

# WG231 AT Instruction and Examples

## Release Notes

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## Introduction

WG231 is a single 2.4 GHz Wi-Fi UART transparent transmission module designed with Independent R&D design of SKYLAB M&C Technology Co.,Ltd. integrates standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules.

This document introduces the WG231 AT commands, explains how to use them and provides examples of several common AT commands. The document is structured as follows:

Chapter	Title	Content
Chapter 1	Overview	Provides instructions on use AT commands.
Chapter 2	Basic AT Commands	Lists AT commands of basic functions.
Chapter 3	Wi-Fi AT Commands	Lists Wi-Fi-related AT commands.
Chapter 4	TCP/IP-Related AT Commands	Lists TCP/IP-related AT commands.
Chapter 5	AT Commands Examples	Gives examples of using WG231 AT Commands.
Chapter 6	AT Commands with Configuration Saved in the NVS Area	Lists the AT commands whose configuration is saved in the NVS area.
Chapter 7	Contact us	Provides Skylab contact information.

## Chapter 1.Overview

This document introduces the WG231 AT commands, and explains how to use them.

The AT command set is divided into different categories: Basic AT commands, Wi-Fi AT commands, TCP/IP AT commands, etc.

The WG231 module each command set contains four types of AT commands:

Type	Command Format	Description
Display Command	AT+<CMD>=?	Display the Set Commands internal parameters and their range of values.
Query Command	AT+<CMD>?	Returns the current value of parameters.
Set Command	AT+<CMD>=<param1,...>	Sets the value of user-defined parameters in commands.
Execute Command	AT+<CMD>	Runs commands with no user-defined parameters.

### Notice:

The users can choose to sends AT commands through UART0

- The default baud rate is 115200.
- Not all AT commands support all four variations mentioned above. Refer to the specific instructions description.
- CMD in Angle brackets < > is the command name and actual use is does not contain.
- Square brackets [ ] designate the default value; it is either not required or may not appear.
- String values need to be included in double quotation marks.  
for example: AT+CWSAP="WG231","21070613",6,3
- AT commands must be capitalized and ended with a new-line (CR-LF), so the serial tool should be set into "New Line Mode".
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## Chapter 2. Basic AT Commands

### Overview

Commands	Description
AT	Tests AT startup.
ATE	Configures echoing of AT commands.
AT+VER	Checks version information.
AT+SYSRAM	Checks the remaining space of RAM.
AT+RST	Restarts WG231 module.
AT+UART	UART configuration.
AT+GSLP	Enters Deep-sleep mode.
AT+SLEEP	Sets the sleep mode.
AT+WAKEUPGPIO	Configures a pin to Wakeup from Light-sleep Mode
AT+SYSIOSETCFG	Set the Working Modes of IO Pin
AT+SYSIOGETCFG	Checks the Working Modes of IO Pin
AT+SYSGPIODIR	Set the Direction of a GPIO
AT+SYSGPIOWRITE	Configures the Output Level of a pin
AT+SYSGPIOREAD	Reads the pin Input Level
Other	...

### Commands

#### AT -- Tests AT startup

Execute Command	AT
Response	OK
Parameters	--
Use	AT

#### ATE -- Configures echoing of AT commands

Execute Command	ATE
Response	OK

Parameters	<ul style="list-style-type: none"> <li>• ATE0: Switches echo off.</li> <li>• ATE1: Switches echo on.</li> </ul>
Use	ATE1

### AT+VER -- Checks version information

Query Command	AT+VER?
Response	<software version info> OK
Parameters	<ul style="list-style-type: none"> <li>• software version info</li> </ul>
Use	AT+VER?

### AT+SYSRAM -- Checks the remaining space of RAM

Query Command	AT+SYSRAM?
Response	+ SYSRAM:<remaining RAM size> OK
Parameters	<ul style="list-style-type: none"> <li>• remaining RAM size. Unit: bytes</li> </ul>
Use	AT+SYSRAM?

### AT+RST -- Restarts WG231 module

Execute Command	AT+RST
Response	OK
Parameters	--
Use	AT+RST

### AT+UART -- UART configuration

Set Command	AT+UART=<baudrate>,<databits>,<stopbits>,<parity>,<flow control>
Response	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;baudrate&gt;: UART baud rate</li> <li>• &lt;databits&gt;: data bits <ul style="list-style-type: none"> <li>▸ 5: 5-bit data</li> <li>▸ 6: 6-bit data</li> <li>▸ 7: 7-bit data</li> <li>▸ 8: 8-bit data</li> </ul> </li> <li>• &lt;stopbits&gt;: stop bits <ul style="list-style-type: none"> <li>▸ 1: 1-bit stop bit</li> <li>▸ 2: 1.5-bit stop bit</li> <li>▸ 3: 2-bit stop bit</li> </ul> </li> <li>• &lt;parity&gt;: parity bit <ul style="list-style-type: none"> <li>▸ 0: None</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▸ 1: Odd</li> <li>▸ 2: Even</li> <li>• &lt;flow control&gt;: flow control <ul style="list-style-type: none"> <li>▸ 0: flow control is not enabled</li> <li>▸ 1: enable RTS</li> <li>▸ 2: enable CTS</li> <li>▸ 3: enable both RTS and CTS</li> </ul> </li> </ul>
Notes	<ol style="list-style-type: none"> <li>1. The configuration changes will be saved in the NVS area, and will still be valid when the chip is powered on again.</li> <li>2. The use of flow control requires the support of hardware: <ul style="list-style-type: none"> <li>▸ MTCK is UART0 CTS</li> <li>▸ MTDO is UART0 RTS</li> </ul> </li> <li>3. The range of baud rates supported: 110 ~ 115200*40.</li> </ol>
Use	AT+UART=115200,8,1,0,0

### AT+GSLP -- Enters Deep-sleep mode

Set Command	AT+GSLP=<time>	
Response	<time> OK	
Parameters	• <time>: the duration of WG231 module sleep. Unit: ms.	
Note	WG231 module will wake up after Deep-sleep for as many milliseconds (ms) as <time> indicates.	
Use	AT+GSLP=10000	

### AT+SLEEP -- Sets the sleep mode

Command	Query Command	Set Command
	AT+ SLEEP?	AT+SLEEP=<sleep mode>
Response	+SLEEP:<sleep mode>  OK	OK or ERROR
Parameters	<ul style="list-style-type: none"> <li>• &lt;sleep mode&gt;: <ul style="list-style-type: none"> <li>▸ 0: disable the sleep mode.</li> <li>▸ 1: Light-sleep mode.</li> <li>▸ 2: Modem-sleep mode.</li> </ul> </li> </ul>	
Use	AT+SLEEP=0	

