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X-C13SG Operation Guide

V1.6

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INTEGRATION INSTRUCTIONS

FCC Rules

The X-C13SG is an Wi-Fi 2.4G/BLE Module with digitally modulated systems using an DSSS and OFDM modulation. It operates on the 2412-2462 MHz band and 2402-2480MHz, therefore, is within U.S. FCC part 15.247 standard.

Modular installation instruction

1, X-C13SG Integrates high-speed GPIO and peripheral interface. Please pay attention to the installation direction (pin direction).

2, Antenna could not be in no-load state when module is working. During debugging, it is suggested to add 50 ohms load to the antenna port to avoid damage or performance degradation of the module under long-time no-load condition.

3, When the module needs to output 15.11dBm or more power, it needs a voltage supply of 3.3V or more to achieve the expected output power.

4, When working at full load, it is recommended that the entire bottom surface of the module be attached to the housing or heat dissipation plate, and it is not recommended to conduct heat dissipation through air or screw column heat conduction.

RF exposure considerations

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.

Antennas

The X-C13SG is an Wi-Fi 2.4G/BLE Module beams signals and communicates with its antenna, which is X-C13SG:PCB Antenna; X-C13SG-0:External Antenna(Peripherals). The PCB Antenna gain is X-C13SG:2.4 dBi; X-C13SG-0:2dBi (Peripherals)

LABEL OF THE END PRODUCT

The final end product must be labeled in a visible area with the following:

Host must Contains FCC ID: 2A8LU-X-C13SG. If the size of the end product is larger than 12x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Information on test modes and additional testing requirements⁵

Data transfer module demo board can control the EUT work in RF test mode at specified test channel.

Additional testing, Part 15 Subpart B disclaimer

The module without unintentional-radiator digital circuit, so the module does not required an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.

ATTENTION

This device is intended only for OEM integrators under the following conditions: 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

- 2) For all products market in US, OEM has to limit the Operating Frequency: 2412MHz~2462MHz,

2402MHz~2480MHz by supplied firmware programming tool. OEM shall not supply any tool or info to the end - user regarding to Regulatory Domain change.

USERS MANUAL OF THE END PRODUCT:

In the user manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio - frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CATALOG

CATALOG	5
HISTORY	9
1. AT COMMAND.....	10
1.1. UART Setting.....	10
1.2. Switch Throughput to AT Command Mode	10
1.3. Send AT Command in Throughput Mod	11
1.3.1. AT Command Syntax Format	11
1.3.2. AT Command Special Character	13
1.3.3. AT Command List	13
1.3.3.1. AT+	13
1.3.3.2. AT+HELP	14
1.3.3.3. AT+VER.....	14
1.3.3.4. AT+RST	14
1.3.3.5. AT+ECHO	14
1.3.3.6. AT+RESTORE	14
1.3.3.7. AT+CMDGD.....	14
1.3.3.8. AT+RAM	15
1.3.3.9. AT+FLASH	15
1.3.3.10. AT+WEL	16
1.3.3.11. AT+EVENT	16
1.3.3.12. AT+FIND	16
1.3.3.13. AT+Q	17
1.3.3.14. AT+MODE	17
1.3.3.15. AT+MID	17
1.3.3.16. AT+WRMID	17
1.3.3.17. AT+LOG	17
1.3.3.18. AT+FCLR.....	18
1.3.3.19. AT+FSET	18
1.3.3.20. AT+UART	18
1.3.3.21. AT+UARTBUF.....	19
1.3.3.22. AT+UARTTM	19
1.3.3.23. AT+WIFI.....	19
1.3.3.24. AT+WMODE	19
1.3.3.25. AT+WSCAN	20
1.3.3.26. AT+CONFIGLINK.....	20
1.3.3.27. AT+APLINK	20
1.3.3.28. AT+BLELINK.....	21
1.3.3.29. AT+WMDCH	21
1.3.3.30. AT+WSMAC.....	21
1.3.3.31. AT+WSSID	21
1.3.3.32. AT+WSKEY	22

1.3.3.33. AT+WSLK	22
1.3.3.34. AT+WSLQ.....	22
1.3.3.35. AT+WSLKO	23
1.3.3.36. AT+WSWAN	23
1.3.3.37. AT+WSDNS.....	23
1.3.3.38. AT+WSPS	24
1.3.3.39. AT+WAMAC	24
1.3.3.40. AT+WAP	24
1.3.3.41. AT+WAKEY	25
1.3.3.42. AT+WADHCP	25
1.3.3.43. AT+WALK	25
1.3.3.44. AT+WALKIND	25
1.3.3.45. AT+WAPMXSTA	26
1.3.3.46. AT+WALAN	26
1.3.3.47. AT+PING	26
1.3.3.48. AT+SOCKA.....	27
1.3.3.49. AT+SOCKAIDEN	27
1.3.3.50. AT+SOCKAID.....	28
1.3.3.51. AT+SOCKASERMAX	28
1.3.3.52. AT+SOCKALK	29
1.3.3.53. AT+SOCKATO.....	29
1.3.3.54. AT+SOCKADIS	29
1.3.3.55. AT+SOCKASEND.....	30
1.3.3.56. AT+SOCKARECV	30
1.3.3.57. AT+SOCKB.....	30
1.3.3.58. AT+SOCKBDIS	30
1.3.3.59. AT+SOCKBTO.....	31
1.3.3.60. AT+SOCKBLK	31
1.3.3.61. AT+SOCKBSEND	31
1.3.3.62. AT+SOCKBRECV	32
1.3.3.63. AT+UDPPORT	32
1.3.3.64. AT+NREGEN	32
1.3.3.65. AT+NREGDT	33
1.3.3.66. AT+NREGSND	33
1.3.3.67. AT+HEART.....	33
1.3.3.68. AT+HTPTP	34
1.3.3.69. AT+HTPURL	34
1.3.3.70. AT+HTPHEAD	34
1.3.3.71. AT+MQTOPIC	35
1.3.3.72. AT+MQLOGIN.....	35
1.3.3.73. AT+MQPARA	35
1.3.3.74. AT+MQID	36
1.3.3.75. AT+UPGRADE	36
1.3.3.76. AT+WEBLANG	36

1.3.3.77. AT+WEBUSER	37
1.3.3.78. AT+NTPRF	37
1.3.3.79. AT+NTPEN.....	37
1.3.3.80. AT+NTPTM	37
1.3.3.81. AT+NTPSER	38
1.3.3.82. AT+BLE	38
1.3.3.83. AT+BLENAM	38
1.3.3.84. AT+BLESVCUID	39
1.3.3.85. AT+BLENTFUIDR	39
1.3.3.86. AT+BLENTFUIDW	39
1.3.3.87. AT+BLEINDUIDR	39
1.3.3.88. AT+BLEINDUIDW	40
1.3.3.89. AT+BLECON.....	40
1.3.3.90. AT+BLEADP	40
1.3.3.91. AT+BLEADV	41
1.3.3.92. AT+RFTESTSIGNAL	41
2. X-C13SX SERIES EVK	42
3. DEBUG AND PROGRAM	43
3.1. Enable Debug Log	43
3.2. Webpage Upgrade	44
3.3. UART Upgrade	44
4. TEST CASE	47
4.1. Throughput Transmission of UART and Wi-Fi Module in AP Mode	47
4.2. Throughput Transmission of UART and Wi-Fi Module in STA Mode.....	48
4.3. Double SOCKET Communication	50
4.4. Multi-TCP Connection for TCP Server	51
4.5. MQTT Transmission in STA Mode	52
4.6. HTTP Transmission in STA Mode	53
4.7. TCP RAW HTTP PACKET TRANSFER.....	54
4.8. Heartbeat Package, Registration Package	54
5. MODULE BLE THROUGHPUT	56
5.1. BLE Data Transfer(IOS).....	56
6. MODULE PIN DESCRIPTION	58
7. MODULE HARDWARE REFERENCE	59
7.1. UART TTL Voltage Transform	60
7.2. Transistor Transform (Recommend)	60
7.3. Resistor Divider (Low Cost Solution).....	60
7.4. MOSFET	60
7.5. Power Supply Design	61
7.5.1. LDO (Recommend)	61
7.6. DC-DC	61

8. CONTACT US	63
<END>	63

HISTORY

V 1.0	08-04-2021	Pre-Version
V 1.1	09-29-2021	Add Event notification
V 1.2	10-11-2021	Update SOCKBDIS, SOCKBTO, SOCKBLK, UARTTM, UARTBUF Command
V 1.3	10-28--2021	Update Firmware upgrade guide
V 1.4	01-02--2022	Delete onelink config mode, debug UART baudrate changed to 115200, Add AP+STA mode;
V 1.5	01-28--2022	Update BLENAME command, add module PIN description.
V 1.6	06-14--2022	Update production test instruction.

1. AT COMMAND

XM-AT is RaymonIoT developed firmware for mass production in IOT application, aim to easy integrated into customer's products and cut down the R&D cost. It finishes the job of throughput data transfer between UART and network. XM-AT command can easily finish data sending and receiving via Wi-Fi or BLE. Parameter setting can also be done.

XM-AT provides different AT command for application such as Wi-Fi, TCP/IP, Bluetooth, MQTT, HTTP and Ethernet command.

Currently, X-C13SL,X-C13SG,X-C13SM,X-C15P these modules support XM-AT firmware.

1.1. UART Setting

1. After module power on, default is throughput mode, users input “+++” and “a” to change into AT Command mode via UART.
2. Recommend to use SecureCRT or UartAssist tools for AT Command test tools.
3. Default module UART parameters are following:

Serial Options

The port may be manually entered or selected from the list.

Port: COM11 USB 串行设备

Baud rate: 115200

Data bits: 8

Parity: None

Stop bits: 1

Name of pipe:

Flow control

☐ DTR/DSR

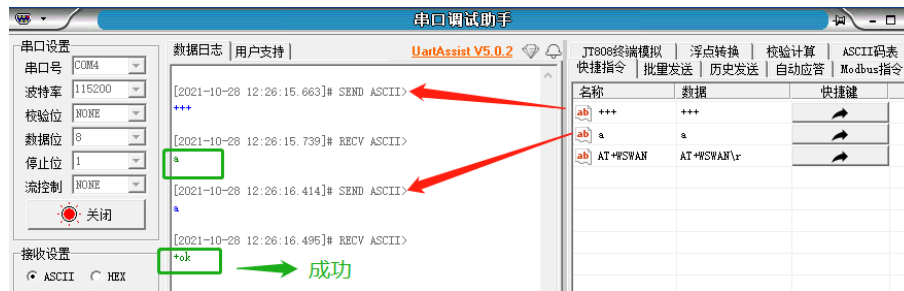
☐ RTS/CTS

☐ XON/XOFF

Serial break length: 100 milliseconds

1.2. Switch Throughput to AT Command Mode

UART send “+++” to module, it will response with “a”, then UART send “a” within 3 seconds. Module will response with “+ok” to indicate AT command mode. Following as example:



Throughput Mode---->AT Command Mode

Direction	UART Data	Notes
—>	+++	Send “+++” to module RXD PIN. Note: +++ is three bytes, \r\n(0x0d 0x0a) is not allowed.
<—	a	Module TXD output 1 byte “a” to acknowledge
—>	a	Send “a” to module RXD PIN. Note: a is one byte and should be input within 3 seconds after modules response with “a”
<—	+ok	Enter AT Command Mode, AT Command is allowed to be used.
—> indicate UART input, <— indicate module response		

1.3. Send AT Command in Throughput Mod

Use AT+CMDGD command to set special characters. Add these special prefix characters before AT Command is applicable to get AT command response in throughput mode. It saves the complexity of frequently switch between throughput and AT command mode.

For example: If set AT+CMDGD=XM (Default setting), send “XM” + “AT+WMODE=STA” + “\r” in throughput mode, the module won’t throughput this packet to network. It will direct execute this AT command and response with “+ok”.

1.3.1. AT Command Syntax Format

AT+Instruction protocol is based on the instruction of ASCII command style, the description of syntax format as follow.

- **Format Description**
- < >: Means the parts must be included
- []: Means the optional part

● Command Message

AT+<CMD>[op][para-1,para-2,para-3,para-4...]<CR>

- AT+: Prefix of command message;
- CMD: Command string;
- [op]: Symbol of command operator,
 - ◆ “=”: The command requires parameters input;
 - ◆ “NULL”: Query the current command parameters setting;
- [para-n]: Parameters input for setting if required;
- <CR>: “Enter” Key, it’s 0x0a or 0x0d in Hex;

● Notes:

<CR>, <LF> and <CRLF> are three different command ends. The HEX value of each is:

<CR>=0x0d, <LF>=0x0a, <CRLF>=0x0d 0x0a. Please pay attention to their differences especially when using different UART tools. Some tools will only send <CR>, some will send <CRLF> when input “Enter” key, so we suggest that:

- 1 · All command use HEX format;
- 2 · Choose a right UART tools, can control these end characters.

- **Response Message** +<RSP>[op] [para-1,para-2,para-3,para-4...]<CR><LF><CR><LF>
- +: Prefix of response message;
- RSP: Response string;
 - ◆ “ok”: Success
 - ◆ “ERR”: Failure
- [op]: =
- [para-n]: Parameters if query command or Error code when error happened;
- <CR>: HEX 0x0d;
- <LF>: HEX 0x0a;

● Error Code

Error Code	Description
-1	Invalid Command Format
-2	Invalid Command
-3	Invalid Operation Symbol

-4	Invalid Parameter
-5	Operation Not Permitted

1.3.2. AT Command Special Character

AT Commands format have special meaning for “,” and “\r\n”, if parameters use these characters, need to do format transform. Transform rules is using 【\\ + character Hex format】 , see following example

, : 0x2C

= : 0x3D

? : 0x3F

AT+WSSSID=DDDDD\\2C\\3D\\3FSSSS, the response will show the exact character.

```
AT+WSSSID=DDDDD\\2C\\3D\\3FSSSS
+ok

AT+WSSSID
+ok=DDDDD,=?SSSS
```

1.3.3. AT Command List

AT Command includes the following types:

- WIFI Basic Command
- WIFI System Command
- WIFI Restore to Factory Command
- WIFI Network Command
- EVNET Message
- BT Basic Command

1.3.3.1. AT+

Function: Null command, used for if module in AT command mode.

