Registration
No.910917

TEST REPORT FOR RF TESTING

Report No.: SRTC2016-9004(F)-0002

Product Name: GSM/GPRS/EDGE/UMTS/LTE Digital Mobile Phone with Bluetooth and WiFi

Product Model: Philips Xenium V787

Applicant: Shenzhen Sang Fei Consumer Communications Co.,Ltd.

Manufacturer: Shenzhen Sang Fei Consumer Communications Co.,Ltd.

Specification: FCC Part 24E, Part 22H, Part 2 (August 20, 2015 edition)

FCC ID: VQRCTV787

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-57996181 Fax: 86-10-57996288

CONTENTS

1. GENERAL INFORMATION 2

1.1 Notes of the test report 2
1.2 Information about the testing laboratory 2
1.3 Applicant's details 2
1.4 Manufacturer's details 2
1.5 Test Environment 3

2 DESCRIPTION OF THE DEVICE UNDER TEST 4

2.1 Final Equipment Build Status 4
2.2 Support Equipment 5

3 REFERENCE SPECIFICATION 6

4 KEY TO NOTES AND RESULT CODES 7

5 RESULT SUMMARY 8

6 TEST RESULT 9

6.1 WCDMA Band II 9
6.2 WCDMA Band V 32

7 MEASUREMENT UNCERTAINTIES 54

8 TEST EQUIPMENTS 55

APPENDIX 56

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1. GENERAL INFORMATION

1.1 Notes of the test report

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The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	No.80 Beilishi Road, Xicheng District
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liujia
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Email:	liujiaf@srtc.org.cn

1.3 Applicant's details

Company:	Shenzhen Sang Fei Consumer Communications Co.,Ltd.
Address:	11 Science & Technology Rd., Shenzhen Hi-tech Industrial Park, Nanshan District
City:	Shenzhen
Country or Region:	China
Grantee Code:	VQR
Contacted person:	linda zhang
Tel:	010-68300097
Fax:	010-68300097
Email:	linda.zhang@sangfei.com

1.4 Manufacturer's details

Company:	Shenzhen Sang Fei Consumer Communications Co.,Ltd.
Address:	11 Science & Technology Rd., Shenzhen Hi-tech Industrial Park, Nanshan District
City:	Shenzhen
Country or Region:	China
Contacted person:	linda zhang
Tel:	010-68300097
Fax:	010-68300097
Email:	linda.zhang@sangfei.com

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1.5 Test Environment

Date of Receipt of test sample at SRTC:	2016.01.21
Testing Start Date:	2016.01.25
Testing End Date:	2016.01.26

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	38
Maximum Extreme	55	80
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	3.80
Maximum Extreme Supply Voltage (V d.c.):	4.35
Minimum Extreme Supply Voltage (V d.c.):	3.50

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2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Frequency Range	WCDMA Band II: Tx:1850~1910MHz Rx:1930~1990MHz WCDMA Band V: Tx:824~849MHz Rx:869~894MHz
Rated Output Power	WCDMA Band II:22.5dBm WCDMA Band V:22.5dBm
Modulation Type	QPSK
Emission Designator	4M20F9W
Duplex Mode	FDD
Duplex Spacing	WCDMA Band II:80MHz WCDMA Band V:45MHz
Antenna Type	Fixed Internal
Power Supply	Battery
HW Version	WMCVc
SW Version	Philips_V787_1553_V01_AG_FCC
IMEI	866636024833059

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2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Equipment	Battery
Manufacturer	Zhongshan Tianmao Battery Co.
Model Number	AB5000AWML
Serial Number	---

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3 REFERENCE SPECIFICATION

Specification	Version	Title
2.1046	July 7, 1998	Measurements required: RF power output.
2.1049	July 7, 1998	Measurements required: Occupied bandwidth.
2.1051	July 7, 1998	Measurements required: Spurious emissions at antenna terminals.
2.1053	July 7, 1998	Measurements required: Field strength of spurious radiation.
2.1055	Dec. 9, 2003	Measurements required: Frequency stability.
22.355	Oct. 17, 1996	Frequency tolerance.
22.913	Dec. 15, 2004	Effective radiated power limits.
22.917	Dec. 17, 2002	Emission limitations for cellular equipment.
24.232	May 2, 2008	Power and antenna height limits.
24.235	N/A	Frequency stability.
24.238	Dec. 17, 2002	Emission limitations for Broadband PCS equipment.

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4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
N/T	Test case is not tested.
NTC	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

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5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	RF Power Output	22.913(a)/24.232(b)	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)/24.232(b)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	22.917(b)/24.238(b)	Pass
5	Spurious Emissions at antenna terminal	2.1051/22.917/24.238	Pass
6	Band Edges Compliance	22.917(b)/24.238(b)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	Radiated Spurious Emissions	2.1053/22.917(a)/24.238	Pass

This Test Report Is Issued by: Mr.Tao Hongbo	Checked by: Mr. Li Boyu
Tested by: Mr. Jiang Shuo	Issued date: 2016/3/23

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6 TEST RESULT

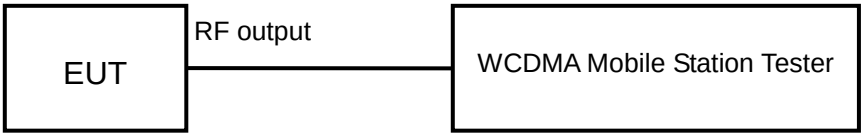
6.1 WCDMA Band II

6.1.1 RF Power Output-FCC Part24.232(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band II)

Limits	≤24.0dBm

Test result:.
WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	22.51
1880.0	9400	22.50
1907.6	9538	22.22

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HSDPA/HSUPA Mode:

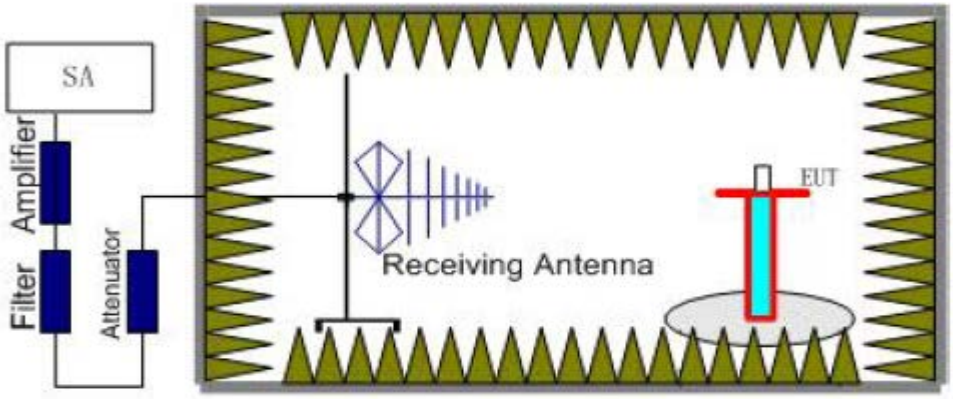
Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	22.46
1880.0	9400	22.47
1907.6	9538	22.48

6.1.2 Effective Radiated Power-FCC Part24.232(b)

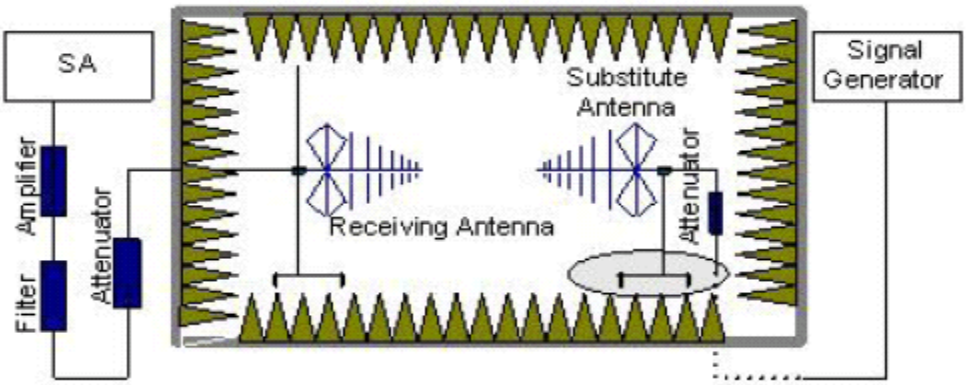
Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test setup:



Step 1



Step 2

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Test procedure:
The measurements procedures in TIA-603C-2004 are used.
Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

The measurement results are obtained as described below:
Power (EIRP) = Pmea+ Pca+ Ga

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

The measurement will be done at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band II)

Limits	≤33.0dBm

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Test result:

WCMDA Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1852.4	23.07	-5.00	8.60	19.47	Vertical
1880.0	23.50	-5.00	8.60	19.90	Vertical
1907.6	23.77	-5.00	8.60	20.17	Vertical

HSDPA/HSUPA Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1852.4	22.16	-5.00	8.60	18.56	Vertical
1880.0	22.14	-5.00	8.60	18.54	Vertical
1907.6	22.30	-5.00	8.60	18.70	Vertical

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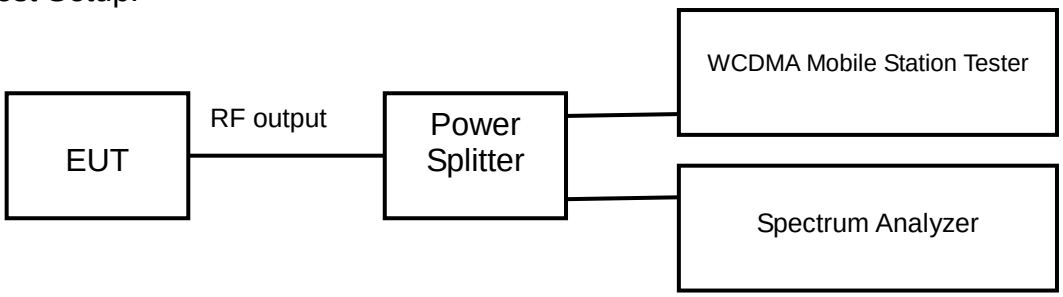
6.1.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band II)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.212
1880.0	9400	4.218
1907.6	9538	4.206

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.212
1880.0	9400	4.212
1907.6	9538	4.215

