ➢ 2: Even
Note	• These settings are not saved in Flash. • This version does not currently support flow control. • You can set only the baud rate; there is no need to enter any other parameters. • Supported baud rates : 9600/19200/38400/57600/115200/230400/460800/921600
Example	AT+UART_CUR=115200 OK AT+UART_CUR=115200,8,n,1 OK

5.2.11 AT+UART_DEF Set the default UART configuration and save it to Flash

Instructions	Query Command: AT+UART_DEF?	Configuration Instructions: AT+UART_DEF=<baudrate>,<databits>,<stopbits>,<parity>
Response	+BAUDRATE:<baudrate> OK	OK
Parameter Description	• <baudrate>: UART baud rate • <databits>: Data bit ➢ 5: 5 bit Data bit ➢ 6: 6 bit Data bit ➢ 7: 7 bit Data bit ➢ 8: 8 bit Data bit • <stopbits>: Stop bit ➢ 1： 1 bit Stop bit ➢ 2： 1.5 bit Stop bit	

	➢ 3： 2 bit Stop bit • <parity>: Check digit ➢ 0: None ➢ 1: Odd ➢ 2: Even
Note	• These settings are stored in flash memory and remain in effect after a reboot or power cycle. • Flow control is not supported. • Supported baud rates： 9600/19200/38400/57600/115200/230400/460800/921600
Example	AT+UART_DEF=115200 OK AT+UART_DEF=115200,8,n,1 OK

5.2.12 AT+TIME Set/Get the current time

Instructions	Query Command： AT+TIME=?	Configuration Instructions： AT+TIME=<date>,<time>
Response	+TIME:<yyy_mm_dd><h h:mm:ss> OK	OK or ERROR
Parameter Description	• <date>Date • <time>Time	
Note	• Restores default settings after a power loss; recommended for use in conjunction with SNTP for obtaining network time	
Example	AT+TIME=2023-8-28,14:04:30 OK AT+TIME=?	

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	+TIME:2023-8-28,14:04:32;. OK

5.2.13 AT+SYSRUNTIME Get the system uptime

Execute command	AT+SYSRUNTIME
Response	+SYSRUNTIME:<day>,<hh:mm.ss>
Example	AT+SYSRUNTIME +SYSRUNTIME:0,22:10.44 OK
Parameter Description	-

5.2.14 AT+TZONE Set the GMT time zone

Instructions	Query Command： AT+TZONE=?	Configuration Instructions： AT+TZONE=<sec>
Response	+TZONE:<sec> OK	OK or ERROR
Parameter Description	＜sec＞：Time Zone Settings.(-43200~43200秒)	
Note	＜sec＞The parameter must be a multiple of 60 seconds. If the value of <sec> is not a multiple of 60 seconds, the remainder will be discarded.	
Example	AT+TZONE=? +TZONE:0 OK AT+TZONE=32400 OK AT+TZONE=? +TZONE:32400	

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	OK

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6 Basic Function Commands

6.1 List of Basic Function Commands

Instructions	Description
AT+CWMODE	Set the device operating mode (STA/AP/STA+AP)
AT+CWMAC	Set MAC Address
AT+CWSPFMAC	Set a spoofed MAC address
AT+CWOTPMAC	Set the OTPMAC address
AT+CWSTA	Check if the STA is connected
AT+CWSTAT	Retrieve Wi-Fi STA protocol information
AT+CWCOUNTRY	Set the Wi-Fi country code
AT+CWSCAN	[STA] Scan for access points
AT+CWPSCAN	[STA] Scan APs on a specified channel
AT+CWPSTOP	[STA] Stop scanning
AT+CWRSSI	[STA] Get current RSSI
AT+CWJAP	[STA] All-protocol Wi-Fi connection commands
AT+CWJAPA	[STA] WPA/WPA2 PSK connection—convenient
AT+CWJAPA3	[STA] WPA3 Wi-Fi Connection
AT+CWCAP	[STA] Connect to the currently configured AP
AT+CWQAP	[STA] Disconnect from the current AP
AT+CWROAP	[STA] Start/Stop Roaming
AT+CWROTH	[STA] Set RSSI roaming threshold
AT+DISSTA	[STA] Set whether to disable the STA Wi-Fi protocol; 0: Do not disable (automatically connects upon power-up); 1: Disable (does not automatically connect upon power-up)
AT+CWENTAP	[STA] Configure Enterprise AP Protocol
AT+CWENTLI	[STA] Set up corporate login ID/password
AT+CWDEFAP	[AP] AP configured with default settings
AT+CWSAP	[AP] AP Mode
AT+CWOAP	[AP] Turn on AP
AT+CWIAP	[AP] Close AP
AT+CWRAP	[AP] Restart AP
AT+CWLCST	[AP] Retrieve information about connected STA
AT+CWAPPROTO	[AP] Configuring the IEEE 802.11 Wi-Fi mode on an AP
AT+CWAPCH	[AP] Setting the AP Channel
AT+CWAPBI	[AP] Set the AP beacon interval
AT+CWAPUI	[AP] Configuring the site disconnect timeout in soft AP mode
AT+CWAPRT	[AP] Set the AP RTS threshold (8-bit byte)
AT+CWAPDE	[AP] Sends an authentication frame to the connected site

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Instructions	Description
AT+CWAPDI	[AP] Send a disassociation frame to the connected workstation
AT+CWWMM	[AP] Enable/Disable WMM
AT+CWWMP	[AP] Enable/Disable WMM-PS (WMM Power Saving)
AT+CWDHCPC	Start/Stop DHCP Client
AT+CWDHCPRANG	Set the IP address range for the DHCP server
AT+CWDHCPLT	Set the IP lease duration for the DHCP server (in seconds)
AT+CWDHCPIP	Display information about the connected DHCP client
AT+CWDHCPS	Start/stop the DHCP server

6.2 Description of Basic Function Commands

6.2.1 AT+CWMODE Check/Set Wi-Fi Mode

Instructions	Query Command： AT+CWMODE=?	Configuration Instructions： AT+CWMOE=<mode>
Response	+CWMODE:<mode> OK	OK
Parameter Description	• <mode>： ➢ 0：Station Mode ➢ 1:：SoftAP Mode ➢ 2：SoftAP+Station Mode	
Note	The device defaults to STA mode when powered on. ● Wi-Fi mode is stored in NVRAM ● You must restart the system for the changes to take effect	
Example	AT+CWMODE=1 OK AT+CWMODE=? +CWMODE:1 OK	

6.2.2 AT+CWMAC View/Set MAC Address

Instructions	Query Command： AT+CWMAC=?	Configuration Instructions： AT+CWMAC=<mac>
Response	+CWMAC:<mac> OK	OK
Parameter Description	• <mac>：The user's MAC address is valid if the last digit is even.	
Note	● The user's MAC address is stored in NVRAM and requires a system reboot to take effect ● Three types of MAC addresses are supported, with the following priority: spoofed MAC address, user MAC address, and OTP MAC address ● When you read the MAC address in AP mode, it will be the MAC address you entered plus 1	
Example	AT+CWMAC=EC:9F:0D:8E:FA:62 OK AT+CWMAC=? ;In STA mode +CWMAC:EC:9F:0D:8E:FA:62 AT+CWMAC=? ;In Soft-AP mode +CWMAC::EC:9F:0D:8E:FA:63	

6.2.3 AT+CWSPFMAC Configure MAC Address Spoofing

Instructions	Configuration Instructions： AT+CWSPFMAC=<mac>
Response	OK
Parameter Description	● <mac>：To spoof a MAC address, the last digit must be even for it to work
Note	● The spoofed MAC address is stored in NVRAM and requires a system

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	reboot to take effect ● Three types of MAC addresses are supported, with the following priority: spoofed MAC address, user MAC address, and OTP MAC address ● When you read the MAC address in AP mode, it will be the MAC address you entered plus 1 ● AT+CWMAC=? This command can be used to retrieve a spoofed MAC address, as it does not support querying
Example	AT+CWSPFMAC=EC:9F:0D:8E:00:62 OK AT+CWMAC=? ;In STA mode +CWMAC:EC:9F:0D:8E:00:62 AT+CWMAC=? ;In AP mode +CWMAC:EC:9F:0D:8E:00:63

6.2.4 AT+CWOTPMAC Write the MAC address to the OTP

Instructions	Configuration Instructions： AT+CWOTPMAC=<mac>
Response	OK
Parameter Description	● <mac>：To spoof a MAC address, the last digit must be even for it to work.
Note	● The spoofed MAC address is stored in NVRAM and requires a system reboot to take effect ● If an old MAC address exists in the OTP, that address will be invalidated ● There are four MAC address slots available in the OTP. A total of four OTP MAC addresses can be written during production; the last address written takes precedence ● Three types of MAC addresses are supported, with the following priority: spoofed MAC address, user MAC address, and OTP MAC address ● AT+CWMAC=? This command can be used to retrieve the OTP MAC

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	address, as it does not support querying ● When you read the MAC address in AP mode, it will be the MAC address you entered plus 1 ● The OTP can only be written once; generally, there is no need to configure this address
Example	AT+CWOTPMAC=EC:9F:0D:8E:00:60 OK AT+CWMAC=? ;In STA mode +CWMAC:EC:9F:0D:8E:00:60 AT+CWMAC=? ;In AP mode +CWMAC:EC:9F:0D:8E:00:61

6.2.5 AT+CWSTA Check if the STA is connected

Execute command	AT+CWSTA
Response	+CWSTA:<status> <status> 1 (connect), 0 (Not connected)
Parameter Description	-
Note	If the command is run in soft AP mode, an error is returned（-100）
Example	AT+CWSTA +CWSTA:0 OK

6.2.6 AT+CWSTAT Get Wi-Fi information

Execute command	AT+CWSTAT
Response	+CWSTAT:<Wi-Fi interface><var>…
Parameter	-

Description	
Note	If the command is run in soft AP mode, an error is returned（-100）
Example	AT+CWSTAT ；STA not connected +CWSTAT:sta0 mac_address= ec:9f:0d:9f:fa:64 wpa_state=DISCONNECTED disconnect_reason=0 OK AT+CWSTAT ；AP not connected +CWSTAT:softap1 mac_address=ec:9f:0d:9f:fa:65 wpa_state=DISCONNECTED disconnect_reason=0 OK AT+CWSTAT ；STA Connection +CWSTAT:sta0 mac_address=ec:9f:0d:9f:fa:64 bssid=70:5d:cc:32:15:32 ssid=MY_AP_SSID id=0 mode=STATION key_mgmt=WPA2-PSK pairwise_cipher=CCMP group_cipher=CCMP channel=3 wpa_state=COMPLETED OK

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6.2.7 AT+CWCOUNTRY Look up/Set Country Code

Instructions	Query Command： AT+CWCOUNTRY=?	Configuration Instructions： AT+CWCOUNTRY=<code>
Response	+CWCOUNTRY:<code> OK	OK or ERROR
Parameter Description	• <code>： ➢ Country codes (as defined by the ISO 3166-1 alpha-2 standard). Examples include KR, US, JP, CN, and 177 other country codes.	
Note	The device defaults to STA mode when powered on. ● Wi-Fi mode is stored in NVRAM ● You must restart the system for the changes to take effect	
Example	AT+CWCOUNTRY=CN OK AT+CWCOUNTRY=? +CWCOUNTRY:CN OK	

6.2.8 AT+CWSCAN Scan AP

Execute Command	AT+CWSCAN
Response	+CWSCAN:<bssid><\t><frequency><\t><signal strength><\t><flag><\t><ssid><LF>…
Parameter Description	-
Note	The SSID may be lost when the AP is hidden
Example	AT+CWSCAN +CWSCAN:70:5d:cc:32:15:32 2422 -30 [WPA2-PSK CCMP][WPS][ESS] IPTIME_N604BLACK_ERIC

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	b4:a9:4f:62:39:46 2422 -32 [WPA-PSK CCMP+TKIP][WPA2-PSK-CCMP+TKIP][WPS][ESS] SK_WiFiGIGA3943 OK

6.2.9 AT+CWPSCAN Retrieve the passive scan results for the specified parameters

Execute command	AT+CWPSCAN=<channel time limit>, <ch>..<ch>
Response	BSSID Wi-Fi_Channel RSSI SSID Security Type
Parameter Description	＜channel time limit＞：Channel scan time limit (requires more than 30,000 microseconds). <ch>：Carrier frequency (0 to 14)
Note	For example, you can enter multiple parameters in <ch>. (“0” indicates all channels)
Example	AT+CWPSCAN=120000,1,3,5 70:5d:cc:8b:49:8e 2412 -47 Gen_Port_*.5_AP [WPA2-PSK-CCMP][WPS][ESS] 72:5d:cc:c0:9a:c4 2412 -47 IPTIME_A3004NS-M_Bell [WPS][ESS] … +PSCAN:TIMEOUT

6.2.10 AT+CWPSTOP Stop Scanning

Execute command	AT+CWPSTOP
Response	OK or ERROR
Parameter	-

Description	
Note	-
Example	AT+CWPSTOP OK

6.2.11 AT+CWRSSI Get the current RSSI

Execute command	AT+CWRSSI
Response	+CWRSSI value
Parameter Description	-
Note	If no connection is established, “+RSSI:NOT_CONN” will be returned
Example	AT+CWPSTOP OK

6.2.12 AT+CWJAP Commands for full-protocol Wi-Fi connections

Instructions	Query Command： AT+CWJAP=?	Configuration Instructions： AT+CWJAP=<ssid>[,<key>][,<hidden>] (sec=0|5)
		AT+CWJAP=<ssid>,<sec>,<idx>,<key>[,<hidden>] (sec=1)
		AT+CWJAP=<ssid>,<sec>,<enc>,<key>[,<hidden>] (sec=2|3|4|6|7)
Response	If Wi-Fi connection is success : +CWJAPA:’<SSID>’,’<Passphrase>’ If Wi-Fi connection is failed : ERROR:-425 (No SSID found)	OK or ERROR Operation Result +CWJAP:<OPS_RESULT>[,’<SSID>’,’<IP_ADDRESS>’] +CWJAP:<OPS_RESULT>,<REASON>,[<REASON_CODE>]

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		<OPS_RESULT> : 1 (SUCCESS), 0 (FAILED)
Parameter Description	<ssid>: AP SSID. <sec>: Security Protocol. 0 (OPEN), 1 (WEP), 2 (WPA), 3 (WPA2), 4 (WPA+WPA2)), 5 (WPA3 OWE), 6 (WPA3 SAE), 7 (WPA2 RSN & WPA3 SAE) <idx>: Key index for WEP. 0~3 <enc>: Encryption. 0 (TKIP), 1 (AES), 2 (TKIP+AES). <key>: Passphrase. 8 ~ 63 characters allowed. <hidden>: 1 (<ssid> is hidden), 0 or [not specified] (<ssid> is NOT hidden)	
Note	● The host should wait for a command response of "OK" or 'ERROR' and for the operation to complete successfully. Then, enter "+CWJAP:1, '<SSID>', <IP address>" to establish a successful connection ● Depending on network conditions, it may take longer to obtain the results of the operation due to internal connection retries ● Running this command will not restart the system ● AP configuration parameters (AP configuration files) are stored in NVRAM	
Example	AT+CWJAP=MY_AP_SSID,0 *; Open security* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAP=MY_AP_SSID,0,1 ; *Open security + hidden SSID* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAP=MY_AP_SSID,1,0,12345 *; WEP security* OK +CWJAP:1,'MY_AP_SSID',192.168.0.7 AT+CWJAP=MY_AP_SSID,1,0,12345,1 *; WEP + hidden AP* OK +CWJAP:1,'MY_AP_SSID',192.168.0.7 AT+CWJAP=MY_AP_SSID,4,2,N12345678 ; WPA2 security OK +CWJAP:1,'MY_AP_SSID',192.168.0.7 AT+CWJAP=MY_AP_SSID,4,2,N12345678,1	

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	; WPA2 + hidden AP OK +CWJAP:1,'MY_AP_SSID',192.168.0.7 AT+CWJAP=? +CWJAP:'MY_AP_SSID',4,2,'N12345678' OK

