

A7683E-TE Kit User Guide Manual

LTE Module

SIMCom Wireless Solutions Limited

SIMCom Headquarters Building, Building 3, No. 289 Linhong Road, Changning District, Shanghai P.R. China Tel: 86-21-31575100 support@simcom.com www.simcom.com



| Document Title: | A7683E-TE Kit User Guide Manual |
|-----------------|---------------------------------|
| Version: | 1.00 |
| Date: | 2023-10-18 |
| Status: | Released |

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 WIRELESS SOLUTIONS LIMITED COPYING, TO OTHERS AND USING THIS DOCUMENT, ARE FORBIDDEN WITHOUT EXPRESS AUTHORITY BY SIMCOM. OFFENDERS ARE LIABLE TO THE PAYMENT OF INDEMNIFICATIONS. ALL RIGHTS RESERVED BY SIMCOM IN THE PROPRIETARY TECHNICAL INFORMATION , INCLUDING BUT NOT LIMITED TO REGISTRATION GRANTING OF A PATENT, A UTILITY MODEL OR DESIGN. ALL SPECIFICATION SUPPLIED HEREIN ARE SUBJECT TO CHANGE WITHOUT NOTICE AT ANY TIME.

SIMCom Wireless Solutions Limited

SIMCom Headquarters Building, Building 3, No. 289 Linhong Road, Changning District, Shanghai P.R. China Tel: +86 21 31575100

Email: simcom@simcom.com

For more information, please visit: https://www.simcom.com/download/list-863-en.html

For technical support, or to report documentation errors, please visit: https://www.simcom.com/ask/ or email to: support@simcom.com

Copyright © 2023 SIMCom Wireless Solutions Limited All Rights Reserved.



Version History

| Date | Version | Description of change | Author |
|------------|---------|-----------------------|-----------|
| 2023-10-18 | 1.00 | Original | Boru Zhou |





Contents

| 1 Introduction | 7 |
|---|----|
| 1.1 Documentation Overview | 7 |
| 2 Assessment Kit | 9 |
| 2.1 A7683E Assessment kit | 9 |
| 2.2 Interface Description | 13 |
| 3 Operation Procedures | 15 |
| 3.1 Accessory installation | 15 |
| 3.2 Power On/Off the Module | 16 |
| 3.2.1 Power on the Module | 16 |
| 3.2.2 Power off the Module | 16 |
| 3.3 USB driver Installation | 16 |
| 3.4 Firmware Update | |
| 3.5 UART Serial port Communication | 20 |
| 3.6 Using SIMCom Serial Port Tool | 22 |
| 3.7 AT Command Communication | 22 |
| 3.8 (U)SIM Application Guide | 23 |
| 3.9 SD/MMC Application Guide | 24 |
| 3.10 Audio Application Guide | 24 |
| 4 Current Consumption | 27 |
| 4.1 Preparation for test | 27 |
| 4.2 SLEEP mode current consumption test | 27 |
| 5 Appendix | 29 |
| 5.1 Related Documents | 29 |
| 5.2 Terms and Abbreviations | 29 |
| 5.3 Safety Caution | 30 |
| | |



Table Index

| TABLE 1: MODULE AND TE PN | 7 |
|---|----|
| TABLE 2: A7683E DOCUMENTS OVERVIEW | 7 |
| TABLE 3: THE SIMCOM EVB KITS | 9 |
| TABLE 4: THE TE KITS | 9 |
| TABLE 5: THE KIT PART NUMBER | |
| TABLE 6: THE TEST POINTS ON THE EVB | 13 |
| TABLE 7: THE TEST POINTS ON THE TE. | 14 |
| TABLE 8: SIMCOM USB PORT | |
| TABLE 9: UART INFORMATION | 20 |
| TABLE 10: UART PORT DESCRIPTION | 21 |
| TABLE 11: THE DEFAULT DATA FRAME FORMAT | 23 |
| TABLE 12: UART BAUD RATE SUPPORT | 23 |
| TABLE 13: UART COMMON BAUD RATE OPERATION | 23 |
| TABLE 14: AT COMMAND FOR NETWORK AND (U)SIM | |
| TABLE 15: AT COMMAND FOR FILE SYSTEM | |
| TABLE 16: AUDIO AMPLIFIER DESCRIPTION | |
| TABLE 17: RELATED DOCUMENTS | |
| TABLE 18: TERMS AND ABBREVIATIONS | |
| TABLE 19: SAFETY CAUTION | |
| | |



