# ZTE中兴

## ZTE MG815+ Module Development Board EBV3 User Guide

### Version：V1.0

# Copyright Statement

With strong technical force, ZTE Corporation can provide CDMA/GPRS module customers with the following all-around technical support:

1. Provide complete technical documentation;

2. Provide the development board used for R&D, test, production, after-sales, etc.;

3. Provide evaluations and technical diagnosis for principle diagram, PCB, test scenarios;

4. Provide test environment;

ZTE Corporation provides customers with onsite supports, and also you could get supports through telephone, website, instant communication, E-mail, etc.

The module website http://module.ztemt.com.cn provides the relevant industry information and module technical documentation. The authorized module customers could download the latest technical documentation for our website. If you have more requirements, you could send an E-mail to module@zte.com.cn. You can also call us at 0755-86140899 for more supports.

# Foreword

## Summary

The corresponding product name to this document is ZTE CDMA and GSM modules. It will be helpful for you to understand how to use the development board by referring this document.

## Readers

- System designers
- Hardware engineers
- Software engineers
- Test engineers

## Brief

This document introduces how to use the development board, here is the index:

| Chapter | Contents |
|---|---|
| 1 summary | Characteristics, function chart and relevant technical specifications of MG815+ module development board. |
| 2 function illustration | Layout and functions. |
| 3 jumper settings | Jumper settings of development board. |
| 4 debugging and testing environment | Debugging and testing environment introduction. |
| 5 debugging steps | Debugging steps introduction. |
| 6 hyper terminal configuration | Hyper terminal configuration steps illustration. |
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## Modification record

### Document version V1.0 （2008-10-10）
The first time to publish in the form.

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# 1  Summary

## 1.1 Characteristics of Development Board

MG815EBV3 development board is designed for debugging and testing based on ZTE CDMA and GSM modules. The users can debug above types of modules provided by ZTE with this board. Meanwhile, considering the variety of modules, we designed jumpers on the development board through which users could make the board work in different modes and therefore realize all the functions provided by the module.

## 1.2 Function Chart

Basic functions provided by development board: power interface, serial port, UIM card interface, audio interface, LED indicator, testing sites and so on. Please refer to the functions chart:

Figure 1-1 Function chart
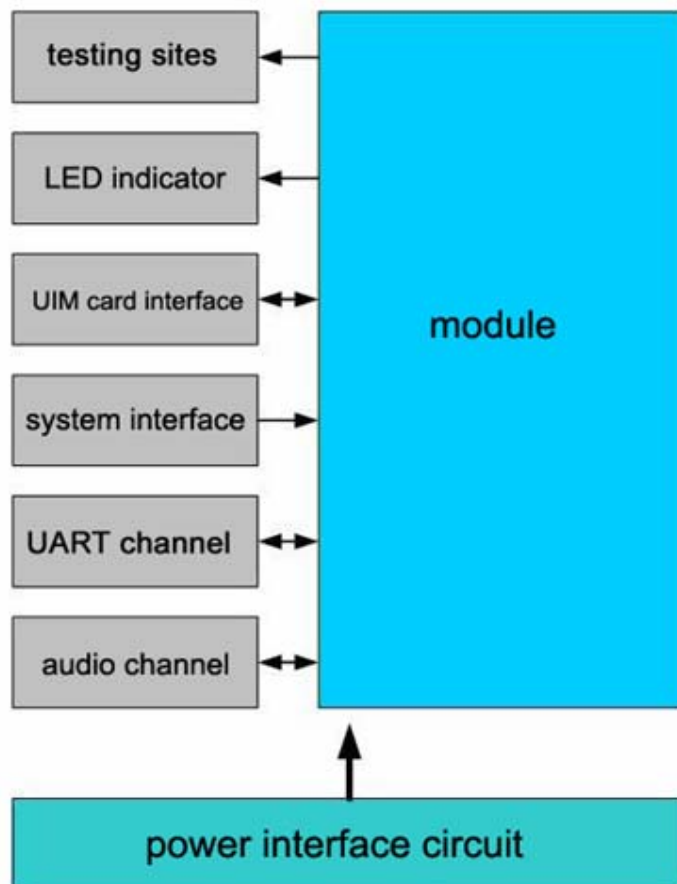


## 1.3 Relative Documents

- Module type selecting guide
- 《AT Command Manual for ZTE Corporation's MG815+ Module》
- 《AT Command Manual for ZTE Corporation's ME3000 Module》
- 《MG815+ Module Hardware Design User Manual》
- 《CDMA/GPRS module FAQ》

