ME3000V2 Operation Description

Version:V1.0

ZTE CORPORTION

Table of Contents

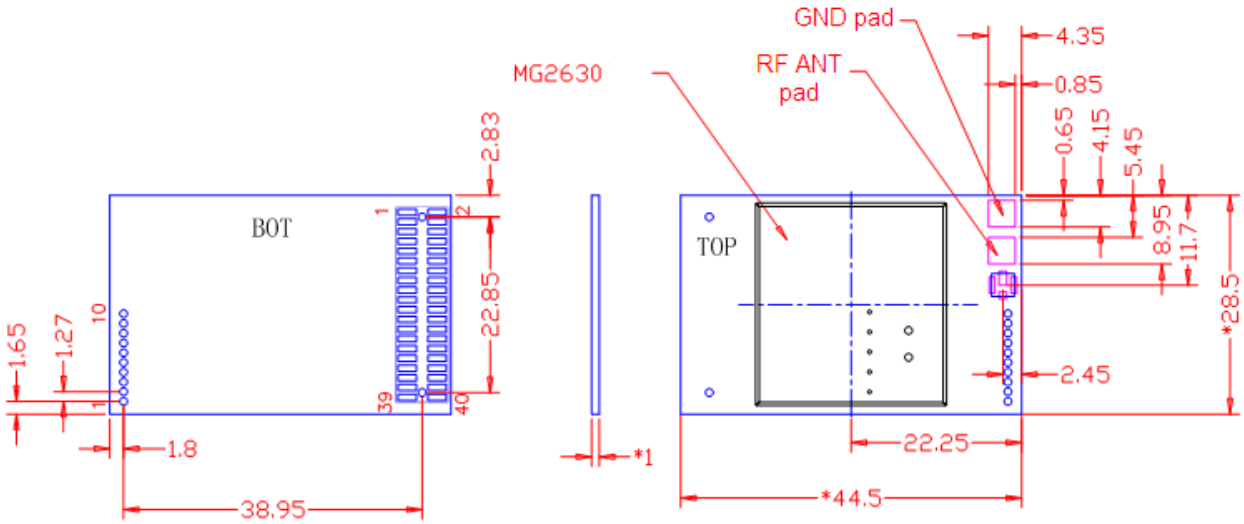
1 Mechanical Interface

1.1 Physical Features

Dimensions & Weight	Length: 44.5 mm Width: 28.5 mm Thickness: 8.25 mm Weight: 8 g
Operational Temperature Range	-20℃ to +65℃
Storage Temperature Range	-40℃ to +80℃
ROHS	Yes
Antenna Connectors	50-Ohm ANT connectors for GSM
Power Supply	Two kinds of inputs: 1.external power supply (+4.75V~ +5.25V, typical value +5V) 2. battery power supply (+3.3V~ +4.2V, typical)