### AT+WAKEUPGPIO -- Set a GPIO to wake up from Light-sleep mode

Set Command	AT+WAKEUPGPIO=<en>,<t_pin>,<t_level>[,<w_pin>,<w_level>]
Response	OK

Parameters	<ul style="list-style-type: none"> <li>• &lt;en&gt;:             <ul style="list-style-type: none"> <li>▸ 0: Disable wakeup from light-sleep by pin.</li> <li>▸ 1: Enable wakeup from light-sleep by pin.</li> </ul> </li> <li>• &lt;t_pin&gt;:             <ul style="list-style-type: none"> <li>▸ Sets the pin to wakeup; range of value:[0,15].</li> </ul> </li> <li>• &lt;t_level&gt;:             <ul style="list-style-type: none"> <li>▸ 0: The pin wakeup on low level.</li> <li>▸ 1: The pin wakeup on high level.</li> </ul> </li> <li>• [&lt;w_pin&gt;]: Optional;             <ul style="list-style-type: none"> <li>▸ This parameter is used to set a pin as a flag of being awoken form Light-sleep; range of value:[0,15].</li> </ul> </li> <li>• [&lt;w_level&gt;]: Optional;             <ul style="list-style-type: none"> <li>▸ 0: The pin is set to be low level after the wakeup process.</li> <li>▸ 1: The pin is set to be high level after the wakeup process.</li> </ul> </li> </ul>
Note	<ul style="list-style-type: none"> <li>• The value of &lt;t_pin&gt; and &lt;w_pin&gt; in the command should not be the same.After being woken up by &lt;t_pin&gt; from Light-sleep, when the WG231 attempts to sleep again, it will check the status of the &lt;t_pin&gt;:             <ul style="list-style-type: none"> <li>▸ if it is still in the wakeup status, the WG231 will enter Modem-sleep mode instead;</li> <li>▸ if it is NOT in the wakeup status, the WG231 will enter Light-sleep mode.</li> </ul> </li> </ul>
Use	<ul style="list-style-type: none"> <li>• Set woken from Light-sleep, when pin 0 is on low level: AT+WAKEUPGPIO=1,0,0</li> <li>• Set woken from Light-sleep, when pin 0 is on high level. After the wakingup,pin 13 is set to high level: AT+WAKEUPGPIO=1,0,1,13,1</li> <li>• Disable the function can be woken up from Light-sleep by a pin AT+WAKEUPGPIO=0</li> </ul>

**AT+SYSIOSETCFG -- Set the Working Modes of IO Pin**

Set Command	AT+SYSIOGETCFG=<pin>,<mode>,<pull-up>
Response	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;pin&gt;: Number of an IO pin.</li> <li>• &lt;mode&gt;: The working mode of the IO pin.</li> <li>• &lt;pull-up&gt;             <ul style="list-style-type: none"> <li>▸ 0: Disable the pull-up</li> <li>▸ 1: Enable the pull-up of the IO pin</li> </ul> </li> </ul>
Use	AT+SYSIOSETCFG=12,3,1 //Set pin GPIO12 to work as a GPIO

**AT+SYSIOGETCFG -- Checks the Working Modes of IO Pin**

Set Command	AT+SYSIOGETCFG=<pin>
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Response	+SYSIOGETCFG:<pin>,<mode>,<pull-up> OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;pin&gt;: Number of an IO pin.</li> <li>• &lt;mode&gt;: The working mode of the IO pin.</li> <li>• &lt;pull-up&gt; <ul style="list-style-type: none"> <li>▸ 0: Disable the pull-up</li> <li>▸ 1: Enable the pull-up of the IO pin</li> </ul> </li> </ul>
Use	AT+SYSIOGETCFG=12

### AT+SYSGPIODIR -- Set the Direction of a GPIO

Set Command	AT+SYSGPIODIR=<pin>,<dir>
Response	<ul style="list-style-type: none"> <li>• If the configuration is successful, the command will return: OK</li> <li>• If the IO pin is not in GPIO mode, the command will return: NOT GPIO MODE! ERROR</li> </ul>
Parameters	<ul style="list-style-type: none"> <li>• &lt;pin&gt;: GPIO pin number</li> <li>• &lt;dir&gt;: <ul style="list-style-type: none"> <li>▸ 0: sets the GPIO as an input</li> <li>▸ 1: sets the GPIO as an output</li> </ul> </li> </ul>
Use	AT+SYSIOSETCFG=12,3,1 //Set pin gpio12 to work as a gpio AT+SYSGPIODIR=12,1 //Set pin gpio12 to work as an output

### AT+SYSGPIOWRITE -- Configures the Output Level of a pin

Set Command	AT+SYSGPIOWRITE=<pin>,<level>
Response	<ul style="list-style-type: none"> <li>• If the configuration is successful, the command will return: OK</li> <li>• If the IO pin is not in output mode, the command will return: NOT OUTPUT! ERROR</li> </ul>
Parameters	<ul style="list-style-type: none"> <li>• &lt;pin&gt;: GPIO pin number</li> <li>• &lt;level&gt;: <ul style="list-style-type: none"> <li>▸ 0: low level</li> <li>▸ 1: high level</li> </ul> </li> </ul>
Use	AT+SYSIOSETCFG=12,3,1 //Set pin gpio12 to work as a gpio AT+SYSGPIODIR=12,1 //Set pin gpio12 to work as an output AT+SYSGPIOWRITE=12,1 //Set pin gpio12 to output high level

### AT+SYSGPIOREAD -- Reads the pin Input Level

<b>Set Command</b>	<b>AT+SYSGPIOREAD=&lt;pin&gt;</b>
<b>Response</b>	<ul style="list-style-type: none"> <li>• If the configuration is successful, the command returns: +SYSGPIOREAD:&lt;pin&gt;,&lt;dir&gt;,&lt;level&gt; OK</li> <li>• If the IO pin is not in GPIO mode, the command will return: NOT GPIO MODE! ERROR</li> </ul>
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• &lt;pin&gt;: GPIO pin number</li> <li>• &lt;dir&gt;: <ul style="list-style-type: none"> <li>▸ 0: sets the GPIO as an input</li> <li>▸ 1: sets the GPIO as an output</li> </ul> </li> <li>• &lt;level&gt;: <ul style="list-style-type: none"> <li>▸ 0: low level</li> <li>▸ 1: high level</li> </ul> </li> </ul>
<b>Use</b>	<pre>AT+SYSIOSETCFG=12,3,1 //Set pin gpio12 to work as a gpio AT+SYSGPIODIR=12,0 //Set pin gpio12 to work as an input AT+SYSGPIOREAD=12</pre>

**Other**

## Chapter 3. Wi-Fi AT Commands

### Overview

Instruction suffix x\_DEF Representative configuration saved in the nvs area.

Commands	Description
AT+CWMODE_DEF	Sets the Wi-Fi mode (STA/AP/STA+AP).
AT+CWJAP_DEF	Connects to an AP.
AT+CWSAP_DEF	Sets the configuration of the WG231 module SoftAP.
AT+CWDHCP_DEF	Enables/disables DHCP.
AT+CWDHCPS_DEF	Sets the IP range of the WG231 module Soft AP DHCP server.
AT+CWLAP	Lists available APs.
AT+CWQAP	Disconnects from the AP.
AT+CWAUTOCONN	Connects to the AP automatically on power-up.
AT+CWSTARTSMART	Starts SmartConfig.
AT+CWSTOPSMART	Stops SmartConfig.
AT+WPS	Enables the WPS function.
Other	...

### Commands

#### AT+CWMODE\_DEF -- Sets the Wi-Fi mode

Commands	Display Command	Query Command	Set Command
	AT+CWMODE_DEF=?	AT+CWMODE_DEF?	AT+CWMODE_DEF=<mode>
Response	+CWMODE_DEF:<mode> OK	+CWMODE_DEF:<mode> OK	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;mode&gt;: <ul style="list-style-type: none"> <li>▸ 1: Station mode</li> <li>▸ 2: SoftAP mode</li> <li>▸ 3: SoftAP+Station mode</li> </ul> </li> </ul>		
Note	The configuration changes will be saved in the NVS area.		
Use	AT+CWMODE_DEF=3		

