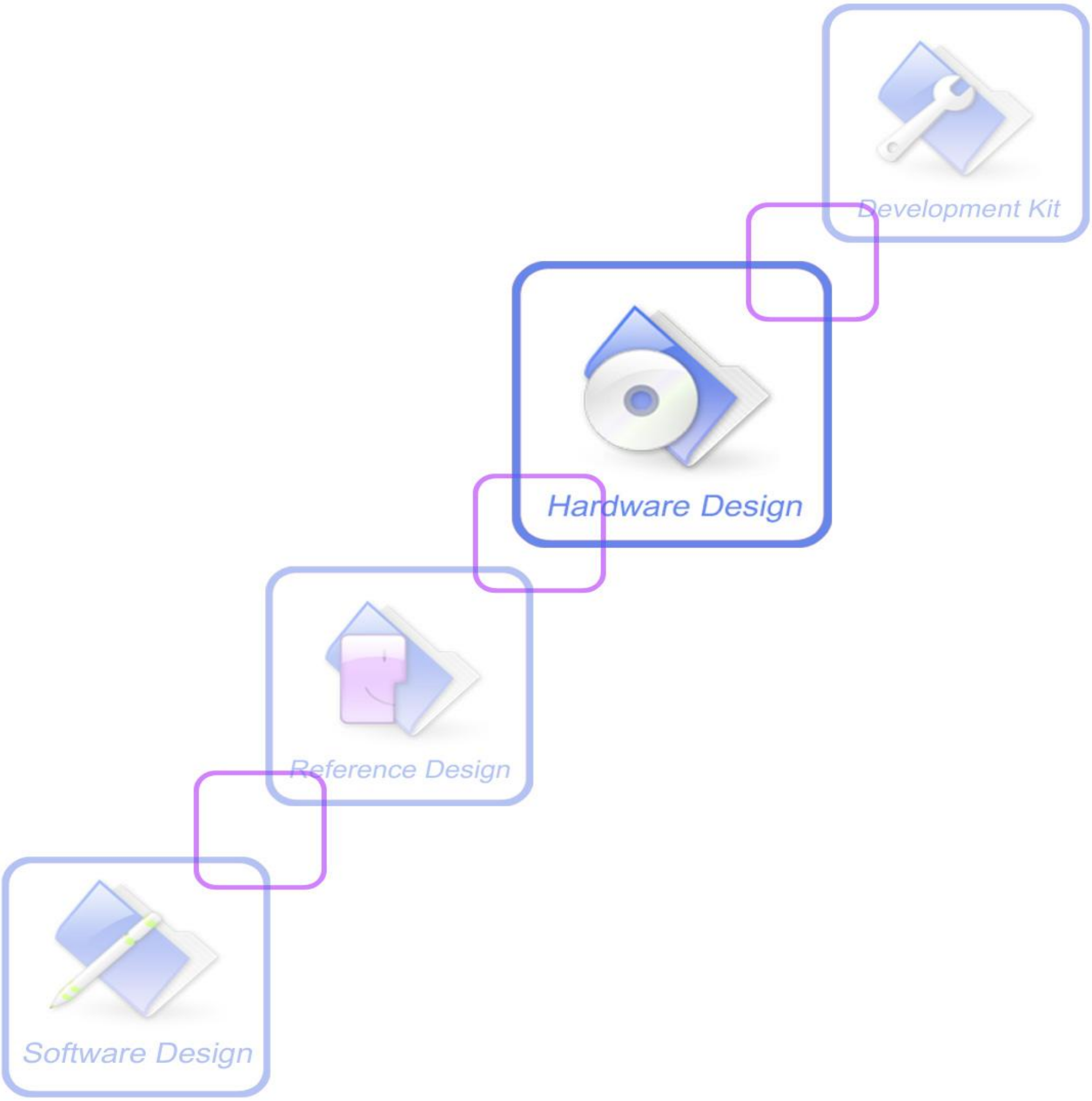
SIM5800 Hardware Design_V1.01

FCC ID:UDV-SIM5800



Document Title	SIM5800 Hardware Design
Version	1.01
Date	2018-10-08
Status	Draft (Initial release)
Document Control ID	SIM5800 Hardware Design_V1.01

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

} -Reorient or relocate the receiving antenna.
} -Increase the separation between the equipment and receiver.
} -Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
} -Consult the dealer or an experienced radio/TV technician for help.

RF warning:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

General Notes

SIMCom offers this information as a service to its customers, to support application and engineering efforts that use the products designed by SIMCom. The information provided is based upon requirements specifically provided to SIMCom by 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, system validation of this 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.

Contents

Table Index

Figure Index

Version History

Date	Version	Description of change	Author
2018-10-08	1.01	Initial release	Jialin Song

1. Introduction

This document describes electrical specifications, mechanical information, interfaces application and manufacturing information about SIM5800 module. With the help of this document and other application notes or user guide, users can understand SIM5800 well and develop various products quickly.

2. Overview

SIM5800 is a multi-mode and multi-band wireless smart module, which is based on MTK MT8321 platform. It includes baseband, memory, RF front end and required circuitry to support rich multimedia features, global location-based service, wireless connectivity, and air interface standards including WCDMA, GSM/GPRS/EDGE.

With higher integration to reduce PCB surface area, time-to-market, and BOM costs, SIM5800 will help drive wireless products adoption in more industry around the world.

There are 210 pins on SIM5800 which provide most application interfaces for users' board.

- LCM: 3 lane MIPI
- Two camera: Primary 2-lane MIPI, Secondary camera 1-lane MIPI
- Three Audio input
- Three Audio output
- USB 2.0, Support USB OTG (External supply of 5V power is required)
- Two UIM card
- SDIO, Support SD3.0
- Two UART
- Three I2C
- One ADC
- Antenna (WIFI/BT, GPS)
- Other interface (GPIO,PWM ect)

2.1 Key Feature

Table 1: Key Feature

Feature	Implementation
Application processor	Quad-core ARM cortex-a7 processor; up to 1.3GHz;
Memory	8Gb LPDDR3 RAM 8GB eMMC Flash
External memory	Support SD3.0, Support hot swap
Operating system	Android 5.1
Software upgrade	Upgrade via USB port
Power supply	3.45V ~4.4V
Charge management	Built-in linear charge manager
Display	3-lane MIPI_DSI， up to 1280*800
Camera	Primary camera: 2-lane MIPI_CSI, 5MP Secondary camera: 1-lane MIPI_CSI, 2MP
Video performance	Encode : H.263 – 1080p， 30 fps MPEG-4 – 1080p， 30 fps/24Mbps Decode: H.264 – 1080p， 30 fps//10Mbps MPEG-4 AS/ASP –1080p， 30 fps/30Mbps VP8 –1080p， 30 fps/10Mbps HEVC –1080p， 30 fps/6Mbps VP9 –1080p， 30 fps/3Mbps
Audio	Encode : EFR、FR、HR、AMR FR、AMR HR； Decode: MP3；AAC，AAC+，eAAC；AMR-NB、-WB，G.711，WMA 9/10 Pro；
UIM card	Dual cards dual standby
RF	● GSM850/ EGSM900/DCS1800/PCS1900 ● WCDMA:Band1/2/5/8
Transmitting power	GSM/GPRS: ● Class 4: GSM850/ EGSM900 ● Class 1: DCS1800/PCS1900 EDGE: ● Class E2:GSM850/ EGSM900 ● Class E1:DCS1800/PCS1900 UMTS: ● Class 3: Band1/2/5/8
Transmission rate	● GPRS Class B, multi-slot class 33 operation, coding scheme: CS1-4, DL maximum speed: 107kbps; UL maximum speed: 85.6kbps ● EDGE multi-slot class 33 operation, coding scheme: MSC1-9, DL maximum speed: 296kbps; UL maximum speed: 236.8kbps ● UMTS R99 speed: 384 kbps DL/UL ● DC-HSDPA Category 24 - 42.2 Mbps, HSUPA Category 6 - 11.5 Mbps
Bluetooth features	V2.1+EDR ， 3.0+HS，V4.0 BLE Class 1、Class2
Wi-Fi/WAPI	Support SoftAP, 802.11 b/g/n Way of encryption: WFA WPA/WPA2 Qos: WFA WMM ， WMM PS RF features: 11b: 17 dBm，EVM≤35%

	11g: 15 dBm，EVM<-25dB 11n: 12 dBm，EVM<-27dB
GNSS	GPS, GLONASS, BEIDOU
Temperature range	Operating temperature: -25℃ ~ +75℃ Storage temperature: -40℃ ~ +90℃
Physical features	Dimension: 40.5*40.5*2.8mm Weight: about 9g

2.2 Functional Diagram

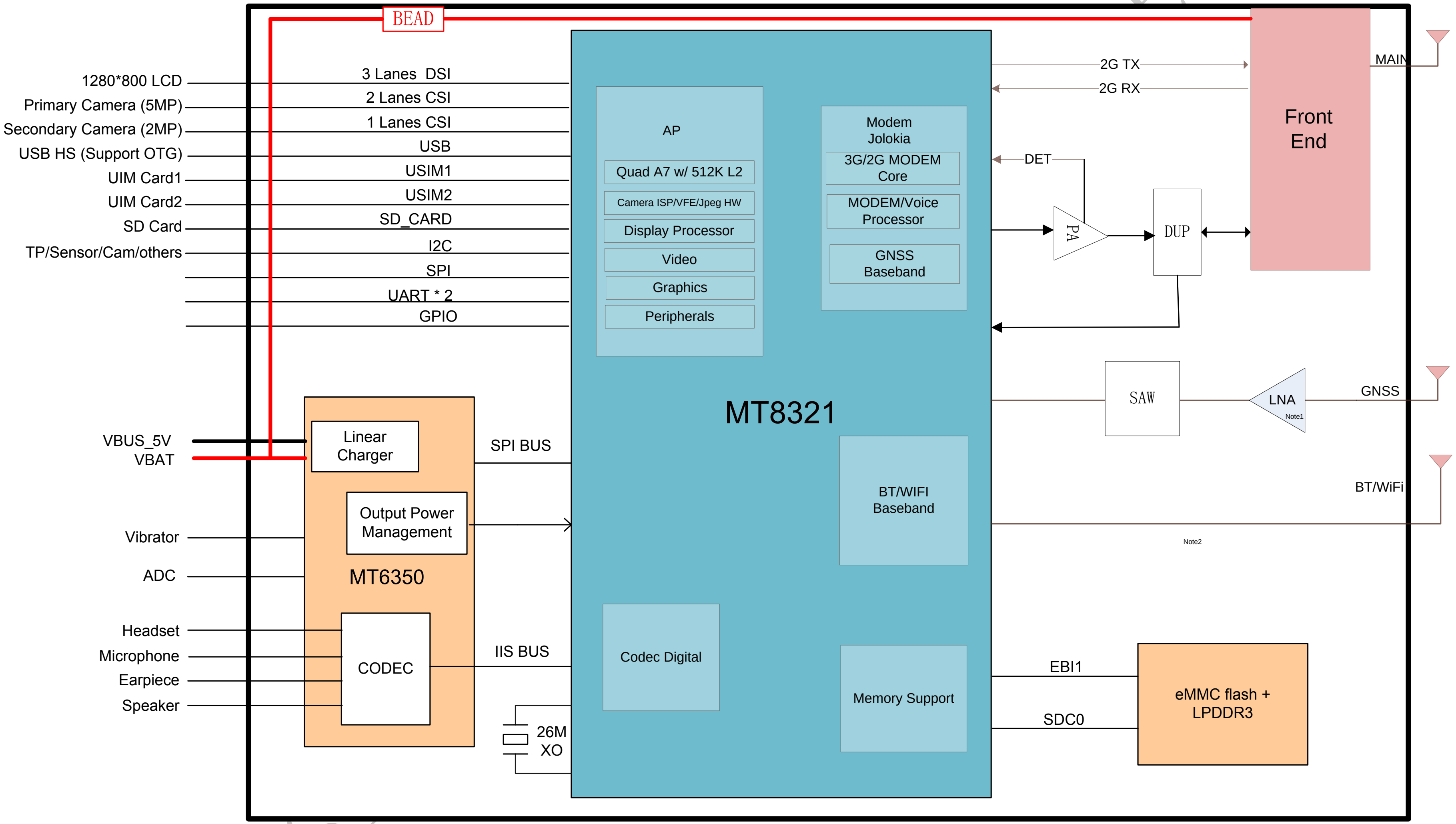


Figure 1: SIM5800 functional diagram

3. Pin definitions

3.1 Pin Assignment

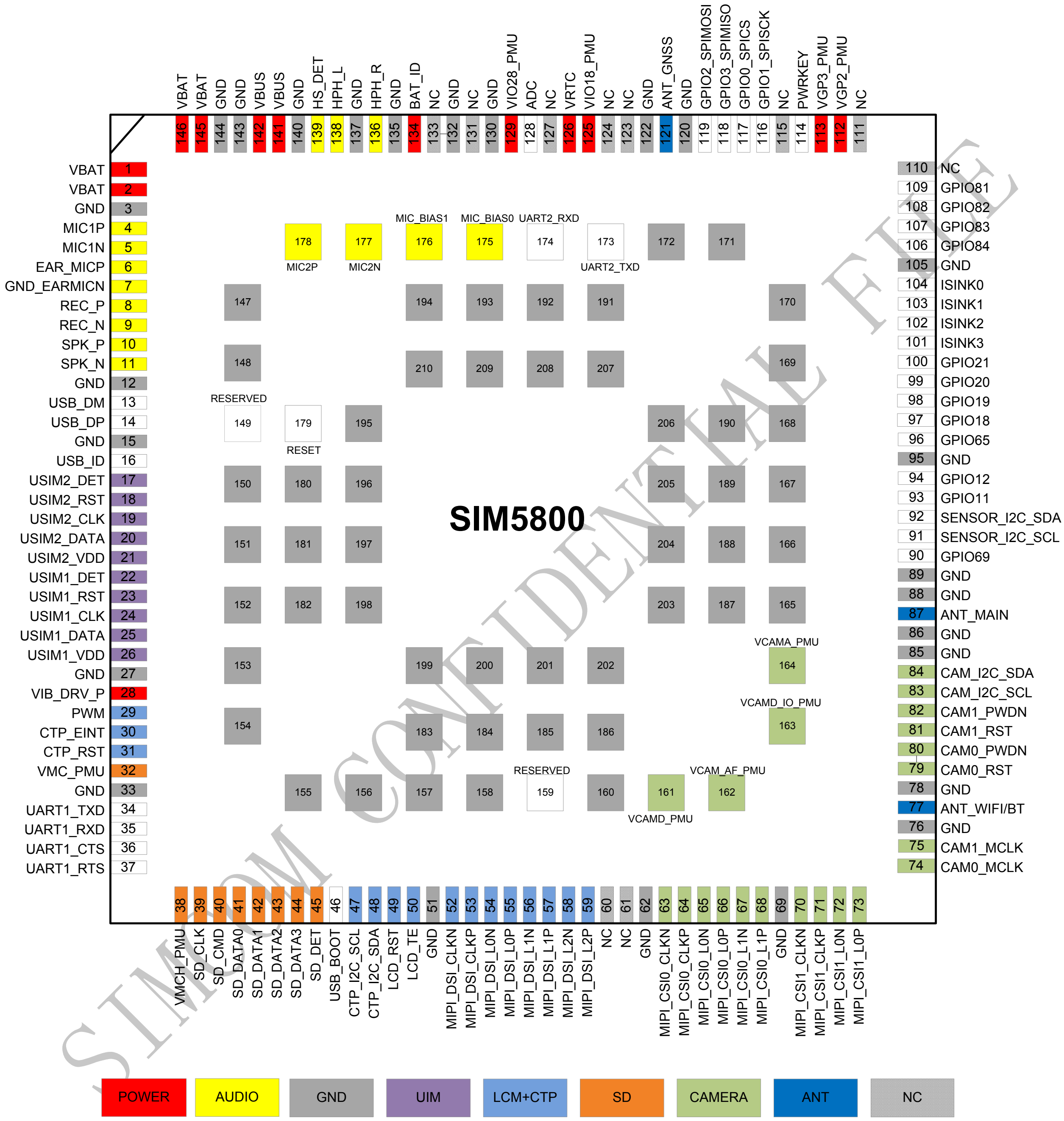


Figure 2: Module pin diagram (Top view)

