A7682E_SIM800C_SIM868_SIM7080G Compatible Design

LTE/GSM/LPWA Module

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1 Introduction

This document describes the differences between A7682E, SIM800C, SIM868 and SIM7080G. Users can use A7682E, SIM800C, SIM868 or SIM7080G modules to quickly design and develop applications.

1.1 Module Overview

A7682E module supports GSM / LTE CAT1；SIM800C/SIM868 module support GSM / GPRS；SIM7080G module supports LTE CAT-M1、LTE CAT-NB1/CAT-NB2. Users can choose different types of modules according to their needs to meet diversified market demands.

Table 1: Module basic information comparison

Modules	Renderings	Package	Size	Description
A7682E		50 LGA pins and 35 LGA pins	19.6*19.6*2.4 mm	LTE CAT-1 and GSM
SIM800C		42 LCC pins	17.6*15.7*2.3 mm	GSM
SIM868		42 LCC pins and 35 LGA pins	17.6*15.7*2.3 mm	GSM
SIM7080G		42 LCC pins and 35 LGA pins	17.5×15.7×2.4mm	LTE CAT-M1、LTE CAT-NB1/CAT-NB2

1.2 Features

This chapter lists the function parameters of A7682E, SIM800C, SIM868 and SIM7080G.The comparison is as follows:

Table 2: Module function comparison

Function	A7682E	SIM800C	SIM868	SIM7080G
Power	Power supply range：3.4V~4.2V Typical value：3.8V	Power supply range: 3.4V~4.4V Typical value：4.0V	Power supply range: 3.4V~4.4V(GSM_VBAT) 2.9V~4.4V(GPS_VBAT) Typical value：4.0V	Power supply range:2.7V~4.8V Typical value：3.8V
Peak current	2A	2A	2A	The peak current of the module power in CAT-M1 and NB-IoT transmit mode is 0.5A
Sleep current	<2mA (AT+CFUN=0)	0.6mA (AT+CFUN=0)	0.65mA (AT+CFUN=0)	1.2mA (AT+CFUN=0)
Frequency band	EGSM900/DCS1800 LTE:1/3/5/7/8/20	GSM850/EGSM900/ DCS1800/PCS1900	GSM850/EGSM900/ DCS1800/PCS1900	LTE:1/2/3/4/5/8/12/13/14/18/19/20/25/26/27/28/66/71/85
GNSS	NA	NA	GPS/GLONASS/BeiDou	GPS/GLONASS/BeiDou
Bluetooth	NA	Need software support	Bluetooth Specification 3.0	NA
Temperature range	Operation temperature: -30℃ ~ +80℃ Extended operation temperature: -40℃ ~ +85℃* Storage temperature: -45℃ ~ +90℃	Operation temperature: -40°C ~ +85°C Storage temperature: -45°C ~ +90°C	Operation temperature: -40°C ~ +85°C Storage temperature: -45°C ~ +90°C	Operation temperature: -40°C ~ +85°C Storage temperature: -45°C ~ +90°C
UART interface	● **Main serial port** Baud rate support from 300bps to 3.6Mbps AT command and data can be sent through serial port Support RTS/CTS Hardware flow control ● **UART3** one ordinary two-wire serial port The default baud rate	**Serial port:** ● Default one Full modem serial port ● Can be used for AT commands or data stream ● Support RTS/CTS hardware handshake and software ON/OFF flow control	**Serial port:** ● Default one full modem serial port ● Can be used for AT commands or data stream ● Support RTS/CTS hardware handshake and software ON/OFF flow control	● One channel full-function UART1 by default can be used for AT communication. ● Baud rate: 300bps to 3686400bps. Default rate is 0bps (auto baud rate). ● Support auto baud rate, but

	is 115200bps. ● **Debug serial port** Support debug usage	● Multiplex ability according to GSM 07.10 Multiplexer Protocol ● Autobauding supports baud rate from 1200 bps to 115200bps ● upgrading firmware	● Multiplex ability according to GSM 07.10 Multiplexer Protocol ● Autobauding supports baud rate from 1200 bps to 115200bps ● upgrading firmware	only limited to 9600, 19200, 38400, 57600 and 115200 bps. ● Support RTS/CTS hardware handshake ● Two channel 2-wire UART2 and UART3 only used as UART in DAM application when secondary development.
USIM Card interface	Support 1.8V/3V USIM card	Support 1.8V/3V USIM card	Support 1.8V/3V USIM card	Support 1.8V USIM card （ Does not support 3V SIM card）
Audio feature	MAX:37mW(32Ω)	MAX:90mW(32Ω)	MAX:90mW(32Ω) MAX:1080mW(8Ω)	NA
PCM interface	NA	NA	NA	Support PCM interface. Only support PCM master mode and short frame sync
SPI interface	NA	NA	NA	Support for serial data bus SPI, only used during DAM application secondary development.
USB interface	USB 2.0 compliant, host mode not supported. This interface can be used for AT command sending, data transmission, software debugging and upgrading.	Can be used for debugging and upgrading firmware	Can be used for debugging and upgrading firmware	USB 2.0 compliant, Can be used for debugging and upgrading firmware
SD Card interface	NA	NA	SDC Interface	NA
SGMII interface	NA	NA	NA	NA

ADC interface	● Provide an analog-to-digital conversion interface ● Voltage range:0~1.8V ● Resolution：9 bits	● Provide an analog-to-digital conversion interface ● Voltage range: 0~2.8V ● Resolution：10 bits	● Provide an analog-to-digital conversion interface ● Voltage range: 0~2.8V ● Resolution：10 bits	● Provide an analog-to-digital conversion interface ● Voltage range: 0~1.8V
Network indication	NETLIGHT: Network indication	NETLIGHT: Network indication	NETLIGHT: Network indication	NETLIGHT: Network indication
Diversity antenna interface	NA	NA	NA	NA
Antenna interface	Main antenna : RF_ANT	Main antenna: RF_ANT Bluetooth antenna: BT_ANT	Main antenna: RF_ANT Bluetooth antenna: BT_ANT GNSS antenna: GNSS_ANT	LTE main antenna: RF_ANT GNSS antenna: GNSS_ANT
Software upgrade	Upgrade software via USB	Upgrade software via USB or UART	Upgrade software via USB or UART	Upgrade software via USB

NOTE

In the extended operating temperature range, the module can work normally, but can not guarantee full compliance with 3GPP test specifications.

2 Package Introduction

2.1 Pin Assignment Overview

The following figure shows the pin assignment of A7682E，SIM800C, SIM868 and SIM7080G.