**AT+CWJAP\_DEF -- Connects to an AP**

Commands	Query Command	Set Command
	AT+CWJAP_DEF?	AT+CWJAP_DEF=<ssid>,<pwd>[,<bssid>]
Response	+CWJAP_DEF:<ssid>,<bssid>,<channel>,<rsssi>  OK	WIFI CONNECTED WIFI GOT IP OK or +CWJAP_DEF:<error code> ERROR
Parameters	<ul style="list-style-type: none"> <li>• &lt;ssid&gt;: a string parameter showing the SSID of the target AP</li> </ul>	<ul style="list-style-type: none"> <li>• &lt;ssid&gt;: the SSID of the target AP.</li> <li>• &lt;pwd&gt;: password, MAX: 64-byte ASCII.</li> <li>• [&lt;bssid&gt;]: the target AP's MAC address, used when multiple APs have the same SSID.</li> <li>• &lt;error code&gt;: (for reference only) <ul style="list-style-type: none"> <li>▸ 1: connection timeout.</li> <li>▸ 2: wrong password.</li> <li>▸ 3: cannot find the target AP.</li> <li>▸ 4: connection failed.</li> </ul> </li> </ul>
Note	The configuration changes will be saved in the NVS area.	
Use	AT+CWJAP_DEF="abc","12345678" If the target AP SSID is "ab\,c" and the password is "12345678\"", the command is as follows: AT+CWJAP_DEF="ab\\,c","0123456789\"	

**AT+CWSAP\_DEF -- Configuration of the WG231 module SoftAP**

Commands	Query Command	Set Command
	AT+CWSAP_DEF?	AT+CWSAP_DEF=<ssid>,<pwd>,<chl>,<ecn>[,<maxconn>][,<ssid hidden>]
Response	+CWSAP_DEF:<ssid>,<pwd>,<chl>,<ecn>,<max conn>,<ssid hidden>	OK or ERROR
Parameters	<ul style="list-style-type: none"> <li>• &lt;ssid&gt;: string parameter, SSID of AP.</li> <li>• &lt;pwd&gt;: string parameter, length of password: 8 ~ 64bytes ASCII.</li> <li>• &lt;chl&gt;: channel ID.</li> <li>• &lt;ecn&gt;: encryption method; WEP is not supported. <ul style="list-style-type: none"> <li>▸ 0: OPEN</li> <li>▸ 2: WPA_PSK</li> <li>▸ 3: WPA2_PSK</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>▸ 4: WPA_WPA2_PSK</li> <li>• [&lt;max conn&gt;] (optional): maximum number of Stations to which WG231 module SoftAP can be connected;within the range of [1, 4].</li> <li>• [&lt;ssid hidden&gt;] (optional): <ul style="list-style-type: none"> <li>▸ 0: SSID is broadcast. (the default setting)</li> <li>▸ 1: SSID is not broadcast.</li> </ul> </li> </ul>
Note	<ol style="list-style-type: none"> <li>1、 This command is only available when SoftAP is active.</li> <li>2、 The configuration changes will be saved in the NVS area.</li> </ol>
Use	AT+CWSAP_DEF="WG231","1234567890",6,3

### AT+CWDHCP\_DEF -- Enables/disables DHCP

Commands	Query Command	Set Command
	AT+CWDHCP_DEF?	AT+CWDHCP_DEF=<operate>,<mode>
Response	DHCP disabled or enabled now?	OK
Parameters	<ul style="list-style-type: none"> <li>• Bit0: <ul style="list-style-type: none"> <li>▸ 0: Station DHCP is disabled.</li> <li>▸ 1: Station DHCP is enabled.</li> </ul> </li> <li>• Bit1: <ul style="list-style-type: none"> <li>▸ 0: SoftAP DHCP is disabled.</li> <li>▸ 1: SoftAP DHCP is enabled.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• &lt;operate&gt;: <ul style="list-style-type: none"> <li>▸ 0: disable</li> <li>▸ 1: enable</li> </ul> </li> <li>• &lt;mode&gt;: <ul style="list-style-type: none"> <li>▸ Bit0: Station DHCP</li> <li>▸ Bit1: SoftAP DHCP</li> </ul> </li> </ul>
Notes	<ol style="list-style-type: none"> <li>1、 The configuration changes will be saved in the NVS area.</li> <li>2、 This set command interacts with static-IP-related AT commands (AT+CIPSTA-related and AT+CIPAP-related commands): <ul style="list-style-type: none"> <li>▸ If DHCP is enabled, static IP will be disabled;</li> <li>▸ If static IP is enabled, DHCP will be disabled;</li> <li>▸ Whether it is DHCP or static IP that is enabled depends on the last configuration.</li> </ul> </li> </ol>	
Use	AT+CWDHCP_DEF=1,1 Enable Station DHCP. If the last DHCP mode is 2, then the current DHCP mode will be 3. AT+CWDHCP_DEF=0,2 Disable SoftAP DHCP. If the last DHCP mode is 3, then the current DHCP mode will be 1.	

### AT+CWDHCPS\_DEF -- Sets the IP range of the WG231 module Soft AP DHCP server

Commands	Query Command	Set Command
	AT+CWDHCPS_DEF?	AT+CWDHCPS_DEF=<enable>,<leasetime>,<start IP>,<end IP>
Response	+CWDHCPS_DEF=<leasetime>,<startIP>,<endIP>	OK

Parameters	<ul style="list-style-type: none"> <li>• &lt;enable&gt;: <ul style="list-style-type: none"> <li>▸ 0: Disable the settings and use the default IP range.</li> <li>▸ 1: Enable setting the IP range, and the parameters below have to be set.</li> </ul> </li> <li>• &lt;lease time&gt;: lease time, unit: minute, range [1, 2880].</li> <li>• &lt;start IP&gt;: start IP of the IP range that can be obtained from WG231 module SoftAP DHCP server.</li> <li>• &lt;end IP&gt;: end IP of the IP range that can be obtained from WG231 module SoftAP DHCP server.</li> </ul>
Notes	<p>1、 The configuration changes will be saved in the NVS area.</p> <p>2、 This AT command is enabled when WG231 runs as SoftAP, and when DHCP is enabled. The IP address should be in the same network segment as the IP address of WG231 module SoftAP.</p>
Use	<p>AT+CWDHCPS=1,3,"192.168.4.10","192.168.4.15"</p> <p>or</p> <p>AT+CWDHCPS=0 //Disable the settings and use the default IP range.</p>

### AT+CWLAP -- Lists available APs

Commands	Set Command	Execute Command
	AT+CWLAP=<ssid>[,<mac>,<ch>]	AT+CWLAP
Response	+CWLAP:<ecn>,<ssid>,<rssi>,<mac>,<ch> OK or ERROR	+CWLAP:<ecn>,<ssid>,<rssi>,<mac>,<ch>  OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;ecn&gt;: encryption method. <ul style="list-style-type: none"> <li>▸ 0: OPEN</li> <li>▸ 1: WEP</li> <li>▸ 2: WPA_PSK</li> <li>▸ 3: WPA2_PSK</li> <li>▸ 4: WPA_WPA2_PSK</li> <li>▸ 5: WPA2_Enterprise (AT can NOT connect to WPA2_Enterprise AP for now.)</li> </ul> </li> <li>• &lt;ssid&gt;: string parameter, SSID of the AP.</li> <li>• &lt;rssi&gt;: signal strength.</li> <li>• &lt;mac&gt;: string parameter, MAC address of the AP.</li> </ul>	
Use	<p>search for AP with a designated SSID:AT+CWLAP="WG231_WIFI01"</p> <p>search for all available Aps: AT+CWLAP</p>	

### AT+CWQAP -- Disconnects from the AP

Execute Command	AT+CWQAP
Response	WIFI DISCONNECT

Parameters	--
Use	AT+CWQAP

### AT+CWAUTOCONN -- Connects to the AP automatically on power-up

Set Command	AT+CWAUTOCONN=<enable>
Response	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;enable&gt;: <ul style="list-style-type: none"> <li>▸ 0: does NOT auto-connect to AP on power-up.</li> <li>▸ 1: connects to AP automatically on power-up.</li> </ul> </li> </ul>
Notes	<p>1、 The WG231 module Station connects to the AP automatically on power-up by default</p> <p>2、 The configuration changes will be saved in the NVS area.</p>
Use	AT+CWAUTOCONN=1