6.2.13 AT+CWJAPA WPA/WPA2 PSK Connection

Instructions	Query Command： AT+CWJAPA=?	AT+CWJAPA=<ssid>[,<key>][,<hidd en>]
Response	If the Wi-Fi connection is successful: +CWJAP:'<SSID>','<Passphrase>' If the Wi-Fi connection fails : ERROR:-425 (No SSID found)	OK or ERROR Operation Results +CWJAP:<OPS_RESULT>[,'<SSID>','<IP_ADDRESS>'] +CWJAP:<OPS_RESULT>,<REASON>,[<REASON_CODE>] <OPS_RESULT> : 1 (SUCCESS), 0 (FAILED)
Parameter Description	● If <key> exists, the security protocol is WPA+WPA2, and the encryption is TKIP+AES. ● If ＜key＞ is omitted, the security protocol is OPEN. ● ＜hidden＞： 1 (where <ssid> is hidden), 0, or [not specified] (where <ssid> is not hidden). If <hidden> is omitted, <ssid> is not hidden. ● ＜ssid＞：AP ssid。 ● ＜key＞：Passphrase. Must be between 8 and 63 characters long	
Note	● The host should wait for a command response of "OK" or 'ERROR' and for the operation to complete successfully. Then, enter "+CWJAP:1, '<SSID>', <IP address>" to establish a successful connection ● Depending on network conditions, it may take longer to obtain the results due to internal connection retries ● Running this command will not restart the system ● AP configuration parameters (AP configuration files) are stored in NVRAM	

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Example	AT+CWJAPA=MY_AP_SSID *; Open security* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=MY_AP_SSID,1 *; Open security + hidden SSID* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=MY_AP_SSID,N12345678 *; WPA2 security* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=MY_AP_SSID,N12345678,1 *; WPA2 security + hidden AP* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=? +CWJAPA:'MY_AP_SSID','N12345678' OK

6.2.14 AT+CWJAPA3 [STA] Includes WPA3 Wi-Fi connections

Instructions	Query Command： AT+CWJAPA3=?	AT+CWJAPA=<wpa3_flag>,<ssid> [,<key>][,<hidden>]
Response	If the Wi-Fi connection is successful: +CWJAP:'<SSID>','<Passphrase>' If the Wi-Fi connection fails : ERROR:-425 (No SSID found)	OK or ERROR Operation Results +CWJAP:<OPS_RESULT>[,'<SSID>','<IP_ADDRESS>'] +CWJAP:<OPS_RESULT>,<REASON>,[<REASON_CODE>] <OPS_RESULT> : 1 (SUCCESS), 0 (FAILED)
Parameter Description	● ＜wpa3_flag＞：WPA2/WPA3 Access Point Types. ● If 1, WPA3-AP; if 0, WPA/WPA2-AP. ● If <key> exists, the security protocol is WPA+WPA2, and the encryption is TKIP+AES. ● If ＜key＞ is omitted, the security protocol is OPEN. ● ＜hidden＞： 1 (where <ssid> is hidden), 0, or [not specified] (where <ssid> is not hidden). If <hidden> is omitted, <ssid> is not hidden.	

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	● ＜ssid＞：AP ssid。 ● ＜key＞：Passphrase. Must be between 8 and 63 characters long
Note	● The host should wait for a command response of “OK” or “ERROR” and for the operation result to return ‘OK’, then send “+CWJAP:1, ‘<SSID>’, <IP address>” to establish a successful connection ● Depending on network conditions, it may take longer to obtain the results of the operation due to internal connection retries ● Running this command will not restart the system ● AP configuration parameters (AP configuration files) are stored in NVRAM
Example	AT+CWJAPA3=0，MY_AP_SSID *; Open security* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=MY_AP_SSID,1 *; Open security + hidden SSID* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=0，MY_AP_SSID,N12345678 *; WPA2 security* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=MY_AP_SSID,N12345678,1 *; WPA2 security + hidden AP* OK +CWJAP:1,'MY_AP_SSID',192.168.43.32 AT+CWJAPA=? +CWJAPA:'MY_AP_SSID','N12345678' OK AT+cwJAPA3=1,WPA3_AP_SSID *; WPA3-OWE* OK +cwJAP:1,'WPA3_AP_SSID',192.168.0.2 AT+cwJAPA3=1,WPA3_AP_SSID,N12345678 *; WPA3-SAE security* OK +cwJAP:1,'WPA3_AP_SSID',192.168.0.2 AT+CWJAPA3=1,WPA3_AP_SSID,N12345678,1 *; WPA3-SAE + hidden AP* OK +CWJAP:1,'WPA3_AP_SSID',192.168.0.2 AT+CWJAPA3=? +CWJAPA3:'MY_AP_SSID','N12345678' OK

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6.2.15 AT+CWCAP Connect to the currently configured AP

Execute command	AT+CWCAP
Response	OK
Parameter Description	-
Note	● AP profile parameters must be stored in NVRAM ● AP profiles can be stored in NVRAM by issuing the "AT+CWJAPA" or "AT+WWJAP" command ● If the AP configuration file cannot be found, the DA16200 (DA16600) returns an error (-503) ● If the DA16200 (DA16600) is already connected to the AP, an error (-460) is returned
Example	AT+CWCAP OK +CWJAP:1,'*MY_AP_SSID*',192.168.0.7 AT+CWCAP ERROR:-503 *; Connect to AP fail. (e.g., No AP profile found)* AT+CWCAP ERROR:-460 *; Already connected*

6.2.16 AT+CWQAP Disconnect from the current AP

Execute command	AT+CWQAP
Response	OK or ERROR
Parameter Description	-
Note	If the connection to the AP has been lost, no error will be returned
Example	AT+ CWQAP OK

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6.2.17 AT+CWROAP Check/Set Roaming

Instructions	Query Command： AT+CWROAP=?	Configuration Instructions： AT+CWROAP=<roam>
Response	+CWROAP:<roam> OK	OK
Parameter Description	<roam>: 1 (run), 0 (stop).	
Note	This command enables “simple” roaming. The roaming configuration includes a parameter called the roaming threshold (set via AT+CWROTH, -65by). Assume that the DA16200 (DA16600) is connected to an AP, and there are other APs with the same SSID and security settings in the vicinity of the DA16200 (DA16600). If the RSSI value of the DA16200 (DA16600)’s currently connected AP falls below the specified roaming threshold, it will attempt to connect to an AP with a higher RSSI (with the same SSID and security settings). If the conditions are met, the DA16200 (DA16600) will silently switch to the new AP without triggering a disconnection event. When <Roaming> is set to 1, the automatic roaming start flag is stored in NVRAM, and roaming is enabled when the system restarts and sets this flag. If <Roaming> is set to 0, the roaming flag is removed from NVRAM and roaming is disabled. DPM mode does not support “simple” roaming. Therefore, use the command “AT+DPM=1” to set DPM mode and disable the “automatic roaming start flag.”	
Example	AT+CWROAP=1 OK AT+CWROAP=0 OK AT+CWROAP=? +CWROAP:1 OK	

6.2.18 AT+CWROTH Query/Set RSSI Roaming Threshold

Instructions	Query Command： AT+CWROTH=?	Configuration Instructions： AT+CWROTH=<rssi>
Response	+CWROAP:<roam> OK	OK
Parameter Description	<roam>: Roaming threshold (from 0 to -95 dBm).	
Note	This command writes the roaming threshold to NVRAM When AT+CWROAP=1 is running, enable roaming using the new threshold	
Example	AT+CWROTH=-55	

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	OK AT+CWROTH=? +CWROTH:-55 OK

6.2.19AT+DISSTA Check/Set whether the STA Wi-Fi protocol is disabled

Instructions	Query command: AT+CWDISSTA=?	Configuration instructions: AT+DISSTA=<disabled>
Response	+DISSTA:<disabled> OK	OK
Parameter Description	＜disabled＞：1（Unused），0（Already used）。	
Note	Set the Wi-Fi STA profile to “Not Used.” If set to 1, the DA16200 (DA16600) will not attempt to connect to the configured AP upon reboot. When the “Not Used” flag is stored in NVRAM, it affects the DA16200 (DA16600) during the boot process, which means the system must be rebooted.	
Example	AT+CWDIS=? +CWDIS:1 AT+CWDIS=1 OK OK	

6.2.20AT+GETFASTCONN Get the status value for Wi-Fi Fast Reconnect mode

Execute command	AT+GETFASTCONN
Response	+GETFASTCONN:<0|1>
Parameter Description	-
Note	-
Example	AT+GETFASTCONN +GETFASTCONN:0 OK

6.2.21AT+SETFASTCONN Enable/Disable Wi-Fi Quick Reconnect Mode

Execute command	AT+SETFASTCONN
Response	OK
Parameter Description	-

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Note	-
Example	AT+SETFASTCONN=1 OK

6.2.22AT+CWDEFAP Set default parameters AP

Execute command	AT+CWDEFAP
Response	Response: OK or ERROR (reboot)
Example	AT+DEFAP OK +INIT:DONE,1
Note	All configuration files in NVRAM will be deleted, and the device will be set to AP mode using the default settings. To initialize the AP interface, the system will automatically reboot.。 Default configuration： SSID:DA16200（DA16600）XXXXXX（For example, 9FFCF3: the last three hexadecimal digits of the board's MAC address） Authentication：WPA2/CCMP IP address：10.0.0.1 Network mask：255.255.255.0 Gateway：10.0.0.1 PSK:12345678 The DHCP server has started。 -DHCP Range：10.0.0.2-10.0.0.11 -DHCP DNS:8.8.8.8 To check the configuration status, you can use AT+CWSAP and/or AT+CWDHCPRANG
Parameter Description	-

6.2.23AT+CWSAP Parameters for configuring SoftAP mode

Instructions	Query Command： AT+CWSAP=?	Configuration Instructions： AT+CWSAP=<ssid>,<sec>, <ch>,<code> (sec=0|5)
		AT+CWSAP=<ssid>,<sec>, <enc>,<key>, <ch>,<code> (sec=2|3|4|6|7)
Response	+CWSAP=<ssid>,<pwd>,<chl>,<ecn	OK or ERROR

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	>,<max conn>,<ssid hidden>	
Parameter Description	＜ssid＞：AP ssid。 ＜sec＞：Security Protocol。0（open）、2（WPA）、3（WPA2）、4（WPA+WPA2）），5（WPA3 OWE），6（WPA3-SAE），7（WPA2 RSN& WPA3-SAE） ＜enc＞：Encrypt。0（TKIP），1（AES），2（TKIP+AES）。 ＜key＞：Passphrase。Allows 8 to 63 characters。 <ch>：Operation channel (optional). The default value is 1 or the current value. Channel (if the soft AP is running). ＜code＞：Country/region code (optional). If present, <ch> is required。	
Note	Soft AP configuration parameters are stored in NVRAM. If the command is issued in STA mode, a reboot is required to boot into Soft AP mode. (If the command is issued in Soft AP mode, a reboot is not required.) If the SSID string contains a comma (,), enclose the SSID in single quotes to mark it.	
Example	AT+CWSAP=DA16200_MY_SSID,0,1,KR ; Open-Mode +CWSAP:DA16200_MY_SSID OK AT+CWSAP=? +CWSAP:'DA16200_MY_SSID',0,1,KR OK AT+CWSAP=DA16200_MY_SSID,3,1,12345678,1,KR ; WPA2-AES +CWSAP:DA16200_MY_SSID OK AT+CWSAP=? +CWSAP:'DA16200_MY_SSID',3,1,'12345678',1,KR OK AT+CWSAP='DA16200,MY_SSID',3,2,'12345678',1,KR ; WPA2-AES +CWSAP:DA16200,MY_SSID OK AT+CWSAP=? +CWSAP:'DA16200,MY_SSID',3,1,'12345678',1,KR OK	

6.2.24 AT+CWOAP [AP] Enable AP

Execute command	AT+CWOAP
Response	OK or ERROR
Parameter Description	-
Note	Run this command in soft AP mode If no configuration file is found in NVRAM, an error (-522) is returned. If the DA16200 (DA16600) is already running as a soft AP, an error (-522) is

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	returned.
Example	AT+CWOAP OK

6.2.25 AT+CWTAP [AP] Turn off AP

Execute command	AT+CWTAP
Response	OK or ERROR
Parameter Description	-
Note	This command is valid when running in soft AP mode
Example	AT+CWTAP OK

6.2.26 AT+CWRAP [AP] Restart the AP

Execute command	AT+CWRAP
Response	OK or ERROR
Parameter Description	-
Note	This command is valid in soft AP mode If running in workstation mode, the DA16200 (DA16600) will return an error (-100)
Example	AT+CWRAP OK

6.2.27AT+CWLCST [AP] Retrieve information about connected STAs

Execute command	AT+CWLCST
Response	+CWLCST:<mac><LF><flags><LF><var>…
Parameter Description	-
Note	If no site is connected, the DA16200 (DA16600) returns “+CWLCST:NOT_FOUND”
Example	+CWLCST:a6:f2:7c:d4:53:1c flags=[AUTH][ASSOC][AUTHORIZED][SHORT_PREAMBLE][WMM][MAYBE_WP S][HT] aid=1

	capability=0x421 listen_interval=10 wifi_mode=802.11n timeout_next=NULLFUNC POLL rx_packets=290 tx_packets=4 rx_bytes=29625 tx_bytes=10658 inact_cnt=0 connected_time=20 sta_count=1 OK AT+CWLCST +CWLCST:NOT_FOUND OK

6.2.28AT+CWAPCH [AP] Setting the AP Channel

Command	Query Command： AT+CWDISSTA=?	Configuration Command： AT+DISSTA=<disabled>
Response	+DISSTA:<disabled> OK	OK
Parameter Description	＜disabled＞：1（Unused），0（Already used）。	
Note	Set the Wi-Fi STA profile to “Not Used.” If set to 1, the DA16200 (DA16600) will not attempt to connect to the configured AP upon reboot. When the “Not Used” flag is stored in NVRAM, it affects the DA16200 (DA16600) during the boot process, which means the system must be rebooted.	
Example	AT+CWDIS=? +CWDIS:1 AT+CWDIS=1 OK OK	

6.2.29AT+CWAPBI [AP] Set the AP beacon interval

Command	Query Command： AT+CWAPBI=?	Configuration Command： AT+CWAPBI=<interval>
Response	+CWAPBI:<interval>	OK or ERROR
Parameter Description	<interval>: Beacon interval (ms).	

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Note	Configuration stored in NVRAM You need to restart the system for the changes to take effect.
Example	AT+CWAPBI=200 OK AT+CWAPBI=? +CWAPBI:200 OK

6.2.30AT+CWAPUI [AP] Setting the site disconnect timeout in soft AP mode

Command	Query Command： AT+CWAPUI=?	Configuration Command ： AT+CWAPUI=<timeout>
Response	+CWAPUI:<timeout>	OK
Parameter Description	＜timeout＞：Disconnection timeout (seconds)。 (From 30 to 86,400, with a step size of 10) If set to 0, the default value (300 seconds) is used。	
Note	If the STA does not send any frames within the specified time, the soft AP sends a NULL frame after the timeout expires to check for inactivity on the part of the STA. If no response is received from the STA, the soft AP removes that STA. The configuration is stored in NVRAM and requires a system reboot to take effect.	
Example	AT+CWAPUI=60 OK AT+CWAPUI=? +CWAPUI:60 OK	

6.2.31AT+CWAPPROTO [AP] Configuring the IEEE 802.11 Wi-Fi mode on an AP

Command	Query Command：	Configuration Commands：
Response	AT+CWAPPROTO=?	AT+CWAPPROTO=<mode>
Parameter Description	<mode>: 0 (B/G/N), 1 (G/N), 2 (B/G), 3 (N), 4 (G), 5 (B)	
Note	The configuration is stored in NVRAM You need to restart the system for the changes to take effect.	
Example	AT+CWAPPROTO=0 OK AT+CWAPPROTO=? +CWAPPROTO:0	

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6.2.32AT+CWAPRT [AP] Set the AP RTS threshold (8-bit byte)

Command	Query Command： AT+CWAPRT=?	Configuration Commands： AT+CWAPRT=<threshold>
Response	+CWAPRT:<threshold>	OK
Parameter Description	＜threshold＞：RTS threshold (from 1 to 2347)	
Note	• If a frame larger than the specified RTS threshold is to be transmitted, an RTS/CTS frame is sent first to prevent collisions in the air. By default, the RTS threshold is 2347. Configuration stored in NVRAM You need to restart the system for the changes to take effect.	
Example	AT+CWAPRT=2100 OK AT+CWAPRT=? +CWAPRT:2100 OK	

