

# FCC RF Test Report

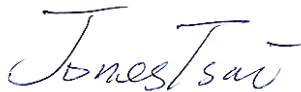
APPLICANT : Tecom Co., Ltd.  
EQUIPMENT : 3G Femtocell Residential Access Point  
BRAND NAME : CISCO  
MODEL NAME : USC3330-BJ-K9  
FCC ID : D6XUSC3330BJ  
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)  
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Dec. 10, 2012 and testing was completed on Jan. 01, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and has been in 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 INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



**SPORTON INTERNATIONAL INC.**

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG482160	Rev. 01	Initial issue of report	Sep. 25, 2014

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	RSS-132 (5.4) RSS-133 (6.4)	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	RSS-132 (5.4) RSS-133(6.4)	Peak-to-Average Ratio	<13 dB	PASS	-
3.3	§22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
3.3	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049 §22.917(b) §24.238(b)	RSS-GEN(4.6.1) RSS-133(2.3)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	RSS-132 (5.5) RSS-133 (6.5)	Band Edge Measurement	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	RSS-132 (5.5) RSS-133 (6.5)	Conducted Spurious Emission	< 43+10log <sub>10</sub> (P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	RSS-132 (5.5) RSS-133 (6.5)	Field Strength of Spurious Radiation	< 43+10log <sub>10</sub> (P[Watts])	PASS	Under limit 25.88 dB at 9800.000 MHz
3.8	§2.1055 §22.355 §24.235	RSS-132(5.3) RSS-133(6.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-

# 1 General Description

## 1.1 Applicant

Tecom Co., Ltd.

23 R&D Road 2, Hsinchu Science-based Industrial Park, Hsin-Chu, Taiwan R.O.C.

## 1.2 Manufacturer

Global Brands Manufacture (DongGuan) Ltd.

Yue Yuan Industrial Estate, Huang Jiang Zhen, DongGuan City, Guangdong Province, China.

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	3G Femtocell Residential Access Point
Brand Name	CISCO
Model Name	USC3330-BJ-K9
FCC ID	D6XUSC3330BJ
EUT supports Radios application	WCDMA
HW Version	G3.5.2
SW Version	BV3.4.1.2
EUT Stage	Beta stage

**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 subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz
Rx Frequency	WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz
Maximum Output Power to Antenna	WCDMA Band V : 13.53 dBm WCDMA Band II : 13.58 dBm
Antenna Type	Omni Antenna
Type of Modulation	WCDMA: 16QAM (Uplink)

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	WCDMA Band V RMC 12.2Kbps	16QAM	0.0206	0.069 ppm	4M18F9W
Part 24	WCDMA Band II RMC 12.2Kbps	16QAM	0.0240	0.085 ppm	4M18F9W

## 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

<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>	
	TH02-HY	03CH06-HY

## 1.8 Applicable Standards

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

- FCC 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01

### 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

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r01 with maximum output power.

Radiated emissions were investigated as following frequency range:

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

All modes and data rates and positions were investigated.

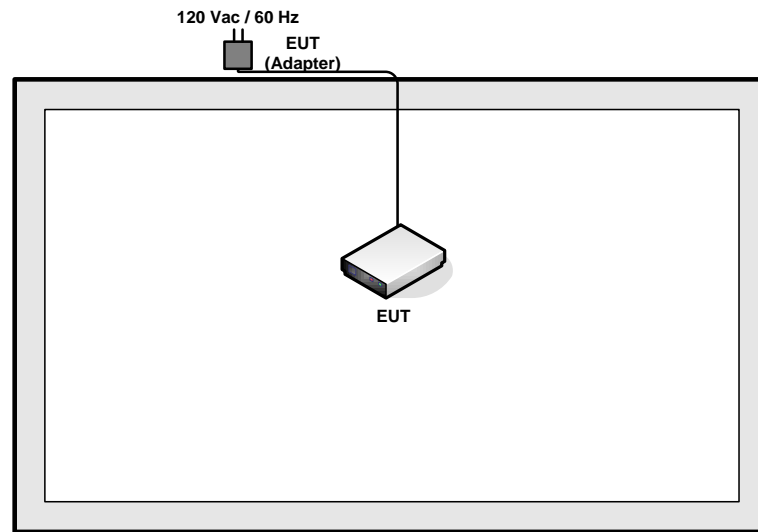
Test modes are chosen to be reported as the worst case configuration below:

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

#### Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4357	4407	4458	9262	9400	9538
Frequency	871.4	881.4	891.6	1932.4	1960.0	1987.6
RMC 12.2K	13.53	13.46	12.86	13.33	13.58	12.88

## 2.2 Connection Diagram of Test System



## 2.3 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 RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

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

*Offset = RF cable loss + attenuator factor.*

The following shows an offset computation example with RF cable loss 4.2 dB and a 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 system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

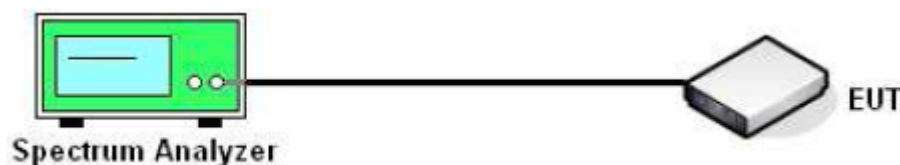
##### 3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

##### 3.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum average power for WCDMA.

##### 3.1.4 Test Setup



**3.1.5 Test Result of Conducted Output Power**

Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4357 (Low)	4407 (Mid)	4458 (High)
Frequency (MHz)	871.4	881.4	891.6
Conducted Power (dBm)	13.53	13.46	12.86

PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9662 (Low)	9800 (Mid)	9938 (High)
Frequency (MHz)	1932.4	1960.0	1987.6
Conducted Power (dBm)	13.33	13.58	12.88

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

## 3.2 Peak-to-Average Ratio

### 3.2.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

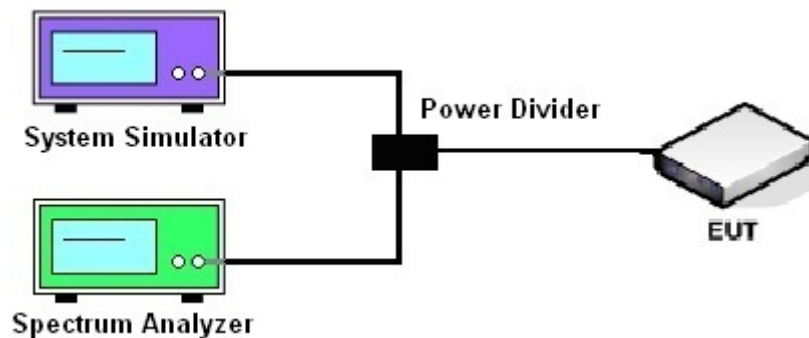
### 3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.2.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 Section 5.7.1.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. For UMTS operating modes:
  - a. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.
  - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

### 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	4357 (Low)	4407 (Mid)	4458 (High)
Frequency (MHz)	871.4	881.4	891.6
Peak-to-Average Ratio (dB)	8.40	8.14	8.37

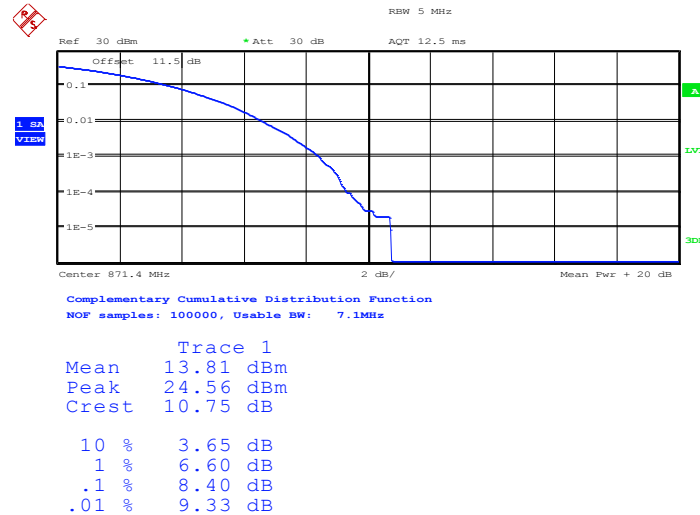
PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9662 (Low)	9800 (Mid)	9938 (High)
Frequency (MHz)	1932.4	1960.0	1987.6
Peak-to-Average Ratio (dB)	8.14	8.11	8.08



