ZTEWelink

Welink your smart

MC2261_V2

HARDWARE DEVELOPMENT GUIDE OF MODULE PRODUCT

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CDMA Module Series

ZTE

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LEGAL INFORMATION

REVISION HISTORY

Version	Date	Description
V1.0	2010-11-30	First published
V1.1	2010-12-20	Modify Table 2-1
V1.2	2011-02-22	Update image
V1.3	2011-02-25	Change Operational Temperature Range
V1.4	2011-03-07	Modify Table 2-1 and power management
V1.5	2011-03-29	Modify content of 3.1 power management and 5.2.5 antenna matching
V1.6	2011-04-25	Modify 2.1 (add note), 3.5(add new content)
V1.7	2011-06-15	Modify the email for supports.
V1.8	2011-11-25	Define pin 57 MO_RI
V1.9	2014-09-25	Update the format and template of module Add the name of all the Figures and Tables Update the picture of the module Update the Figure 4-1 of NMM22-5017 connector Update chapter 3.1 of power Update the pins of 35&36
V2.0	2014-09-28	Update chapter 3.1 of power Update the pins of 35
V2.1	2016-04-18	Add PID information in chapter 1.1

ABOUT THIS DOCUMENT

A. Application Range

R&D personnel using CDMA modules to make the second development

B. Reading Note

The symbols below are the reading notes you should pay attention on:

⚠ : Warning or Attention

: Note or Remark

CONTACT INFORMATION

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Note: Consult our website for up-to-date product descriptions, documentation, application notes, firmware upgrades, troubleshooting tips, and press releases

Besides, ZTEWelink provides various technical support ways to the customers, such as support by phone, website, instant messaging, E-mail and on-site.

SAFETY INFORMATION

The following safety precautions must be observed during all phases of the operation, such as usage, service or repair of any cellular terminal or mobile incorporating ME3610 module. Manufacturers of the cellular terminal should send the following safety information to users and operating personnel and to incorporate these guidelines into all manuals supplied with the product. If not so, ZTEWelink does not take on any liability for customer failure to comply with these precautions.

	Full attention must be given to driving at all times in order to reduce the risk of an accident. Using a mobile while driving (even with a hands free kit) cause distraction and can lead to an accident. You must comply with laws and regulations restricting the use of wireless devices while driving.
	Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it switched off. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. Consult the airline staff about the use of wireless devices on boarding the aircraft, if your device offers a Airplane Mode which must be enabled prior to boarding an aircraft.
	Switch off your wireless device when in hospitals or clinics or other health care facilities. These requests are designed to prevent possible interference with sensitive medical equipment.
	GSM cellular terminals or mobiles operate over radio frequency signal and cellular network and cannot be guaranteed to connect in all conditions, for example no mobile fee or an invalid SIM card. While you are in this condition and need emergent help, please remember using emergency call. In order to make or receive call, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength.
	Your cellular terminal or mobile contains a transmitter and receiver. When it is on, it receives and transmits radio frequency energy. RF interference can occur if it is used close to TV set, radio, computer or other electric equipment.
	In locations with potentially explosive atmospheres, obey all posted signs to turn off wireless devices such as your phone or other cellular terminals. Areas with potentially explosive atmospheres including fuelling areas, below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles such as grain, dust or metal powders.

Federal Communication Commission Interference Statement

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.

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 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.

FCC Caution:

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

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.

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and the maximum antenna gain allowed for use with this device is 4.8 dBi.
2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: Q78-ZTEMC2261”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

CONTENTS

TABLES

FIGURES

1. Mechanical Interface

1.1. Physical Features

Table 1–1 Major Technical Parameters

Item	Specifications
Dimensions & Weight	Length: 34.4 mm Width: 30 mm Thickness: 3.3 mm Weight: 8 g
Operational Temperature Range	-30℃ to +75℃
Storage Temperature Range	-40℃ to +80℃
ROHS	Yes
Antenna Connectors	50-Ohm ANT connectors for CDMA
Power Supply	Powered by the VPH_PWR pin (+3.3V~ +4.2V, typical value：3.8V)
Current	Idle current: 5mA @-75dBm, Powered by the VPH_PWR call current: 156mA @-75dBm, Powered by the VPH_PWR max current: 535mA @-104dBm, Powered by the VPH_PWR
CELL BAND	PID V1CP: 800M/1.9G PID V2CP: 800M/1.9G

1.2. Mechanical size

NOTE:

- **1. All dimensions shown in the drawing below are in the unit of mm.**
- **2. Default dimension's tolerance is +/-0.1mm.**

