

# FCC RF Test Report

APPLICANT : ZTE CORPORATION  
EQUIPMENT : LTE uFi  
BRAND NAME : ZTE  
MODEL NAME : 203Z / GL09P / MF98+  
FCC ID : Q78-MF98PLUS  
STANDARD : FCC 47 CFR Part 2, 22(H)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Apr. 23, 2013 and completely tested on Jun. 09, 2013. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:



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Jones Tsai / Manager



**SPORTON INTERNATIONAL (KUNSHAN) INC.**  
**No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.**

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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG342301	Rev. 01	Initial issue of report	Jun. 20, 2013

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	N/A	PASS	-
3.2	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
3.3	§2.1049 §22.917(b)	99% Occupied Bandwidth and 26dB Bandwidth	N/A	PASS	-
3.4	§2.1051 §22.917(a)	Band Edge Measurement	$< 43 + 10\log_{10}(P[\text{Watts}])$	PASS	-
3.5	§2.1051 §22.917(a)	Conducted Spurious Emission	$< 43 + 10\log_{10}(P[\text{Watts}])$	PASS	-
3.6	§2.1053 §22.917(a)	Field Strength of Spurious Radiated	$< 43 + 10\log_{10}(P[\text{Watts}])$	PASS	Under limit 25.56 dB at 1672.000 MHz
3.7	§2.1055 §22.355	Frequency Stability for Temperature and Voltage	< 2.5 ppm	PASS	-

# 1 General Description

## 1.1 Applicant

**ZTE CORPORATION**

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.2 Manufacturer

**ZTE CORPORATION**

ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

## 1.3 Feature of Equipment Under Test

Product Feature	
Equipment	LTE uFi
Brand Name	ZTE
Model Name	203Z / GL09P / MF98+
FCC ID	Q78-MF98PLUS
EUT supports Radios application	WCDMA/HSPA/HSPA+/WLAN 11abgn
HW Version	xr4B
SW Version	Alpha4.0
EUT Stage	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	WCDMA Band V: 826.4 MHz ~ 846.6 MHz
Rx Frequency	WCDMA Band V: 871.4 MHz ~ 891.6 MHz
Maximum Output Power to Antenna	WCDMA Band V : 22.19 dBm
Antenna Type	Fixed Internal Antenna
Type of Modulation	WCDMA: QPSK (Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink) HSPA+: 16QAM(Uplink)

## 1.5 Maximum ERP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP (W)	Frequency Tolerance (% , Hz, ppm)	Emission Designator
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	0.1238	0.03 ppm	4M16F9W

## 1.6 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.		
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH01-KS	03CH01-KS	149928/4086E-1

## 1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ Preliminary Guidance for Receiving Applications for Certification of 3G Device. May 9, 2006.
- ♦ FCC 47 CFR Part 2, 22(H)
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v02

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 2 Test Configuration of Equipment Under Test

### 2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for WCDMA Band V.

Test Modes		
Band	Radiated TCs	Conducted TCs
WCDMA Band V	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

**Note:**

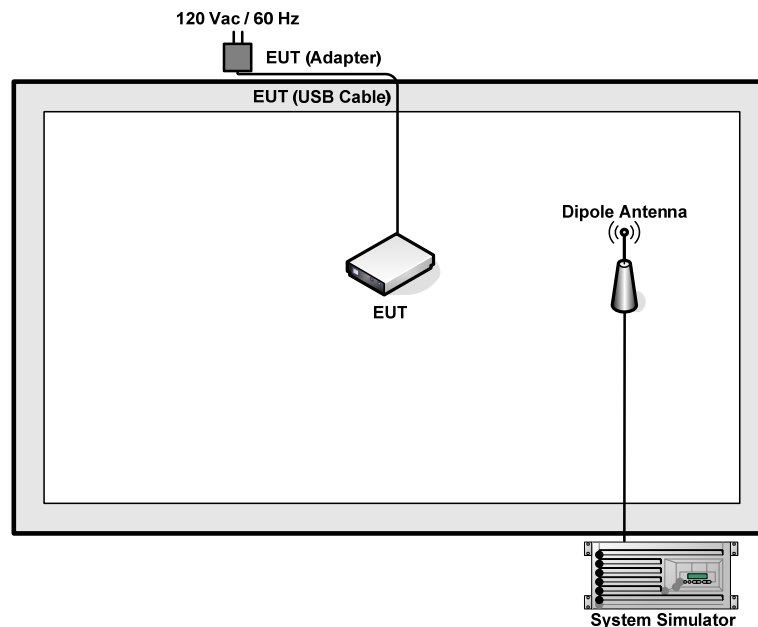
1. The maximum power levels are RMC 12.2Kbps mode for WCDMA band V, only these modes were used for all tests.
2. Because there are individual antennas for each WWAN and WLAN, the co-location test modes are not required.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)			
Band	WCDMA Band V		
Channel	4132	4182	4233
Frequency	826.4	836.4	846.6
RMC 12.2K	22.14	22.10	22.19
HSDPA Subtest-1	22.05	21.84	21.65
HSDPA Subtest-2	21.76	21.69	21.91
HSDPA Subtest-3	21.68	21.75	21.81
HSDPA Subtest-4	21.85	21.88	21.75
HSUPA Subtest-1	20.93	20.58	20.72
HSUPA Subtest-2	21.00	20.72	20.84
HSUPA Subtest-3	19.55	19.51	19.53
HSUPA Subtest-4	19.53	19.89	20.00
HSUPA Subtest-5	20.85	20.67	20.73
HSPA+ (16QAM) Subtest-1	21.12	20.98	21.07



## 2.2 Connection Diagram of Test System



## 2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

## 2.4 Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 Conducted Output Power Measurement

##### 3.1.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

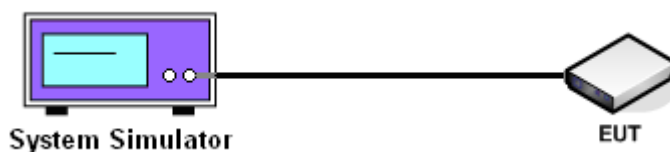
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

##### 3.1.4 Test Setup



**3.1.5 Test Result of Conducted Output Power**

Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	826.4	836.4	846.6
Conducted Power (dBm)	22.14	22.10	22.19
Conducted Power (Watts)	0.16	0.16	0.17

**Note:** maximum average power for WCDMA.

## 3.2 Effective Radiated Power Measurement

### 3.2.1 Description of the ERP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for ERP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02. The ERP of mobile transmitters must not exceed 7 Watts.