Format:

AT+<CR>

+ok<CR><LF><CR><LF>

If response with +ok, then module is in AT command mode.

1.3.3.2. AT+HELP

Function: HELP command.
Format:
AT+HELP<CR>
+ok=<command help><CR><LF><CR><LF>
Parameters:
command help: AT Command introduction.

1.3.3.3. AT+VER

Function: Query module software version information.
Format:
AT+VER<CR>
+ok=<ver><CR><LF><CR><LF>
Parameters:
ver: Module software version information.

1.3.3.4. AT+RST

Function: Reset module.
Format:
AT+RST<CR>

1.3.3.5. AT+ECHO

Function: Open/Close show back function.
Format:
Set Operation:
AT+ECHO=<status><CR>
+ok<CR><LF><CR><LF>
Parameters:
status: Echo status
on: Open Echo
off: Close Echo
module firstly switch from transparent transmission to configuration mode, show back status is open, input "AT+ECHO" to close show back function, input "AT+ECHO" again to open show back function, use AT+ECHO=on/off command to save the echo status.

1.3.3.6. AT+RESTORE

Function: Module restore to factory default setting
Format
AT+RESTORE<CR>
+ok=rebooting...<CR><LF><CR><LF>
When operate this command, module will restore to factory default setting and reboot.

1.3.3.7. AT+CMDGD

Function: Set/Query AT command prefix character for sending AT command in throughput mode. Setting is valid after reset.

Format:
Query Operation:
AT+CMDGD<CR>
+ok=<data><CR><LF><CR><LF>
Set Operation:
AT+CMDGD=<data><CR>
+ok<CR><LF><CR><LF>
Parameters:
data: default is 【XM】 , close this function when set to 【off】 , The maximum is 20 character length, once has been set, the AT command in transparent transmission mode function is enabled (AT+HELP are not supported). Do restore to factory operation to disable and clear the setting.

1.3.3.8. AT+RAM

Function: Query module RAM status.
Format:
Query Operation:
AT+RAM<CR>
+ok=<status><CR><LF><CR><LF>
Parameters:
staus: The remained RAM status, bytes. Ex: current_size: 126736

1.3.3.9. AT+FLASH

Function: Set/Query FLASH
Format:
Query Operation:
AT+FLASH<CR>
+ok=<value><CR><LF><CR><LF>
Set Operation:
AT+FLASH=<type,address[,range]><CR>
+ok[=result]<CR><LF><CR><LF>
Parameters:
value: flash type query
2MB(Int): SOC internal 2MB Flash
2MB(Ext): SOC external 2MB Flash
8MB(Ext): SOC external 8MB Flash
type:
R: Read
W: Write, Xmodem to transfer file.
C: MD5 check
address: flash address relative address, start from 0, 4K(0x1000) Hex format, the absolute flash address refer to following flash mapping table.
range: Range
R read operation, define the length of read, hex format, write 1000 for reading 1000 bytes content. Following is 96 bytes for example.
W operation leave it blank, the actual size is according to the file. max is user flash area(200KB).
C check operation, hex format, write 1000 to check 1000 bytes.
result:
Invalid: operation invalid.
md5: return md5 for C operation.

1.3.3.10. AT+WEL

Function: Set/Query boot welcome message

Format:

Query Operation:

AT+WEL<CR>

+ok=<message><CR><LF><CR><LF>

Set Operation:

AT+WEL=<message><CR>

+ok<CR><LF><CR><LF>

Parameters:

message: Bootup welcome message output, default is product type such as **【X-C13SL】**, if it is **【off】**, means this function be closed, max 10 bytes.

1.3.3.11. AT+EVENT

Function: Set/Query event notification function. Setting is valid after reset.

Format:

Query Operation:

AT+EVENT<CR>

+ok=<status><CR><LF><CR><LF>

Set Operation:

AT+EVENT=<status><CR>

+ok<CR><LF><CR><LF>

Parameters:

status: Enable/Disable event notification function.

off: Disable.

on: Enable event notification function, default value.

Meet with following Wi-Fi and BLE condition, module output UART data initatively

Event Notification Data	Condition
+EVENT=STA_CON	STATION connect success
+EVENT=STA_DISCON	STATION disconnect
+EVENT=STA_GOT_IP	DHCP got IP
+EVENT=SOCKA_CON	SOCKA connection success in TCP Server mode
+EVENT=SOCKA_DISCON	SOCKA disconnect in TCP Server mode
+EVENT=SOCKB_CON	SOCKB connection success in TCP Server mode
+EVENT=SOCKB_DISCON	SOCKB disconnect in TCP Server mode
+EVENT=BLE_CON	BLE connect success
+EVENT=BLE_DISCON	BLE disconnect

1.3.3.12. AT+FIND

Function: Set/Query WiFi Configuration Password, used for local network search.

Format:

Query Operation:

AT+FIND<CR>

+ok=<char><CR><LF><CR><LF>

Set Operation:

AT+FIND =<char><CR><LF><CR><LF>

Parameters:

Char: WiFi Configuration Password (within 20 characters), default:XM-LOCALUDPFIND.

1.3.3.13. AT+Q

Function: Quit AT command and switch to throughput mode.

Format:

AT+Q<CR>

+ok<CR><LF><CR><LF>

1.3.3.14. AT+MODE

Function: Set/Query module data transfer mode. Setting is valid after reset.

Format:

Query Operation:

AT+MODE<CR>

+ok=<mode><CR><LF><CR><LF>

Set Operation:

AT+MODE=<mode><CR>

+ok<CR><LF><CR><LF>

Parameters:

mode: data transfer mode, include:

throughput: throughput mode

cmd: command mode

1.3.3.15. AT+MID

Function: Query module ID information

Format:

AT+MID<CR>

+ok=<module_id><CR><LF><CR><LF>

Parameters:

module_id:

Default: X-C13SL

1.3.3.16. AT+WRMID

Function: Set module ID

Format:

Set Operation:

AT+WRMID=<wrmid><CR>

+ok<CR><LF><CR><LF>

Parameters:

wrmid: set module's ID, range within 20 characters.

1.3.3.17. AT+LOG

Function: Enable/Disable UART debug information.

Format:

Query Operation:

AT+ LOG<CR>

+ok=<debug_level,uart_num><CR>< LF><CR>< LF>

Set Operation:
 AT+ LOG =<debug_level,uart_num><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 debug_level: UART debug level value, only show these log which debug level same or higher then this setting.
 0: Disable debug information output.
 1~XX: Output internal UART debug information which is same or higher then this set value.
 uart_num: UART debug information output channel
 0: UART0
 1: UART1, uard rate 115200, with more system information output.

1.3.3.18. AT+FCLR

Function: Erase factory setting.
 Format:
 Query Operation:
 AT+FCLR<CR>
 +ok<CR><LF><CR><LF>

1.3.3.19. AT+FSET

Function: Copy User Parameters to Factory Default Parameters.
 Format:
 Query Operation:
 AT+FSET<CR>
 +ok=<status><CR><LF><CR><LF>
 Parameters:
 status: feedback operation status.

1.3.3.20. AT+UART

Function: Set/Query serial port parameters. Setting is valid after reset.
 Format:
 Query Operation:
 AT+UART[=uart_num]<CR>
 +ok=<baudrate,data_bits,stop_bit,parity,flowctrl><CR><LF><CR><LF>
 Set Operation:
 AT+UART=<baudrate,data_bits,stop_bit,parity,flowctrl>[,uart_num]<CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 uart_num: UART Channel, the default is UART0.
 0: UART0 Channel
 baudrate: baud rate
 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 380400, 460800, 921600
 data_bits: data bit 8
 stop_bits: stop bit 1
 parity:
 NONE
 EVEN
 ODD

flowctrl: CTSRTS
 NFC: No flow control
 FC: Flow control(Reserved)

1.3.3.21. AT+UARTBUF

Function: Set/Query the maximum Serial Port frame size
 Format:
 Query Operation:
 AT+UARTBUF<CR>
 +ok=<size><CR><LF><CR><LF>
 Set Operation:
 AT+UARTBUF=<size><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 size: Serial port maximum frame size, default **【1400】** bytes, range 32~1400

1.3.3.22. AT+UARTTM

Function: Set/Query the Two-Frame Time Interval When the Serial Port Receives Data
 Format:
 Query Operation:
 AT+UARTTM<CR>
 +ok=<interval><CR><LF><CR><LF>
 Set Operation:
 AT+UARTTM=<interval><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 interval: Serial port division interval, default **【20】** ms, range 10~1000ms

1.3.3.23. AT+WIFI

Function: Enable/Disable Wi-Fi Command
 Format:
 Query Operation:
 AT+WIFI<CR>
 +ok=<status><CR><LF><CR><LF>
 Set Operation:
 AT+WIFI=<status><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 staus: Wi-Fi status
 UP (boot default status): Enable Wi-Fi Chip
 DOWN: Disable Wi-Fi Chip, it will take several seconds (max 10) to disable the Wi-Fi, if response with +ERR=-5 means disable failed, usually it is already in disable status.
 Note: Use this command to make Wi-Fi AT command valid without reboot, Ex: AT+WIFI=DOWN, AT+WMODE=STA, AT+WIFI=UP, then module works as STA mode without reboot.

1.3.3.24. AT+WMODE

Function: Set/Query Wi-Fi work mode. Setting is valid after reset.

Format:
 Query Operation:
 AT+WMODE<CR>
 +ok=<mode><CR><LF><CR><LF>
 Set Operation:
 AT+WMODE=<mode><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 Mode: Wi-Fi work mode.
 AP
 STA
 AP+STA

1.3.3.25. AT+WSCAN

Function: Scan AP, max show 50 item.
 Format:
 Query Operation:
 AT+WSCAN<CR>
 +ok=<ap_site><CR><LF><CR><LF>
 Parameters:
 ap_site: AP searched..
 ap_ssid: search specific AP SSID

1.3.3.26. AT+CONFIGLINK

Function: Config/Query Smart config method.
 Format:
 Query Operation:
 AT+CONFIGLINK<CR>
 +ok=<status,[ap_prefix,ap_key]><CR>< LF><CR>< LF>
 Set Operation:
 AT+CONFIGLINK=<status,[ap_prefix,ap_key]><CR>
 +ok<CR>< LF><CR>< LF>
 Parameters:
 staus: Set Smart config mode function
 0(Default): Enable BLELINK config.
 Set reload pin (0.2s < "Low" < 1.5s) to trigger into this config mode
 1: Enable APLINK config
 Set reload pin (0.2s < "Low" < 1.5s) to trigger into this config mode.
 2: Enable BLELINK and APLINK config.
 Set reload pin (0.2s < "Low" < 1.5s) to trigger into BLELINK config mode, When in BLELINK config mode, set reload again to trigger into APLINK config mode. Repeat this cycle after set reload
 ap_prefix: APLINK module AP SSID, default is softap.
 ap_key: APLINK module AP password, blank for no password, password length 8~20.

1.3.3.27. AT+APLINK

Function: Start SmartAPLink function(Recommend to use this)
 Format:
 Set Operation:

AT + APLINK<CR>

+ok<CR>< LF><CR>< LF>

Note: Reboot to quit this APLINK config mode.

1.3.3.28. AT+BLELINK

Function: Start SmartBLELink function

Format:

Set Operation:

AT + BLELINK<CR>

+ok<CR>< LF><CR>< LF>

Note: Reboot to quit BLELINK config mode

1.3.3.29. AT+WMDCH

Function: Set Wi-Fi Auto Switch Function. Setting is valid after reset.

Format:

Query Operation:

AT+WMDCH<CR>

+ok=<mode><CR><LF><CR><LF>

Set Operation:

AT+WMDCH=<mode><CR><LF><CR><LF>

+ok<CR><LF><CR><LF>

Parameters:

mode: Wi-Fi Auto Switch Mode.

off: 关 Disable Wi-Fi auto switch. When response with auto, it is the same as off

on: Enable Wi-Fi auto switch. When the module (STA mode) fail to connect to router, it will switch to AP mode itself in one minute.

1.3.3.30. AT+WSMAC

Function: Set/Query Module STA MAC address parameters. Setting is valid after reset.

Format:

Query Operation:

AT+WSMAC<CR>

+ok=<mac_address><CR><LF><CR><LF>

Set Operation:

AT+WSMAC=<mac_address><CR>

+ok<CR><LF><CR><LF>

Parameters:

mac_address: module MAC address, such as 90EB48000C60

1.3.3.31. AT+WSSSID

Function: Set/Query Wi-Fi associated AP SSID parameters. Setting is valid after reset.

Format:

Query Operation:

AT+WSSSID<CR>

+ok=<ap's ssid><CR><LF><CR><LF>

Set Operation:

AT+WSSSID=<ap's ssid ><CR>

```
+ok<CR><LF><CR><LF>
Parameters:
ap's ssid: AP's SSID (Within 32 character).
```

1.3.3.32. AT+WSKEY

Function: Set/Query STA security parameters. Setting is valid after reset.

Format:

Query Operation:

```
AT+WSKEY<CR>
+ok=<auth, encry, key><CR><LF><CR><LF>
```

Set Operation:

```
AT+WSKEY=< auth, encry, key><CR>
+ok<CR><LF><CR><LF>
```

Parameters:

auth:

- OPEN
- SHARED
- WPAPSK
- WPA2PSK

encry:

- NONE: When "auth=OPEN", effective
- WEP-H: When "auth=OPEN" or "SHARED", effective, in HEX format
- WEP-A: When "auth=OPEN" or "SHARED", effective, in ASCII format
- TKIP: When "auth= WPAPSK" or "WPA2PSK", effective
- AES: When "auth= WPAPSK" "WPA2PSK", effective

key: password. When encry is WEP-H, password is in HEX format, password length is 10 or 26. When encry is WEP-A, password is in ASCII format, password length is 5 or 13. When encry is TKIP or AES, password is in ASCII code, password length shall be 8~63..

1.3.3.33. AT+WSLK

Function: Query STA WiFi link status.

Format:

Query Operation:

```
AT+WSLK<CR>
+ok=<ret><CR><LF><CR><LF>
```

Parameters:

ret

- "Disconnected", if no WiFi connection.
- "AP' SSID(AP's MAC"), if WiFi connection available;.