Figure 1–1　MC2261 TOP SIDE

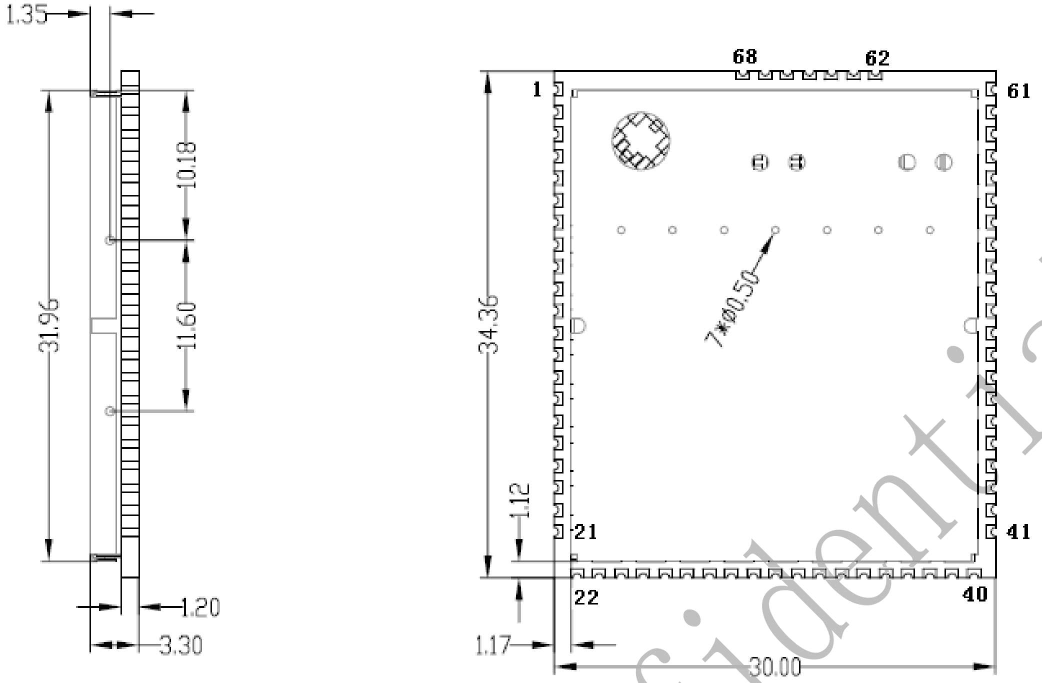


Figure 1–2: MC2261 BOTTOM SIDE

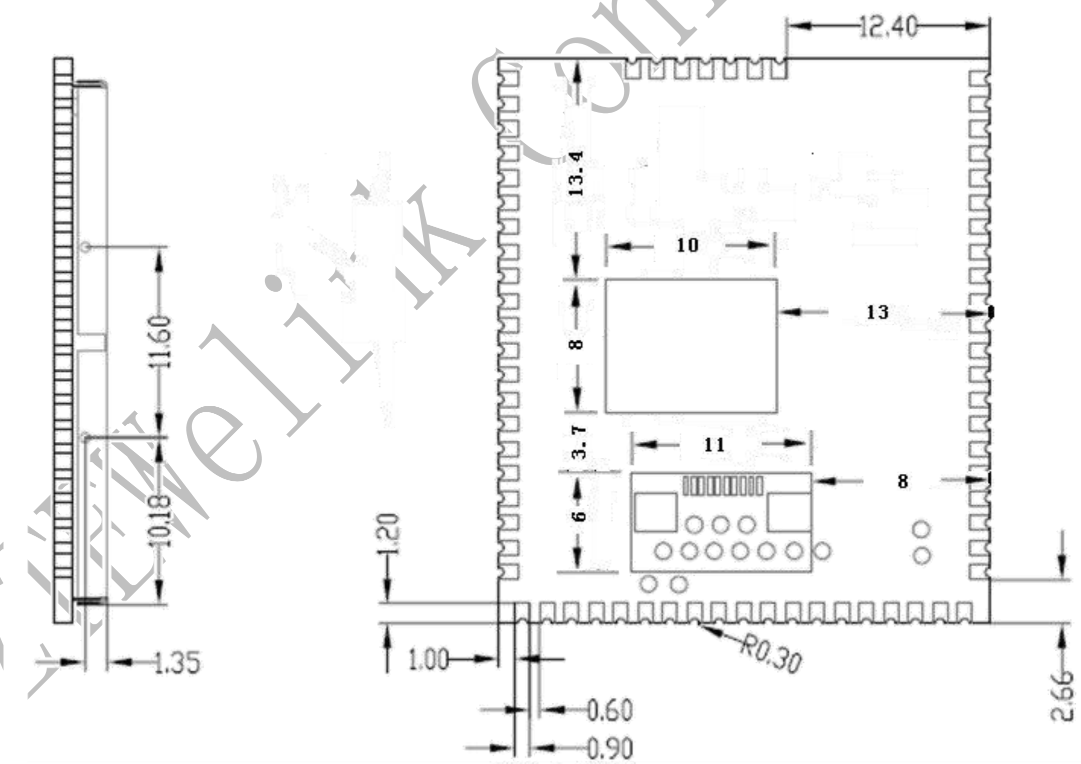


Figure 1–3 MC2261 Module Illustration

NOTE: The picture above is just for reference, please take the actual product as the referece.

2. Electrical Interface

2.1. Pin Assignments

Table 2–1 MC2261 Module 68-pin Electrical Interface

No.	Signal Name	Signal Type	Input/output	Description	Typical Value	Default (Internal PU/PD)	Comments
1	GND_RF			Ground			
2	RF_ANT	Analog	I/O	Connect 50ohm antenna or feed			Connect 50ohm antenna or feed
3	GND_RF			Ground			
4	GPIO0	Digital	I/O	GPIO	1.8V	0（Output PD）	1.8V Level，
5	GPIO1	Digital	I/O	GPIO	1.8V	0（Output PD）	1.8V Level
6	GPIO2	Digital	I/O	GPIO	1.8V	0（Output PD）	1.8V Level
7	GPIO3	Digital	I/O	GPIO	1.8V	0（Output PD）	1.8V Level
8	GPIO4	Digital	I/O	GPIO	1.8V	0（Output PD）	1.8V Level
9	GPIO9	Digital	I/O	GPIO	1.8V	1.8V（Input PU）	1.8V Level
10	GPIO8	Digital	I/O	GPIO	1.8V	1.8V（Input PU）	1.8V Level
11	GPIO7	Digital	I/O	GPIO	1.8V	1.8V（Input PU）	1.8V Level
12	GPIO6	Digital	I/O	GPIO	1.8V	1.8V（Input PU）	1.8V Level
13	GPIO5	Digital	I/O	GPIO	1.8V	1.8V（Input PU）	1.8V Level
14	GND			Ground			
15	MSM_CTS		I	Clear to send			UART Port 1.8V Level
16	MSM_RTS		O	Ready to send			UART Port 1.8V Level
17	MSM_RXD		I	Transmitting data			UART Port 1.8V Level
18	MSM_TXD		O	Receiving data			UART Port 1.8V Level
19	GND			Ground			
20	NA						Reserved
21	NA						Reserved
22	NA						Reserved
23	NA						Reserved
24	GND			Ground			
25	NA						Reserved
26	NA						Reserved
27	GND			Ground			
28	NA						Reserved
29	NA						Reserved

30	NA						Reserved
31	NA						Reserved
32	GND			Ground			
33	VPH_PWR		P (input)	Main power	3.8		Power range: 3.3V-4.2V
34	VPH_PWR		P (input)	Main power	3.8		Power range: 3.3V-4.2V
35	NC			Not connected			
36	VBAT		P (input)	Used for module's power supply	3.8		Power range: 3.3V-4.2V
37	NA						Reserved
38	GND			Ground			
39	NA						Reserved
40	NA						Reserved
41	ON			Power button			Power button
42	NA						Reserved
43	NA						Reserved
44	NA						Reserved
45	NA						Reserved
46	VREG_MSME2		O	Digital power	2.85V		
47	VREG_MSME1		O	Digital power	1.8V		
48	NA						Reserved
49	GND			Ground			
50	USB_VBUS		I	USB power	5V		
51	USB_DP	Digital	B	Send D+ to USB			USB_D+ signal
52	USB_DM	Digital	B	Send D- to USB			USB_D- signal
53	GND			Ground			
54	NA						Reserved
55	NA						Reserved
56	NA						Reserved
57	MO_RI	Digital	O	MSG arrival indication		Output PU	2.85V， normal 300ms high-level impulse when MSG arrival
58	DCD		O	Carrier detect	2.85V		2.85V, low active
59	DTR		O	Data Terminal	2.85V		UART Port,

				Ready			Connect to DCD, 2.85V Level
60	DSR		I	Data Set Ready	2.85V		UART Port, Connect to DTR, 2.85V Level
61	NA						Reserved
62	GND			Ground			
63	USE_LED		O	In-use LED			LED ON as the level is high. 2.85V Level
64	NA						Reserved
65	NA						Reserved
66	GPIO42	Digital	I/O	GPIO	1.8V	0（Iutput PD）	1.8V Level
67	GPIO43	Digital	I/O	GPIO	1.8V	0（Iutput PD）	1.8V Level
68	GND			Ground			

NOTE:

1 **All the pin can be left open ,when they are not used.**

2 **I/O stands for Inupt/Output, P stands for Power, B stands for Bi-Directional.**

3 **PU/PD stands for Pull-up/Pull-down.**

4 **The unit of Min, Typ, Max is V.**

2.2. Digital logic characteristics

Specifications for the digital I/Os of the baseband functions depend upon the pad voltage being used. The MC2261 I/O uses two pad voltages: 1.8 and 2.85 V. Digital I/O specifications under both pad voltage conditions are presented in Table 2-2 and Table 2-3

Table 2–2 Baseband digital I/O characteristics for VDD_PX = 1.8 V nominal

Parameter		Min	Typ	Max	Unit
VIH	High-level input voltage	0.65·VDD_PX	-	VDD_PX+0.3	V
VIL	Low-level input voltage	-0.3	-	0.35·VDD_PX	V
VOH	High-level output voltage4	VDD_PX-0.45	-	VDD_PX	V
VOL	Low-level output voltage 4	0	-	0.45	V

Table 2–3 Baseband digital I/O characteristics for VDD_PX = 2.85 V nominal

Parameter		Min	Typ	Max	Unit
VIH	High-level input voltage	0.65·VDD_PX	-	VDD_PX+0.3	V
VIL	Low-level input voltage	-0.3	-	0.35·VDD_PX	V
VOH	High-level output voltage4	VDD_PX-0.45	-	VDD_PX	V
VOL	Low-level output voltage 4	0	-	0.45	V

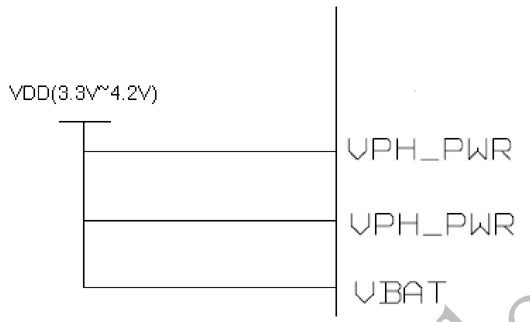
3. Applications

3.1. Power Management

The module could work under the conditions as follows:

Connect VPH_PWR and VBAT pins together, and then connect to the power as shown in Figure 3-1.