1.2 Mechanical size

Figure 1-1: ME3000V2 T-viewgraph



NOTES

1. ALL DIMENTIONS SHOWN ON THE DRAWING IN MM.
2. DEFAUT DIMENTION'S TOLERANCE IS +/-0.1MM.

2 Electrical Interface

2.1 Pin Assignments

Figure 2-1 ME3000V2 Module interface ME3000V2 map

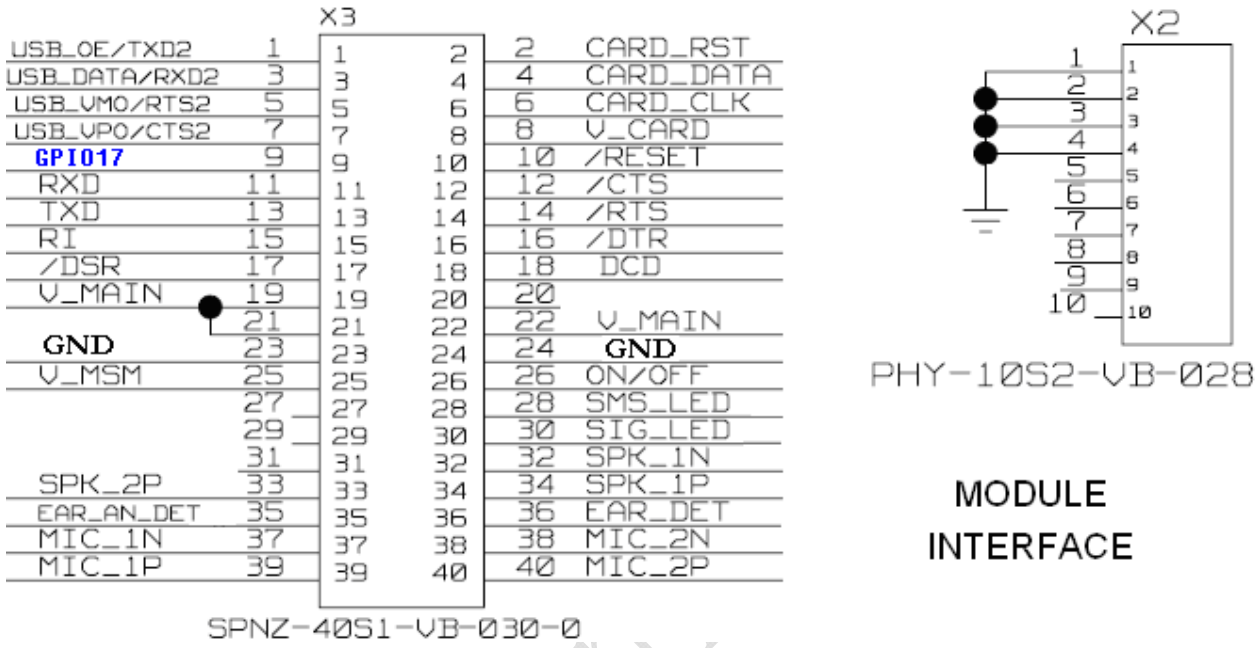


Table 2-1 ME3000V2 Module 40-pin Electrical Interface

Pin	Signeal Name	Signal Type	Input/Output	Function	Min	Typ	Max	Unit	Comments
6	SIM-CLK	Digital	0	SIM clock	2.5	2.8	3.3	V	2.8VLevel
8	SIM-VCC	Power	0	SIM power supply	2.5	2.8	3.3	V	2.8VLevel
4	SIM-DATA	Digital	I/O	SIM data	2.5	2.8	3.3	V	2.8VLevel
2	SIM-RST	Digital	0	SIM reset	2.5	2.8	3.3	V	2.8VLevel
30	SIG_LED	Digital	0	LED control	2.5	2.8	3.3	V	2.8VLevel
3	RXD2	Digital	0	COM Port	2.5	2.8	3.3	V	2.8VLevel
11	RXD	Digital	0	COM Port	2.5	2.8	3.3	V	2.8VLevel
1	TXD2	Digital	I	COM Port	2.5	2.8	3.3	V	2.8VLevel
13	TXD	Digital	I	COM Port	2.5	2.8	3.3	V	2.8VLevel
30	SIG_LED	Digital	0	LED control	2.5	2.8	3.3	V	2.8VLevel
28	SMS_LED	Digital	0	LED control	2.5	2.8	3.3	V	2.8VLevel
22	V_MAIN	Power	P	Main power	3.3	3.7	4.25	V	

