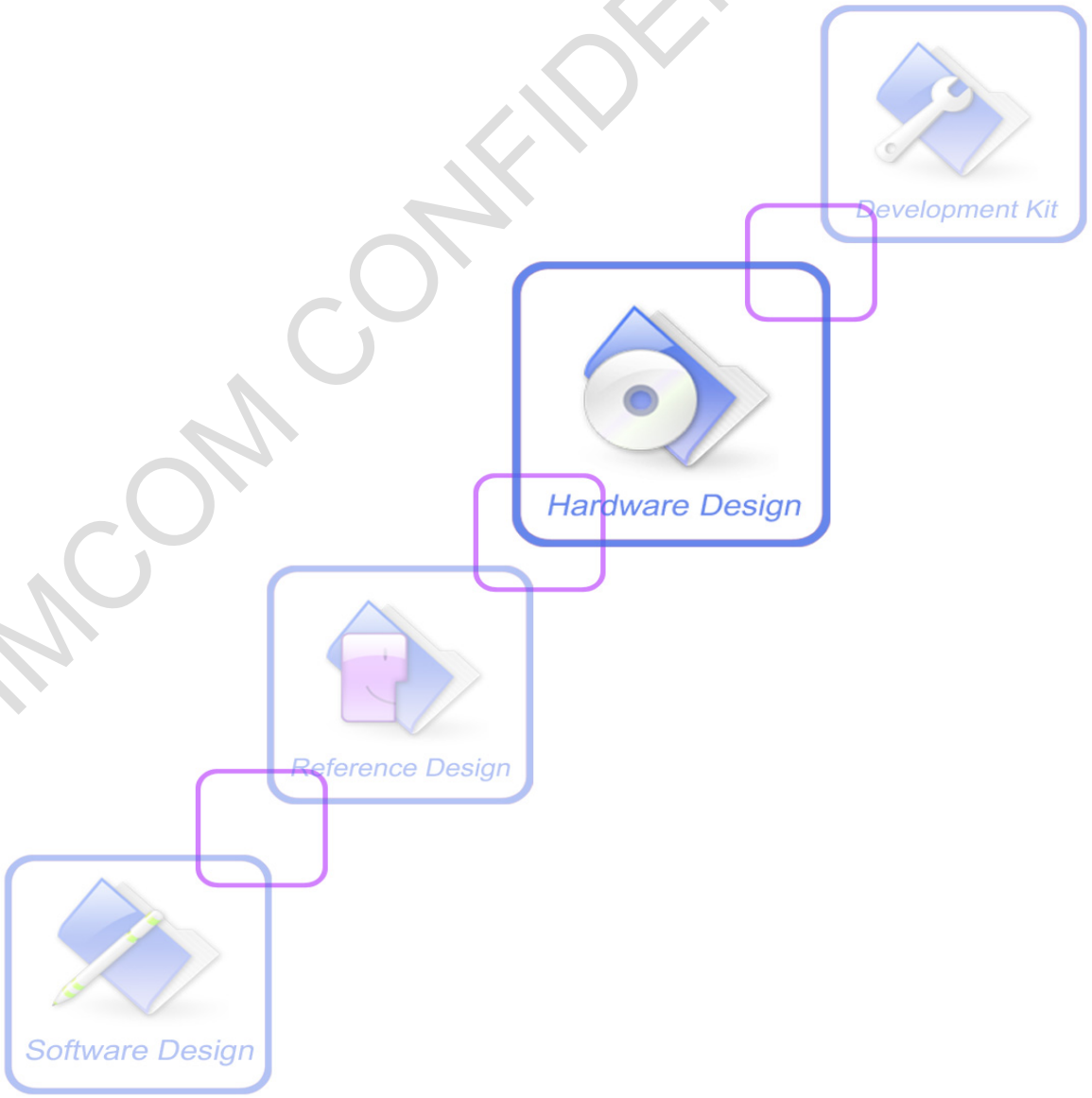
SIM800C&SIM7020X_Compatible_Design_V1.00



SIMCOM CONFIDENTIAL FILE

Document Title	SIM800C&SIM7020X_Compatible_Design
Version	1.00
Date	2018-10-30
Status	Released
Document Control ID	SIM800C&SIM7020X_Compatible_Design_V1.00

General Notes

SIMCom offers this information as a service to its customers to support the application and engineering efforts that use the products designed by SIMCom. The information provided is based on the requirements specifically from 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, the system validation of the 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 without notice.

Copyright

This document contains the proprietary technical information which is the property of SIMCom Limited, copying of this document, giving it to others, the using or communication of the contents thereof are forbidden without the official authority by SIMCom. Offenders are liable to the payment of the damages. All rights are reserved in the event of grant of a patent or the registration of a utility model or design. All specifications supplied herein are subject to change without notice

Copyright © SIMCom Wireless Solutions Co., Ltd. 2018

SIMCOM CONFIDENTIAL FILE

Contents

SIMCOM CONFIDENTIAL FILE

Table Index

SIMCOM CONFIDENITAL FILE

Figure Index

SIMCOM CONFIDENTIAL FILE

Revision History

Data	Version	Description of change	Author
2018-10-30	1.00	Original	Tu Hongjun

SIMCOM CONFIDENITAL FILE

1 Introduction

This document is targeted for customers to understand the differences between SIM800C and SIM7020X. Users can use SIM7020X or SIM800C module to design and develop applications quickly.