Figure 3–1 Powered by VBAT and VPH_PWR pin



Refer to Table 3-1 for the module's input power characteristics. If the input voltage is not in the range, it must be converted to the voltage below:

Table 3–1 Input Power Characteristics

Status	Max. Value	Typical Volute	Min. Value
Power voltage supply	+4.2V DC	+3.8V DC	+3.3V DC
Power current supply	< 3mA (Average value)	--	800mA (Depending on the network signal condition)

When powered, the module will be automatically powered on.

3.2. GPIO

The Module have 12 GPIO,,The GPIO level is 1.8V, the logic-level voltage refer to the Table 2-2.

The GPIO input and output functions can be set by software. When the GPIO is set to output, the output drive current are 2~16mA. in the range of 2~16mA current value can be set by software. When the GPIO is set to input, it can be set to pull-up or pull-down by software.

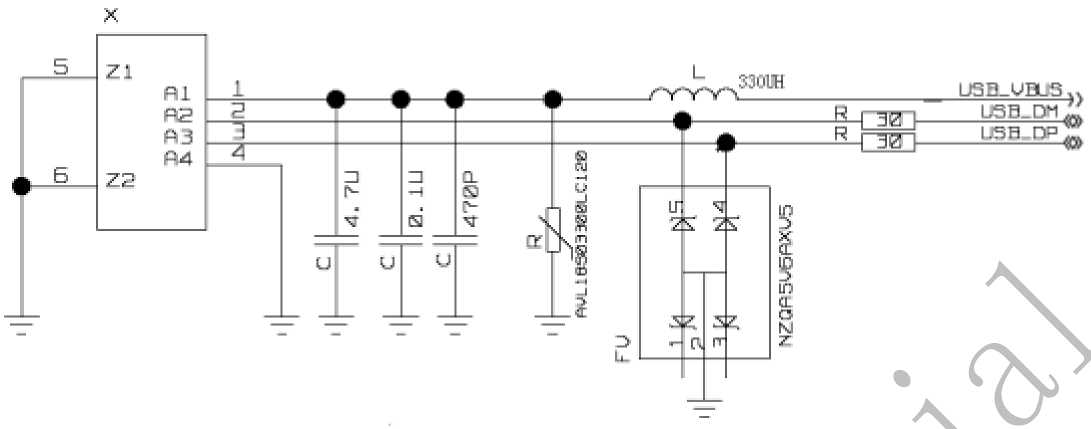
NOTE: The AT commands now do not support setting the GPIO functions. If you want AT commands to support the functions, the software must be revised.

3.3. USB

The module provides a USB2.0 full-speed interface. The ESD protector and RC circuit are required to restrain EMI for USB port. Please see Figure 3-2 for USB port.

The USB port could be used for AT command、software upgrade, RF calibration and mobile station test.

Figure 3–2 USB Typical Circuit



3.4. UART

Pins of MSM_CTS, MSM_RTS, MSM_RXD and MSM_TXD are 1.8V level respectively for the external interface, when connecting with level circuit which is not 1.8V will need the level switch connection. Pins of MO_RI, DCD, DTR and DSR are the level of 2.85V respectively for the external interface, when connecting with level circuit which is not 2.85V will need the level switch connection. Otherwise, UART will be unstable or module will be damaged because of the unmatched level. Figure 3-3, 3-4 and 3-5 are the references:

NOTES:

1) UART must be led out[only requires the connection with RXD or TXD] for upgrading when use the module to do whole device design, USB for software upgrading is the first choice.

2) IO level is 1.8V or 2.85V. Level switch connection must be needed when 1.8V level is connected with the logic circuit which is not 1.8V[such as MCU, RS232 or driver IC MAX3238], or when 2.85V level is connected with the logic circuit which is not 2.85V[for example, RS232 or driver IC MAX3238]. Otherwise, level will be unstable or module will be damaged because of the unmatched level

3) Only RXD and TXD are needed to be connected under the condition of no flow control. RXD, TXD, /CTS and /RTS are needed to be used when selecting hardware flow control to connect other processors. All IO signal should be connected when the module is used as Modem to connect with PC.

4) Module won't be hibernated if RxD is high level.

Figure 3–3 Wire serial level conversion circuit

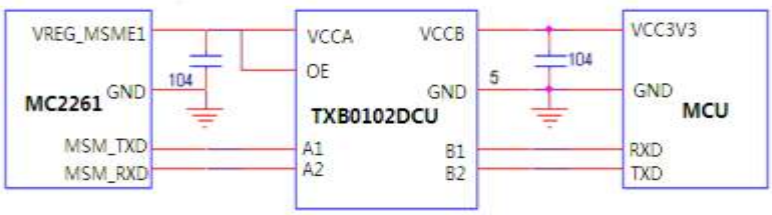


Figure 3–4 wire serial level conversion circuit

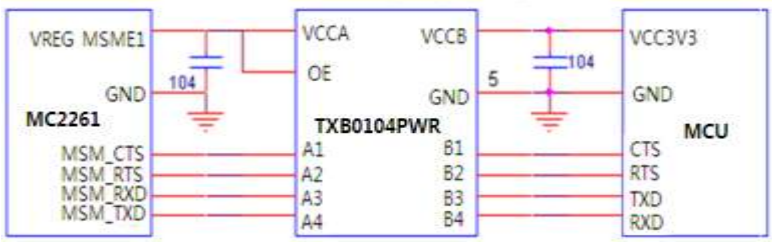
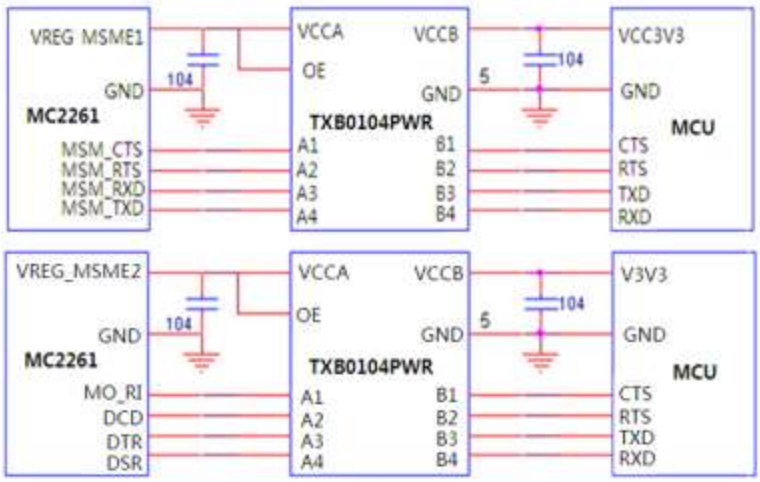


Figure 3–5 wire serial level conversion circuit



3.5. POWERING THE MODULE USING THE MDB

Place the module on the MDB (Module Development Board), then plugging one end of USB cable in PC and another in MDB, if the power supplied by the USB port, the X3 doesn't supplied the power. If not use the USB port, the X3 can supplied the power (DC5V), when the users power the module's development board, the module will be automatically powered on.