## 3.2.6 Test Result (Plots) of Peak-to-Average Ratio

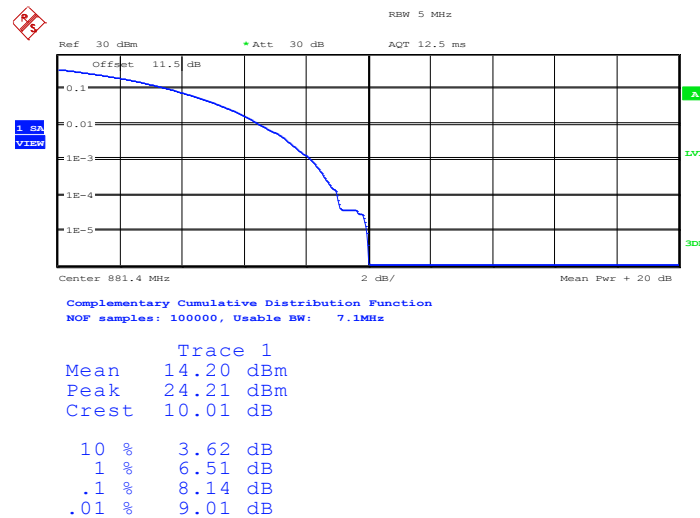
Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link (16QAM)
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## Peak-to-Average Ratio on Channel 4357 (871.4 MHz)



Date: 1.JAN.2003 05:12:46

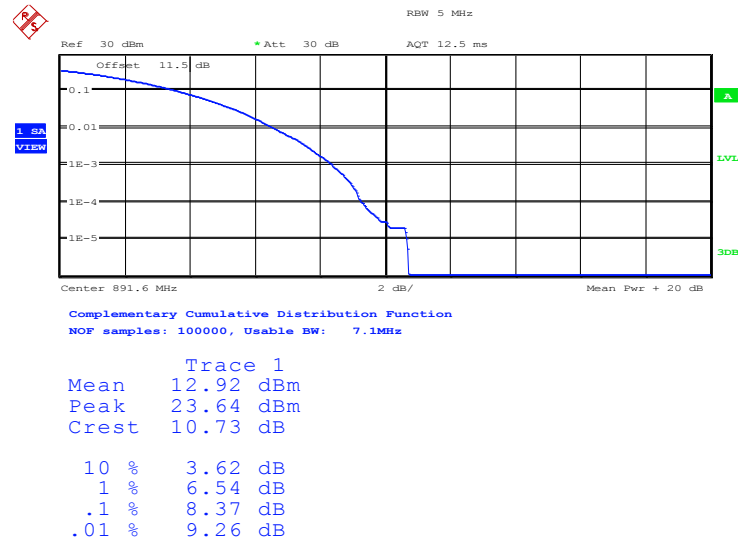
## Peak-to-Average Ratio on Channel 4407 (881.4 MHz)



Date: 30.DEC.2012 13:53:21



Peak-to-Average Ratio on Channel 4458 (891.4 MHz)

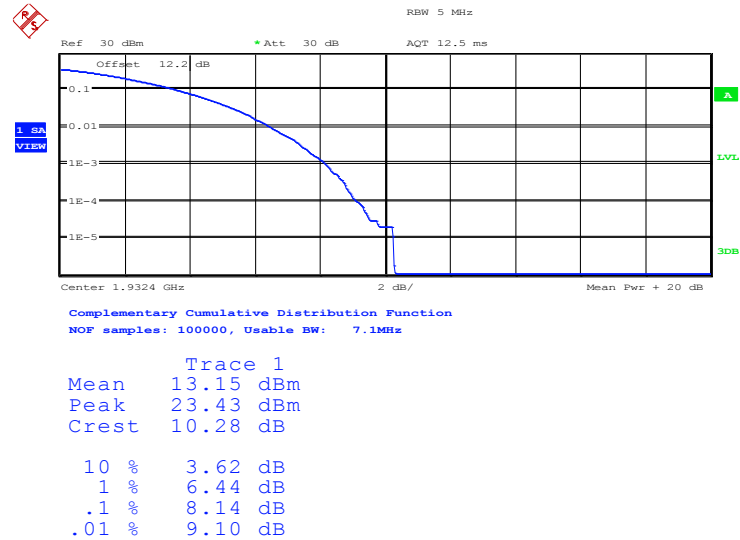


Date: 1.JAN.2003 05:14:51



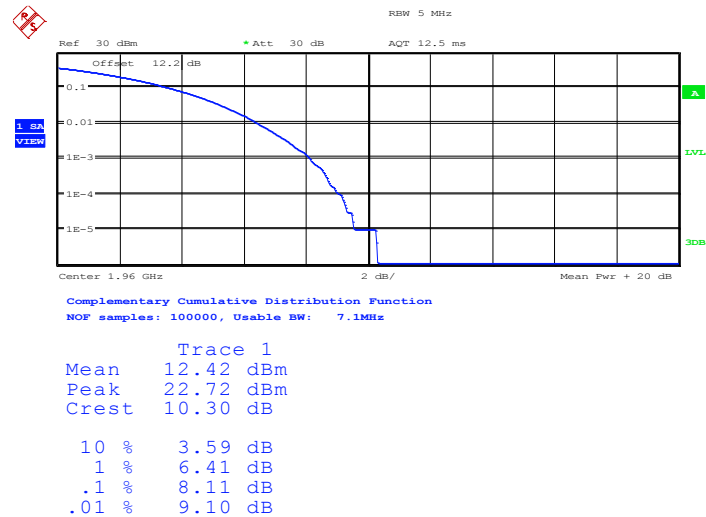
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link (16QAM)
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Peak-to-Average Ratio on Channel 9662 (1932.4 MHz)



Date: 1.JAN.2003 05:23:14

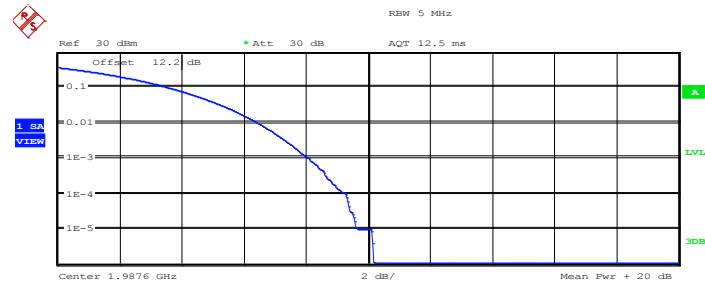
Peak-to-Average Ratio on Channel 9800 (1960.0 MHz)



Date: 20.DEC.2012 10:54:11



Peak-to-Average Ratio on Channel 9938 (1987.6 MHz)



Center 1.9876 GHz 2 dB/ Mean Pwr + 20 dB

Trace 1  
Mean 12.69 dBm  
Peak 22.87 dBm  
Crest 10.17 dB

10 % 3.59 dB  
1 % 6.44 dB  
.1 % 8.08 dB  
.01 % 9.26 dB

Date: 1.JAN.2003 05:24:37





### **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 v02r01. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

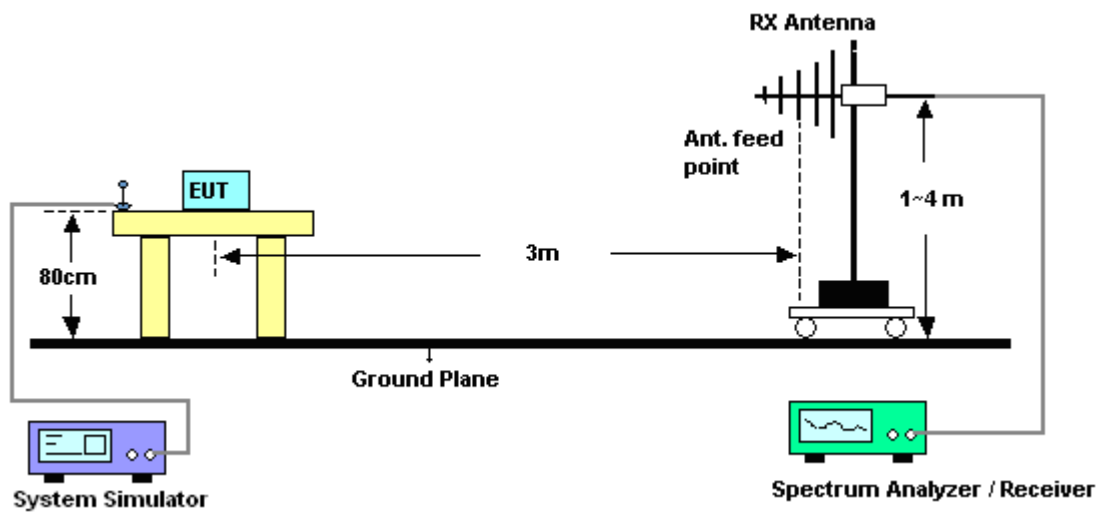
#### **3.3.2 Measuring Instruments**

The measuring equipment is listed in the section 4 of this test report.

