产品规格书

产品名称：蓝牙数据模块

产品型号：F-9688

文件编号：XZX-SPEC-BT-RD-019

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刘竹[illegible]	王杨	

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一、Product description

1.1 Overview

F-9688 Bluetooth module is BLE single-mode data transmission module (suitable for small data very low power transmission, does not support voice, mainly used for control), now we supply customer sample module is serial port data transmission module, other programs, applications need to be customized (design conventions and reference circuits can be found at the end of the manual, ″15, Customized Program Rules and Reference Circuits″).

1.2 Module characteristics

A. BLM world Limited is the first one solved perfectly Android system (Android 4.4 is perfectly compatible, 4.3 system only supports one-way),IOS system and F-9688 bluetooth module by two-way transmission

B. The user interface uses a universal serial port design, full-duplex two-way communication, and the baud rate ranges from 9600 to 115200 bps.

C. the default 20ms connection interval, the connection is fast.

D. Support the AT command software reset module to obtain the MAC address.

E. Support AT command to adjust the bluetooth connection interval and control different forwarding rates. (Dynamic power adjustment).

F. Support AT command to adjust the transmit power, modify the broadcast interval, customize the broadcast data, set the data delay (user CPU serial port connection time), modify the serial port baud rate, modify the module name, and save power.

G. The serial port data packet length is 20 bytes per pass.

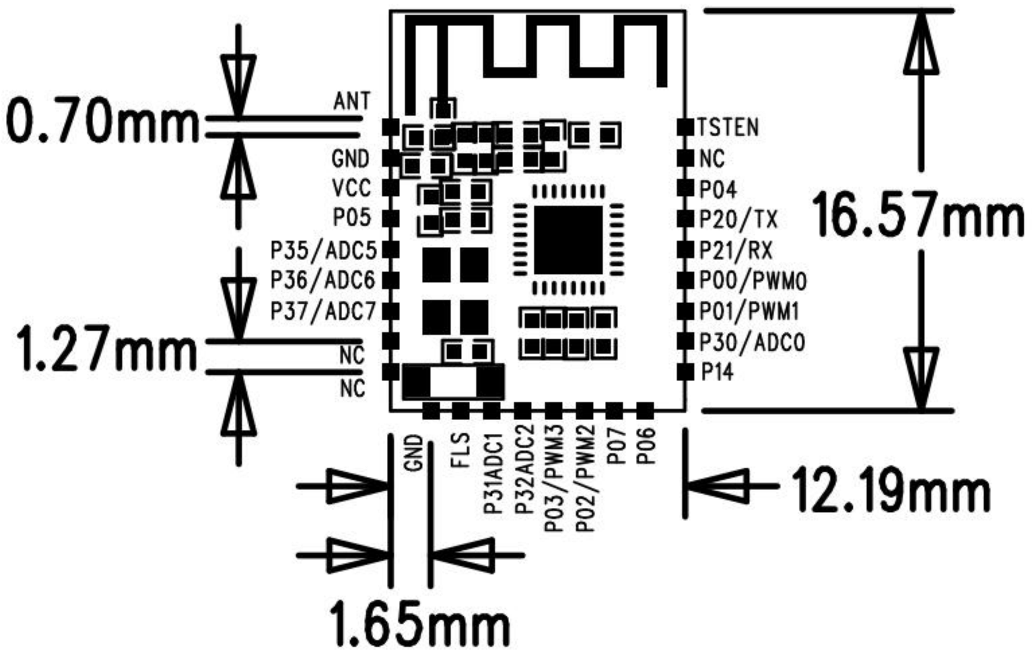
H. very low power standby mode, the module measured power consumption is as follows:

Status	Average current	Test Conditions
Standby	2uA	
Broadcast	800uA	Broadcast interval is 100ms
Connection	300uA	Connection interval is 500ms

1.3 Module parameter

P/N	F-9688
Bluetooth Version	BluetoothV4.0
Power supply voltage	2.0-3.6V
Bluetooth protocol	ATT,GATT,SMP,L2CAP,GAP
Working current	≤10mA(Simple application 200uA~1mA)
Standby current	Below 2uA
Temperature range	-40°Cto+80°C
Transmission range	0~100 meters
Transmission power	Max 4dBm
Sensitivity	-93dBm<0.1%BER
Frequency range	2.4GHz-2.480GHz
External interface	IO,UART,SPI,PWM,ADC,IIC
Dimension	16.57mm*12.19mm*1.8
IO feature	Input 6ma, output 3.9ma, internal pull-down 50k

1.4 Module pin definition



1.5 Pin function description

Pin number	Pin name	input Output	Description note
1	ANT	----	The input of RF
2	GND	----	GND
3	VDD	----	VCC2.0-3.6v
4	P0.5	I/O	General I/O, or MOSI for SPI, SO_FLA
5	P3.5	I/O	General I/O， or input of ADC1
6	P3.6	I/O	General I/O， or input of ADC1
7	P3.7	I/O	General I/O， or input of ADC1
8	NC	----	
9	NC	----	
10	GND	----	GND
11	FLS	I/O	The output of boost
12	P3.1	I/O	General I/O， or input of ADC1
13	P3.2	I/O	General I/O， or input of ADC2
14	P0.3	I/O	General I/O, or 3DS_PWM[3],I2C1.SDA, WP_FLA
15	P0.2	I/O	General I/O, or 3DS_PWM[2], I2C1.SCL, HOLD_FLA
16	P0.7	I/O	General I/O, or SPI_NSS, CSN_FLA
17	P0.6	I/O	General I/O,or MISO for SPI,SCK_FLA
18	P1.4	I/O	General I/O， or enable for PWM4
19	P3.0	I/0	General I/O， or input of ADC0
20	P0.1	I/O	General I/O, or 3DS_PWM[1]
21	P0.0	I/O	General I/O, or 3DS_PWM[0]
22	P2.1	I/O	General I/O, or UART RX
23	P2.0	I/O	General I/O, or UART TX
24	P0.4	I/O	General I/O, or SPI_SCK, SI_FLA
25	NC	----	
26	TSTEN	----	Enable the testting function of memory

二.Application

2.1 Application field

》Sports

》Security

》Smart home

》Automation

》Mobile accessories

》indoor positioning control

》Medical and health care

2.2 Application example

》Smart watch

》Anti-lost

》Heart rate meter

》Weighing scale

》Electronic pedometer

》Sphygmomanometer and blood glucose meter

2.3 Low power applications

The F-9688 serial port transmission has two modes of operation: (1) low power mode and (2) non-low power mode.

（1）Low power mode:

In low-power mode, the module has very low power consumption, so the low-power mode is suitable for circuit design with low power consumption, and has two enable terminals P0ˆ0 and P0 in low-power mode. ˆ1, P0ˆ0 is the module enable end, and P0ˆ1 is the serial port transparent transmission enable end. When in the sleep state, only need to give P0ˆ0 a falling edge, the BLE module works, and P0ˆ1 is low to enable serial port transparent transmission.

(Note: The default won't turn on low power mode)

（2）Non-low power mode

The non-low power mode has power-on automatic broadcast, and can directly use the characteristics of serial port transparent transmission. It is not necessary to control two enable ends of P0ˆ0 and P0ˆ1, so the non-low power mode is convenient to use.

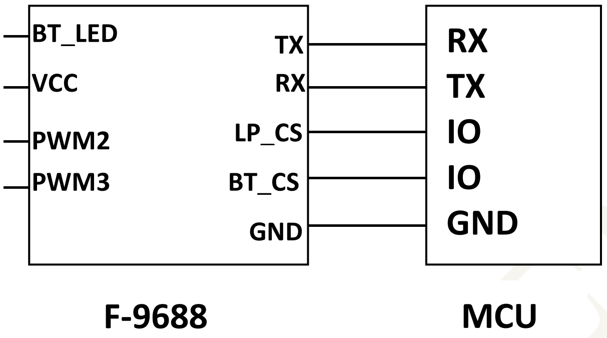
Note: In the low power state, the AT command cannot be set normally. Before the AT command is set, the LP_CS is set low.

三、Communication mode

The working mode of the module is data transmission mode.

In the transparent transmission mode, the user CPU can perform two-way communication through the module's universal serial port and the mobile device, and the user can also manage and control certain communication parameters through a specific serial port AT command. The specific meaning of user data is defined by the upper application. The mobile device can write to the module through the APP, and the written data will be sent to the user's CPU through the serial port. After the module receives the data packet from the user CPU serial port, it will automatically forward it to the mobile device. For development in this mode, the user must be responsible for the code design of the main CPU and the smart mobile device side APP code design.

3.1 Data transmission module and MCU connection



3.2 MCU host data transmission control instructions and program reference

3.2.1 Pin description

P21/RX :Serial port receiving pin

P20/TX :Serial port send pin

P00/BT_CS :Module enable pin

P01 /LP_CS:(low power)Low power control pin

P02 /PWM2:PWM

P03 / PWM3: PWM

P06/BT_LED :Bluetooth status indicator pin

BT_LED is the connection state of Bluetooth. The output on the Bluetooth connection is high and the output is off. BT _CS is the MCU control BLE module status pin, low level enable module, high level is not enabled. The LP_CS serial port is enabled, the low level turns off the low power consumption, and the high level enters the low power consumption (the transmission is unstable).

Note: BT_CS, LP_CS, BT_LED, PWM function need to use AT command enable function communication process

For different serial port baud rates and BLE connection intervals, as well as different packet delivery intervals, the module will have different data throughput capabilities. To coordinate the use of low-speed CPUs, the default baud rate is 9600 bps. In applications with large data volume transmission or high real-time requirements, it is recommended to set the high-speed serial port baud rate to 9600 bps to support power-down save. When the module BLE connection interval is 20 ms and the serial port baud rate is 9600 bps, the module has the highest theoretical forwarding capability (4K/S). Here, in the level enable mode, this configuration is an example, and the transparent transmission protocol is described in detail.
(1)Serial port hardware protocol: baud rate 9600bps, data length 8, no parity, stop bit length 1.(2) When BT_CS is high, the bluetooth module is in a full sleep state in the low power mode.When BT_CS is low, the module starts to work. The default broadcast interval is 100ms until the docking with the mobile phone is successful. At this time, the module will pull BT_LED high.(3)The module's bluetooth default connection interval is 20ms, if you need to save power consumption, use low-speed forwarding mode, you need to pass AT command adjusts the connection between connections (the longest connection interval is 2000ms), each connection interval is up to 40 bytes, and the connection interval is T (unit: ms), then the highest forwarding rate per second V (unit: byte/s) is:
V= 40*1000/T(V is only related to T)
If the module's Bluetooth connection interval is 20ms and each interval is up to 40bytes, the theoretical maximum transmission capacity (forward rate) is 40*50 = 2K byte/s. Tests have shown that the forwarding rate is below 2K/s and the probability of packet loss is very low. For security reasons, it is recommended to perform re-transmission processing on the upper layer, whether it is a low-speed or high-speed data forwarding application.

MCU Reference Code

```
void main(void)
{

    halMcuWaitMs(1); //delay 1ms
    while(1)          //Cyclic test
    {
                //Waiting for the transmission to be completed, or waiting for a limited time
                if(UARTRead(uartBuffer)== SUCCESS)     //Serial port read data
            {...                              //data processing
            ...}
        halMcuWaitMs(2);                    //delay 2ms send_TX("12345678901234567890");//
        Send  any  data（20byte） halMcuWaitMs(50);  //delay 50ms(Different
        baud rates, connection gaps, different times)

    }
}
```

四、AT command test

(1).When transmitting data in transparent transmission mode, please do not use "AT+" (hex 41542B) as the transparent data header. The format of the transparent transmission needs to be defined by itself. Check whether or not the header is included. Each passthrough is sent in 20 bytes. This module is a slave module and the associated UUID is as follows:

SeviceUUID:0xFFF0

CharacteristicUUID:0xFFF4

(2).In the command mode, the hexadecimal encoding of the "AT+" string is 41542B, and the 16 of \CR\LF is 0D0A.

Please note, each time a project is set up, since it is basically a power-down save project, you need to power-on and restart the module or use the AT command to reset. (Special reminder: AT command end character must be a newline character)

4.1 Command set

	Command	Function
Basic command	AT+RSET	Restore factory defaults
	AT+CONB	Disconnect
	AT+REST	Reset
Query command	AT+GCTO	Query - connection timeout
	AT+VERS	Query - Software Version
	AT+GADD	Query - module address
	AT+GNAM	Query - module name
	AT+GCMA	Query - maximum connection interval
	AT+GPWR	Query - transmit power
	AT+GSLA	Query - slave latency
	AT+GCMI	Query - minimum connection interval
	AT+GURT	Query - baud rate
	AT+GAVI	Query - broadcast interval
	AT+GPAC	Query - pairing password
	AT+GPAE	Query - pairing password enable
	AT+PWM0(reserve)	Query - PWM0 duty cycle
	AT+PWM1(reserve)	Query - PWM1 duty cycle
	AT+PWM2	Query - PWM2 duty cycle
	AT+PWM3	Query - PWM3 duty cycle

	AT+ GFRQ	Query - PWM frequency
Setting command	AT+UART	Setting - serial port baud rate
	AT+SNAM	Settings - module name
	AT+SCMA	Settings - maximum connection interval
	AT+SPWR	Setting - transmit power
	AT+SCMI	Settings - minimum connection interval
	AT+SPAC	Set-pairing password
	AT+SPAE	Set-pair password enable
	AT+SSLA	Set-slave latency
	AT+SCTO	Settings - connection timeout
	AT+SAVI	Settings - broadcast interval
	AT+ ENLP	Setup - Low Power Control Enable
	AT+ NOLP	Setup - Low Power Control Disabled
	AT+ ELED	Settings - Bluetooth LED Enable
	AT+ DLED	Settings - Bluetooth LED is not enabled
	AT+ ESLP	Setup - Module Switch Control Enable
	AT+ DSLP	Setup - Module Switch Control Disabled
	AT+ DPWM	Set -PWM always enabled to turn off
	AT+ EPWM	Set －PWM always enable
	AT+ FREQ+XXX	Set -PWM frequency
	AT+ PWM0+XXX(reserve)	Set the -PWM0 duty cycle
	AT+ PWM1+XXX(reserve)	Set -PWM1 duty cycle
	AT+ PWM2+XXX	Set -PWM2 duty cycle
	AT+ PWM3+XXX	Set -PWM3 duty cycle
	AT+ PWM0+0(reserve)	Set -PWM0 off
	AT+ PWM1+0(reserve)	Set -PWM1 off
	AT+ PWM2+0	Set -PWM2 off
	AT+ PWM3+0	Set -PWM3 off

PWM Step description：

1、AT+ EPWM turns on the PWM main switch

2、AT+ FREQ+XXX set frequency, unit HZ, greater than 20hz, less than 200Khz

3、AT+ PWM3+XXX sets the duty cycle, greater than 0, less than 101, when the duty cycle is equal to 0, the channel is closed.

Note: All channels must have the same pwm frequency

4.2 Command description

AT+ROLE

AT+ROLE\CR\LF：Query – module master-slave mode		
Query command：AT +ROLE\CR\LF	Response	ROLE:SLAVE
	Description	None
Example: Send query command: AT+ROLE, return: ROLE: SLAVE		

AT+VERS

AT+VERS：Query – Software Version		
Query command：AT +VERS\CR\LF	Response	Version:5.0
	Description	None
Example: Send query command: AT+VERS, return software version information: Version: 5.0		

AT+GADD

AT+GADD：Query – module address		
Query command: AT+GADD\CR\LF	Response	BLEADDRESS: Para
	Description	Para:12-digit Bluetooth address
Example: Send query command: AT+GADD, return 12-bit address: BLEADDRESS: 0xB85FF98FC320		

AT+GNAM

AT+GNAM：Query – module name		
Query command: AT+GNAM\CR\LF	Response	NAME:Para
	Description	Para： Module name
Example: Send the query command: AT+GNAM, return the current name: NAME: BK3231S_SPP		

AT+SNAM

AT+SNAM：Settings – module name		
Set the command: AT+SNAM+Para\CR\LF	Response	Ok
	Description	Para:String name, up to 20 bytes
For example: set the name to blm, then send the command: AT+SNAM+blm, return ok after the setting is successful.		

