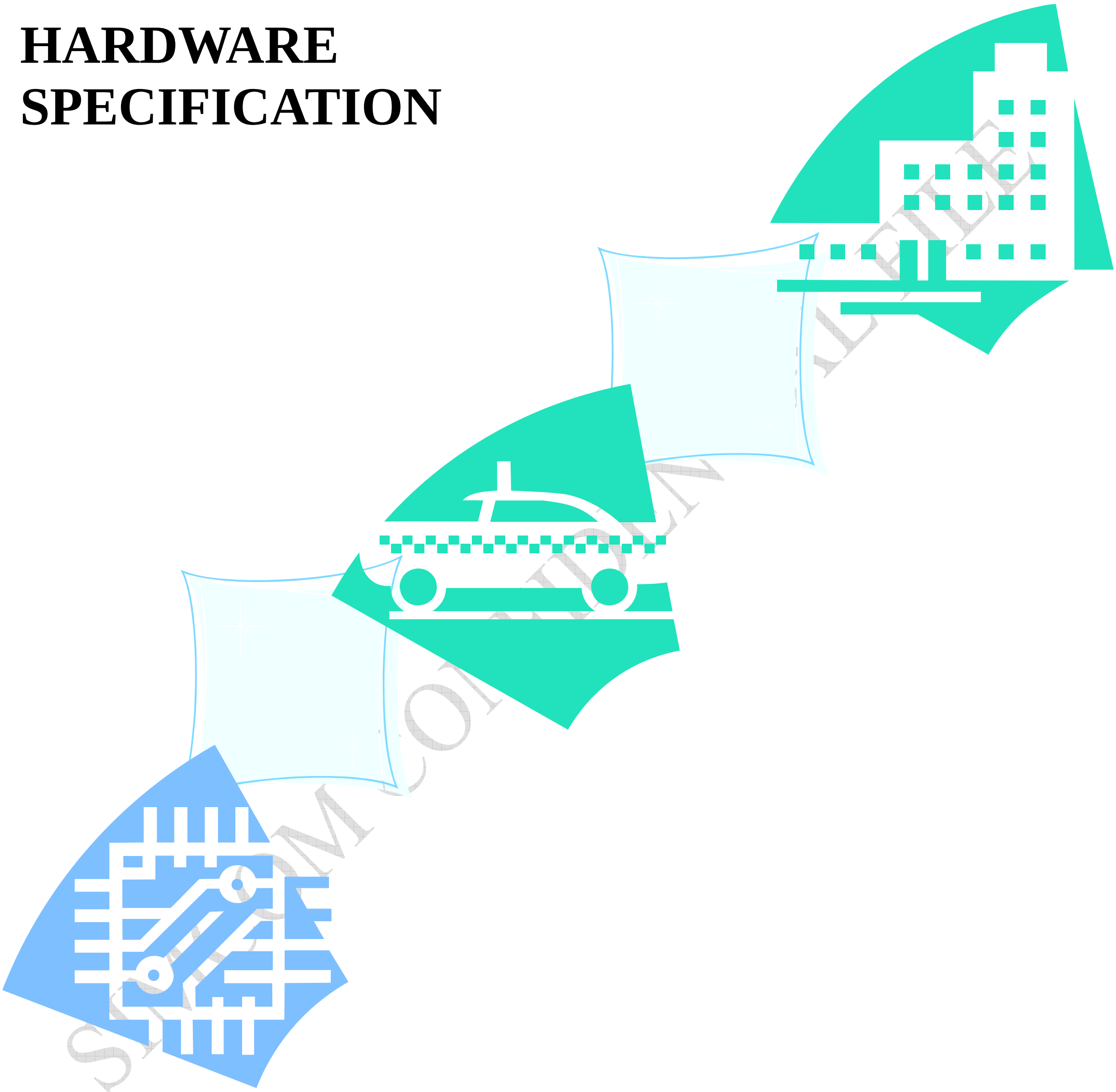
SIM300

HARDWARE SPECIFICATION



Designed by SIMCOM Ltd,.

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Version history

Data	Version	Description of change	Author
2005-04-13	01.00	Origin	anthony
2005-06-29	01.01	Modify the RESET pin DC characteristics etc.	anthony
2005-08-02	01.02	Modify the ESD characteristics etc.	anthony
2005-08-23	01.03	Delete reset part, update Mechanical dimensions sleep mode and board-to-board connector description	anthony
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2005-11-22	01.05	Add the restart timing figure	anthony
2005-12-27	01.06	Add the Software upgrade, the auto-baud and the over temperature power off. Modify the sleep mode control and the SIM card detection.	anthony
2006-02-22	01.07	Modify the figure 3,4,5,20,28 and add the figure 14	anthony
2006-03-16	02.01	Modify for SIM300_V7.02 Add support GPRS class 8, Modify the VDD_EXT level, “RDY” out by set fixed baudrate, timing of the turn on system	anthony
2006-04-04	02.02	Modify the function of GPIO5 and BUZZER pins, the 10K resistance integrated in the VRTC pin. Add the description of the Autobauding function.	anthony
2006-05-09	02.03	Update Temperature range. Modify the mechanical dimensions of SIM300. Delete the description of MOLEX connector. Modify the figure of the SIM reference circuit.	anthony
2006-6-10	03.01	Update the figure of SIM card holder	anthony
2006-7-27	03.02	Add the note about the VRTC pin. Add the note about the configuration be set and saved as the fix baud rate.	anthony
2006-8-30	03.03	Delete the chapter of antenna gain, Modify the figure of the timing of turn on system, Modify the figure of the timing of turn off system, Modify the high voltage and low voltage of the PWRKEY. Modify the PIN name.	anthony

1 Introduction

This document describes the hardware interface of the SIMCOM SIM300 module that connects to the specific application and the air interface. As SIM300 can be integrated with a wide range of applications, all functional components of SIM300 are described in great detail.

This document can help you quickly understand SIM300 interface specifications, electrical and mechanical details. With the help of this document and other SIM300 application notes, user guide, you can use SIM300 module to design and set-up mobile applications quickly.

1.1 Related documents

Table 1: Related documents

SN	Document name	Remark
[1]	SIM300_ATC_V01.06	SIM300_ATC_V01.06
[2]	ITU-T Draft new recommendation V.25ter:	Serial asynchronous automatic dialing and control
[3]	GSM 07.07:	Digital cellular telecommunications (Phase 2+); AT command set for GSM Mobile Equipment (ME)
[4]	GSM 07.10:	Support GSM 07.10 multiplexing protocol
[5]	GSM 07.05:	Digital cellular telecommunications (Phase 2+); Use of Data Terminal Equipment – Data Circuit terminating Equipment (DTE – DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
[6]	GSM 11.14:	Digital cellular telecommunications system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface
[7]	GSM 11.11:	Digital cellular telecommunications system (Phase 2+); Specification of the Subscriber Identity Module – Mobile Equipment (SIM – ME) interface
[8]	GSM 03.38:	Digital cellular telecommunications system (Phase 2+); Alphabets and language-specific information
[9]	GSM 11.10	Digital cellular telecommunications system (Phase 2)； Mobile Station (MS) conformance specification； Part 1: Conformance specification

1.2 Terms and abbreviations

Table 2: Terms and abbreviations

Abbreviation	Description
ADC	Analog-to-Digital Converter
ARP	Antenna Reference Point
ASIC	Application Specific Integrated Circuit
BER	Bit Error Rate
BTS	Base Transceiver Station
CHAP	Challenge Handshake Authentication Protocol
CS	Coding Scheme
CSD	Circuit Switched Data
CTS	Clear to Send
DAC	Digital-to-Analog Converter
DRX	Discontinuous Reception
DSP	Digital Signal Processor
DTE	Data Terminal Equipment (typically computer, terminal, printer)
DTR	Data Terminal Ready
DTX	Discontinuous Transmission
EFR	Enhanced Full Rate
EGSM	Enhanced GSM
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
ETS	European Telecommunication Standard
FCC	Federal Communications Commission (U.S.)
FDMA	Frequency Division Multiple Access
FR	Full Rate
GMSK	Gaussian Minimum Shift Keying
GPRS	General Packet Radio Service
GSM	Global Standard for Mobile Communications
HR	Half Rate
I/O	Input/Output
IC	Integrated Circuit
IMEI	International Mobile Equipment Identity
Inorm	Normal Current
Imax	Maximum Load Current
kbps	Kilo bits per second
LED	Light Emitting Diode

Abbreviation	Description
Li-Ion	Lithium-Ion
MO	Mobile Originated
MS	Mobile Station (GSM engine), also referred to as TE
MT	Mobile Terminated
PAP	Password Authentication Protocol
PBCCH	Packet Switched Broadcast Control Channel
PCB	Printed Circuit Board
PCS	Personal Communication System, also referred to as GSM 1900
PDU	Protocol Data Unit
PPP	Point-to-point protocol
RF	Radio Frequency
RMS	Root Mean Square (value)
RTC	Real Time Clock
Rx	Receive Direction
SIM	Subscriber Identification Module
SMS	Short Message Service
TDMA	Time Division Multiple Access
TE	Terminal Equipment, also referred to as DTE
TX	Transmit Direction
UART	Universal Asynchronous Receiver & Transmitter
URC	Unsolicited Result Code
USSD	Unstructured Supplementary Service Data
VSWR	Voltage Standing Wave Ratio
Vmax	Maximum Voltage Value
Vnorm	Normal Voltage Value
Vmin	Minimum Voltage Value
VIHmax	Maximum Input High Level Voltage Value
VIHmin	Minimum Input High Level Voltage Value
VILmax	Maximum Input Low Level Voltage Value
VILmin	Minimum Input Low Level Voltage Value
VImax	Absolute Maximum Input Voltage Value
VImin	Absolute Minimum Input Voltage Value
VOHmax	Maximum Output High Level Voltage Value
VOHmin	Minimum Output High Level Voltage Value
VOLmax	Maximum Output Low Level Voltage Value
VOLmin	Minimum Output Low Level Voltage Value
Phonebook abbreviations	

Abbreviation	Description
FD	SIM fix dialing phonebook
LD	SIM last dialing phonebook (list of numbers most recently dialed)
MC	Mobile Equipment list of unanswered MT calls (missed calls)
ON	SIM (or ME) own numbers (MSISDNs) list
RC	Mobile Equipment list of received calls
SM	SIM phonebook
NC	Not connect

2 Product concept

Designed for global market, SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz. SIM300 provides GPRS multi-slot class 10/ class 8 (optional) capability and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

With a tiny configuration of 40mm x 33mm x 2.85 mm, SIM300 can fit almost all the space requirements in your applications, such as Smart phone, PDA phone and other mobile devices.

The physical interface to the mobile application is made through a 60 pins board-to-board connector, which provides all hardware interfaces between the module and customers' boards except the RF antenna interface.

- The keypad and SPI display interface will give you the flexibility to develop customized applications.

- Serial port and Debug port can help you easily develop your applications.

- Two audio channels include two microphones inputs and two speaker outputs. This can be easily configured by AT command.

The SIM300 provides RF antenna interface with two alternatives: antenna connector and antenna pad. The antenna connector is MURATA MM9329-2700. And customer's antenna can be soldered to the antenna pad.

The SIM300 is designed with power saving technique, the current consumption to as low as 2.5mA in SLEEP mode.

The SIM300 is integrated with the TCP/IP protocol，Extended TCP/IP AT commands are developed for customers to use the TCP/IP protocol easily, which is very useful for those data transfer applications.

2.1 SIM300 key features at a glance

Table 3: SIM300 key features

Feature	Implementation
Power supply	Single supply voltage 3.4V – 4.5V
Power saving	Typical power consumption in SLEEP mode to 2.5mA (BS-PA-MFRMS=5)
Frequency bands	● SIM300 Tri-band: EGSM 900, DCS 1800, PCS 1900. The SIM300 can search the 3 frequency bands automatically. The frequency bands also can be set by AT COMMAND. ● Compliant to GSM Phase 2/2+
GSM class	Small MS
Transmit power	● Class 4 (2W) at EGSM900 ● Class 1 (1W) at DCS1800 and PCS 1900
GPRS connectivity	● GPRS multi-slot class 10 （default） ● GPRS multi-slot class 8 (option) ● GPRS mobile station class B
Temperature range	● Normal operation: -20°C to +55°C ● Restricted operation: -30°C to -20°C and +55°C to +80°C ● Storage temperature -40°C to +85°C
DATA *GPRS:* *CSD:*	● GPRS data downlink transfer: max. 85.6 kbps ● GPRS data uplink transfer: max. 42.8 kbps ● Coding scheme: CS-1, CS-2, CS-3 and CS-4 ● SIM300 supports the protocols PAP (Password Authentication Protocol) usually used for PPP connections. ● The SIM300 integrates the TCP/IP protocol. ● Support Packet Switched Broadcast Control Channel (PBCCH) ● CSD transmission rates: 2.4, 4.8, 9.6, 14.4 kbps, non-transparent ● Unstructured Supplementary Services Data (USSD) support
SMS	● MT, MO, CB, Text and PDU mode ● SMS storage: SIM card ● Support transmission of SMS alternatively over CSD or GPRS. User can choose preferred mode.
FAX	Group 3 Class 1
SIM interface	Support SIM card: 1.8V ,3V
External antenna	Connected via 50 Ohm antenna connector or antenna pad
Audio features	Speech codec modes: ● Half Rate (ETS 06.20) ● Full Rate (ETS 06.10) ● Enhanced Full Rate (ETS 06.50 / 06.60 / 06.80) ● Echo suppression

Serial interface and Debug interface	● Serial Port Seven lines on Serial Port Interface ● Serial Port can be used for CSD FAX, GPRS service and send AT command of controlling module. ● Serial Port can use multiplexing function. ● Autobauding supports baud rate from 1200 bps to 115200bps. ● Debug port Two lines on Serial Port Interface /TXD and /RXD ● Debug Port only used for debugging
Phonebook management	Support phonebook types: SM, FD, LD, RC, ON, MC.
SIM Application Toolkit	Support SAT class 3, GSM 11.14 Release 98
Real time clock	Implemented
Timer function	Programmable via AT command
Physical characteristics	Size: 40±0.15 x 33±0.15 x 3.3±0.3 mm (including application connector) 40±0.15 x 33±0.15 x 2.85±0.3 mm (excluding application connector) Weight: 8g
Firmware upgrade	Firmware upgrade over serial interface

Table 4: Coding schemes and maximum net data rates over air interface

Coding scheme	**1 Timeslot**	**2 Timeslot**	**4 Timeslot**
CS-1:	9.05kbps	18.1kbps	36.2kbps
CS-2:	13.4kbps	26.8kbps	53.6kbps
CS-3:	15.6kbps	31.2kbps	62.4kbps
CS-4:	21.4kbps	42.8kbps	85.6kbps

3 Application interface

All hardware interfaces except RF interface that connects SIM300 to the customers' cellular application platform is through a 60-pin 0.5mm pitch board-to-board connector. Sub-interfaces included in this board-to-board connector are described in detail in following chapters:

- Power supply (*see Chapter 3.3*)
- Serial interfaces (*see Chapter 3.8*)
- Two analog audio interfaces (*see Chapter 3.9*)
- SIM interface (*see Chapter 3.11*)

Electrical and mechanical characteristics of the board-to-board connector are specified in *Chapter 6*. There we also order information for mating connectors.

