

Variant FCC RF Test Report

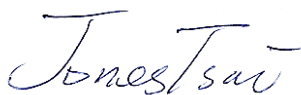
APPLICANT : Acer Incorporated
EQUIPMENT : Smart HandHeld
BRAND NAME : Acer
MODEL NAME : Z410
MARKETING NAME : Liquid Z410
FCC ID : HLZDMZ410
STANDARD : FCC 47 CFR Part 2, 27(L)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

This is a variant report which is only valid together with the original test report. The testing was completed on Apr. 23, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.

No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China



TABLE OF CONTENTS

REVISION HISTORY.....	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant.....	5
1.2 Manufacturer	5
1.3 Product Feature of Equipment Under Test	5
1.4 Product Specification subjective to this standard.....	6
1.5 Modification of EUT	7
1.6 Maximum EIRP Power, Frequency Tolerance, and Emission Designator.....	7
1.7 Testing Location	7
1.8 Applicable Standards	7
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	8
2.1 Test Mode.....	8
2.2 Connection Diagram of Test System	10
2.3 Support Unit used in test configuration	11
2.4 Measurement Results Explanation Example	11
3 TEST RESULT	12
3.1 Conducted Output Power Measurement.....	12
3.2 Peak-to-Average Ratio	14
3.3 Effective Isotropic Radiated Power Measurement	19
3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement.....	22
3.5 Band Edge Measurement.....	27
3.6 Conducted Spurious Emission Measurement.....	29
3.7 Field Strength of Spurious Radiation Measurement	39
3.8 Frequency Stability Measurement.....	44
4 LIST OF MEASURING EQUIPMENT	48
5 UNCERTAINTY OF EVALUATION	49
APPENDIX A. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG4O1525-03	Rev. 01	This is a variant report for Z410. All test cases were performed on original report which can be referred to SPORTON Report Number FG4O1525. Based on the original test report, add WCDMA Band IV for full test.	Apr. 27, 2015

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	Reporting Only	PASS	-
3.2	N/A	Peak-to-Average Ratio	< 13 dB	PASS	-
3.3	§27.50(d)(4)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.4	§2.1049 §27.53(g)	Occupied Bandwidth	Reporting Only	PASS	-
3.5	§2.1051 §27.53(h)	Band Edge Measurement	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	-
3.6	§2.1051 §27.53(h)	Conducted Emission	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	-
3.7	§2.1053 §27.53(h)	Field Strength of Spurious Radiation	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 31.28 dB at 6930.000 MHz
3.8	§2.1055 §27.54	Frequency Stability for Temperature & Voltage	Within Authorized Band	PASS	-

1 General Description

1.1 Applicant

Acer Incorporated

8F., No. 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 22181, Taiwan (R.O.C)

1.2 Manufacturer

Shanghai Sunrise Simcom Limited

No. 888, Shengli Rd., Qingpu, Shanghai, P. R. China 201700

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart HandHeld
Brand Name	Acer
Model Name	Z410
Marketing Name	Liquid Z410
FCC ID	HLZDMZ410
EUT supports Radios application	GSM/GPRS/EGPRS/WCDMA/ HSPA/HSPA+(Downlink Only)/LTE/ WLAN2.4GHz 802.11b/g/n HT20/HT40/ Bluetooth v3.0+EDR/Bluetooth v4.0 LE
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 subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band IV : 2112.4 MHz ~ 2152.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz
Maximum Output Power to Antenna	WCDMA Band IV : 21.22 dBm
Antenna Type	IFA Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA: QPSK (Uplink) HSDPA: QPSK (Uplink) HSUPA: QPSK (Uplink) HSPA+: 16QAM (Downlink Only)

1.5 Modification of EUT

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

1.6 Maximum EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 27	WCDMA Band IV RMC 12.2Kbps	QPSK	0.1219	0.0092 ppm	4M22F9W

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sporton Site No.		FCC Registration No.
	TH01-KS	03CH01-KS	149928

1.8 Applicable Standards

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

- 47 CFR Part 2, 27(L)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

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 v02r02 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Frequency range investigated for radiated emission: 30MHz to 10th harmonic.

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 IV	■ RMC 12.2Kbps Link	■ RMC 12.2Kbps Link

Note: The maximum power levels are chosen to test as the worst case configuration as follows:

GSM mode for GMSK modulation,

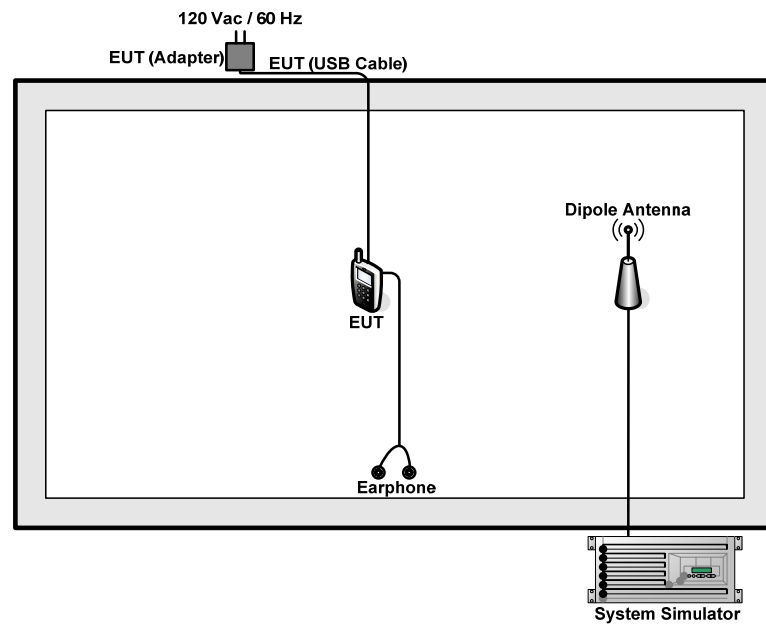
RMC 12.2Kbps mode for WCDMA band IV, the modes were used for all tests.

Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)			
Band	WCDMA Band IV		
Channel	1312	1413	1513
Frequency	1712.4	1732.6	1752.6
AMR 12.2Kbps	21.12	21.21	20.98
RMC 12.2Kbps	21.14	21.22	21.00
HSDPA Subtest-1	20.12	20.17	19.96
HSDPA Subtest-2	20.13	20.19	19.97
HSDPA Subtest-3	19.66	19.72	19.51
HSDPA Subtest-4	19.64	19.71	19.48
HSUPA Subtest-1	18.10	18.15	17.92
HSUPA Subtest-2	18.08	18.14	17.89
HSUPA Subtest-3	19.12	19.19	18.97
HSUPA Subtest-4	17.64	17.69	17.39
HSUPA Subtest-5	20.09	20.15	19.93

2.2 Connection Diagram of Test System

<27L Tx Mode>



2.3 Support Unit used in test configuration

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

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between 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 6 dB and a 10dB attenuator.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 6 + 10 = 16 \text{ (dB)}\end{aligned}$$

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.

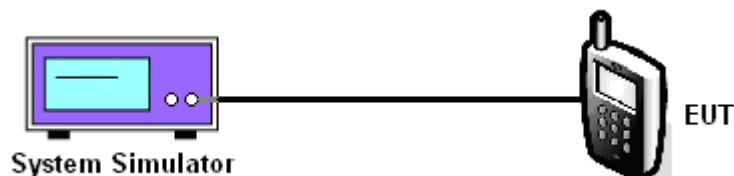
3.1.2 Measuring Instruments

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 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

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)	21.14	21.22	21.00

Note: Maximum burst 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.