# 2 Function Illustration

## 2.1 Layout

Figure 2-1 Layout
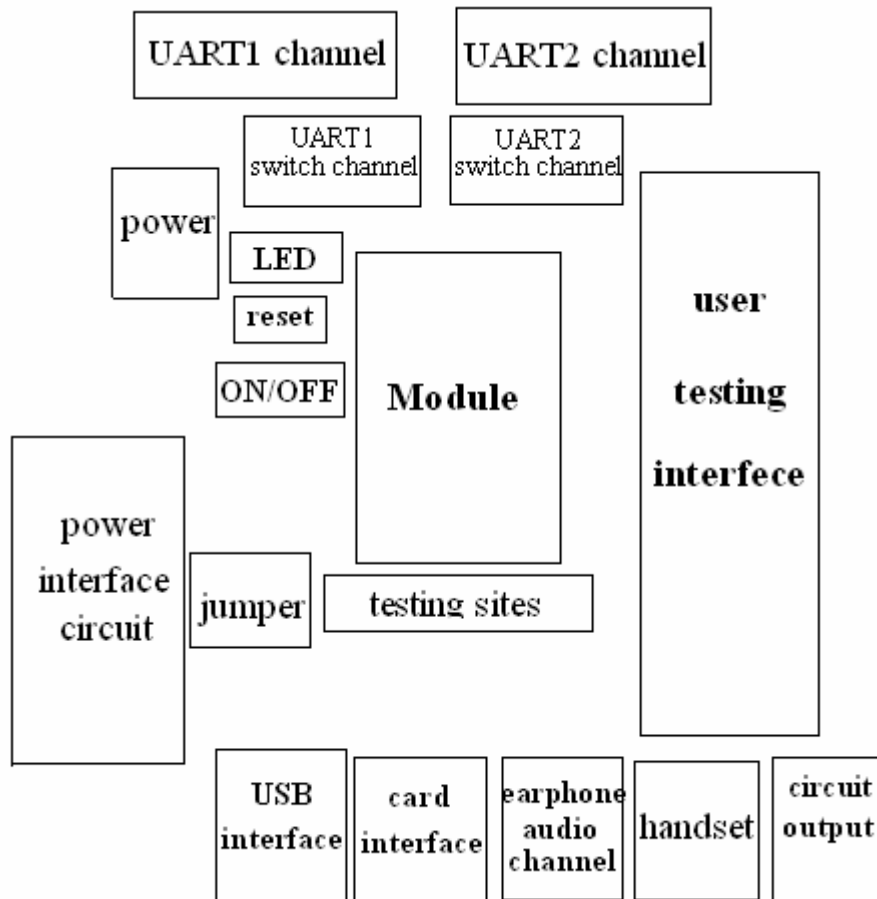


## 2.2 Functions of Development Board

**1）Power Interface**

The users can supply power to module development board in the following ways:

A）Supply a 3.8~4.2V steady battery interface to the development board via pin JP5. JP5 interface defines as a standard lithium battery interface, PIN1 is battery input (VCCBAT), PIN3 is battery voltage detection (BATSENSE), PIN5 is GND. The power input like supply power for module through battery. If you use this method, the development board will be turned on when the users short circuit JP5 PIN2,4, and short circuit JP30 after inserting JP5 connector.

B）Supply a 5~6V steady DC to the development board via pin JP20, which like supply power for module through charger. If you use this method, the development board will be turned on when the users place switch(S0) to "on" ,and JP5 short circuit PIN4,6（default），short circuit JP30 after inserting JP20 connector.

Figure 2-2 The principle of part of power
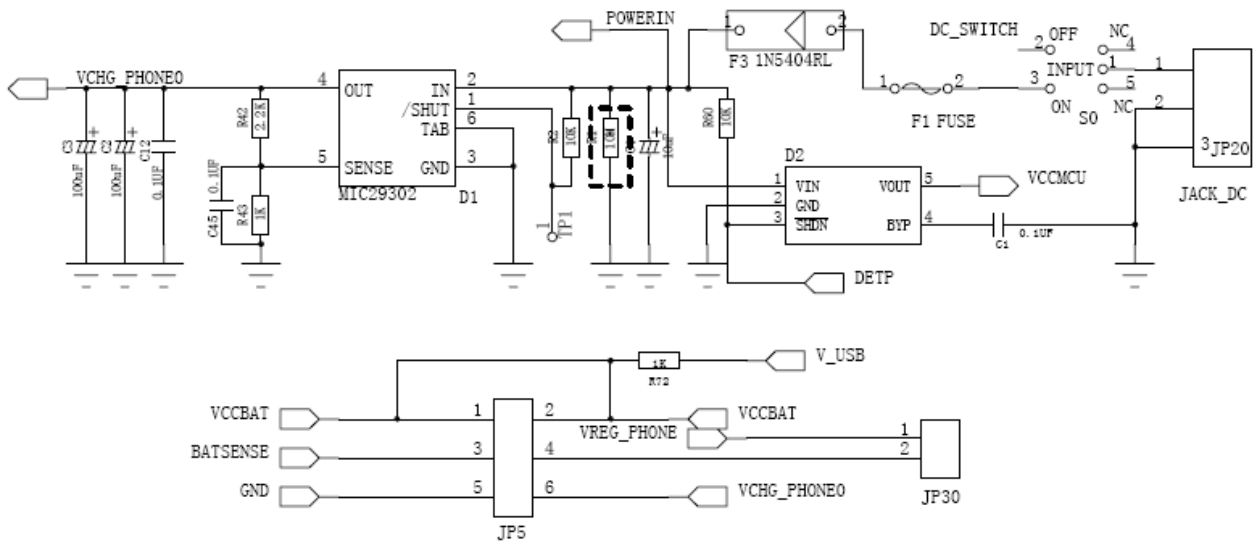


If user's board has CPU, MCU and our module, you should advert to the order if module power first or power at the same time. You should avoid module's internal CMOS chip lanch-up, that will lead to the module can't start.