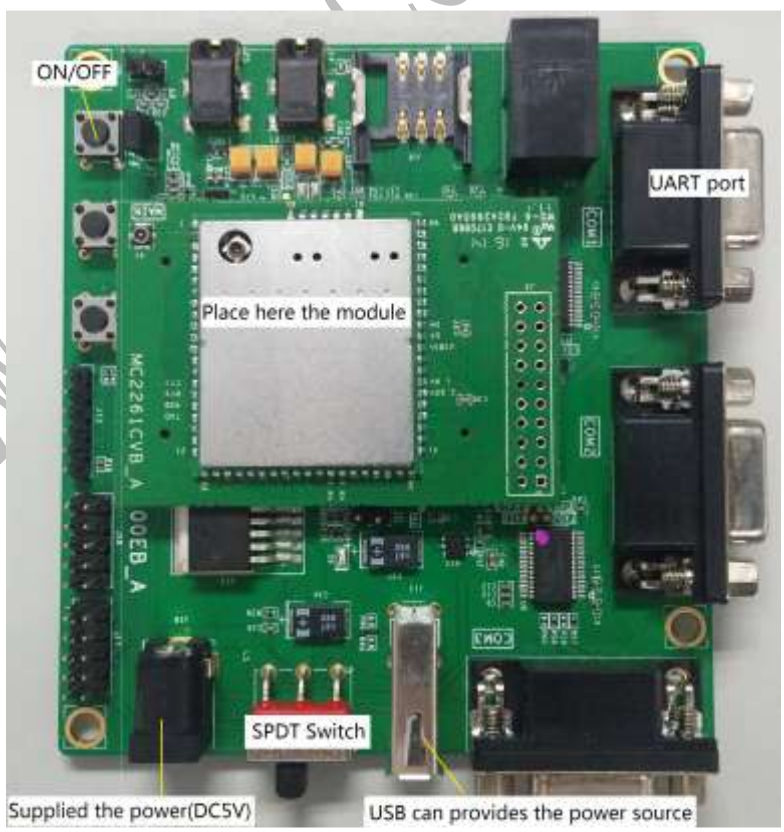
The users could power the module's development board in the following two methods:

i. Supplied by USB_VBUS_5V.

ii. Supplied by X3 (DC5V).

- Operating instructions

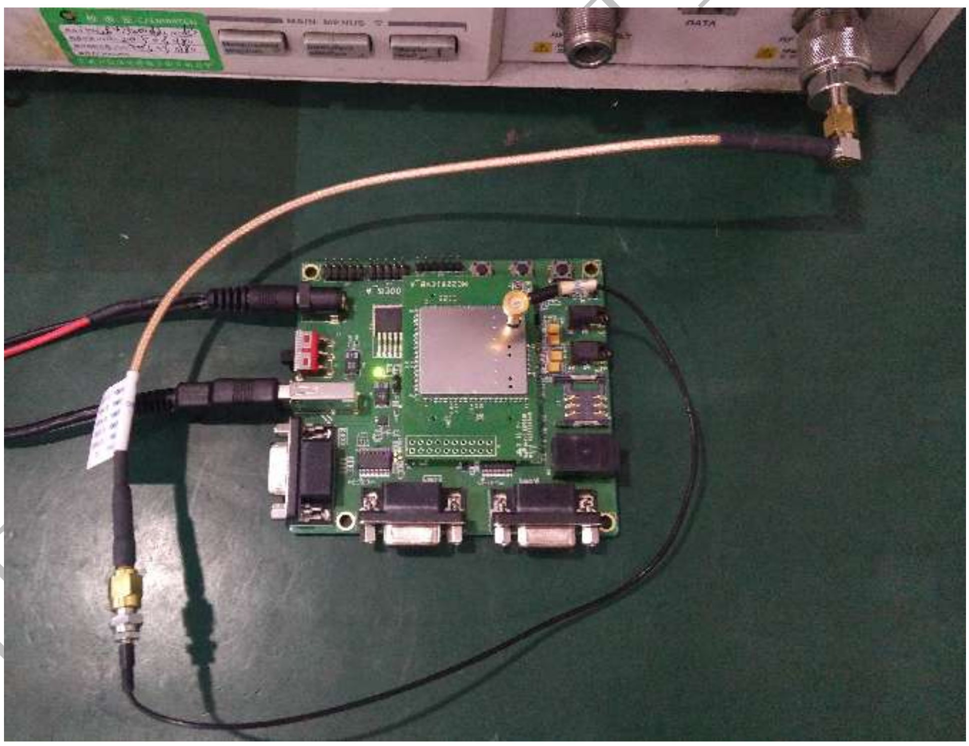
Figure 3–6 Module Development Board Illustration



Connect the sector to access terminal antenna connectors as shown in the following Figure 3-8 or Figure 3-9.

Figure 3–7 First method to connect the module to RF test equipment

Figure 3–8 Second method to connect the module to RF test equipment



4. Antenna Interface

The RF interface of the MC2261 Module has an impedance of 50 ohm. The module is capable of sustaining a total mismatch at the antenna connector or pad without any damage, even when transmitting at maximum RF power.

The external antenna must be matched properly to achieve best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression. Antenna matching networks are not included on the MC2261 Module PCB and should be placed in the host application.

Regarding the return loss, the Module provides the following values in the active band:

Table 4–1 Return Loss in the Active Band

State of Module	Return Loss of Module	Recommended Return Loss of Application
Receive	≥ 8dB	≥ 12dB
Transmit	not applicable	≥ 12dB

The connection of the antenna or other equipment must be de coupled from DC voltage. This is necessary because the antenna connector is DC coupled to ground via an inductor for ESD protection.

4.1. Antenna Installation

To suit the physical design of individual applications, the MC2261 offers two alternatives approached to connecting the antenna:

- ■ Recommended approach: CS-G2-SS1S-1.6S antenna connector manufactured by Percsson assembled on the daughter board. See Section 4.3 for details. CS-G2-SS1S-1.6D antenna connector manufactured by Percsson assembled on the component side of the PCB (top view on Module). See Section 4.3 for details.
- ■ Antenna pad and grounding plane placed on the bottom side. See Section 4.2 for details.

The SSMB-50TKE-10 and NMM22-5017 connectors have been chosen as antenna reference point (ARP) for the ZTE reference equipment submitted to type approve the MC2261 Module. All RF data specified throughout this manual are related to the ARP. For compliance with the test results of the ZTE type approval you are advised to give priority to the connector, rather than using the antenna pad.

NOTE: Both solutions can be applied alternatively. This means, if the antenna is connected to the pad, then the connector on the Module must be left empty. If the antenna is connected to daughter board, the connector on the Module must be left empty too. And when the antenna is connected to the Module connector, the pad is useless.

4.2. Antenna Pad

The antenna pad of the module is soldered to the board on the customer design to connect with RF line.

For proper grounding connect the RF line to the ground plane on the bottom of the MC2261 Module which must be connected to the ground plane of the application.

Consider that according to CDMA recommendations as 50Ω connector is mandatory for type approval measurements. It must be ensured that the RF line which is connected to antenna pad should be controlled on 50Ω.

Notes on soldering

- ■ To prevent damage to the Module and to obtain long-term solder joint properties, you are advised to maintain the standards of good engineering practice for soldering.

Material Properties

■ MC2261 Module PCB: FR4

■ Antenna pad: Gold plated pad

4.3. ANTENNA CONNECTOR

The MC2261 Module uses a microwave coaxial connector supplied by Murata Ltd. The product name is NMM22-5017. The position of the antenna connector on the Module PCB can be seen in Figure 5-1.