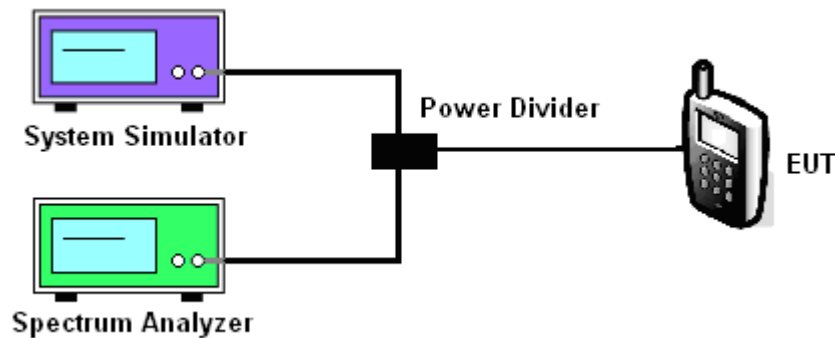
3.2.2 Measuring Instruments

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 v02r02 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



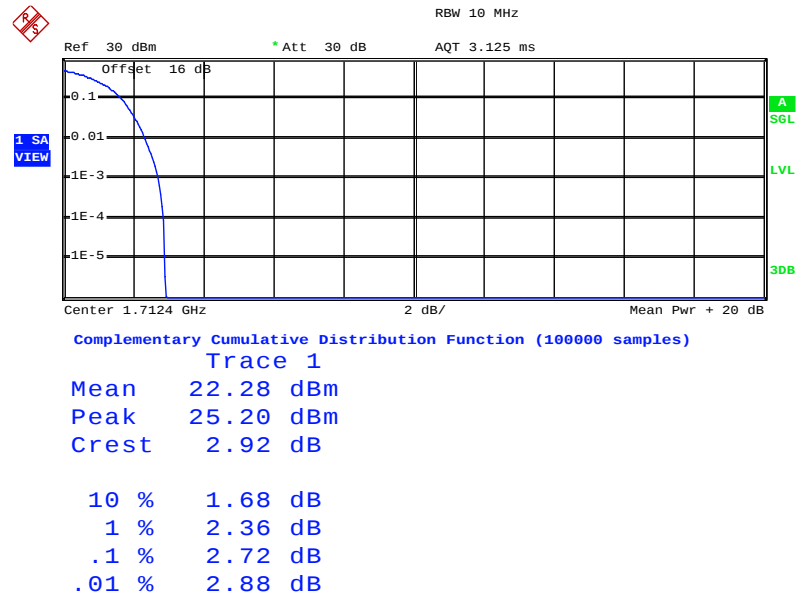
3.2.5 Test Result of Peak-to-Average Ratio

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)	2.72	2.72	2.52

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

Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kbps Link (QPSK)
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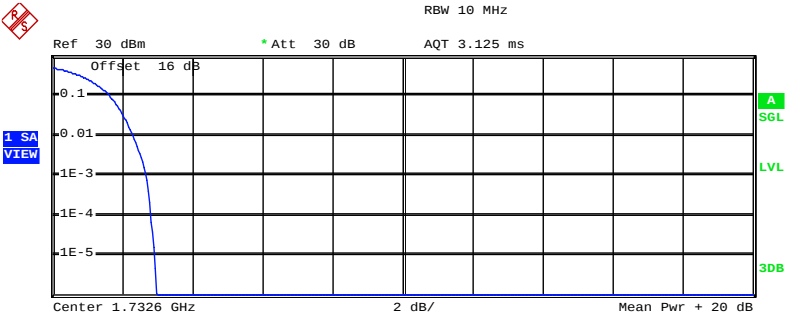
Peak-to-Average Ratio on Channel 1312 (1712.4 MHz)



Date: 23.APR.2015 10:55:04



Peak-to-Average Ratio on Channel 1413 (1732.6 MHz)



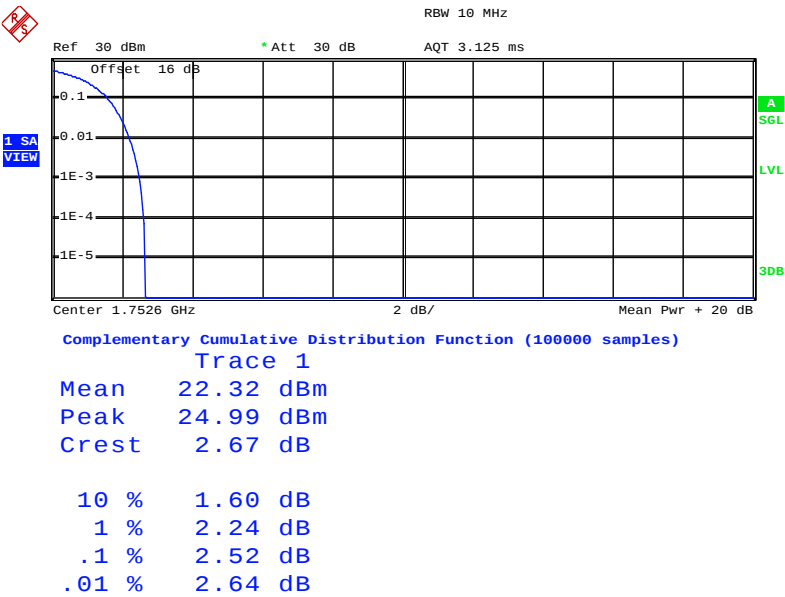
Complementary Cumulative Distribution Function (100000 samples)

Trace 1	
Mean	22.44 dBm
Peak	25.41 dBm
Crest	2.97 dB
10 %	1.68 dB
1 %	2.32 dB
.1 %	2.72 dB
.01 %	2.84 dB

Date: 23.APR.2015 10:55:31



Peak-to-Average Ratio on Channel 1513 (1752.6 MHz)



Date: 23.APR.2015 10:56:04

3.3 Effective Isotropic Radiated Power Measurement

3.3.1 Description of the EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. The EIRP of mobile transmitters are limited to 1 Watts (AWS Band).

3.3.2 Measuring Instruments

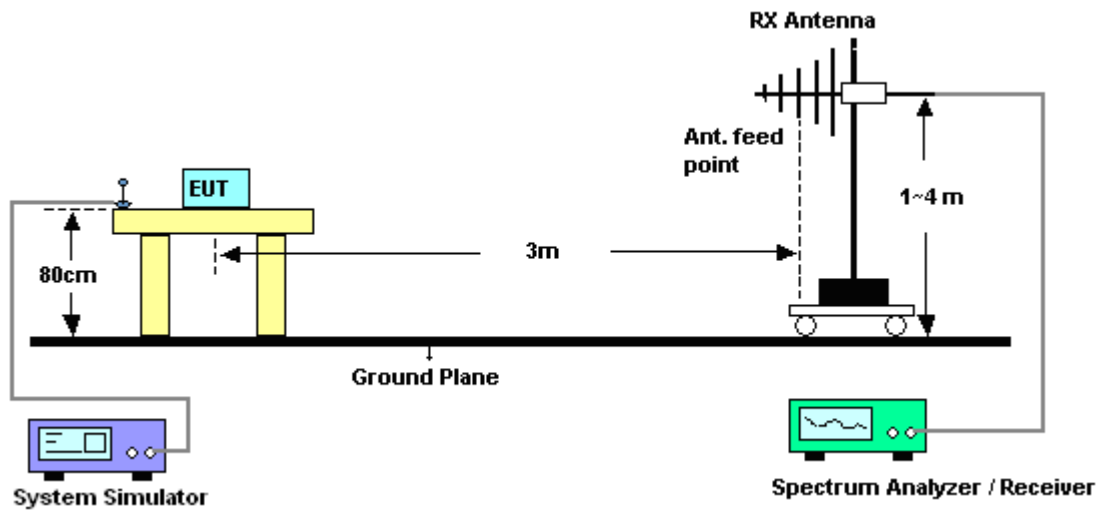
The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 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 the 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 $ERP = EIRP - 2.15$. Take the record of the output power at substitution antenna.

