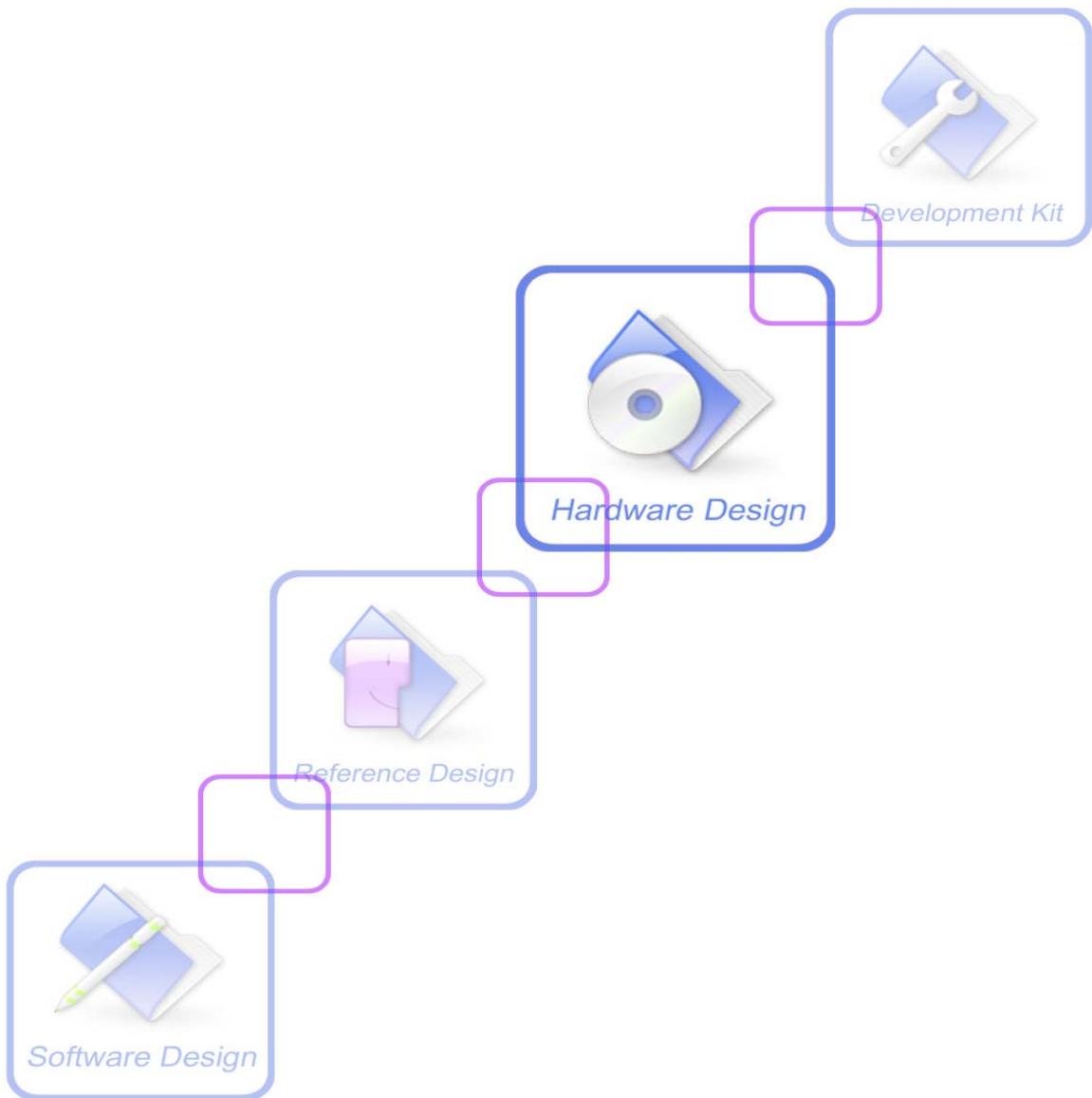




A company of SIM Tech

## T5320+G\_User Guide\_V1.01



|                            |                          |
|----------------------------|--------------------------|
| <b>Document Title</b>      | T5320+G User Guide       |
| <b>Version</b>             | 1.01                     |
| <b>Date</b>                | 2013-04-15               |
| <b>Status</b>              | Release                  |
| <b>Document Control ID</b> | T5320+G User Guide V1.01 |

### General Notes

SIMCom offers this information as a service to its customers, to support application and engineering efforts that use the products designed by SIMCom. The information provided is based upon requirements specifically provided to SIMCom by the customers. SIMCom has not undertaken any independent search for additional relevant information, including any information that may be in the customer's possession. Furthermore, system validation of this product designed by SIMCom within a larger electronic system remains the responsibility of the customer or the customer's system integrator. All specifications supplied herein are subject to change.

### Copyright

This document contains proprietary technical information which is the property of SIMCom Limited, copying of this document and giving it to others and the using or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights reserved in the event of grant of a patent or the registration of a utility model or design. All specification supplied herein are subject to change without notice at any time.

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

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

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

*Copyright © Shanghai SIMCom Wireless Solutions Ltd. 2013*

## Contents

|   |           |
|---|-----------|
| <b>Contents.....</b>  | <b>3</b>  |
| <b>Version History.....</b>                                       | <b>7</b>  |
| <b>1   Introduction .....</b>                                     | <b>8</b>  |
| <b>2   Key features .....</b>                                     | <b>9</b>  |
| <b>3   Terminal dimensions .....</b>                              | <b>10</b> |
| <b>4   Installation .....</b>                                     | <b>11</b> |
| <b>5   Interface introduction .....</b>                           | <b>12</b> |
| 5.1    Overview.....  | 12        |
| 5.2    T5320+G Functional Diagram.....                            | 13        |
| 5.3    Accessory information.....                                 | 14        |
| <b>6   Application Interface.....</b>                             | <b>15</b> |
| 6.1    Power Supply.....  | 15        |
| 6.2    Serial Interface.....                                      | 16        |
| 6.3    10 PIN I/O interface.....                                  | 17        |
| 6.3.1    Audio interface.....                                     | 19        |
| 6.3.2    ADC channel.....   | 20        |
| 6.3.3    GPIO interfaces.....                                     | 21        |
| 6.4    LED indicator .....  | 22        |
| 6.5    Micro USB interface.....                                   | 23        |
| 6.6    USIM Card Interface .....                                  | 24        |
| 6.7    I2C Interface .....  | 25        |
| 6.8    GPS Interface.....   | 26        |
| 6.8.1    Technical specification.....                             | 26        |
| 6.8.2    Antenna type .....                                       | 26        |
| 6.8.3    GPS operating .....                                      | 27        |
| 6.9    Antenna interface.....                                     | 27        |
| 6.9.1    Antenna connector.....                                   | 27        |
| 6.9.2    Antenna type .....                                       | 28        |
| 6.9.3    Antenna placement.....                                   | 28        |
| <b>7   Electrical, Reliability and Radio Characteristics.....</b> | <b>29</b> |
| 7.1    Absolute Maximum Ratings .....                             | 29        |
| 7.2    Recommended Operating Conditions .....                     | 29        |
| 7.3    Electro-Static Discharge .....                             | 29        |
| 7.4    Operating frequency .....                                  | 30        |
| 7.5    Transmitter output power and receiver sensitivity.....     | 30        |
| <b>8   Software/ Firmware Upgrade.....</b>                        | <b>31</b> |
| 8.1    Tool introduction .....                                    | 31        |
| 8.2    Illustration of software updating.....                     | 31        |
| <b>Appendix .....</b>   | <b>35</b> |
| A. Related Documents .....  | 35        |
| B. Terms and Abbreviations .....                                  | 36        |

---

|                         |    |
|-------------------------|----|
| C. Safety Caution ..... | 37 |
|-------------------------|----|

STMCOM CONFIDENTIAL FILE

## Table Index

|   |    |
|---|----|
| TABLE 1: T5320+G SERIES FREQUENCY BANDS .....                               | 8  |
| TABLE 2: T5320+G KEY FEATURES .....   | 9  |
| TABLE 3: THE POWER LINE ASSIGNMENT .....                                    | 15 |
| TABLE 4: 9-POLE D-SUB (FEMALE) RS-232 .....                                 | 16 |
| TABLE 5: SIGNAL ASSIGNMENT OF 10 PIN CABLE .....                            | 18 |
| TABLE 6: MIC INPUT CHARACTERISTICS .....                                    | 19 |
| TABLE 7: SPEAKER OUTPUT CHARACTERISTICS .....                               | 19 |
| TABLE 8: AUDIO PARAMETER .....  | 20 |
| TABLE 9: ADC SPECIFICATION .....  | 20 |
| TABLE 10: AT+CADC READ ADC .....  | 21 |
| TABLE 11: T5320+G GPIOs .....   | 22 |
| TABLE 12: STATUS OF THE NETLIGHT INDICATOR (GREEN) .....                    | 22 |
| TABLE 13: AT+CUSBSPD SWITCH T5320+G USB HIGH OR FULL SPEED .....            | 23 |
| TABLE 14: AT+CRIIC READ VALUES FROM REGISTER OF IIC DEVICE .....            | 25 |
| TABLE 15: AT+CWIIC WRITE VALUES TO REGISTER OF IIC DEVICE .....             | 25 |
| TABLE 16: ANTENNA CHOOSING CONSIDERATION .....                              | 26 |
| TABLE 17: ANTENNA CHOOSING CONSIDERATION .....                              | 28 |
| TABLE 18: ABSOLUTE MAXIMUM RATINGS .....                                    | 29 |
| TABLE 19: RECOMMENDED OPERATING CONDITIONS .....                            | 29 |
| TABLE 20: THE ESD CHARACTERISTICS (TEMPERATURE: 25°C, HUMIDITY: 45 %) ..... | 29 |
| TABLE 21: OPERATING FREQUENCY .....   | 30 |
| TABLE 22: TRANSMITTER OUTPUT POWER AND RECEIVER SENSITIVITY .....           | 30 |
| TABLE 23: RELATED DOCUMENTS .....   | 35 |
| TABLE 24: TERMS AND ABBREVIATIONS .....                                     | 36 |
| TABLE 25: SAFETY CAUTION .....  | 37 |

## Figure Index

|   |    |
|---|----|
| FIGURE 1: T5320+G OVERVIEW .....                              | 8  |
| FIGURE 2: MECHANICAL DIMENSIONS OF T5320+G ( UNIT: MM ) ..... | 11 |
| FIGURE 3: INSTALLATION OF THE TERMINAL .....                  | 12 |
| FIGURE 4: T5320+G INTERFACE FRONT VIEW .....                  | 13 |
| FIGURE 5: T5320+G INTERFACE BACK VIEW .....                   | 13 |
| FIGURE 6: T5320+G FUNCTIONAL DIAGRAM .....                    | 14 |
| FIGURE 8: DIMENSIONS OF POWER LINE ( UNIT: MM ) .....         | 15 |
| FIGURE 9: POWER INTERFACE .....                               | 16 |
| FIGURE 10: PIN ASSIGNMENT RS-232 (D-SUB 9-POLE FEMALE) .....  | 16 |
| FIGURE 11: COM PORT PROPERTIES OF THE HYPER TERMINAL.....     | 17 |
| FIGURE 12: SIGNAL ASSIGNMENT OF 10PIN I/O PORT .....          | 18 |
| FIGURE 13: DIMENSIONS OF 10-LINE CABLE.....                   | 18 |
| FIGURE 14: SPEAKER REFERENCE CIRCUIT .....                    | 19 |
| FIGURE 15: INDICATOR LED.....                                 | 22 |
| FIGURE 16: MICRO USB INTERFACE .....                          | 23 |
| FIGURE 17: INSTALLATION OF SIM CARD .....                     | 25 |
| FIGURE 18: ANTENNA INTERFACE .....                            | 28 |
| FIGURE 19: VIRTUAL PORTS IN COMPUTER MANAGER WINDOW .....     | 31 |
| FIGURE 20: QDL WINDOW .....                                   | 31 |
| FIGURE 21: BROWSE THE SOURCE FILE .....                       | 32 |
| FIGURE 22: CLICK DOWNLOAD BUTTON WITHOUT POWER UP .....       | 32 |
| FIGURE 23: UPGRADE IN PROCEEDING.....                         | 33 |
| FIGURE 24: FINISH UPGRADING .....                             | 33 |

## Version History

| Date       | Version | Description of change | Author |
|------------|---------|-----------------------|--------|
| 2013-04-15 | 1.01    | Origin                | Libing |
|            |         |                       |        |
|            |         |                       |        |

STIMCOM CONFIDENTIAL FILE

## 1 Introduction

This document describes features, functions and interfaces of T5320+G terminal in great detail.