1.3.3.34. AT+WSLQ

Function: Query STA WiFi signal strength

Format:

Query Operation:

```
AT+WSLQ<CR>
+ok=<ret><CR><LF><CR><LF>
```

Parameters:

ret

"Disconnected", if no WiFi connection.
 "AP's WiFi signal strength", if WiFi connection available;

1.3.3.35. AT+WSLKO

Function: Query/Set STA WiFi connection order function.
 Format:
 Query Operation:
 AT+WSLKO<CR>
 +ok=<order><CR><LF><CR><LF>
 Set Operation:
 AT+WSLKO=<order><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 Order: order scheme. When there is much same name and password SSID, If enable this order function, module will connect to the strongest signal strength. If disabled, it will connect to the first response AP(may connect to the weaker AP). Enable this function will cost 2 more seconds more first connect time.
 Enable: Enable order function, connect the strongest signal strength AP
 Disable: Disable order function, default.

1.3.3.36. AT+WSWAN

Function: Set/Query STA network setting. Setting is valid after reset..
 Format:
 Query Operation:
 AT+WSWAN<CR>
 +ok=<mode,address,mask,gateway><CR><LF><CR><LF>
 Set Operation:
 AT+WSWAN=< mode,address,mask,gateway ><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 mode: STA's IP network setting
 static: Static IP
 DHCP: Dynamic IP
 address: STA IP.
 mask: STA subnet mask.
 gateway: STA gateway IP.

1.3.3.37. AT+WSDNS

Function: Set/Query STA static DNS server address.
 Format:
 Query Operation:
 AT+WSDNS<CR>
 +ok=<address><CR><LF><CR><LF>
 Set Operation:
 AT+WSDNS =<address><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 address: STA's DNS server address; Effective right away.

1.3.3.38. AT+WSPS

Function: Set/Query power save parameters.

Format:

Query Operation:

AT+WSPS<CR>

+ok=<ret><CR><LF><CR><LF>

Set Operation:

AT+WSPS=<mode[,time]><CR>

+ok<CR><LF><CR><LF>

Parameters:

ret:

Yes: Disable power save

Auto: Auto power save mode(default), enter power saving mode after receive or send data in time seconds

No: Enable power save

mode:

Yes: Disable power save

Auto: Auto power save mode(default), enter power saving mode after receive or send data in time seconds.

No: Enable power save

time: Only valid in auto mode, >=2 integer value, default is 3 seconds. when value is 0, the default waiting time is still 3 seconds.

1.3.3.39. AT+WAMAC

Function: Set/Query Module AP MAC address parameters.

Format:

Query Operation:

AT+WSMAC<CR>

+ok=<mac_address><CR><LF><CR><LF>

AP MAC is the same as STA

1.3.3.40. AT+WAP

Function: Set/Query AP Wi-Fi parameters. Max support 3 STA connection. Setting is valid after reset.

Format:

Query Operation:

AT+WAP<CR>

+ok=< wifi_mode,ssid,channel ><CR><LF><CR><LF>

Set Operation:

AT+WAP =<wifi_mode,ssid,channel ><CR>

+ok<CR><LF><CR><LF>

Parameters:

wifi_mode: Wi-Fi mode, include:

11B

11BG

11BGN (Default)

ssid: SSID at AP mode, the maximum length is 32..

channel: Wi-Fi channel : AUTO(Default CH1) or CH1~CH11.

1.3.3.41. AT+WAKEY

Function: Set/Query AP Wi-Fi security parameters. Setting is valid after reset.

Format:

Query Operation:

AT+WAKEY<CR>

+ok=<auth,encry,key><CR><LF><CR><LF>

Set Operation:

AT+WAKEY=< auth,encry,key><CR>

+ok<CR><LF><CR><LF>

Parameters:

auth:

OPEN, WPA2PSK

encry:

NONE: When "auth=OPEN" available;

AES: When "auth=WPA2PSK" available;.

key: security code, ASCII code, 8~63 bytes.

1.3.3.42. AT+WADHCP

Function: Set/Query AP DHCP server status; Setting is valid after reset

Format:

Query Operation:

AT+WADHCP<CR>

+ok=<status>,<ip1>,<ip2><CR><LF><CR><LF>

Set Operation:

AT+WADHCP=<status>[,ip1,ip2]<CR>

+ok<CR><LF><CR><LF>

Parameters:

status: AP's DHCP server function status:

on: DHCP Server open.

off: DHCP Server close

ip1: DHCP allocate IP start value

ip2: DHCP allocate IP end value

1.3.3.43. AT+WALK

Function: Query MAC address of STA device connecting to module AP.

Format:

Query Operation:

AT+WALK<CR>

+ok=<status><CR><LF><CR><LF>

Parameters:

status: MAC address of STA device connecting to module AP

No Connection: No STA device connecting to module AP;.

1.3.3.44. AT+WALKIND

Function: Enable/Disable indication of module AP connection status.

Format:

Query Operation:

AT+WALKIND<CR>
+ok=<status><CR><LF><CR><LF>
Set Operation:
AT+WALKIND=<status><CR>
+ok<CR><LF><CR><LF>
Parameters:
status: indication of module AP connection status
on: Enable nLink indication function. When STA device connecting to module AP, nLink output Low, otherwise output High.
off: Disable nLink indication function. (default mode).

1.3.3.45. AT+WAPMXSTA

Function: Set/Query max STA number supported for AP
Format:
Query Operation:
AT+WAPMXSTA<CR>
+ok=<num><CR><LF><CR><LF>
Set Operation:
AT+WAPMXSTA=<num><CR>
+ok<CR><LF><CR><LF>
Parameters:
num: max STA number supported for AP
1~3: Support max 1~3 STA devices connects to module AP. 3 is default value for max 3 STA device supported..

1.3.3.46. AT+WALAN

Function: Set/Query AP's network parameters. Setting is valid after reset.
Format:
Query Operation:
AT+WALAN<CR>
+ok=<ipaddress,mask><CR><LF><CR><LF>
Set Operation:
AT+WALAN=< ipaddress,mask><CR>
+ok<CR><LF><CR><LF>
Parameters:
ipaddress: AP's IP address.
mask: AP's net mask;

1.3.3.47. AT+PING

Function: Network "Ping" command
Format:
Set Operation:
AT+PING=<ip[,count,size]><CR>
+ok=<sta><CR><LF><CR><LF>
Parameters:
ip: ip address or domain name
count: Ping command execute count times. Default is 1, range 1~100.
size: Ping packet size. Default is 32 bytes, range <=1472

sta: feedback result

- Success
- Timeout
- Unknown host

1.3.3.48. AT+SOCKA

Function: Set/Query SOCKA network protocol parameters. Setting is valid immediately.

Format:

Query Operation:

AT+SOCKA<CR>

+ok=<protocol,CS,port,IP[,opt]><CR><LF><CR><LF>

Set Operation:

AT+SOCKA=<protocol[,CS,port,IP[,opt]]><CR>

+ok<CR><LF><CR><LF>

Parameters:

Protocol:

- TCP
- UDP
- HTTP
- MQTT
- ALI-IOT

CS: Network mode

- SERVER
- CLIENT

Port: : protocol port ID: Decimal digit and less than 65535

IP: Server's IP address or domain name when module set as client, domain name length length <= 100

If set as UDP SERVER, the module will save the IP address and port of the latest UDP packet received. The data will be sent to the saved IP address and port. If the module hasn't saved any IP address and port when power up. The data will be sent to the IP address and port which is set by this command

If set as UDP,CLIENT, the data will always be sent to the IP address and port set by this command.

Param: TLS

Example:

AT+SOCKA=TCP,CLIENT,8899,192.168.1.1

AT+SOCKA=TCP,CLIENT,80,www.baidu.com

Support HTTP, TSL:

AT+SOCKA=HTTP,80,www.baidu.com

AT+SOCKA=MQTT,80,www.baidu.com

AT+SOCKA=ALI-IOT

AT+SOCKA=http,443,getman.cn,NULL,TLS

AT+SOCKA=TCP,client,8899,192.168.1.1,TLS

AT+SOCKA=TCP,client,443,getman.cn,TLS

1.3.3.49. AT+SOCKAIDEN

Function: Set/query whether display from which communication channel the data comes from, and the setting will take effect after reset.

Format:

Query Operation:

AT+SOCKAIDEN=<id><CR>

+ok=<id,status><CR><LF><CR><LF>

Set Operation:
 AT+SOCKAIDEN=<id,status><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 id: Communication channel number, including the following parameters..
 A: SOCKA
 B: SOCKB
 status: Status values, including the following parameters.
 on: Enable.
 off: Close, default **【off】** .
 Under enabled status, increase the communication channel number tag value in the received data header, such as receiving data **【abc】** , and the actual serial port output **【#SOCKA#abc】** .
 Under serial port transmission mode, user must increase the communication channel number tag value in the header, so that the data will only be sent to the specified channel. For example, you need to send data **【abc】** to the SOCKA channel, and the actual serial port needs to send **【#SOCKA#abc】** .
 Under disabling mode, the data output by the serial port does not distinguish the communication channel number, and the data received by the serial port is sent to all communication channels pointing to the serial port number.

1.3.3.50. AT+SOCKAID

Function: Set/query the communication channel number tag value.
 Format:
 Query Operation:
 AT+SOCKAID=<id><CR>
 +ok=<id,value><CR><LF><CR><LF>
 Set Operation:
 AT+SOCKAID=<id,value><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 id: Communication channel number, including the following parameters..
 A: SOCKA
 B: SOCKB
 value: Communication channel number mark, SOCKA default **【#SOCKA#】** , SOCKB default **【#SOCKB#】** , up to 10 characters.

1.3.3.51. AT+SOCKASERMAX

Function: Set/ Query SOCKA TCP Client connection number.
 Format:
 Query Operation:
 AT+SOCKASERMAX<CR>
 +ok=<num><CR><LF><CR><LF>
 Set Operation:
 AT+SOCKASERMAX=<num><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 num: TCP Client connection number. Range: 1~5. 5 is the default value it means when the module work in TCP server , it accepts max 5 TCP client connect to it.

1.3.3.52. AT+SOCKALK

Function: Query if SOCKA TCP link already build-up.

Format:

AT+SOCKALK<CR>

+ok=<sta><CR><LF><CR><LF>

Parameters:

sta.: if module already setup TCP link

on: TCP link setup;

off: TCP link not setup;

1.3.3.53. AT+SOCKATO

Function: Set/Query SOCKA TCP timeout; Setting is valid after reset.

Format:

Query Operation:

AT+SOCKATO<CR>

+ok=<time><CR><LF><CR><LF>

Set Operation:

AT+SOCKATO=<time><CR>

+ok<CR><LF><CR><LF>

Parameters:

Time: TCP timeout time.

<= 600: 600s

>=0: (0 means no timeout);

Default: 300s

Module begin to count time when TCP channel don't receive any data, clecherar time counter when TCP channel receive any data. If the time counter reaches the TCPTO, the tcp channel will be break. If the module work in TCP Client, it will connect the TCP server instantly and when the module work in TCP Server, the TCP client device should make the connection itself.

1.3.3.54. AT+SOCKADIS

Function: Open/Close SOCKA TCP client link.

Format:

Query Operation

AT+SOCKADIS<CR>

+ok=<sta><CR><LF><CR><LF>

Set Operation:

AT+SOCKADIS =<sta[,opt]><CR>

+ok<CR><LF><CR><LF>

Parameters:

sta.: Response with TCP client connection setting status

on, Allow TCP client connection, default value

off, Forbidden or break TCP Client connection

opt: function code, save to flash or not, option parameter. if not fill in, default is 0

0: setting not saved to flash

1: setting saved to flash,

When setting, "off" means close TCP client link. After finish this command, module disconnect TCP link and not connect again. "On" means open TCP link. After finish this command, module re-connect TCP server right away.

If set opt to 0, the setting won't saved to flash, module AT+SOCKADIS is on by default, if set opt to 1,

setting saved to flash.

1.3.3.55. AT+SOCKASEND

Function: Send Data to SOCKA at Command Mode

Format:

AT+SOCKASEND=<data_lenth><CR>

+ok<CR><LF><CR><LF>

Parameters:

data_lenth: Lenth of send data. Range: 0~1000 Byte

The UART port will wait 3 seconds for input after this command is sent OK. The data received from UART port is sent to SOCKA. If the interval of two bytes is more than 10ms, the data will be sent instantly.

1.3.3.56. AT+SOCKARECV

Function: Receive Data from SOCKA at Command Mode

Format:

AT+SOCKARECV=<data_lenth><CR>

+ok=< data_lenth, data_content><CR><LF><CR><LF>

Parameters:

data_lenth: Lenth of receive data. Range: 0~1000 Byte

data_content: contents of receive data..

If not receive any data in 3 second, then feedback +ok=0.

1.3.3.57. AT+SOCKB

Function: Set/Query SOCKB parameters. Setting is valid immediately.

Format:

Query Operation:

AT+SOCKB<CR>

+ok=<protocol,port,IP><CR><LF><CR><LF>

Set Operation:

AT+SOCKB=<protocol,port,IP><CR>

+ok<CR><LF><CR><LF>

Parameters:

Protocol: Protocol type:

TCP: TCP client

UDP: UDP client

UDPS: UDP server

Port: Protocol Port in decimal, less than 65535

IP: Destination IP address or domain name, domain name length length <= 100

If set as UDP SERVER, the module will save the IP address and port of the latest UDP packet received. The data will be sent to the saved IP address and port. If the module hasn't saved any IP address and port when power up. The data will be sent to the IP address and port which is set by this command.

If set as UDP,CLIENT, the data will always be sent to the IP address and port set by this command.

1.3.3.58. AT+SOCKBDIS

Function: Open/Close SOCKB TCP client link.