The SIM7020X series include SIM7020E and SIM7020C.

SIMCOM CONFIDENITAL FILE

2 Pin assignment

2.1 Pin Assignment Overview

The following table shows the pin assignment of SIM7020X and SIM800C.

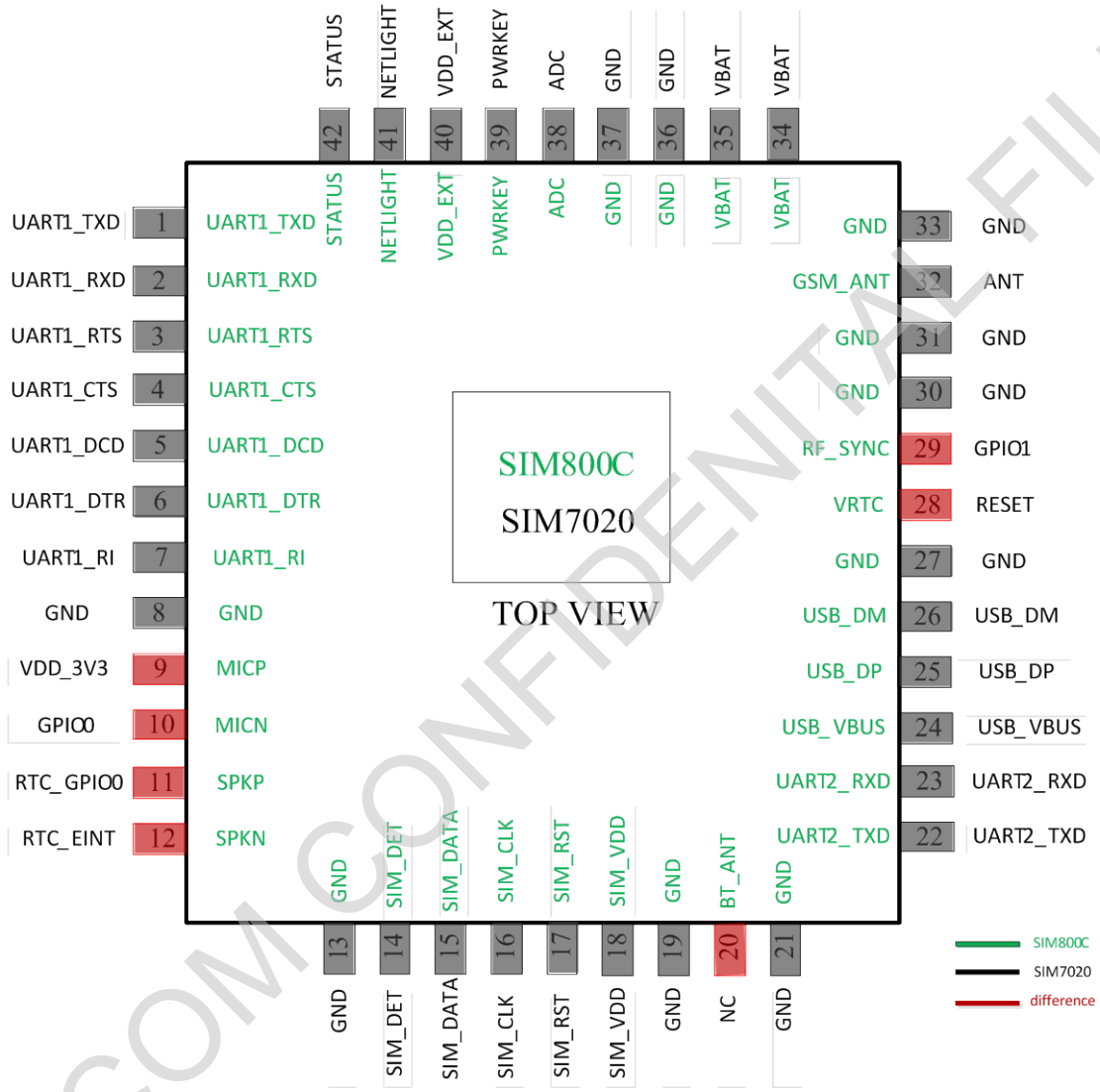


Figure 1: SIM800C and SIM7020X pin assignment (Top view)

SIMCOM CONFIDENTIAL FILE

2.2 Differences Overview

Table 1: The Differences overview

Functions	SIM800C	SIM7020X
Cellular technology	GSM/GPRS	NB-IoT
Bluetooth	Support	Not support
Audio	Support	Not support
RESET	Not support	Support
VRTC	Support	Not support
RF_SYNC	Support	Not support
Download interface	UART1 or USB	UART2
Debug interface	USB	UART2 or USB
IO Power Domain	2.8V	1.8V

