L306 Mini PCIe User Manual

GSM/WCDMA Series

Version： V1.0

Date： 2017-01-12

Shanghai Mobiletek Communication Ltd

Notice

Some features of the product and its accessories described herein rely on the software installed, capacities and settings of local network, and therefore may not be activated or may be limited by local network operators or network service providers.Thus, the descriptions herein may not exactly match the product or its accessories which you purchase.Shanghai Mobiletek Communication Ltd reserves the right to change or modify any information or specifications contained in this manual without prior notice and without any liability.

Copyright

DISCLAIMER

ALL CONTENTS OF THIS MANUAL ARE PROVIDED “AS IS”. EXCEPT AS REQUIRED BY APPLICABLE LAWS, NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDINGBUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE MADE IN RELATION TO THE ACCURACY, RELIABILITY OR CONTENTS OF THIS MANUAL.TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL SHANGHAI MOBILETEKCOMMUNICATION LTD BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, OR LOSS OF PROFITS, BUSINESS, REVENUE, DATA, GOODWILL SAVINGS OR ANTICIPATED SAVINGS REGARDLESS OF WHETHER SUCH LOSSES ARE FORSEEABLE OR NOT.

Version History

Date	Version	Modify records	Author
2017-01-12	V1.0	Initial version	Rongchun.Dong

CONTENT

1. Summary of command

Terms and Abbreviations

Table 1-1 Abbreviation

Abbreviation	Description
AP	Another name of DTE
BER	Bit Error Rate
DL	Downlink
DPCH	Dedicated Physical Channel
ESD	Electro-Static discharge
GPRS	General Packet Radio Service
GSM	Global Standard for Mobile Communications
I/O	Input/output
LED	Light Emitting Diode
SMT	Surface Mount Technology
UMTS	Universal Mobile Telecommunication System
WCDMA	Wideband Code Division Multi Access
EDGE	Enhanced data rates for GSM evolution

2. Introduction

L306 Mini PCIe is a small UMTS/HSPA+ module, with stable and reliable performance. It supports UMTS/HSDPA/HSUPA900(850)/2100(1900) and can be completely compatible with existing GSM/GPRS/EDGE networks.

2.1 Hardware Diagram

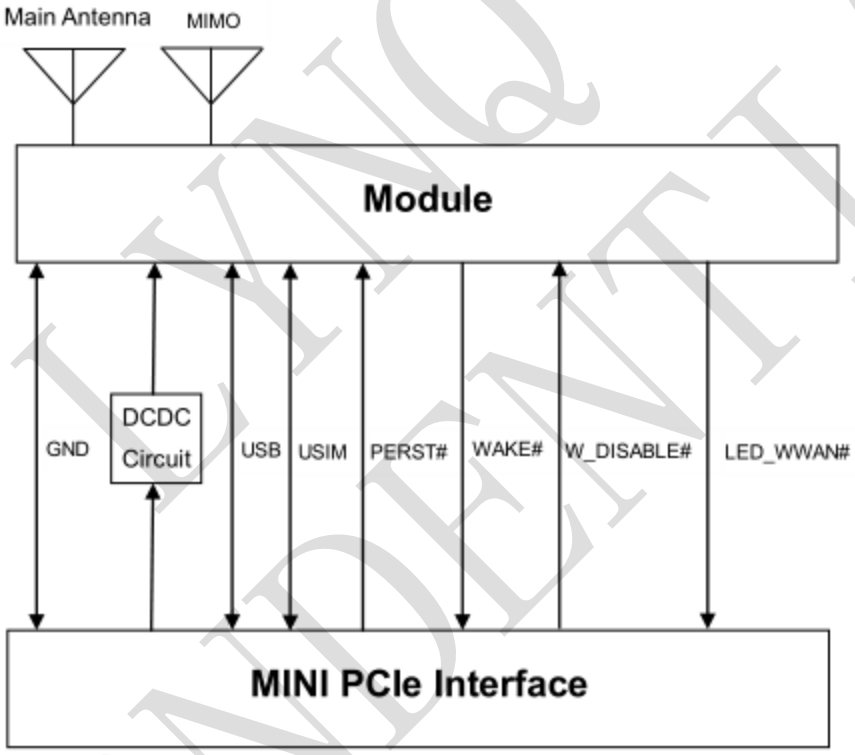

Figure 2-1 L306 Mini PCIe functional architecture

2.2 Main features

- **Processor**

MT6280

- **L306 Mini PCIe series frequency bands**

Standard	Frequency	L306E Mini PCIe	L306A Mini PCIe	L306ME Mini PCIe	L306MA Mini PCIe	L306HE Mini PCIe	L306HA Mini PCIe
GSM	GSM850 MHZ	●	●	●	●	●	●
	EGSM900 MHZ	●	●	●	●	●	●
	DCS1800 MHZ	●	●	●	●	●	●
	PCS1900 MHZ	●	●	●	●	●	●
WCDMA	UMTS850 MHZ		●		●		●
	UMTS900 MHZ	●		●		●	
	UMTS1900 MHZ		●		●		●
	UMTS2100 MHZ	●		●		●	
HSPA	HSDPA(1)	●	●	●	●	●	●
	HSUPA(1)	●	●	●	●	●	●

(1)L306E(A)/L306ME(A)/L306HE(A) Mini PCIe support different Version of HSPA , Please Reference Table 6-4 Data link.

2.3 Specifications

- Supply Voltage Range：3.0～3.6V （type3.3V）
- Dimensions：51mm * 31mm * 5.43mm
- Package：52-pin Mini PCIe
- Operation Temperature Range：-40℃～+85℃
- Storage Temperature Range：-45℃～+90℃

2.4 Interfaces

- SIM： Support 1.8V/3V
- UART： High speed UART
- USB 2.0： High Speed ,480Mbps
- PCM：Digital audio interface(optional)
- IIC(optional)
- Analog voice interface(default)
- Network indicator interface

3. Package Information

3.1 Pin Configuration

The pin order of the L306 Mini PCIe interface is shown in Figure 3-1.

