

FCC RF Test Report

APPLICANT : TECOM CO., LTD.
EQUIPMENT : 3G Femtocell Access Point
BRAND NAME : NEC
MODEL NAME : FP8132T
FCC ID : D6XFP8132T
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)

The product was received on Dec. 10, 2012 and completely tested on Jan. 01, 2013. We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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FCC ID : D6XFP8132T

Page Number : 1 of 49

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REVISION HISTORY

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	N/A	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	RSS-133(6.4)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.3	§22.913(a)(2)	RSS-132(4.4) 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(a) §24.238(a)	RSS-GEN(4.6.1) RSS-132 (4.5) RSS-133(6.5)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Band Edge Measurement	< 43+10log ₁₀ (P[Watts])	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Conducted Spurious Emission	< 43+10log ₁₀ (P[Watts])	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Field Strength of Spurious Radiation	< 43+10log ₁₀ (P[Watts])	PASS	Under limit 25.88 dB at 9800.000 MHz
3.8	§2.1055 §22.355 §24.235	RSS-132(4.3) 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, 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 Feature of Equipment Under Test

Product Feature	
Equipment	3G Femtocell Access Point
Brand Name	NEC
Model Name	FP8132T
FCC ID	D6XFP8132T
Sample 1	EUT with NEC logo
Sample 2	EUT without NEC logo
EUT supports Radios application	WCDMA
HW Version	G3.5.2
SW Version	BV2.13.0.35
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: 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	PIFA Antenna
Antenna Gain	Band V: 2.00 dBi Band II : 3.00 dBi
Type of Modulation	QPSK (Uplink)

1.5 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

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

1.6 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st 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		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH02-HY	03CH06-HY	722060/4086B-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), 24(E)
- ♦ ANSI / TIA / EIA-603-C-2004
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v01
- ♦ IC RSS-132 Issue 2
- ♦ IC RSS-133 Issue 5
- ♦ IC RSS-Gen Issue 3
- ♦ NOTICE 2012-DRS0126

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.
3. Per the section 2.2.3 of Notice of 2012-DRS0126, " Receivers Excluded from Industry Canada Requirements", only radio communication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to Industry Canada requirements.

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 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 II	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

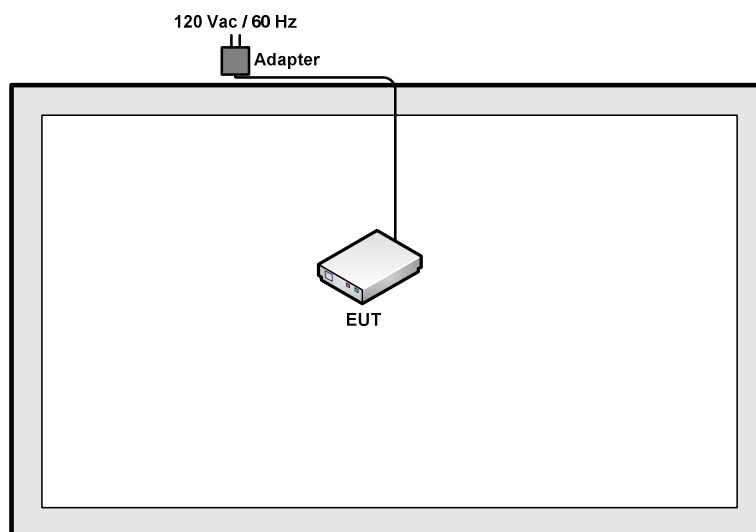
Note:

1. The maximum power levels are RMC 12.2Kbps mode for WCDMA band V and WCDMA band II, only these modes were used for all tests.
2. All the tests were performance with Sample 1.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4357	4407	4458	9662	9800	9938
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 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.

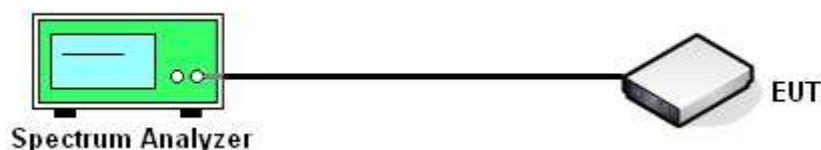
3.1.2 Measuring Instruments

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	4357 (Low)	4407 (Mid)	4458 (High)
Frequency (MHz)	871.4	881.4	891.6
Conducted Power (dBm)	13.53	13.46	12.86
Conducted Power (Watts)	0.02	0.02	0.02

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
Conducted Power (Watts)	0.02	0.02	0.02

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.

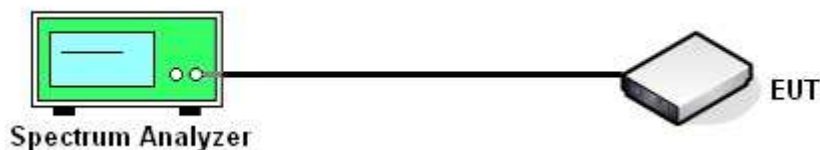
3.2.2 Measuring Instruments

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 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. For GSM/EGPRS operating modes:
 - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
 - b. Set EUT in maximum power output, and triggered the burst signal.
 - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS operating modes:
 - a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
 - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

3.2.4 Test Setup



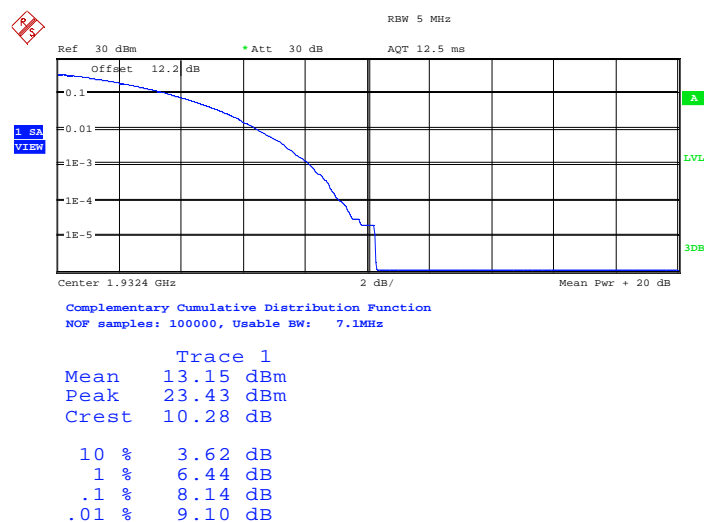
3.2.5 Test Result of Peak-to-Average Ratio

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

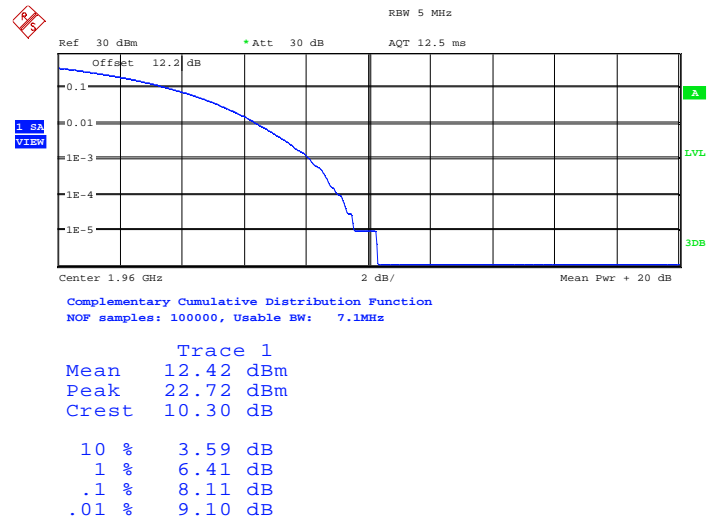
3.2.6 Test Result (Plots) of Peak-to-Average Ratio

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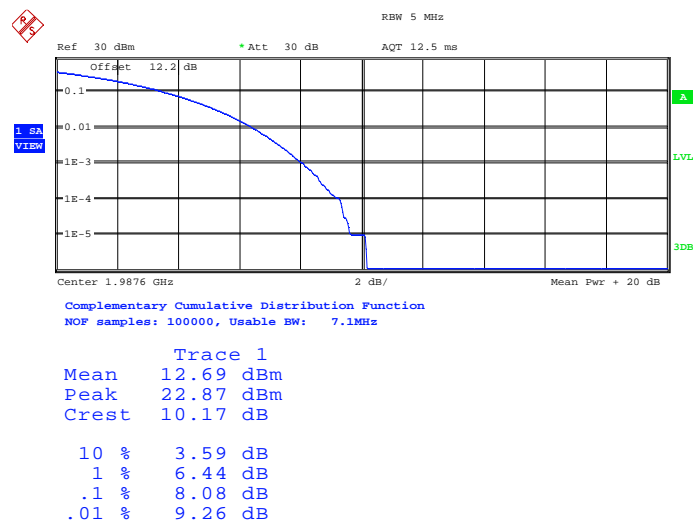
Peak-to-Average Ratio on Channel 9662 (1932.4 MHz)



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



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



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.