25	V_MSM	Power	O	External power supply	2.5	2.8	3.3	V	
15	RI	Digital	O		2.5	2.8	3.3	V	LED ON as the level is high.
17	/DSR	Digital	O	COM Port	3.3	3.8	4.2	V	
14	/RTS	Digital	I	COM Port	3.3	3.8	4.2	V	
16	/DTR	Digital	I	COM Port	4.75	5	5.25	V	
5	RTS2	Digital	I	COM Port	3.0	3.8	4.25	V	
12	/CTS	Digital	O	COM Port	2.5	2.8	3.3	V	
7	CTS2	Digital	O	COM Port	2.5	2.8	3.3	V	
18	DCD	Digital	O	COM Port	2.5	2.8	3.3	V	
10	/RESET	Digital	I	System reset	2.5	2.8	3.3	V	
26	ON/OFF	Digital	I	Power on/off key control	2.5	2.8	3.3	V	
35	EAR_ANT_DET	Analog	I	EARPHONE MIC KEY					
36	EAR_DET	Digital	I	EARPHONE insert detect					
37	MIC_1N	Analog	AI	Mic input-					Headset MIC
39	MIC_1P	Analog	AI	Mic input+					
38	MIC_2P	Analog	AI	Mic input+					Earphone MIC
40	MIC_2N	Analog	AI	Mic input-					
32	SPK_1N	Analog	AO	Speaker output-					Headset Receiver
34	SPK_1P	Analog	AO	Speaker output-					
33	SPK_2P	Analog	AO	Speaker output-					Earphone Receiver

3 Power Management

3.1 Power and Reset

3.1.1 Power supply

The module could work under two power modes: 1. Charger; 2 Battery.

When powered by the charger, you could perform constant current charge, constant voltage charge and trickle current charge. Normally, trickle current charge starts when the voltage is lower than 3.2V, constant current charge starts as the voltage is between 3.2V and 4.0V; and constant voltage charge starts when the voltage reaches 4.0V. As the blackout happens, the battery would be immediately used.

See table 4-1 for the module's input voltage characteristics. If the input voltage is not in the range, it must be converted to the voltage below:

Table4-1 Voltage Characteristics

1. External power supply

Status	Max. voltage	Typical voltage	Min. voltage
Power supply	+5.25 VDC	+5.0VDC	+4.75 VDC

2. Battery（currently the software supports Li battery）

Status	Max. voltage	Typical voltage	Min. voltage
Power supply	+4.25 VDC	+3.8 VDC	+3.3 VDC

3.1.2 Power on

The module is under power-off status after it's normally powered on. To turn on the module, provide a 1500-2000mS low level pulse to ON/OFF pin when the module is OFF.

3.1.3 Power off

To turn off the module, provide a 1500-2000mS low level pulse to ON/OFF pin when the module is ON.

3.1.4 Reset

Use the above method to firstly "Power off" and then "Power on", and by doing so the module could be reset. ME3000V2 module does not lead the reset pin.

4 Antenna Interface

The RF interface of the ME3000V2 Module has an impedance of 50 . 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 ME3000V2 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 ME3000V2 offers two alternative approached to connecting the antenna:

- Recommended approach: MM9329-2700B antenna connector manufactured by MURATA 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 MM9329-2700B connector has been chosen as antenna reference point (ARP) for the ZTEMT reference equipment submitted to type approve the ME3000V2 Module. All RF data specified throughout this manual are related to the ARP. For compliance with the test results of the ZTEMT 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,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 MG2636 Module which must be connected to the ground plane of the application.

Consider that according to GSM 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

- ME3000V2 Module PCB: FR4
- Antenna pad: Gold plated pad

4.3 Antenna connector

The ME3000V2 Module uses a microwave coaxial connector supplied by Murata Ltd. The product name is MM9329-2700B. The position of the antenna connector on the Module PCB can be seen in Figure 4-1.