Format:

Query Operation:

AT+SOCKADISB<CR>
+ok=<sta><CR><LF><CR><LF>
Set Operation:
AT+SOCKADISB=<sta[,opt]><CR>
+ok<CR><LF><CR><LF>
Parameters:
sta: Response with SOCKB TCP client connection setting status,
on, Allow TCP client connection, default value
off, Forbidden or break TCP Client connection
opt: function code, save to flash or not, option parameter. if not fill in, default is 0..
0: setting not saved to flash
1: setting saved to flash
When setting, "off" means close TCP client link. After finish this command, module disconnect TCP link and not connect again. "On" means open TCP link. After finish this command, module re-connect TCP server right away.
If set opt to 0, the setting won't saved to flash, module AT+SOCKADISB is on by default, if set opt to 1, setting saved to flash, AT+TCPDISB status depends on previous setting

1.3.3.59. AT+SOCKBTO

Function: Set/Query Operation SOCKB TCP timeout. Setting is valid after reset.
Format:
Query Operation:
AT+SOCKATOB<CR>
+ok=<time><CR><LF><CR><LF>
Set Operation:
AT+SOCKATOB=<time ><CR>
+ok<CR><LF><CR><LF>
Parameters:
Time: TCP timeout.
<= 600: 600s
>=0: 0 means no timeout
Default: 300s
If the SOCKB TCP don't receive any data from TCP server for TCP tmeout setting, the module will break and reconnect the TCP server. If it receive data from server, the timeout counter will be clear.

1.3.3.60. AT+SOCKBLK

Function: Query SOCKB connection status.
Format:
AT+SOCKALKB<CR>
+ok=<sta><CR><LF><CR><LF>
Parameters:
sta.: SOCKB connection status
on: TCP connected
off: TCP disconnected

1.3.3.61. AT+SOCKBSEND

Function: Send datas to SOCKB at Command Mode
Format:
AT+SOCKBSEND=<data_lenth><CR>

```
+ok<CR><LF><CR><LF>
```

Parameters:

data_lenth: Lenth of send data. Range: 0~1000 Byte

The UART port will wait 3 seconds for input after this command is sent OK. The data received from UART port is sent to SOCKB. If the interval of two bytes is more than 10ms, the data will be sent instantly.

1.3.3.62. AT+SOCKBREC V

Function: Receive datas from SOCKB at Command Mode

Format:

```
AT+SOCKBREC V=<data_lenth><CR>
```

```
+ok=< data_lenth, data_content><CR><LF><CR><LF>
```

Parameters:

data_lenth: Lenth of receive data. Range: 0~1000 Byte

data_content: contents of receive data

If not receive any data in 3 second, then feedback +ok=0.

1.3.3.63. AT+UDPPORT

Function: Set/Query UDP local port of SOCKA and SOCKB

Format:

Query Operation:

```
AT+UDPPORT<CR>
```

```
+ok=<porta,portb><CR><LF><CR><LF>
```

Set Operation:

```
AT+UDPPORT=<porta,portb><CR>
```

```
+ok<CR><LF><CR><LF>
```

Parameters:

porta: UDP local port of SOCKA, 0: do not fix local UDP port.

portb: UDP local port of SOCKB, 0: do not fix local UDP port..

1.3.3.64. AT+NREGEN

Function: Set/Query Communication Channel Number Registration Package Function.

Format:

Query Operation:

```
AT+NREGEN=<id><CR>
```

```
+ok=<id,status><CR><LF><CR><LF>
```

Set Operation:

```
AT+NREGEN=<id,status><CR>
```

```
+ok<CR><LF><CR><LF>
```

Parameters:

id: Communication channel number, including the following parameters..

A: SOCKA

B: SOCKB

status: Status value, including the following parameter..

on: Enable

off: Close, default **【off】**

1.3.3.65. AT+NREGDT

Function: Set/query communication channel number registration package function

Format:

Query Operation:

```
AT+NREGDT=<id><CR>
+ok=<id,value><CR><LF><CR><LF>
```

Set Operation:

```
AT+NREGDT=<id,value><CR>
+ok<CR><LF><CR><LF>
```

Parameters:

id: Communication channel number, including the following parameters.

A: SOCKA

B: SOCKB

data: Custom data, up to 40bytes, % wildcard has special function, as an escape character, Use % to send data in HEX format(Ex. %25), it also support special strings as following.

%MAC: MAC address, ASCII format, Ex: D0D900428073

%WSLQ: Wi-Fi status, 2 bytes, the first for Wi-Fi status(1: Connect router OK, 0: Not connect to router), the second for Wi-Fi signal strength, HEX format, Ex: 01 16

There are several ways to match custom data, such as:

The contents of the registration package are ASCII code 【ABCDEFGH】

```
AT+NREGDT=A,ABCDEFGH
```

The contents of the registration package are hexadecimal 【0x01 0x02 0x03 0x04 0x05】

```
AT+NREGDT=A,%01%02%03%04%05
```

The content of the registration package is MAC+ data 【370895123431 0x00 0x01 0x02 0x03】

```
AT+NREGDT=A,%MAC%00%01%02%03
```

1.3.3.66. AT+NREGSND

Function: Set/Query the Transmission Method of the Communication Channel Number Registration Package

Format:

Query Operation:

```
AT+NREGSND=<id><CR>
+ok=<id,type><CR><LF><CR><LF>
```

Set Operation:

```
AT+NREGSND=<id,type><CR>
+ok<CR><LF><CR><LF>
```

Parameters:

id: Communication channel number, including the following parameters.

A: SOCKA

B: SOCKB

type: Sending method, including

link: Send when the connection is established, default 【link】

data: The registration packet as the header of each packet of data

both: Support both methods at the same time

1.3.3.67. AT+HEART

Function: Set/query communication channel number heartbeat packet data

Format:

Query Operation:

AT+HEART=<id><CR>
+ok=<id,time,value><CR><LF><CR><LF>
Set Operation:
AT+HEART=<id,time,value><CR>
+ok<CR><LF><CR><LF>
Parameters:
id: channel number, send heartbeat packets to a specific channel, including the following parameters.
A: SOCKA
B: SOCKB
1: UART
time: Heartbeat interval, default **【0】** seconds, stands for disable heartbeat function, range 0~65535, this time is valid after reboot.
value: Custom data, up to 38 bytes, support escape characters, please refer to AT+NREGDT command for details. When SOCKA is used for MQTT, this content is of no use.

1.3.3.68. AT+HTPTP

Function: Set/query SOCKA HTTP request type. Setting will take effect after reset
Format:
Query Operation:
AT+HTPTP<CR>
+ok=<type,method><CR>< LF><CR>< LF>
Set Operation:
AT+HTPTP=<type[,method]><CR>
+ok<CR>< LF><CR>< LF>
Parameters:
type: HTTP request type
GET: GET
POST: POST
method: HTTP data method, optional value, if not fill, default is 0 only POST request valid.
0: Default value, received UART data is put in HTTP body.
1: received UART data is put in HTTP url parameters, auto add “?” between url and parameters(UART received data)

1.3.3.69. AT+HTPURL

Function: Set/query SOCKA HTTP url resources and version. Setting will take effect after reset
Format:
Query Operation:
AT+HTPURL<CR>
+ok=<path,version><CR>< LF><CR>< LF>
Set Operation:
AT+HTPURL=<path,version><CR>
+ok<CR>< LF><CR>< LF>
Parameters:
path: url resource, 50 characters length maximum, default: /abcd
version: HTTP protocol version, 1.0 or 1.1 default: 1.1

1.3.3.70. AT+HTPHEAD

Function: Set/query SOCKA HTTP header. Setting will take effect after reset

Format:
 Query Operation:
 AT+HTPHEAD<CR>
 +ok=<header><CR>< LF><CR>< LF>
 Set Operation:
 AT+HTPHEAD=<header><CR>
 +ok<CR>< LF><CR>< LF>
 Parameters:
 heade HTTP header, for new line in header use "<CRLF><CRLF>". 180 characters maximum

```
AT+HTPHEAD=Host:1.1.1.1<CRLF><CRLF>
+ok
```

1.3.3.71. AT+MQTOPIC

Function: Set/query SOCKA MQTT topic content. Setting will take effect after reset
 Format:
 Query Operation:
 AT+MQTOPIC<CR>
 +ok=<publish,subscribe><CR>< LF><CR>< LF>
 Set Operation:
 AT+MQTOPIC=<publish,subscribe[,opt]><CR>
 +ok<CR>< LF><CR>< LF>
 Parameters:
 publish: publish topic, default: %MAC/up, %MAC is module MAC address, show real MAC when query.
 Max 60 characters.
 subscribe: subscribe topic, default: %MAC/down, max 60 characters
 opt: option parameter, default is saved to flash if not fill in this
 0: Not save to flash, used for scene that change topic frequently.
 1: Save to flash.

1.3.3.72. AT+MQLOGIN

Function: Set/query SOCKA MQTT login content. Setting will take effect after reset
 Format:
 Query Operation:
 AT+MQLOGIN<CR>
 +ok=<user,password><CR>< LF><CR>< LF>
 Set Operation:
 AT+MQLOGIN=<user,password><CR>
 +ok<CR>< LF><CR>< LF>
 Parameters:
 user: login user, max 32 characters
 password: login password, max 32 characters

1.3.3.73. AT+MQPARA

Function: Set/query SOCKA MQTT parameters. Setting will take effect after reset
 Format:
 Query Operation:
 AT+MQPARA<CR>

```
+ok=<heartbeat,QoS><CR>< LF><CR>< LF>
```

Set Operation:

```
AT+MQPARAE=<heartbeat,QoS><CR>
```

```
+ok<CR>< LF><CR>< LF>
```

Parameters:

heartbeat: MQTT heartbeat time, default is 60, range 0~300

QoS: MQTT QoS, default is 0, range 0,1,2

1.3.3.74. AT+MQID

Function: Set/query SOCKA MQTT login content. Setting will take effect after reset

Format:

Query Operation:

```
AT+MQID<CR>
```

```
+ok=<id><CR>< LF><CR>< LF>
```

Set Operation:

```
AT+MQID=<id><CR>
```

```
+ok<CR>< LF><CR>< LF>
```

Parameters:

id: Client ID, must be different for each device, recommend to use MAC for this Client ID, max 32 characters. Support %MAC for setting, show real MAC when query.

1.3.3.75. AT+UPGRADE

Function: Set/ Query remote upgrade URL address

Format:

Query Operation:

```
AT+UPGRADE<CR>
```

```
+ok=<url><CR><LF><CR><LF>
```

设置

```
AT+UPGRADE =<url><CR>
```

```
+ok=<result><CR><LF><CR><LF>
```

Parameters:

url: The upgrade file url address; the last charter shall be "/" (within 20 characters).

result: the download operation result.

Download failed: Url is error or file is not valid.

Update success: Need reboot to run new the download new firmware.

1.3.3.76. AT+WEBLANG

Function: Set/Query webpage language option

Format:

Query Operation:

```
AT+WEBLANG<CR>
```

```
+ok=<language><CR><LF><CR><LF>
```

Set Operation:

```
AT+WEBLANG =<language><CR>
```

```
+ok<CR><LF><CR><LF>
```

Parameters:

language:

CN: Chinese, Default

1.3.3.77. AT+WEBUSER

Function: Set/ Query webpage user name and password; Setting is valid after reset

Format:

Query Operation:

AT+WEBUSER<CR>

+ok=<username,password><CR><LF><CR><LF>

Set Operation:

AT+WEBUSER =<username, password><CR>

+ok<CR><LF><CR><LF>

Parameters:

username: User Name, within 15 characters, not support empty.

password: password, within 15 characters, not support empty.

1.3.3.78. AT+NTPRF

Function: Set /Query time calibration interval

Format:

Query Operation:

AT+NTPRF<CR>

+ok=<num><CR><LF><CR><LF>

Set Operation:

AT+NTPRF=<num><CR>

+ok<CR><LF><CR><LF>

Parameters:

num: time calibration interval, range:0~720, default:30 minutes, 10 minutes for each step, set 0 means no time calibration automatically.

1.3.3.79. AT+NTPEN

Function: Enable/Disable time calibration function. Setting is valid after reset.

Format:

Query Operation:

AT+NTPEN<CR>

+ok=<status><CR><LF><CR><LF>

Set Operation:

AT+NTPEN=<status><CR>

+ok<CR><LF><CR><LF>

Parameters:

status: status of time calibration

on: Turn on NTP function.

off: Turn off NTP function

1.3.3.80. AT+NTPTM

Function: Query network time, time zone is GMT+8 by default

Format:

Query Operation:

AT+NTPTM<CR>

```
+ok=<time><CR><LF><CR><LF>
```

Parameters:

time: network time, for example: 2013-10-9 16:10:42 Wed, if it shows Not Available means that the time calibration function is not enabled or the module doesn't connect to the internet..

1.3.3.81. AT+NTPSER

Function: Set/Query NTP server IP address.

Format:

Query Operation:

```
AT+NTPSER<CR>
```

```
+ok=<ipaddress><CR><LF><CR><LF>
```

Set Operation:

```
AT+NTPSER=< ipaddress ><CR>
```

```
+ok<CR><LF><CR><LF>
```

Parameters:

ipaddress: NTP network server IP address, cn.ntp.org.cn (default value).

1.3.3.82. AT+BLE

Function: Config/Query BLE UART throughput function

Format:

Query Operation:

```
AT+BLE<CR>
```

```
+ok=<status><CR><LF><CR><LF>
```

Set Operation

```
AT+BLE=<status[,opt]><CR>
```

```
+ok<CR><LF><CR><LF>
```

Parameters:

status: Enable/Disable BLE UART throughput function

on: Enable.

off: Disable, default

opt: function code, save to flash or not, option parameter. if not fill in, default is 1

0: setting not saved to flash

1: setting saved to flash

1.3.3.83. AT+BLENAM

Function: Config/Query BLE broadcast name, valid after reboot.

Format:

Query Operation:

```
AT+BLENAM<CR>
```

```
+ok=<name1,name2><CR><LF><CR><LF>
```

Set Operation:

```
AT+BLENAM=<name1,name2><CR>
```

```
+ok<CR><LF><CR><LF>
```

Parameters:

Name1: BLELINK config mode BLE name default XM, 26 characters max.

Name2: Normal working BLE name, default is X-C13SL, 26 characters max.

1.3.3.84. AT+BLESVCUUID

Function: Config/Query BLE notification UUID.

Format:

Query Operation:

AT+BLESVCUUID<CR>

+ok=<uuid><CR>< LF><CR>< LF>

Set Operation:

AT+BLESVCUUID=<uuid><CR>

+ok<CR>< LF><CR>< LF>

Parameters:

uuid: BLE notification UUID

Default value

AT+BLESVCUUID

+ok=0000FEE700001000800000805F9B34FB

1.3.3.85. AT+BLENTFUUIIDR

Function: Config/Query BLE notification Receive UUID.