SIMCOM CONFIDENTIAL FILE

2.3 Differences of Electronic Characteristic

Table 2: The Differences of electronic characteristic

Pin #	SIM800C		SIM7020X	
	PIN name	Voltage range	PIN name	Voltage range
34,35	VBAT	3.4~4.4V	VBAT	2.1~3.63V
1~7	UART1	2.8V	UART1	1.8V
22~23	UART2	2.8V	UART2	1.8V
25~26	USB	\	USB	\
10	MICN	\	GPIO0	1.8V
11	SPKP	\	RTC_GPIO0	VBAT domain
12	SPKN	\	RTC_EINT	VBAT domain
14	SIM_DET	2.8V	SIM_DET	1.8V
28	VRTC	1.2~3.0V	RESET	VBAT domain
29	RF_SYNC	2.8V	GPIO1	1.8V
38	ADC	0~2.8V	ADC	0~1.4V
39	PWRKEY	VBAT	PWRKEY	VBAT
40	VDD_EXT	2.8V	VDD_EXT	1.8V
41	NETLIGHT	2.8V	NETLIGHT	1.8V
42	STATUS	2.8V	STATUS	1.8V

Note: For details information, please refer to each HD guide

SIMCOM CONFIDENTIAL FILE

Table 3: Difference in Pin Definitions

Pin #	SIM800C	SIM7020X
9	MICP	VDD_3V3
10	MICN	GPIO0
11	SPKP	RTC_GPIO0
12	SPKN	RTC_EINT
20	BT_ANT	NC
28	VRTC	RESET
29	RF_SYNC	GPIO1

SIMCOM CONFIDENTIAL FILE

3 Recommended Footprint

3.1 Top and Bottom View

The following figures show top and bottom view of SIM7020X and SIM800C.
There has no difference for footprint.

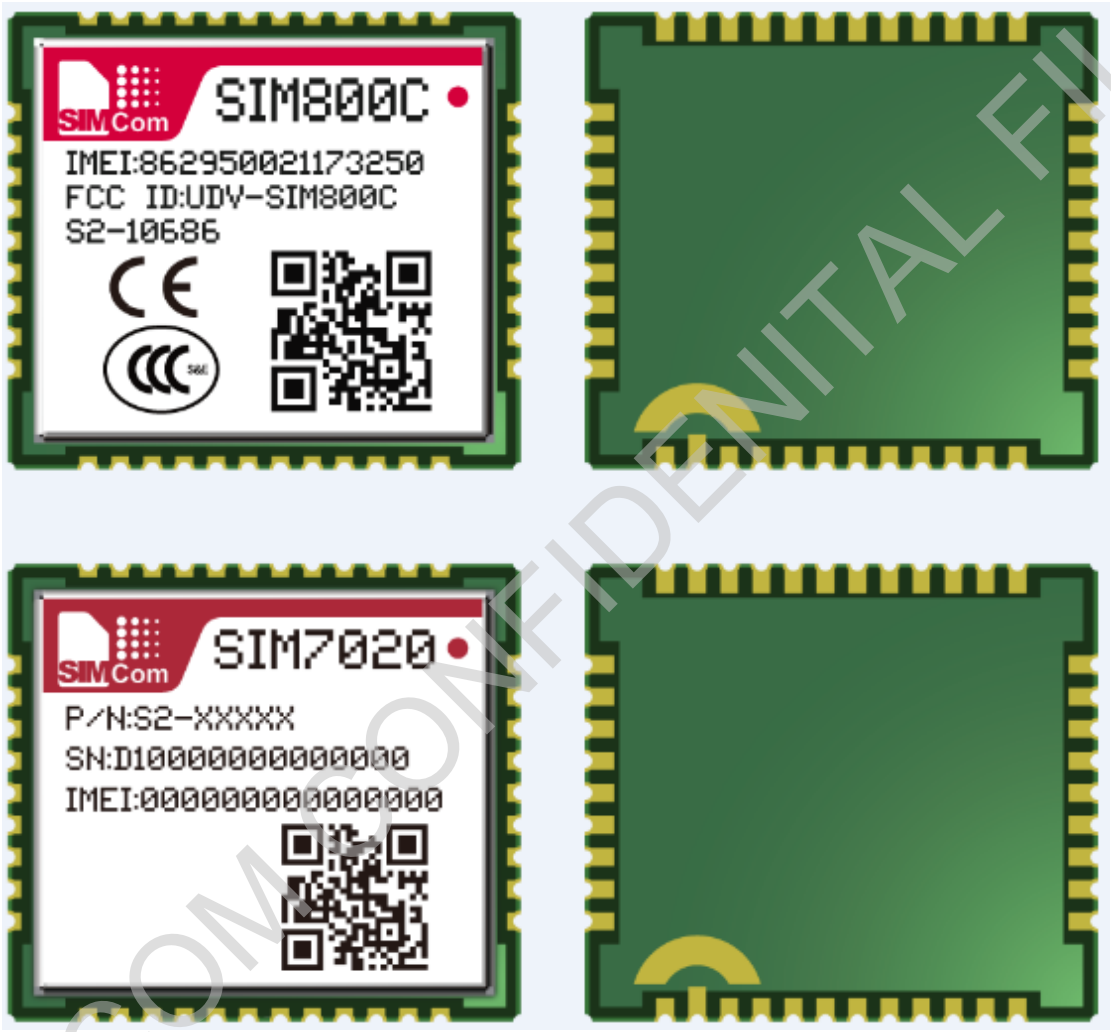


Figure 2: SIM800C and SIM7020X top and bottom view

SIMCOM CONFIDENTIAL FILE

3.2 Recommended Stencil Design

SIM7020 and SIM800C have the same Recommended Stencil Design.