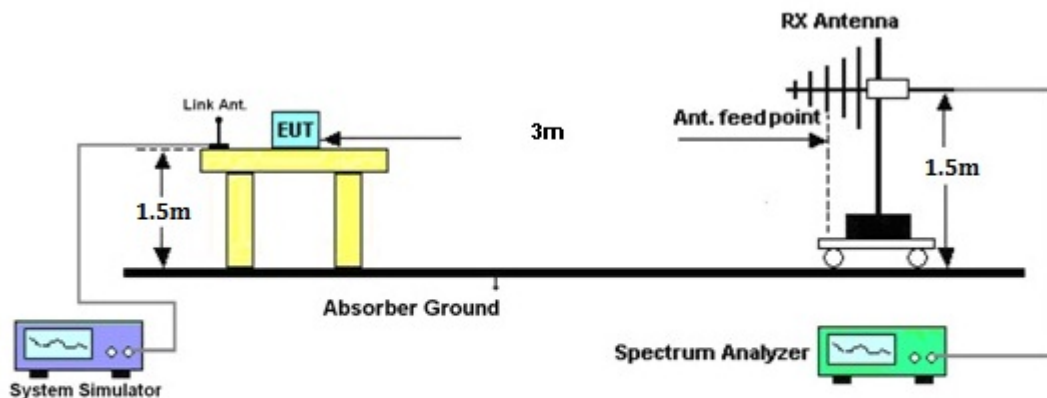
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;  
UMTS operating modes: Set RBW= 100 KHz, VBW= 300 KHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10.  $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$   
     $P_s$  (dBm) : Input power to substitution antenna.  
     $G_s$  (dBi or dBd) : Substitution antenna Gain.  
     $E_t = R_t + AF$   
     $E_s = R_s + AF$   
     $AF$  (dB/m) : Receive antenna factor  
     $R_t$  : The highest received signal in spectrum analyzer for EUT.  
     $R_s$  : The highest received signal in spectrum analyzer for substitution antenna.

### 3.2.4 Test Setup



### 3.2.5 Test Result of ERP

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
826.40	-26.11	-48.12	0.00	-1.08	20.93	0.1238
836.40	-26.56	-48.28	0.00	-0.93	20.79	0.1199
846.60	-27.66	-48.35	0.00	-0.76	19.93	0.0983
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
826.40	-39.87	-47.97	0.00	-1.08	7.02	0.0050
836.40	-39.23	-48.01	0.00	-0.93	7.85	0.0061
846.60	-38.33	-48.05	0.00	-0.76	8.96	0.0079

### 3.3 99% Occupied Bandwidth and 26dB Bandwidth Measurement

#### 3.3.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

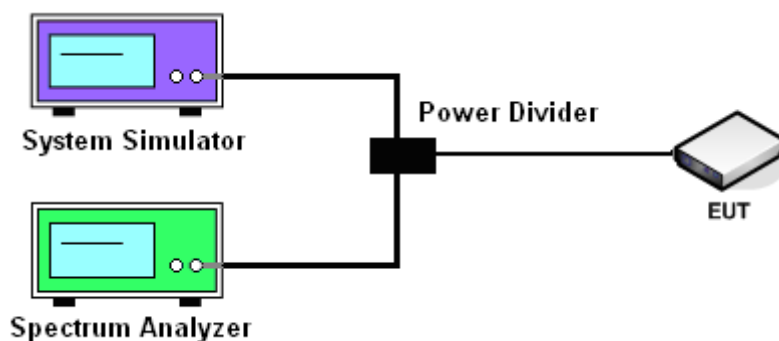
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 99% occupied bandwidth and 26 dB bandwidth of the middle channel for the highest RF powers were measured.

#### 3.3.4 Test Setup



**3.3.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth**

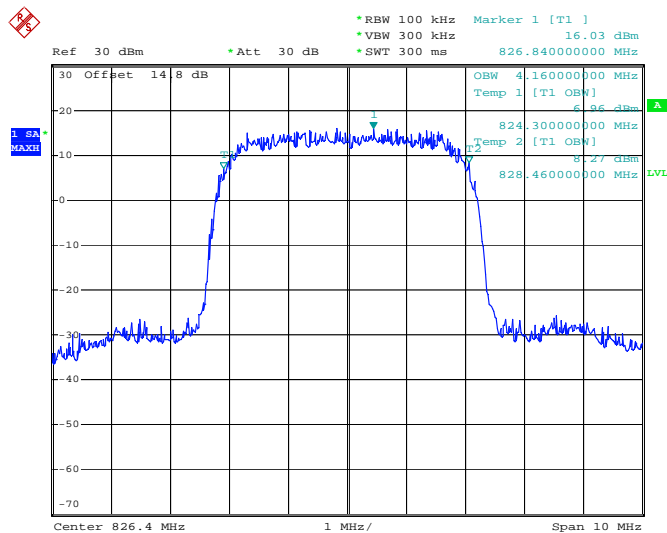
Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	826.4	836.4	846.6
99% OBW (MHz)	4.16	4.16	4.14
26dB BW (MHz)	4.68	4.68	4.68



