SIM7672X & SIM7652X Series_UART_Application Note

LTE Module

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Document Title:	SIM7672X & SIM7652X Series_UART_Application Note
Version:	1.00
Date:	2023.05.22
Status:	Released

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About Document

Version History

Revision	Date	Owner	Description
V1.00	2023.05.22		New version

Scope

Based on module AT command manual, this document will introduce UART application process. Developers could understand and develop application quickly and efficiently based on this document. This document applies to SIM7672X Series, SIM7652X Series.

Contents

1 Introduction

1.1 Purpose of the document

This document describes how to use UART interface of SIM7672X and SIM7652X series, the UART mainly refers to a full function serial port. Examples are also given for reference.

1.2 Related documents

[1] SIM7672X & SIM7652X Series_AT Command Manual.

1.3 Conventions and abbreviations

abbreviation	description
DTE	Data terminal equipment
DCE	Data communications equipment
UART	Universal asynchronous receiver/transmitter
RXD	Receive data
TXD	Transmit data
RTS	Request to send
CTS	Clear to send
DCD	Data carrier detect
DTR	Data terminal ready
RI	Ring indicator

1.4 Port Introduction

Port name	description

Enhanced	The enhance port is used to burn programs and send AT instructions.
Standard	The standard port is used to grab logs.

NOTE

- This port name is only limited to testing using our company's EVB board.

2 AT Commands for Serial Interface

Command	Description
AT+IPR	Set local baud rate temporarily
AT+IPREX	Set local baud rate permanently
AT+ICF	Set control character framing
AT+IFC	Set local data flow control
AT+CSCLK	Control UART Sleep

2.1 Detailed Description of AT Commands for Serial Interface

2.1.1 AT+IPR Set local baud rate temporarily

This command sets the baud rate of module's serial interface temporarily, after reboot the baud rate is set to value of IPREX.

AT+IPR Set local baud rate temporarily	
Test Command AT+IPR=?	Response +IPR: (list of supported <speed>s) OK
Read Command AT+IPR?	Response +IPR: <speed> OK
Write Command AT+IPR=<speed>	Response 1) OK 2) ERROR
Execution Command AT+IPR	Response Set the value to boot value: OK
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	-

Defined Values

<speed>	Baud rate per second: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800.

Examples

```
AT+IPR?
+IPR: 115200

OK
AT+IPR=?
+IPR: (600,1200,2400,4800,9600,19200,38400,57600,115200,230400,460800)

OK
AT+IPR=115200
OK
```

2.1.2 AT+IPREX Set local baud rate permanently

This command sets the baud rate of module's serial interface permanently, after reboot the baud rate is also valid.

AT+IPREX Set local baud rate permanently	
Test Command **AT+IPREX=?**	Response +IPREX: (list of supported <speed>s) OK
Read Command **AT+IPREX?**	Response +IPREX: <speed> OK
Write Command **AT+IPREX=<speed>**	Response 1) OK 2) ERROR
Execution Command **AT+IPREX**	Response Set default value 115200: OK
Parameter Saving Mode	AUTO_SAVE

Max Response Time	9000ms
Reference	-

Defined Values

<speed>	Baud rate per second: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800.

Examples

```
AT+IPREX?
+IPREX: 115200

OK
AT+IPREX=?
+IPREX: (600,1200,2400,4800,9600,19200,38400,57600,115200,230400,460800)

OK
AT+IPREX=115200
OK
```

2.1.3 AT+ICF Set control character framing

This command sets character framing which contains data bit, stop bit and parity bit.

AT+ICF Set control character framing	
Test Command **AT+ICF=?**	Response +ICF: (list of supported<format>s),(list of supported<parity>s) OK
Read Command **AT+ICF?**	Response +ICF: <format>,<parity> OK
Write Command **AT+ICF=<format>[,<parity>]**	Response 1) OK 2)

	ERROR
Execution Command **AT+ICF**	Response Set default value: OK
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	-

Defined Values

<format>	1 data bit 8, parity bit 1,stop bit 1. 2 data bit 8, stop bit 1. 3 data bit 7, parity bit 1,stop bit 1. 4 data bit 7, stop bit 1.
<parity>	0 Odd 1 Even 2 none

Examples

```
AT+ICF?
+ICF: 2,2

OK
AT+ICF=?
+ICF: (1-4),(0-2)

OK
AT+ICF=2,2
OK
AT+ICF
OK
```

2.1.4 AT+IFC Set local data flow control

The command sets the flow control mode of the module.

AT+IFC Set local data flow control	
Test Command	Response

AT+IFC=?	+IFC: (list of supported<DCE>s),(list of supported<DTE>s) OK
Read Command **AT+IFC?**	Response +IFC: <DCE>,<DTE> OK
Write Command **AT+IFC=<DCE>[,<DTE>]**	Response 1) OK 2) ERROR
Execution Command **AT+IFC**	Response Set default value: OK
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	-

Defined Values

<DCE>	0 none 2 RTS hardware flow control
<DTE>	0 none 2 CTS hardware flow control

Examples

```
AT+IFC?
+ICF: 0,0

OK
AT+IFC=?
+IFC: (0,2),(0,2)

OK
AT+IFC=2,2
OK
AT+IFC
OK
```

2.1.5 AT+CSCLK Control UART Sleep

This command is used to enable UART Sleep or always work. If set to 0, UART always work. If set to 1, ensure that DTR is pulled high and the module can go to DTR sleep. If set to 2, the module will enter RX sleep. RX wake-up directly sends data through the serial port (for example: AT) to wake-up.

