

# FCC RF Test Report

APPLICANT : ZTE CORPORATION  
EQUIPMENT : LTE USB Modem  
BRAND NAME : ZTE  
MODEL NAME : MF820B  
FCC ID : Q78-MF820B  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E), 27(L)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)  
Tx/Rx FREQUENCY RANGE : WCDMA Band V : 826.4 ~ 846.6 MHz /  
871.4 ~ 891.6 MHz  
WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz  
2112.4 MHz ~ 2152.6 MHz  
WCDMA Band II : 1852.4 ~ 1907.6 MHz /  
1932.4 ~ 1987.6 MHz  
MAX. ERP/EIRP POWER : WCDMA Band V (RMC 12.2Kbps) : 0.09 W  
WCDMA Band IV (RMC 12.2Kbps) : 0.19 W  
WCDMA Band II (RMC 12.2Kbps) : 0.16 W

The product was received on Dec. 31, 2011 and completely tested on Mar. 30, 2012. 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:



Jones Tsai / Manager



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



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### 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	-
3.2	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.2	§24.232(d)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.2	§27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.4	§2.1049 §22.917(a) §24.238(a) §27.53(g)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a) §27.53(g)	Band Edge Measurement	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a) §27.53(g)	Conducted Emission	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a) §27.53(g)	Field Strength of Spurious Radiation	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 27.13 dB at 7520 MHz
3.8	§2.1055 §22.355 §24.235 §27.54	Frequency Stability for Temperature & 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 & Specification	
Equipment	LTE USB Modem
Brand Name	ZTE
Model Name	MF820B
FCC ID	Q78-MF820B
Tx Frequency	WCDMA Band V : 824 MHz ~ 849 MHz WCDMA Band IV : 1710 MHz ~ 1755 MHz WCDMA Band II : 1850 MHz ~ 1910 MHz
Rx Frequency	WCDMA Band V : 869 MHz ~ 894 MHz WCDMA Band IV : 2110 MHz ~ 2155 MHz WCDMA Band II : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	WCDMA Band V : 21.90 dBm WCDMA Band IV : 22.25 dBm WCDMA Band II : 21.73 dBm
Antenna Type	PIFA Antenna
HW Version	x13A+xi8A
SW Version	EN_CLA_MF820BV1.0.0B01
Type of Modulation	WCDMA: QPSK (Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink)
EUT Stage	Production Unit

**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 Emission Designator and Maximum ERP/EIRP Power

FCC Rule	System	Type of Modulation	Emission Designator	Maximum ERP/EIRP
Part 22	WCDMA Band V RMC 12.2Kbps	QPSK	4M16F9W	0.09 W
Part 24	WCDMA Band II RMC 12.2Kbps	QPSK	4M16F9W	0.16 W
Part 27	WCDMA Band IV RMC 12.2Kbps	QPSK	4M16F9W	0.19 W

## 1.5 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC.		
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH02-HY	03CH07-HY	722060/4086B-1

## 1.6 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.
- ♦ 47 CFR Part 2, 22(H), 24(E), 27(L)
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v01

**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.

## 1.7 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU200	N/A	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

## 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, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for WCDMA Band V.
2. 30 MHz to 18000 MHz for WCDMA Band IV.
3. 30 MHz to 19000 MHz for WCDMA Band II.

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

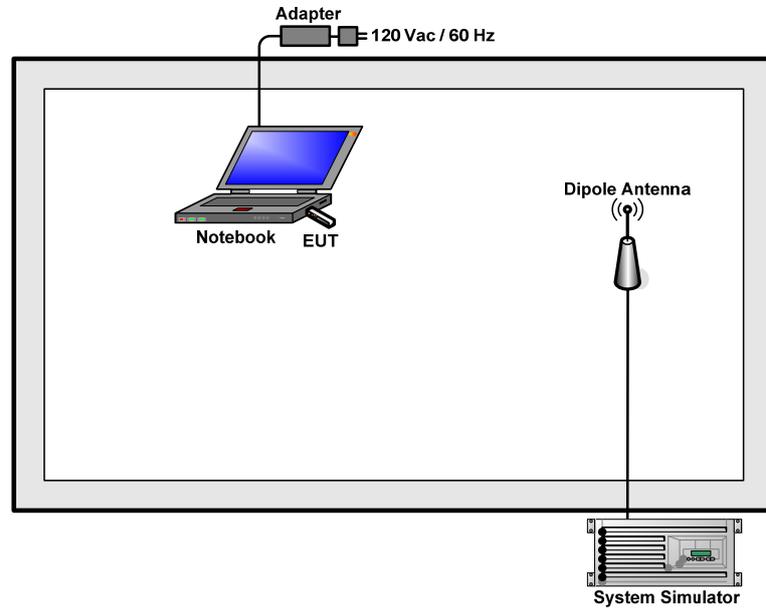
**Note:**

The maximum power levels are RMC 12.2Kbps mode for WCDMA band V, RMC 12.2Kbps mode for WCDMA band IV, and RMC 12.2Kbps mode for WCDMA band II, only these modes were used for all tests.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)									
Band	WCDMA Band V			WCDMA Band II			WCDMA Band IV		
Tx Channel	4132	4182	4233	9262	9400	9538	1312	1413	1513
Rx Channel	4357	4408	4458	9662	9800	9938	1537	1638	1738
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
RMC 12.2K	21.86	21.79	21.90	21.62	21.73	21.57	21.93	21.85	22.25
HSDPA Subtest-1	21.78	21.70	21.89	21.65	21.70	21.50	22.12	21.84	22.21
HSDPA Subtest-2	21.84	21.79	21.86	21.70	21.72	21.64	22.07	21.86	22.20
HSDPA Subtest-3	21.33	21.23	21.37	21.27	21.47	21.31	21.52	21.32	21.87
HSDPA Subtest-4	21.27	21.27	21.29	21.43	21.20	21.56	21.56	21.49	21.75
HSUPA Subtest-1	20.95	21.74	21.31	21.05	20.88	20.82	20.76	20.77	20.65
HSUPA Subtest-2	19.91	19.90	19.72	19.31	19.75	19.77	19.10	19.16	19.26
HSUPA Subtest-3	20.48	20.62	20.35	20.50	20.67	20.86	20.65	20.60	20.67
HSUPA Subtest-4	19.89	19.75	19.83	19.33	19.58	19.33	19.14	19.49	19.23
HSUPA Subtest-5	20.95	21.56	21.23	20.87	20.86	20.88	20.67	20.67	20.68

## 2.2 Connection Diagram of Test System



### 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.

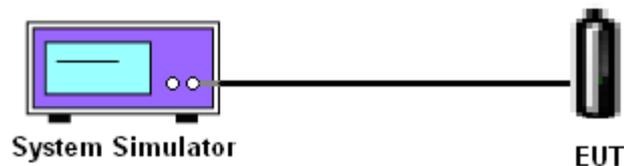
##### 3.1.2 Measuring Instruments

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. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

##### 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)	21.86	21.79	21.90
Conducted Power (Watts)	0.15	0.15	0.15

PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
Conducted Power (dBm)	21.62	21.73	21.57
Conducted Power (Watts)	0.15	0.15	0.14

AWS Band			
Modes	WCDMA Band IV (RMC 12.2Kbps)		
Channel	1312(Low)	1413 (Mid)	1513 (High)
Frequency (MHz)	1712.4	1732.6	1752.6
Conducted Power (dBm)	21.93	21.85	22.25
Conducted Power (Watts)	0.16	0.15	0.17

## 3.2 Peak-to-Average Ratio

### 3.2.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. The following guidelines are offered for performing a CCDF measurement.

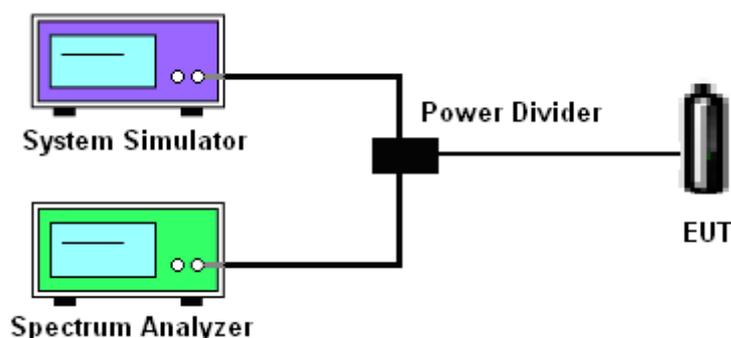
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The CCDF (Complementary Cumulative Distribution Function) of the middle channel for the highest RF powers were measured.

### 3.2.4 Test Setup





3.2.5 Test Result of Peak-to-Average Ratio

Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4132 (Low)	4182 (Mid)	4233 (High)
Frequency (MHz)	826.4	836.4	846.6
Peak-to-Average Ratio (dB)	3.50	3.57	3.52

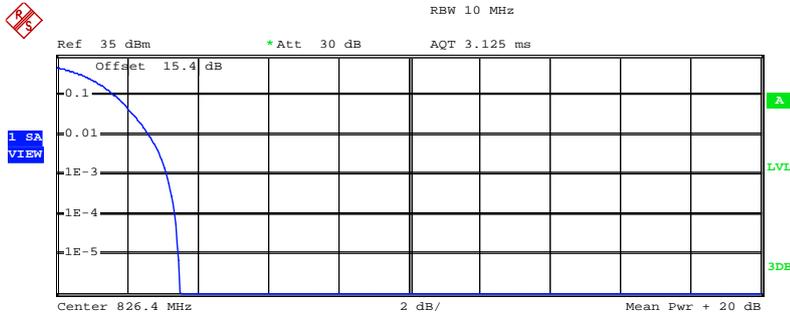
PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)
Frequency (MHz)	1852.4	1880	1907.6
Peak-to-Average Ratio (dB)	3.77	3.72	3.71

AWS Band			
Modes	WCDMA Band IV (RMC 12.2Kbps)		
Channel	1312(Low)	1413 (Mid)	1513 (High)
Frequency (MHz)	1712.4	1732.6	1752.6
Peak-to-Average Ratio (dB)	3.41	3.29	3.37



Band :	WCDMA Band V	Test Mode :	WCDMA Link
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Peak-to-Average Ratio on Channel 4132



Complementary Cumulative Distribution Function (100000 samples)