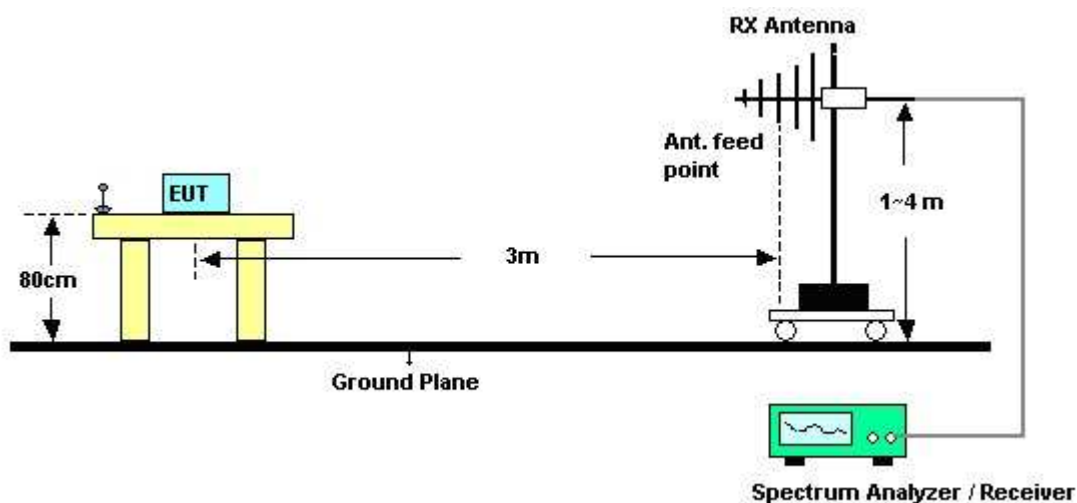
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The EUT was placed on an 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= 100 KHz, VBW= 300 KHz, used channel power option with bandwidth=5MHz 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)
871.4	-14.06	29.34	13.13	0.0206
881.4	-14.58	29.29	12.56	0.0180
891.6	-15.68	29.42	11.59	0.0144
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (W)
871.4	-20.15	33.17	10.87	0.0122
881.4	-20.12	32.65	10.38	0.0109
891.6	-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)
1932.4	-30.86	44.16	13.30	0.0214
1960.0	-30.83	44.33	13.50	0.0224
1987.6	-30.54	44.35	13.81	0.0240
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1932.4	-34.61	46.05	11.44	0.0139
1960.0	-34.73	46.16	11.43	0.0139
1987.6	-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.

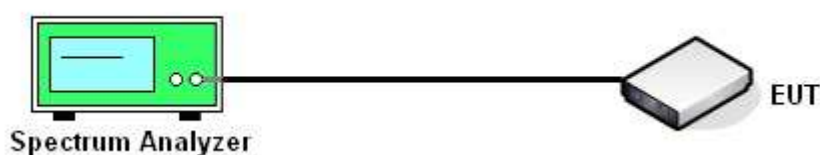
3.4.2 Measuring Instruments

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

3.4.4 Test Setup



3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

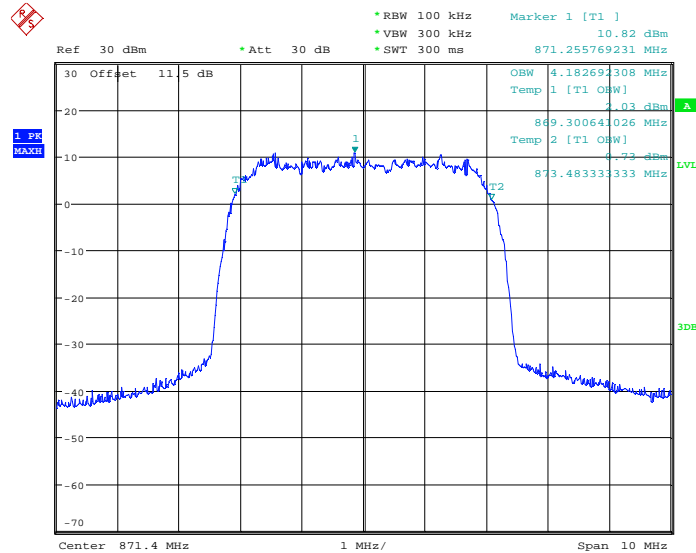
Cellular Band			
Modes	WCDMA Band V (RMC 12.2Kbps)		
Channel	4357 (Low)	4407 (Mid)	4458 (High)
Frequency (MHz)	871.4	881.4	891.6
99% OBW (MHz)	4.18	4.17	4.15
26dB BW (MHz)	4.71	4.70	4.71

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

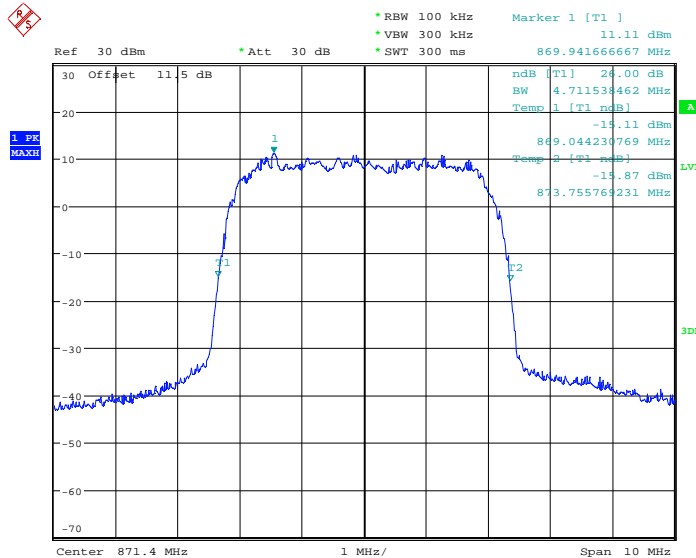
Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link
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99% Occupied Bandwidth Plot on Channel 4357 (871.4 MHz)



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

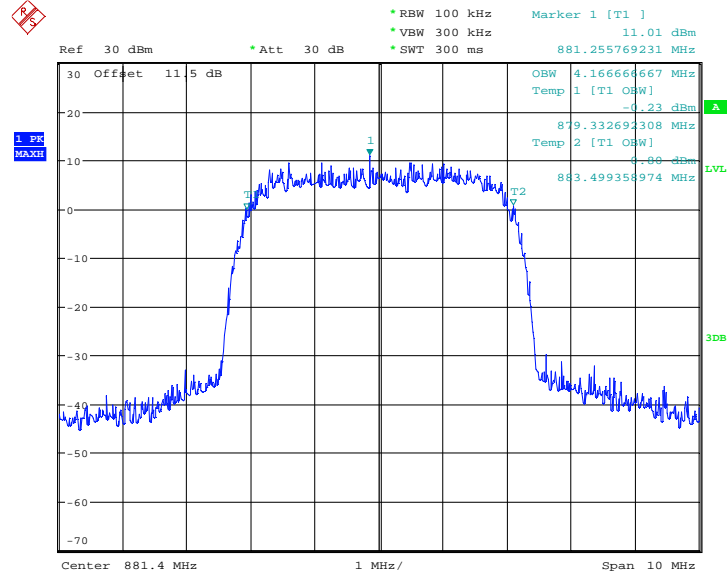
26dB Bandwidth Plot on Channel 4357 (871.4 MHz)