Format:

Query Operation:

AT+BLENTFUUIIDR<CR>

+ok=<uuid><CR>< LF><CR>< LF>

Set Operation:

AT+BLENTFUUIIDR=<uuid><CR>

+ok<CR>< LF><CR>< LF>

Parameters:

uuid: BLE notification receive UUID

Default value

AT+BLENTFUUIIDR

+ok=0000FEC800001000800000805F9B34FB

1.3.3.86. AT+BLENTFUUIIDW

Function: Config/Query BLE notification Write UUID.

Format:

Query Operation:

AT+BLENTFUUIIDR<CR>

+ok=<uuid><CR>< LF><CR>< LF>

Set Operation:

AT+BLENTFUUIIDR=<uuid><CR>

+ok<CR>< LF><CR>< LF>

Parameters:

uuid: BLE notification write UUID

Default value:

AT+BLENTFUUIIDW

+ok=0000FEC700001000800000805F9B34FB

1.3.3.87. AT+BLEINDUUIIDR

Function: Config/Query BLE indication Receive UUID.

Format:
Query Operation:
AT+BLEINDUUIR<CR>
+ok=<uuid><CR>< LF><CR>< LF>
Set Operation:
AT+BLEINDUUIR=<uuid><CR>
+ok<CR>< LF><CR>< LF>
Parameters:
uuid: BLE indication receiveUUID
Default value
AT+BLEINDUUIR
+ok=0000FED600001000800000805F9B34FB

1.3.3.88. AT+BLEINDUUIRW

Function: Config/Query BLE indication Write UUID.
Format:
Query Operation:
AT+BLEINDUUIRW<CR>
+ok=<uuid><CR>< LF><CR>< LF>
Set Operation:
AT+BLEINDUUIRW=<uuid><CR>
+ok<CR>< LF><CR>< LF>
Parameters:
uuid: BLE indication write UUID
Default value:
AT+BLEINDUUIRW
+ok=0000FED500001000800000805F9B34FB

1.3.3.89. AT+BLECON

Function: Config/Query BLE connection parameters.
Format:
Query Operation:
AT+BLECON<CR>
+ok=<value><CR>< LF><CR>< LF>
Set Operation:
AT+BLECON=<value><CR>
+ok<CR>< LF><CR>< LF>
Parameters:
value: IntervalMin+IntervalMax+Slave Latency+connSupervision Timeout, Format: AAAABBBBCDDDD, Default 值 0016003200200
IntervalMin: Connection minimum interval, AAAA position decimal value. 0016 x 1.25ms=20ms, minimum is 0016, that is 20ms
IntervalMax: Connection maximum interval, BBBB position decimal value. 0032 x 1.25ms=40ms, max 0800, that is 1000ms.
connSupervision timeout: Connection time out, DDDD position decimal value, actual timeout of 0200 is 0200 x 10ms=2000ms.

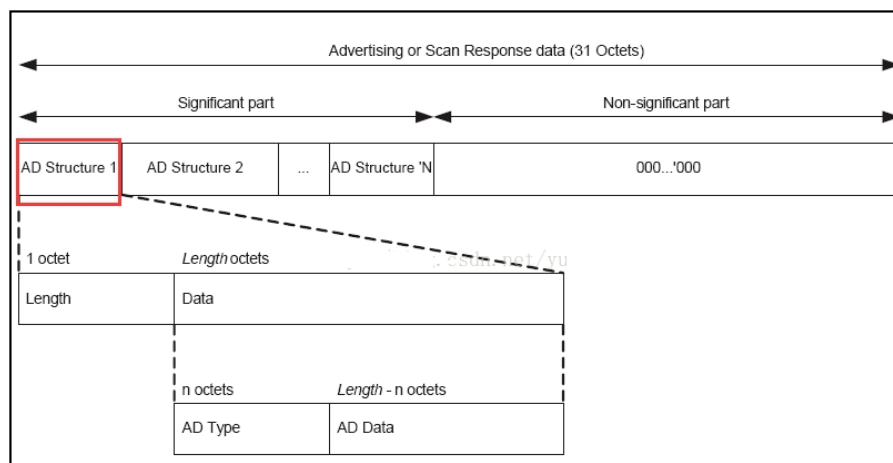
1.3.3.90. AT+BLEADP

Function: Config/Query BLE advertising parameters

Format:
 Query Operation:
 AT+BLEADP<CR>
 +ok=<value><CR><LF><CR><LF>
 Set Operation:
 AT+BLEADP=<value><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 value: IntervalMin+IntervalMax+Type+Channel, Format: AAAABBBBCD, Default 值 0768128007
 IntervalMin: advertising minimum interval, AAAA position decimal value, 0768 x 0.625ms=480ms,
 IntervalMax: advertising maximum interval, BBBB position decimal value, 1280 x 0.625ms=800ms
 Type: 0 or 1, 0 for public, 1 for random
 Channel: advertising channel, 3bit hex value, bit0 for channel37, bit1 for channel38, bit2 for channel39,
 value 7 is using all channel (37, 38 and 39).

1.3.3.91. AT+BLEADV

Function: Config/Query BLE advertising content
 Format:
 Query Operation:
 AT+BLEADV<CR>
 +ok=<value><CR><LF><CR><LF>
 Set Operation:
 AT+BLEADV=<value><CR>
 +ok<CR><LF><CR><LF>
 Parameters:
 value: advertising content, maximum is 14 bytes together with BLE name, hex format, content must obey the standard BLE protocol



1.3.3.92. AT+RFTESTSIGNAL

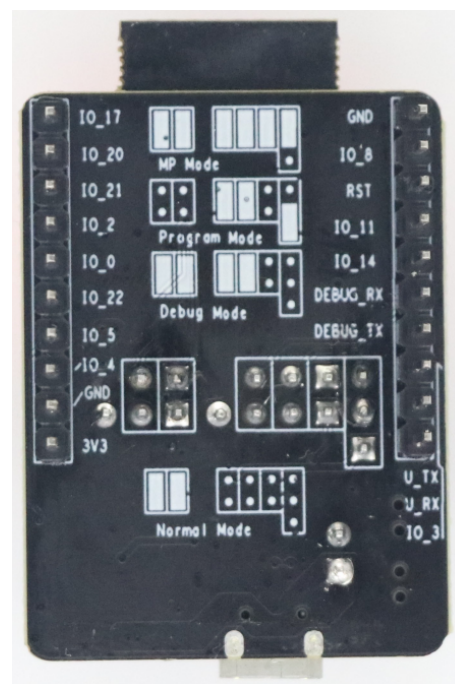
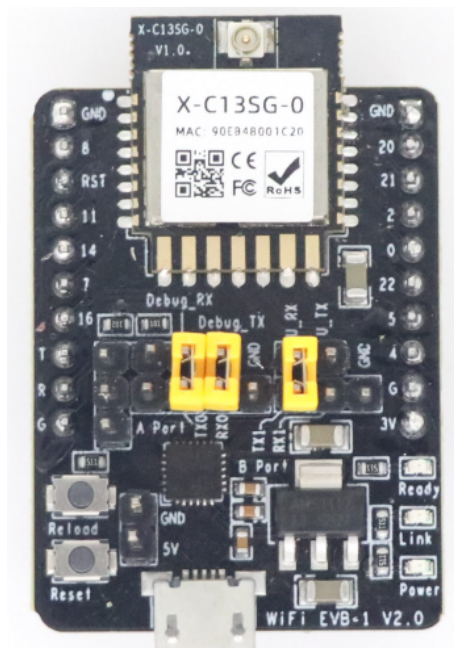
Function: Production test mode, scanning specified AP signal
 Format:
 Set Operation:
 AT+RFTESTSIGNAL=<ap_site,ret><CR>
 +ok=<status><CR><LF><CR><LF>
 Parameters:

```
ap_site: AP searched..
ret: AP's WiFi signal strength
status: pass,Fail
```

2. X-C13SX SERIES EVK

Connect DATA_UART to PC via USB cable. Install CH340B driver.

- Mass Produced Mode
- Program Mode
- Normal Mode
- Debug Mode



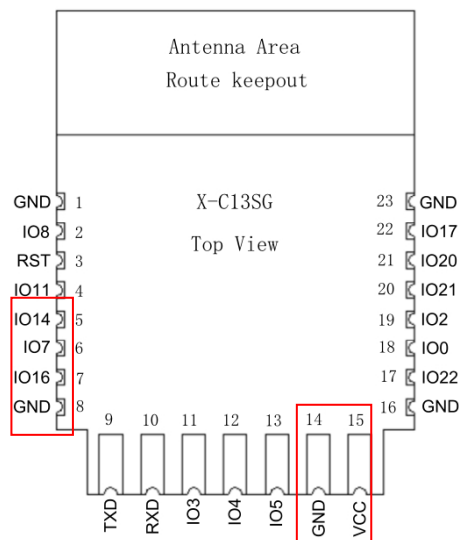
Function	Name	Description
Interface	TXD/RXD	Communication UART0
	Debug_TX/Debug_RX	Debug UART1, used for output log
	Power	5VDC Input
LED	Power	Power LED
	Ready	Boot LED
	Link	Link status LED
Button	Reload	Trigger config or restore to factory setting(connect to GND for more than 4 seconds)
	Reset	Reboot button

3. DEBUG AND PROGRAM

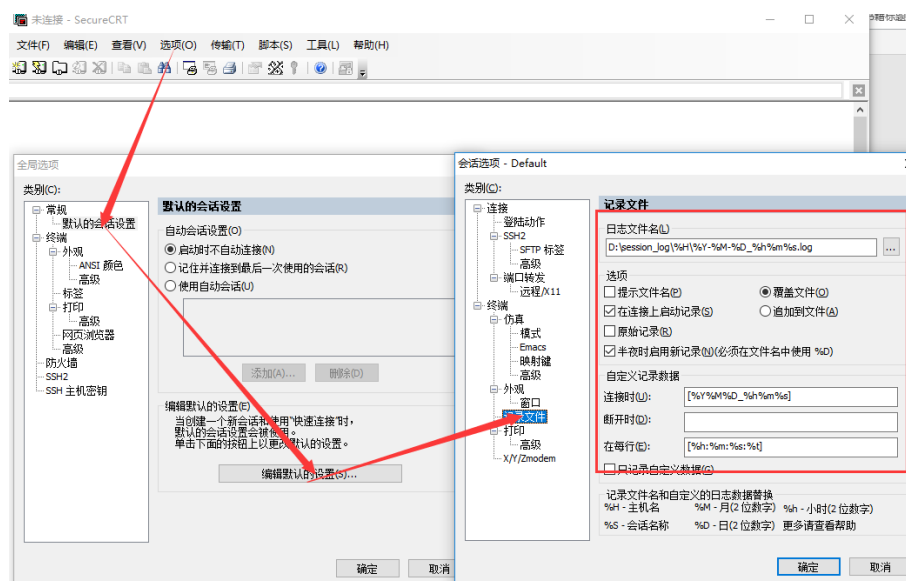
3.1. Enable Debug Log

Open SecureCRT(baud rate 115200), refer to previous chapter to enter AT command mode, and input "AT+LOG=1,1" to enable Debug UART to output log, "AT+LOG=0" to close log output.

Module Debug UART pin is as following, use USB to TTL board to connect module GND, debug_TX(IO16), UART1_RX(IO7)(Refer to module manual for detailed debug UART Pin).



Follow the following picture to enable secureCRT tools file log function.

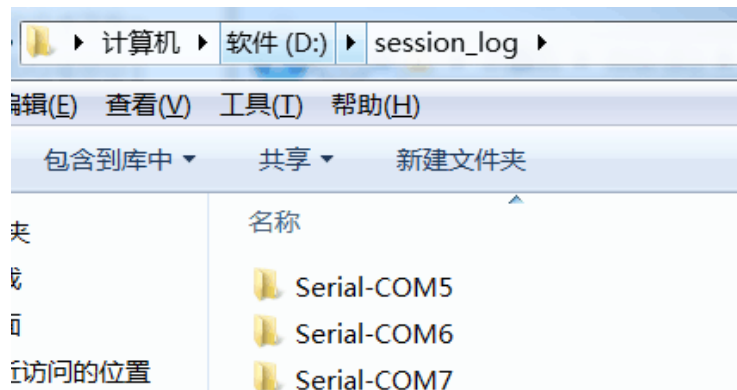


D:\session_log\%H\%Y-%M-%D_%h%m%s.log

[%Y%M%D_%h%m%s]

[%h:%m:%s:%t]

Any UART print will be auto saved in files.



3.2. Webpage Upgrade

- Use module external webpage to upgrade firmware, need manual reboot to run new firmware when webpage show upgrade success.



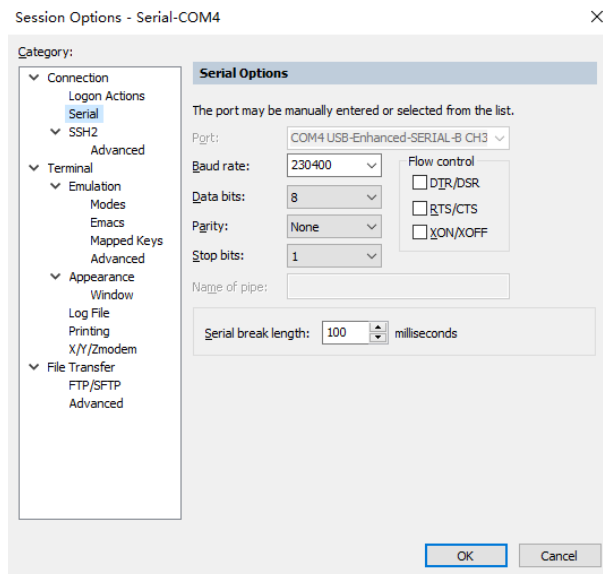
- User Internal webpage to upgrade."http://192.168.1.254/hide", this is for upgrade firmware or external webpage. For external webpage customize, please contact us. .



