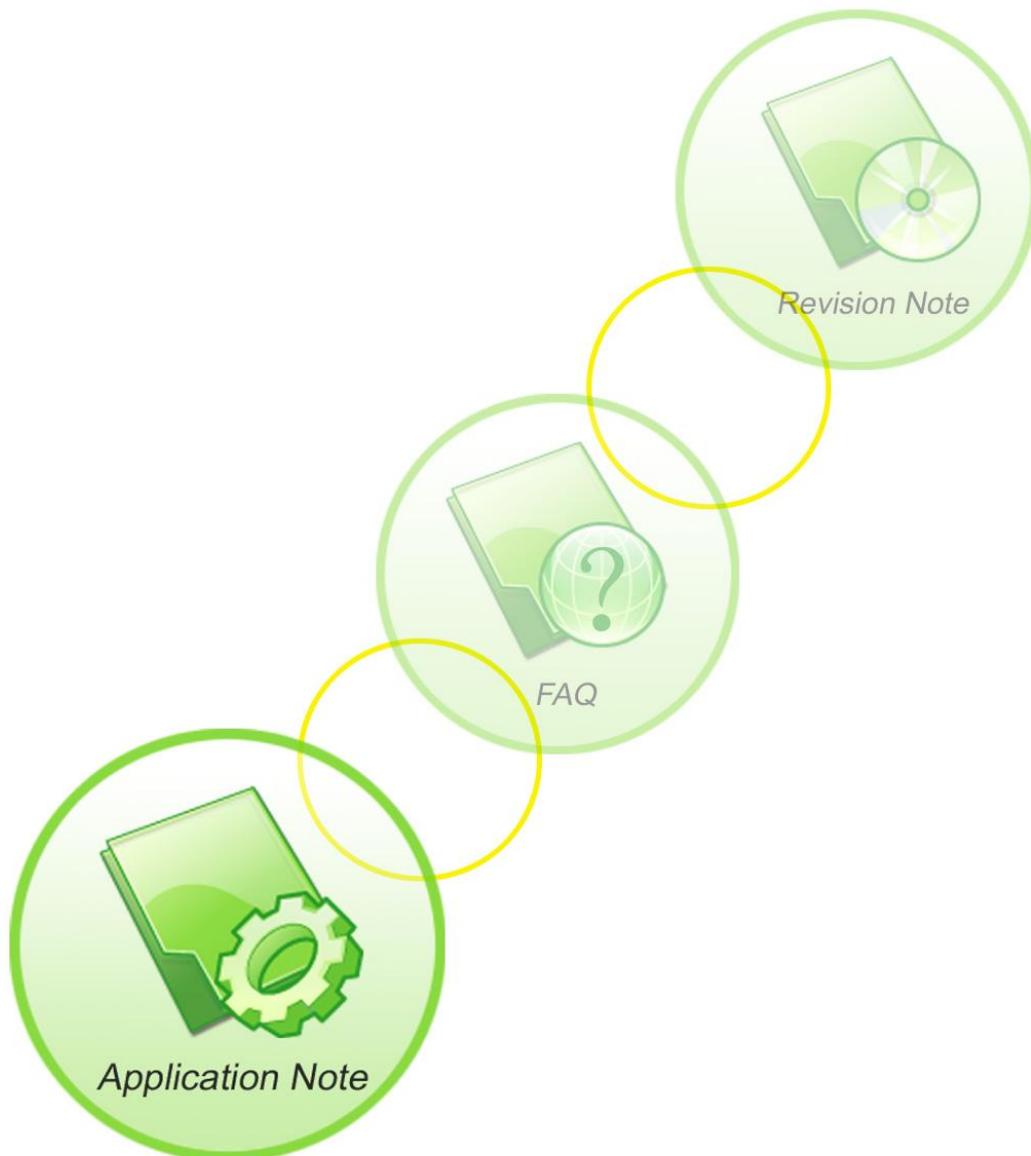




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SIM7X00 Series_UART_Application Note_V1.00



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Version History

Date	Version	What is new	Author
2016-07-07	1.00	New version	Dongshan.liu

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Scope

This document presents the AT command of UART operation and application examples. This document can apply to SIM7X00 series modules, including SIM7600C, SIM7600CE, SIM7500A and SIM7500JE.