AT+GCMA

AT+GCMA：Query – maximum connection interval		
Query command: AT+GCMA\CR\LF	Response	CONNECTIONINTERVAl:Para
	Description	Para：Connection interval (range: 8~1600, unit 1.25 ms)
Example: Send command AT+GCMA, return the current connection interval: CONNECTIONINTERVAl: 16 (default is 16)		

AT+SCMA

AT+SCMA：Settings – maximum connection interval		
Setting command: AT+SCMA+Para\CR\LF	Response	Ok
	Description	Para:Connection interval (range: 8~1600, unit 1.25 ms)
Example: Set the connection interval to 100ms. Then send the setting command: AT+SCMA+80, return after the setting is successful: ok		

AT+GPWR

AT+GPWR：Query – transmit power		
Query command: AT+GPWR\CR\LF	Response	Tx_power:ParadBm
	Description	Para：0 or 1 or 6
Example: Send query command: AT+GPWR, return current transmit power: Tx_power: 6dBm		

AT+SPWR

AT+SPWR：Setting – transmit power		
Setting command: AT+SPWR+Para\CR\LF	Response	Tx_power:ParadBm
	Description	Para:Input 0,or 1,or 6
Example: Set the transmit power to 6 dBm. Then send the setting command: AT+SPWR+6, return after the setting is successful: Tx_power: 6dBm		

AT+ GURT

AT+ GURT：Setting – serial port baud rate		
Setting command: AT+ GURT\CR\LF	Response	UARTBAUDRATE:Para
	Description	Para: Serial port baud rate is one of the following 5 （1）：9600 （2）：19200 （3）：38400 （4）：57600 （5）：115200
Example: Send query command: AT+ GURT, return: UARTBAUDRATE: 9600		

AT+UART

AT+ UART：Setting – serial port baud rate		
Setting command: AT+UART+Para\CR\LF	Response	Ok
	Description	Para: The serial port baud rate is one of the following five （1）：9600 （2）：19200 （3）：38400 （4）：57600 （5）：115200
Example: Set the baud rate to 38400. Then send the setting command AT+UART+38400, and return ok after successful setting. (Note: After setting a new baud rate, the baud rate of the serial debugging assistant should also be adjusted accordingly, in this case, it should be adjusted to 38400)		

AT+GCMI

AT+GCMI：Query – minimum connection interval		
Setting command: AT +GCMI\CR\LF	Response	Ok
	Description	Para: connection interval range: 8~1600, unit 1.25ms
Example: Send query command: AT+GCMI, return: OK		

AT+SCMI

AT+SCMI：Settings – minimum connection interval		
Setting command: AT+SCMI+Para\CR\LF	Response	Ok
	Description	Para: connection interval range: 8~1600, unit 1.25 ms
Example: Set the connection interval to 100ms. Then send the setting command: AT+SCMA+80, return after the setting is successful: ok		

AT+CONB

AT+CONB：Disconnect		
Setting command: AT+CONB\CR\LF	Response	CONNTIONISBROKEN
	Description	None
Example: Send disconnect command: AT+CONB, return: Connectionisbroken		

AT+REST

AT+RSET：Module reset		
Reset command: AT+REST\CR\LF	Response	None
	Description	None
For example: send the command directly: AT+REST, you can reset it.		

AT+RSET

AT+RSET：Restore factory settings		
Setting command: AT+RSET\CR\LF	Response	None
	Description	None
For example: send the command directly: AT+RSET		

4.3 AT command test

4.3.1 Test environment setup

（1）Tools can be used:

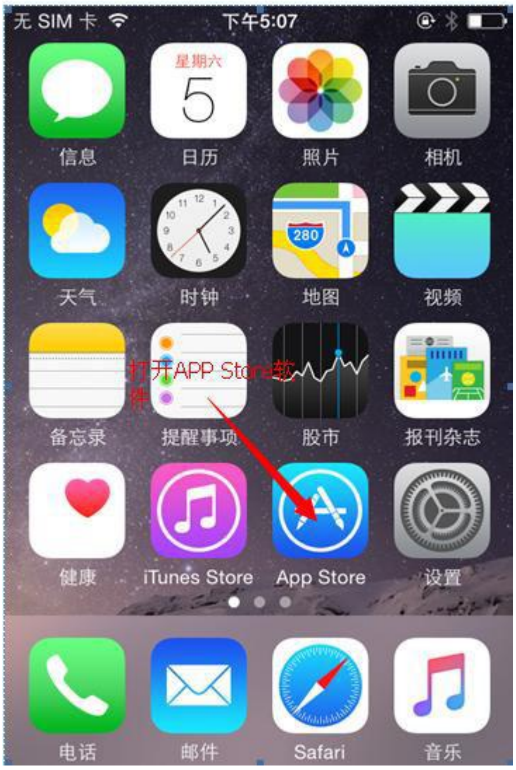
Serial debugging assistant sscom32 (version 1.0.0.1), use Baidu to directly search and download "serial debugging assistant sscom32", open the application directly after downloading, no need to install.

Android mobile phone: equipped with Bluetooth test software such as BLE reader, (BLE reader can use 100

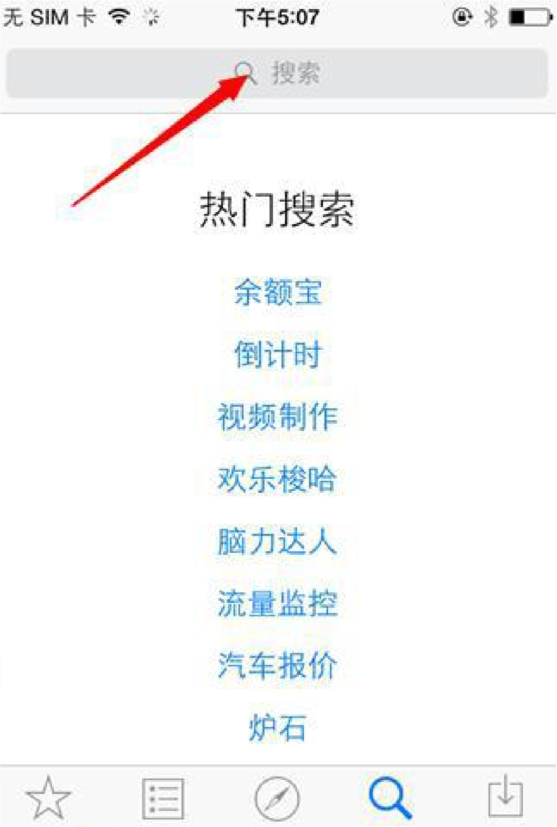
Search for "BLE reader" online has a lot of download links) Apple system tools: equipped with Bluetooth test such as "LightBlue"

Software, LightBlue can be downloaded from the Apple app's "APPStore" software.

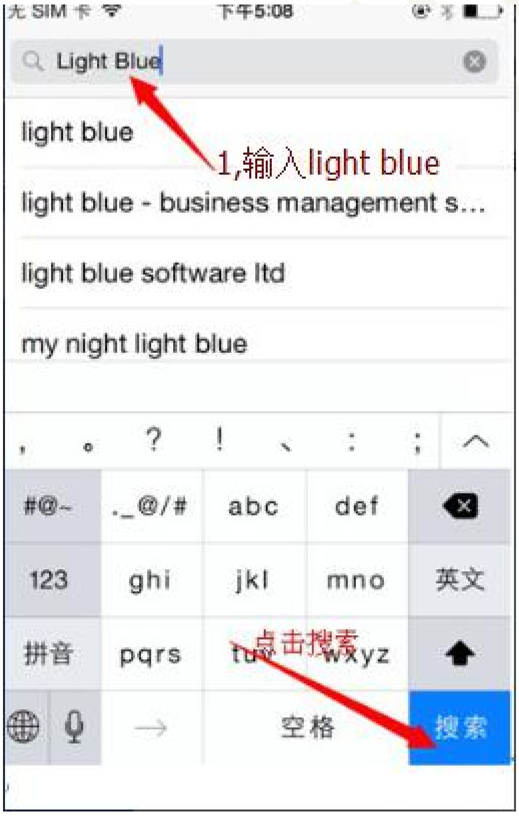
Step 1: Open the "APPStore" software on your iPhone



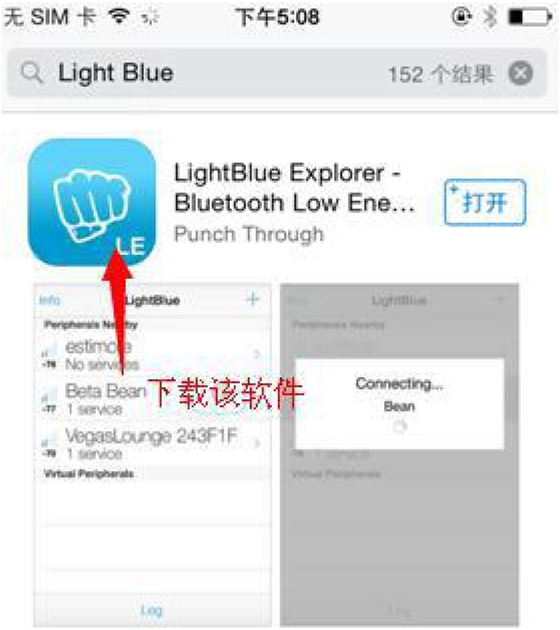
Step 2: Click Search



Step 3: Enter Light Blue in the search and click Search



Step 4: Download and install LightBlue

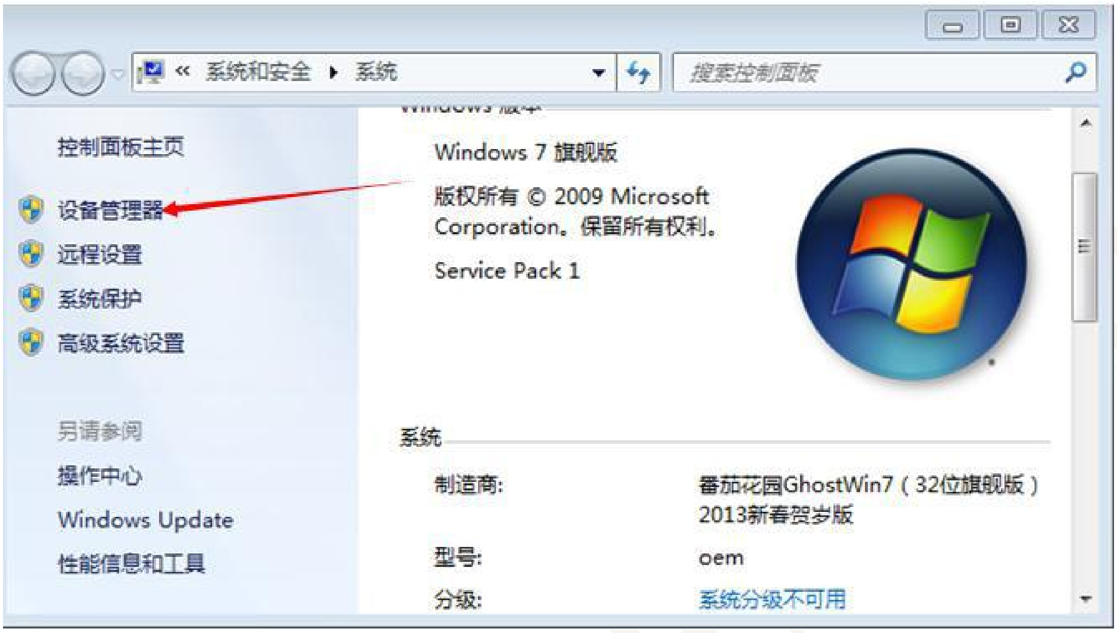


（2）Environmental construction

》Connect the serial port module, the F-9688 module pin diagram is shown above

》Query the serial port number:

Step 1: Under win7 system, right click on "Computer", select "Properties", click on Properties to open the following interface.



Windows 7 旗舰版

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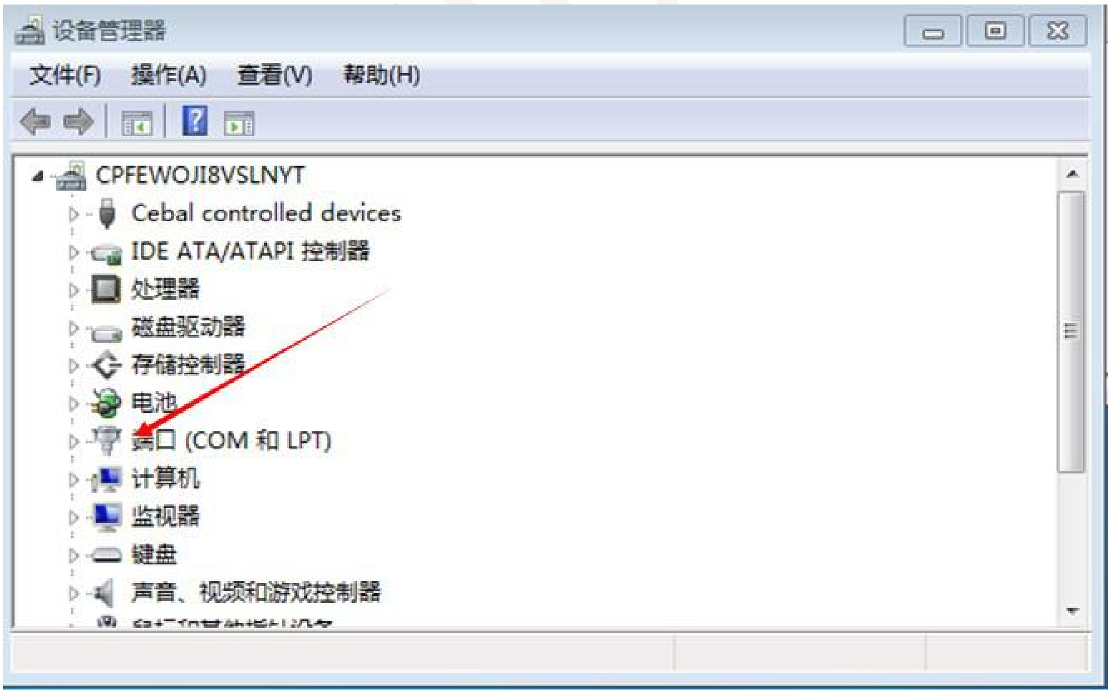
Service Pack 1

制造商: 番茄花园GhostWin7（32位旗舰版）2013新春贺岁版

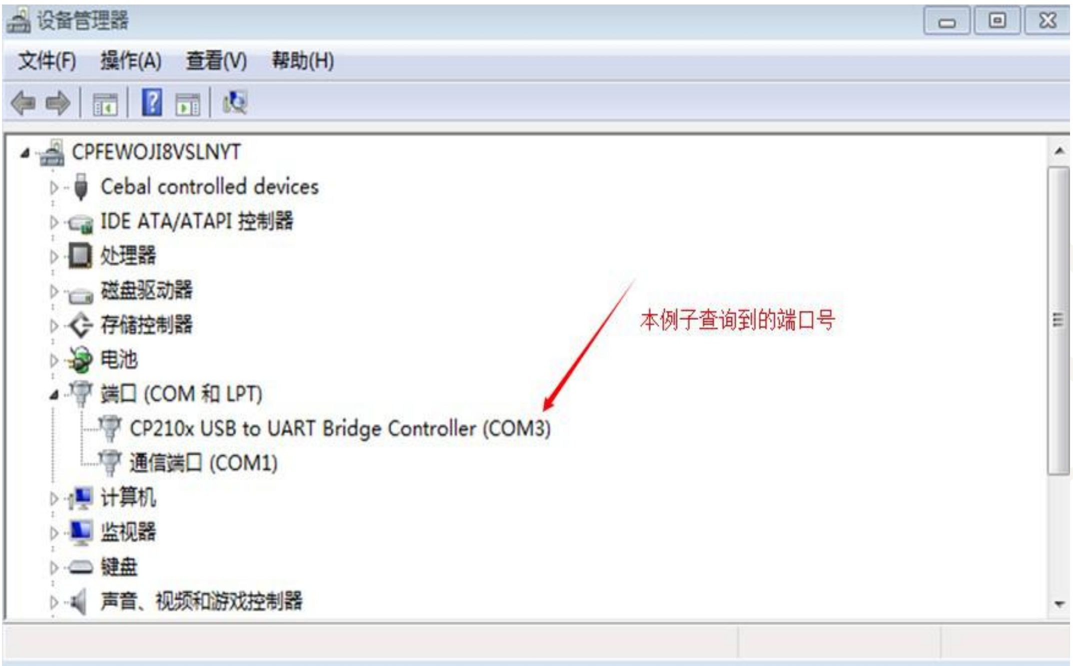
型号: oem

分级: 系统分级不可用

Step 2: Click on "Device Manager" to enter the interface shown below.



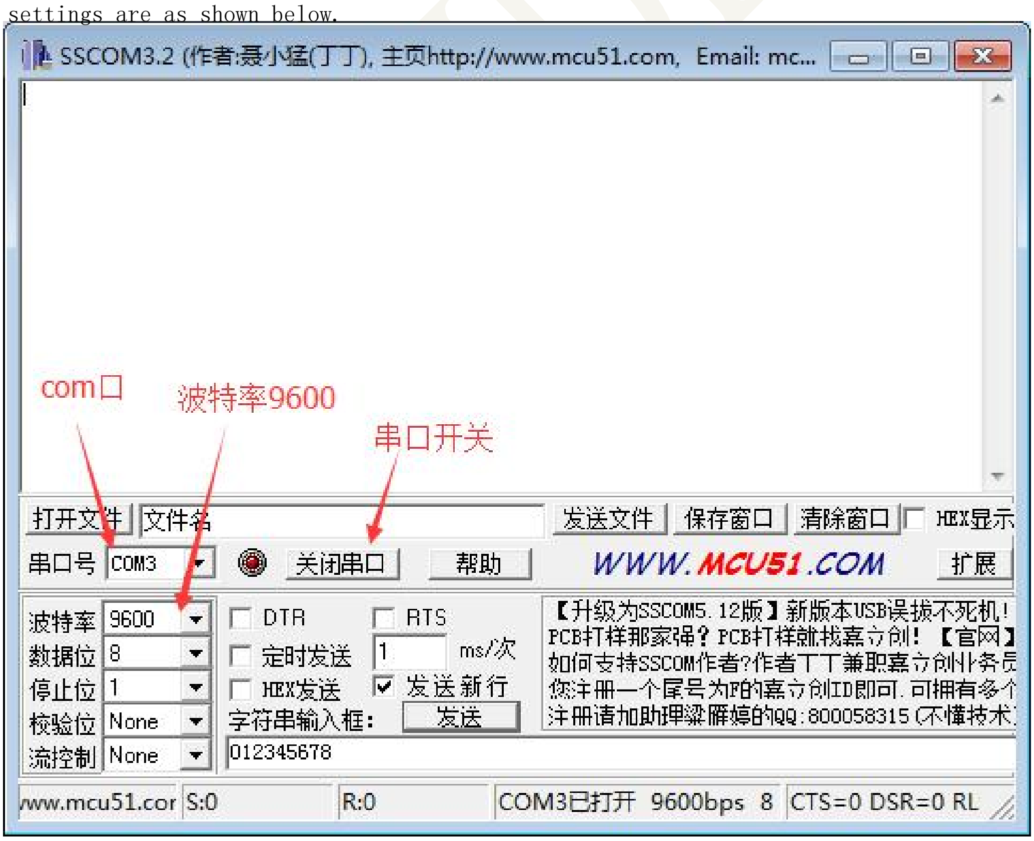
Step 3: Click on the "Port" option, you can see the CP210xUSBtoUARTBridgeController (COM3), COM3 is the port number, note: it is a variable number, so different device port numbers are not the same, so according to their own Precisely, write down the port number you found.