### 3.3.6 Test Result (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth

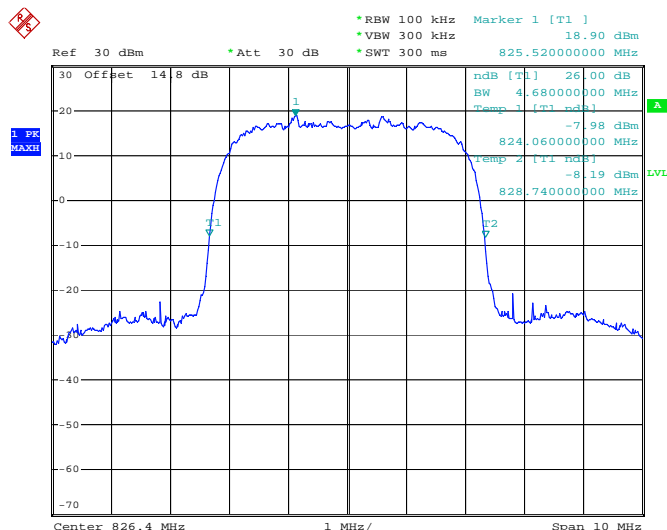
<b>Band :</b>	WCDMA Band V	<b>Test Mode :</b>	RMC 12.2Kbps Link
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#### 99% Occupied Bandwidth Plot on Channel 4132 (826.4 MHz)