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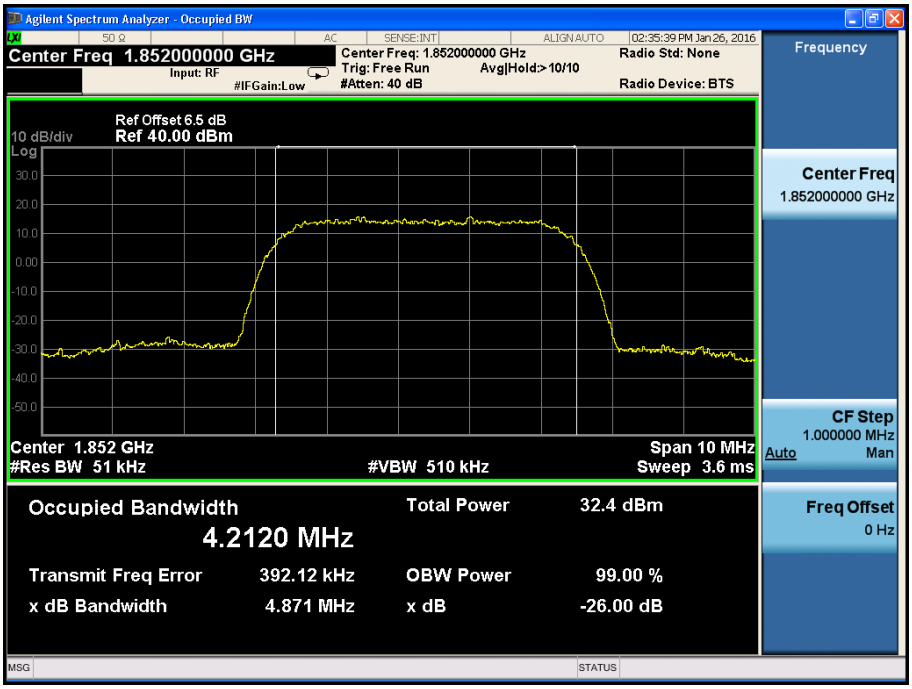
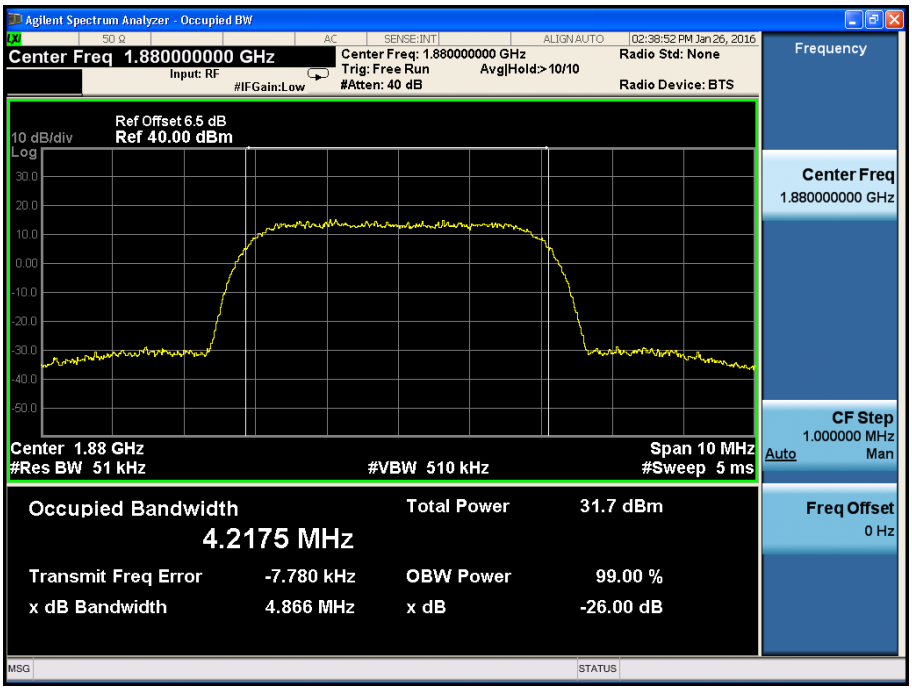
WCDMA Mode:



Channel 9262



Channel 9400

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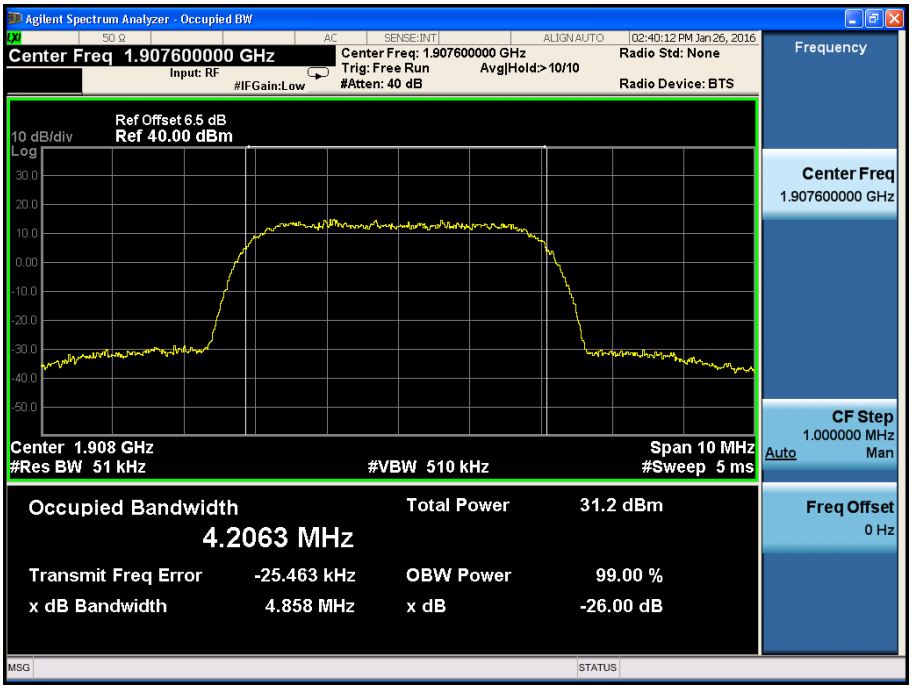
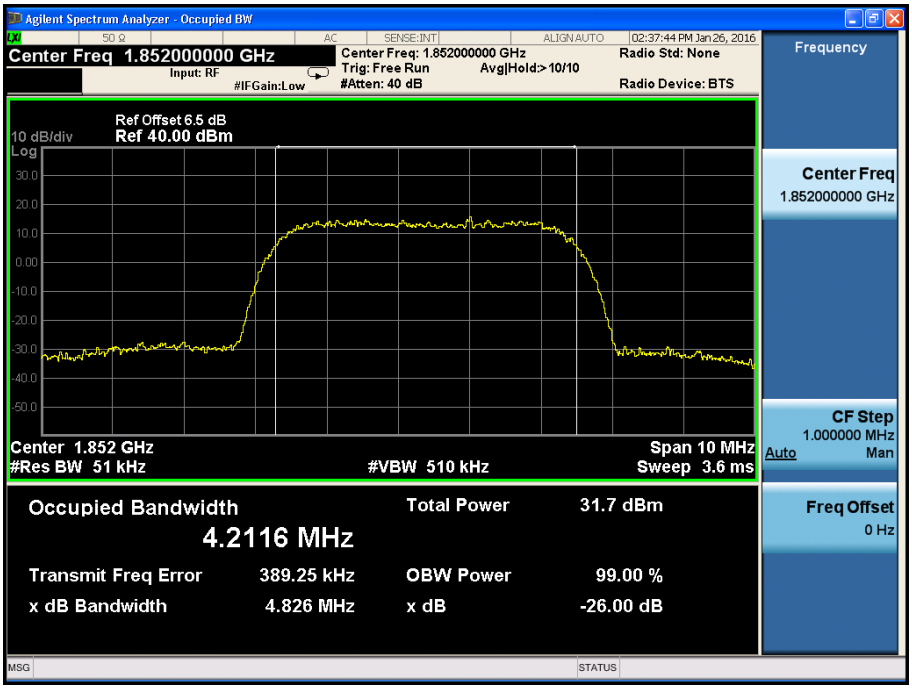


Channel 9538

HSDPA/HSUPA Mode:



Channel 9262

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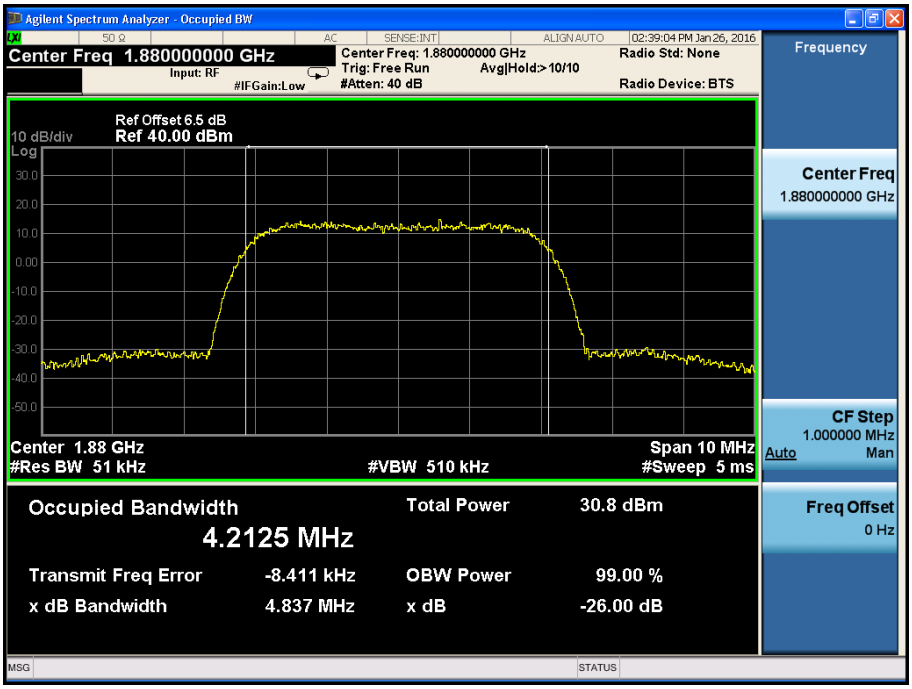
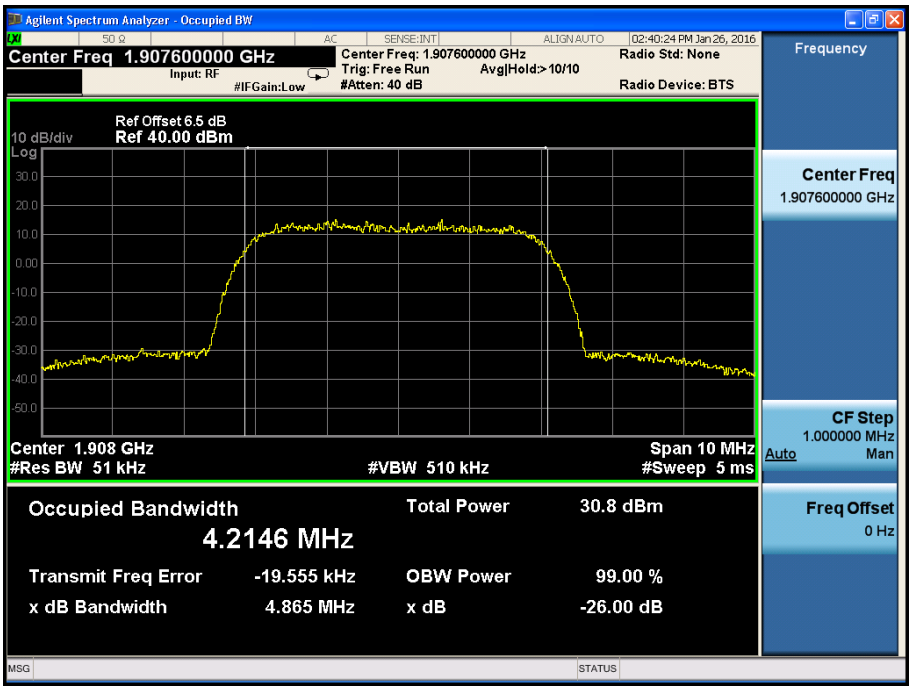


Channel 9400



Channel 9538

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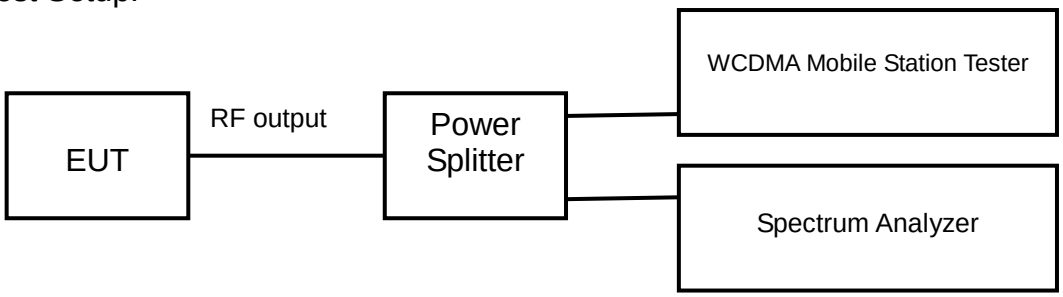
6.1.4 Emission Bandwidth-FCC Part24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of -26dBc power can be read on spectrum analyzer.