6.2.33AT+CWAPDE [AP] Sends an authentication frame to the connected site

Configuration Commands：	AT+CWAPDE=<mac>
Response	OK or ERROR
Parameter Description	<mac>：The MAC address of the connecting device
Note	Use this command in soft AP mode You can check the MAC address of the STA you want to deauthenticate using the “AT+CWLCST” command. If the operation fails (for example, if an incorrect MAC address is specified), the result is (+CWDST:<mac_addr>)has not appeared
Example	AT+CWAPDE=E6:0D:E5:A5:5D:B3 +CWDST:e6:0d:e5:a5:5d:b3 OK

6.2.34AT+CWAPDI [AP] Send a disassociation frame to the connected workstation

Configuration Commands：	AT+CWAPDE=<mac>
Response	OK or ERROR
Parameter	<mac>：The MAC address of the connected device

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Description	
Note	Use this command in soft AP mode You can check the MAC address of the STA for which you want to revoke authentication using the “AT+CWLCST” command. If the operation fails (for example, if an incorrect MAC address is specified), the result (+CWDST:<mac_addr>) will not appear.
Example	AT+CWAPDE=E6:0D:E5:A5:5D:B3 +CWDST:e6:0d:e5:a5:5d:b3 OK

6.2.35AT+CWWMM [AP] Enable/Disable WMM

Command	Query Command： AT+CWWMM=?	Configuration instructions: AT+CWWMM=<wmm>
Response	+CWWMM:<wmm>	OK
Parameter Description	<wmm>: 0 (off), 1 (on).	
Note	By default, WMM is enabled. If WMM is enabled, beacon, RSP, and ASSOC frames will contain WMM information. WMM enables QoS on the AC class. The configuration is stored in NVRAM	
Example	AT+CWWMM=1 OK AT+CWWMM= +CWWMM:1 OK	

6.2.36AT+CWWMP [AP] Enable/Disable WMM-PS (WMM Power Saving)

Command	Query Command： AT+CWWMP=?	Configuration instructions: AT+CWWMP=<wmmps>
Response	Response: +CWWMP:<wmmps>	OK or ERROR
Parameter Description	<wmmps>: 0 (off), 1 (on)	
Note	By default, WMM-PS is disabled. If WMM-PS is enabled, the U-APSD flag will be set in the beacon, Rsp, and Assoc Rsp frames sent by the soft AP. WMM and WMM-PS authentication must also be obtained for WMM and WMM-PS STAs. The configuration is stored in NVRAM	
Example	AT+CWWMM=0 OK AT+CWWMM=? +CWWMM:0 OK	

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6.2.37AT+CWDHCPC Check/Set DHCP Client Status

Command	Query Command： AT+CWDHCPC=?	Configuration instructions: AT+CWDHCPC= <dhcpc> Start/Stop DHCP Client
Response	+CWDHCPC:<dhcpc>	OK
Parameter Description	<dhcpc>: 0 (Stop), 1 (Start)	
Note	This command is only valid after connecting to the AP.	
Example	AT+CWDHCPC=1 OK AT+CWDHCPC=? +CWDHCPC=1 OK	

6.2.38AT+CWDHCPRANG Query/Set the IP address range for the DHCP server

Command	Query Command： AT+CWDHCPRANG=?	Configuration instructions: AT+CWDHCPRANG=<start_ip>,<end_ip>
Response	+CWDHCPRANG:<start_ip>,<end_ip>	OK or ERROR
Parameter Description	＜start_ip＞：The starting IP address assigned by the DHCP server. ＜end_ip＞：The last IP address assigned by the DHCP server	
Note	Use this command in soft AP mode You need to restart the DHCP server (AT+RST or AT+CIPDHCPS=0). Apply the changes	
Example	AT+CWDHCPRANG=10.0.0.2,10.0.0.11 OK AT+CWDHCPRANG +CWDHCPRANG:10.0.0.2,10.0.0.11 OK	

6.2.39AT+CWDHCPLT Set the IP lease duration for the DHCP server (in seconds)

Command	Query Command： AT+CWDHCPLT=?	Configuration instructions: AT+CWDHCPLT=<lease_time>
Response	+CWDHCPLT:<lease_time>	OK or ERROR

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Parameter Description	＜lease_time＞：IP lease duration (from 60 seconds to 86,400 seconds)
Note	Use this command in soft AP mode You need to restart the DHCP server (AT+RST or AT+CWDHCPS=0 > AT+CWDHCPS=0) Apply the changes
Example	AT+CWDHCPLT=1800 OK AT+CWDHCPLT =? +CWDHCPLT:1800 OK

6.2.40AT+CWDHCPIP Display information about connected DHCP clients

Execute command	AT+CWDHCPIP
Response	OK or ERROR
Parameter Description	OK or ERROR If the status is OK, the following response appears before “OK” +CWDHCPIP:<mac_addr_1>,<ip_addr_1>;<mac_addr_2>,<ip_addr_2>;…..
Note	Use this command while the DHCP server is running

Example	AT+CWDHCPIP
	+CWDHCPIP:80:35:c1:79:c1:da,10.0.0.2
	OK
	// Two DHCP clients are currently connected
	AT+CWDHCPIP
	+CWDHCPIP:80:35:c1:79:c1:da,10.0.0.2;b4:f1:da:b4:27:11,10.0.0.3
	OK
	//No DHCP client
	AT+CWDHCPIP
	ERROR:-622 //No clients are connected

6.2.41AT+CWDHCPS Start/Stop the DHCP server

Command	Query Command： AT+CWDHCPS=?	Configuration instructions: AT+CWDHCPS=<dhcpd>
		AT+CWDHCPS=<dhcpd>, <start_ip>,<end_ip>, <lease_time>
Response	+CWDHCPS:<dhcpd>	OK or ERROR

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Parameter Description	<dhcpd>: 0 (stop), 1 (start). ＜start_ip＞：The starting IP address for the DHCP client. ＜end_ip＞：The final IP address of the DHCP client. ＜lease_time＞：IP lease duration (optional, in seconds; default is 1800）
Note	-
Example	AT+CWDHCPS=1 OK AT+CWDHCPS=1,10.0.0.2,10.0.0.10,1800 OK

7 TCP/IP Related Instructions

7.1TCP/IP List of Commands

Command	Description
AT+CIPIP	Set the IP address
AT+CIPDNS	Set the DNS server IP address for the STA interface
AT+CIPDNS2	Set the IP address of the second DNS server for the STA interface
AT+CIPDOMAIN	Get the host's IP address by name
AT+PING	PING Test
AT+CIPSNS	Set the SNTP server IP address/domain name
AT+CIPSNS1	Use AT+CIPSNS to set the IP address or domain name of the backup SNTP server
AT+CIPSNS2	Use AT+CIPSNS to set the IP address or domain name of the backup SNTP server
AT+CIPSNUP	Set the SNTP client update interval (in seconds)
AT+CIPSNTP	Start/stop the SNTP client.
AT+CIPSNTP1	Use the same as AT+CIPSNTP
AT+CIPSNTP2	Use the same as AT+CIPSNTP
AT+CIPSERVER	Open a TCP server socket
AT+CIPSTART	Open a TCP client socket and connect to a TCP server
AT+CIPUDP	Open a UDP socket
AT+CIPUDPR	Set the remote IP address and port for the UDP socket.
AT+CIPSEND	Sending data via a socket
AT+CIPINFO	Retrieve the session ticket using the CID
AT+CIPINFOALL	Get all session information
AT+CIPCLOSE	Close the session via CID
AT+CIPCLOSEALL	Close all sessions
AT+CIPSAVE	Save the state of all sessions to NVRAM.
AT+TCPDATAMODE	Set the mode for receiving TCP data

7.2TCP/IP Instructions

<CID>Note: A CID is a number assigned after a socket connection is established. The first three CIDs are fixed: 0 (TCP server), 1 (TCP client), and 2 (UDP) are pre-assigned numbers. New CIDs are assigned starting from 3 based on the order in which TCP/UDP sessions are opened. If a TCP client disconnects, we must close the connection and reconnect to the server; otherwise, a new CID will be assigned.

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7.2.1AT+CIPIP Set the IP address

Command	Query command: AT+CIPIP=?	Configuration command: AT+CIPIP=<iface>,<ip_addr>, <netmask>,<gw>
Response	+CIPIP: <iface>,<ip_addr>,<netmask>,<gw>	OK or ERROR
Parameter Description	<iface>：WLAN interface。0（WLAN 0，STA），1（WLAN 1，软AP） <ip_addr>：IP address。 ＜netmask＞：Subnet mask。 <gw>：Gateway。	
Note	● In Soft AP mode, after changing the IP address, the DHCP server pool range should also be updated to match the category based on the new IP address. Redefine it using AT+CIPDHR, and then run AT+CIPIP to update the DHCP server pool range. ● In Soft AP mode, if the IP configuration changes while the DHCP server is running, you must restart the DHCP server using the following commands: AT+RST AT+CIPDHCPS=0 AT+CIPDHCPS=1	
Example	AT+CIPIP=0,192.168.0.100,255.255.255.0,192.168.0.1 OK AT+CIPIP +CIPIP:0,192.168.0.100,255.255.255.0,192.168.0.1 OK At+CIPIP=? +CIPIP:0,192.168.0.100,255.255.255.0,192.168.0.1 OK	

7.2.2AT+CIPDNS/CIPDNS2 Set the DNS server IP address for the STA interface

Command	Query command: AT+CIPDNS=?	Configuration command: AT+CIPDNS=<dns_ip>
Response	+CIPDNS:<dns_ip>	OK or ERROR
Parameter Description	<dns_ip>：DNS server IP address	
Note	If AT+CIPDNS=? is running in DHCP mode, it returns the DNS IP address from DHCP.	

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	Provides data regardless of any DNS IP address set using AT+CIPDNS=<DNS_IP>. Error: If DHCP is not available, -7 (“No result” or “Not configured”) may be returned. Current supply dataIf AT+CIPDNS=? is running in static IP mode, it uses the IP address from a previous run or the default value of AT+CIPDNS=<dns_ip>. If AT+CIPDNS=<dns_ip> is running in DHCP mode, and the change is to take effect in static IP mode, the system must be restarted.
Example	AT+CIPDNS=8.8.8.8 OK AT+CIPDNS =? +CIPDNS:8.8.8.8 OK

7.2.3AT+CIPDOMAIN Domain Name Resolution

Execute command	AT+CIPDOMAIN=<name>
Response	+CIPDOMAIN:<ip>
Parameter Description	＜name＞：Domain name
Note	-
Example	AT+CIPDOMAIN=www. Renesas Electronics-semiconductor.com +CIPDOMAIN:54.192.175.64 OK

7.2.4AT+PING PING Test

Execute command	AT+PING=<iface>,<dst_ip>, <count>
Response	+PING:<sent_count>,<recv_count>, <avg_time>,<min_time>,<max_time>
Parameter Description	＜name＞：Domain name
Note	<iface>：WLAN interface。0（WLAN0）、1（WLAN1）。 ＜dst_ip＞：Target IP address。 ＜count＞：Number of ICMP messages transmitted
Example	AT+PING=0,192.168.0.1,4 +PING:4,4,0,0,0 OK

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7.2.5AT+CIPSNS/CIPSNS1/CIPSNS2 Set the SNTP server IP address/domain name

Command	Query command: AT+CIPSNS=?	Configuration instructions: AT+CIPSNS=<server_ip>
Response	+CIPSNS:<sntp>	OK or ERROR
Parameter Description	＜server_ip＞：SNTP server IP address/domain name	
Note	Users can specify up to three SNTP servers; if the system time cannot be synchronized with the servers, the system will contact the SNTP servers in a cyclic manner. If not specified, the default SNTP server will be used.	
Example	AT+CIPSNS=pool.ntp.org OK AT+CIPSNS=? +CIPSNS:pool.ntp.org	

7.2.6AT+CIPSNUP Set the SNTP client update interval (in seconds)

Command	Query command: AT+CIPSNUP=?	Configuration instructions: AT+CIPSNUP=<period>
Response	+CIPSNUP:<period>	OK or ERROR
Parameter Description	<period>:SNTP client update interval (from 60 seconds to 129,600 seconds)	
Note	-	
Example	AT+CIPSNUP=86400 OK AT+CIPSNUP=? +CIPSNUP:86400 OK	

7.2.7AT+CIPSNTP/CIPSNTP1/CIPSNTP2 Start/Stop the SNTP client

Command	Query command: AT+CIPSNTP/CIPSNTP1/CIPSNTP2=?	Configuration command: AT+CIPSNTP/CIPSNTP1/CIPSNTP2=<sntp>, <server_ip>, <period> If you've configured the system using the two commands above, only the first parameter is needed here.

Response	+CIPSNTP:<sntp>	OK or ERROR
Parameter Description	＜sntp＞：1（Start） ＜server_ip＞：SNTP server IP address (or domain) <period>:SNTP client update interval (optional, in seconds; default is 86400)	
Note	-	
Example	AT+CIPSNTP=0 OK AT+CIPSNTP=1,pool.ntp.org,86400 OK AT+CIPSNTP +CIPSNTP:1,pool.ntp.org,86400 OK	

7.2.8AT+CIPSERVER Open a TCP server socket

Configuration command:	AT+CIPSERVER=<local_port>[,<max allowed connection>]
Response	OK (with ‘+CIPSERVER :*** ’, see Table 41 or ERROR. Async message: CID(+CIPSERVER :<Assigned CID>)
Parameter Description	＜local_port＞：The local port number of the socket。 ＜max allowed connection＞：Optional. Set the maximum number of TCP sessions allowed
Note	-
Example	AT+CIPSERVER=8081 OK

7.2.9AT+CIPSTART Open a TCP client socket and connect to a TCP server

Configuration command:	AT+CIPSTART=<server_ip>, <server_port>[, <local_port>]
Response	OK or ERROR Async message: CID(+CIPSTART:<Assigned CID>)
Parameter Description	＜server_ip＞：The IP address of the TCP server you want to access. ＜server_port＞：The port number of the TCP server. ＜local_port＞：The local port number of the socket (optional, 0:auto)
Note	CID numbers 0 (TCP server), 1 (TCP client), and 2 (UDP) are preassigned numbers. • New CIDs starting with 3 are assigned in the order in which TCP sessions are opened. Multiple TCP clients with specified CIDs and asynchronous messages; a total of eight session transfer functions can be created, though this depends on the configuration of the DA16200/DA16600 SDK.

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	Basically, the DA16200/DA16600 can create eight TCP sockets.
Example	AT+CIPSTART=192.168.0.18,1025,1024 +TRTC:1 OK AT+CIPSTART=192.168.0.18,1025,1025 +TRTC:3 OK

7.2.10AT+CIPUDP Open a UDP socket

Configuration command:	AT+CIPUDP=<local_port>
Response	(+CIPUDP:<Assigned CID>) OK or ERROR
Parameter Description	＜local_port＞： The local port number of the socket
Note	CID numbers 0 (TCP server), 1 (TCP client), and 2 (UDP) are preassigned numbers. New CIDs starting with 3 are assigned in the order in which sessions are opened. Supports multiple UDP sockets and asynchronous messages with specified CIDs. The transport function can create a total of eight sessions.
Example	AT+CIPCLOSEALL(Optional: If the response is “ERROR,” please perform this step first.) AT+CIPUDP=8080 +CIPUDP:2 OK AT+CIPUDP=8081 +CIPUDP:3 OK

7.2.11AT+CIPUDPR Set the remote IP address and port for the UDP socket

Command	Query command: AT+CIPUDPR=?	Configuration command: AT+CIPUDPR= ＜ remote_ip ＞ , ＜ remote_port＞
Response	+CIPUDPR: ＜ remote_ip ＞ , ＜ remote_port＞	OK or ERROR Async message: CID(+TRUR:2)
Parameter Description	＜remote_ip＞：Remote IP address ＜remote_port＞：Remote port number	
Note	Applies only to CID 2 If it is not configured, an error will occur when attempting to read it.	
Example	AT+CIPUDPR=?	

	ERROR:-740 AT+CIPUDPR=192.168.1.10,8081 +CIPUDPR:0 OK AT+CIPUDPR=? +CIPUDPR:192.168.1.10,8081 OK
Configuration command:	AT+CIPUDPR
Response	OK or ERROR Async message: CID(+TRUR:2)
Parameter Description	＜remote_ip＞：Remote IP address ＜remote_port＞：Remote port number
Note	Applies only to CID 2
Example	AT+CIPUDPR=192.168.0.10，8080 +CIPUDPR:2 OK

7.2.12AT+CIPTRANSLINK Enter Transparent Transmission Mode

Execute command	AT+CIPTRANSLINK=<mode>
Response	OK
Parameter Description	<mode>: 0 TCP pass-through　1 UDP pass-through
Note	Can only be used in non-low-power mode
Example	AT+CIPTRANSLINK=0 OK

7.2.13AT+CIPSEND Sending data via a socket

Execute command	AT+CIPSEND=<cid>,<length>,<remote ip> ,<remote port>,<data>
Response	-
Parameter Description	<cid> Assigned CID <length> The data length is insufficient to transmit the actual length <remote ip> Remote IP address <remote port> Remote port number <data>Data
Note	For a TCP server, you must provide the TCP client＇ s <remote_ip> and <remote_port>.