- CPFEWOJI8VSLNYT
  - Cebal controlled devices
  - IDE ATA/ATAPI 控制器
  - 处理器
  - 磁盘驱动器
  - 存储控制器
  - 电池
  - 端口 (COM 和 LPT)
    - CP210x USB to UART Bridge Controller (COM3)
    - 通信端口 (COM1)
  - 计算机
  - 监视器
  - 键盘
  - 声音、视频和游戏控制器

本例子查询到的端口号

Step 4: Open the serial port debugging assistant sscom32 in the accessory, set the baud rate to 115200 (Note: F_9688 transparent transmission default baud rate is 9600), select the port number you just found under the serial port number option, and click to open Serial port button, the environment is set up, the serial debugging assistant environment settings are as shown below.



com口

波特率9600

串口开关

串口号 COM3

波特率 9600

数据位 8

停止位 1

校验位 None

流控制 None

□ DTR □ RTS

□ 定时发送 1 ms/次

□ HEX发送 ☑ 发送新行

字符串输入框: 012345678

【升级为SSCOM5.12版】新版本USB误拔不死机!
PCB打样那家强? PCB打样就找嘉立创! 【官网】
如何支持SSCOM作者?作者丁丁兼职嘉立创业务员
您注册一个尾号为F的嘉立创ID即可.可拥有多个
注册请加助理梁霄婷的QQ:800058315(不懂技术

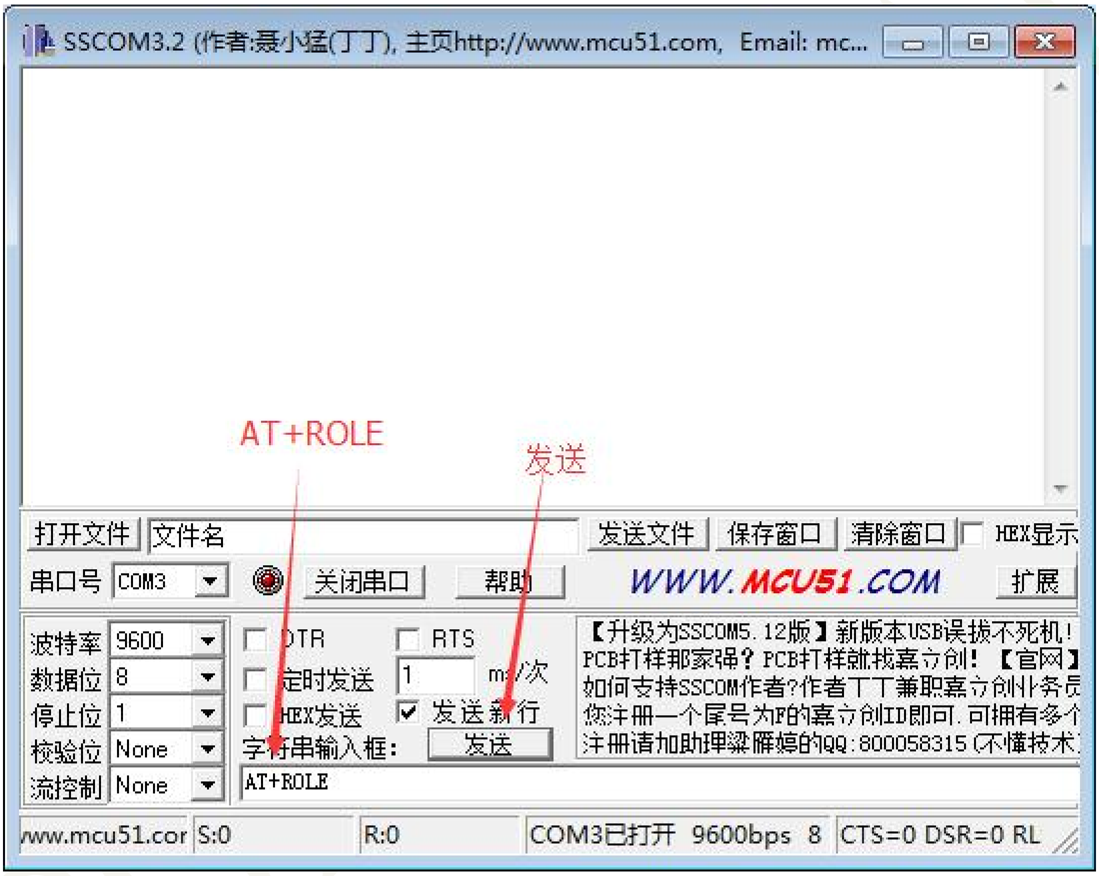
www.mcu51.cor S:0 R:0 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

4.3.2 Query command test

Because the use of various query instructions and basic instructions is basically the same as the steps, so here is only to explain the use of the query-module master-slave mode instruction, and the rest of the query instructions and the use of the basic instructions refer to the query-module master. Use of slave mode instructions.

(1) Query - module master-slave mode: instruction: AT+ROLE

Step 1: In the “string input box” of the serial debugging assistant, enter the AT command of the query-module master-slave mode: AT+ROLE, and click “send”



SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...

串口号 COM3

波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行

字符串输入框: AT+ROLE

【升级为SSCOM5.12版】新版本USB误拔不死机！
PCB打样那家强？PCB打样就找嘉立创！【官网】
如何支持SSCOM作者?作者丁丁兼职嘉立创业务员
您注册一个账号为F的嘉立创ID即可.可拥有多个
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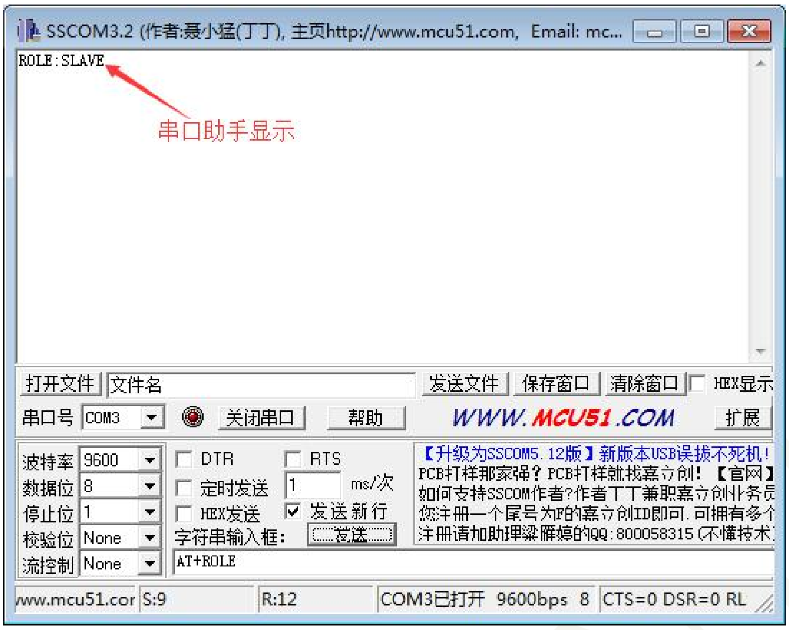
www.mcu51.cor S:0 R:0 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

Step 2: After clicking the “Send” button, you can see that the serial debugging assistant displays the working mode of the current module: ROLE: SLAVE, the function of the command is correct.



```
ROLE:SLAVE
```

串口号 COM3
波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None
定时发送 1 ms/次
字符串输入框: AT+ROLE

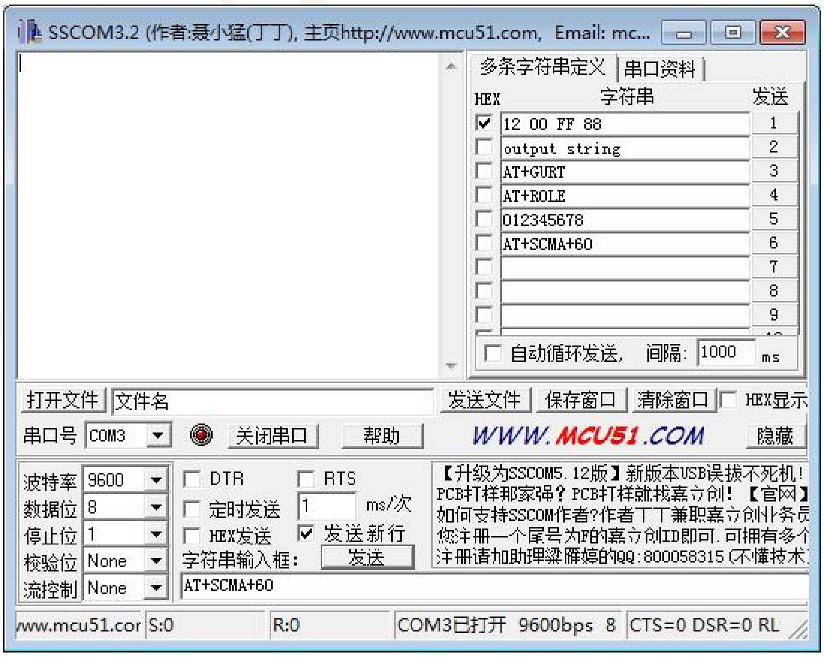
www.mcu51.cor S:9 R:12 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

4.3.3 Setting command test

Since the various setting instructions are basically the same as the steps, only the setting-connection interval instruction is used here. The rest of the setting instructions are used by reference to the setting-connection interval instruction. (Note: When setting the baud rate, when the baud rate is set, you need to reselect the new baud rate in the baud rate option of the serial debugging assistant.)

(1) Set the connection interval, command: AT+ SCMA+Para Description: Para: is the connection interval to be set. Here, for example, set the connection interval of the module to 100ms.

Step 1: Enter AT+ SCMA+60 in the “String Input Box” of the Serial Debug Assistant and click “Send”



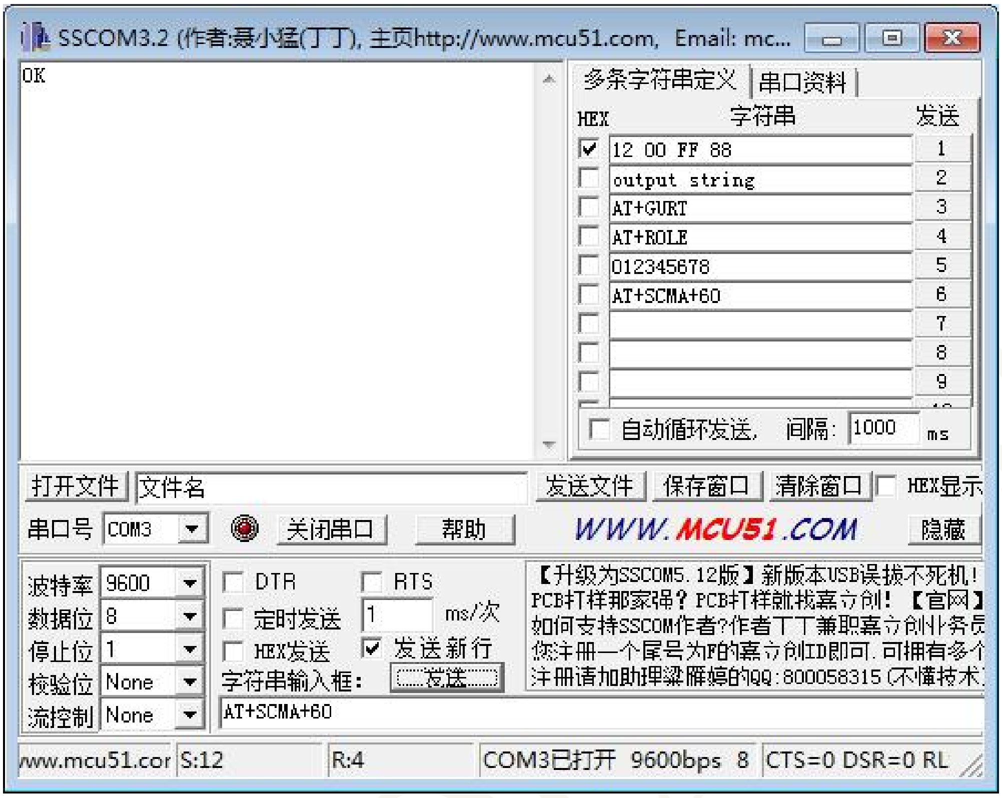
HEX	字符串	发送
☑	12 00 FF 88	1
□	output string	2
□	AT+GURT	3
□	AT+ROLE	4
□	012345678	5
□	AT+SCMA+60	6
□		7
□		8
□		9

□ 自动循环发送, 间隔: 1000 ms

串口号 COM3
波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None
定时发送 1 ms/次
字符串输入框: AT+SCMA+60

www.mcu51.cor S:0 R:0 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

Step 2: After clicking the "Send" button, if the serial debugging assistant displays OK, then reset the 9688 module.



```
OK
```

HEX	字符串	发送
☑	12 00 FF 88	1
□	output string	2
□	AT+GURT	3
□	AT+ROLE	4
□	012345678	5
□	AT+SCMA+60	6
□		7
□		8
□		9

□ 自动循环发送, 间隔: 1000 ms

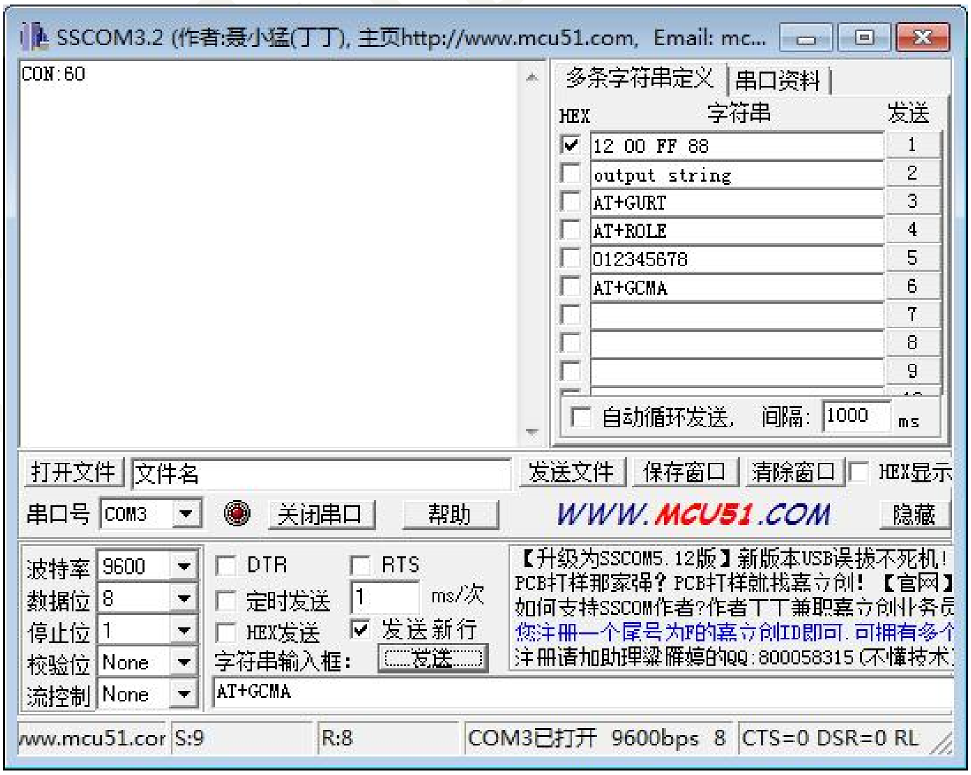
串口号 COM3

波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行
字符串输入框: AT+SCMA+60

ww.mcu51.cor S:12 R:4 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

Step 3: After resetting the 9688 module, query the connection interval of the F-9688 module (see 4.3.2 for the query method). The query result is shown in the figure below. As shown in the figure below, the connection interval is successfully set to 60 (unit : 1.25ms), is 100ms.



```
CON:60
```

HEX	字符串	发送
☑	12 00 FF 88	1
□	output string	2
□	AT+GURT	3
□	AT+ROLE	4
□	012345678	5
□	AT+GCMA	6
□		7
□		8
□		9