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

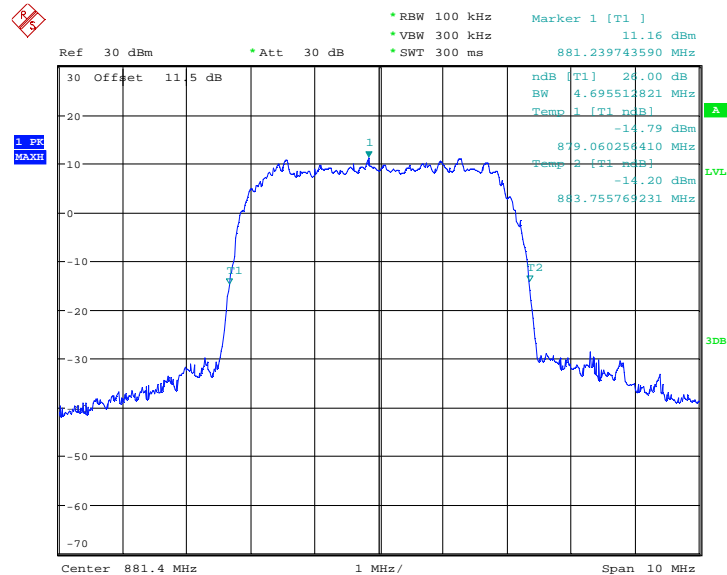


99% Occupied Bandwidth Plot on Channel 4407 (881.4 MHz)

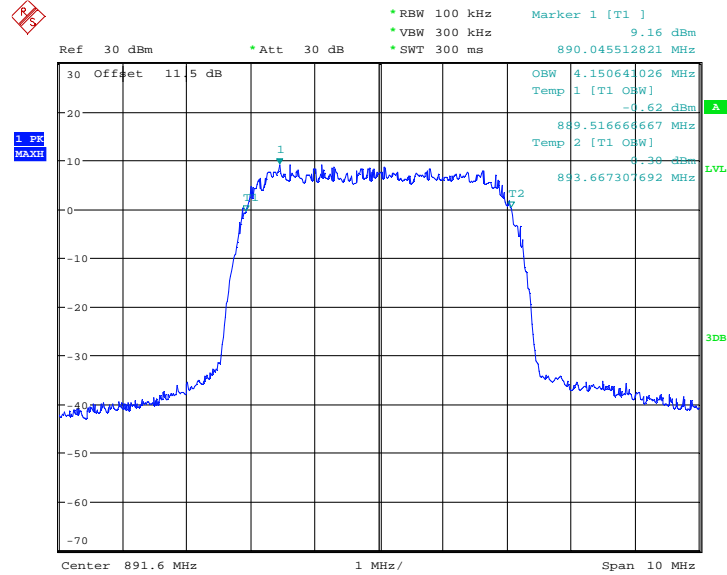


Date: 30.DEC.2012 13:51:49

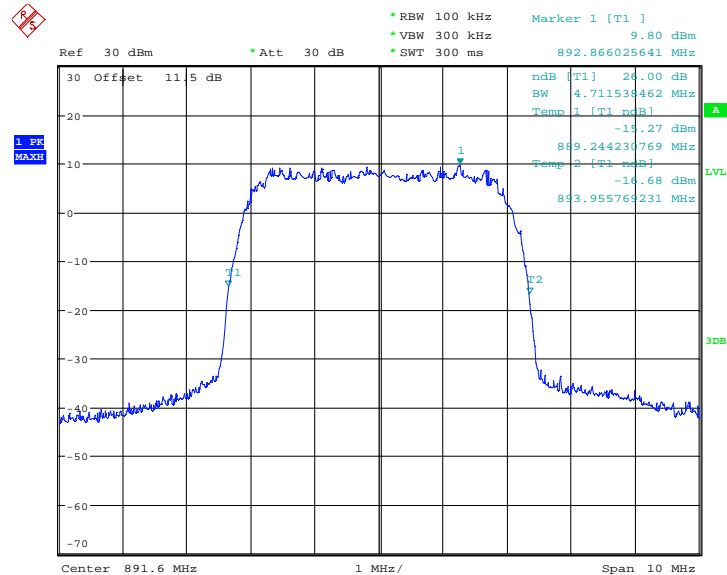
26dB Bandwidth Plot on Channel 4407 (881.4 MHz)



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

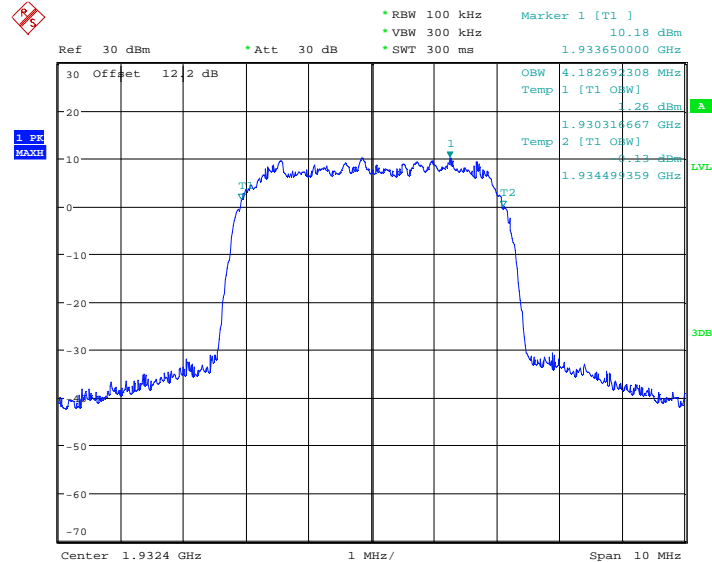
99% Occupied Bandwidth Plot on Channel 4458 (891.6 MHz)


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

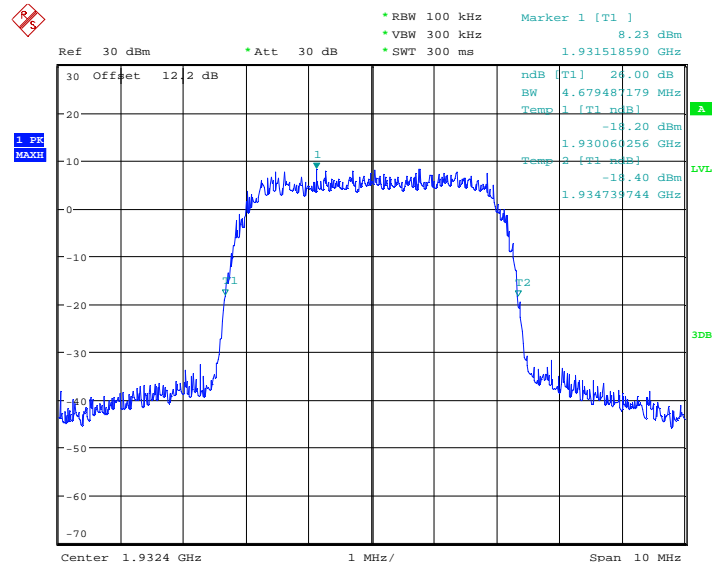
26dB Bandwidth Plot on Channel 4458 (891.6 MHz)


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

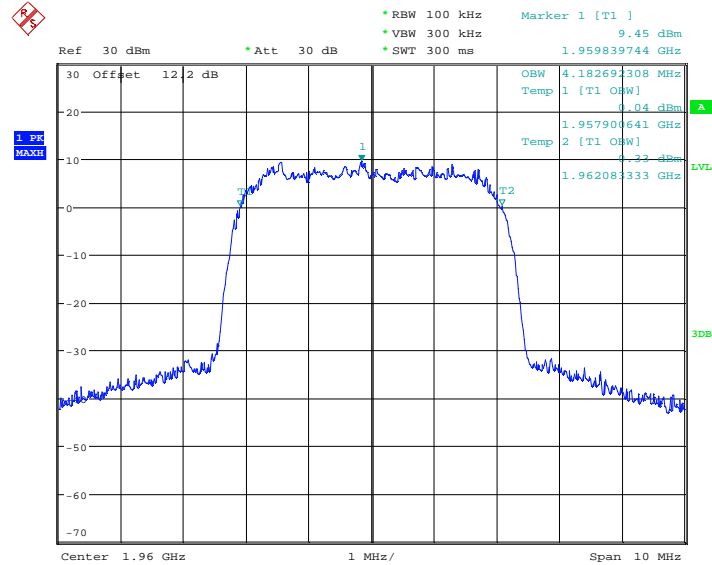
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link
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99% Occupied Bandwidth Plot on Channel 9662 (1932.4 MHz)