Figure 4-1 Specification of MM9329-2700B connector

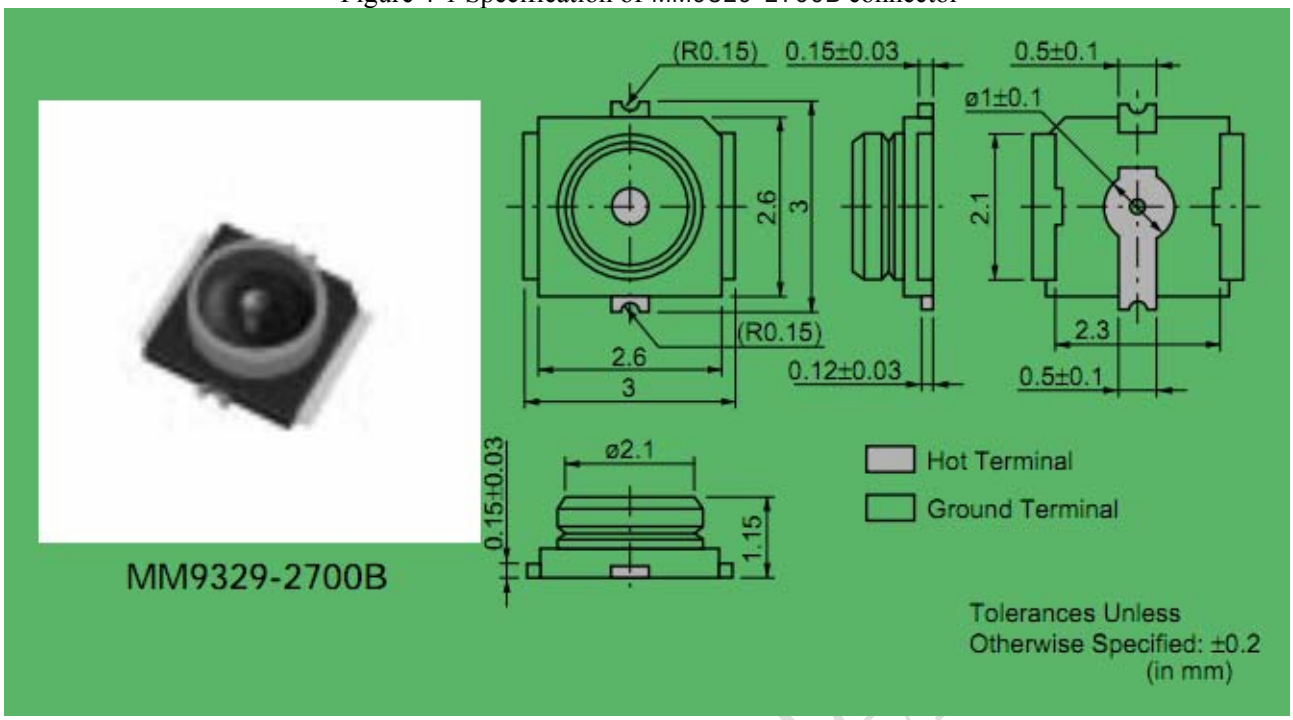


Table 4-2 Product specifications of MM9329-2700B connector

Part Number	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
MM9329-2700B	250	0.015 max.	300 (AC)	500 min.	100	DC - 6.0	-40~+90	1.2 max. (DC~3GHz)	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 GSM Connector

The module must provide a suitable antenna that works in the desired frequency band of operation. The Antenna connected to the GSM connector should be a dual band antenna supporting the GSM900 and DCS1800 bands.

Band	TX Frequency	RX Frequency
GSM	880~915 MHz	925~960 MHz
DCS	1710~1785 MHz	1805~1880 MHz

Note: TX refers to the transmit from the module into the antenna (Reverse Link of the GSM system), and RX refers to the receive from the antenna into the module (Forward Link of the GSM 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 (loss) cables, this will degrade GSM 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 GSM900 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 GSM900 band and 13dBi for the DCS 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.

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

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.

