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# **CLM920\_EC5\_LTE Module Hardware User Guide**

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V1.01



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## Revision record

Version	Date	Author	Description
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## Contents

Chapter 1. Introduction.....	5
1.1 Overview.....	5
1.2 Abbreviations.....	5
Chapter 2. Product introduction.....	7
2.1 Product introduction.....	7
2.2 Module characteristics.....	7
2.3 Module function block diagram.....	9
2.3.1 Introduction to module functions.....	9
2.3.2 Module Functional Block Diagram.....	9
Chapter 3. Interface application description.....	10
3.1 Overview.....	10
3.2 Module Interface Definition.....	10
3.3 Power Interface Definition.....	12
3.4 USB interface definition.....	14
3.4.1 Overview.....	14
3.4.2 USB interface design reference circuit.....	14
3.5 UART interface.....	15
3.6 USIM Interface Definition.....	15
3.6.1 Overview.....	15
3.6.2 USIM Card Reference Circuit.....	16
3.6.3 USIM_DET Hot Swap Reference Design.....	17
3.7 WWAN interface.....	17
3.8 General GPIO Interface.....	18
3.9 Network indication interface.....	19
3.10 RF antenna interface.....	20
3.11 analog voice interface.....	20
3.11.1 Description of the analog voice interface.....	20
3.11.2 Analog Voice Interface Reference Design.....	21
3.12 I2C interface.....	21
3.13 SPI interface.....	22
Chapter 4. Overall technical indicators.....	23
4.1 Overview.....	23



4.2 Working frequency.....	23
4.3 Conducted RF measurements.....	23
4.3.1 Test environment.....	23
4.3.2 Test criteria.....	24
4.4 Conducted Receive Sensitivity and Transmit Power.....	24
4.5 antenna requirements.....	25
4.6 Power consumption characteristics.....	26
Chapter 5. Interface electrical characteristics.....	27
5.1 Working storage temperature.....	27
5.2 Module IO Level.....	27
5.3 Power supply.....	27
5.4 Electrostatic characteristics.....	28
Chapter 6. Structural and mechanical properties.....	29
6.1 Appearance.....	29
6.2 Mini PCI Express Connector.....	30
6.3 module fixing method.....	31
Chapter 7. Typical reference design.....	32

## Figure

Figure 2-1 Functional Block Diagram of CLM920_EC5 4G Module.....	9
Figure 3-2 Power supply reference circuit.....	13
Figure 3-3 USB design circuit diagram.....	14
Figure 3-4 UART serial port design.....	15
Figure 3-5 USIM design circuit diagram.....	16
Figure 3-6 Hot swap detection of the USIM card.....	17
Figure 3-8 Reset Reference Circuit.....	18
Figure 3-9 Startup timing diagram.....	19
Figure 3-10 Network indicator circuit diagram.....	19
Figure 3-11 Antenna Interface.....	20
Figure 3-12 Analog voice interface circuit.....	21
Figure 3-13 I2C interface circuit.....	22
Figure 3-14 SPI interface circuit.....	22
Figure 6-1 CLM920_EC5 Appearance.....	29



Figure 6-2 CLM920_EC5 module size chart.....	30
Figure 6-3 Connector dimensions.....	31

## Table

Table 2-1 Product Name.....	7
Table 2-2 Function description.....	7
Table 3-1 Interface definition.....	10
Table 3-2 Power pin definition.....	13
Table 3-3 USB pin definition.....	14
Table 3-5 UART serial port pin definition.....	15
Table 3-6 USIM card pin definitions.....	15
Table 3-7 Hot swap detection foot definition.....	17
Table 3-8 W_DISABLE pin definition.....	17
Table 3-9 General GPIO Pin Definitions.....	18
Table 3-10 Network indicator pin definition.....	19
Table 3-11 Network indication status.....	19
Table 3-12 Simulated voice pin definitions.....	20
Table 3-13 I2C pin definition.....	21
Table 3-14 SPI interface pin definitions.....	22
Table 4-1 RF frequency table.....	23
Table 4-2 Test instruments.....	23
Table 4-3 2G3G RF indicators.....	24
Table 4-4 4G RF sensitivity indicators.....	24
Table 4-5 4G RF transmit power indicators.....	25
Table 4-6 Antenna indicator requirements.....	25
Table 4-7 GSM power consumption.....	26
Table 4-8 WCDMA Power Consumption.....	26
Table 4-9 LTE power consumption.....	26
Table 4-10 TDS-CDMA power consumption.....	26
Table 5-1 CLM920_EC5 4G module works, storage temperature.....	27
Table 5-2 CLM920_EC5 4G module IO level.....	27



# Chapter 1. Introduction

## 1.1 Overview

This document is a wireless solution product CLM920\_EC5 4G module hardware interface manual, which is intended to describe the hardware components and functional characteristics of the module solution product, application interface definition and usage instructions, electrical and mechanical characteristics, etc., for the user to develop based on the application development of the product. Hardware description.

## 1.2 Abbreviations

ADC	Analog-Digital Converter
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
ARFCN	Absolute Radio Frequency Channel Number
B2B	Board to Board Connector
BER	Bit Error Rate
CDMA	Code Division Multiple Access
DAI	Digital Audio interface
DAC	Digital-to-Analog Converter
DSP	Digital Signal Processor
DTR	Data Terminal Ready
EFR	Enhanced Full Rate
EMC	Electromagnetic Compatibility
EMI	Electro Magnetic Interference
ESD	Electronic Static Discharge
EVDO	Evolution Data Only
FR	Full Rate
GPRS	General Packet Radio Service
HR	Half Rate
IMEI	International Mobile Equipment Identity
ISO	International Standards Organization
PLL	Phase Locked Loop
PPP	Point-to-point protocol



RAM	Random Access Memory
ROM	Read-only Memory
RTC	Real Time Clock
SMS	Short Message Service
UART	Universal asynchronous receiver-transmitter
UIM	User Identifier Management
USB	Universal Serial Bus
VSWR	Voltage Standing Wave Ratio



## Chapter 2. Product introduction

### 2.1 Product introduction

CLM920\_EC5 Mini PCIE module is a PCI Express Mini Card 1.2 standard module, which is a wireless terminal product integrating multiple network standards and GPS positioning services such as FDD/TDD/TD-SCDMA/UMTS/EVDO/CDMA/EDGE/GSM. . The module baseband chip adopts Qualcomm's MSM8909, supports the three major network standards of China Mobile Unicom Telecom, and supports OS: Windows 7/Windows 8/Windows 10/Android and other embedded operating systems. The CLM920\_EC5 4G module can be used in the following applications:

- ✧ Car Equipment
- ✧ Wireless POS machine
- ✧ Wireless advertising, media
- ✧ Remote monitoring
- ✧ Smart meter reading
- ✧ Mobile broadband
- ✧ Other wireless terminals, etc.