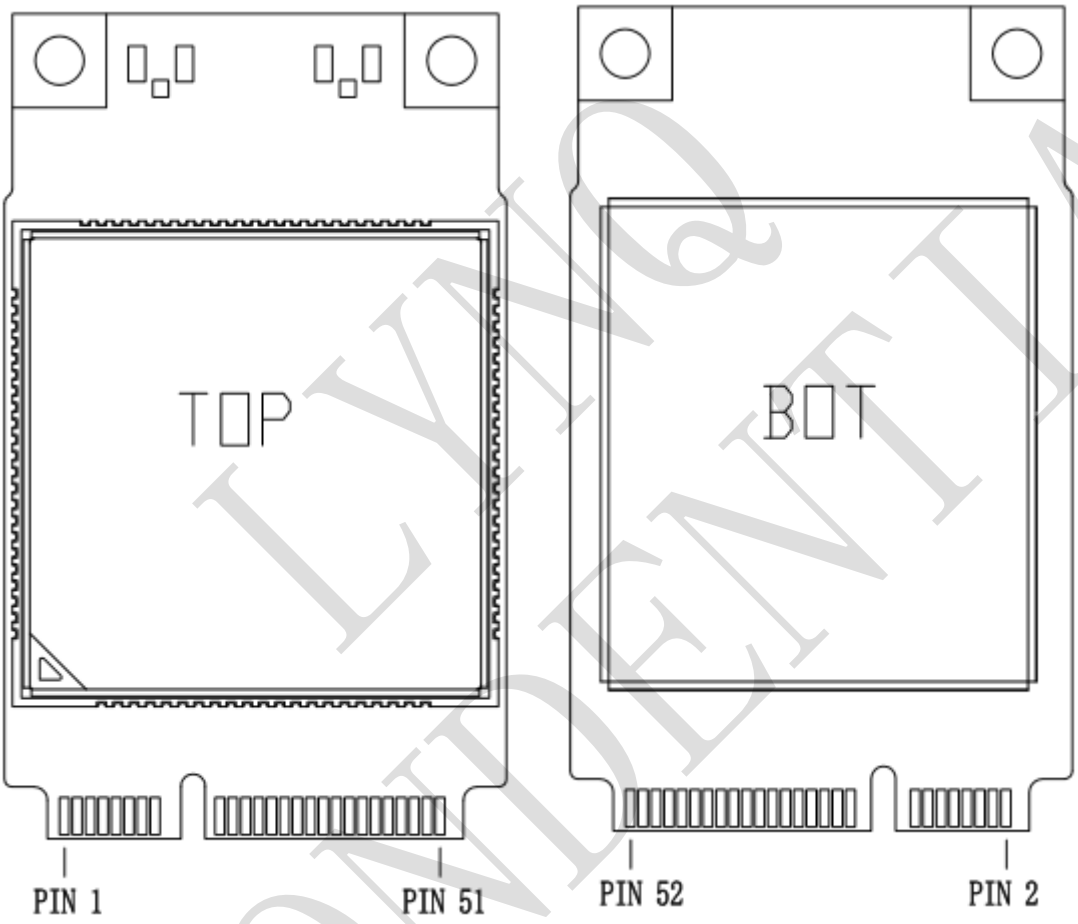

Figure 3-1 L306 Mini PCIe Pin Configuration

3.2 Pin definition

L306 Mini PCIe has 52 pins, the specific interface functions are as follows.

Table 3-1 Standard Mini PCIe Pin description(no codec)

Pin NO.	L306 Mini PCIe Pin name	Type	Function Description	Power domain	Standard Mini PCIe Pin name	Notes
1	WAKE#	I/O	Wake-up host signal	DVDD18	WAKE#	Low active
2	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
3	NC				COEX1	
4	GND	G	GND		GND	
5	RESERVED				COEX2	
6	NC				1.5V	
7	RESERVED				CLKREQ#	
8	UIM_PWR	P	USIM output voltage	1.8/3.0V	UIM_PWR	
9	GND	G	GND		GND	
10	UIM_DATA	I/O	USIM data	DVDD18	UIM_DATA	
11	UART0_RX	DI	UART0 receive data input	DVDD18	REFCLK-	
12	UIM_CLK	O	USIM clock	DVDD18	UIM_CLK	
13	UART0_TX	DO	UART0 transmit output	DVDD18	REFCLK+	
14	UIM_RESET	O	USIM reset	DVDD18	UIM_RESET	
15	GND	G	GND		GND	
16	NC		NC		UIM_VPP	
17	UART0_RING	DO	UART0 ring indicator	DVDD18	RESERVED	
18	GND	G	GND		GND	
19	GPIO52	I/O	General input/output PIN	DVDD18	RESERVED	
20	W_DISABLE#	I/O	Flight mode enabled	DVDD18	W_DISABLE#	Low active

21	GND	G	GND		GND	
22	PERST#	I	System reset signal	DVDD18	PERST#	
23	UART0_CTS	DI	UART0 clear to send	DVDD18	PERn0	
24	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
25	UART0_RTS	DO	UART0 ready to receive	DVDD18	PERp0	
26	GND	G	GND		GND	
27	GND	G	GND		GND	
28	NC		NC		1.5V	
29	GND	G	GND		GND	
30	GPIO44	I/O	General input/output PIN. It can be used as IIC clock	DVDD18	SMB_CLK	External reserve pull-up resistor of 4.7K by VIO18
31	UART0_DTR	DI	UART0 Data terminal ready	DVDD18	PETn0	
32	GPIO49	I/O	General input/output PIN. It can be used as IIC data	DVDD18	SMB_DATA	External reserve pull-up resistor of 4.7K by VIO18
33	UART0_DCD	DO	UART0 data carrier detect	DVDD18	PETp0	
34	GND	G	GND		GND	
35	GND	G	GND		GND	
36	USB_D-	DIO	USB port differential data line		USB_D-	
37	GND	G	GND		GND	
38	USB_D+	DIO	USB port differential data line		USB_D+	

39	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
40	GND	G	GND		GND	
41	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
42	LED_WWAN#	O	Network Status Indication output		LED_WWAN#	
43	GND	G	GND		GND	
44	NC		NC		LED_WLAN#	
45	PCM_CLK	I/O	PCM interface clock	DVDD18	RESERVED	
46	NC		NC		LED_WPAN#	
47	PCM_DIN	I/O	PCM I/F data in	DVDD18	RESERVED	
48	NC		NC		1.5V	
49	PCM_DOUT	I/O	PCM I/F data out	DVDD18	RESERVED	
50	GND	G	GND		GND	
51	PCM_SYNC	I/O	PCM interface sync	DVDD18	RESERVED	
52	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	

Table 3-2 Mini PCIe with integrated codec Pin description

Pin NO.	L306 Mini PCIe Pin name	Type	Function Description	Power domain	Standard Mini PCIe Pin name	Notes
1	WAKE#	I/O	Wake-up host signal	DVDD18	WAKE#	Low active
2	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
3	NC				COEX1	
4	GND	G	GND		GND	
5	SPK_OUT_P	AO	Output of internal speaker amp		COEX2	

6	NC				1.5V	
7	SPK_OUT_N	AO	Output of internal speaker amp		CLKREQ#	
8	UIM_PWR	P	USIM output voltage	1.8/3.0V	UIM_PWR	
9	GND	G	GND		GND	
10	UIM_DATA	I/O	USIM data	DVDD18	UIM_DATA	
11	UART0_RX	DI	UART0 receive data input	DVDD18	REFCLK-	
12	UIM_CLK	O	USIM clock	DVDD18	UIM_CLK	
13	UART0_TX	DO	UART0 transmit output	DVDD18	REFCLK+	
14	UIM_RESET	O	USIM reset	DVDD18	UIM_RESET	
15	GND	G	GND		GND	
16	NC		NC		UIM_VPP	
17	UART0_RING	DO	UART0 ring indicator	DVDD18	RESERVED	
18	GND	G	GND		GND	
19	GPIO52	I/O	General input/output PIN	DVDD18	RESERVED	
20	W_DISABLE#	I/O	Flight mode enabled	DVDD18	W_DISABLE#	Low active
21	GND	G	GND		GND	
22	PERST#	I	System reset signal	DVDD18	PERST#	
23	UART0_CTS	DI	UART0 clear to send	DVDD18	PERn0	
24	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
25	UART0_RTS	DO	UART0 ready to receive	DVDD18	PERp0	
26	GND	G	GND		GND	
27	GND	G	GND		GND	