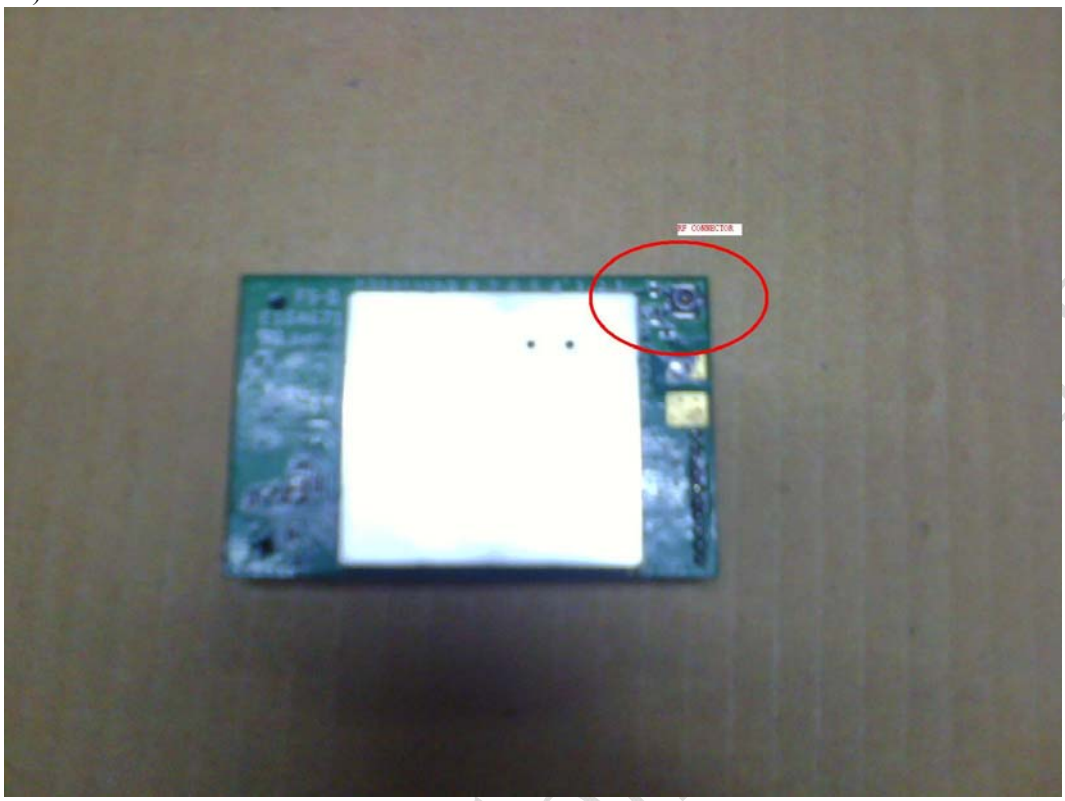
5.2.8 Grounding

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.