3.1 SIM300 pin description

Table 5: Board-to-Board Connector pin description

Power Supply			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
VBAT		Eight BAT pins of the board-to-board connector are dedicated to connect the supply voltage. The power supply of SIM300 has to be a single voltage source of VBAT= 3.4V...4.5V. It must be able to provide sufficient current in a transmit burst which typically rises to 2A.mostly, these 8 pins are voltage input	Vmax= 4.5V Vmin=3.4V Vnorm=4.0V
VRTC	I/O	Current input for RTC when the battery is not supplied for the system. Current output for backup battery when the main battery is present and the backup battery is in low voltage state.	Vmax=2.0V Vmin=1.2V Vnorm=1.8V Inorm= 20uA
VDD_EXT	O	Supply 2.93V voltage for external circuit. By measuring this pin, user can judge whether the system is power on or off. When the voltage is low, the system is power off. Otherwise, the system is power on.	Vmax=3.0V Vmin=2.75V Vnorm=2.93V Imax=60mA
GND		Digital ground	

Power on or power off			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
PWRKEY	I	Voltage input for power on key. PWRKEY get a low level Voltage for user to power on or power off the system. The user should keep pressing the key for a moment when power on or power off the system. Because the system need margin time assert the software.	VILmax=0.2*VBAT VIHmin=0.6*VBAT VImax=VBAT
Audio interfaces			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
MIC1P MIC1N	I	Positive and negative voice-band input	Audio DC Characteristics refer to chapter 3.9.4
MIC2P MIC2N	I	Auxiliary positive and negative voice-band input	
SPK1P SPK1N	O	Positive and negative voice-band output	
SPK2P SPK2N	O	Auxiliary positive and negative voice-band output	
BUZZER	O	Buzzer Output	
AGND		Analog ground	
General purpose input/output			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
KBC0~KBC4	O	The GPO can be configured by AT command for outputting high or low level voltage. All of the GPOs are initial low without any setting from AT command.	VILmin=0V VILmax=0.3 *VDD_EXT VIHmin=0.7*VDD_EXT VIHmax= VDD_EXT+0.3 VOLmin=GND VOLmax=0.2V VOHmin= VDD_EXT-0.2 VOHmax= VDD_EXT
KBR0~KBR4	I		
DISP_DATA	I/O		
DISP_CLK	O		
DISP_CS	O		
DISP_D/C	O		
DISP_RST	O		
NETLIGHT	O		
GPIO0	I/O	Normal Input/Output Port	
Serial interface			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
DTR	I	Data Terminal Ready	VILmin=0V VILmax=0.3*VDD_EXT VIHmin=0.7*VDD_EXT VIHmax= VDD_EXT+0.3 VOLmin=GND
RXD	I	Receive Data	
TXD	O	Transmit Data	
RTS	I	Request to Send	
CTS	O	Clear to Send	

RI	O	Ring Indicator	VOLmax=0.2V VOHmin= VDD_EXT-0.2 VOHmax= VDD_EXT
DCD	O	Data Carrier detection	
Debug interface			
DBG_TXD	O	Serial interface for debugging and communication	
DBG_RXD	I		
SIM interface			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
SIM_VDD	O	Voltage Supply for SIM card	The voltage can be select by software either 1.8v or 3V
SIM_DATA	I/O	SIM Data Output	VILmin=0V VILmax=0.3*SIM_VDD VIHmin=0.7*SIM_VDD VIHmax= SIM_VDD+0.3 VOLmin=GND VOLmax=0.2V VOHmin= SIM_VDD-0.2 VOHmax= SIM_VDD
SIM_CLK	O	SIM Clock	
SIM_PRESENCE	I	SIM Card Detection	
SIM_RST	O	SIM Reset	
AUXADC			
PIN NAME	I/O	DESCRIPTION	DC CHARACTERISTICS
ADC0	I	General purpose analog to digital converter.	Input voltage value scope 0V to 2.4V

3.2 Operating modes

The following table summarizes the various operating modes, each operating modes is referred to in the following chapters.

Table 6: Overview of operating modes

Mode	Function	
Normal operation	GSM/GPRS SLEEP	Module will automatically go into SLEEP mode if DTR is set to high level and there is no on air or audio activity is required and no hardware interrupt (such as GPIO interrupt or data on serial port). In this case, the current consumption of module will reduce to the minimal level. During sleep mode, the module can still receive paging message and SMS from the system normally.

	GSM IDLE	Software is active. Module has registered to the GSM network, and the module is ready to send and receive.
	GSM TALK	CSD connection is going on between two subscribers. In this case, the power consumption depends on network settings such as DTX off/on, FR/EFR/HR, hopping sequences, antenna.
	GPRS IDLE	Module is ready for GPRS data transfer, but no data is currently sent or received. In this case, power consumption depends on network settings and GPRS configuration (e.g. multi-slot settings).
	GPRS DATA	There is GPRS data in transfer (PPP or TCP or UDP). In this case, power consumption is related with network settings (e.g. power control level), uplink / downlink data rates and GPRS configuration (e.g. used multi-slot settings).
POWER DOWN	Normal shutdown by sending the “AT+CPOWD=1” command or using the PWRKEY. The power management ASIC disconnects the power supply from the base band part of the module, only the power supply for the RTC is remained. Software is not active. The serial interfaces are not accessible. Operating voltage (connected to VBAT) remains applied.	
Minimum functionality mode (without remove power supply)	Use the “AT+CFUN” command can set the module to a minimum functionality mode without remove the power supply. In this case, the RF part of the module will not work or the SIM card will not be accessible, or RF part and SIM card will be closed all, the serial interface is still accessible. The power consumption in this case is very low.	
Alarm mode	RTC alert function launches this restricted operation while the module is in POWER DOWN mode. SIM300 will not be registered to GSM network and only parts of AT commands can be available.	

3.3 Power supply

The power supply of SIM300 is from a single voltage source of VBAT= 3.4V...4.5V. In some case, the ripple in a transmit burst may cause voltage drops when current consumption rise to typical peaks of 2A. So the power supply must be able to provide sufficient current up to 2A. For the VBAT input, a local bypass capacitor is recommended. A capacitor (about 100µF, low ESR) is recommended. Multi-layer ceramic chip (MLCC) capacitors can provide the best combination of low ESR and small size but may not be cost effective. A lower cost choice may be a 100 µF tantalum capacitor (low ESR) with a small (0.1 µF to 1µF) ceramic in parallel, which is illustrated as following figure. And the capacitors should put as closer as possible to the SIM300 VBAT pins. The following figure is the recommended circuit.

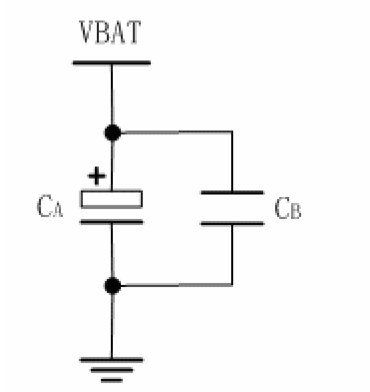


Figure 1: VBAT input

The following figure is the VBAT voltage ripple wave at the maximum power transmit phase, the test condition is VBAT=4.0V, VBAT maximum output current =2A, C_A=100 µF tantalum capacitor (ESR=0.7Ω) and C_B=1µF.

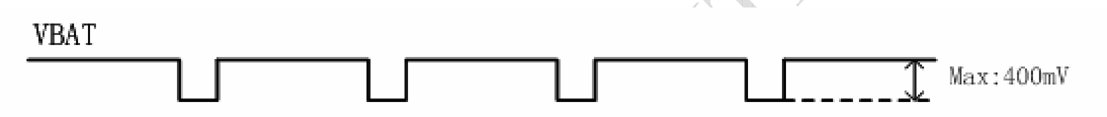


Figure 2: VBAT voltage drop at the maximum power transmit phase

3.3.1 Power supply pins on the board-to-board connector

Eight VBAT pins of the board-to-board connector are dedicated to connect the supply voltage; six GND pins are recommended for grounding. VRTC pin can be used to back up the RTC.

3.3.2 Minimizing power losses

Please pay special attention to the supply power when you are designing your applications. Please make sure that the input voltage will never drop below 3.4V even in a transmit burst during which the current consumption may rise up to 2A. If the power voltage drops below 3.4V, the module may be switched off. Using the board-to-board connector will be the best way to reduce the voltage drops. You should also remove the resistance from the power supply lines on the host board or from battery pack into account.

3.3.3 Monitoring power supply

To monitor the supply voltage, you can use the "AT+CBC" command which include three parameters: voltage percent and voltage value (in mV). It returns the battery voltage 1-100 percent of capacity and actual value measured at VBAT and GND.
The voltage is continuously measured at intervals depending on the operating mode. The displayed voltage (in mV) is averaged over the last measuring period before the AT+CBC command was executed.

For details please refer to *document [1]*

3.4 Power up and power down scenarios

3.4.1 Turn on SIM300

SIM300 can be turned on by various ways, which are described in following chapters:

- Via PWRKEY pin: starts normal operating mode (see chapter 3.4.1.1);
- Via RTC interrupt: starts ALARM modes (see chapter 3.4.1.2)

Note: The AT command must be set after the SIM300 is power on and Unsolicited Result Code "RDY" is received from the serial port. But if the SIM300 was set autobauding, the serial port received nothing, the AT command can be set after 2-3S from the SIM300 is power on. You can use AT+IPR=x;&W to set a fix baud rate and save the configuration to non-volatile flash memory. After the configuration was saved as fix baud rate, the Code "RDY" should be received from the serial port all the time when the SIM300 was power on. See Chapter AT+IPR in *document [1]*.

3.4.1.1 Turn on SIM300 using the PWRKEY pin (Power on)

You can turn on the SIM300 by driving the PWRKEY to a low level voltage for period time. The power on scenarios illustrate as following figure.

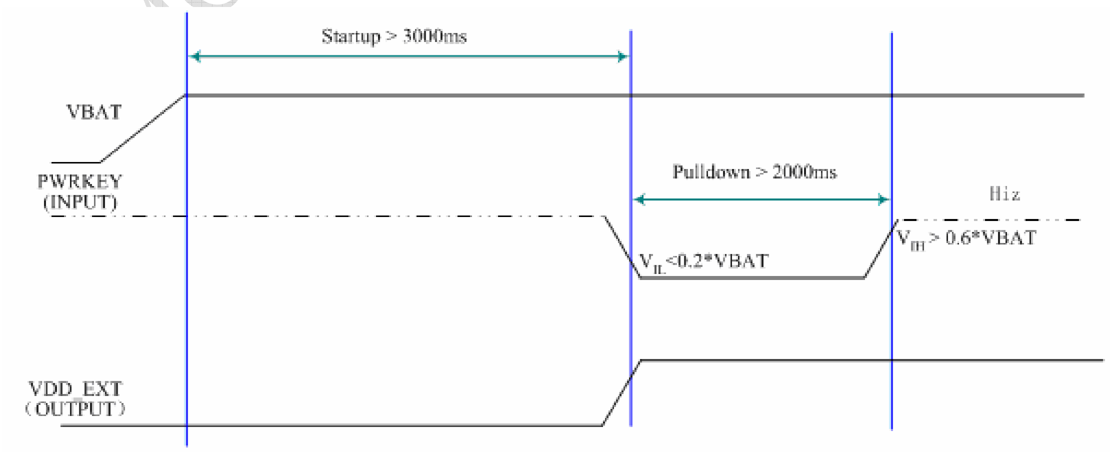


Figure 3: Timing of turn on system

When power on procedure complete, the SIM300 will send out following result code to indicate the module is ready to operate when set as fixed baud rate.

RDY

Note that if SIM300 was set as autobauding, the serial port sends nothing.

3.4.1.2 Turn on SIM300 using the RTC (Alarm mode)

Alarm mode is a power-on approach by using the RTC. The alert function of RTC makes the SIM300 wake up while the module is power off. In alarm mode, SIM300 will not register to GSM network and the software protocol stack is closed. Thus the parts of AT commands related with SIM card and Protocol stack will not accessible, and the others can be used as well as in normal mode.

Use the AT+CALARM command to set the alarm time. The RTC remains the alarm time if SIM300 was power down by "AT+CPOWD=1" or by PWRKEY pin. Once the alarm time is expired and executed, SIM300 goes into the Alarm mode. In this case, SIM300 will send out an Unsolicited Result Code (URC) when set as fixed baud rate:

RDY
ALARM MODE

During Alarm mode, use AT+CFUN command to query the status of software protocol stack; it will return 0 which indicates that the protocol stack is closed. Then after 90s, SIM300 will power down automatically. However, during Alarm mode, if the software protocol is started by AT+CFUN=1 command, the process of automatic power down will not be available. In ALARM mode, driving the PWRKEY to a low level voltage for a period will cause SIM300 to power down (Please refer to the power down scenarios).

The table follow briefly summarizes the AT commands that are used usually during alarm mode, for details of the instructions refer to *document [1]*:

Table 7: AT commands used in Alarm mode

AT command	USE
AT+CALARM	Set alarm time
AT+CCLK	Set data and time of RTC
AT+CPOWD	Power down
AT+CFUN	Start or close the protocol stack

3.4.2 Turn off SIM300

Following procedure can be used to turn off the SIM300:

- Normal power down procedure: Turn off SIM300 using the PWRKEY pin
- Normal power down procedure: Turn off SIM300 using AT command
- Under-voltage automatic shutdown: Take effect if Under-voltage is detected
- Over-temperature automatic shutdown: Take effect if Over-temperature is detected

3.4.2.1 Turn off SIM300 using the PWRKEY pin (Power down)

You can turn off the SIM300 by driving the PWRKEY to a low level voltage for period time. The power down scenarios illustrate as following Figure.

This procedure will let the module to log off from the network and allow the software to enter into a secure state and save data before completely disconnect the power supply.

Before the completion of the switching off procedure the module will send out result code:

NORMAL POWER DOWN

After this moment, the AT commands can't be executed. The module enters the POWER DOWN mode, only the RTC is still active. POWER DOWN can also be indicated by VDD_EXT pin, which is a low level voltage in this mode.