Figure Index

| FIGURE 1: EVB AND TE ASSESSMENT KITS | 10 |
|---|----|
| FIGURE 2: EVB TOP VIEW | 10 |
| FIGURE 3: EVB BOTTOM VIEW | 11 |
| FIGURE 4: TE TOP VIEW | 11 |
| FIGURE 5: TE BOTTOM VIEW | 12 |
| FIGURE 6: THE PICTURE OF TE BOARD INSTALLED ON EVB BOARD | 15 |
| FIGURE 7: A7683E DEVICES RECOGNIZED BY THE OPERATING SYSTEM | 17 |
| FIGURE 8: BROWSE FOR THE DRIVERS | 17 |
| FIGURE 9: SCHEMATIC DIAGRAM OF DRIVERS' SUCCESSFUL INSTALLATION | 17 |
| FIGURE 10: THE DOWNLOAD TOOL | |
| FIGURE 11: SELECT THE PACKAGE | |
| FIGURE 12: THE PREPARATION OF DOWNLOAD BY USB | |
| FIGURE 13: DOWNLOAD SUCCESSFULLY | 20 |
| FIGURE 14: THE SETTING OF THE JUMPER WHEN USING DEBUG_UART | 21 |
| FIGURE 15: THE SETTING OF THE JUMPER WHEN USING UART3 | 21 |
| FIGURE 16: SIMCOM SERIAL PORT TOOL INTRODUCTION | |
| FIGURE 17: THE CONNECTION OF PHONE HANDLE (VOLTE) | 25 |
| FIGURE 18: THE CONNECTION OF SPEAKER (PLAYING AUDIO) | 25 |
| FIGURE 19: QUERY VERSION NUMBER | 27 |
| FIGURE 20: THE METHOD OF TEST CURRENT CONSUMPTION | 28 |
| | |





This document describes the interface and usage of the A7683E-TE kit. With the help of this document, customers can quickly use the A7683E-TE Kit.

This document applies to the following product module and TE:

Table 1: Module and TE PN

| IE IE | E PN | Module |
|------------------------------|---------|--------|
| 8BAE00-A7682X-TE_V1.02 RO S2 | 2-10DEY | A7683E |

1.1 Documentation Overview

Table 2: A7683E Documents Overview

| No. | Document | Description |
|-----|---|---|
| 1 | A7683E_Hardware_Design_V1.01 | Mainly introducing interface functions, Recommend circuit, PCB layout guideline, packaging and other hardware components, as well as the use of AT commands |
| 2 | SIMCom_A7683E Reference_Design_V1.00_20231011 | Reference circuit applications |
| 3 | 8BAE00-A7682E-TE _V1.02_DL&PCB | A7683E TE SCH&PCB PDF Document |
| 4 | SIMCOM_EVB_DL&PCB | SIMCOM_EVB SCH&PCB PDF Document |
| 5 | MOD_A7683E_85 | Reference Package (Pads) |
| 6 | A1602 & 1606_Series_AT_Command Manual_V1.03 | AT Command Manual |
| 7 | A7683E_TE kit_User Guide_V1.00 (This document) | The use of TE board, forced download, startup, reset, and the location of other measurement points, as well as the use method in conjunction with EVB |



NOTE

This current revision is an early release to support initial product developers. The content is subject to change without advance notice.





2 Assessment Kit

The Assessment Kit includes EVB Kit and TE Kit. The following chapters describe A7683E Assessment Kit.

2.1 A7683E Assessment kit

SIMCom EVB Kits are listed as follows. Please confirm all accessories are complete.

- 1) SIMCom EVB board;
- 2) 5V DC power adapter;
- 3) Micro USB cable;
- 4) GSM\WCDMA\LTE Antenna;

Table 3: The SIMCom EVB Kits

| Items | Description | Quantity |
|-------------------------|------------------------|----------|
| 8PYA00-SIMCOM-EVB_V1.02 | EVB | 1 |
| Adapter | 5V/2A DC power adapter | 1 |
| Cable | Micro USB cable | 1 |
| Antenna | GSM\WCDMA\LTE Antenna | 1 |

A7683E TE Kits are listed as follows. Please confirm all accessories are complete.

Table 4: The TE Kits

| Items | Description | Quantity |
|------------------------|-------------|----------|
| 8BAE00-A7682X-TE_V1.02 | TE | 1 |





Figure 1: EVB and TE Assessment Kits

The top view and bottom view of the SIMCom EVB board is shown as follows.

| O A | |
|-------------------------|-------|
| | • • • |
| | |
| | |
| | |
| BPYA00-SIMCOM-EVB_V1.02 | |
| | |
| | • |
| | • ~ 0 |

Figure 2: EVB Top View





Figure 3: EVB Bottom View

The top view and bottom view of A7683E TE board is shown as follows.