### 2.2 Module characteristics

Table 2-1 Product Name

Product name	Description
CLM920_EC5	LTE for CMCC,CUCC and CTCC, support SRLTE,GPS and Analog audio
MC900	LTE for CMCC,CUCC and CUCC, support SRLTE Analog audio

Table 2-2 Function description

characteristic	description
Physical characteristics	51mmx30mmx4.6mm
Fixed way	Ground screw hole (2)
Application processor	Quad-core ARM Cortex-A7 processor, clocked at 1.1GHZ, 512kB level 2 cache
Working frequency band	✧ LTE (FDD) B1/B3/B5 ✧ LTE (TDD) B38/B39/B40/B41





	<ul style="list-style-type: none"> <li>✧ UMTS/HSDPA/HSUPA Band B1</li> <li>✧ TD-SCDMA B34/B39</li> <li>✧ GSM/GPRS/EDGE Tri Band 850/900/1800</li> <li>✧ CDMA2000 1X/EVDO BC0</li> </ul>
Operating temperature	<p>Normal operating temperature: - 20° C to +70° C</p> <p>Extreme operating temperature: - 30° C to +85° C</p> <p>Storage temperature: -40° C to +90° C</p>
Operating Voltage	3.3V-4.2V Typical voltage 3.7V
Application interface	<p>Standard USIM interface, support 3.0V/1.8V, support hot swap function</p> <p>USB2.0 (High-Speed)</p> <p>Hardware reset interface</p> <p>UART serial interface</p> <p>Analog voice input interface</p> <p>Analog voice output interface</p> <p>Power interface</p> <p>Network status indication interface</p> <p>General purpose GPIO interface</p>
Antenna connector	<p>Main antenna connector (MM4829-2702RA4)</p> <p>Diversity Antenna Connector (MM4829-2702RA4)</p> <p>GPS antenna connector (MM4829-2702RA4)</p>
Data service	<p>GPRS: DL 85.6 kbps/UL 85.6 kbps</p> <p>EDGE: DL 236.8 kbps/UL 236.8 kbps</p> <p>WCDMA CS: DL 64 kbps/UL 64 kbps</p> <p>WCDMA PS: DL 384 kbps/UL 384 kbps</p> <p>TDD-HSPA: DL 2.8Mbps/UL 2.2Mbps</p> <p>TDD-HSPA+: DL 4.2Mbps/UL 2.2Mbps</p> <p>HSPA+: DL 21.6 Mbps/UL 5.76 Mbps</p> <p>DC-HSPA+: DL 42 Mbps/UL 5.76 Mbps</p> <p>CDMA 1X: DL 153.6kbps/UL 153.6kbps</p> <p>CDMA 1xEVDO<sub>r0</sub>: DL 2.4Mbps/UL 153kbps</p> <p>CDMA 1xEVDO<sub>rA</sub>: DL 3.1Mbps/UL 1.8Mbps</p> <p>LTE FDD:DL 150Mbps/UL 50Mbps@20M BW cat4</p> <p>LTE TDD:DL 150Mbps/UL 50Mbps@20M BW cat4</p>
Satellite positioning	GPS/BEIDOU/GLONASS
Diversity antenna	Support LTE/WCDMA/TDSCDMA/EVDO diversity antenna
AT command	Support for standard AT instruction sets (Hayes 3GPP TS 27.007 and 27.005)



## 2.3 Module function block diagram

### 2.3.1 Introduction to module functions

The CLM920\_EC5 4G module mainly contains the following circuit units:

- ✧ Baseband processing unit
- ✧ Power management unit
- ✧ Memory unit
- ✧ RF transceiver unit
- ✧ RF front end unit
- ✧ GPS RF receiving unit

### 2.3.2 Module Functional Block Diagram

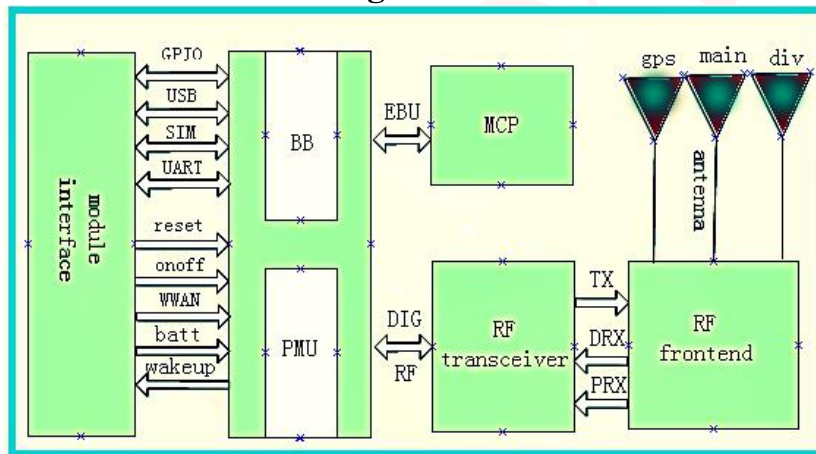


Figure 2-1 Functional Block Diagram of CLM920\_EC5 4G Module



## Chapter 3. Interface application description

### 3.1 Overview

This chapter mainly describes the application interface of this module. It mainly includes the following parts:

- ✧ Interface definition
- ✧ Power interface
- ✧ USB interface
- ✧ USIM interface
- ✧ UART interface
- ✧ WWAN control interface
- ✧ Analog voice interface
- ✧ RF antenna interface

### 3.2 Module Interface Definition

The CLM920\_EC5 4G module interface is defined as shown in the following table:

Table 3-1 Interface definition

PIN	PIN Name	I/O	Description	Mark
1	MIC_P	Input	Analog audio input	
2	VBAT		power input	
3	MIC_N	Input	Analog audio input	
4	GND		Ground signal	
5	REC_P	Output	Analog audio output	
6	USIM_DET	Input	USIM card hot plug detection	
7	REC_N	Output	Analog audio output	
8	REG_USIM	Output	3.0V/1.8V SIM card power supply	
9	GND		Ground signal	
10	USIM_DATA	Two way	USIM card data cable	
11	UART_RX	Input	Serial port reception	1.8V level
12	USIM_CLK	Output	USIM card clock line	
13	UART_TX	Output	Serial port transmission	1.8V level
14	USIM_RESET	Output	USIM card reset signal	



15	GND		Ground signal	
16	NC		No connection	
17	NC		No connection	
18	GND		Ground signal	
19	WAKEUP_BP	Input	Master wake-up module	Not supported yet
20	W_DISABLE	Input	WWAN function is off	Not supported yet
21	GND		Ground signal	
22	RESET	Input	Reset signal	
23	CTS	Input	User allows module to send	
24	VBAT		power input	
25	RTS	Output	The module requests the user to send	
26	GND		Ground signal	
27	GND		Ground signal	
28	ONOFF		Switch signal	Power on
29	GND		Ground signal	
30	NC		No connection	
31	NC		No connection	
32	WAKEUP_AP	Output	BP wakes up AP	Not supported yet
33	NC			
34	GND		Ground signal	
35	GND		Ground signal	
36	USB_DM	Two way	USB_DM	
37	GND		Ground signal	
38	USB_DP	Two way	USB_DP	
39	VBAT		power input	
40	GND		Ground signal	
41	VBAT		power input	
42	LED_WWAN	Input	Network indication	Active low
43	GND		Ground signal	



44	NC		No connection	
45	GPIO21	input Output		I2C/GPIO, etc.
46	NC		No connection	
47	GPIO20	input Output		I2C/GPIO, etc.
48	NC		No connection	
49	GPIO112	input Output		I2C/SPI, etc.
50	GND		Ground signal	
51	GPIO111	input Output		I2C/SPI, etc.
52	VBAT		power input	



Figure 3-1 Pin map

### 3.3 Power Interface Definition

The CLM920\_EC5 4G module power connector consists of two parts:

- ✧ VBAT is the working power of the module;
- ✧ VREG\_USIM is the working power supply for the USIM card;



The CLM920\_EC5 4G module adopts single-supply mode. The power supply range is 3.3V~4.2V. It is recommended to use 3.7V/2A power supply. The module will generate a peak current of 2A when transmitting data or talking, resulting in a large power supply. Ripple, so it is recommended that customers design a circuit with one 150uF capacitor or three 47uF capacitors at the power supply input. It is recommended that the customer control the VBAT power supply through the MOS tube so that the module can be completely powered down. Refer to the following circuit design:

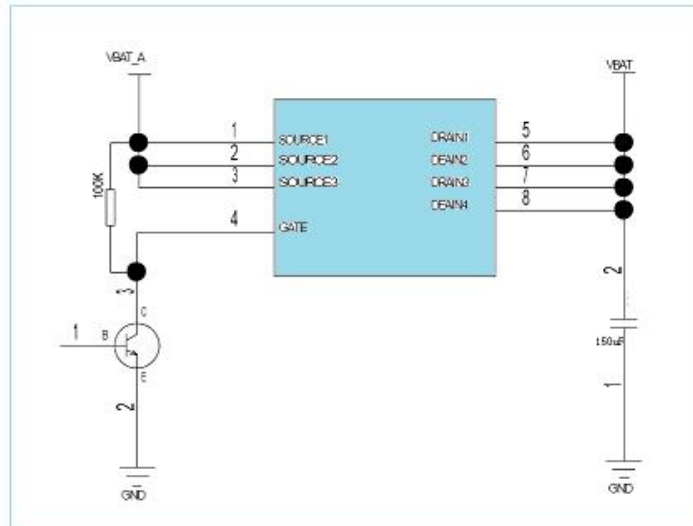


Figure 3-2 Power supply reference circuit

The power supply interface of CLM920\_EC5 4G module is as follows:

Table 3-2 Power pin definition

Pin	name	I/O	Description	DC characteristics (V)		
				MIN	TYP	MAX
2,24,39,41,52	power supply	Input	Module power supply	3.3V	3.7V	4.2V
8	SIM power supply	Output	USIM power supply	0	1.8/2.85V	1.98/3.3V
4,9,15,18,21,26,27,29,34,35,37,40,43,50	Ground		Ground	-	0	-

Note: Considering factors such as the voltage drop of the trace, it is recommended that the power supply of the module be at least 3.4V.