	GSM/GPRS/EDGE	WCDMA/HSPA
SPAN	500kHz	10MHz
RBW	10kHz	100kHz
VBW	30kHz	300kHz
Detector	RMS	RMS
Trace	Average	Average
Average Type	Power	Power
Sweep Count	100	100

3.3.4 Test Setup



3.3.5 Test Result of EIRP

WCDMA Band IV(RMC 12.2Kbps) Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1712.40	19.24	0.0839	18.37	0.0687
Middle	1732.60	19.84	0.0964	20.86	0.1219
Highest	1752.60	19.75	0.0944	17.04	0.0506
Limit	EIRP < 1W	Result		PASS	

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.

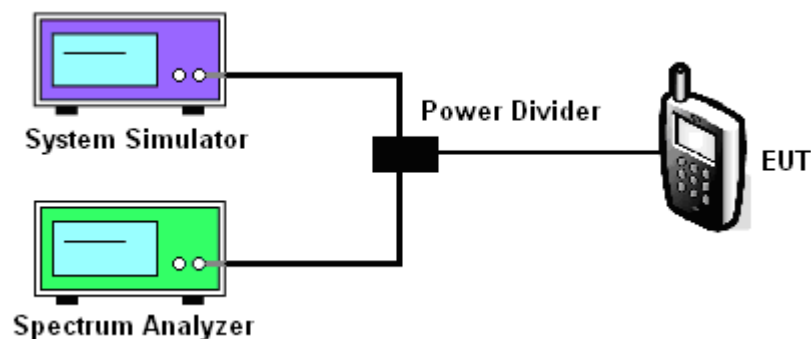
3.4.2 Measuring Instruments

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 v02r02 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, peak 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



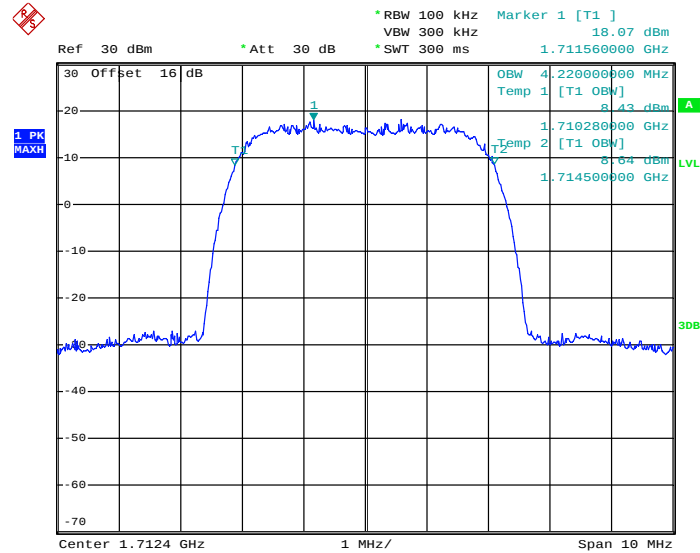
3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

AWS Band			
Modes	WCDMA Band IV (RMC 12.2Kbps)		
Channel	1312(Low)	1413 (Mid)	1513 (High)
Frequency (MHz)	1712.4	1732.6	1752.6
99% OBW (MHz)	4.22	4.22	4.22
26dB BW (MHz)	4.86	4.86	4.90

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

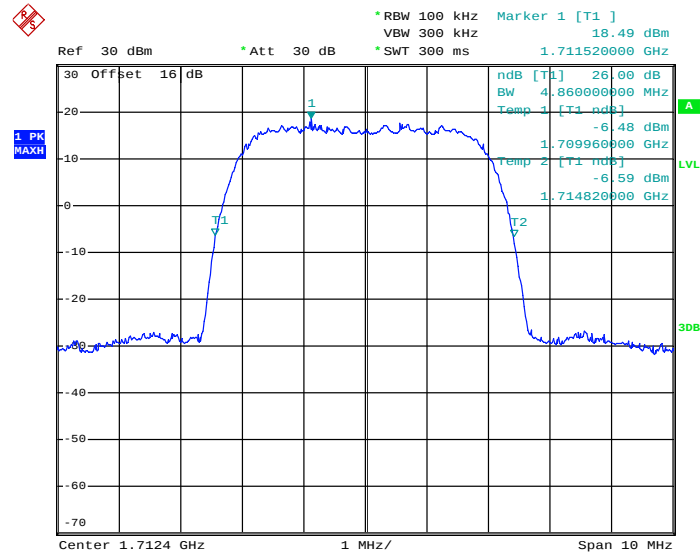
Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kbps Link (QPSK)
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99% Occupied Bandwidth Plot on Channel 1312 (1712.4 MHz)



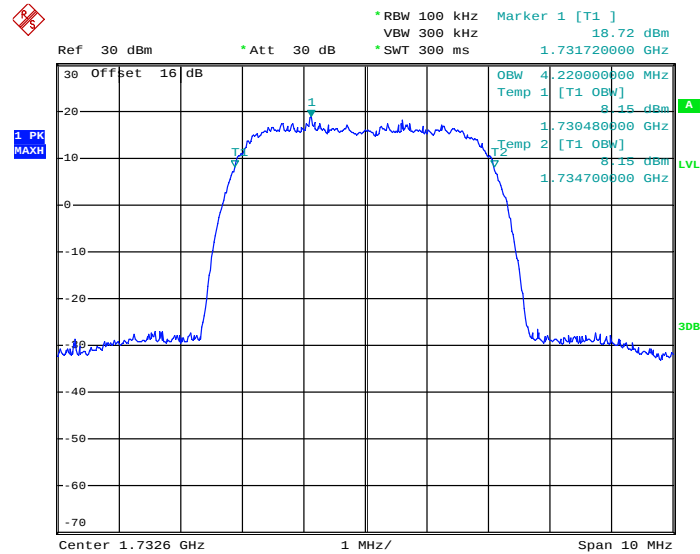
Date: 23.APR.2015 10:46:23

26dB Bandwidth Plot on Channel 1312 (1712.4 MHz)



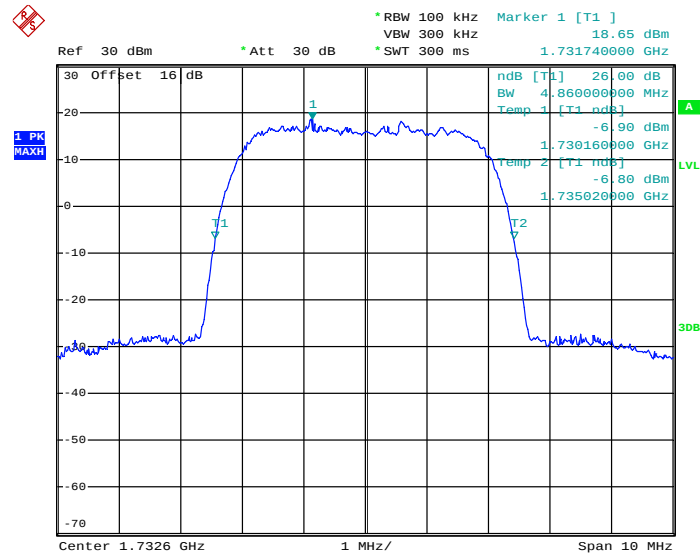
Date: 23.APR.2015 10:42:29

99% Occupied Bandwidth Plot on Channel 1413 (1732.6 MHz)