Press reset button (S3) on the development board to reset module. This button controls RESET pin on module through a audion. Please refer to 《MG815+ Module Hardware Design User Manual》 for information of Idiographic requirements to control RESET pin on modules.

Figure 2-3 The principle of reset and ON/OFF circuit
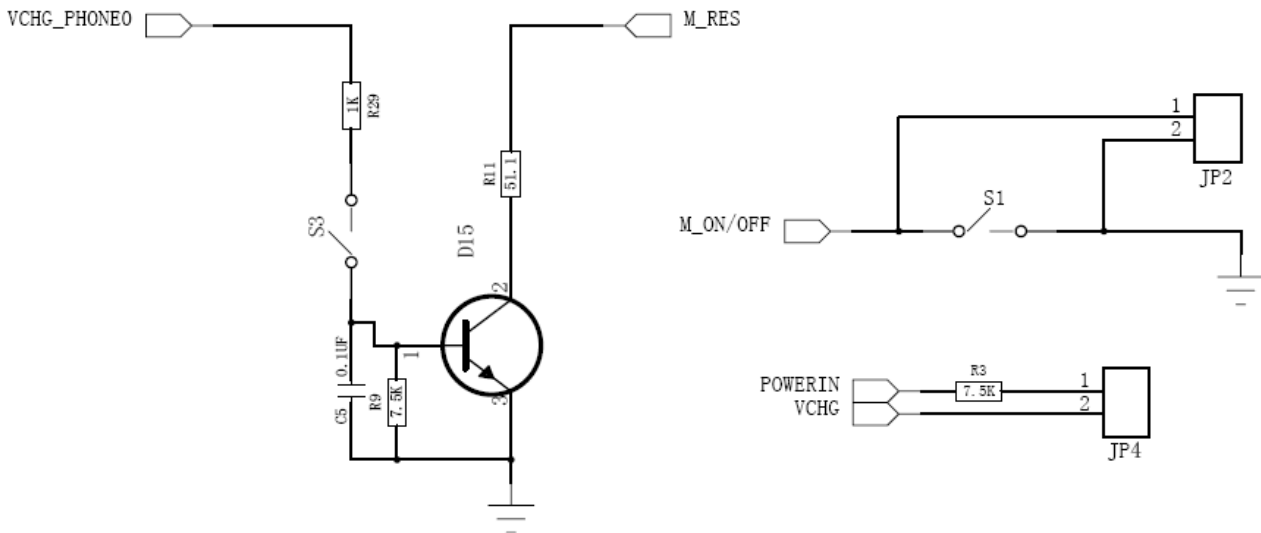


For the same reason, modules can be started or shut down by pressing switch button—press the button to shut down when it powers on, press the button to run when it powers off. One end of this switch is connected to ON/OFF pin on module, the other end connect with GND, The module's ON/OFF pin is used to pull up, low level is valid. Therefore ON/OFF operation is completed through controlling ON/OFF pin. In addition, if ON/OFF the module through S1, you must disconnect JP4 (default short circuit). Because JP4 is connect the module's pin VCHG with 5~6VDC power. When JP4 is short circuit, the module will turn on automatically if switch on the power, at this time S1 is inefficacy, because even if

you press the S1 turn off, the module will turn on at once.

**Note**：*At present ,if you want to start GSM module's ON/OFF button，you must press switch button S1 to start the module.*

**2）Serial Port**

External connector could provide two serial ports, among which UART1 must be provided externally through the testing board because it is an exclusive port used for downloading, RF parameter calibration, and AT command interface. UART1's label is COM1. In most cases, the users would debug the module only through UART1. Serial port 1 is always set as 8-line standard modem. It is specially noted that if the users need to connect development board through serial port, a standard serial port connection cable is required. Otherwise, it may cause serial port communication failure. Luminescence diode D4 is used to indicate UART1's state, D4 light is used to indicate UART1's connection is normal. UART2 uses pins together with USB. Furthermore, these pins are mainly used for USB. Actually, development board supplies external interfaces UART2 and USB at the same time. There are some jumpers fixed on the board, the users can choose if serial port 2 or USB is available. The location of jumpers relation to USB/ UART2 are D20 (pin Com USB).If short circuit pin Com (short circuit pin 1 and pin 2; short circuit pin 4 and pin 5; short circuit pin 7 and pin 8; short circuit pin 11 and pin 12) that is enable serial port 2, If short circuit USB (short circuit pin 2 and pin 3; short circuit pin 5 and pin 6; short circuit pin 8 and pin 9; short circuit pin 11 and pin 12), that is enable USB (software support is needed), please refer to "jumper setting" section for D20 details. It is specially noted that UART2 only set 4 lines (TXD, RXD, CTS, RTS). Luminescence diode D16 is used to indicate UART2's state, D16 light is used to indicate UART2's connection is normal.