### AT+CWSTARTSMART -- Starts SmartConfig

Commands	Execute Command	Set Command
	AT+CWSTARTSMART	AT+CWSTARTSMART=<type>
Response	OK	
Parameters	<ul style="list-style-type: none"> <li>• &lt;type&gt;: <ul style="list-style-type: none"> <li>▸ 1: TOUCH</li> <li>▸ 2: AirKiss</li> <li>▸ 3: TOUCH+AirKiss</li> </ul> </li> </ul>	
Notes	<p>1、 SmartConfig is only available in the WG231 module Station mode.</p> <p>2、 The message Smart get Wi-Fi info means that SmartConfig has successfully acquired the AP information. WG231 module will try to connect to the target AP.</p> <p>3、 Message Smartconfig connected Wi-Fi is printed if the connection is successful. Use command AT+CWSTOPSMART to stop SmartConfig before running other commands. Please make sure that you do not execute other commands during SmartConfig.</p>	
Use	AT+CWMODE_DEF=1 AT+CWSTARTSMART	

### AT+CWSTOPSMART -- Stops SmartConfig

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

**AT+WPS -- Gets the local IP address**

Set Command	AT+WPS=<enable>
Response	OK or ERROR
Parameters	<enable>: <ul style="list-style-type: none"><li>▸ 0: open wps</li><li>▸ 1: close wps</li></ul>
Note	<ul style="list-style-type: none"><li>▸ WPS is only available in the WG231 module Station mode.</li><li>▸ WPS non support wep encryption method</li></ul>
Use	AT+CWMODE=1 AT+WPS=1

**Other**



## Chapter 4. TCP/IP-Related AT Commands

### Overview

Instruction suffix x\_DEF Representative configuration saved in the nvs area.

Commands	Description
AT+CIPSTA_DEF	Sets the IP address of WG231 module Station.
AT+CIPAP_DEF	Sets the IP address of WG231 module SoftAP.
AT+CIPSTATUS	Gets the connection status.
AT+CIPDOMAIN	DNS function.
AT+CIPMUX	Configures the multiple connections mode.
AT+CIPSTART	Establishes TCP connection, UDP transmission or SSL connection.
AT+CIPSSLSIZE	Sets the Size of SSL Buffer
AT+CIPCLOSE	Closes TCP/UDP/SSL connection.
AT+CIPSERVER	Deletes/Creates TCP server.
AT+CIPSTO	Sets timeout when WG231 module runs as a TCP server.
AT+CIPMODE	Configures the transmission mode.
AT+CIPSEND	Sends data.
AT+CIPDINFO	Shows remote IP and remote port with +IPD.
AT+CIPSNTPCFG	Configures the time zone and the SNTP server.
AT+CIPSNTPTIME	Queries the SNTP time.
AT+CIFSR	Gets the local IP address.
AT+SAVETRANSLINK	Saves the transparent transmission link in flash.
Other	...

## Commands

### AT+CIPSTA\_DEF -- Sets the IP address of WG231 module Station

Commands	Query Command	Set Command
	AT+CIPSTA_DEF?	AT+CIPSTA_DEF=<ip>[,<gateway>,<netmask>]
Response	+CIPSTA_DEF:<ip> OK	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;ip&gt;: string parameter, the IP address of the WG231 module Station.</li> <li>• [&lt;gateway&gt;]: gateway.</li> <li>• [&lt;netmask&gt;]: netmask.</li> </ul>	
Notes	<ol style="list-style-type: none"> <li>1、 The configuration changes will be saved in the NVS area.</li> <li>2、 Only when the WG231 module Station is connected to an AP can its IP address be queried.</li> <li>3、 The set command interacts with DHCP-related AT commands (AT+CWDHCP-related commands): <ul style="list-style-type: none"> <li>▸ If static IP is enabled, DHCP will be disabled;</li> <li>▸ If DHCP is enabled, static IP will be disabled;</li> <li>▸ Whether it is DHCP or static IP that is enabled depends on the last configuration.</li> </ul> </li> </ol>	
Use	AT+CIPSTA_DEF="192.168.6.10","192.168.6.1","255.255.255.0"	

### AT+CIPAP\_DEF -- Sets the IP address of WG231 module SoftAP

Command	Query Command	Set Command
s	AT+CIPAP_DEF?	AT+CIPAP_DEF=<ip>[,<gateway>,<netmask>]
Response	+CIPAP_DEF:<ip>,<gateway>,<netmask> OK	OK
Parameter s	<ul style="list-style-type: none"> <li>• &lt;ip&gt;: string parameter, the IP address of the WG231 module SoftAP.</li> <li>• [&lt;gateway&gt;]: gateway.</li> <li>• [&lt;netmask&gt;]: netmask.</li> </ul>	
Notes	<ol style="list-style-type: none"> <li>1、 The configuration changes will be saved in the NVS area.</li> <li>2、 Currently, WG231 module only supports class C IP addresses..</li> <li>3、 The set command interacts with DHCP-related AT commands (AT+CWDHCP-related commands): <ul style="list-style-type: none"> <li>▸ If static IP is enabled, DHCP will be disabled;</li> <li>▸ If DHCP is enabled, static IP will be disabled;</li> <li>▸ Whether it is DHCP or static IP that is enabled depends on the last configuration.</li> </ul> </li> </ol>	
Use	AT+CIPAP_DEF="192.168.5.1","192.168.5.1","255.255.255.0"	

### AT+CIPSTATUS -- Gets the connection status

Execute Command <b>AT+CIPSTATUS</b>	
Response	STATUS:<stat> +CIPSTATUS:<link ID>,<type>,<remote IP>,<remote port>,<local port>,<tetype>
Parameters	<ul style="list-style-type: none"> <li>• &lt;stat&gt;: status of the WG231 module Station interface. <ul style="list-style-type: none"> <li>▸ 2: The WG231 module Station is connected to an AP and its IP is obtained.</li> <li>▸ 3: The WG231 module Station has created a TCP or UDP transmission.</li> <li>▸ 4: The TCP or UDP transmission of WG231 module Station is disconnected.</li> <li>▸ 5: The WG231 module Station does NOT connect to an AP.</li> </ul> </li> <li>• &lt;link ID&gt;: ID of the connection (0~4), used for multiple connections.</li> <li>• &lt;type&gt;: string parameter, "TCP" or "UDP".</li> <li>• &lt;remote IP&gt;: string parameter indicating the remote IP address.</li> <li>• &lt;remote port&gt;: the remote port number.</li> <li>• &lt;local port&gt;: WG231 module local port number.</li> <li>• &lt;tetype&gt;: <ul style="list-style-type: none"> <li>▸ 0: WG231 module runs as a client.</li> <li>▸ 1: WG231 module runs as a server.</li> </ul> </li> </ul>
Use	AT+CIPSTATUS

### AT+CIPDOMAIN -- DNS function

Set Command <b>AT+CIPDOMAIN=&lt;domain name&gt;</b>	
Response	+CIPDOMAIN:<IP address>
Parameters	<ul style="list-style-type: none"> <li>• &lt;domain name&gt;: the domain name.</li> </ul>
Use	AT+CWMODE=1 // set Station mode AT+CWJAP="SSID","password" // access to the internet AT+CIPDOMAIN="skylab.com.cn" // DNS function