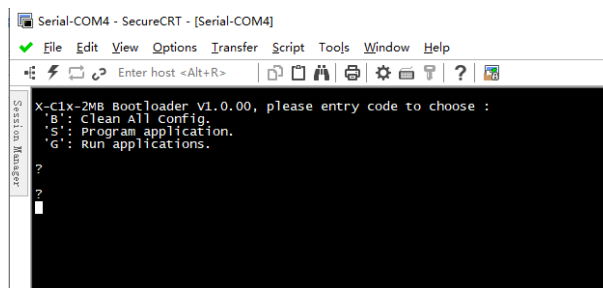
3.3. UART Upgrade

- Module on module, connect PC UART to X-C1x TXD/RXD;

- Open SecureCRT, connect PC COM, baud rate set to 230400,8,1,None. Deselect RTS/CTS;

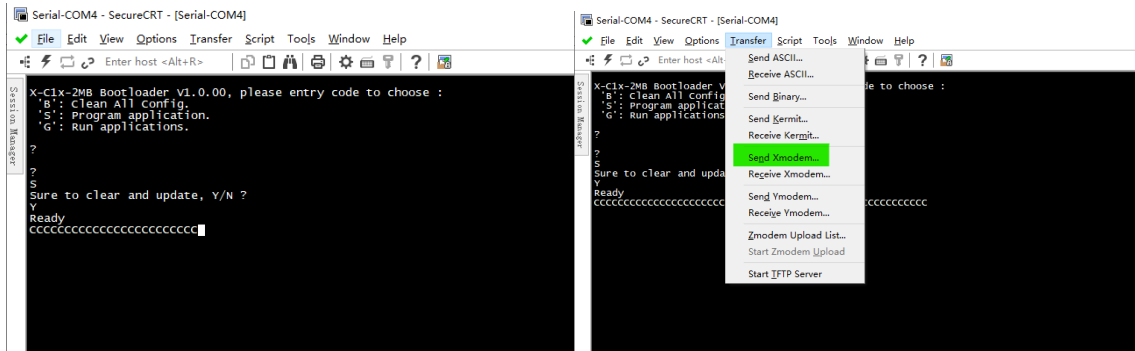


- Press down and hold X-C1x EVK Reload button(IO3), click Reset button(or any other reboot operation), and then press the keyboard space button to enter the serial port bootloader interface.It will show X-C1x-2MB Bootloader UI.

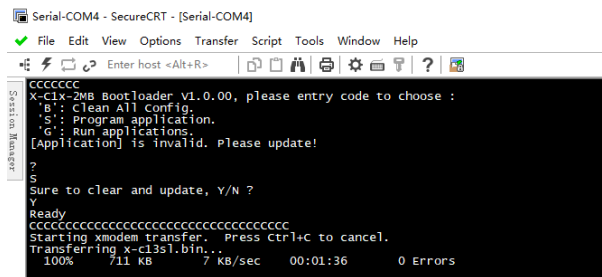


Note:

- ✧ 命令'B': Clear all setting parameters, including factory parameters
 - ✧ 命令'S': Upgrade the application firmware
 - ✧ 命令'G': Execute the application frmware
- Enter the command 'S' to upgrade the application, the screen displays Ready, wait for the character 'C' to appear, select the file to be upgraded using Xmodem, and upgrade the file example:



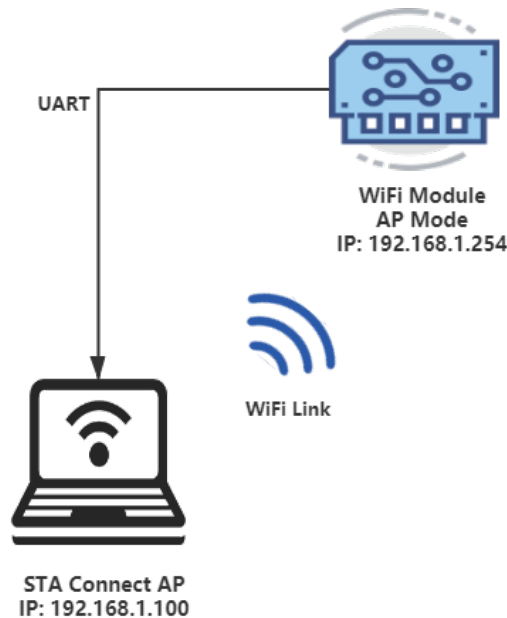
- secureCRT tools will show the upgrade process..



4. TEST CASE

4.1. Throughput Transmission of UART and Wi-Fi Module in AP Mode

The test topology is as follows:



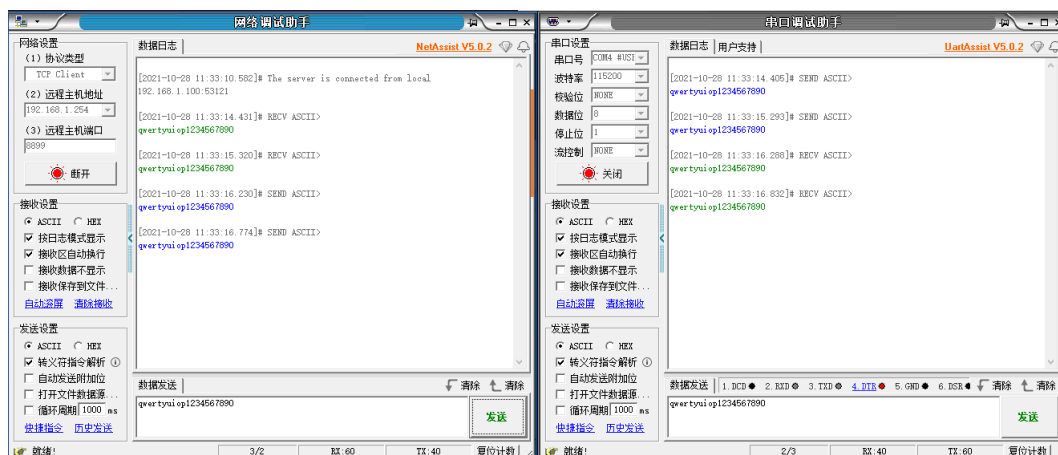
- ▶ After power-on, the Power light is on, the Ready light is on, and the module is working properly.
- ▶ After the computer Wi-Fi searches for the AP hot spot of this device, it connects.



- ▶ Open NetAssist, create a TCP client, fill in the module's IP address and TCP information (AP IP: 192.168.1.254, TCP Server, 8899 port, use AT+WALAN, AT+SOCKA to change these default parameters), click 【Connect】 establish connection..

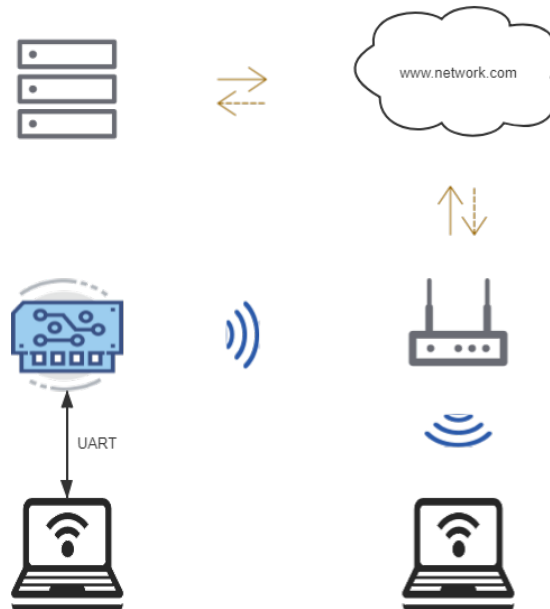


► The bi-direction data throughput transmission is shown below.



4.2. Throughput Transmission of UART and Wi-Fi Module in STA Mode

The test topology is as follows:



First, you need to configure the module to connect to the router. The module supports multiple ways to configure the connection router:

- BLELINK BLE config, Support both APP and WeChat.
 - APLINK AP config. Support both APP and WeChat.
 - **UART AT command**
- Refer to the following AT command to config module STA pramters. After “AT+RST” reboot command, it will connect to Router.

```
AT+WMODE=STA
+ok

AT+WSSSID=mm
+ok

AT+WSKEY=WPA2PSK,AES,buzhidaoo.**a;;
+ok
```

- Check router connecting status.

```
X-C13SLa+ok

AT+WANN
+ok=DHCP,192.168.0.105,255.255.255.0,192.168.0.1

AT+WSLQ
+ok=Good, 88%

AT+WSLK
+ok=mm(74:05:A5:4F:13:97)
```

- **Webpage Config**

- ▶ PC Wi-Fi connect to module AP, input 192.168.1.254, and input login information(admin,admin)

- ▶ Search the AP information and choose one, fill in the password and click Save button.

无线接入点参数设置

网络名称 (SSID) *注意区分大小写: mm 搜索

加密方式: WPA2PSK 加密算法: AES

密码: *****

网络参数设置

自动获得IP地址: Enable

IP地址: 0.0.0.0 子网掩码: 0.0.0.0

网关地址: 0.0.0.0 DNS服务器地址: 192.168.1.254

保存

- ▶ Mode set to STA. and then reboot module

模式设置

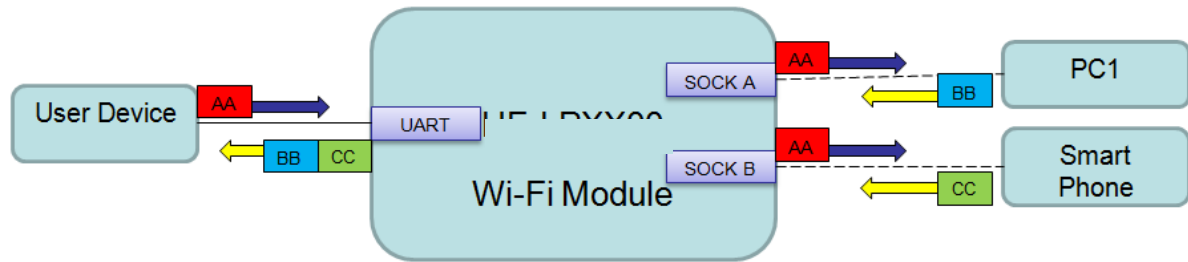
模式选择: STA 模式

保存

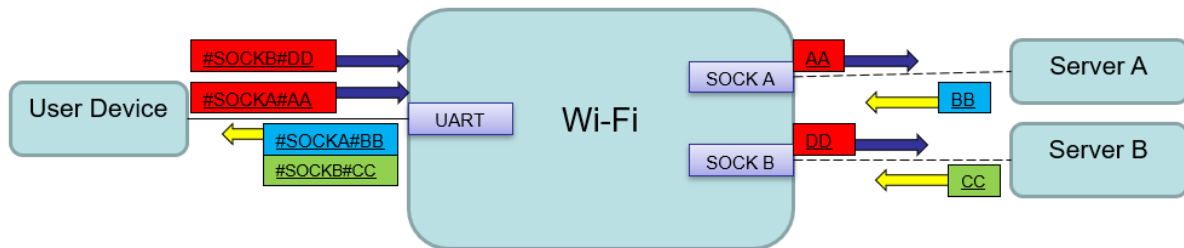
4.3. Double SOCKET Communication

X-C13SX support double socket communication.

- ▶ AT+SOCKA=TCP,SERVER,8899,192.168.1.254
- ▶ AT+SOCKB=UDP,9999,192.168.2.254
- ▶ AT+RST



Use AT+SOCKAIDEN, AT+SOCKAID command to distinguish the data packet.



4.4. Multi-TCP Connection for TCP Server

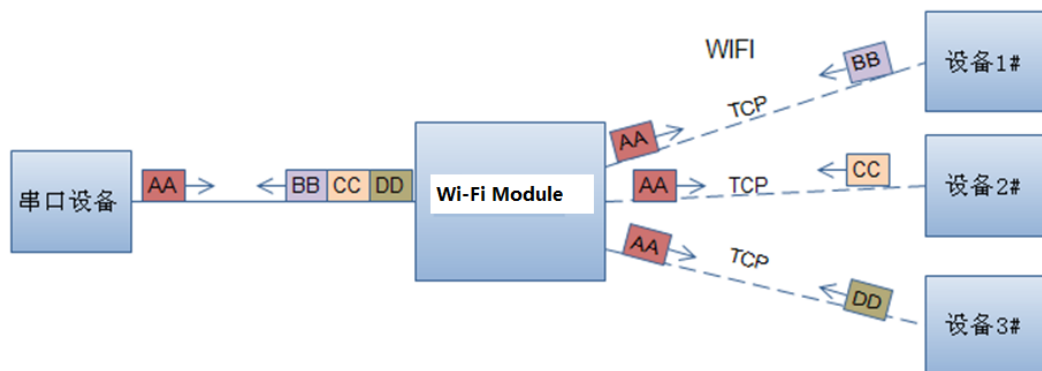
Module SOCK A configured as TCP Server, it supports Multi-TCP link connection, and maximum 5 TCP clients permitted to connect it.

Multi-TCP link connection will work as following structure:

Upstream: All dates from different TCP connection or client will be transmitted to the serial port as a sequence.

Downstream: All data from serial port (user) will be replicate and broadcast to every TCP connection or client.