Module's output IO level is 2.9VTTL, when it's connect with standard 3.3V or 5V logic circuit (like RS232 driver chip MAX3238 etc.), it need level transfer. Module's output pin is connect with MAX3238 chip in our development board, and input pin is connect with MAX3238 through audion circuit in figure 2-4.

Figure 2-4 level transfer circuit
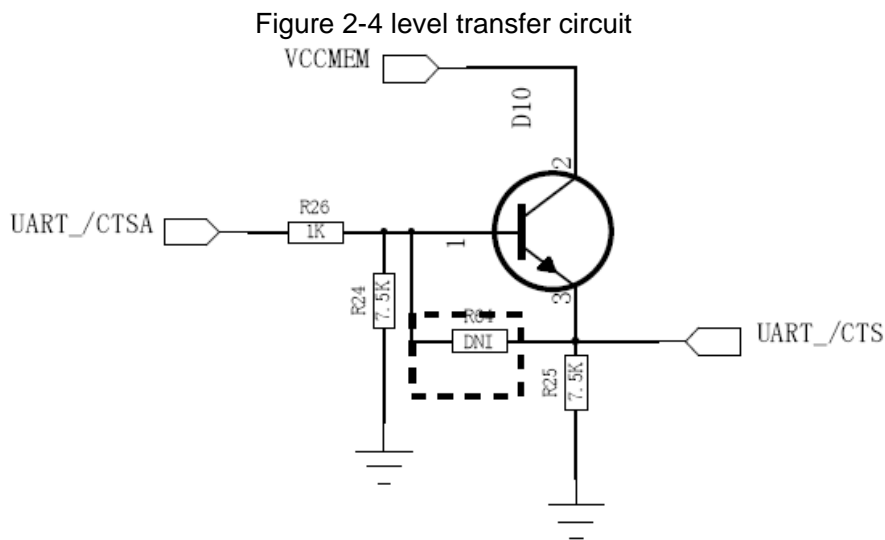


**3）USB interface**

Development board use MIC2550A interface chip to extend module's USB pin, supply USB interface for exterior. USB interface's site is F4.

*Note: module's USB pin and UART2 pin are in common use, so when you use USB, you need choose jumper D20 short circuit USB pin (Short circuit pin2,3; Short circuit pin5,6; Short circuit pin8,9; Short circuit pin11,12）.*

### 4）SIM/UIM Card Interfaces

As a standard communication module, this interface supports SIM and UIM at the same time. Testing board supply UIM／SIM card. Because different card's data pin's output circuit is different, so I/O used 7.5K resistance pull up to VPP, and the location number of card interface is S2.

Note：be careful to insert the UIM/SIM card, metal piece is face to underside, jag is face to outside.

Figure 2-5 UIM/SIM card interface circuit
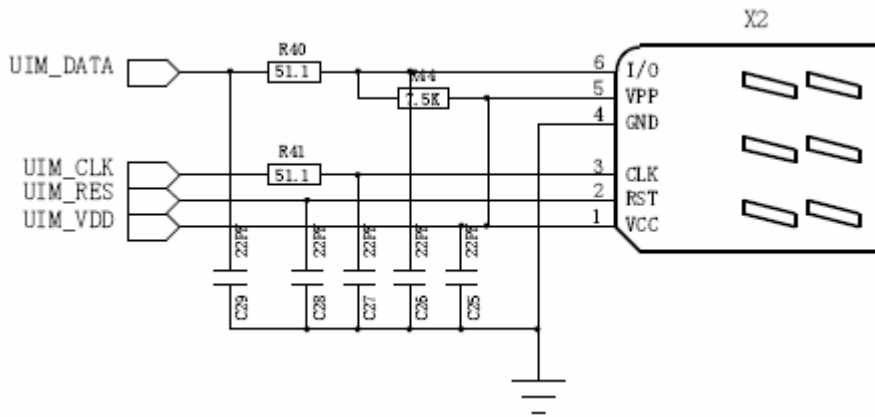


### 5）Audio Channels

External interface defines multiple audio channels, including 2 audio input channels, one for handset and the other for earphone; 2 audio output channel, one for handset and the other for earphone too. The interface also defines line output, used to support chord ring or voice output. All these audio channels are extended from development board, if the users want to test their functions, they just need to connect corresponding external devices, such as earphone, handset, etc.