### AT+CIPMUX -- Configures the multiple connections mode

Commands	Query Command	Set Command
	<b>AT+CIPMUX?</b>	<b>AT+CIPMUX=&lt;mode&gt;</b>
Response	+CIPMUX:<mode> OK	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;mode&gt;: <ul style="list-style-type: none"> <li>▸ 0: single connection</li> <li>▸ 1: multiple connections</li> </ul> </li> </ul>	
Notes	1、 The default mode is single connection mode. 2、 Multiple connections can only be set when transparent transmission is disabled (AT+CIPMODE=0). 3、 This mode can only be changed after all connections are disconnected. 4、 If the TCP server is running, it must be deleted (AT+CIPSERVER=0) before the single	

	connection mode is activated.
Use	AT+CIPMUX=1

## AT+CIPSTART -- Establishes TCP connection, UDP transmission or SSL connection

### Establish TCP Connection

Set Command	Single connection (AT+CIPMUX=0)	Multiple Connections (AT+CIPMUX=1)
	AT+CIPSTART=<type>,<remoteIP>,<remoteport>[,<TCP keep alive>]	AT+CIPSTART=<linkID>,<type>,<remoteIP>,<remoteport>[,<TCP keep alive>]
Response	OK or ERROR	
Parameters	<ul style="list-style-type: none"> <li>• &lt;link ID&gt;: ID of network connection (0~4), used for multiple connections.</li> <li>• &lt;type&gt;: string parameter indicating the connection type: "TCP", "UDP" or "SSL".</li> <li>• &lt;remote IP&gt;: string parameter indicating the remote IP address.</li> <li>• &lt;remote port&gt;: the remote port number.</li> <li>• [&lt;TCP keep alive&gt;]: detection time interval when TCP is kept alive; this function is disabled by default. <ul style="list-style-type: none"> <li>▸ 0: disable TCP keep-alive.</li> <li>▸ 1 ~ 7200: detection time interval; unit: second (s).</li> </ul> </li> </ul>	
Use	AT+CIPSTART="TCP","xx.cn",8000 AT+CIPSTART="TCP","192.168.4.2",8000	

### Establish UDP Transmission

Set Command	Single connection (AT+CIPMUX=0)	Multiple Connections (AT+CIPMUX=1)
	AT+CIPSTART=<type>,<remoteIP>,<remote port>[,<UDP local port>,<UDP mode>]	AT+CIPSTART=<linkID>,<type>,<remoteIP>,<remote port>[,<UDP local port>,<UDP mode>]
Response	OK or ERROR If TCP is already connected, the response is: ALREADY CONNECT	
Parameters	<ul style="list-style-type: none"> <li>• &lt;link ID&gt;: ID of network connection (0~4), used for multiple connections.</li> <li>• &lt;type&gt;: string parameter indicating the connection type: "TCP", "UDP" or "SSL".</li> <li>• &lt;remote IP&gt;: string parameter indicating the remote IP address.</li> <li>• &lt;remote port&gt;: the remote port number.</li> </ul>	
Note	To use <UDP mode> , <UDP local port> must be set first.	
Use	AT+CIPSTART="UDP","192.168.4.2",8000,1002,2	

### Establish SSL Connection

Set Command	AT+CIPSTART=[<linkID>,<type>,<remoteIP>,<remoteport>[,<TCP keep alive>]	
Response	OK or ERROR If TCP is already connected, the response is: ALREADY CONNECT	
Parameters	<ul style="list-style-type: none"> <li>• &lt;link ID&gt;: ID of network connection (0~4), used for multiple connections.</li> <li>• &lt;type&gt;: string parameter indicating the connection type: "TCP", "UDP" or "SSL".</li> </ul>	

	<ul style="list-style-type: none"> <li>• &lt;remote IP&gt;: string parameter indicating the remote IP address.</li> <li>• &lt;remote port&gt;: the remote port number.</li> <li>• [&lt;TCP keep alive&gt;]: detection time interval when TCP is kept alive; this function is disabled by default. <ul style="list-style-type: none"> <li>▸ 0: disable TCP keep-alive.</li> <li>▸ 1 ~ 7200: detection time interval; unit: second (s).</li> </ul> </li> </ul>
Notes	<p>1、WG231 module can only set one SSL connection at most.</p> <p>2、SSL connection does not support UART-Wi-Fi passthrough mode (transparent transmission).</p> <p>3、SSL connection needs a large amount of memory; otherwise, it may cause system reboot.</p>
Use	AT+CIPSTART="SSL","skylab.com.cn",8443

### AT+CIPSSLSIZE -- Sets the Size of SSL Buffer

Set Command	AT+CIPSSLSIZE=<size>
Response	OK or ERROR
Parameters	<size>: the size of the SSL buffer; range of value: [2048, 4096].
Use	AT+CIPSSLSIZE=4096

### AT+CIPCLOSE -- Closes TCP/UDP/SSL connection

Commands	Set Command for multiple connections	Execute Command for single connection
	AT+CIPCLOSE =<link ID>	AT+CIPCLOSE
Response	OK	
Parameters	• <link ID>: ID number of connections to be closed; when ID=5, all connections will be closed.	
Use	AT+CIPCLOSE	

### AT+CIPSERVER -- Creates/Deletes tcp server

Set Command	AT+CIPSERVER=<mode>[,<port>]
Response	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;mode&gt;: <ul style="list-style-type: none"> <li>▸ 0: delete server.</li> <li>▸ 1: create server.</li> </ul> </li> <li>• &lt;port&gt;: port number; 333 by default.</li> </ul>
Notes	<p>1、A TCP server can only be created when multiple connections are activated (AT+CIPMUX=1).</p> <p>2、A server monitor will automatically be created when the TCP server is created.</p> <p>3、When a client is connected to the server, it will take up one connection and be assigned an ID.</p>

Use	AT+CIPMUX=1 AT+CIPSERVER=1
-----	-------------------------------

### AT+CIPSTO -- Sets the tcp server timeout

Commands	Query Command	Set Command
	AT+CIPSTO?	AT+CIPSTO=<time>
Response	+CIPSTO:<time> OK	OK
Parameters	• <time>: TCP server timeout within the range of 0 ~ 7200s.	
Notes	1、WG231 module configured as a TCP server will disconnect from the TCP client that does not communicate with it until timeout. 2、If AT+CIPSTO=0, the connection will never time out. This configuration is not recommended.	
Use	AT+CIPMUX=1 AT+CIPSERVER=1,1001 AT+CIPSTO=10	

### AT+CIPMODE -- Configures the transmission mode

Commands	Query Command	Set Command
	AT+CIPMODE?	AT+CIPMODE=<mode>
Response	+CIPMODE:<mode> OK	OK
Parameters	• <mode>: ▸ 0: normal transmission mode. ▸ 1: UART-Wi-Fi passthrough mode (transparent transmission), which can only be enabled in TCP single connection mode or in UDP mode when the remote IP and port do not change.	
Notes	1、The configuration changes will NOT be saved in flash. 2、During the UART-Wi-Fi passthrough transmission, if the TCP connection breaks, WG231 will keep trying to reconnect until +++ is input to exit the transmission. If it is a normal TCP transmission and the TCP connection breaks, WG231 will give a prompt and will not attempt to reconnect.	
Use	AT+CIPMODE=1	

### AT+CIPSEND -- Sends data

Commands	Set Command	Execute Command
	1.Single connection(+CIPMUX=0) AT+CIPSEND=<len>	AT+CIPSEND
	2.Multiple connections(+CIPMUX=1)	