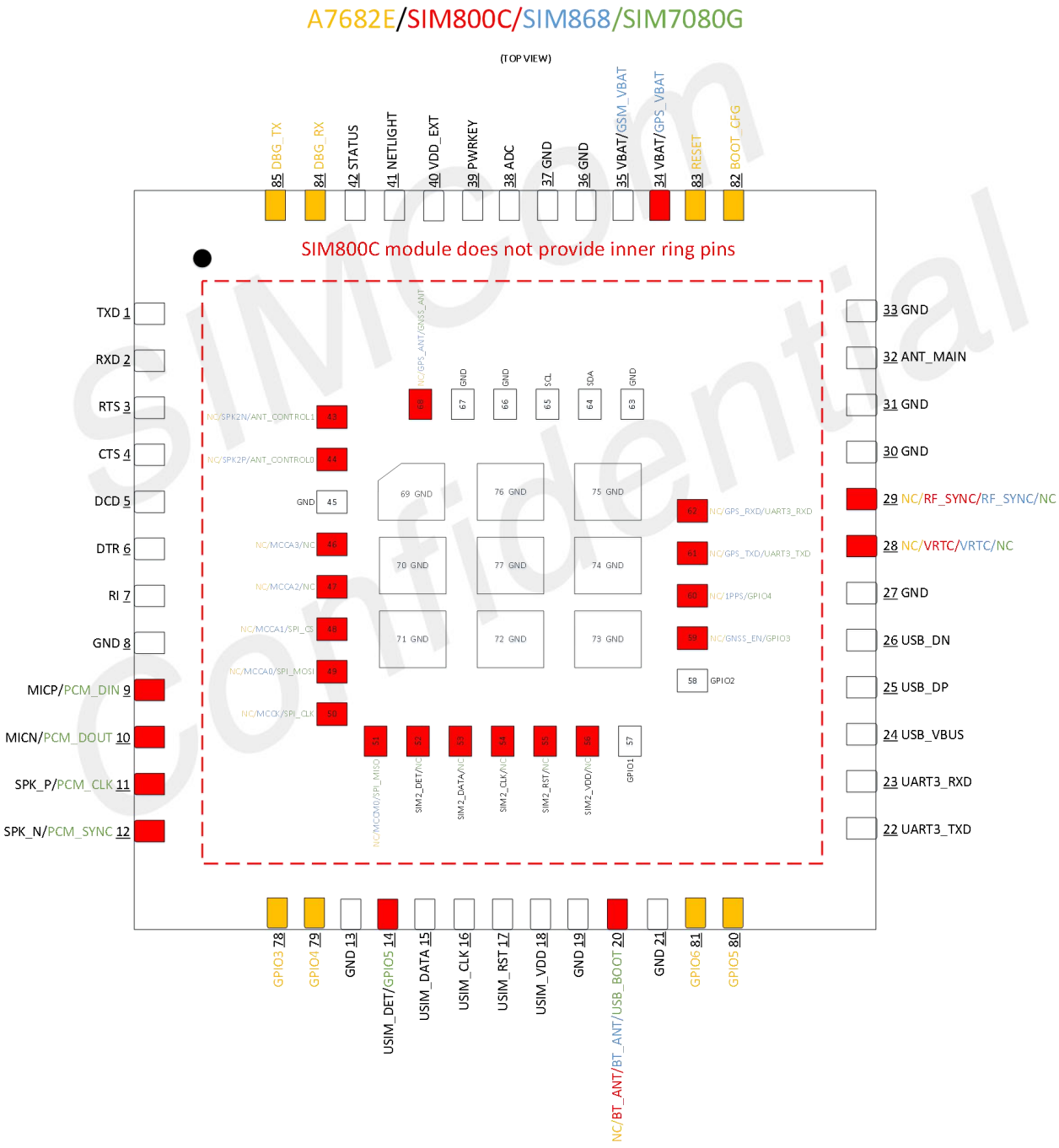

Figure 1: A7682E/SIM800C/SIM868/SIM7080G pin assignment (Top view)

NOTE

1. SIM800C module does not provide inner ring pins.
2. A7682E module has 8 more outer ring pins (78, 79, 80, 81, 82, 83, 84, 85).
3. Please refer to the hardware manual for details.

2.2 PIN definition

This chapter describes the pin definition and comparison of A7682E, SIM800C, SIM868 and SIM7080G.

Table 3: Pin type definition

Abbreviation	Description
PI	Power Input
PO	Power Output
AI	Analog Input
AO	Analog Output
I/O	Input or Output
DI	Digital Input
DO	Digital Output
DOH	Default output high level
DOL	Default output low level
PU	pull up
PD	Pull down
OD	Open drain

Table 4: Module pin definition comparison

	A7682E		SIM800C		SIM868		SIM7080G	
Pin No.	Pin Name	Power domain	Pin Name	Power domain	Pin Name	Power domain	Pin Name	Power domain
1	UART1_ TXD	1.8V	UART1_ TXD	2.8V	UART1_ TXD	2.8V	UART1_ TXD	1.8V
2	UART1_ RXD	1.8V	UART1_ RXD	2.8V	UART1_ RXD	2.8V	UART1_ RXD	1.8V
3	UART1_ RTS	1.8V	UART1_ RTS	2.8V	UART1_ RTS	2.8V	UART1_ RTS	1.8V
4	UART1_	1.8V	UART1_	2.8V	UART1_	2.8V	UART1_	1.8V