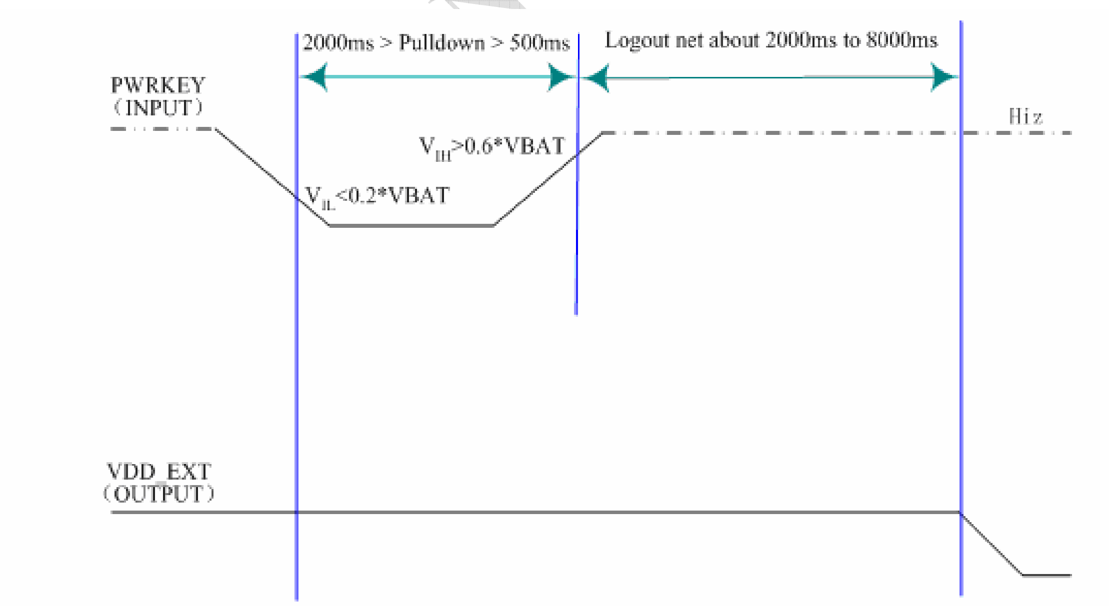


Figure 4: Timing of turn off system

3.4.2.2 Turn off SIM300 using AT command

You can use an AT command “AT+CPOWD=1” to turn off the module. This command will let the module to log off from the network and allow the software to enter into a secure state and save data before completely disconnect the power supply.

Before switching off the module will send out result code:

NORMAL POWER DOWN

After this moment, the AT commands can’t be executed. The module enters the POWER DOWN mode, only the RTC is still active. POWER DOWN can also be indicated by VDD_EXT pin, which is a low level voltage in this mode.

Please refer to *document [1]* for detail about the AT command of “AT+CPOWD”.

3.4.2.3 Under-voltage automatic shutdown

Software will constantly monitor the voltage applied on the VBAT, if the measured battery voltage is no more than 3.5V, the following URC will be presented:

POWER LOW WARNNING

If the measured battery voltage is no more than 3.4V, the following URC will be presented:

POWER LOW DOWN

After this moment, no further more AT commands can be executed. The module will log off from network and enters POWER DOWN mode, only the RTC is still active. POWER DOWN can also be indicated by VDD_EXT pin, which is a low level voltage in this mode.

3.4.2.4 Over-temperature automatic shutdown

Software will constantly monitor the temperature of the module, if the measured temperature ≥ 80℃, the following URC will be presented:

+CMTE:1

If the measured temperature ≤ -30℃, the following URC will be presented:

+CMTE:-1

The uncritical temperature range is -35℃ to 85℃. If the measured temperature ≥ 85℃ or ≤ -35℃, the module will be automatic shutdown soon.

If the measured temperature ≥ 85℃, the following URC will be presented:

+CMTE:2

If the measured temperature ≤ -35℃, the following URC will be presented:

+CMTE:-2

After this moment, the AT commands can't be executed. The module will log off from network and enter POWER DOWN mode, only the RTC is still active. POWER DOWN can also be indicated by VDD_EXT pin, which is a low level voltage in this mode.

To monitor the temperature, you can use the "AT+CMTE" command to measure the temperature when the module is power on.

For details please refer to *document [1]*

3.4.3 Restart SIM300 using the PWRKEY pin

You can restart SIM300 by driving the PWRKEY to a low level voltage for period time, same as turn on SIM300 using the PWRKEY pin. Before restart the SIM300, you need delay at least 500ms from detecting the VDD_EXT low level on. The restart scenarios illustrate as the following figure.

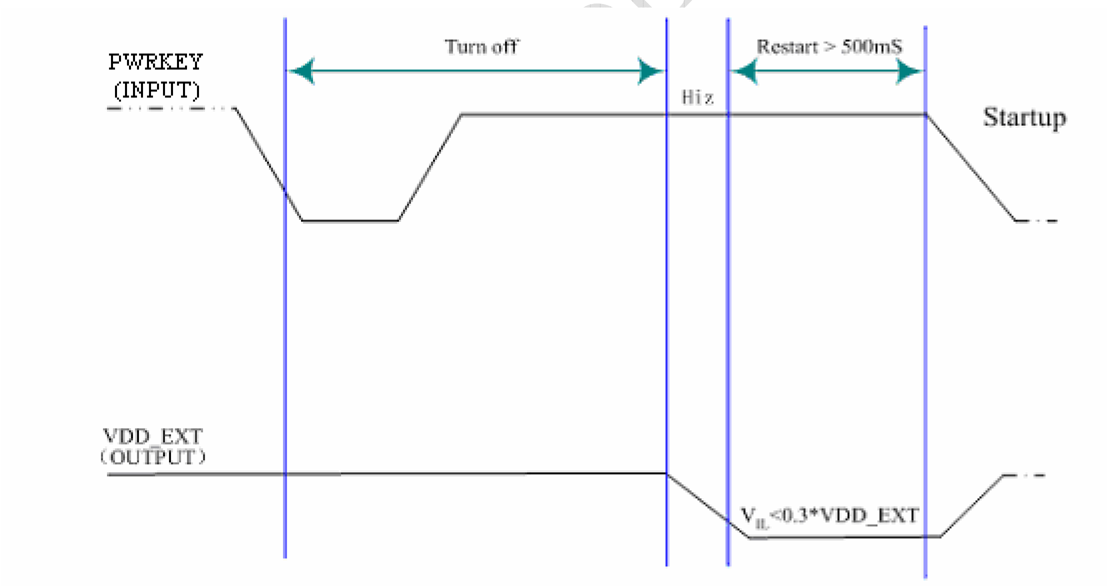


Figure 5: Timing of restart system

3.5 Power saving

There are two methods to achieve SIM300 module extreme low power. "AT+CFUN" is used to set module into minimum functionality mode and DTR hardware interface signal can be used to set system to be SLEEP mode (or Slow clocking mode).

3.5.1 Minimum functionality mode

Minimum functionality mode reduces the functionality of the module to a minimum and, thus, minimizes the current consumption to the lowest level. This mode is set with the “AT+CFUN” command which provides the choice of the functionality levels <fun>=0，1，4

- 0: minimum functionality;
- 1: full functionality (Default);
- 4: disable phone both transmit and receive RF circuits;

If SIM300 has been set to minimum functionality by “AT+CFUN=0”, then the RF function and SIM card function will be closed, in this case, the serial port is still accessible, but all AT commands need RF function or SIM card function will not be accessible.

If SIM300 has disable all RF function by “AT+CFUN=4”, then RF function will be closed, the serial port is still active in this case but all AT commands need RF function will not be accessible.

When SIM300 is in minimum functionality or has been disable all RF functionality by “AT+CFUN=4”, it can return to full functionality by “AT+CFUN=1”.

For detailed information about “AT+CFUN”, please refer to *document [1]*.

3.5.2 Sleep mode (slow clock mode)

Through DTR signal control SIM300 module to enter or exit the SLEEP mode in customer applications.

When DTR is in high level, at the same time there is no on air or audio activity is required and no hardware interrupt (such as GPIO interrupt or data on serial port), SIM300 will enter SLEEP mode automatically. In this mode, SIM300 can still receive paging or SMS from network.

In SLEEP mode, the serial port is not accessible.

Note: For SIM300, it requests to set AT command “AT+CSCLK=1” to enable the sleep mode; the default value is 0, that can’t make the module enter sleep mode, for more details please refer to our AT command list.

3.5.3 Wake up SIM300 from SLEEP mode

When SIM300 is SLEEP mode, the following method can wake up the module.

- Enable DTR pin to wake up SIM300.
  If DTR Pin is pull down to a low level，this signal will wake up SIM300 from power saving mode. The serial port will be active after DTR change to low level about 20ms.

- Receive a voice or data call from network to wake up SIM300.
- Receive a SMS from network to wake up SIM300.
- RTC alarm expired to wake up SIM300.

3.6 Summary of state transitions (except SLEEP mode)

Table 8: Summary of state transitions

Further mode / Current mode	**POWER DOWN**	**Normal mode**	**Alarm mode**
POWER DOWN		Use PWRKEY	Switch on from POWER DOWN mode bye RTC
Normal mode	AT+CPOWD or use PWRKEY pin		Set alarm by "AT+CALARM", and then switch off the module. When the timer expire, the module turn on and enter Alarm mode
Alarm mode	Use PWRKEY pin or wait module switch off automatically	Use AT+CFUN	

3.7 RTC backup

The RTC (Real Time Clock) power supply of module can be provided by an external battery or a battery (rechargeable or non-chargeable) through the VRTC (PIN15) on the board-to-board connector. There is a 10K resistance has been integrated in SIM300 module used for restricting current. You need only a coin-cell battery or a super-cap to VRTC to backup power supply for RTC.

Note: The VRTC couldn't be designed to a NC pin in your circuit. You should connect the VRTC pin to a battery or a capacitor.

The following figures show various sample circuits for RTC backup.

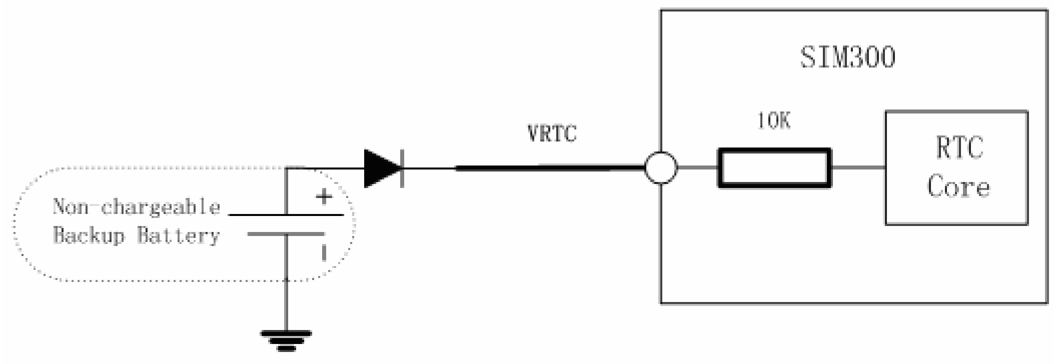


Figure 6: RTC supply from non-chargeable battery

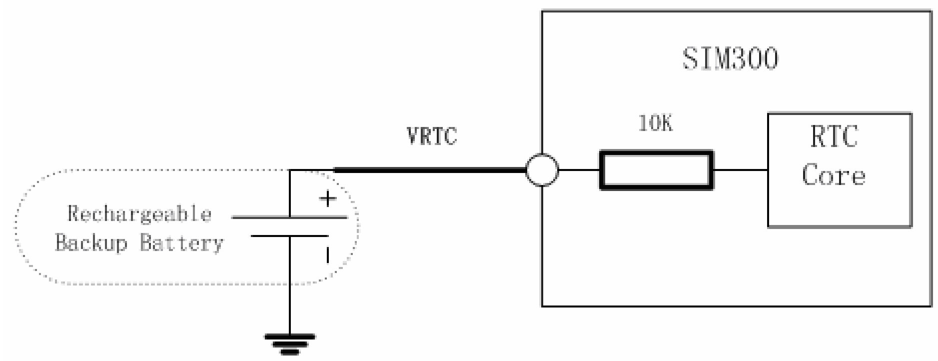


Figure 7: RTC supply from rechargeable battery

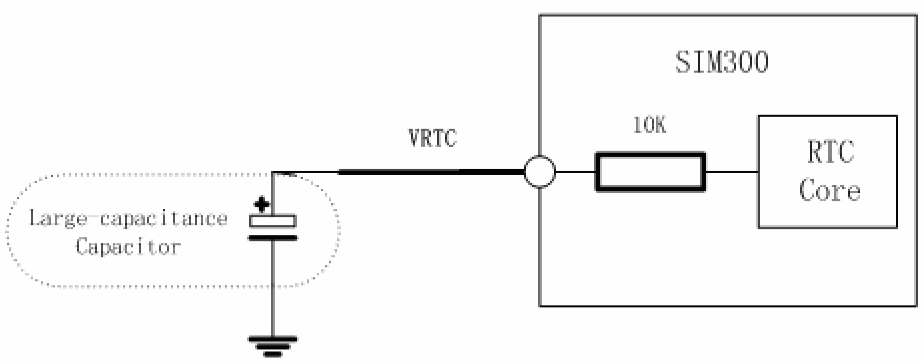


Figure 8: RTC supply from capacitor

- **Li-battery backup**

Rechargeable Lithium coin cells such as the TC614 from Maxell, or the TS621 from Seiko, are also small in size, but have higher capacity than the double layer capacitors resulting in longer backup times.

Typical charge curves for each cell type are shown in following figures. Note that the rechargeable Lithium type coin cells generally come pre-charged from the vendor.

