SIM7100_SIM7500_SIM7600 Series_UART_Application Note

LTE Module

Document Title:	SIM7100_SIM7500_SIM7600 Series_UART_Application Note
Version:	3.00
Date:	2021.11.19
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

About Document

Version History

Version	Date	Owner	What is new
2.00	2020.8.6	Dongshan Liu	Update the format
3.00	2021.11.19	Haotian Wang	Update the format

Contents

1 Document Overview

This document describes how to use UART interface of SIM7100 modules. Examples are also given for reference. This document can be used for SIM7100 modules.

The UART port has several features:

- Support High-speed UART, the baud rate up to 4Mbps. the communication baud rate including: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600, 3200000, 3686400, 4000000bps.

- Support both RS232 modem and Simple modem connections.

- Support Hardware flow control.

- Support Auto baud rate synchronize.

2 Hardware interface

SIMCom 4G modules designed as a DCE (Data Communication Equipment). It provides a Simple or RS232 modem which is used for data transmission and sending AT commands.

The default baud rate is 115200bps, data size is 8 bits, stop bits is 1 bit, and parity is none. The default connection is Simple modem, the control signals PIN should be configured as corresponding UART control signal function if user need support Simple modem.

2.1   Description of related PIN

PIN type	PIN name	I/O	Active voltage	Default Status
UART	UART_RXD	I	High/Low	Pull- Up
	UART_TXD	O	High/Low	Pull-Up
	UART_RTS	O	High/Low	
	UART_CTS	I	High/Low	Pull-Up
	UART_DTR	I	High/Low	Pull-Up
	UART_DCD	O	High/Low	
	UART_RI	O	High/Low	

Table 2: Logic level

Parameter	Min	Max	Unit
Logic low input	-0.3	0.3	V
Logic high input	0.8	1.83	V
Logic low output	-0.3	0.3	V
Logic high output	0.9	1.83	V

2.2 Connect to Host

2.2.1 Simple modem

When the module is used as a Simple modem for data transmission, only RXD and TXD signal PIN are used, the following figure shows the connection between SIM7100 module and DTE(customer's CPU).
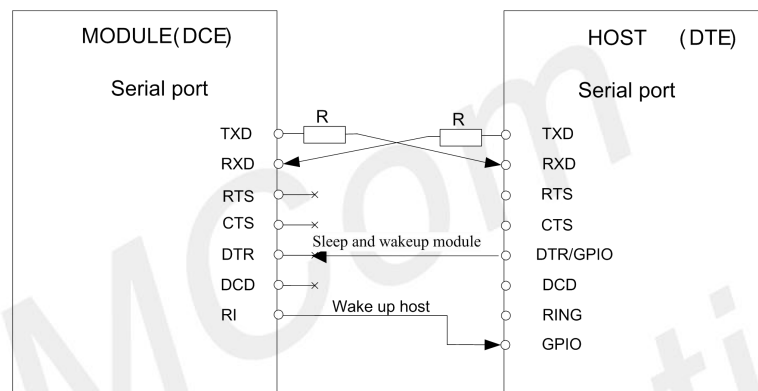
Figure 1: Simple modem