	For a TCP client, you can specify 0, 0 (since the destination is the server) For UDP: If 0,0 is specified, the data will be sent to the destination specified by AT+CIPUDPR. If non-zero values are specified for <remote_ip> and <remote_port>, UDP will temporarily send the data to the specified destination <remote_ip> and <remote_port>.
Example	-

7.2.14<ESC>H Sending data via a socket (recommended for high baud rates)

Transmit data through a socket with a specified CID.
The host must send data only after receiving an "OK" response.

Execute command	<ESC>H<cid>,<length>,<remote_ip >,<remote_port >
Response	OK or ERROR
Parameter Description	<cid>：CID has been assigned. ＜length＞：Data length. Read data until an OK response is received. ＜remote_ip＞：Remote IP address. ＜remote_port＞：Remote port number.
Note	● For a TCP server, you should provide a TCP client's＜remote_ip＞和＜remote_port＞。 ● For a TCP client, you can specify 0, 0 (since the destination is the server). ● For UDP: If 0,0 is specified, the data will be sent to The destination specified by AT+TTRUR. If 0 is not specified, and <remote_ip> and <remote_port> are provided, UDP is temporarily sent to the destination <remote_ip> and <remote_port> specified.
Example	Example1 – To send data to TCP client <ESC>H0,10,192.168.0.18,43110 OK abcde12345 OK Example2 – To send data to TCP server <ESC>H1,10,192.168.0.18,1025 OK abcde12345 OK Example3 – To send data to TCP server with '0, 0' as the destination/server <ESC>H1,10,0,0 OK abcde12345 OK Example4 – To send data to UDP receiver <ESC>H2,10,192.168.0.18,1024 OK

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	abcde12345 OK

7.2.15AT+CIPINFO Retrieve session information via CID

Execute command	AT+CIPINFO=<cid>
Response	<cid>,[TCP|UDP],<remote_ip>,<remote_port>, <local_port>
Parameter Description	<cid> Assigned CID
Note	CID numbers 0 (TCP server), 1 (TCP client), and 2 (UDP) are pre-assigned. New CIDs starting from 3 are assigned based on the order in which TCP sessions are opened.
Example	-

7.2.16AT+CIPINFOALL Retrieve all session information

Execute command	AT+CIPINFOALL
Response	<cid>,[TCP|UDP],<remote_ip>,<remote_port>, <local_port><LF>…
Parameter Description	-
Note	CID numbers 0 (TCP server), 1 (TCP client), and 2 (UDP) are pre-assigned. New CIDs starting from 3 are assigned based on the order in which TCP sessions are opened.
Example	AT+CIPINFOALL

7.2.17AT+CIPCLOSE Close the socket session via CID

Execute command	AT+CIPCLOSE=<cid>
Response	OK
Parameter Description	<cid> The CID assigned to the socket
Note	CID numbers 0 (TCP server), 1 (TCP client), and 2 (UDP) are pre-assigned. New CIDs starting from 3 are assigned based on the order in which TCP sessions are opened.
Example	AT+CIPCLOSE=0 OK

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7.2.18AT+CIPCLOSEALL Close all socket sessions

Execute command	AT+CIPCLOSEALL
Response	OK
Parameter Description	-
Note	-
Example	AT+CIPCLOSEALL OK

7.2.19AT+CIPSAVE Save the state of all sessions to NVRAM

Execute command	AT+CIPSAVE
Response	OK or ERROR
Parameter Description	-
Note	This is used before entering sleep3 mode; using it before entering sleep3 will preserve the current session connection.
Example	AT+CIPSAVE OK

7.2.20AT+TCPDATAMODE Set the mode for receiving TCP data

Configuration command	AT+TCPDATAMODE=<mode>
Response	OK or ERROR
Parameter Description	0：Text mode (default） 1：Hexadecimal string patterns
Note	-
Example	AT+TCPDATAMODE=1 OK

8 MQTT Related Instructions

8.1MQTTList of Commands

MQTT Command Reference

MQTT Command Reference	
AT+MQTTBR	Set the hostname (or IP address) and port MQTT Broker ID
AT+MQTTQOS	Set MQTT QoS Level
AT+MQTTTLS	Enable/Disable MQTT TLS
AT+MQTTCA	Flash the MQTT TLS certificate
AT+MQTTALPN	Set the TLS ALPN protocol name for MQTT
AT+MQTTSNI	Configure TLS SNI for MQTT
AT+MQTTTS	Set the topic for the MQTT subscriber
AT+MQTTATS	Before running this command, you should disable the MQTT client (+CIPMQCL:0).
AT+MQTTDTS	Delete the specified topic configuration from MQTT
AT+MQTTUTS	Unsubscribe from a specific topic
AT+MQTTTP	Set the topic for the MQTT publisher
AT+MQTTV311	Uses the MQTT protocol version 3.1.1. The default is version 3.1.
AT+MQTTPING	Check/Set MQTT Ping Interval
AT+MQTTCID	Set the MQTT client ID
AT+MQTTLI	View/Configure MQTT Login Credentials
AT+MQTTWILL	Query/Set MQTT Will Messages
AT+MQTTDEL	Reset MQTT Configuration
AT+MQTTCL	Check/Set MQTT Status
AT+MQTTMSG	Send an MQTT message
AT+MQTTTT	MQTT General Configuration
AT+MQTTAUTO	Check/Configure MQTT Auto-Start
AT+MQTTCS	Check/Set Session Status

8.2MQTTInstruction Description

8.2.1AT+MQTTBR Query/set the primary domain name (or IP address) and port number of the MQTT broker

command	Query command: AT+MQTTBR=?	Configuration instructions: AT+MQTTBR=<host_name>,<port>
Response	+MQTTBR	OK or ERROR
Parameter Description	＜host_name＞：The broker's domain name or IP address ＜port＞：Broker port number	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0).	
Example	AT+MQTTBR=192.168.0.65，1884 OK AT+MQTTBR=?	

	+MQTTBR=192.168.0.65，1884

8.2.2AT+MQTTQOS Query/Set MQTT QoS Level

command	Query command: AT+MQTTQOS=?	Configuration instructions: AT+MQTTQOS=<qos>
Response	+MQTTQOS：<qos>	OK or ERROR
Parameter Description	<qos>：0（at most once）、1（At least once），2（Just once）	
Note	You need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTQOS=1 OK AT+MQTTQOS=? +MQTTQOS:1 OK	

8.2.3AT+MQTTTLS Enable/Disable MQTT TLS

command	Query command: AT+MQTTTLS=?	Configuration instructions: AT+MQTTTLS=<tls>
Response	+MQTTTLS:<tls>	OK or ERROR
Parameter Description	＜tls＞：1（Enable），0（Disable）	
Note	You should store the certificate before enabling TLS. Before running this command, you should disable the MQTT client (+MQTTCL:0). You need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTTLS=1 OK AT+MQTTTLS=? +MQTTTLS=1	

8.2.4AT+MQTTCA Flash the MQTT TLS certificate

Execute command	AT+MQTTCA=<cert_id>,<content>
Response	OK or ERROR
Parameter Description	<cert_id> #1: For MQTT 0 (Root CA)/1 (Client Certificate)/2 (Private Key) #2: For OTA HTTPS clients

	3 (Root CA)/4 (Client Certificate)/5 (Private Key) <content> Certificate data. Copy and paste the certificate's ASCII text; the maximum length is 2048 characters.
Note	The certificate must be enclosed in double or single quotation marks.
Example	AT+MQTTCA=0,“----BEGIN CERTIFICATE----- MIIDQTCCAimgAwIBAgITBmyfz5m/jAo54vB4ikPmljZbyjANBgkqhkiG9w .....(Omitted)..... -----END CERTIFICATE-----”

8.2.5AT+MQTTALPN Set the TLS ALPN protocol name for MQTT

command	Query command: AT+MQTTALPN=?	Configuration instructions: AT+MQTTALPN=<num>, <alpn#1>, <alpn#2>, <alpn#3>
Response	+MQTTALPN:<num>,<alpn#1>,<alpn#2>,<alpn#3>	OK or ERROR
Parameter Description	＜num＞：The number of ALPNs. The maximum number of ALPNs is three. <alpn#n>： TLS ALPN protocol name. The maximum length of each ALPN protocol name is 24 characters.	
Note	ERROR：-644“Indicates” that ALPN is not set Before running this command, you should disable the MQTT client (+MQTTCL:0).	
Example	AT+NWMQALPN=? ERROR:-644 AT+MQTTALPN=2,alpn-protrol-name-an,alpn-protocol-name-ax OK AT+MQTTALPN +MQTTALPN:2,"alpn-protrol-name-an","alpn-protocol-name-ax" OK	

8.2.6AT+MQTTSNI Check/Configure MQTT TLS SNI

command	Query command: AT+MQTTSNI=?	Configuration instructions: AT+MQTTSNI=<sni>
Response	+MQTTSNI:<sni>	OK or ERROR
Parameter Description	<sni>：Server Name Indication. The maximum length of SNI is 64	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0) ERROR: -648 “SNI not set”	

Example	AT+MQTTSNI=? ERROR:-648 AT+MQTTSNI=a38a9rhiu3roqb-ats.myserver.com OK AT+MQTTSNI +MQTTSNI: a38a9rhiu3roqb-ats.myserver.com OK

8.2.7AT+MQTTTS Query/Set the topic of an MQTT subscriber

command	Query command: AT+MQTTTS=?	Configuration instructions: AT+MQTTTS=<num>,<topic#1>, <topic#2>, …
Response	+MQTTTS： <num>,<topic#1>,<topic#2>,…	OK or ERROR
Parameter Description	<num>：Number of topics. <topic#n>：MQTT subscriber host. Maximum topic length = 64	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). “ERROR: -654” is returned if no subscriber topic has been set. After running this command, the previously configured subscriber topic will be cleared and set to the new topic. You must restart MQTT for the new configuration to take effect.	
Example	AT+MQTTTS=? ERROR:-654 AT+MQTTTS=1,da16k_sub OK AT+MQTTTS=? +MQTTTS:1,”da16k_sub” OK	

8.2.8AT+MQTTATS Check if the specified topic has been added to the MQTT configuration

Configuration Instructions	AT+NWMQATS=<topic>
Response	ok
Parameter Description	<topic>Specified topic
Note	The query command (AT+NWMQATS=?) is not supported. If

	AT+NWMQATS=? is executed, a “?” is appended to the subject.
Example	AT+NWMQATS=ABCD OK AT+MQTTTS=? +MQTTTS:1,"ABCD" OK

8.2.9AT+MQTTDTS Delete the specified topic configuration from MQTT

Configuration Instructions	AT+MQTTDTS=<topic>
Response	Ok
Parameter Description	<topic>Specified topic
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0).
Example	AT+MQTTTS=? +MQTTTS:2,"ABCD",”EFGH” OK AT+MQTTDTS=ABCD OK AT+MQTTTS=? +MQTTTS:1,”EFGH” OK

8.2.10AT+MQTTUTS Unsubscribe from a specific topic

Configuration Instructions	AT+MQTTUTS=<topic>
Response	Ok
Parameter Description	<topic>Specified topic
Note	The MQTT client should be enabled. (+MQTTCL:1) This command should be run while the MQTT client is connected to the broker.
Example	AT+MQTTTS=? +MQTTTS:2,"ABCD",”EFGH” OK AT+MQTTDTS=ABCD OK AT+MQTTTS=? +MQTTTS:1,”EFGH” OK

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8.2.11AT+MQTTTP Query/Set the MQTT Publisher's Topic

command	Query command: AT+MQTTTP=?	Configuration instructions: AT+MQTTTP=<topic>
Response	+MQTTTP：<topic>	OK or ERROR
Parameter Description	<topic>:MQT Publisher Topics	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). “Error: -662” indicates that “the Publish topic does not exist.” You need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTTP=? ERROR:-662 AT+MQTTTP=da16k_pub OK AT+MQTTTP=? +MQTTTP:da16k_pub OK	

8.2.12AT+MQTTV311 Query/Configure the MQTT v3.1.1 Protocol

command	Query command: AT+MQTTV311=?	Configuration instructions: AT+MQTTV311=<use_v311>
Response	+MQTTV311：<use_v311>	OK
Parameter Description	<use_v311>: 1 (v3.1.1) / 0 (v3.1)	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). You will need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTV311=? +MQTTV311:0 OK AT+MQTTV311=1 OK AT+MQTTV311=? +MQTTV311:1 OK	

8.2.13AT+MQTTPING Check/Set MQTT Ping Interval

command	Query command: AT+MQTTPING=?	Configuration instructions: AT+MQTTPING=<period>

Response	+MQTTPING：<period>	OK or ERROR
Parameter Description	＜period＞：Ping interval (seconds)	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). You will need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTPING=? +MQTTPING:600 OK AT+MQTTPING=300 OK	

8.2.14AT+MQTTCID Set the MQTT client ID

command	Query command: AT+MQTTCID=?	Configuration instructions: AT+MQTTCID=<client_id>
Response	+MQTTCID：<client_id>	OK
Parameter Description	<client_id>: Client ID.	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). You will need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTCID=? +MQTTCID:da16x_CCA4 ; generate a default cid if there's no cid stored in NVRAM AT+MQTTCID=client-1 OK AT+MQTTCID=? +MQTTCID:client-1 OK	

8.2.15AT+MQTTLI View/Configure MQTT Login Credentials

command	Query command: AT+MQTTLI=?	Configuration instructions: AT+MQTTLI=<name>,<pw>
Response	+MQTTLI:<name>,<pw>	OK or ERROR
Parameter Description	<name>: ID. <pw>: Password.	
Note	ERROR:-673 indicates “Username does not exist.” You should disable the MQTT client (+MQTTCL:0) before running this command. You need to restart MQTT for the new configuration to take effect.	