Detailed multi-TCP link data transmission structure as following figure:



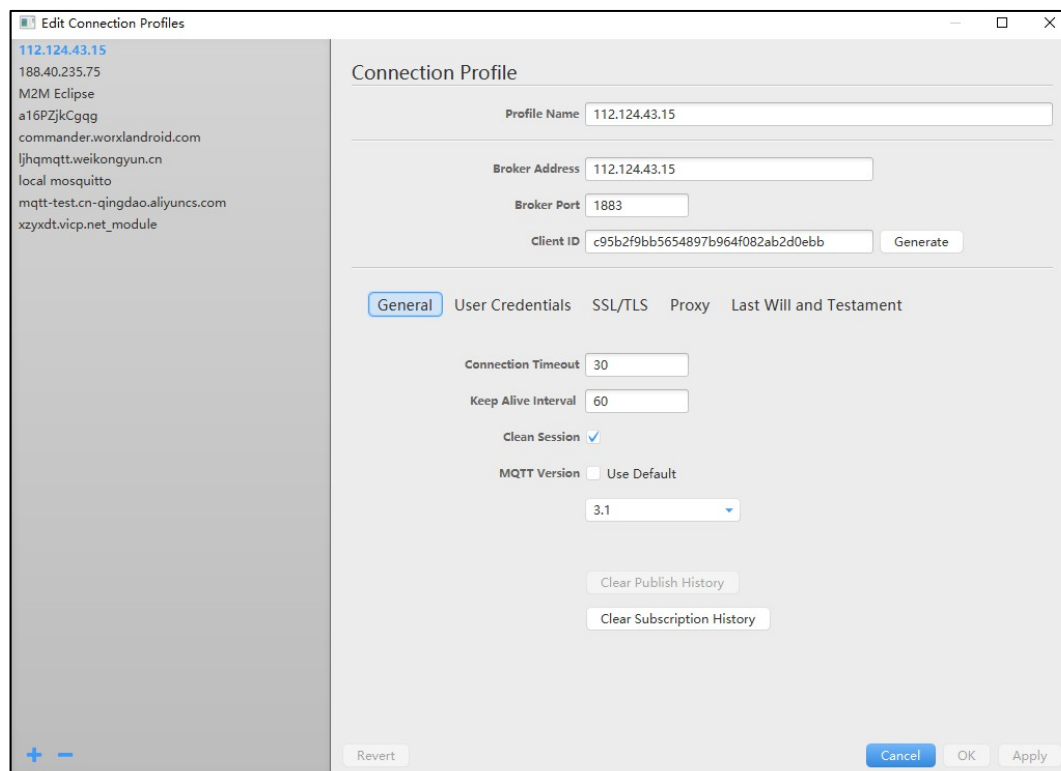
4.5. MQTT Transmission in STA Mode

The configuration module is connected to the router, and the MQTT server, the theme, and the like are configured, MQTT test server: 112.124.43.15, port: 1883.

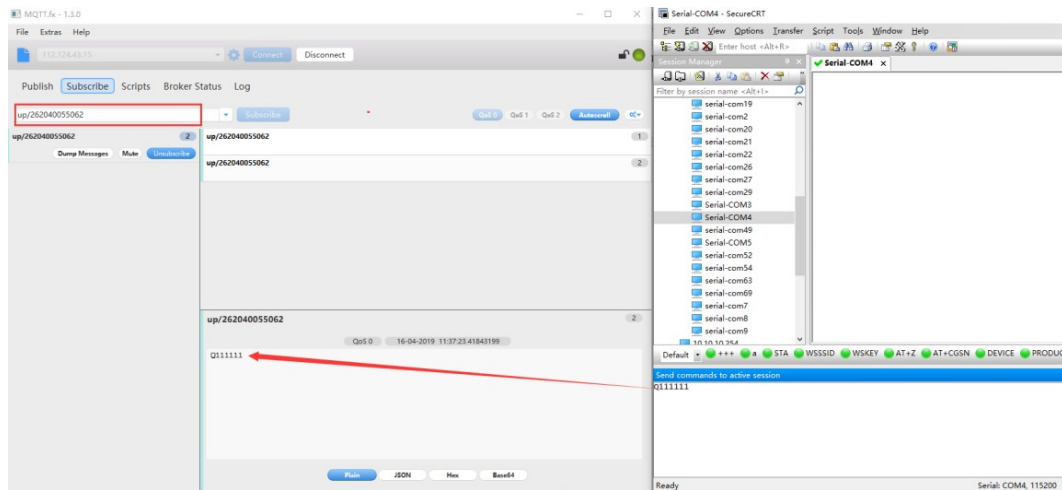
AT+SOCKA=MQTT,1883,112.124.43.15, first set the MQTT server information and then set other topics, etc. The default parameters are as shown below. After the configuration is completed AT+RST or RESET button to reboot module.

- ▶ AT+SOCKA=MQTT,1883,112.124.43.15
- ▶ AT+MQTOPIC
- ▶ AT+MQLOGIN
- ▶ AT+MQID

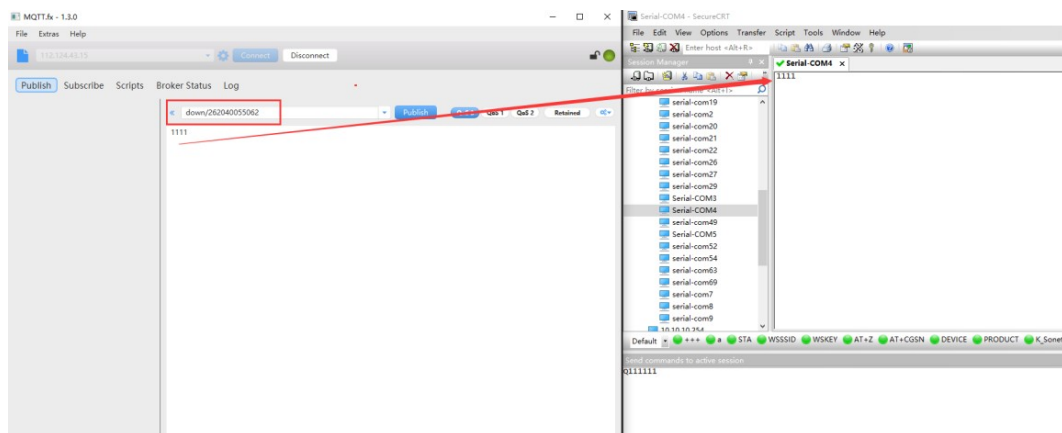
1. Open the MQTTfx tool and fill in the server address information as well.



2. Fill in the **subscription topic** in the MQTTFX software, and keep the same theme as the device-side **publishing topic**. Open the serial port tool (SecureCRT or other serial port tools are available), send data, and see the data packets sent from the device in the tool subscription.

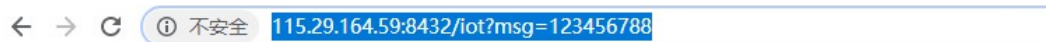


- The tool fills in the corresponding publishing topic (consistent with the subscription topic filled in by the device), and the sent data can be output through the serial port of the device.



4.6. HTTP Transmission in STA Mode

The browser accesses <http://115.29.164.59:8432/iot?msg=123456788>:



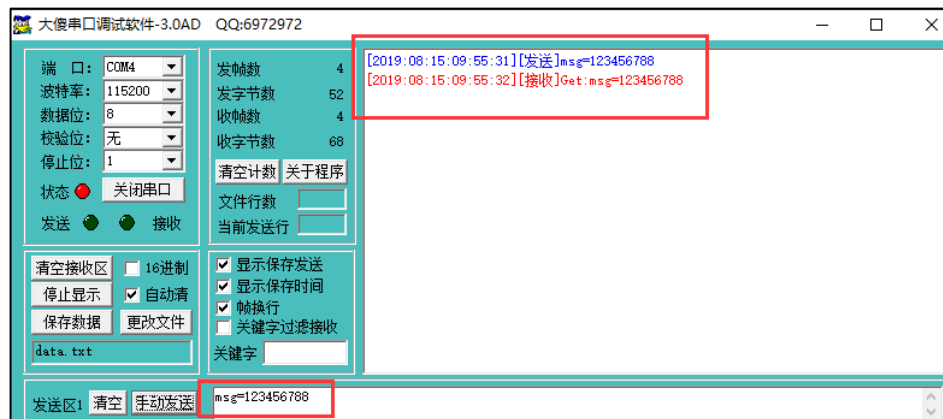
Get:msg=123456788

Fill in the HTTP server parameters as follows

- ▶ AT+SOCKA=HTTP,8432,115.29.164.59
- ▶ AT+HTPTP=GET
- ▶ AT+HTPURL=/iot,1.1
- ▶ AT+HTPHEAD=Host:115.29.164.59106:8432<CRLF><CRLF>

After the setting is completed, restart, wait for the serial port output SOCKA EVENT status to indicate the

connection is successful. Then The serial port sends a parameter request, and you can see the data replied by the server



4.7. TCP RAW HTTP PACKET TRANSFER

Module support http data transfer, but there is also another more general method via send HTTP raw packet via TCP.

1. Configure HTTP server information.
 - ▶ AT+SOCKA=TCP,CLIENT,80,HTTP_IP
2. Configure module connecting to router AP and reboot.
 - ▶ AT+WMODE=STA
 - ▶ AT+WSSSID="AP_NAME"
 - ▶ AT+WSKEY=WPA2PSK,AES,"KEY"
 - ▶ AT+RST
3. Sending HTTP raw data via UART, end the data with<CR><LF><CR><LF>.

GET /URL HTTP/1.1

Host: IP:80

Connection: keep-alive

4.8. Heartbeat Package, Registration Package

Configure the enable heartbeat packet and the registration packet function as shown below (for details of the heartbeat packet and registration package, see the AT Command Chapter). The corresponding

configuration AT command is as follows.

▶ AT+HEART=A,10,%MAC_ // Enable the heartbeat packet function and report the module's actual MAC once every 10 second

▶ AT+NREGSND=A,link // Send the registration package only when connected

▶ AT+NREGEN=A,on // Enable the registration package function

▶ AT+NREGDT=A,%MAC! //Content is MAC address and “!”.

Example:

Register content: FFFFFFFFA+MAC+0F

AT+NREGDT should be set as: %FF%FF%FF%FF%FA%MAC%0F

The exact content will be: FF FF FF FF FA 38 36 38 35 37 35 30 32 36 36 31 34 0F

5. MODULE BLE THROUGHPUT

5.1. BLE Data Transfer(IOS)

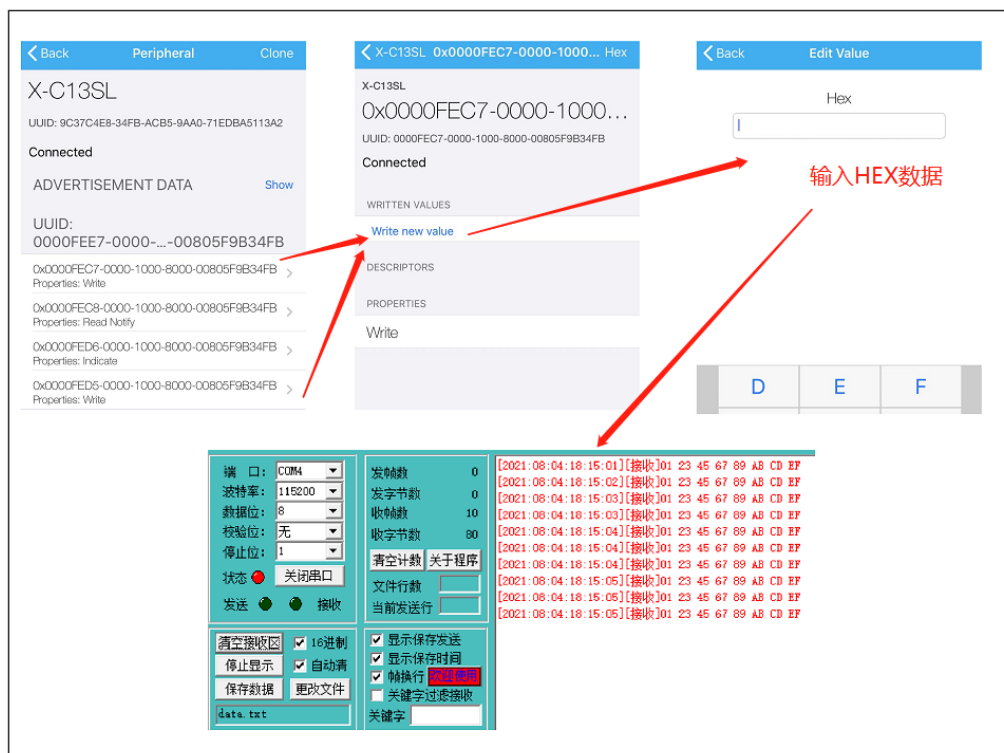
IOS download LightBlue in APP store 【LightBlue】.

- Android download BLE Utility or other BLE test APP.



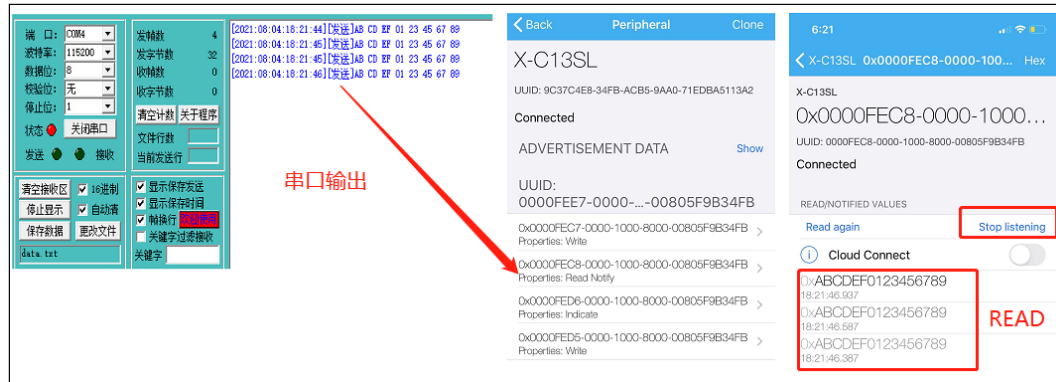
- Config module with 【AT+BLE=on】 and reboot, enable BLE throughput function.
- Open BLE APP and choose to connect X-C13SL.

Click the following FEC7(notification write UUID) or FED5(indication write UUID) to send APP data to module.



When read packet, click read UUID:FEC8(notification read channel) or UUID:FED6 (indication read channel) , enable both notification and indication read channel.

The received UART packet will be sent to both FEC8(notification read) and FED6(indication read). So the logs show two packets.