Figure 4: TE Top View





Figure 5: TE Bottom View

Ensure the module normally use, it is recommended to use the correct kit model. The following table shows each kit part number.

Table 5: The Kit part number

| Kits | Part Number | Description |
|----------------|-------------|-------------|
| SIMCom EVB KIT | S2-106XN | EVB KIT |
| | | |
| NOTE | | |

The figures above are the effect diagrams of the module, for reference only. Please refer to the actual product for appearance.



2.2 Interface Description

Through the introduction in the above chapters, we see that there are many signal test points reserved on the EVB and TE board. This chapter mainly introduces the corresponding signals.

The test points on the EVB are listed as follows.

Table 6: The test points on the EVB

| Position | Pin | Description | | Position | Pin | Description |
|----------|-------------|--------------|---|--------------------------|--------------------------|---------------|
| | J301_PIN_1 | PWRKEY | | D | J304_PIN_12 | PCM_CLK |
| | J301_PIN_2 | RESET | | | J304_PIN_13 | PCM_IN |
| | J301_PIN_3 | DBG/UART3_RX | | | J304_PIN_14 | PCM_OUT |
| | J301_PIN_4 | DBG/UART3_TX | | | J304_PIN_15 | PCM_SYNC |
| | J301_PIN_5 | UART1_RI | | | J304_PIN_X | NC |
| | J301_PIN_6 | UART1_DCD | | | J305_PIN_1 | GPIO_7 |
| | J301_PIN_7 | UART1_DTR | | | J305_PIN_3 | GPIO_6 |
| | J301_PIN_8 | UART1_RXD | | | J305_PIN_5 | GPIO_5 |
| Α | J301_PIN_9 | UART1_CTS | | | J305_PIN_8 | GPIO_11 |
| | J301_PIN_10 | UART1_RTS | | E | J305_PIN_10 | GPIO_10 |
| | J301_PIN_11 | UART1_TXD | | | J305_PIN_11 | GPIO_2 |
| | J301_PIN_12 | NC | | | J305_PIN_13 | GPIO_1 |
| | J301_PIN_13 | ADC1 | | | J305_PIN_14 | GPIO_8 |
| | J301_PIN_14 | NC | | | J305_PIN_X | NC |
| | J301_PIN_15 | VRTC | F | F | J202 | Main sim slot |
| | J301_PIN_16 | NETLIGHT | | | J401_PIN_1 J401_PIN_2 | VDD_EXT |
| в | | | | J401_PIN_3 J401_PIN_4 | USB BOOT | |
| | J302_PIN_1 | 514105 | | | J401_PIN_5 J401_PIN_6 | GND |
| | J302_PIN_15 | SIM_DET | | Η | J204 | USB-2-UART |
| | J302_PIN_X | NC | | I | J101 / J102 | To TE board |
| | J303_PIN_2 | SPI_CS | | J | D402 | Status LED |
| | J303_PIN_3 | SPI_MOSI | | Κ | D401 | Network LED |
| С | J303_PIN_5 | SPI_MISO | | L | D201 | Power LED |
| | J303_PIN_6 | SPI_CLK | | Μ | SW401 | PWRKEY |
| | J303_PIN_7 | PWM1 | | N | SW402 | Reset |



| J303_PIN_8 | PWM2 | Ο | S201 | Power switch |
|-------------|---------|---|------|----------------|
| J303_PIN_9 | VDD_EXT | Р | S401 | RF switch |
| J303_PIN_10 | GND | Q | J203 | Sim slot (n/a) |
| J303_PIN_12 | VCC_1V8 | R | J502 | Audio jack |
| J303_PIN_X | NC | S | X501 | Audio jack |
| | | Т | J103 | +5V DC input |

Table 7: The test points on the TE.

| Attachment Label | Description |
|------------------|-----------------------------------|
| T1 | Module |
| T2 | UART Switch* |
| ТЗ | Micro USB Connector |
| T4 | Main Antenna Connector |
| Т5 | SIM1 Card Holder |
| Т6 | SIM2 Card Holder |
| Τ7 | SD Card Holder |
| Т8 | SPEAKER connector |
| B1 | Connector (Connect to SIMCOM-EVB) |
| B2 | Connector (Connect to SIMCOM-EVB) |

NOTE

Customers can connect DEBUG_UART/UART3 to SIMCom_EVB by jumper (T2). By default, DEBUG_UART is connected to SIMCom_EVB.



3 Operation Procedures

3.1 Accessory installation

Install the necessary accessories and perform functional tests.