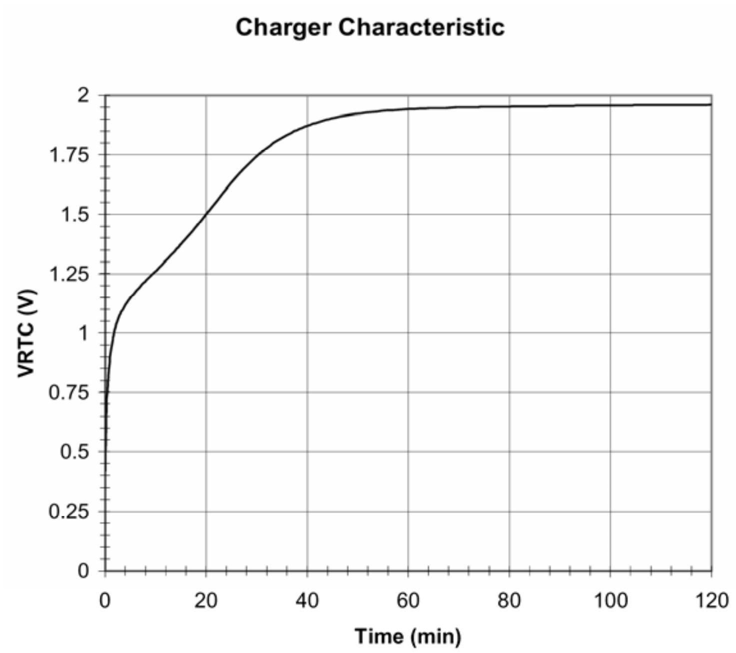


Figure 9: Panasonic EECEMOE204A Charge Characteristic

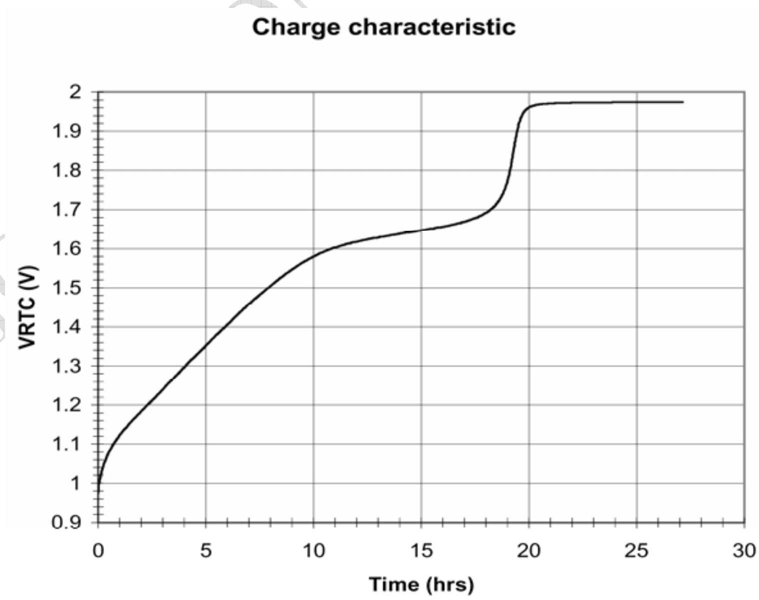


Figure 10: Maxell TC614 Charge Characteristic

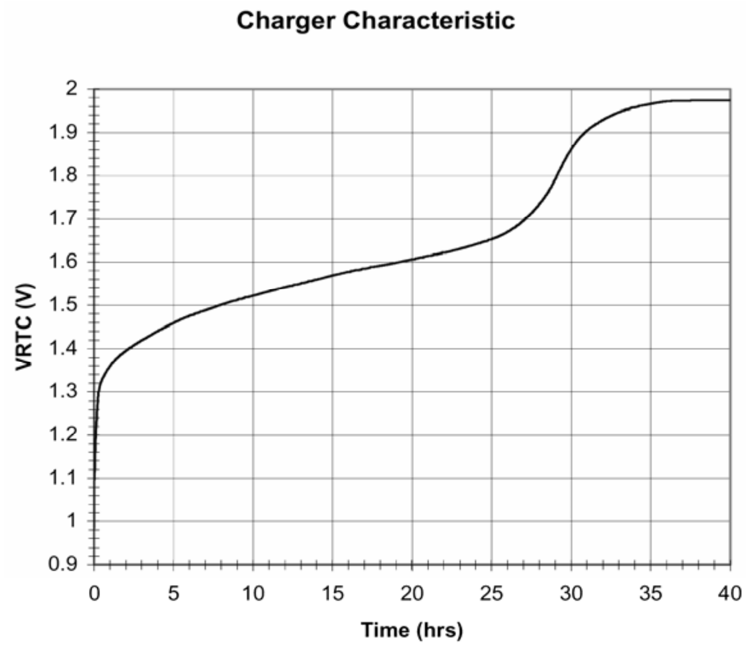


Figure 11: Seiko TS621 Charge Characteristic

Note:
Gold-capacitance backup
Some suitable coin cells are the electric double layer capacitors available from Seiko (XC621), or from Panasonic (EECEM0E204A). They have a small physical size (6.8 mm diameter) and a nominal capacity of 0.2 F to 0.3 F, giving hours of backup time.

3.8 Serial interfaces

SIM300 provides two unbalanced asynchronous serial ports. One is the serial port and another is the debug port. The GSM module is designed as a DCE (Data Communication Equipment), following the traditional DCE-DTE (Data Terminal Equipment) connection, the module and the client (DTE) are connected through the following signal (as following figure shows). Autobauding supports baud rate from 1200 bps to 115200bps.

Serial port
- Port/TXD @ Client sends data to the RXD signal line of module
- Port/RXD @ Client receives data from the TXD signal line of module

Debug port
- Port/TXD @ Client sends data to the DBG_RXD signal line of module
- Port/RXD @ Client receives data from the DBG_TXD signal line of module

All pins of all serial ports have 8mA driver, the logic levels are described in following table

Table 9: Logic levels of serial ports pins

Parameter	Min	Max	Unit
Logic low input	0	0.3*VDD_EXT	V
Logic high input	0.7 *VDD_EXT	VDD_EXT +0.3	V
Logic low output	GND	0.2	V
Logic high output	VDD_EXT -0.2	VDD_EXT	V

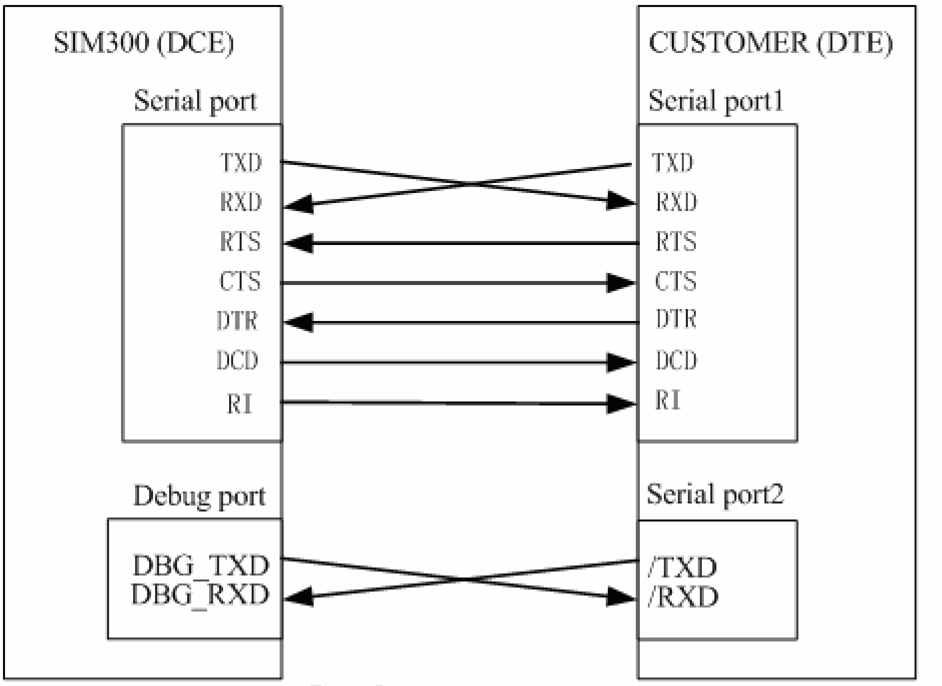


Figure 12: Interface of serial ports

3.8.1 Function of serial port & debug port supporting

Serial port

- Seven lines on Serial Port Interface.
- Contains Data lines TXD and RXD, State lines RTS and CTS, Control lines DTR, DCD and RI.
- Serial Port can be used for CSD FAX, GPRS service and send AT command of controlling module. Serial Port can use multiplexing function.
- Serial Port supports the communication rate as following:
  300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Default as 115200bps.
- Autobauding supports the communication rate as following:
  1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200bps.

Autobauding allows the GSM engine to automatically detect the baud rate configured in the host application. The serial interface of the GSM engine supports autobauding for the following baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200. Factory setting is autobauding enabled. This gives you the flexibility to put the GSM engine into operation no matter what baud rate your host application is configured to. To take advantage of autobaud mode specific attention must be paid to the following requirements:

Synchronization between DTE and DCE.

Ensure that DTE and DCE are correctly synchronized and the baud rate used by the DTE is detected by the DCE (= ME). To allow the baud rate to be synchronized simply issue an "AT" or "at" string. This is necessary.

- after you have activated autobauding
- when you start up the GSM engine while autobauding is enabled. It is recommended to wait 3 to 5 seconds before sending the first AT character. Otherwise undefined characters might be returned.

Restrictions on autobauding operation

- The serial interface has to be operated at 8 data bits, no parity and 1 stop bit (factory setting).
- The Unsolicited Result Codes like "RDY", "+CFUN: 1" and "+CPIN: READY" are not indicated when you start up the ME while autobauding is enabled. This is due to the fact that the new baud rate is not detected unless DTE and DCE are correctly synchronized as described above.

Note: You can use AT+IPR=x;&W to set a fixed baud rate and save the configuration to non-volatile flash memory. After the configuration was saved as fix baud rate, the Unsolicited Result Codes like "RDY" should be received from the serial port all the time when the SIM300 was power on.

Debug port

- Two lines on Serial Port Interface
- Only contains Data lines /TXD and /RXD
- Debug Port only used for debugging. It cannot be used for CSD call, FAX call. And the Debug port can not use multiplexing function;
- Debug port supports the communication rate as following:
  9600, 19200, 38400, 57600, 115200

3.8.2 Software upgrade and software debug

The **TXD**、**RXD**、**DBG_TXD**、**DBG_RXD**、**GND** must be connected to the IO connector when user need to upgrade software and debug software, the TXD、RXD should be used for software upgrade and the DBG_TXD、DBG_RXD for software debug. The PWRKEY pin is recommended to connect to the IO connector. The user also can add a switch between the PWRKEY and the GND. The PWRKEY should be connected to the GND when SIM300 is upgrading software. Please refer to the following figures.

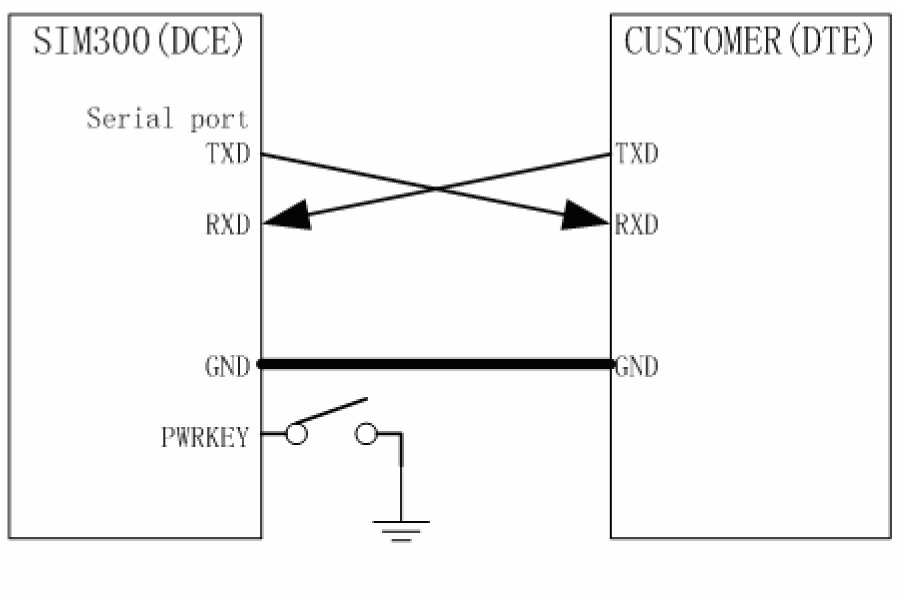


Figure 13: Interface of software upgrade

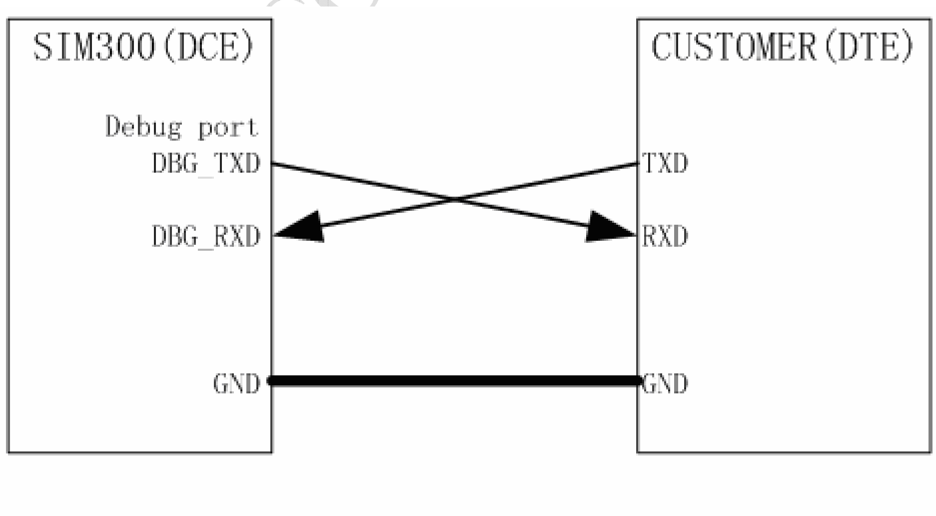


Figure 14: Interface of software debug

Note: The serial port doesn't support the RS_232, it only supports the TTL level. You should add the level converter IC between the DCE and DTE, if you connect it to the PC.

3.9 Audio interfaces

Table 10: Audio interface signal

	Name	Pin	Function
(AIN1/AOUT1)	MIC1P	53	Microphone1 input +
	MIC1N	55	Microphone1 input -
	SPK1P	54	Audio1 output+
	SPK1N	56	Audio1 output-
(AIN2/AOUT2)	MIC2P	57	Microphone2 input +
	MIC2N	59	Microphone2 input -
	SPK2P	58	Audio2 output+
	SPK2N	60	Audio2 output-

The module provides two analogy input channels, AIN1 and AIN2, which may be used for both microphone and line inputs. The AIN1 and AIN2 channels are identical. One of the two channels is typically used with a microphone built into a handset. The other channel is typically used with an external microphone or external line input. The Module analogy input configuration is determined by control register settings and established using analogy multiplexes.

For each channels, you can use AT+CMIC to set the input gain level of microphone, use AT+ECHO to set the parameters for echo suppression. Also, you can use AT+SIDET to set the side-tone level. For details, please refer to *document [1]*.
It is suggested that you adopt the one of following two matching circuits in order to satisfy speaker effect. The difference audio signals have to be layout according to difference signal layout rules. As show in following Figures **(Note: all components package are 0603)** .If you want to adopt a amplifier circuit for audio, we commend National company's LM4890. But you can select it according to your needs.