<p><b>AT+CIPSEND=&lt;link ID&gt;,&lt;len&gt;</b>          3.Remote IP and ports can be set in UDP transmission:  <b>AT+CIPSEND=[&lt;linkID&gt;,&lt;len&gt;[,&lt;remoteIP&gt;,&lt;remoteport&gt;]</b></p>		
<b>Response</b>	<p>Send data of designated length.Wrap return &gt; after the set command. Begin receiving serial data. When the requirement of data length is met, the transmission of data starts.If the connection cannot be established or gets disrupted during data transmission, the system returns:  <b>ERROR</b>          If data is transmitted successfully, the system returns:  <b>SEND OK</b></p>	<p>Wrap return &gt; after executing this command.          Enter transparent transmission, with a 20-ms interval between each packet, and a maximum of 2048 bytes per packet.When a single packet containing +++ is received,WG231 returns to normal command mode.          Please wait for at least one second before sending the next AT command.          This command can only be used in transparent transmission mode which requires single connection.For UDP transparent transmission, the value of &lt;UDP mode&gt; has to be 0 when using AT+CIPSTART.</p>
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• &lt;link ID&gt;: ID of the connection (0~4), for multiple connections.</li> <li>• &lt;length&gt;: data length, MAX: 2048 bytes.</li> <li>• [&lt;remote IP&gt;]: remote IP can be set in UDP transmission.</li> <li>• [&lt;remote port&gt;]:remote port can be set in UDP transmission.</li> </ul>	
<b>Use</b>	For more information please see Chapter 7	

**AT+CIPDINFO -- Shows remote ip and remote port with +IPD**

<b>Set Command</b>	<b>AT+CIPDINFO=&lt;mode&gt;</b>
<b>Response</b>	OK
<b>Parameters</b>	<ul style="list-style-type: none"> <li>• &lt;mode&gt;:             <ul style="list-style-type: none"> <li>▸ 0: does not show the remote IP and port with "+IPD".</li> <li>▸ 1: shows the remote IP and port with "+IPD".</li> </ul> </li> </ul>
<b>Use</b>	AT+CIPDINFO=1

**AT+CIPSNTPCFG -- Configures the time zone and the SNTP server**

Commands	Query Command	Execute Command	Set Command
	<b>AT+CIPSNTPCFG?</b>	<b>AT+CIPSNTPCFG</b>	<b>AT+CIPSNTPCFG=&lt;timezone&gt; [,&lt;SNTPserver1&gt;,&lt;SNTPserver2&gt;,&lt;SNTPserver3&gt;]</b>
<b>Response</b>	+CIPSNTPCFG:<enable>,<timez		

	one>,<SNTPserver1>[,<SNTPserver2>,<SNTPserver3>] OK	OK	OK
Parameters	<ul style="list-style-type: none"> <li>• &lt;enable&gt;: <ul style="list-style-type: none"> <li>▸1: SNTP server is configured.</li> <li>▸0: SNTP server not configured.</li> </ul> </li> <li>• &lt;timezone&gt;: <ul style="list-style-type: none"> <li>time zone, range:[-11,13].</li> </ul> </li> <li>• &lt;SNTP server1&gt;: <ul style="list-style-type: none"> <li>the first SNTP server.</li> </ul> </li> <li>• &lt;SNTP server2&gt;: <ul style="list-style-type: none"> <li>the second SNTP server.</li> </ul> </li> <li>• &lt;SNTP server3&gt;: <ul style="list-style-type: none"> <li>the third SNTP server.</li> </ul> </li> </ul>	Clear the SNTP server information.	<ul style="list-style-type: none"> <li>• &lt;timezone&gt;: <ul style="list-style-type: none"> <li>time zone, range: [-11,13].</li> </ul> </li> <li>• &lt;SNTP server1&gt;: <ul style="list-style-type: none"> <li>the first SNTP server.</li> </ul> </li> <li>• &lt;SNTP server2&gt;: <ul style="list-style-type: none"> <li>the second SNTP server.</li> </ul> </li> <li>• &lt;SNTP server3&gt;: <ul style="list-style-type: none"> <li>the third SNTP server.</li> </ul> </li> </ul>
Note	If the three SNTP servers are not configured,the following default configuration is used:"cn.ntp.org.cn", "ntp.sjtu.edu.cn","us.pool.ntp.org".		
Use	AT+CIPSNTPCFG=8,"cn.ntp.org.cn","ntp.sjtu.edu.cn"		

### AT+CIPSNTPTIME -- Queries the SNTP time

Query Command	AT+CIPSNTPTIME?
Response	+CIPSNTPTIME:SNTP time OK
Parameters	--
Use	AT+CIPSNTPTIME?

### AT+CIFSR -- Gets the local IP address

Execute Command	AT+CIFSR
Response	+CIFSR:<SoftAP IP address> +CIFSR:<Station IP address> OK
Parameters	<IP address>: IP address of the WG231 SoftAP; IP address of the WG231 Station.
Note	Only when the WG231 Station is connected to an AP can the Station IP can be queried
Use	AT+CIFSR

### AT+SAVETRANSLINK -- Saves the transparent transmission link in flash

Set Command	AT+SAVETRANSLINK=<mode>,<remote IP or domain name>,<remote port>[,<type>,<TCP keep alive>]
-------------	--



Response	OK or ERROR
Parameters	<ul style="list-style-type: none"> <li>• &lt;mode&gt;: <ul style="list-style-type: none"> <li>▸ 0: normal mode, WG231 will NOT enter UART-Wi-Fi passthrough mode on power-up.</li> <li>▸ 1: WG231 will enter UART-Wi-Fi passthrough mode on power-up.</li> </ul> </li> <li>• &lt;remote IP&gt;: remote IP or domain name.</li> <li>• &lt;remote port&gt;: remote port.</li> <li>• [&lt;type&gt;] (optional): TCP or UDP, TCP by default.</li> <li>• [&lt;TCP keep alive&gt;] (optional): TCP is kept alive. This function is disabled by default. <ul style="list-style-type: none"> <li>▸ 0: disables the TCP keep-alive function.</li> <li>▸ 1 ~ 7200: keep-alive detection time interval; unit: second (s).</li> </ul> </li> </ul>
Note	<ol style="list-style-type: none"> <li>1、 This command will save the UART-Wi-Fi passthrough mode and its link in the NVS area. WG231 will enter the UART-Wi-Fi passthrough mode on any subsequent power cycles.</li> <li>2、 As long as the remote IP (or domain name) and port are valid, the configuration will be saved in flash.</li> </ol>
Use	AT+SAVETRANSLINK=1,"192.168.6.110",8002,"TCP"

## Other

## Chapter 5. AT Commands Examples

Herein we introduce some examples of how to use WG231 AT Commands.

### ⊕ Basic AT Commands example

#### 1、 Restarts WG231 module

Send Execute Command:

**AT+RST**

Response :

OK

#### 2、 Checks version information

Send Query Command:

**AT+VER?**

Response :

Software Version:V1.01

OK

#### 3、 Set GPIO to output high level

Example : Set GPIO12 to output high level

Set GPIO12 to work as a GPIO:

**AT+SYSIOSETCFG=12,3,1**

Response :

OK

Set GPIO12 to work as an output:

**AT+SYSGPIODIR=12,1**

Response :

OK

Set GPIO12 to output high level:

**AT+SYSGPIOWRITE=12,1**

Response :

OK

#### 4、 Get GPIO level

Example : Read pin GPIO12 level

Set GPIO12 to work as a GPIO:

**AT+SYSIOSETCFG=12,3,1**

Response :

OK

Set GPIO12 to work as an input:

**AT+SYSGPIODIR=12,0**

Response :

OK

Get GPIO12 level:

**AT+SYSGPIOREAD=12**

⊙ **Wi-Fi AT Commands example**

1、 Set/Get the Wi-Fi mode

```
Send Set Command:  
    AT+CWMODE_DEF=2  
Response :  
    OK  
Send Query Command:  
    AT+CWMODE_DEF?  
Response :  
    +CWMODE_DEF:2  
    OK
```