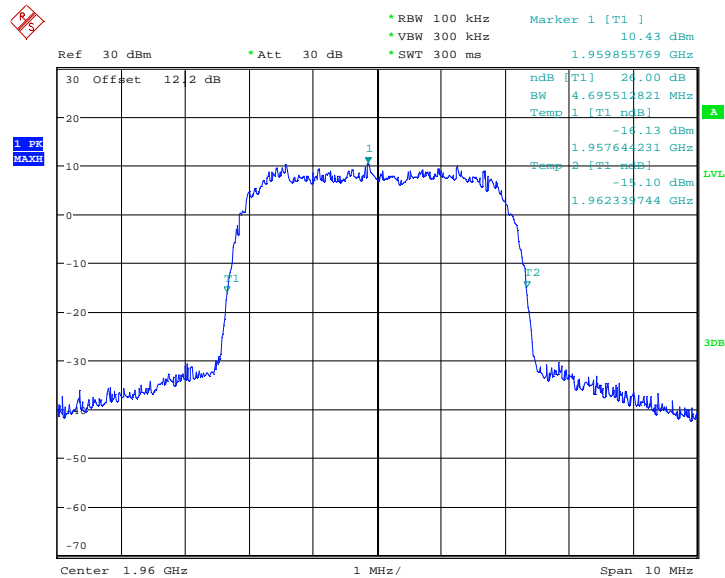
Date: 20.DEC.2012 10:57:33

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)


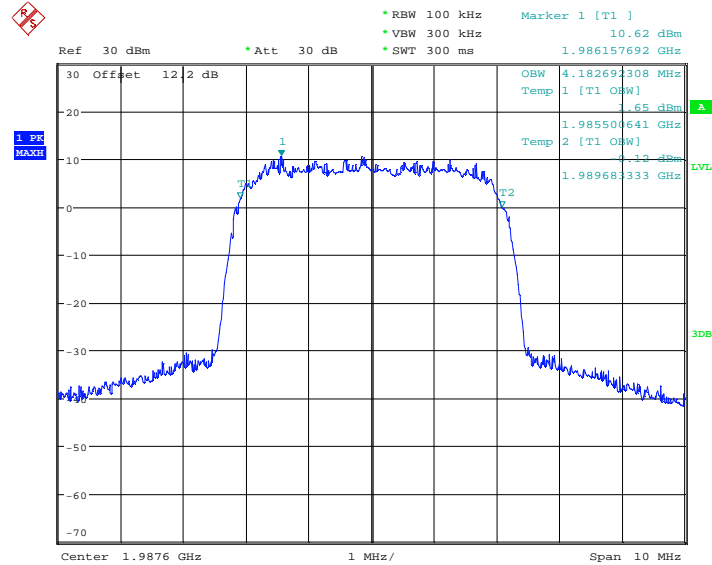
Date: 20.DEC.2012 10:56:11

26dB Bandwidth Plot on Channel 9800 (1960.0 MHz)


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

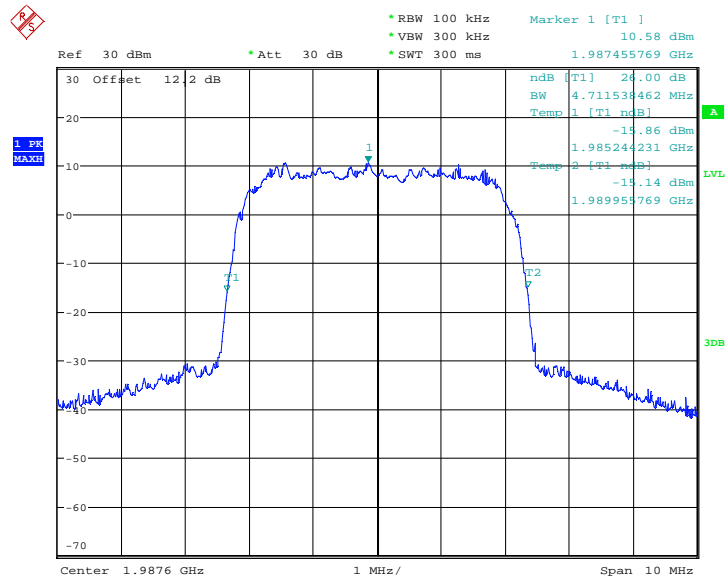


99% Occupied Bandwidth Plot on Channel 9938 (1987.6 MHz)



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.

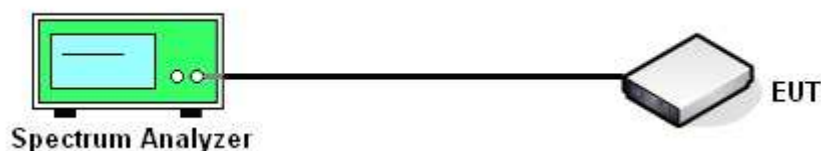
3.5.2 Measuring Instruments

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 band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.
1. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
 2. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

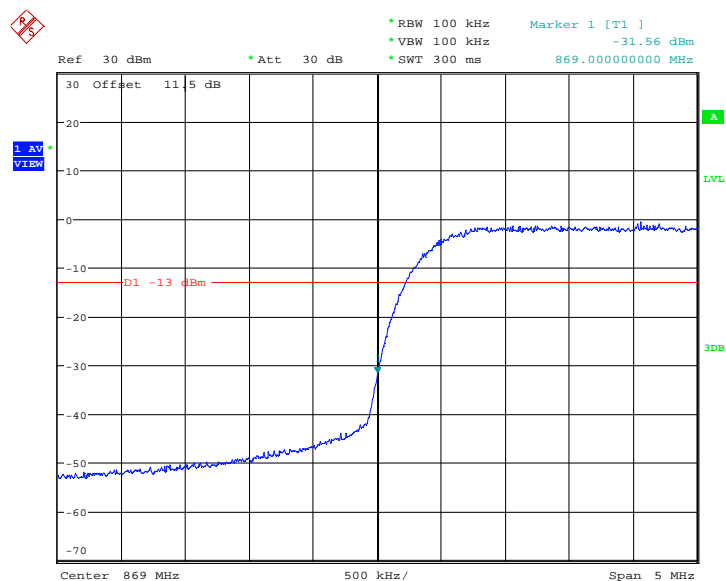
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link
Correction Factor :	-3.27dB	Maximum 26dB Bandwidth :	4.71MHz
Band Edge :	-34.83dBm	Measurement Value :	-31.56dBm

Lower Band Edge Plot on Channel 4357 (871.4 MHz)

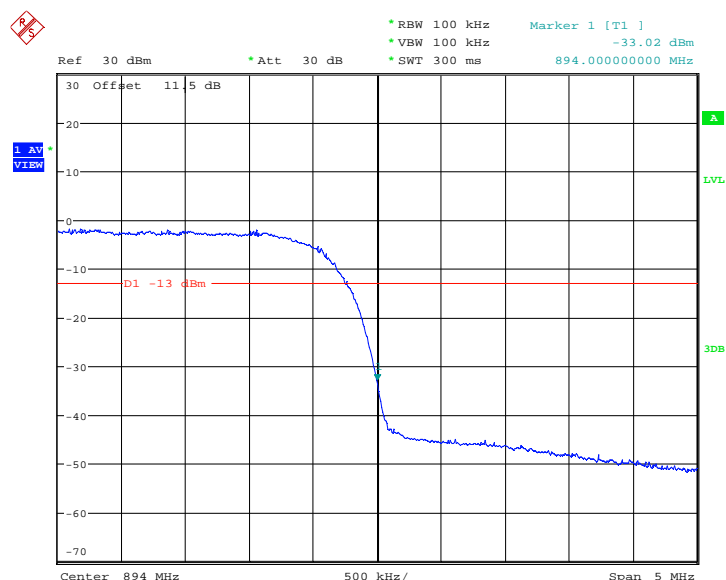


Date: 20.DEC.2012 14:38:26

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

Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link
Correction Factor :	-3.27dB	Maximum 26dB Bandwidth :	4.71MHz
Band Edge :	-36.29dBm	Measurement Value :	-33.02dBm