28	NC		NC		1.5V	
29	GND	G	GND		GND	
30	MIC_P	AI	Microphone Channel		SMB_CLK	
31	UART0_DTR	DI	UART0 Data terminal ready	DVDD18	PETn0	
32	MIC_N	AI	Microphone Channel		SMB_DATA	
33	UART0_DCD	DO	UART0 data carrier detect	DVDD18	PETp0	
34	GND	G	GND		GND	
35	GND	G	GND		GND	
36	USB_D-	DIO	USB port differential data line		USB_D-	
37	GND	G	GND		GND	
38	USB_D+	DIO	USB port differential data line		USB_D+	
39	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
40	GND	G	GND		GND	
41	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	
42	LED_WWAN#	O	Network Status Indication output		LED_WWAN#	
43	GND	G	GND		GND	
44	NC		NC		LED_WLAN#	
45	RESERVED				RESERVED	
46	NC		NC		LED_WPAN#	
47	RESERVED				RESERVED	
48	NC		NC		1.5V	
49	RESERVED				RESERVED	

50	GND	G	GND		GND	
51	RESERVED				RESERVED	
52	V_MAIN	P	Power supply	3.0～3.6V	3.3Vaux	

Table 3-3 Pin type description

P:POWER	G:GROUND
I:INPUT	DI:DIGITAL INPUT
O:OUTPUT	DO:DIGITAL OUTPUT
NC:NOT CONNECT	DIO:DIGITAL INPUT OUTPUT

3.3 Package Information

The module size information is shown in figure 3-2.

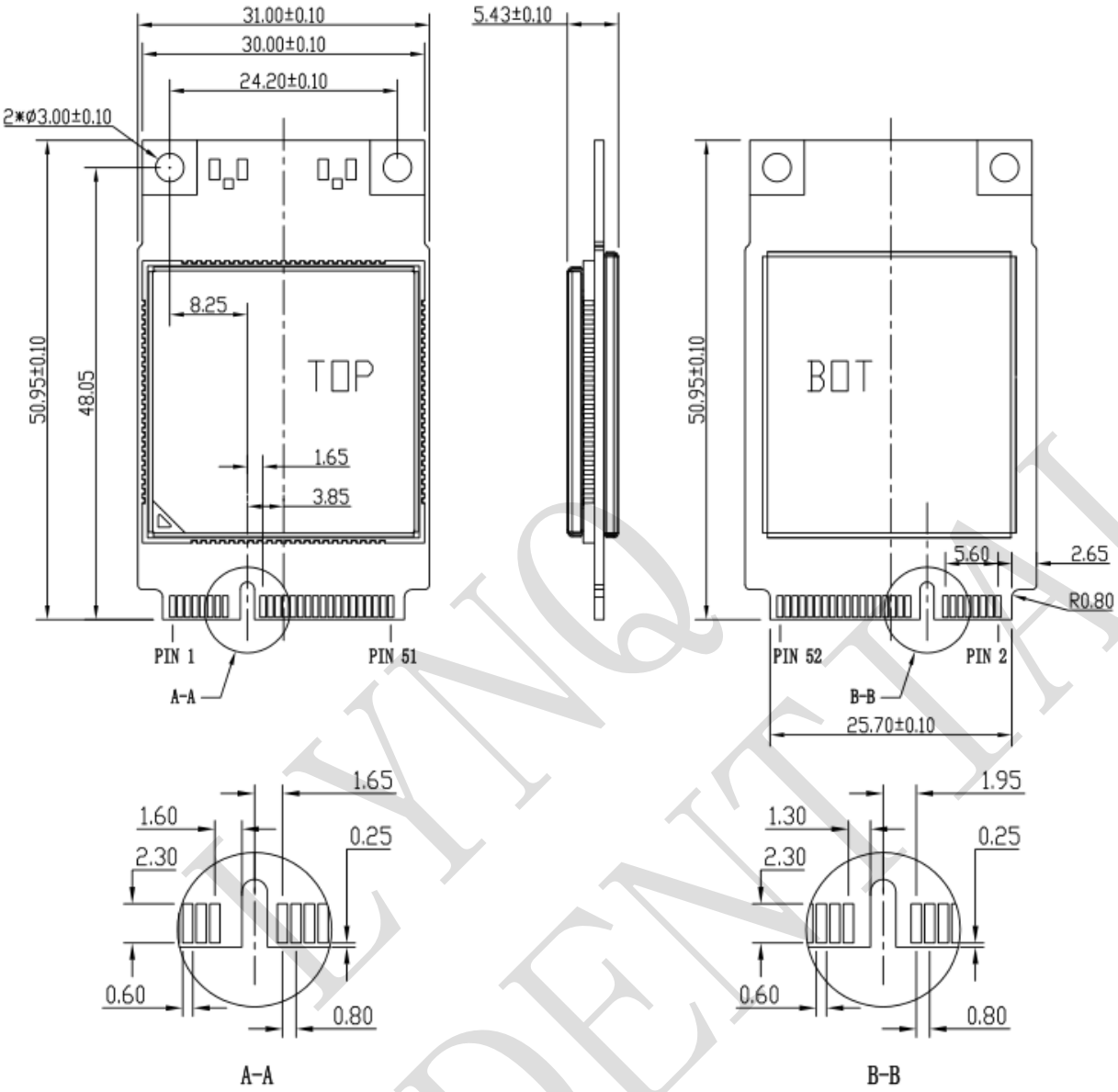

Figure 3-2 Module Size

3.4 Mini PCI Express connector

The connector on the user board uses the standard 52Pin Mini PCI Express connector. Molex 67910-0002 series connectors are recommended, as shown in figure 3-3.