#### **3.3.3 Test Procedures**

1. The testing follows FCC KDB 971168 v02r01 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high 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 RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum 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.
4. 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 the 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)
871.40	-14.06	29.34	13.13	0.0206
881.00	-14.58	29.29	12.56	0.0180
891.60	-15.68	29.42	11.59	0.0144
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
871.40	-20.15	33.17	10.87	0.0122
881.00	-20.12	32.65	10.38	0.0109
891.60	-20.16	32.03	9.72	0.0094

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

**3.3.6 Test Result of EIRP**

WCDMA Band II (RMC 12.2Kbps) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1932.40	-30.86	44.16	13.30	0.0214
1960.00	-30.83	44.33	13.50	0.0224
1987.60	-30.54	44.35	13.81	0.0240
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1932.40	-34.61	46.05	11.44	0.0139
1960.00	-34.73	46.16	11.43	0.0139
1987.60	-35.12	47.13	12.01	0.0159

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

### 3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

#### 3.4.1 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.

#### 3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 3.4.3 Test Procedures

5. The testing follows FCC KDB 971168 v02r01 Section 4.2.
6. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
7. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
8. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3\*RBW, sample detector, trace maximum hold.
9. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3\*RBW, peak detector, trace maximum hold.

#### 3.4.4 Test Setup



### 3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4357 (Low)	4407 (Mid)	4458 (High)
Frequency (MHz)	871.4	881.4	891.6
99% OBW (MHz)	4.18	4.17	4.15
26dB BW (MHz)	4.71	4.70	4.71

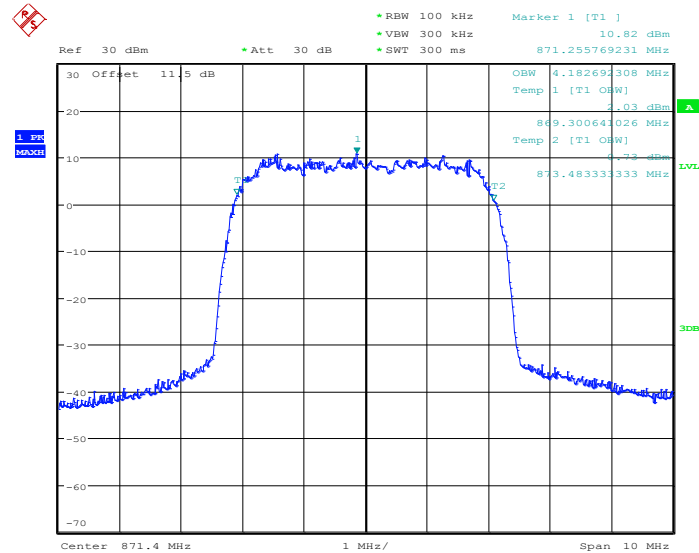
PCS Band			
Modes	WCDMA Band II (RMC 12.2Kbps)		
Channel	9662 (Low)	9800 (Mid)	9938 (High)
Frequency (MHz)	1932.4	1960.0	1987.6
99% OBW (MHz)	4.18	4.18	4.18
26dB BW (MHz)	4.68	4.70	4.71



## 3.4.6 Test Result (Plots) of Occupied Bandwidth and 26dB Bandwidth

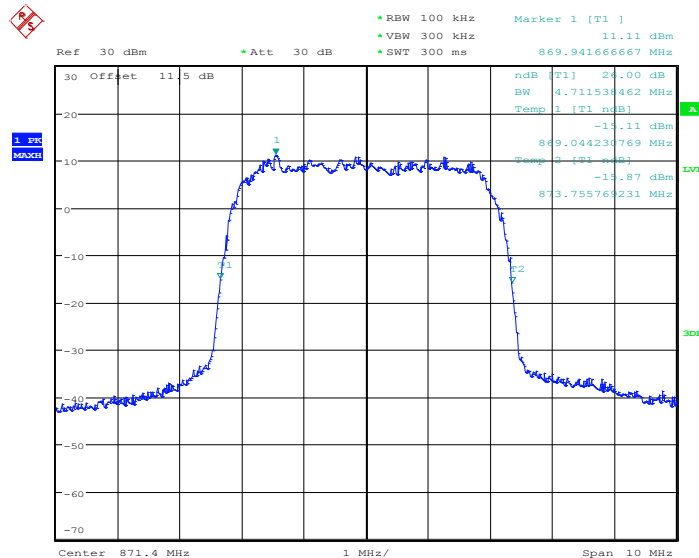
Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link
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## 99% Occupied Bandwidth Plot on Channel 4357 (871.4 MHz)



Date: 20.DEC.2012 14:31:27

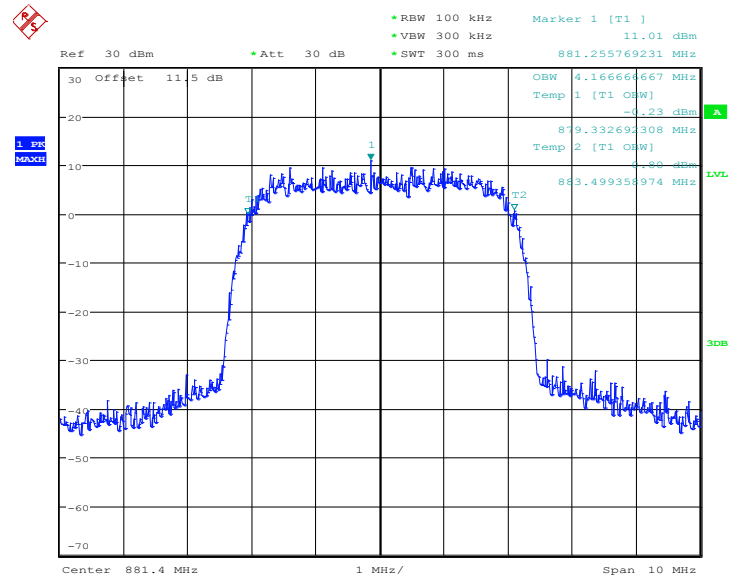
## 26dB Bandwidth Plot on Channel 4357 (871.4 MHz)



Date: 20.DEC.2012 14:25:37

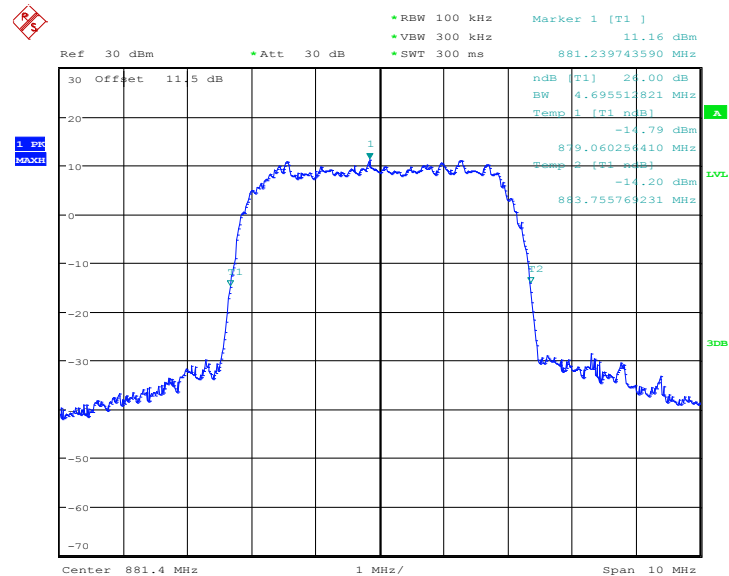


99% Occupied Bandwidth Plot on Channel 4407 (881.4 MHz)