The recommended stencil design for SIM800C and SIM7020X is shown as below.

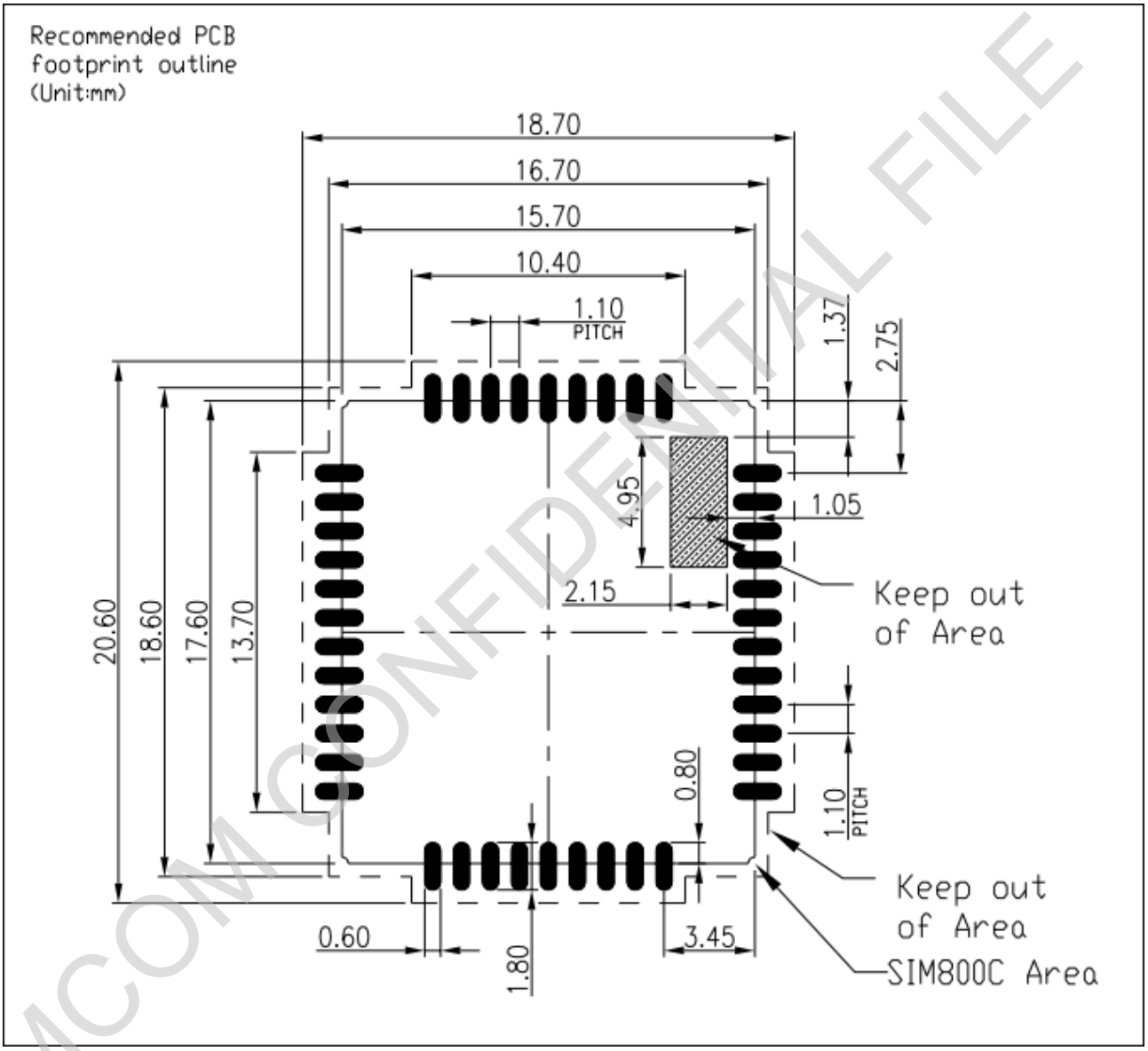


Figure 3: Recommended Stencil Design for SIM800C and SIM7020X (Unit: mm)

SIMCOM CONFIDENTIAL FILE

4 Hardware Reference Design

This chapter introduces compatible design between SIM800C and SIM7020X on main functionalities.

4.1 Power Supply

The power supply pins of SIM800C and SIM7020X include two VBAT pins (pin 34 and pin 35). VBAT pins directly supply the power to RF circuit and baseband circuit. Both VBAT pins of the module must be used together. The following figure is the reference design of the module VBAT power supply.

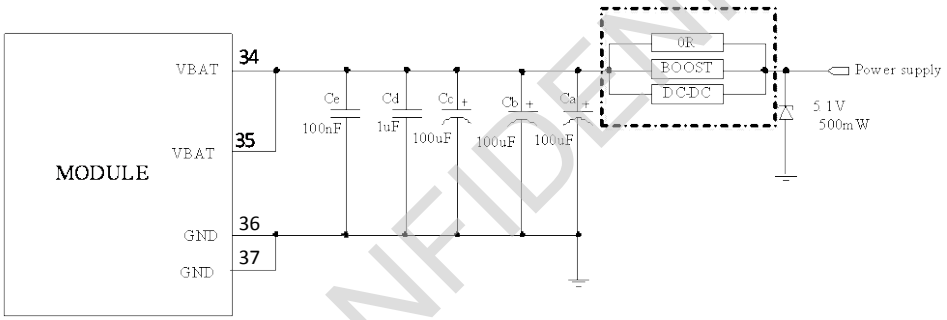


Figure 4: Power supply reference circuit

According to power supply type (battery or DC power), the reference design for power switching circuit in the above dashed box will be different. The details are illustrated in the table below.