AT+CSCLK Control UART Sleep	
Test Command **AT+CSCLK=?**	Response +CSCLK: (range of supported <status>s) OK
Read Command **AT+CSCLK?**	Response +CSCLK: <status> OK
Write Command **AT+CSCLK=<status>**	Response 1) OK 2) ERROR
Execution Command **AT+CSCLK**	Response Set <status>=0: OK
Parameter Saving Mode	NO_SAVE
Max Response Time	9000ms
Reference	-

Defined Values

<status>	0	off
	1	DTR sleep
	2	RX sleep

Examples

```
AT+CSCLK?
+CSCLK: 0

OK
AT+CSCLK=?
+CSCLK: (0-2)
```

```
OK
AT+CSCLK=1
OK
AT+CSCLK=2
OK
AT+CSCLK
OK
```

3 UART Introduction

The UART is a universal serial data bus for asynchronous communication. The bus is bidirectional communication, which can realize full duplex transmission and receiving.

The UART port has several features:

- Support High-speed UART, the baud rate up to 3.6Mbps. the communication baud rate including:600b/s, 1200b/s, 2400b/s, 4800b/s, 9600b/s, 19200b/s, 38400b/s, 57600b/s, 115200b/s(default), 230400b/s, 460800b/s.
- Support both RS232 modem and Simple modem connections.
- Support Hardware flow control.

4 Hardware Interface

SIMCom 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 RS232 modem.

4.1 Description of related PIN

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	Pull-Up
	UART_CTS	I	High/Low	Pull-Up
	UART_DTR	I	High/Low	Pull-Up
	UART_DCD	O	High/Low	Pull-Up
	UART_RI	O	High/Low	Pull-Up

4.2 Connect to Host

1）Simple modem

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

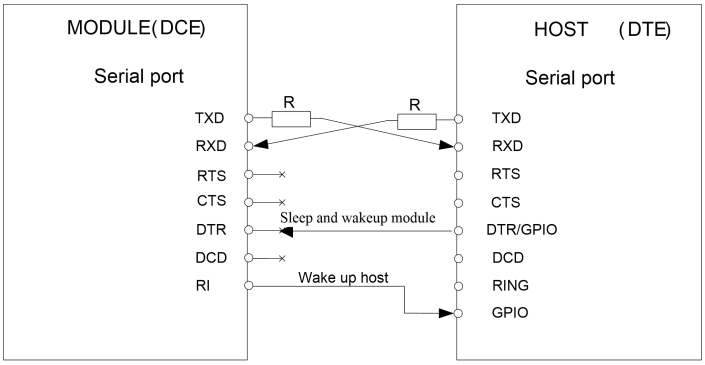

Figure 1: Simple modem

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 module and DTE (customer's CPU).

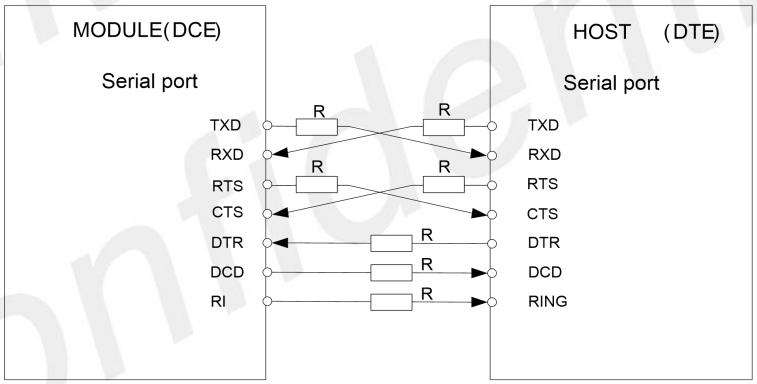

Figure 2: RS232 modem

NOTE

- For different 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 module's CTS PIN is IN, and RTS PIN is OUT, user can determine the confusion by the I/O direction.

5 Control PIN Description

5.1 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.

5.2 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.
Stop receiving data if RTS PIN is high level, reception begins or continues if RTS is 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.
Parameter Description(*AT&C0,AT&C1,AT&C2*):
0 DCD line shall always be on.
1 DCD line shall be on only when data carrier signal is present.
2 Setting the DCD line be on just 1 second after the data calls end.

NOTE

- Call is not supported yet and is under development.

5.4 DTR

The PIN default in GPIO mode, and support sleep/wake-up mode, AT command *AT+CSCLK* can be used to switch GPIO and sleep/wake-up 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/wake-up mode, then module enter sleep mode when DTR pin pulled up; module will be waked up when DTR pin pulled dow