2.2.2 RS232 modem

When the module is used as a RS232 modem for data transmission, all the signal PIN should be connected, including TXD, RXD, RTS, CTS, DTR, DCD and RI, and the corresponding PIN should be configured as UART function, the details please refer to the Control Signals section below. The following figure shows the connection between SIM7100 module and DTE (customer's CPU).
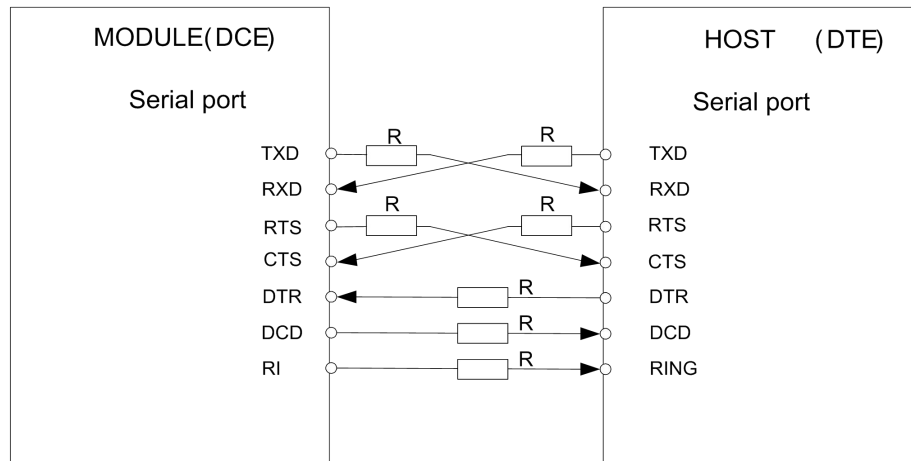
Figure 2: RS232 modem

> **NOTE**
>
> For difference devices, the name of RTS PIN maybe confused as CTS PIN, and the name of CTS PIN maybe confused as RTS PIN, the I/O direction of SIM7100 module's CTS PIN is IN, and RTS PIN is OUT, user can determine this confusion by the I/O direction.

3 Control Signals

3.1 Control pin description

3.1.1 CTS

When this pin is in hardware flow control mode, this signal is asserted (low level) to prepare the module (DCE) for accepting transmitted data from the DTE device.

DCE stop transmitting data if CTS PIN is high level, transmission begins or continues if CTS is low level, if CTS goes high in the middle of character transmission, the module (DCE) waits for a completed transmission before stop transmitting data.

This PIN is in GPIO mode by default, user can switch to flow control mode by "AT+IFC=2,2" command.

3.1.2 RTS

When this pin is in hardware flow control mode, this signal is asserted by the module (DCE) to inform the DTE device that transmission may begin.

The RTS PIN output high level when the RX FIFO (512 Bytes) level of the module (DCE) is the same or greater than 64, when the Rx FIFO level falls below 64 the RTS PIN output low level.

This PIN is in GPIO mode by default, user can switch to flow control mode by "AT+IFC=2,2" command.

3.1.3 DCD

AT command AT&C can be used to set DCD function mode. When set "AT&C0", DCD line is always ON (low). When set "AT&C1", DCD line is ON (low) only in the presence of data carrier.

3.1.4 DTR

The PIN default in GPIO mode, and support sleep/wakeup mode, AT command AT+CSCLK can be used to switch GPIO and sleep/wakeup mode. If DTR in Sleep mode, module will be in sleep mode when it not have any work.

   AT+CSCLK=0 set to GPIO mode
   AT+CSCLK=1 set to Sleep/Wakeup mode

Note:

* If module coming call when in sleep mode, it will be wakeup and send URC to host, module will be auto sleep when URC send complete and DTR is high then sleep time.*
Anytime host want send data to module, it must be pull down DTR then 20ms.

3.1.5 RI

This PIN is used wakeup host when module have message to the port, message can support Call, SMS or URC.

State	RI respond
Standby	HIGH
Voice/Data call	Change to LOW, then: (1) Change to HIGH when call is established. (2) Use AT command ATH, the RI PIN is changed to HIGH. (3) Sender hangs up, change to HIGH. (4) SMS received.
SMS	When receiving SMS, the RI PIN will be changed to LOW level for about 120ms, and then it is changed to HIGH level.

3.2 Flow Control

Flow control is very important during the transmission (large data) between the module (DCE) and the terminal device (DTE). When the receiving buffer reaches its capacity, the receiving device should be capable of pause the sending device until it overflows. SIM7100 modules are designed as no flow control by default, but use can enable this function by AT command.