## 3.4 USB interface definition

### 3.4.1 Overview

CLM920\_EC5 4G module USB interface supports USB2.0 high-speed protocol, USB input and output routing must comply with USB2.0 features, USB interface is defined as follows:

Table 3-3 USB pin definition

Pin	Signal name	I/O	Description
36	USB_D-	Two way	USB data cable -
38	USB_D+	Two way	USB data cable +
4,9,15,18,21,26,27,29, 34,35,37,40,43,50	GND		Ground

### 3.4.2 USB interface design reference circuit

The USB reference design circuit is as follows:

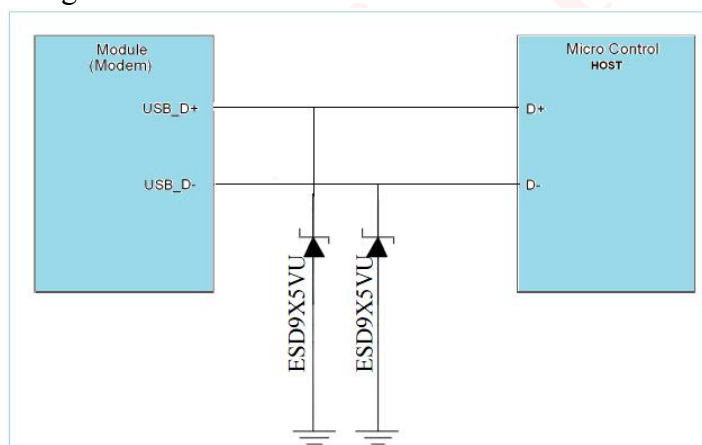


Figure 3-3 USB design circuit diagram

Design considerations:

1. USB cable design needs to strictly follow the USB2.0 protocol requirements. Pay attention to the protection of the data line when wiring, differential trace, control impedance is  $90 \Omega$ . ESD protection devices should be added to the data line.
2. The USB bus supply voltage is provided internally by the module and does not need to be provided externally. At the same time, since the USB interface of the module does not provide USB bus power, the module can only be used as a slave device of the USB bus.

The USB interface supports the following features:

- ✧ Software download upgrade



- ✧ Data communication
- ✧ AT Command

### 3.5 UART interface

The CLM920\_EC5 4G module provides a set of UART interfaces. The serial port level is 1.8V. If the serial port is connected to a 5V logic level MCU, pay attention to the level matching. The serial port can print the program log information. .

The UART interface is defined as follows:

Table 3-5 UART serial port pin definition

Pin	Signal name	I/O	Description
11	UART_TX	Output	send data
13	UART_RX	Input	Receive data
23	UART_CTS	Input	User allows module to send
25	UART_RTS	Output	The module requests the user to send

If you use the serial port to print information, you need to refer to the following serial port design.

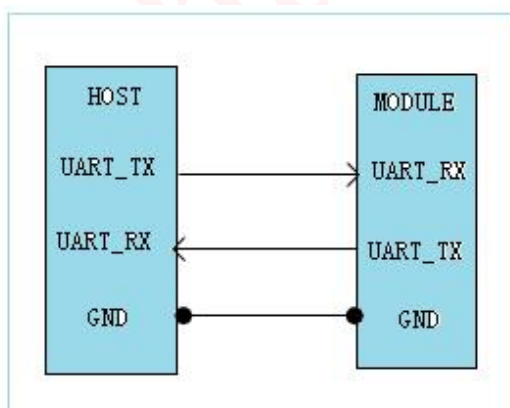


Figure 3-4 UART serial port design

### 3.6 USIM Interface Definition

#### 3.6.1 Overview

The CLM920\_EC5 4G module provides an ISO 7816-3 compliant USIM card interface and supports a 1.8V/3.0V USIM card.

Table 3-6 USIM card pin definitions

Pin	Signal name	Attribute	High value	Description
-----	-------------	-----------	------------	-------------





		s		
6	USIM_DET	Input	1.8V	SIM hot plug detection
8	VREG_USIM	Output	1.8V/2.85V	USIM card power supply
10	UIM1_DATA	Two way	1.8V/2.85V	USIM card data
12	UIM1_CLK	Output	1.8V/2.85V	USIM card clock
14	UIM1_RESET	Output	1.8V/2.85V	USIM card reset
4,9,15,18,21,26,27,29,34,35,37,40,43,50	GND		0V	Ground signal

### 3.6.2 USIM Card Reference Circuit

The CLM920\_EC5 4G module does not come with a USIM card slot. Users need to design a USIM card slot on their own interface board.

The USIM card interface reference design is as follows:

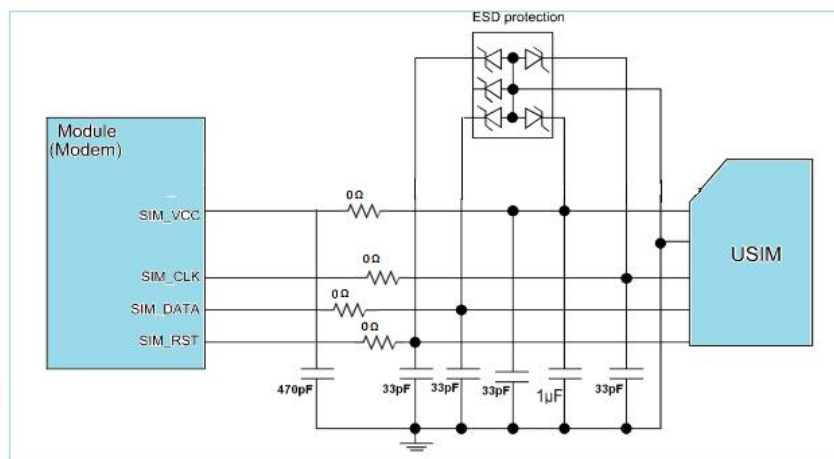


Figure 3-5 USIM design circuit diagram

Design considerations:

- ✧ As shown in the USIM interface reference design diagram, ESD protection devices with a capacitance less than 10 PF should be selected on the interface cable to enhance antistatic capability.
- ✧ The USIM card slot should be placed as far as possible from the RF radiation from the antenna.
- ✧ SIM\_DET inserts or does not insert the detection pin for the USIM card. It is high by default. The SIM card status is detected by this PIN pin during hot plug application.



### 3.6.3 USIM\_DET Hot Swap Reference Design

The CLM920\_EC5 4G module supports SIM hot plugging. The USIM\_DET pin acts as an input detection pin to determine whether the SIM card is inserted or not. The USIM\_DET pin defaults to a pull-up high.