	CTS		CTS		CTS		CTS	
5	UART1_DCD	1.8V	UART1_DCD	2.8V	UART1_DCD	2.8V	UART1_DCD	1.8V
6	UART1_DTR	1.8V	UART1_DTR	2.8V	UART1_DTR	2.8V	UART1_DTR	1.8V
7	UART1_RI	1.8V	UART1_RI	2.8V	UART1_RI	2.8V	UART1_RI	1.8V
8	GND	-	GND	-	GND	-	GND	-
9	**MICP**	**-**	**MICP**	**-**	**MICP**	**-**	**PCM_DIN**	**-**
10	**MICN**	**-**	**MICN**	**-**	**MICN**	**-**	**PCM_DOUT**	**-**
11	**SPK1P**	**-**	**SPKP**	**-**	**SPK1P**	**-**	**PCM_CLK**	**-**
12	**SPK1N**	**-**	**SPKN**	**-**	**SPK1N**	**-**	**PCM_SYNC**	**-**
13	GND	-	GND	-	GND	-	GND	-
14	**SIM1_DET**	**1.8V**	**SIM_DET**	**2.8V**	**SIM1_DET**	**2.8V**	**GPIO5**	**1.8V**
15	SIM1_DATA	1.8V/3.0V	SIM_DATA	1.8V/3.0V	SIM1_DATA	1.8V/3.0V	SIM_DATA	1.8V
16	SIM1_CLK	1.8V/3.0V	SIM_CLK	1.8V/3.0V	SIM1_CLK	1.8V/3.0V	SIM_CLK	1.8V
17	SIM1_RST	1.8V/3.0V	SIM_RST	1.8V/3.0V	SIM1_RST	1.8V/3.0V	SIM_RST	1.8V
18	SIM1_VDD	1.8V/3.0V	SIM_VDD	1.8V/3.0V	SIM1_VDD	1.8V/3.0V	SIM_VDD	1.8V
19	GND	-	GND	-	GND	-	GND	-
20	**NC**	**-**	**BT_ANT**	**-**	**BT_ANT**	**-**	**USB_BOOT★**	
21	GND	-	GND	-	GND	-	GND	-
22	UART3_TXD	1.8V	UART2_TXD	2.8V	UART2_TXD	2.8V	UART2_TXD	1.8V
23	UART3_RXD	1.8V	UART2_RXD	2.8V	UART2_RXD	2.8V	UART2_RXD	1.8V
24	USB_VBUS	3.0~5.2V	USB_VBUS	4.3~7.0V	USB_VBUS	4.3~7.0V	USB_VBUS	3.5V~5.25V
25	USB_DP	-	USB_DP	-	USB_DP	-	USB_DP	-
26	USB_DM	-	USB_DN	-	USB_DN	-	USB_DM	-
27	GND	-	GND	-	GND	-	GND	-
28	**NC**	**-**	**VRTC**	**1.2~3.0V**	**VRTC**	**1.2~3.0V**	**NC**	**-**
29	**NC**	**-**	**RF_SYNC**	**2.8V**	**RF_SYNC**	**2.8V**	**NC**	**-**

30	GND	-	GND	-	GND	-	GND	-
31	GND	-	GND	-	GND	-	GND	-
32	RF_ANT	-	GSM_ANT	-	GSM_ANT	-	RF_ANT	-
33	GND	-	GND	-	GND	-	GND	-
34	**VBAT**	**3.4~4.2V**	**VBAT**	**3.4~4.4V**	**GPS_VBAT**	**2.9~4.4V**	**VBAT**	**2.7V~4.8V**
35	**VBAT**	**3.4~4.2V**	**VBAT**	**3.4~4.4V**	**GSM_VBAT**	**3.4~4.4V**	**VBAT**	**2.7V~4.8V**
36	GND	-	GND	-	GND	-	GND	-
37	GND	-	GND	-	GND	-	GND	-
38	ADC	0-1.8V	ADC	0-2.8V	ADC	0-2.8V	ADC	0V~1.875V
39	PWRKEY	VBAT	PWRKEY	VBAT	PWRKEY	VBAT	PWRKEY	VBAT
40	VDD_EXT	1.8V	VDD_EXT	2.8V	VDD_EXT	2.8V	VDD_EXT	1.8V
41	NETLIGHT	1.8V	NETLIGHT	2.8V	NETLIGHT	2.8V	NETLIGHT	1.8V
42	STATUS	1.8V	STATUS	2.8V	STATUS	2.8V	STATUS	1.8V
43	**NC**	**-**			**SPK2N**	**-**	**ANT_CONTROL1**	**-**
44	**NC**	**-**			**SPK2P**	**-**	**ANT_CONTROL0**	**-**
45	GND	-			GND	-	GND	-
46	**NC**	**-**			**MCCA3**	**-**	**NC**	**-**
47	**NC**	**-**			**MCCA2**	**-**	**NC**	**-**
48	**NC**	**-**			**MCCA1**	**-**	**SPI_CS**	**-**
49	**NC**	**-**			**MCCA0**	**-**	**SPI_MOSI★**	**-S**
50	**NC**	**-**			**MCCK**	**-**	**SPI_CLK**	**-**
51	**NC**	**-**			**MCCM0**	**-**	**SPI_MISO**	**-**
52	**SIM2_DET**	**1.8V/3.0V**			**SIM2_DET**	**-**	**NC**	**-**
53	**SIM2_DATA**	**1.8V/3.0V**			**SIM2_DATA**	**-**	**NC**	**-**
54	**SIM2_CLK**	**1.8V/3.0V**			**SIM2_CLK**	**-**	**NC**	**-**
55	**SIM2_RST**	**1.8V/3.0V**			**SIM2_RST**	**-**	**NC**	**-**
56	**SIM2_VDD**	**1.8V/3.0V**			**SIM2_VDD**	**-**	**NC**	**-**
57	GPIO1	1.8V			GPIO1	-	GPIO1	1.8V

58	GPIO2	1.8V			GPIO2	-	GPIO2	1.8V
59	**NC**	**-**			**GNSS_EN**	**-**	**GPIO3**	**1.8V**
60	**NC**	**-**			**1PPS**	**-**	**GPIO4**	**1.8V**
61	**NC**	**-**			**GPS_TXD**	**-**	**UART3_TXD**	**1.8V**
62	**NC**	**-**			**GPS_RXD**	**-**	**UART3_RXD**	**1.8V**
63	GND	-			GND	-	GND	-
64	SDA	-			SDA	-	I2C_SDA	-
65	SCL	-			SCL	-	I2C_SCL	-
66	GND	-			GND	-	GND	-
67	GND	-			GND	-	GND	-
68	**NC**	**-**			**GPS_ANT**	**-**	**GNSS_ANT**	**-**
69	GND	-			GND	-	GND	-
70	GND	-			GND	-	GND	-
71	GND	-			GND	-	GND	-
72	GND	-			GND	-	GND	-
73	GND	-			GND	-	GND	-
74	GND	-			GND	-	GND	-
75	GND	-			GND	-	GND	-
76	GND	-			GND	-	GND	-
77	GND	-			GND	-	GND	-
78	**GPIO3**	**1.8V**						
79	**GPIO4**	**1.8V**						
80	**GPIO5**	**1.8V**						
81	**GPIO6**	**1.8V**						
82	**BOOT_CFG●**	**1.8V**						
83	**RESET**	**VBAT**						
84	**DBG_RXD**	**1.8V**						
85	**DBG_TXD**	**1.8V**						

NOTE

1. Bold lines indicate different pin functions.
2. The PIN Marked “●” cannot be pulled up before the module powered up, otherwise it will affect the normal start-up of the module.
3. The PIN Marked “★” cannot be pulled down before the module powered up, otherwise it will affect

the normal start-up of the module.
4. SIM7080G module only supports 1.8V SIM card (3V SIM card is not supported)
5. For detailed information, please refer to HD for each module.

2.3 Top and Bottom View

The following figures show top and bottom view of A7682E, SIM800C, SIM868 and SIM7080G.