3.9.1 Speaker interface configuration

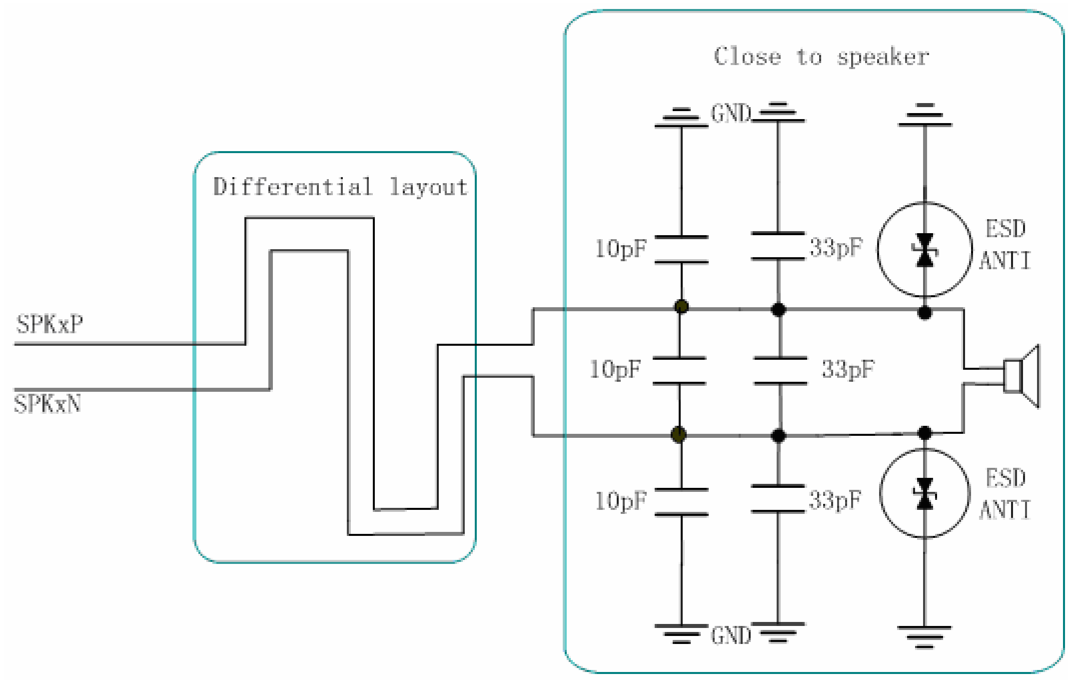


Figure 15: Speaker interface configuration

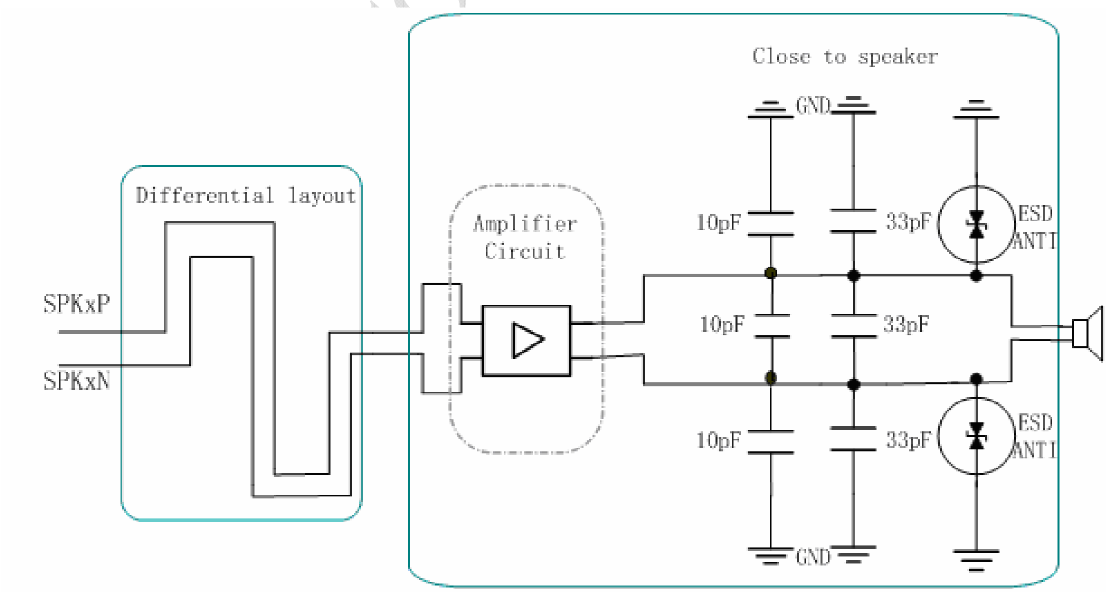


Figure 16: Speaker interface with amplifier configuration

3.9.2 Microphone interfaces configuration

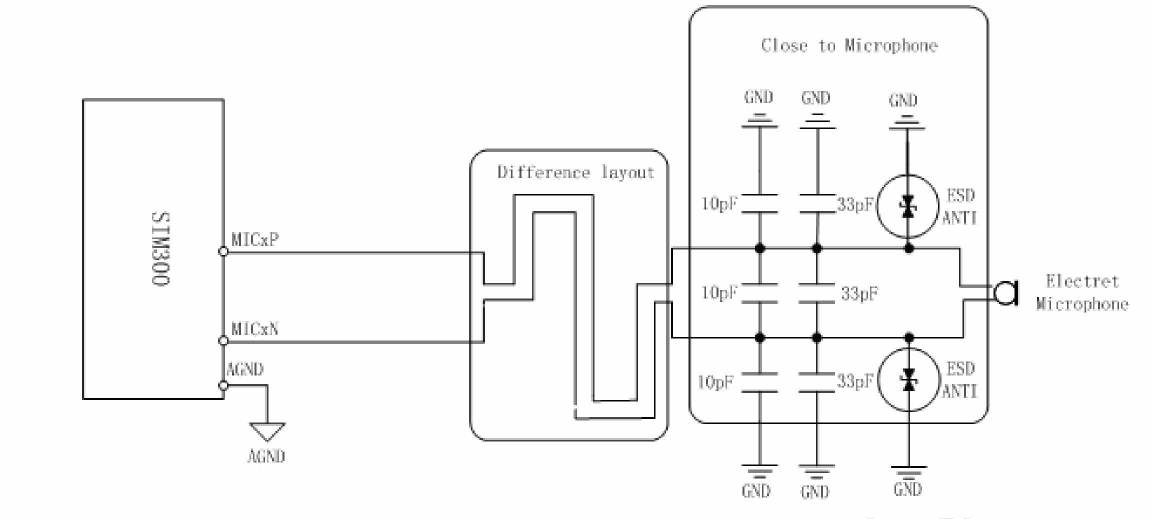


Figure 17: Microphone interface configuration

3.9.3 Earphone interface configuration

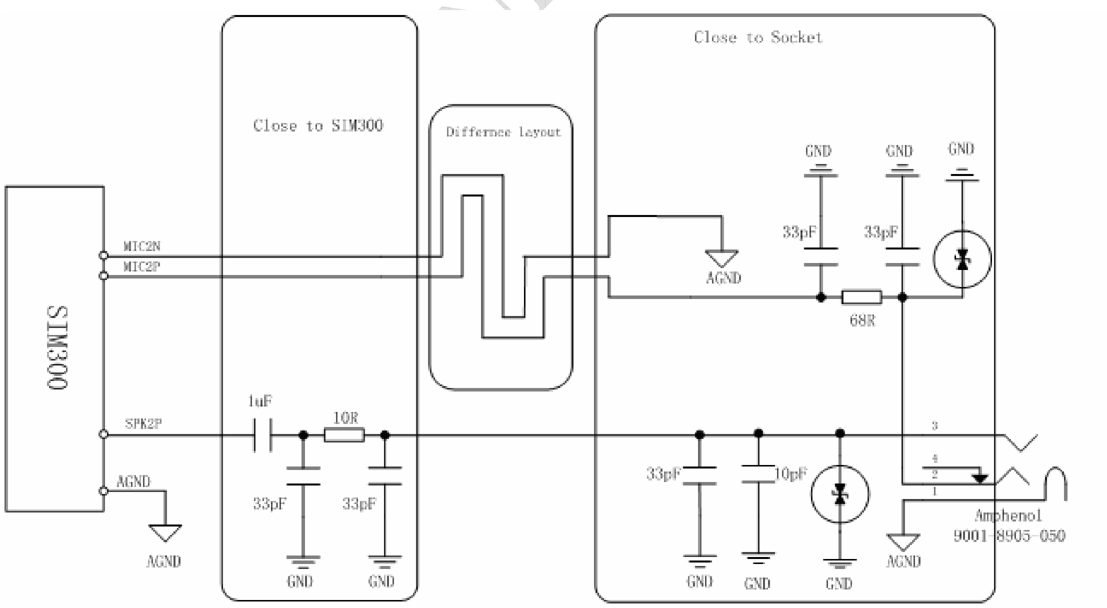


Figure 18: Earphone interface configuration

3.9.4 Referenced electronic characteristic

Table 11: MIC Input Characteristics

Parameter	Min	Typ	Max	Unit
Working Voltage		1.25	2.5	V
Working Current	5		300	uA
External Microphone Load Resistance	1.2	2.2		k Ohms

Table 12: Audio Output Characteristics

Parameter			Min	Typ	Max	Unit
Normal Output(SPK1)	Single Ended	load Resistance	27	32		Ohm
		Ref level			1.0954	Vpp
	Differential	load Resistance	27	32		
		Ref level			0.5477	Vpp
Auxiliary Output(SPK2)	Single Ended	load Resistance	27	32		Ohm
		Ref level			1.0954	Vpp
	Differential	load Resistance	27	32		
		Ref level			0.5477	Vpp

Table 13: Buzzer Output Characteristics

Parameter	Min	Typ	Max	Unit
Working Voltage	2.4	2.8	3.3	V
Working Current		8		mA
Load Resistance	1			k Ohms

3.10 Buzzer

The PIN 36 on the board-to-board connector can be used to drive a buzzer to indicate incoming call. The output volume of buzzer can be set by “AT+CRSL”. The reference circuit for buzzer as shown as following figure:

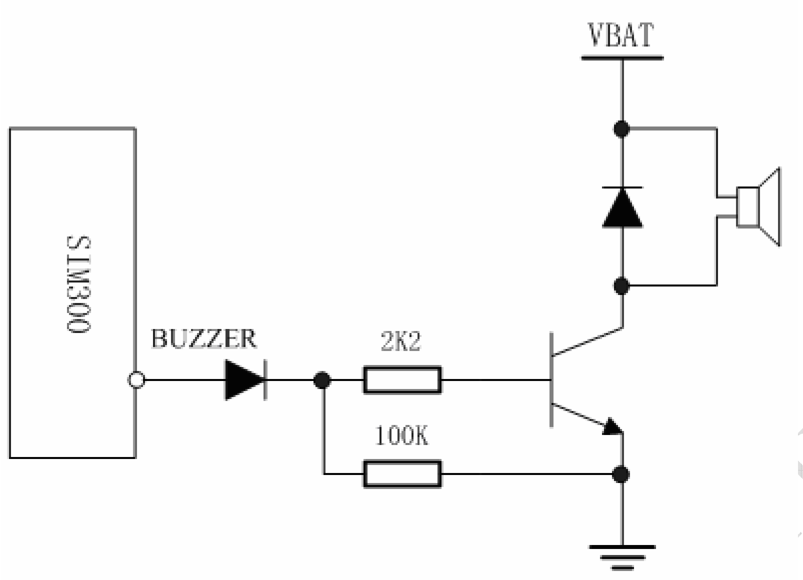


Figure 19: Reference circuit for Buzzer

3.11 SIM card interface

3.11.1 SIM card application

You can use AT Command to get information in SIM card. For more information, please refer to *document [1]*.

The SIM interface supports the functionality of the GSM Phase 1 specification and also supports the functionality of the new GSM Phase 2+ specification for FAST 64 kbps SIM (intended for use with a SIM application Tool-kit).

Both 1.8V and 3.0V SIM Cards are supported.

The SIM interface is powered from an internal regulator in the module having nominal voltage 2.8V. All pins reset as outputs driving low. Logic levels are as described in table

Table 14: Signal of SIM interface (board-to-board connector)

Pin	Signal	Description
19	SIM_VDD	SIM Card Power output automatic output on SIM mode, one is 3.0V±10%, another is 1.8V±10%. Current is about 10mA.
21	SIM_DATA	SIM Card data I/O
23	SIM_CLK	SIM Card Clock
25	SIM_RST	SIM Card Reset
16	SIM_PRESENCE	SIM Card Presence

Following is the reference circuit about SIM interface. We recommend an Electro-Static discharge device ST (www.st.com) ESDA6V1W5 or ON SEMI (www.onsemi.com) SMF05C for "ESD ANTI". The 22Ω resistors showed in the following figure should be added in series on the IO line between the module and the SIM card for matching the impedance. The pull up resistor (about 10KΩ) must be added on the SIM_DATA line. Note that the SIM peripheral circuit close to the SIM card socket.

The SIM_PRESENCE pin is used for detecting the SIM card removal. You can use the AT command "AT+CSDT" to set the SIMCARD configure. For detail of this AT command, please refer to *document [1]*:

You can select the 8 pins SIM card. The reference circuit about 8 pins SIM card illustrates as following figure.

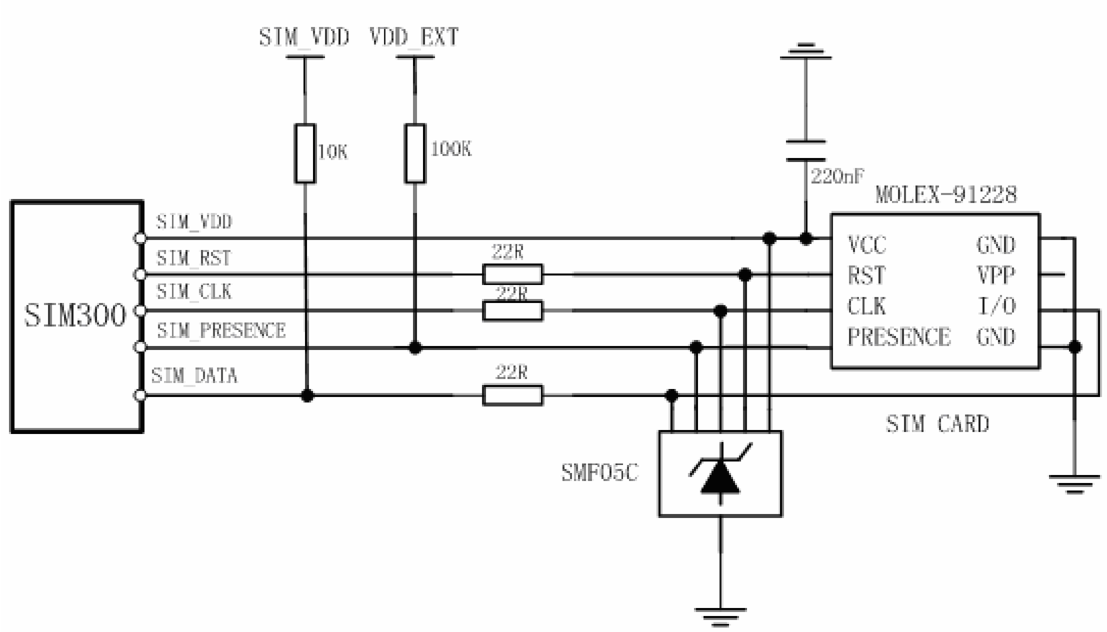


Figure 20: SIM interface reference circuit with 8 pins SIM card

If you don't use the SIM card detection function, you can let the SIM_PRESENCE pin NC or connect to the GND. The reference circuit about 6 pins SIM card illustrate as following figure.