Table 4: Power Supply Type and Power Switching Circuit Relationship

Power Supply Type	SIM7020X (VBAT=2.1V~3.63V)	SIM800C (VBAT=3.4V~4.4V)
Li-SOCl2 Battery (2.0V~3.6V)	0 Ω	Boost
Li-MnO2 Battery (1.8V~3.0V)	0 Ω	Boost
DC Power Supply	DC-DC	DC-DC

SIMCOM CONFIDENTIAL FILE

The VBAT has different input power range for SIM7020X and SIM800C. Please refer to the following table.

Table 5: The differences for VBAT power range

Module	VBAT power supply			VBAT power peak current
	Min.	Typical	Max.	Max.
SIM800C	3.4V	3.8V	4.4V	2000mA
SIM7020X	2.1V	3.3V	3.63V	700mA

Power design for a module is critical to its performance. The power supply of SIM800C and SIM7020X should be able to provide sufficient current up to 2.0A.

Note: For details information, please refer to each HD guide

4.2 USB Interface

SIM800C and SIM7020X provide a USB interface.

The following circuit is the reference design of USB interface.

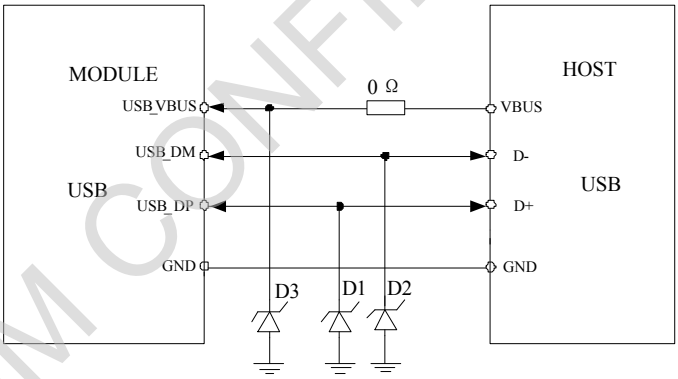


Figure 5: USB reference circuit

SIMCOM CONFIDENITAL FILE

4.3 Network Status Indication

The NETLIGHT/STATUS pins can be used to drive a network status indicator LED. The following circuit is the reference design.

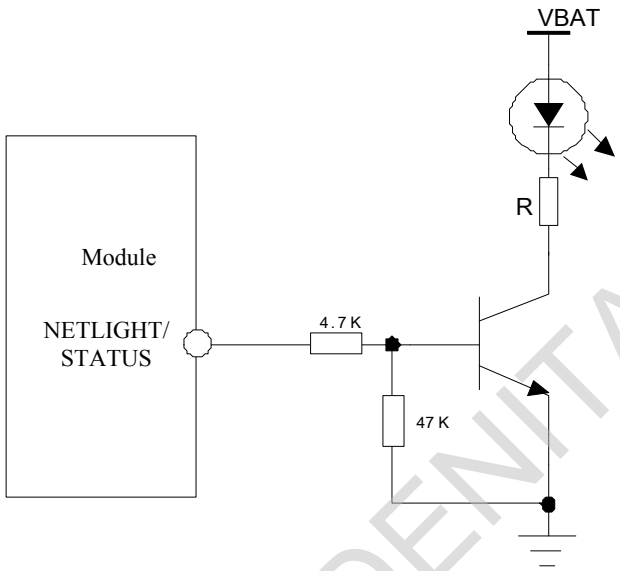


Figure 6: NETLIGHT/STATUS reference circuit

SIMCOM CONFIDENTIAL FILE

4.4 Power on/off circuit

SIM800C and SIM7020X can be turned on by driving the PWRKEY pin to a low level for a certain time. It is recommended use an open drain or collector driver to control the PWRKEY. A reference circuit is shown below.

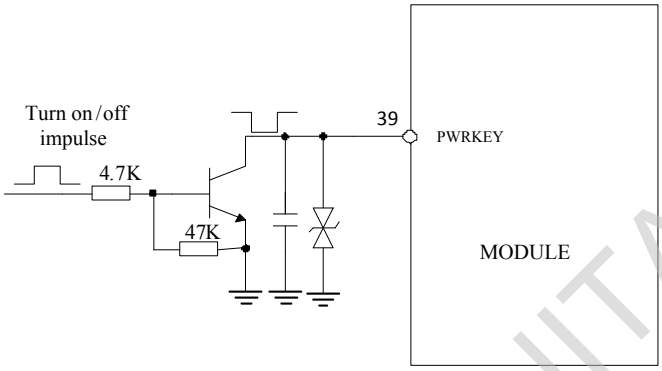


Figure 7: Power on/off reference circuit

Table 6: PWRKEY timing and electronic characteristic

Project	PWRKEY pin voltage When floating	PWRKEY input effective low level voltage For turn on	PWRKEY input low level minimum time For turn on	PWRKEY input low level minimum time For turn off
SIM800C	3V	<0.7V	>1000ms	>1500ms
SIM7020	VBAT	<0.3*VBAT	>1000ms	>1000ms

SIMCOM CONFIDENTIAL FILE

4.5 Reset Circuit

SIM800C has no reset pin. SIM7020X can reset by hardware or software methods as illustrated below.