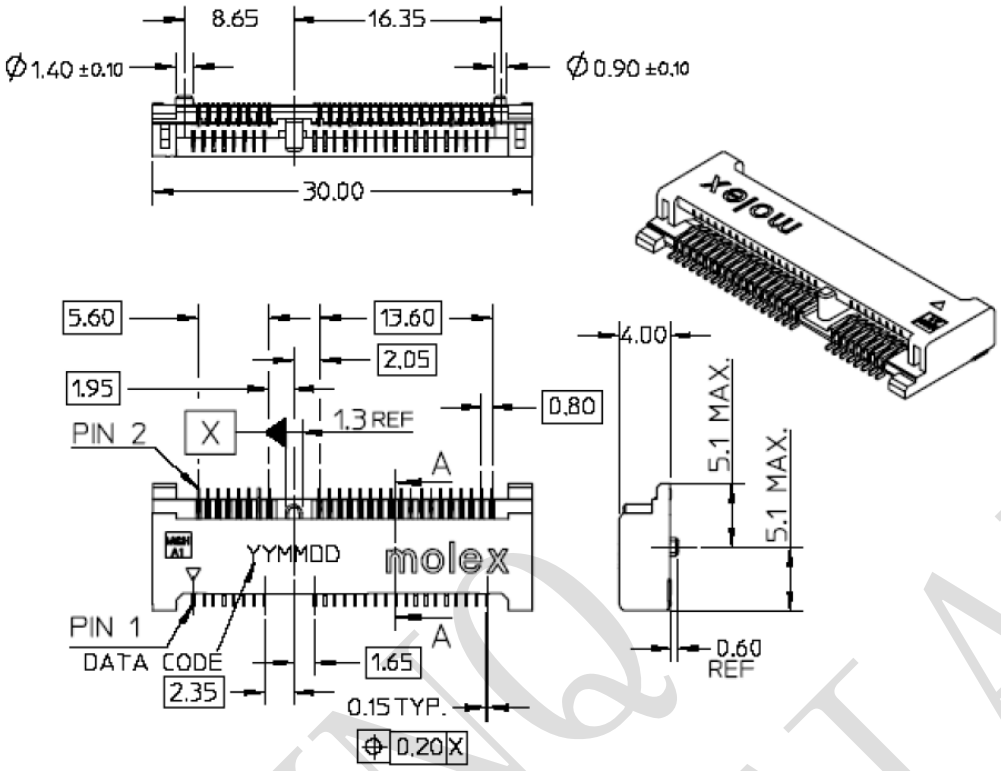

Figure 3-3 Mini PCIe connector

4. Interface Circuit Design

4.1 Power Section

4.1.1 Power Supply

V_MAIN is the main power supply of the module, and the input voltage range is 3.0V to 3.6V. The recommended voltage is 3.3V. Because the module transmit burst may cause voltage drops, the highest peak will reach 2A. A large capacitor voltage is recommended to use near V_MAIN pins, and the capacitor's value is the bigger the better. In order to improve the continued flow of large current, it is recommended to use a low-impedance tantalum 470uF or larger. During layout, the capacitors are close to the V_MAIN pins.

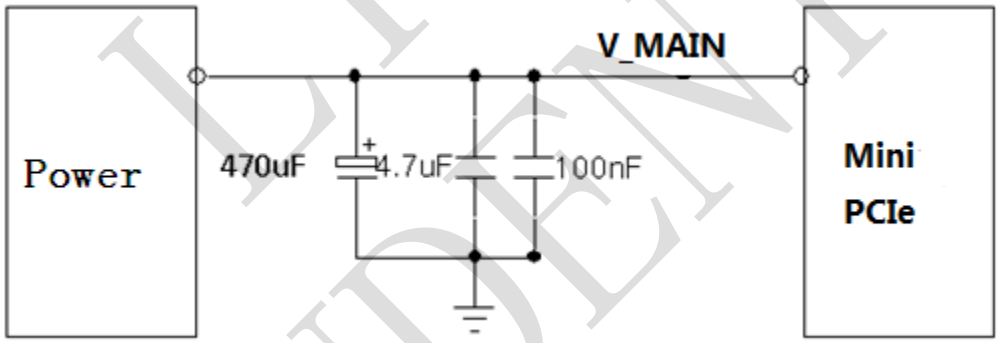

Figure 4-1 Power Supply circuit

Notes: According to the environment, please select capacitor as large value as possible; and add 100pF, 33pF capacitors if requiring.

4.1.2 Power pin description

Pin number	Pin name	Description
2/4/39/41/52	V_MAIN	positive signal
4/9/15/18/21/26/27/29/34/35/37/40/43/50	GND	GND

The Ground of power and signal need to be GND signal connection. Incomplete connection of the GND signal may affect the performance of the product.

4.2 USIM Interface

4.2.1 Pin Description

L306 Mini PCIe is able to automatically detect 3.0V and 1.8V USIM card. USIM card interface signal as shown in table 4-1.

Table 4-1 (U)SIM Pin Description

Pin NO.	Pin Name	Signal definition	Function Description
8	UIM_PWR	USIM output voltage	USIM card power supply, output by the module
10	UIM_DATA	USIM card data pin	USIM card DATA signal, I/O signal
12	USIM_CLK	USIM card clock pin	USIM card clock signal, output by the module
14	UIM_RESET	USIM card reset pin	USIM card reset signal, output by the module

4.2.2 USIM application

In order to meet the requirements of 3GPP TS 51.010-1 protocol and EMC certification, the proposed USIM card is arranged near the position module USIM card interface, and avoid to layout too long resulting in serious waveform distortion, affecting the signal integrity. UIM_CLK and UIM_DATA signals are recommended to be protected. Between GND and UIM_PWR in parallel with a 1uF and

33pF capacitors, that can filter out the interference of radio frequency signals.

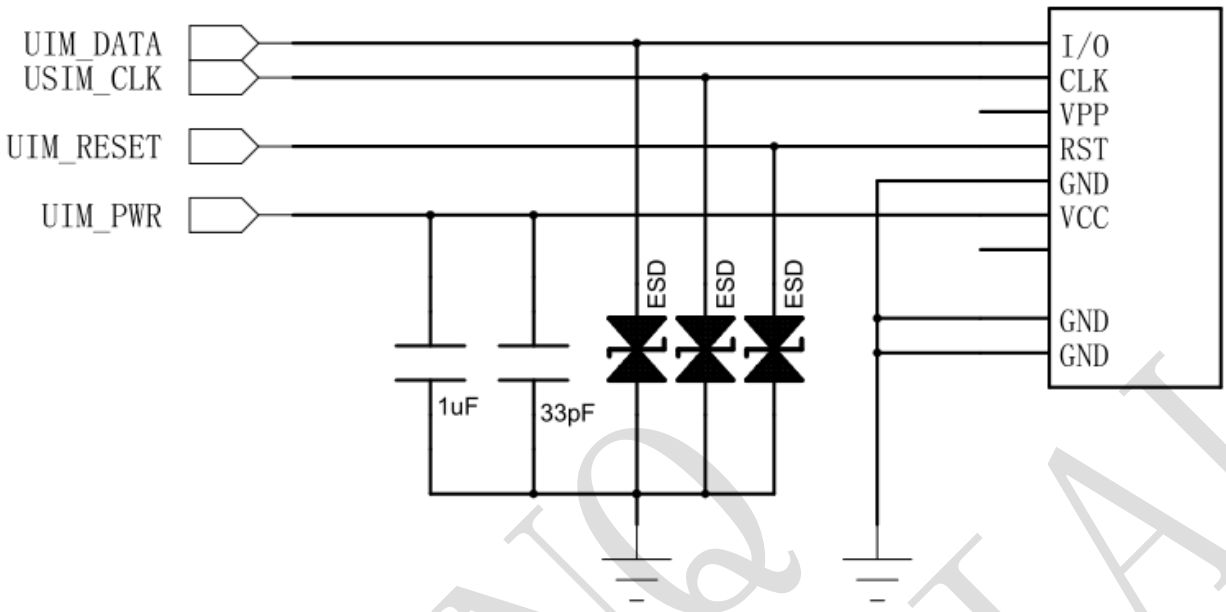

Figure 4-2 (U)SIM Circuit

4.3 USB Interface

The USB interface of the module conforms to the USB2.0 specification and electrical characteristics. Support the low-speed, full-speed and high-speed three operating modes. The data exchange between the main processor (AP) and the module is mainly completed through the USB interface.