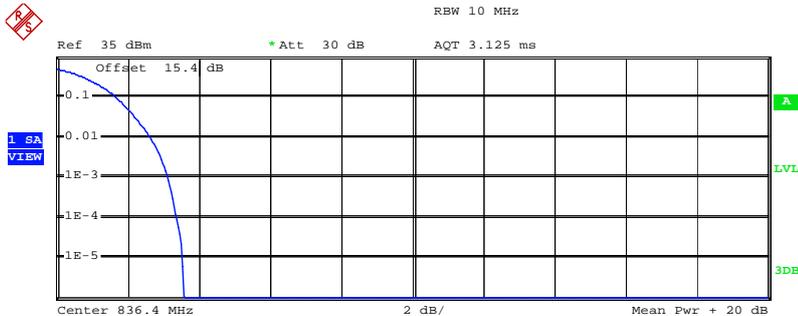
Trace 1

Mean 19.34 dBm  
 Peak 22.84 dBm  
 Crest 3.50 dB

10 % 1.68 dB  
 1 % 2.64 dB  
 .1 % 3.16 dB  
 .01 % 3.36 dB

Date: 26.MAR.2012 22:33:13

Peak-to-Average Ratio on Channel 4182



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

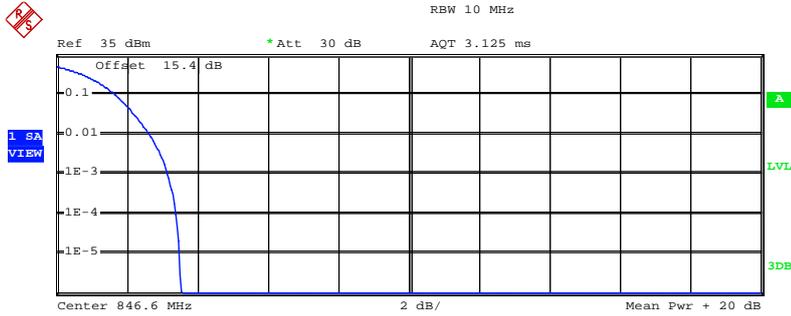
Mean 18.99 dBm  
 Peak 22.55 dBm  
 Crest 3.57 dB

10 % 1.68 dB  
 1 % 2.64 dB  
 .1 % 3.12 dB  
 .01 % 3.40 dB

Date: 26.MAR.2012 22:32:44



Peak-to-Average Ratio on Channel 4233



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 19.25 dBm  
 Peak 22.77 dBm  
 Crest 3.52 dB

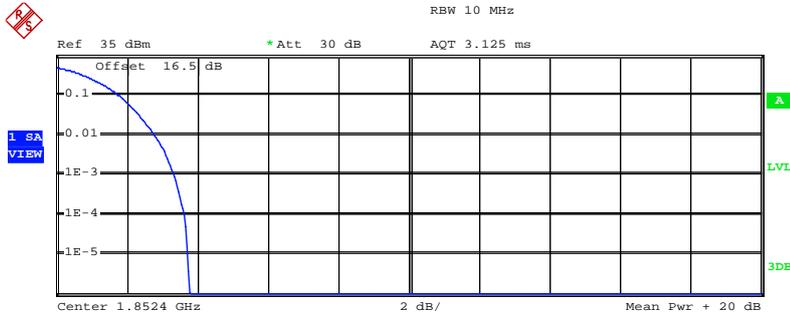
10 % 1.68 dB  
 1 % 2.64 dB  
 .1 % 3.16 dB  
 .01 % 3.40 dB

Date: 26.MAR.2012 22:32:18



<b>Band :</b>	WCDMA Band II	<b>Test Mode :</b>	WCDMA Link
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Peak-to-Average Ratio on Channel 9262

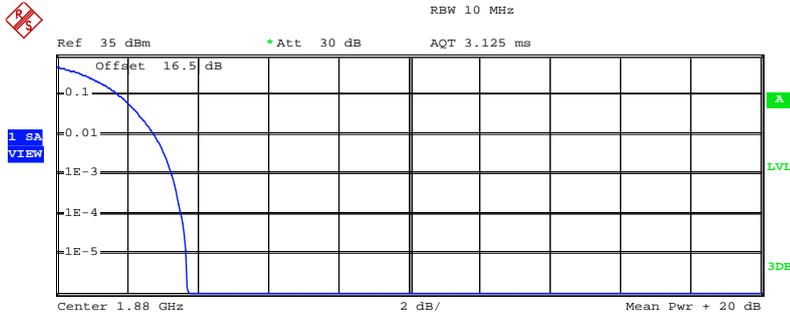


Complementary Cumulative Distribution Function (100000 samples)  
 Trace 1  
 Mean 18.43 dBm  
 Peak 22.20 dBm  
 Crest 3.77 dB

10 %	1.80 dB
1 %	2.80 dB
.1 %	3.36 dB
.01 %	3.64 dB

Date: 26.MAR.2012 22:20:30

Peak-to-Average Ratio on Channel 9400



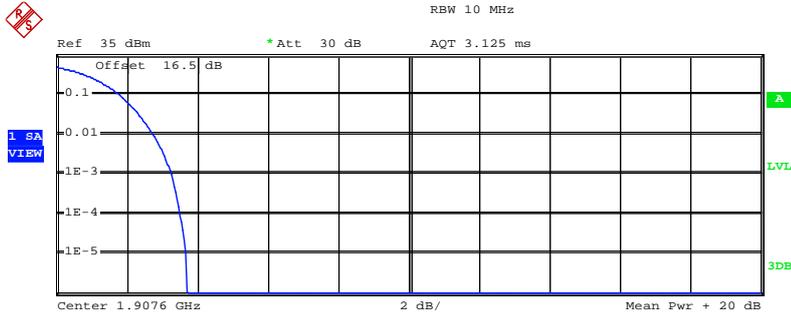
Complementary Cumulative Distribution Function (100000 samples)  
 Trace 1  
 Mean 18.98 dBm  
 Peak 22.69 dBm  
 Crest 3.72 dB

10 %	1.80 dB
1 %	2.80 dB
.1 %	3.28 dB
.01 %	3.56 dB

Date: 26.MAR.2012 22:19:42



Peak-to-Average Ratio on Channel 9538



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

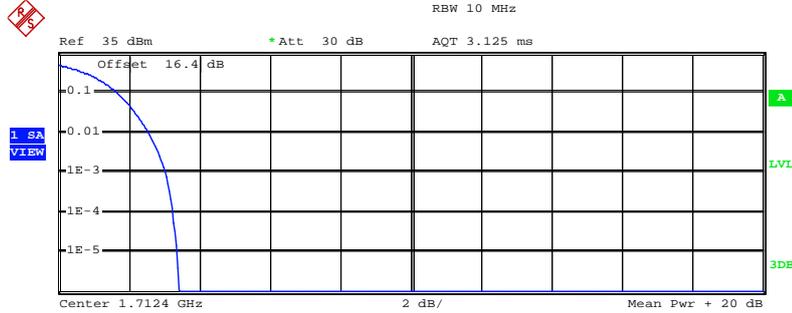
Mean	18.35 dBm
Peak	22.06 dBm
Crest	3.71 dB
10 %	1.80 dB
1 %	2.76 dB
.1 %	3.28 dB
.01 %	3.52 dB

Date: 26.MAR.2012 22:19:14



Band :	WCDMA Band IV	Test Mode :	WCDMA Link
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Peak-to-Average Ratio on Channel 1312



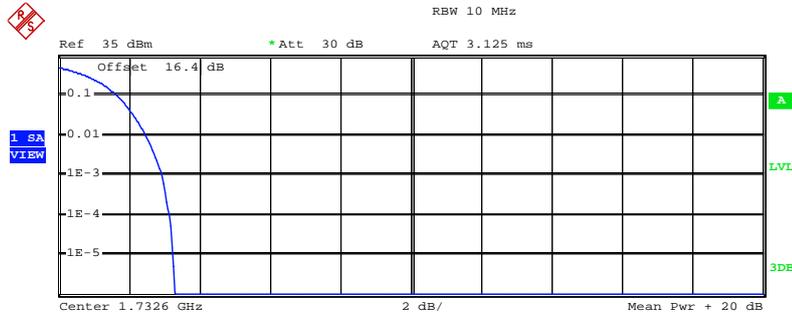
Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean	21.33 dBm
Peak	24.74 dBm
Crest	3.41 dB
10 %	1.68 dB
1 %	2.56 dB
.1 %	3.04 dB
.01 %	3.24 dB

Date: 26.MAR.2012 22:35:30

Peak-to-Average Ratio on Channel 1413



Complementary Cumulative Distribution Function (100000 samples)

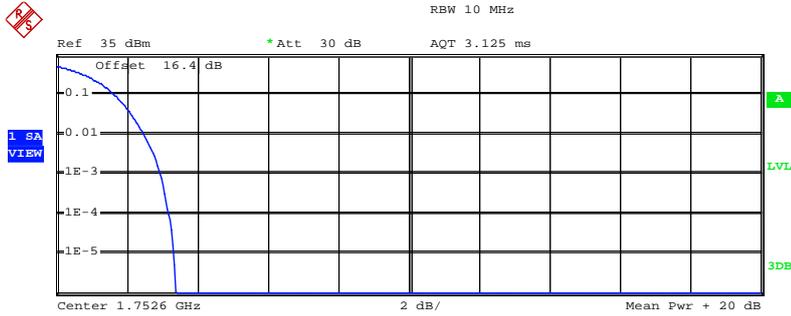
Trace 1

Mean	21.52 dBm
Peak	24.81 dBm
Crest	3.29 dB
10 %	1.68 dB
1 %	2.48 dB
.1 %	2.96 dB
.01 %	3.16 dB

Date: 26.MAR.2012 22:36:05



Peak-to-Average Ratio on Channel 1513



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 21.58 dBm  
 Peak 24.95 dBm  
 Crest 3.37 dB

10 % 1.68 dB  
 1 % 2.48 dB  
 .1 % 2.96 dB  
 .01 % 3.20 dB

Date: 26.MAR.2012 22:36:36



### 3.3 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

#### 3.3.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v01. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

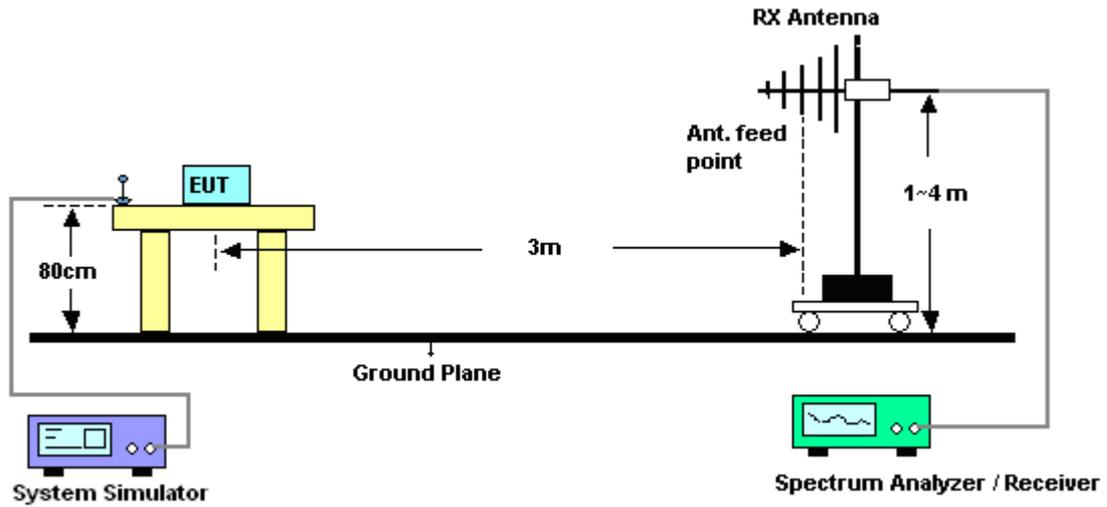
#### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.3.3 Test Procedures

1. The EUT was placed on a non-conductive rotating platform with 0.8 meter height in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW= 1MHz, VBW= 3MHz for GSM, RBW= 300KHz, VBW= 1MHz for WCDMA, and RMS detector settings per section 4.0 of KDB 971168 D01.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor,  $EIRP = LVL + \text{Correction factor}$  and  $ERP = EIRP - 2.15$ .