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Example	AT+MQTTLI=? ERROR:-673 AT+MQTTLI=da16k_user,12345678 OK AT+MQTTLI=? +MQTTLI:da16k_user,12345678 OK

8.2.16AT+MQTTWILL Query/Set MQTT Will Messages

command	Query command: AT+MQTTWILL=?	Configuration instructions: AT+MQTTWILL
Response	+MQTTWILL:<topic>,<msg>,<qos>	OK or ERROR
Parameter Description	<topic>: Will topic. <msg>: Will message. <qos>: QoS level. 0 (at most once), 1 (at least once), 2 (exactly once).	
Note	“Error: -664 or -665” indicates that a topic or message is missing. You need to restart MQTT for the new configuration to take effect.	
Example	AT+MQTTWILL=? ERROR:-664 Or ERROR:-665 AT+MQTTWILL=da16k_will,bye,0 OK AT+MQTTWILL +MQTTWILL:da16k_will,bye,0 OK	

8.2.17AT+MQTTDEL Reset MQTT Configuration

Configuration Instructions	AT+MQTTDEL
Response	OK or ERROR
Parameter Description	-
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). This command will reset all MQTT configurations.
Example	AT+NWMQDEL OK

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8.2.18AT+MQTTCL Check/Set MQTT Client Enabled Status

command	Query command: AT+MQTTCL=?	Configuration instructions: AT+MQTTCL=<mqtt_client>
Response	+MQTTCL:<mqtt_client>	OK
Parameter Description	<mqtt_client>：0（禁用），1（启用）	
Note	The DA16200 (DA16600) must be connected to the network. Otherwise, this command will not work. If the system restarts, the MQTT client will not start automatically, as this command only starts or stops the MQTT client. Before issuing this command, you must configure MQTT settings such as the MQTT broker IP address, port number, and subscriber topics.	
Example	AT+MQTTCL=1 OK AT+MQTTCL=? +MQTTCL:1 OK	

8.2.19AT+MQTTMSG Send an MQTT message

Execute command	AT+MQTTMSG=<msg>,<topic>
Response	OK or ERROR Results:Send successful: +NWMQMSGSND:1 Send failed: +NWMQMSGSND:0, <err_code>
Parameter Description	<msg>：The message to be released. <topic>:MQT Theme (Optional)
Note	The MQTT client needs to be started (++MQTTCL:1)
Example	AT+MQTTMSG=Hello world !!! OK +NWMQMSGSND:1 AT+MQTTMSG='{"car":"red", "type":"bus"}' OK +NWMQMSGSND:1 AT+MQTTMSG=Hello OK +NWMQMSGSND:0,-6 // send failed due to mqtt is not in connected state

8.2.20AT+MQTT MQTTOverall Configuration

Execute command	AT+MQTT=<host_name>,<port>, <sub_topic>, <pub_topic>, <qos>,<tls>, <username>, <password>
Response	OK or ERROR
Parameter Description	<host_name>: The broker's domain name or IP address <port>: The broker's port number. <sub_topic>: MQTT subscriber topic. <pub_topic>: MQTT publisher topic. <qos>: MQTT QoS level. ＜tls＞: Enable/disable MQTT TLS. 1 (Enable), 0 (Disable). ＜username＞: Login ID (optional). ＜password＞: Login password (optional)
Note	Run the MQTT client using the specified options. After entering this command, the system will automatically reboot. A successful Wi-Fi connection must be established during the reboot. Before running this command, you should disable the MQTT client (+MQTTCL:0).
Example	AT+MQTT=192.168.0.65,1884,da16k_sub,da16k_pub,0,0 ; Below are logs after DA16200 reboot +INIT:DONE,0 +CWJAP:1,'test_ap_ssid',192.168.0.88 +MQTTCL:1

8.2.21AT+MQTTAUTO Check/Configure MQTT Auto-Start

command	Query command: AT+MQTTAUTO=?	Configuration instructions: AT+MQTTAUTO=<auto>
Response	+MQTTAUT:<auto>	OK or ERROR
Parameter Description	＜auto＞： 1 (Enabled), 0 (Disabled)	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). The default value is 0 (disabled). The new configuration requires a restart of MQTT to take effect.	
Example	AT+MQTTAUTO=? +NWMQAUTO:0	

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	OK AT+MQTTAUTO=1 OK AT+MQTTAUTO=? +NWMQAUTO:1 OK

8.2.22AT+MQTTCS Query/Set MQTT Clean Session Status

command	Query command: AT+MQTTCS=?	Configuration instructions: AT+MQTTCS=<clean_session>
Response	+MQTTCS：<clean_session>	OK or ERROR
Parameter Description	＜clean_session＞：1 (Clear session), 0 (Keep session)	
Note	Before running this command, you should disable the MQTT client (+MQTTCL:0). The default value is 1. When set to 1, the MQTT client is automatically terminated when it disconnects; when set to 0, the session remains active after the client disconnects until it times out and is logged out.	
Example	AT+MQTTCS=1 OK AT+MQTTCS=? +MQTTCS:1 OK	

8.3MQTTImportant Notes

• Generally, AT MQTT commands respond within 10 seconds, with the exception of the AT+MQTTCONN command. For example, if the router cannot access the Internet, the AT+MQTTPUB command will respond within 10 seconds. However, the AT+MQTTCONN command may take longer because it needs to retransmit packets in poor network conditions.

9 Peripheral Driver Description

9.1Peripheral Driver Commands

9.1.1AT+ADCINIT ADC Initialization

Execute command	AT+ADCINIT
Response	OK or ERROR
Parameter Description	-
Note	Configure GPIOA_0, GPIOA_1, GPIOA_2, and GPIOA_3 as analog input pins for the ADC GPIOA_0: ADC Channel 0 GPIOA_1: ADC Channel 1 GPIOA_2: ADC Channel 2 GPIOA_3: ADC Channel 3
Example	AT+ADCINIT OK

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9.1.2AT+ADCCHEN Enable ADC channel

Execute command	AT+ADCINIT=<channel >,< resolution >
Response	OK or ERROR
Parameter Description	＜channel＞：ADC channel number [0|1|2|3] ＜resolution＞：ADC resolution. Fixed at 12 bits.
Note	ADC sampling range: 0 – 1.4 V
Example	AT+ADCCHEN=0,12 OK

9.1.3AT+ADCSTART Start the ADC

Execute command	AT+ADCSTART=<divider>
Response	OK or ERROR
Parameter Description	<divider>: ADC divider sampling rate For example, when the divider is 1, 1 MHz / (divider (1) + 1) = 500 kHz
Note	-
Example	AT+ADCSTART=1 OK

9.1.4AT+ADCREAD Read the ADC value

Execute command	AT+ADCREAD=<channel>, <sample count>
Response	OK or ERROR
Parameter Description	<channel>: ADC channel number [0|1|2|3]. <sample count>: Number of samples to read.

Note	-
Example	AT+ADCREAD=0,16 [279 275 269 271 270 268 268 274 274 277 276 269 271 276 264 274] OK

9.1.5AT+ADCSTOP Stop ADC

Execute command	AT+ADCSTOP
Response	OK or ERROR
Parameter Description	-
Note	-
Example	AT+ADCSTOP OK

9.1.6AT+PWMINIT PWM Initialization

Execute command	AT+PWMINIT
Response	OK or ERROR
Parameter Description	-
Note	Configure pin GPIOA_10 as a PWM output
Example	AT+PWMINIT +OK

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9.1.7AT+PWMSTART Start PWM

Execute command	AT+PWMSTART=<channel >, <period>, <duty> <mode cycle>
Response	OK or ERROR
Parameter Description	<channel>: PWM channel, fixed at 0 <period>: One clock cycle (microseconds). <duty>: Duty is a percentage. <mode cycle>: Fixed at 0.
Note	-
Example	AT+PWMSTART=0,40,50,0 OK

9.1.8AT+PWMSTOP Stop PWM

Execute command	AT+PWMSTOP
Response	OK or ERROR
Parameter Description	-
Note	-
Example	AT+PWMSTOP OK

9.1.9AT+I2CINIT Initialize I2C

Execute command	AT+I2CINIT
Response	OK or ERROR

Parameter Description	-
Note	Configure the GPIOA_8 (I2C_SDA) and GPIOA_9 (I2C_SCL) pins as I2C pins
Example	AT+I2CINIT OK

9.1.10AT+I2CWRITE Write a value to the I2C register of an I2C device

Execute command	AT+I2CWRITE=<slave address>, <register>, <length>, <values>
Response	OK or ERROR
Parameter Description	<slave address>: The 8-bit slave address of the I2C device (hexadecimal). <register>: The value to be written to the register (hexadecimal) <length>: The length of the data to be written (hexadecimal) <values>: The data to be written (hexadecimal)
Note	-
Example	AT+I2CWRITE=d0,10,3,670292 OK

9.1.11AT+I2CREAD Reading values from the registers of an I2C device

Execute command	AT+I2CREAD=<slave address>, <register>, <length>
Response	OK or ERROR
Parameter Description	<slave address>: The 8-bit slave address of the I2C device (hexadecimal) <register>: The value of the register to be read (hexadecimal) <length>: The length of the data to be read (decimal)
Note	-
Example	AT+I2CREAD=d0,10,1

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	66 OK

9.1.12AT+SLEEPMS Enter SLEEP3 mode and wake up at the specified time

Execute command	AT+SLEEPMS=<period>
Response	OK or ERROR
Parameter Description	<period>: Wake-up interval (in milliseconds). Maximum period: 2097151000 (approximately 24 days)
Note	-
Example	AT+SLEEPMS=5000 +INIT:DONE,0

9.1.13AT+GPIOWR Configure GPIO output levels

Execute command	AT+GPIOWR=<port>, <pin>, <level>
Response	OK or ERROR
Parameter Description	<port>: GPIO port number. 0: GPIOA 2: GPIOC <pin>: GPIO pin number. This is a hexadecimal value that refers to the GPIO bitmap. <level>: GPIO output level. 0: Low 1: High
Note	The GPIO must be set to output mode
Example	Configure GPIOC[8:6] as outputs and set them to high. GPIOs 6, 7, and 8 are set to binary 1 1 (0000 0001 1100 0000).

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	AT+GPIOSTART=2,1c0.1 OK AT+GPIOWR=2,1c0.1 Normal

9.1.14AT+GPIOSTART Configuring GPIO Multiplexing

Execute command	AT+GPIOSTART=<port>, <pin >, <direction>
Response	OK or ERROR
Parameter Description	<port>: GPIO port number. 0: GPIOA 2: GPIOC <pin>: GPIO pin number. This is a hexadecimal value that refers to the GPIO bitmap. GPIOA: GPIOA0 – GPIOA11 GPIOC: GPIOC6 – GPIOC8 <direction>: GPIO pin direction. 0: Set the pin as an input 1: Set the pin as an output
Note	-
Example	; Configure GPIOA [3:0] as outputs: ; Set GPIOs 0, 1, 2, and 3 to binary 1 (0000 0000 0000 1111). AT+GPIOSTART=0,f,1 OK ; To configure GPIOC [8:6] as inputs: ; Set GPIOs 6, 7, and 8 to binary 1 (0000 0001 1100 0000). AT+GPIOSTART=2,1c0,0 OK

9.1.15AT+GPIORD Read GPIO input values

Execute command	AT+GPIOWR=<port>, <pin>

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Response	<Read value>: [h'0 ~ h'1fff] OK or Error
Parameter Description	<port>: GPIO port number. ● 0: GPIOA ● 2: GPIOC <pin>: GPIO pin number. This is a hexadecimal value that specifies the GPIO bitmap.
Note	The GPIO must be set to output mode
Example	; Configure GPIOC[8:6] as outputs and set them to high. AT+GPIOSTART=2,1c0.1 OK AT+GPIOWR=2,1c0.1 Normal ; Read the status of the I/O pins: AT+GPIORD=2.1c0 0x01c0 OK

9.1.16AT+LEDINIT Configure LED Pins

Execute command	AT+LEDINIT
Response	OK or ERROR
Parameter Description	-
Note	Configure the GPIOC_6 (LED1)/GPIOC_7 (LED2)/GPIOC_8 (LED3) pins as GPIO outputs
Example	AT+LEDINIT +OK

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9.1.17AT+LEDCTRL Operate the LED

Execute command	AT+LEDCTRL=<port >, <status>
Response	OK or ERROR
Parameter Description	<port>: GPIO port number 1: GPIOC_6 2: GPIOC_7 3: GPIOC_8 <status>: LED status off: LED is off on: LED is on
Note	Set the LED1/2/3 (GPIOC_6/7/8) pins to output high or low
Example	AT+LEDCTRL=1, off OK

10 HTTP Related commands

10.1 HTTP List of Commands

Commands	Description
AT+HTTPC	Launch the HTTP client using the following options
AT+HTTPCTLSAUTH	Set the certificate verification mode
AT+HTTPCALPN	Configure application layer protocol negotiation
AT+HTTPCSNI	Set the server name directive
AT+HTTPCALPNDEL	Delete all saved ALPNs
AT+HTTPCSNIDEL	Delete Saved SNI

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10.2 HTTP Command Descriptions

10.2.1AT+HTTPC Launch the HTTP client using the following options

Configuration Instructions	AT+HTTPC=<url>,<method>(,<msg>)	AT+HTTPC=<url>,message ,<’header+bod y’>
Response	OK or ERROR	
Parameter Description	<url>: HTTP server address. <method>: GET, POST, or PUT. <msg>: Request message for the POST and PUT methods.	<url>: HTTP server address. message: Use the message as a fixed option (rather than an HTTP method). <'header+body>: Enter a plain text string in the format “header+body”.
Note	The target system should be connected to the AP.	
Example	Example 1 AT+HTTPC=https://httpbin.org/get,get OK Example 2 AT+HTTPC=https://httpbin.org/post,post,HTTP-Client POST method sample test! OK Example 3 AT+HTTPC=https://httpbin.org/put,put,HTTP-Client POST method sample test! OK	HTTP server should exist. Example 1 : GET method request(header) AT+HTTPC=http://httpbin.org/get,message,’GET /get HTTP/1.1\r\nHost: httpbin.org\r\nConnection: Close\r\n\r\n’ Example 2 : POST method request(header+body) AT+HTTPC=http://httpbin.org/post,message,’POST /post HTTP/1.1\r\nHost: httpbin.org\r\nAccept: */*\r\nContent Length: 10\r\nConnection: Close\r\n\r\nHelloWorld\r\n’

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10.2.2AT+HTTPCTLSAUTH Set the certificate verification mode

Instructions	AT+HTTPCTLSAUTH=<tls_auth_mod e>
Response	OK or ERROR
Parameter Description	MBEDTLS_SSL_VERIFY_NONE 0 MBEDTLS_SSL_VERIFY_OPTIONAL 1 MBEDTLS_SSL_VERIFY_REQUIRED 2
Note	This must be configured before connecting to the server.
Example	AT+HTTPCTLSAUTH=1； OK

10.2.3AT+HTTPCALPN Configure application layer protocol negotiation

Configuration Instructions	AT+HTTPCALPN=<alpn_number>,<alpn1>,<alpn2>,<alpn3>
Response	OK
Parameter Description	<alpn_number>: Number of ALPNs <alpn1>: First ALPN <alpn2>: Second ALPN <alpn3>: Third ALPN
Note	This must be configured before connecting to the server.
Example	AT+HTTPCALPN=1,http/1.1 OK

10.2.4AT+HTTPCSNI Set the server name directive

Configuration Instructions	AT+HTTPCSNI=<sni>
Response	OK
Parameter Description	<sni>：Server Name

Note	This must be configured before connecting to the server.
Example	AT+HTTPCSNI=httpbin.org OK

10.2.5AT+HTTPCALPNDEL Delete all saved ALPNs

Configuration Instructions	AT+HTTPCALPNDEL
Response	OK or ERROR
Parameter Description	-
Note	This must be configured before connecting to the server.
Example	AT+HTTPCALPNDEL

10.2.6AT+HTTPCSNIDEL Delete Saved SNI

Configuration Instructions	AT+HTTPCSNIDEL
Response	OK
Parameter Description	-
Note	This must be configured before connecting to the server.
Example	AT+HTTPCSNIDEL OK

11 Low power consumption

11.1 Overview of the Low-Power Instruction Set

Instructions	Description

Instructions	Description
AT+DPM	Check/Enter DPM Low-Power Mode (Sleep3 mode maintains network connectivity)
AT+DPMKA	Query/Set the DPM keepalive interval
AT+DPMTIMWU	Query/Set DPM TIM Wake-up Count
AT+DPMUSERWU	Check/Set DPM User Wake-Up Time
AT+CLRDPMSLPEXT	Do not enter DPM sleep mode
AT+SETDPMSLPEXT	Enter DPM sleep
AT+SETSLEEP2EXT	Enter DPM sleep2 mode during the specified time period

11.2 Description of Low-Power Instructions

11.2.1AT+DPM: Query/Enter DPM (low-power mode; sleep3 mode maintains network connection)

Commands	Query command: AT+DPM=?	Configuration instructions: AT+DPM=<dpm> [,<nvm_only>]
Response	+DPM:<0|1>	OK or ERROR
Parameter Description	<dpm>: 0 (off), 1 (on). <nvm_only>: 1 (write the dpm mode to NVRAM only, without rebooting), 0 or unspecified (change the dpm mode and reboot)	
Note	Available only in STA mode: The DPM configuration is stored in NVRAM. If the “<nvram_only>” parameter is zero or unspecified, and the AT command responds normally, the module will reboot. +INIT:DONE: The DA16200 (DA16600) sends a 0 message upon startup. If an AT command is invalid, the DA16200 (DA16600) sends an ERROR message without rebooting. If the “nvram_only” parameter is set to “1”, the system is rebooted manually. “Upon +reboot”: When the DA16200 (DA16600) reboots, it attempts to	

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	connect to Wi-Fi. If Wi-Fi connection information is available in NVRAM, the AP is notified. +CWJAP:0, <reason> or +CWJAP:1, ‘<SSID>’, <IP address> as the result of the Wi-Fi connection If the Wi-Fi connection fails during startup due to unexpected circumstances (e.g., AP offline, temporary communication issues with the AP, incorrect password stored, etc.), +CWJAP:x may not be sent immediately and may take some time; in this case, please wait to receive +CWJAP:x. When a timeout occurs, depending on the application, either cancel the connection attempt (AT+CWQAP) or retry the connection with the correct information (AT+CWJAP/AT+CWJAPA). If MQTT is configured, the DA16200 (DA16600) will attempt to connect to the MQTT broker. The result—+NWMQCL:0 or +NWMQCL:1—is then sent via UART1. If DPM is set to 1 (TRUE), the DA16200 (DA16600) will operate in DPM mode. If a Wi-Fi connection is not established in DPM mode, the DA16200 (DA16600) will enter abnormal DPM operation. ** DPM Abnormal Operation: When the DA16200 (DA16600) is running in DPM sleep mode, if for some reason the DA16200 is in a “disconnected” state with the specified AP, the DA16200 will perform abnormal DPM operation. Abnormal DPM operates as follows: If the AP connection fails, the DA16200 (DA16600) will enter sleep mode using a predefined RTC timer (referred to as the abnormal DPM RTC timer). If the DA16200 (DA16600) is woken up by the Abnormal DPM RTC timer, it will attempt to connect to the specified AP within a predefined time period and then go back to sleep for a predefined duration. The DA16200 library provides default predefined values for Abnormal DPM, but users can modify the