3.2 Pin Description

Table 2: Pin definitions

Name	Pin NO	I/O	Description	Note	Power domain
Power					
VBAT	1，2，145，146	I	Main power supply for the module		
VRTC	126	I/O	Coin cell or backup-battery charger supply and input		
VIO18_PMU	125	O	1.8V LDO Output		
VIO28_PMU	129	O	2.8V LDO Output		
VGP2_PMU	112	O	1.2V~2.0V Output	100mA	
VGP3_PMU	113	O	1.2V~1.8V Output	200mA	
VMCH_PMU[1]	38	O	Power supply for SD	400mA	
VMC_PMU[2]	32	O	Only used pull up for SD card	100mA	
VCAMD_PMU	161	O	1.8V Output, for Camera core	150 mA	
VCAM_AF_PMU	162	O	2.8V Output, for Camera AF	100 mA	
VCAMD_IO_PMU	163	O	1.8V Output, for Camera IO	100 mA	
VCAMA_PMU	164	O	2.8V Output, for Camera	150 mA	
VIB_DRV_P	28	O	Motor drive	Connect the positive of the motor	
VBUS_USB	141，142	I	USB power and detection USB		
GND	3，7，12，15，27，33，51，62，69，76，78，85，86，88，89，95，105，120，122，130，132，135，137，140，143，144，147，148，150~158，160，165~172，180~210	P	GND		
USB interface					
USB_DM	13	I/O	USB differential signal		

USB_DP	14	I/O			
USB _ID	16	I	OTG detection signal		
SIM card interface					
USIM2_DET	17	I	USIM2 presence detection		VIO18_PMU
USIM2_RST	18	O	USIM2 reset	Connect to PMU internally	USIM2_VDD
USIM2_CLK	19	O	USIM2 clk		
USIM2_DAT	20	I/O	USIM2 data		
USIM2_VDD	21	P	USIM2 power		
USIM1_DET	22	I	USIM1 presence detection		VIO18_PMU
USIM1_RST	23	O	USIM1 reset	Connect to PMU internally	USIM1_VDD
USIM1_CLK	24	O	USIM1 clk		
USIM1_DAT	25	I/O	USIM1 data		
USIM1_VDD	26	P	USIM1 power		
SDIO/SD card interface					
SD_CLK	39	O	SDIO clk		VMC_PMU
SD_CMD	40	I/O	SDIO command		
SD_DATA0	41	I/O	SDIO data0		
SD_DATA1	42	I/O	SDIO data1		
SD_DATA2	43	I/O	SDIO data2		
SD_DATA3	44	I/O	SDIO data3		
SD_DET	45	I	SD presence detection		VIO18_PMU
Touch panel interface					
CTP_I2C_SDA	48	I/O	I2C data for touch panel	Open drain output	VIO18_PMU
CTP_I2C_SCL	47	O	I2C clock for touch pane		
CTP_EINT	30	I	Interrupt signal for touch panel		
CTP_RST	31	O	Reset signal for touch panel		
LCM interface					
PWM	29	O	PWM control for external WLED driver		VIO18_PMU

LCD_RST	49	O	LCM reset		
LCD_TE	50	I	LCM frame alignment signal		
MIPI_DSI_CLKN	52	O	LCM MIPI		
MIPI_DSI_CLKP	53	O			
MIPI_DSI_LANE0N	54	O			
MIPI_DSI_LANE0P	55	O			
MIPI_DSI_LANE1N	56	O			
MIPI_DSI_LANE1P	57	O			
MIPI_DSI_LANE2N	58	O			
MIPI_DSI_LANE2P	59	O			
Camera interface					
MIPI_CSI0_CLKN	63	I	MIPI signal		VIO18_PMU
MIPI_CSI0_CLKP	64	I			
MIPI_CSI0_LN0N	65	I			
MIPI_CSI0_LN0P	66	I			
MIPI_CSI0_LN1N	67	I			
MIPI_CSI0_LN1P	68	I			
MIPI_CSI1_CLKN	70	I	MIPI signal		
MIPI_CSI1_CLKP	71	I			
MIPI_CSI1_LN0N	72	I			
MIPI_CSI1_LN0P	73	I			
CAM0_MCLK	74	O	Primary Camera master clock		
CAM1_MCLK	75	O	Secondary Camera master clock		
CAM0_RST	79	O	Primary Camera reset		
CAM0_PWDN	80	O	Primary Camera power down		
CAM1_RST	81	O	Secondary Camera reset		
CAM1_PWDN	82	O	Secondary Camera power down		
CAM_I2C_SCL	83	O	Dedicated Camera I2C clock	Open drain output	

CAM_I2C_SDA	84	I/O	Dedicated Camera I2C data		
Sensors interface					
SENSOR_I2C_SCL	91	O	Sensors I2C clock	Open drain output	VIO18_PMU
SENSOR_I2C_SDA	92	I/O	Sensors I2C data		
ADC interface					
ADC	128	I	ADC		
BAT_ID	134	I	Battery Temperature detection(need 47K NTC inside the Battery)	Please connect to GND via 47k, when no NTC inside the battery)	
Audio interface					
MIC1P	4	I	Microphone input 1, positive		
MIC1N	5	P	Microphone input 1, negative		
EAR_MICP	6	I	Microphone input positive headset		
GND_ EARMICN	7	P	Microphone input negative headset (GND)		
REC_P	8	O	Earpiece output, positive		
REC_N	9	O	Earpiece output, negative		
SPK_P	10	O	Speaker driver output, positive		
SPK_N	11	O	Speaker driver output, negative		
HPH_R	136	O	Headset output,right channel		
HPH_L	138	O	Headset output, left channel		
HS_DET	139	I	Headset detection		VIO18_PMU
MIC_BIAS0	175	O	Microphone bias1	For MIC1/MIC2	
MIC_BIAS1	176	O	Microphone bias2	For EAR_MIC	
MIC2N	177	I	Microphone input 2, negative		
MIC2P	178	P	Microphone input 2, positive		
RF Antenna					
ANT_MAIN	87	I/O	2G/3G Main Antenna		
ANT_GNSS	121	I	GNSS Antenna		
ANT-WIFI/BT	77	I/O	WIFI/BT Antenna		

Others interface					
USB_BOOT	46	I	USB Force download	Pull down before power up, boot into download mode.	VIO18_PMU
UART1_TXD	34	I/O	UART1_TXD		
UART1_RXD	35	I/O	UART1_RXD		
UART1_CTS	36	I/O	UART1_CTS		
UART1_RTS	37	I/O	UART1_RTS		VIO18_PMU
GPIO69	90	I/O	GPIO		
GPIO11	93	I/O	GPIO		
GPIO12	94	I/O	GPIO		
GPIO65	96	I/O	GPIO		
GPIO18	97	I/O	GPIO		
GPIO19	98	I/O	GPIO		
GPIO20	99	I/O	GPIO		
GPIO21	100	I/O	GPIO		
ISINK3	101	I	Constant flow source		
ISINK2	102	I	Constant flow source		
ISINK1	103	I	Constant flow source		
ISINK0	104	I	Constant flow source		
GPIO84	106	I/O	GPIO		VIO18_PMU
GPIO83	107	I/O	GPIO		
GPIO82	108	I/O	GPIO		
GPIO81	109	I/O	GPIO	Don’t pull up externally	
GPIO1	116	I/O	GPIO		
GPIO0	117	I/O	GPIO		
GPIO3	118	I/O	GPIO		
GPIO2	119	I/O	GPIO		
PWRKEY	114	I	Power on keypad		VBAT

RESET	179	I	Reset keypad		VIO18_PMU
RESERVED					
RESERVED	149,159		Internal connection	If not used, Don’t connect anything	
NC	60，61，110，111，115，123，124，127，131，133		No internal connection		

①:VMCH_PMU : Connect to PMU internally, Voltage: 3.0V/3.3V

②:VMC_PMU: Connect to PMU internally, Voltage: 1.8V/3.3V

3.3 Physical dimension

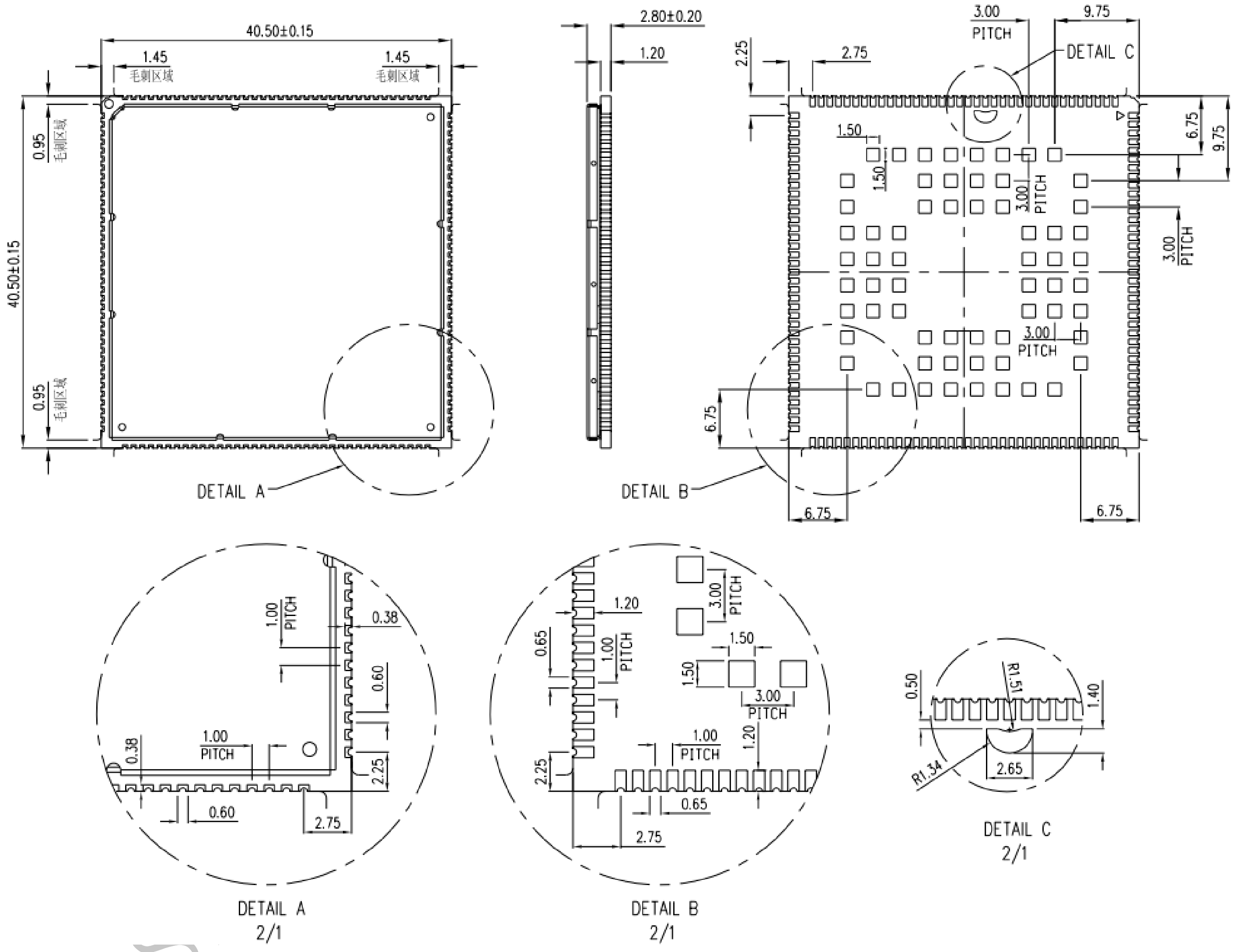


Figure 3: Outline drawing (unit: mm)