USB bus is mainly used for data transmission, software upgrade, module program testing. Working in the USB mode of the high-speed line, if you need ESD design, ESD protection devices must meet the junction capacitance value of <3pf, otherwise the larger junction capacitance will cause waveform distortion, and affect the bus communication. The differential impedance of differential data lines should be controlled at 90ohm ±10%, and lines should be protected up and down, and can't be crossed with other lines. USB connection circuit is as follows.

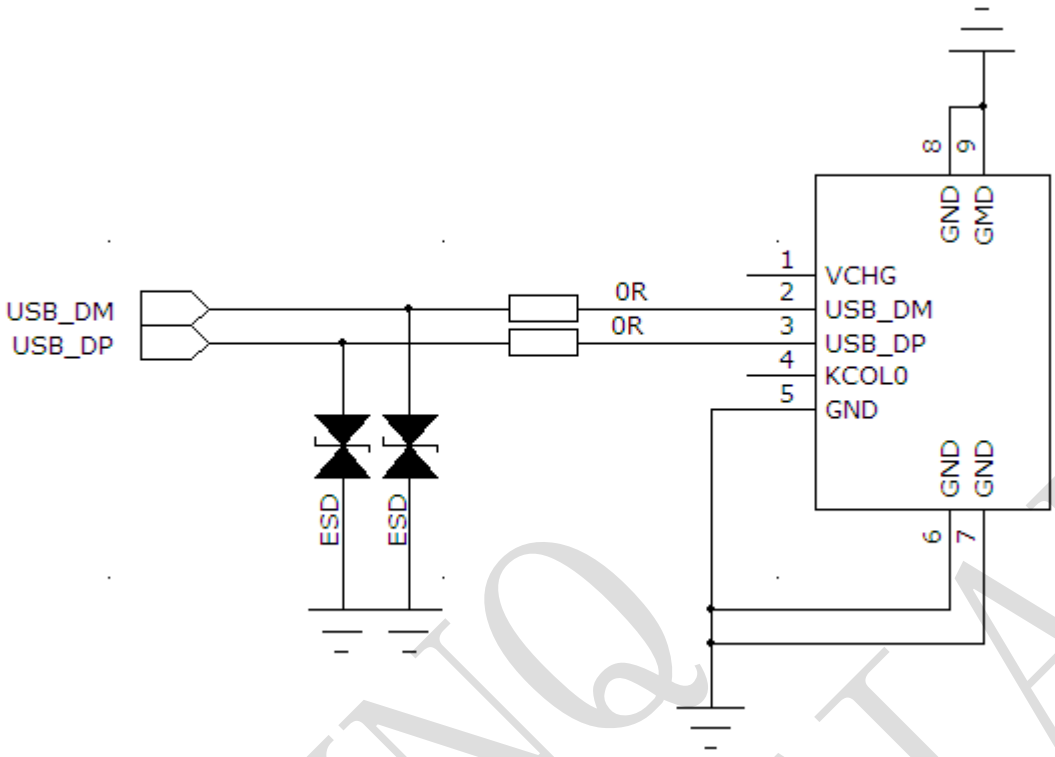

Figure 4-3 USB Circuit

4.4 UART Interface

4.4.1 Pin Description

The module L306 Mini PCIe provides one UART serial communication interface. The UART can be debug port and also can be as complete non-synchronous communication interface, supporting standard modem handshake signal control and in compliance with the RS-232 interface protocol, also supporting 4-wire serial bus interface or 2-wire serial bus interface mode. The module can communicate by AT commands or UART interfaces.

The UART port supports programmable data width, stop bits, and parity bits, with separate TX and Rx FIFOs (512 bytes each). The max baud rate of normal application of UART (non-Bluetooth) is 115200bps. The default baud rate is 115200bps.

Table 4-2 UART Pin Description

Pin NO.	Pin Name	I/O	Function Description
11	UART0_RX	DI	UART0 receive data input
13	UART0_TX	DO	UART0 transmit output
17	UART0_RING	DO	UART0 Ring Indicator
23	UART0_CTS	DI	UART0 Clear to Send
25	UART0_RTS	DO	UART0 Ready to receive
31	UART0_DTR	DI	UART0 Data Terminal Ready
33	UART0_DCD	DO	UART0 Data Carrier Detect

4.4.2 UART application

UART can be used for software debugging process. We suggest that the users retain this interface and set aside the test point.

If used in communication between the module and application processor, and the level is 1.8V, the connection mode is shown in Figure 4-4 and figure 4-5. You can use the complete RS232 mode, 4 wires or 2 wires mode connection. Module interface level is 1.8V. If the AP interface level does not match, you must increase the level conversion circuit.

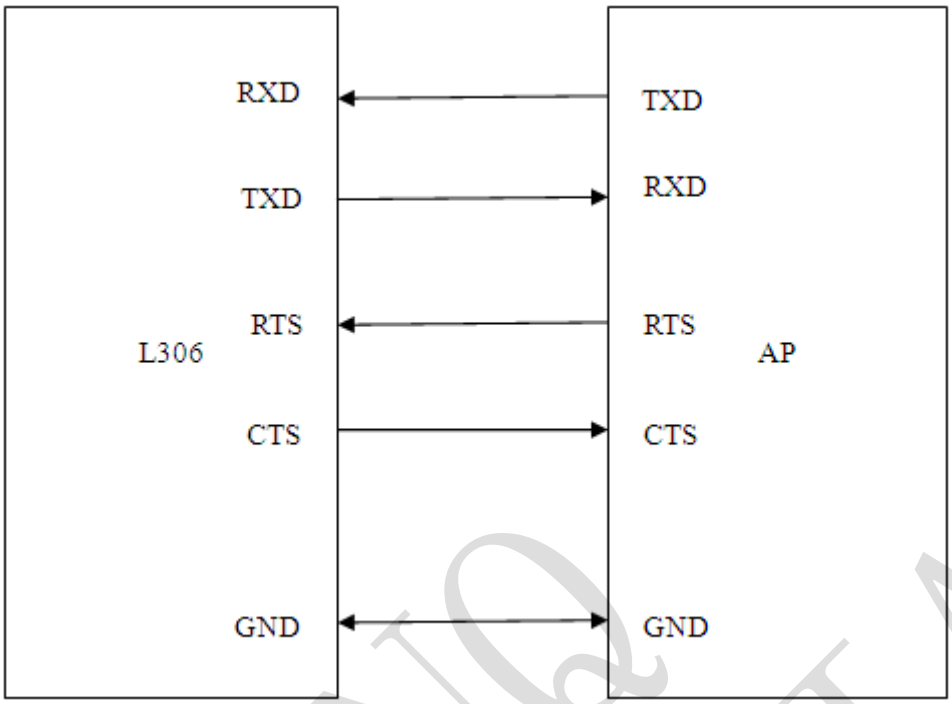

Figure 4-4 Connect to AP method(4lines)