Figure 2: A7682E/SIM800C/SIM868/SIM7080G top and bottom view

NOTE

The above is the design effect drawing of the module for reference, and the actual appearance shall prevail in kind.

2.4 Recommended PCB footprint outline

A7682E, SIM800C SIM868 and SIM7080G have the same Recommended PCB footprint outline.

The recommended PCB footprint outline for A7682E, SIM800C SIM868 and SIM7080G is shown as below.

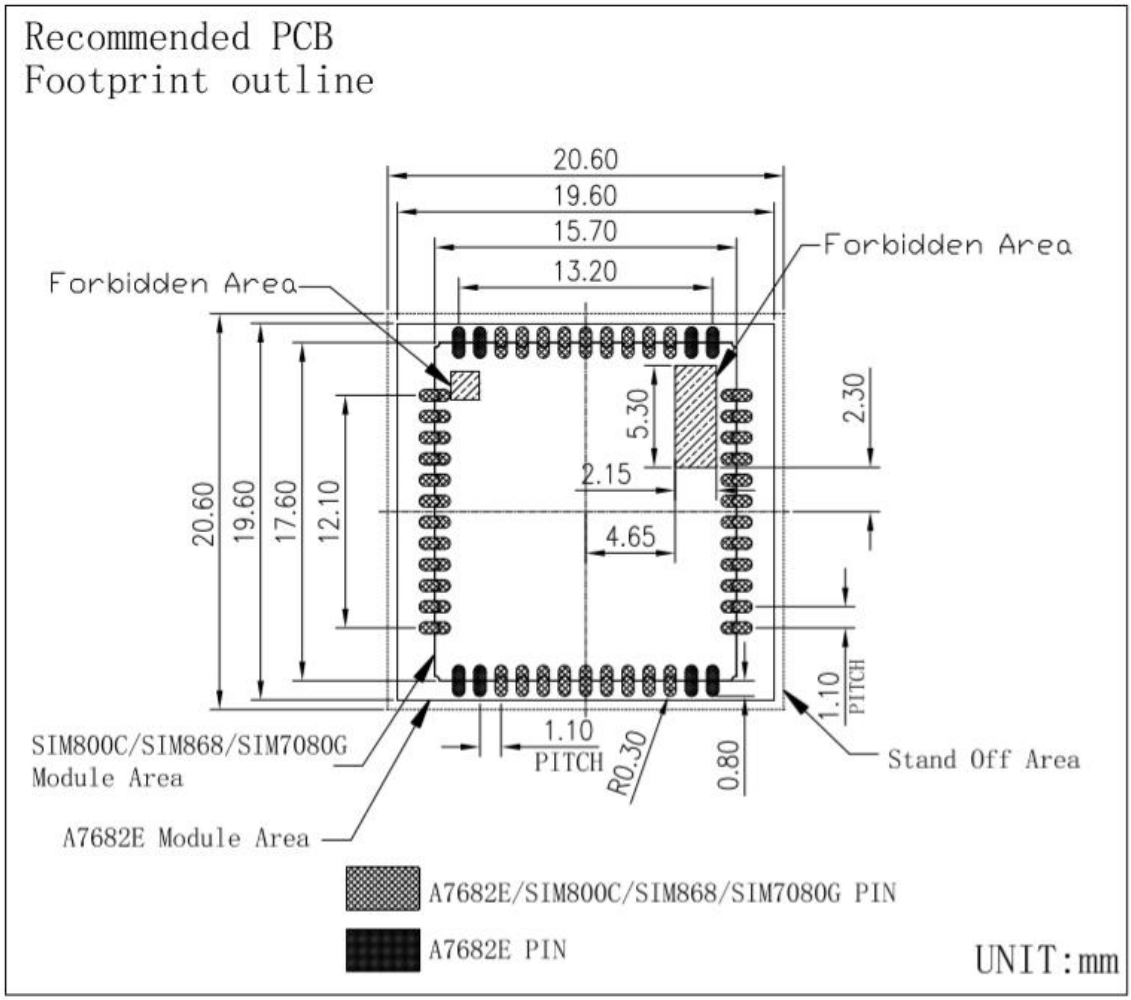

Figure 3: Recommended PCB footprint outline for A7682E/SIM800C/SIM868/SIM7080G (Unit: mm)

NOTE

1. A7682E module has 8 more outer ring pins (78, 79, 80, 81, 82, 83, 84, 85).
2. For details information, please refer to each HD guide

3 Hardware Reference Design

Users using A7682E, SIM800C, SIM868 and SIM7080G user interface can refer to the design in this chapter.

3.1 Power Supply

The following table shows the power supply voltage range of A7682E, SIM800C, SIM868 and SIM7080G:

Table 5: Module recommended supply voltage comparison

Modules	Power Pin	Symbol description	Min	Typical	Max	unit
A7682E	VBAT	Power supply range	3.4	3.8	4.2	V
SIM800C	VBAT	Power supply range	3.4	4.0	4.4	V
SIM868	GSM_VBAT	Power supply range	3.4	4.0	4.4	V
	GPS_VBAT	Power supply range	2.9	4.0	4.4	V
SIM7080G	VBAT	Power supply range	2.7	3.8	4.8	V

3.1.1 A7682E

When the A7682E module is at the maximum power in GSM TX mode, the peak current can reach 2A (peak current), which results in a large voltage drop on VBAT. In order to ensure that the voltage drop is less than 300mV, the power supply capacity of external power supply must be no less than 2A.

In the user's design, make sure that the voltage on the VBAT pins will never drop below 3.4V even when the module current consumption reaches 2A. If the voltage drops below 3.4V, the RF performance of the module will be affected. It is recommended to select an LDO or DC-DC chip with an enable pin, and the enable pin is controlled by the MCU.

The following figure shows the VBAT voltage drop.