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1 Introduction

This document describes the UART interface of SIMCom SIM7X00 module. The UART port has several features:

- Support High-speed UART, the baud rate is up to 4Mbps, the communication baud rates include: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600, 3200000, 3686400, 4000000bps.
- Support RS232 modem and simple modem.
- Support Hardware flow control.
- Support Auto baud-rating synchronization.

2 Connection

SIM7X00 module is 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 Hardware Interface

Table 1: Pin description

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	

More pin information, please refer to chapter 6.

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

When the module is used as a simple modem (null modem, 3-line modem) for data transmission, only RXD and TXD signal PINs are used, the following figure shows the connection between SIM7X00 module and DTE (customer's CPU).

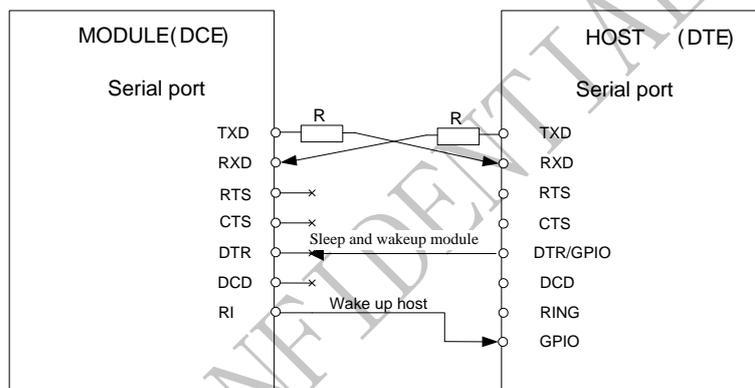


Figure 1: Simple modem

When the module is used as a RS232 modem (full modem, 7-line modem) for data transmission, all the signal PINs should be connected, including TXD, RXD, RTS, CTS, DTR, DCD and RI, and the corresponding PINs should be configured as UART function, for the details please refer to the Control Signals section below. The following figure shows the connection between SIM7X00 module and DTE (customer's CPU).

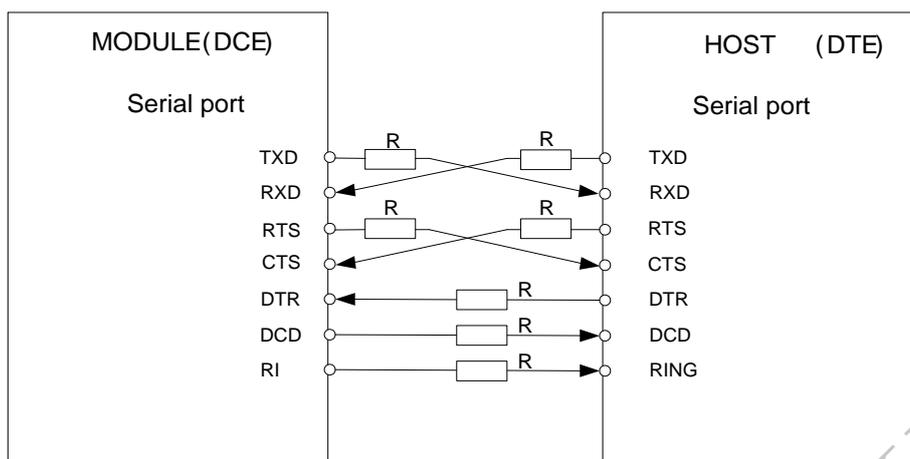


Figure 2: RS232 modem

Note: For different devices, the name of RTS PIN may be confused as CTS PIN, and the name of CTS PIN may be confused as RTS PIN, the I/O direction of SIM7X00 module's CTS PIN is IN, and RTS PIN is OUT, user can clear this confusion by the I/O direction.