T5320+G is a quad-band GSM/GPRS/EDGE and dual-band UMTS /HSDPA that works on frequencies of GSM 850MHz, EGSM 900 MHz, DCS 1800 MHz, PCS 1900MHz and WCDMA 2100/900MHz, 2100/850 MHz or 1900/850MHz, which is a ideal solution for wireless m2m applications, the terminal features HSDPA Category 5/6 -3.6 Mbps.

With the help of this document user can understand T5320+G interface specifications, electrical and mechanical quickly.

**Table 1: T5320+G series frequency bands**

| Standard | Frequency     | T5320E+G | T5320J+G | T5320A+G |
|----------|---------------|----------|----------|----------|
| GSM      | GSM 850MHz    | ✓        | ✓        | ✓        |
|          | EGSM 900MHz   | ✓        | ✓        | ✓        |
|          | DCS1800MHz    | ✓        | ✓        | ✓        |
|          | PCS1900MHz    | ✓        | ✓        | ✓        |
| WCDMA    | WCDMA 850MHz  |          | ✓        | ✓        |
|          | WCDMA 900MHz  | ✓        |          |          |
|          | WCDMA 1900MHz |          |          | ✓        |
|          | WCDMA 2100MHz | ✓        | ✓        |          |
| HSPA     | HSDPA         | ✓        | ✓        | ✓        |
|          | HSUPA         |          |          |          |



**Figure 1: T5320+G overview**

## 2 Key features

T5320+G terminal has the following features:

1. Standard AT commands set
2. SIMCom proprietary AT commands set
3. watch-dog function
4. Short circuit protection
5. Voice call
6. GPIOs
7. ADC function
8. GPS

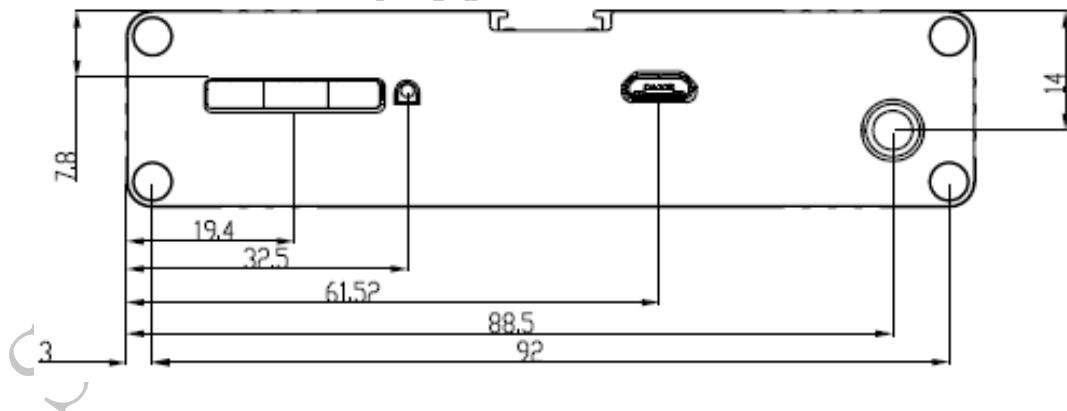
**Table 2: T5320+G key features**

| Feature            | Implementation  |
|--------------------|---|
| Power supply       | 5V ~ 30V  |
| Transmission data  | <ul style="list-style-type: none"> <li>● Dual-mode UMTS/HSDPA/EDGE/GPRS operation</li> <li>● GPRS Class B, multislot class 12 operation, Supports coding scheme: CS1-4</li> <li>● EDGE multislot class 12 operation, Supports coding schemes MSC1-9</li> <li>● UMTS R99 data rates-384 kbps DL/UL</li> <li>● HSDPA Category 5/6 -3.6 Mbps and Category12-1.8 Mbps</li> <li>● Integrate the TCP/IP protocol</li> </ul> |
| Transmitting power | <ul style="list-style-type: none"> <li>● Class 4 (+33dBm) for GSM850 and EGSM900</li> <li>● Class 1 (+30dBm) for DCS 1800 PCS GSM1900</li> <li>● Class 3 (+24dBm) for WCDMA 2100, WCDMA FDD BDI</li> <li>● Class 3 (+24dBm) for WCDMA 1900, WCDMA FDD BDII</li> <li>● Class 3 (+24dBm) for WCDMA 900, WCDMA FDD BDVIII</li> <li>● Class 3 (+24dBm) for WCDMA 850, WCDMA FDD BDV</li> </ul>                            |
| GPS                | <ul style="list-style-type: none"> <li>● Mobile-Assisted mode</li> <li>● Mobile-based mode</li> <li>● Standalone mode</li> </ul>  |
| Temperature range  | <ul style="list-style-type: none"> <li>● Normal operation: -30°C ~ +75°C</li> <li>● Restricted operation: -35°C ~ -30°C and +75 °C ~ +80°C*</li> <li>● Storage temperature -40°C ~ +85°C</li> </ul>   |
| CSD                | <ul style="list-style-type: none"> <li>● CSD feature: 9.6, 14.4, 64 kbps UL/DL</li> </ul>   |
| SMS                | <ul style="list-style-type: none"> <li>● MT, MO, CB, Text and PDU mode</li> <li>● SMS storage: SIM card</li> <li>● Support transmission of SMS alternatively over CSD or GPRS. User can choose preferred mode.</li> </ul>   |
| FAX                | Group 3 Class 1   |
| USIM interface     | Support USIM card: 1.8V, 3V   |
| External antenna   | SMA type RF connector   |
| Audio features     | Speech codec modes:<br><ul style="list-style-type: none"> <li>● Half Rate (ETS 06.20)</li> </ul>  |

|                          |   |
|--------------------------|---|
|                          | <ul style="list-style-type: none"> <li>● Full Rate (ETS 06.10)</li> <li>● Enhanced Full Rate (ETS 06.50 / 06.60 / 06.80)</li> <li>● AMR (WCDMA)</li> <li>● AMR+QCP (GSM)</li> <li>● A5/1, A5/2, and A5/3 ciphering</li> </ul>   |
| USB                      | Support USB2.0 Slave mode   |
| RS232 serial port        | <p><b>Serial port:</b></p> <ul style="list-style-type: none"> <li>● Full modem interface with status and control lines, unbalanced, asynchronous.</li> <li>● 1200bps to 115200bps.</li> <li>● Default rate is 115200bps.</li> <li>● Can be used for AT commands data stream.</li> <li>● Support RTS/CTS hardware handshake and software ON/OFF flow control.</li> <li>● Multiplex ability according to GSM 07.10 Multiplexer Protocol.</li> </ul> |
| Phonebook management     | Support phonebook types: SM, FD, LD, RC, ON, MC.  |
| SIM application toolkit  | Support SAT class 3, GSM 11.14 Release 98<br>Support USAT   |
| Physical characteristics | Size: 98*60*23mm<br>Weight: 129g  |
| Firmware upgrade         | Firmware upgradeable by USB interface   |

\*T5320+G does work at this temperature, but some radio frequency characteristics may deviate from the GSM specification.