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	relevant parameters based on their application use cases. If a Wi-Fi connection is established but an MQTT connection is not (if MQTT is enabled), the DA16200 (DA16600) will attempt to connect to the MQTT broker multiple times and enter DPM sleep mode according to the MQTT Abnormal DPM operation.
Example	AT+DPM=? +DPM:0 OK AT+DPM=1 ; DPM enabled and system reboots automatically. OK +INIT:DONE,0 AT+DPM=1,1 ; DPM enabled without system reboots. OK AT+DPM=? +DPM:1 OK

11.2.2AT+DPMKA: Query/Set DPM Keep-Alive Interval

Instructions	Query command: AT+DPMKA=?	Configuration instructions: AT+DPMKA=<period>
Response	+DPMKA=<millisecond>	OK or ERROR
Parameter Description	<period>: Keep-alive interval (milliseconds, 0 – 600,000)	
Note	The configuration is stored in NVRAM A system reboot is required for the changes to take effect	
Example	AT+DPMKA=? +DPMKA:30000	

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	OK AT+DPMKA=5000 OK AT+DPMKA=? +DPMKA:5000 OK

11.2.3AT+DPMTIMWU Query/Set DPM TIM Wake-up Count

Instructions	Query command: AT+DPMTIMWU=?	Configuration instructions: AT+DPMTIMWU=<count>
Response	+DPMTIMWU=<count>	OK or ERROR
Parameter Description	<count>: TIM wake-up count (1 – 6000). Unit: 100 ms	
Note	The configuration is stored in NVRAM. A system reboot is required for the changes to take effect.	
Example	AT+DPMTIMWU=? +DPMTIMWU:10 OK AT+DPMTIMWU=20 OK	

11.2.4AT+DPMUSERWU Check/Set DPM User Wake-Up Time

Query command: AT+DPMUSERWU=?	Configuration instructions: AT+DPMUSERWU=<time>
+ DPMUSERWU =<second>	OK or ERROR
＜time＞：User wake-up interval (seconds, 0 – 86,400)	
● This command sets the interval at which the system automatically wakes up while in sleep3	

mode. ● The configuration is stored in NVRAM. ● A system reboot is required for the changes to take effect.
AT+DPMUSERWU=? +DPMUSERWU:0 OK AT+DPMUSERWU=300 OK AT+DPMUSERWU=? +DPMUSERWU:300 OK

11.2.5AT+CLRDPMSLPEXT Exit DPM Sleep

Query command:	AT+CLRDPMSLPEXT
Response	OK or ERROR
Parameter Description	-
Note	It operates in DPM mode. The host must execute this command within 200 milliseconds of waking up the DA16200 (DA16600) via the external wake-up pin; otherwise, the DA16200 will enter DPM sleep mode.
Example	AT+CLRDPMSLPEXT OK

11.2.6AT+SETDPMSLPEXT Enter DPM sleep

Configuration Instructions	AT+SETDPMSLPEXT
Response	OK or ERROR

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Parameter Description	-
Note	It operates in DPM mode. If the DA16200 (DA16600) is woken up by an external wake-up signal and the “AT+CLRPDPMSLEXT” command is executed, this command should be issued after each task you wish to perform is completed. If this command is not executed after a task is completed, the DA16200 (DA16600) will not enter DPM sleep mode.
Example	AT+SETDPMSLPEXT OK

11.2.7AT+SETSLEEP2EXT Enter sleep2 mode during the specified time period

Configuration Instructions	AT+SETDPMSLP2EXT=<period>,<retain_ dpm_memory>
Response	OK or ERROR
Parameter Description	<period>: Wake-up timeout, in seconds. Maximum period: 2097151 (approximately 24 days) <retain_dpm_memory>: 1 (retain), 0 (do not retain)
Note	It operates in DPM mode ● The DA16200 (DA16600) can be woken up from sleep by the RTC_WAKE_UP event Upon receiving AT+SETSLEEP2EXT ● The DA16200 (DA16600) sends “+INIT:DONE:0” upon waking up ● When the value of the <period> parameter is 0, DPM is configured to wake up only when an RTC_WAKE_UP event occurs.
Example	AT+SETSLEEP2EXT=10,1 OK +INIT:DONE,0

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12 Over-the-air update

12.1 OTA List of Commands

Commands	Description
AT+OTADWSTART	Start downloading the OTA firmware from the server
AT+OTADWSTOP	Stop OTA firmware download
AT+OTARENEW	Restart using the updated firmware

12.2 OTA Instruction Description

12.2.1 AT+OTADWSTART Start downloading OTA firmware

Configuration Instructions	AT+OTADWSTART=<fw_type>,<uri>
Response	OTADWSTART:0x00
Parameter Description	<fw_type>: Set the type of firmware to download <uri>: The server URL where the firmware is located
Note	The target system should be connected to the AP. The OTA server should be available. fw_type should consist of lowercase characters.
Example	AT+NWOTADWSTART=rtos,https://server/DA16200_RTOS-GEN01-01-1111-000000.img OK +OTADWSTART:0x00

12.2.2AT+OTADWSTOP Stop OTA firmware download

Execute command	AT+OTADWSTOP
Response	OK or ERROR

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Parameter Description	-
Note	-
Example	AT+OTADWSTOP OK

12.2.3AT+OTARENEW Restart using the updated firmware

Execute command	AT+OTARENEW
Response	+OTARENEW:0x00
Parameter Description	-
Note	The system will automatically restart once the process is complete.
Example	AT+NWOTARENEW +NWOTARENEW:0x00

13 Module Active Response Command Table

13.1 Initialization Response

Response	Parameters	Description
+INIT	DONE,<mode>	Startup complete<mode>:0(STA),1(Soft-AP) Example: +INIT:DONE,0
	WAKEUP,<type>	Wake-up from DPM sleep state complete <type> Wake-up type

		UC: Received a unicast packet NOBCN: The connected AP is not beeping DEAUTH: Disconnected from the connected AP EXT: External wake-up RTC: Via a registered timer

13.2WIFI Connection Response

Response	Parameters	Description
+CWJAP	<result>,<ssid>,<ip> <result>, <well-known-reason> [,<reason_code>]	Result of connecting to an AP in STA mode (result of AT+CWJAP, AT+CWJAPA, or AT+CWCAP). <Result>: 0 (Failure), 1 (Success) For <Result>: 1 <ssid>: The AP's SSID upon success <ip>: The station's IP address upon success For <Result>: 0 <well-known-reason>: The reason for the failed connection attempt in text format. TIMEOUT/WRONGPWD/ACCESSLIMIT/OTHER TIMEOUT: Connection attempt failed after consecutive attempts WRONGPWD: WPA 4-way handshake failed; the pre-shared key

		(password) may be incorrect ACCESSLIMIT: Connection was terminated because the authorized access limit was reached OTHER: Other reasons <reason_code>: If <known reason> is OTHER, this field displays the specific cause of the failed connection attempt. For example: +CWJAP:0, TIMEOUT +CWJAP:1, ‘ap_test’, 192.168.0.10 // A Wi-Fi connection has been established, and the assigned IP address is 192.168.0.10.
+CWDAP	<reserved>, <well-known-reason> [,<reason_code>]	Disconnected from the AP. <reserved>: 0 <well-known-reason>: Disconnection reason in text format, AUTH_NOT_VALID/DEAUTH/INACTIVITY/APBUSY/OTHER. AUTH_NOT_VALID: Previous authentication is no longer valid •DEAUTH: Authentication was revoked when the STA left INACTIVITY: Disassociated due to inactivity APBUSY: Not associated because the AP cannot handle all currently

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		associated STAs <reason_code>: If <well-known-reason> is OTHER, this field indicates the cause of the disassociation. See Appendix E. For example: +CWDAP:0, INACTIVITY +CWDAP:0.DEAUTH +CWDAP:0.OTHER.80 WLAN_REASON_CLASS2_FRAME_FROM_NONAUTH_STA (8)
+CWCST	<mac>	In AP mode, there is a station connected to the Wi-Fi. <mac>: The MAC address of the station connected to the network
+CWDST	<mac>	The Wi-Fi station has disconnected in AP mode. <mac>: The MAC address of the disconnected station

13.3MQTT Response Table

Response	Parameters	Description

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+MQTTCL	<result> [,TOO_LONG_MSG_RX]	Result of the MQTT client connection. <Result>: 0 (disconnected), 1 (connected) For example: +MQTTCL:1 • MQTT connection to the MQTT broker has been successfully established +MQTTCL:2 MQTT connection to the MQTT broker is in progress +MQTTCL:0 • MQTT connection failed to establish +MQTTCL:0, TOO_LONG_MSG_RX This message is sent only when the current MQTT connection has clean_session=0 and QoS is greater than or equal to 1, and the connection is terminated due to an unsupported message length.
+MQTTMSG	<msg>,<topic>,<length>	Receive MQTT messages. <msg>: Message data <topic>: Received topic <length>: Message length

13.4HTTP-client Response Table

Response	Parameters	Description
+HTTPCSTATUS	<status>	Returns the status of the requested method and the received payload. <Status>: 0x00 Success Example: +HTTPCSTATUS:0x00
+HTTPCDATA	<data size,>	Insert information about the size of the data received from the AT+HTTPCH command. Insert the integer data size followed by a comma, with the actual received data following it. For example: AT+HTTPCHDATA:426,

13.5 Socket Connection Response Table

Response	Parameters	Description
+TRCTS	<cid>, <remote_ip>, <remote_port>	Response when a remote TCP client connects to a locally created TCP server <cid>: The CID assigned to the TCP server <remote_ip>: The IP address of the TCP client <remote_port>: The port number of the TCP client

+TRXTS	<cid>, <remote_ip>, <remote_port>	Response when a remote TCP client disconnects from a TCP server opened via AT+TCPSERVER. <cid>: The CID assigned to the TCP server <remote_ip>: The IP address of the TCP client <remote_port>: The port number of the TCP client
+TRXTC	<cid>, <remote_ip>, <remote_port>	The TCP client socket opened by AT+CIPSATART has been disconnected. <cid>: Assigns a CID to the TCP client <remote_ip>: The IP address of the TCP server <remote_port>: The port number of the TCP server

14 AT List of Instruction Error Codes

Category	Value	Error Code	Description
Common	0	AT_CMD_ERR_CMD_OK	OK, No error.
	-1	AT_CMD_ERR_UNKNOWN_CMD	Unknown command
	-2	AT_CMD_ERR_INSUFFICENT_ARGS	Insufficient parameter
	-3	AT_CMD_ERR_TOO_MANY_ARGS	Too many parameters
	-4	AT_CMD_ERR_WRONG_ARGUMENTS	Wrong parameter value
	-5	AT_CMD_ERR_NOT_SUPPORTED	Unsupported function
	-6	AT_CMD_ERR_NOT_CONNECTED	Not connected to an AP
	-7	AT_CMD_ERR_NO_RESULT	No result

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Category	Value	Error Code	Description
	-8	AT_CMD_ERR_TOO_LONG_RESULT	Response buffer overflow
	-9	AT_CMD_ERR_INSUFFICENT_CONFI G	Function is not configured
	-10	AT_CMD_ERR_TIMEOUT	Command timeout
	-11	AT_CMD_ERR_NVR_WRITE	NVRAM write failure
	-12	AT_CMD_ERR_RTM_WRITE	Retention memory write failure
	-13	AT_CMD_ERR_SYS_BUSY	System busy
	-14	AT_CMD_ERR_MEM_ALLOC	Memory allocation failure
	-20	AT_CMD_ERR_DATA_TX	Data Tx failure
	-22	AT_CMD_ERR_IP_ADDRESS	IP address get failure
	-100	AT_CMD_ERR_COMMON_SYS_MODE	Wrong system running mode
	-110	AT_CMD_ERR_COMMON_ARG_TYPE	Wrong argument type
	-111	AT_CMD_ERR_COMMON_ARG_RANGE	Argument int-value range error
	-112	AT_CMD_ERR_COMMON_ARG_LEN	Argument value length error
	-113	AT_CMD_ERR_COMMON_WRONG_CC	Wrong Country-Code
	-114	AT_CMD_ERR_COMMON_WRONG_MAC_ ADDR	Wrong MAC address
FLASH	-170	AT_CMD_ERR_SFLASH_READ	SFLASH driver read failure
	-171	AT_CMD_ERR_SFLASH_WRITE	SFLASH drive write failure
	-172	AT_CMD_ERR_SFLASH_ERASE	SFLASH driver erase failure
NVRAM	-180	AT_CMD_ERR_NVRAM_READ	NVRAM driver read failure
	-181	AT_CMD_ERR_NVRAM_WRITE	NVRAM driver write failure
	-182	AT_CMD_ERR_NVRAM_ERASE	NVRAM driver erase failure
	-188	AT_CMD_ERR_NVRAM_NOT_SAVED_V ALUE	No saved value in NVRAM
Basic	-200	AT_CMD_ERR_BASIC_ARG_NULL_PT R	Not used in AT-CMD module
	-201	AT_CMD_ERR_BASIC_ARG_DATE	Argument “Date” format failure
	-202	AT_CMD_ERR_BASIC_ARG_TIME	Argument “Time” format failure
	-203	AT_CMD_ERR_BASIC_ARG_TIME_ET C	Argument Time value failure
UART	-220	AT_CMD_ERR_UART_INTERFACE	Not defined UART type
	-221	AT_CMD_ERR_UART_BAUDRATE	Argument “BaudRate” failure
	-222	AT_CMD_ERR_UART_DATABITS	Argument “DataBits” failure
	-223	AT_CMD_ERR_UART_PARITY	Argument “Parity” failure

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Category	Value	Error Code	Description
	-224	AT_CMD_ERR_UART_STOPBIT	Argument “StopBits” failure
	-225	AT_CMD_ERR_UART_FLOWCTRL	Argument “FlowCtrl” failure
	-226	AT_CMD_ERR_UART_BAUDRATE_NV_ WR	NVRAM Write failure - Baudrate
	-227	AT_CMD_ERR_UART_DATABITS_NV_ WR	NVRAM Write failure - DataBits
	-228	AT_CMD_ERR_UART_PARITY_NV_WR	NVRAM Write failure - Parity
	-229	AT_CMD_ERR_UART_STOPBIT_NV_W R	NVRAM Write failure - StopBit
	-230	AT_CMD_ERR_UART_FLOWCTRL_NV_ WR	NVRAM Write failure - FlowCtrl
DPM	-300	AT_CMD_ERR_DPM_MODE_DISABLED	DPM operation is not enabled
	-301	AT_CMD_ERR_DPM_SLEEP_STARTED	Already DPM sleep function is running.
	-302	AT_CMD_ERR_DPM_FAST_CONN_EN	Fast-connection function is enabled.
	-303	AT_CMD_ERR_DPM_USER_RTM_ALLO C	Failed to allocate user area RTM.
	-304	AT_CMD_ERR_DPM_USER_RTM_DUP	Already same Task name exists.
	-305	AT_CMD_ERR_DPM_MODE_ARG	Wrong argument type : DPM flag
	-306	AT_CMD_ERR_DPM_NVRAM_FLAG_AR G	Wrong argument type : Nvram flag
	-309	AT_CMD_ERR_DPM_SLP2_PERIOD_T YPE	Wrong argument t type : Period
	-310	AT_CMD_ERR_DPM_SLP2_PERIOD_R ANGE	Wrong argument value range : Period
	-311	AT_CMD_ERR_DPM_SLP2_RTM_FLAG _ARG	Wrong argument type : RTM flag
	-312	AT_CMD_ERR_DPM_SLP1_RTM_FLAG _RANGE	Wrong argument value range : RTM flag
	-313	AT_CMD_ERR_DPM_SLP1_RTM_FLAG _ARG	Wrong argument type : RTM flag
	-314	AT_CMD_ERR_DPM_SLP1_RTM_FLAG _RANGE	Wrong argument value range : RTM flag
Wi-Fi	-400	AT_CMD_ERR_WIFI_NOT_CONNECTED	Not connected to AP
	-401	AT_CMD_ERR_WIFI_RUN_MODE_TYPE	Wrong argument type