3 Synchronize baud rate

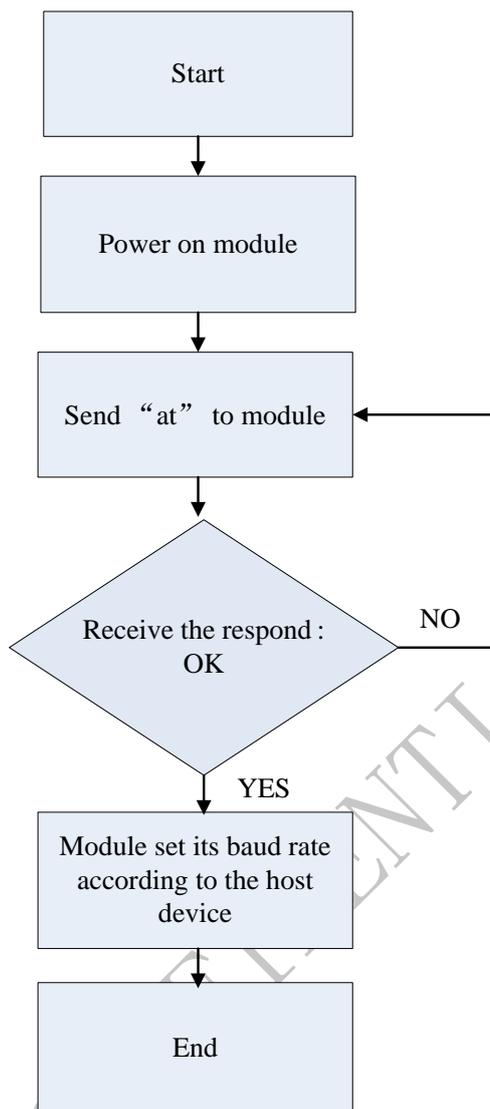
Although the standard SIM7X00 module does not support this function by default, customer can use command AT+IPR or AT+IPREX to set auto baud rate.

Auto baudrating allows SIM7X00 module to automatically detect the baud rate based on the host device. Host device must synchronize the baud rate with SIM7X00 module first before communication. Host must send "AT" string to synchronize the module, if module matches the baud rate it will respond with URC: "AT+IPR=0", if no URC is reported, host must send the synchronize string again until the URC is received. If the baud rate is matched between the module and the 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 sends "AT+IPREX=0" command to the modem, then module will be saved as autobaud mode.



Baud rate synchronization chart

4 Flow Control

Flow control is very important during the transmission (large data) between the module (DCE) and the terminal device (DTE). When receiving buffer reaches its capacity, the receiving device should be capable of pause the sending device until it overflows. SIM7X00 module is designed as no flow control by default, but user can enable this function by AT command.

4.1 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 settings are stored automatically.

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

5 Control Signals

5.1 CTS

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

This pin is in GPIO mode by default, user can switch it to flow control mode by “AT+IFC=2,2” command.

5.2 RTS

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

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

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

5.3 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.

5.4 DTR

The pin is in GPIO mode by default, and supports sleep/wakeup mode, AT command AT+CSCLK can be used to switch GPIO and sleep/wakeup mode. If DTR is in sleep mode, module will be in sleep mode when there has no air data or uart communication.

AT+CSCLK=0 set to GPIO mode

AT+CSCLK=1 set to Sleep/Wakeup mode

Note:

If there has incoming call during module sleep mode, there will be URC reported to host, and module will be waken up by this incoming call. Once DTR is at high level, and there has no air data or uart communication, module will go back to sleep mode again.

If DTR pin was pulled down more than 20ms by host, module will wake up.

5.5 RI

This pin is used to wakeup host when module has message to output, message could be incoming Call, SMS or URC.

Table 3: RI Respond

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.
URC	URCs trigger 60ms LOW level on RI, this function can be enable/disable by "AT+CFGRI" command.

6 Multiplex

Before using the multiplexer protocol, customer should implement his own multiplexer followed by this specification GSM07.10.

Currently module only supports Basic mode and one byte length indicator, command

| AT+CMUX=0 can generate 4 virtual ports; there are ~~only 2 ports~~ support AT communication.

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Appendix

A Terms and Abbreviations

Abbreviation	Description
UART	Universal Asynchronous Receiver/Transmitter
URC	Unsolicited Result Code
DTE	Data Terminal Equipment
DCE	Data Communication Equipment

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