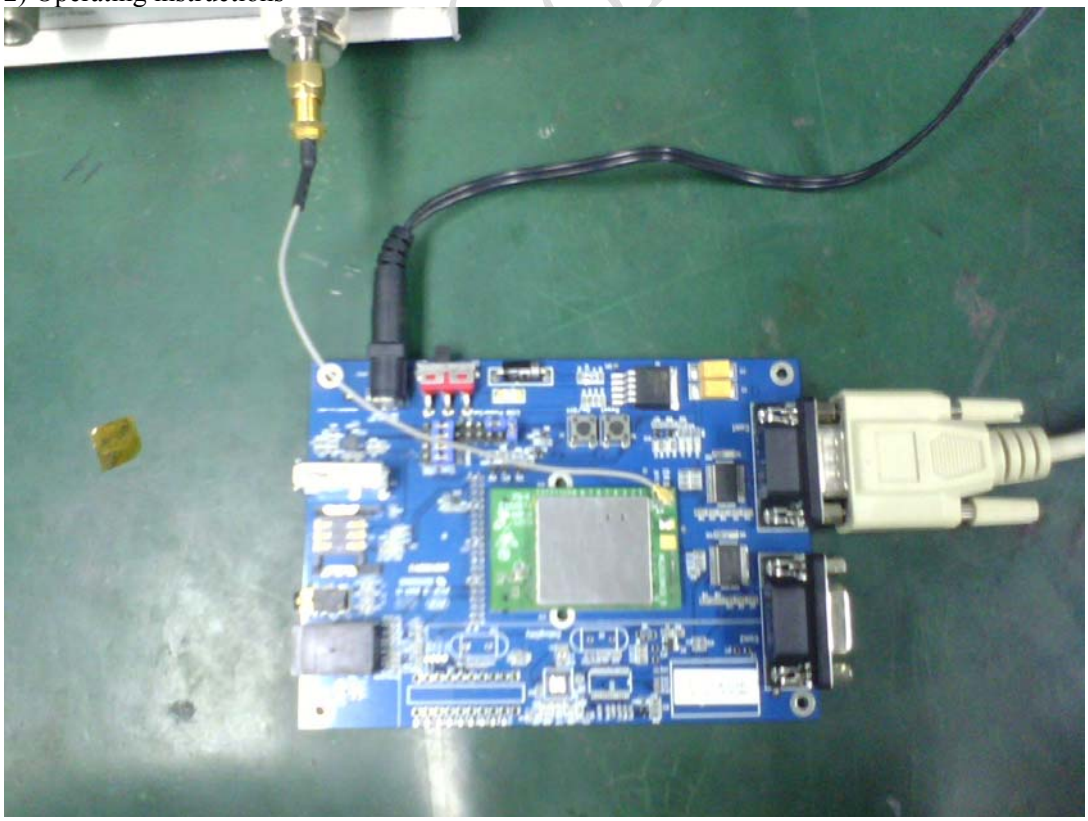
6 Test Capabilities

6.1 Test Description

1) ME3000V2 RF Connectors：



2) Operating instructions



Connect the sector to access terminal antenna connectors as shown in the following figure 6-1

figure 6-1

- Connect the sector to access terminal antenna connectors as shown in the following figure 6-2:

figure 6-2

6.2 GSM Test Equipment and Tools

Lease or purchase of test equipment is available from vendors who provide this equipment for GSM 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

RF Performance Requirements

6.2.1 GSM RF Rx Specification

Frequency range	925~960 MHz/1805~1880 MHz
Rx. Sensitivity	-109 dBm for GSM, -108dBm for DCS (BER≤2.4％)
Rx. Signal Range	-25 dBm~ -109dBm(BER≤2.4％)

6.2.2 GSM RF Tx Specification:

Max. frequency tolerance	880~915 MHz/1710~1785 MHz
Max. Tx. Power	GSM900: 32.2±1 dBm DCS1800:29.2±1 dBm
Peak Phase Error	-20° < PPE < 20°
RMS Phase Error	-5° < RMS < 5°
Frequency Error	GSM900: -90Hz< FE <90 Hz DCS1800: -180Hz< FE <180 Hz
Modulation Spectrum	Mod +400kHz: <-60dBm Mod -400kHz: <-60dBm Mod+1800kHz:<-63dBm Mod-1800kHz:<-63dBm
Switching Spectrum	Switching +400kHz:<-22dBm Switching -400kHz:<-22dBm Switching +1800kHz:<-27dBm Switching -1800kHz:<-27dBm

Remarks:
RF technical specification conforms to the following standards:
3GPP2 Recommended Minimum Performance Standards for GSM Spread Spectrum Mobile Stations
3GPP2 Recommended Minimum Performance Standards for GSM High Rate Packet Data Access Terminal
Environmental Reliability Requirement

6.2.3 High Temperature Operation Test

EUT Status	Power-on
Temperature	70℃
Duration	24h

6.2.4 Low Temperature Operation Test

EUT Status	Power-on
Temperature	-30℃
Duration	24h

6.2.5 High Temperature Storage Test

EUT Status	Power-off
Temperature	85℃

Duration	24h

6.2.6 Low Temperature Storage Test

EUT Status	Power-off
Temperature	-40℃
Duration	24h

6.2.7 High Temperature High Humidity Operation Test

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

6.2.8 Temperature Concussion Test

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

ElectroMagnetic Compatibility

6.2.9 ESD Immunity Test

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

6.2.10 Radiated Emissions Test

EUT Status	Idle mode and traffic mode
Limits for radiated disturbance	Class B ITE
Reference Standard	FCC Part 22H&24E