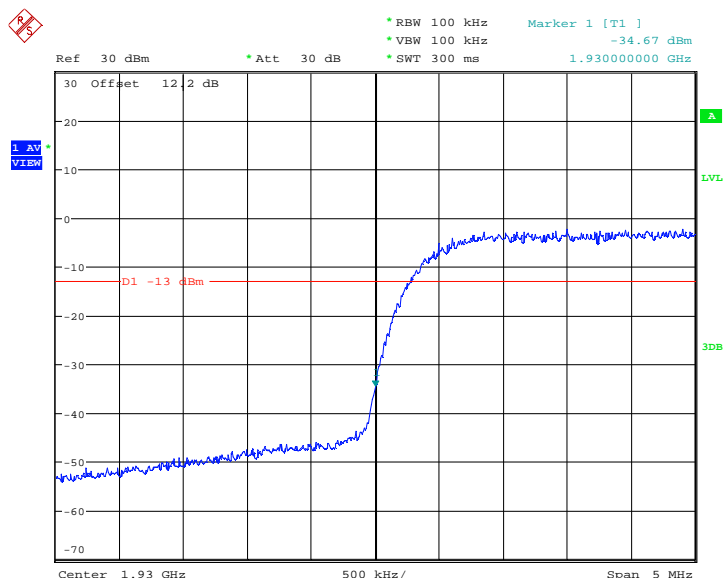
Higher Band Edge Plot on Channel 4458 (891.6 MHz)



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

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

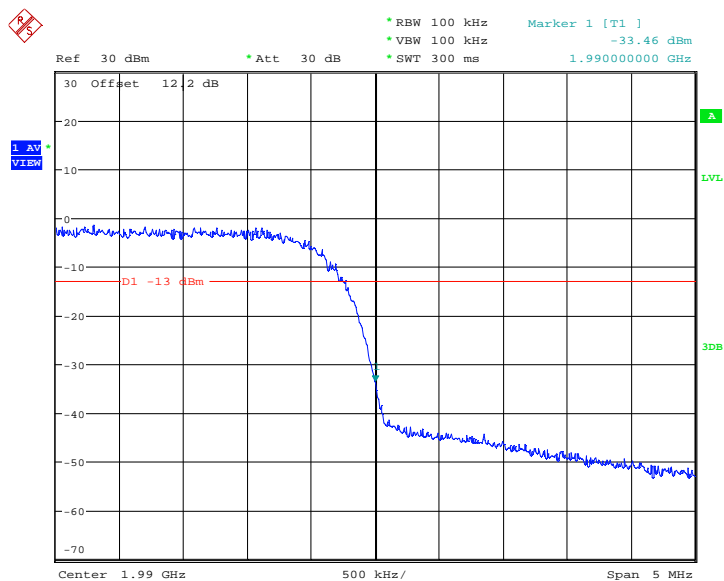
Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link
Correction Factor :	-3.27dB	Maximum 26dB Bandwidth :	4.71MHz
Band Edge :	-37.94dBm	Measurement Value :	-34.67dBm

Lower Band Edge Plot on Channel 9662 (1932.4 MHz)


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

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

Band :	WCDMA Band II	Test Mode :	RMC 12.2Kbps Link
Correction Factor :	-3.27dB	Maximum 26dB Bandwidth :	4.71MHz
Band Edge :	-36.73dBm	Measurement Value :	-33.46dBm

Higher Band Edge Plot on Channel 9938 (1987.6 MHz)


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

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

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 10th harmonic.

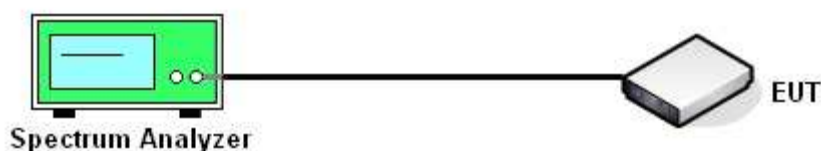
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The EUT was 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.

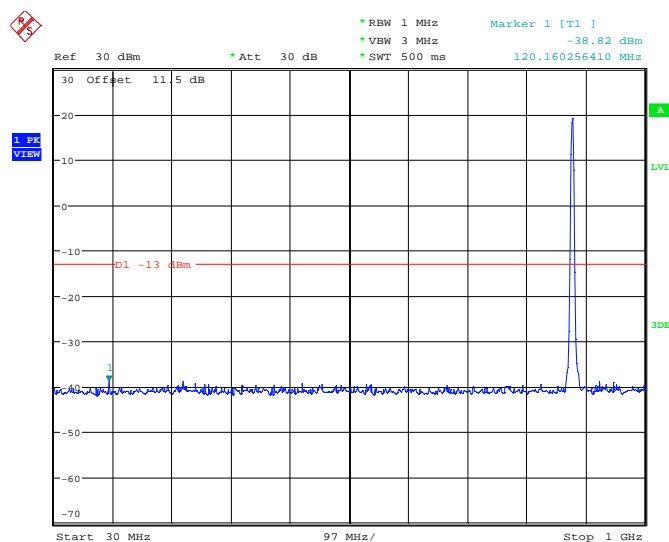
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

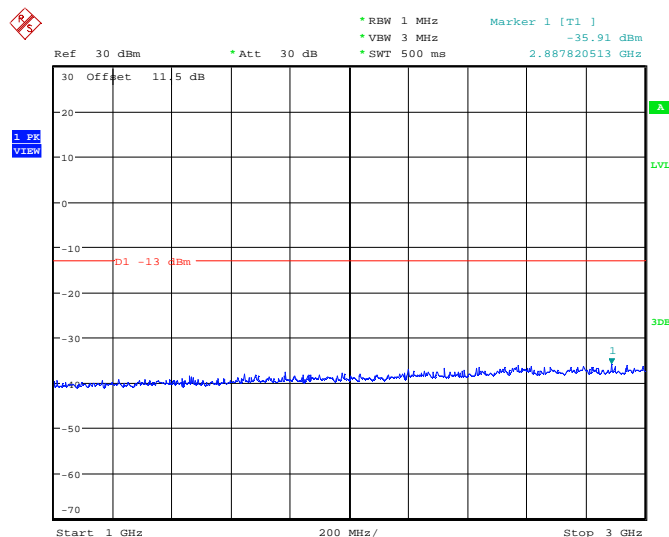
Band :	WCDMA Band V	Channel :	CH4407
Test Mode :	RMC 12.2Kbps Link	Frequency :	881.4 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz

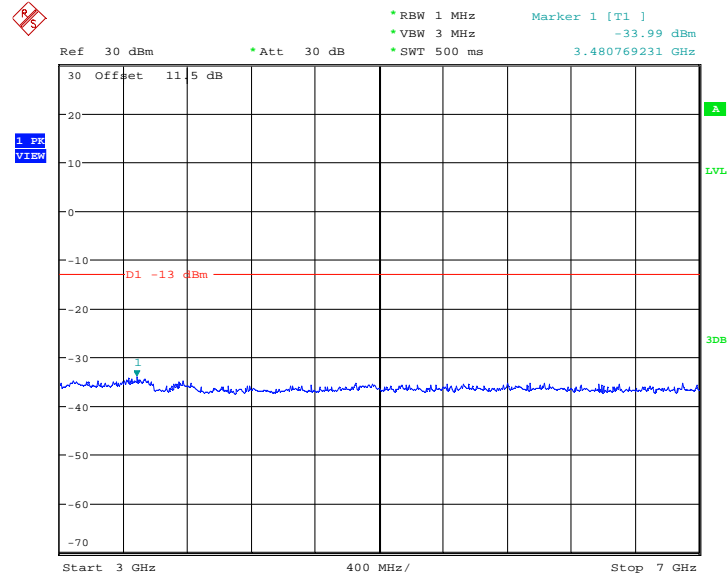


Date: 20.DEC.2012 15:13:28

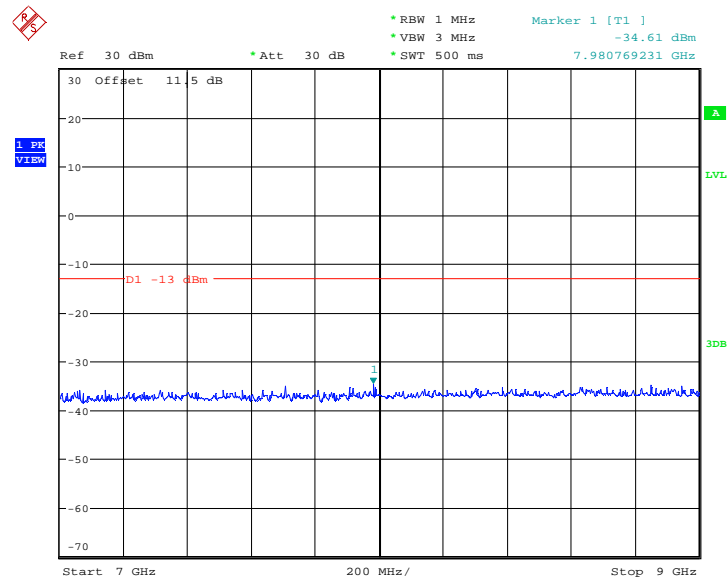
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