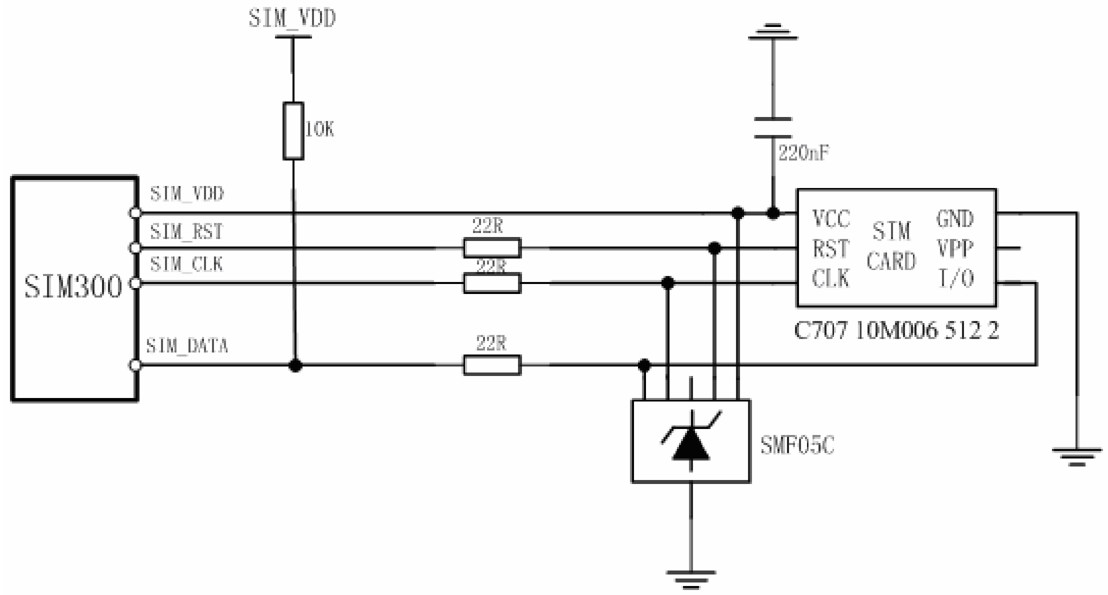


Figure 21: SIM interface reference circuit with 6 pins SIM card

3.11.2 Design considerations for SIM card holder

For 6 pins SIM card, we recommend to use Amphenol C707 10M006 512 2 .You can visit http://www.amphenol.com for more information about the holder.

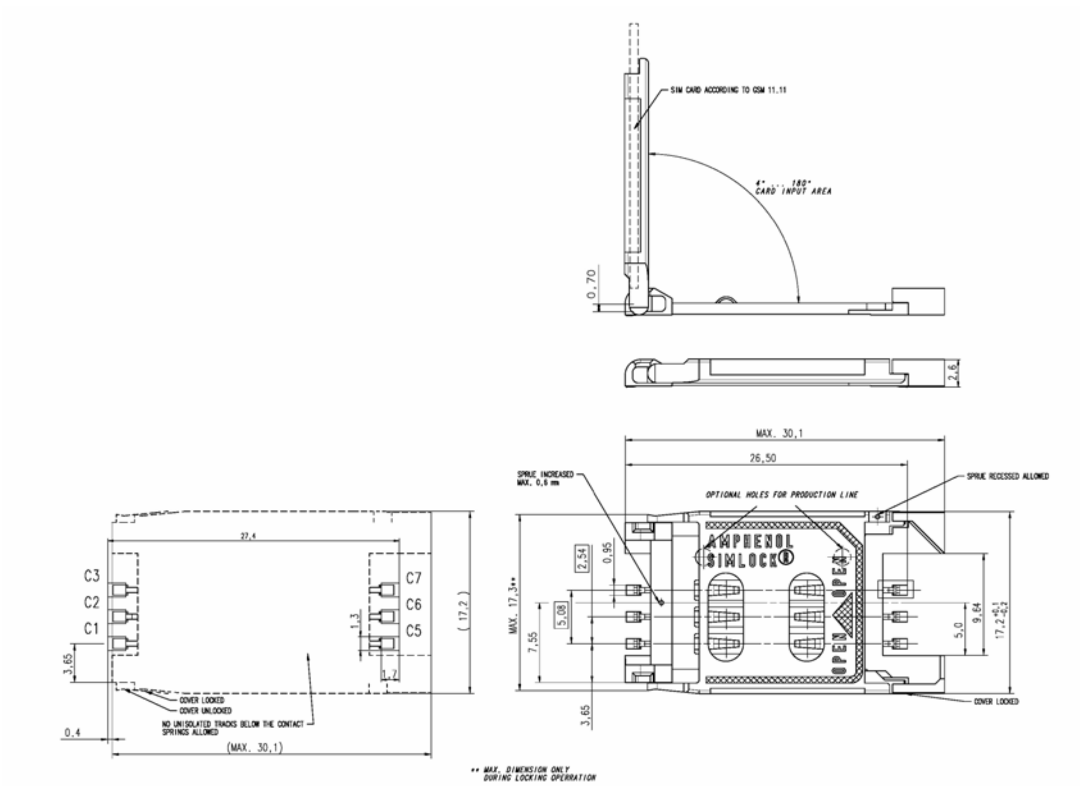


Figure 22: Amphenol C707 10M006 512 2 SIM card holder

Table 15: Pin description (Amphenol SIM card holder)

Pin	Signal	Description
C1	SIM_VDD	SIM Card Power supply, it can identify automatically the SIM Card power mode，one is 3.0V±10%, another is 1.8V±10%. Current is about 10mA.
C2	SIM_RST	SIM Card Reset.
C3	SIM_CLK	SIM Card Clock.
C5	GND	Connect to GND.
C6	VPP	Not connect.
C7	SIM_DATA	SIM Card data I/O.

For 8 pins SIM card, we recommend to use Molex 91228.You can visit http://www.molex.com for more information about the holder.

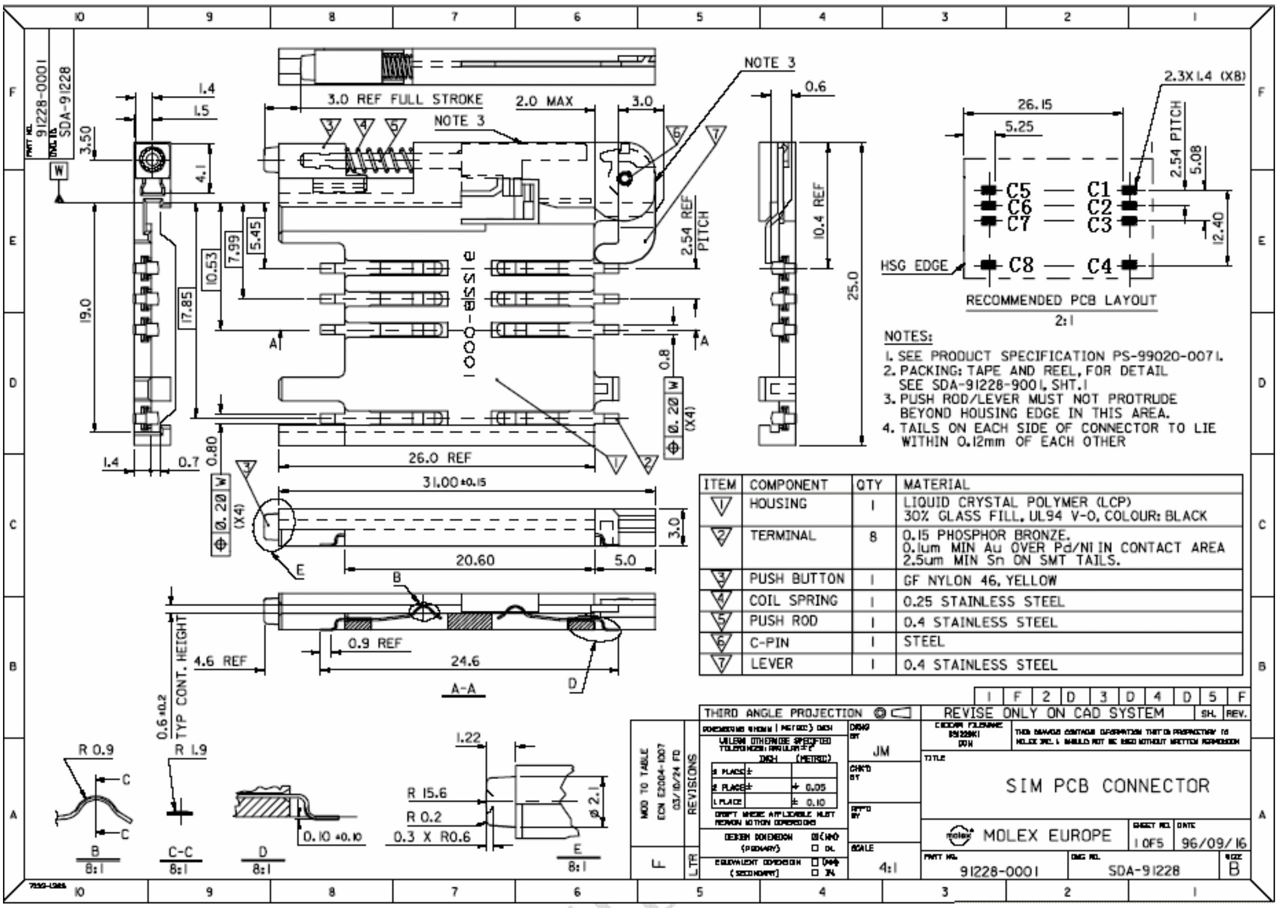


Figure 23: Molex 91228 SIM card holder

Table 16: Pin description (Molex SIM card holder)

Pin	Signal	Description
C1	SIM_VDD	SIM Card Power supply, it can identify automatically the SIM Card power mode，one is 3.0V±10%, another is 1.8V±10%. Current is about 10mA.
C2	SIM_RST	SIM Card Reset.
C3	SIM_CLK	SIM Card Clock.
C4	GND	Connect to GND.
C5	GND	Connect to GND.
C6	VPP	Not connect.
C7	SIM_DATA	SIM Card data I/O.
C8	SIM_PRESENCE	Detect SIM Card Presence

3.12 LCD interface

SIM300 provides a serial LCD display interface that supports serial communication with LCD device. These are composite pins that can be used as GPIO ports or LCD display interface according to your application. When use as LCD interface, the following table is the pin define. LCD interface timing should be united with the LCD device.

Table 17: PIN define of LCD interface

Pin (On board-to-board connector)	Name	Function
18	DISP_DATA	Display data output
20	DISP_CLK	Display clock for LCD
22	DISP_CS	Display enable
24	DISP_D/C	Display data or command select
26	DISP_RST	LCD reset

3.13 ADC

SIM300 provides one auxiliary ADC (General purpose analog to digital converter.) as voltage input pin, which can be used to detect the values of some external items such as voltage, temperature etc. User can use AT command "AT+CADC" to read the voltage value added on ADC pin. For detail of this AT command, please refer to *document [1]*.

Table 18: ADC pin of SIM300

Name	Pin (On board-to-board connector)	Input voltage scope(V)
ADC0	52	0 – 2.4

3.14 Behaviors of the RI line (serial port1 interface only)

Table 19: Behaviours of the RI line (PIN48)

State	RI respond
Standby	HIGH

Voice calling	Change LOW, then: （1）Change to HIGH when establish calling. （2）Use AT command ATH, the RI pin changes to HIGH. （3）Sender hangs up, change to HIGH.
Data calling	Change LOW, then： （1）Change to HIGH when establish calling. （2）Use AT command ATH, the RI changes to HIGH.
SMS	When receive SMS, The RI will change to LOW and hold low level about 120 ms, then change to HIGH.

If the module is used as caller, signal RI will maintain high. But when it is used as receiver, following is timing of ring.

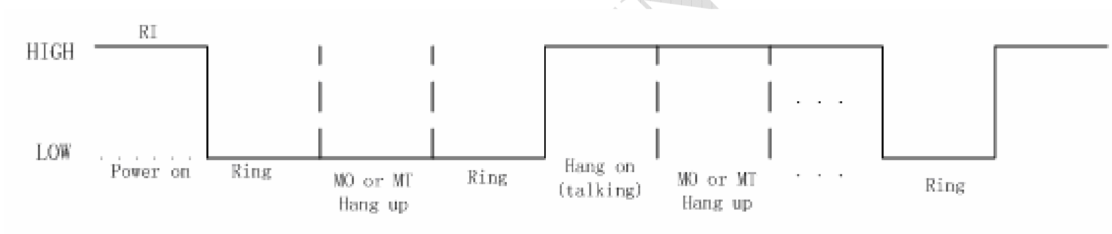


Figure 24: SIM300 Services as Receiver

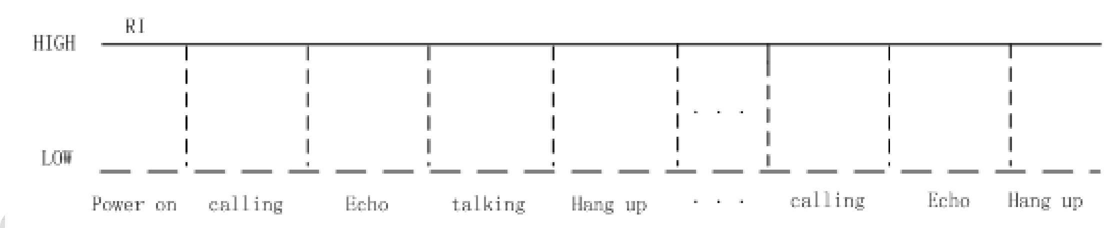


Figure 25: SIM300 Services as caller

3.15 Network status indication LED lamp

The **PIN 30** on the board-to-board connector can be used to drive a network status indication LED lamp. The working state of this pin is listed in following table:

Table 20: Working state of network status indication LED pin

State	SIM300 function
Off	SIM300 is not running
64ms On/ 800ms Off	SIM300 does not find the network
64ms On/ 3000ms Off	SIM300 find the network
64ms On/ 300ms Off	GPRS communication

We provide a reference circuitry for you, show as following figure:

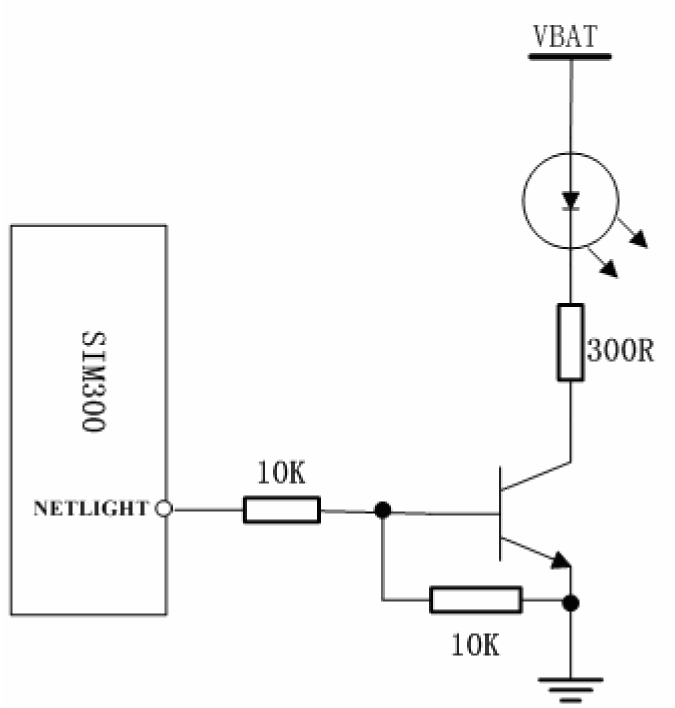


Figure 26: Reference circuit for Network status LED

3.16 General purpose input & output (GPIO)

SIM300 provides a limited number of General Purpose Input/Output signal pin.