Generally, the first audio input/output channel is used for handset, it is differential interface. HMIC is connect with MIC_1, HSPK is connect with SPK_1. Considering handsets' interfaces maybe are different, so the design supplies two scheme: OldHandle and NewHandle, development board default in initialization state. In different actual condition, user can choose whether to joint R46-52's eight resistances to decide to use NewHandle scheme or other custom scheme. Handset's site is X5.
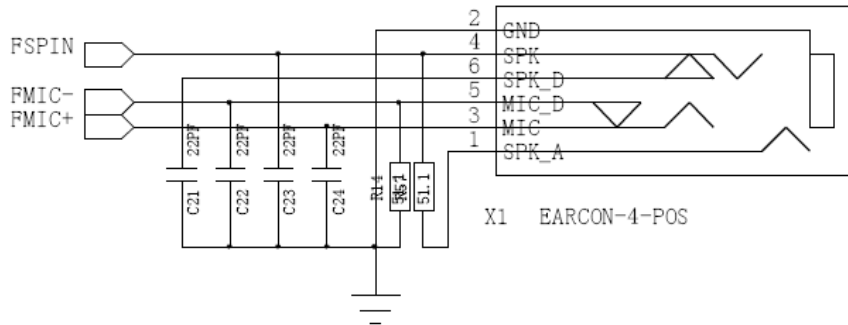
Figure 2-6 Handset interface circuit
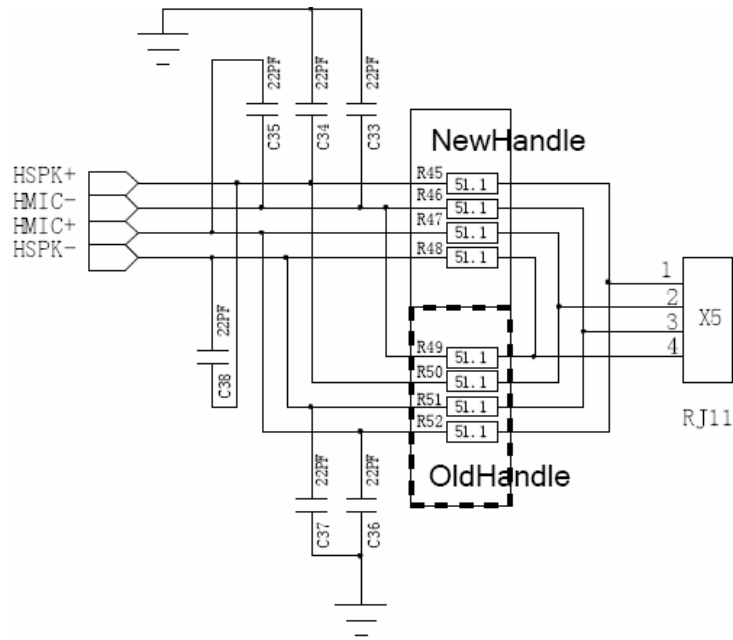


The channel2 audio input/output is used for earphone. FSPIN is connect with SPK_2, FMIC is connect with module MIC_2.
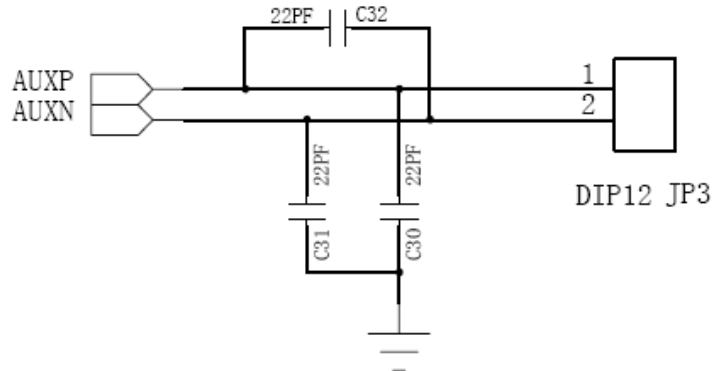
Note：be careful to choose earphone socket，prevent when insert earphone, the audio and GND is short circuit. The earphone's site is is X1.

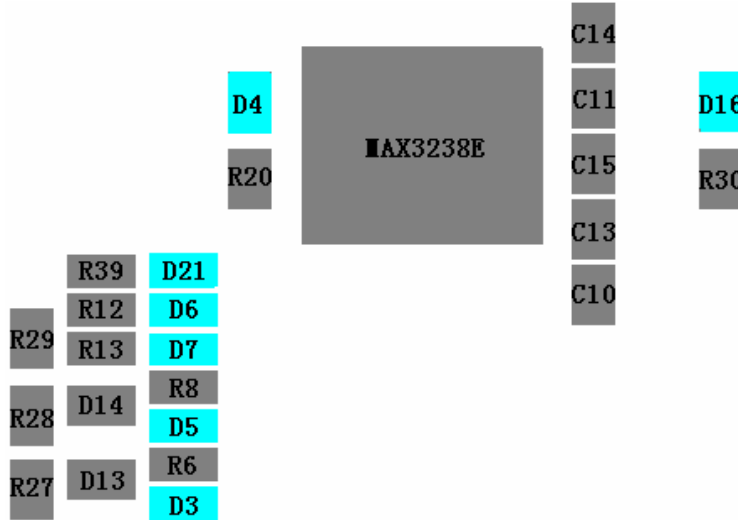Figure 2-7 earphone interface circuit



Only output testing pin is given for line output (its site is JP3), it can be used through externally connecting PA driver.

Figure 2-8 The principle of parts of output circuit

**6）LED Indicators**

Figure 2-9 The ketch map of LED



Development board supply following LED to represent module's state (software support is needed).