- 1) Installing the TE to the EVB board, pay attention to the installation direction to prevent short circuit;
- 2) Insert the SIM card to the T5 position of the main card slot on the front;
- 3) Installing the LTE antenna to the T4 position;
- 4) For serial AT communication, grab the debug log and upgrade the software, insert the micro USB cable to the interface **T3** position;
- 5) Insert the 5V DC power supply to the **T** position of the EVB board.

The picture of TE board installed on EVB board is shown below.



Figure 6: The picture of TE board installed on EVB board



3.2 Power On/Off the Module

3.2.1 Power on the Module

The module power on procedure is shown in the following:

- (1) Please assure the EVB board **O** (S201) is **OFF** status.
- (2) Connect the DC adapter.

(3) Pull the O (S201) to ON state, the L (D201) and the J (STATUS) light will be lighted all time, if the module registers to the net, the K (NET) light will be lighted flash, if not, the J (NET) light will be lighted all the time.

3.2.2 Power off the Module

- (1) Power off the module by pull the O (S201) to off status, after the module saving the data, the module will be powered off automatically and all lights will be extinguished. This method is not recommended for customers to use directly.
- (2) Power off the module by pressing the POWER_ON (SW401) for 2.5s, after the module saving the data, the module will be powered off automatically and all lights will be extinguished. Then pull the O (S201) to off state.
- (3) Power off the module by AT command when the module is at power on status. By sending AT command "AT+CPOF=1", the module will be powered off automatically and J (STATUS) and K (NET) will be extinguished after the module saving the data. Then pull the O (S201) to off state. For more details about the AT command, please refer to the AT command manual.

3.3 USB driver Installation

1. Use USB cable to connect the PC to the Micro-USB port on the TE board. Then several SimTech A7683E devices should be listed under other devices in device manager.





Figure 7: A7683E Devices Recognized by the Operating System

- 2. Right click the "Mobile AT Interface" devices and selecting "Update driver".
- 3. Select "Browse my computer for drivers".

4. Select "Let me pick from a list of available drivers on my computer". Click "Browse", manually search the driver folder, and then click "Next". Locate the folder where the SIMCom driver is and click OK.

| | × | Browse For Folder X |
|---|---|---|
| ÷ | Update Drivers - ASR Modern Device (COM3) | Select the folder that contains drivers for your hardware. |
| | Browse for drivers on your computer | Desktop |
| | Search for drivers in this location: | > 2 刘俊熙 |
| | C:\Users\Y0218\Desktop\simcom强动\Windows10 Yers | > 🗊 3D Objects Y 🔲 Desktop |
| | → Let me pick from a list of available drivers on my computer This list will show available drivers compatible with the device, and all drivers in the same category as the device. | > Driver > simcom₩St) > Windows7 > Windows8 > Windows80 > Windows80 > Windows80 > Bocuments |
| | Next Cancel | OK Cancel |
| | | |

Figure 8: Browse for the drivers

5. Drivers need to be installed in the same way for each device. If you install successfully, you will see one SimTech device under Modems and three SimTech devices under Ports (COM & LPT) as shown in follows.



Figure 9: Schematic diagram of drivers' successful installation



Table 8: SIMCom USB port

| USB Ports | Description |
|---------------------------------|---|
| SimTech HS-USB AT Port 9011 | AT Command Communication Port |
| SimTech HS-USB Diagnostics 9011 | Software Debug and Firmware Update Port |

3.4 Firmware Update

Customers can update firmware by USB. The firmware update process of the module is as follows.

Before updating the firmware, please contact the SIMCom technical support team and the supplier to obtain the correct firmware upgrade file.

1. Open the download tool (A76XX_A79XX_MADL V1.21 Only for Update), the interface is shown as follows.

| <u>F</u> ile <u>V</u> iew <u>H</u> e | lp | | | | | | | |
|--------------------------------------|----------|-----|----------|--------------|--|---|------|----|
| s 🤄 📮 | | | | | | | | |
| Infonation | Detailed | ^ ^ | C BLF1 | Type file | C:\Users\Y0289\Desktop\A7683E\SW\22110B01V01A7683M6A_230926_A7 | 7683E-LAXS_V102230926\22110B01A7683M6A_230926_A | | |
| | | | ⊙ Zip fi | ile | <mark>i ģ60</mark> < | | | |
| Station | | | | | | | | |
| ProductInfo | | | | | | | | |
| | 0 | | Connect | Port | Address | Progress | Time | _ |
| | 0 | _ | æ | Device 1 | Port_#0003.Hub_#0001 | | | |
| | 0 | _ | æ | Device 2 | Port_#0002. Hub_#0001 | | | |
| | | | æ | Device 3 | Port_#0002. Hub_#0002 | | | |
| | | | æ | Device 4 | Port_#0004.Hub_#0002 | | | |
| | | | æ | Device 5 | Port_#0002.Hub_#0003 | | | |
| | | | æ | Device 6 | Port_#0004.Hub_#0003 | | | |
| | | ~ | | Th | is Mode Will Keep MRD Da | ta | | |
| | | > v | < | | | | | |
| erGuide | | |] - | | | | - | ц. |
| | | | | | | | | ٦ |
| | | | | | | | | |
| | | | | | | | | > |
| | | | | | | | | |

CAP NUM SCRL ...