3.2.1 Hardware flow control (RTS/CTS)

Hardware flow control achieves the data flow control by controlling the RTS/CTS line which follows the RS232 standard. The command "AT+IFC=2, 2" can be used to enable hardware flow control, these setting are stored automatically.

To achieve hardware flow control, ensure that the RTS/CTS lines are present on user's application platform.

4 Multiplex

Before using the multiplexer of module, one should also implement the same function on one's own side, currently the multiplexer resided in the module is conformed to the specification of GSM07.10 so one can implement his own multiplexer followed by this specification.

In a word one must implement his own multiplexer first at his side before rightly using SIMCOM module's multiplexer.

Currently the module only supports Basic mode and one byte length indicator, AT+CMUX=0 can make four virtual ports, there are ports only support AT service.
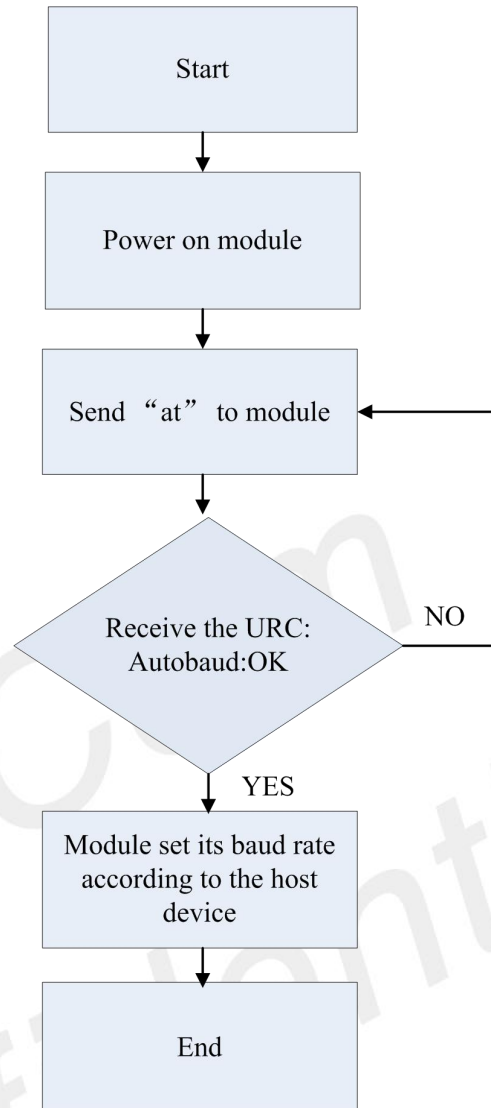
5 Synchronize baud rate

Although the standard SIM7100 module doesn't support this function by default, user can use AT+IPR or +IPREX command to set auto baud rate.

Autobaud allows SIM7100 module to automatically detect the baud rate based on the host device. Host device must to synchronize the baud rate with SIM7100 module first before use. Host must send "at" string to synchronize the module, if module matches the baud rate it will response with URC: "Autobaud: OK", if no URC reported host must send the synchronize string again until the URC received. If the baud rate is matched between the module and host device, two devices can communicate with each other normally.

The function is supported in +IPR or +IPREX.

When IPREX or IPR is set to 0，autobaud is activated.

If TA send "AT+IPREX=0" command to modem, then module will be save autobaud mode.

```
┌─────────────────┐
│      Start      │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│  Power on module │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Send "at" to module │◀─────┐
└─────────────────┘         │
         │                  │
         ▼                  │ NO
      ╱─────────╲           │
     ╱  Receive   ╲         │
    ╱  the URC:    ╲────────┘
    ╲ Autobaud:OK  ╱
     ╲            ╱
      ╲──────────╱
         │ YES
         ▼
┌─────────────────┐
│ Module set its baud rate │
│ according to the host │
│      device     │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│       End       │
└─────────────────┘
```

Baud rate synchronization chart