### 3.3.4 Test Setup





3.3.5 Test Result of ERP

WCDMA Band V (RMC 12.2Kbps) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
826.4	-11.65	31.44	17.64	0.06
836.4	-10.44	32.04	19.45	0.09
846.6	-11.04	32.63	19.44	0.09
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
826.4	-13.26	32.78	17.37	0.05
836.4	-12.73	32.82	17.94	0.06
846.6	-14.24	33.4	17.01	0.05

\* ERP = LVL (dBm) + Correction Factor (dB) – 2.15

3.3.6 Test Result of EIRP

WCDMA Band IV (RMC 12.2Kbps) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1712.4	-19.05	41.74	22.69	0.19
1732.6	-20.11	42.41	22.30	0.17
1752.6	-19.31	41.82	22.51	0.18
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1712.4	-23.58	43.38	19.80	0.10
1732.6	-25.02	45.43	20.41	0.11
1752.6	-24.16	44.43	20.27	0.11

\* EIRP = LVL (dBm) + Correction Factor (dB)

WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1852.4	-22.24	44.15	21.91	0.16
1880.0	-22.72	44.79	22.07	0.16
1907.6	-22.13	44.21	22.08	0.16
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1852.4	-24.72	45.73	21.01	0.13
1880.0	-24.85	46.78	21.93	0.16
1907.6	-24.53	46.49	21.96	0.16

\* EIRP = LVL (dBm) + Correction Factor (dB)

## 3.4 Occupied Bandwidth Measurement

### 3.4.1 Description of Occupied Bandwidth Measurement

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.

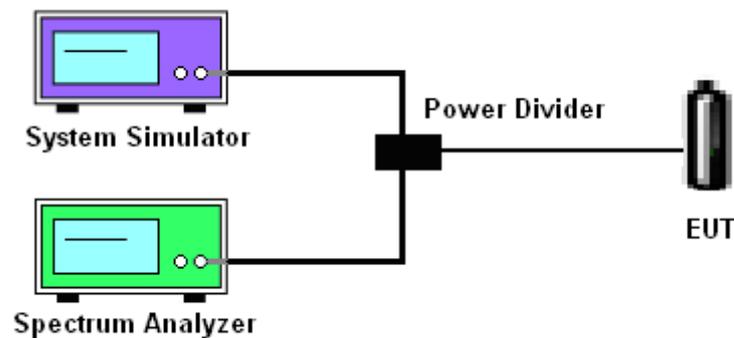
### 3.4.2 Measuring Instruments

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 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers were measured.

### 3.4.4 Test Setup

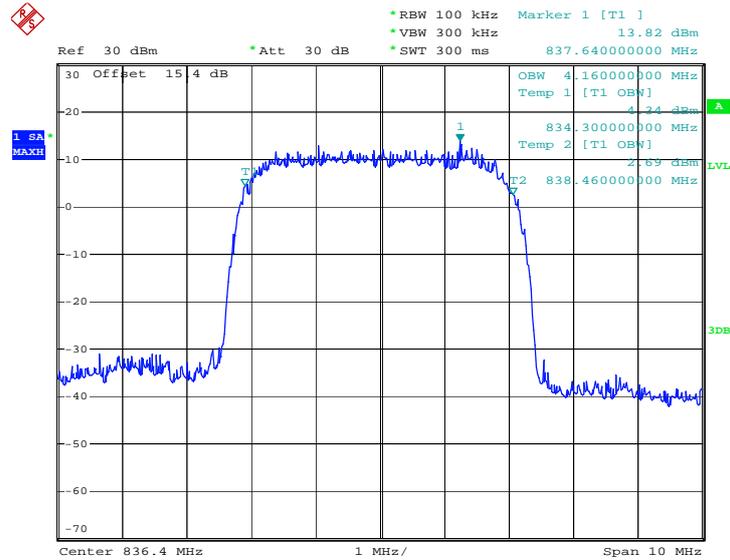




### 3.4.5 Test Result (Plots) of Occupied Bandwidth

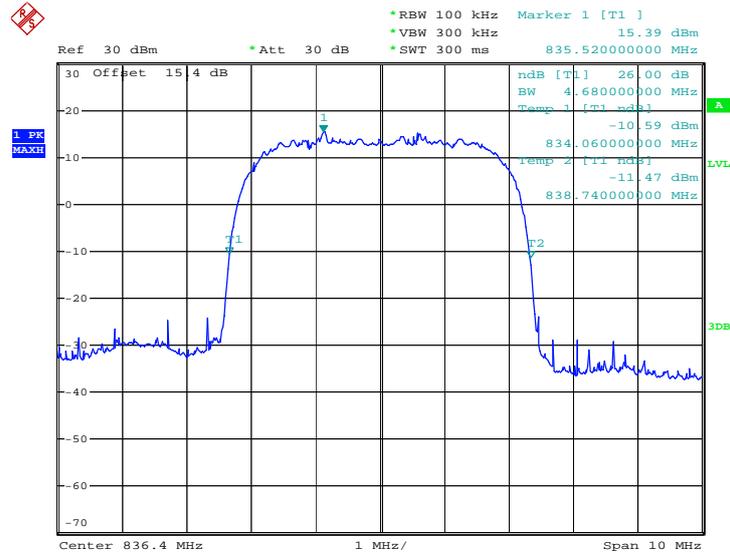
Band :	WCDMA Band V	Power Stage :	High
Test Mode :	RMC 12.2Kbps Link		

99% Occupied Bandwidth Plot on Channel 4182



Date : 26.MAR.2012 22:27:54

26dB Bandwidth Plot on Channel 4182

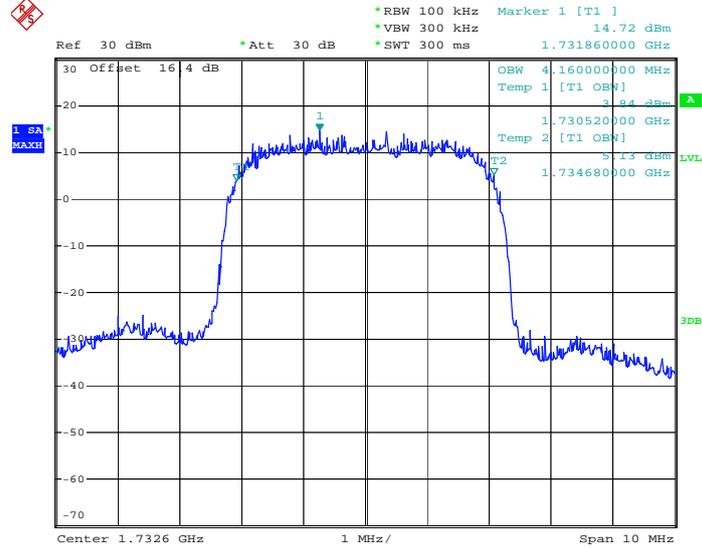


Date : 26.MAR.2012 22:26:35



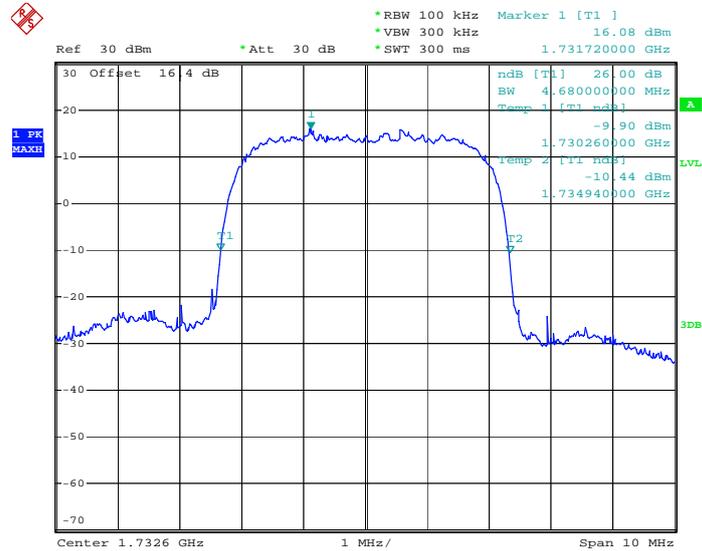
<b>Band :</b>	WCDMA Band IV	<b>Power Stage :</b>	High
<b>Test Mode :</b>	RMC 12.2Kbps Link		

**99% Occupied Bandwidth Plot on Channel 1413**



Date: 26.MAR.2012 22:41:37

**26dB Bandwidth Plot on Channel 1413**

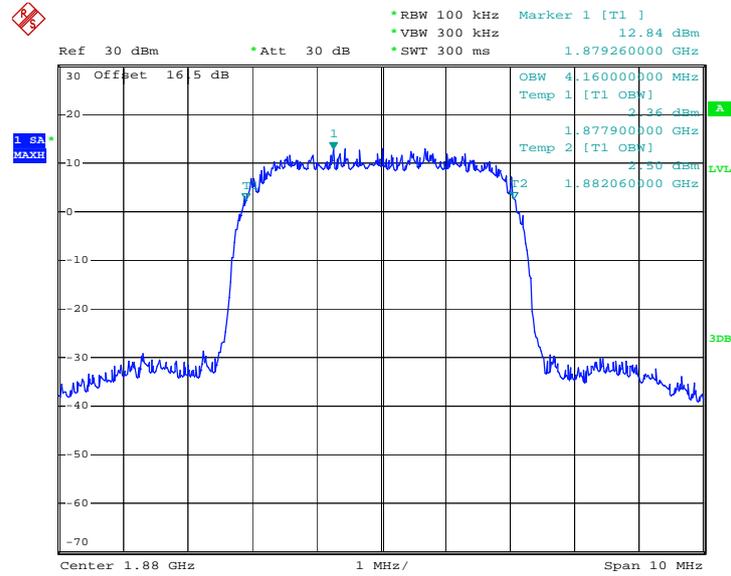


Date: 26.MAR.2012 22:40:18



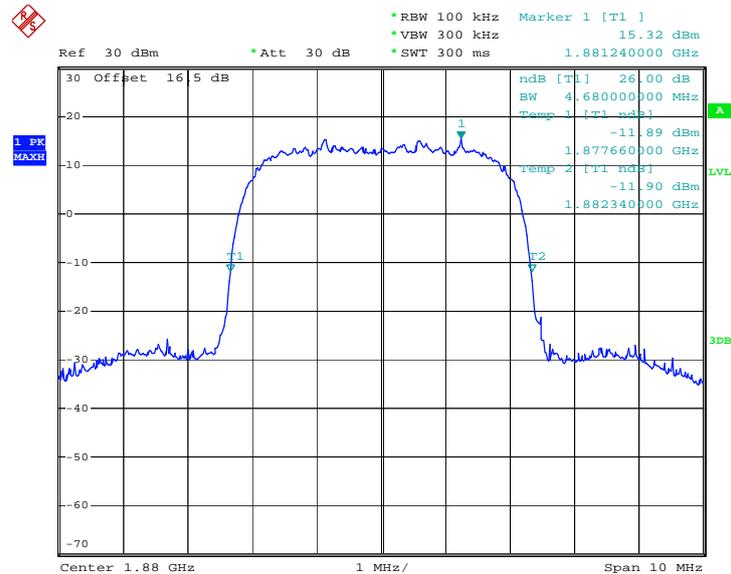
<b>Band :</b>	WCDMA Band II	<b>Power Stage :</b>	High
<b>Test Mode :</b>	RMC 12.2Kbps Link		