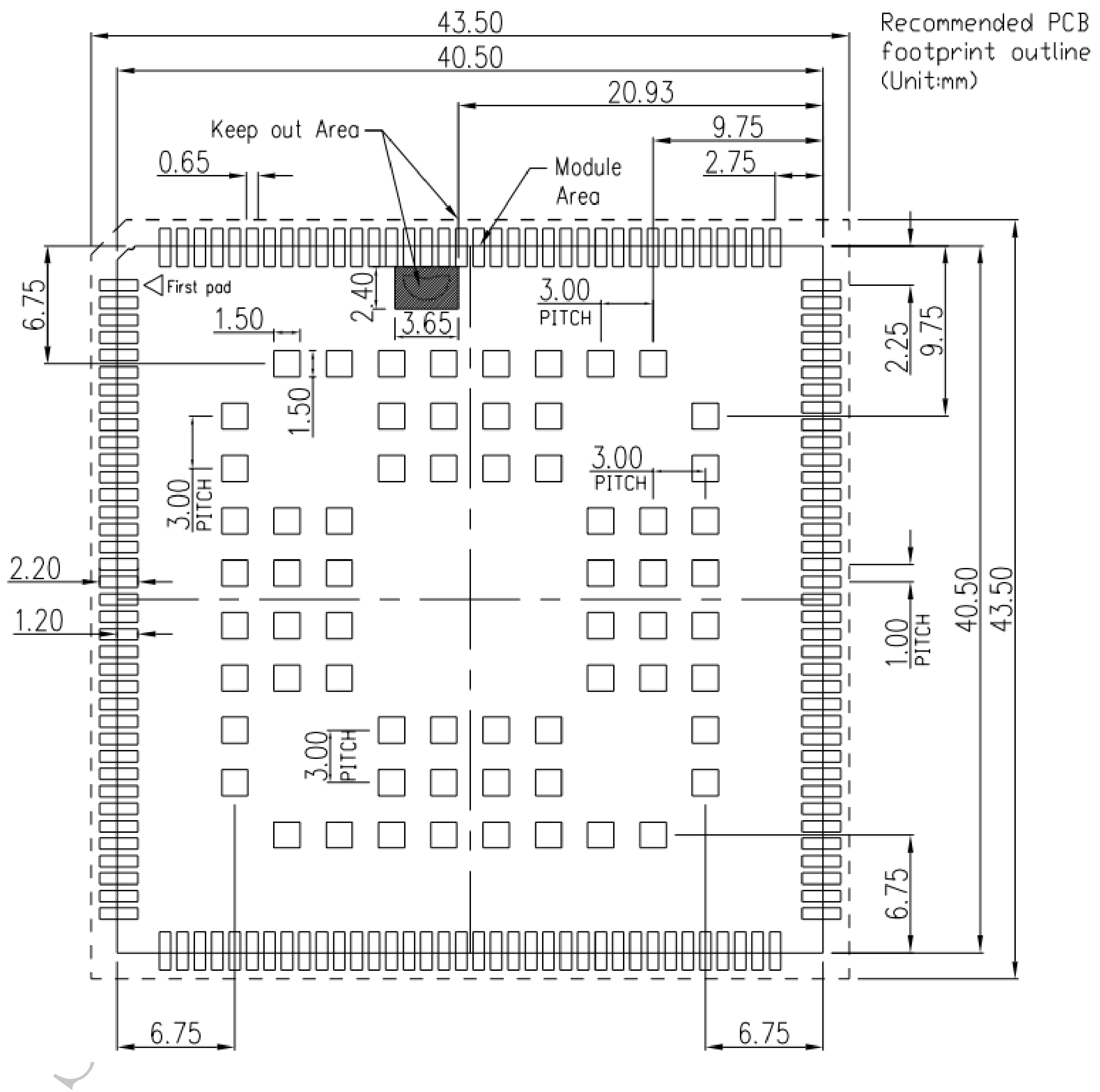


Figure 4: Recommended PCB footprint (unit: mm)

4. Interface Application

4.1 Power Supply

For non-battery applications, if the DC input voltage is +5V and users do not care about the power efficiency, a high-current low-dropout regulator is recommended. The reference design is shown in Figure 5

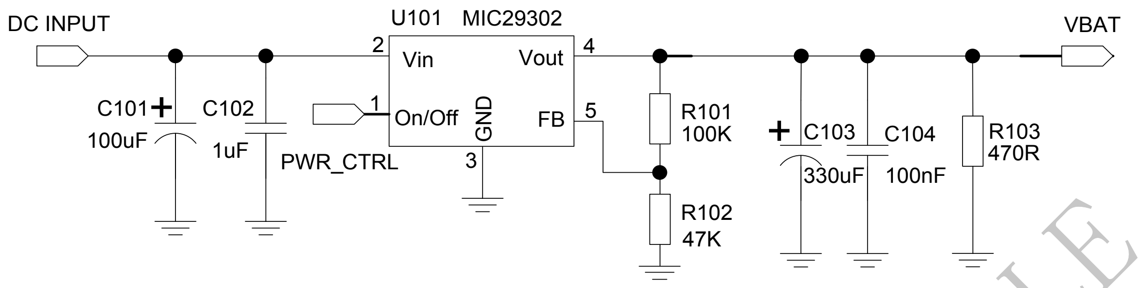


Figure 5: LDO power supply reference circuit

Note: To ensure a proper behavior of the regulator under light load, an extra minimum load (R103 in Figure 5***) is required, because the current SIM5800 consumed is very small in sleep mode and power off mode. For more details about minimum load, please refer to specification of MIC29302.***

To increase power efficiency, the switching mode DC-DC converter is preferable, especially when DC input voltage is quite high. The reference design is show in Figure 6, and it is recommended to reserve a proper ferrite bead (FB101 in Figure 6) in series for EMI suppression.

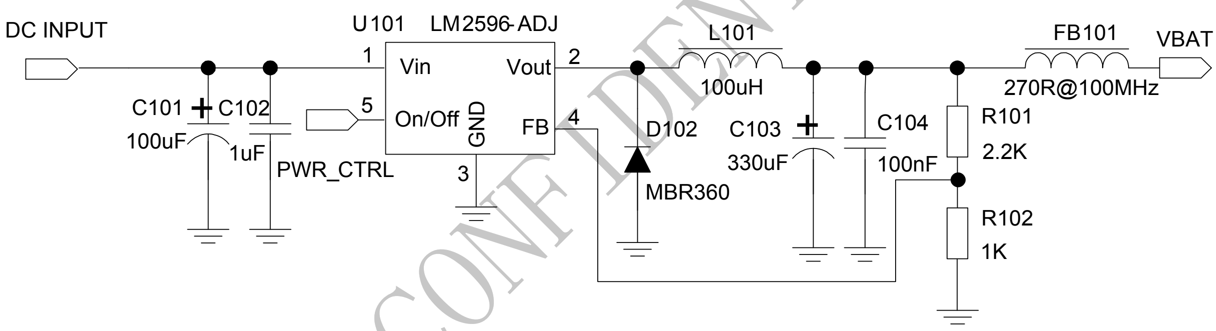


Figure 6: DC-DC power supply reference circuit

The user can directly power the module with a single lithium battery or use other types of battery, but it should be noted that its maximum voltage cannot exceed the maximum allowable voltage of the module, otherwise the module will be damaged.

Note: The module supports charging function. When users use non-rechargeable power supply, they need to turn off the charging function in the software or connect schottky diodes in the VBAT path to prevent reverse flow of current into the power supply.

No matter which power supply design is adopted, please refer to the following figure for the design of VBAT pin of the module.

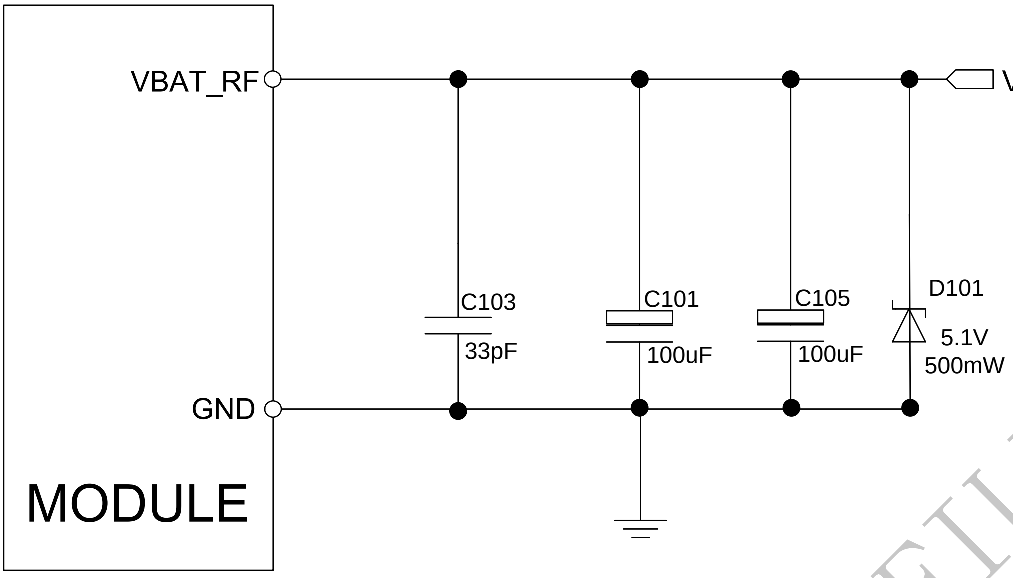


Figure 7: VBAT Input reference circuit

In the Figure 7, C101/C105 is 100uF tantalum capacitors of low ESR; 33pF capacitance can effectively remove high frequency interference; 5.1V/500mW zener diode can prevent the damage of surge on the chip. The capacitance and zener diodes should be as close to the VBAT pin of the module as possible during PCB layout.

Table 3: Recommended Zener diode model

	Vender	Part Number	Power	Pack
1	On semi	MMSZ5231BT1G	500mW	SOD123
3	Prisemi	PZ3D4V2H	500mW	SOD323
4	Vishay	MMSZ4689-V	500mW	SOD123
5	Crownpo	CDZ55C5V1SM	500mW	0805

4.1.1 Power Supply Pins

The VBAT pins are used for power input, and pin 143, 144, 147, 148 should be connected to the power GND. VRTC pin is the power supply of the RTC circuit in the module.

When designing the power supply in users' application, pay more attention to the power losses. Ensure that the input voltage never drop below 2.9V even when current consumption rises to 2A in the transmit burst. If the power voltage drops below 2.9V, the module may be shut down automatically. The PCB traces from the VBAT pins to the power supply must be wide enough 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.

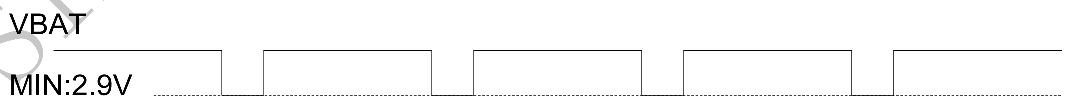


Figure 8: The minimal VBAT voltage requirement at VBAT drop

4.2 Power on/off

Do not open the module when the temperature and voltage limit of the module is exceeded. The module will be shut down as soon as it detects these inappropriate conditions. In extreme cases such an operation can result in permanent damage to the module.

4.2.1 Power on

Users can power on SIM5800 by pulling down the PWRKEY pin at least 6 seconds (TBD) and then release. This pin is already pulled up to VBAT in the module, so external pull up is not necessary. Reference circuit is show as below:

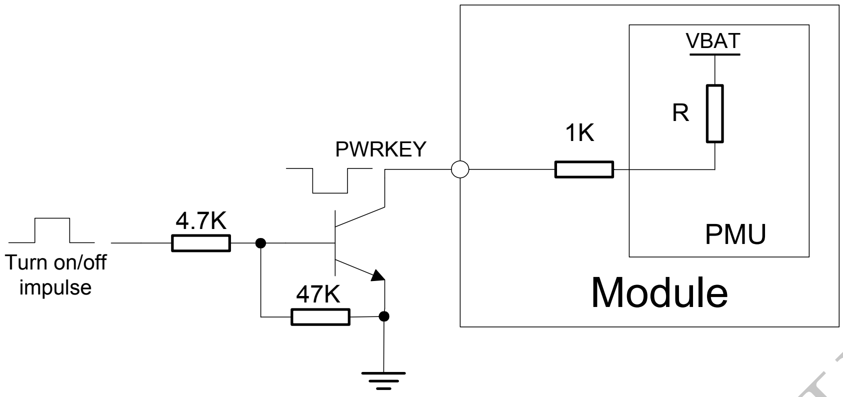


Figure 9: Power on/off module using transistor

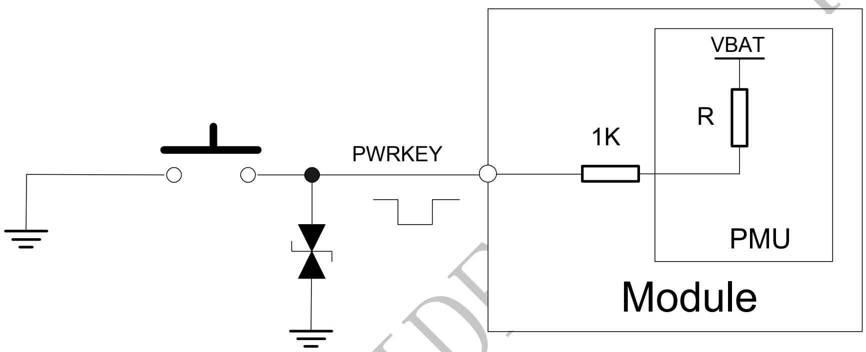


Figure 10: Power on/off module using button

The power on timing is illustrated as the following figure.

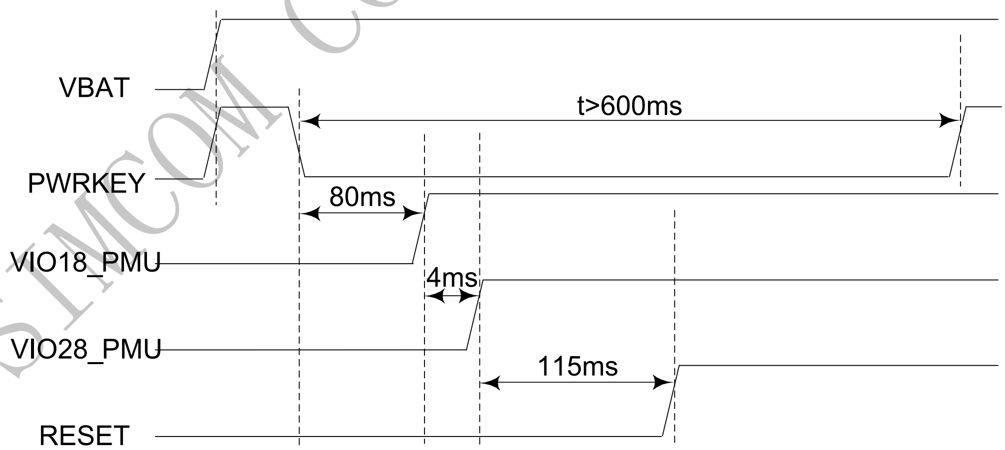


Figure 11: Timing of power on module

4.2.2 Power off

SIM5800 could power off by pull down PWRKEY for at least 1 second. once the module detect the power off action ,there will be a notice on the screen for users to confirm whether to power off or not.

4.2.3 Reset Function

SIM5800 also have a RESET pin used to reset the module. This function is used as an emergency reset. Users can pull the RESET pin to the ground, and then the module will restart.

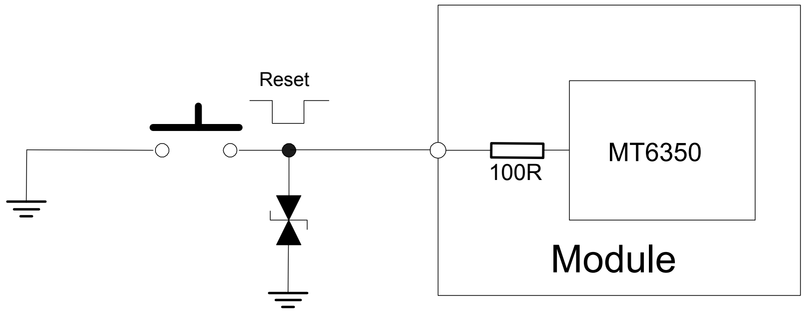


Figure 12: Reset circuit

Note: This function requires software modification. Please contact SIMCom.