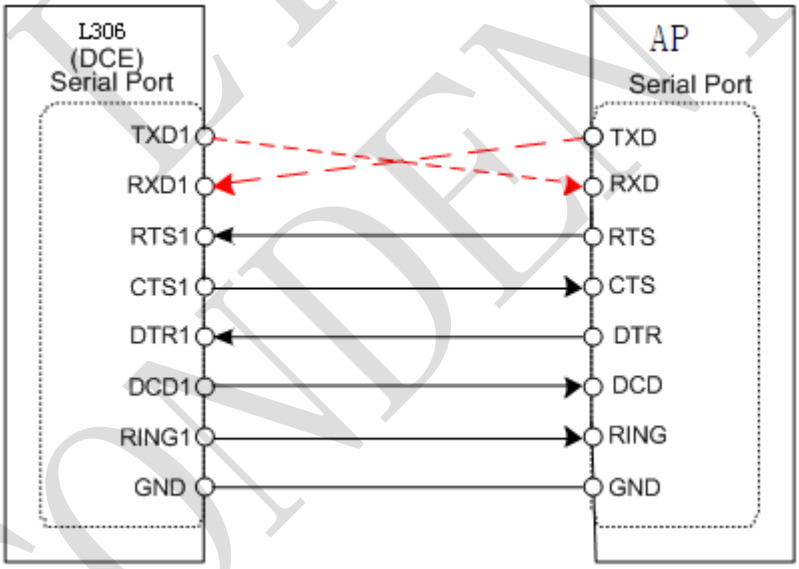

Figure 4-5 Connect to AP method

Notes：If you use the serial port communication, USB DM, DP reserved test points respectively in order to download software.

Serial communication, the module can enter the sleep; USB communication, the module can't enter the sleep, and unplugging the module for USB can enter the sleep.

4.5 Hardware PERST#

4.5.1 Pin Description

Module twenty-second pin is the hardware reset input. The module will power off when it receives a 20ms low level signal. The system has an internal pull up, and the typical value is 1.8V, and do not need to pull up externally.

4.5.2 PERST# application

The design circuit for PERST# can be seen in Figure 4-6.

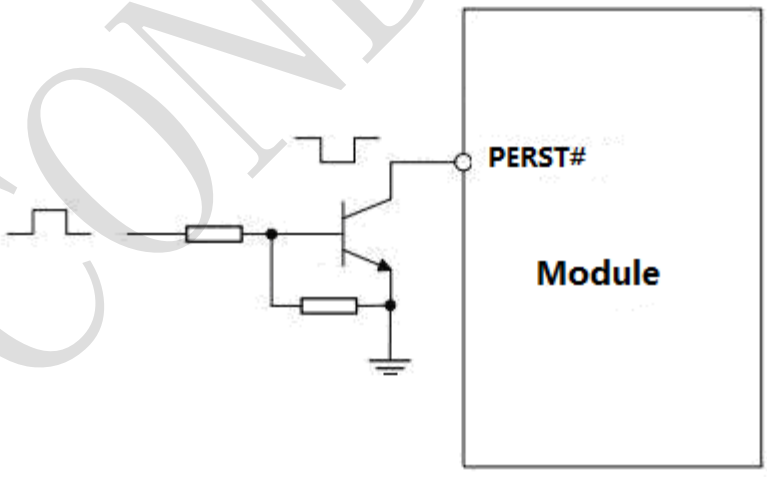

Figure 4-6 PERST# recommended circuit

4.6 LED_WWAN# Interface

4.6.1 Pin Description

The LED_WWAN# signal of the module is used to control the LED and can be used to indicate the network connection status. The LED blinks in different modes, indicating different network states. The pin can be directly connected to the cathode of the LED, the external access V_MAIN can directly drive the LED, and you can change the resistance in series LED lights to adjust the LED brightness.

4.5.2 LED_WWAN# application

The design circuit for LED_WWAN# can be seen in Figure 4-7. Table 4-3 shows the LED status.

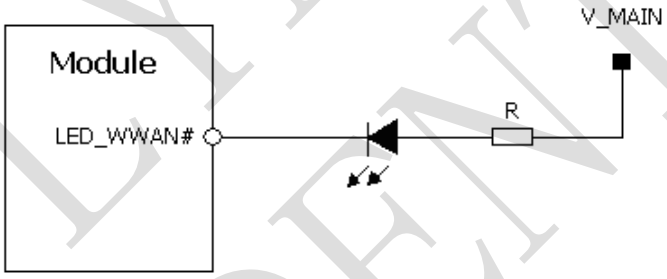

Figure 4-7 LED_WWAN# circuit

Table 4-3 LED Status

LED Status	Module Status
Always On	Searching Network/Call Connect
300ms ON, 300ms OFF	Data Transmit
800ms ON, 800ms OFF	Registered network
OFF	Power off / Sleep

4.7 W_DISABLE# Interface

The W_DISABLE # signal is a RF enable switch for entering flight mode and normal mode. As shown in Table 4-4.

Table 4-4 W_DISABLE# Status

Module working mode	W_DISABLE# Status	Notes
Normal mode	High level	Module working normally
Flight mode	Low level	Turn off the RF function

4.8 WAKE# Interface

WAKE# can be used as wake-up signal for the module, as shown in Figure 4-8.

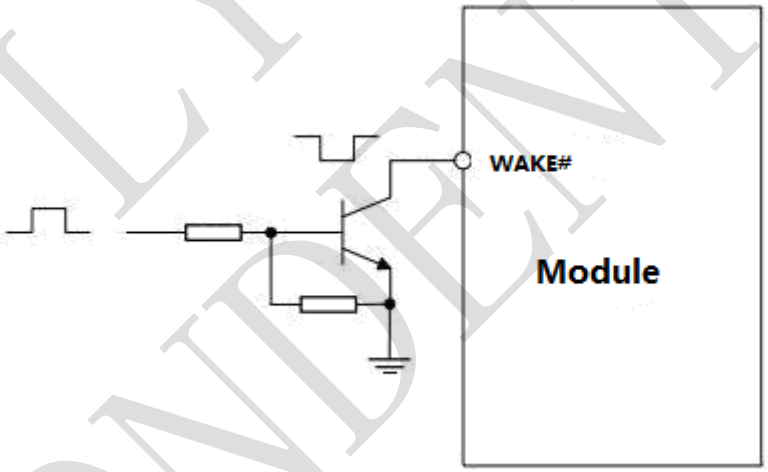

Figure 4-8 WAKE# recommended circuit

4.9 Audio Section

L306 Mini PCIe supports one audio input and output, which can meet different audio demands. The audio must take the differential layout and must be protected by GND around it. The audio layout should be not parallel to other layout of power or high speed routes.