Table 21: GPIO Pins of SIM300

Pin	Name	Function
32	GPIO0	General Purpose Input/Output Port

4 Antenna interface

The RF interface has an impedance of 50Ω. To suit the physical design of individual applications SIM300 offers two alternatives:

- Recommended approach: antenna connector on the component side of the PCB
- Antenna pad and grounding plane placed on the bottom side.

To minimize the loss on the RF cable, it need be very careful to choose RF cable. We recommend the insertion loss should be meet following requirement:
- GSM900<1dB
- DCS1800/PCS1900<1.5dB

4.1 Antenna installation

4.1.1 Antenna connector

SIM300 use MURATA's MM9329-2700 RF connector on the module side, we recommend user use MURATA's MXTK92XXXXX as matching connector on the application side. Please refer to appendix for detail info about MURATA's MXTK92XXXXX.

4.1.2 Antenna pad

The antenna can be soldered to the pad, or attached via contact springs. To help you to ground the antenna, SIM300 comes with a grounding plane located close to the antenna pad.
SIM300 material properties:
SIM300 PCB Material: FR4
Antenna pad: Gold plated pad

4.2 Module RF output power

Table 22: SIM300 conducted RF output power

Frequency	Max	Min
E-GSM900	33dBm ±2db	5dBm±5db
DCS1800	30dBm ±2db	0dBm±5db
PCS1900	30dBm ±2db	0dBm±5db

4.3 Module RF receive sensitivity

Table 23: SIM300 conducted RF receive sensitivity

Frequency	**Receive sensitivity**
E-GSM900	< -106dBm
DCS1800	< -106dBm
PCS1900	< -106dBm

4.4 Module operating frequencies

Table 24: SIM300 operating frequencies

Frequency	**Receive**	**Transmit**
E-GSM900	925 ～ 960MHz	880 ～ 915MHz
DCS1800	1805 ～ 1880MHz	1710 ～ 1785MHz
PCS1900	1930 ～ 1990MHz	1850 ～ 1910MHz

5 Electrical, reliability and radio characteristics

5.1 Absolute maximum ratings

Absolute maximum rating for power supply and voltage on digital and analog pins of SIM300 are list in following table:

Table 25: Absolute maximum ratings

Parameter	Min	Max	Unit
Peak current of power supply	0	4.0	A
RMS current of power supply (during one TDMA- frame)	0	0.7	A
Voltage at digit pins	-0.3	3.3	V
Voltage at analog pins	-0.3	3.0	V
Voltage at digit/analog pins in POWER DOWN mode	-0.25	0.25	V

5.2 Operating temperatures

The operating temperature is listed in following table:

Table 26: SIM300 operating temperature

Parameter	Min	Typ	Max	Unit
Ambient temperature	-20	25	55	℃
Restricted operation*	-30 to -20		55 to 80	℃
Storage temperature	-40		+85	℃

* SIM300 can work, but the deviation from the GSM specification may occur.

5.3 Power supply ratings

Table 27: SIM300 power supply ratings

Parameter	Description	Conditions	Min	Typ	Max	Unit
VBAT	Supply voltage	Voltage must stay within the min/max values, including voltage drop, ripple, and spikes.	3.4	4.0	4.5	V
	Voltage drop during transmit burst	Normal condition, power control level for Pout max			400	mV
	Voltage ripple	Normal condition, power control level for Pout max @ f<200kHz @ f>200kHz			50 2	mV
I_{VBAT}	Average supply current	POWER DOWN mode SLEEP mode (BS-PA-MFRMS=5)		35 2.5		uA mA
		IDLE mode EGSM 900 GSM 1800/1900		23 23		mA
		TALK mode EGSM 900 GSM 1800/1900		260 190		mA
		DATA mode, GPRS (3 Rx,2Tx) EGSM 900 GSM 1800/1900		490 340		mA
		DATA mode, GPRS (4 Rx,1Tx) EGSM 900 GSM 1800/1900		290 220		mA
	Peak supply current (during transmission slot every 4.6ms)	Power control level for Pout max.		2	3	A

5.4 Current consumption

The values for current consumption listed below refer to Table 28.

Table 28: SIM300 current consumption

Voice Call	
GSM 900	@power level #5 <350mA,Typical 260mA @power level #10,Typical 130mA @power level #19,Typical 86mA
GSM1800/1900	@power level #0 <300mA,Typical 200mA @power level #10,Typical 87mA @power level #15,Typical 80mA
GPRS Data	
DATA mode, GPRS (1 Rx,1 Tx) CLASS 8	
GSM 900	@power level #5 <350mA,Typical 260mA @power level #10,Typical 125mA @power level #19,Typical 84mA
DCS 1800/PCS 1900	@power level #0 <300mA,Typical 200mA @power level #10,Typical 83mA @power level #15,Typical 76mA
DATA mode, GPRS (3 Rx, 2 Tx) CLASS 10	
GSM 900	@power level #5 <550mA,Typical 470mA @power level #10,Typical 225mA @power level #19,Typical 142mA
DCS 1800/PCS 1900	@power level #0 <450mA,Typical 340mA @power level #10,Typical 140mA @power level #15,Typical 127mA
DATA mode, GPRS (4 Rx,1 Tx) CLASS 8	
GSM 900	@power level #5 <350mA,Typical 270mA @power level #10,Typical 160mA @power level #19,Typical 120mA
DCS 1800/PCS 1900	@power level #0 <300mA,Typical 220mA @power level #10,Typical 120mA @power level #15,Typical 113mA

Class 10 is default set when the module work at data translation mode, the module can also work at class 8 set by AT command.

5.5 Electro-Static discharge

Normally the module is designed inside customer terminal, so about Electro-Static Discharge (ESD) should be considered base on the requirement of terminal product. But for the module is protected against Electro-Static Discharge in conveyance and customer production, and some second level ESD protect design inside module.

The remaining ports are not special ESD protection in module, so the user should consider in the final product, and therefore, they are only protected according to the Human Body Model requirements.

Table 29: The ESD endure statue measured table (Temperature: 25℃, Humidity:45%)

Part	Contact discharge	Air discharge
VBAT,GND	±4KV	±8KV
KBR0-4, DTR, RXD, TXD, RTS, DISP_DATA, DISP_CLK	±2KV	±4KV
Antenna port	±2KV	±4KV
Other port	±1KV	

6 Mechanics

This chapter describes the mechanical dimensions of SIM300.

6.1 Mechanical dimensions of SIM300

Following are SIM300 top view, side view and bottom view. These show you Mechanical dimensions of SIM300.

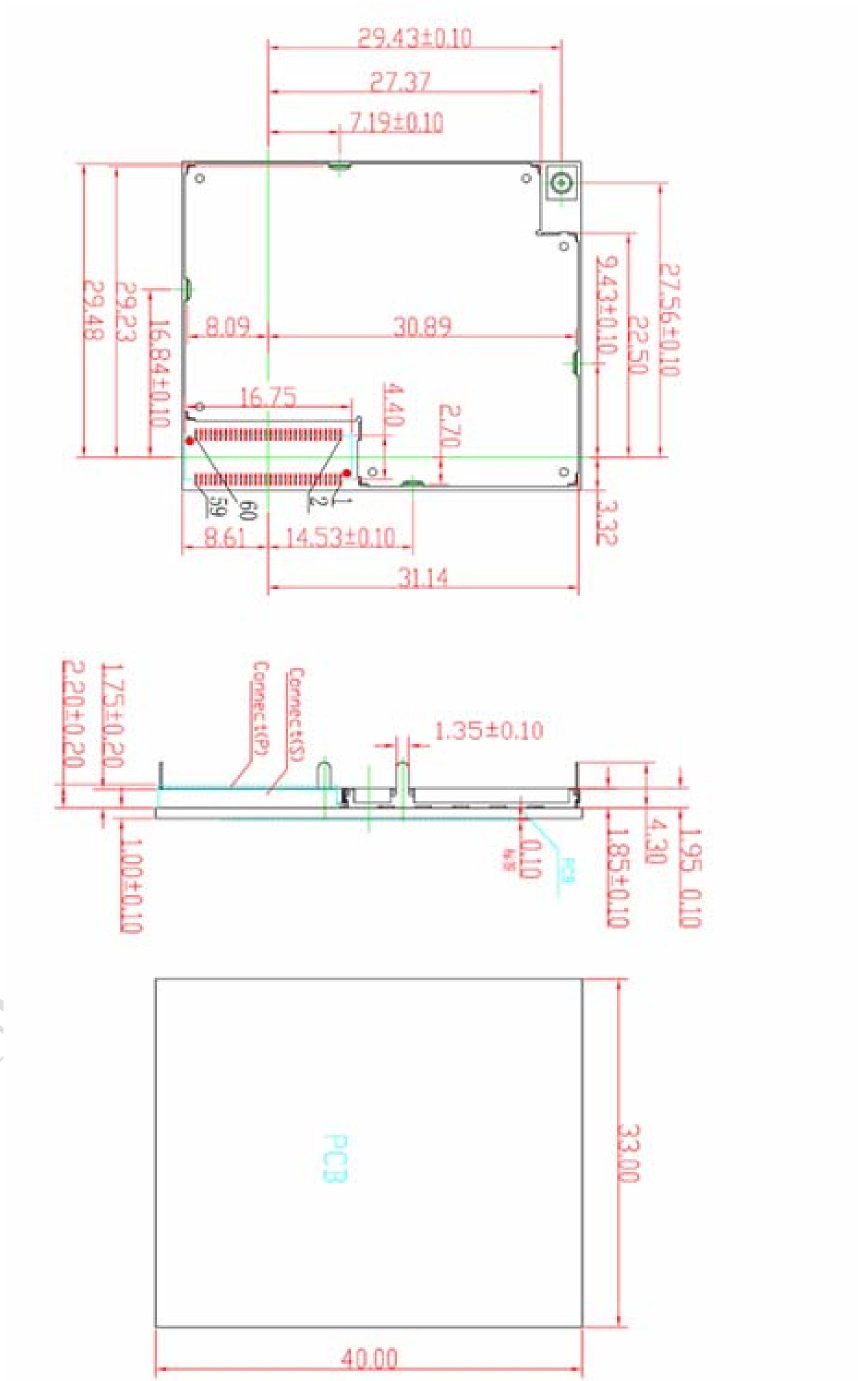


Figure 27: Mechanical dimensions of SIM300（Unit: mm）

6.2 Mounting SIM300 onto the application platform

Use the connector ENTERY 1008-G60N-01R and four mounting pads fix the SIM300 onto customer platform.

6.3 Board-to-board connector

We recommend user adopt ENTERY Company's 1008-G60N-01R as the Board to board connector. These high density SMT connectors are designed for parallel PCB-to-PCB applications. They are ideal for use in VCRs, notebook PCs, cordless telephones, mobile phones, audio/visual and other telecommunications equipment where reduced size and weight are important. Following is parameter of 1008-G60N-01R. For more details, you can login http://www.entery.com.tw for more information.