Figure 10: The download tool



2. Select the package and click the "GO".

| 🎒 A76XX_A79X | X_MADL V1.21 Only for Upd | ate Build: Aug | 2 2022 14:56:4 | 0 This is up | grade mode. | | | | | | _ | | \times |
|--------------|---------------------------|----------------|----------------------------------|--------------|--------------------------------------|-------------------------|----------------------|----------------|--------------------------|-----|----|--------|----------|
| File View He | elp | | | | | | | | | | | | |
| i 🖪 🐵 🖕 | | | _ | | | | | | | | | | |
| Infonation | Detailed ^ | Platform | n Type — Ffile | | C:\Users\Y0289\Desktop\A7683E\SW\221 | 10B01V01A7683M6A_230926 | 5_A7683E-LAXS_V10223 | 0926\22110B01/ | A7683M6A_230926_A | 1 | | | |
| User | | ⊙ Zip | file | <u>⊖</u> G0 | < | | | | > BL | _ L | | | |
| Station | | | | 3 | | | | | | | | | |
| ProductInfo | | | | | | | | | | | | | |
| DownloadTot | 0 | Com | IJĦ | | | | | | | | | Time | |
| SussessMur | 0 | eres (| \rightarrow \land \uparrow | « 22110 | 0B01V01A76 > 22110B01A7683M6 | A_230926_A7683E-LAXS_ | V102230926 | ~ Ö | | ōA | | | |
| SuccessRate | , v | er 19 | 1织 ▼ 新建3 | 文件夹 | | | | | | • | | | |
| Successivate | | æ | 此电脑 へ | 名称 | ^ | 修改日期 | 类型 | 大小 | | _ | | | |
| | | æ | 🧊 3D 对象 | 221 | 110B01V01A7683M6A_230926_A76 | 2023/9/27 10:16 | WinRAR ZIP 压缩 | 10,483 KB |] | - | | | |
| | | | ■ 视频 | 2 | | | | | | _ | | | |
| | | 200 | ■ 文档 | | | | | | | _ | | | |
| | | e e | 🕹 下載 | | | | | | | | | | |
| | v | | | | | | | | | | | | |
| < | > | × . | 三 桌面 些 系统 (C:) | | | | | | | | | | > |
| UserGuide | | 1. | | | | | | | | | | - | Ф X |
| | | | 🕳 文档 (E:) | | | | | | | | | | 1^ |
| | | | 🛫 dcc (\\19 | | | | | | | | | | |
| < | | _ | 一 人会中心分 一 dcc (\\19 | | | | | | | | | | > ¥ |
| Output | | | - | | | | | | | | | - | ųΧ |
| | | | | 又件名(N) |): 22110B01V01A7683M6A_230926_A | 47683E-LAXS_V10223092 | 6.zip | ~ | Download Zip File(*.zip) | ~ | | | |
| | | | | | | | | | 刊井(<u>Q</u>) 取消 | | | | |
| Ready | | | | | | | | | | | CA | NUM SC | CRL .:: |
| | | | | | | | | | | | | | |

Figure 11: Select the package

3. Connect the Micro USB to the TE board, pull down the BOOT test point to the GND test point, then turn on the Power (**O**) and press the PWRKEY(**M**) button, the module will enter download mode.