Figure 4–1 Specification of NMM22-5017 connector

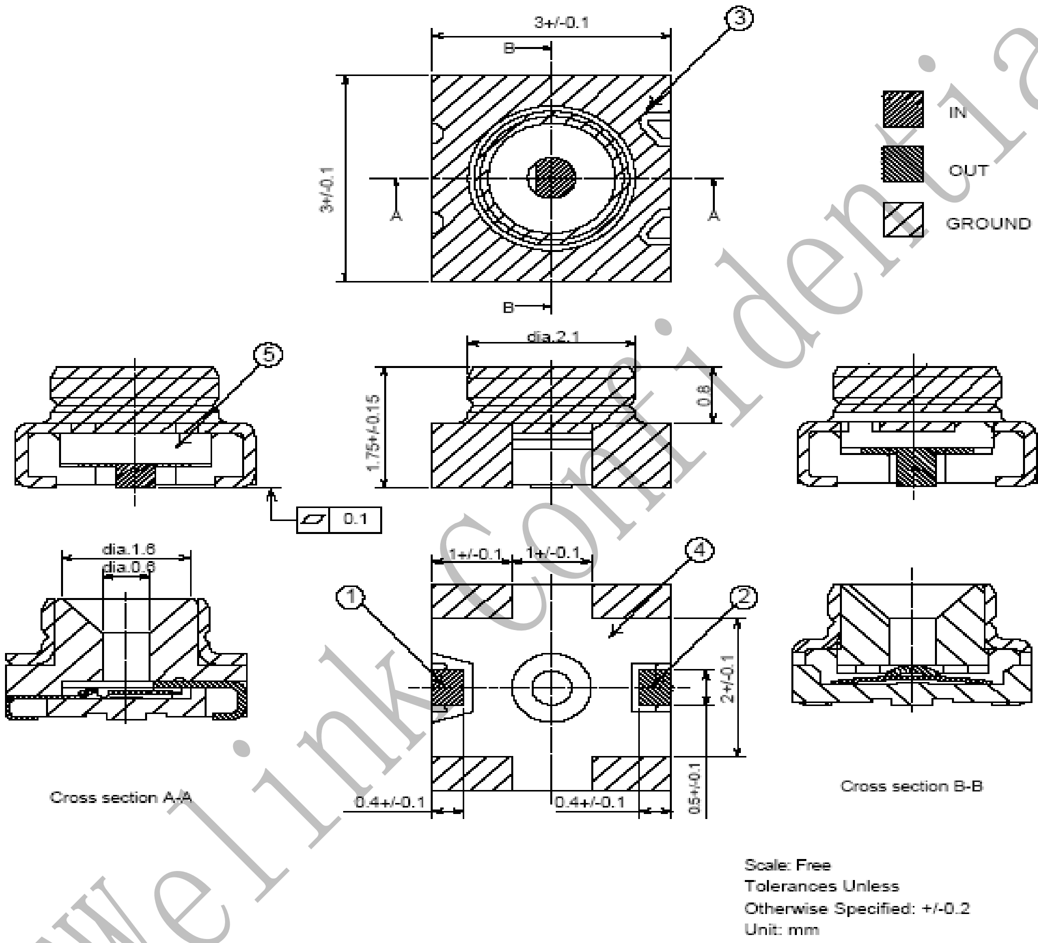


Table 4–2 Product specifications of NMM22-5017 connector

Rated Voltage (V)	Contact Resistance (ohm)	With standing Voltage (rms)	Insulation Resistance (M ohm)	Durability (cycles)	Frequency Rating (GHz)	TEMP Range (degree C)	VSWR	Center Contact	Outer Contact	Insulator
250	0.05 max.	300 (AC)	500 min.	500	DC - 6.0	-40~+90	1.2 max. (DC~3 GHz)	Copper Alloy Gold plated	Copper Alloy Silver plated	Engineering plastic

Impedance: 50 ohm

The daughter board of MC2261 Module uses a microwave coaxial connector supplied by CNT Ltd. The product name is SSMB-50TKE-10. The position of the antenna connector on the daughter PCB can be seen in Figure 5-2.

Figure 4–2 Specification of SSMB-50TKE-10

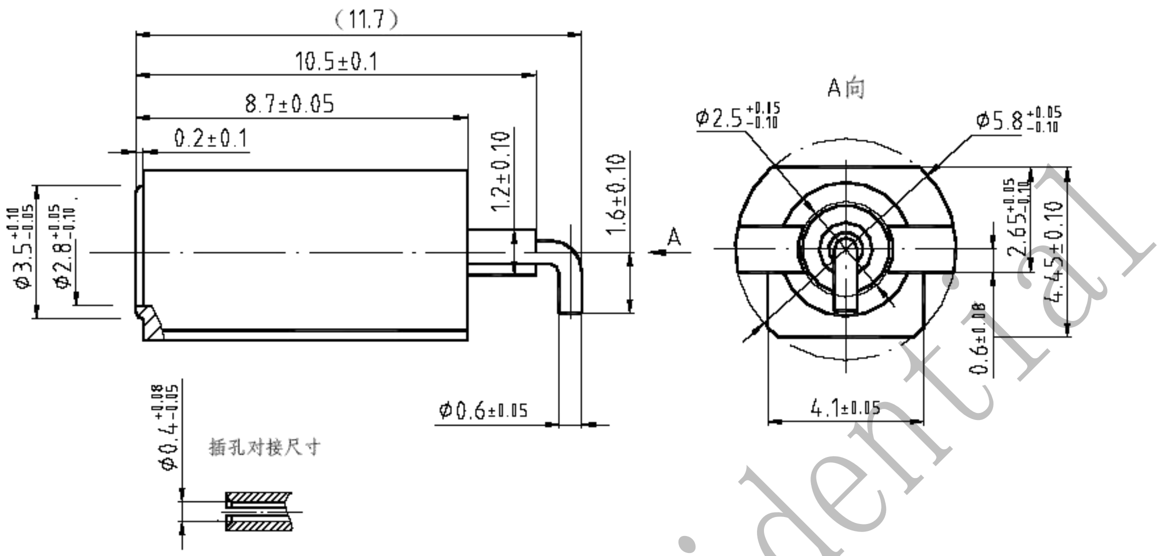


Table 4–3 Product specifications of SSMB-50TKE-10 connector

Rated Voltage (V)	Contact Resistance (ohm)	Withstanding Voltage (rms)	Insulation Resistance (M ohm)	Durability (cycles)	Frequency Rating (GHz)	Temperature Range (degree C)	VSWR	Center Contact	Outer Contact	Insulator
250	0.05 max.	300 (AC)	1000 min.	5000	DC - 3.0	-55~+155	1.35 max. (DC~3 GHz)	Copper Alloy Gold plated	Copper Alloy Silver plated	Engineering plastic