6.3.1 Mechanical dimensions of the ENTERY 1008-G60N-01R

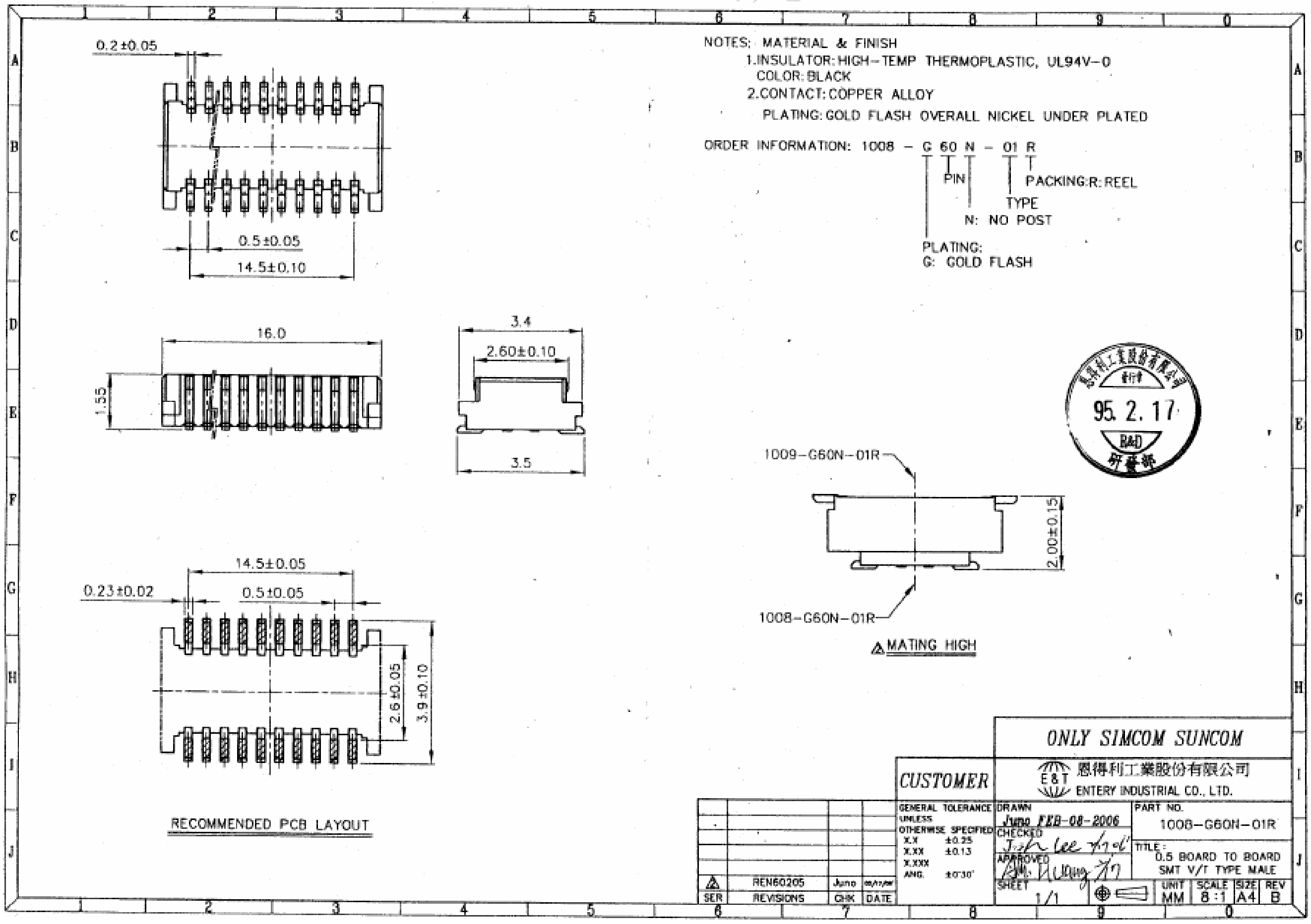


Figure 28: ENTERY 1008-G60N-01R board-to-board connector pin side

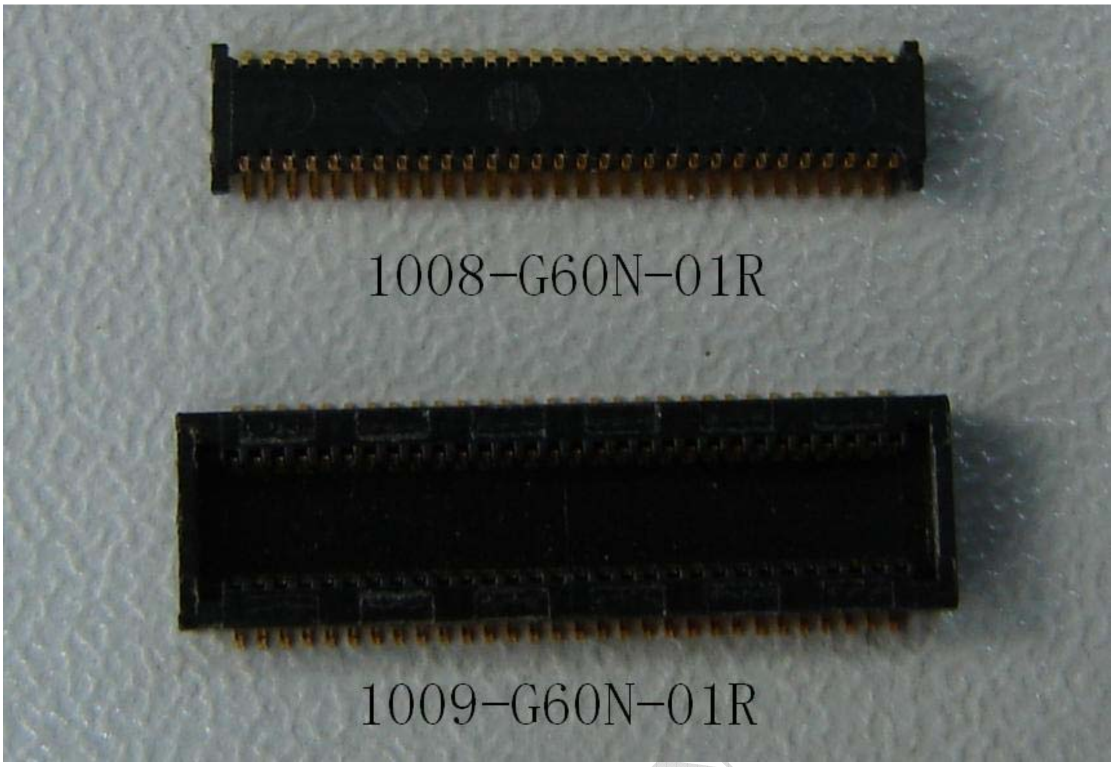


Figure 29: ENTERY board to board connector physical photo

NOTE:
The connector ENTERY 1009-G60N-01R is used in socket side (SIM300 module) and ENTERY 1008-G60N-01R is used pin side (user side).

6.4 RF adapter cabling

The RF connector in module side is Murata Company Microwave Coaxial Connectors MM9329-2700B, it makes a pair with Murata Company RF connector MXTK. It has high performance with wide frequency range, surface mountable and reflow solderable. Following is parameter. Certainly you can visit http://www.murata.com/ for more information.

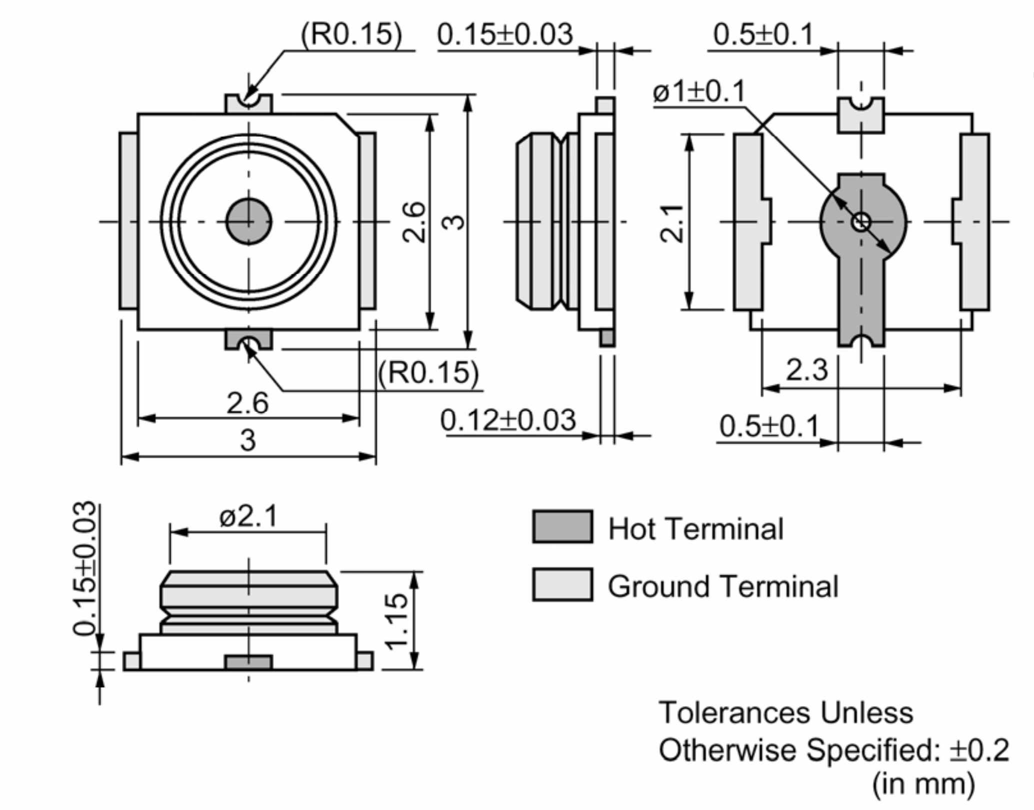


Figure 30: MM9329-2700B

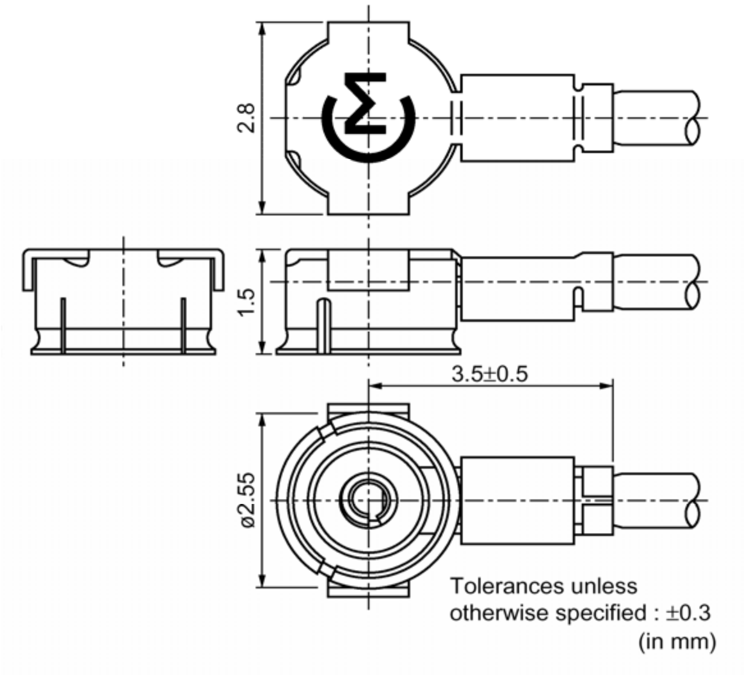
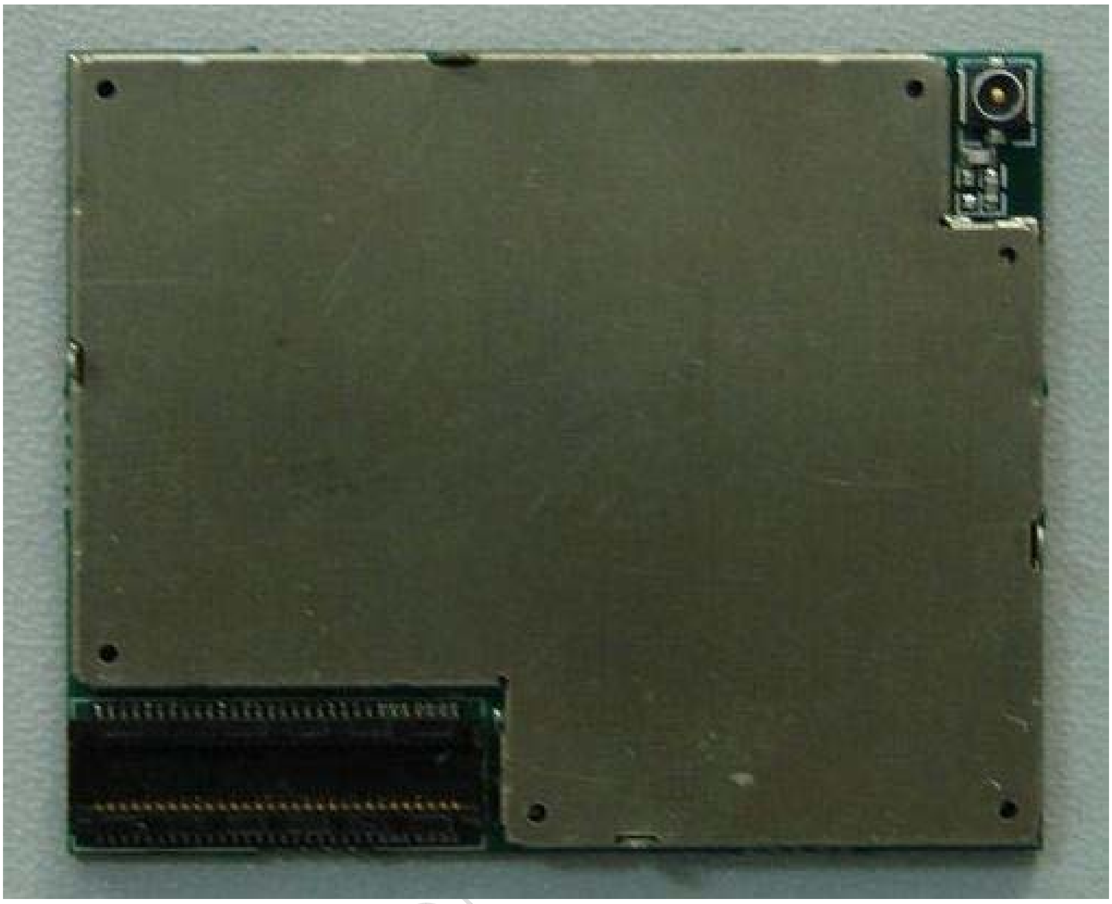


Figure 31: RF connector MXTK

For more information about the connector, please visit http://www.murata.com/

6.5 Top view of the SIM300



6.6 PIN assignment of board-to-board connector of SIM300

Table 30: Connection diagrams

PIN NO.	PIN NAME	I/O	PIN NO.	PIN NAME	I/O
2	VBAT	I	**1**	VBAT	I
4	VBAT	I	**3**	VBAT	I
6	VBAT	I	**5**	VBAT	I
8	VBAT	I	**7**	VBAT	I
10	GND		**9**	GND	
12	GND		**11**	GND	
14	GND		**13**	GND	
16	SIM_PRESENCE	I	**15**	VRTC	I/O
18	DISP_DATA	I/O	**17**	VDD_EXT	O
20	DISP_CLK	O	**19**	SIM_VDD	O
22	DISP_CS	O	**21**	SIM_DATA	I/O
24	DISP_D/C	O	**23**	SIM_CLK	O
26	DISP_RST	O	**25**	SIM_RST	O
28	DCD	O	**27**	KBC0	O
30	NETLIGHT	O	**29**	KBC1	O
32	GPIO0	I/O	**31**	KBC2	O
34	PWRKEY	I	**33**	KBC3	O
36	BUZZER	O	**35**	KBC4	O
38	DTR	I	**37**	KBR0	I
40	RXD	I	**39**	KBR1	I
42	TXD	O	**41**	KBR2	I
44	RTS	I	**43**	KBR3	I
46	CTS	O	**45**	KBR4	I
48	RI	O	**47**	DBG_RXD	I
50	AGND	I/O	**49**	DBG_TXD	O
52	ADC0	I	**51**	AGND	I/O
54	SPK1P	O	**53**	MIC1P	I
56	SPK1N	O	**55**	MIC1N	I
58	SPK2P	O	**57**	MIC2P	I
60	SPK2N	O	**59**	MIC2N	I