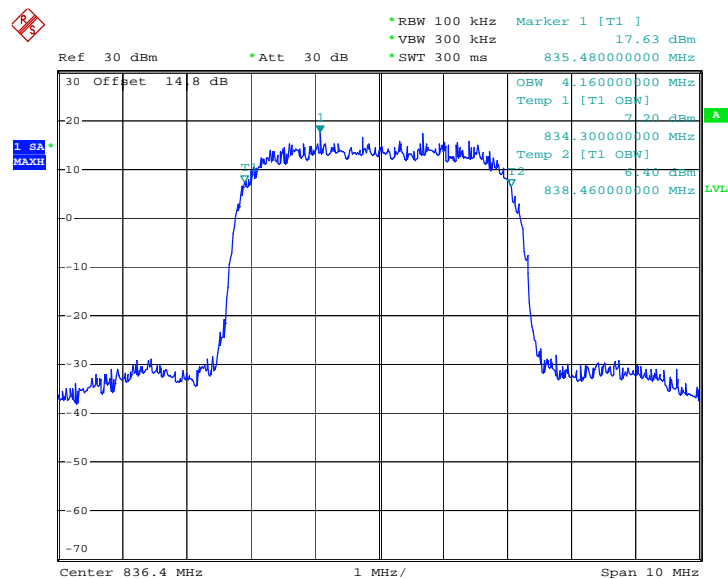
Date: 15.MAY.2013 22:56:30

#### 26dB Bandwidth Plot on Channel 4132 (826.4 MHz)



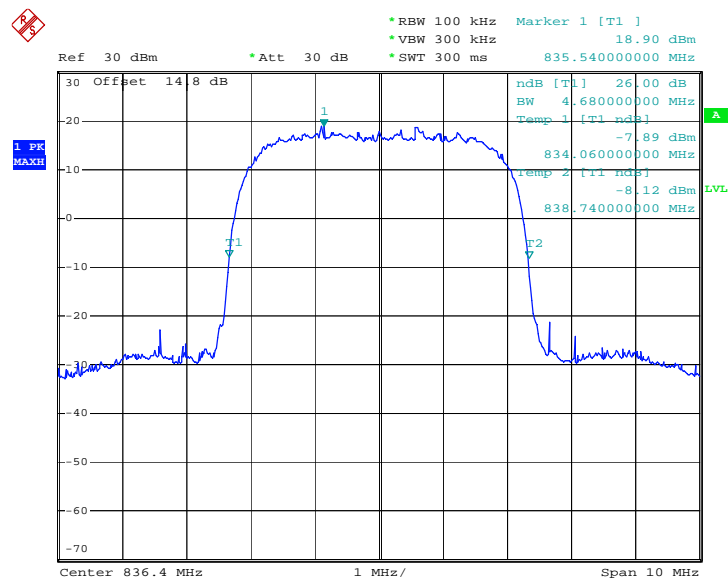
Date: 15.MAY.2013 22:26:12

### 99% Occupied Bandwidth Plot on Channel 4182 (836.4 MHz)



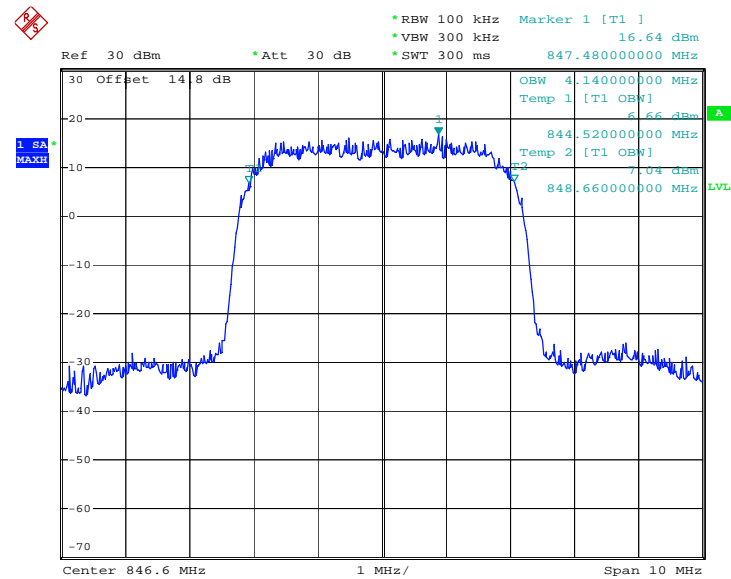
Date: 15.MAY.2013 22:56:56

### 26dB Bandwidth Plot on Channel 4182 (836.4 MHz)



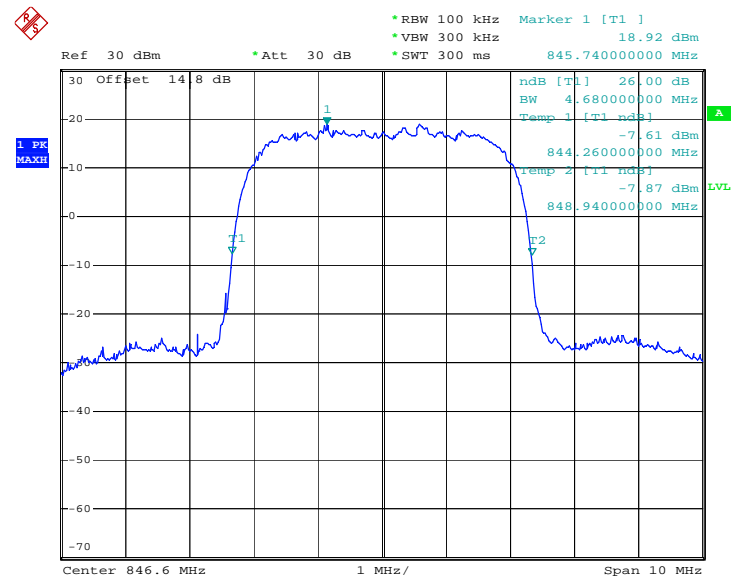
Date: 15.MAY.2013 22:26:39

### 99% Occupied Bandwidth Plot on Channel 4233 (846.6 MHz)



Date: 15.MAY.2013 22:57:22

### 26dB Bandwidth Plot on Channel 4233 (846.6 MHz)



Date: 15.MAY.2013 22:27:05

### 3.4 Band Edge Measurement

#### 3.4.1 Description of Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

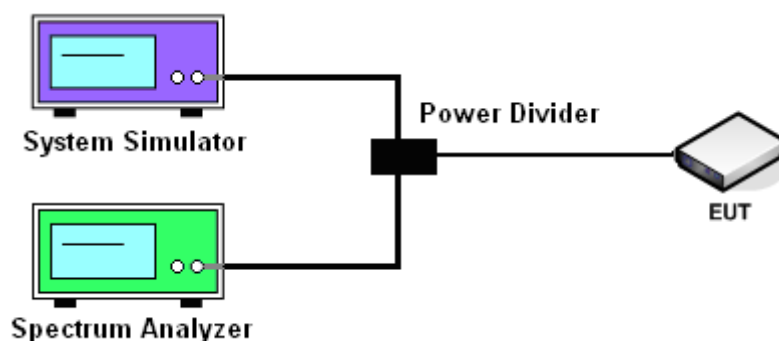
#### 3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.4.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$

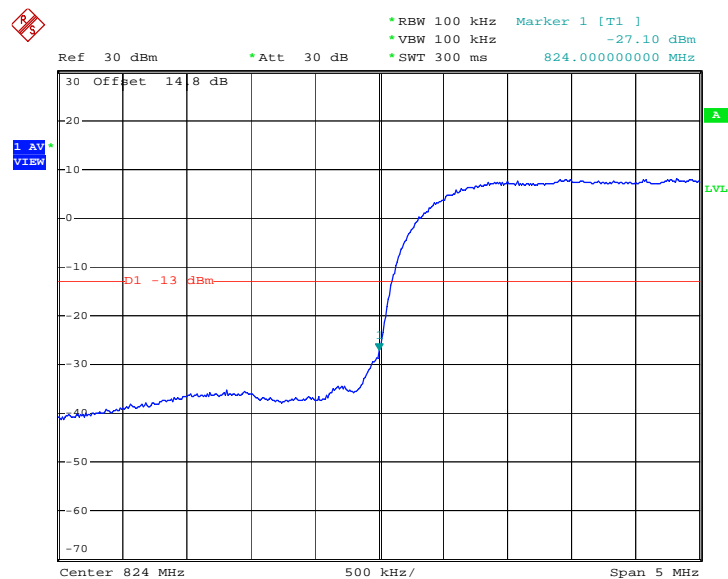
#### 3.4.4 Test Setup



### 3.4.5 Test Result (Plots) of Conducted Band Edge

<b>Band :</b>	WCDMA Band V	<b>Test Mode :</b>	RMC 12.2Kbps Link
<b>Correction Factor :</b>	-3.30dB	<b>Maximum 26dB Bandwidth :</b>	4.68MHz
<b>Band Edge :</b>	-30.40dBm	<b>Measurement Value :</b>	-27.10dBm

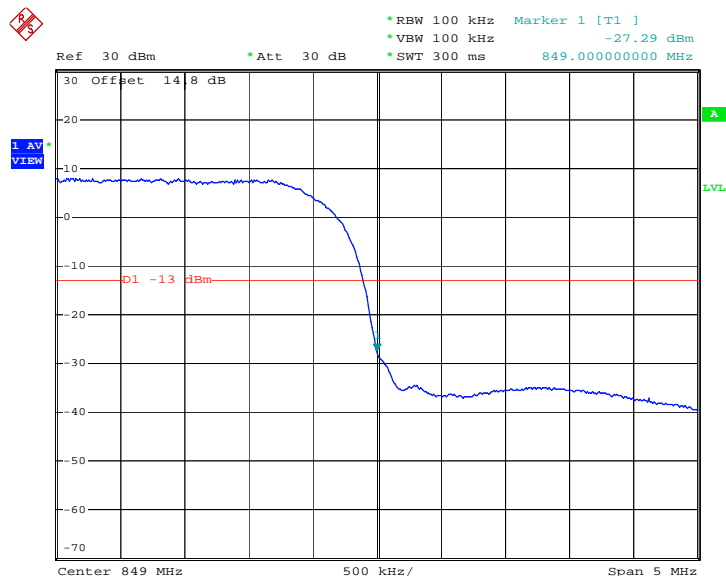
**Lower Band Edge Plot on Channel 4132 (826.4 MHz)**