Notes:

- 1 · Use AT+BLENAME command to change default BLE throughput name.
- 2 · APP update MTU to 240, The received UART bytes of one frame should not exceed this MTU..
- 3 · Module should be throughput mode, if in AT command mode, packets will all be process as AT command.
- 4 · If need to change the BLE name and UUID, use the following command, parameters will be valid after reboot:

```
AT+BLENAME=X-C13SL           // modify BLE name
AT+BLESVCUUID                // BLE notification service UUID
Default: 0000FEE700001000800000805F9B34FB
AT+BLENTFUUIIDR              // BLE notification read UUID
Default: 0000FEC800001000800000805F9B34FB
AT+BLENTFUUIIDW              // BLE notification write UID
Default: 0000FEC700001000800000805F9B34FB
AT+BLEINDUUIIDR              // BLE indication read UUID
Default: 0000FED600001000800000805F9B34FB
AT+BLEINDUUIIDW              // BLE indication write UUID
Default: 0000FED500001000800000805F9B34FB
```

Indication: slave(module) sends packet to master(phone), master need to confirm, so packet won't lost

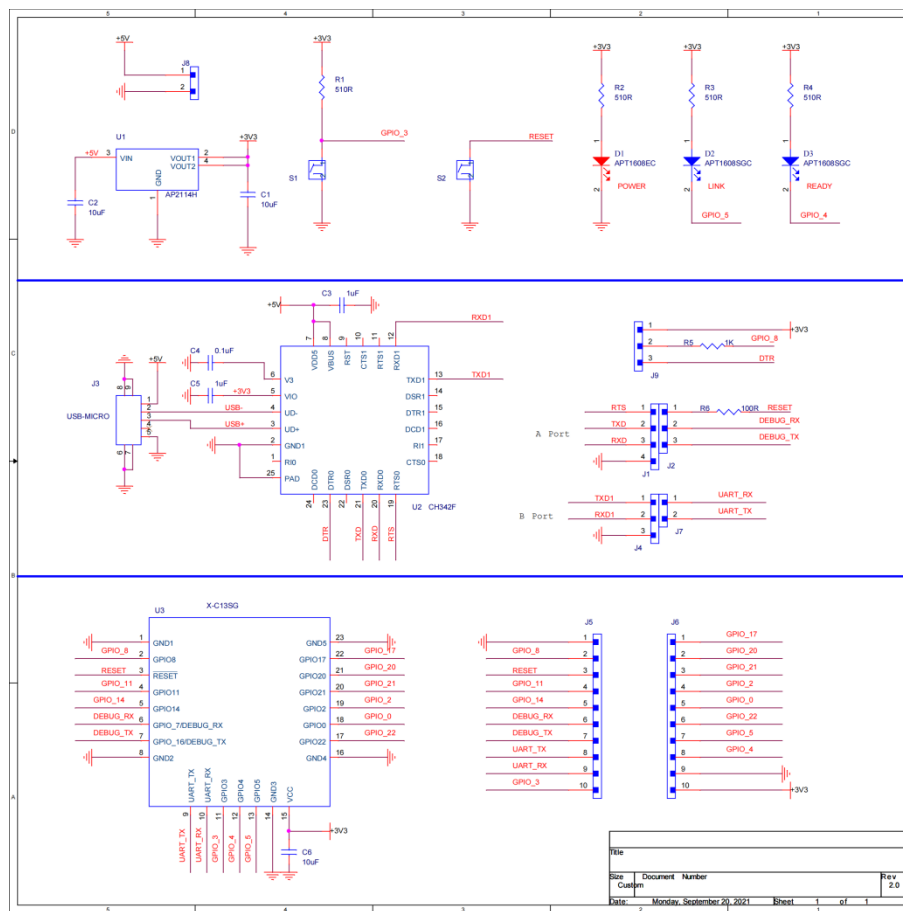
Notification: slave(module) sends packet to master(phone), master don't need confirm, packet may be lost..

6. MODULE PIN DESCRIPTION

GPIO	SDIO	FLASH	SPI	I2C	UART	PWM	ADC		X-C13SL	X-C13SG	X-C13SM
IO0	CLK	D1	MISO	SCL	SIG0	CH0			√	√	√
IO1	CMD	D2	MOSI	SDA	SIG1	CH1			√	UART_RX	√
IO2	DAT0	D3	SS	SCL	SIG2	CH2			√	√	
IO3	DAT1	D4	SCLK	SDA	SIG3	CH3			Reload	Reload	Reload
IO4	DAT2		MISO	SCL	SIG4	CH4			Ready	Ready	Ready
IO5	DAT3		MOSI	SDA	SIG5	CH0			Link	Link	Link
IO6			SS	SCL	SIG6	CH1					
IO7			SCLK	SDA	SIG7	CH2			UART_RX	DEBUG_RX	UART_RX
IO8			MISO	SCL	SIG0	CH3			√	√	√
IO9			MOSI	SDA	SIG1	CH4					
IO10			SS	SCL	SIG2	CH0					
IO11			SCLK	SDA	SIG3	CH1			DEBUG_RX	√	DEBUG_RX
IO12			MISO	SCL	SIG4	CH2			√	UART_TX	√
IO13			MOSI	SDA	SIG5	CH3					
IO14			SS	SCL	SIG6	CH4			√	√	√
IO15			SCLK	SDA	SIG7	CH0					
IO16			MISO	SCL	SIG0	CH1			UART_TX	DEBUG_TX	UART_TX
IO17		D3	MOSI	SDA	SIG1	CH2			DEBUG_TX	√	DEBUG_TX
IO18		D2	SS	SCL	SIG2	CH3					
IO19		D1	SCLK	SDA	SIG3	CH4					
IO20		D0	MISO	SCL	SIG4	CH0			√	√	
IO21		CS	MOSI	SDA	SIG5	CH1			√	√	√
IO22		CLK_OUT	SS	SCL	SIG6	CH2			√	√	

7. MODULE HARDWARE REFERENCE

Module EVK is as following.

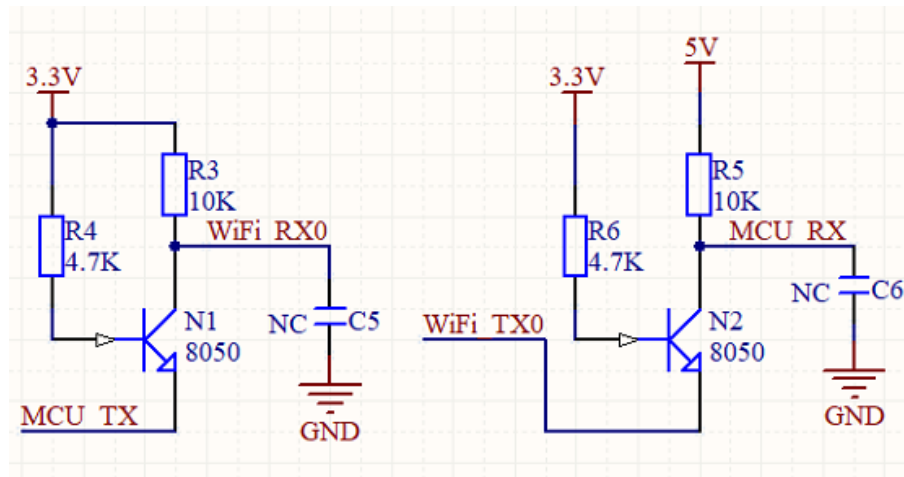


- Link- (Optional, usually for debug) Module Wi-Fi, mass upgrade and config status indication. Signal Output. When module connects to AP (AP associated), this pin will output "0". This signal used to judge if module already at WiFi connection status. There is pull-up resistor internal and no external pull-up required. If nLink function not required, can leave this pin open.
- Ready- (Optional, usually for debug) Module boot status indication. Signal output. The module will output "0" after normal boot up. This signal used to judge if module finish bootup and ready for application or working at normal mode. If nReady function not required, can leave this pin open.
- Reload- (Recommend to use, important function), It is used for restore to factory setting, mass upgrade, config Wi-Fi. Signal input, active low, can be connected to external MCU. User can de-assert nReload signal "0" more than 4s through button or MCU pin, then release, module will restore to factory default configuration and re-start boot up process. If nReload function not required, can leave this pin open.
- UART_TX/RX(Essential)- UART port data transmit and receive signal.

7.1. UART TTL Voltage Transform

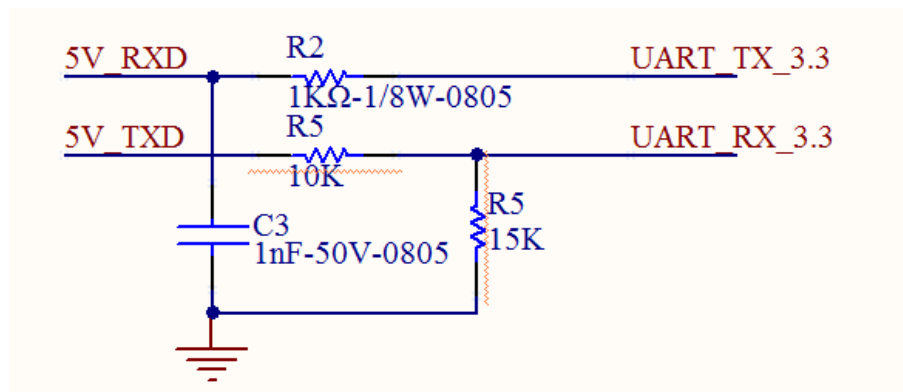
7.2. Transistor Transform (Recommend)

If the RX pin of the user equipment considers 3.3V to be high, it can be directly connected. No need of the Transform circuit.



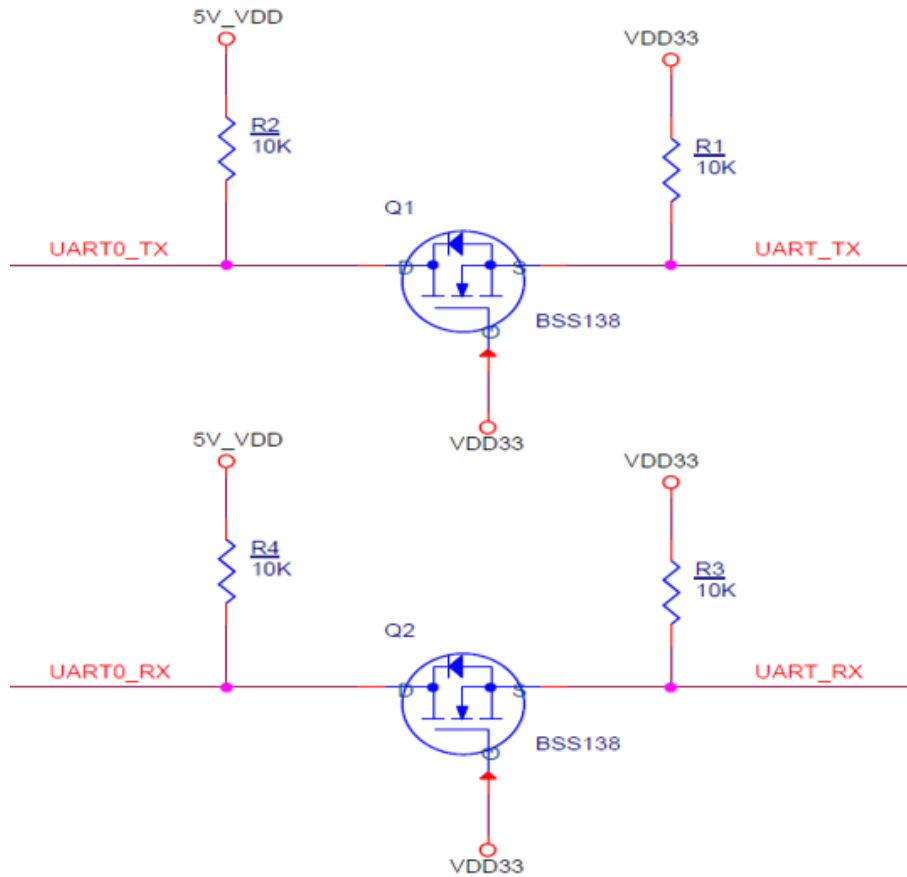
7.3. Resistor Divider (Low Cost Solution)

If the RX pin of the user equipment considers 3.3V to be high, R1, R3, and D2 can be removed.



7.4. MOSFET

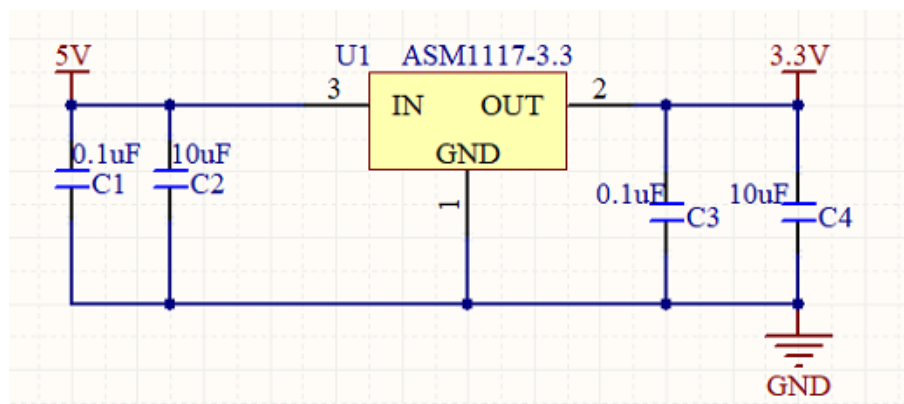
The most stable version of the hardware supports high-speed transmission (baud rate 921600, etc.), but at a higher cost.



7.5. Power Supply Design

7.5.1. LDO (Recommand)

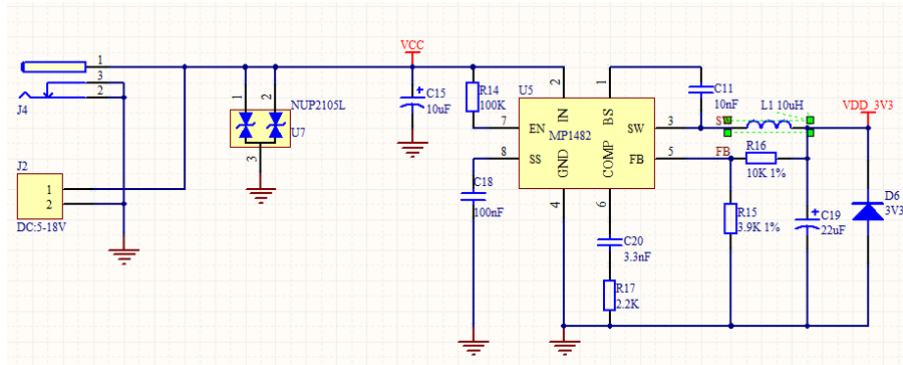
5VDC to 3.3VDC



7.6. DC-DC

Input: 5~18VDC

Output: 3.3VDC



8. CONTACT US

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