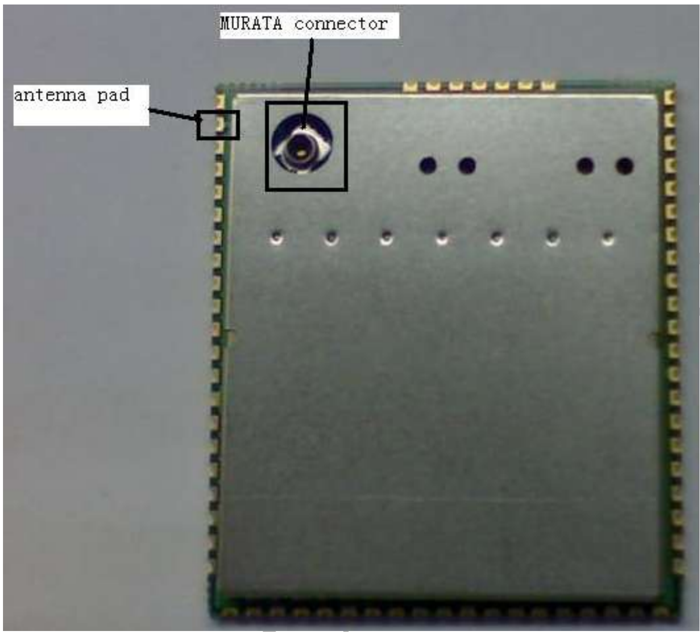
Impedance: 50 ohm

5. RF INTERFACE

5.1. OVERVIEW

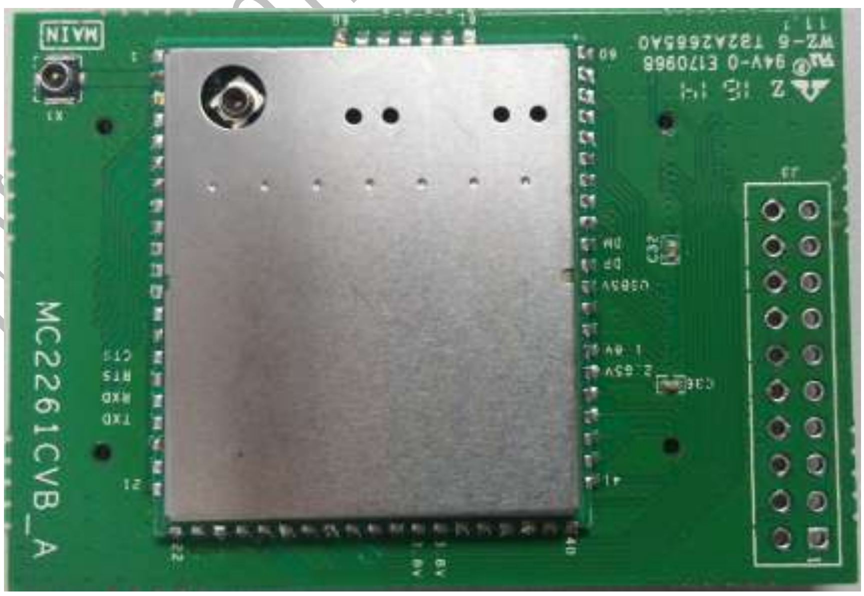
A 50 ohm coaxial RF connector is provided for Module testing. However, we advise customers lead from the antenna pad at the RF line to the antenna.

Figure 5–1 CDMA Connector



Another 50 ohm coaxial RF connector on daughter board is provided for Module testing and customer showing.

Figure 5–2 CDMA Connector on daughter board



The integrator must provide a suitable antenna that works in the desired frequency band of operation. The Antenna connected to the CDMA connector should be a dual band antenna supporting the US PCS and Cellular bands.

Table 5–1 The requirement of dual band antenna

Band	TX Frequency	RX Frequency
PCS	1850-1910 MHz	1930-1990 MHz
Cellular	824-849 MHz	869-894 MHz

NOTE: TX refers to the transmit from the module into the antenna (Reverse Link of the CDMA system), and RX refers to the receive from the antenna into the module (Forward Link of the CDMA system).

5.2. Antenna Subsystem

The antenna sub-system and its design is a major part of the final product integration. Special attention and care should be taken in adhering to the following guidelines.

5.2.1. Antenna Specifications

Choice of the antenna cable (type, length, performance, RF loss, etc) and antenna connector (type + losses) can have a major impact on the success of the design.

5.2.2. Cable Loss

All cables have RF losses. Minimizing the length of the cable between the antenna and the RF connectors on the module will help obtain superior performance. High Quality/Low loss co-axial cables should be used to connect the antenna to the RF connectors. Contact the antenna vendor for the specific type of cable that interfaces with their antenna and ask them to detail the RF losses of the cables supplied along with the antenna. Typically, the cable length should be such that they have no more than 1-2dB of loss. Though the system will work with longer (lossy) cables, this will degrade CDMA system performance. Care should also be taken to ensure that the cable end connectors/terminations are well assembled to minimize losses and to offer a reliable, sturdy connection to the Module sub-system. This is particularly important for applications where the module is mounted on a mobile or portable environment where it is subject to shock and vibration.

5.2.3. Antenna Gain Minimum Requirements

It is recommended that the antenna chosen have at least 2 dBi gain in the cellular band and 4 dBi in the PCS band. The Antenna subsystem shall also have at least 8 dB of return loss at the input with respect to a 50-ohm system.

5.2.4. Antenna Gain Maximum Requirements

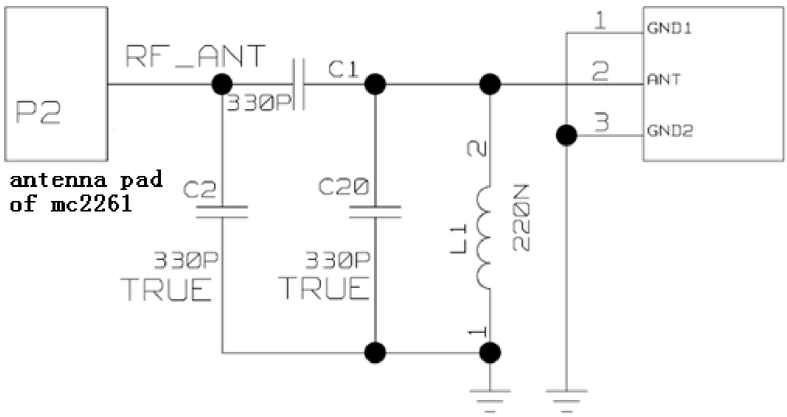
Our FCC Grant imposes a maximum gain for the antenna subsystem: 7 dBi for the Cellular band and 13dBi for the PCS band.

Warning: Excessive gain could damage sensitive RF circuits and void the warranty.

5.2.5. Antenna Matching

The module's RF connectors are designed to work with a 50-ohm subsystem. It is assumed that the antenna chosen has matching internal to it to match between the 50-ohm RF connectors and the antenna impedance.

Figure 5–3 Antenna Matching Circuit



5.2.6. PCB Design Considerations

- The antenna subsystem should be treated like any other RF system or component. It should be isolated as much as possible from any noise generating circuitry including the interface signals via filtering and shielding.
- As a general recommendation all components or chips operating at high frequencies such as micro controllers, memory, DC/DC converts and other RF components should not be placed too close to the module. When such cases exist, correct supply and ground de-coupling areas should be designed and validated.
- Avoid placing the components around the RF connection and close to the RF line between the RF antenna and the module.
- RF lines and cables should be as short as possible.
- If using coaxial cable it should not be placed close to devices operating at low frequencies. Signals like charger circuits may require some EMI/RFI decoupling such as filter capacitors or ferrite beads.
- Adding external impedance matching to improve the match to your cable and antenna assemblies is optional. Please contact the antenna vendor for matching requirements.
- For better ESD protection one can implement a shock coil to ground and place it close to the RF connector.

5.2.7. Other Precautions

V_MAIN_3V7 are used to supply the module. The module internally regulates these to obtain regulated voltages to supply both the baseband and RF parts of the Module. V_MAIN_3V7 directly supplies the RDF components with 3.7V. It is essential to keep the voltage ripple to a minimum at this connection in order to avoid phase error. Insufficient power supply voltage can dramatically affect some RF performance such as TX power, modulation spectrum EMC performance, and spurious emissions and frequency error.

The RF connections are 50-ohm impedance systems and are a DC short to ground. Best effort should be made to provide low insertion loss and shielding between the external antenna and RF connections over the frequency band of interest.