□ 自动循环发送, 间隔: 1000 ms

串口号 COM3

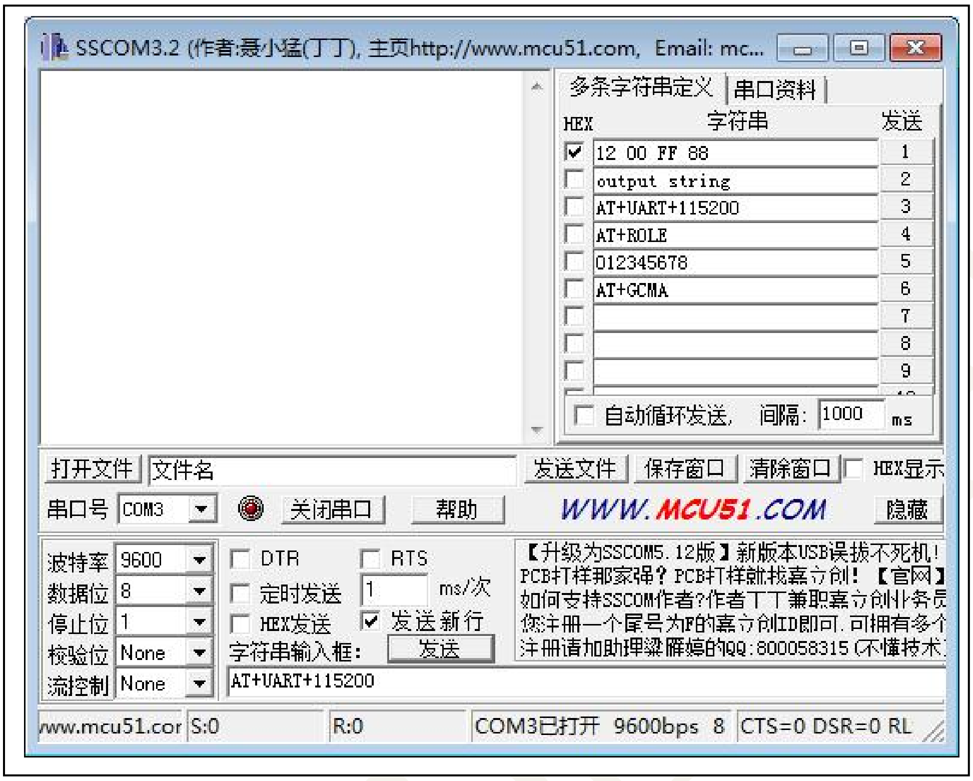
波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行
字符串输入框: AT+GCMA

ww.mcu51.cor S:9 R:8 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

(2) Set the baud rate, command: AT+ UART+Para Description: Para: is the baud rate to be set. Here, the baud rate of the module is set to 115200.

Step 1: Enter AT+ UART+115200 in the “String Input Box” of the Serial Debug Assistant and click “Send”.


SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...
多条字符串定义
串口资料
HEX
字符串
发送
自动循环发送, 间隔: 1000 ms
打开文件
文件名
发送文件
保存窗口
清除窗口
HEX显示
关闭串口
帮助
WWW.MCU51.COM
隐藏
DTR
RTS
定时发送
ms/次
HEX发送
发送新行
字符串输入框:
发送
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PCB打样那家强? PCB打样就找嘉立创! 【官网】

HEX	字符串	发送
☑	12 00 FF 88	1
□	output string	2
□	AT+UART+115200	3
□	AT+ROLE	4
□	012345678	5
□	AT+GCMA	6
□		7
□		8
□		9

串口号 COM3

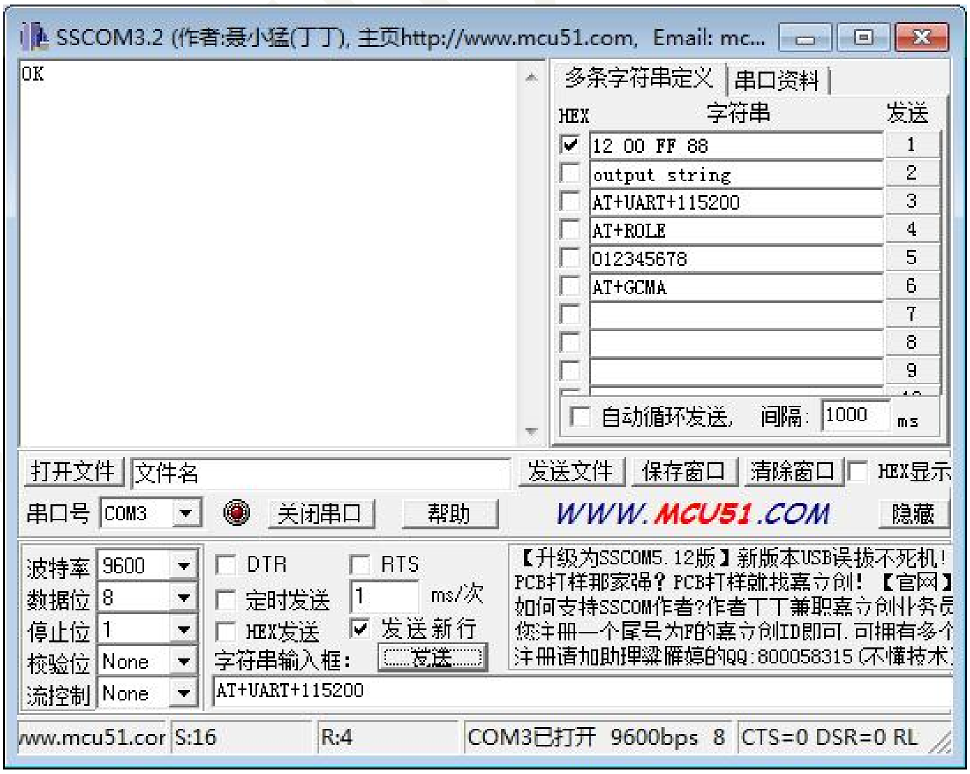
波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行

字符串输入框: AT+UART+115200

```
www.mcu51.cor S:0  R:0  COM3已打开 9600bps 8 CTS=0 DSR=0 RL
```

Step 2: After clicking the “Send” button, if the serial debugging assistant displays OK, then reset the 9688 module.


SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...
多条字符串定义
串口资料
HEX
字符串
发送
自动循环发送, 间隔: 1000 ms
打开文件
文件名
发送文件
保存窗口
清除窗口
HEX显示
关闭串口
帮助
WWW.MCU51.COM
隐藏
DTR
RTS
定时发送
ms/次
HEX发送
发送新行
字符串输入框:
发送
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PCB打样那家强? PCB打样就找嘉立创! 【官网】

```
OK
```

HEX	字符串	发送
☑	12 00 FF 88	1
□	output string	2
□	AT+UART+115200	3
□	AT+ROLE	4
□	012345678	5
□	AT+GCMA	6
□		7
□		8
□		9

串口号 COM3

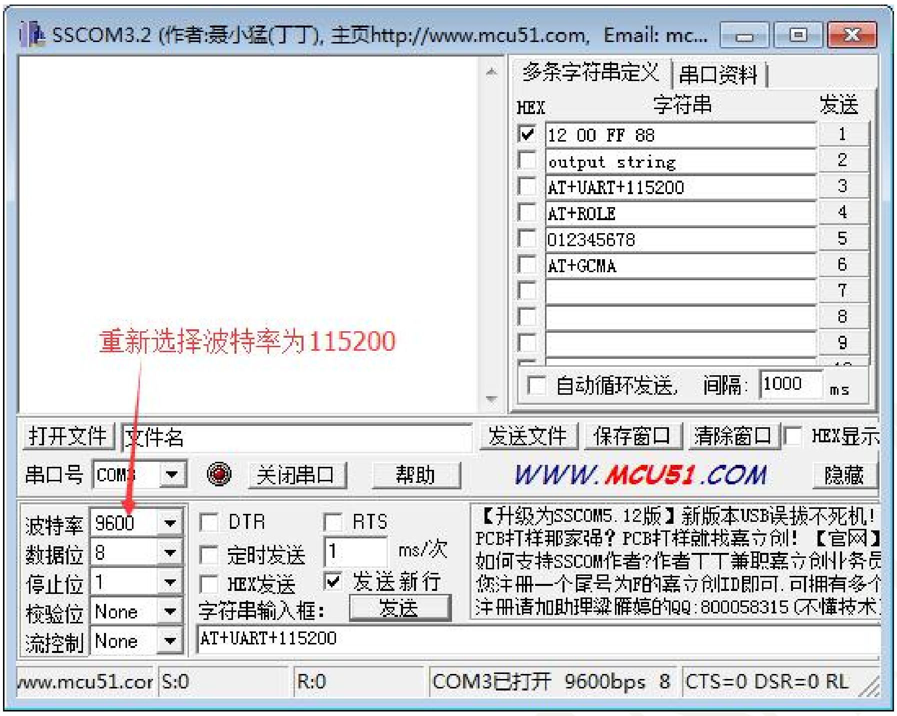
波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行

字符串输入框: AT+UART+115200

```
www.mcu51.cor S:16  R:4  COM3已打开 9600bps 8 CTS=0 DSR=0 RL
```

Step 3: After resetting the 9688 module, re-select the serial port assistant baud rate to 115200.



HEX	字符串	发送
☑	12 00 FF 88	1
□	output string	2
□	AT+UART+115200	3
□	AT+ROLE	4
□	012345678	5
□	AT+GCMA	6
□		7
□		8
□		9

□ 自动循环发送, 间隔: 1000 ms

串口号 COM3

波特率 9600
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行

AT+UART+115200

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注册请加助理梁雁婷的QQ:800058315 (不懂技术

www.mcu51.cor S:0 R:0 COM3已打开 9600bps 8 CTS=0 DSR=0 RL

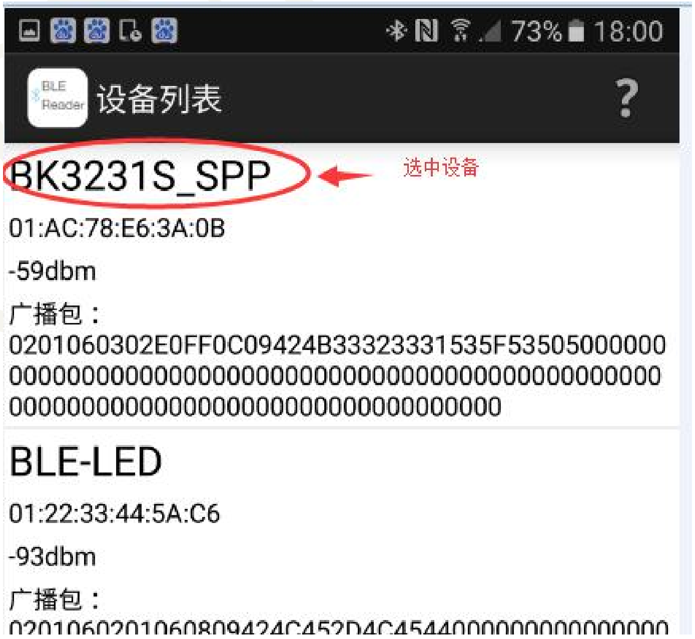
Step 3: Description: The examples that follow are based on a baud rate of 115200.

五、Serial port transmission test

5.1 Serial to Bluetooth transmission test

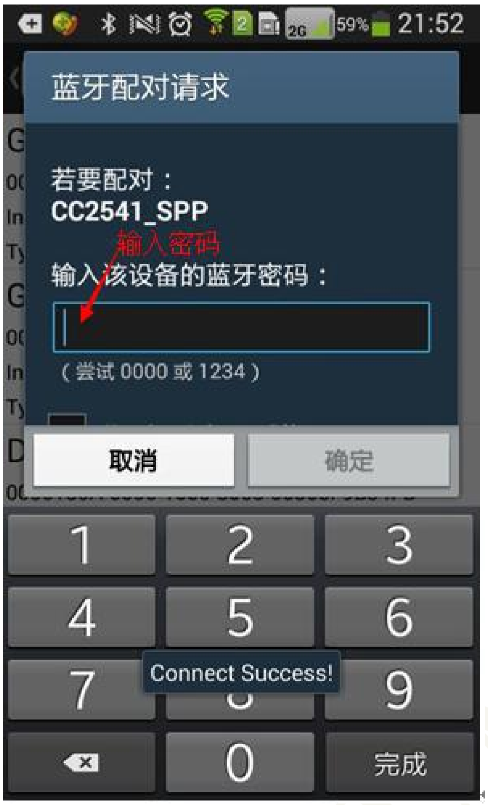
（1）Data transmission based on Android system

Step 1: First, open the “BLE Reader” software on your Android phone and find your Bluetooth device in the BLE reader.(The default name is: BK3231S_SPP), and click Connect. If you need to pair when connecting, the default password is 123456. After entering the password, click OK. If you don’t need it, skip this step.



BK3231S_SPP
01:AC:78:E6:3A:0B
-59dbm
广播包：
0201060302E0FF0C09424B33323331535F53505000000000000000000000000000000000000000000000000000000000000000000000000000000000

BLE-LED
01:22:33:44:5A:C6
-93dbm
广播包：
0201060201060809424C452D4C454400000000000000000



蓝牙配对请求

若要配对：

CC2541_SPP

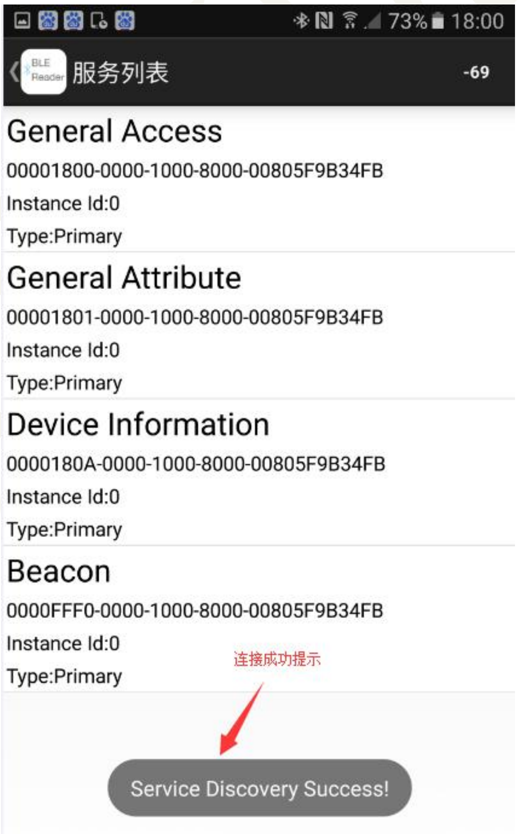
输入密码

输入该设备的蓝牙密码：

（尝试 0000 或 1234）

Connect Success!

Step 2: After clicking OK, if the phone screen first displays ConnectSuccess and then displays Service Discovery Success, then Bluetooth is connected.



服务列表 -69

General Access
00001800-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

General Attribute
00001801-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

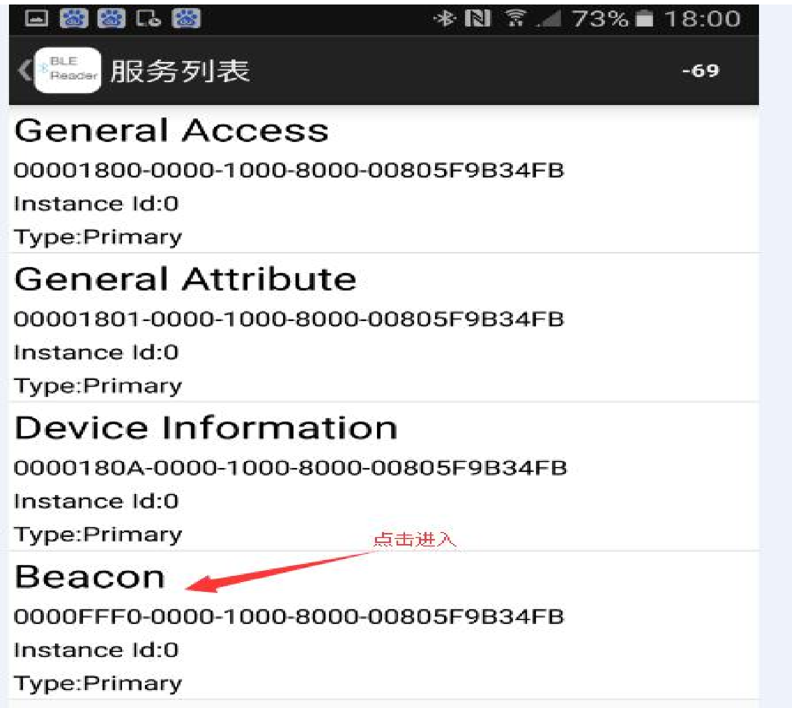
Device Information
0000180A-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

Beacon
0000FFF0-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

连接成功提示

Service Discovery Success!

Step 3: After connecting Bluetooth, click the Beacon button to open the service.