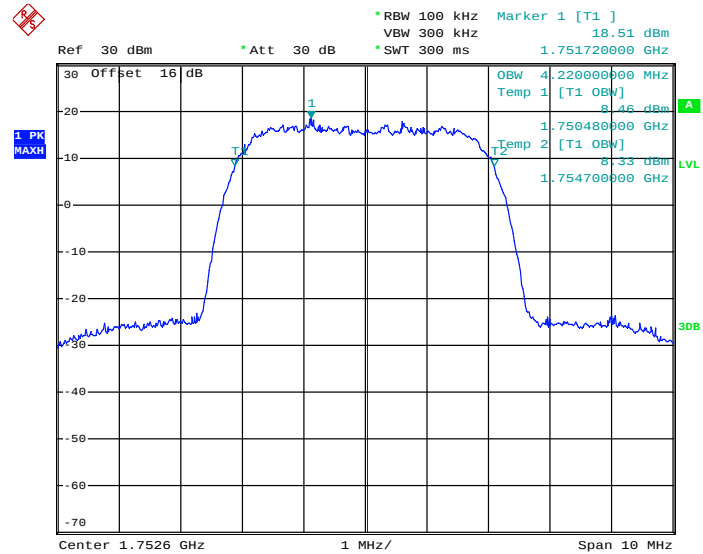
Date: 23.APR.2015 10:46:00

26dB Bandwidth Plot on Channel 1413 (1732.6 MHz)



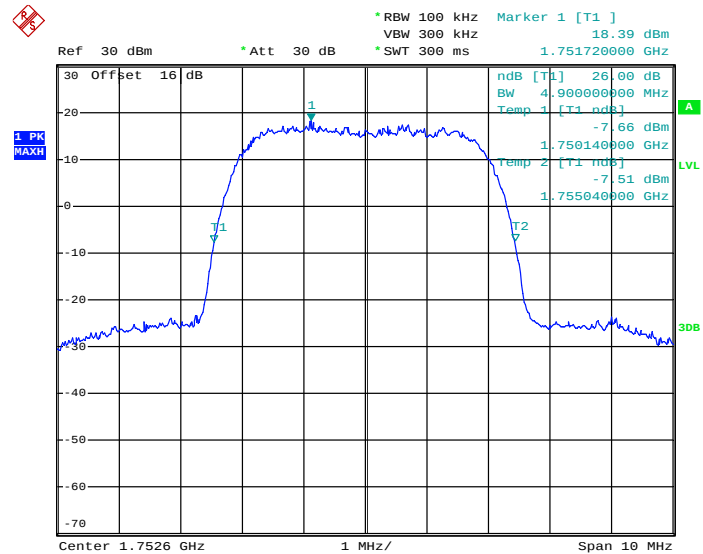
Date: 23.APR.2015 10:41:54

99% Occupied Bandwidth Plot on Channel 1513 (1752.6 MHz)



Date: 23.APR.2015 10:45:30

26dB Bandwidth Plot on Channel 1513 (1752.6 MHz)



Date: 23.APR.2015 10:43:06

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.

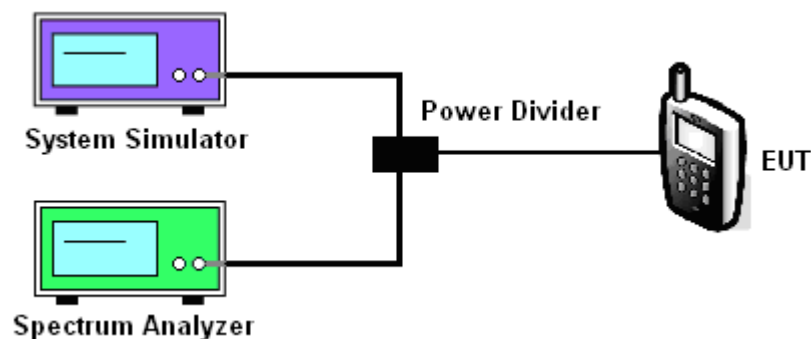
3.5.2 Measuring Instruments

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 v02r02 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)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

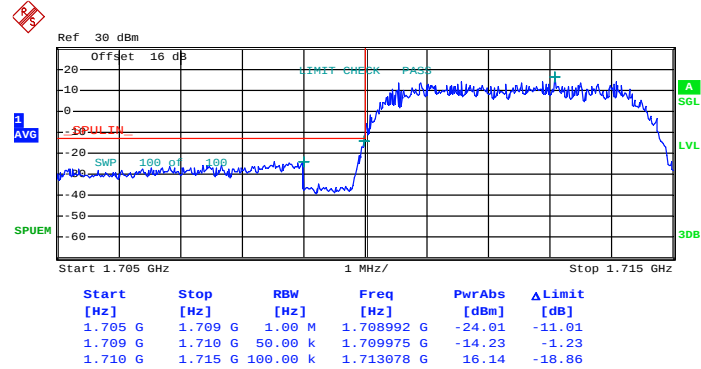
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

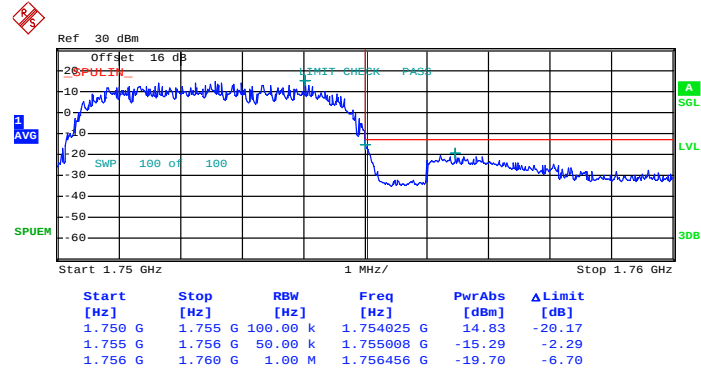
Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kbps Link (QPSK)
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Lower Band Edge Plot on Channel 1312 (1712.4 MHz)



Date: 23.APR.2015 10:53:31

Higher Band Edge Plot on Channel 1513 (1752.6 MHz)



Date: 23.APR.2015 10:51:04

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.

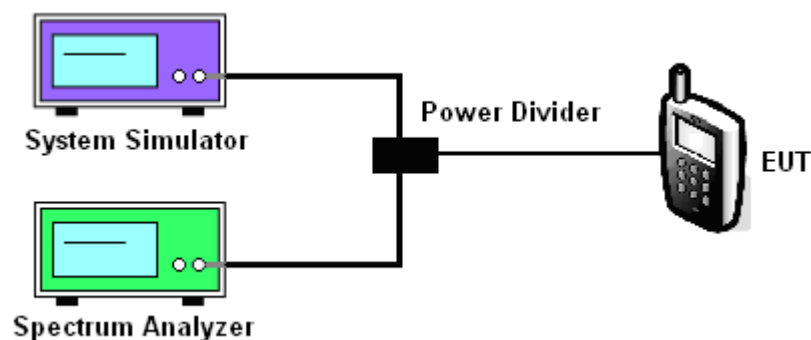
3.6.2 Measuring Instruments

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 v02r02 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)
 $= -13\text{dBm}$.