The 28 pin of SIM800C is VRTC, but it is reset for SIM7020X.

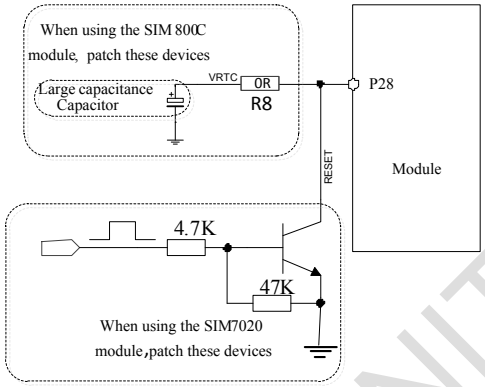


Figure 8: Reset reference circuit

4.6 USIM Interface

Both 1.8V and 3.0V USIM cards are supported on both modules.

The following circuit is a reference design for SIM7020X and SIM800C USIM circuit.

The pin assignment of SIM800C USIM interface and SIM7020X USIM interface are compatible with each other. A compatible design for 6-pin USIM interface is shown in the figure below:

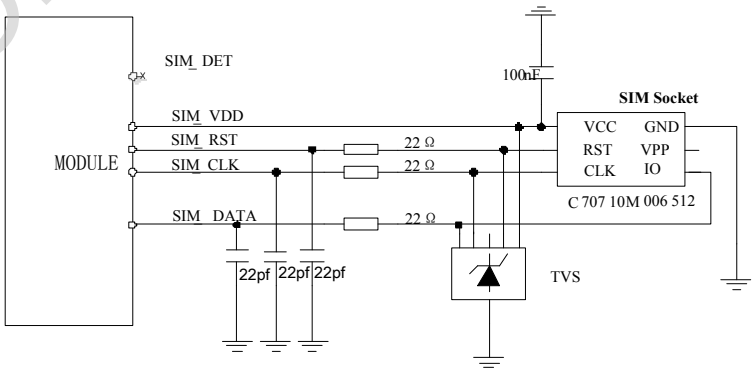


Figure 9: SIM interface reference circuit

Note: For details information, please refer to each HD guide

SIMCOM CONFIDENTIAL FILE

4.7 UART Interface

The module is as the DCE (Data Communication Equipment) and the client PC is as the DTE (Data Terminal Equipment). AT commands are executed through UART interface.

SIM800C UART1 is used for AT command communication, and firmware upgrade. SIM800C UART2 is only used for debug.

SIM7020X UART1 is used for AT command communication. And SIM7020X UART2 is used for both AT command communication and FW upgrade.

FW upgrade interface is strongly recommended to be reserved.

Below are the reference circuits.

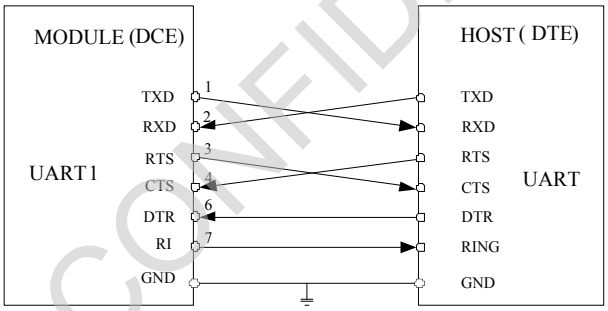


Figure 10: UART Full modem

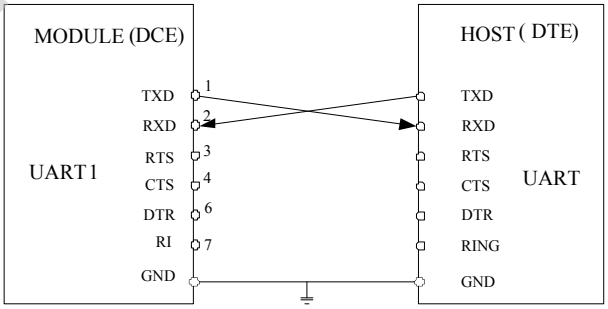


Figure 11: UART Null modem

SIMCOM CONFIDENITAL FILE

The voltage range of each UART between SIM800C and SIM7020X are different.

Table 7: The differences for UART power level

Module	UART power level	VDD_EXT
SIM800C	2.8V	2.8V
SIM7020X	1.8V	1.8V

A level shifter should be used if external host UART interface is 3.3V level. The voltage-level translator TXB0108RGYR provided by Texas Instruments is recommended. The reference design of the TXB0108RGYR is in the following figures.