Table 3-7 Hot swap detection foot definition

NO	USIM_DET status	Description
1	High	SIM card insertion, USIM_DET is high
2	Low	SIM card is pulled out, USIM_DET is low

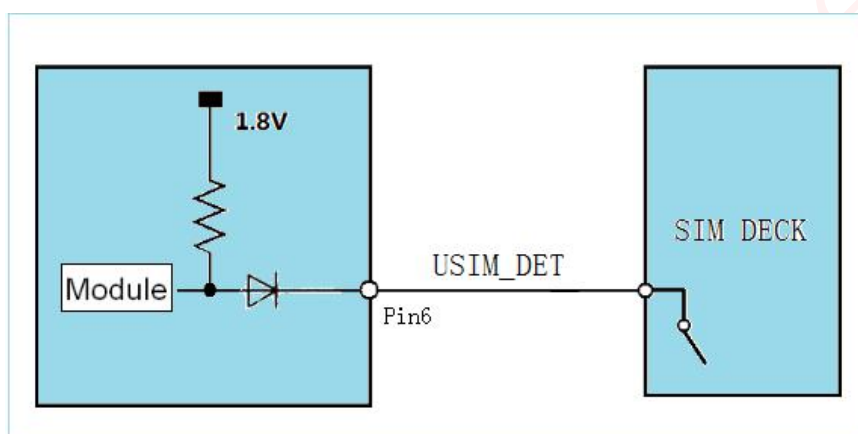


Figure 3-6 Hot swap detection of the USIM card

When the customer uses a normally closed SIM or a normally open SIM card, the detection function can be set by the AT command. Set `AT+HOSCFG=1,1` When the SIM card is in the state, the status is high, set `AT+HOSCFG=1,0` when the SIM card is in the state, the status is low.

### 3.7 WWAN interface

The CLM920\_EC5 4G module provides a hardware pin `W_DISABLE` to turn the RF off function on. In addition, the RF function can also be turned off by the software AT command. The `W_DISABLE` function is defined as follows:

Table 3-8 `W_DISABLE` pin definition

NO	<code>W_DISABLE</code> 状态	功能
1	H	WWAN 功能打开
2	L	WWAN 功能关闭



### 3.8 General GPIO Interface

Table 3-9 General GPIO Pin Definitions

Pin	Signal name	I/O	High value	Description
19	WAKEUP_BP	Input	1.8V	Master wake-up module
22	RESET	Input	1.8V	Module reset control pin, low effective
28	ONOFF	Input	VBAT-0.3V	Low level boot
32	WAKEUP_AP	Output	1.8V	Module wakeup master

The CLM920\_EC5 4G module provides WAKEUP\_AP and WAKEUP\_BP functions when applied to a MID tablet. WAKEUP\_AP is the module wake-up host signal, WAKEUP\_BP is the host wake-up module signal.

**RESET:** The module can be reset by pulling this pin low for 100ms. The pull-up resistor is recommended to be 10K to 1.8V externally. This pin is sensitive to interference ratio and should be protected when wiring.

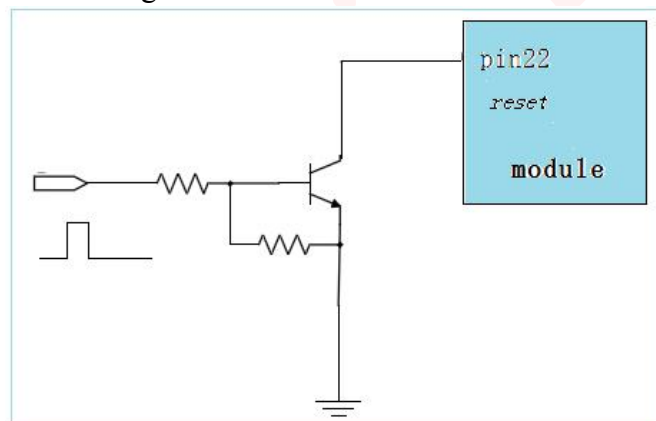


Figure 3-8 Reset Reference Circuit

**ONOFF:** As long as the pin is pulled low when the power is turned on, the power can be turned on.



Refer to the power-on boot timing diagram:

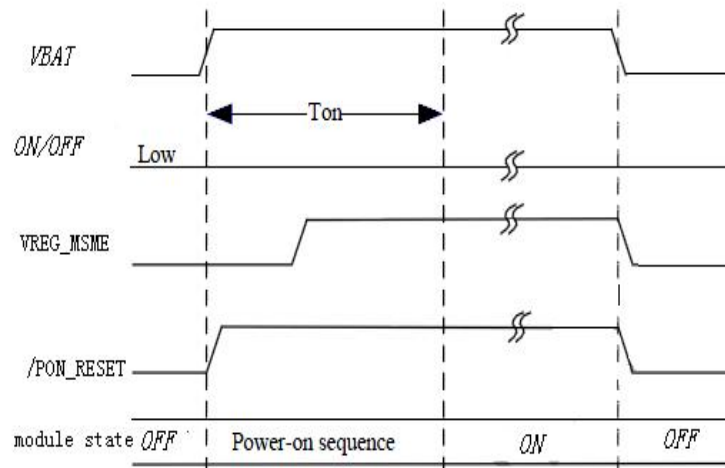


Figure 3-9 Startup timing diagram

### 3.9 Network indication interface

The CLM920\_EC5 4G module provides an open-drain GPIO signal to indicate the status of the RF communication.

Table 3-10 Network indicator pin definition

Pin name	Pin	I/O	Description
LED_WWAN	42	Input	Network status indicator

Table 3-11 Network indication status

status	LED display status
no service	Constantly bright
Module registration on non-4G network	Slow flash
Module registration 4G network or module registration non-4G network for data and other services	Fast flash

The LED network indicator reference design is as follows:

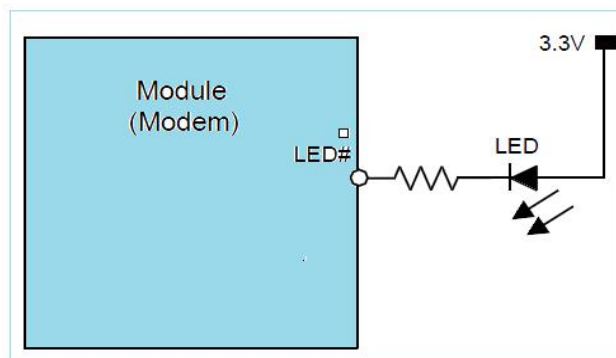


Figure 3-10 Network indicator circuit diagram



The brightness of the LED lamp can be adjusted by adjusting the resistance value, and the current can be adjusted to a maximum of 40 mA.