The typical value of RESET pin high level is 1.8V, so for the 3V or 3.3V condition, customer could not directly use MCU's GPIO to driver this pin directly, refer to the following table for RESET hardware parameters.

Table 4: Electronic characteristic of the RESET Pin

Pin Name	Symbol	Min	Typ	Max	unit
RESET	V_{IH}	1.4	-	-	V
	V_{IL}	-	-	0.2	V
	$T_{pull\text{-}down}$	TBD	TBD	-	s

4.3 VRTC

VRTC is the power supply for RTC circuit and charger output for coin cell or backup battery. If RTC support is needed when the battery is removed, a qualified coin cell or keep-alive capacitor is required on the VRTC pin. When VBAT is present and valid, coin cell charging is enabled through software control and powered from VBAT.

Reference circuits are shown in the following figures:

- **External capacitor backup**

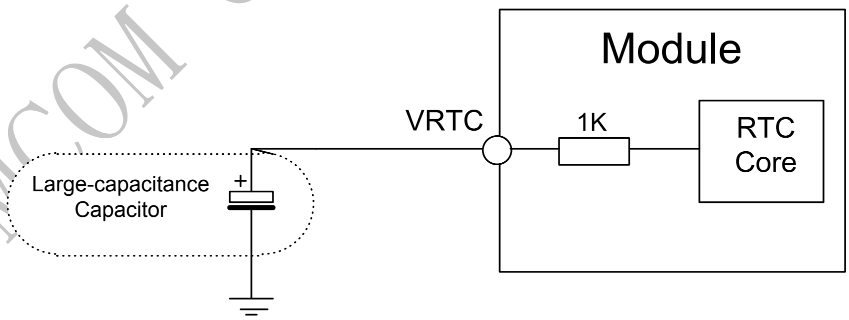


Figure 13: RTC supply from capacitor

- **Non-chargeable battery backup**

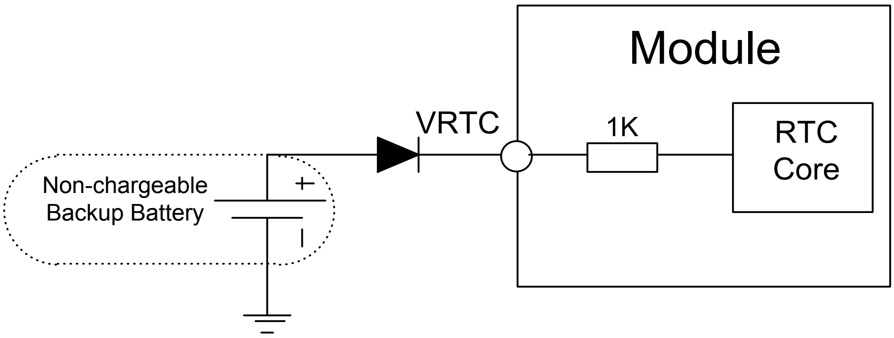


Figure 14: RTC supply from non-chargeable battery

- **Rechargeable battery backup**

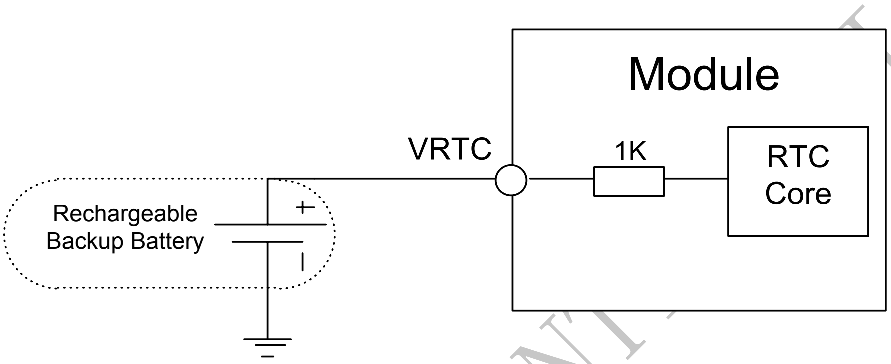


Figure 15: RTC supply from rechargeable battery

The typical voltage of VRTC is 2.8V, when VBAT is not supplied, the current consumption is about 5uA (TBD).Please refer to Table 32: VRTC Characteristics

4.4 Power output---LDO

SIM5800 has eight LDO power output, they are used for LCD, camera and touch panel, etc.

Recommend to add 33pF and 10pF capacitors to effectively eliminate the high frequency interference

Table 5: Power Supply Pins

Power Name	Pin	Outpur Voltage(V)	Current (mA)	Application
VIO18_PMU①	125	1.8	150	LCM, camera, sensor etc.
VIO28_PMU②	129	2.8	100	LCM, camera, sensor etc.
VMC_PMU	32	1.8/**3.3**	100	Only use pull up for SD card
VMCH_PMU	38	3.0/**3.3**	400	Power suplly for SD
USIM1_VDD	26	**1.8**/3.0	50	Power supply for USIM1
USIM2_VDD	21	**1.8**/3.0	50	Power supply for USIM2
VGP2_PMU	112	1.2/1.3/1.5/1.8/**2.0**/2.5/ 2.8/3.0	100	No used internally. Output voltage can be programmed with software
VGP3_PMU	113	**1.2**/1.3/1.5/1.8	200	No used internally. Output voltage can be programmed with software
VIB_DRV_P	28	**1.2**/1.3/1.5/1.8/2.0/2.8/ 3.0/3.3	100	Motor positive

①VIO18_PMU: The power supply is used internally. PMU has an output capacity 300mA. Considering the

internal power of the module, it is recommended that the external current consumption is less than 150mA.

② VIO28_PMU: The power supply is used internally. PMU has an output capacity 200mA. Considering the internal power of the module, it is recommended that the external current consumption is less than 150mA.

Note: bold is the default voltage value in the table.

4.5 USB interface

The SIM5800 can be used to debug and download software via USB.

Table 6: USB interface

Pin Name	Pin NO	Description
VBUS	141，142	USB 5V Power supply input and USB insert detection
USB_DM	13	USB -
USB_DP	14	USB +
USB_ ID	16	USB device detection signal

The connection circuit diagram is recommended as follows:

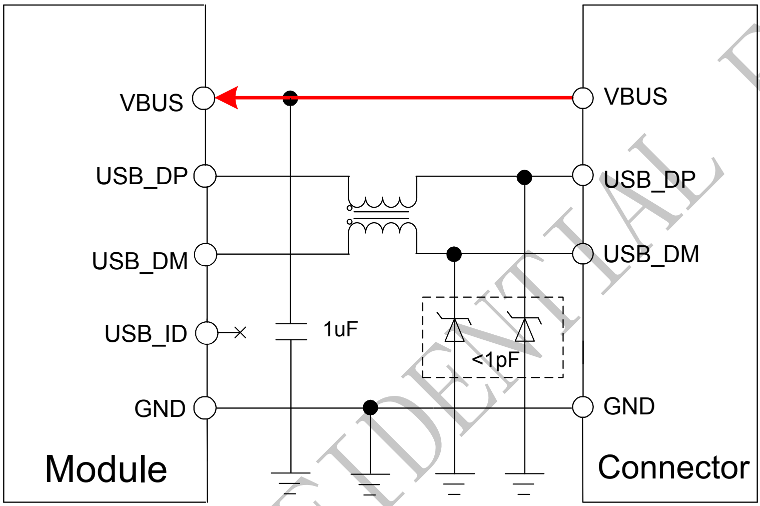


Figure 16: USB reference circuit

Customers can download and upgrade software via USB. The module provides a convenient way to download. Customers do not need to connect VBAT, only insert USB cable to complete the download. In the download stage, VBAT of the module can be provided by VCHG, but the current limit of this channel is very small, only enough for the module to download, and the module cannot be started up through VCHG power supply.

The customer first run the download tool, and then inserts the USB. After the module detects the USB insertion, it will automatically boot into the download mode. The connection diagram is as follows:

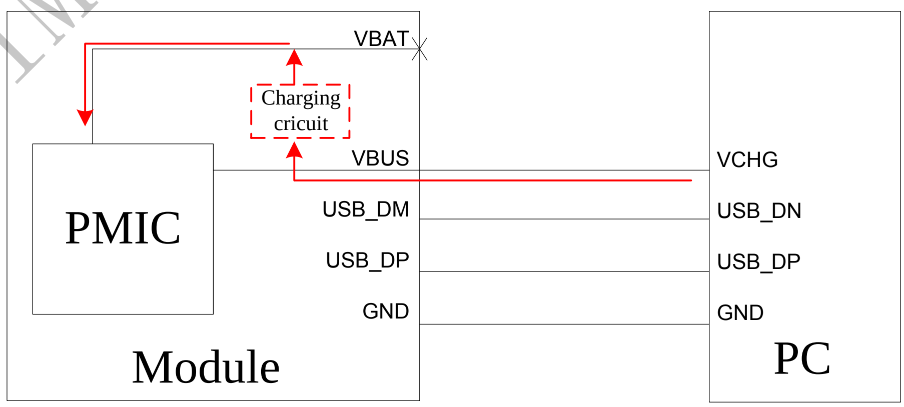


Figure 17: USB Download diagram

Note:

1. ***In the download phase, the current limit is very small from the VCHG to the VBAT path , only enough for the module to download the required current. Therefore, normal startup function of the module cannot be realized through VBUS power supply.***
2. ***If there are other chips in the module VBAT network which will consume the current when the power on, if the current consumption is high, it will also cause the module download failure.***

4.5.1USB HOST

The SIM5800 module can provide the function of USB HOST, but the module does not have the output of 5V power supply. Therefore, when using this function, the customer needs the external circuit to add 5V output.

The detection order of USB_HOST is as follows: when the device is connected, an interrupt signal is generated by USB_ID first, then the software controls GPIO to enable external +5V output, and finally the data on USB_DP/DM is detected. The recommended circuit diagram is as follows:

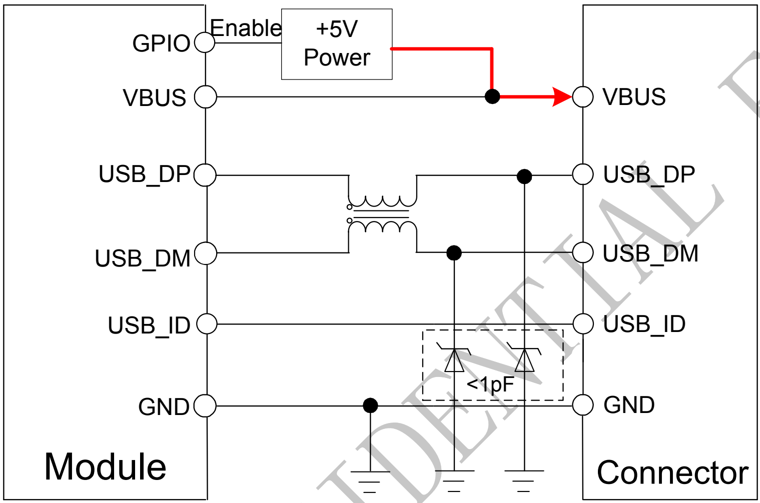


Figure 18:USB_OTG diagram

4.6 Charge management

The SIM5800 supports the charging function, and users can charge the lithium battery through the VBUS pin. The maximum charging current can be supported up to 1A (TBD).

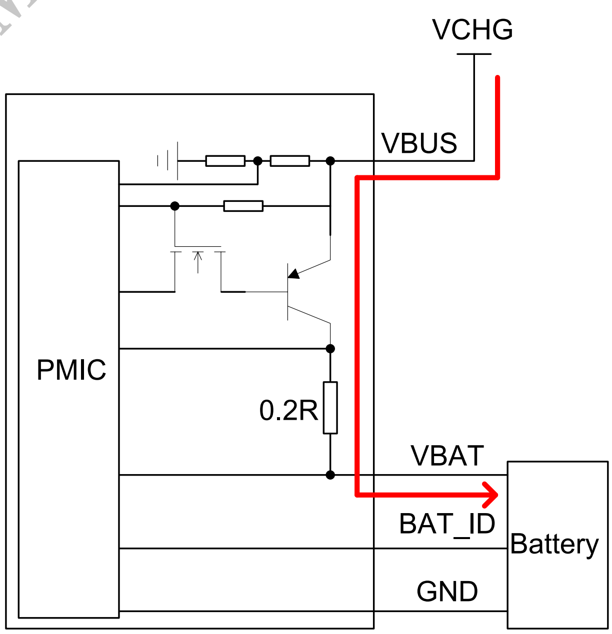


Figure 19: Charge diagram

Note: The standard charger supported by SIM5800 module needs to connect USB_DP and USB_DM together, and the charging current can only reach the normal value set by the software after the software determines that it is a standard charger. If there is no short connection between USB_DP and USB_DM, the software thinks that it is a non-standard charger with a small charging current and a slow charging.

4.6.1Charger detection

When the VBUS pin voltage is higher than 4.3v (TBD), a hardware interrupt will occur inside the module. The software recognizes whether the charger is inserted or the USB data cable is inserted by judging the state of USB_DP/USB_DM.

Whenever an invalid charging source is detected (>7.0V),the charger detector will stop charging process immediately to avoid burning out the chip or module. Furthermore, if the charger-in level is not high enough (<4.3V),the charger will also be disabled to avoid improper charging behavior.

4.6.2Charging Control

When the charger is active, the charger controller will manage the charging phase according to the battery status. During the charging period, the battery voltage is constantly monitored. The battery charger supports pre-charge mode (VBAT<3.2V, PMIC power-off state), CC mode (constant current mode or fast charging mode at the range of 3.2V<VBAT<4.2V) and CV mode (constant voltage mode) to optimize the charging procedure for Li-ion battery.

4.6.2.1 Pre-charge mode

When the battery voltage is in the UVLO state, the charger will operate in the pre-charge mode. There are two steps in this mode. While the battery voltage is deeply discharged below 2.2V,the trickle charging current is applied to the battery, the trickle charging current is about 550ms pulse 70mA current when VBAT is under 2.2V.when the battery voltage exceeds 2.2V,the charging current is 300mA(AC charger) or 70mA(USB host).

4.6.2.2 Constant current mode

As the battery is charged up and over 3.3V,it can switch to the CC mode, In the CC mode charging current can be set by registers up to 1A.for more details of the register, please refer to related software document.

4.6.2.3 Constant voltage mode

While the battery voltage reaches about 4.1V, a constant voltage is used for charging. The charging current is gradually decreased step-by-step. The charging process is completed once the current reaches zero automatically. Whenever the battery voltage exceeds 4.3V (programmed by SW),a hardware OV protection is activated and turns off the charger immediately.