4.9.1 Audio input

The module provides one MIC input, as shown in figure 4-9.

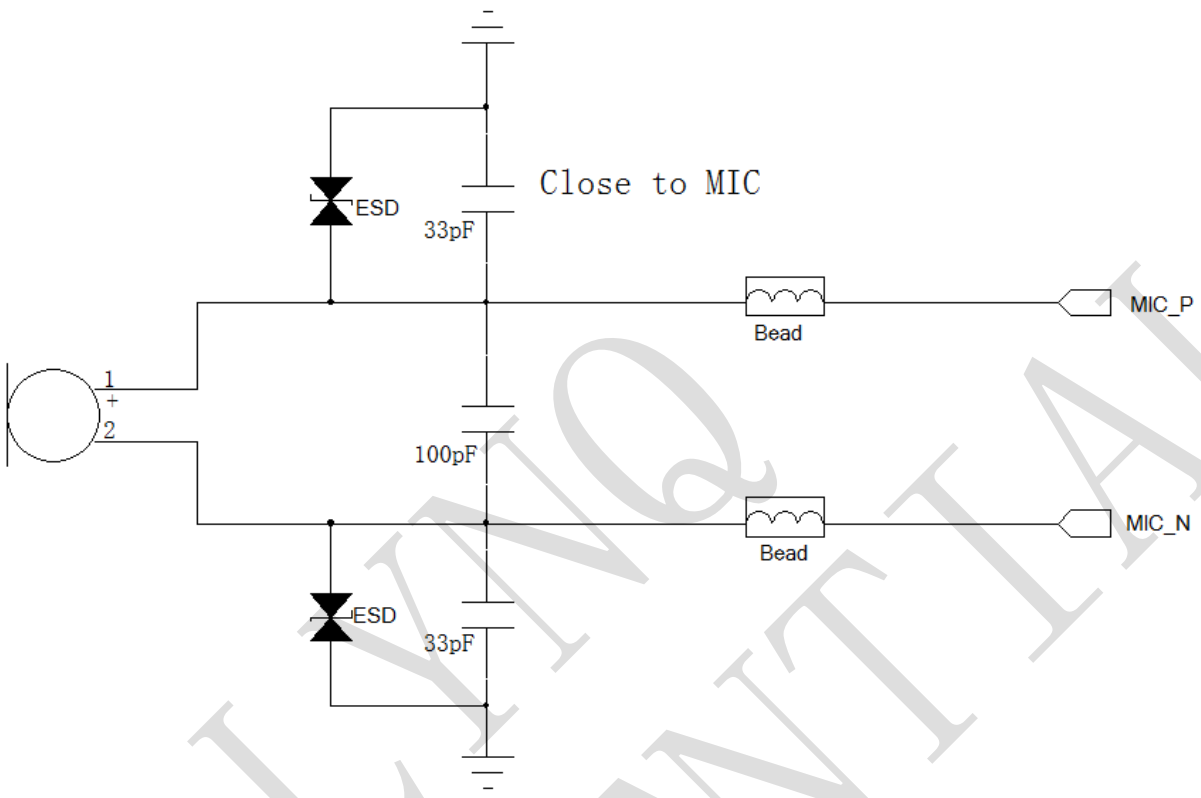

Figure 4-9 Mic circuit

4.9.2 Audio output

Module provides one SPK output, can be directly driven 8Ω, 0.8W speaker, as shown in figure 4-10.

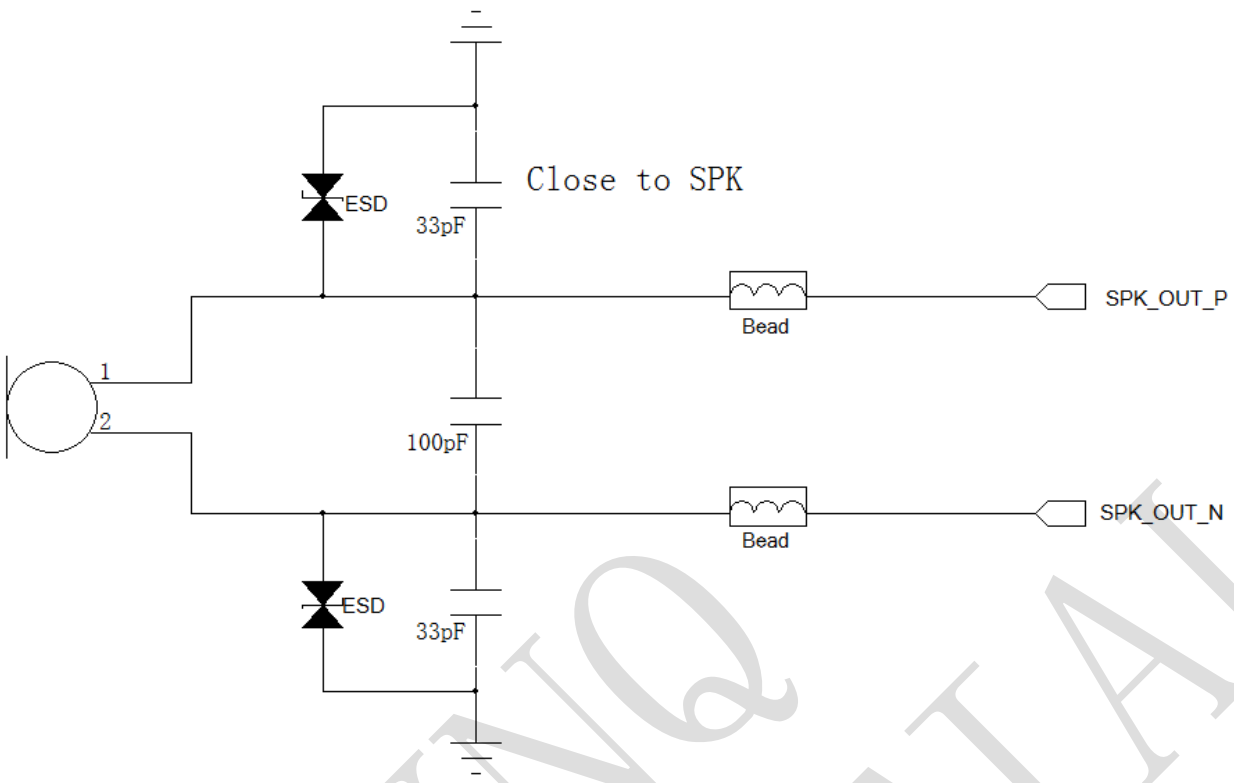

Figure 4-10 SPK circuit

5. Electrical characteristics

5.1 Electrical characteristics

Table 5-1 Electrical characteristics

Power	Min.	Nom.	Max	Unit
VBAT	3.0	3.3	3.6	V
Peak current	-0.3	-	2.0	A

Notes: The over-low voltage can't power on the module; Over-high voltage may be danger to damage the module.