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

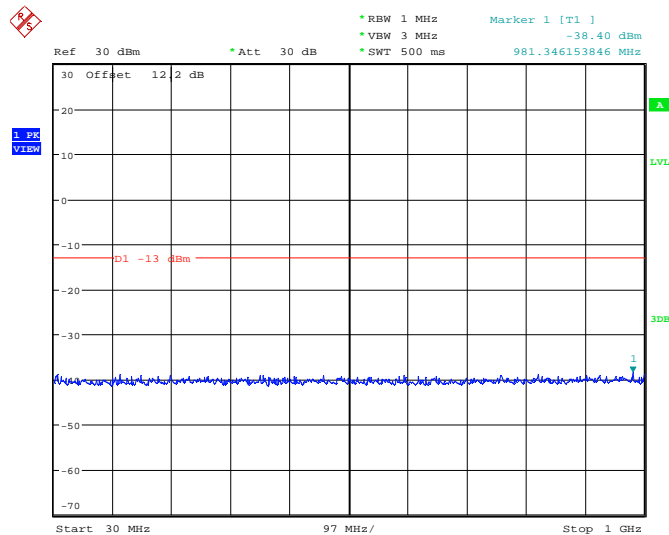
Conducted Spurious Emission Plot between 3GHz ~ 7GHz


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

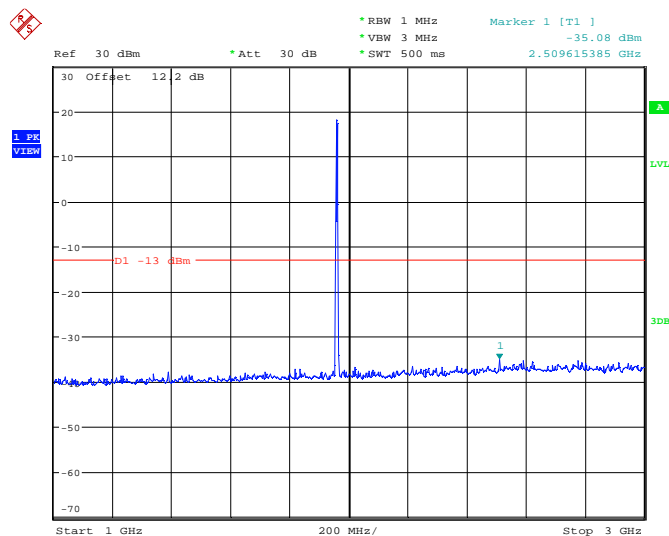
Conducted Spurious Emission Plot between 7GHz ~ 9GHz


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

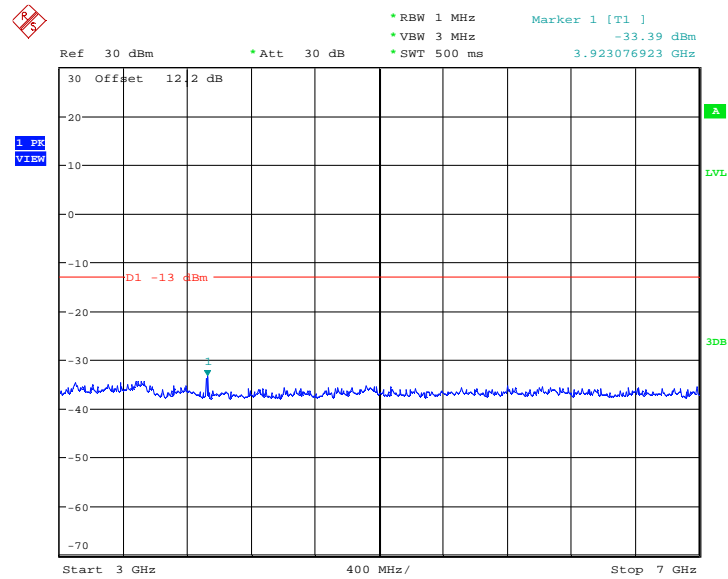
Band :	WCDMA Band II	Channel :	CH9800
Test Mode :	RMC 12.2Kbps Link	Frequency :	1960.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz


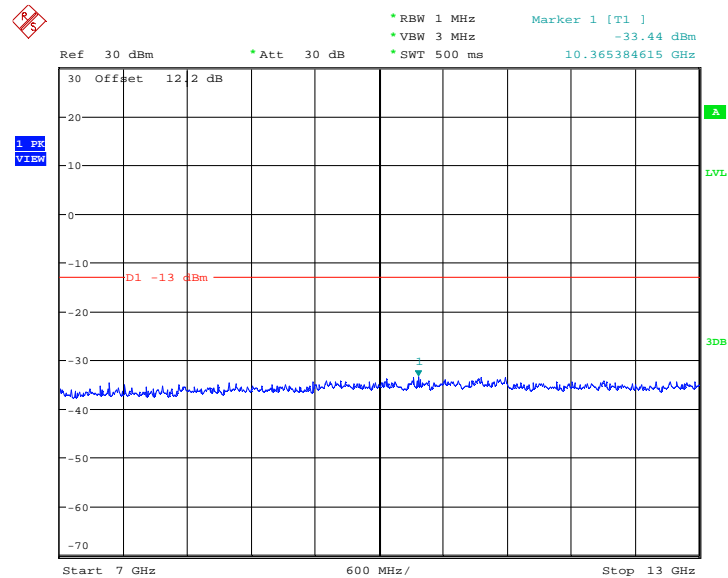
Date: 20.DEC.2012 11:19:31

Conducted Spurious Emission Plot between 1GHz ~ 3GHz


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

Conducted Spurious Emission Plot between 3GHz ~ 7GHz


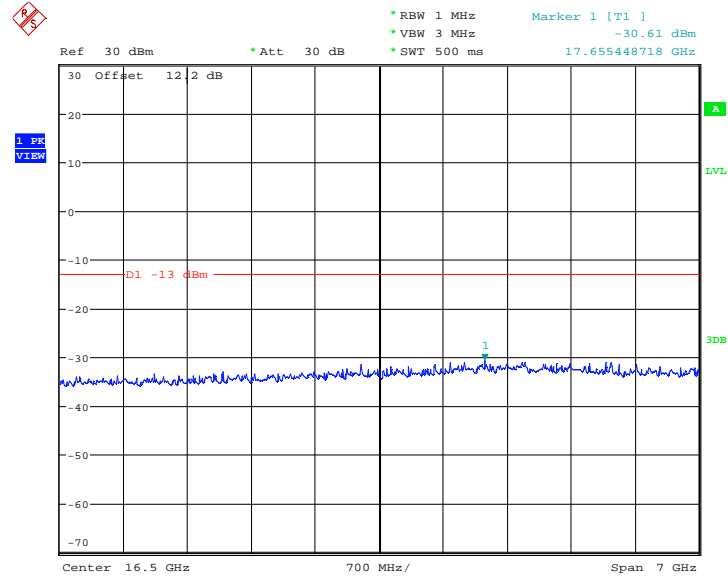
Date: 20.DEC.2012 11:18:20

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

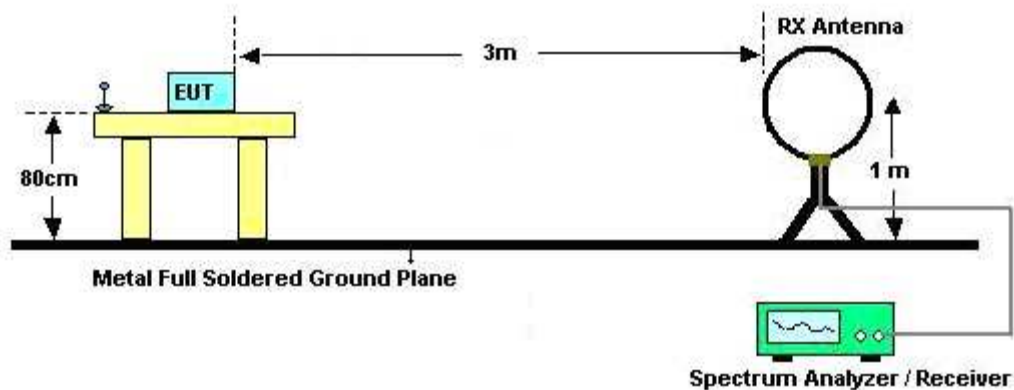
See list of measuring instruments of this test report.