Date: 15.MAY.2013 22:29:51

1. Correction Factor(dB)=  $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

<b>Band :</b>	WCDMA Band V	<b>Test Mode :</b>	RMC 12.2Kbps Link
<b>Correction Factor :</b>	-3.30dB	<b>Maximum 26dB Bandwidth :</b>	4.68MHz
<b>Band Edge :</b>	-30.59dBm	<b>Measurement Value :</b>	-27.29dBm

**Higher Band Edge Plot on Channel 4233 (846.6 MHz)**


Date: 15.MAY.2013 22:30:17

1. Correction Factor(dB)=  $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

### 3.5 Conducted Spurious Emission Measurement

#### 3.5.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10<sup>th</sup> harmonic.

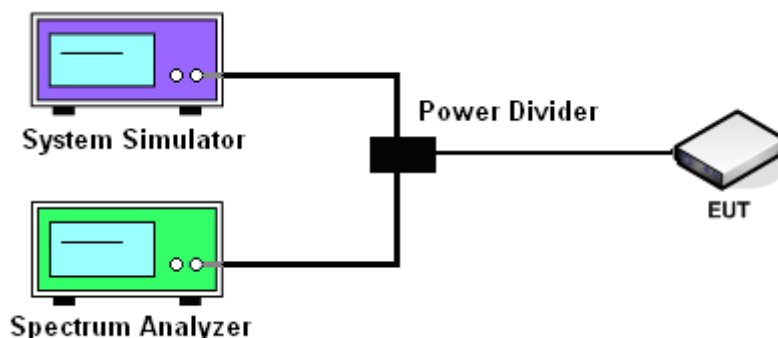
#### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.5.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$

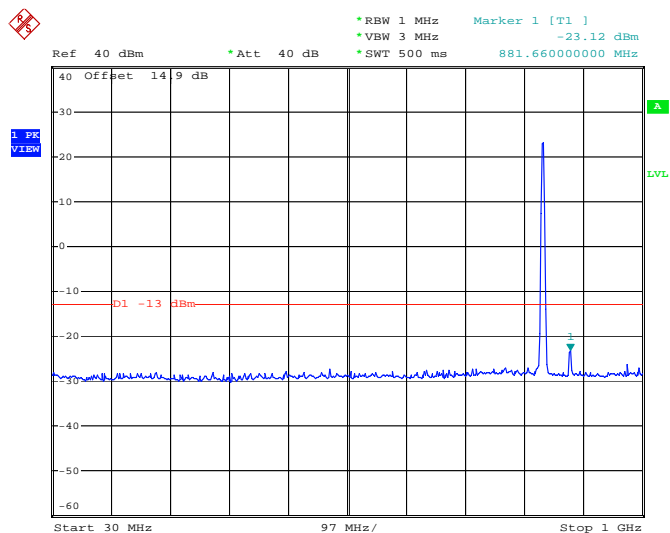
#### 3.5.4 Test Setup



### 3.5.5 Test Result (Plots) of Conducted Spurious Emission

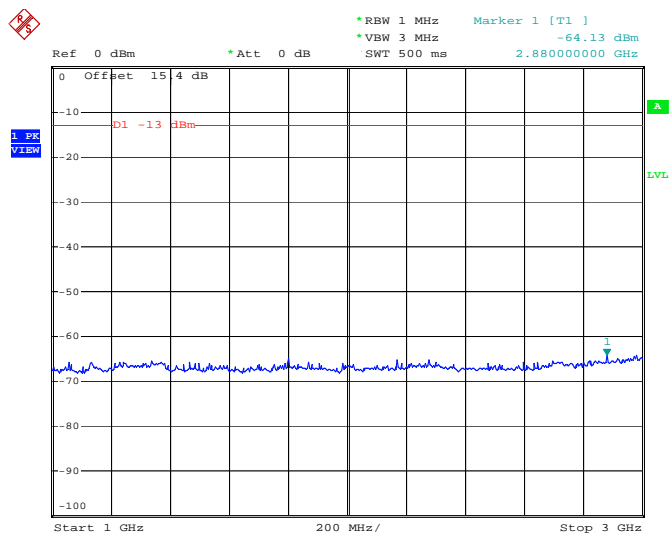
<b>Band :</b>	WCDMA Band V	<b>Channel :</b>	CH4182
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Frequency :</b>	836.4 MHz

**Conducted Spurious Emission Plot between 30MHz ~ 1GHz**



Date: 15.MAY.2013 22:40:37

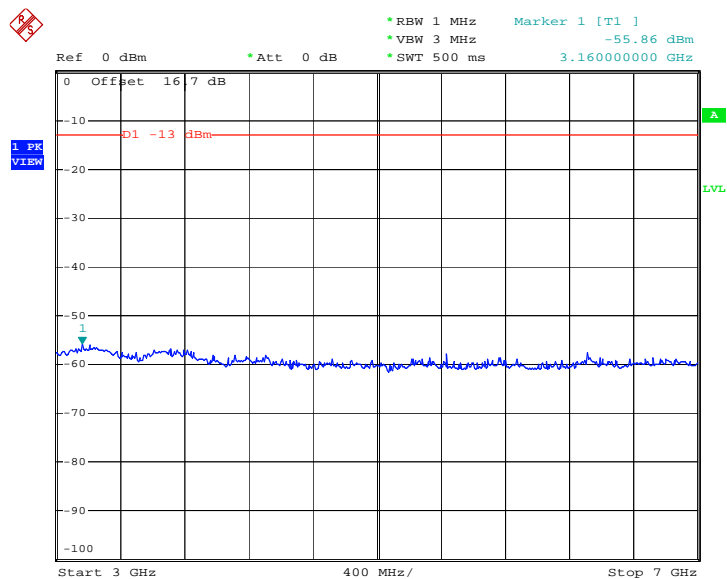
**Conducted Spurious Emission Plot between 1GHz ~ 3GHz**