Figure 12: The preparation of Download by USB



4. The download is successful.

| 🖡 A76XX_A79XX | X_MADL V1.21 Only for U | pdate E | Build: Aug | 2 2022 14:56 | 40 This is upgrade mode. | | - 🗆 X |
|---|--|------------------------------|---------------------------------------|--|---|--|--|
| Eile ⊻iew <u>H</u> el | Ip | | | | | | |
| S 🕘 🖕 | | | | | | | |
| Infomation | Detailed | ^ ^ | Platform BLFI | Type | C:\Users\Y0289\Desktop\A7683E\SW\22110B01V01A7683M6A_230926_A7 | 7683E-LAXS_V102230926\22110B01A7683M6A_230926_A | |
| User | | | © Zip fi | le | | > 4000 | |
| Station | | | | | | | |
| ProductInfo | | | | | | | |
| DownloadTot | 1 | | Connect | Port | Address | Progress | Time |
| | | | ŝ | Device 1 | Port_#0003.Hub_#0001 | | |
| SuccessNum | \$100.00 | | æ | Device 2 | Port_#0002.Hub_#0001 | | |
| | | | æ | Device 3 | Port_#0002.Hub_#0002 | | |
| | | | ŝ | Device 4 | Port_#0004.Hub_#0002 | | |
| | | | æ | Device 5 | Port_#0002.Hub_#0003 | | |
| | | | ê | Device 6 | Port_#0004.Hub_#0003 | Download progress | |
| | | ~ | ÷ | Device 7 | Port_#0006.Hub_#0001 | Succeed | 00:00:30 |
| < . | > | ` | < | | | | 1 |
| UserGuide | | | | | | | → ↓ > |
| | | | | | | | |
| | | | | | | | |
| Output | | | | | | | - + + > |
| 2023/10/27 9:25:2 2023/10/27 9:25:2 | 27:54] - Target Debug Me 27:62] - Target Debug Me | ssage | \\ eve | nt": 0, "1 nt": 0, "1 | locationInfo": "Port_#0006.Kub_#0001", "message": "09:25:27.054 <com40> locationInfo": "Port_#0006.Kub_#0001", "message": "09:25:27.054 <com40></com40></com40> | (flasher) erase \"nvm\" done. \n"}\ OKAV [7.373z]\n"]\ | |
| 2023/10/27 9:25:2 2023/10/27 9:25:2 2023/10/27 9:25:2 | 27:69] - Target Debug Me 27:76] - Device: 7, Targ 27:86] - Device: 7, Targ 27:86] - Device: 7, Targ | essage get Deb get Deb | : \{ ~eve ug Message ug Message | nt": 0, "] : \{ "deson : \{ "deson | locationInfo": "Fort #0006.Nub_#0001", "message", '09:25:27.0%4 CODM400 ription": "Arom Usb Boot Port", "displayName": "ASR Serial Download Dav ription": "Arom Usb Boot Port", "displayName": "ASR Serial Download Dav | all finished total time: 28.714s/n ⁷ }\ ice (COM40)", "enabled": true, "event": 6, "locationInfo": ice (COM40)", "enabled": true, "event": 6, "locationInfo": | "Port_#0006. Hub_#000 "Port_#0006. Hub_#000 |
| Ready | 21.55 J Device. 6, Iars | et Deb | ug message | . GOCCAEDED | | | CAP NUM SCRL |
| | | | | | | | |

Figure 13: Download successfully

3.5 UART Serial port Communication

The SIMCom_EVB provides a USB-TO-UART interface (**T3**), the chip of USB to UART interfaces is CH342F or CP2105.

Table 9: UART information

| Interface Type | Support Baud Rate (bps) | Default Baud Rate (bps) | Function Description |
|-----------------------|---|----------------------------|---|
| Full function UART | 300 600 1200 2400 4800 9600 19200 38400 57600 115200 230400 460800 921600 1842000 and 3686400 | 115200 | Data transmission and AT command transmission |
| Debug UART | 300 600 1200 2400 4800 9600 19200 38400 57600 115200 230400 460800 921600 1842000 and 3686400 | 115200 | Module partial log output |
| Two-wire UART | 9600 115200 230400 and 921600 | 115200 | Used to communicate with peripherals |



Table 10: UART port description

| EVB-CH342 | EVB-CP2105 | Module serial port |
|-----------------------------|--|--------------------|
| USB-Enhanced-SERIAL-A CH342 | Silicon Labs Dual CP210X USB to UART Bridge: Standard COM Port | DEBUG_UART/UART3 |
| USB-Enhanced-SERIAL-B CH342 | Silicon Labs Dual CP210X USB to UART Bridge: Enhanced COM Port | MAIN_UART |

DEBUG_UART and UART3 can be switched by jumper T2 (J101).

The setting of the jumper **T2** (J101) when using DEBUG_UART is shown as follows.



Figure 14: The setting of the jumper when using DEBUG_UART

The setting of the jumper **T2** (J101) when using UART3 is shown as follows.