### 3.10 RF antenna interface

The CLM920\_EC5 4G module provides three RF antenna interfaces, which are the main set antenna, diversity antenna and GPS antenna (optional). Connected to the antenna must be a 50 ohm characteristic impedance trace.

In actual use, the matching device parameter value can be debugged according to the user's circuit board trace, and the 68~100nH inductor can be connected to the ground to prevent static electricity. Pay attention to the impedance matching and antistatic or lightning strike of the antenna.

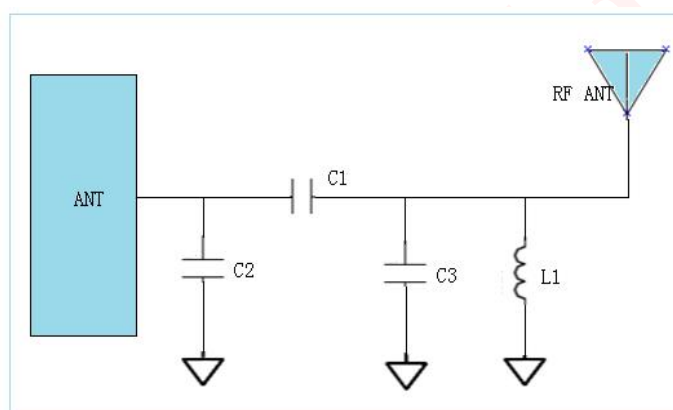


Figure 3-11 Antenna Interface

### 3.11 analog voice interface

The CLM920\_EC5 4G module provides a set of analog voice interfaces that include one differential input signal (MIC\_P/MIC\_N) and one differential output signal (REC\_P/REC\_N).

#### 3.11.1 Description of the analog voice interface

Table 3-12 Simulated voice pin definitions

Pin number	Signal name	I/O	Description
1	MIC_P	Input	Audio input +
3	MIC_N	Input	Audio input -
5	REC_P	Output	Audio output +
7	REC_N	Output	Audio output-
4,9,15,18,21,26,27,29,34 ,35,37,40,43,50	GND		Ground



### 3.11.2 Analog Voice Interface Reference Design

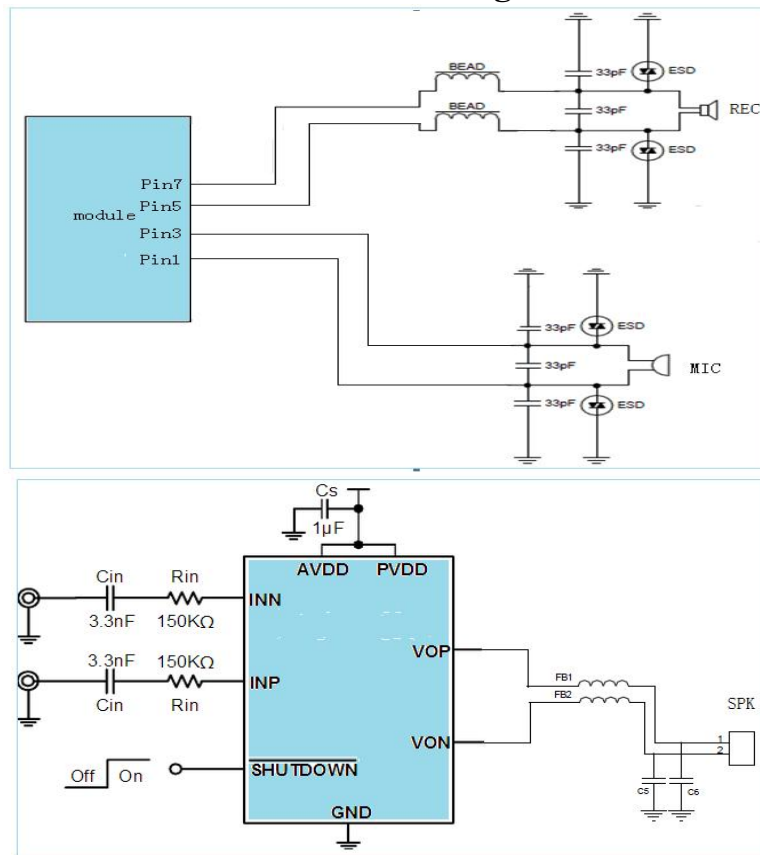


Figure 3-12 Analog voice interface circuit

Design considerations:

- ✧ The audio signal is a sensitive signal, and the wiring should be protected against interference;
- ✧ Pay attention to the EMI layout away from the RF interference area;
- ✧ A filter capacitor is reserved when designing the audio circuit to remove the radio frequency interference signal;

### 3.12 I2C interface

The CLM920\_EC5 4G module provides a set of I2C interfaces. Supports master mode, the maximum rate supports 3.4Mbps, and the interface IO level is 1.8V.

Table 3-13 I2C pin definition

Pin number	Signal name	I/O	Description
49	GPIO112	DIO	I2C clock
51	GPIO111	DO	I2C data

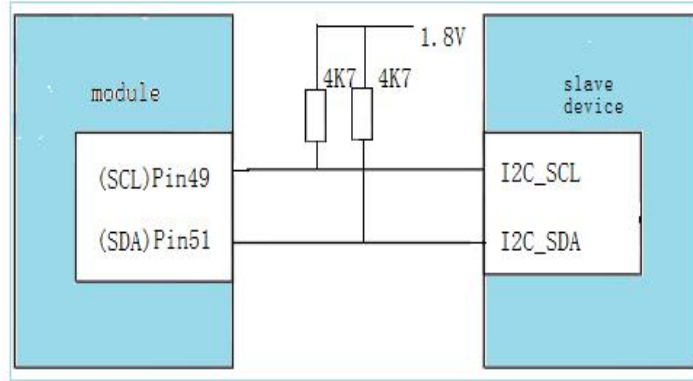


Figure 3-13 I2C interface circuit

### 3.13 SPI interface

The CLM920\_EC5 4G module provides a set of SPI interfaces that support the master mode. The SPI interface has a maximum rate of 52 MHz and an interface level of 1.8V.