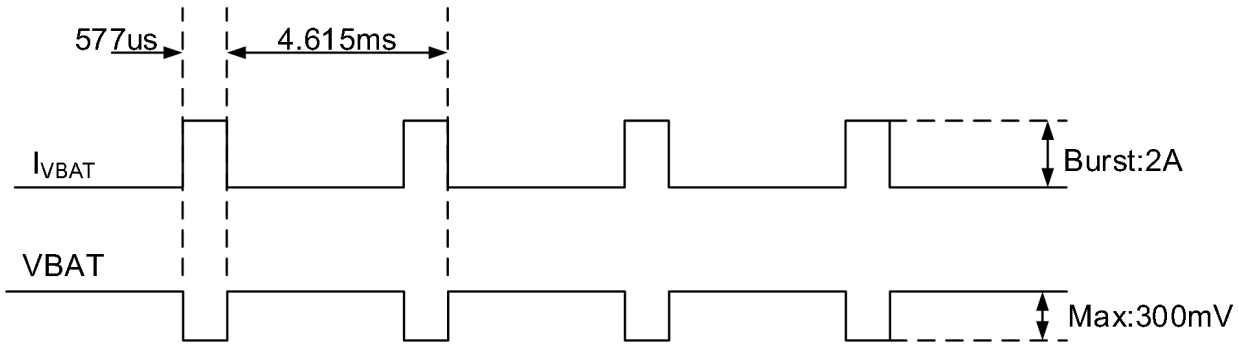

Figure 4: Burst current cause VBAT drop

3.1.2 SIM800C/SIM868

SIM800C/SIM868 during 2G transmission, the instantaneous current is as high as 2A, and the battery terminal burst current and voltage drop model are shown in the figure below:

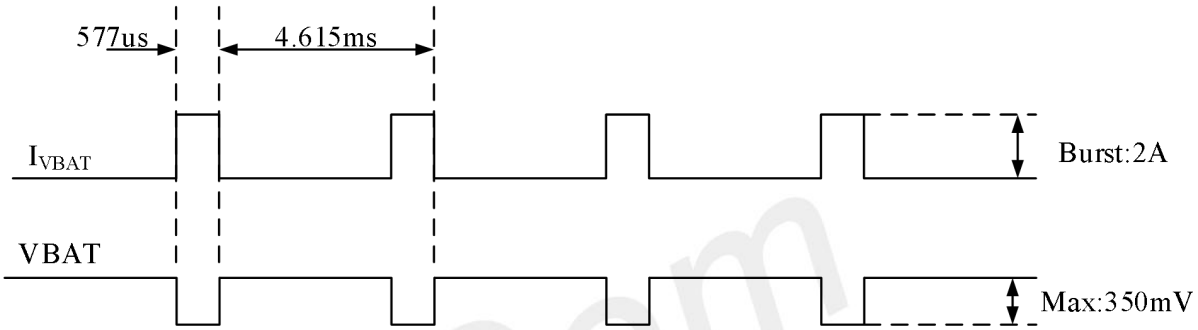

Figure 5: Burst transmission power requirements (SIM800C/SIM868)

When designing the power supply in customers' application, pay special attention to power losses. Ensure that the input voltage never drops below 3.0V even when current consumption rises to 2A in the transmit burst. If the power voltage drops below 3.0V, the module may be shut down automatically. The PCB traces from the VBAT pins to the power supply must be wide enough (at least 60mil) to decrease voltage drops in the transmit burst. The power IC and the bypass capacitor should be placed to the module as close as possible.

3.1.3 SIM7080G

On VBAT pads, when module works on CAT-M1 or NB-IoT mode, the ripple current is up to 0.5A typically. For steady voltage, the power supply capability must be up to 0.5A. In the user's design, special attention must be paid to the design of the power supply to ensure that the drop of VBAT is not less than 2.5V even when the module's current consumption reaches the instantaneous maximum. If the voltage drop is less than 2.5V, the module may shut down due to the low voltage.

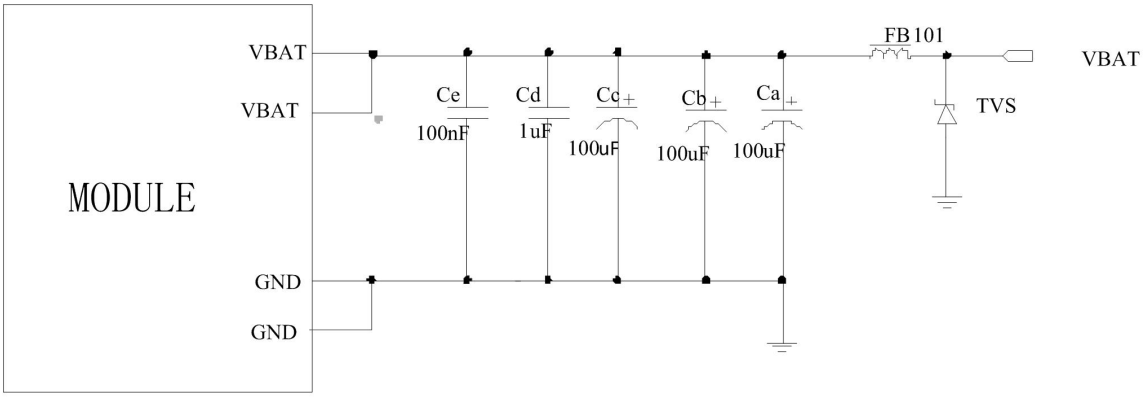

Figure 6: Power supply application circuit

NOTE

1. The peak current of A7682E is 2A, and the power supply voltage cannot be lower than 3.4V;
2. The peak current of SIM800C/SIM868 is 2A, and the power supply voltage cannot be lower than 3V;
3. The peak current of SIM7080G is 0.5A, and the power supply voltage cannot be lower than 2.5V; Users should pay special attention to the choice of power chip.

4 . For details information, please refer to each HD guide

3.2 USB Interface

A7682E, SIM800C, SIM868 and SIM7080G module provide a USB2.0 interface, supporting high-speed 480Mbps and full-speed mode 12Mbps, and do not support USB charging function; A7682E/SIM7080G does not support USB HOST mode.

USB is the main debugging port and software upgrade interface. It is recommended that customers reserve USB test points during design. If the main control chip is connected, 0R resistors should be reserved for switching external test points during design, as shown in the figure below.

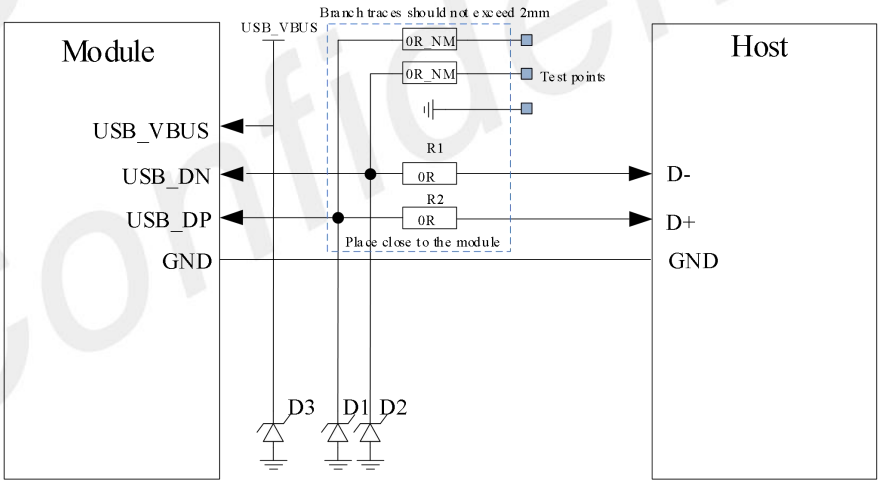

Figure 7: USB reference circuit

Customers can replace R1 and R2 with a common mode inductor to prevent EMI interference, and pay attention to the selection of D3 devices. It is recommended to choose anti-static and anti-surge two-in-one devices, and one TVS tube can be placed. Recommended model ESD5681N07. D+/D- trace impedance is controlled according to 90Ω and covered with ground; D1/D2 select TVS tube with capacitance value <1pf.