Figure 15: The setting of the jumper when using UART3



3.6 Using SIMCom Serial Port Tool

SIMCom has a serial port tool to test modules with AT Commands. Serial Port Tool can communicate with modules after opening COM Ports on list. On the following figure, every section of serial tool can be seen.

| SIMCom Serial Port Tool_V2.6 | - 0 | × |
|---|--|-------|
| | Select All Round Send Round Times: / | |
| OK A | Enter Hex Run Delay(ms) Note | |
| 2020-04-24 13:21:02:288[Send->]AT+CSQ | 1: AT | |
| 2020-04-24 13:21:02:318[Reov<-]AT+CSQ +CSQ: 99, 99 | 2: AT+CSQ 2 Antenna Strength | |
| OK | 3: Al +U-MEGY | teche |
| 2020-04-24 13:21:19:346[Send->]AT+CSQ | 4: AT+CIMB? | diot |
| 2020-04-24 13:21:19:390[Recv<-]AT+CSQ | 5: AI+UMANB=Z 5 | 310t |
| +CSQ: 99,99 | 6: AT +CBANDCFG="NB-IOT", 20 6 Band Selections | |
| OK | 7: AT+CNACT? 7 PDF Active | |
| 2020-04-24 13:21:28:330[Send->]AT+CSQ | 8: AT+CNACT=1, "internet" 8 | |
| 2020-04-24_13:21:28:362[Reav(-]AT+CSQ | 9: AT+CBAND? 9 Preferred Band | |
| | 10: AT+CBAND="ALL_MODE" 10 Preffered Band | |
| | 11: AT+CGMR 11 FW Inquire | |
| 2020-04-24 13:21:44:200[Send=>]AI+LSQ | 12: AT +CBANDCFG? | |
| 2020-04-24 13:21:44:288[Recv<-]AT+CSQ +CSQ: 99,99 | 13: AT +CGDCONT? | _ |
| ок | 14: AT+CPIN? | |
| 2020-04-24 13:21:52:441[Send->]AT+CSQ | 15: AT+CSTT="stream.co.uk", "stres | |
| 2020-04-24_13:21:52:477[Recv<-]AT+CSQ +rS0_99 | 16: AT+CIICR | |
| 0 | 17: AT+CIFSR 17 IP Adress | |
| л. Х | 18: AT+COPS? 18 Operator Selecton | |
| | 19: AT+CNMMP? 19 Preffered Mode 2- Autom | atic |
| PortNum: (COMID) SimTech HS-USB AT Port 9001 | 20: AT+CFUN=0 □ 20 | |
| | 21: AT+CFUN=1 21 | |
| Close Fort BaudRate: 115200 V Parity: NONE V Data Bits: 8 V Stop Bit: 1 V | 22: AT +CIMI | _ |
| RTS DTR AtLog Signal Save Log File Path D:\Google Drive\Simcom Belgeler | 23: AT+CCID 23 | |
| Ver Send Clear Send | 24: | |
| | 25: 25 | |
| Dend With \r\n Select File No File Selected! Send File Exit | ◉Cmd List 1 ○Cmd List 2 ○Cmd List 3 | |
| STATUSE®COMIO OPENED£-115200, N, 8, 1 RX:156 TX:51 Count cleared | Load CMD List Save CMD List Clear CMD List | |

Figure 16: SIMCom Serial Port Tool Introduction

In addition, SIMCom Serial Port Tool may take some log records and save these command lists to use later again. Tool has a 3 CMD List sections and holds AT Commands with their notes and saves under .ini format on PC to import it back.

3.7 AT Command Communication

A7683E provides three serial ports. By default, when used as an ordinary serial port, we can set the data frame format of the serial port and set the baud rate.

1) Set the serial port data frame format

A7683E supports multiple serial data frame formats. The default data frame format is 8 data bits, 1 stop bit,



and no parity bit.

Table 11: The default data frame format

| UART frame format | Support format |
|-------------------|----------------|
| Data bit | 8bits |
| Stop bit | 1bits |
| Parity bit | None |

2) Set the serial port baud rate

A7683E supports a variety of common baud rates; the factory default baud rate of the standard module is 115200. For temporary modification of baud rate, please refer to the command "AT+IPR".

Table 12: UART baud rate support

| UART baud rate support | Support rate |
|--------------------------------|---|
| Serial communication baud rate | 300 600 1200 2400 4800 9600 19200 38400 57600 |
| Senar communication badd rate | 115200 230400 460800 921600 1842000 and 3686400 |

Common methods of using serial port baud rate commands:

Table 13: UART common baud rate operation

| UART common baud rate operation | Related command |
|---------------------------------|-----------------|
| Query the current baud rate | AT+IPR? |
| Query module supports baud rate | AT+IPR=? |
| Set temporary baud rate to 9600 | AT+IPR=9600 |

3.8 (U)SIM Application Guide

Insert the SIM card into the slot and connect the antenna, and the module will automatically register with the network. After the network is registered successfully, the network light will flash continuously.