Date: 30.DEC.2012 13:51:49

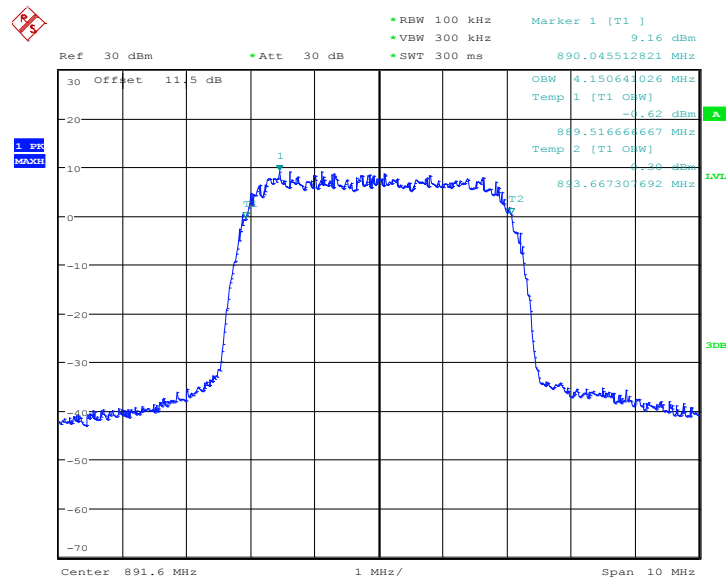
26dB Bandwidth Plot on Channel 4407 (881.4 MHz)



Date: 30.DEC.2012 13:53:58

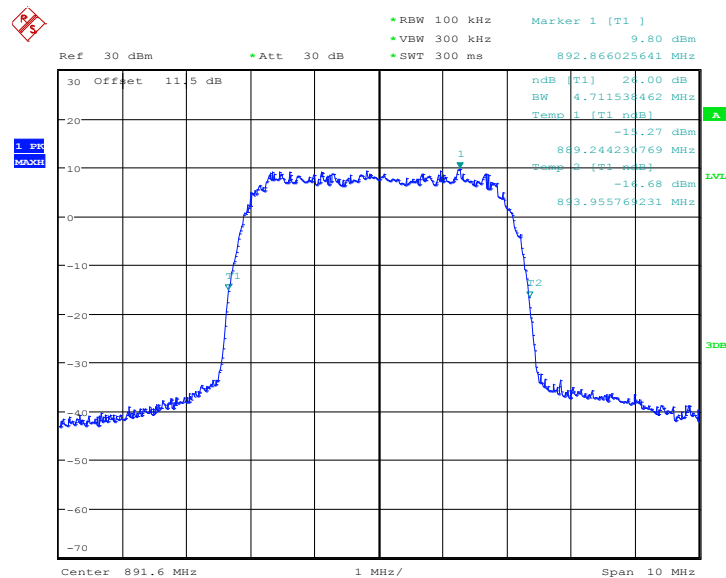


### 99% Occupied Bandwidth Plot on Channel 4458 (891.6 MHz)



Date: 20.DEC.2012 14:29:12

### 26dB Bandwidth Plot on Channel 4458 (891.6 MHz)

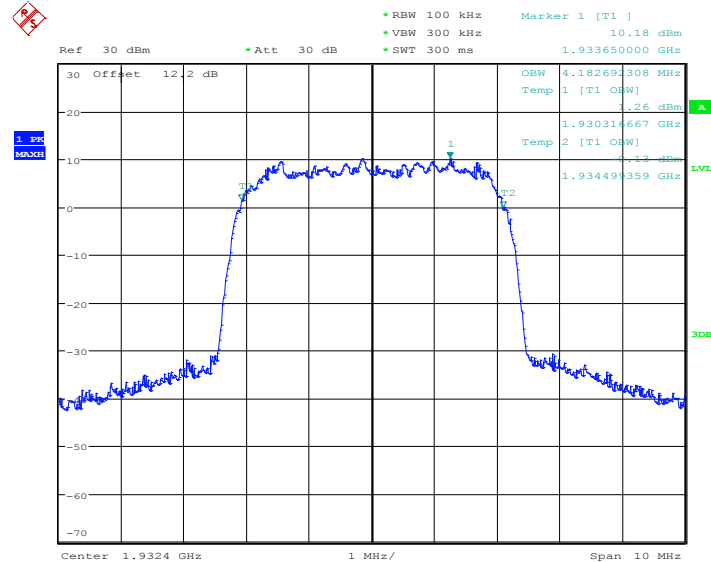


Date: 20.DEC.2012 14:27:40



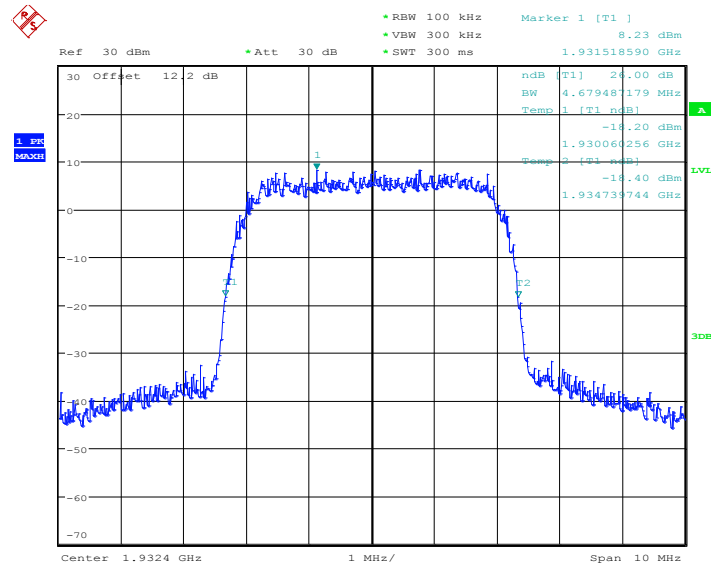
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link
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99% Occupied Bandwidth Plot on Channel 9662 (1932.4 MHz)



Date: 20.DEC.2012 10:57:33

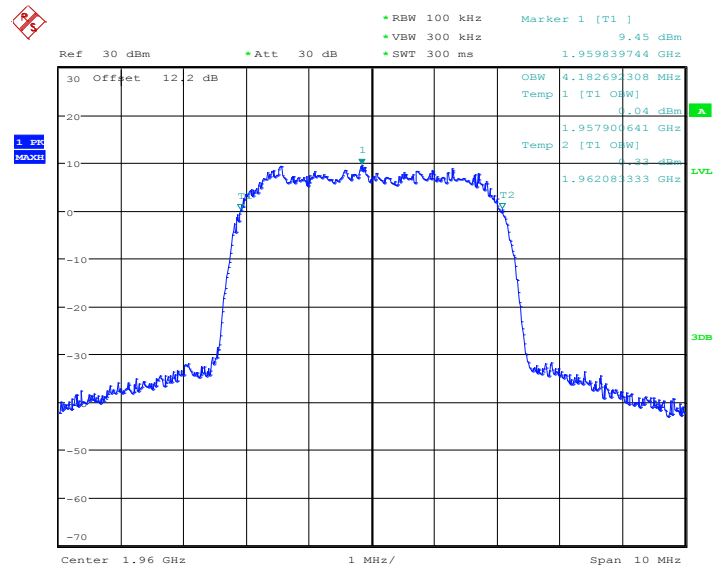
26dB Bandwidth Plot on Channel 9662 (1932.4 MHz)



Date: 20.DEC.2012 10:35:06

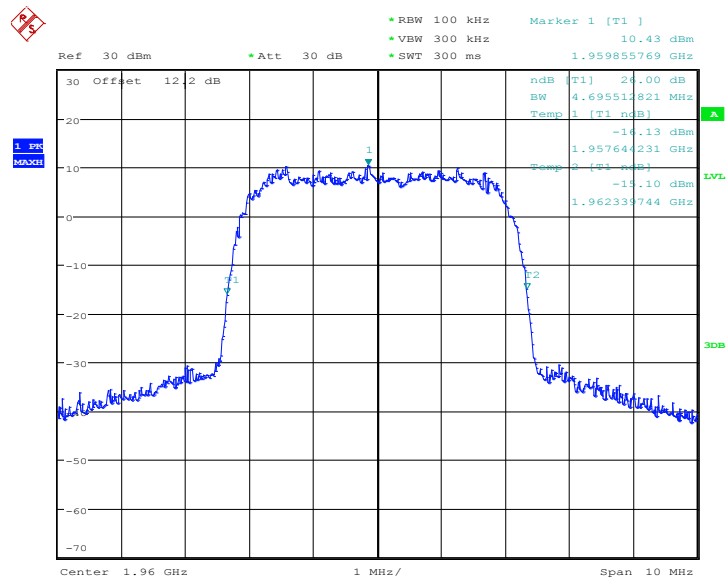


99% Occupied Bandwidth Plot on Channel 9800 (1960.0 MHz)



