SIM5360 UART Application Note

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Version History

Date	Version	Description of change	Author
2014-2-12	V0.01	New version	
2014-2-12	V0.02	Add second UART	
2014-4-25	V0.03	Add second UART supports NMEA port, modify default mode is null mode	
2014-5-21	V0.04	Add compatible with sim900 UART design	
2014-6-27	V0.05	Modify UART design, baud rate can be adjusted	

Scope

This document describes how to use UART interface of SIMCom SIM5360 modules. Examples are also given for reference. This document can be used for SIMCom SIM5360 modules.

1   Introduction

This document describes the UART interface of SIMCom 3G modules. The UART has two interfaces, named MAIN port and AT port, MAIN 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 Full modem and Null modem connections.

- Support Hardware flow control.

- Support Software flow control.

- Support Auto baud rate synchronize.

2   Connection

SIMCom 3G modules designed as a DCE (Data Communication Equipment). It provides a null or full 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 null modem, the control signals PIN should be configured as corresponding UART control signal function if user need support null 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-Down
	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 refers 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 null modem for data transmission, only RXD and TXD signal PIN are used, the following figure shows the connection between SIM5360 module and DTE(customer's CPU).
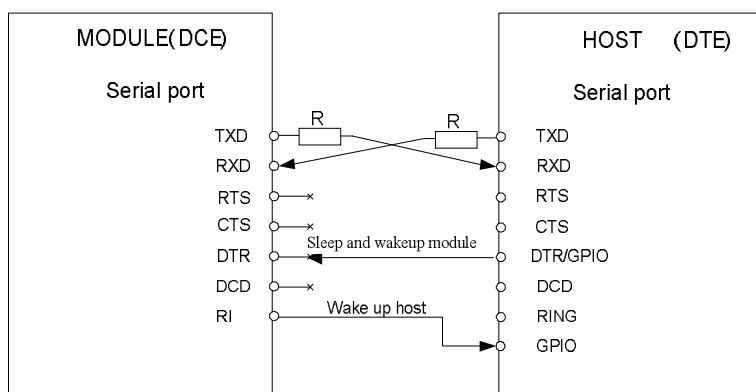
Figure 1: Null modem

When the module is used as a full 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 SIM5360 module and DTE (customer's CPU).
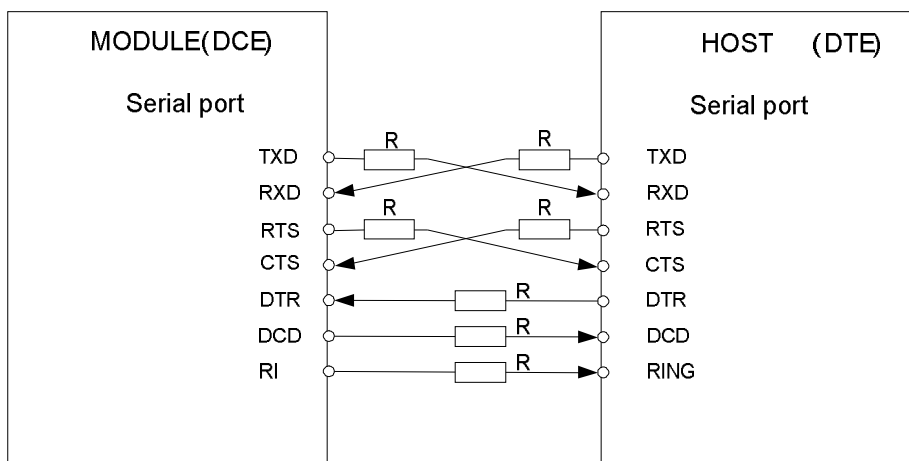
Figure 2: Full modem

Note:

1. 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 SIM5360 module's CTS PIN is IN, and RTS PIN is OUT, user can determine this confusion by the I/O direction.

3   Synchronize baud rate

Although the standard SIM5360 module doesn't support this function by default, user can use AT+IPREX command to set auto baud rate.

Autobaud allows SIM5360 module to automatically detect the baud rate based on the host device. Host device must to synchronize the baud rate with SIM5360 module first before use. Host must send "at" string to synchronize the module, if module matches the baud rate it will response with URC: "+Cautobaud: synchronized", 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 +IPREX.

When IPREX is set to 0，autobaud   is activated.

TA send "AT+IPREX=0" command to modem, then TA will be get autobaud support bitrates ("Autobaud support: (9600, 19200, 38400, 57600, 115200, 230400, 460800)").