**99% Occupied Bandwidth Plot on Channel 9400**



Date: 26.MAR.2012 22:12:56

**26dB Bandwidth Plot on Channel 9400**



Date: 26.MAR.2012 22:11:37

### 3.5 Band Edge Measurement

#### 3.5.1 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.

#### 3.5.2 Measuring Instruments

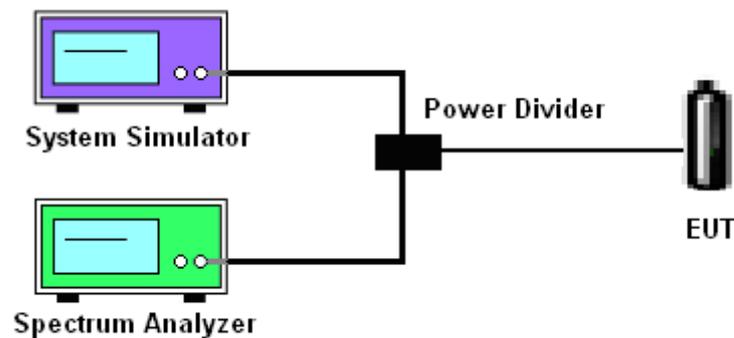
See list of measuring instruments of this test report.

#### 3.5.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly  $BW/100$ .

#### 3.5.4 Test Setup

<Conducted Band Edge >

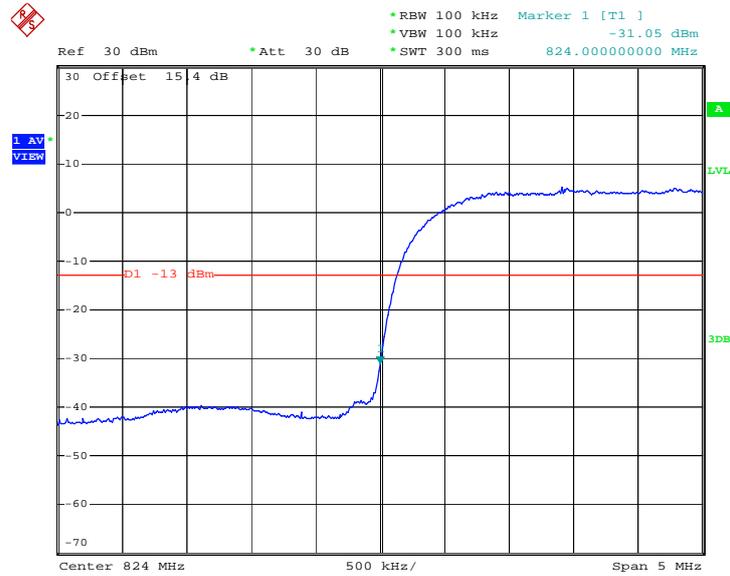




3.5.5 Test Result (Plots) of Conducted Band Edge

Band :	WCDMA Band V	Power Stage :	High
Test Mode :	RMC 12.2Kbps Link	26dB Bandwidth:	4.68MHz
Correction Factor:	-3.30dB	Measurement Value:	-31.05dBm
Band Edge:	-34.35dBm		

Lower Band Edge Plot on Channel 4132



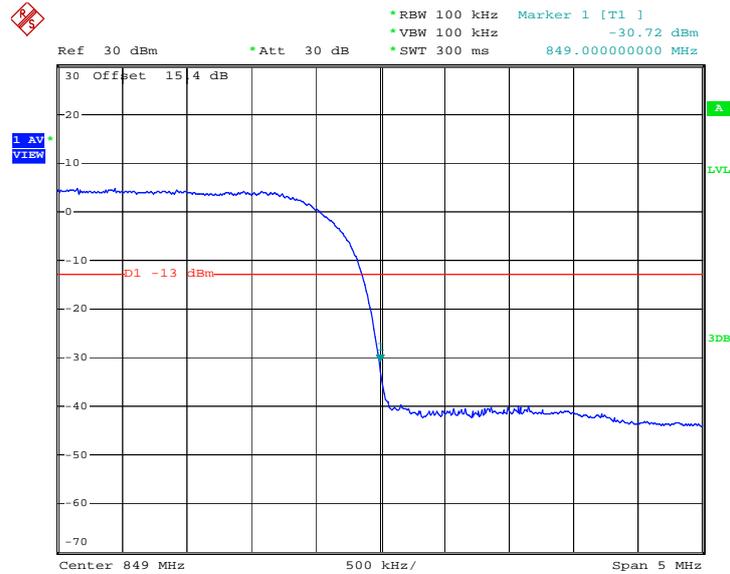
Date: 26.MAR.2012 22:29:48

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



Band :	WCDMA Band V	Power Stage :	High
Test Mode :	RMC 12.2Kbps Link	26dB Bandwidth:	4.68MHz
Correction Factor:	-3.30dB	Measurement Value:	-30.72dBm
Band Edge:	-34.02dBm		

Higher Band Edge Plot on Channel 4233



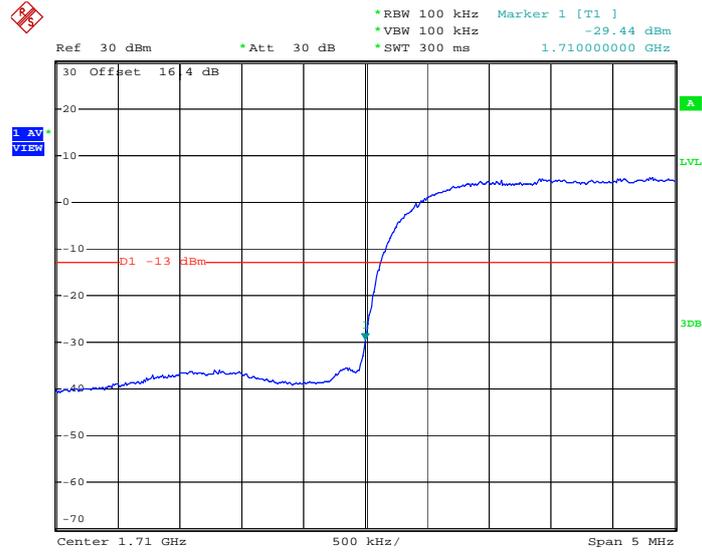
Date: 26.MAR.2012 22:30:15

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



Band :	WCDMA Band IV	Power Stage :	High
Test Mode :	RMC 12.2Kbps Link	26dB Bandwidth:	4.68MHz
Correction Factor:	-3.30dB	Measurement Value:	-29.44dBm
Band Edge:	-32.74dBm		

Lower Band Edge Plot on Channel 1312



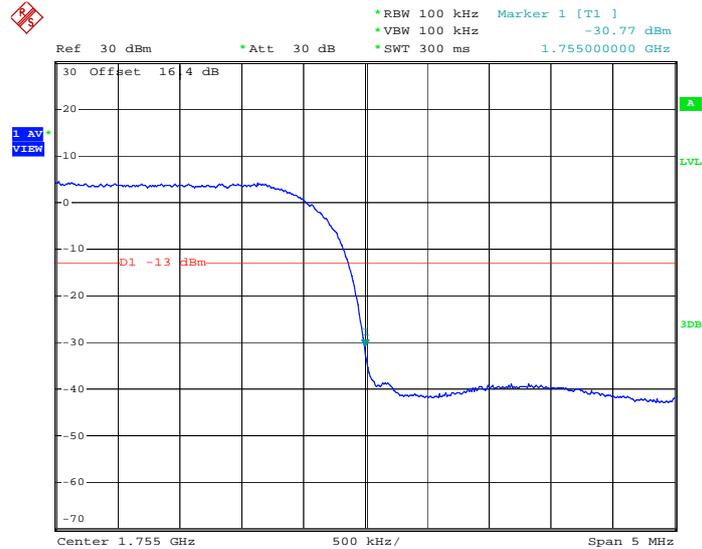
Date: 26.MAR.2012 22:43:31

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



Band :	WCDMA Band IV	Power Stage :	High
Test Mode :	RMC 12.2Kbps Link	26dB Bandwidth:	4.68MHz
Correction Factor:	-3.30dB	Measurement Value:	-30.77dBm
Band Edge:	-34.07dBm		

Higher Band Edge Plot on Channel 1513



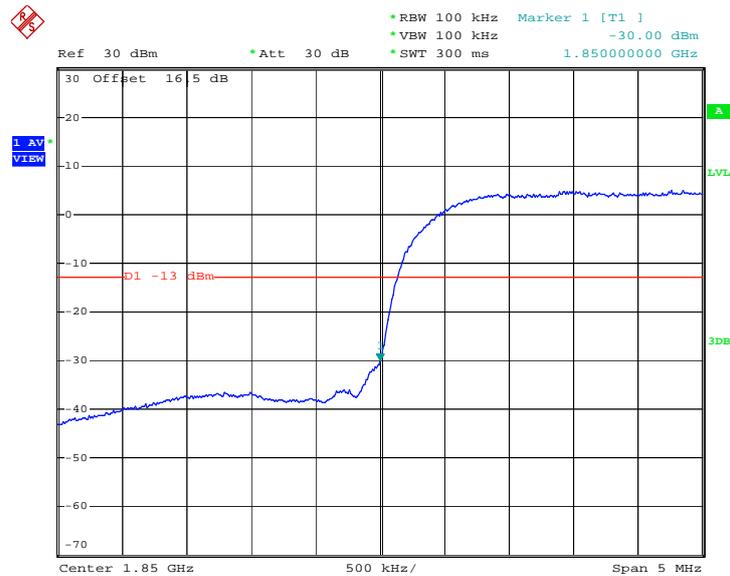
Date: 26.MAR.2012 22:43:57

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



<b>Band :</b>	WCDMA Band II	<b>Power Stage :</b>	High
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>26dB Bandwidth:</b>	4.68MHz
<b>Correction Factor:</b>	-3.30dB	<b>Measurement Value:</b>	-30.00dBm
<b>Band Edge:</b>	-33.30dBm		