3.3 Network Status Indication

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

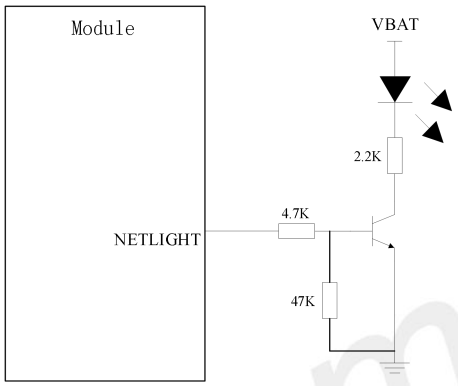

Figure 8: NETLIGHT/STATUS reference circuit

3.4 Power on/off Circuit

A7682E, SIM800C, SIM868 and SIM7080G 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.

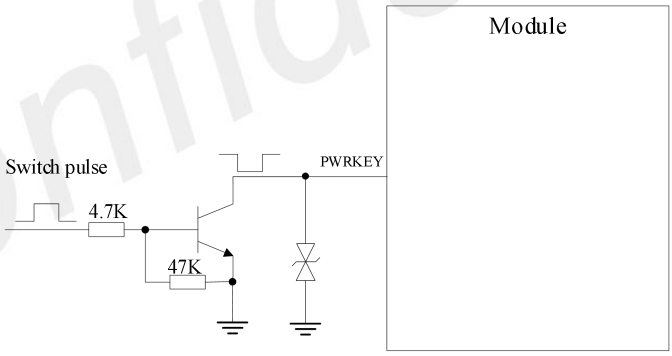

Figure 9: Power on/off reference circuit

The module has the following shutdown methods:

- Use PWRKEY pin to shut down
- Use AT command to shut down
- Over-temperature or under-temperature automatic power off.
- Over-voltage or under-voltage automatic power off, ‘AT+CPMVT’ set voltage range(A7682E)

It is strongly recommended that customers use PWRKEY or AT command to shut down, and then power off VBAT after shutting down (especially when the module does not need to work at all). In addition, turning off

the VBAT directly by disconnecting the VBAT may cause damage to the FLASH.

NOTE

1. Shutdown AT command
   SIM800C/SIM868/SIM7080G: AT+CPOWD=1
   A7682E: AT+CPOF
2. When the temperature exceeds the range of - 30 ~ + 80 ℃, A7682E will report warning information through AT port. When the temperature exceeds the range of - 40 ~ + 85 ℃, A7682E will shut down automatically. For a detailed description of 'AT+ CPOF' and 'AT+ CPMVT', please refer to document [1].

3.5 Reset Circuit

The A7682E reset circuit is as follows, the user resets the module by pulling down the RESET pin.
The PWRKEY pin of SIM800C/SIM868/SIM7080G has its own reset function. When PWRKEY is pulled low for a certain period of time, the module will reset the system. Therefore, it is not recommended to connect PWRKEY to GND directly or to GND through a 0R resistor when designing external circuits.

The recommended (A7682E) circuit is as follows:

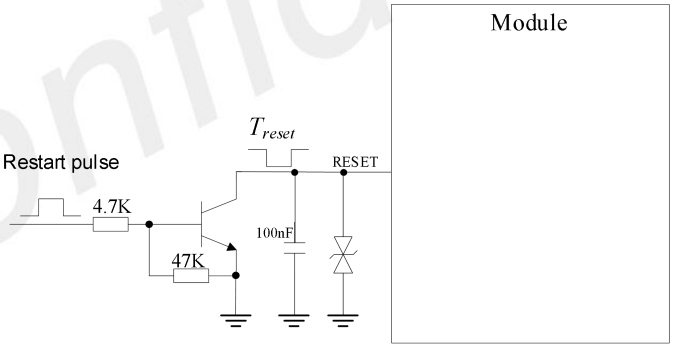

Figure 10: A7682E Reset reference circuit

NOTE

1. When PWRKEY is pulled low (1.5S <T <2S), SIM800C/SIM868 module will reset. When PWRKEY is pulled low (T> 12.6S), the SIM7080G module will reset.
2. For details information, please refer to each HD guide.

3.6 USIM Interface

A7682E, SIM800C and SIM868 support 1.8V/3.0V (U)SIM card by default and support hot-swappable function; SIM7080G only supports 1.8V SIM card and does not support hot swap function.

The recommended circuit is as follows:

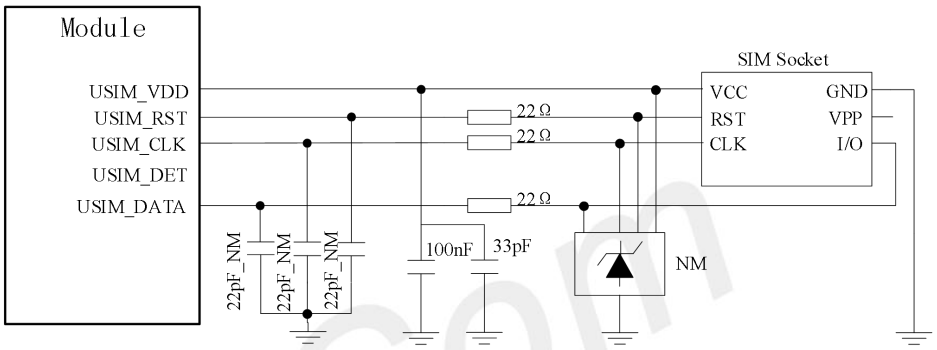

Figure 11: SIM interface reference circuit (6PIN)