The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band V)

Limits: No specific emission bandwidth requirements in part 22.917(b)

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.871
1880.0	9400	4.866
1907.6	9538	4.858

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.826
1880.0	9400	4.837
1907.6	9538	4.865

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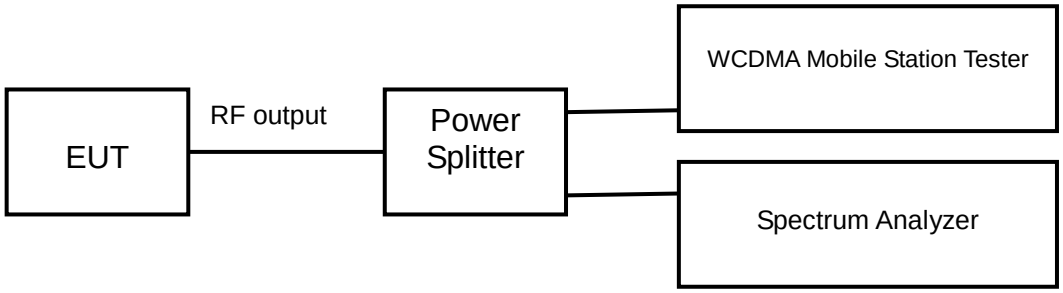
6.1.5 Spurious Emissions at antenna terminal-FCC Part2.1051/24.238

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 9GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

The measurement will be conducted at one channel No4183 (middle channel of WCDMA band V)

Limits	≤-13.0dBm

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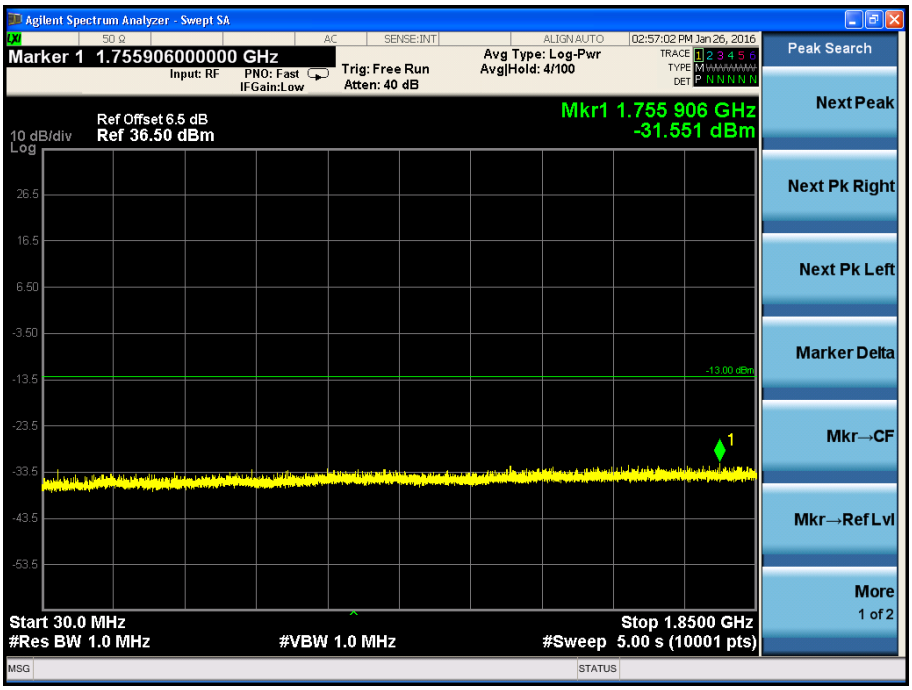
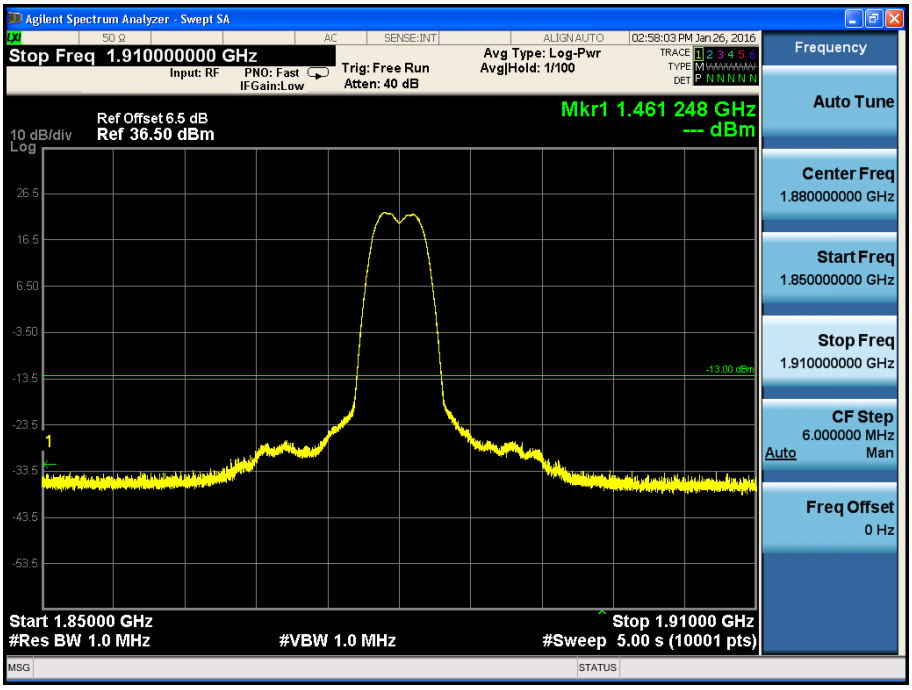
Test result:
Refer to the following figures.

WCDMA Mode:



Channel 9400, 30MHz~1850MHz



Channel 9400, 1850MHz~1910MHz

Note: The signal beyond the limit is the base station simulator carrier.

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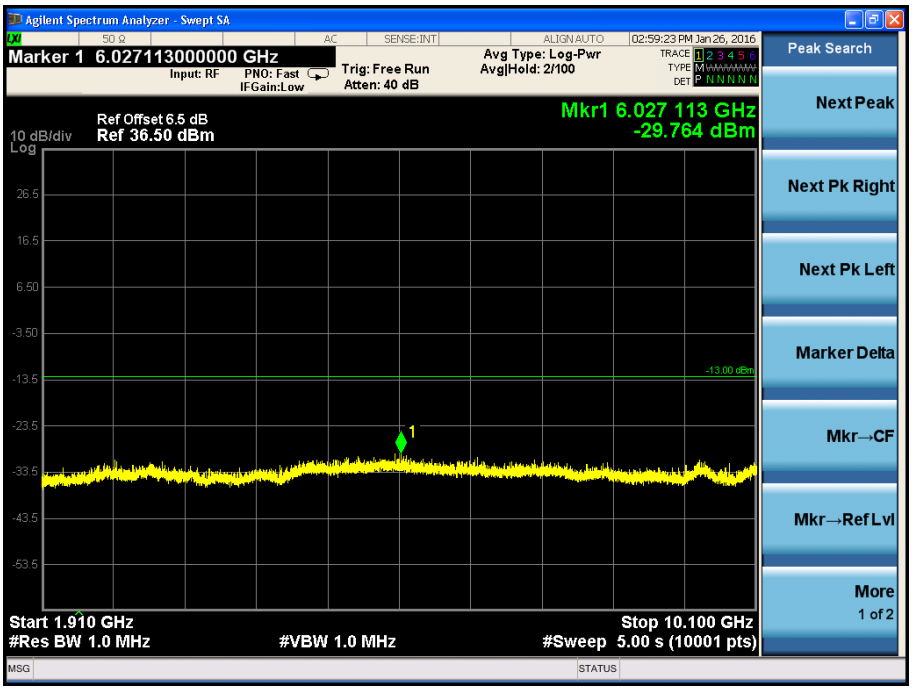
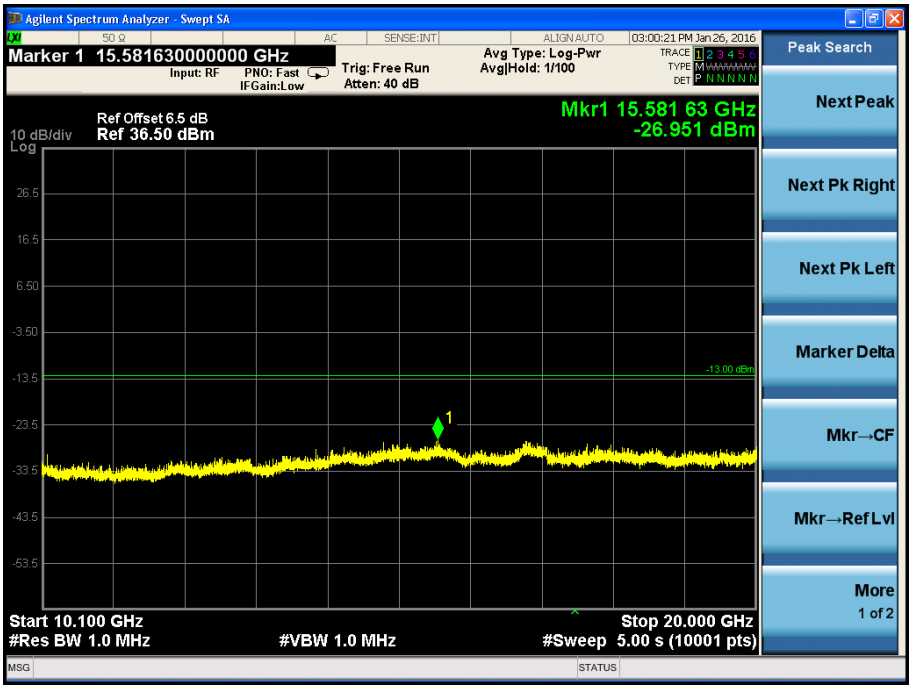