Lower Band Edge Plot on Channel 9262



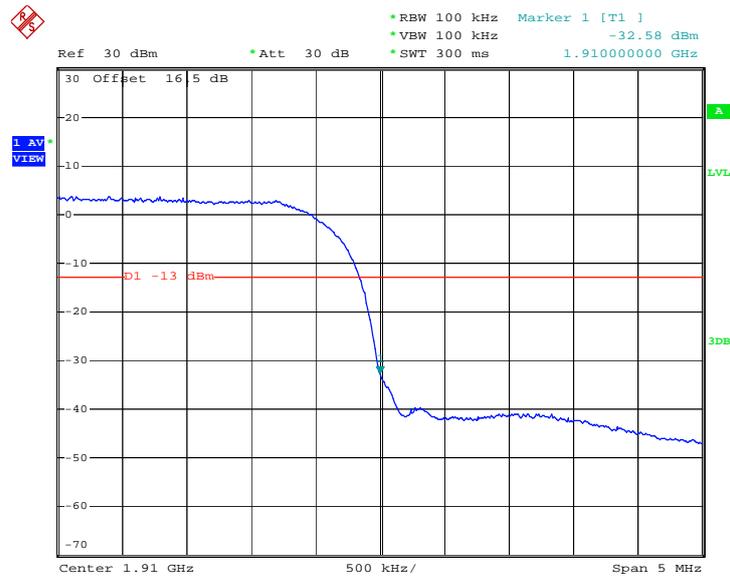
Date: 26.MAR.2012 22:14:50

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



<b>Band :</b>	WCDMA Band II	<b>Power Stage :</b>	High
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>26dB Bandwidth:</b>	4.66MHz
<b>Correction Factor:</b>	-3.30 dB	<b>Measurement Value:</b>	-32.58dBm
<b>Band Edge:</b>	-35.88dBm		

Higher Band Edge Plot on Channel 9538



Date: 26.MAR.2012 22:15:18

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

## 3.6 Conducted Emission Measurement

### 3.6.1 Description of Conducted 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.

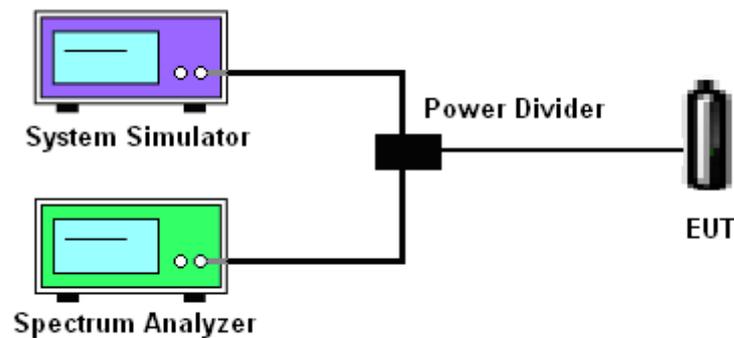
### 3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.6.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The middle channel for the highest RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.

### 3.6.4 Test Setup

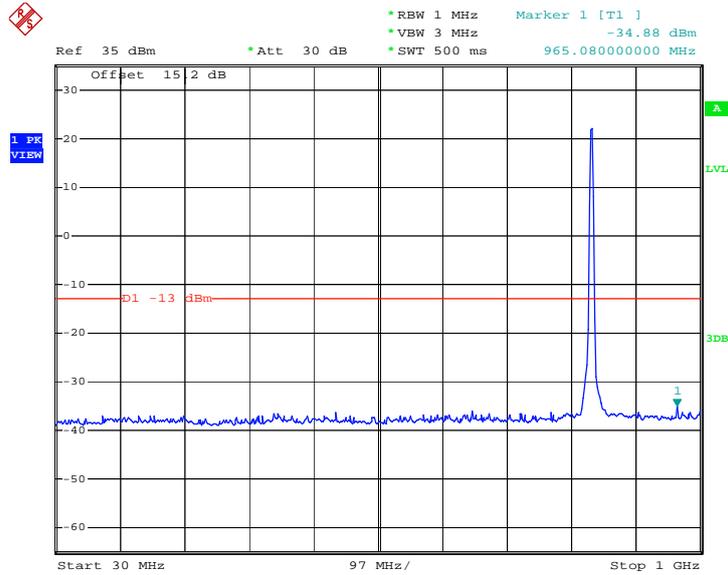




### 3.6.5 Test Result (Plots) of Conducted Emission

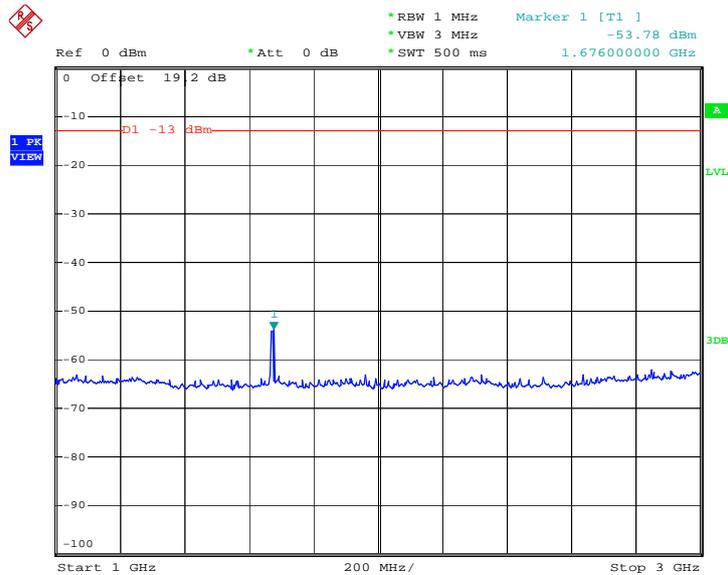
Band :	WCDMA Band V	Channel :	CH4182
Test Mode :	RMC 12.2Kbps Link		

Conducted Emission Plot between 30MHz ~ 1GHz



Date: 26.MAR.2012 22:24:28

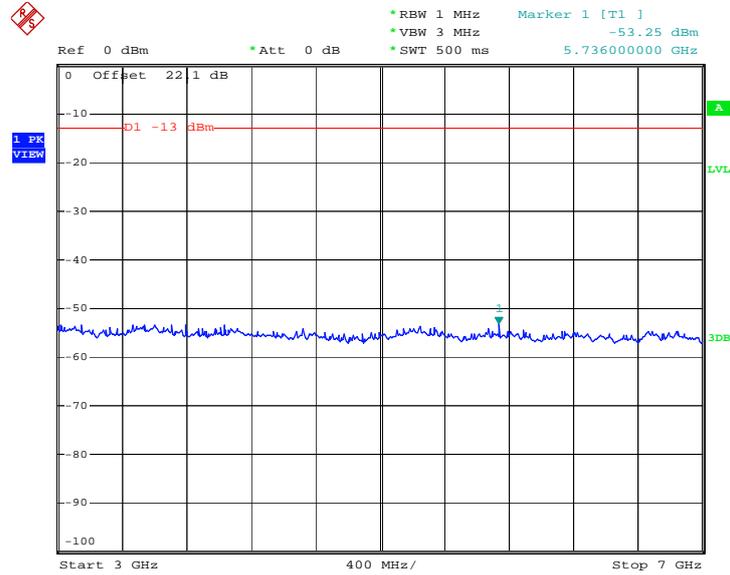
Conducted Emission Plot between 1GHz ~ 3GHz



Date: 26.MAR.2012 22:24:48

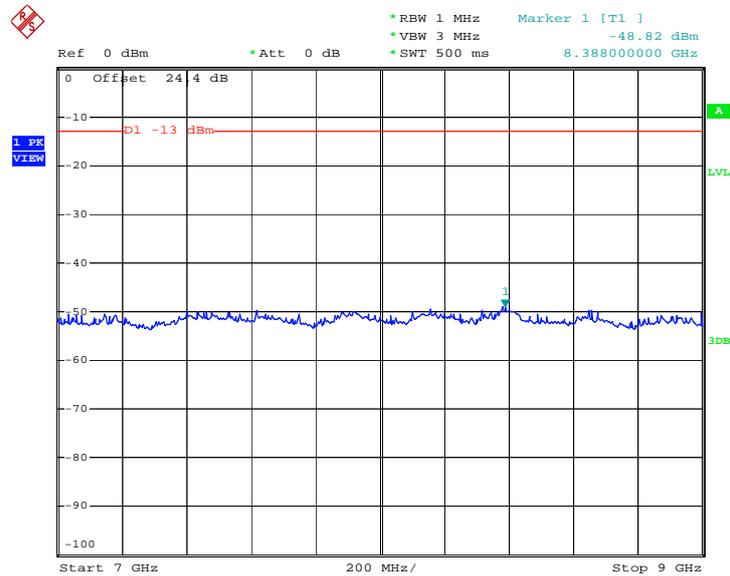


### Conducted Emission Plot between 3GHz ~ 7GHz



Date: 26.MAR.2012 22:25:00

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

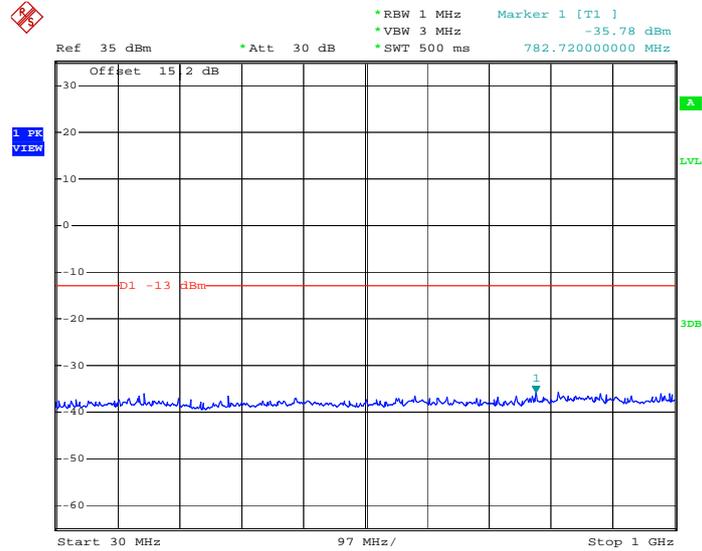


Date: 26.MAR.2012 22:25:13



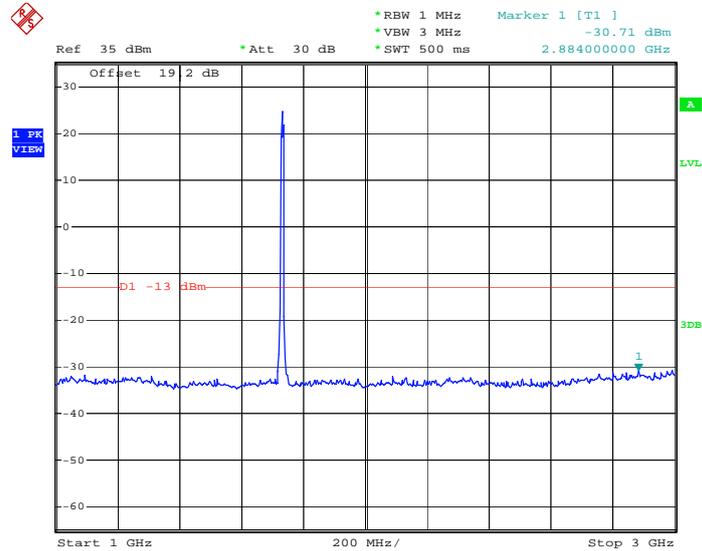
Band :	WCDMA Band IV	Channel :	CH1413
Test Mode :	RMC 12.2Kbps Link		