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Category	Value	Error Code	Description
	-402	AT_CMD_ERR_WIFI_RUN_MODE_RANG E	Wrong argument value range
	-403	AT_CMD_ERR_WIFI_MAC_ADDR	Wrong string type for MAC address
	-404	AT_CMD_ERR_WIFI_WPS_PIN_NUM	Wrong PIN number for WPS connection
	-406	AT_CMD_ERR_WIFI_SCAN_UNSUPPOR TED	SCAN command not supported
	-407	AT_CMD_ERR_WIFI_PSCAN_FREQ_RA NGE	Wrong argument value range : Frequency
	-408	AT_CMD_ERR_WIFI_PSCAN_CMAX_RA NGE	Wrong argument value : Max RSSI threshold
	-409	AT_CMD_ERR_WIFI_PSCAN_CMIN_RA NGE	Wrong argument value : Min RSSI threshold
	-410	AT_CMD_ERR_WIFI_JAP_SSID_NO_V ALUE	No saved SSID information in NVRAM
	-411	AT_CMD_ERR_WIFI_JAP_SSID_LEN	Too long SSID string (Max length : 32 Bytes)
	-412	AT_CMD_ERR_WIFI_JAP_SECU_ARG_ TYPE	Wrong argument type : Auth
	-413	AT_CMD_ERR_WIFI_JAP_SECU_ARG_ RANGE	Wrong argument value range : Auth
	-414	AT_CMD_ERR_WIFI_JAP_OPEN_TOO_ MANY_ARG	Too many arguments for OPEN-mode
	-415	AT_CMD_ERR_WIFI_JAP_OPEN_HIDD EN_TYPE	Wrong argument type (OPEN) : Hidden flag
	-416	AT_CMD_ERR_WIFI_JAP_OPEN_HIDD EN_RANGE	Wrong argument value (OPEN) : Hidden flag
	-417	AT_CMD_ERR_WIFI_JAP_SECU_HIDD EN_TYPE	Wrong argument type (Security) : Hidden flag
	-418	AT_CMD_ERR_WIFI_JAP_SECU_HIDD EN_RANGE	Wrong argument value (Security) : Hidden flag

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Category	Value	Error Code	Description
	-419	AT_CMD_ERR_WIFI_JAP_WEP_IDX_T YPE	Wrong argument type : WEP Index
	-420	AT_CMD_ERR_WIFI_JAP_WEP_IDX_R ANGE	Wrong argument value range : WEP Index
	-421	AT_CMD_ERR_WIFI_JAP_WEP_KEY_L EN	Wrong argument : WEP key length
	-422	AT_CMD_ERR_WIFI_JAP_WPA_MODE_ TYPE	Wrong argument type : Encrypt
	-423	AT_CMD_ERR_WIFI_JAP_WPA_MODE_ RANGE	Wrong argument value range : Encrypt
	-424	AT_CMD_ERR_WIFI_JAP_WPA_KEY_L EN	Wrong argument : WPA PSK length
	-425	AT_CMD_ERR_WIFI_JAPA_SSID_NO_ VALUE	No saved SSID information in NVRAM
	-426	AT_CMD_ERR_WIFI_JAPA_SSID_LEN	Too long SSID string (Max length : 32 Bytes)
	-427	AT_CMD_ERR_WIFI_JAPA_PSK_LEN	Wrong argument : WPA PSK length
	-428	AT_CMD_ERR_WIFI_JAPA_WEP_NOT_ SUPPORT	Not supported security mode : WEP-mode
	-429	AT_CMD_ERR_WIFI_JAPA_HIDDEN_T YPE	Wrong argument type : Hidden flag
	-430	AT_CMD_ERR_WIFI_JAPA_HIDDEN_R ANGE	Wrong argument value range : Hidden flag
	-431	AT_CMD_ERR_WIFI_JAPA_WPA3_MOD E_TYPE	Wrong argument type : wpa3 flag
	-432	AT_CMD_ERR_WIFI_JAPA_WPA3_MOD E_RANGE	Wrong argument value range : wpa3 flag
	-433	AT_CMD_ERR_WIFI_JAPA_WPA3_HID DEN_TYPE	Wrong argument type : Hidden flag
	-434	AT_CMD_ERR_WIFI_JAPA_WPA3_HID DEN_RANGE	Wrong argument value range : Hidden flag
	-435	AT_CMD_ERR_WIFI_ROAP_ROAM_TYP E	Wrong argument type

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Category	Value	Error Code	Description
	-436	AT_CMD_ERR_WIFI_ROAP_ROAM_RAN GE	Wrong argument value range
	-437	AT_CMD_ERR_WIFI_ENTAP_SSID_NO _VALUE	No saved SSID information in NVRAM
	-438	AT_CMD_ERR_WIFI_ENTAP_SSID_LE N	Too long SSID string (Max length : 32 Bytes)
	-439	AT_CMD_ERR_WIFI_ENTAP_AUTH0_U NSUPPORT	Unsupported security mode
	-440	AT_CMD_ERR_WIFI_ENTAP_ENC0_UN SUPPORT	Unsupported encrypt mode
	-441	AT_CMD_ERR_WIFI_ENTAP_EAP_PHA SE1	Unsupported EAP Phase #1 value
	-442	AT_CMD_ERR_WIFI_ENTAP_EAP_PHA SE2	Wrong argument value range : EAP Phase #2
	-443	AT_CMD_ERR_WIFI_ENTAP_SECU_MO DE	Wrong argument value range : Auth
	-444	AT_CMD_ERR_WIFI_ENTAP_ENC_MOD E	Wrong argument value range : Encrypt
	-445	AT_CMD_ERR_WIFI_ENTAP_EAP_MOD E	Wrong argument value range : EAP Phase #1
	-446	AT_CMD_ERR_WIFI_ENTAP_EAP_ID_ NO_VALUE	No saved login ID information in NVRAM
	-447	AT_CMD_ERR_WIFI_ENTAP_EAP_ID_ LEN	Too long ID string (Max length : 64 Bytes)
	-448	AT_CMD_ERR_WIFI_ENTAP_EAP_PWD _LEN	Too long PWD string (Max length : 64 Bytes)
	-449	AT_CMD_ERR_WIFI_SOFTAP_SSID_N O_VALUE	No saved SSID for Soft-AP mode in NVRAM
	-450	AT_CMD_ERR_WIFI_SOFTAP_SECU_M ODE	Wrong argument value : Security
	-451	AT_CMD_ERR_WIFI_SOFTAP_ENC_MO DE	Wrong argument value range : Encrypt

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Category	Value	Error Code	Description
	-452	AT_CMD_ERR_WIFI_SOFTAP_CH_VAL UE_TYPE	Wrong argument type : Channel
	-453	AT_CMD_ERR_WIFI_SOFTAP_CH_VAL UE_RANGE	Wrong argument value range : Channel
	-454	AT_CMD_ERR_WIFI_SOFTAP_OPEN_T OO_MANY_ARG	Too many arguments for OPEN-mode
	-455	AT_CMD_ERR_WIFI_SOFTAP_CH_TX_ PWR_VALUE	Wrong channel Tx-power value
	-456	AT_CMD_ERR_WIFI_SOFTAP_WEP_NO T_SUPPORT	Unsupported security mode on Soft-AP
	-457	AT_CMD_ERR_WIFI_SOFTAP_ENC_MO DE_TYPE	Wrong argument type : Encrypt
	-458	AT_CMD_ERR_WIFI_SOFTAP_ENC_MO DE_RANGE	Wrong argument value range : Encrypt
	-459	AT_CMD_ERR_WIFI_SOFTAP_PASSKE Y_LEN	Too short/long PSK length (length : 8 ~ 63 Bytes)
	-460	AT_CMD_ERR_WIFI_ALREADY_CONNE CTED	Already Wi-Fi session connected
	-461	AT_CMD_ERR_WIFI_CONCURRENT_NO _PROFILE	Not saved concurrent-mode profile information
CLI	-500	AT_CMD_ERR_WIFI_CLI_STATUS	Failed to run “cli status” command
	-501	AT_CMD_ERR_WIFI_CLI_SET_NETWORK	Failed to run “cli set_network 0”
	-502	AT_CMD_ERR_WIFI_CLI_SET_NETWORK_HI DDEN	Failed to run “cli set_network 0” w/ hidden flag
	-503	AT_CMD_ERR_WIFI_CLI_SELECT_NETWORK	Failed to run “cli select_network 0”
	-504	AT_CMD_ERR_WIFI_CLI_SAVE_CONF	Failed to run “cli save_config”
	-505	AT_CMD_ERR_WIFI_CLI_SAVE_CONF_HIDD EN	Failed to run “cli save_config” w/ hidden flag
	-506	AT_CMD_ERR_WIFI_CLI_DISCONNECT	Failed to run “cli disconnect”
	-507	AT_CMD_ERR_WIFI_CLI_DEAUTHENTICATE	Failed to run “cli deauthenticate”

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Category	Value	Error Code	Description
	-508	AT_CMD_ERR_WIFI_CLI_DISASSOCIATE	Failed to run “cli disassociate”
	-510	AT_CMD_ERR_WIFI_CLI_WPS_PBC_ANY	Failed to run “cli wps_pbc any”
	-511	AT_CMD_ERR_WIFI_CLI_WPS_PIN_GET	Failed to run “cli wps_pin get”
	-512	AT_CMD_ERR_WIFI_CLI_WPS_PIN_ANY	Failed to run “cli wps_pin any”
	-513	AT_CMD_ERR_WIFI_CLI_WPS_PIN_NUM	Wrong argument : PIN value (length = 8 Bytes)
	-514	AT_CMD_ERR_WIFI_CLI_WPS_CANCEL	Failed to run “cli wps_cancel”
	-515	AT_CMD_ERR_WIFI_CLI_COUNTRY	Failed to run “cli country”
	-516	AT_CMD_ERR_WIFI_CLI_PSCAN_CH_TL	Failed to run “cli passive_scan chan_time_limit”
	-517	AT_CMD_ERR_WIFI_CLI_PSCAN_STOP	Failed to run “cli passive_scan_stop”
	-518	AT_CMD_ERR_WIFI_CLI_PSCAN_CMAX_GET	Failed to run “cli passive_scan_condition_max”
	-519	AT_CMD_ERR_WIFI_CLI_PSCAN_CMAX_SET	Failed to run “cli passive_scan_condition_max …”
	-520	AT_CMD_ERR_WIFI_CLI_PSCAN_CMIN_GET	Failed to run “cli passive_scan_condition_min”
	-521	AT_CMD_ERR_WIFI_CLI_PSCAN_CMIN_SET	Failed to run “cli passive_scan_condition_min …”
	-522	AT_CMD_ERR_WIFI_CLI_SOFTAP_START	Failed to run “cli ap start”
	-523	AT_CMD_ERR_WIFI_CLI_SOFTAP_STOP	Failed to run “cli ap stop”
	-524	AT_CMD_ERR_WIFI_CLI_SOFTAP_RESTART	Failed to run “cli ap restart”
Network Basic	-600	AT_CMD_ERR_NW_NET_IF_NOT_INITIALIZ E	Network interface does not initialize
	-601	AT_CMD_ERR_NW_NET_IF_IS_DOWN	Network interface is DOWN
	-602	AT_CMD_ERR_NW_IP_IFACE_TYPE	Wrong argument type : interface
	-603	AT_CMD_ERR_NW_IP_IFACE_RANGE	Wrong argument value range : interface
	-604	AT_CMD_ERR_NW_IP_ADDR_CLASS	Invalid IP address class

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Category	Value	Error Code	Description
	-605	AT_CMD_ERR_NW_IP_INVALID_ADDR	Invalid IP address type
	-606	AT_CMD_ERR_NW_IP_NETMASK	Invalid Netmask address type
	-607	AT_CMD_ERR_NW_IP_GATEWAY	Invalid Gateway address type
	-608	AT_CMD_ERR_NW_DNS_A_QUERY_FAIL	Failed to get IP address by DNS Query
	-609	AT_CMD_ERR_NW_PING_IFACE_ARG_TYPE	Wrong argument type : Interface
	-610	AT_CMD_ERR_NW_PING_IFACE_ARG_RANGE	Wrong argument value range : Interface
	-611	AT_CMD_ERR_NW_PING_DST_ADDR	Invalid destination IP address
	-612	AT_CMD_ERR_NW_PING_TX_COUNT	Wrong argument : Ping Tx count
DHCP Client	-613	AT_CMD_ERR_NW_DHCPC_START_FAIL	Failed to start DHCP client
	-614	AT_CMD_ERR_NW_DHCPC_HOSTNAME_LEN	Too long DHCP hostname (Max length : 32 Bytes)
	-615	AT_CMD_ERR_NW_DHCPC_HOSTNAME_TYPE	Wrong format for DHCP hostname
DHCP Server	-616	AT_CMD_ERR_NW_DHCPS_START_ADDR_NOT_EXIST	No saved IP pool start-address in NVRAM
	-617	AT_CMD_ERR_NW_DHCPS_END_ADDR_NOT_EXIST	No saved IP pool end-address in NVRAM
	-618	AT_CMD_ERR_NW_DHCPS_WRONG_START_IP_CLASS	Invalid start IP address class
	-619	AT_CMD_ERR_NW_DHCPS_WRONG_END_IP_CLASS	Invalid end IP address class
	-620	AT_CMD_ERR_NW_DHCPS_IPADDR_RANGE_MISMATCH	Mismatch IP address class range
	-621	AT_CMD_ERR_NW_DHCPS_IPADDR_RANGE_OVERFLOW	Exceed IP address pool count (Max : 10)
	-622	AT_CMD_ERR_NW_DHCPS_NO_CONNECTED_CLIENT	No connected client information to DHCP server

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Category	Value	Error Code	Description
	-623	AT_CMD_ERR_NW_DHCPS_RUN_FLAG_TYPE	Wrong argument type : dhcpd flag
	-624	AT_CMD_ERR_NW_DHCPS_RUN_FLAG_VAL	Wrong argument value range : dhcpd flag
	-625	AT_CMD_ERR_NW_DHCPS_LEASE_TIME_TYP E	Wrong argument type : dhcpd lease_time
	-626	AT_CMD_ERR_NW_DHCPS_LEASE_TIME_RAN GE	Wrong argument value range : dhcpd lease_time
SNTP Client	-629	AT_CMD_ERR_NW_SNTP_NOT_SUPPORTED	SNTP client does not supported
	-630	AT_CMD_ERR_NW_SNTP_FLAG_TYPE	Wrong argument type : SNTP flag
	-631	AT_CMD_ERR_NW_SNTP_FLAG_VAL	Wrong argument value range : SNTP flag
	-632	AT_CMD_ERR_NW_SNTP_PERIOD_TYPE	Wrong argument type : SNTP period
	-633	AT_CMD_ERR_NW_SNTP_PERIOD_RANGE	Wrong argument value range : SNTP period
MQTT Client	-634	AT_CMD_ERR_NW_MQTT_NOT_CONNECTED	No connected MQTT session
	-635	AT_CMD_ERR_NW_MQTT_NEED_TO_STOP	Need to stop the already connected MQTT session
	-636	AT_CMD_ERR_NW_MQTT_UNKNOWN_OP_ID	
	-637	AT_CMD_ERR_NW_MQTT_CLIENT_TASK_STA RT	
MQTT Broker	-638	AT_CMD_ERR_NW_MQTT_BROKER_NAME_NOT _FOUND	
	-639	AT_CMD_ERR_NW_MQTT_BROKER_PORT_NUM _TYPE	
	-640	AT_CMD_ERR_NW_MQTT_BROKER_PORT_NUM _RANGE	
	-641	AT_CMD_ERR_NW_MQTT_BROKER_NAME_LEN	
MQTT TLS	-642	AT_CMD_ERR_NW_MQTT_TLS_TYPE	Wrong argument type : tls
	-643	AT_CMD_ERR_NW_MQTT_TLS_RANGE	Wrong argument value range : tls
	-644	AT_CMD_ERR_NW_MQTT_TLS_ALPN_NOT_EX	No saved ALPN information in