Channel 9400, 1910MHz~10.1GHz



Channel 9400, 10.1 GHz ~20GHz

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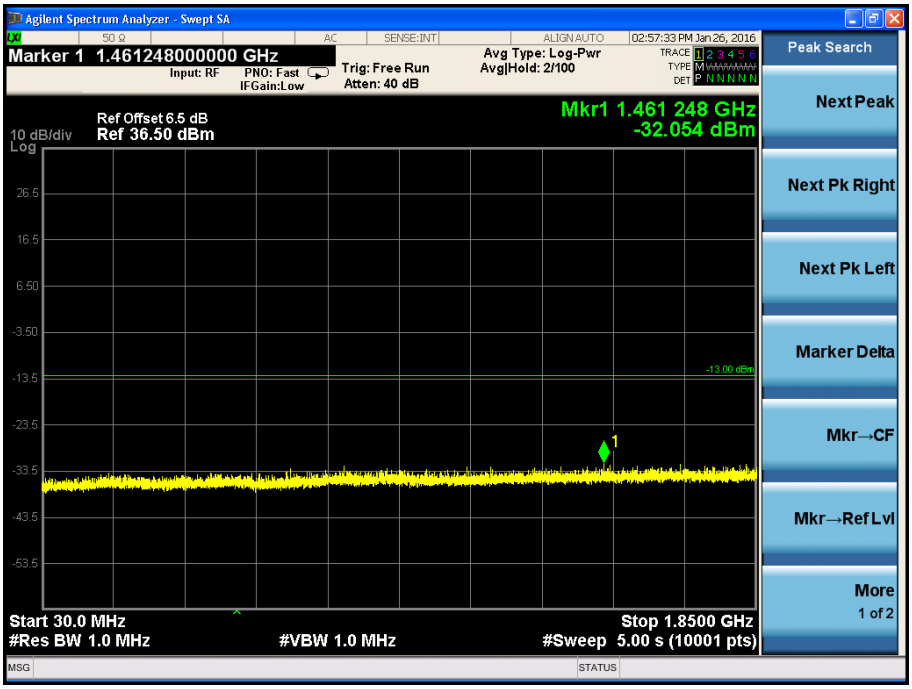
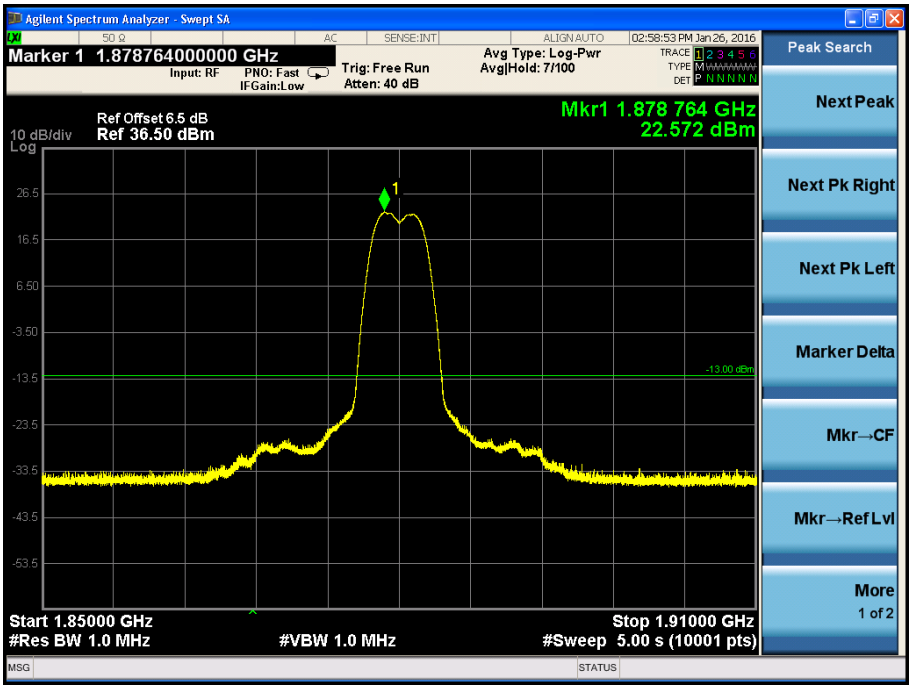
HSDPA/HSUPA Mode:



Channel 9400, 30MHz~1850MHz



Channel 9400, 1850MHz~1910MHz

Note: The signal beyond the limit is the base station simulator carrier.

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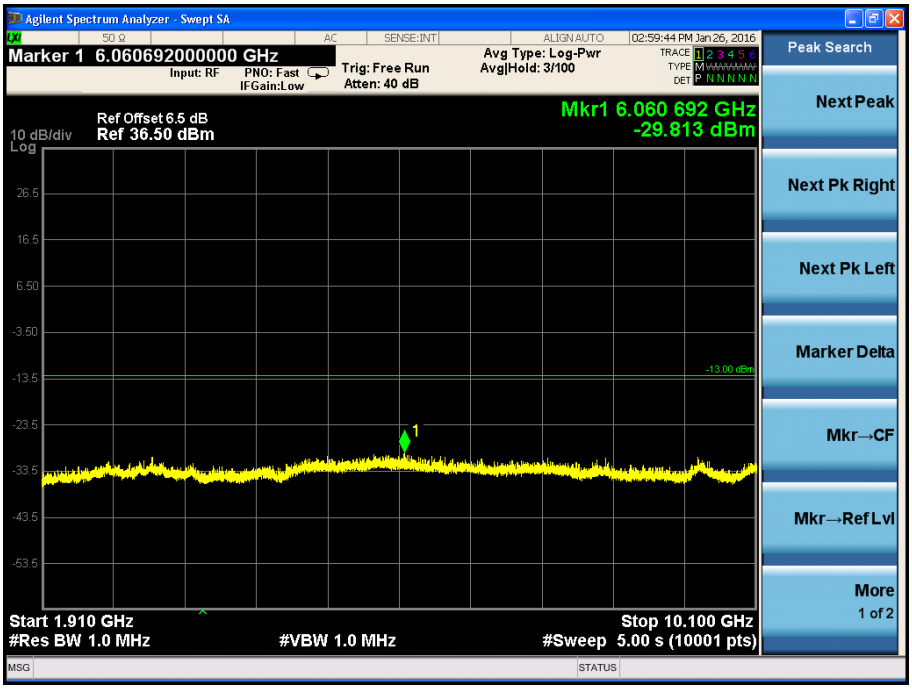
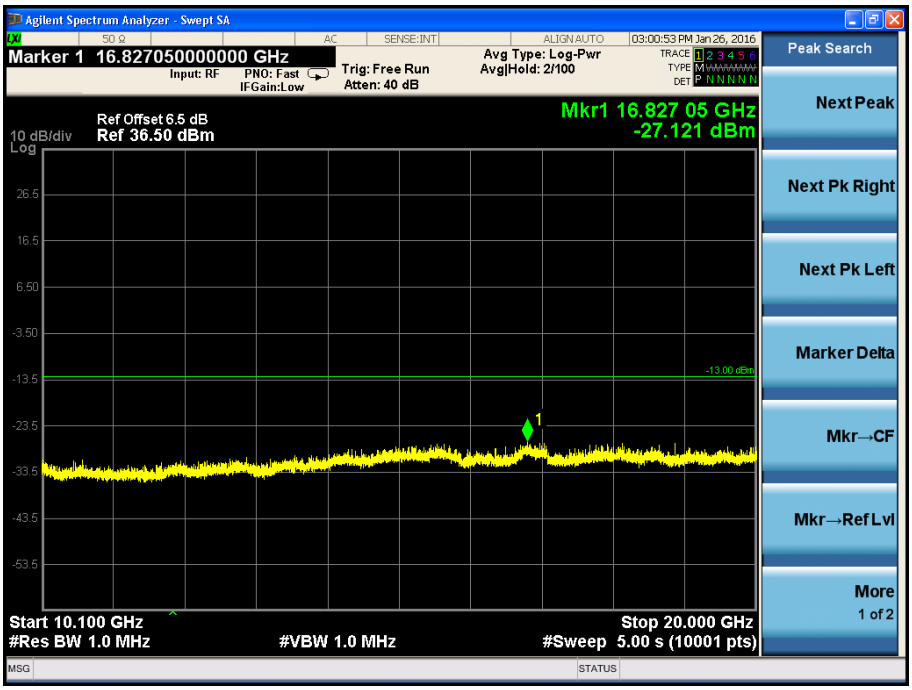


Channel 9400, 1910MHz~10.1GHz



Channel 9400, 10.1 GHz ~20GHz

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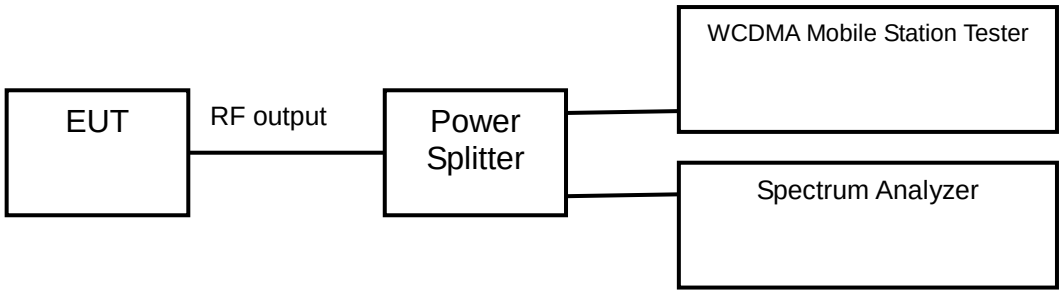
6.1.6 Band Edges Compliance-FCC Part22.917(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

The measurement will be conducted at two channels No4132 and No4233 (Bottom and top channels of WCDMA band V)

Limits	≤-13.0dBm

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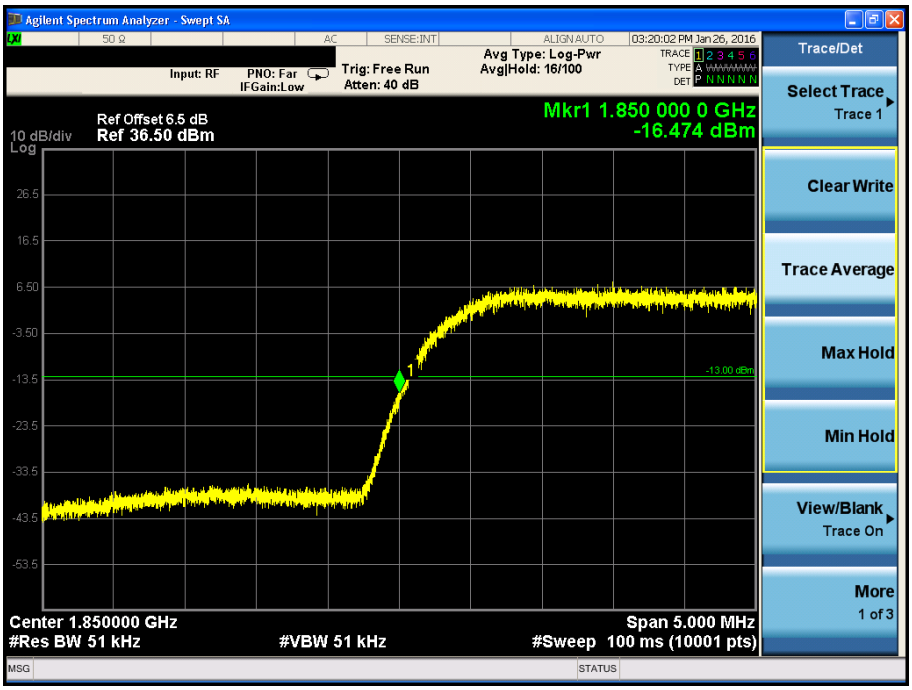
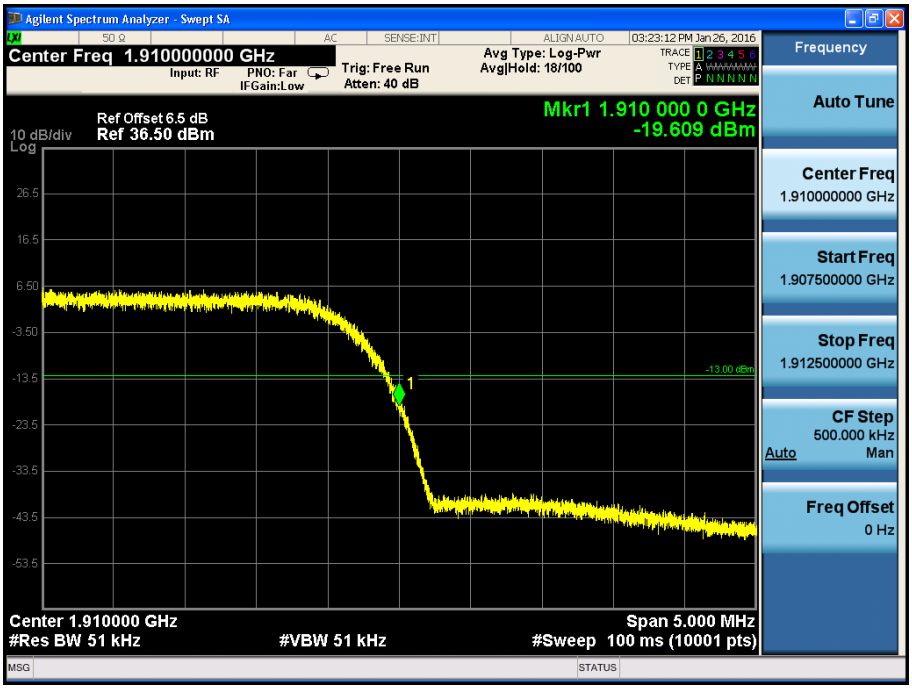
Test result:
Refer to the following figures.