Table 3-14 SPI interface pin definitions

Pin	Signal name	I/O	Description
45	GPIO21	DI	SPI_MISO
47	GPIO20	DO	SPI_MOSI
49	GPIO112	DO	SPI_CLK
51	GPIO111	DO	SPI_CS

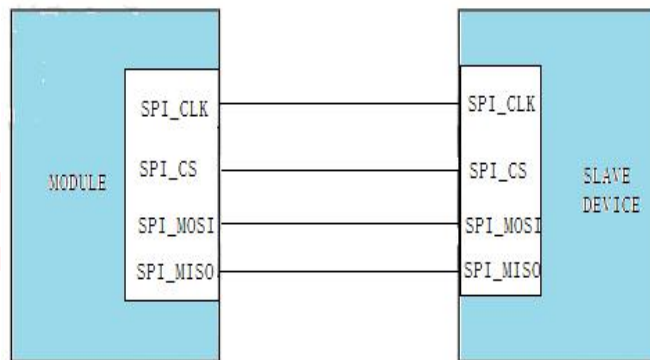


Figure 3-14 SPI interface circuit



## Chapter 4. Overall technical indicators

### 4.1 Overview

The CLM920\_EC5 4G Module RF contains the following sections:

- ✧ working frequency;
- ✧ Conducted radio frequency measurement;
- ✧ Conducted receiving sensitivity and transmitting power;

### 4.2 Working frequency

Table 4-1 RF frequency table

Band	UL	DL	Duplex Mode
LTE B1	1920MHz– 1980MHz	2110MHz – 2170MHz	FDD
LTE B3	1710MHz– 1785MHz	1805MHz – 1880MHz	FDD
LTE B5	824MHz – 849MHz	869MHz – 894MHz	FDD
LTE B38	2570MHz– 2620MHz	2570MHz – 2620MHz	TDD
LTE B39	1880MHz– 1920MHz	1880MHz – 1920MHz	TDD
LTE B40	2300MHz– 2400MHz	2300MHz – 2400MHz	TDD
LTE B41	2555MHz– 2655MHz	2555MHz – 2655MHz	TDD
GSM850	824MHz – 849MHz	869MHz – 894MHz	GSM
GSM900	880MHz – 915MHz	925MHz – 960MHz	GSM
GSM1800	1710MHz– 1785MHz	1805MHz – 1880MHz	GSM
UMTS B1	1920MHz –1980MHz	2110MHz – 2170MHz	WCDMA
UMTS B3	1710MHz –1785MHz	1805MHz – 1880MHz	WCDMA
TDS B34	2010MHz –2025MHz	2010MHz – 2025MHz	TD-SCDMA
TDS B39	1880MHz –1920MHz	1880MHz – 1920MHz	TD-SCDMA
BC0	824MHz – 849MHz	869MHz – 894MHz	CDMA
GPS	1575.42MHz+/-1MHz		

### 4.3 Conducted RF measurements

#### 4.3.1 Test environment

Table 4-2 Test instruments

test instrument	R&S CMW500
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power supply	Agilent 66319
RF cable	Rosenberger Precision Microwave Cable
Murata coaxial RF line	MXHP32HP1000

### 4.3.2 Test criteria

The CLM920\_EC5 4G module passes the 3GPP TS 51.010-1, 3GPP TS 34.121-1, 3GPP TS 36.521-1, 3GPP2 C.S0011 and 3GPP2 C.S0033 test standards. Each module is rigorously tested at the factory to ensure reliable quality.

### 4.4 Conducted Receive Sensitivity and Transmit Power

CLM920\_EC5 4G module 2G and 3G receiving sensitivity and transmit power test indicators are as follows:

Table 4-3 2G3G RF indicators

mode	Up	Down	power	Receiving sensitivity
GSM	824~849MHz	869~894MHz	33±2dBm	<-108dBm
	880~915MHz	925~960MHz	33±2dBm	<-108dBm
	1710~1785MHz	1805~1880MHz	30±2dBm	<-108dBm
WCDMA	1710~1785MHz	1805~1880MHz	23+2/-2dBm	<-109dBm
TD-SCDMA	2010~2025MHz	2010~2025MHz	24+1/-3dBm	<-108dBm
	1880~1920MHz	1880~1920MHz	24+1/-3dBm	<-108dBm
1XEVDOrA	824~849MHz	869~894MHz	23+2/-2dBm	<-108dBm

CLM920\_EC5 4G module 4G receiving sensitivity and transmit power test indicators are as follows:

Table 4-4 4G RF sensitivity indicators

Directory	3GPP protocol requirements	Module test sensitivity		
		Min	Typical	Max
LTE B1 (FDD QPSK pass) 95%)	< -97(10 MHz)		-98	-97
LTE B3 (FDD QPSK pass) 95%)	< -94(10 MHz)		-97	-96
LTE B5 (FDD QPSK pass) 95%)	< -95(10 MHz)		-97	-96
LTE B38 (TDD QPSK pass) 95%)	< -97(10 MHz)		-98	-97
LTE B39 (TDD QPSK pass) 95%)	< -97(10 MHz)		-98	-97



LTE B40 (TDD QPSK pass) 95%)	< -97(10 MHz)		-98	-97
LTE B41 (TDD QPSK pass) 95%)	< -97(10 MHz)		-97	-96

Table 4-5 4G RF transmit power indicators

Directory	3GPP protocol requirements	Module test value transmit power		
		Min	Typical	Max
LTE B1	21 to 25	22	23	24
LTE B3	21 to 25	22	23	24
LTE B5	21 to 25	22	23	24
LTE B38	21 to 25	22	23	24
LTE B39	21 to 25	22	23	24
LTE B40	21 to 25	22	23	24
LTE B41	21 to 25	22	23	24