5.2.8. Grounding

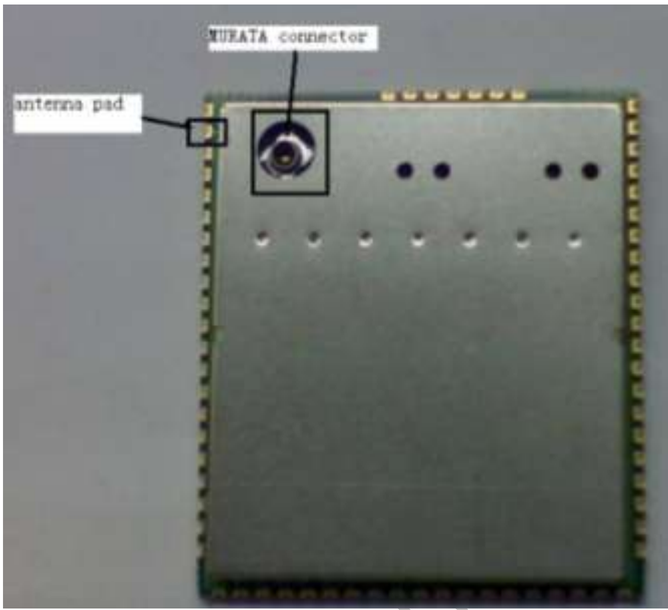
On terminals including the antenna, poor shielding can dramatically affect the sensitivity of the terminal. Moreover the power emitted through the antenna can affect the application.

6. TEST CAPABILITIES

6.1. TEST DESCRIPTION

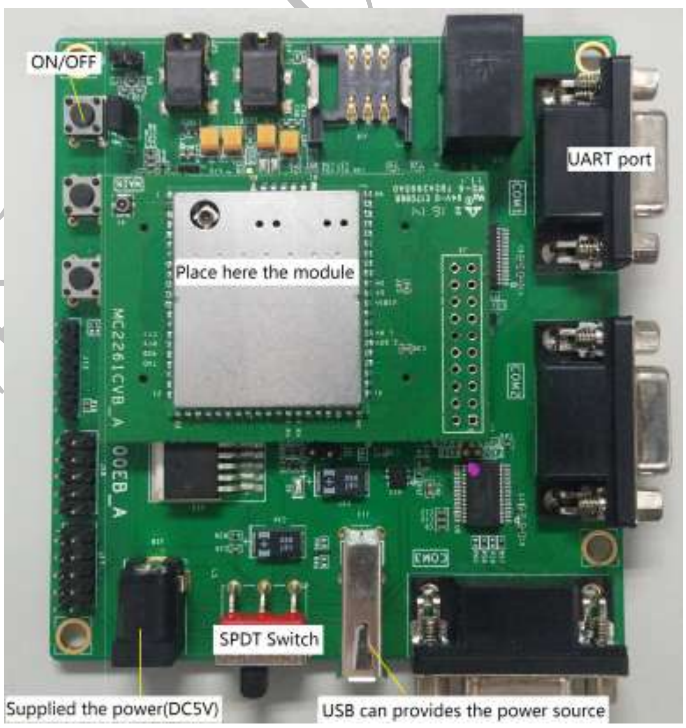
1) MC2261 RF Connectors are shown in Figure 5-1：

Figure 6–1 CDMA Connector



2) Operating instructions

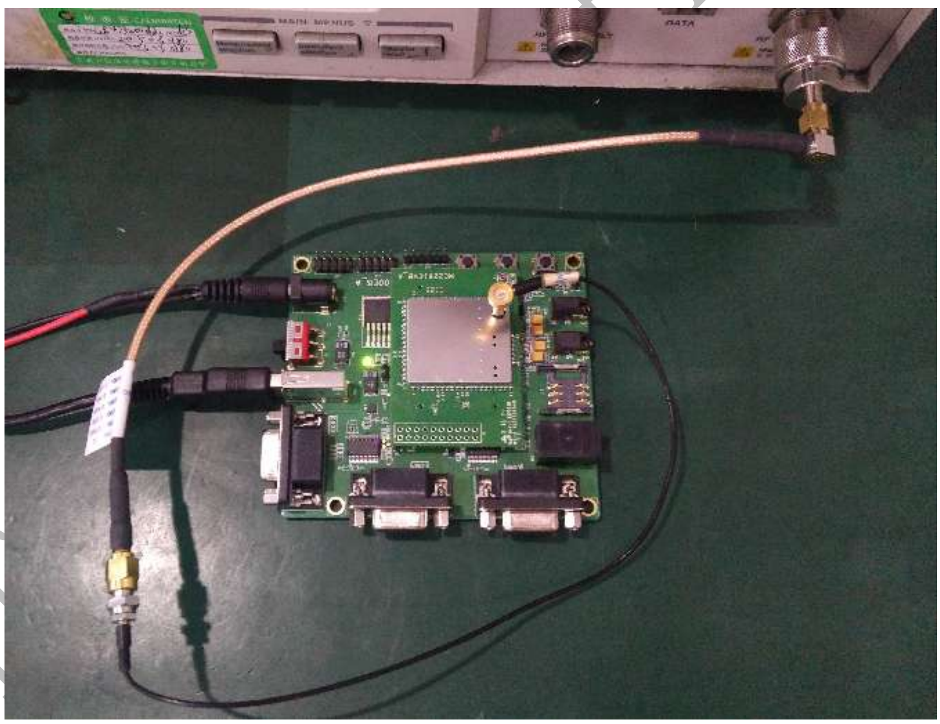
Figure 6–2 Module Development Board Illustration



Connect the sector to access terminal antenna connectors as shown in the following Figure 6-3 or Figure 6-4:

Figure 6–3 First method to connect the module to RF test equipment

Figure 6–4 Second method to connect the module to RF test equipment



- Connect the RF antenna to terminal antenna connectors as shown in the following Figure 6-5 or Figure 6-6:

Figure 6–5 First method to connect the module to RF antenna

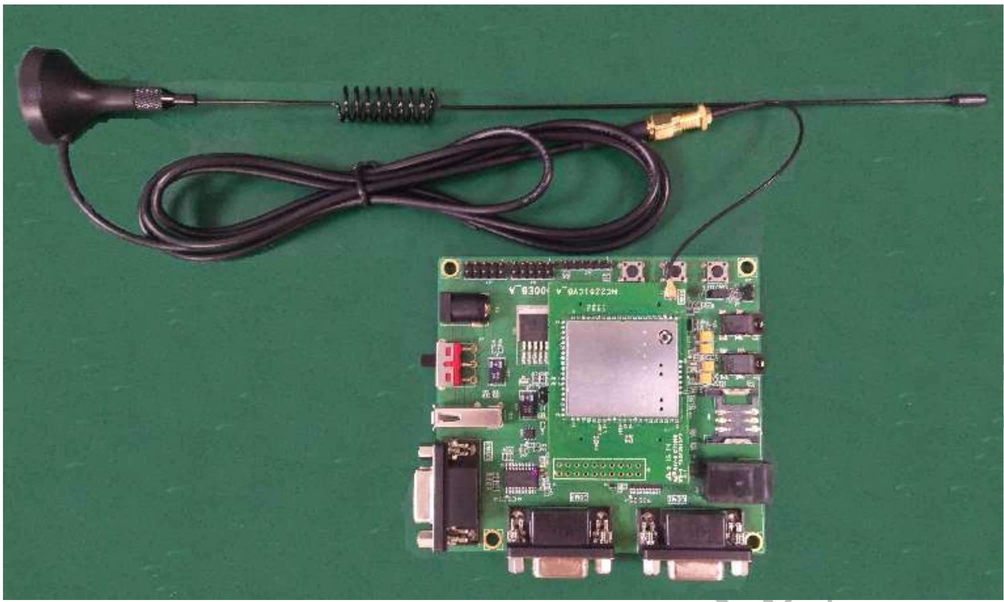
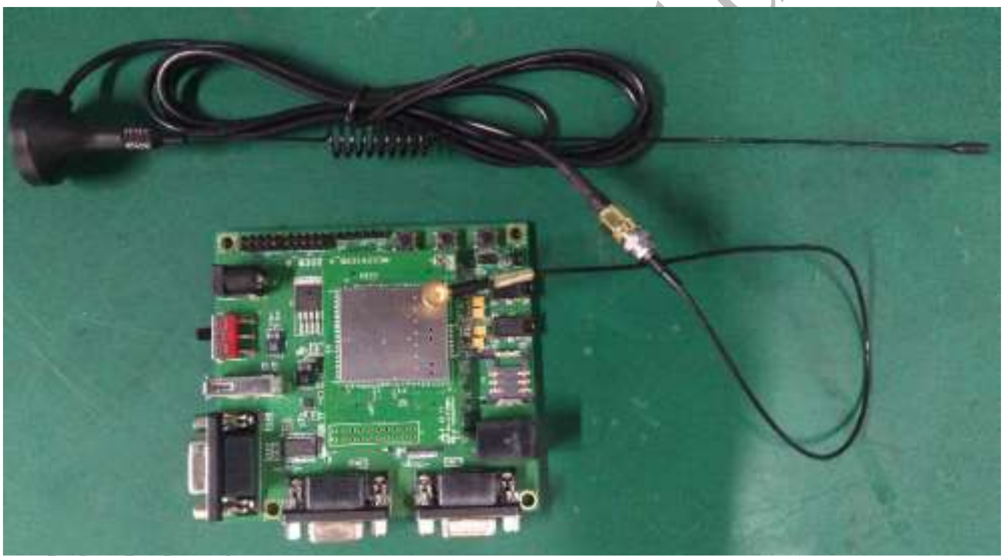