Date: 20.DEC.2012 10:56:11

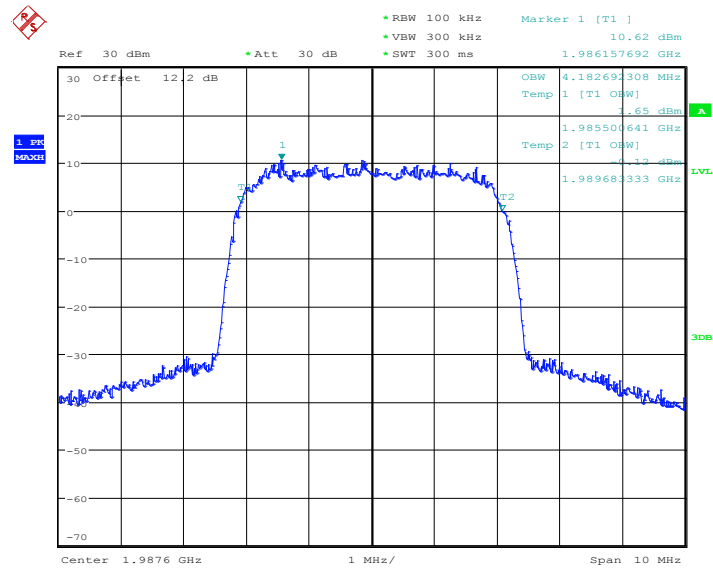
26dB Bandwidth Plot on Channel 9800 (1960.0 MHz)



Date: 20.DEC.2012 10:39:41

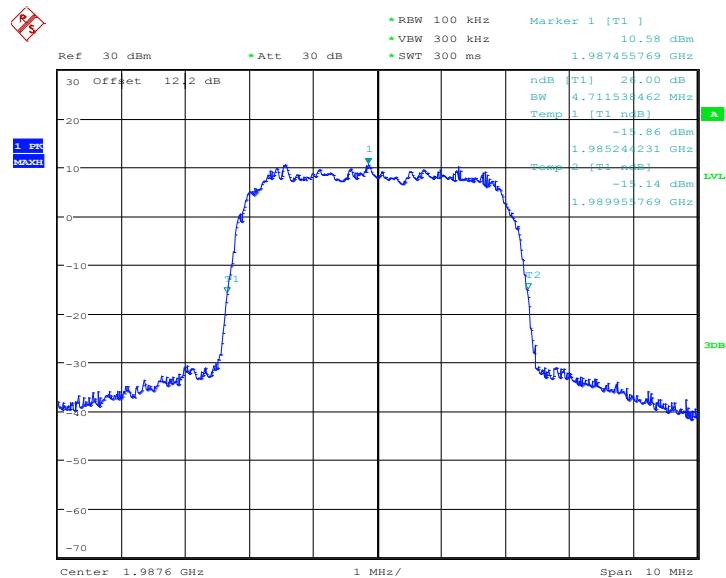


99% Occupied Bandwidth Plot on Channel 9938 (1987.6 MHz)



Date: 20.DEC.2012 10:59:19

26dB Bandwidth Plot on Channel 9938 (1987.6 MHz)



Date: 20.DEC.2012 10:40:49

### 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

The measuring equipment is listed in the section 4 of this test report.

#### 3.5.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
4. The band edges of low and high channels for the highest RF powers were measured.
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

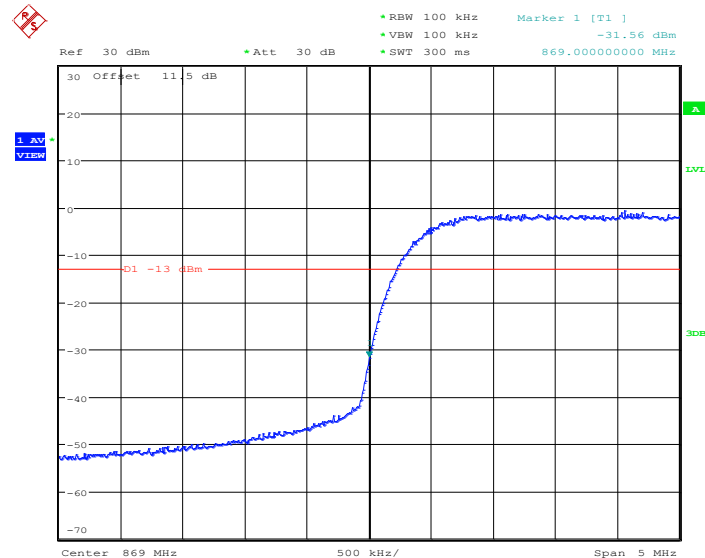
<Conducted Band Edge >



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

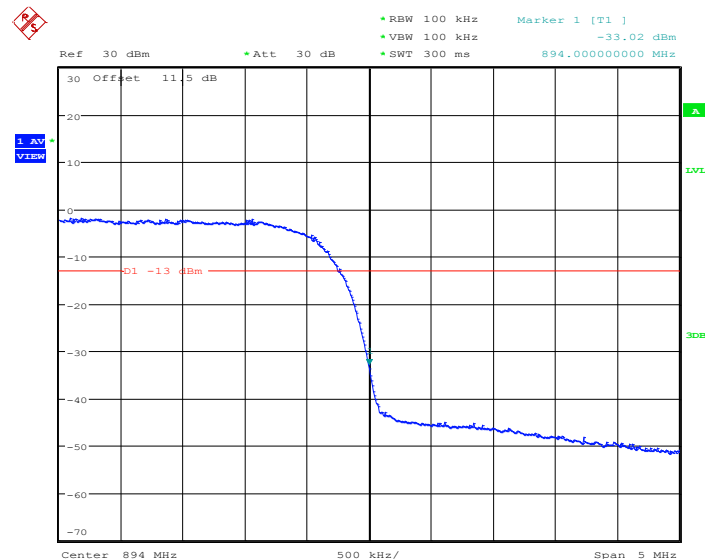
<b>Band :</b>	WCDMA Band V	<b>Test Mode :</b>	RMC 12.2Kbps Link
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### Lower Band Edge Plot on Channel 4357 (871.4 MHz)



Date: 20.DEC.2012 14:38:26

### Higher Band Edge Plot on Channel 4458 (891.6 MHz)

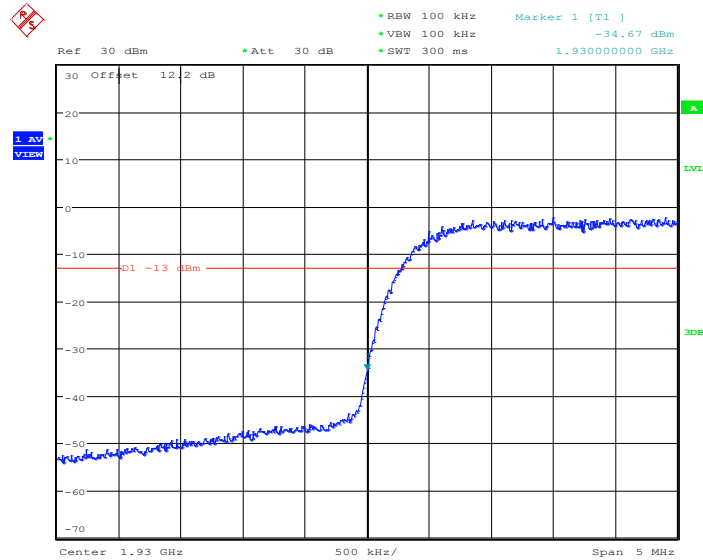


Date: 20.DEC.2012 14:41:01



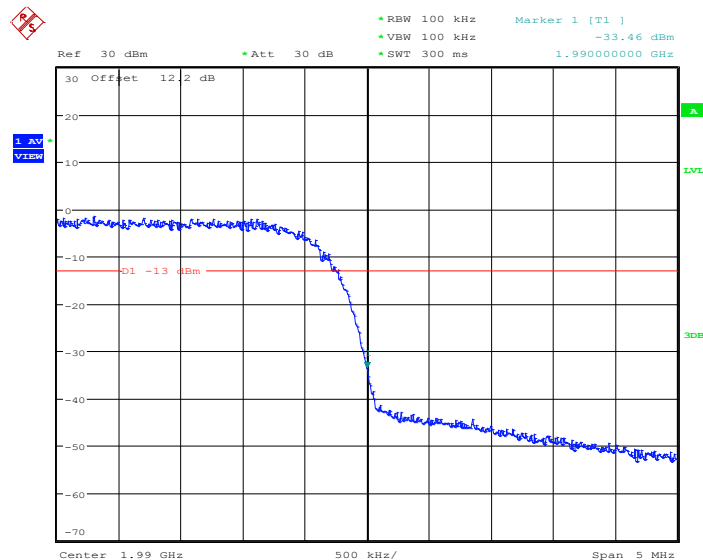
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link
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Lower Band Edge Plot on Channel 9662 (1932.4 MHz)