4.6.2.4 BAT_ID

SIM5800 provide the battery temperature monitoring function with Pin134 BAT_ID. It needs a 10K Ohm NTC resistor , and connect to BAT_ID. In the charging procedure, the voltage on the BAT_ID will be a notice for the temperature ,if the temperature is too high or too low, it will stop charging immediately to prevent from battery damage. The battery connection is as following.

If customers to use the battery without thermistor, only connect VBAT and GND, at this time in order to prevent the system determine the battery temperature anomaly, lead to cannot charge even unbootable, customers should connect BAT_ID pin to GND via 10KR, so that we can make the system think battery temperature within the scope of the work, system can normal boot and charging. However, this connection SIMCom is not recommended for customers considering abnormal battery temperature.

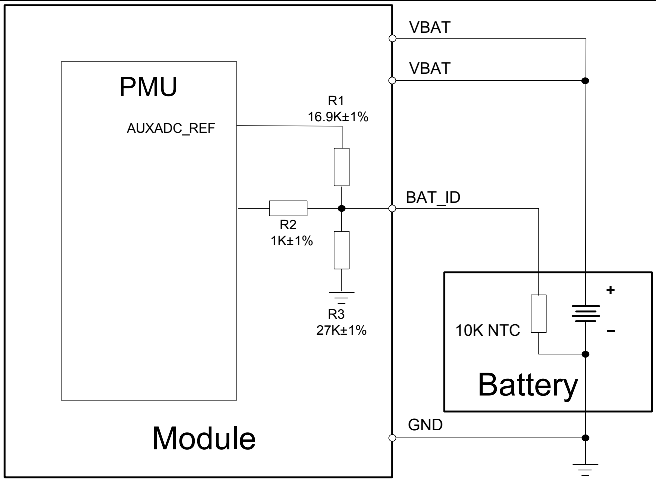


Figure 20: BAT_ID diagram

4.7 UARTs

SIM5800 provides two UARTs，the pin definition is in the following table：

Table 7: UART pins definition

Name	Pin	I/O	Function
UART1_TXD	34	O	UART1 Transmit data
UART1_RXD	35	I	UART1 Receive data
UART1_CTS	36	I	UART1 Clear to send
UART1_RTS	37	O	UART1 Request to send
UART2_TXD	173	O	UART2 Transmit data
UART2_RXD	174	I	UART2 Receive data

If the voltage of UART is 3.3V, customer can use the following reference circuits:

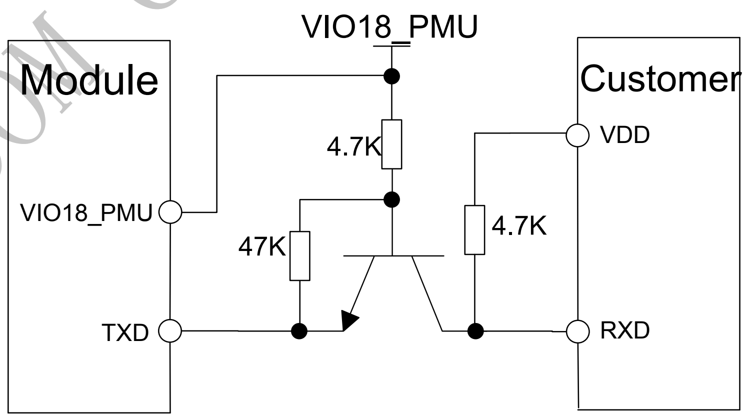


Figure 21: TX level converting by transistor

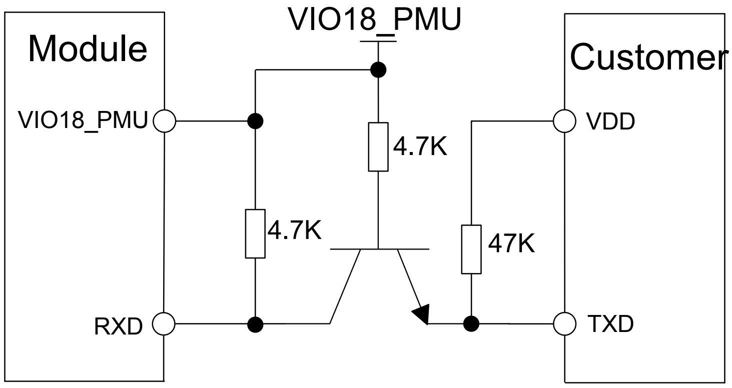


Figure 22: RX level converting by transistor

Note: When using the level isolation in Figure 21 and Figure 22, please pay attention to the output sequential of VIO18_PMU. Only after VIO18_PMU is normally output, can the serial port communicate normally.

4.8 SD card

Table 8: SD interface

Name	Pin	I/O	Description
VMC_PMU	32	O	Pull up
VMCH_PMU	38	O	Power supply
SD_CLK	39	O	SDIO clock
SD_CMD	40	I/O	SDIO command
SD_DATA0	41	I/O	SDIO data0
SD_DATA1	42	I/O	SDIO data1
SD_DATA2	43	I/O	SDIO data2
SD_DATA3	44	I/O	SDIO data3
SD_DET	45	I	SD card detection

Refer to the following application circuit:

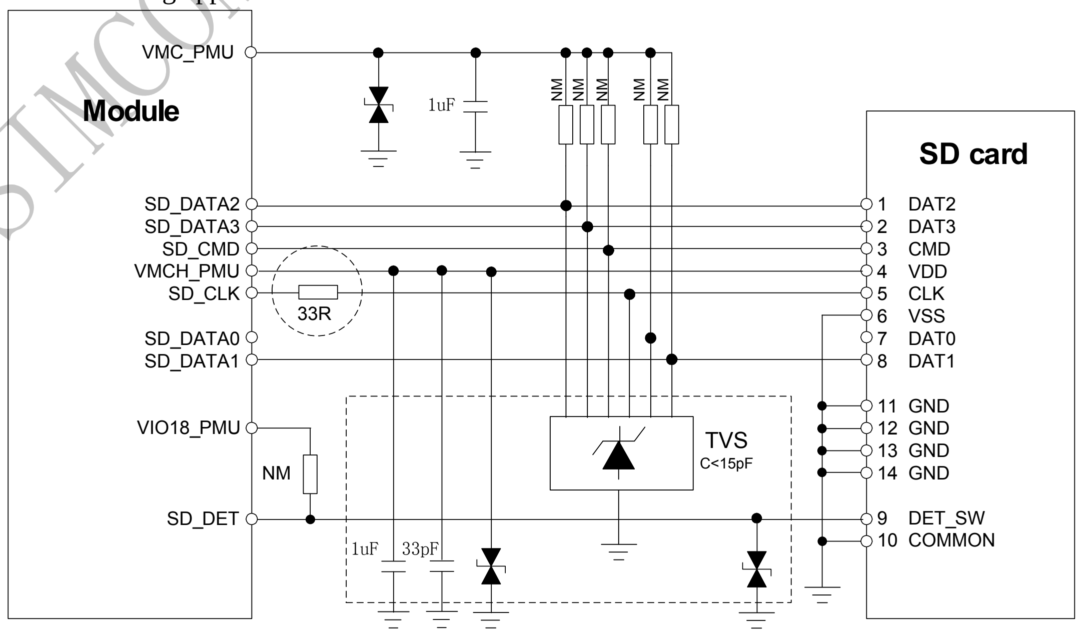


Figure 23: SD card reference circuit

4.9 LCD interface

SIM500 support LCM display with 3-lane MIPI interface, there is LCM_ID for different LCM compatible design. The landscape or portrait panel resolution is up to qHD (1280*800). The LCM interface is in the following table. MIPI differential impedance should be 100Ohm when routing.

MIPI voltage is 1.8V, ADC could be used as LCM_ID for different LCM compatible design. The interface definition is in the following table.

Table 9: LCM interface pin definitions

Name	Pin	I/O	Description
PWM	29	O	PWM control for external WLED driver
LCD_RST	49	O	LCM reset
LCD_TE	50	I	LCM frame alignment signal
MIPI_DSI_CLKN	52	O	LCM MIPI clock
MIPI_DSI_CLKP	53	O	
MIPI_DSI_L0N	54	O	LCM MIPI signal
MIPI_DSI_L0P	55	O	
MIPI_DSI_L1N	56	O	
MIPI_DSI_L1P	57	O	
MIPI_DSI_L2N	58	O	
MIPI_DSI_L2P	59	O	
ADC	128	AI	LCM ID
VIO18_PMU	125	O	Power supply
VIO28_PMU	129	O	Power supply

MIPI is a high-speed signal line. In order to avoid EMI interference, it is recommended to place the common mode inductance on the side near LCM. If the LCM only needs 2-lane, the LANE2 can be suspended. Reference circuit:

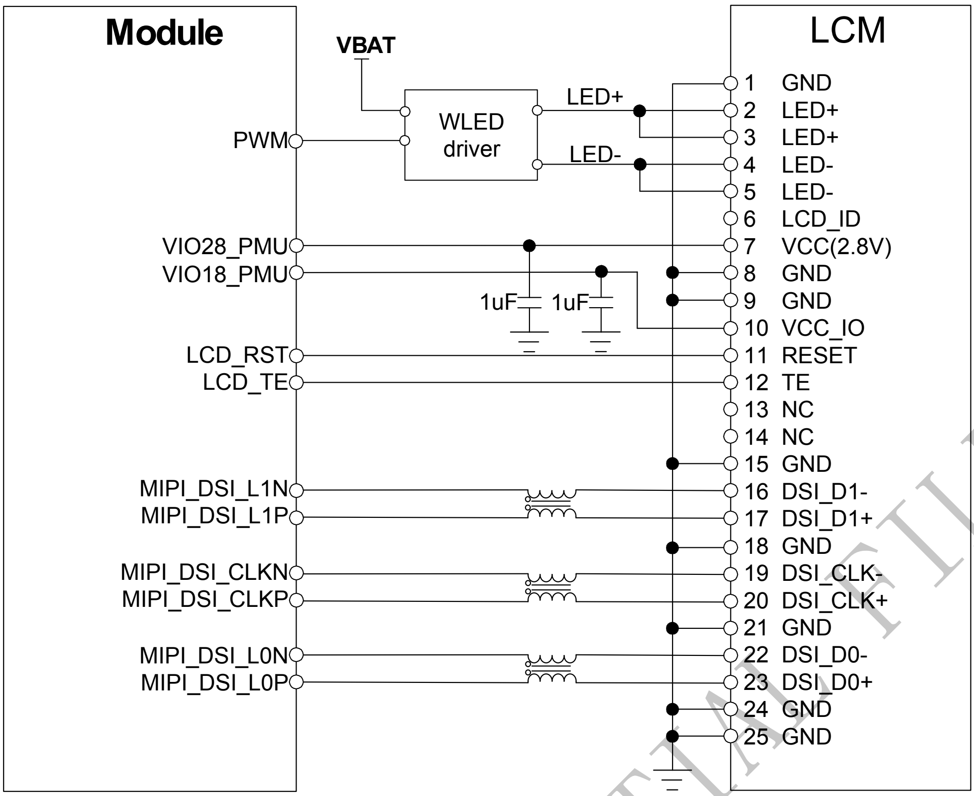


Figure 24: LCD reference circuit

Note: MIPI is a high-speed signal line. In the PCB routing stage, please follow the impedance and length requirements strictly. For detailed routing introduction, please refer to the chapter 5.2.4 MIPI

4.10 Touch panel interface

The module provides a set of I2C interfaces that can be used to connect capacitive touch panel and provide the required power supply and interrupt pin. The default interface pin of capacitive touch panel software as follows:

Table 10: Touch panel interface pin definitions1

Name	Pin	I/O	Description
CTP_I2C_SDA	48	I/O	Touch screen I2C data
CTP_I2C_SCL	47	O	Touch screen I2C clock
CTP_EINT	30	I	Touch screen interrupt
CTP_RST	31	O	Touch screen reset

Note : I2C requires external pull-up to VIO18_PMU, pull-up resistor 4.7Kohm.

4.11 Camera interface

SIM5800 supports two cameras:
2-lane MIPI_CSI primary camera up to 5MP resolution, Each group up to 1Gbps.
1-lane MIPI_CSI secondary camera up to 2MP resolution.

Table 11: Camera interface pin definitions

Pin Name	Pin	I/O	Description
CAM0_MCLK	74	O	Primary camera clock
CAM0_RST	79	O	Primary camera reset
CAM0_PWDN	80	O	Primary camera power down

MIPI_CSI0_CLKN	63	I	Primary camera MIPI
MIPI_CSI0_CLKP	64	I	
MIPI_CSI0_L0N	65	I	
MIPI_CSI0_L0P	66	I	
MIPI_CSI0_L1N	67	I	
MIPI_CSI0_L1P	68	I	
CAM_I2C_SCL	83	O	I2C clock of camera
CAM_I2C_SDA	84	I/O	I2C data of camera
CAM1_MCLK	75	O	Secondary camera clock
CAM1_RST	81	O	Secondary camera reset
CAM1_PWDN	82	O	Secondary camera power down
MIPI_CSI1_CLKN	70	I	Secondary camera MIPI
MIPI_CSI1_CLKP	71	I	
MIPI_CSI1_L0N	72	I	
MIPI_CSI1_L0P	73	I	
VCAMD_PMU	161	O	Digital power
VCAM_AF_PMU	162	O	Motor power of module
VCAMD_IO_PMU	163	O	I/O interface level
VCAMA_PMU	164	O	Analog power

The reference circuit of the primary camera is as follows:

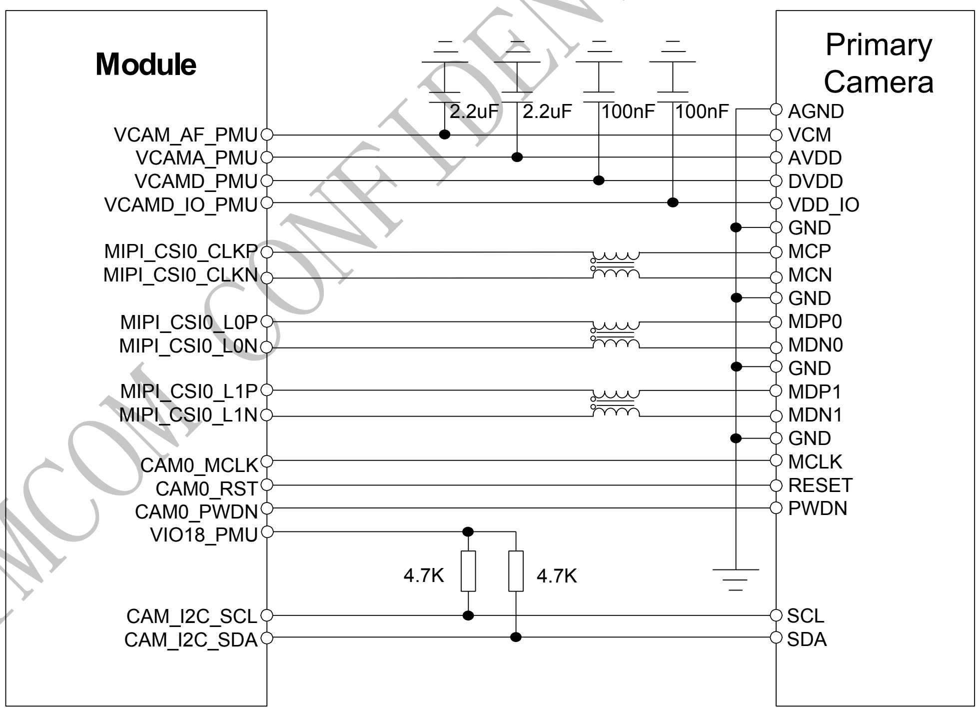


Figure 25: Primary camera reference circuit

4.12 Audio Interface

SIM5800 provides three microphone inputs and four outputs; the pin definition is shown in the following table:

Table 12: Pin Definition of the audio interface

Pin Name	Pin	I/O	Description

MIC1P	4	I	Microphone input , positive
MIC1N	5	I	Microphone input , negative
EAR_MICP	6	I	Ear_microphone input , positive
GND_EARMICN	7	P	Ear_microphone input , negative (GND)
MIC2P	178	I	Microphone input 2, positive
MIC2N	177	P	Microphone input 2, negative (GND)
MIC_BIAS0	175	P/O	Microphone bias of MIC1P/1N and MIC2P/2N
MIC_BIAS1	176	P/O	Microphone bias of EAR_MICP
REC_P	8	O	Receiver output positive
REC_N	9	O	Receiver output negative
SPK_P	10	O	Speaker output positive
SPK_N	11	O	Speaker output negative
HPH_R	136	O	Headphone output, right channel
HPH_L	138	O	Headphone output, left channel
HS_DET	139	I	Headphone detection

4.12.1 Receiver Interface

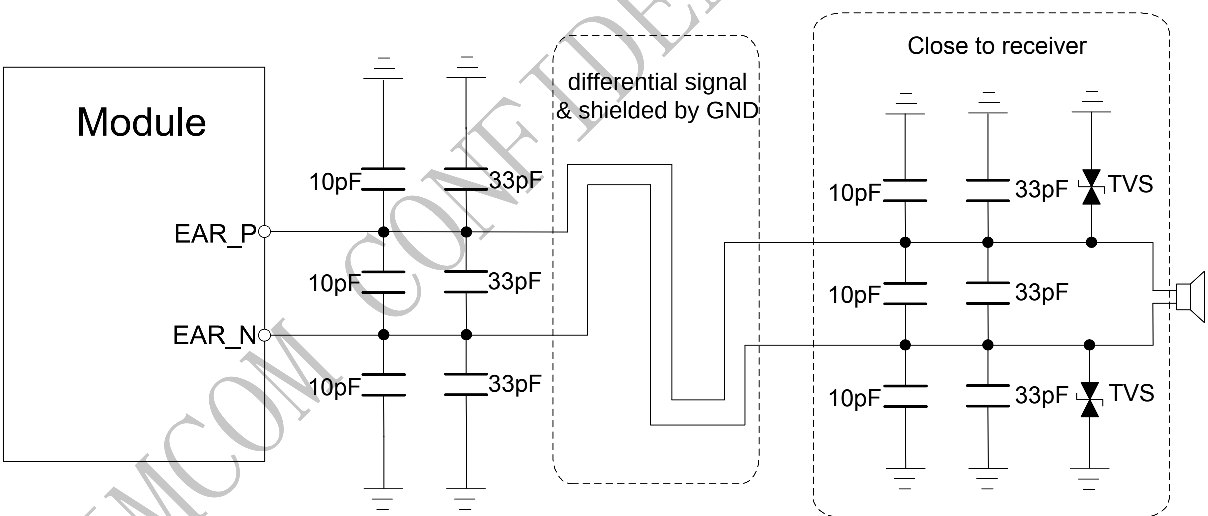


Figure 26: Receiver reference circuit

Table 13: Performance parameters of the receiver

Test Condition	Parameters	Min	Typ	Max	Unit
32 Ω load f = 1 kHz, 0 dB gain	Output power		85	-	mW
	SNR		92	-	dB(A)
	THD @Pout=10mW @Pout=50mW		-77 -74		dB
	THD+N @Pout=10mW @Pout=50mW		-76 -74		dB

16 Ω load f = 1 kHz, 0 dB gain	Output power		118	-	mW
	SNR		90	-	dB(A)
	THD @Pout=20mW @Pout=100mW		-74 -70		dB
	THD+N @Pout=20mW @Pout=100mW		-74 -70		dB

4.12.2 MIC Interface

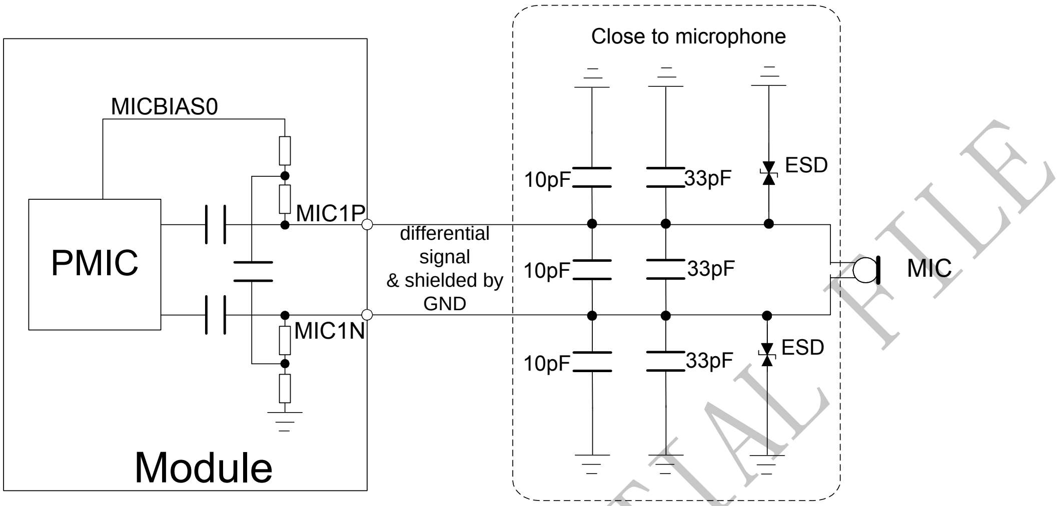


Figure 27: Reference citcuit of the MIC

4.12.3 Headset

Module integrated one way stereo headphone interface. Customers are advised to reserve ESD devices during the design phase to prevent ESD damage.

The 139 pin of the module is the interrupt pin, through which the user can realize the insert and pull out detection of the headset. Schematic diagram of headphone connection is as follows:

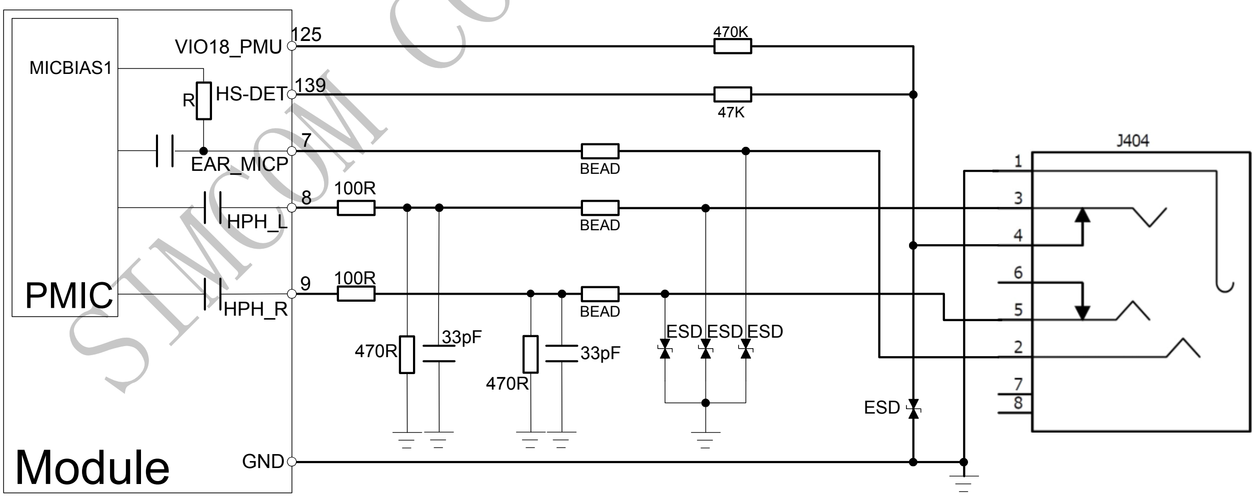


Figure 28: Reference circuit of headset

Note: the earphone seat in the figure is normally closed type. If the earphone seat used by the user is normally open type, please modify the detection circuit and software according to the actual pin.

Table 14: Performance parameters of the headset

Test Condition	Parameters	Min	Typ	Max	Unit
32 Ω load f = 1 kHz, 0 dB gain	Output power		22	-	mW
	SNR		90	-	dB(A)
	THD @Pout=2mW @Pout=10mW @Pout=22mW		-80 -79 -60		dB
	THD+N @Pout=2mW @Pout=10mW @Pout=22mW		-78 -78 -58		dB
16 Ω load f = 1 kHz, 0 dB gain	Output power		33	-	mW
	SNR		93	-	dB(A)
	THD @Pout=2mW @Pout=10mW @Pout=22.5mW		-80 -78 -78		dB
	THD+N @Pout=2mW @Pout=10mW @Pout=22.5mW		-76 -77 -77		dB

4.12.4 Speaker Interface

The module is integrated with a Class-D audio amplifier. Parameters are shown in the following table:

Table 15: Performance parameters of the speaker

Parameters	Test Condition	Min	Typ	Max	Unit
Power	8 Ω load, VBAT= 4.2 V THD+N=1%		900	-	mW
	8 Ω load, VBAT= 3.8 V THD+N=1%		700	-	mW
	8 Ω load, VBAT= 3.4 V THD+N=1%		500	-	mW
	8 Ω load, VBAT= 4.2 V THD+N=10%		1100		mW
	8 Ω load, VBAT= 3.8 V THD+N=10%		850		mW
	8 Ω load, VBAT= 3.4 V THD+N=10%		600	-	mW
THD+N (1 kHz)	Pout=0.5Wrms VBAT=4.2V	-	0.1	0.2	%
	Pout=0.4Wrms VBAT=3.8V	-	0.1	0.2	%
	Pout=0.3Wrms VBAT=3.4V	-	0.1	0.2	%
Efficiency	VBAT=4.2V 0.5W 8Ω 68uH 1kHz		85		%
	VBAT=3.8V 0.5W 8Ω 68uH 1kHz		85		%
Static current			5	-	mA

Reference circuit is follow:

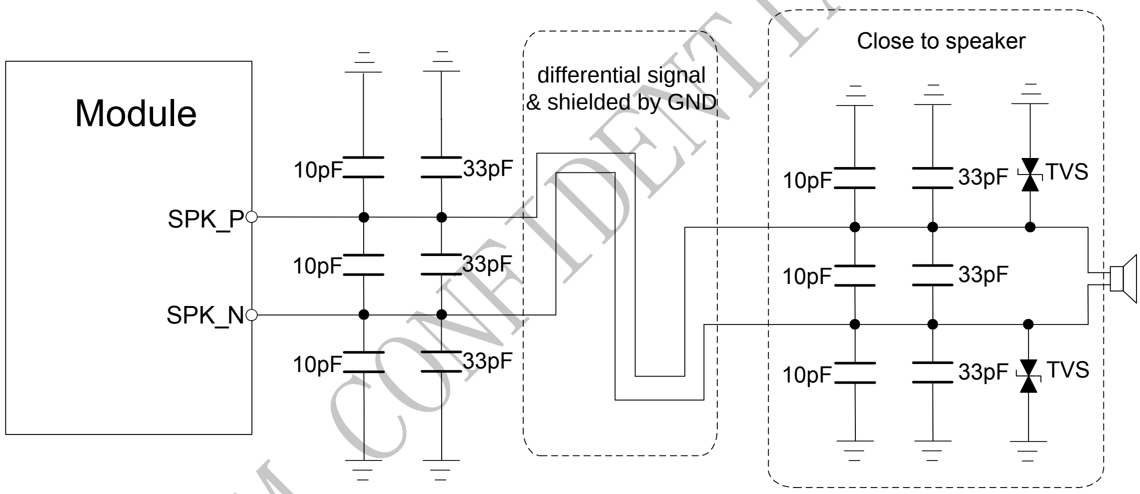


Figure 29: Reference circuit of the speaker

4.12.5 Microphone Bias

The module provides two-channel microphone bias voltage output: MIC_BIAS0 and MIC_BIAS1. Users can supply power to external silicon microphones. The output voltage can be set to 1.9v, 2.0v, 2.1v and 2.2v through the software. The default voltage is 1.9v.

The internal block diagram is following:

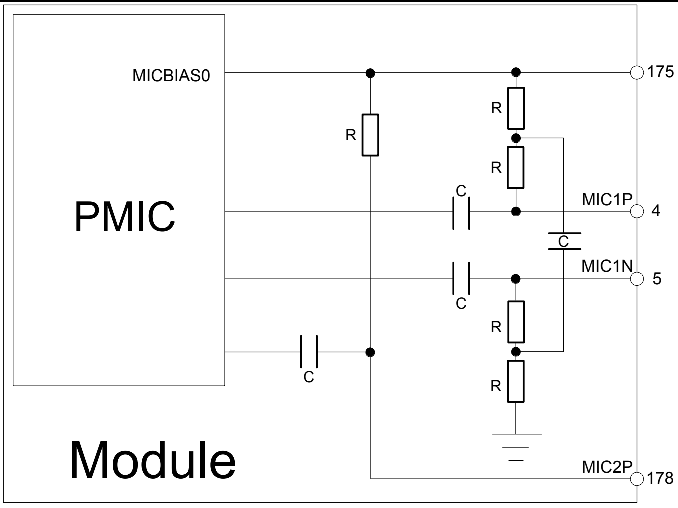


Figure 30: MICBIAS0 Internal Circuit

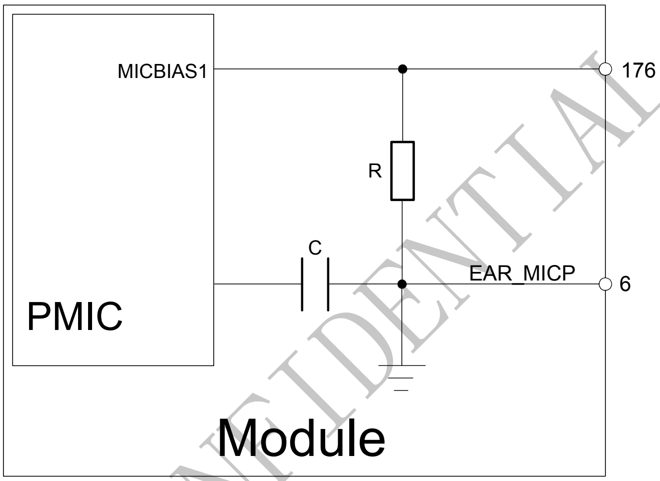


Figure 31: MICBIAS1 Internal Circuit

4.13 USIM Card

SIM5800 supports dual cards dual standby, and card presence detection.