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Category	Value	Error Code	Description
		IST	NVRAM
	-645	AT_CMD_ERR_NW_MQTT_TLS_ALPN_COUNT_TYPE	Wrong argument type : count
	-646	AT_CMD_ERR_NW_MQTT_TLS_ALPN_COUNT_RANGE	Wrong argument value range : count (1 ~ 3)
	-647	AT_CMD_ERR_NW_MQTT_TLS_ALPN_NAME_LEN	Too long ALPN name length (Max : 24 Bytes)
	-648	AT_CMD_ERR_NW_MQTT_TLS_SNI_NOT_EXI ST	No saved SNI information in NVRAM
	-649	AT_CMD_ERR_NW_MQTT_TLS_SNI_LEN	Too long SNI string length (Max : 64 Bytes)
	-650	AT_CMD_ERR_NW_MQTT_TLS_CSUITE_NUM_NOT_EXIST	No saved CipherSuite count value in NVRAM
	-651	AT_CMD_ERR_NW_MQTT_TLS_CSUITE_NOT_EXIST	No saved CipherSuite information in NVRAM
	-652	AT_CMD_ERR_NW_MQTT_TLS_CSUITE_NUM_NVRAM_WR	Failed to write Cipher Suit count info to NVRAM
	-653	AT_CMD_ERR_NW_MQTT_TLS_CSUITE_NVRAM_WR	Failed to write Cipher Suit info to NVRAM
MQTT Sub-Topic	-654	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_NOT_EXIST	SUB topic does not exist in NVRAM
	-655	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_NUM_TYPE	Wrong argument type : count
	-656	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_NUM_RANGE	Wrong argument value range : count (1~4)
	-657	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_LEN	Too long topic string length (Max: 64 Bytes)
	-658	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_DUP	Duplicate Sub-topic string
	-659	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_NUM_NVRAM_WR	Failed to write topic count to NVRAM

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Category	Value	Error Code	Description
	-660	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_NUM_OVERFLOW	Adding a topic exceeds the max topic count (4)
	-661	AT_CMD_ERR_NW_MQTT_SUBS_TOPIC_ALREADY_EXIST	Already exist Subscribe topic
MQTT Pub-Topic	-662	AT_CMD_ERR_NW_MQTT_PUB_TOPIC_NOT_EXIST	No saved PUB topic in NVRAM
	-663	AT_CMD_ERR_NW_MQTT_PUB_TOPIC_LEN	Too long topic string length (Max: 64 Bytes)
MQTT Will Message	-664	AT_CMD_ERR_NW_MQTT_WILL_TOPIC_NOT_EXIST	WILL topic does not exist in NVRAM
	-665	AT_CMD_ERR_NW_MQTT_WILL_MESSAGE_NOT_EXIST	WILL message not existing in NVRAM
	-666	AT_CMD_ERR_NW_MQTT_WILL_TOPIC_LEN	Too long WILL topic length (Max : 64 Bytes)
	-667	AT_CMD_ERR_NW_MQTT_WILL_MESSAGE_LEN	Too long WILL message length (Max : 64 bytes)
	-668	AT_CMD_ERR_NW_MQTT_WILL_QOS_TYPE	Wrong argument type : qos
	-669	AT_CMD_ERR_NW_MQTT_WILL_QOS_RANGE	Wrong argument value range : qos
MQTT Common	-670	AT_CMD_ERR_NW_MQTT_PROTOCOL	Network protocol error occurred with Broker
	-671	AT_CMD_ERR_NW_MQTT_PING_PERIOD_TYPE	Ping period value is invalid (not number type)
	-672	AT_CMD_ERR_NW_MQTT_PING_PERIOD_RANGE	Wrong argument value range : (0 ~ 86400)
	-673	AT_CMD_ERR_NW_MQTT_USERNAME_NOT_EXIST	User name does not exist in NVRAM
	-674	AT_CMD_ERR_NW_MQTT_USERNAME_LEN	Too long username length (Max : 64 Bytes)
	-675	AT_CMD_ERR_NW_MQTT_PASSWORD_LEN	Too long password length (Max : 160 Bytes)

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Category	Value	Error Code	Description
	-676	AT_CMD_ERR_NW_MQTT_PUB_MESSAGE_LEN	Too long message length (Max : 2048 Bytes)
	-677	AT_CMD_ERR_NW_MQTT_PUB_TX_IN_PROGRESS	Previous message Tx is still in progress
HTTP(s) Server	-680	AT_CMD_ERR_NW_HTS_TASK_CREATE_FAIL	Failed to create HTTP server task
	-681	AT_CMD_ERR_NW_HTSS_TASK_CREATE_FAI L	Failed to create HTTPs server task
HTTP Client	-682	AT_CMD_ERR_NW_HTC_TASK_CREATE_FAIL	Failed to create HTTP client task
	-683	AT_CMD_ERR_NW_HTC_ALPN_CNT_TYPE	Wrong argument type : alpn_number
	-684	AT_CMD_ERR_NW_HTC_ALPN_CNT_RANGE	Wrong argument value range : alpn_number
	-685	AT_CMD_ERR_NW_HTC_ALPN1_STR_LEN	Too long ALPN #1 string length (Max 24 Bytes)
	-686	AT_CMD_ERR_NW_HTC_ALPN2_STR_LEN	Too long ALPN #2 string length (Max 24 Bytes)
	-687	AT_CMD_ERR_NW_HTC_ALPN3_STR_LEN	Too long ALPN #3 string length (Max 24 Bytes)
	-688	AT_CMD_ERR_NW_HTC_SNI_LEN	Too long SNI string length (Max 64 Bytes)
Web-Socket Client	-689	AT_CMD_ERR_NW_WSC_URL_STR_LEN	Too short URL string length (Min 1 Byte)
	-690	AT_CMD_ERR_NW_WSC_INVALID_URL	Invalid URL string
	-691	AT_CMD_ERR_NW_WSC_TASK_ALREADY_EXIST	Already WebSocket session is exist
	-692	AT_CMD_ERR_NW_WSC_CB_FUNC_DOES_NOT_EXIST	Not registered user Websocket cb-function
	-693	AT_CMD_ERR_NW_WSC_INVALID_STATE	No connected session to disconnect
	-694	AT_CMD_ERR_NW_WSC_TASK_CREATE_FAIL	Failed to create WebSocket client task
	-695	AT_CMD_ERR_NW_WSC_CLOSE_FAIL	Failed to send “Session-Close” frame

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Category	Value	Error Code	Description
	-696	AT_CMD_ERR_NW_WSC_SESS_NOT_CONNECTED	No connected session to send message
	-697	AT_CMD_ERR_NW_WSC_UNKNOW_CMD	Unknown WebSocket internal error
OTA	-700	AT_CMD_ERR_NW_OTA_WRONG_FW_TYPE	Wrong argument: fw_type
	-701	AT_CMD_ERR_NW_OTA_DOWN_OK_AND_WAIT_RENEW	Already downloading done
	-702	AT_CMD_ERR_NW_OTA_FLASH_READ_SIZE_TYPE	Wrong argument type : read_addr
	-703	AT_CMD_ERR_NW_OTA_FLASH_COPY_SIZE_TYPE	Wrong argument type : size
	-704	AT_CMD_ERR_NW_OTA_FLASH_ERASE_SIZE_TYPE	Wrong argument type : size
	-705	AT_CMD_ERR_NW_OTA_BY_MCU_INIT	Failed to initialize MCU configuration for OTA
	-706	AT_CMD_ERR_NW_OTA_SET_TLS_AUTH_MODE_NVRAM	Failed to save TLS certificate in NVRAM
Zero Config	-710	AT_CMD_ERR_NW_MDNS_WRONG_FLAG	Wrong argument: flag of MDNS
	-711	AT_CMD_ERR_NW_MDNS_WRONG_MODE	Wrong argument: mode of MDNS
	-712	AT_CMD_ERR_NW_MDNS_NOT_RUNNING	MDNS is not running
	-713	AT_CMD_ERR_NW_MDNS_ALREADY_RUN	Already MDNS is running
	-714	AT_CMD_ERR_NW_MDNS_IN_PROCESS	Progressing Probing and Announcing on MDNS
	-715	AT_CMD_ERR_NW_MDNS_UNKNOW_FAULT	Unknown MDNS internal error
	-716	AT_CMD_ERR_NW_MDNS_START_RUN_MODE_VAL	Invalid interface
	-717	AT_CMD_ERR_NW_MDNS_SOCKET_FAIL	Failed to initialize socket
	-718	AT_CMD_ERR_NW_DNS_SD_NOT_RUNNING	DNS-SD is not running
	-719	AT_CMD_ERR_NW_DNS_SD_ALREADY_RUN	Already DNS-SD is running

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	-720	AT_CMD_ERR_NW_DNS_SD_IN_PROCESS	Progressing Probing and Announcing of DNS-SD
	-721	AT_CMD_ERR_NW_DNS_SD_SVC_CREATE_FAIL	Failed to register service of DNS-SD
	-722	AT_CMD_ERR_NW_DNS_SD_SVC_PARAMS	Invalid parameters to register service
	-723	AT_CMD_ERR_NW_DNS_SD_SVC_INST_NAME_NVRAM_WR	Failed to write service name to NVRAM
	-724	AT_CMD_ERR_NW_DNS_SD_SVN_PROTOCOL_NVRAM_WR	Failed to write service protocol to NVRAM
	-725	AT_CMD_ERR_NW_DNS_SD_SVC_PORT_NO_NVRAM_WR	Failed to write service port to NVRAM
	-726	AT_CMD_ERR_NW_DNS_SD_SVC_TEXT_NVRAM_WR	Failed to write service TXT to NVRAM
Transport Function (TCP/UDP)	-730	AT_CMD_ERR_TCP_SERVER_LOCAL_PORT_TYPE	Wrong argument: local port of TCP server
	-731	AT_CMD_ERR_TCP_SERVER_MAX_PEER_TYP E	Wrong argument : max allowed peer
	-732	AT_CMD_ERR_TCP_SERVER_TASK_CREATE	Failed to start TCP server
	-733	AT_CMD_ERR_TCP_CLIENT_SVR_PORT_TYP E	Wrong argument : TCP server port of TCP client
	-734	AT_CMD_ERR_TCP_CLIENT_LOCAL_PORT_TYPE	Wrong argument : local port of TCP client
	-736	AT_CMD_ERR_TCP_CLIENT_TASK_CREATE	Failed to start TCP client
	-737	AT_CMD_ERR_UDP_SESS_LOCAL_PORT_TYP E	Wrong argument: local port of UDP session
	-738	AT_CMD_ERR_UDP_SESS_LOCAL_PORT_RANGE	Invalid range of local port of UDP session
	-739	AT_CMD_ERR_UDP_SESS_TASK_CREATE	Failed to start UDP session

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Category	Value	Error Code	Description
	-740	AT_CMD_ERR_UDP_CID2_SESS_NOT_EXIST	UDP session, CID 2, is not exist
	-741	AT_CMD_ERR_UDP_CID2_ALREADY_EXIST	Already UDP session, CID 2, is exist
	-742	AT_CMD_ERR_UDP_CID2_SESS_INFO	Invalid UDP session, CID 2, information
	-743	AT_CMD_ERR_UDP_CID2_REMODE_PORT_TYPE	Invalid remote port of UDP session, CID 2
	-744	AT_CMD_ERR_NO_CONNECTED_SESSION_EXIST	No session information
	-745	AT_CMD_ERR_NO_FOUND_REQ_CID_SESSIO N	No assigned CID to terminate session
	-746	AT_CMD_ERR_CONTEXT_CID_TYPE	Wrong argument type : cid
	-747	AT_CMD_ERR_CONTEXT_DELETE	Failed to terminate session
	-748	AT_CMD_ERR_CONTEXT_TYPE_IS_NOT_TCP_SVR	Wrong CID value : Not TCP Server session
	-749	AT_CMD_ERR_CONTEXT_INVALID_SESS_TY PE	Invalid session type to save session information
	-750	AT_CMD_ERR_TRTRM_CID_TYPE	Wrong argument: CID to terminate session
	-751	AT_CMD_ERR_TRTRM_REMOTE_PORT_NUM_TYPE	Wrong argument type : remote_port
	-752	AT_CMD_ERR_TRTRM_TCP_SVR_REMOTE_SESS_DISCON	Failed to disconnect TCP client from TCP server
	-753	AT_CMD_ERR_TCP_SERVER_TERMINATE	Failed to terminate TCP server
	-754	AT_CMD_ERR_TCP_CLIENT_TERMINATE	Failed to terminate TCP client
	-755	AT_CMD_ERR_UDP_SESSION_TERMINATE	Failed to terminate UDP session
	-756	AT_CMD_ERR_MULTI_SESSION_CID_TERMINATE	No assigned CID to terminate session
	-757	AT_CMD_ERR_NO_SESSOIN_TO_SAVE_NVRA M	No session information to save

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Category	Value	Error Code	Description
SSL/TLS	-760	AT_CMD_ERR_SSL_ROLE_NOT_SUPPORT	Not supported role of TLS session
	-761	AT_CMD_ERR_SSL_CONF_CID_TYPE	Wrong argument: CID of TLS session
	-762	AT_CMD_ERR_SSL_CONTEXT_NOT_FOUND	No assigned CID of TLS session
	-763	AT_CMD_ERR_SSL_CONTEXT_ALREADY_EXIST	Already TLS session is running to configure
	-764	AT_CMD_ERR_SSL_CONF_ID_NOT_SUPPORT ED	Not supported configuration
	-765	AT_CMD_ERR_SSL_SAVE_CLR_ALL_NV	Failed to erase TLS session from NVRAM
	-766	AT_CMD_ERR_SSL_SAVE_FAIL_NV	Failed to save TLS session to NVRAM
	-767	AT_CMD_ERR_SSL_CONF_ID_TYPE	Wrong argument: configuration ID
	-768	AT_CMD_ERR_SSL_CONF_ID_RANGE	Invalid range of configuration ID
	-769	AT_CMD_ERR_SSL_CONF_CID_CA_CERT	No exist CA certification of assigned CID
	-770	AT_CMD_ERR_SSL_CONF_CID_CERT	No exist certification of assigned CID
	-771	AT_CMD_ERR_SSL_CONF_CID_SNI	Failed to configure SNI of assigned CID
	-772	AT_CMD_ERR_SSL_CONF_CID_SVR_VALID_TYPE	Wrong argument: auth mode of assigned CID
	-773	AT_CMD_ERR_SSL_CONF_CID_SVR_VALID_RANGE	Invalid range of auth mode of assigned CID
	-774	AT_CMD_ERR_SSL_CONF_CID_RX_BUF_LEN	Wrong argument: Rx buffer length of CID
	-775	AT_CMD_ERR_SSL_CONF_CID_TX_BUF_LEN	Wrong argument: Tx buffer length of CID
	-776	AT_CMD_ERR_SSL_CONF_CID_TYPE	Wrong argument: CID to configure TLS session
	-777	AT_CMD_ERR_SSL_CONN_ALREADY_CONNEC	Already TLS session is connected

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Category	Value	Error Code	Description
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	-778	AT_CMD_ERR_SSL_CONN_PORT_NUM_TYPE	Wrong argument: peer_port of TLS client
	-779	AT_CMD_ERR_SSL_CONN_UNKNOWN_HOSTNAME	Unknown hostname to connect TLS server
	-780	AT_CMD_ERR_SSL_CONN_CFG_SETUP_FAIL	Failed to setup TLS client
	-781	AT_CMD_ERR_SSL_CONN_TLS_CLIENT_RUN_FAIL	Failed to connect TLS client
SSL Certificate	-782	AT_CMD_ERR_SSL_CERT_TYPE	Wrong argument: type
	-783	AT_CMD_ERR_SSL_CERT_RANGE	Invalid range of certificate type
	-784	AT_CMD_ERR_SSL_CERT_STO_SEQ_TYPE	Wrong argument: sequence type
	-785	AT_CMD_ERR_SSL_CERT_STO_SEQ_RANGE	Invalid range of sequence type
	-786	AT_CMD_ERR_SSL_CERT_STO_FORMAT_TYP E	Wrong argument: format type
	-787	AT_CMD_ERR_SSL_CERT_STO_FORMAT_RANGE	Invalid range of format type
	-788	AT_CMD_ERR_SSL_CERT_STO_ALREADY_EXIST	Already certificate is existed
	-789	AT_CMD_ERR_SSL_CERT_STO_NO_SPACE	Not enough space to save certificate
	-790	AT_CMD_ERR_SSL_CERT_DEL_LIST_NOT_FOUND	Not found certificate to delete
	-999	AT_CMD_ERR_UNKNOWN	Undefined Error

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