Date: 20.DEC.2012 10:48:52

Higher Band Edge Plot on Channel 9938 (1987.6 MHz)



Date: 20.DEC.2012 10:51:13

## 3.6 Conducted Spurious Emission Measurement

### 3.6.1 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.

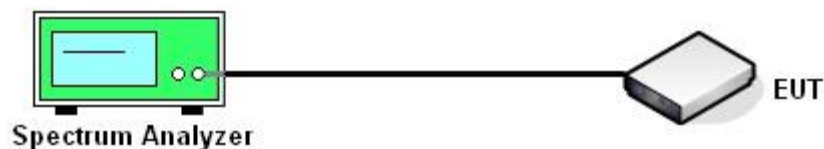
### 3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.6.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator.  
The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
 $= -13\text{dBm}$ .

### 3.6.4 Test Setup

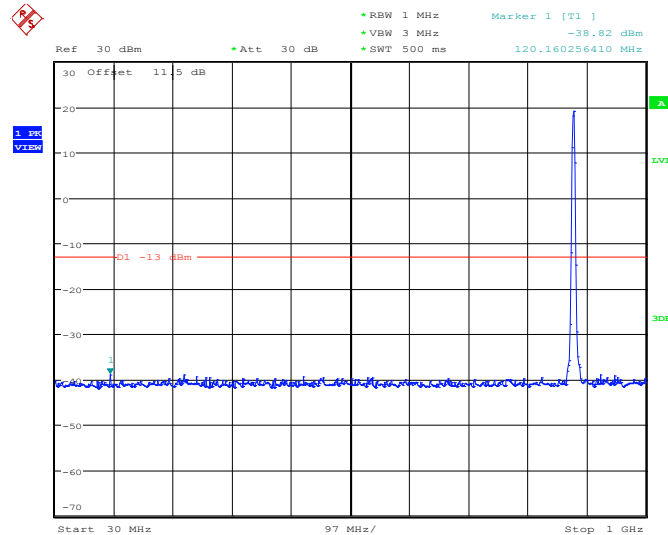




### 3.6.5 Test Result (Plots) of Conducted Spurious Emission

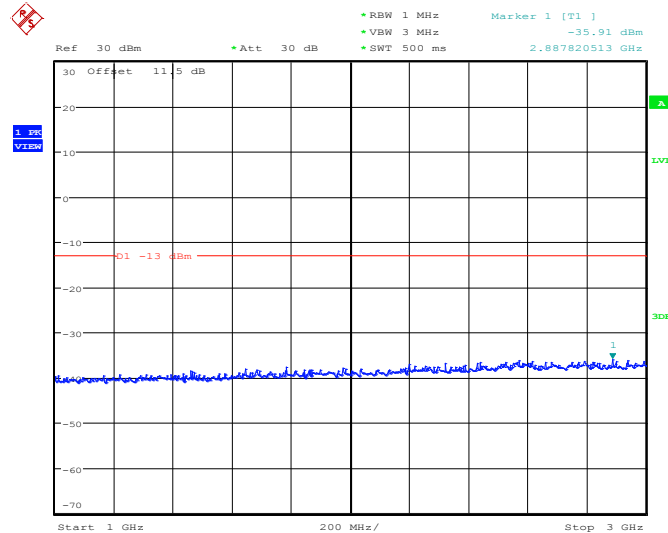
<b>Band :</b>	WCDMA Band V	<b>Channel :</b>	CH4407
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Frequency :</b>	881.4 MHz

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



Date: 20,DEC,2012 15:13:28

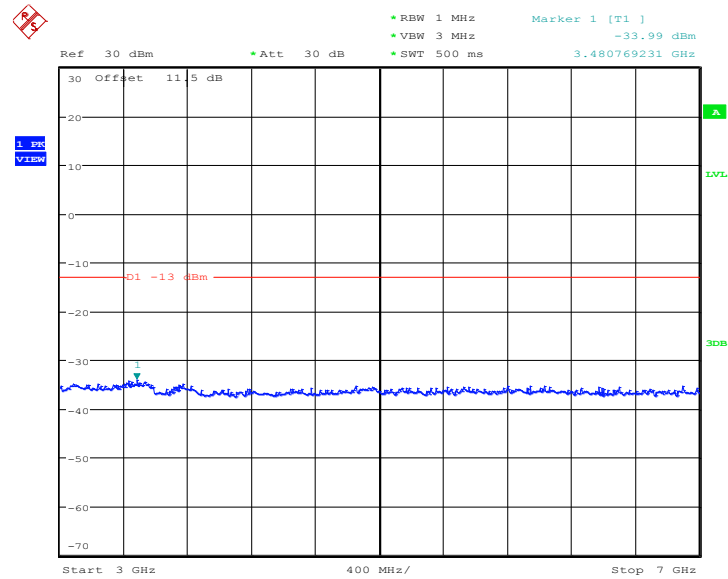
**Conducted Spurious Emission Plot between 1GHz ~ 3GHz**