- D4: Serial port 1 working state indicator will be turned on when serial port1 connect successfully.
- D16: Serial port 2 working state indicator will be turned on when serial port2 connect successfully.
- D3: Call incoming/SMS indicator will be turned on when receive data.
- D5: Network state indicator will wink when inspect carrier.
- D7: module working state indicator will be turned on when module startup normally (2.85V output power).
- D6: Development board power indicator will be turned on when development board power supply （3.8V main power）normally.
- D21: module ringing indicator will be turned on when ringing signal is low level.

**7）Testing Sites**

The module's 40-pin connector leads to 40 testing sites, which are provided for users to conveniently test the module's working status. The location number for test sites is X35.

Testing sites figure and the name of main testing sites signal are as follows:

Figure 2-10 The ketch map of testing sites
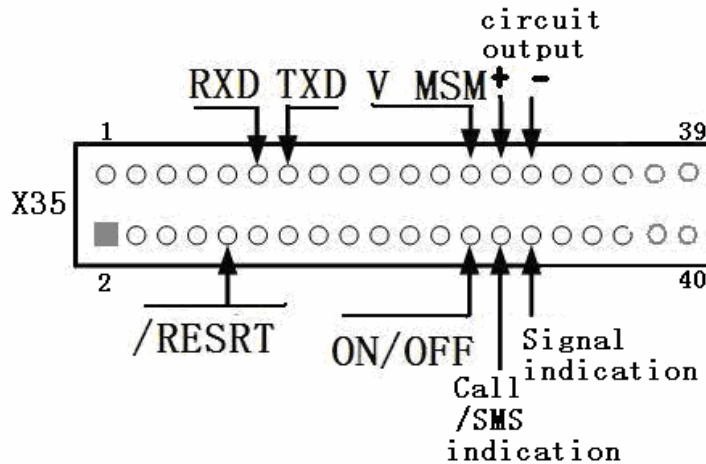
# 3 Jumper Settings

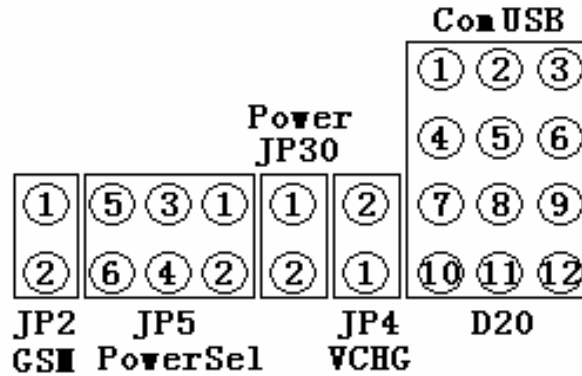Figure 3-1 The sketch map of jumper



Table 3-1 Jumper settings

| Jumper | Jumper modes | Function explanation |
|---|---|---|
| JP2 | Connect | Connect ON/OFF with GND (used for GSM module) |
| | Disconnect | Default |
| JP5(pin1,3,5) | Supply power | PIN1 is power input, PIN 3 is power detection, PIN 5 is GND |
| | No supply power | Default |
| JP5(pin2,4,6) | Short circuit pin2,4 | Supply power |
| | Short circuit pin4,6 | exterior supply power (default） |
| JP30 | For reduce impedance arouse from the jumper, in fact, PCB has already short circuited, but it's inefficacy. | |
| JP4 | Short circuit | V_CHG enable (Default) |
| | Disconnect | V_CHG inefficacy |
| D20 | Short circuit PIN1,2 | Serial Port 2 RXD signal enable |
| | Short circuit PIN4,5 | Serial Port 2 RTS signal enable |
| | Short circuit PIN7,8 | Serial Port 2 CTS signal enable |
| | Short circuit PIN10,11 | Serial Port 2 TXD signal enable |
| | Short circuit PIN2,3 | USB_DATA signal enable |
| | Short circuit PIN5,6 | USB_VPO signal enable |
| | Short circuit PIN8,9 | USB_VMO signal enable |
| | Short circuit PIN11,12 | USB_OE signal enable |

# 4  Debugging and Testing Environment

Debugging and testing environment is composed by development kit and PC. Development kit contains: development board, module, linear power (typical output value is DC6V, 1500m A), standard 5-core serial port cable, antenna, RF connection cable, handset, earphone. SIM/UIM card is necessary to prepare.

The development board is used for power supply and signal output, linear power for supplying necessary power to module (5V-7V) via development board, PC for inputting/outputting AT commands from module via serial ports or USB interfaces. Please refer to practical design scheme of development board for connecting structure.

# 5  Debugging Steps

Take CDMA module as an example:

1.  Insert module to development board, connect power, serial port cable, antenna, handset, earphone and SIM/UIM card. Then connect module with antenna through RF cable.
2.  Turn on power, press S1 on-off. (If the JP4 is short circuit, neglect this step.)
3.  Check current display. Current in module itself should be 80-100MA when power on. If current is too low, please turn off power supply and check if connection between module and development board is correct.
4.  Open corresponding PC serial port( setting parameters：baud rate is 115200bps, 8 data bit, 1 stop bit, no checkout, install USB to serial port converter before communicating through USB interface (if necessary). Send "AT+CGMR" through serial port to query software version. response from module:

    +CGMR: S/W VER: M6025A-SBTW-3.1.30 ZDM1A4AAC0.11OK(indicates that software version is M6025A-SBTW-3.1.30 ZDM1A4AAC0.11OK)

    If software version query is on the rails, it makes out that the baseband portion of module works in the right way. Otherwise, the connection on board or UART/USB interface must have some mistakes.
5.  Make sure that antenna can receive signals from base station through RF cable connecting module with antenna.