Date: 15.MAY.2013 22:45:09

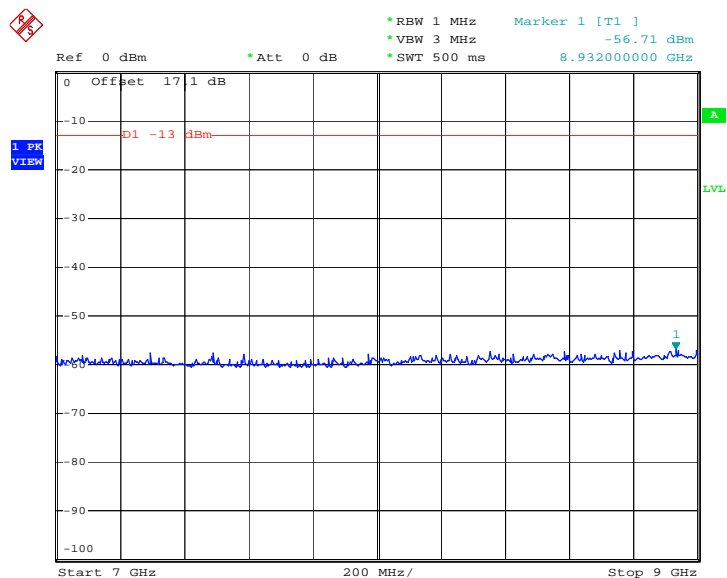


## Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 15.MAY.2013 22:45:40

## Conducted Spurious Emission Plot between 7GHz ~ 9GHz



Date: 15.MAY.2013 22:46:08

## 3.6 Field Strength of Spurious Radiated Measurement

### 3.6.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 3.6.2 Measuring Instruments

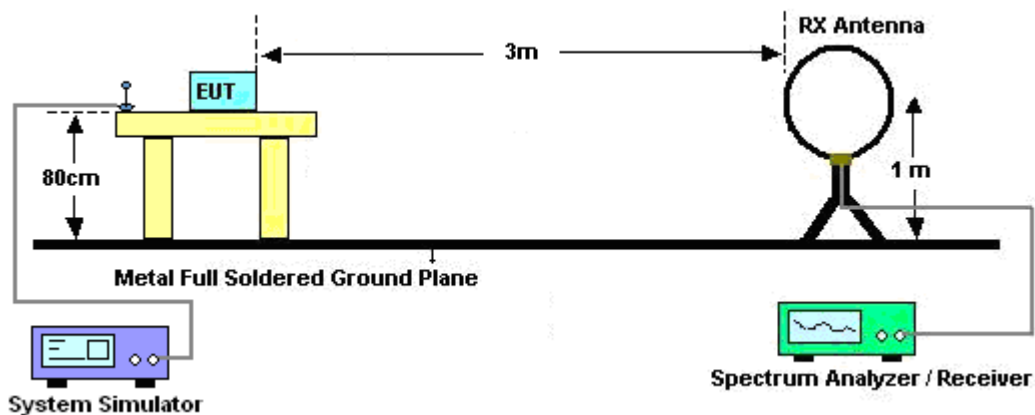
See list of measuring instruments of this test report.

### 3.6.3 Test Procedures

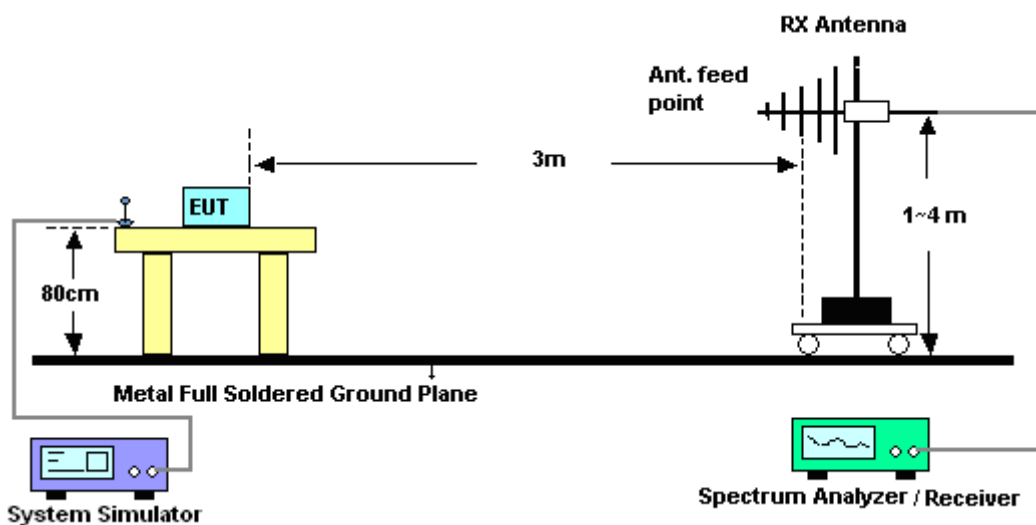
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$   
EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain  
ERP (dBm) = EIRP - 2.15