Figure 6–6 Second method to connect the module to RF antenna



6.2. CDMA Test Equipment and Tools

Lease or purchase of test equipment is available from vendors who provide this equipment for CDMA over the-air simulation. Some suggested products include:

- • Agilent 8960 Series 10 E5515C CDMA Mobile Station Tester
- • Agilent E4440A Spectrum analyzer
- • Agilent E4438C Signal Generator
- • Agilent E4438C Signal Generator
- • Programmable Temperature-Humidity Testor
- • Programmable Temperature Concussion Testor

6.3. RF Performance Requirements

6.3.1. CDMA2000 1X RF Rx Specification

Table 6–1 CDMA2000 1X RF Rx Specification

Frequency range	869~894MHz/1930~1990MHZ
Rx. Sensitivity	-104 dBm(FER≤0.5％)
Rx. Signal Range	-25 dBm~ -104dBm(FER≤0.5％)
Immunity	FER≤1.0％(-101dBm/BW , 30dBm@±900KHz) (800MHz) FER≤1.0％(-101dBm/BW ,-40dBm@±1250KHz) (1900MHz)
Inter-modulation spurious emissions	FER≤1.0％(Test1: -101dBm/BW ,+900/+1700KHz, -43dBm) FER≤1.0％(Test1: -101dBm/BW ,+1250/+2050KHz, -43dBm)
	FER≤1.0％(Test 2: -101dBm/BW ,-900/-1700KHz, -43dBm) FER≤1.0％(Test 2: -101dBm/BW,-1250/-2050KHz, -43dBm)
Conductive spurious emissions	<-76dBm/1MHz(1930~1990MHz ; 869~894MHz)
	< - 61dBm/1MHz(1850~1910MHz ; 824~849MHz)
	< - 47dBm/30KHz(other frequency)
Demodulation of forward traffic channel in AWGN	FER≤3.0％(Test 1: Rate Group 1(9600bps)
	FER≤1.0％(Test 2: Rate Group 1(9600bps)
	FER≤0.5％(Test 3: Rate Group 1(9600bps)
	FER≤1.0％(Test 4: Rate Group 1(4800bps)
	FER≤1.0％(Test 5: Rate Group 1(2400bps)
	FER≤1.0％(Test 6: Rate Group 1(1200bps)
	FER≤3.0％(Test 7: Rate Group 2(14400bps)
	FER≤1.0％(Test 8: Rate Group 2(14400bps)
	FER≤0.5％(Test 9: Rate Group 2(14400bps)
	FER≤1.0％(Test 10: Rate Group 2(7200bps)
	FER≤1.0％(Test 11: Rate Group 2(3600bps)
	FER≤1.0％(Test 12: Rate Group 2(1800bps)

6.3.2. CDMA2000 1X RF Tx Specification:

Table 6–2 CDMA2000 1X RF Tx Specification

Max. frequency tolerance	824~849MHz/1850~1910MHz
Max. Tx. Power	±300Hz/±150Hz
Min. output power	800MHz: 23dBm ~ 30dBm@-105.5 dBm 1900MHz: 18dBm ~ 27dBm@-105.5 dBm
Standby output power	< -50dBm@-25 dBm

Code domain power	<-61dBm
Transmitter time error	±1.0μs
Waveform quality factor	>0.944
Open loop power control	(Test 1: -25dBm/1.23MHz)-48dBm/1.23MHz±9.5dBm
	(Test 2: -65dBm/1.23MHz)-8dBm/1.23MHz±9.5dBm
	(Test 3: -93.5dBm/1.23MHz)+20dBm/1.23MHz±9.5dBm
Close loop power control	±24dB(9600bps data rate)
	±24dB(4800bps data rate)
	±24dB(2400bps data rate)
	±24dB(1200bps data rate)
Conductive spurious emissions	-42dBc/30KHz or -54dBm/1.23MHz(|Δf|: 1.25MHz~1.98MHz)
	-54dBc/30KHz or -54dBm/1.23MHz(|Δf|: 1.98MHz~4.00MHz)
	< -13dBm/1KHz(f> 4MHz, 9KHz < f < 150KHz,)
	< -13dBm/10KHz(f > 4MHz, 150KHz <f < 30MHz)
	< -13dBm/100KHz(f > 4MHz, 30MHz < f < 1GHz)
	< -13dBm/1MHz(f> 4MHz, 1GHz < f < 10GHz)

Remarks: RF technical specification conforms to the following standards:

- **3GPP2 C.S0011-C V2.0 Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations**
- **3GPP2 C.S0033-0 V2.0 Recommended Minimum Performance Standards for cmda2000 High Rate Packet Data Access Terminal**

6.4. Environmental Reliability Requirement

6.4.1. High Temperature Operation Test

Table 6–3 High Temperature Operation Test

EUT Status	Power-on
Temperature	70℃
Duration	16h

6.4.2. Low Temperature Operation Test

Table 6–4 Low Temperature Operation Test

EUT Status	Power-on
Temperature	-25℃
Duration	16h

6.4.3. High Temperature Storage Test

Table 6–5 High Temperature Storage Test

EUT Status	Power-off
Temperature	85℃
Duration	24h

6.4.4. Low Temperature Storage Test

Table 6–6 Low Temperature Storage Test

EUT Status	Power-off
Temperature	-45℃
Duration	24h

6.4.5. High Temperature High Humidity Operation Test

Table 6–7 High Temperature High Humidity Operation Test

EUT Status	Power-on
Temperature	55℃
Humidity	93%
Duration	48h

6.4.6. Temperature Concussion Test

Table 6–8 Temperature Concussion Test

EUT Status	Power-off
High Temperature	85℃
High Temperature Duration	1h
Low Temperature	-45℃
Low Temperature Duration	1h
Cycle Times	10

6.5. Electro Magnetic Compatibility

6.5.1. ESD Immunity Test

Table 6–9 ESD Immunity Test

EUT Status	Idle mode and traffic mode
Test Voltage	Air ±8KV; Contact ±6KV
Reference Standard	IEC 61000-4-2 : 2001

6.5.2. Radiated Emissions Test

Table 6–10 Radiated Emissions Test

EUT Status	Idle mode and traffic mode
Limits for radiated disturbance	Class B ITE
Reference Standard	FCC Part15