    Send "AT+CSQ？" to query receiving signal's intensity（RSSI）and frame error rate(FER).

    response from module:

    +CSQ：<RSSI>,<FER>

    OK

    (<RSSI>: virtual value:0-31, meanings of SQM（RSSI）are defined by manufacturer)

    (<FER>: 99：return 99 if unknown）

    RSSI value is determined by the signal intensity at the location of antenna. If RSSI is too low, please check if there are some problems on the antenna. Keep moving antenna to the direction to base station, and query signal intensity periodically, the RSSI should be rise up gradually.

    Otherwise, the connection between module and antenna must be wrong

    The environment of module working should basically be in gear after step 3, 4 are finished. You can

test other functions by sending AT commands, such as audio output, call and response. Please refer to 《CDMA/GPRS module AT command manual》 for details.

Convenient DEMO commands for testing working status of development board:

① After the board has been electrified for 5-6s, the display will be:

A、without SIM/UIM card:

+ZIND: 8

+ZIND: 0

B、with SIM/UIM card:

+ZIND: 8

+ZIND: 1

② Query ESN number of modules:（no card）

AT+GSN

+GSN: 698C4A4A

③ if SIM/UIM card and antenna has been planted, you can input commands below:

A、Query signal intensity（check if there is enough network signal）

AT+CSQ?

+CSQ: 20, 99

OK

B、Query network time（check if the right time could be captured）

AT+CCLK?

+CCLK: "04/04/10,00:08:39.038"

OK

④ input command below to dial:

  A、dial out

ATD10010;

OK

+ZCORG:10010

+ZCCNT:0,3

B、ring off

ATH

OK

+ZCEND:29

⑤connect with handset and earphone, input audio channel query and switch commands below to test if two audio channels are working correctly.

A、Channel query

AT+SPEAKER?