### 3 Terminal dimensions



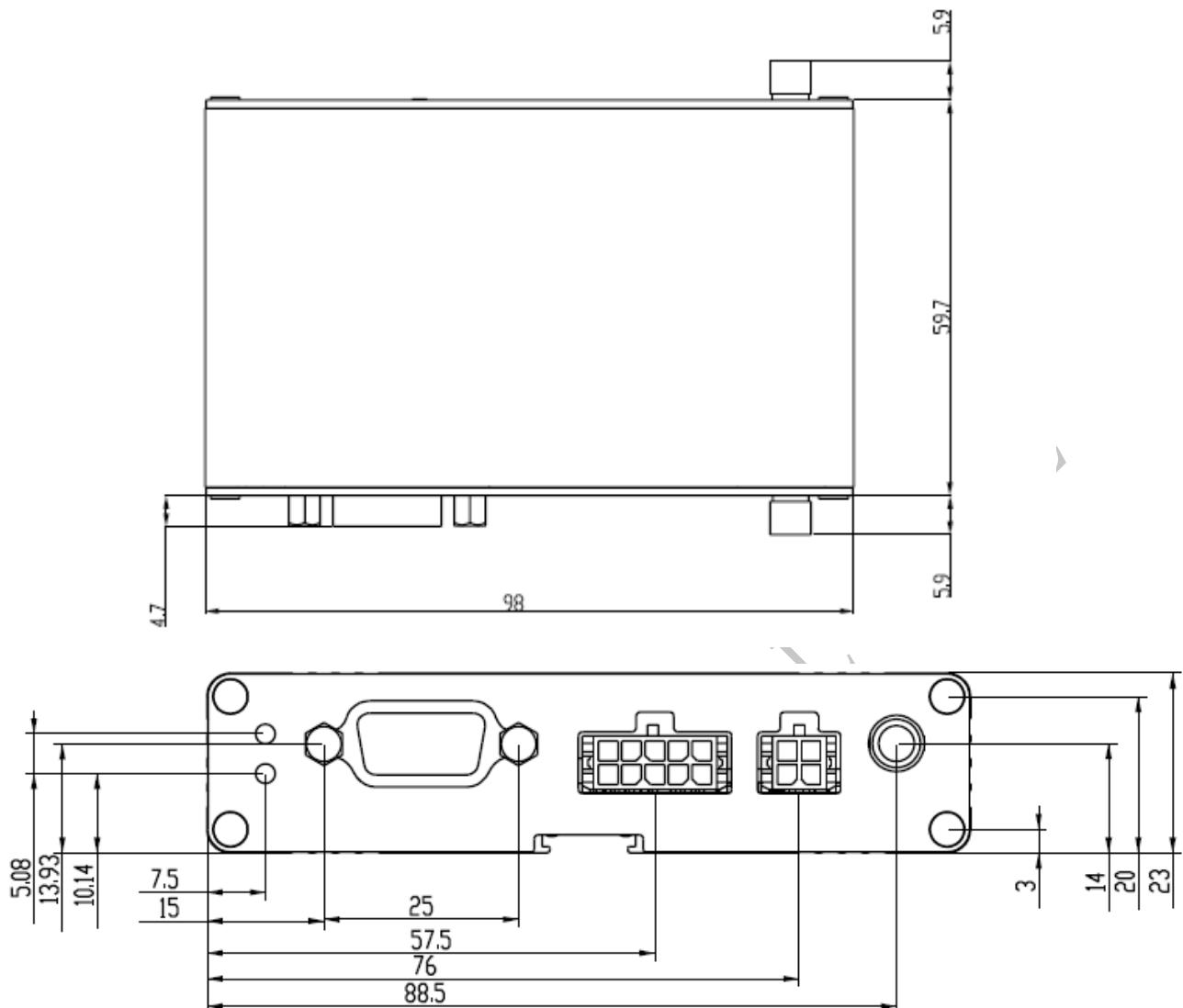
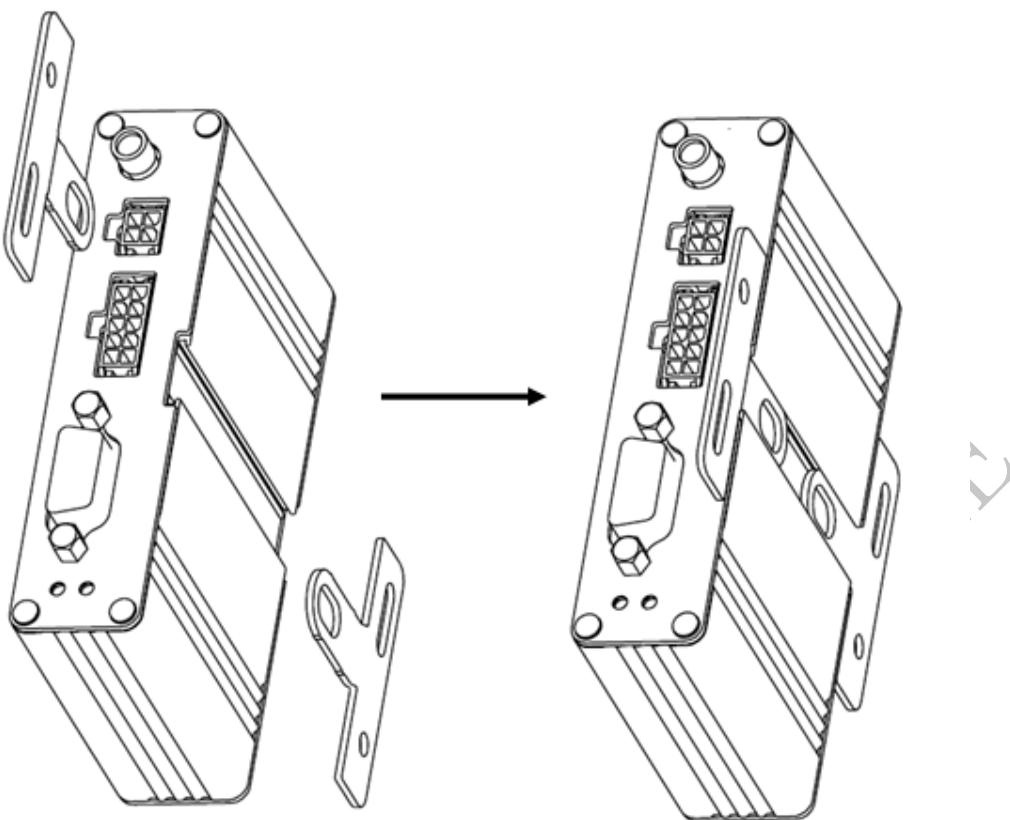


Figure 2: Mechanical dimensions of T5320+G ( Unit: mm )

## 4 Installation

The terminal can be fixed by two kickstands (Optional) that provided by SIMCom, the following figure is the illustration.



**Figure 3: Installation of the terminal**

## 5 Interface introduction

### 5.1 Overview

T5320+G Terminal provides the following connectors for power supply, GPIOs, Audio, ADC, Serial port and antenna:

- The GSM/WCDMA antenna interface(SMA type female connector)
- The 4 PIN I/O port for power supply
- The 10 PIN I/O port for audio, I2C, GPIOs and ADC
- The standard RS232 interface
- LED indicator for power (Red) and GSM/WCDMA netlight (Green)
- USIM card holder
- Micro USB interface
- The GPS antenna interface(SMA type female connector)



Figure 4: T5320+G interface Front view

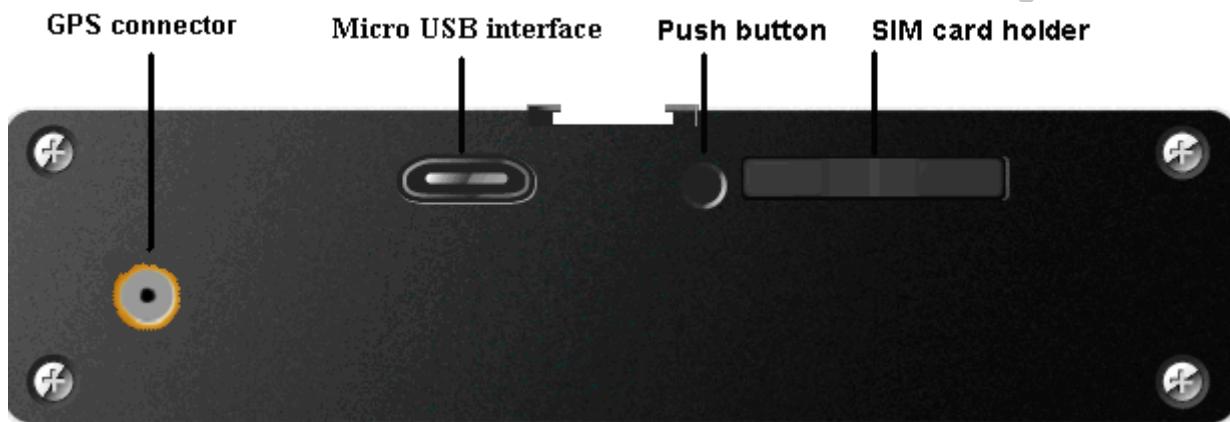


Figure 5: T5320+G interface Back view

*Note: For the I/O interface, SIMCom provides 4-line cable and 10-line cable (optional) to assist developers, it will be introduced at the following chapter.*

## 5.2 T5320+G Functional Diagram

The following figure shows a functional diagram of T5320+G and typical accessories.

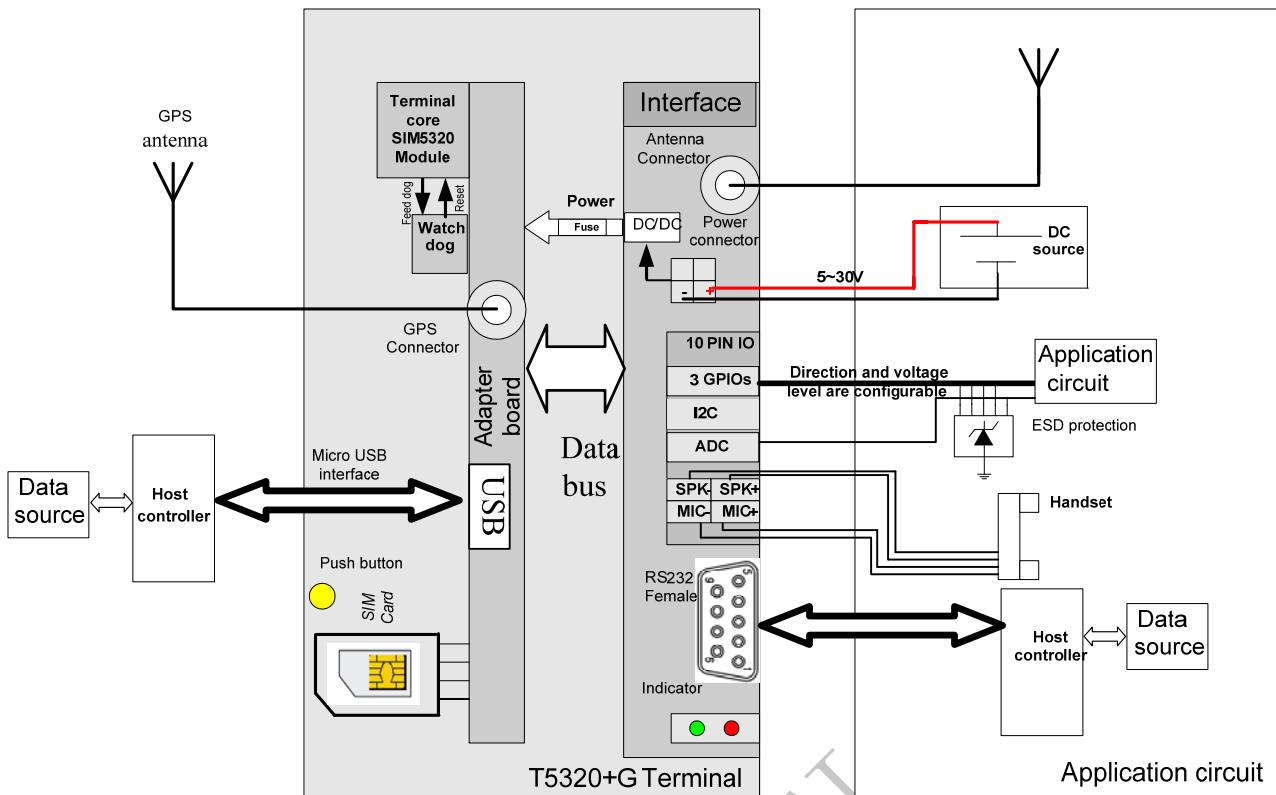


Figure 6: T5320+G functional diagram

### 5.3 Accessory information



- A: T5320+G Terminal
- B: WCDMA/GSM Antenna
- C: Male to Female DB9 Line
- D: 5V Adapter
- E: Two kickstands (Optional)
- F: 10-Line cable (Optional)
- G: Micro-USB cable
- H: GPS Antenna

## 6 Application Interface

### 6.1 Power Supply

Customer can use the DC adapter that SIMCom provides as the power source.

If customer does not use the adapter, then DC source should be satisfied with the following requirements.