Conducted Emission Plot between 30MHz ~ 1GHz



Date: 26.MAR.2012 22:37:11

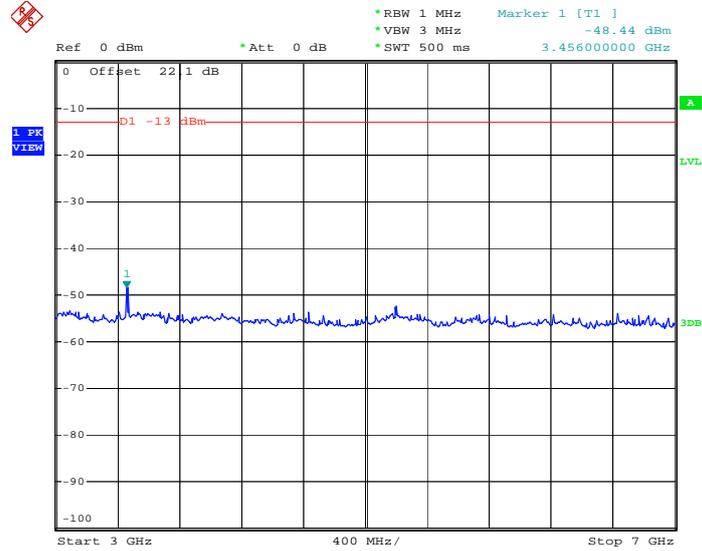
Conducted Emission Plot between 1GHz ~ 3GHz



Date: 26.MAR.2012 22:38:30

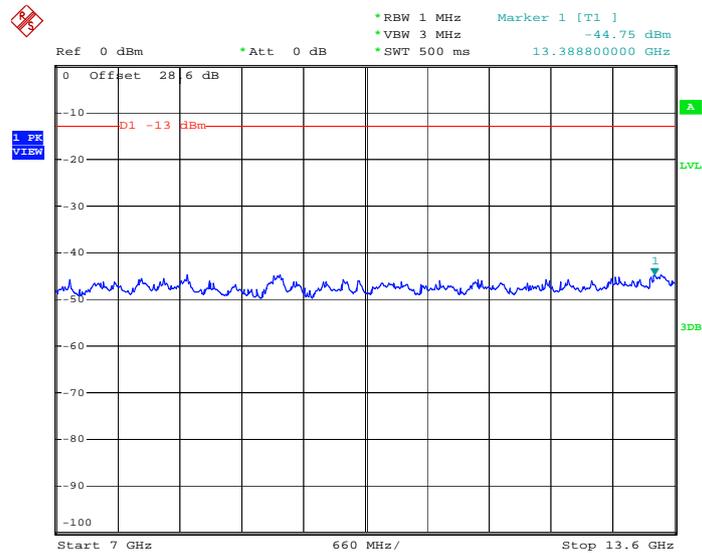


### Conducted Emission Plot between 3GHz ~ 7GHz



Date: 26.MAR.2012 22:38:47

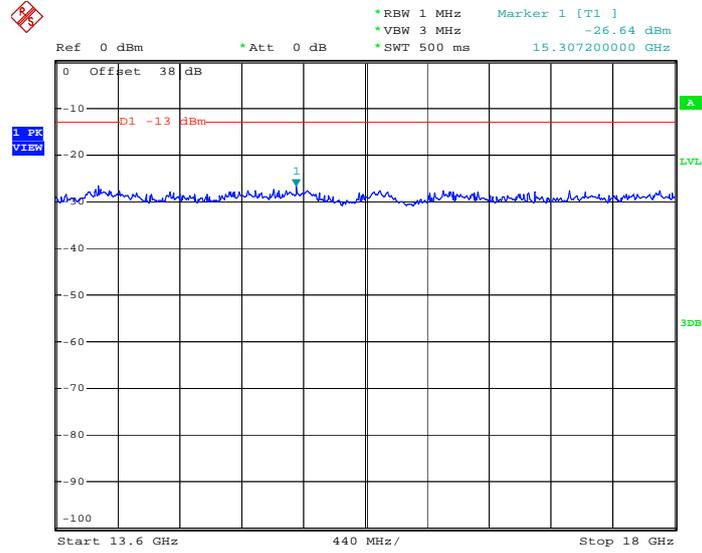
### Conducted Emission Plot between 7GHz ~ 13.6GHz



Date: 26.MAR.2012 22:39:00



Conducted Emission Plot between 13.6GHz ~ 18GHz

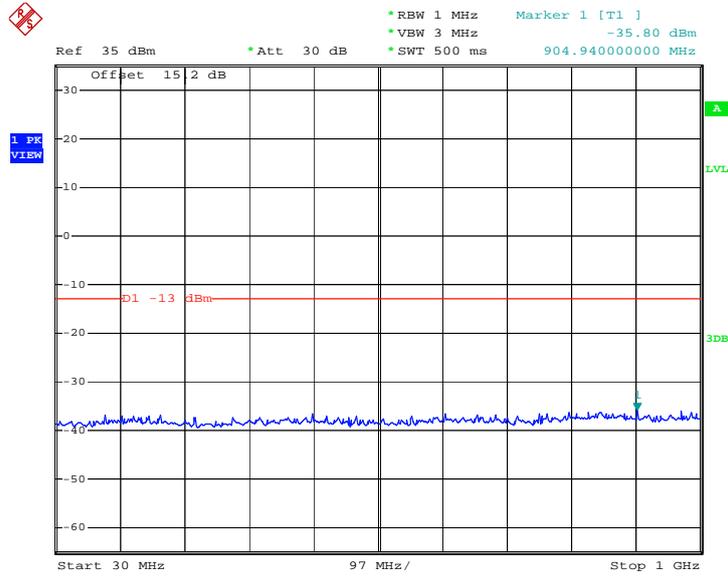


Date: 26.MAR.2012 22:39:12



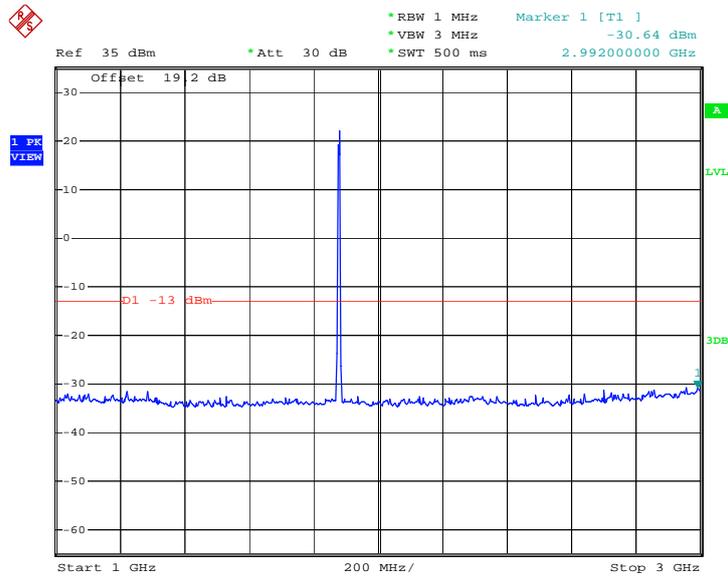
Band :	WCDMA Band II	Channel :	CH9400
Test Mode :	RMC 12.2Kbps Link		

Conducted Emission Plot between 30MHz ~ 1GHz



Date: 26.MAR.2012 22:08:38

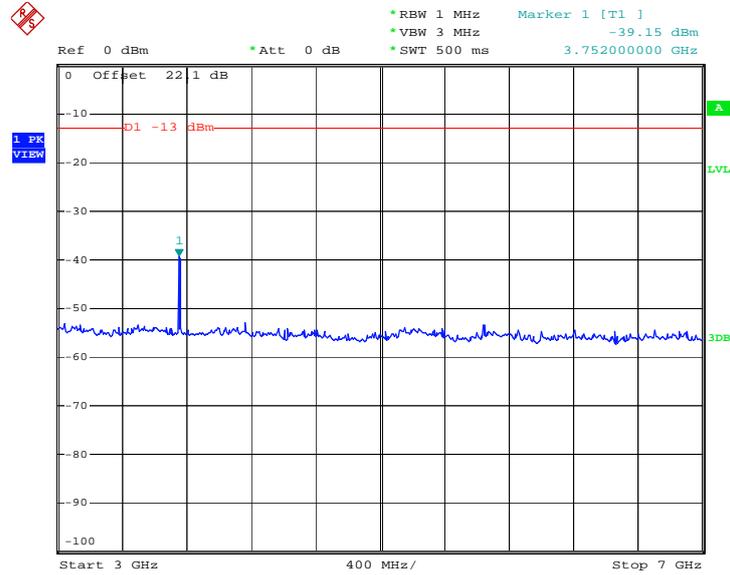
Conducted Emission Plot between 1GHz ~ 3GHz



Date: 26.MAR.2012 22:08:51

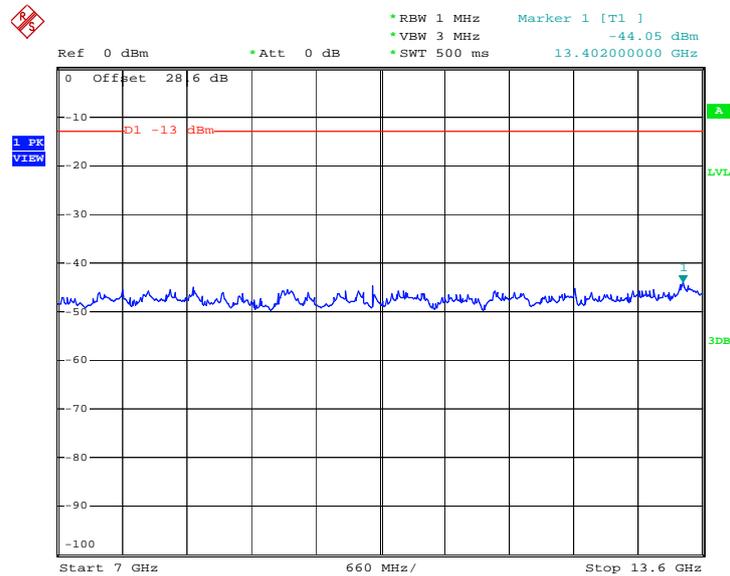


Conducted Emission Plot between 3GHz ~ 7GHz



Date: 26.MAR.2012 22:09:24

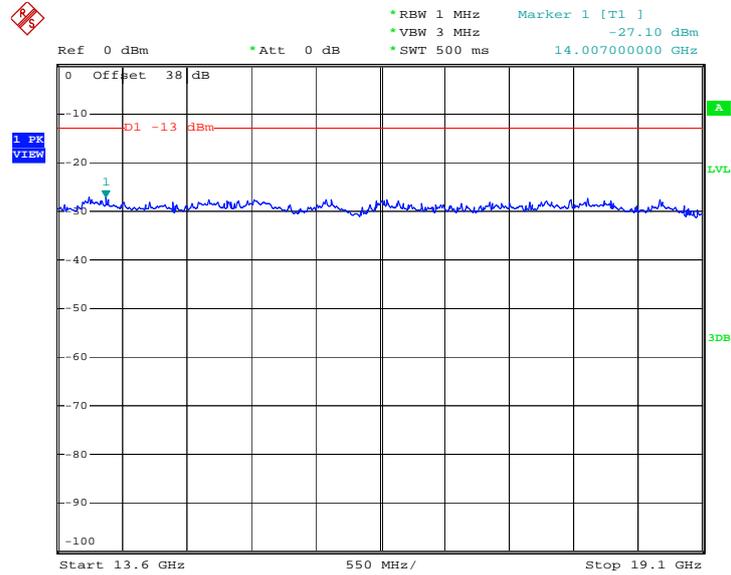
Conducted Emission Plot between 7GHz ~ 13.6GHz



Date: 26.MAR.2012 22:09:37



Conducted Emission Plot between 13.6GHz ~ 19.1GHz



Date: 26.MAR.2012 22:09:49

## 3.7 Field Strength of Spurious Radiation Measurement

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

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. 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.