+SPEAKER: 0

OK
B、channel switch（1-earphone，0-handset）
AT+SPEAKER=1;
OK

# 6 Hyper Terminal Configuration

1. Create a new connection, type in the name.

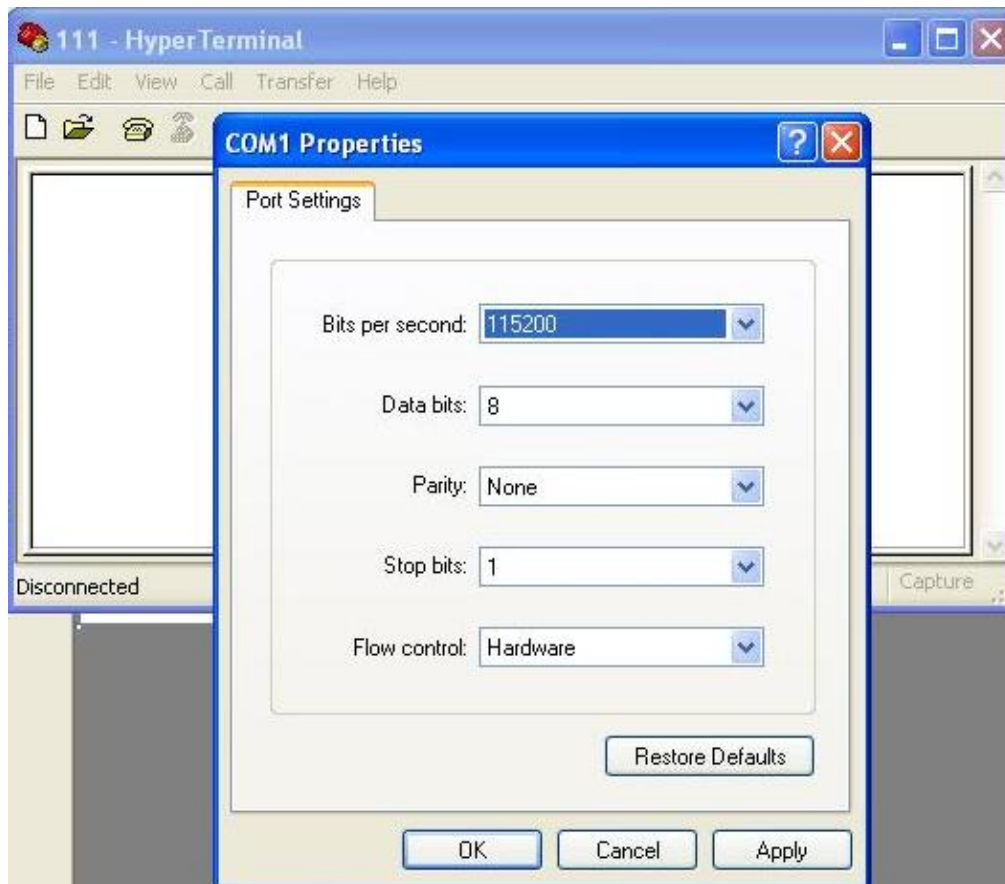Figure 6-1 Create a new connection



2. Set up corresponding serial port.
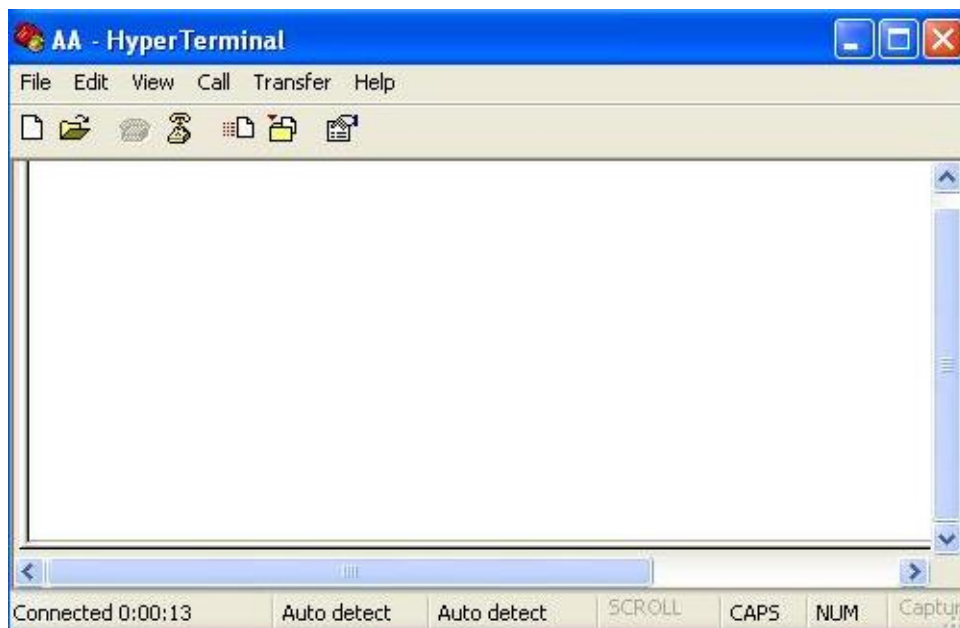
Figure 6-2 Setup corresponding serial port

3.  Configure serial port parameters (baud rate, communication format, flow control and so on).

Figure 6-3 Configure serial port parameters



4.  Activate serial port.

Figure 6-4 Activate serial port

5.  Use standard 9-core serial port cable to connect serial port 1 with PC, insert module and antenna, and then turn on the switch on the development board. Type in "AT" and press enter on the keyboard, if it responds "OK", the configuration has been successful. You can use hyper terminal to test.

Figure 6-5 Ready to test
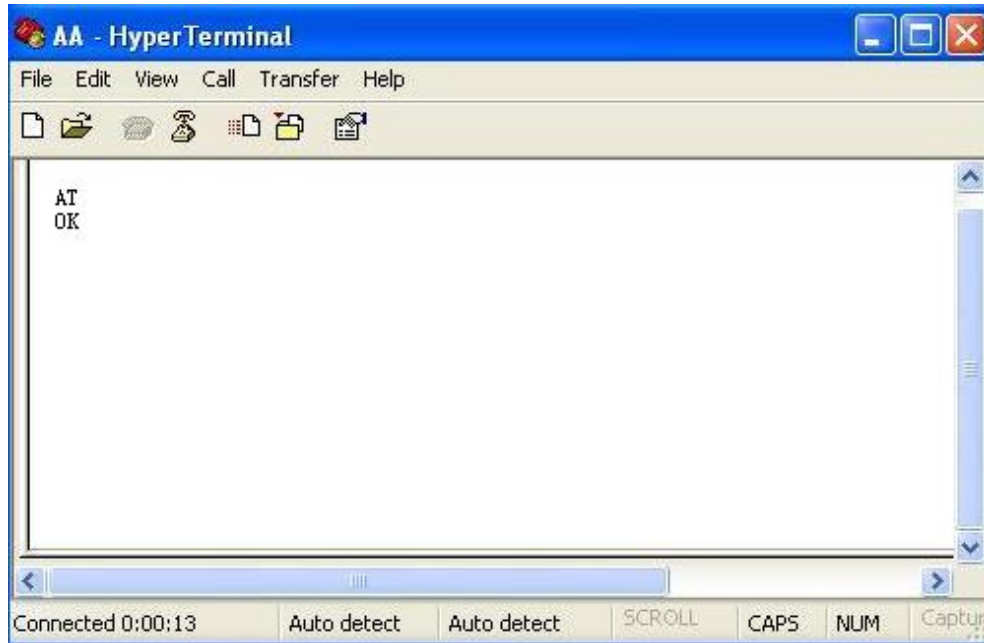
# 7  The bitmap of module development board

Please refer to figure 7-1 for the bitmap of module.

Figure 7-1 Module's bitmap