Note: For details information, please refer to each HD guide

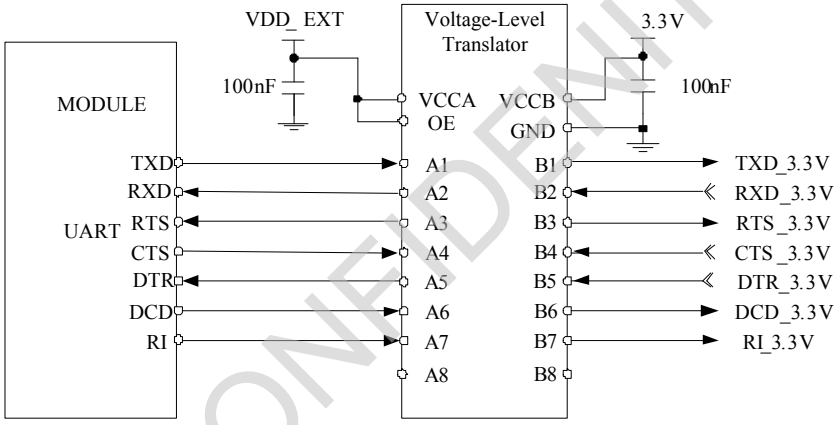


Figure 12: Reference circuit of voltage-level translator

Note: The VDD_EXT of each project in the diagram is different. For details information, please refer to each HD guide.

SIMCOM CONFIDENTIAL FILE

4.8 Audio Interface

SIM800C provides an analog audio interface.
But SIM7020X provides GPIO interface instead of analog audio function.

The following circuit is the reference design.

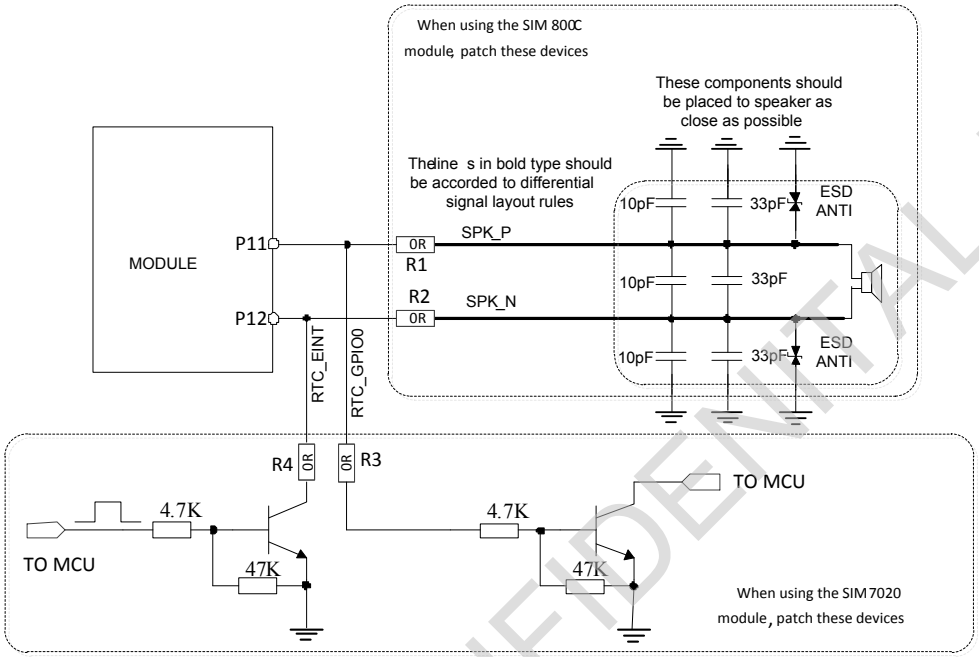


Figure 13 : Speaker reference circuit

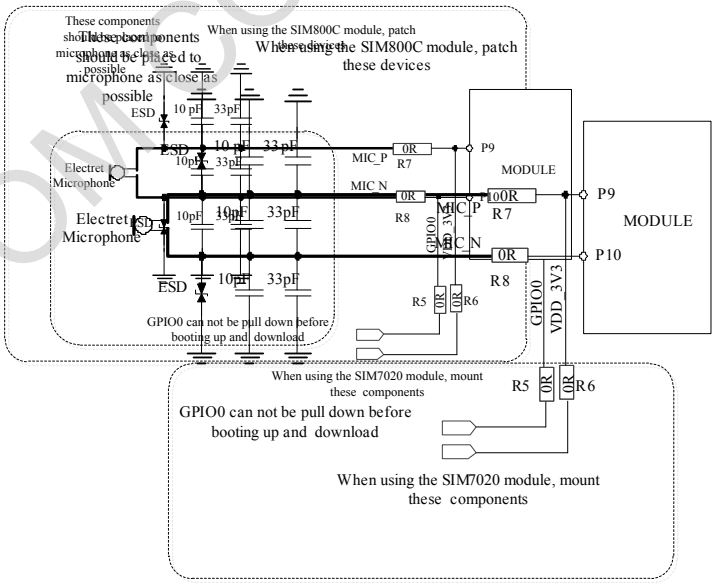


Figure 14 : Microphone reference circuit

SIMCOM CONFIDENTIAL FILE

SIM7020X GPIO0 can't be pulled down before booting up or entering UART download mode. If GPIO0 pin was pulled down firstly, and PWRKEY pin was pulled down after then, module will enter USB download mode.

Note: For details information, please refer to each HD guide.