2、 Lists available APs

```
Send Set Command list specific ap:  
    AT+CWLAP="WG231_WiFi02"  
Response :  
    +CWLAP:(3,"WG231_WiFi02",-58,"30:ae:a4:03:c5:ad",9)  
    OK  
Send Execute Command list all available ap:  
    AT+CWLAP  
Response :  
    +CWLAP:(3,"WG231_WiFi02",-58,"30:ae:a4:03:c5:ad",9)  
    +CWLAP:(4,"JOE",-68,"ec:26:ca:d0:58:b4",6)  
    .....  
    OK
```

3、 Set/Get the configuration of the WG231 module SoftAP

```
Send Set Command:  
    AT+CWMODE_DEF=2  
    AT+CWSAP_DEF="WG231_01","1234567890",5,3  
Response :  
    OK  
Send Query Command:  
    AT+CWSAP_DEF?  
Response :  
    +CWSAP_DEF:"WG231_01","1234567890",5,3,4,0  
    OK
```

4、 Connects to an AP

```
Send Set Command:  
    AT+CWJAP_DEF="WG231_ap","1234567890"  
Response :  
    OK
```

5、 Disconnects from the AP

```
Send Set Command:  
    AT+CWQAP
```

Response :

OK

Other

⊙ TCP/IP related AT Commands example

**TCP Connect**

1、 WG231 as a TCP Client in Single Connection

- Set the Wi-Fi mode

Send Set Command:

**AT+CWMODE\_DEF=3** //SoftAP+Station mode

Response :

OK

- Connect to the router

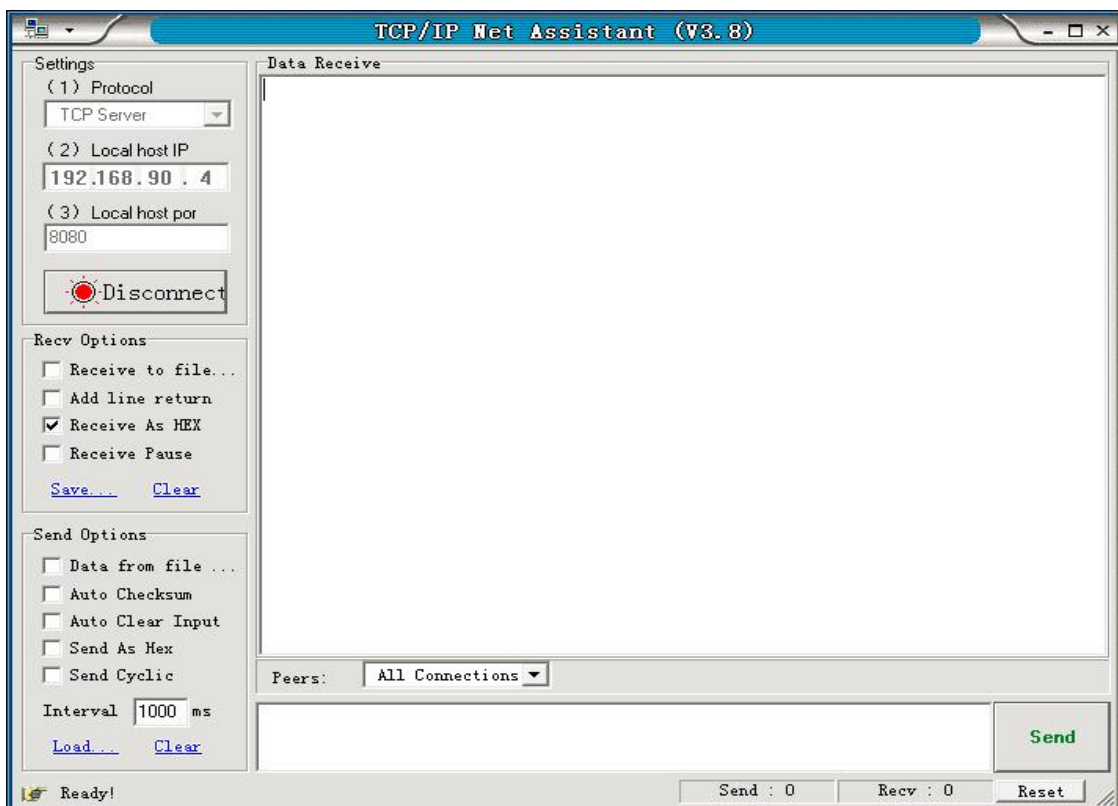
Send Set Command:

**AT+CWJAP\_DEF="ssid","password"** // ssid and password of router

Response :

OK

- Connect the PC to the same router which WG231 is connected to. Use a network tool on the PC to create a TCP server



- Query the devices IP

Send Execute Command:

**AT+CIFSR**

Response :

192.168.3.116 // device got an IP from router

- WG231 is connected to the TCP server as a client

Send Set Command:

**AT+CIPSTART="TCP","192.168.3.116",8080** //protocol、 server IP & port

Response :

OK

- Send data

Set UART-Wi-Fi normal transmission mode send data:

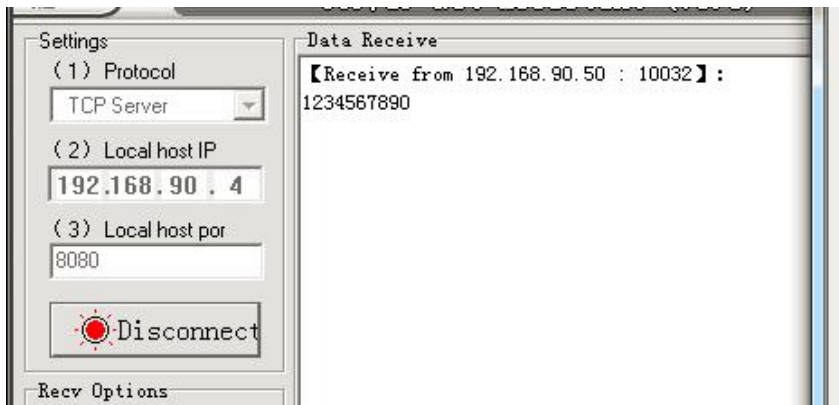
**AT+CIPMODE\_DEF=0**

**AT+CIPSEND=10** // set date, such as 10 bytes

**> 1234567890** // enter the data, no CR

Response :

SEND OK



```
ready
AT+CIPSTART="TCP","192.168.90.4",8080
CONNECT

OK
AT+CIPSEND=10

OK
>
Recv 10 bytes

SEND OK
```

Set UART-Wi-Fi passthrough mode send data:

**AT+CIPMODE\_DEF=1**

**AT+CIPSEND**

Response :

**>** //From now on, data received from UART will be transparent transmitted to server

Stop sending data:

Do NOT select Send With Enter Input String: +++

**Notice:**

- The aim of ending the packet with +++ is to exit transparent transmission and to accept normal AT commands, while TCP still remains connected. However, users can also deploy command AT+CIPSEND to go back into transparent transmission

- Close the TCP connection

Send Set Command:

**AT+CIPCLOSE**

Response :

CLOSED

OK

## 2、 WG231 as a TCP Server in Multiple Connections

When WG231 works as a TCP server, multiple connections should be enabled; that is to say, there should be more than one client connecting to WG231.

Below is an example showing how a TCP server is established when WG231 works in the SoftAP mode. If WG231 works as a Station, set up a server in the same way after connecting WG231 to the router.