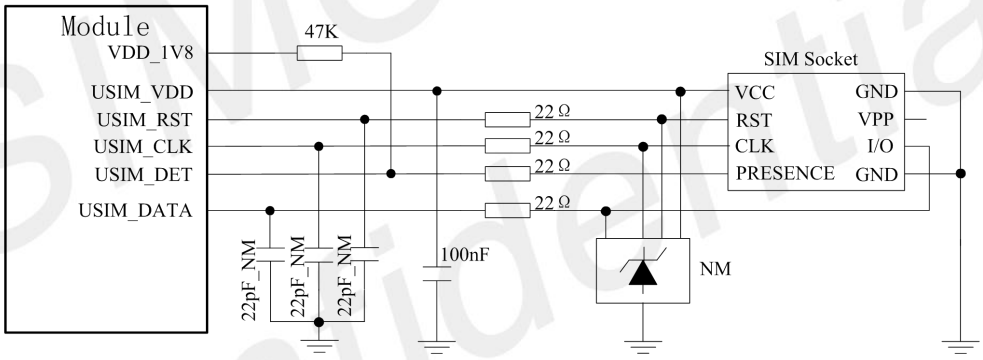

Figure 12: SIM interface reference circuit (8PIN)

NOTE

1. A7682E and SIM7080G support two SIM card interfaces.
2. For details information, please refer to each HD guide.

3.7 UART Interface

A7680C provides 3 serial ports, one main full-function communication serial port UART (RTS/CTS flow control function debugging), one ordinary two-wire serial port, one print LOG serial port, and the module is a DCE (Data Communication Equipment) device.

SIM800C/SIM868 provides two sets of serial ports, one main full-function communication serial port UART1

(support RTS/CTS flow control function debugging), one set of ordinary serial ports, which can be used for external devices. The module is DCE (Data Communication Equipment).

SIM7080G can provide 3 channels serial ports, one main full-function communication serial port, one print LOG serial port, One channel 2-wire serial port UART3. The default function of UART3 after power-on is GPIO, It can be configured as a UART function, but it cannot be used for AT command communication. It is only used as UART in DAM (Downloadable Application Module) application when secondary development. It can also be configured as a GNSS NMEA data output port.

Below are the reference circuits.

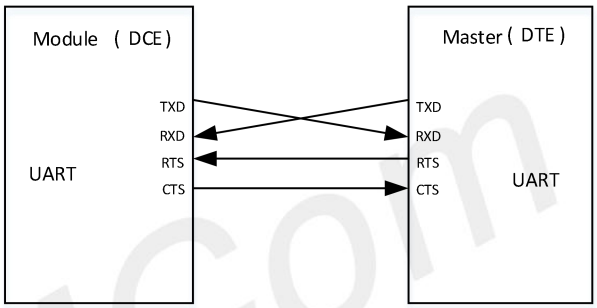

Figure 13: UART Full modem

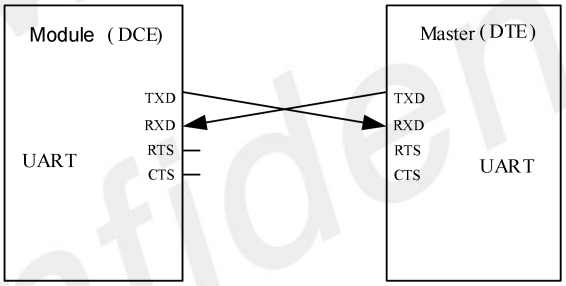

Figure 14: UART Null modem

The following figure shows the use of a transistor for circuit conversion. The circuit in the dotted line can refer to the circuit of the solid line TXD and RXD, and you need to pay attention to the direction of the signal. The recommended transistor model here is MMBT3904.

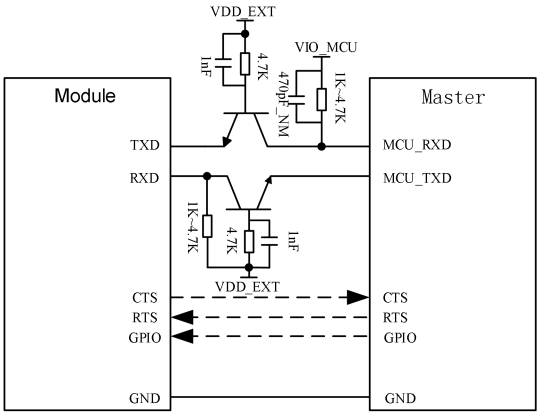

Figure 15: Triode level conversion circuit

NOTE

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

3.8 Audio Interface

Both A7680C and SIM800C provide 1 channel of analog audio MIC input interface and 1 channel of analog audio SPK output interface, customers can connect to the external phone handle for voice calls.

SIM868 provides an analog input (MICP; MICN), which could be connected to electric microphone. The module also provides two analog audio outputs (SPK1P/1N; SPK2P/2N).

SIM7080G module does not support analog audio interface.

Table 6: Audio output characteristics

	A7682E	SIM800C	SIM868
Conditions	Mono,32Ω Difference	RL=32 Ω receiver	SPK1P/1N:32Ω receiver. SPK2P/2N:8Ω speaker
Maximum power	37mW	90mW	90mW(32Ω) 1080mW(8Ω)

The following circuit is the reference design.