4.9 RF Interface

SIM7020X or SIM800C provide a cellular antenna interface.

External antenna should be placed close to module RF pad through micro-strip line or other types of RF trace, and the trace impedance must be controlled as 50Ω.

The following circuit is a reference design for SIM800C and SIM7020X RF antenna circuit.

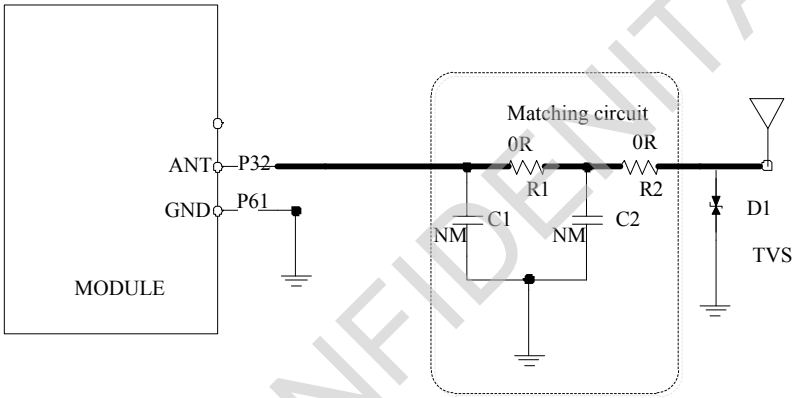


Figure 15: Antenna matching circuit

The capacitors (C1/C2) are not mounted and a 0Ω resistor is mounted on R1 and R2 by default. The component D1 is a TVS for ESD protection, and it is optional for users according to application environment. The RF test connector is used for the conducted RF performance test, and should be placed as close as to the module's RF_ANT pin. Two TVS are recommended in the table below.

Table 8: Recommended TVS

Package	Part Number	Vender
0201	LXES03AAA1-154	Murata
0402	LXES15AAA1-153	Murata

SIMCOM CONFIDENTIAL FILE

4.10 GPIO interface

There are some dedicated GPIO pins for SIM800C and SIM7020X.

Table 9: Dedicated Pins Description for module

	SIM800C	SIM7020X
GPIO voltage domain	2.8V	1.8V
VDD_EXT	2.8V	1.8V

The following circuit is the reference design.

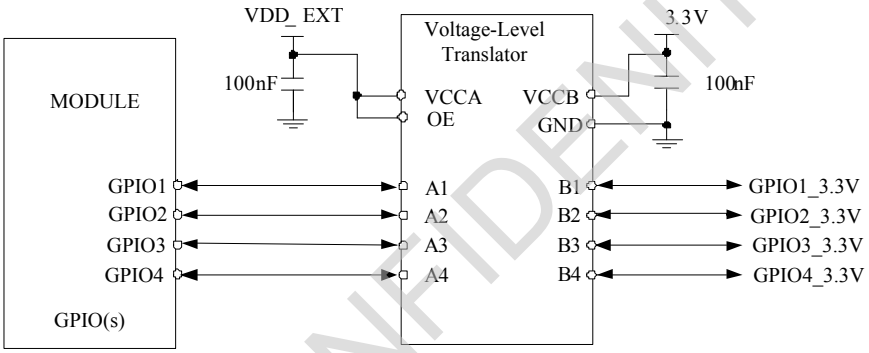


Figure 16: Reference circuit of GPIO voltage-level translator

4.11 ADC interface

SIM800C and SIM7020X modules provide a 10-bit ADC input channel to read the external voltage value.

They have different sampling scope.

Table 10: Module ADC Interface Information

interface	SIM800C	SIM7020X
ADC	0~2.8V	0~1.4V

SIMCOM CONFIDENTIAL FILE

5 Appendix

5.1 Related documents

Table 11: Related documents

SN	Document name	Remark
[1]	SIM7020X_Hardware_Design	SIM7020X Hardware Design Document
[2]	SIM800C_Hardware_Design	SIM800C Hardware Design Document

5.2 Terms and Abbreviation

Table 12: Terms and Abbreviations

Abbreviation	Description
ESD	Electrostatic Discharge
GSM	Global Standard for Mobile Communications
I2C	Inter-Integrated Circuit
PCB	Printed Circuit Board
PCS	Personal Communication System, also referred to as GSM 1900
RF	Radio Frequency
RTC	Real Time Clock
Rx	Receive Direction
SIM	Subscriber Identification Module
UART	Universal Asynchronous Receiver & Transmitter
NC	Not connect
EDGE	Enhanced data rates for GSM evolution
HSDPA	High Speed Downlink Packet Access HSUPA
HSDPA	High Speed Downlink Packet Access HSUPA
HSDPA	High Speed Downlink Packet Access HSUPA
USIM	Universal subscriber identity module
UMTS	Universal mobile telecommunications system
SMPS	Switch Mode Power Supply

SIMCOM CONFIDENTIAL FILE

Contact us:

Shanghai SIMCom Wireless Solutions Ltd.

Add: SIM Technology Building, No.633, Jin zhong Road, Chang ning District, Shanghai P.R. China 200335

Tel：+86-21-3157 5100, +86-21-3157 5200

URL：www.simcomm2m.com

SIMCOM CONFIDENITAL FILE