### 3.6.4 Test Setup

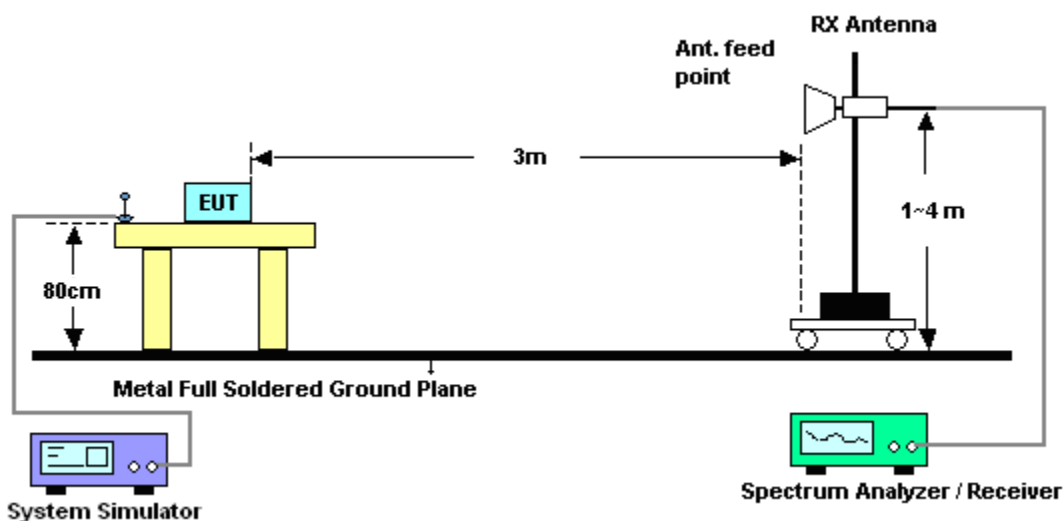
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

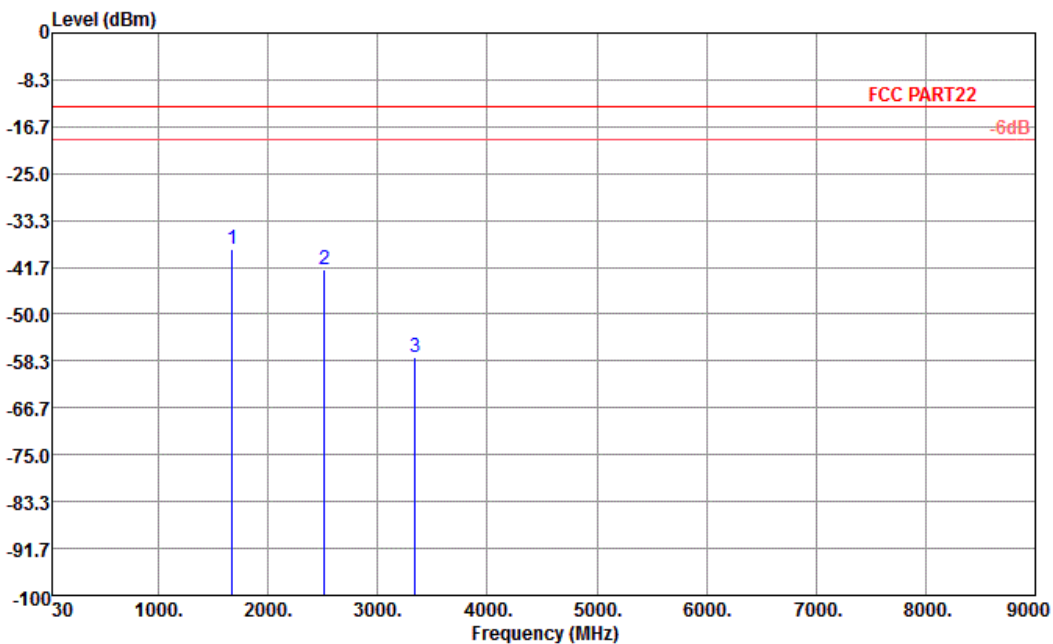


### 3.6.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

**3.6.6 Test Result of Field Strength of Spurious Radiated**

<b>Band :</b>	WCDMA Band V	<b>Temperature :</b>	23~24°C
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Relative Humidity :</b>	43~44%
<b>Test Engineer :</b>	Stone Gu	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

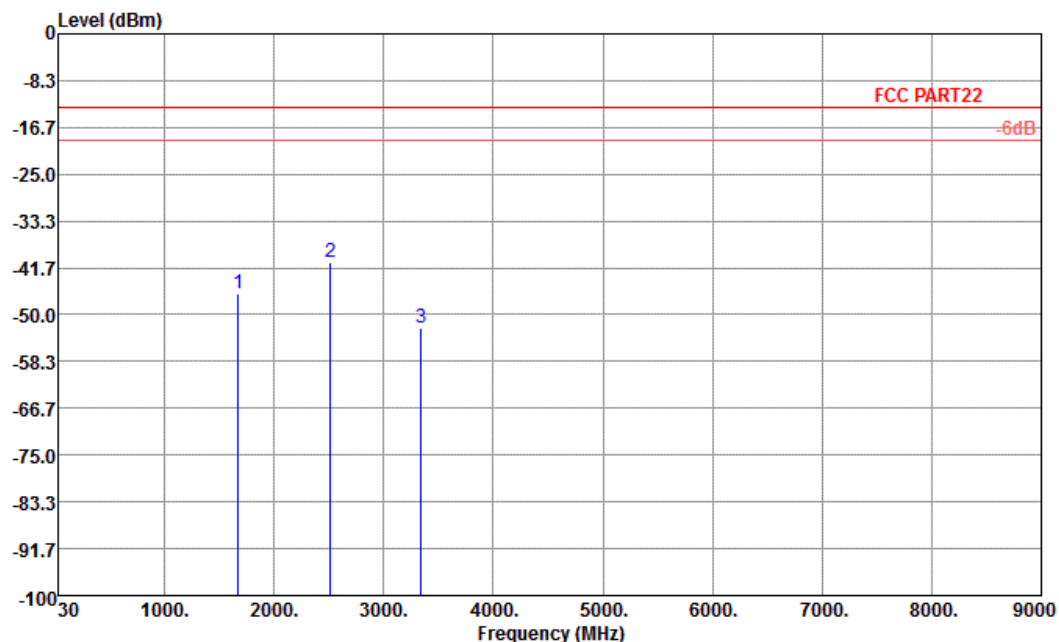


Site : 03CH01-KS  
 Condition : FCC PART22 HF EIRP FACTOR HORIZONTAL  
 EUT : (FG) 342301

Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1672	-38.56	-13	-25.56	-42.85	-39.21	0.57	3.37	H	Pass
2512	-42.00	-13	-29.00	-49.73	-44.23	0.78	5.16	H	Pass
3344	-57.58	-13	-44.58	-64.22	-61.22	0.87	6.66	H	Pass



Band :	WCDMA Band V	Temperature :	23~24°C
Test Mode :	RMC 12.2Kbps Link	Relative Humidity :	43~44%
Test Engineer :	Stone Gu	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH01-KS  
Condition : FCC PART22 HF EIRP FACTOR VERTICAL  
EUT : (FG) 342301

Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-46.14	-13	-33.14	-52.18	-46.79	0.57	3.37	V	Pass
2512	-40.72	-13	-27.72	-51.31	-42.95	0.78	5.16	V	Pass
3344	-52.26	-13	-39.26	-60.71	-55.90	0.87	6.66	V	Pass

### **3.7 Frequency Stability for Temperature and Voltage Measurement**

#### **3.7.1 Description of Frequency Stability Measurement**

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

#### **3.7.2 Measuring Instruments**

See list of measuring instruments of this test report.

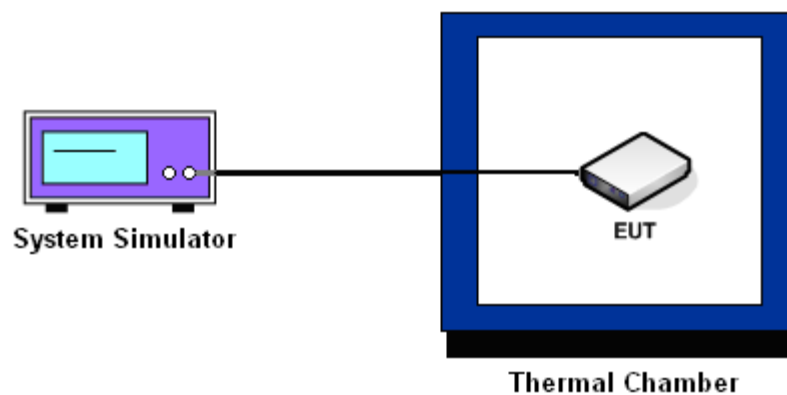
#### **3.7.3 Test Procedures for Temperature Variation**

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  step up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT cannot be turned on at  $-30^{\circ}\text{C}$ , the testing lowest temperature will be raised in  $10^{\circ}\text{C}$  step until the EUT can be turned on.

#### **3.7.4 Test Procedures for Voltage Variation**

1. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

### 3.7.5 Test Setup





### 3.7.6 Test Result of Temperature Variation

<b>Band :</b>	WCDMA Band V	<b>Channel :</b>	4182
<b>Limit (ppm) :</b>	2.5	<b>Frequency :</b>	836.4 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	13	0.02	PASS
-20	9	0.01	
-10	7	0.01	
0	-6	-0.01	
10	-7	-0.01	
20	-13	-0.02	
30	-15	-0.02	
40	-17	-0.02	
50	-21	-0.02	
55	-23	-0.03	

**Note:** The manufacturer declared that the EUT could work properly at temperature 55°C.

**3.7.7 Test Result of Voltage Variation**

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
WCDMA Band V CH4182	RMC 12.2Kbps	3.7	-15	-0.02	2.5	PASS
		BEP	-8	-0.01		
		4.2	-16	-0.02		

**Note:**

1. Normal Voltage = 3.7V.
2. Battery End Point (BEP) = 3.3 V.

## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 29, 2012	May 15, 2013	Dec. 28, 2013	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV30	100845	9kHz~30GHz	Nov. 06, 2012	May 15, 2013	Nov. 05, 2013	Conducted (TH01-KS)
System Simulator	R&S	CMU200	837587/066	2G Full-Band	Dec. 29, 2012	May 15, 2013	Dec. 28, 2013	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 22, 2012	May 15, 2013	Aug. 21, 2013	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Dec. 29, 2012	May 15, 2013	Dec. 28, 2013	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 08, 2012	Jun. 09, 2013	Nov. 07, 2013	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	101399	9kHz~30GHz	May. 23, 2013	Jun. 09, 2013	May 22, 2014	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 07, 2012	Jun. 09, 2013	Dec. 06, 2013	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 06, 2013	Jun. 09, 2013	Jan. 05, 2014	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161069	1MHz~1GHz	May. 23, 2013	Jun. 09, 2013	May 22, 2014	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 29, 2012	Jun. 09, 2013	Dec. 28, 2013	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	9170249	15GHz~40GHz	Nov. 23, 2012	Jun. 09, 2013	Nov. 22, 2013	Radiation (03CH01-KS)
HFH2-Z2 Loop Antenna	R&S	HFH2-Z2	100321	9KHZ-30MHZ	Oct. 22, 2012	Jun. 09, 2013	Oct. 21, 2013	Radiation (03CH01-KS)
System Simulator	R&S	CMU200	116456	Full-Band	Sep. 19, 2012	Jun. 09, 2013	Sep. 18, 2013	Radiation (03CH01-KS)

## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.54
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### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.72
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## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP342301 as below.