UART autobaud mode is available when next boot.
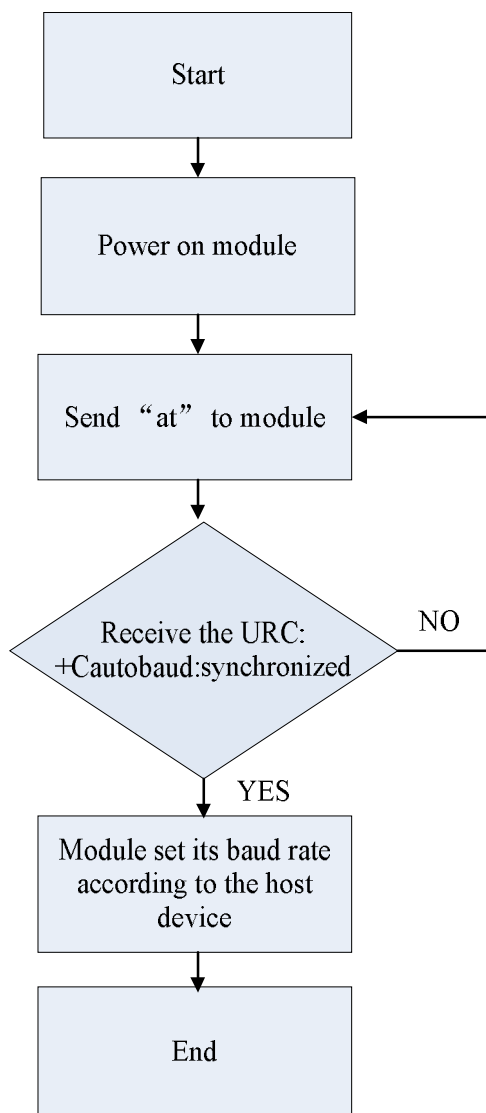
Baud rate synchronization chart

4 Flow Control

Flow control is very important during the transmission (large data) between the module (DCE) and the terminal device (DTE). When the receiving buffer reaches its capacity, the receiving device should be capable of pause the sending device until it overflows. SIM5360 modules are designed as no flow control by default, but use 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 setting are stored automatically.

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

5 Control Signals

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.

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.

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 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 (AT+CUARTWD use to set the sleep time).

Anytime host want send data to module, it must be pull down DTR then 20ms.

5.5 RI

This PIN is in WAKEUP_HOST mode by default, user can switch to UART RI PIN (EVENT indicator) mode by "AT+CGFUNC=17,1" command, more details please refer to "SIM5360_GPIO_Application_Note" and"SIM5360_Sleep_Mode_Application_Note" documents.

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 Second serial interface(at port)

The second serial interface is designed as an auxiliary interface for applications which need multiple parallel access to the module.
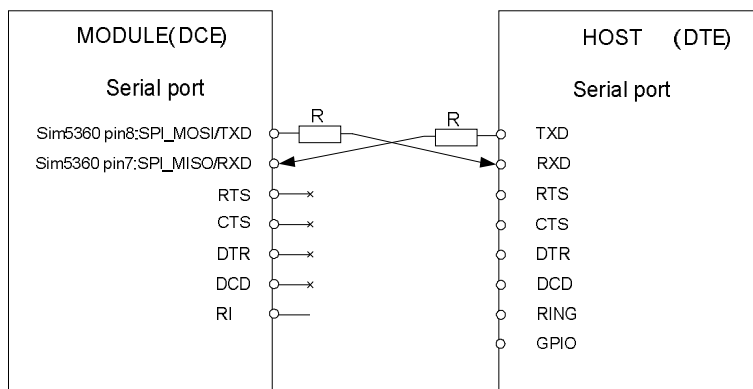
6.1 Feature

. No RTS, CTS, DTR, DCD, RI pins.

. No autobaud.

. No Flow control

. baudrate setting support

. No CMUX

6.2   Application

Second UART pins and SPI pins is multiplexed, so if enable SPI function, then uart2 function will be disable, and enable uart2 will be disable SPI function.

AT+CGFUNC=21,1 enable UART2 disable SPI

AT+CGFUNC =21,0 disable UART2 ,it will be auto switch to SPI function

● Change second serial baudrate

If Second-serial can run AT command, host can use "AT+IPR" to change baudrate on this port.

If Second-serial cannot run AT command and the port configuration is AT mode, host can use "AT+IPR2" to change baudrate on the other AT port.

Appendix

A   Related Documents

SN	Document name	Remark
[1]	SIM5360_GPIO_Application_Note_V0.03.doc	GPIO Application Note

B   Terms and Abbreviations

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

Contact us:
Shanghai SIMCom Wireless Solutions Co.,Ltd.
Address: Building A, SIM Technology Building, No. 633, Jinzhong Road, Shanghai,
P. R. China 200335
Tel: +86 21 3252 3300
Fax: +86 21 3252 2030
URL: www.sim.com/wm