- Set the Wi-Fi mode

Send Set Command:

```
AT+CWMODE_DEF=3 //SoftAP+Station mode
```

Response :

OK

- Enable multiple connections

Send Set Command:

```
AT+CIPMUX=1
```

Response :

OK

- Set up a TCP server

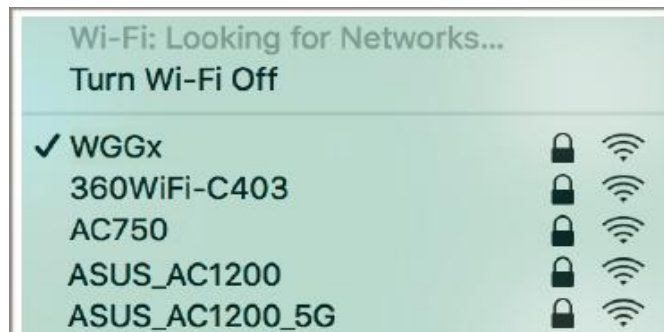
Send Set Command:

```
AT+CIPSERVER=1 // default port = 333
```

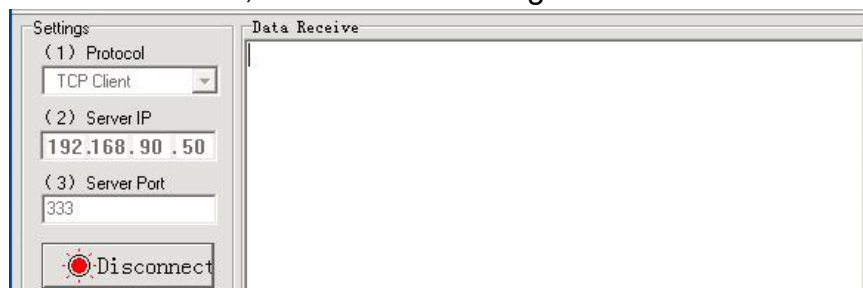
Response :

OK

- Connect the PC to the WG231 module SoftAP SSID WGGX



- Connect the device to the PC, with the PC working as a TCP client



- Send data: 

```
AT+CIPSEND=0,10 //ID number of connection is defaulted to be 0
```

```
> 1234567890 //send 10 bytes to connection NO.0
```

```
// enter the data, no CR
```

Response :

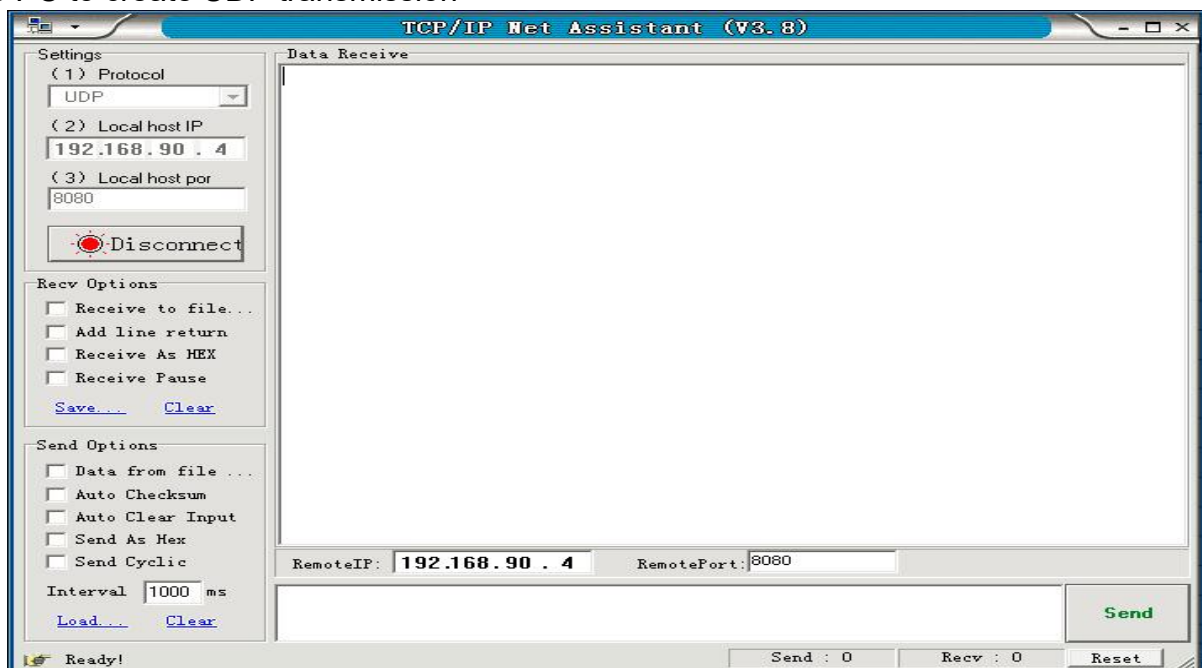
SEND OK

- Receive data:  
`+IPD,0,n:xxxxxxxxxx` //received n bytes, data = xxxxxxxxx
- Close the TCP connection  
Send Set Command:  
`AT+CIPCLOSE=0` //delete NO.0 connection
- Response :  
`0,CLOSED`  
`OK`

## UDP Transmission

UDP transmission is established via AT+CIPSTART. There is no such distinction between UDP server and UDP client.

- Set the Wi-Fi mode  
Send Set Command:  
`AT+CWMODE_DEF=3` //SoftAP+Station mode
- Response :  
`OK`
- Connect to the router  
Send Set Command:  
`AT+CWJAP_DEF="SSID","password"` // SSID and password of router
- Response :  
`OK`
- Connect the PC to the same router which WG231 is connected to. Use a network tool on the PC to create UDP transmission



In UDP transmission, whether the remote IP and port are fixed or not is determined by the last parameter of AT+CIPSTART, namely 0. 0 means that the remote IP and port are fixed and cannot be changed. A specific ID is given to such a connection, ensuring that the data

sender and receiver will not be replaced by other devices.

- Enable multiple connections

Send Set Command:

```
AT+CIPMUX=1
```

Response :

```
OK
```

- Create a UDP transmission, with the ID being 4

Send Set Command:

```
AT+CIPSTART=4,"UDP","192.168.101.110",8080,1112,0
```

Response :

```
4,CONNECT
```

```
OK
```



**Notice:**

- "192.168.101.110" and 8080 are the remote IP and port of UDP transmission on the remote side, i.e., the UDP configuration set by PC.
- 1112 is the local port number of WG231. Users can define this port number. The value of this parameter will be random if it is not defined beforehand.
- 0 means that the remote IP and port are fixed and cannot be changed. For example, if another PC also creates a UDP entity and sends data to WG231 port 1112, WG231 can receive the data sent from UDP port 1112. But when data are sent using AT command AT+CIPSEND=4,X, it will still be sent to the first PC end. If parameter 0 is not used, the data will be sent to the new PC.

- Send data:

```
AT+CIPSEND=4,10 //send 10 bytes to connection NO.4  
> 1234567890 // enter the data, no CR
```

Response :

```
SEND OK
```

- Receive data:

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

- Close the TCP connection

Send Set Command:

```
AT+CIPCLOSE=4
```

Response :

```
4,CLOSED
```

```
OK
```



## Chapter 6. AT Commands with Configuration Saved in the NVS Area

### Overview

Commands	Use Description
AT+UART	AT+UART=115200,8,1,0,3
AT+CWDHCP_DEF	AT+CWDHCP_DEF=1,1
AT+CWDHCPS_DEF	AT+CWDHCP_DEF=1,3,"192.168.4.10"," 192.168.4.15"
AT+CWMODE_DEF	AT+CWMODE_DEF=3
AT+CWJAP_DEF	AT+CWJAP_DEF="WG231_AP","1234567890"
AT+CWSAP_DEF	AT+CWSAP="WG231_AP","1234567890",5,3
AT+CWAUTOCONN	AT+CWAUTOCONN=1
AT+CIPSTA_DEF	AT+CIPSTA="192.168.4.8"
AT+CIPAP_DEF	AT+CIPAP="192.168.4.1"
AT+SAVETRANSLINK	AT+SAVETRANSLINK=1,"192.168.6.110",8002,"TCP"
Other	...

## Chapter 7. Contact us



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