服务列表

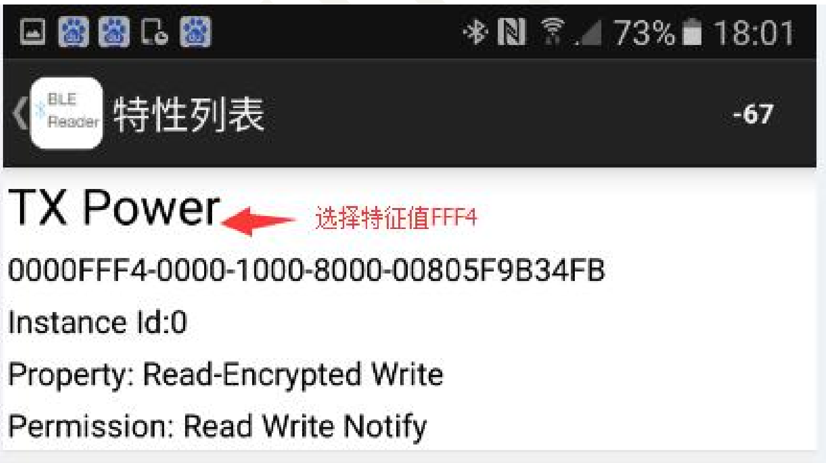
General Access
00001800-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

General Attribute
00001801-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

Device Information
0000180A-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

Beacon
0000FFF0-0000-1000-8000-00805F9B34FB
Instance Id:0
Type:Primary

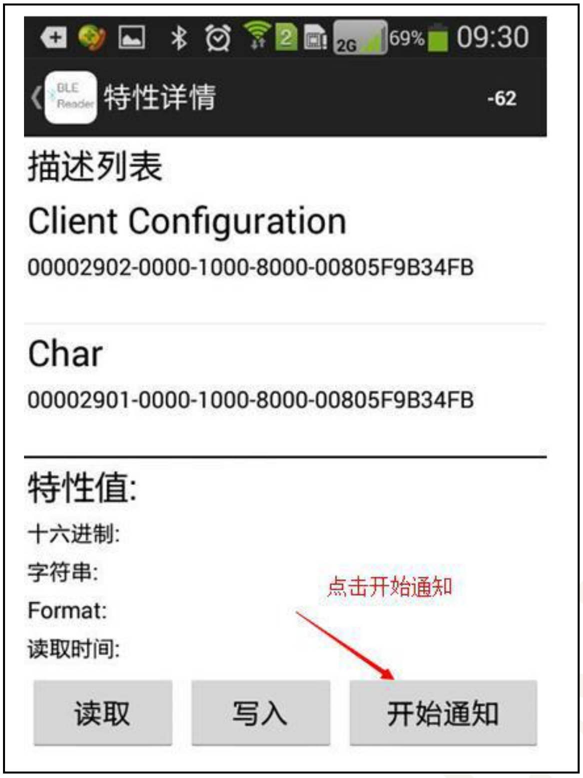
Step 4: Click the Beacon button to open the service and the interface shown below will be displayed. Click the Passconde button again.



特性列表

TX Power
0000FFF4-0000-1000-8000-00805F9B34FB
Instance Id:0
Property: Read-Encrypted Write
Permission: Read Write Notify

Step 5: After clicking the Passconde button, the interface shown below will appear. Click the "Start notification button" again.



特性详情

描述列表

Client Configuration

00002902-0000-1000-8000-00805F9B34FB

Char

00002901-0000-1000-8000-00805F9B34FB

特性值:

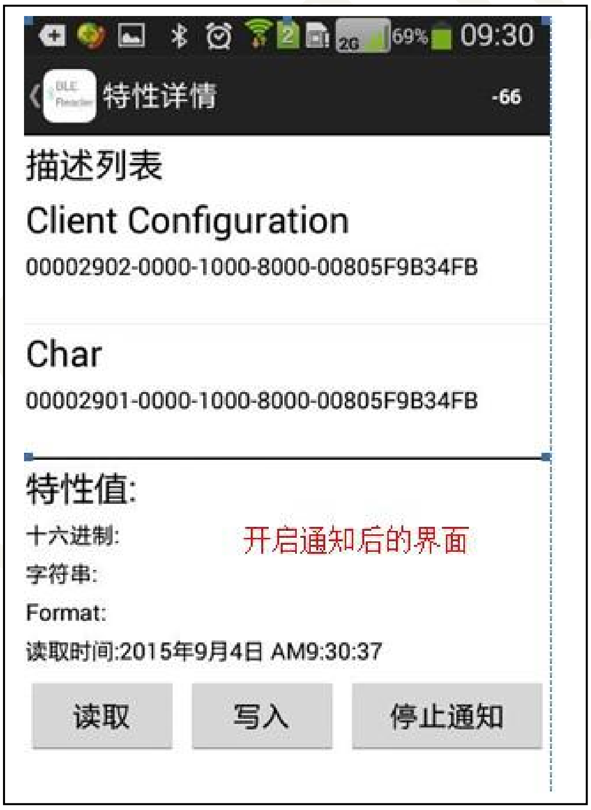
十六进制:

字符串:

Format:

读取时间:

Step 6: After clicking the “Start Notification Button”, the interface shown below will appear, that is, the notification will be enabled.



特性详情

描述列表

Client Configuration

00002902-0000-1000-8000-00805F9B34FB

Char

00002901-0000-1000-8000-00805F9B34FB

特性值:

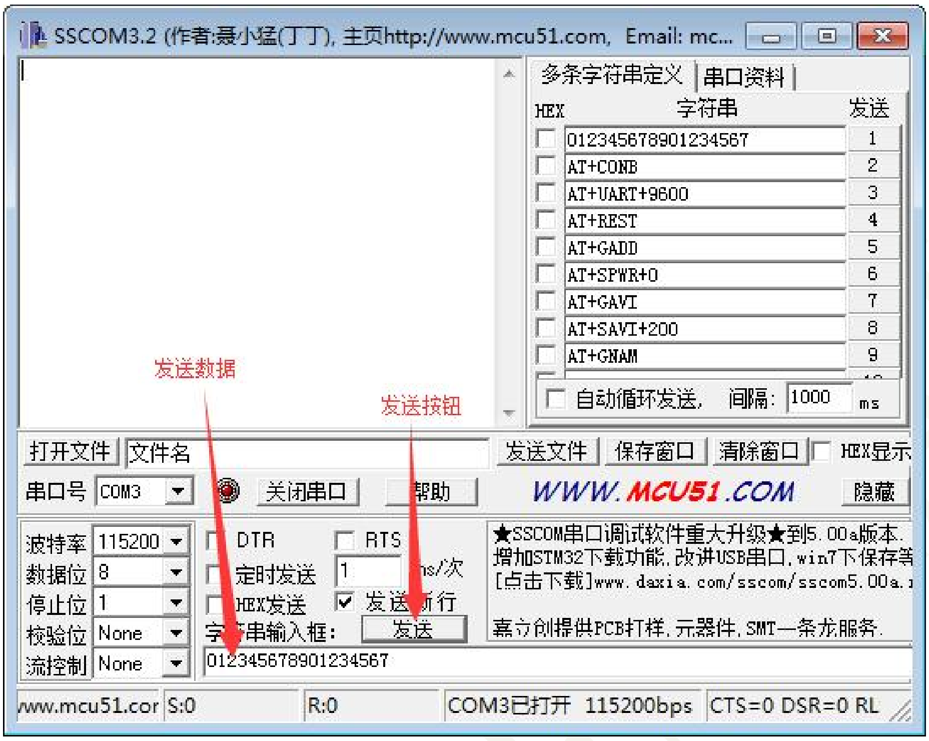
十六进制:

字符串:

Format:

读取时间:2015年9月4日 AM9:30:37

Step 7: Enter 18 bytes of transparent data in the “string input box” of the serial debugging assistant. In this example, enter the 18 bytes of data with the data: “012345678901234567” and click “Send”.



SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...

多条字符串定义 | 串口资料

HEX	字符串	发送
□	012345678901234567	1
□	AT+CONB	2
□	AT+UART+9600	3
□	AT+REST	4
□	AT+GADD	5
□	AT+SPWR+0	6
□	AT+GAVI	7
□	AT+SAVI+200	8
□	AT+GNAM	9

□ 自动循环发送, 间隔: 1000 ms

打开文件 | 文件名 | 发送文件 | 保存窗口 | 清除窗口 | □ HEX显示

串口号 COM3 | 关闭串口 | 帮助 | WWW.MCU51.COM | 隐藏

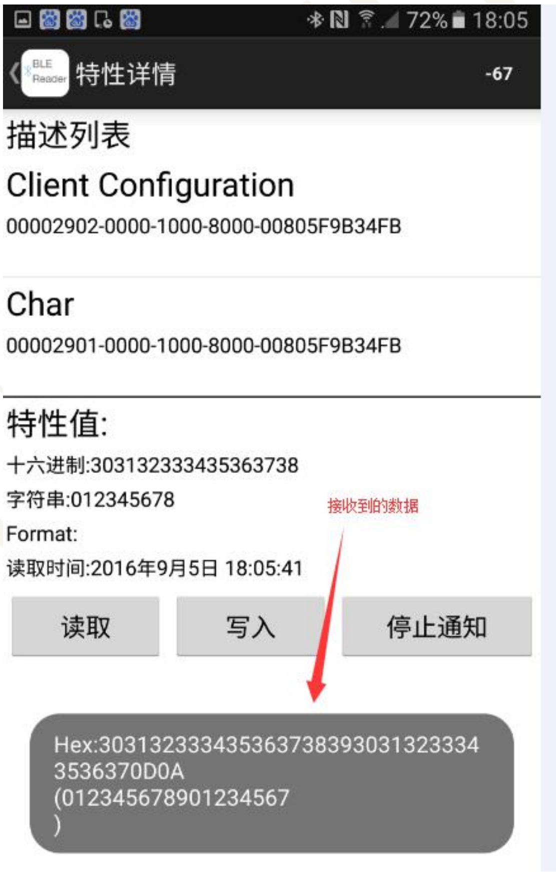
波特率 115200
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1 ms/次
□ HEX发送 ☑ 发送新行
字符串输入框: 发送
012345678901234567

★SSCOM串口调试软件重大升级★到5.00a版本. 增加STM32下载功能,改进USB串口,win7下保存等 [点击下载]www.daxia.com/sscom/sscom5.00a.r
嘉立创提供PCB打样,元器件,SMT一条龙服务.

www.mcu51.cor | S:0 | R:0 | COM3已打开 115200bps | CTS=0 DSR=0 RL

Step 8: After clicking Send, you can see the data transmitted through the Android phone.



72% 18:05

特性详情 -67

描述列表

Client Configuration
00002902-0000-1000-8000-00805F9B34FB

Char
00002901-0000-1000-8000-00805F9B34FB

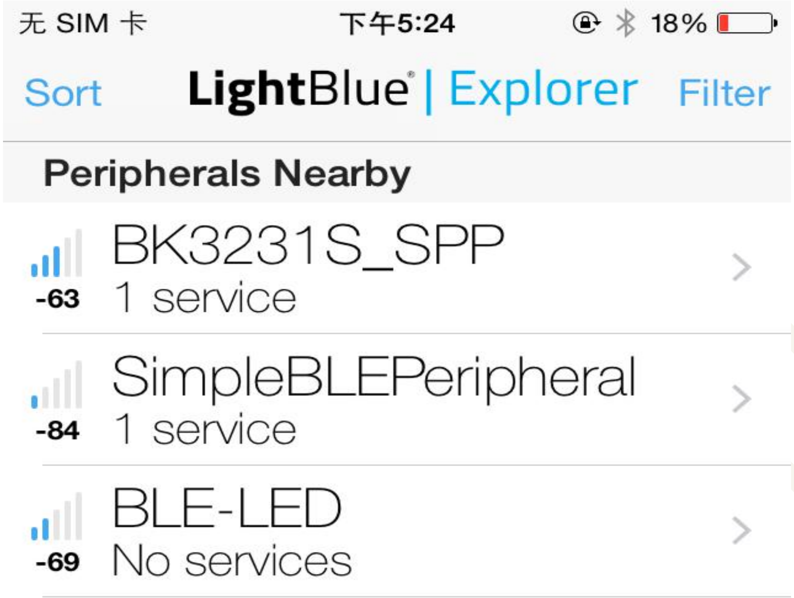
特性值:
十六进制:303132333435363738
字符串:012345678
Format:
读取时间:2016年9月5日 18:05:41

读取 | 写入 | 停止通知

Hex:303132333435363738393031323334
3536370D0A
(012345678901234567
)

(2) Transparent transmission test based on Apple system

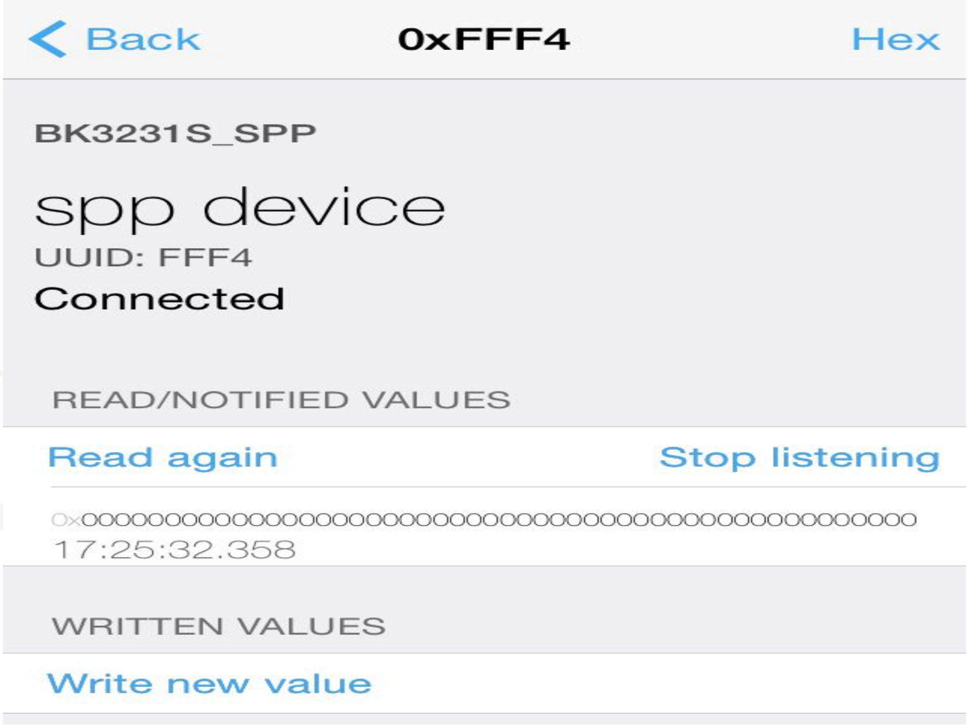
Step 1: First, open the "Light Blue" software on your iPhone, find your Bluetooth device in LightBlue (the default name is: BK3231S_SPP), and click Connect. If you need to enter the connection password when connecting, the default password is 123456, enter the password. Click OK.



Peripherals Nearby

-63	BK3231S_SPP	1 service
-84	SimpleBLEPeripheral	1 service
-69	BLE-LED	No services

Step 2: After clicking OK, if the connection is successful, the interface shown in the figure below will be displayed.



BK3231S_SPP

spp device

UUID: FFF4

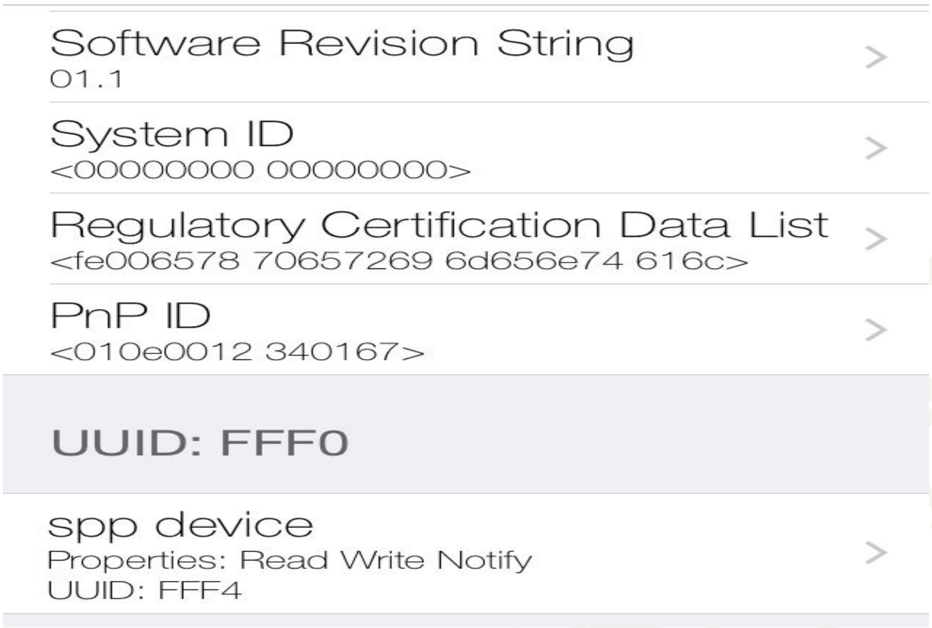
Connected

READ/NOTIFIED VALUES

0x000000000000000000000000000000000000000000000
17:25:32.358

WRITTEN VALUES

Step 3: Under the current interface, pull down, pull to the lowest end, you can see the interface, and click the UUID option for FFF4.