Using the DCDC supply, please ensure the capacity of DCDC over 2.0A. We don't suggest the LDO as the power supplier.

5.2 Temperature characteristic

Table 5-2 Temperature characteristic

State	Min.	Nom.	Max	Unit
Working	-40	25	85	℃
Storage	-45	25	90	℃

Note: When the temperature is over the range, the RF performance may be dropped. It also may cause power down or restart problem.

5.3 Absolute Maximum Power

Table 5-3 Absolute maximum power rating

PIN Name	Description	Min.	Typ.	Max.	Unit
DVDD18	Digital power input for IO	1.7	1.8	1.9	V

5.4 Recommended operating conditions

Table 5-4 Recommended operating range

PIN Name	Description	Min.	Typ.	Max.	Unit
DVDD18	Digital power input for IO	1.7	1.8	1.9	V

5.5 Power consumption

Table 5-5 Power Consumption

Parameter	Conditions	Min.	Average	Max.	Unit
Standby current	Flight mode Suspend state	-	1.3		mA
	2G only	-	1.9		mA

	WCDMA only	-	2.3		mA
	USB+Fltght mode	-	21.8		mA
Working current	GSM850,MAX Power	-	248		mA
	GSM900,MAX Power	-	246		mA
	DCS1800，MAX Power	-	183		mA
	PCS1900，MAX Power	-	181		mA
	WCDMA@CH3012,MAX Power	-	410		mA
	WCDMA@CH10700,MAX Power	-	419		mA
Peak current	Max power mode burst current		-	2.0	A

5.6 Digital Interface Characteristics

Table 5-6 Digital IO Voltage

Parameter	Description	Min.	Typical	Max.	Unit
VIH	High level input voltage	1.62	1.8	1.98	V
VIL	Low level input voltage	0	-	0.7	V
VOH	High level output voltage	1.62	1.8	1.98	V
VOL	Low level output voltage	0	-	0.3	V

Note: Suit to GPIO, UART interfaces.

5.7 ESD

Because there is no special protection against electrostatic discharge in the module, it is necessary to pay attention to the protection of electrostatic protection in the production, assembly and operation module. The performance parameters of the module test are as follows.

ESD parameter（Tem：25℃，humidity：45%）.

Table 5-7 ESD Performance

PIN Name	Contact discharge	Air discharge
V_MAIN	±4KV	±8KV
GND	±4KV	±8KV
RF_ANT	±4KV	±8KV

Enhanced ESD performance method：

1、 USB, UART and other plug connection need to add ESD devices, the other from the outside of the machine out of the control line also need to add ESD devices;

2、 SIM card, users will get inserted t-card touch the place also need to add ESD device;

3、 External antenna, please add ESD device, ESD C_{pf}<0.5pF.

Notes: For ESD protect, please add ESD methods according to upper ways.

High speed circuits like USB, TF and SIM card should be added ESD with low capacity value.

ESD components include varistors and TVS. For better performance, please use TVS.

6. RF Features

6.1 Frequency Band

L306 Mini PCIe supports GSM Band 2/3/5/8 and WCDMA Band1(2)/Band8(5).

Table 6-1 Frequency Bands

Frequency	Uplink	Downlink
GSM850	824 MHz — 849 MHz	869 MHz — 894 MHz
E-GSM900	880 MHz — 915 MHz	925 MHz — 960 MHz
DCS1800	1710 MHz — 1785 MHz	1805 MHz — 1880 MHz
PCS1900	1850 MHz — 1910 MHz	1930 MHz — 1990 MHz
UMTS2100	1920 MHz — 1980 MHz	2110 MHz — 2170 MHz
UMTS1900	1850 MHz — 1910 MHz	1930 MHz — 1990 MHz
UMTS850	824 MHz — 849MHz	869 MHz — 894 MHz
UMTS900	880 MHz — 915 MHz	925 MHz — 960 MHz

Table 6-2 Output power

Frequency	Max output power	Min output power
GSM850	33dBm ±2dB	5dBm ±5dB
E-GSM900	33dBm ±2dB	5dBm ±5dB
DCS1800	30dBm ±2dB	0dBm ±5dB
PCS1900	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
PCS1900(8-PSK)	26dBm +3/-4dB	0dBm ±5dB
UMTS2100	24dBm +1/-3dB	-56dBm ±5dB
UMTS1900	24dBm +1/-3dB	-56dBm ±5dB
UMTS850	24dBm +1/-3dB	-56dBm ±5dB
UMTS900	24dBm +1/-3dB	-56dBm ±5dB

Table 6-3 Receive sensitivity

Frequency	Receive sensitivity
GSM850	<-109dBm
E-GSM900	<-109dBm
DCS1800	<-109dBm
PCS1900	<-109dBm
UMTS2100	<-109dBm
UMTS1900	<-109dBm
UMTS850	<-109dBm
UMTS900	<-109dBm

6.2 Data link

L306 Mini PCIe supports GPRS/EDGE CLASS12 and HSDPA/HSDPA R8. The actual application depends on the local network operator.

Table 6-4 Data Link

Version	Function	Max supported	Theoretical max peak rate
L306 Mini PCIe	GPRS	CS4	85.6kbps

L306 Mini PCIe	EDGE	MCS9	236.8kbps
L306E/A Mini PCIe	HSDPA	Cat10	14.4Mbps
L306ME/MA Mini PCIe	HSDPA	Cat14	21Mbps
L306HE/HA Mini PCIe	HSDPA	Cat24	42Mbps
L306E/A Mini PCIe	HSUPA	Cat6	5.76Mbps
L306ME/MA Mini PCIe	HSUPA	Cat7	11Mbps
L306HE/HA Mini PCIe	HSUPA	Cat7	11Mbps

6.3 Antenna Design

The access part of the RF antenna of this product supports the PAD form. The connection between the module and the main board antenna interface is required to be welded and connected through a microstrip line or a strip line.

Antenna efficiency

The ratio is recommended to be controlled over 40%(-4dB).

S11 or VSWR

The recommended value for S11 is less than -10dB.

Polarization

Linear polarization is recommended.

Radiation pattern

The radiation pattern refers to the intensity of the electromagnetic field while the antenna is in every direction of the far field. Dipole antenna is perfect as the terminal antenna. For built-in antenna, it is recommended to use PIFA or IFA antennas.

Antenna dimension: 6mm*10mm*100mm (H*W*L).

Antenna radiation direction: omnidirectional.

TRP/TIS

TRP(Total Radiated Power):

GSM850/900 >28dBm

GSM1800/1900 >25dBm

WCDMA Band1/8 >19dBm

TIS(Total Isotropic Sensitivity):

GSM850/900/1800/1900 <-102dBm

WCDMA Band1/8 <-102dBm