Table 16: Pin definitions of the USIM

Pin Name	Pin	I/O	Description
USIM2_DET	17	I	USIM2 presence detection
USIM2_RST	18	O	USIM2 reset
USIM2_CLK	19	O	USIM2 clock
USIM2_DAT	20	I/O	USIM2 data
USIM2_VDD	21	P	USIM2 power
USIM1_DET	22	I	USIM1 presence detection
USIM1_RST	23	O	USIM1 reset
USIM1_CLK	24	O	USIM1 clock
USIM1_DAT	25	I/O	USIM1 data
USIM1_VDD	26	P	USIM1 power

Reference circuit of the USIM is following:

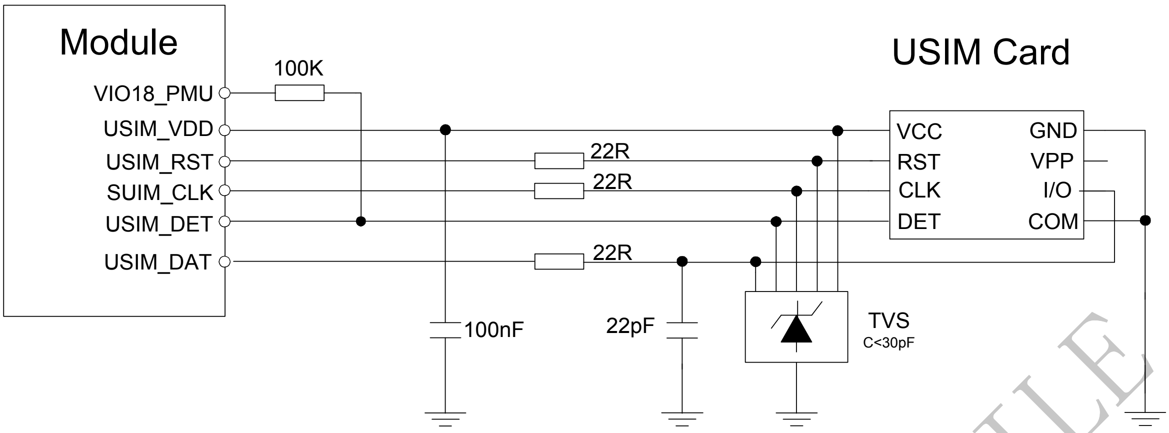


Figure 32: USIM reference circuit

4.14 ADC

SIM5800 provides one 12bits ADC. Its performance parameters are following:

Table 17: ADC performance parameters

Parameter	Min	Typ	Max	Unit
Input voltage range	0.1	-	1.8	V
Resolution	-	12	-	bits

4.15 Motor Interface

SIM5800 provides one motor interface (VIB_DRV), the pin connect to motor positive, motor negative connect to GND. The software programmable range is 1.2~ 3.3v.

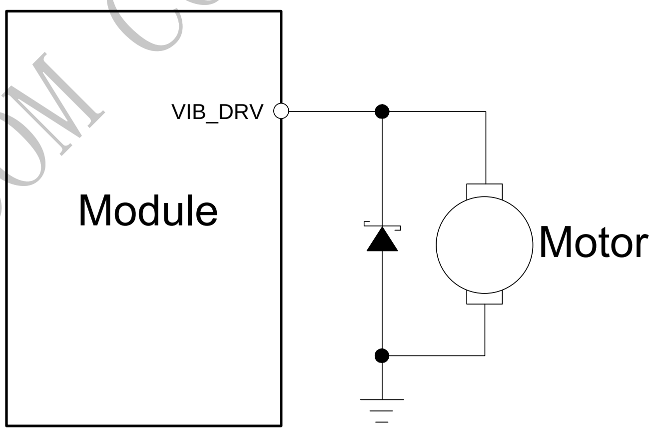


Figure 33: Motor reference circuit

4.16 ISINK

Table 18: ISINK parameters

Pin name	Pin NO	Current Range	Setp	Unit
ISINK0	104	4~24	4	mA

ISINK1	103	4~24	4	mA
ISINK2	102	4~24	4	mA
ISINK3	101	4~24	4	mA

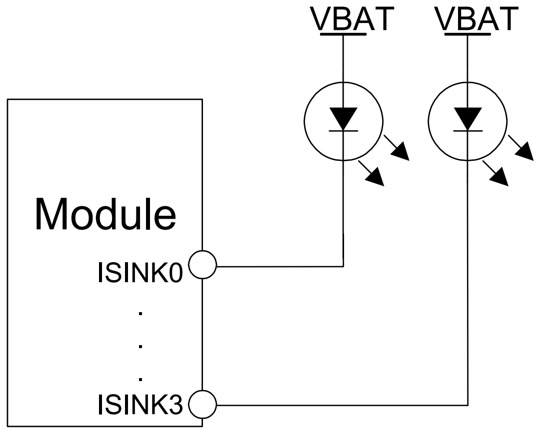


Figure 34: ISINK reference ciruit

4.17 GPIO

SIM5800 default provides 16 GPIO pins. All GPIOs can be configured as inputs or outputs, pull-up or pull-down. The GPIOs are shown following table:

Table 19: GPIO interface definition

Pin name	Pin No.	Default status	Default function
GPIO69	90	Pull down	KPROW0
GPIO11	93	Pull down	GPIO
GPIO12	94	Pull down	GPIO
GPIO65	96	Pull down	KPROW1
GPIO18	97	Pull down	GPIO
GPIO19	98	Pull down	GPIO
GPIO20	99	Pull up	GPIO
GPIO21	100	Pull down	GPIO
GPIO84	106	/	GPIO
GPIO83	107	/	GPIO
GPIO82	108	Pull down	GPIO
GPIO81	109	Pull down	GPIO
GPIO1	116	Pull down	GPIO
GPIO0	117	Pull down	GPIO
GPIO3	118	Pull down	GPIO
GPIO2	119	Pull down	GPIO

GPIO has multiplex function, customers can use it as needed, please refer to the detailed list of multiplex function "错误！未找到引用源。"

4.18 Keypad interface

Module support button function, software default Keypad mode, No recommended to used GPIO interrupt mode to detect the keypad.
The module has the following three pins that can be used as the keypad:

Table 20: Keypad interface

Pin Name	Pin	I/O	Description
USB_BOOT	46	I	KPCOL0
GPIO69	90	O	KPROW0
GPIO65	96	O	KPROW1

Recommended keypad circuit is as the following:

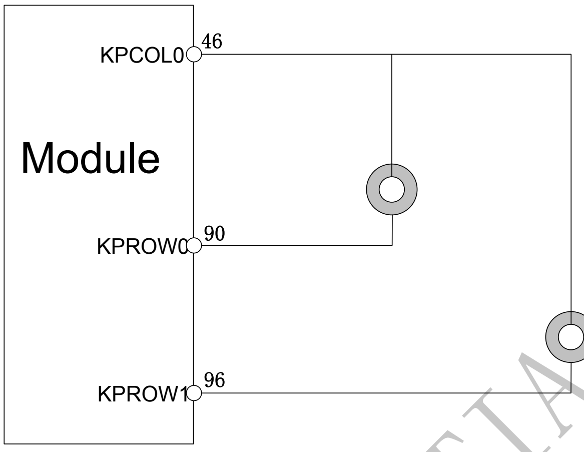


Figure 35: Keypad reference circuit

4.19 Antenna Interface

SIM5800 provides three antenna interfaces including MAIN antenna, GNSS antenna, and WiFi/BT antenna. To ensure good RF performance, users should meet the following requirements:

- Keep the RF traces at 50 .
- Maintain a complete and continuous reference ground plane from antenna pin to the RF connector.
- The RF traces should be away from any other noisy traces.
- Keep the RF traces as short as possible.

4.19.1 MAIN Antenna reference circuit

The recommended circuit is shown as Figure 36:

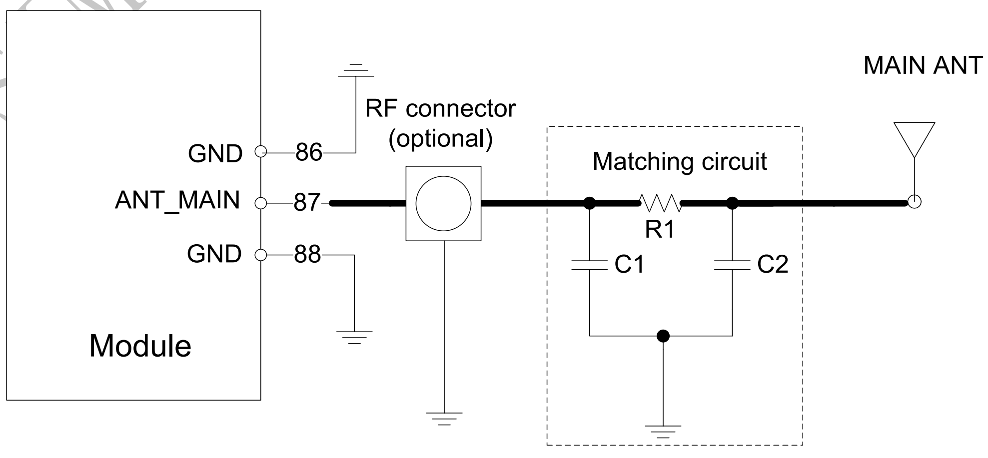


Figure 36: MAIN antenna recommended circuit

R1, C1 and C2 are antenna matching components in Figure 36, the value of these components are determined according to the antenna tuning results. By default, R1 is 0Ω, C1 and C2 are reserved. The RF connector in Figure 36 is used to ensure the accuracy and convenience of the conduction testing, so SIMCOM suggest keeping it. If considering Low-Cost BOM, user can cancel the connector.

4.19.2 GNSS Antenna reference circuit

The recommended circuit is shown as Figure 37:

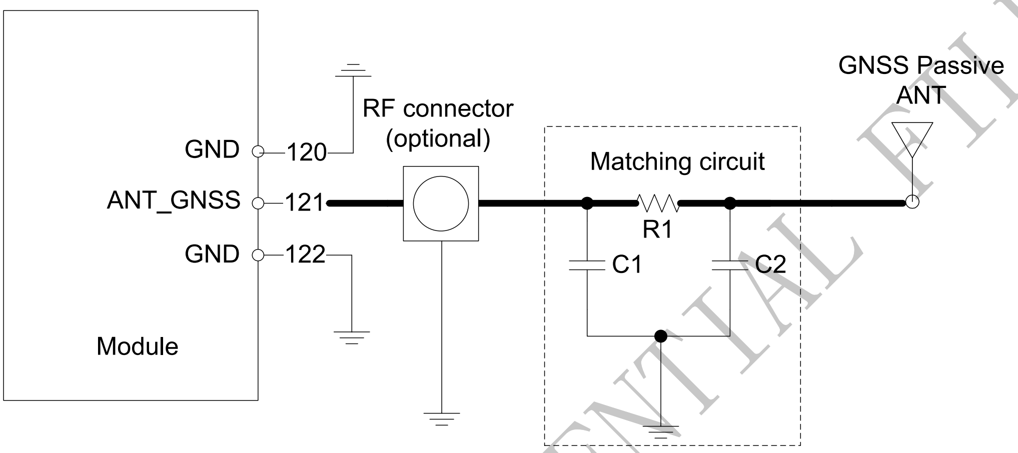


Figure 37: GNSSantenna recommended circuit

R1, C1 and C2 are antenna matching components in Figure 37, the value of these components are determined according to the antenna tuning results. By default, R1 is 0Ω, C1 and C2 are reserved. The RF connector in Figure 37 is used to ensure the accuracy and convenience of the conduction testing, so SIMCOM suggest keeping it. If considering Low-Cost BOM, user can cancel the connector.

The module has internal LAN, so there is no need for external active antenna. But if the antenna is far away the module and need a long cable to connect, users can use external active antenna, the recommended circuit is shown Figure 38:

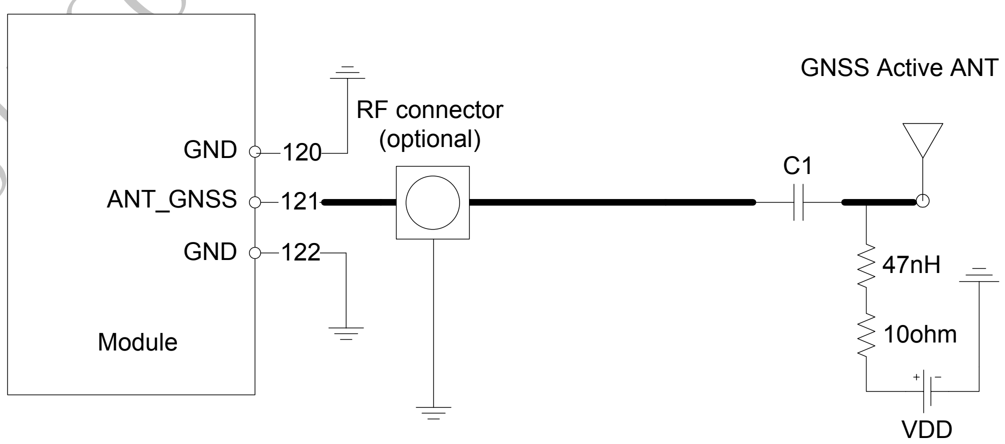


Figure 38: GNSS active antenna circuit

In Figure 38, the VDD is used to provide voltage to the external active antenna and its value should be taken according to antenna characteristic; C1 is used for DC blocking and its value is 33pF by default; the RF connector is used to ensure the accuracy and convenience of the conduction testing, if considering LOW-Cost BOM, users can cancel it.