Software Revision String
01.1

System ID
<00000000 00000000>

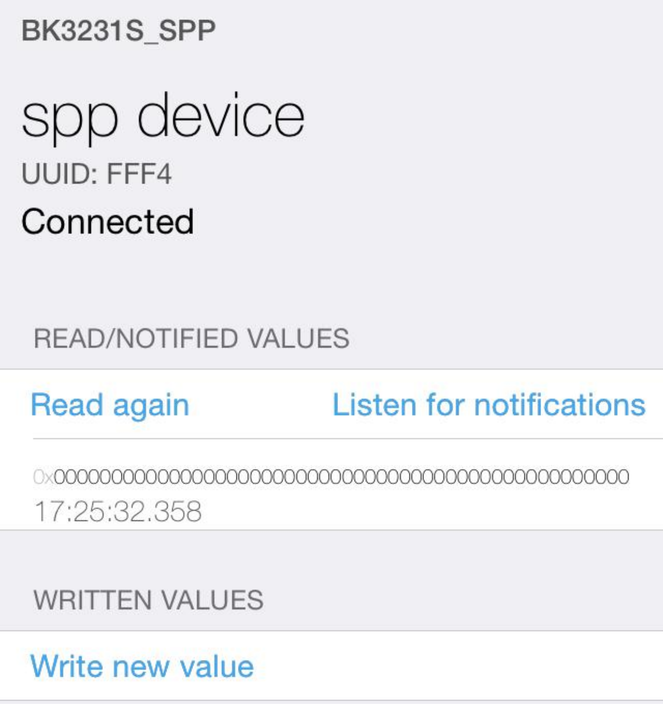
Regulatory Certification Data List
<fe006578 70657269 6d656e74 616c>

PnP ID
<010e0012 340167>

UUID: FFF0

spp device
Properties: Read Write Notify
UUID: FFF4

Step 4: Click the SPP device button to enter the interface shown below, and then click the “Listenfor notifications” button to open the notification.



BK3231S_SPP

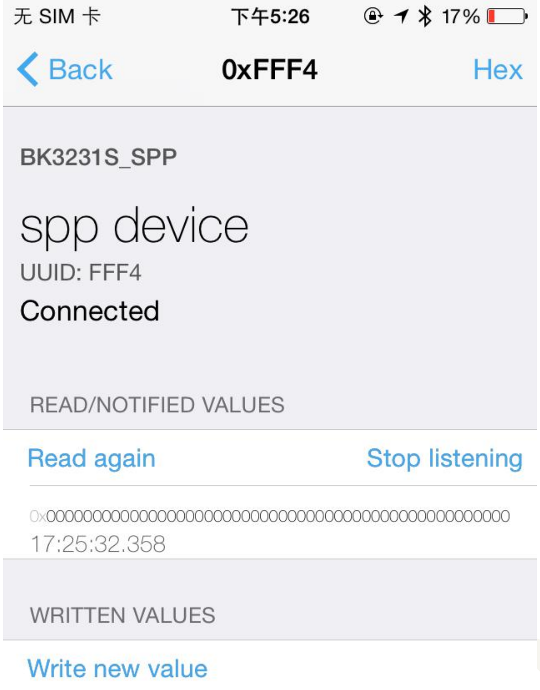
spp device
UUID: FFF4
Connected

READ/NOTIFIED VALUES

0x0000000000000000000000000000000000000000
17:25:32.358

WRITTEN VALUES

Step 5: After clicking the “Start Notification Button”, the interface shown below will appear, that is, the notification will be enabled.



BK3231S_SPP

spp device

UUID: FFF4

Connected

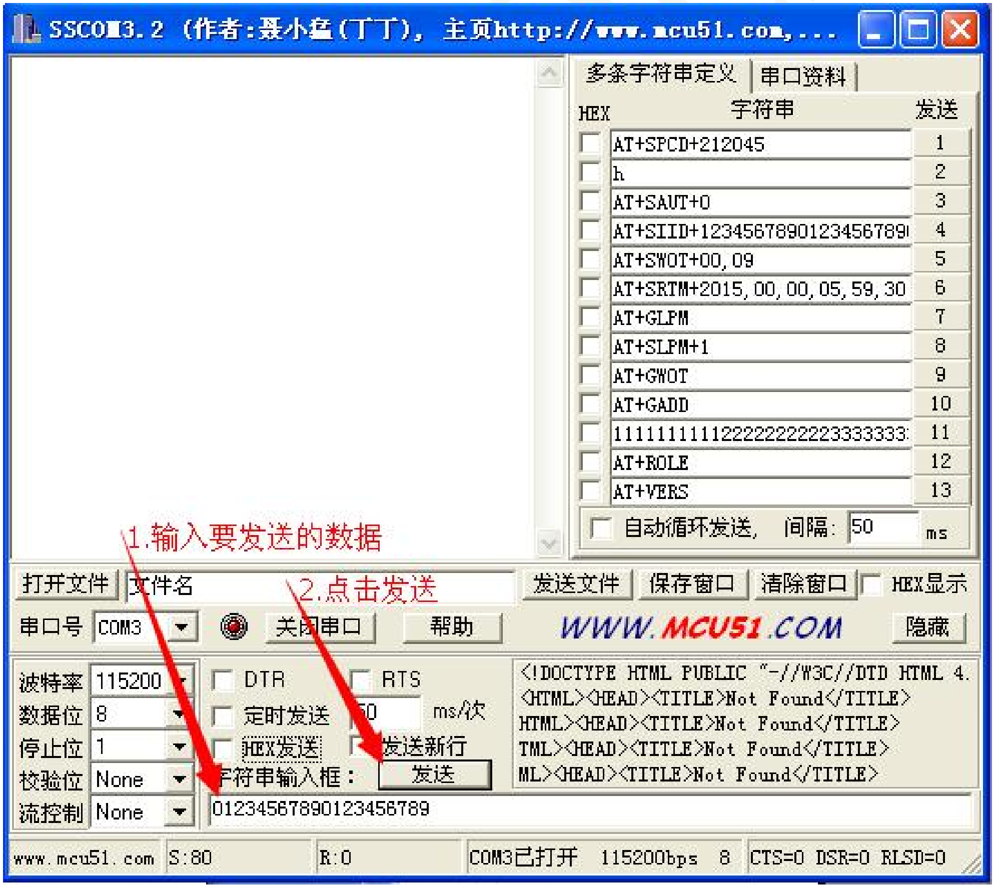
READ/NOTIFIED VALUES

0x0000000000000000000000000000000000000000

17:25:32.358

WRITTEN VALUES

Step 6: Enter 20 bytes of transparent data in the “string input box” of the serial debugging assistant. In this example, enter the 20 bytes of data with the data: “01234567890123456789” and click “Send”.



HEX	字符串	发送
□	AT+SPCD+212045	1
□	h	2
□	AT+SAUT+0	3
□	AT+SIID+1234567890123456789	4
□	AT+SWOT+00,09	5
□	AT+SRTM+2015,00,00,05,59,30	6
□	AT+GLPM	7
□	AT+SLPM+1	8
□	AT+GWOT	9
□	AT+GADD	10
□	111111111122222222223333333	11
□	AT+ROLE	12
□	AT+VERS	13

串口号 COM3

波特率 115200

数据位 8

停止位 1

校验位 None

流控制 None

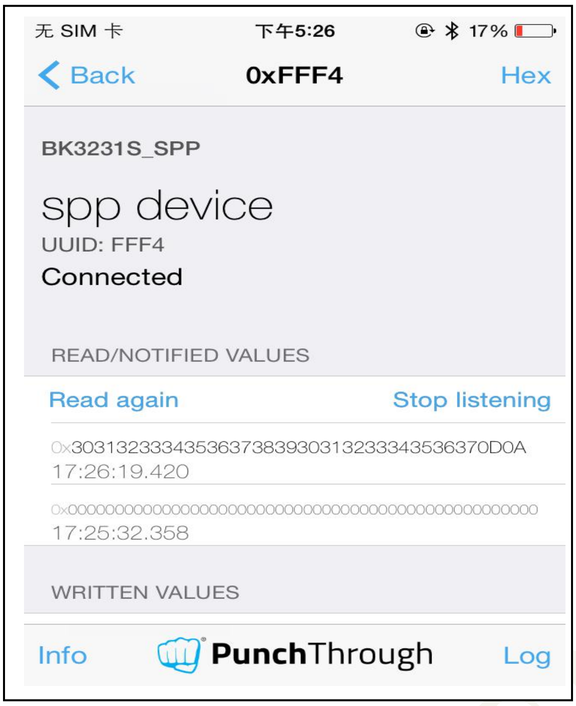
□ DTR □ RTS □ 定时发送 50 ms/次 □ HEX发送 □ 发送新行

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.
<HTML><HEAD><TITLE>Not Found</TITLE>
HTML><HEAD><TITLE>Not Found</TITLE>
TML><HEAD><TITLE>Not Found</TITLE>
ML><HEAD><TITLE>Not Found</TITLE>
```

字符串输入框： 01234567890123456789

www.mcu51.com S:80 R:0 COM3已打开 115200bps 8 CTS=0 DSR=0 RLSD=0

Step 7: After clicking Send, you can see the data transmitted through the Apple phone.



BK3231S_SPP

spp device

UUID: FFF4

Connected

READ/NOTIFIED VALUES

```
0x3031323334353637383930313233343536370D0A
17:26:19.420
0x00000000000000000000000000000000000000000000000000
17:25:32.358
```

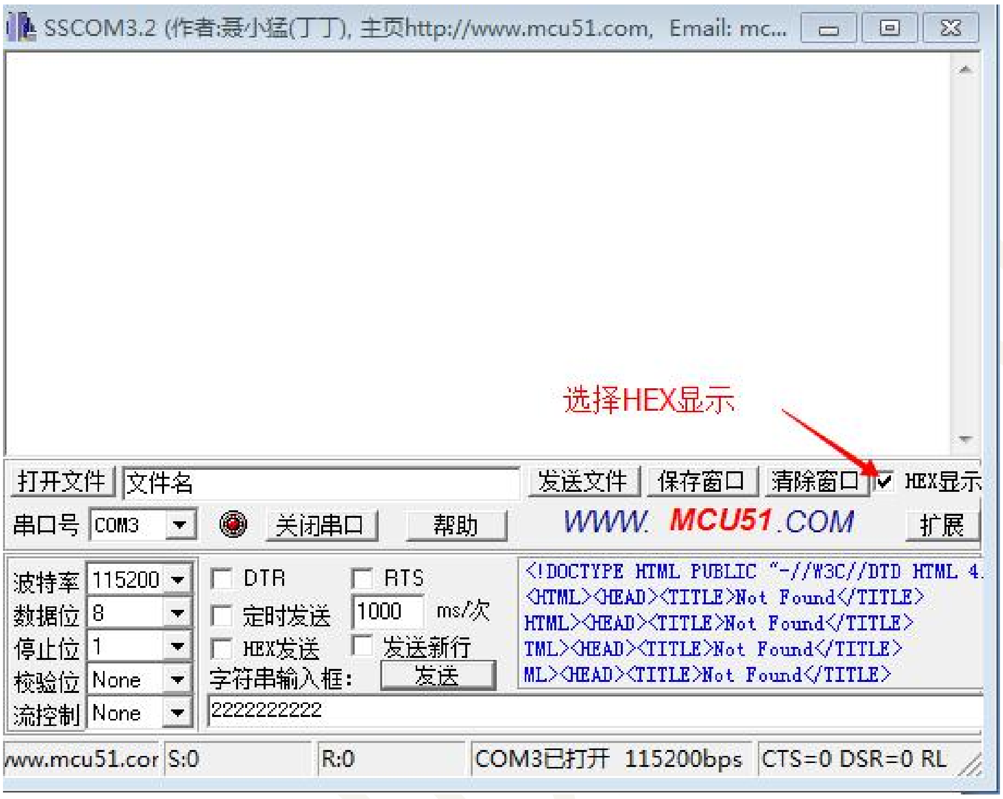
WRITTEN VALUES

Step 8: Click the Log button to view all transferred data.

5.2 Bluetooth to serial ransmission test

(1) Transparent transmission test based on Android system

Step 1: Open the serial port debugging assistant, set the serial port debugging assistant according to the method of 4.3.1, and then select “HEX display”.



SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...

选择HEX显示

打开文件 | 文件名 | 发送文件 | 保存窗口 | 清除窗口 | ☑ HEX显示

串口号 COM3 | 关闭串口 | 帮助 | WWW.MCU51.COM | 扩展

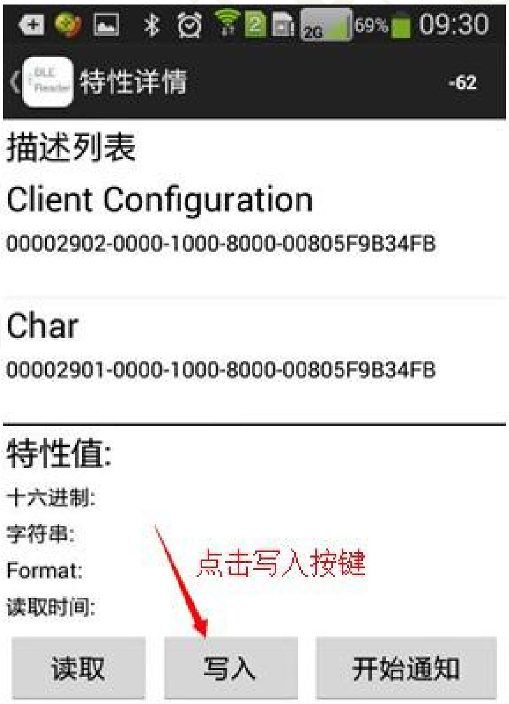
波特率 115200
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1000 ms/次
□ HEX发送 □ 发送新行
字符串输入框: 发送
2222222222

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.
<HTML><HEAD><TITLE>Not Found</TITLE>
HTML><HEAD><TITLE>Not Found</TITLE>
TML><HEAD><TITLE>Not Found</TITLE>
ML><HEAD><TITLE>Not Found</TITLE>
```

www.mcu51.cor S:0 R:0 COM3已打开 115200bps CTS=0 DSR=0 RL

Step 2: Repeat the steps 1 to 4 of the transparent transmission test under Android in 4.2.13. After the operation, enter the interface shown in the figure below, and then click the Write button.



09:30

特性详情 -62

描述列表

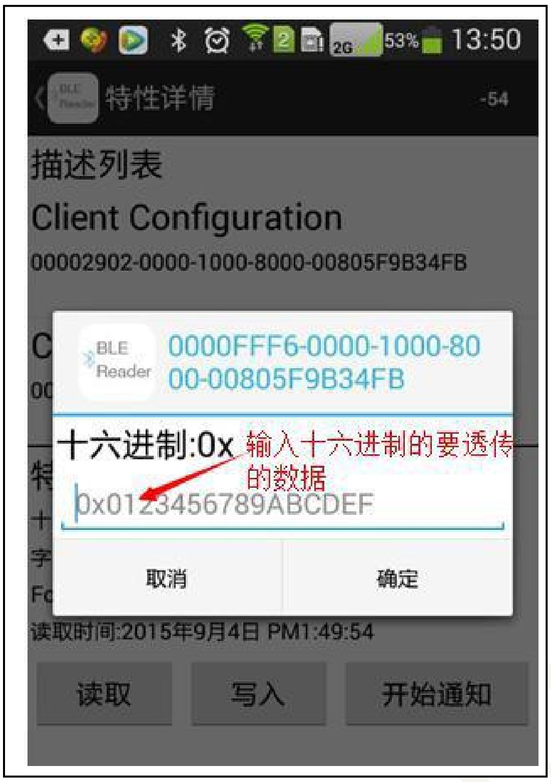
Client Configuration
00002902-0000-1000-8000-00805F9B34FB

Char
00002901-0000-1000-8000-00805F9B34FB

特性值:
十六进制:
字符串:
Format:
读取时间:

点击写入按键

Step 2: Click the write button to enter the interface shown in the figure below.



13:50

特性详情 -54

描述列表

Client Configuration

00002902-0000-1000-8000-00805F9B34FB

BLE Reader 0000FFF6-0000-1000-8000-00805F9B34FB

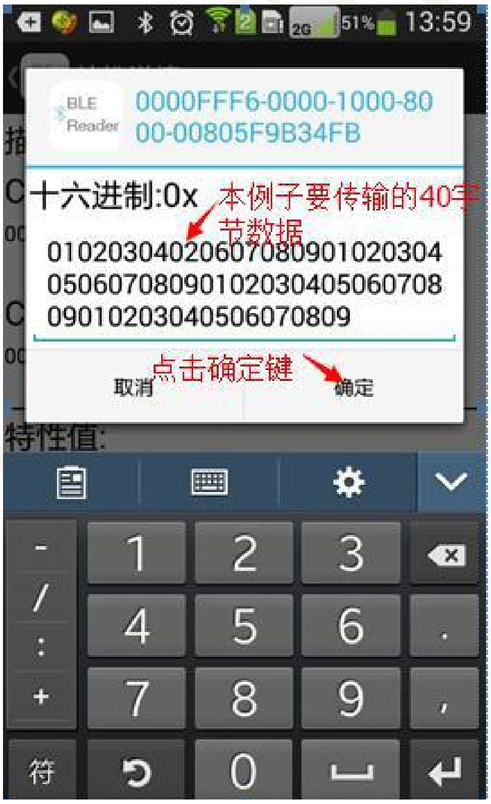
十六进制:0x

输入十六进制的要透传的数据

0x0123456789ABCDEF

读取时间:2015年9月4日 PM1:49:54

Step 3: Write the data to be transparently transmitted under ″hexadecimal: 0x″ (Note: the written data must be hexadecimal). In this example, the following data is written: ″01020304050607080901020304050607080901020304050600607080901020304050607080 9″, write After confirming the data, click OK and it will be sent out.