WCDMA Mode:



Channel 9262



Channel 9538

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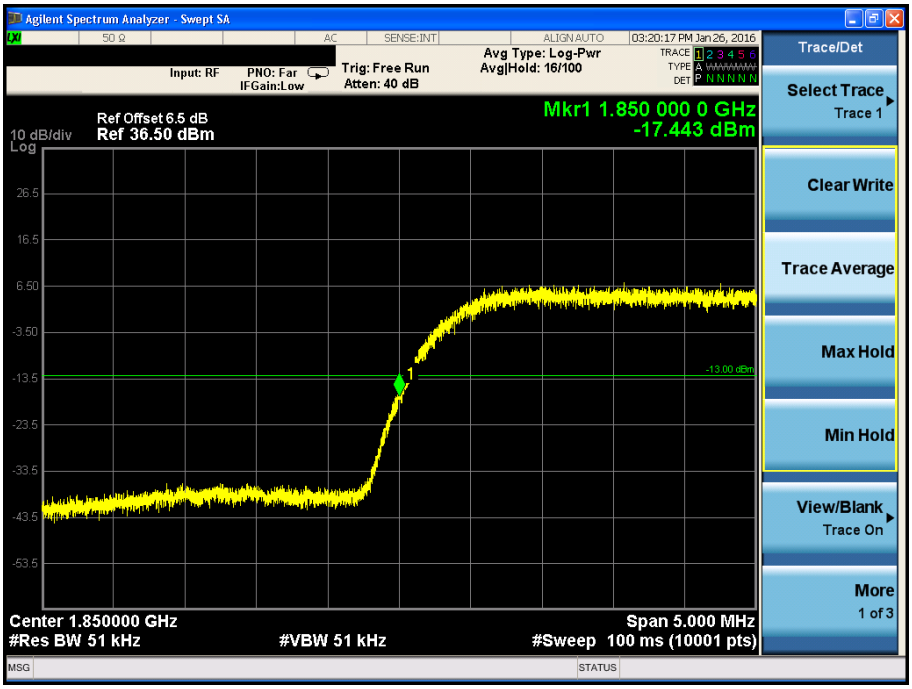
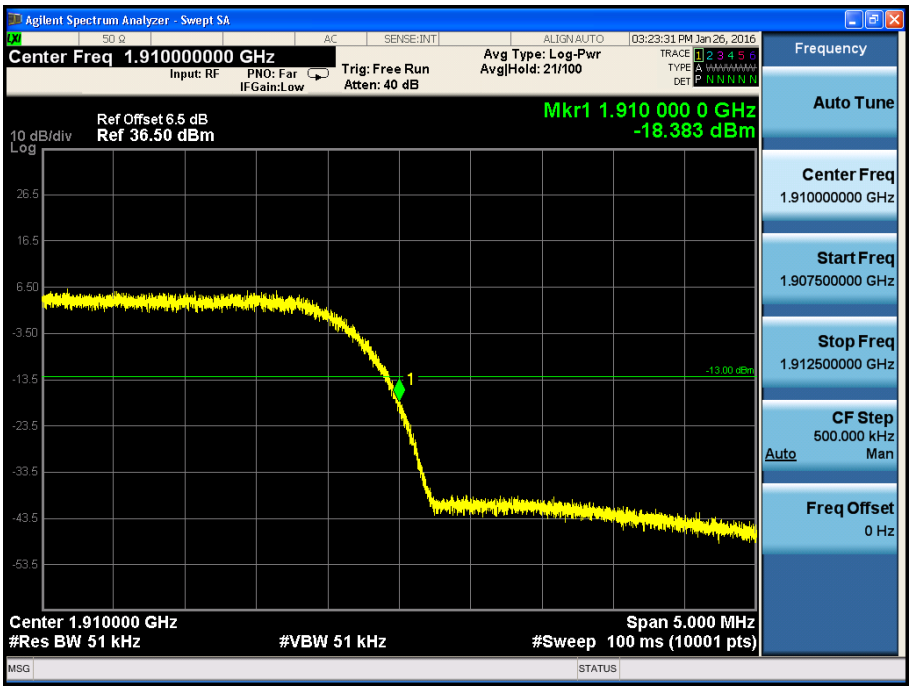
HSDPA/HSUPA Mode:



Channel 9262



Channel 9538

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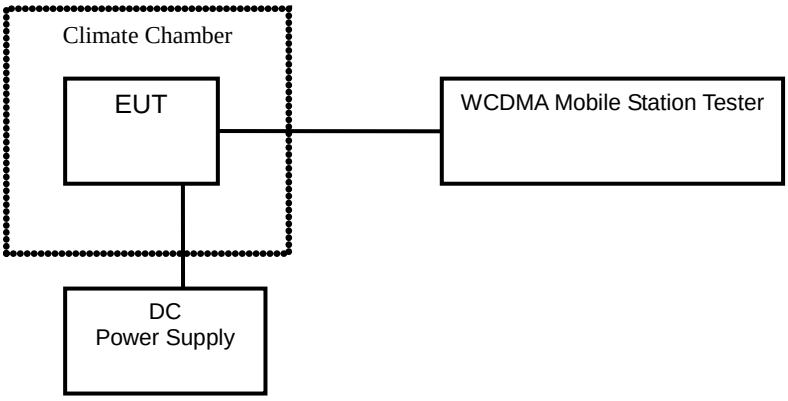
6.1.7 Frequency Stability-FCC Part2.1055/22.355

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test setup:



Test Procedure:
A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V).

Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

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Test result:
WCDMA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 9262	Channel 9400	Channel 9538
-30	0.012	0.013	0.013
-20	0.012	0.013	0.013
-10	0.013	0.012	0.013
0	0.013	0.012	0.012
+10	0.013	0.013	0.012
+20	0.014	0.013	0.014
+30	0.014	0.014	0.014
+40	0.014	0.015	0.015
+50	0.012	0.016	0.015

Voltage	Test Result (ppm)@NT		
	Channel 9262	Channel 9400	Channel 9538
LV	0.011	0.012	0.015
HV	0.011	0.012	0.016

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 9262	Channel 9400	Channel 9538
-30	0.012	0.013	0.014
-20	0.012	0.012	0.013
-10	0.013	0.012	0.012
0	0.013	0.012	0.012
+10	0.014	0.013	0.012
+20	0.015	0.014	0.014
+30	0.016	0.012	0.014
+40	0.013	0.013	0.014
+50	0.013	0.013	0.016

Voltage	Test Result (ppm)@NT		
	Channel 9262	Channel 9400	Channel 9538
LV	0.012	0.013	0.016
HV	0.012	0.013	0.018

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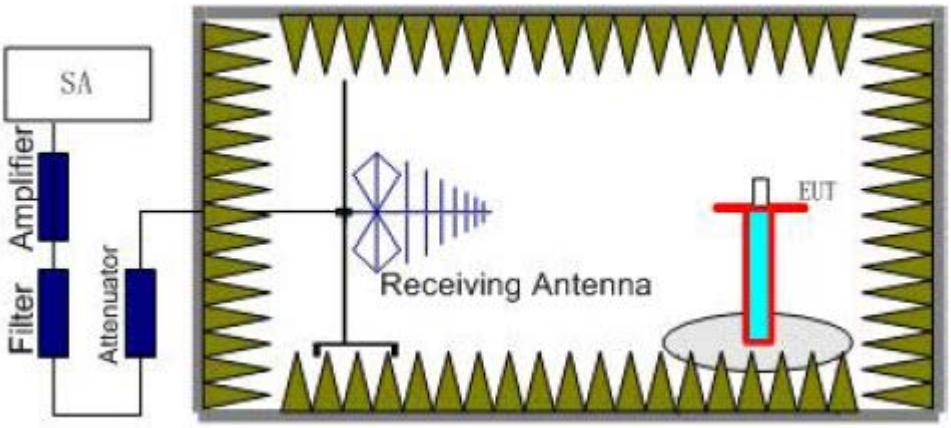
6.1.8 Radiated Spurious Emissions-FCC Part2.1053/24.238

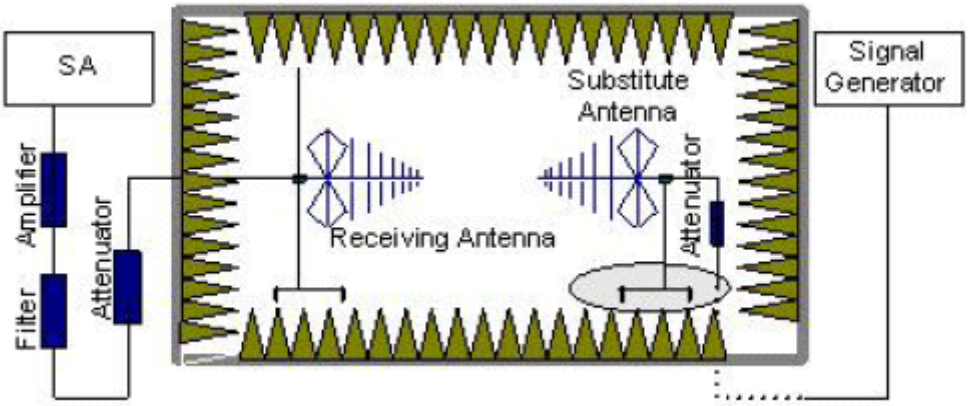
Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test Setup:



Step 1



Step 2

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Test procedure:
The measurements procedures in TIA-603C-2004 are used.
The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

Calculation procedure:
The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:
Power(EIRP) = Pmea+ Pca + Ga
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

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Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
P=Pmea+Pca+Ga=(-20dBm)+(-30dB)+(11dB)= -39dBm

The measurement will be done at carrier frequencies that pertain to bottom (Channel 4133, middle (Channel 4175and top (Channel 4232)channels of WCDMA band V.