3.7.3 Test Procedures

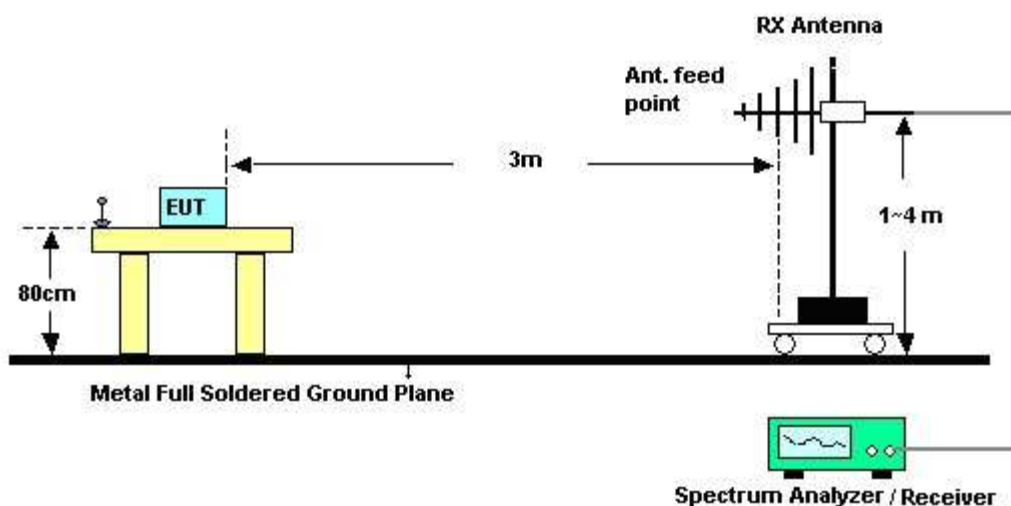
1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving 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)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$
12. $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
13. $\text{ERP (dBm)} = \text{EIRP} - 2.15$

3.7.4 Test Setup

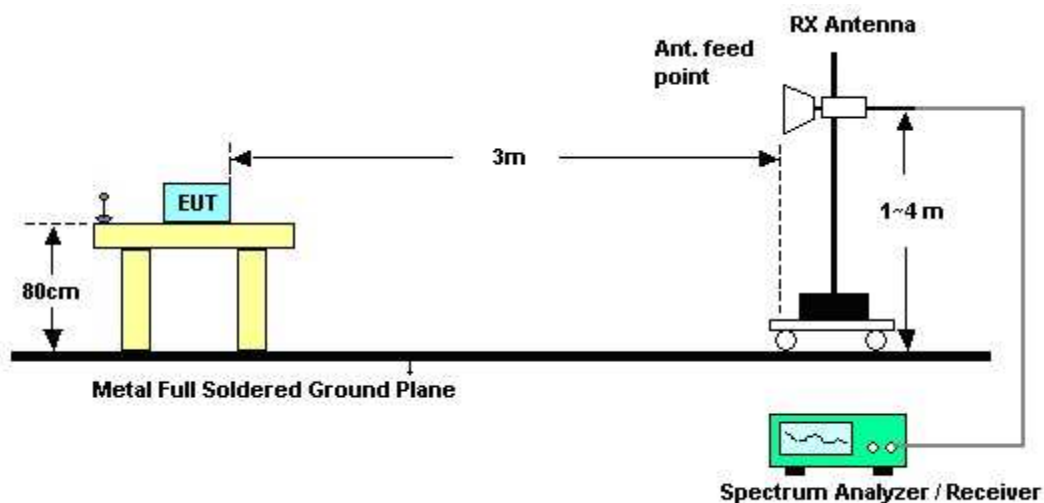
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

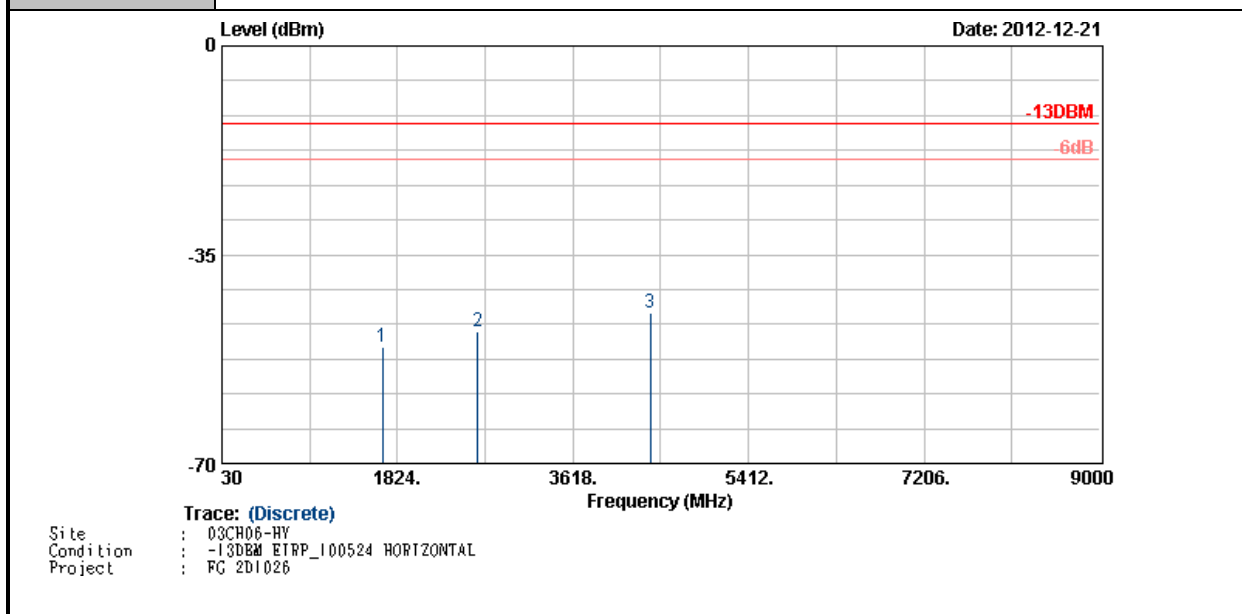


3.7.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

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

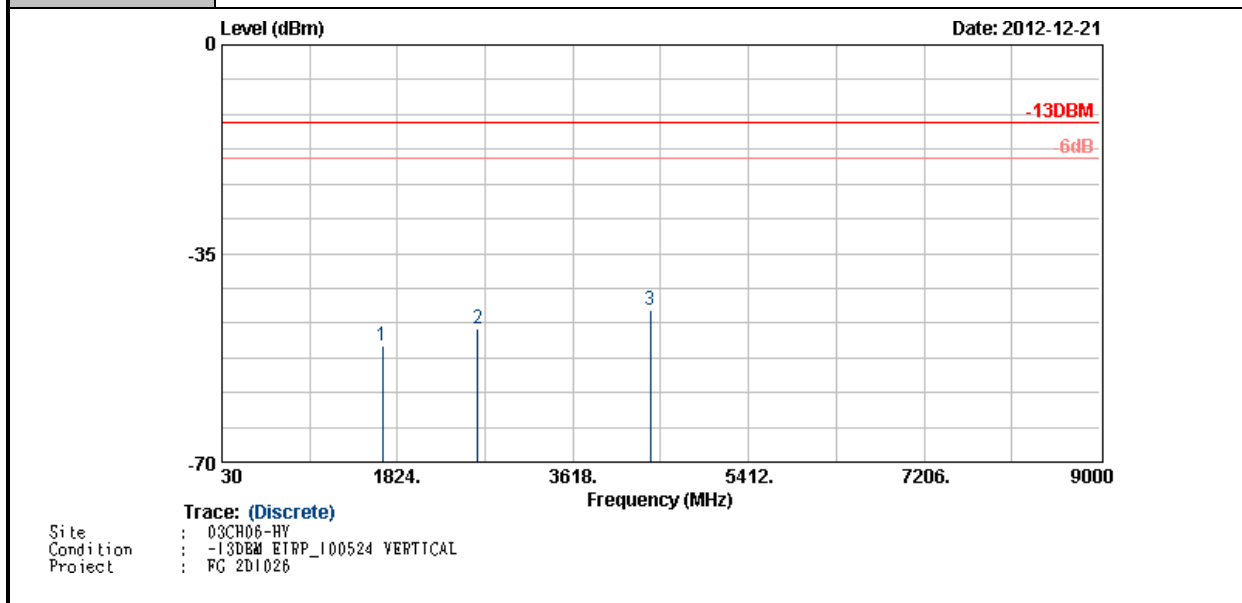
Band :	WCDMA Band V	Temperature :	26~27℃
Test Mode :	RMC 12.2Kbps Link	Relative Humidity :	45~46%
Test Engineer :	Hayden Wu	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Frequency (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
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