Date: 20,DEC,2012 15:14:45

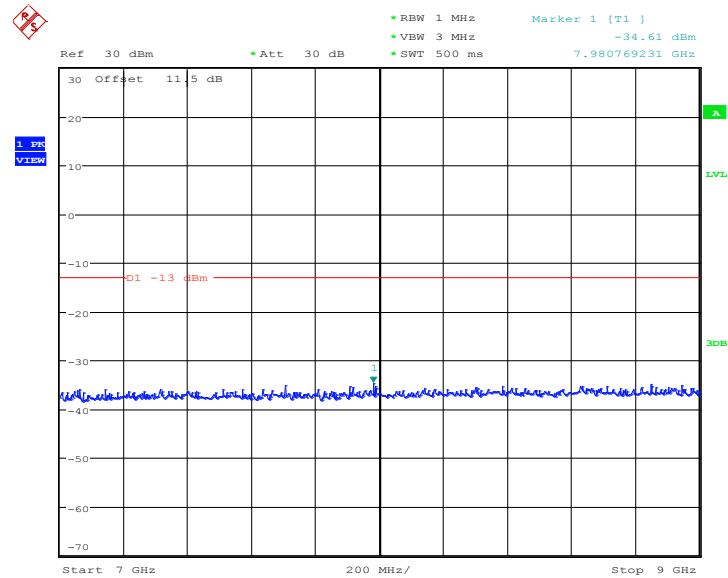


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



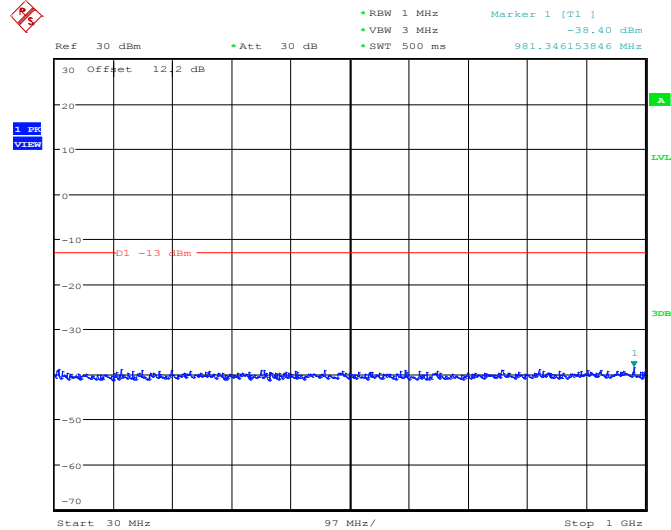
Date: 20.DEC.2012 15:18:37

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

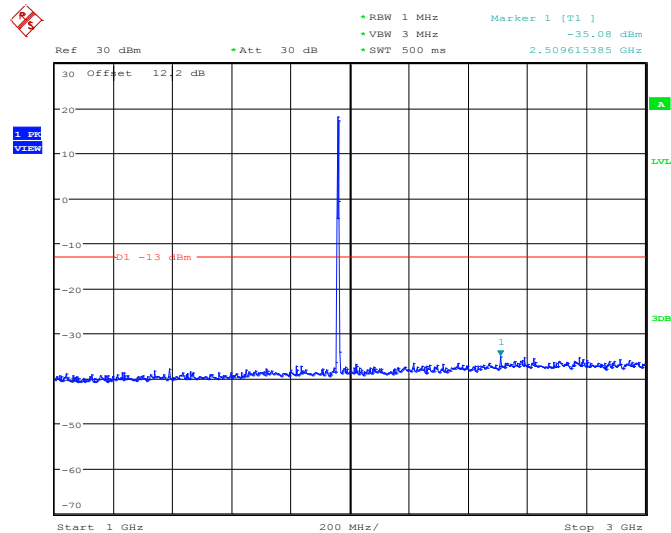


Date: 20.DEC.2012 15:19:11

<b>Band :</b>	WCDMA Band II	<b>Channel :</b>	CH9800
<b>Test Mode :</b>	RMC 12.2Kbps Link	<b>Frequency :</b>	1960.0 MHz

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


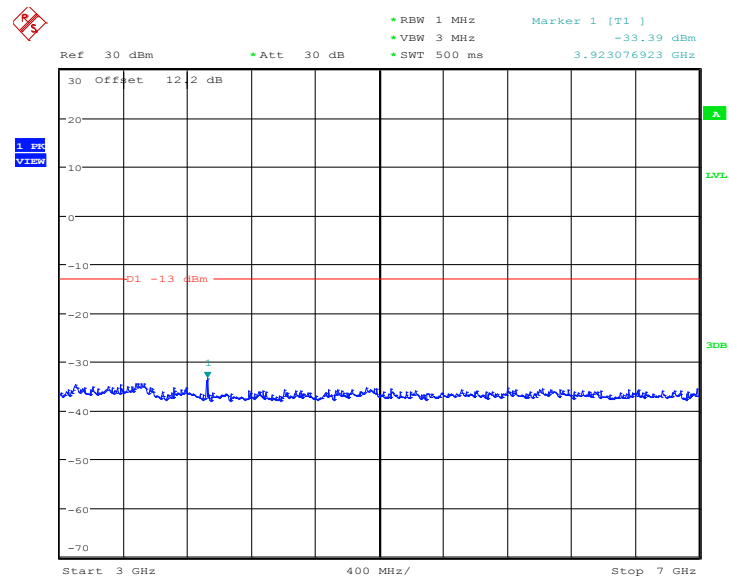
Date: 20.DEC.2012 11:19:31

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


Date: 20.DEC.2012 11:19:00

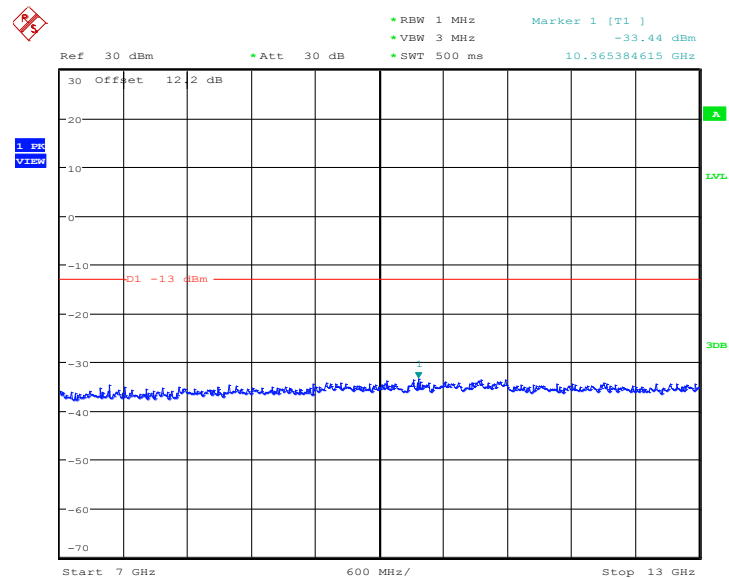


### Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 20.DEC.2012 11:18:20

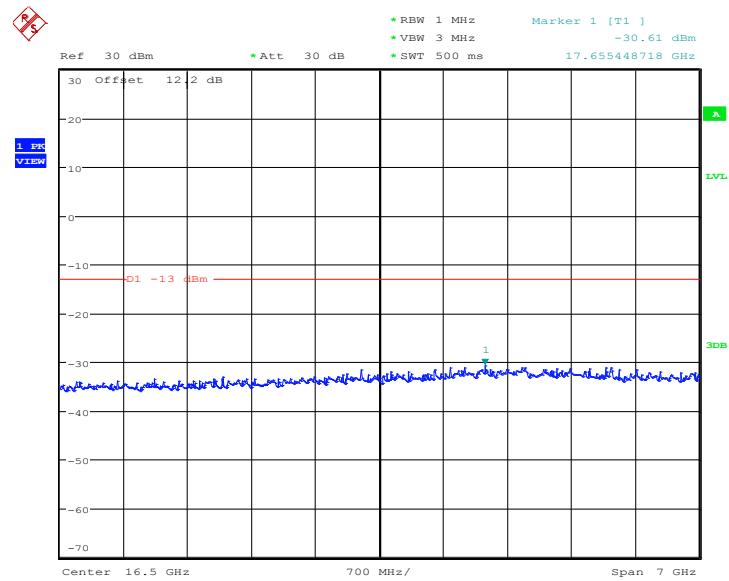
### Conducted Spurious Emission Plot between 7GHz ~ 13GHz



Date: 20.DEC.2012 11:17:31



Conducted Spurious Emission Plot between 13GHz ~ 20GHz



Date: 20.DEC.2012 11:17:04



## **3.7 Field Strength of Spurious Radiation Measurement**

### **3.7.1 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.

### **3.7.2 Measuring Instruments**

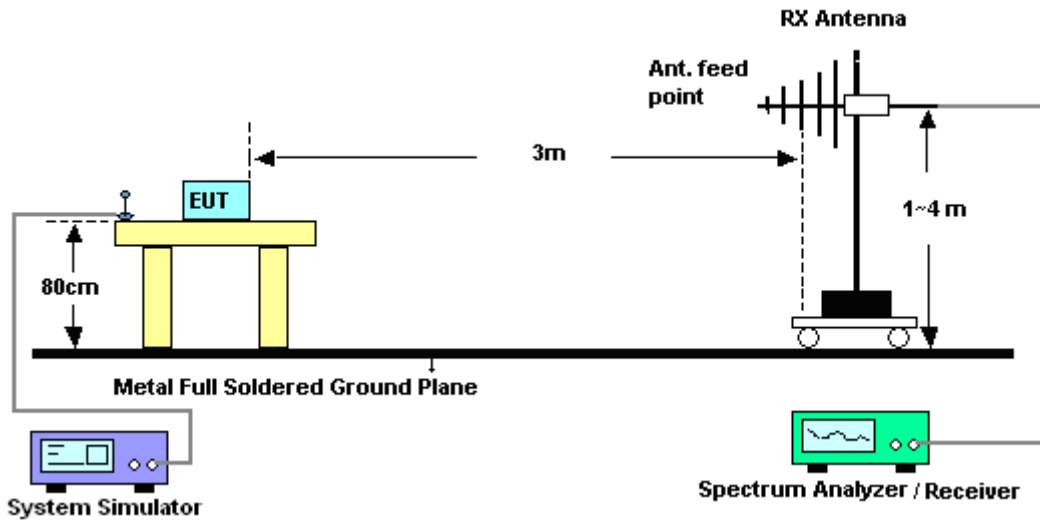
The measuring equipment is listed in the section 4 of this test report.