Test result:
WCDMA Mode:
Channel 9662

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.25	-49.48	-13.0	Vertical
2777.70	-48.01	-13.0	Vertical
3727.03	-40.41	-13.0	Vertical
6677.07	-40.28	-13.0	Horizontal
9960.99	-37.65	-13.0	Vertical
17821.38	-34.48	-13.0	Vertical

Channel 9800

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2452.92	-52.21	-13.0	Vertical
2774.14	-52.43	-13.0	Vertical
3730.18	-44.58	-13.0	Horizontal
6677.11	-44.07	-13.0	Vertical
9963.51	-39.06	-13.0	Vertical
17821.89	-35.95	-13.0	Vertical

Channel 9938

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.17	-52.92	-13.0	Vertical
2781.12	-51.18	-13.0	Vertical
3732.31	-43.91	-13.0	Vertical
6680.04	-43.21	-13.0	Vertical
9960.51	-38.55	-13.0	Vertical
17822.15	-35.70	-13.0	Vertical

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HSDPA/HSUPA Mode:
Channel 9662

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.42	-52.39	-13.0	Vertical
2776.72	-51.56	-13.0	Vertical
3731.16	-44.48	-13.0	Vertical
6677.30	-43.73	-13.0	Vertical
9959.51	-40.02	-13.0	Vertical
17820.76	-36.05	-13.0	Vertical

Channel 9800

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2458.13	-52.31	-13.0	Vertical
2778.26	-51.74	-13.0	Horizontal
3729.87	-44.54	-13.0	Vertical
6677.22	-42.97	-13.0	Vertical
9959.55	-39.29	-13.0	Vertical
17824.02	-35.55	-13.0	Vertical

Channel 9938

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.52	-53.67	-13.0	Vertical
2780.24	-51.91	-13.0	Vertical
3728.91	-44.42	-13.0	Vertical
6677.93	-44.05	-13.0	Vertical
9961.53	-39.24	-13.0	Horizontal
17819.82	-36.45	-13.0	Vertical

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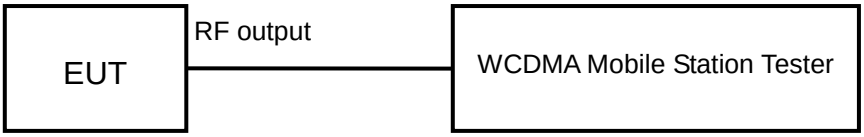
6.2 WCDMA Band V

6.2.1 RF Power Output-FCC Part22.913(a)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits	≤24.0dBm

Test result:.
WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	22.06
836.6	4183	21.97
846.6	4233	22.00

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	21.93
836.6	4183	21.86
846.6	4233	21.90

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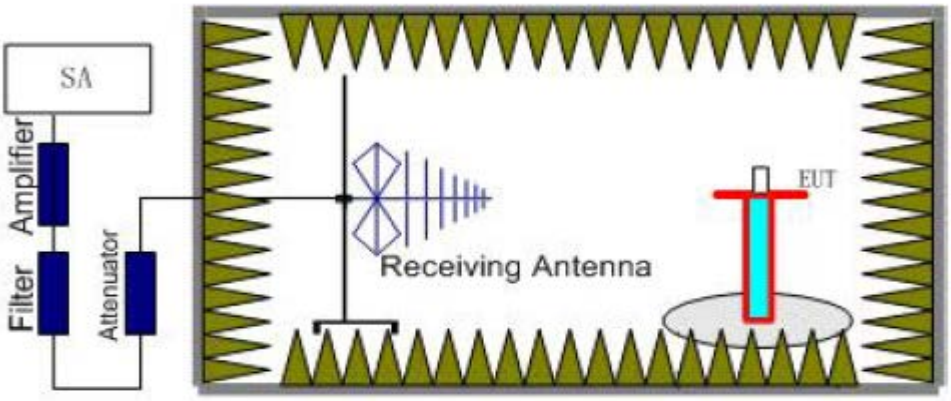
6.2.2 Effective Radiated Power-FCC Part22.913(a)

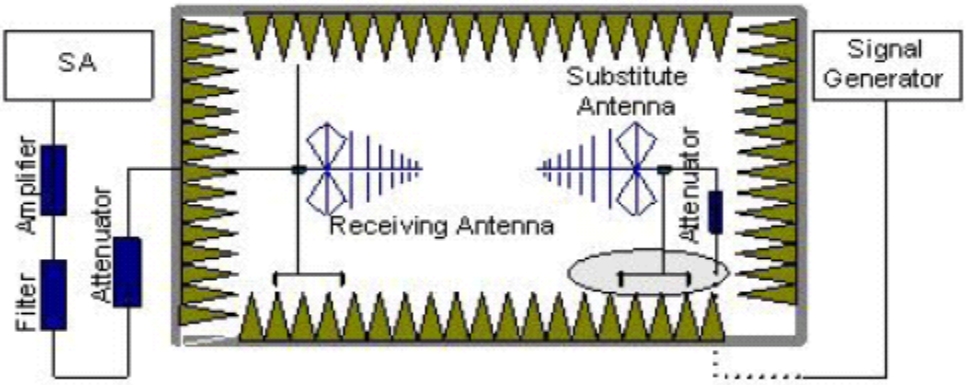
Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test setup:



Step 1



Step 2

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Test procedure:
The measurements procedures in TIA-603C-2004 are used.
Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

The measurement results are obtained as described below:
Power (EIRP) = Pmea+ Pca+ Ga

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

The measurement will be done at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits	≤38.5dBm

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Test result:
WCDMA Mode:

Frequency (MHz)	Peak ERP (dBm)	Pca Cable loss (dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
832.5	23.99	-3.80	8.60	19.19	Vertical
835.0	23.18	-3.80	8.60	18.38	Vertical
837.5	23.11	-3.80	8.60	18.31	Vertical

HSDPA/HSUPA Mode:

Frequency (MHz)	Peak ERP (dBm)	Pca Cable loss (dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
832.5	22.22	-3.80	8.60	17.42	Vertical
835.0	22.88	-3.80	8.60	18.08	Vertical
837.5	22.78	-3.80	8.60	17.98	Vertical

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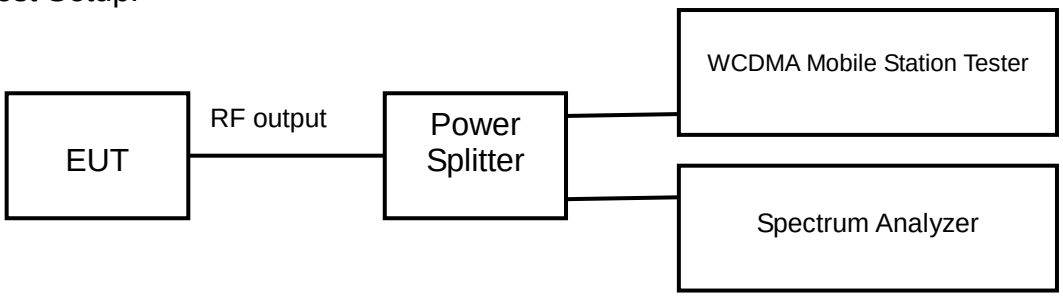
6.2.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.220
836.6	4183	4.200
846.6	4233	4.226

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.217
836.6	4183	4.200
846.6	4233	4.222

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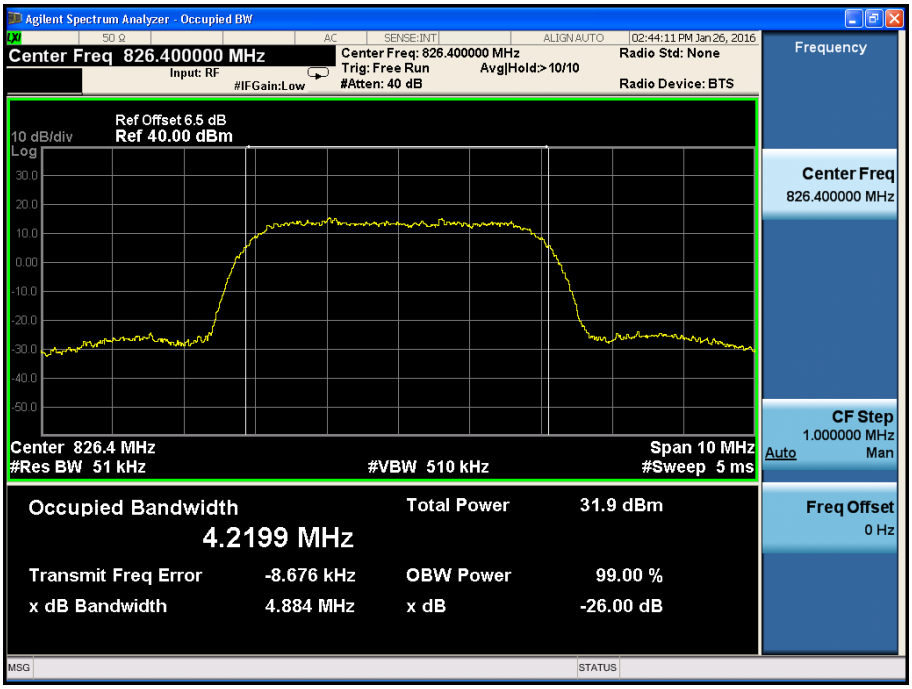
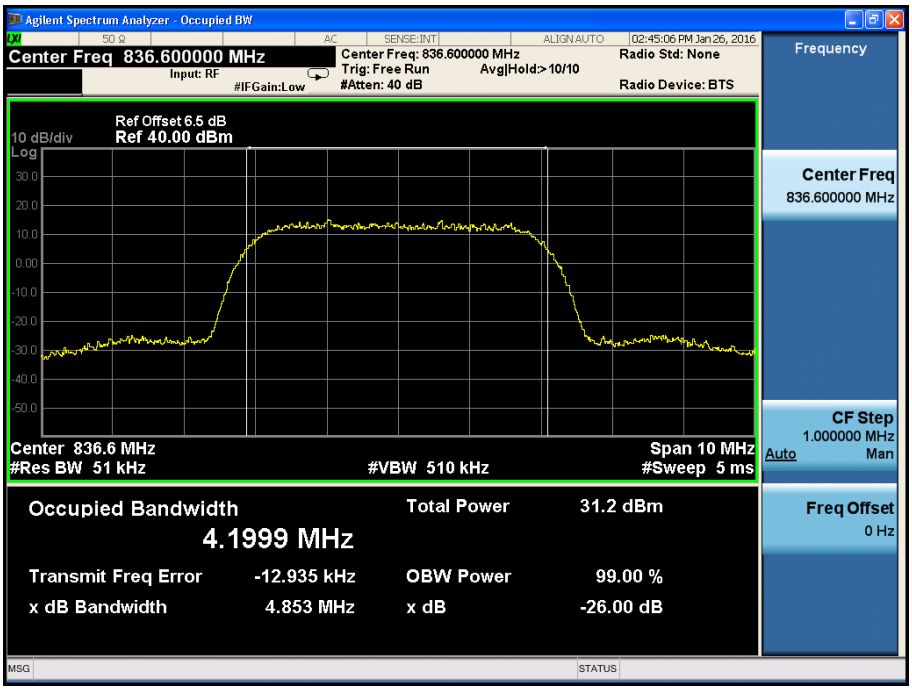
WCDMA Mode:



Channel 4132



Channel 4183

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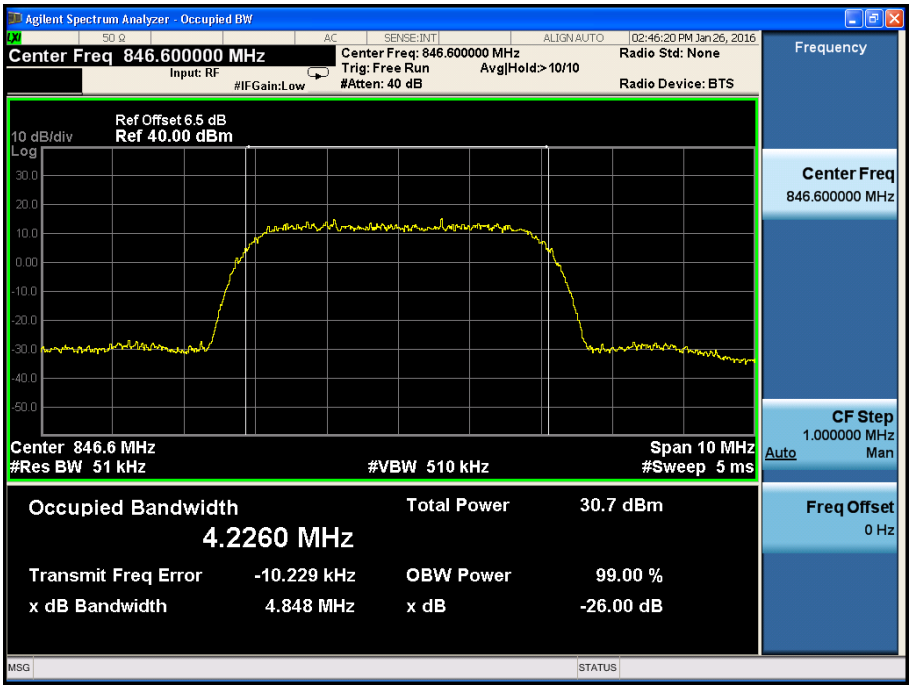
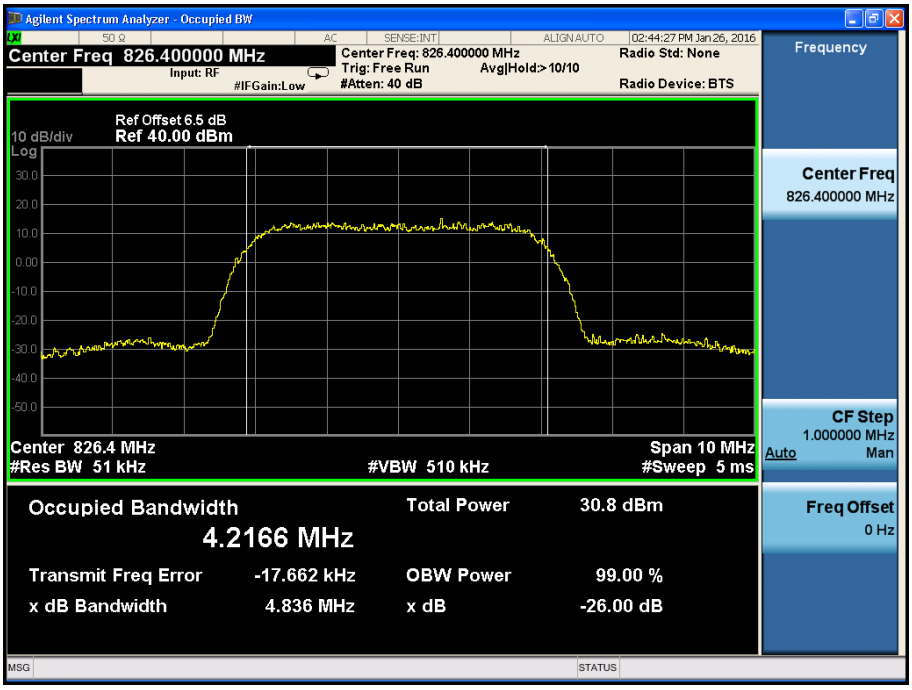


Channel 4233

HSDPA/HSUPA Mode:



Channel 4132

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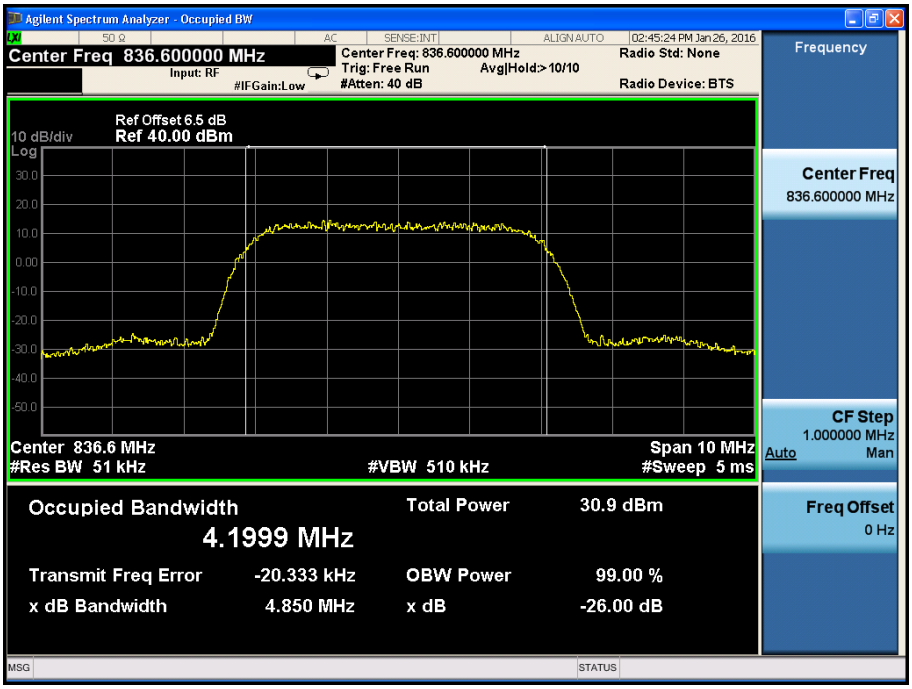
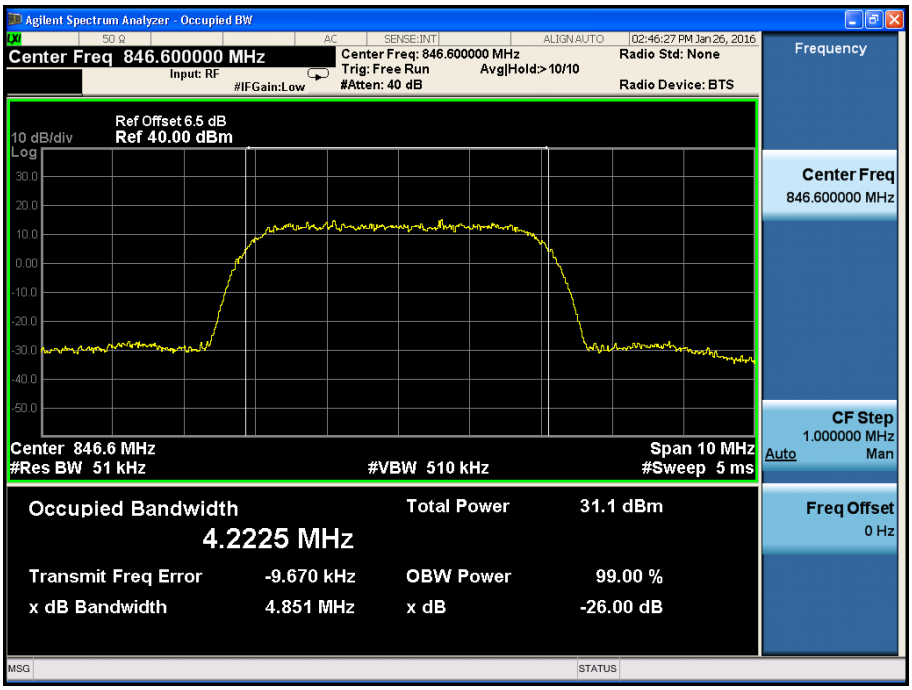


Channel 4183



Channel 4233

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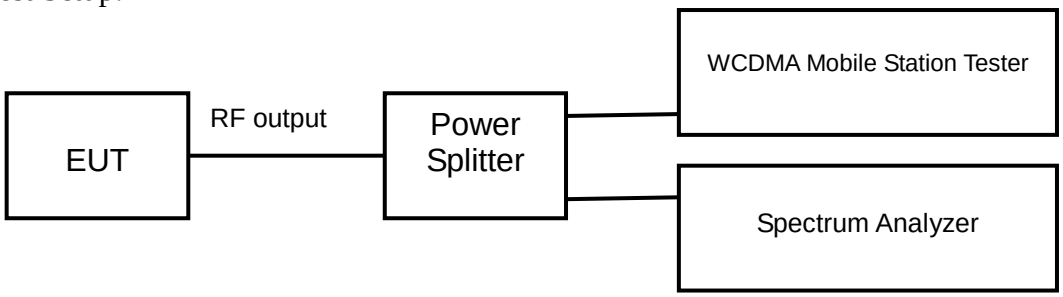
6.2.4 Emission Bandwidth-FCC Part22.917(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The emission bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of -26dBc power can be read on spectrum analyzer.

The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band V)

Limits: No specific emission bandwidth requirements in part 22.917(b)

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.884
836.6	4183	4.853
846.6	4233	4.848

HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.836
836.6	4183	4.850
846.6	4233	4.851

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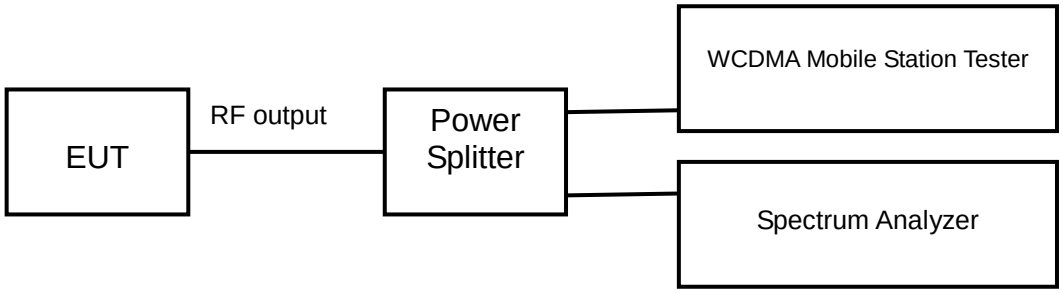
6.2.5 Spurious Emissions at antenna terminal-FCC Part2.1051/22.917

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 9GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

The measurement will be conducted at one channel No4183 (middle channel of WCDMA band V)

Limits	≤-13.0dBm

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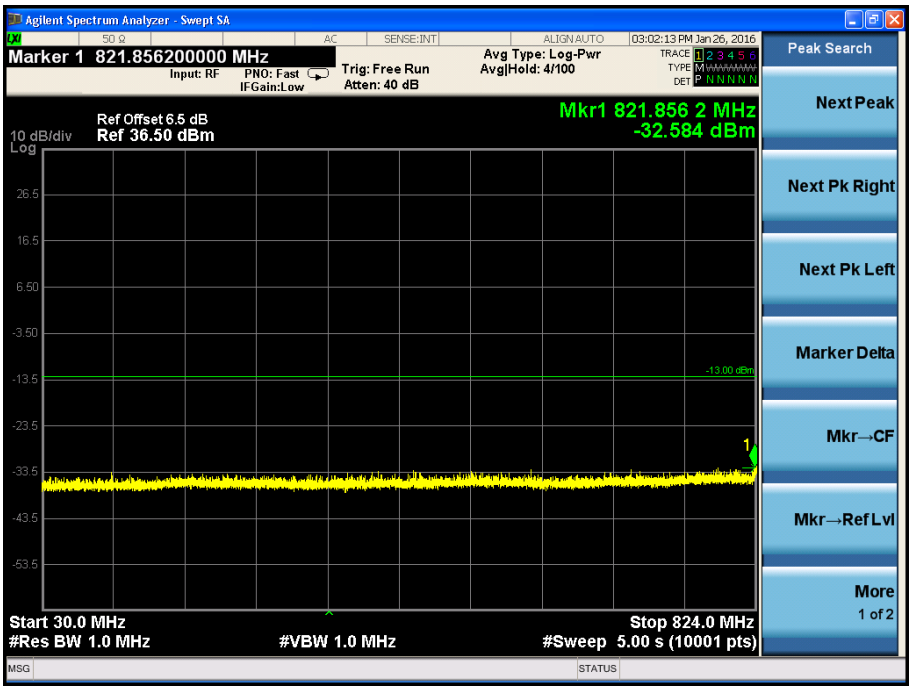
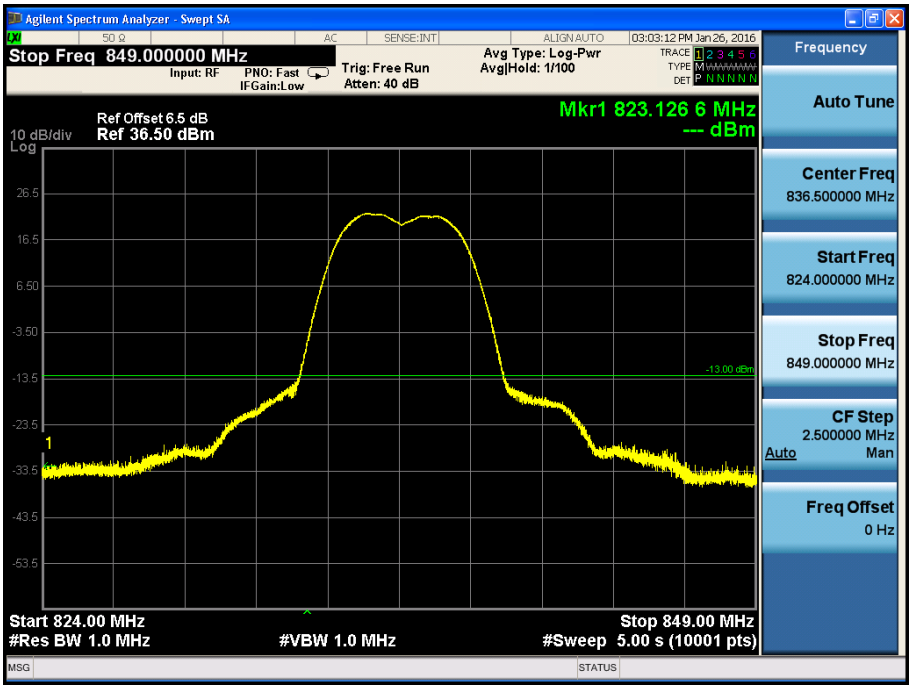
Test result:
Refer to the following figures.