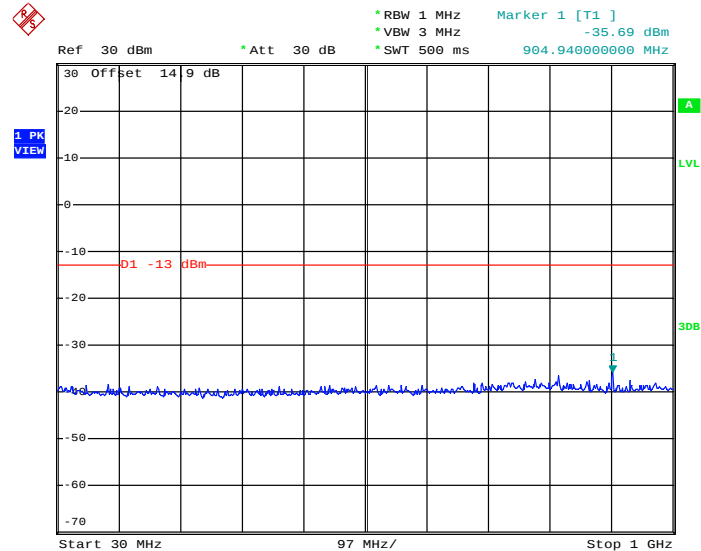
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

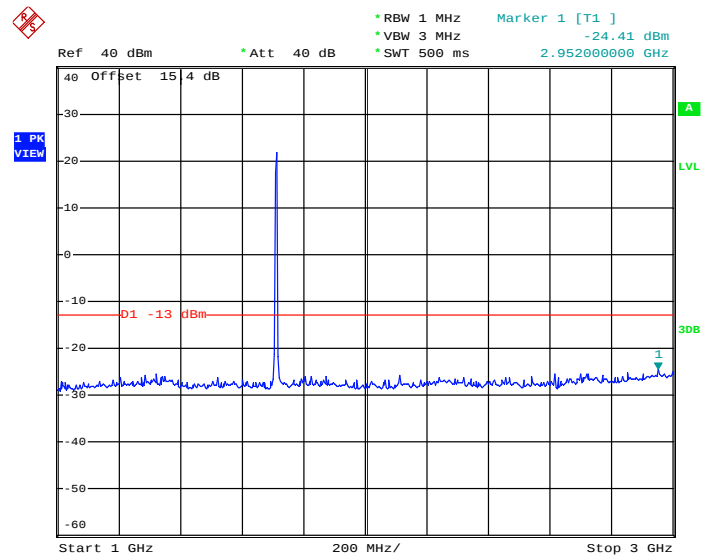
Band :	WCDMA Band IV	Channel :	CH1312
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	1712.4 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



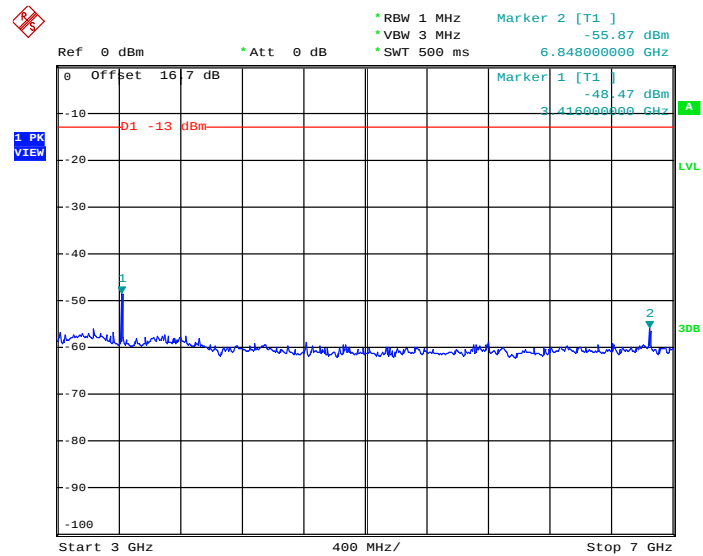
Date: 23.APR.2015 11:14:32

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



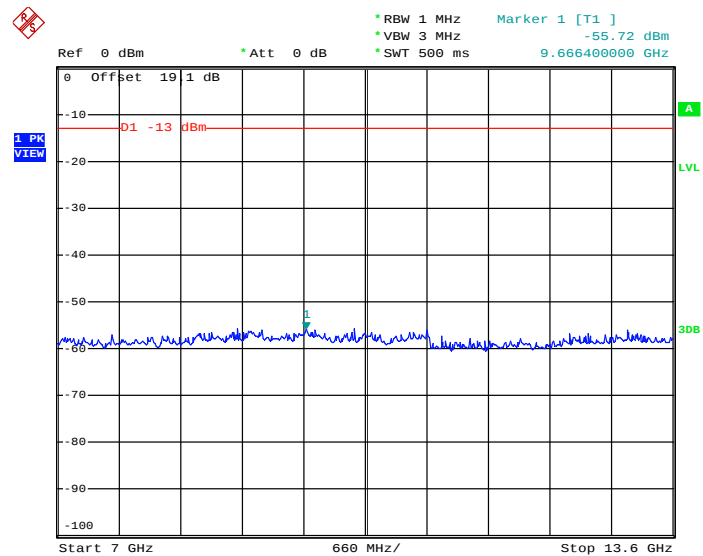
Date: 23.APR.2015 11:15:53

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 23.APR.2015 11:16:49

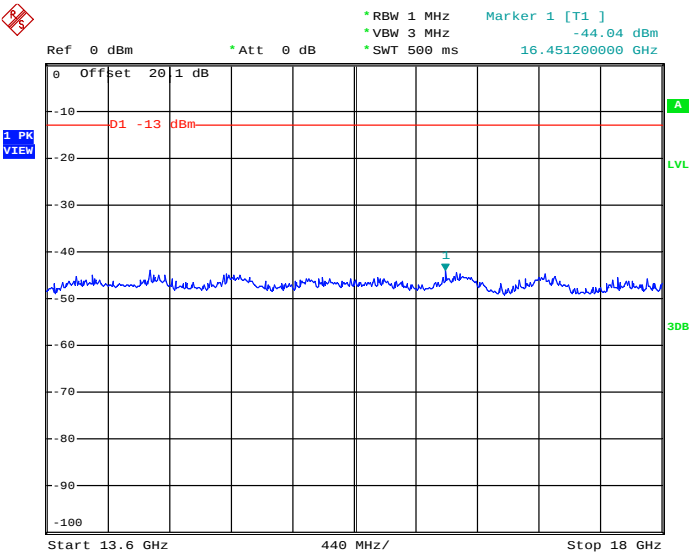
Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 23.APR.2015 11:17:38



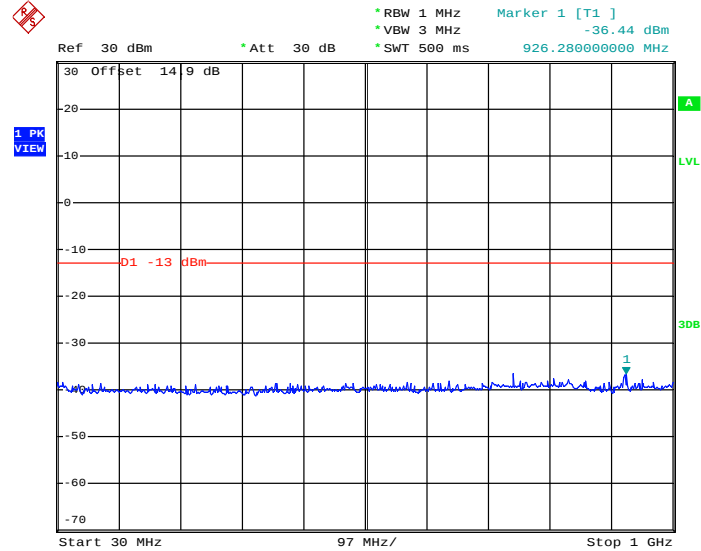
Conducted Spurious Emission Plot between 13.6GHz ~ 18GHz