13:59

BLE Reader 0000FFF6-0000-1000-8000-00805F9B34FB

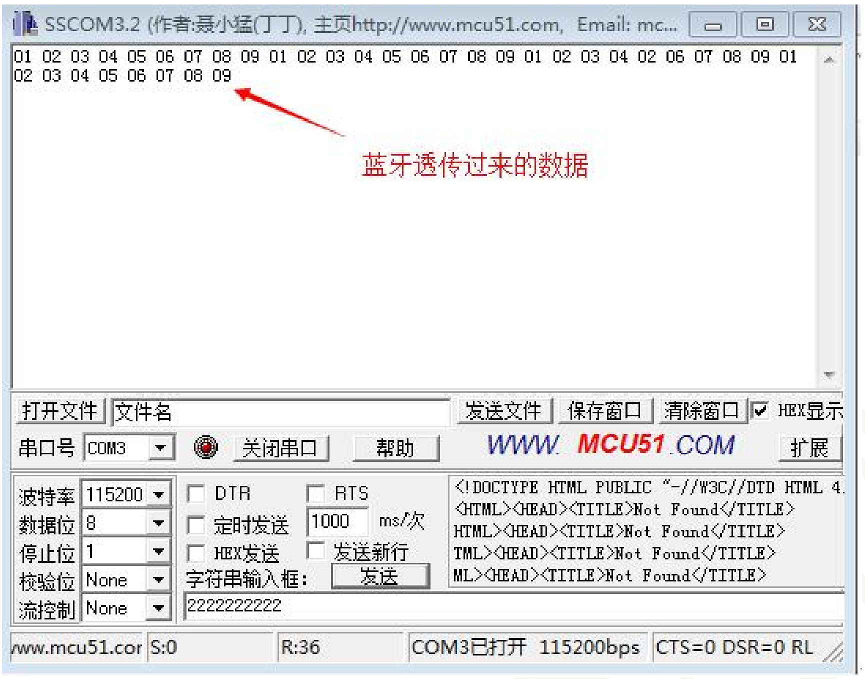
十六进制:0x

本例子要传输的40字节数据

01020304020607080901020304
05060708090102030405060708
0901020304050607080 9

点击确定键

Step 4: After clicking OK, you can see the data just sent in the serial debugging assistant.



SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...

```
01 02 03 04 05 06 07 08 09 01 02 03 04 05 06 07 08 09 01 02 03 04 02 06 07 08 09 01
02 03 04 05 06 07 08 09
```

蓝牙透传过来的数据

打开文件 | 文件名 | 发送文件 | 保存窗口 | 清除窗口 | ☑ HEX显示

串口号 COM3 | 关闭串口 | 帮助 | WWW. MCU51 .COM | 扩展

波特率 115200
数据位 8
停止位 1
校验位 None
流控制 None

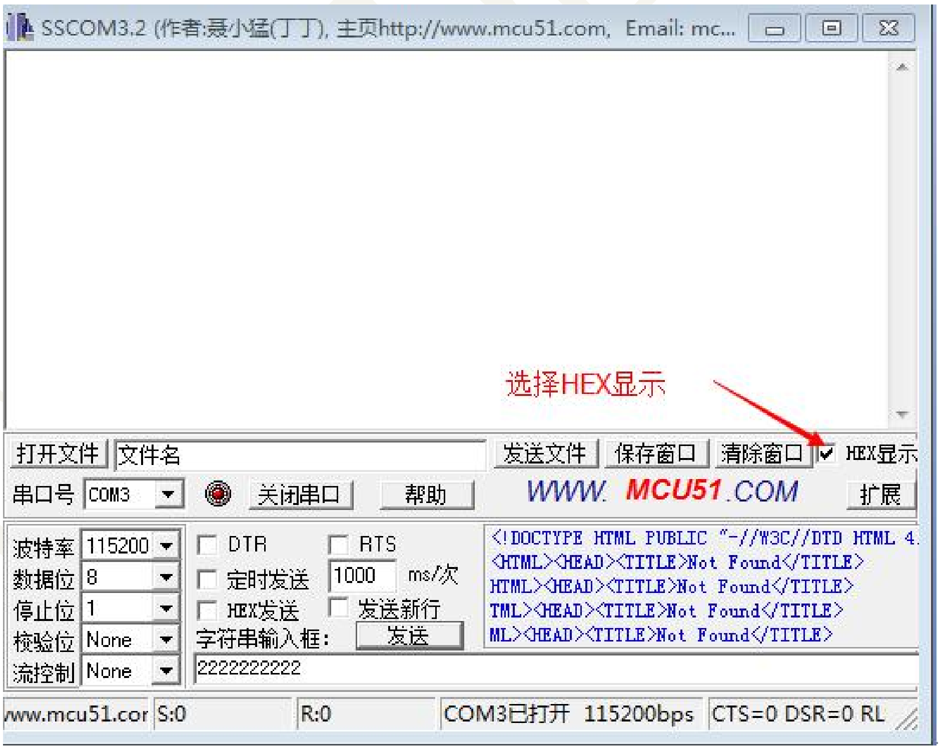
□ DTR □ RTS
□ 定时发送 1000 ms/次
□ HEX发送 □ 发送新行
字符串输入框: 发送
2222222222

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.
<HTML><HEAD><TITLE>Not Found</TITLE>
HTML><HEAD><TITLE>Not Found</TITLE>
TML><HEAD><TITLE>Not Found</TITLE>
ML><HEAD><TITLE>Not Found</TITLE>
```

www.mcu51.com S:0 R:36 COM3已打开 115200bps CTS=0 DSR=0 RL

(2) Transparent transmission test based on Apple system

Step 1: Open the serial port debugging assistant, set the serial port debugging assistant according to the method of 4.3.1, and then select “HEX display”.



SSCOM3.2 (作者:聂小猛(丁丁), 主页http://www.mcu51.com, Email: mc...

选择HEX显示

打开文件 | 文件名 | 发送文件 | 保存窗口 | 清除窗口 | ☑ HEX显示

串口号 COM3 | 关闭串口 | 帮助 | WWW. MCU51 .COM | 扩展

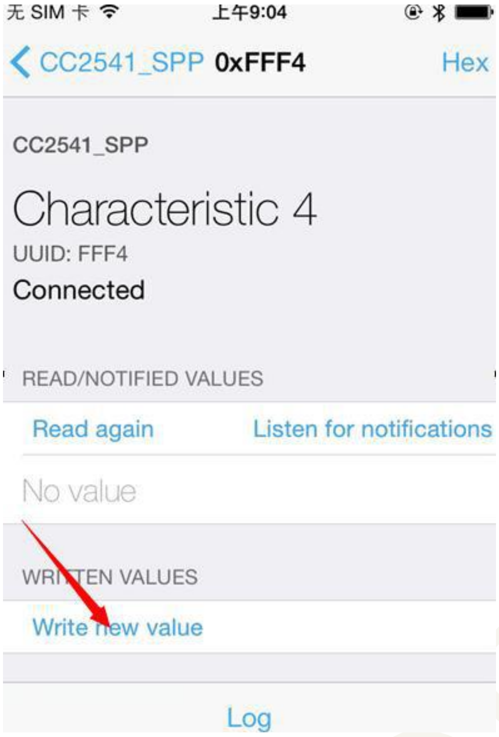
波特率 115200
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1000 ms/次
□ HEX发送 □ 发送新行
字符串输入框: 发送
2222222222

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.
<HTML><HEAD><TITLE>Not Found</TITLE>
HTML><HEAD><TITLE>Not Found</TITLE>
TML><HEAD><TITLE>Not Found</TITLE>
ML><HEAD><TITLE>Not Found</TITLE>
```

www.mcu51.com S:0 R:0 COM3已打开 115200bps CTS=0 DSR=0 RL

Step 2: Repeat the steps 1 to 3 of the transparent transmission test under the Apple system in 4.2.13. After the operation, enter the interface shown in the figure below, and then click the Write new value button.



CC2541_SPP

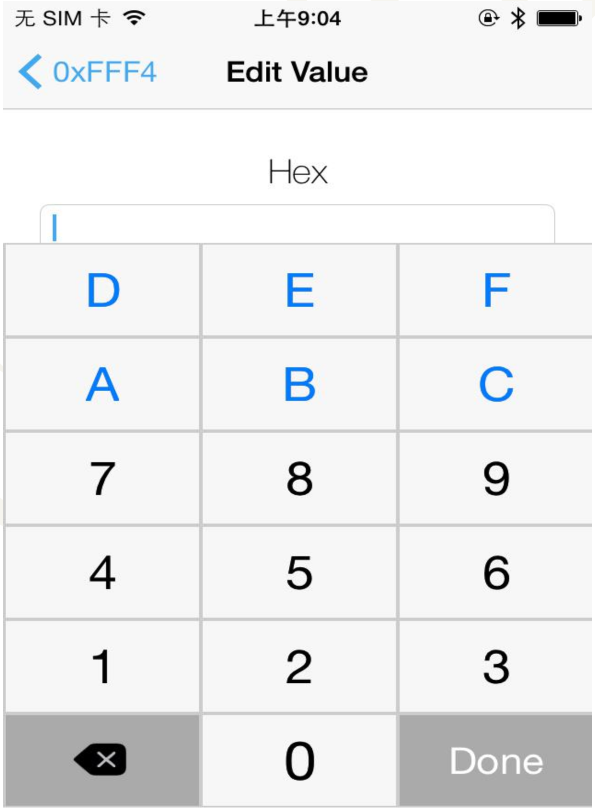
Characteristic 4

UUID: FFF4

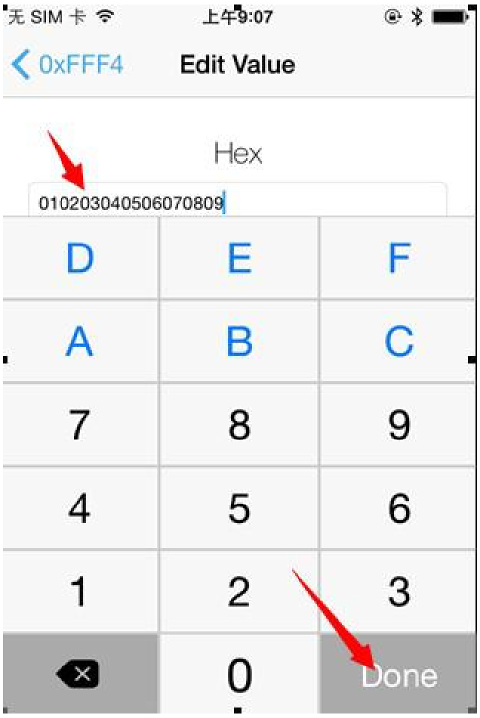
Connected

No value

Step 3: Click the Write newvalue button to enter the interface shown below.

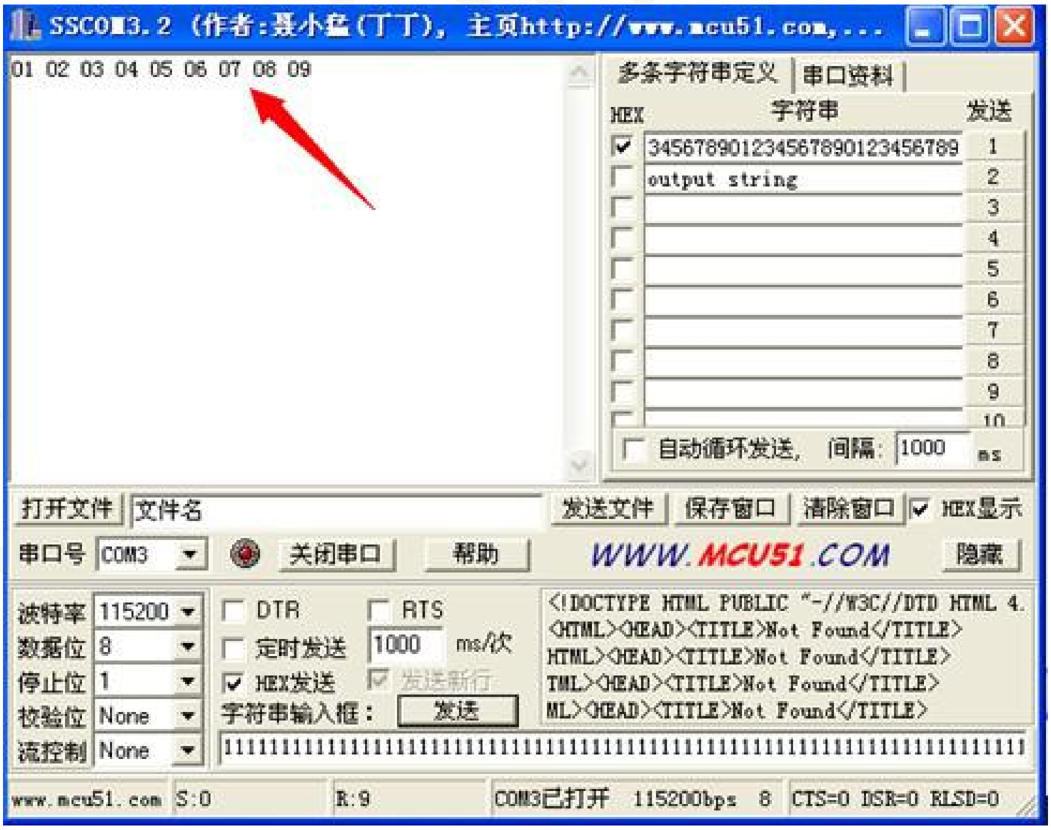


Step 4: Enter the hexadecimal transparent transmission data to be transmitted, enter "010203040506070809" here, click Done



Hex: 010203040506070809

Step 5: After clicking Done, you can see the data transmitted through the serial debugging assistant.



```
01 02 03 04 05 06 07 08 09
```

HEX	字符串	发送
☑	3456789012345678901234567890123456789	1
□	output string	2
□		3
□		4
□		5
□		6
□		7
□		8
□		9
□		10

□ 自动循环发送, 间隔: 1000 ms

☑ HEX显示

串口号 COM3

波特率 115200
数据位 8
停止位 1
校验位 None
流控制 None

□ DTR □ RTS
□ 定时发送 1000 ms/次
☑ HEX发送 ☑ 发送新行

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.
<HTML><HEAD><TITLE>Not Found</TITLE>
HTML><HEAD><TITLE>Not Found</TITLE>
TML><HEAD><TITLE>Not Found</TITLE>
ML><HEAD><TITLE>Not Found</TITLE>
```

字符串输入框: 1111111111111111111111111111111111111111111111111111111111111111

www.mcu51.com S:0 R:9 COM3已打开 115200bps 8 CTS=0 DSR=0 RLSD=0

六、mobile phone big data transmission

Service UUID: 0XFFF0

Channel UUID: 0XFFF3

specification:

HEAD	Package number	Current package ID	Data1	Data2	…	Data…	Data…	Checksum

HEAD is fixed at: 0XA1

Number of packages: the number of data packets currently transmitted

Checksum: 0 minus the current package data and

E.g:

Send data 0123456789012345678901234567890123456789 (note that the data can not exceed 128 bytes) is divided into 4 packets to send, the number of packets is: 4

0XA1	4	1	0	1	2	3	4	5	6	7	8	9	**0X2D**

0-(0xa1+4+1+1+2+3+4+5+6+7+8+9)= **0X2D**

0XA1	4	2	0	1	2	3	4	5	6	7	8	9	0X2C

0XA1	4	3	0	1	2	3	4	5	6	7	8	9	0X2B

0XA1	4	4	0	1	2	3	4	5	6	7	8	9	0X2A

Error return:

Head error:

0XA1	0XA5	0X05	0X0E	0XE0	0XC7

Check code error:

0XA1	0XA5	0X05	0X0E	0XFF	0XA8

Package erro:

0XA1	0XA5	0X05	0X0E	包 ID	Checksum

七、PP and MCU Programming Reference

7.1 IOS programming reference

The module always broadcasts in slave mode, waiting for the smart mobile device to scan as the master device, and to connect. This scan and connection is usually done by the APP. Due to the special nature of the BLE protocol, scanning the Bluetooth connection in the system settings is not practical. The smart device must be responsible for the management of the connection, communication, disconnection, etc. of the BLE slave device, which is usually implemented in the APP.For the programming of BLE under IOS, the most important thing is to read, write, and turn on the eigenvalue (Characteristic, this is called channel). Direct control of the module's direct drive function is achieved by reading and writing to the channel without the need for an additional CPU. The connectionhandle of this module defaults to 0 and communicates via UUID. The typical function description is as follows:

```
/*!
 *    @method    writeValue:forCharacteristic:withResponse:
 *    @paramdataThevalue towrite.
 *    @paramcharacteristicThecharacteristicon whichtoperformthewriteoperation.
 *    @paramtypeThetypeofwritetobeexecuted.
 *    @discussionWritethevalueofacharacteristic.
 *               Thepasseddataiscopiedandcanbedisposedofafterthecall finishes.
 *               The relevant delegatecallbackwillthen beinvokedwiththe status oftherequest.
 *    @see    peripheral:didWriteValueForCharacteristic:error:
*/
- (void)writeValue:(NSData*)dataforCharacteristic:(CBCharacteristic*)characteristictype:(CBCharacteristicWriteType)type;
```

Description: Writes a feature value.