- Input voltage range 5-30V
- Normal voltage 12V
- Current ability 1A

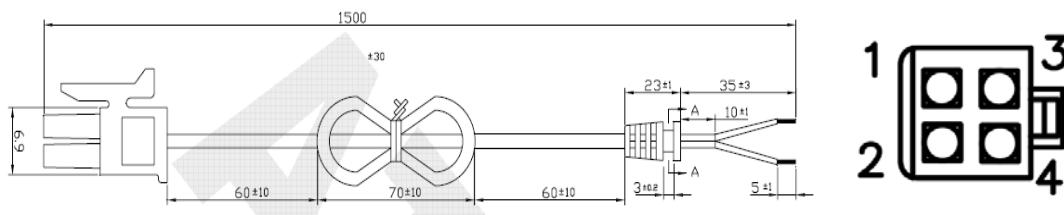
The following chapter introduces the power line that SIMCom provides to customers, customer can power the terminal by connect the terminal to the DC source via this line.

The power line includes four lines as the following figure shows, and table 2 gives a detailed description.

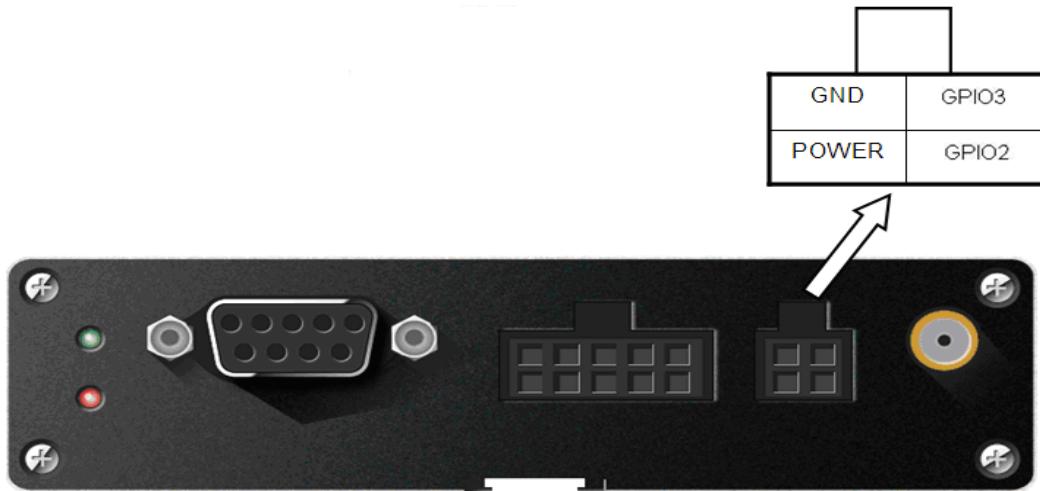
**NOTE : The part number of power line connector is ATOM GROUP LIMITED ATOM010070190003 in T5320+G side. User can login <http://www.asia-atom.com/en/> for more information.**

**Table 3: The power line assignment**

| PIN Number | Colour | Item   |
|------------|--------|--------|
| 1          | white  | GPIO2  |
| 2          | Red    | Power  |
| 3          | Yellow | GPIO3  |
| 4          | Black  | Ground |



**Figure 7: dimensions of power line ( Unit: mm )**



**Figure 8: Power interface**

When a valid power appears the terminal will power up automatic, for the MCU that inside the terminal processed the power up part, MCU also acts as a Watch Dog, when the terminal runs wrong, MCU will cut off the power and recover it immediately to restart the terminal.

## 6.2 Serial Interface

T5320+G provides one asynchronous RS232 serial port (female). The RS232 standard interface serves to connect a PC, Data Terminal Equipment (DTE) or other application, which acts as host controller of the T5320+G Terminal with all its functions. Through the RS232 interface it can be used as GSM/GPRS modem for sending and receiving of SMS, Data and Fax calls.



**Figure 9: Pin assignment RS-232 (D-Sub 9-pole female)**

**Table 4: 9-pole D-Sub (female) RS-232**

| Pin no | Signal name | I/O | Function              |
|--------|-------------|-----|-----------------------|
| 1      | DCD         | O   | Data Carrier Detected |

|   |      |   |  |
|---|------|---|--|
| 2 | RXD  | O | Receive Data   |
| 3 | TXD  | I | Transmit Data  |
| 4 | DTR  | I | Data Terminal Ready<br>Attention: The ignition of T5320+G<br>Terminal is activated via a rising<br>edge of high potential (+3 ... +15 V) |
| 5 | GND  | - | Ground   |
| 6 | DSR  | O | Data Set Ready   |
| 7 | RTS  | I | Request To Send  |
| 8 | CTS  | O | Clear To Send  |
| 9 | RING | O | Ring Indication  |

**Note:** User can use AT command "AT+IPR=x" to set a fixed baud rate and the setting will be saved to non-volatile flash memory automatically. After the configuration is set as fixed baud rate, the URC such as "RDY", "+CFUN: 1" and "+CPIN: READY" will be reported when T5320+G is powered on.

Hyper terminal usually as the PC software tool to operate T5320+G; customer can set up a connection between PC and terminal, configure the port properties as the figure 9 shows.

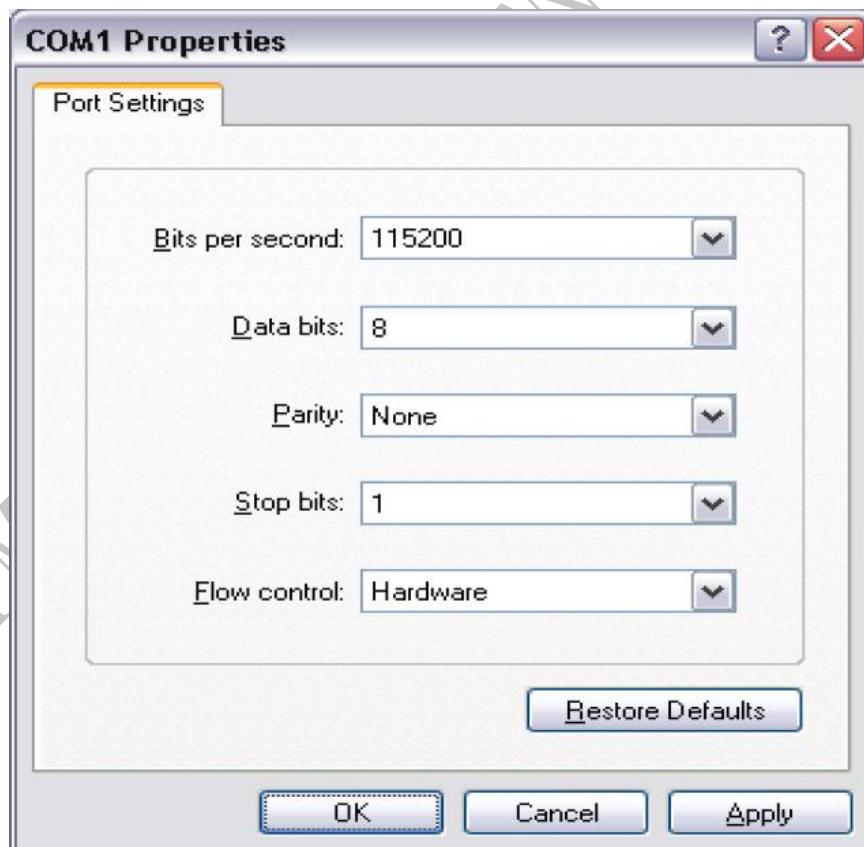
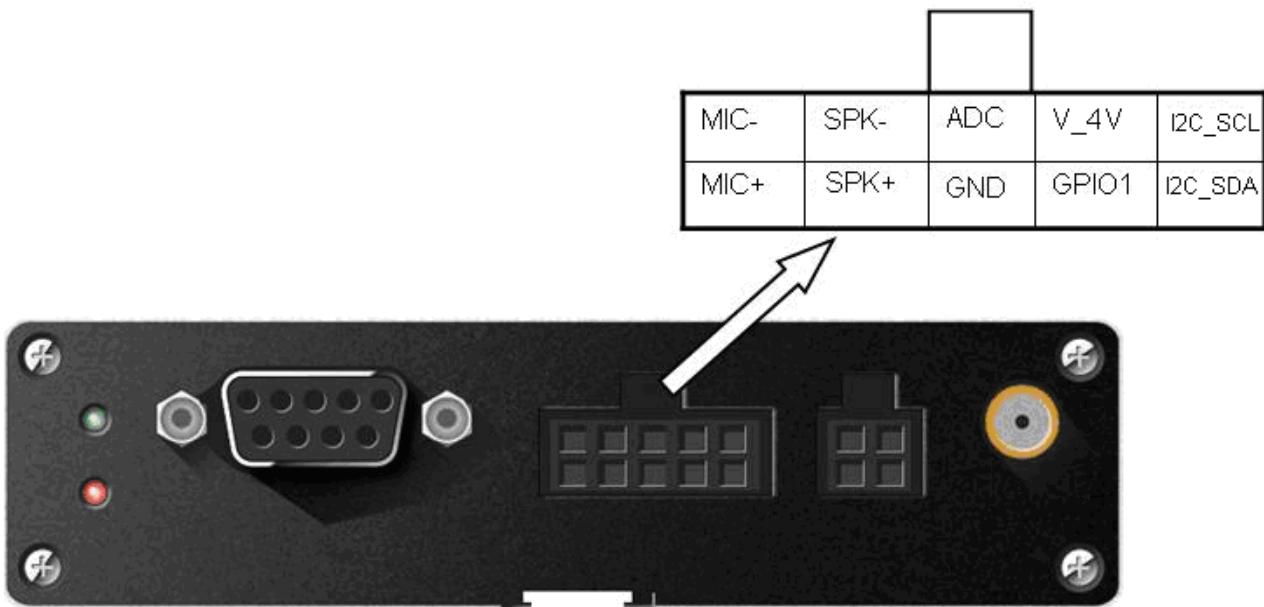


Figure 10: COM port properties of the hyper terminal

### 6.3 10 PIN I/O interface

T5320+G provides a 10 PIN I/O interface for customer use, including Audio, GPIOs and 1 ADC channel.

The following figure gives a brief view of signal assignment.

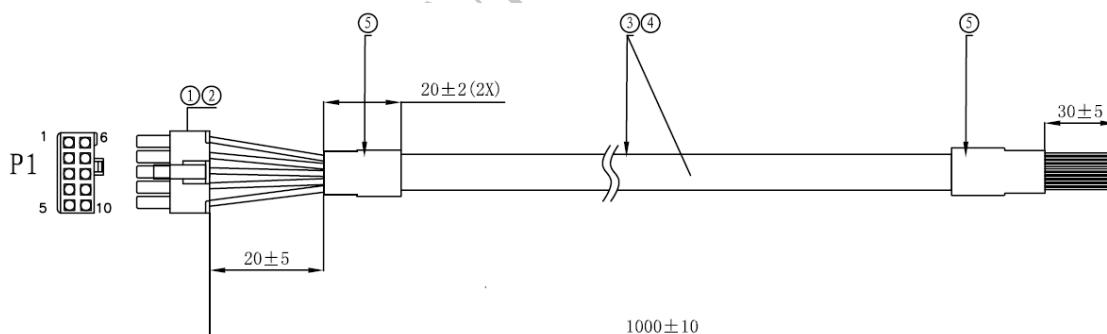


**Figure 11: signal assignment of 10PIN I/O port**

**NOTE : The part number of the 10 PIN I/O connector is ATOM GROUP LIMITED ATOM010070190005 in T5320+G side. User can login <http://www.asia-atom.com/en/> for more information.**

To make the usage conveniently, SIMCom provides a cable for customer, it can be inserted to the 10 PIN I/O port so customer can develop their application by connecting some devices.