Date: 23.APR.2015 11:18:20

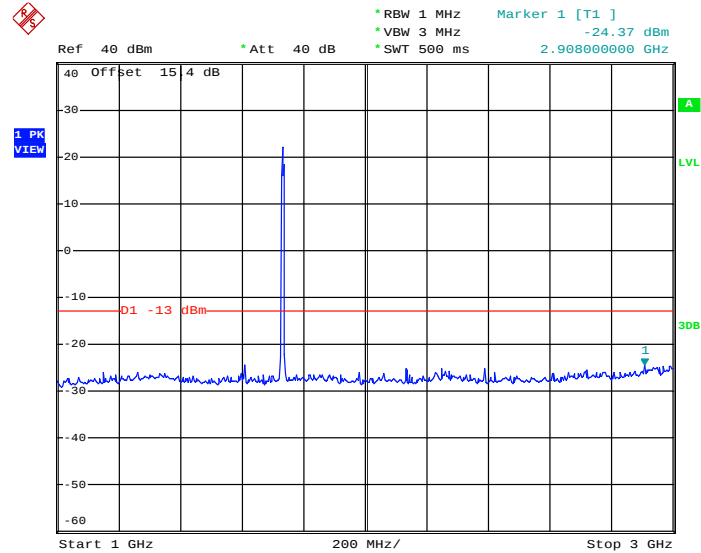
Band :	WCDMA Band IV	Channel :	CH1413
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	1732.6 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



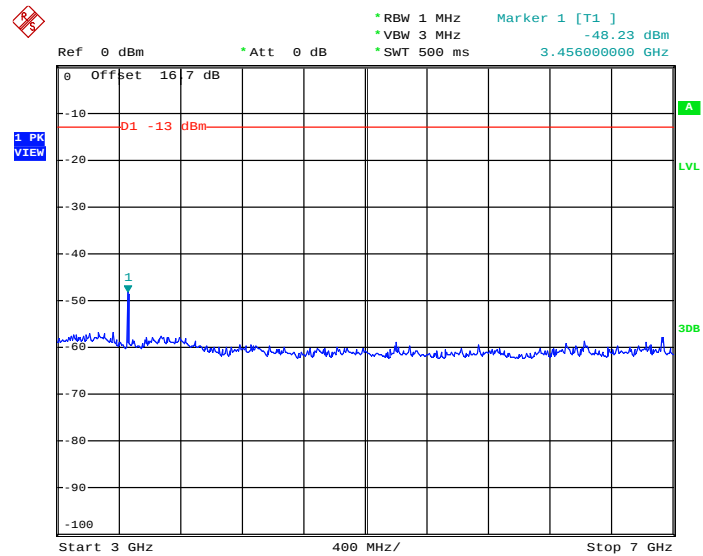
Date: 23.APR.2015 11:03:02

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



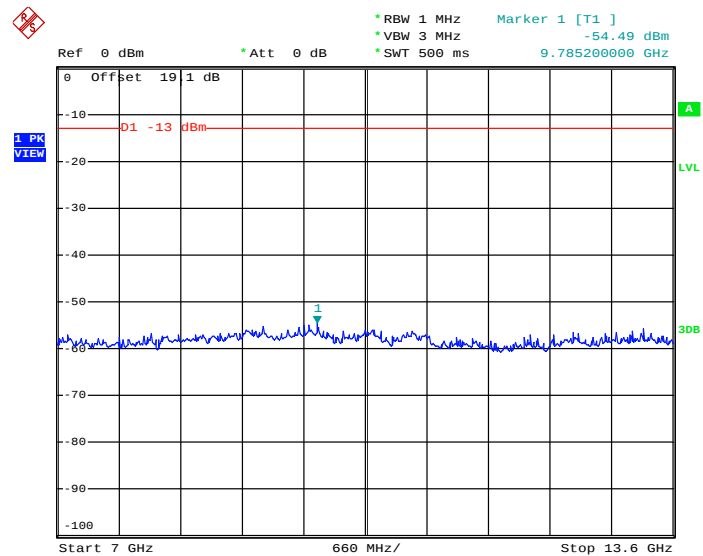
Date: 23.APR.2015 11:04:02

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



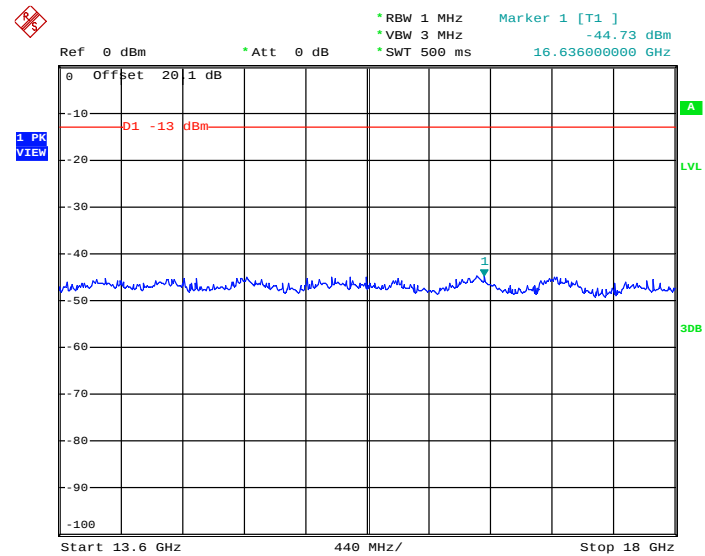
Date: 23.APR.2015 11:05:43

Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



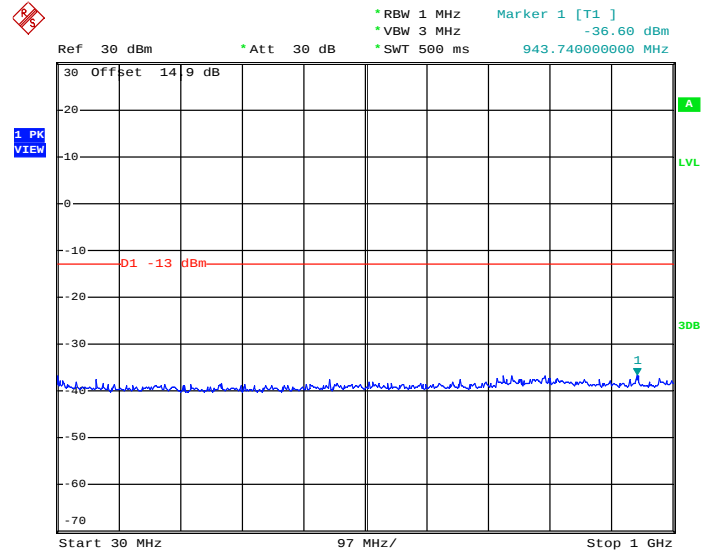
Date: 23.APR.2015 11:06:28

Conducted Spurious Emission Plot between 13.6GHz ~ 18GHz

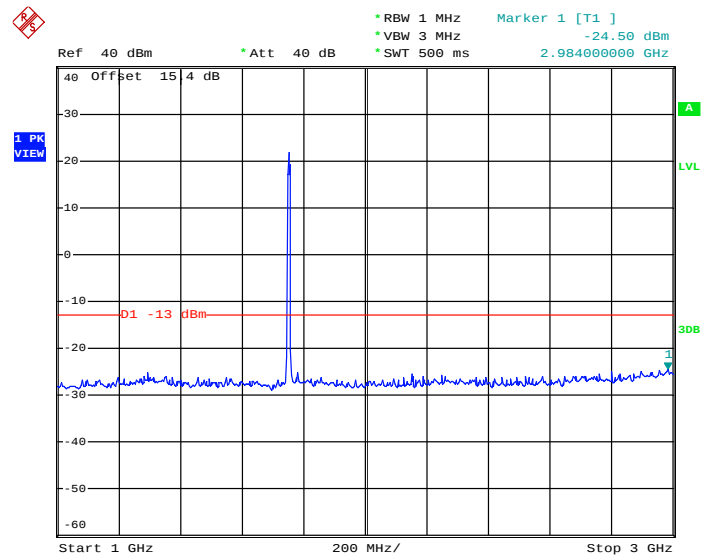


Date: 23.APR.2015 11:04:43

Band :	WCDMA Band IV	Channel :	CH1513
Test Mode :	RMC 12.2Kbps Link (QPSK)	Frequency :	1752.6 MHz