```
NSData*d=[[NSDataalloc]initWithBytes:&datalength:mdata.length];
[pwriteValue:dforCharacteristic:ctype:CBCharacteristicWriteWithoutResponse];
/*!
 *    @methodreadValueForCharacteristic:
 *    @paramcharacteristicThecharacteristic for whichthevalueneeds toberead.
 *    @discussionFetchthevalueofacharacteristic.
 *               The relevant delegatecallbackwillthen beinvokedwiththe status oftherequest.
 *    @see    peripheral:didUpdateValueForCharacteristic:error:
*/
- (void)readValueForCharacteristic:(CBCharacteristic*)characteristic;
```

Description: Read a feature value.

```
[preadValueForCharacteristic:c]; /*!

 *   @methodsetNotifyValue:forCharacteristic:
 *   @paramnotifyValueThevaluetosettheclientconfigurationdescriptor to.
 *   @paramcharacteristicThecharacteristiccontainingtheclientconfiguration.
 *   @discussionAsktostart/stopreceivingnotificationsforacharacteristic.
 *             The relevant delegatecallbackwillthen beinvokedwiththe status ofthe
request.
 *   @see   peripheral:didUpdateNotificationStateForCharacteristic:error:
 */
-        (void)setNotifyValue:(BOOL)notifyValue        forCharacteristic:(CBCharacteristic
*)characteristic;
```

Description: Turns on the feature value notification

enable switch.

```
[selfsetNotifyValue:YESforCharacteristic:c];
```

Turn on the notification enable switch

```
[selfsetNotifyValue:NOforCharacteristic:c];
```

Turn off the notification enable switch

```
/*
 *   @methoddidUpdateValueForCharacteristic
 *   @paramperipheralPheripheralthatgotupdated
 *   @paramcharacteristicCharacteristicthatgotupdated
 *   @errorerrorErrormessageifsomethingwentwrong
 *    @discussion  didUpdateValueForCharacteristic  is  called when  CoreBluetooth
hasupdateda
 *   characteristicforaperipheral.Allreadsandnotificationscomehere tobeprocessed.
*/
-(void)peripheral:(CBPeripheral                                   *)peripheral
didUpdateValueForCharacteristic:(CBCharacteristic        *)characteristicerror:
(NSError*)error
```

Description: This callback function is executed each time the read operation is performed. The application layer saves the read data in this function.

Note: The best test BLE software for IOS is LightBlue, which can be downloaded to the source code online.

7.2 Android programming reference

The Android 4.4 system can be fully transparent to the Bluetooth 4.0 module. Connectionhandle defaults to 0, communicating via UUID. Download the BLEDemo.apk on the official website of Android and you can use the F-9688 Bluetooth module for serial port transmission.

7.3 IOS, Android, MCU ,the parameter programmer need to know

Connection interval: connInterval, a multiple of 1.25ms, with a minimum of 6 (ie 7.5ms) and a maximum of 3200 (ie 4.0s). Supervised timeout: supervisorTimeout, multiple of 10ms, minimum 10 (ie 100ms), maximum 3200 (ie 32.0s). Must be greater than: (1+slaveLatency)*(connInterval)

Slave latency: slaveLatency, minimum 0, maximum 499. Must be less than: ((supervisionTimeout/connInterval)–1) Features of different connection parameters: Both devices will run with high power consumption and high data throughput. Waiting time is short. Connection interval. Both devices will run with low power consumption and low data throughput. Or 0 Latent value: The slave device operates at high energy consumption. The high latency value of the master device that can be quickly received from the device can be operated with low energy consumption from the device without data transmission. The slave device cannot receive the data master device from the master device in time. Can receive data from the device in a short time. Supervised timeout. When the signal is weak or the signal is unstable, it can be “seen” in time. The connection is disconnected. The long supervision timeout occurs. When the signal is unstable, the data is re-received within the supervision time. In the case of a packet, it is considered that the connection is not disconnected. Suggestions and suggestions: The connection interval can be simply understood as the interval at which two connected Bluetooth devices send a "heartbeat packet". The Bluetooth device determines whether the connection between them is disconnected, that is, whether the heartbeat packet arrives in time. For example, set connInterval=100ms, slaveLatency=1, and supervisorTimeout=1s. connInterval=100ms, means that the Bluetooth host sends a heartbeat packet to the slave every 100ms, and the slave responds once after receiving it. slaveLatency=1 means that if there is no data transmission from the slave, you can skip the reply of the heartbeat packet and save power. supervisionTimeout=1s, for the slave, when it finds that it has not received the heartbeat packet for 1 second, it considers the connection broken. The host said that when it sent 11 heartbeat packets in succession, it did not get a reply and thought that the connection was broken.

According to the BLE4.0 protocol, the master device can send a connection update request to the slave at any time to change the connection parameters. At the link layer, the update of the connection parameters is always initiated by the master, but the L2CAP layer allows the slave to

The master sends a connection parameter update request. The BLE protocol allows the application layer to dynamically adjust connection parameters based on actual needs, which results in corresponding power consumption and data throughput. Each time the two Bluetooth devices create a connection, these three connection parameters are given by the host. For example, iPhone4S and iPhone5, the connection parameters are set to: 24,0,72.

Convert it:

connInterval=24*1.25ms=30ms;

slaveLatency=0;supervisionTimeout=72*10ms=7

20ms;

We see that the connection interval of the iPhone is relatively short, so the data throughput is large, but the energy consumption is relatively large. The average current is about 900uA~1000uA, the supervision timeout is 720ms, and the connection is quickly detected. In addition, the connection parameter values set by the Samsung galaxy S3 are 54, 0, 42. According to experience, the slave latency setting value is generally lower or 0, and the supervision timeout is generally not too long. The connection interval can be set according to different application needs. With less data exchange and power-sensitive applications, the connection interval can be set longer. In summary, for the setting of BLE connection parameters, you can experiment more and get a set of values that are satisfactory in terms of data throughput and power consumption. In addition, when the module is connected to an iOS device, Apple stipulates that the connection interval parameter of the Bluetooth accessory of the iOS device must comply with Apple's regulations in addition to the requirements of the Sig group:

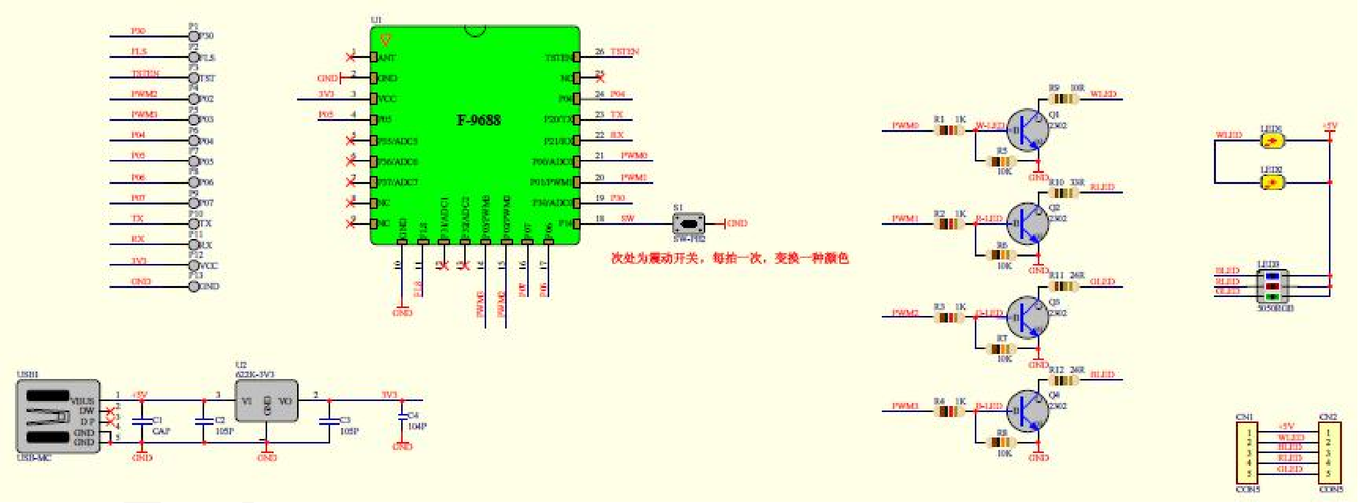
connInterval*(slaveLatency+1)≤2seconds connInterval≥20ms

slaveLatency≤4 supervisionTimeout≤6seconds

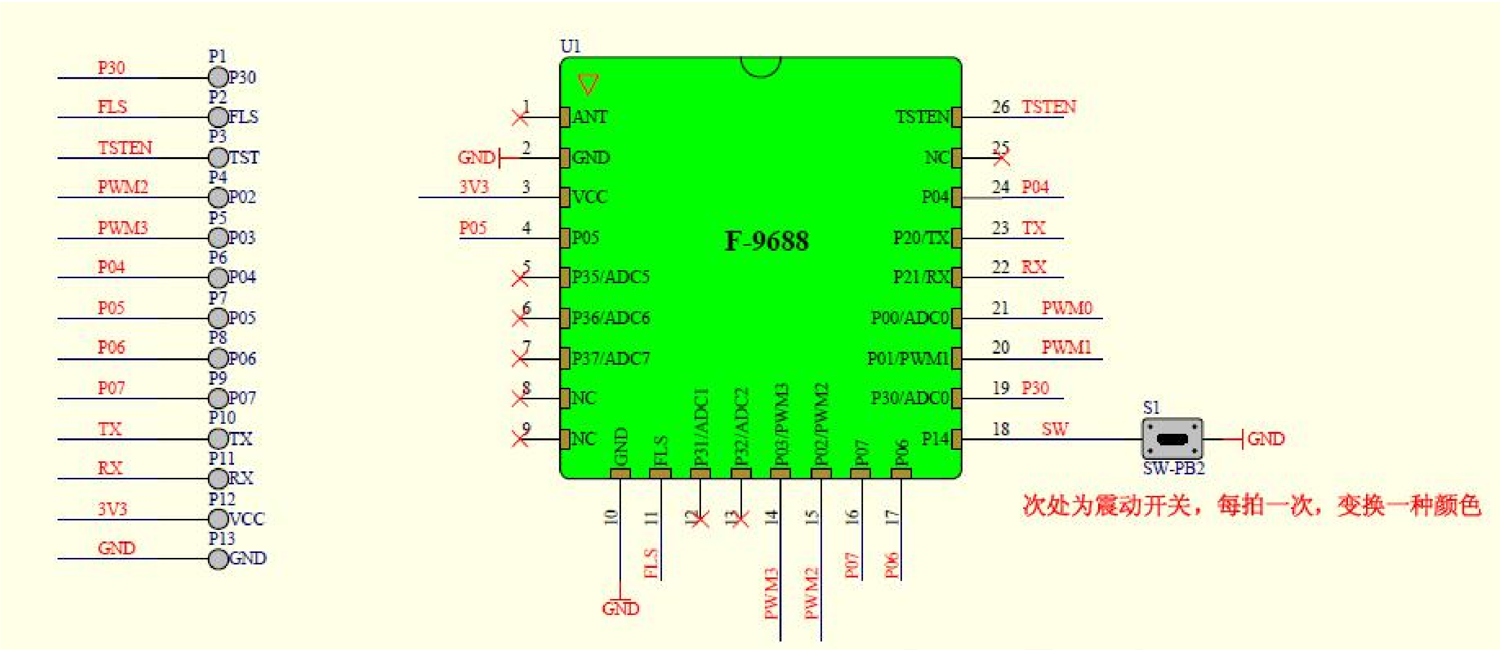
connInterval*(slaveLatency+1)*3<supervisionTimeout.

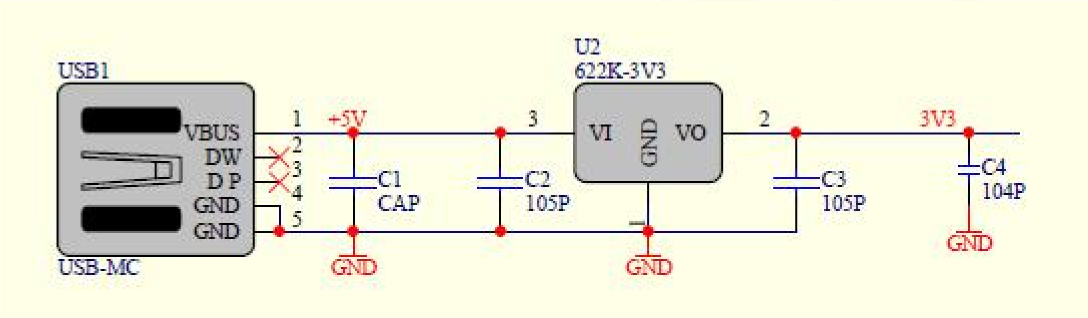
八、Customized program rule conventions and reference circuits

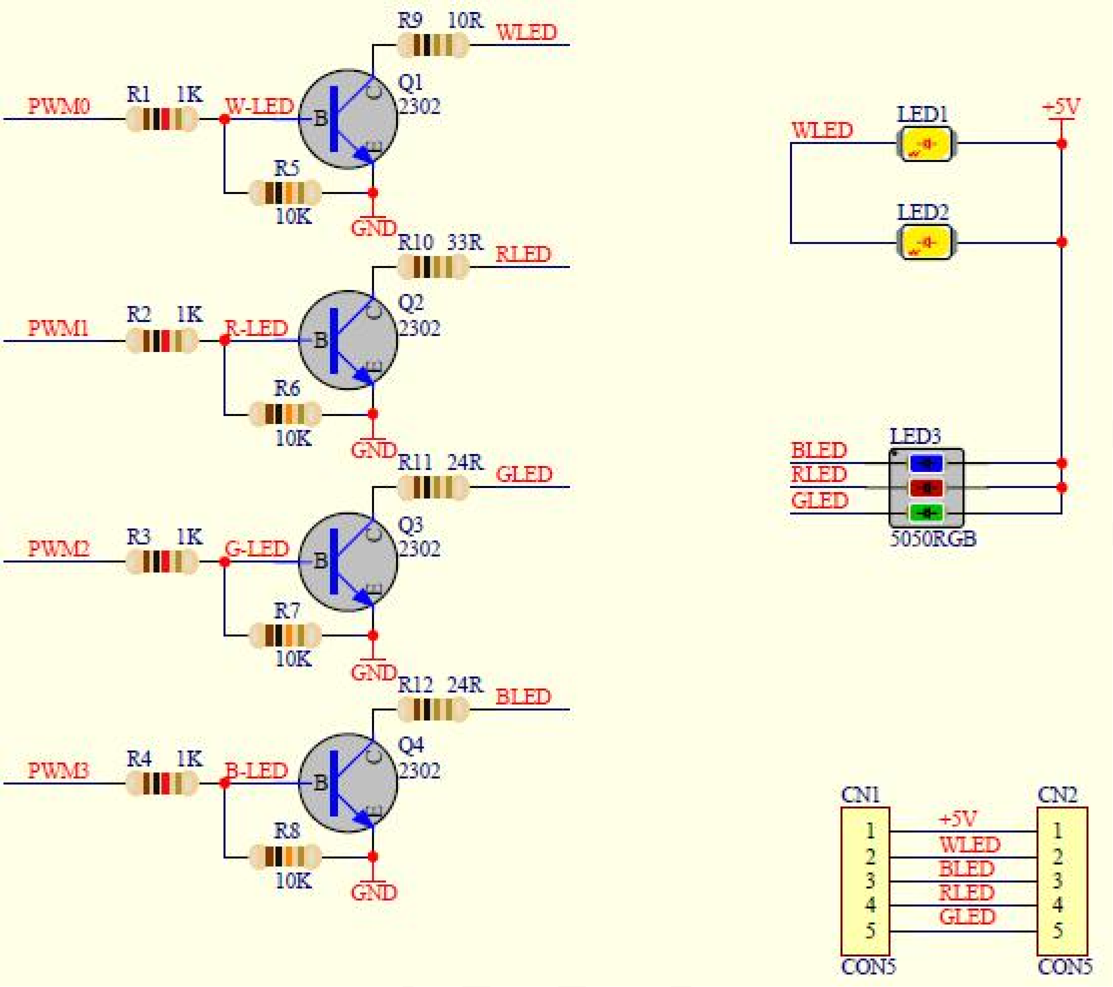
1)Complete circuit diagram



2）Partially clear schematic







九、Modification record

Document version	Code version	Change description
3.0.1	3.0	Software version changed from 2.5 to 3.0
3.0.2	3.0	IO function change, AT command adds LED, low power control, module control enable
3.0.3	3.7	Protocol stack version upgrade 3.7, change the problem that the device name is too long, increase the mobile phone AT command, increase the error AT command prompt, change the write attribute to within response
3.1.0	3.9	Increase PWM control and upgrade the protocol stack to 3.9
3.1.1	3.9	P00 change, change from ADC0 to PWM0
3.2.0	4.1	Increase airborne upgrades, increase mobile phone big data transmission part, software upgrade 4.1