### 3.7.2 Measuring Instruments

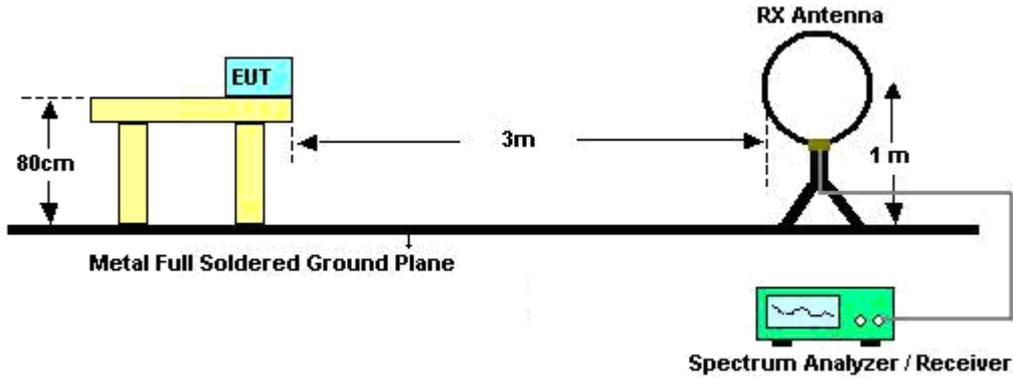
See list of measuring instruments of this test report.

### 3.7.3 Test Procedures

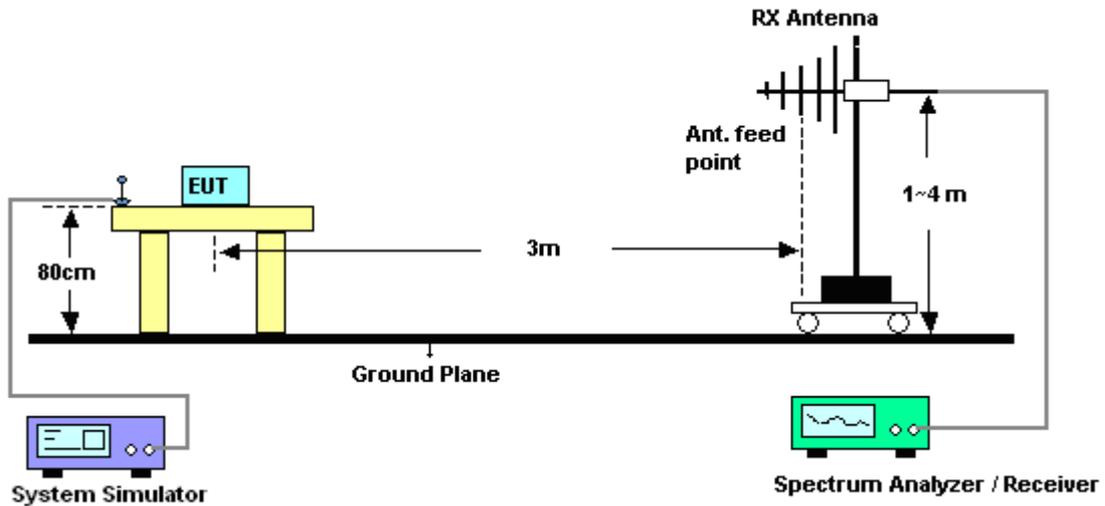
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. 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.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11.  $ERP \text{ (dBm)} = EIRP - 2.15$

### 3.7.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



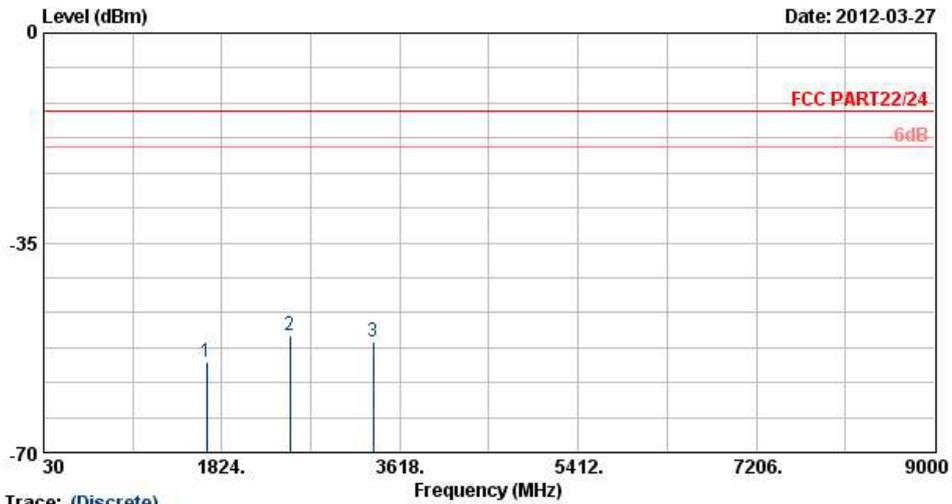
### 3.7.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

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.



3.7.6 Test Result of Field Strength of Spurious Radiated

Band :	WCDMA Band V	Temperature :	20~22°C
Test Mode :	RMC 12.2Kbps Link	Relative Humidity :	50~52%
Test Engineer :	Kyle Chuang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

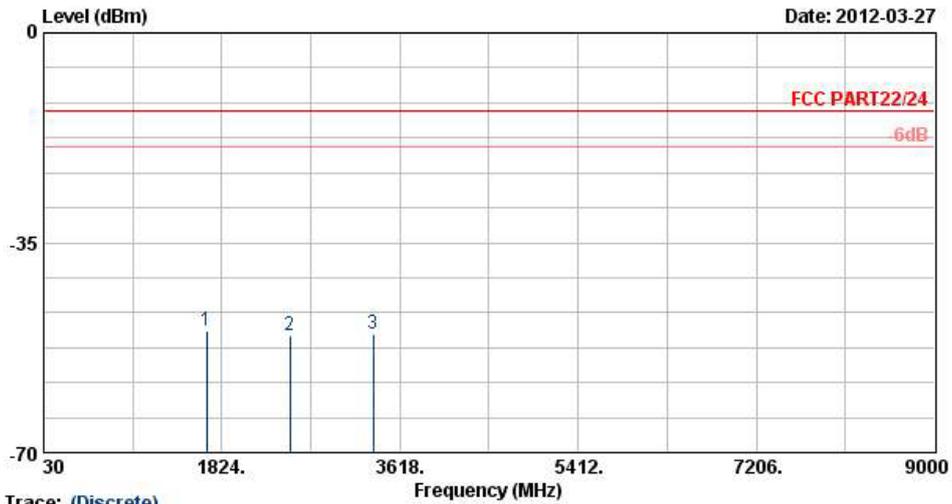


Trace: (Discrete)  
 Site : D3CH07-HY  
 Condition : FCC PART22/24 HF-EIRP(060306) HORIZONTAL

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	-54.99	-13	-41.99	-64.57	-56.71	1.62	5.49	H	Pass
2509	-50.47	-13	-37.47	-63.82	-52.44	2.1	6.22	H	Pass
3345	-51.47	-13	-38.47	-66.21	-54.36	3.03	8.07	H	Pass



<b>Band :</b>	WCDMA Band V	<b>Temperature :</b>	20~22°C
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Relative Humidity :</b>	50~52%
<b>Test Engineer :</b>	Kyle Chuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

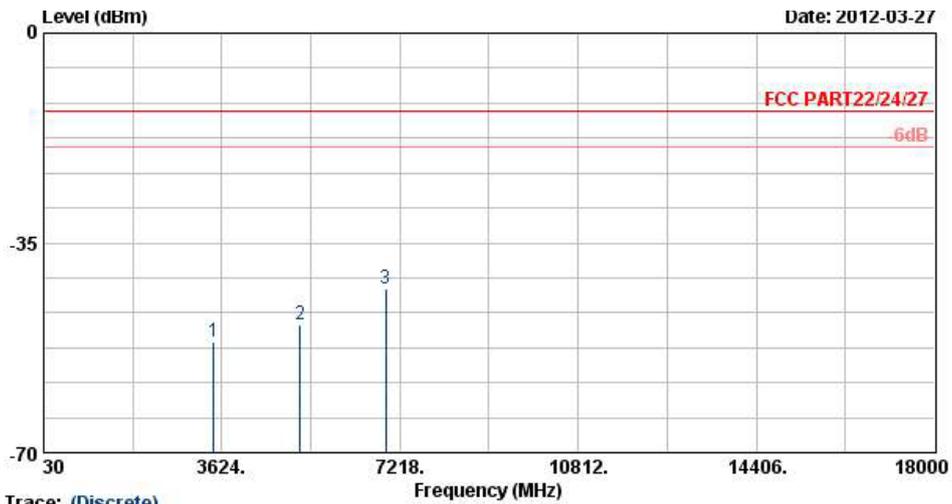


Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC PART22/24 HF-ETRP(060306) VERTICAL

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	-49.73	-13	-36.73	-61.36	-51.45	1.62	5.49	V	Pass
2509	-50.59	-13	-37.59	-63.95	-52.56	2.1	6.22	V	Pass
3345	-50.29	-13	-37.29	-66.27	-53.18	3.03	8.07	V	Pass



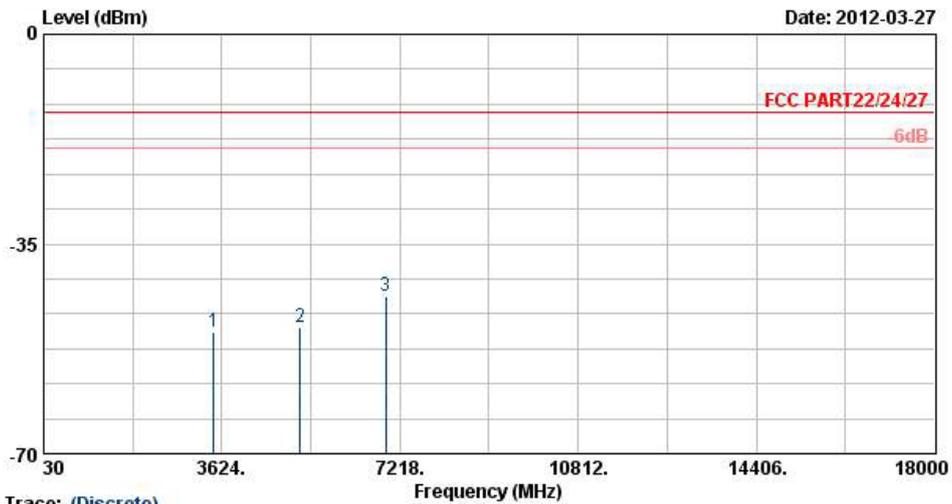
Band :	WCDMA Band IV	Temperature :	20~22°C
Test Mode :	RMC 12.2Kbps Link	Relative Humidity :	50~52%
Test Engineer :	Kyle Chuang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Frequency ( MHz )	EIRP ( 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
3465	-51.48	-13	-38.48	-65.94	-55.31	4.48	8.31	H	Pass
5197	-48.55	-13	-35.55	-67.37	-53.19	5.332	9.98	H	Pass
6930	-42.72	-13	-29.72	-68.55	-47.96	6.1	11.34	H	Pass