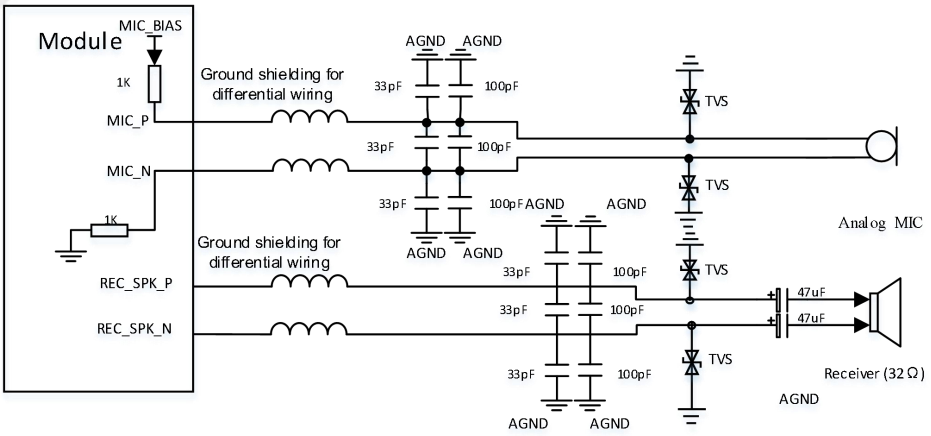

Figure 16: Analog audio recommendation circuit for SIM800C/SIM868/SIM7080G

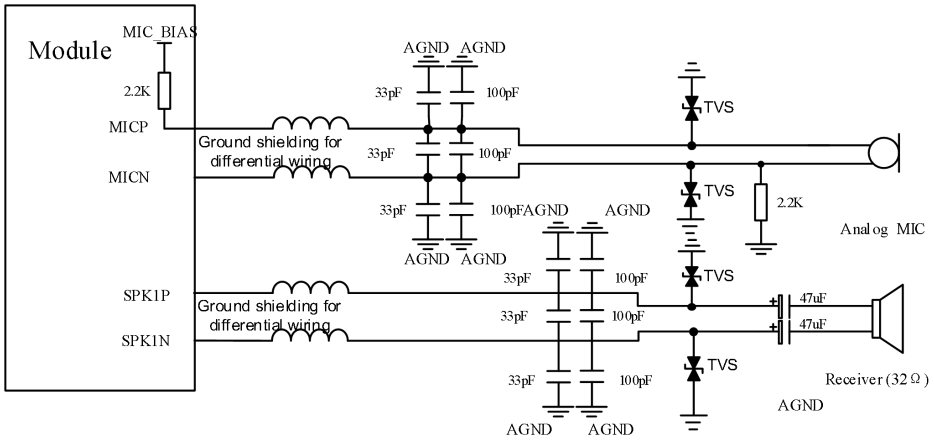

Figure 17: Analog audio recommendation circuit for A7682E

NOTE

1. The MICN circuit of A7682E requires an external resistor.
2. For details information, please refer to each HD guide.

3.9 PCM Interface

A7682E/SIM800C/SIM868 modules do not support PCM interface.

SIM7080G provides a PCM interface for external codec, which can be used in master mode with short sync and 16 bits linear format.

Table 7: PCM Format

Characteristics	Specification
Line Interface Format	Linear(Fixed)
Data length	16bits(Fixed)
PCM Clock/Sync Source	Master Mode(Fixed)
PCM Clock Rate	2048 KHz (Fixed)
PCM Sync Format	Short sync(Fixed)
Data Ordering	MSB

The following circuit is the reference design.

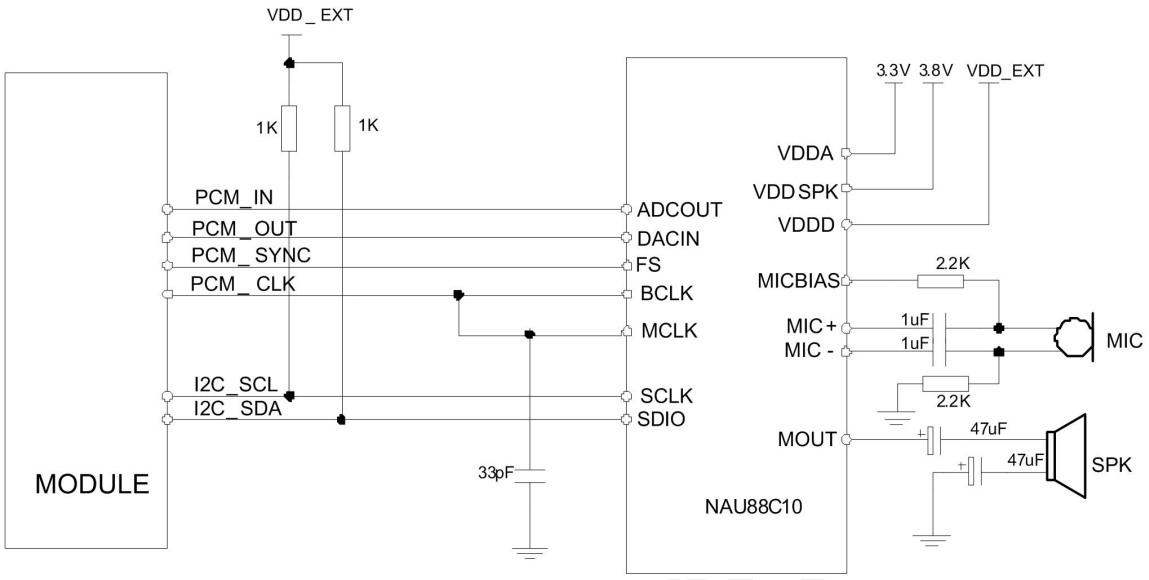

Figure 18: PCM recommended circuit

NOTE

For more details about PCM AT commands, please refer to document [1].

3.10 RF Interface

The reference circuit of RF_ANT connection is shown as the figure below:

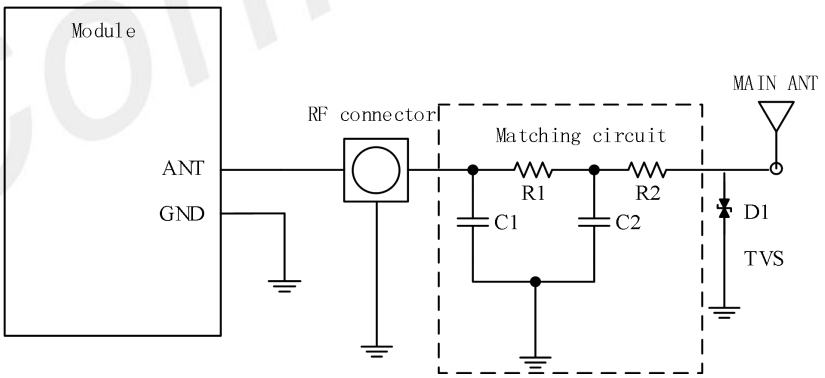

Figure 19: Antenna matching circuit

The specific values of R1, C1, C2 and R2 in the matching circuit usually provided by the antenna factory and determined by the antenna optimization. R1 and R2 are pasted 0 Ω by default, C1 and C2 are not pasted by default. D1 is a bidirectional TVS device, it is recommended to choose to paste. The capacitance value is required to be less than 0.2pf to avoid damage to the internal devices of the module. The recommended TVS models are as follows:

Table 8: Recommended TVS

Package	Part Number	Vender
0201	CE0201S05G01R	SOCAY
0402	PESD0402-03	PRISEMI

3.11 ADC Interface

A7682E, SIM800C, SIM868 and SIM7080G provide 1 ADC interface.

Table 9: ADC interface parameters

Function	A7682E	SIM800C	SIM868	SIM7080G
ADC Interface	-Resolution：9bits -voltage range：0~1.8V	-Resolution：10bits -voltage range：0~2.8V	-Resolution：10bits -voltage range：0~2.8V	-voltage range：0~1.8V

4 Appendix

4.1 Related documents

Table 10: Related documents

SN	Document name	Remark
[1]	A7682E_Hardware Design	A7682E_Hardware Design
[2]	SIM800C_Hardware_Design	SIM800C_Hardware_Design
[3]	SIM868_Hardware_Design	SIM868_Hardware_Design
[4]	SIM7080G_Hardware Design	SIM7080G_Hardware Design

4.2 Terms and Abbreviation

Table 11: Terms and Abbreviation

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
USIM	Universal subscriber identity module
UMTS	Universal mobile telecommunications system
SMPS	Switch Mode Power Supply