Table 14: AT command for network and (U)SIM

| AT command | Description |
|------------|---------------------------------|
| AT+CICCID | Read ICCID from SIM card |
| AT+CPSI | Inquiring UE system information |
| AT+CSQ | Query signal quality |



| AT+CPIN | Enter PIN |
|--------------------|---------------------------------------|
| AT+UIMHOTSWAPON | Enable the SIM card hot swap function |
| AT+UIMHOTSWAPLEVEL | Set the SIM card detection level |

NOTE

- 1. A7683E supports SIM card hot swap function, this function is disabled by default.
- 2. For more details of AT commands about USIM, please refer to document [2].

3.9 SD/MMC Application Guide

After inserting the SD card into the slot, the SD/MMC functions can be used normally.

Table 15: AT command for File System

| AT command | Description |
|------------|---|
| AT+FSCD | Select directory as current directory |
| AT+FSMKDIR | Make new directory in current directory |
| AT+FSRMDIR | Delete directory in current directory |
| AT+FSLS | List directories/files in current directory |
| | |

NOTE

For more details of AT commands, please refer to document [2].

3.10 Audio Application Guide

A7683E provides MIC and SPK interface, and supports VoLTE. The audio amplifier and speaker connector are integrated on the TE board



Table 16: Audio amplifier description

| Audio amplifier | Description |
|---------------------|--|
| PN | BCT8933EGP-TR/AW8733ATQR |
| Туре | Class-K |
| Output power | 2W(8Ω) |
| Enable gain control | GPIO1 (PIN57), Customer can choose GPIO or other |
| Enable gain control | control source at will. |

Customers can connect the external phone handle to Audio jack (**R**) on the SIMCom_EVB for VoLTE, and connect loudspeaker to the speaker connector (**T8**) for playing audio.



Figure 17: The connection of phone handle (VoLTE)



Figure 18: The connection of speaker (Playing audio)



NOTE

If customers need to use the phone handle to make calls, please remove the R410 and R411, and weld the R213 and R214.





4 Current Consumption

4.1 Preparation for test

Firstly, connect the power supply with the "VBAT and GND" on the TE board, connect the TE board with the USB, power on the module, and then send the command "AT+SIMCOMATI" to query valid information such as module version and software version.

2023-10-19 09:58:07:276[Send->]AT+SIMCOMATI 2023-10-19 09:58:07:299[Recv<-] Manufacturer: SIMCOM INCORPORATED Model: A7683E-LAXS Revision: 22110B01A7683M6A_230926 A7683M6_B01V01_230926 IMEI: 862095060002257

ΟK

Figure 19: Query version number

Calibrate the module after checking the information of module correctly.

4.2 SLEEP mode current consumption test

1. Insert the SIM card, register the network, and query the network registration status through "AT+CREG?"

2. After the network is registered successfully, turn off functions (such as indicator lights, log, etc.) related to leakage through AT commands.

3. Enable sleep mode by "AT+CSCLK=1", and unplug USB.

4. Measure the current in sleep mode.





Figure 20: The method of test current consumption

NOTE

- 1. Before testing the current, please remove the R401/R410/411/U301.
- 2. If the current waveform is abnormal, start again from Step 1.





5.1 Related Documents

Table 17: Related documents

| No. | Title | Description |
|-----|--|-----------------------------------|
| [1] | A7683E Hardware Design | A7683E Hardware Design document |
| [2] | A1602 & 1606_Series_AT_Command Manual_V1.03 | A7683E AT Command Manual document |
| [3] | SIMCOM_EVB KIT_User Guide | SIMCOM EVB User Guide |

5.2 Terms and Abbreviations

Table 18: Terms and abbreviations

| Abbreviation | Description |
|--------------|---|
| EMC | Electromagnetic Compatibility |
| ESD | Electrostatic Discharge |
| GPS | Global Positioning System |
| I2C | Inter-Integrated Circuit |
| IMEI | International Mobile Equipment Identity |
| LTE | Long Term Evolution |
| MSB | Most Significant Bit |
| PCB | Printed Circuit Board |
| RF | Radio Frequency |
| SIM | Subscriber Identification Module |
| SMPS | Switched-Mode Power Supply |
| NC | Not connect |
| ZIF | Zero Intermediate Frequency |
| (U)SIM | Universal Subscriber Identity Module |
| UART | Universal Asynchronous Receiver Transmitter |



5.3 Safety Caution

Table 19: 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 and not operate normally due to RF energy interference. |
| X | 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. Forgetting to think much of these instructions may impact the flight safety, or offend 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. |
| sos | GSM cellular terminals or mobiles operate over radio frequency signals and cellular networks and cannot be guaranteed to connect in all conditions, especially with a mobile fee or an invalid SIM card. While you are in this condition and need emergent help, please remember to use 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. |
| | 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. |
| | Also, some networks require that a valid SIM card be properly inserted in the cellular terminal or mobile. |