## 4.5 antenna requirements

CLM920\_EC5 4G module antenna design requirements:

Table 4-6 Antenna indicator requirements

Frequency band	Standing wave ratio	Gain (AVG)	effectiveness	TRP	TIS
GSM850	< 2.5:1	> -4dbi	> 40%	29	<-102
GSM900				29	<-102
GSM1800				26	<-102
B1 FDD				19	<-94
B3 FDD				19	<-91
B38 TDD				19	<-93
B39 TDD				19	<-93
B40 TDD				19	<-93
B41 TDD				19	<-93
WCDMA B1				19	<-106
CDMA BC0				19	<-106
B34 TDS				19	<-106
B39 TDS				19	<-106



## 4.6 Power consumption characteristics

Table 4-7 GSM power consumption

Frequency band	Configuration	Power level	Current consumption mA
GPRS850	1UP/1DL	5	310
GPRS900	1UP/1DL	5	315
GPRS1800	1UP/1DL	0	200
EDGE850	1UP/1DL	8	220
EDGE900	1UP/1DL	8	225
EDGE1800	1UP/1DL	2	175

Table 4-8 WCDMA Power Consumption

Frequency band	power	Current consumption mA
WCDMA B1	23.2dbm	556
	1dbm	165

Table 4-9 LTE power consumption

Frequency band	power	Current consumption mA
B1	21.5	560
B3	21.8	545
B38	22.5	465
B39	21.9	375
B40	22.1	362
B41	22.8	482

Table 4-10 TDS-CDMA power consumption

Frequency band	power	Current consumption mA
TDS B34	22.8	173
TDS B39	23.1	180



## Chapter 5. Interface electrical characteristics

### 5.1 Working storage temperature

Table 5-1 CLM920\_EC5 4G module works, storage temperature

parameter	min	max
Normal operating temperature	-20°C	70°C
Extreme working temperature	-30°C	85°C
storage temperature	-40°C	90°C

### 5.2 Module IO Level

CLM920\_EC5 4G module IO level is as follows:

Corresponding to the 1.8V USIM application, the REG\_USIM is 1.8V; corresponding to the 3V USIM application, the REG\_USIM is 2.85V.

Other digital IO levels are unified to 1.8V.

Table 5-2 CLM920\_EC5 4G module IO level

parameter	Parameter Description	min	max
VIH	High level input voltage	0.65*VDD_PX V	VDD_PX+0.3V
VIL	Low level input voltage	-	0.35*VDD_PX V
VOH	High level output voltage	VDD_PX-0.45 V	VDD_PX V
VOL	Low level output voltage	0V	0.45V

### 5.3 Power supply

The CLM920\_EC5 4G module input power requirements are as follows:

parameter	min	Typical value	max
Input voltage	3.3V	3.7V	4.2V

The power-on time of any interface of the module must not be earlier than the boot time of the module. Otherwise, the module may be abnormal or damaged.

Note: Considering factors such as the voltage drop of the trace, it is recommended that the power supply of the module be at least 3.4V.



## 5.4 Electrostatic characteristics

When using the CLM920\_EC5 4G module, ESD protection is required to ensure product quality.

Test port	Contact discharge	air discharge	unit
USB interface	±4	±8	KV
USIM interface	±4	±8	KV
Analog voice interface	±4	±8	KV
VBAT power supply	±4	±8	KV



## Chapter 6. Structural and mechanical properties

### 6.1 Appearance

The CLM920\_EC5 4G module is a two-sided layout of PCBA. The appearance of the module is as follows:



Figure 6-1 CLM920\_EC5 Appearance



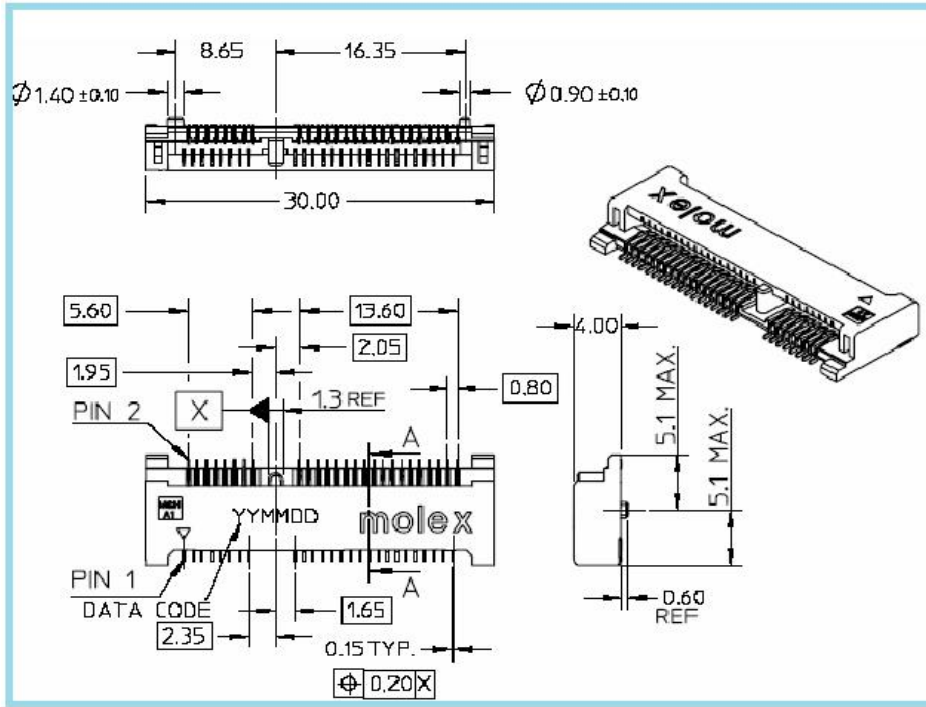


Figure 6-3 Connector dimensions

### 6.3 module fixing method

The module is fixed in such a way that the two screw holes are grounded.





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## Chapter 7. Typical reference design

Shanghai Yuge