Figure 11 shows the specification of cable.



**Figure 12: Dimensions of 10-line cable**

**Table 5: signal assignment of 10 pin cable**

| Connecting diagram |                               |  |                 |     |                             |
|--------------------|-------------------------------|--|-----------------|-----|-----------------------------|
| P1                 | Wire color and cutting length |  | Terminal signal |     |                             |
|                    |                               |  | Signal name     | I/O | Command                     |
| 1                  | Green                         |  | I2C_SDA         | I/O | Configurable by AT commands |
|                    |                               |  | GPIO1           | I/O |                             |

|    |        |          |         |        |                             |
|----|--------|----------|---------|--------|-----------------------------|
| 3  | Black  | 1007 26# | GND     |        | Ground                      |
| 4  | Orange |          | SPK+    | O      |                             |
| 5  | Brown  |          | MIC+    | I      |                             |
| 6  | White  |          | I2C_SCL | I/O    | Configurable by AT commands |
| 7  | Gray   |          | V_4V    | DC OUT |                             |
| 8  | Red    |          | ADC     | I      |                             |
| 9  | Purple |          | SPK-    | O      |                             |
| 10 | Blue   |          | MIC-    | I      |                             |

### 6.3.1 Audio interface

T5320+G has one pair of audio input and audio output; it can be connected to a speakerphone directly.

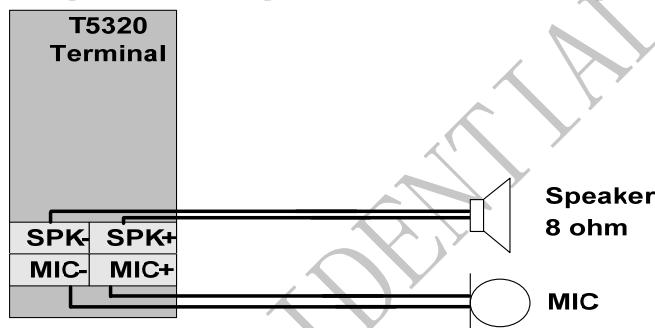


Figure 13: Speaker reference circuit

Firstly, customer must use the “AT +CSDVC=3” to select speaker audio channel.

Customer can set the terminal MIC gain level to make the sounds louder so that the listener can hear more clearly. And if the sound a little lower on the terminal side, customer can use the “AT +CLVL” to make the sound higher so that customer can hear clearly.

The AT commands should be send to the terminal by RS232 or USB interface, and the following table shows the detail commands.

Table 6: MIC input characteristics

| Parameter                           | Min  | Typ | Max | Unit   |
|-------------------------------------|------|-----|-----|--------|
| Working Voltage                     | -    | 1.8 | -   | V      |
| Working Current                     | 0.07 | 0.4 | 1   | mA     |
| External Microphone Load Resistance | 1.2  | 2.2 | -   | k Ohms |

Table 7: Speaker output characteristics

| Parameter          | Min | Typ | Max | Unit |
|--------------------|-----|-----|-----|------|
| Quiescent Current  | -   | 2.5 | 4   | mA   |
| Load resistance    | -   | 8   | -   | Ohm  |
| Output power(1KHz) | -   | 500 | -   | mW   |

**Table 8: Audio parameter**

| Parameter       | Influence to   | Range           | Gain range           | Calculation                                | AT command                       |
|-----------------|--|-----------------|----------------------|--|----------------------------------|
| <b>micAmp1</b>  | MICP/MICN analogue amplifier gain before ADC   | 0...1           | 0...24dB             | 2 steps                                    | AT+CMICAMP1                      |
| <b>txVol</b>    | Digital gain of input signal after ADC   | 0,<br>1...65535 | Mute,<br>-84...+12dB | $20 * \log_{10}(\text{txVol}/16384)$       | AT+CTXVOL                        |
| <b>txGain</b>   | Digital gain of input signal after summation of sidetone                                   | 0,<br>1...65535 | Mute,<br>-84...+12dB | $20 * \log_{10}(\text{txGain}/16384)$      | AT+CTXGAIN                       |
| <b>txFilter</b> | Input PCM 13-tap filter parameters, 7 values   | 0...65535       | ---                  | MATLAB calculate                           | AT+CTXFTR                        |
| <b>rxGain</b>   | Digital gain of output signal after summation of sidetone                                  | 0,<br>1...65535 | Mute,<br>-84...+12dB | $20 * \log_{10}(\text{rxGain}/16384)$      | AT+CRXGAIN                       |
| <b>rxVol</b>    | Digital Volume of output signal after speech decoder, before summation of sidetone and DAC | -300...300      | dbm                  | -300...300dbm                              | AT+CLVL<br>AT+CVLVL<br>AT+CRXVOL |
| <b>stGain</b>   | Digital attenuation of sidetone  | 0, 1...65535    | Mute,<br>-96...0dB   | $20 * \log_{10}(\text{stGain}/16384) - 12$ | AT+SIDET                         |
| <b>rxFilter</b> | Output PCM 13-tap filter parameters, 7 values  | 0...65535       | ---                  | MATLAB calculate                           | AT+CRXFTR                        |

Please refer to *document [1]* and *document [3]* for details.

### 6.3.2 ADC channel

T5320+G provides an auxiliary ADC, which can be used to measure the voltage. User can use AT command “AT+CADC=2” to read the voltage value.

**Table 9: ADC specification**

| Parameter      | Min | Typ | Max  | Unit |
|----------------|-----|-----|------|------|
| Voltage range  | 0   | -   | 2.2  | V    |
| ADC Resolution | -   | 12  | -    | Bits |
| Sampling rate  | -   | -   | 200K | Hz   |

*Note: the maximum voltage that the ADC can gather is 2.2V*

**Table 10: AT+CADC Read ADC**

### Description

Read the ADC value from modem. We support 3 type of ADC, raw type, temperature type and voltage type.

| SIM PIN | References |
|---------|------------|
| NO      | Vendor     |

### Syntax

| Test Command      | Responses  |
|-------------------|--|
| AT+CADC=?         | +CADC: (range of supported <adc>s)<br>OK           |
| Write Command     | Responses  |
| AT+CADC=<adc>     | +CADC: <value><br>OK<br>ERROR                      |
| Execution Command | Responses  |
| AT+CADC           | <i>Same as AT+CADC= 0:</i><br>+CADC: <value><br>OK |

### Defined values

|                                |
|--------------------------------|
| <adc>                          |
| ADC type:                      |
| 0 – raw type.                  |
| 1 – temperature type.          |
| 2 – voltage type(mv)           |
| <value>                        |
| Integer type value of the ADC. |

### Examples

|             |
|-------------|
| AT+CADC=?   |
| +CADC:(0-2) |
| OK          |
| AT+CADC=0   |
| +CADC: 187  |
| OK          |

### 6.3.3 GPIO interfaces

T5320+G provides 3 GPIO pins. All GPIOs can be configured as inputs or outputs. User can use AT Commands to read or write GPIOs status. Refer to *document [1]* for details.

**Table 11: T5320+G GPIOs**

| T5320+G GPIO | CPU Pin No. | I/O | Function  |
|--------------|-------------|-----|---|
| GPIO1        | GPIO0       | I/O | General input/output PIN. It can be used as wake/interrupt signal to host from module If it is unused, left open. |
| GPIO2        | GPIO2       | I/O | General input/output PIN.   |
| GPIO3        | GPIO3       | I/O | General input/output PIN.   |

Example 1: If user use T5320+G GPIO1 pin as an output GPIO:

- 1) AT+CGDRT=0,1 //set T5320+G GPIO1 to output
- 2) AT+CGSETV=0,1 //set T5320+G GPIO1 to high value

Example 2: If user use T5320+G GPIO4 pin as an input GPIO:

- 1) AT+CGDRT=5,0 //set T5320+G GPIO4 to input

Please refer to *document [1]* and *document [2]* for details.

#### 6.4 LED indicator

A red led indicates the power status, when a valid power appears, the red led will lighten up. But a lighten up red led does not mean that the terminal has been powered up.

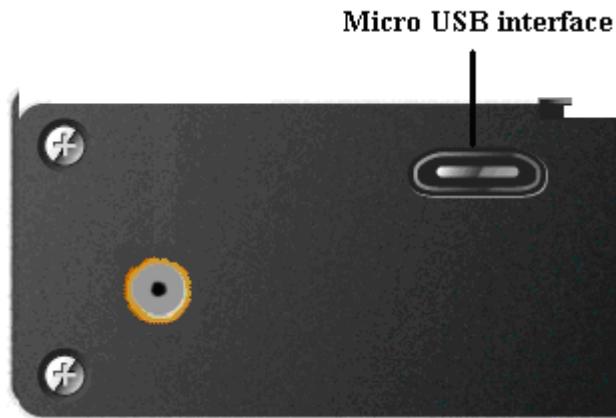
A green led indicates the terminal status and GSM net status, after the terminal been powered up and registered to the network, it will blink at a certain frequency.


**Figure 14: Indicator LED**
**Table 12: Status of the NETLIGHT indicator (Green)**

| LED Status          | T5320+G behavior               |
|---------------------|--------------------------------|
| Always On           | Searching Network/Call Connect |
| 200ms ON, 200ms OFF | Data Transmit                  |
| 800ms ON, 800ms OFF | Registered network             |
| Off                 | Power off / Sleep              |

## 6.5 Micro USB interface

T5320+G provides a Micro USB interface. This interface is compliant with the USB2.0 specification. The USB2.0 specification requires hosts such as the computer to support full-speed (12Mbps) and high-speed (480Mbps). USB charging and USB-OTG is not supported.



**Figure 15: Micro USB interface**

**Table 13: AT+CUSBSPD Switch T5320+G USB high or full speed**

### Description

This command is used to switch the speed of USB between high speed and full speed. If you just want to use full speed to simplify the circuit then you can use this command to switch the USB speed. This command will save your configuration so if you don't change the speed the module will use the latest configuration forever.

This command will only takes effect on the next start-up.

| SIM PIN | References |
|---------|------------|
| NO      | Vendor     |

### Syntax

| Test Command       | Responses                                    |
|--------------------|--|
| AT+CUSBSPD=?       | +CUSBSPD: (list of supported <speed>s)<br>OK |
| Read Command       | Responses                                    |
| AT+CUSBSPD?        | +CUSBSPD: <speed><br>OK                      |
| Write Command      | Responses                                    |
| AT+CUSBSPD=<speed> | OK<br>ERROR                                  |

### Defined values

<speed>

Integer type and nonvolatile value.