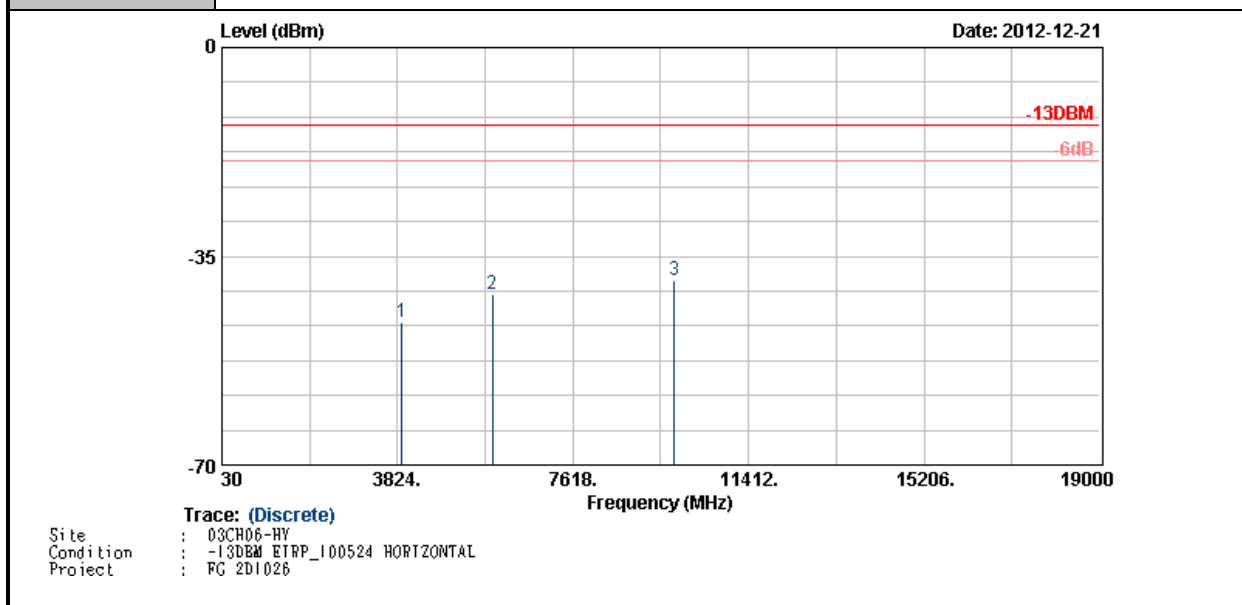
Band :	WCDMA Band V	Temperature :	26~27℃
Test Mode :	RMC 12.2Kbps Link	Relative Humidity :	45~46%
Test Engineer :	Hayden Wu	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Frequency (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
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



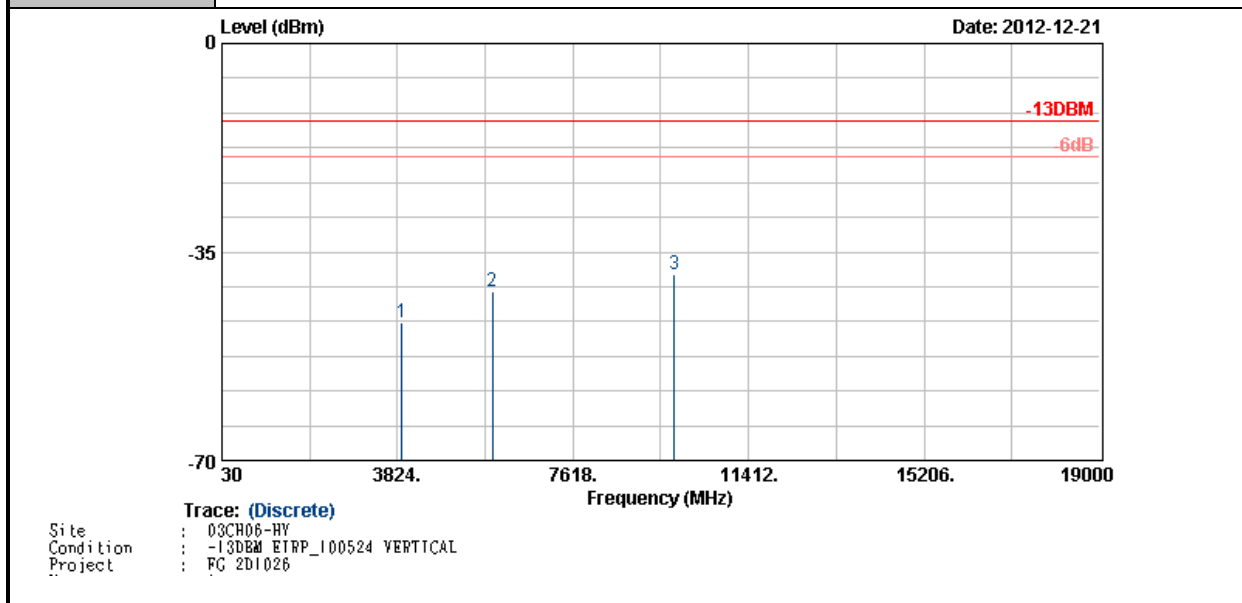
Band :	WCDMA Band II	Temperature :	26~27°C
Test Mode :	RMC 12.2Kbps Link	Relative Humidity :	45~46%
Test Engineer :	Hayden Wu	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Frequency (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
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	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 (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
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

See list of measuring instruments of this test report.

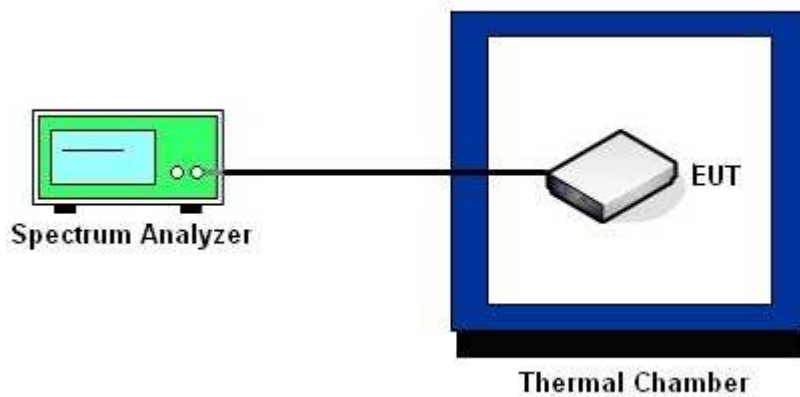
3.8.3 Test Procedures for Temperature Variation

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°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°C step up to 50°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°C , the testing lowest temperature will be raised in 10°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

Band :	WCDMA Band V	Channel :	4407
Limit (ppm) :	2.5	Frequency :	881.4 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	44.82	0.051	PASS
-20	41.77	0.047	
-10	-26.93	-0.031	
0	-22.47	-0.025	
10	-31.98	-0.036	
20	-33.58	-0.038	
30	-39.14	-0.044	
40	-48.26	-0.055	
50	-60.52	-0.069	

Band :	WCDMA Band II	Channel :	9800
Limit (ppm) :	2.5	Frequency :	1960.0 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	125.69	0.064	PASS
-20	14.33	0.007	
-10	-29.69	-0.015	
0	-167.16	-0.085	
10	-115.54	-0.059	
20	-81.52	-0.042	
30	-85.89	-0.044	
40	-111.8	-0.057	
50	-150.19	-0.077	

3.8.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
WCDMA Band V CH4407	RMC 12.2Kbps	5.0	-41.17	-0.047	2.5	PASS
		BEP	-36.67	-0.042		
		5.5	-50.3	-0.057		
WCDMA Band II CH9800	RMC 12.2Kbps	5.0	-110.55	-0.056		
		BEP	-112	-0.057		
		5.5	-111	-0.057		

Note:

1. Normal Voltage = 5.0V.
2. Battery End Point (BEP) = 4.5 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	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% ($U = 2U_c(y)$)	2.54
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

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

Please refer to Sporton report number EP2D1026 as below.