### **3.7.3 Test Procedures**

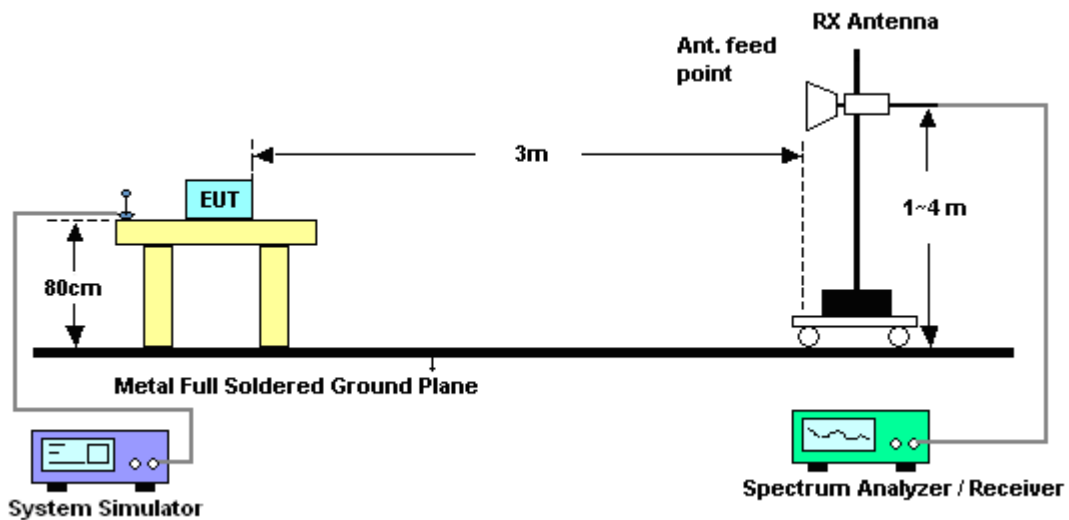
1. The testing follows FCC KDB 971168 v02r01 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11.  $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12.  $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power P(Watts)  
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$   
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$   
 $= -13\text{dBm}.$

### 3.7.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.7.5 Test Result of Field Strength of Spurious Radiated

Band :	WCDMA Band V				Temperature :	26~27°C			
Test Mode :	RMC 12.2Kbps Link (16QAM)				Relative Humidity :	45~46%			
Test Engineer :	Hayden Wu				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
( MHz )	( dBm )	( dBm )	Limit ( dB )	Reading ( dBm )	Power ( dBm )	loss ( dB )	Gain ( dBi )	(H/V)	
1762	-50.41	-13	-37.41	-61.26	-52	1.88	5.62	H	Pass
2643	-47.92	-13	-34.92	-61.44	-50.2	2.44	6.87	H	Pass
4405	-44.82	-13	-31.82	-65.21	-50	2.35	9.68	H	Pass

Band :	WCDMA Band V					Temperature :	26~27°C		
Test Mode :	RMC 12.2Kbps Link (16QAM)					Relative Humidity :	45~46%		
Test Engineer :	Hayden Wu					Polarization :	Vertical		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
( MHz )	( dBm )	( dBm )	Limit ( dB )	Reading ( dBm )	Power ( dBm )	loss ( dB )	Gain ( dBi )	(H/V)	
1762	-50.61	-13	-37.61	-61.69	-52.2	1.88	5.62	V	Pass
2643	-47.72	-13	-34.72	-61.24	-50	2.44	6.87	V	Pass
4405	-44.62	-13	-31.62	-65.08	-49.8	2.35	9.68	V	Pass





Band :	WCDMA Band II	Temperature :	26~27°C						
Test Mode :	RMC 12.2Kbps Link (16QAM)	Relative Humidity :	45~46%						
Test Engineer :	Hayden Wu	Polarization :	Horizontal						
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over Limit	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
( MHz )	( dBm )	( dBm )	( dB )	Reading	Power	loss	Gain	(H/V)	
3920	-46.11	-13	-33.11	-65.12	-53.30	2.56	9.75	H	Pass
5880	-41.42	-13	-28.42	-66.20	-50.00	2.96	11.54	H	Pass
9800	-38.98	-13	-25.98	-67.13	-49.30	3.66	13.98	H	Pass

Band :	WCDMA Band II	Temperature :	26~27°C						
Test Mode :	RMC 12.2Kbps Link (16QAM)	Relative Humidity :	45~46%						
Test Engineer :	Hayden Wu	Polarization :	Vertical						
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over Limit	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
( MHz )	( dBm )	( dBm )	( dB )	Reading (dBm)	Power ( dBm )	loss ( dB )	Gain (dBi)	(H/V)	
3920	-46.81	-13	-33.81	-65.37	-54.00	2.56	9.75	V	Pass
5880	-41.72	-13	-28.72	-66.04	-50.30	2.96	11.54	V	Pass
9800	-38.88	-13	-25.88	-67.21	-49.20	3.66	13.98	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

The measuring equipment is listed in the section 4 of this test report.

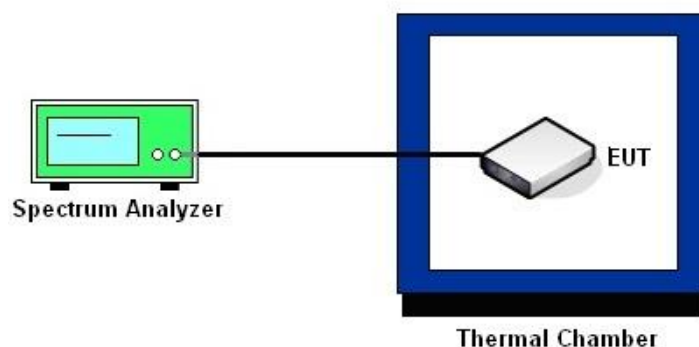
### 3.8.3 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 v02r01 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. 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.
4. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  steps 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.

### 3.8.4 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r01 Section 9.0.
2. The EUT was placed in a temperature chamber at  $25 \pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
4. 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	<b>Frequency :</b>	836.4 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	44.82	0.0937	PASS
-20	41.77	0.0901	
-10	-26.93	0.0080	
0	-22.47	0.0133	
10	-31.98	0.0019	
20(Ref.)	-33.58	0.0000	
30	-39.14	0.0066	
40	-48.26	0.0176	
50	-60.52	0.0322	

<b>Band :</b>	WCDMA Band II	<b>Channel :</b>	9400
<b>Limit (ppm) :</b>	within authorized band	<b>Frequency :</b>	1880.0 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	125.69	0.1102	PASS
-20	14.33	0.0510	
-10	-29.69	0.0276	
0	-167.16	0.0456	
10	-115.54	0.0181	
20(Ref.)	-81.52	0.0000	
30	-85.89	0.0023	
40	-111.8	0.0161	
50	-150.19	0.0365	

Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

**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	5.5	-50.30	0.0200	2.5 (Note 3.)	PASS
		5.0	-41.17	0.0091		
		BEP	-36.67	0.0037		
WCDMA Band II CH9400	RMC 12.2Kbps	5.5	-111.00	0.0157		
		5.0	-110.55	0.0154		
		BEP	-112.00	0.0162		

**Note:**

1. Normal Voltage = 5.0V.
2. Battery End Point (BEP) = 4.5 V.
3. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Dec. 20, 2012 ~ Jan. 01, 2013	Jun. 05, 2013	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 23, 2012	Dec. 20, 2012 ~ Jan. 01, 2013	Jul. 22, 2013	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP30	101352	9KHz~30GHz	Nov. 07, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Nov. 06, 2013	Radiation (03CH06-HY)
Spectrum Analyzer	Agilent	E4408B	MY44211030	9KHz ~ 26.5GHz	Nov. 26, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Nov. 25, 2013	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESVS10	834468/0003	20MHz ~ 1000MHz	May 04, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	May 03, 2013	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz ~ 2GHz	Oct. 06, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Oct. 05, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	EMCO	3117	00066583	1GHz ~ 18GHz	Aug. 01, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Jul. 31, 2013	Radiation (03CH06-HY)
Double Ridge Horn Antenna	COM-POWER	AH-118	071025	1GHz~18GHz	Aug. 09, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Aug. 08, 2013	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917025 1	15GHz ~ 40GHz	Sep. 28, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Sep. 27, 2013	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz ~ 26.5GHz	Apr. 13, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Apr. 12, 2013	Radiation (03CH06-HY)
Amplifier	Agilent	310N	186713	9KHz ~ 1GHz	Apr. 11, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Apr. 10, 2013	Radiation (03CH06-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz ~ 18GHz	Jul. 21, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Jul. 20, 2013	Radiation (03CH06-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-1	159087	1GHz~18GHz	Feb. 27, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Feb. 26, 2013	Radiation (03CH06-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Dec. 21, 2012 ~ Dec. 27, 2012	Jul. 02, 2014	Radiation (03CH06-HY)



## 5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.50
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