- |                                |
|--------------------------------|
| 0 – High speed                 |
| 1 – Full speed (default value) |

## Examples

```
AT+CUSBSPD=?
```

```
+CUSBSPD: (0-1)
```

```
OK
```

```
AT+CUSBSPD=0
```

```
OK
```

```
AT+CUSBSPD=1
```

```
OK
```

## 6.6 USIM Card Interface

The USIM provides the required subscription verification information to allow the mobile equipment to attach to a GSM or UMTS network. Both 1.8V and 3.0V SIM Cards are supported.

T5320+G does not support USIM card “hot” plug.



**Figure 16: Installation of SIM Card**

## 6.7 I2C Interface

T5320+G provides a I2C interface. I2C is used to communicate with peripheral equipments and can be operated as either a transmitter or receiver, depending on the device function. Use AT Commands “AT+CRIIC and AT+CWIIC” to read/write register values of related peripheral equipments connected with I2C interface.

**Table 14: AT+CRIIC Read values from register of IIC device**

### Description

Read values from register of IIC device.

| SIM PIN | References |
|---------|------------|
| NO      | Vendor     |

### Syntax

| Test Command                    | Responses                     |
|---------------------------------|-------------------------------|
| AT+CRIIC=?                      | OK                            |
| Write Command                   | Responses                     |
| AT+CRIIC=<br><addr>,<reg>,<len> | +CRIIC: <data><br>OK<br>ERROR |

### Defined values

|   |
|---|
| <addr>  |
| Device address. Input format must be hex, such as 0xFF.         |
| <reg>   |
| Register address. Input format must be hex, such as 0xFF.       |
| <len>   |
| Read length. Range:1-4; unit:byte.                              |
| <data>  |
| Data read. Input format must be hex, such as 0xFF – 0xFFFFFFFF. |

### Examples

```
AT+CRIIC=0x0F, 0x0F, 2
+CRIIC: FFFF
OK
```

**Table 15: AT+CWIIC Write values to register of IIC device**

### Description

Write values to register of IIC device.

| SIM PIN | References |
|---------|------------|
| NO      | Vendor     |

### Syntax

|  |             |
|--|-------------|
| Test Command                           | Responses   |
| AT+CWIIC=?                             | OK          |
| Write Command                          | Responses   |
| AT+CWIIC=<br><addr>,<reg>,<data>,<len> | OK<br>ERROR |

## Defined values

|        |  |
|--------|--|
| <addr> | Device address. Input format must be hex, such as 0xFF.            |
| <reg>  | Register address. Input format must be hex, such as 0xFF.          |
| <len>  | Read length. Range: 1-4; unit: byte.                               |
| <data> | Data written. Input format must be hex, such as 0xFF – 0xFFFFFFFF. |

## Examples

```
AT+CWIIC=0x0F, 0x0F, 0x1234, 2
+CWIIC: 0x1234
OK
```

## 6.8 GPS Interface

T5320+G supports both A-GPS and S-GPS, and then provides three operating modes: mobile-assisted mode, mobile-based mode and standalone mode. A-GPS includes mobile-assisted and mobile-based mode.

### 6.8.1 Technical specification

|                               |  |
|-------------------------------|--|
| <b>Tracking sensitivity</b>   | -157 dBm   |
| <b>Cold-start sensitivity</b> | -144 dBm   |
| <b>Accuracy (Open Sky)</b>    | <2m (CEP50)  |
| <b>TTFF (Open Sky)</b>        | Hot start <1s      Cold start  35s (good signal) / 100s(weak signal) |
| <b>Receiver Type</b>          | 16-channel, GPS L1 Frequency (1575.42MHz), C/A Code                  |
| <b>Update rate</b>            | Default 1 Hz   |
| <b>GPS data format</b>        | NMEA-0183  |
| <b>GPS antenna</b>            | Passive/Active antenna   |

### 6.8.2 Antenna type

The recommended antenna specifications are showed in following table:

**Table 16: antenna choosing consideration**

|                             |              |
|-----------------------------|--------------|
| Patch                       |              |
| Center Frequency            | 1575.42MHz   |
| Bandwidth(10db return loss) | 10MHZ min.   |
| Polarization                | R.H.C.P      |
| LNA(for Active antenna)     |              |
| Center Frequency            | 1575.42MHz   |
| VSWR                        | $\leq 2.0$   |
| Gain                        | 27db typ.    |
| Voltage                     | DC 3.3*0.6 V |

### 6.8.3 GPS operating

The DC3V voltage for active antenna is controlled by GPIO43.

#### Passive antenna

If user use passive antenna, The DC3V voltage must be cut off by GPIO43.

- 1) AT+CGFUNC=12,0 //set T5320+G GPIO43 to general GPIO
- 2) AT+CGDRT=43,1 //set T5320+G GPIO43 to output
- 3) AT+CGSETV=43,0 //set T5320+G GPIO43 to low value
- 4) AT+CGPS=1,1 // start GPS, standalone mode

#### Active antenna

If user use active antenna, The DC3V voltage must be exist for active antenna.

- 1) AT+CGFUNC=12,0 //set T5320+G GPIO43 to general GPIO
- 2) AT+CGDRT=43,1 //set T5320+G GPIO43 to output
- 3) AT+CGSETV=43,1 //set T5320+G GPIO43 to high value
- 4) AT+CGPS=1,1 // start GPS, standalone mode

Please refer to document [1] and document [23] for details.

## 6.9 Antenna interface

### 6.9.1 Antenna connector

Antenna connector allows transmission of radio frequency (RF) signals between the modem and the external supplied antenna. The T5320+G modem is fitted with a  $50\Omega$  male SMA connector.



**Figure 17: Antenna interface**

### 6.9.2 Antenna type

The antenna is a very important component in the system. Since the antenna transmits and receives electromagnetic signal, and its efficiency depends on the antenna's type, placement and the environment of the antenna operating.

The recommended antenna specifications are showed in following table:

**Table 17: antenna choosing consideration**

|                    |   |
|--------------------|---|
| Frequency range    | GSM 850/900/1800/1900MHz<br>WCDMA 1900/850MHz(T5320A+G)<br>WCDMA 2100/900MHz(T5320E+G)<br>WCDMA 2100/850MHz(T5320J+G) |
| Impedance          | 50 ohm  |
| Input power        | >33dBm (2W) peak power in GSM<br>>24dBm (0.25W) peak power in WCDMA   |
| VSWR absolute max. | $\leq 10:1$   |
| VSWR recommended   | $\leq 2:1$  |
| Gain               | < 3dBi  |

### 6.9.3 Antenna placement

The antenna performance is very easily influenced by other electronic devices. So the antenna placement should be considered carefully as follow.

1. Place away from other electronic devices or other antennas.
2. Place far away from metal material.
3. Face the base station antenna directly if the signal strength is very weak.

## 7 Electrical, Reliability and Radio Characteristics

### 7.1 Absolute Maximum Ratings

The absolute maximum ratings stated in following table are stress ratings under non-operating conditions. Stresses beyond any of these limits will cause permanent damage to T5320+G.

**Table 18: Absolute maximum ratings**

| Symbol                      | Parameter            | Min  | Typ | Max | Unit |
|-----------------------------|----------------------|------|-----|-----|------|
| V <sub>BAT</sub>            | Power supply voltage | 5    | -   | 30  | V    |
| V <sub>I</sub> <sup>*</sup> | Input voltage        | -0.3 | -   | 2.8 | V    |
| I <sub>I</sub> <sup>*</sup> | Input current        | -    | -   | 6   | mA   |
| I <sub>O</sub> <sup>*</sup> | Output current       | -    | -   | 6   | mA   |

\* These parameters are for digital interface pins, such as GPIO, UART.

### 7.2 Recommended Operating Conditions

**Table 19: Recommended operating conditions**

| Symbol            | Parameter                 | Min | Typ | Max | Unit |
|-------------------|---------------------------|-----|-----|-----|------|
| V <sub>BAT</sub>  | Power supply voltage      | 5   | 5   | 30  | V    |
| I <sub>IH</sub>   | High-level input current  | -10 | -   | 10  | uA   |
| I <sub>IL</sub>   | Low-level input current   | -10 | -   | 10  | uA   |
| V <sub>IH</sub>   | High-level input voltage  | 2.4 | -   | -   | V    |
| V <sub>IL</sub>   | Low-level input voltage   | -   | -   | 0.4 | V    |
| V <sub>OH</sub>   | High-level output voltage | 2.6 | -   | -   | V    |
| V <sub>OL</sub>   | Low-level output voltage  | -   | -   | 0.1 | V    |
| T <sub>OPER</sub> | Operating temperature     | -35 | +25 | +80 | °C   |
| T <sub>STG</sub>  | Storage temperature       | -40 |     | +85 | °C   |

### 7.3 Electro-Static Discharge

T5320+G is an ESD sensitive component, so more attention should be paid to the procedure of handling and packaging. The ESD test results are shown in the following table.

**Table 20: The ESD characteristics (Temperature: 25°C, Humidity: 45 %)**

| Pin   | Contact discharge | Air discharge |
|-------|-------------------|---------------|
| Shell | ±10KV             | ±15KV         |

|                  |                   |                   |
|------------------|-------------------|-------------------|
| RF&GPS interface | $\pm 10\text{KV}$ | $\pm 15\text{KV}$ |
| RS232 interface  | $\pm 10\text{KV}$ | $\pm 15\text{KV}$ |
| Audio interface  | $\pm 10\text{KV}$ | $\pm 15\text{KV}$ |
| SIM card holder  | $\pm 10\text{KV}$ | $\pm 15\text{KV}$ |

## 7.4 Operating frequency

The operating frequencies in GSM850, EGSM900, DCS, PCS and WCDMA modes are conform to the GSM/WCDMA Specifications, shown as bellow.

**Table 21: Operating frequency**

| Mode       | Freq.TX(MHz)    | Freq.RX(MHz)    | Channels(ARFC) | TX-RX offset |
|------------|-----------------|-----------------|----------------|--------------|
| GSM-850    | 824.2 – 848.8   | 869.2 – 893.8   | 128 - 251      | 45 MHz       |
| E-GSM-900  | 890.0-914.8     | 935.0-959.8     | 0-124          | 45M          |
|            | 880.2-889.8     | 925.2 - 934.8   | 975-1023       | 45M          |
| DCS-1800   | 1710.2-1784.8   | 1805.2-1879.8   | 512-885        | 95 MHz       |
| PCS-1900   | 1850.2 - 1909.8 | 1930.2 - 1989.8 | 512 - 810      | 80 MHz       |
| WCDMA 2100 | 1920 - 1980     | 2110 - 2170     | 9612 - 9888    | 190 MHz      |
| WCDMA 1900 | 1850 - 1910     | 1930 - 1990     | 9262 - 9538    | 80 MHz       |
| WCDMA 900  | 880 - 915       | 925 - 960       | 2712 - 2863    | 45 MHz       |
| WCDMA 850  | 824 - 849       | 869 - 894       | 4132 - 4233    | 45 MHz       |

## 7.5 Transmitter output power and receiver sensitivity

The T5320+G's conducted transmitter output power and receiver sensitivity are shown as bellow:

**Table 22: Transmitter output power and receiver sensitivity**

| Mode      | Power(dBm) | Sensitivity(dBm) |
|-----------|------------|------------------|
| GSM-850   | +33        | -106             |
| E-GSM-900 | +33        | -106             |
| DCS-1800  | +30        | -107             |
| PCS-1900  | +30        | -107             |
| WCDMA2100 | +24        | -106             |
| WCDMA1900 | +24        | -106             |
| WCDMA900  | +24        | -106             |
| WCDMA850  | +24        | -106             |

## 8 Software/ Firmware Upgrade

The software can be upgraded via the Micro USB interface with the help of tools provided by SIMCom,

### 8.1 Tool introduction

The tool name is “*SIMCOM 3G Module Software update tools(QDL)*”, which runs on the windows OS, customers can upgrade software conveniently by it.