4.19.3 WIFI/BT antenna

The recommended circuit is shown as Figure 39:

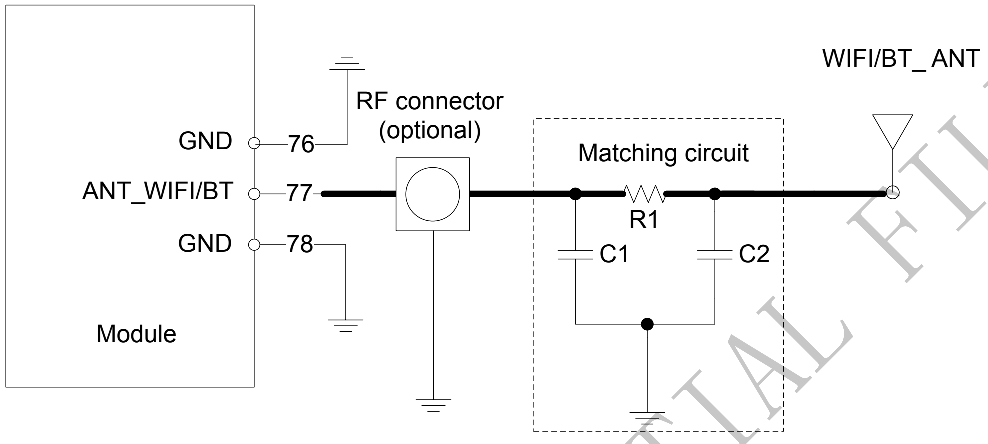


Figure 39: WiFI/BT antenna recommended circuit

R1, C1 and C2 are antenna matching components in , the value of these components are determined according to the antenna tuning results. By default, R1 is 0Ω, C1 and C2 are reserved. The RF connector is used to ensure the accuracy and convenience of the conduction testing, so SIMCOM suggest keeping it. If considering Low-Cost BOM, user can cancel the connector.

5. PCB Layout Guide

Usually, most electronic products with good performance are based on good PCB layout. A bad PCB layout will lead to lots of issues, like TDD noise, SIM card can not be detected, etc. The final solution for these problems is to redo PCB layout. Making good PCB layout at beginning will save development schedule and cost as well.

This section as below will give some guidelines on PCB layout.

5.1 Stack-up Options

At least, 4-layer through-hole PCB should be chosen for good impedance control and signal shielding.

5.2 PCB Layout

Key points to note in the PCB layout phase:

5.2.1 RF Trace

- RF connector should be placed close to the module's antenna pin.
- Antenna matching circuit should be placed close to the antenna.
- Keep the RF traces at 50Ω.
- Maintain a complete and continuous reference ground plane from antenna pin to the RF connector.
- The RF traces should be far away from any other noisy traces.
- Keep the RF traces as short as possible.
- If using a coaxial RF cable to connect the antenna, please avoid spanning on UIM cards, power circuits and high-speed digital circuits to minimize the impact of each other.

5.2.2 POWER/GND

- Both VBAT and return path should be as short and wide as possible .
- The VBAT current should go through Zener diode, capacitors, then VBAT pins
- Must have a solid ground plane throughout the board as the primary reference plane for most signals

5.2.3 USIM

- Ensure UIM card holder is far way from antenna or RF signal
- ESD component and bypass caps should be placed closed to UIM Card
- UIM card signals should be far away from other high-speed signal

5.2.4 MIPI

- Protect MIPI_DSI/CSI signals from noisy signals (clocks, SMPS, etc.)
- Differential pairs, 100 Ω nominal, ±10%
- Total routing length < 305 mm
- Intra-pair length matching < 5 ps (0.67 mm)
- Inter-pair length matching < 10 ps (1.3 mm)
- Lane-to-lane trace spacing = 3x line width
- Spacing to all other signals = 4x line width
- Maintain a solid ground reference for clocks to provide a low-impedance path for return currents
- Each trace needs to be next to a ground plane
- Minimize the number of via on the trace

About the length, please refer to the inner length of module in the following table to achieve the above requirements:

Table 21: Line length of MIPI inside the module

Pin	Signal	Length(mm)	Error in length（P-N）
52	MIPI_DSI_CLKN	12.04	0.14
53	MIPI_DSI_CLKP	12.18	
54	MIPI_DSI_L0N	12.98	0.42
55	MIPI_DSI_L0P	13.40	
56	MIPI_DSI_L1N	12.48	-0.55
57	MIPI_DSI_L1P	11.93	
58	MIPI_DSI_L2N	13.50	-0.11
59	MIPI_DSI_L2P	13.39	
63	MIPI_CSI0_CLKN	18.78	0.33
64	MIPI_CSI0_CLKP	19.11	
65	MIPI_CSI0_L0N	18.90	0.48
66	MIPI_CSI0_L0P	19.38	
67	MIPI_CSI0_L1N	19.63	0.56
68	MIPI_CSI0_L1P	20.19	
70	MIPI_CSI1_CLKN	22.89	-0.52
71	MIPI_CSI1_CLKP	22.37	
72	MIPI_CSI1_L0N	23.71	-0.32
73	MIPI_CSI1_L0P	23.39	

5.2.5 USB

- 90 Ω differential, ± 10% trace impedance
- Differential data pair matching < 6 mm
- External components should be located near the USB connector.
- Should be routed away from sensitive circuits and signals.
- If there are test points, place them on the trace to keep branches as short as possible
- If USB connector is used as the charger input, USB_VBUS node must be routed to the module using extremely wide traces or sub planes.

About the length, please refer to the inner length of module in the following table to achieve the above requirements:

Table 22: Line length of USB inside the module

Pin	Signal	Length(mm)	Error Length（P-M）
13	USB_DM	47.46	0.15
14	USB_DP	47.61	

5.2.6 SD

- Protect other sensitive signals/circuits from SDC corruption.
- Protect SDC signals from noisy signals (clocks, SMPS, etc.).
- Up to 200 MHz clock rate
- 50 Ω nominal, ±10% trace impedance
- CLK to DATA/CMD length matching < 1 mm
- 30–35 Ω termination resistor on clock lines near the module

- Total routing length < 50 mm recommended
- Spacing to all other signals = 2x line width
- Bus capacitance < 15 pF

Table 23: Line length of SD inside the module

Pin	Signal	Length(mm)
39	SD_CLK	14.24
40	SD_CMD	15.19
41	SD_DATA0	14.87
42	SD_DATA1	13.63
43	SD_DATA2	12.90
44	SD_DATA3	13.05

5.2.7 Audio

- Isolate from noise sources such as antenna, RF signals, SMPS, clocks, and other digital signals with fast transients.
- All audio signal should away from the VBAT backflow path.
- Differential route for MIC1P with MIC1N, EAR_MICP with GND_EARMIC, REC_P with REC_N and SPK_P with SPK_N.
- HPH output signals – not a differential pair; GND isolation between L and R
- SPKR output signals – route as differential pair with 20 mil trace widths with 8 Ω load.

6. Electrical and Reliabilit

6.1 Absolute Maximum Rating

Absolute maximum ratings reflect the stress levels that, if exceeded, may cause permanent damage to the device. Functionality and reliability are only guaranteed within the operating conditions.

Table 24: Absolute maximum ratings

Parameter	Description	Min	Max	Unit
VBAT	Power supply	-0.3	4.5	V
VBUS	USB 5V Power supply	-0.3	7	V
VRTC		-	3.5	V

6.2 Temperature Range

Table 25: Temperaturerange

Parameter	Min	Typ	Max	Unit
Operating temperature	-25	25	+75	℃
Storage temperature	-45		+90	℃

6.3 Operating Voltage

Table 26: Operating voltage

Parameter	Min	Typ	Max	Unit
VBAT	3.4	3.9	4.4	V
VBUS	4.35	5	5.5	V
V_RTC	2.0	3.0	3.25	V

6.4 Digital-logic Characteristics

Table 27: GPIO characteristics

Parameter	Description	Min	Typ	Max	Unit
V_{IH}	High-level input voltage	0.65*VDDIO	-	-	V
V_{IL}	Low-level input voltage	-	-	0.35*VDDIO	V
V_{OH}	High-level output voltage	VDDIO-0.45	-	-	V
V_{OL}	Low-level output voltage	-	-	0.45	V

VDDIO Please refer to "Power domain" in the Table 2:

Table 28: USIM interface characteristics（USIM_VDD=1.8V or 2.95V）

Parameter	Description	Min	Typ	Max	Unit
V_{IH}	High-level input voltage	0.7* USIM_VDD	-	USIM_VDD+0.3	V
V_{IL}	Low-level input voltage	-0.3	-	0.2* USIM_VDD	V
V_{OH}	High-level output voltage	0.8*USIM_VDD	-	USIM_VDD	V

V_{OL}	Low-level output voltage	0	-	0.4	V

Table 29: SD interface characteristics（VMCH_PMU=1.8V）

Parameter	Description	Min	Typ	Max	Unit
V_{IH}	High-level input voltage	1.27	-	2	V
V_{IL}	Low-level input voltage	-0.3	-	0.58	V
V_{OH}	High-level output voltage	1.4	-	-	V
V_{OL}	Low-level output voltage	0	-	0.45	V

Table 30: SD interface characteristics（VMCH_PMU=2.95V）

Parameter	Description	Min	Typ	Max	Unit
V_{IH}	High-level input voltage	0.625* VMCH_PMU	-	VMCH_PMU +0.3	V
V_{IL}	Low-level input voltage	-0.3	-	0.25* VMCH_PMU	V
V_{OH}	High-level output voltage	0.75* VMCH_PMU	-	VMCH_PMU	V
V_{OL}	Low-level output voltage	0	-	0.125* VMCH_PMU	V

6.5 PWRKEY characteristics

Table 31: PWRKEY characteristics

Parameter	Description	Min	Typ	Max	Unit
V_{IH}	High-level input voltage	1.4	-	-	V
V_{IL}	Low-level input voltage	-	-	0.6	V

6.6 VRTC Characteristics

Table 32: VRTC Characteristics

Parameter	Description	Min	Typ	Max	Unit
$VRTC_{-IN}$	VRTC Power input	2.0	3.0	3.25	V
I_{RTC-IN}	VRTC current consumption（VBAT=0V）	-	5	10	uA
$VRTC_{-OUT}$	VRTC Power output	2.5	3.1	3.2	V
$I_{RTC-OUT}$	VRTC current output	-		2	mA

6.7 Current Consumption (VBAT=3.9V)

Table 33: Current consumption (TBD)

Parameter	Description	Min	Typ	Max	Unit
Leakage current	Off mode		TBD		uA
Standby current	Flight mode		TBD		mA
	GSM: BS-PA-MFRMS=9 BS-PA-MFRMS=5 BS-PA-MFRMS=2		TBD		 mA mA mA
	WCDMA, DRX=8		TBD		mA
Peak current				3.0	A

6.8 Electro-Static Discharge

Electrostatic discharge (ESD) occurs naturally in laboratory and factory environments. An established high-voltage potential is always at risk of discharging to a lower potential. If this discharge path is through a semiconductor device, it may result in destructive damage.

SIM5800 must be handled according to the ESD Association standard: ANSI/ESD S20.20-1999, Protection of Electrical and Electronic Parts, Assemblies, and Equipment.

Table 34: ESD performance parameters （Temperature: 25℃, Humidity: 45%）

Pin	Contact discharge	Air discharge
VBAT	TBD	TBD
GND	TBD	TBD
天线接口	TBD	TBD
PWRKEY	TBD	TBD

6.9 Module Operating Frequencies

Table 35: Module operating frequencies

Frequency	Receive	Transmit	Physical channel
GSM850	869-8954MHz	824-869MHz	128-151
EGSM900	925-960MHz	880-915MHz	0-124, 975-1023
DCS1800	1805-1880MHz	1710-1785MHz	512-885
PCS1900	925-960MHz	880-915MHz	512-810
WCDMA B1	2110-2170 MHz	1920-1980 MHz	TX: 9612-9888 RX: 10562-10838
WCDMA B2	1930~1990MHz	1850~1910MHz	TX: 9262-9538 RX: 9662-9938
WCDMA B5	824~ 849MHz	869~ 894MHz	TX: 4132-4233 RX: 4357-4458
WCDMA B8	925-960MHz	880-915 MHz	TX: 2712-2863 RX: 2937-3088

6.10 RF Characteristics

Table 36: Conducted transmission power

Band	Power	Min

GSM850	33dBm ±2dB	5dBm ±5dB
E-GSM900	33dBm ±2dB	5dBm ±5dB
DCS1800	30dBm ±2dB	0dBm ±5dB
DCS1900	30dBm ±2dB	0dBm ±5dB
GSM850 (8-PSK)	27dBm ±3dB	5dBm ±5dB
E-GSM900 (8-PSK)	27dBm ±3dB	5dBm ±5dB
DCS1800 (8-PSK)	26dBm +3/-4dB	0dBm ±5dB
DCS1900 (8-PSK)	26dBm +3/-4dB	0dBm ±5dB
WCDMA B1	24dBm +1/-3dB	<-50dBm
WCDMA B2	24dBm +1/-3dB	<-50dBm
WCDMA B5	24dBm +1/-3dB	<-50dBm
WCDMA B8	24dBm +1/-3dB	<-50dBm

6.11 Module Receiving Sensitivity

Table 37: Conducted receiving sensitivity

Band	Receiving sensitivity（Typ）	Receiving sensitivity（Max）
GSM850	< -108dBm	3GPP standard
E-GSM900	< -108dBm	3GPP standard
DCS1800	<-109 dBm	3GPP standard
DCS1900	<-109 dBm	3GPP standard
WCDMA B1	<-109 dBm	3GPP standard
WCDMA B2	<-109 dBm	3GPP standard
WCDMA B5	<-109 dBm	3GPP standard
WCDMA B8	<-109 dBm	3GPP standard

6.12 WIFI Main RF Characteristics

Table 38: WIFI Main RF Characteristics

Transmission performance				
	802.11B	802.11G	802.11N	
Output power	17	15	12	dBm
EVM	20%	-25	-27	dB
Receiving performance				
	802.11B	802.11G	802.11N	
Receiving sensitivity	-89	-74.5	-72.5	dBm

6.13 BT Main RF Characteristics

Table 39: BT Main RF Characteristics

Output performance				
	DH5	2DH5	3DH5	
Output power	9	7	7	dBm
Receiving performance				
Receiving sensitivity	DH5	2DH5	3DH5	
	-90	-80	-80	dBm

6.14 GNSS Main RF Characteristics

Table 40: GNSS Main RF Characteristics

Receiver type	GPS,GLANOSS,BEIDOU	
CNo	39dB/Hz@-130dBm	
Sensitivity	Tracking & Navigation	-160dBm
	Reacquisition	-156dBm
	Cold start	-148dBm
TTFF	Cold start	<35s
	Warm start	<15s
	Hot start	<5s

Contact us:

Shanghai SIMCom Wireless Solutions Limited.

Address: Building B, No.633 Jinzhong Road, Changning District, Shanghai P.R.China 200335
Tel: +86 21 3157 5100\3157 5200
Email: simcom@simcom.com
Website: www.simcom.com