<b>Band :</b>	WCDMA Band IV	<b>Temperature :</b>	20~22°C
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Relative Humidity :</b>	50~52%
<b>Test Engineer :</b>	Kyle Chuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

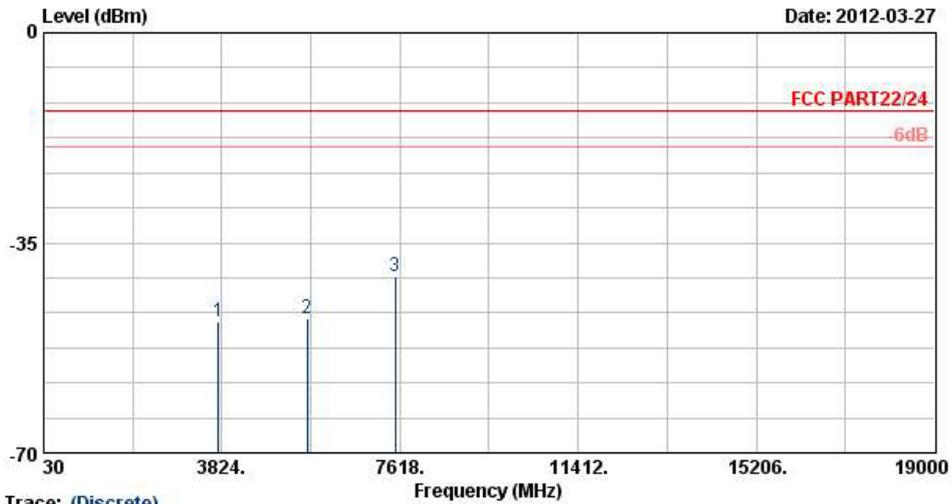


Trace: (Discrete)  
 Site : D3CH07-HY  
 Condition : FCC PART22/24/27 HF-ETRP(060306) VERTICAL

Frequency ( MHz )	EIRP ( 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
3465	-49.65	-13	-36.65	-65.47	-53.48	4.48	8.31	V	Pass
5197	-48.87	-13	-35.87	-67.27	-53.51	5.332	9.98	V	Pass
6930	-43.69	-13	-30.69	-68.76	-48.93	6.1	11.34	V	Pass



<b>Band :</b>	WCDMA Band II	<b>Temperature :</b>	20~22°C
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Relative Humidity :</b>	50~52%
<b>Test Engineer :</b>	Kyle Chuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

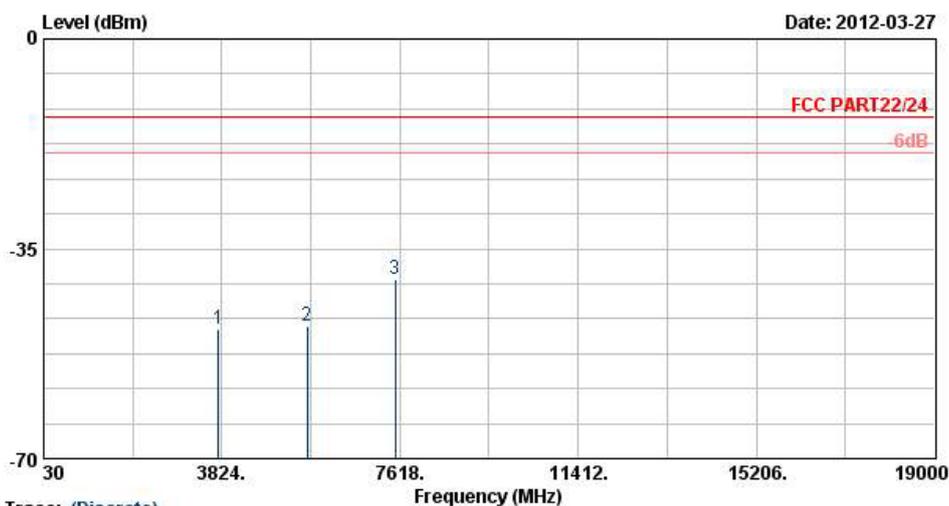


Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC PART22/24 HF-EIRP(060306) HORIZONTAL

Frequency ( MHz )	EIRP ( 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
3760	-48.16	-13	-35.16	-64.09	-54.46	2.51	8.81	H	Pass
5636	-47.53	-13	-34.53	-68.69	-55.24	2.99	10.70	H	Pass
7520	-40.70	-13	-27.70	-68.08	-49.23	3.59	12.12	H	Pass



<b>Band :</b>	WCDMA Band II	<b>Temperature :</b>	20~22°C
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Relative Humidity :</b>	50~52%
<b>Test Engineer :</b>	Kyle Chuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Trace: (Discrete)  
 Site : D3CH07-HY  
 Condition : FCC PART22/24 HF-ETRP(060306) VERTICAL

Frequency ( MHz )	EIRP ( 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
3760	-48.49	-13	-35.49	-65.06	-54.79	2.51	8.81	V	Pass
5636	-47.97	-13	-34.97	-68.58	-55.68	2.99	10.70	V	Pass
7520	-40.13	-13	-27.13	-67.61	-48.66	3.59	12.12	V	Pass

## 3.8 Frequency Stability Measurement

### 3.8.1 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.

### 3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

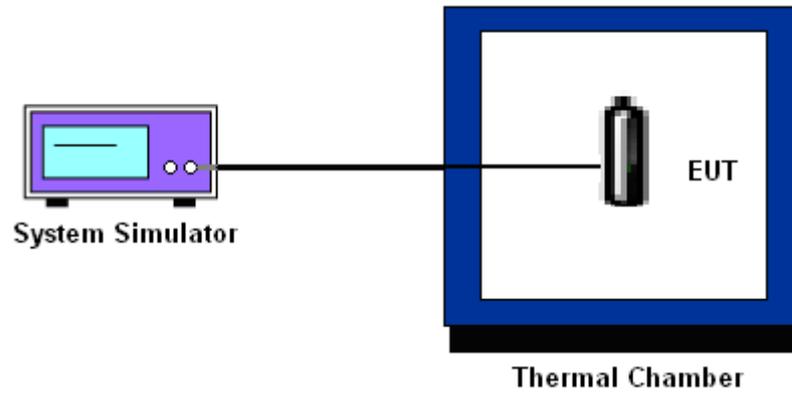
### 3.8.3 Test Procedures for Temperature Variation

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 for three hours. 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.

### 3.8.4 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.

### 3.8.5 Test Setup



**3.8.6 Test Result of Temperature Variation**

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

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	NA	NA	PASS
-20	NA	NA	
-10	5	0.01	
0	8	0.01	
10	4	0.00	
20	9	0.01	
30	12	0.01	
40	5	0.01	
50	6	0.01	
55	4	0.00	

**Note:**

1. The EUT stops transmitting at temperatures -20°C and -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -10°C~55°C.



Band :	WCDMA Band IV	Channel :	1413
Limit (ppm) :	2.5		

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	NA	NA	PASS
-20	NA	NA	
-10	-7	0.00	
0	-8	0.00	
10	-9	-0.01	
20	-6	0.00	
30	-10	-0.01	
40	-7	0.00	
50	-6	0.00	
55	-7	0.00	

**Note:**

1. The EUT stops transmitting at temperatures -20°C and -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -10°C~55°C.



Band :	WCDMA Band II	Channel :	9400
Limit (ppm) :	2.5		

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	NA	NA	PASS
-20	NA	NA	
-10	10	0.01	
0	9	0.00	
10	8	0.00	
20	9	0.00	
30	7	0.00	
40	9	0.00	
50	8	0.00	
55	7	0.00	

**Note:**

1. The EUT stops transmitting at temperatures -20°C and -30°C.
2. The manufacturer declared that the EUT could work properly between temperatures -10°C~55°C.

3.8.7 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	5	8	0.01	2.5	PASS
		4.8	5	0.01		
		5.2	11	0.01		
WCDMA Band IV CH1413	RMC 12.2Kbps	5	-7	0.00		
		4.8	-8	0.00		
		5.2	-10	-0.01		
WCDMA Band II CH9400	RMC 12.2Kbps	5	9	0.00		
		4.8	8	0.00		
		5.2	11	0.01		

Note: Normal Voltage = 5.0V.



### 4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Mar. 26, 2012~ Mar. 30, 2012	Jun. 12, 2012	Conducted (TH02-HY)
LTE Base Station	Anritsu	MT8820C	6200930978	N/A	Dec. 27, 2011	Mar. 26, 2012~ Mar. 30, 2012	Dec. 28, 2012	Conducted (TH02-HY)
DC Power Supply	TOPWARD	3303D	740889	N/A	Jun. 07, 2011	Mar. 26, 2012~ Mar. 30, 2012	Jun. 08, 2012	Conducted (TH02-HY)
Thermal	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 27, 2011	Mar. 26, 2012~ Mar. 30, 2012	Jul. 26, 2012	Conducted (TH02-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 22, 2011	Mar. 27, 2012	Oct. 21, 2012	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Mar. 27, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Mar. 27, 2012	Aug. 09, 2012	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz ~ 26.5Gz	Dec. 05, 2011	Mar. 27, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.3 2dB.GAIN	Mar. 29, 2011	Mar. 27, 2012	Mar. 28, 2012	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz~7GHz	Aug. 22, 2011	Mar. 27, 2012	Aug. 21, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-001 01800-30-10	159088	1GHz ~ 18GHz	Feb. 21, 2011	Mar. 27, 2012	Feb. 20, 2012	Radiation (03CH07-HY)
System Simulator	R&S	CMU200	117591	N/A	Oct. 21, 2011	Mar. 27, 2012	Oct. 20, 2012	Radiation (03CH07-HY)

## 5 Uncertainty of Evaluation

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

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.27</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.54</b>		

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Contribution	Uncertainty of $X_i$		$u(X_i)$	$C_i$	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	$\pm 0.10$	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	$\pm 1.70$	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	$\pm 0.50$	Normal (k=2)	0.25	1	0.25
Receiver Correction	$\pm 2.00$	Rectangular	1.15	1	1.15
Antenna Factor Directional	$\pm 1.50$	Rectangular	0.87	1	0.87
Site Imperfection	$\pm 2.80$	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>4.72</b>				



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP1D3102 as below.