This tool is a single-road download tool, one terminal can be upgraded by it every time. SIMCom also provides multi-road download tools for customer’s factory use. Contact SIMCom sales for support.

Please do not power off T5320+G during the upgrade.

### 8.2 Illustration of software updating

- Connect the Micro USB port of T5320+G to the PC USB port and connect the direct current source adapter.
- Installing module USB driver on PC OS. *USB interface is mapped to five virtual ports*: “*SIMTECH USB Modem*”, “*SIMTECH NMEA Device*”, “*SIMTECH ATCOM Device*”, “*SIMTECH Diagnostics interface*” and “*SIMTECH Wireless Ethernet Adapter*”.

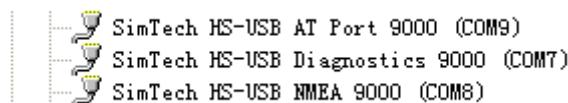


Figure 18: Virtual ports in computer manager window

- Open the tools, the main operation interface as the following figure shows:

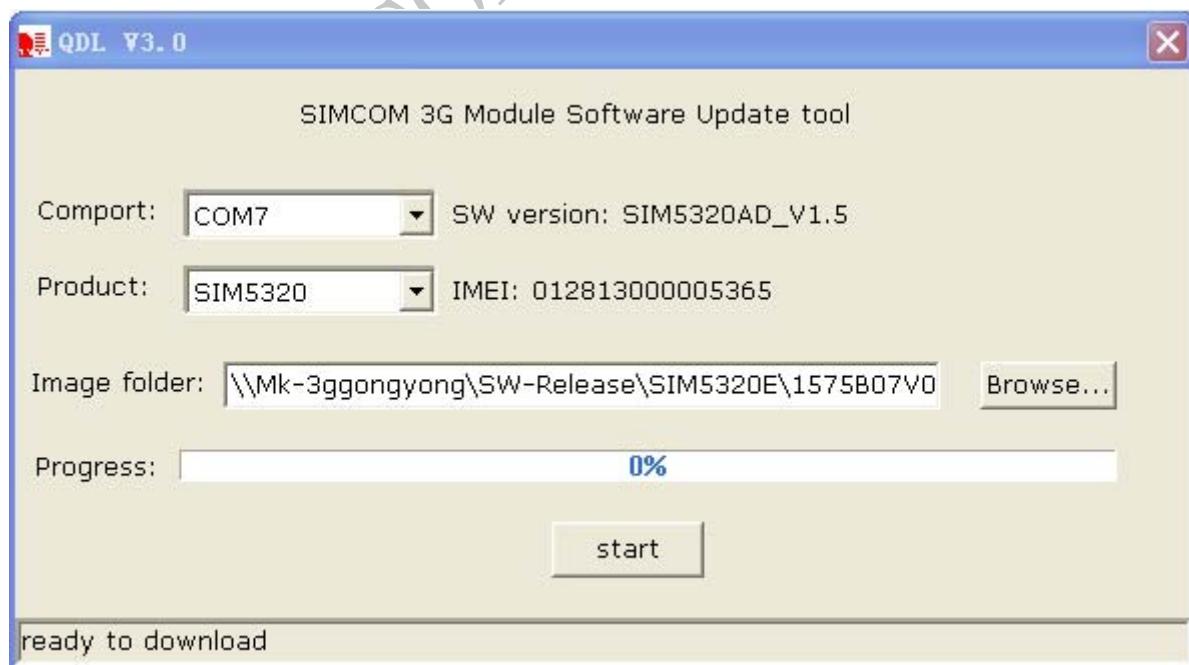
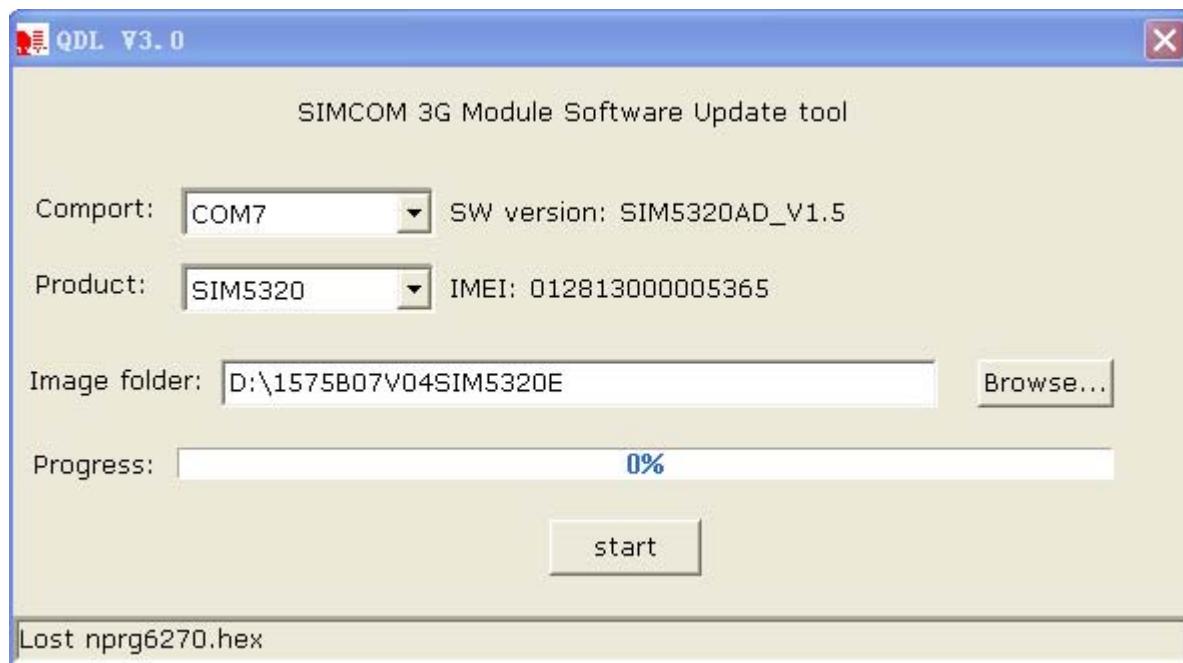


Figure 19: QDL window

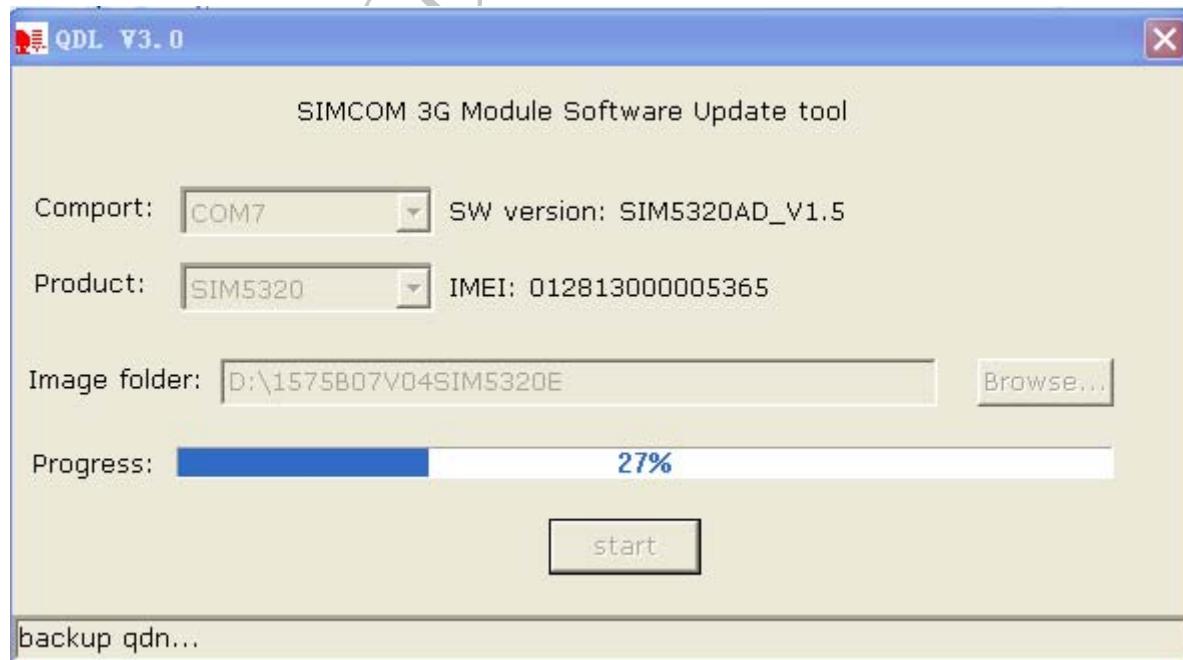
- Browse the source file



**Figure 20: Browse the source file**

- Software download

Click the **start** button, then the window will change like the following figure shows.



**Figure 21: click download button without power up**

- Upgrade in proceeding

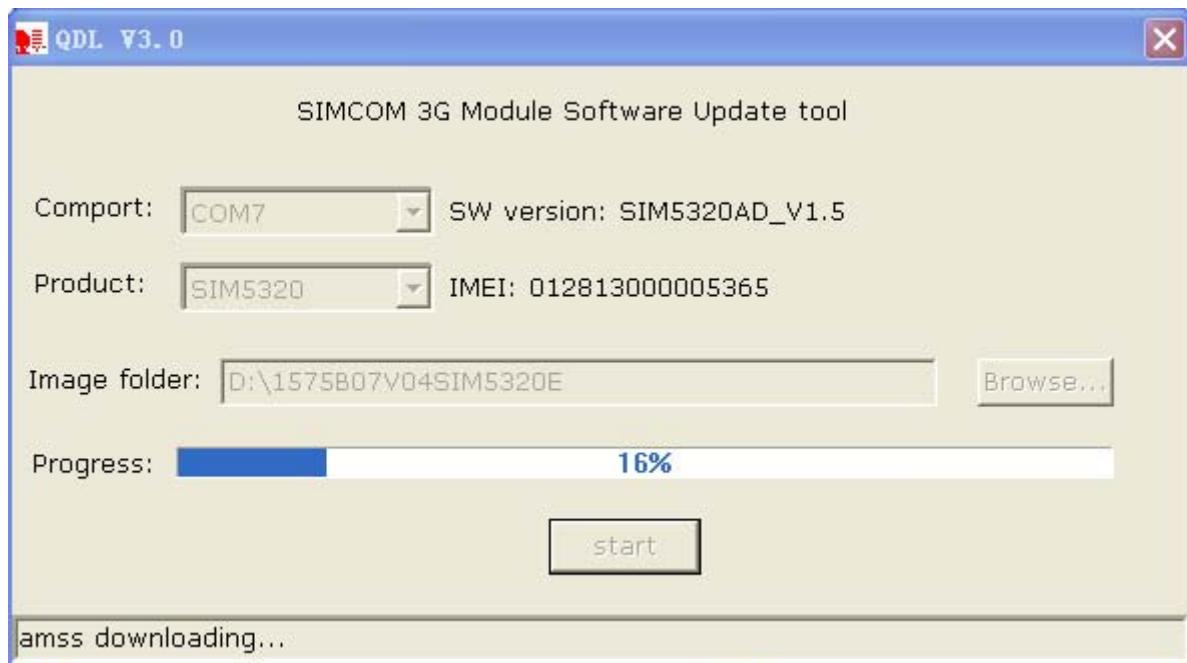


Figure 22: Upgrade in proceeding

- Finish upgrading

Now the software is the new version, customer can check the software version by “ATI”.