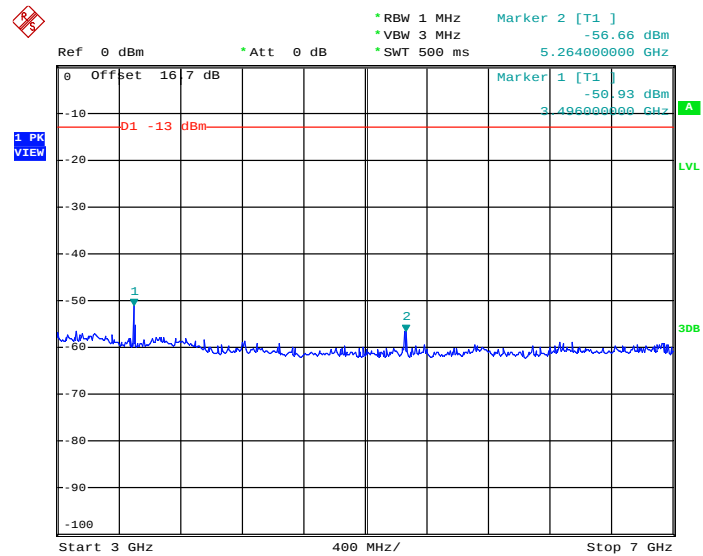
Conducted Spurious Emission Plot between 30MHz ~ 1GHz


Date: 23.APR.2015 10:57:50

Conducted Spurious Emission Plot between 1GHz ~ 3GHz


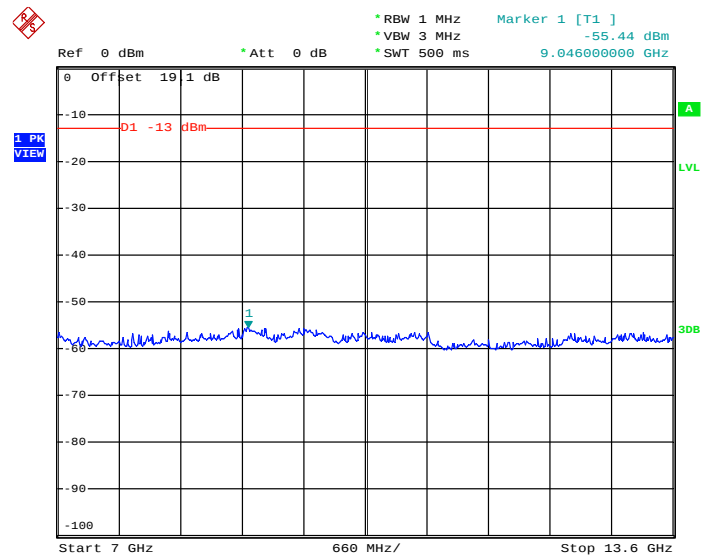
Date: 23.APR.2015 10:58:53

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 23.APR.2015 11:00:10

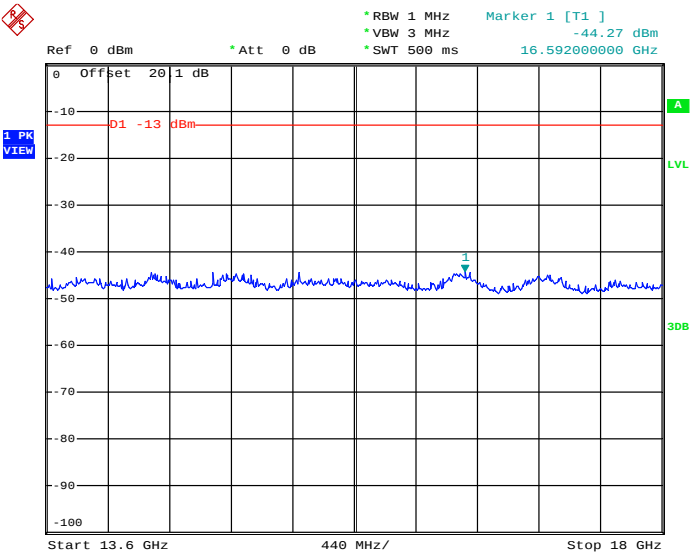
Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 23.APR.2015 11:00:54



Conducted Spurious Emission Plot between 13.6GHz ~ 18GHz



Date: 23.APR.2015 11:01:49

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

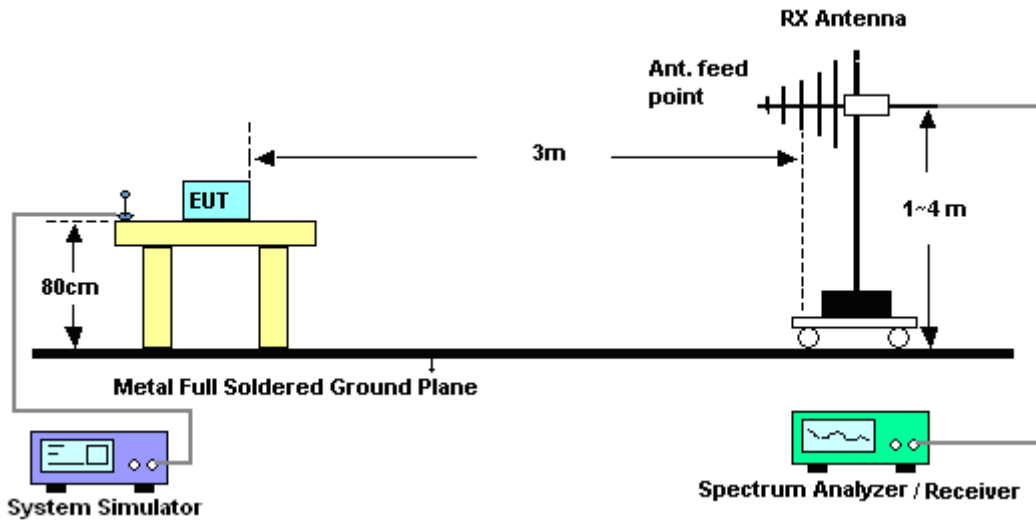
The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedures

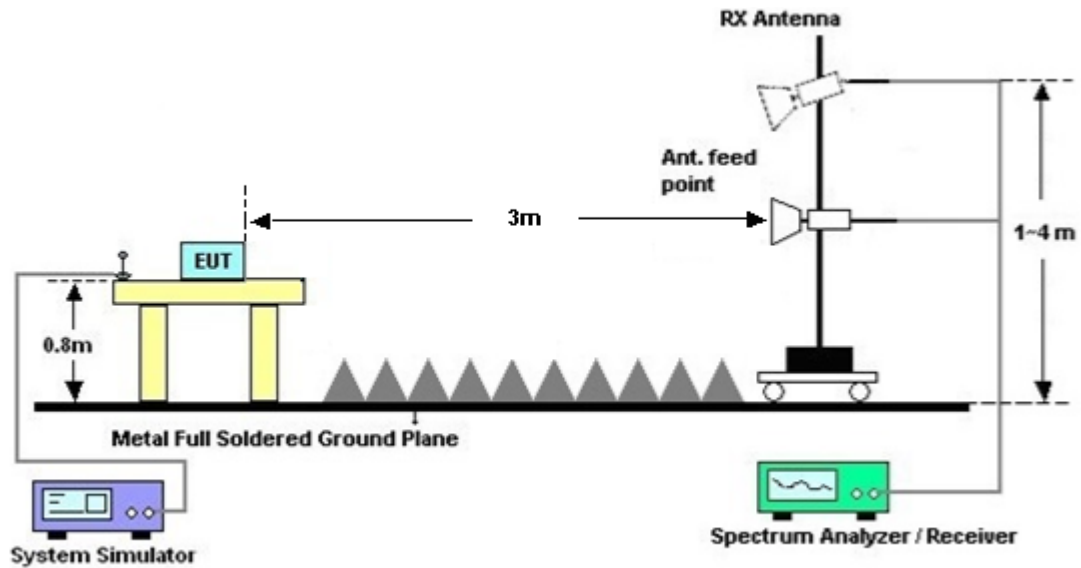
1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 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 IV for CH1312					Temperature :	24~25°C		
Test Mode :	RMC 12.2Kbps Link (QPSK)					Relative Humidity :	49~51%		
Test Engineer :	Issac Song					Polarization :	Horizontal		
Remark :	Spurious emissions below 1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	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)	
3426	-51.50	-13	-38.50	-65.63	-55.87	3.12	7.49	H	Pass
5137.2	-49.11	-13	-36.11	-62.26	-54.91	3.65	9.45	H	Pass
6849	-45.02	-13	-32.02	-61.88	-52.22	4.15	11.35	H	Pass

Band :	WCDMA Band IV for CH1312	Temperature :	24~25°C						
Test Mode :	RMC 12.2Kbps Link (QPSK)	Relative Humidity :	49~51%						
Test Engineer :	Issac Song	Polarization :	Vertical						
Remark :	Spurious emissions below 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)	
3426	-52.40	-13	-39.40	-65.22	-56.77	3.12	7.49	V	Pass
5137.2	-48.32	-13	-35.32	-62.33	-54.12	3.65	9.45	V	Pass
6849	-47.11	-13	-34.11	-62.36	-54.31	4.15	11.35	V	Pass



Band :	WCDMA Band IV for CH1413	Temperature :	24~25℃						
Test Mode :	RMC 12.2Kbps Link (QPSK)	Relative Humidity :	49~51%						
Test Engineer :	Issac Song	Polarization :	Horizontal						
Remark :	Spurious emissions below 1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	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)	
3465	-48.88	-13	-35.88	-63.01	-53.25	3.12	7.49	H	Pass
5199	-46.48	-13	-33.48	-59.63	-52.28	3.65	9.45	H	Pass
6930	-44.28	-13	-31.28	-61.14	-51.48	4.15	11.35	H	Pass

Band :	WCDMA Band IV for CH1413	Temperature :	24~25°C						
Test Mode :	RMC 12.2Kbps Link (QPSK)	Relative Humidity :	49~51%						
Test Engineer :	Issac Song	Polarization :	Vertical						
Remark :	Spurious emissions below 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)	
3465	-50.66	-13	-37.66	-63.48	-55.03	3.12	7.49	V	Pass
5197.8	-47.59	-13	-34.59	-61.6	-53.39	3.65	9.45	V	Pass
6930	-46.41	-13	-33.41	-61.66	-53.61	4.15	11.35	V	Pass



Band :	WCDMA Band IV for CH1513	Temperature :	24~25℃						
Test Mode :	RMC 12.2Kbps Link (QPSK)	Relative Humidity :	49~51%						
Test Engineer :	Issac Song	Polarization :	Horizontal						
Remark :	Spurious emissions below 1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	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)	
3504	-50.98	-13	-37.98	-65.11	-55.35	3.12	7.49	H	Pass
5257.8	-48.76	-13	-35.76	-61.91	-54.56	3.65	9.45	H	Pass
7011	-44.36	-13	-31.36	-61.22	-51.56	4.15	11.35	H	Pass

Band :	WCDMA Band IV for CH1513	Temperature :	24~25°C						
Test Mode :	RMC 12.2Kbps Link (QPSK)	Relative Humidity :	49~51%						
Test Engineer :	Issac Song	Polarization :	Vertical						
Remark :	Spurious emissions below 1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit	Reading	Power	loss	Gain		
			(dB)	(dBm)	(dBm)	(dB)	(dBi)	(H/V)	
3504	-51.89	-13	-38.89	-64.71	-56.26	3.12	7.49	V	Pass
5257.8	-47.68	-13	-34.68	-61.69	-53.48	3.65	9.45	V	Pass
7011	-45.97	-13	-32.97	-61.22	-53.17	4.15	11.35	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.

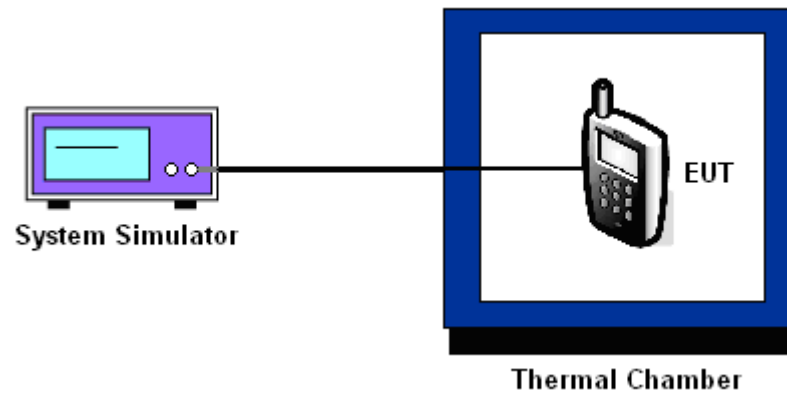
3.8.3 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 v02r02 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°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°C steps 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.

3.8.4 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r02 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

Band :	WCDMA Band IV	Channel :	1413
Limit (ppm) :	within authorized band	Frequency :	1732.6 MHz

Temperature (°C)	RMC 12.2Kbps		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
50	-33	0.0087	PASS
40	-24	0.0035	
30	-21	0.0017	
20(Ref.)	-18	0.0000	
10	-23	0.0029	
0	-27	0.0052	
-10	-28	0.0058	
-20	-30	0.0069	
-30	-34	0.0092	

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 IV CH1413	RMC 12.2Kbps	4.35	-12	0.0035	(Note 3.)	PASS
		3.80	-11	0.0040		
		BEP	-13	0.0029		

Note:

1. Normal Voltage = 3.80V.
2. Battery End Point (BEP) = 3.60 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	100319	9kHz~40GHz	Oct. 28, 2014	Mar. 23, 2015~ Apr. 23, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014	Mar. 23, 2015~ Apr. 23, 2015	Oct. 24, 2015	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Oct. 25, 2014	Apr. 22, 2015	Oct. 24, 2015	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	101399	9kHz~30GHz	May 04, 2014	Apr. 22, 2015	May 03, 2015	Radiation (03CH01-KS)
Bilog Antenna	TeseQ	CBL6112D	23182	25MHz~2GHz	Jan. 17, 2015	Apr. 22, 2015	Jan. 16, 2016	Radiation (03CH01-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	Apr. 22, 2015	Nov. 07, 2015	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	Apr. 22, 2015	Nov. 07, 2015	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Mar. 03, 2015	Apr. 22, 2015	Mar. 02, 2016	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161073	1MHz~1GHz	May 04, 2014	Apr. 22, 2015	May 03, 2015	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02371	1GHz~26.5GHz	Oct. 28, 2014	Apr. 22, 2015	Oct. 27, 2015	Radiation (03CH01-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Apr. 22, 2015	NCR	Radiation (03CH01-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Apr. 22, 2015	NCR	Radiation (03CH01-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Apr. 22, 2015	NCR	Radiation (03CH01-KS)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.5dB
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