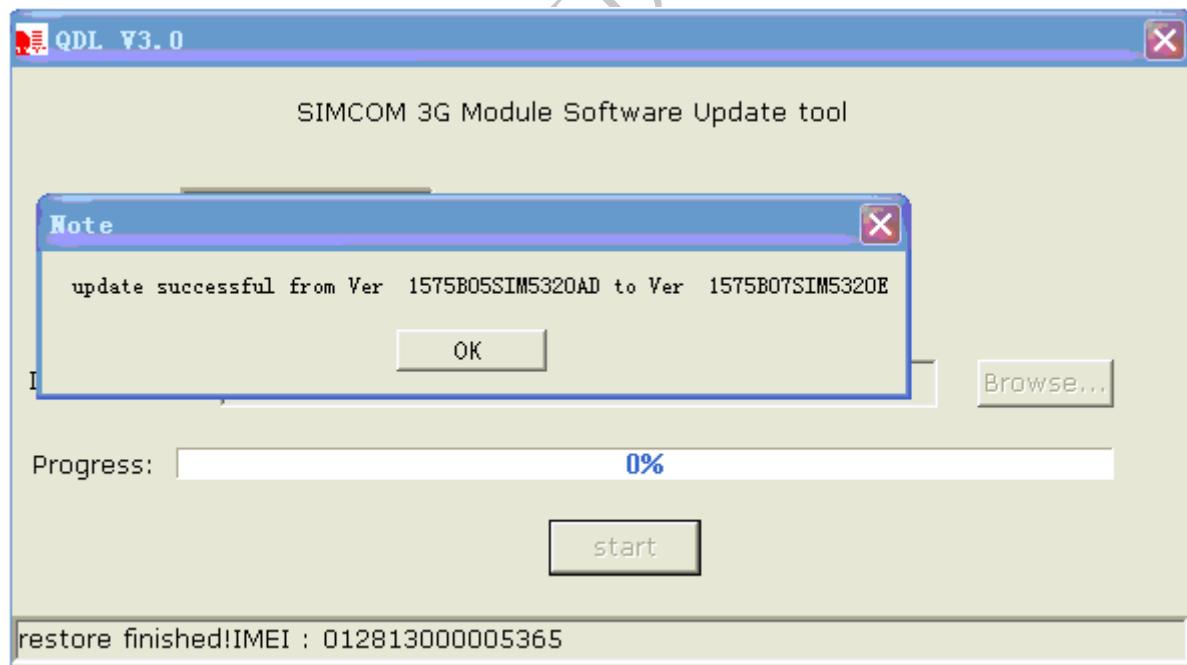


Figure 23: Finish upgrading

STMCOM CONFIDENTIAL FILE

## Appendix

### A. Related Documents

**Table 23: Related documents**

| SN   | Document name                         | Remark   |
|------|---------------------------------------|--|
| [1]  | SIM5320_ATC                           | SIM5320 AT Command Manual  |
| [2]  | SIM5xxx_GPIO_Application_note         | Applications Note About SIM5xxx_GPIO   |
| [3]  | Audio Application Note V1.01          | Applications Note About T5320+G Audio  |
| [4]  | ITU-T Draft new recommendationV.25ter | Serial asynchronous automatic dialing and control  |
| [5]  | GSM 07.07                             | Digital cellular telecommunications (Phase 2+); AT command set for GSM Mobile Equipment (ME)   |
| [6]  | GSM 07.10                             | Support GSM 07.10 multiplexing protocol  |
| [7]  | GSM 07.05                             | Digital cellular telecommunications (Phase 2+); Use of Data Terminal Equipment – Data Circuit terminating Equipment (DTE – DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS) |
| [8]  | GSM 11.14                             | Digital cellular telecommunications system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface                             |
| [9]  | GSM 11.11                             | Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface   |
| [10] | GSM 03.38                             | Digital cellular telecommunications system (Phase 2+); Alphabets and language-specific information   |
| [11] | GSM 11.10                             | Digital cellular telecommunications system (Phase 2); Mobile Station (MS) conformance specification; Part 1: Conformance specification   |
| [12] | 3GPP TS 51.010-1                      | Digital cellular telecommunications system (Release 5); Mobile Station (MS) conformance specification  |
| [13] | 3GPP TS 34.124                        | Electromagnetic Compatibility (EMC) for mobile terminals and ancillary equipment.  |
| [14] | 3GPP TS 34.121                        | Electromagnetic Compatibility (EMC) for mobile terminals and ancillary equipment.  |
| [15] | 3GPP TS 34.123-1                      | Technical Specification Group Radio Access Network; Terminal conformance specification; Radio transmission and reception (FDD)   |
| [16] | 3GPP TS 34.123-3                      | User Equipment (UE) conformance specification; Part 3: Abstract Test Suites.   |
| [17] | EN 301 908-02 V2.2.1                  | Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000. Third Generation cellular networks; Part 2:                                       |

|      |                              |  |
|------|------------------------------|--|
|      |                              | Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive   |
| [18] | EN 301 489-24 V1.2.1         | Electromagnetic compatibility and Radio Spectrum Matters Electromagnetic Compatibility (EMC) standard for radio equipment and s Part 24: Specific conditions for IMT-2000 CDMA Direct Spread (UTR Mobile and portable (UE) radio and ancillary equipment |
| [19] | IEC/EN60950-1(2001)          | Safety of information technology equipment (2000)  |
| [20] | 3GPP TS 51.010-1             | Digital cellular telecommunications system (Release 5); Mobile Station conformance specification   |
| [21] | GCF-CC V3.23.1               | Global Certification Forum - Certification Criteria  |
| [22] | 2002/95/EC                   | Directive of the European Parliament and of the Council of 27 January 200 restriction of the use of certain hazardous substances in electrical and el equipment (RoHS)   |
| [23] | SIM52xx_GPS_Application_Note | Applications Note About SIM5xxx GPS  |

## B. Terms and Abbreviations

**Table 24: Terms and Abbreviations**

| Abbreviation | Description   |
|--------------|---|
| ADC          | Analog-to-Digital Converter                                     |
| AMR          | Adaptive Multi-Rate   |
| AT           | Attention commands  |
| CS           | Coding Scheme   |
| CSD          | Circuit Switched Data   |
| CTS          | Clear to Send   |
| DTE          | Data Terminal Equipment (typically computer, terminal, printer) |
| DTR          | Data Terminal Ready   |
| DTU          | Data Transmit Unit  |
| DTX          | Discontinuous Transmission                                      |
| EFR          | Enhanced Full Rate  |
| EGSM         | Enhanced GSM  |
| ESD          | Electrostatic Discharge   |
| ETS          | European Telecommunication Standard                             |
| FR           | Full Rate   |
| GPRS         | General Packet Radio Service                                    |
| GSM          | Global Standard for Mobile Communications                       |
| HR           | Half Rate   |
| IMEI         | International Mobile Equipment Identity                         |
| Li-ion       | Lithium-Ion   |
| MO           | Mobile Originated   |
| MS           | Mobile Station (GSM engine), also referred to as TE             |
| MT           | Mobile Terminated   |

|       |   |
|-------|---|
| PAP   | Password Authentication Protocol                            |
| PBCCH | Packet Broadcast Control Channel                            |
| PCB   | Printed Circuit Board                                       |
| PCL   | Power Control Level   |
| PCS   | Personal Communication System, also referred to as GSM 1900 |
| PDU   | Protocol Data Unit  |
| PPP   | Point-to-point protocol                                     |
| RF    | Radio Frequency   |
| RMS   | Root Mean Square (value)                                    |
| RTC   | Real Time Clock   |
| RX    | Receive Direction   |
| SIM   | Subscriber Identification Module                            |
| SMS   | Short Message Service                                       |
| TE    | Terminal Equipment, also referred to as DTE                 |
| TX    | Transmit Direction  |
| UART  | Universal Asynchronous Receiver & Transmitter               |
| URC   | Unsolicited Result Code                                     |
| USSD  | Unstructured Supplementary Service Data                     |

**Phonebook abbreviations**

|    |   |
|----|---|
| FD | SIM fix dialing phonebook   |
| LD | SIM last dialing phonebook (list of numbers most recently dialed) |
| MC | Mobile Equipment list of unanswered MT calls (missed calls)       |
| ON | SIM (or ME) own numbers (MSISDNs) list                            |
| RC | Mobile Equipment list of received calls                           |
| SM | SIM phonebook   |
| NC | Not connect   |

## C. Safety Caution

**Table 25: Safety caution**

| Marks   | Requirements  |
|---|---|
|  | When in a hospital or other health care facility, observe the restrictions about the use of mobiles. Switch the cellular terminal or mobile off, medical equipment may be sensitive to not operate normally for RF energy interference.   |
|  | Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it is switched off. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. Forget to think much of these instructions may lead to the flight safety or offend against local legal action, or both.    |
|  | Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard. |

|   |  |
|---|--|
|  | Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. RF interference can occur if it is used close to TV sets, radios, computers or other electric equipment.   |
|  | Road safety comes first! Do not use a hand-held cellular terminal or mobile when driving a vehicle, unless it is securely mounted in a holder for hands free operation. Before making a call with a hand-held terminal or mobile, park the vehicle.  |
|  | GSM cellular terminals or mobiles operate over radio frequency signals and cellular networks and cannot be guaranteed to connect in all conditions, for example no mobile fee or a invalid SIM card. While you are in this condition and need emergent help, please remember using emergency calls. In order to make or receive calls, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength.<br>Some networks do not allow for emergency call if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may have to deactivate those features before you can make an emergency call.<br>Also, some networks require that a valid SIM card be properly inserted in the cellular terminal or mobile. |

STMCOM CONFIDENTIAL

**Contact us:**

**Shanghai SIMCom Wireless Solutions Ltd.**

Add: SIM Technology Building, No.633, Jinzhong Road, Changning District, Shanghai P.R. China  
200335

Tel: +86 21 3235 3300

Fax: +86 21 3235 3301

URL: [www.sim.com/wm](http://www.sim.com/wm)

STMCOM CONFIDENTIAL FILE