WCDMA Mode:



Channel 4183, 30MHz~824MHz



Channel 4183, 824MHz~849MHz

Note: The signal beyond the limit is the base station simulator carrier.

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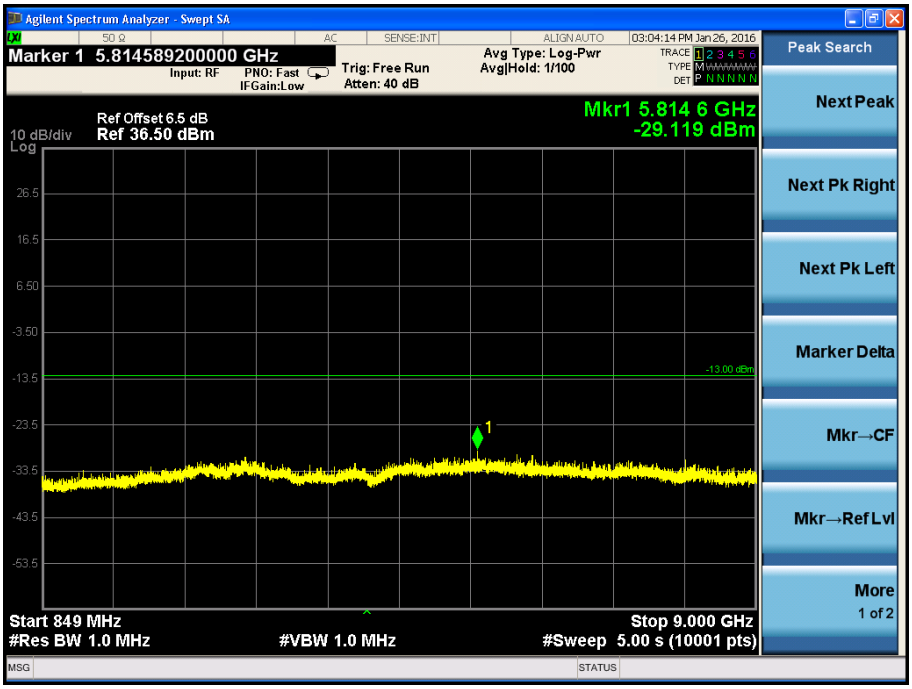
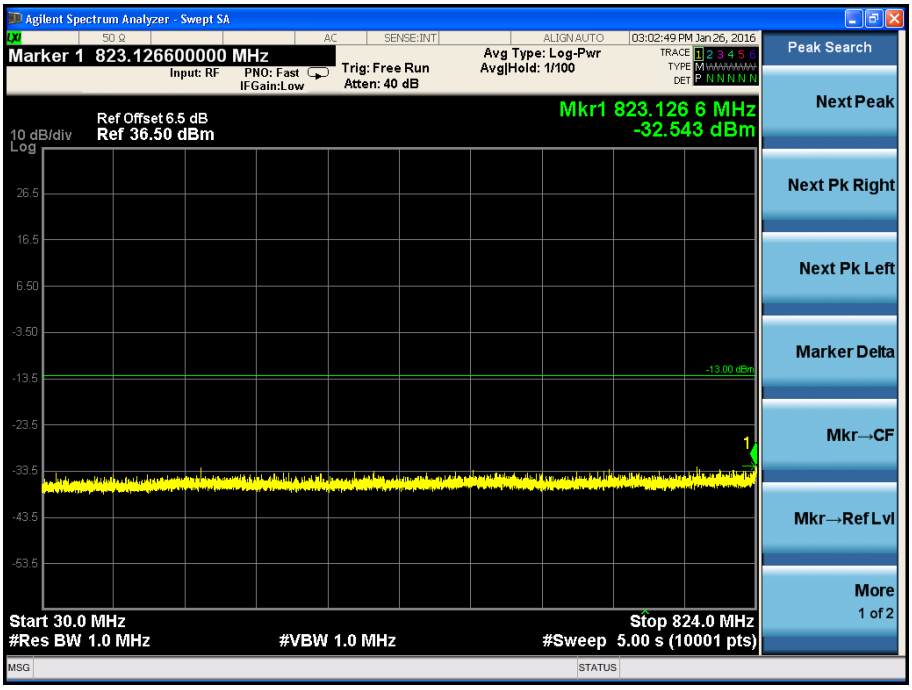


Channel 4183, 849MHz~9GHz

HSDPA/HSUPA Mode:



Channel 4183, 30MHz~824MHz

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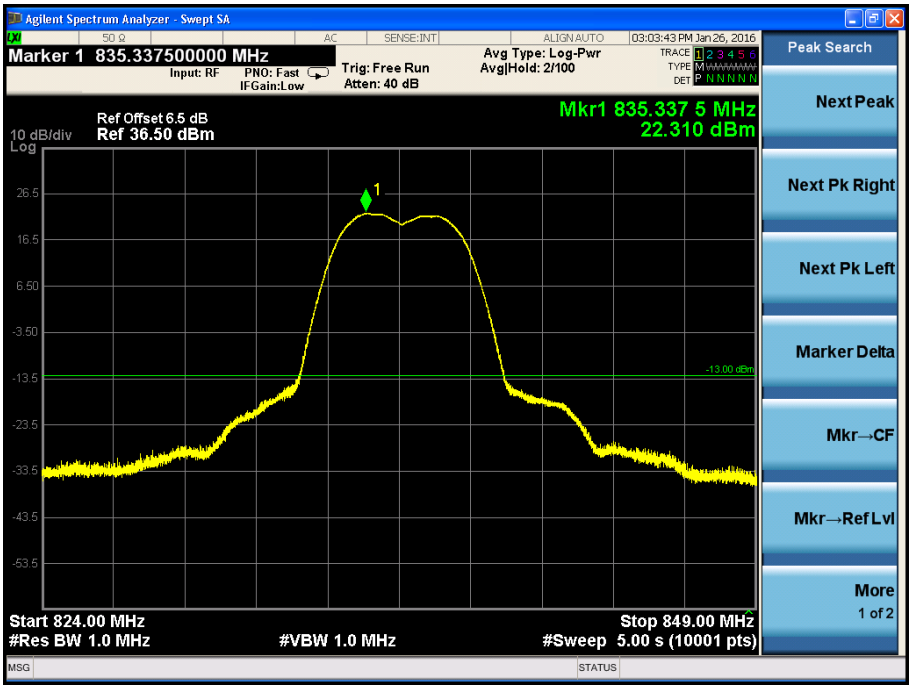
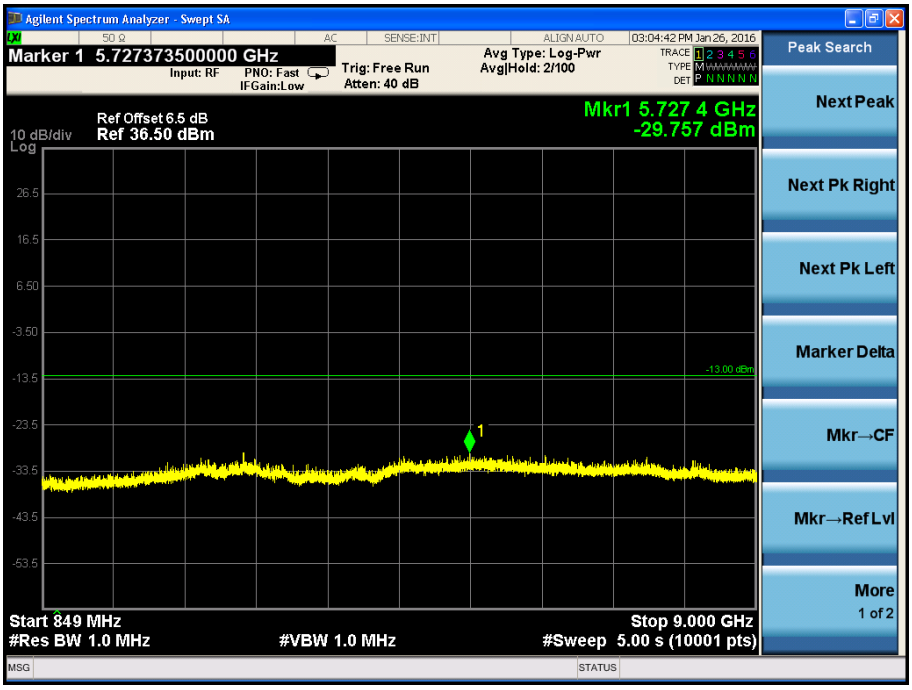


Channel 4183, 824MHz~849MHz

Note: The signal beyond the limit is the base station simulator carrier.



Channel 4183, 849MHz~9GHz

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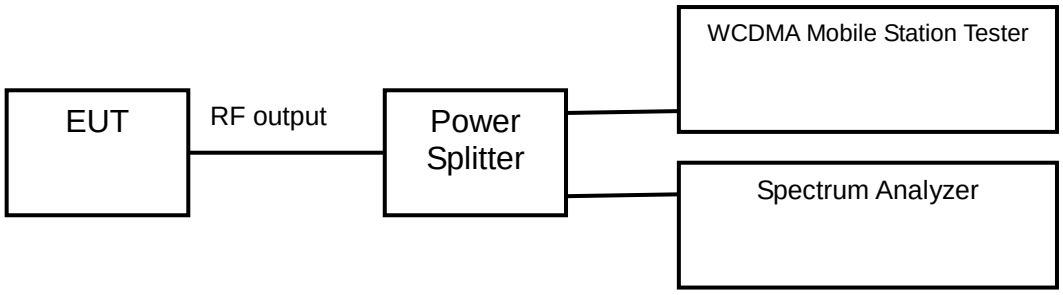
6.2.6 Band Edges Compliance-FCC Part22.917(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

The measurement will be conducted at two channels No4132 and No4233 (Bottom and top channels of WCDMA band V)

Limits	≤-13.0dBm

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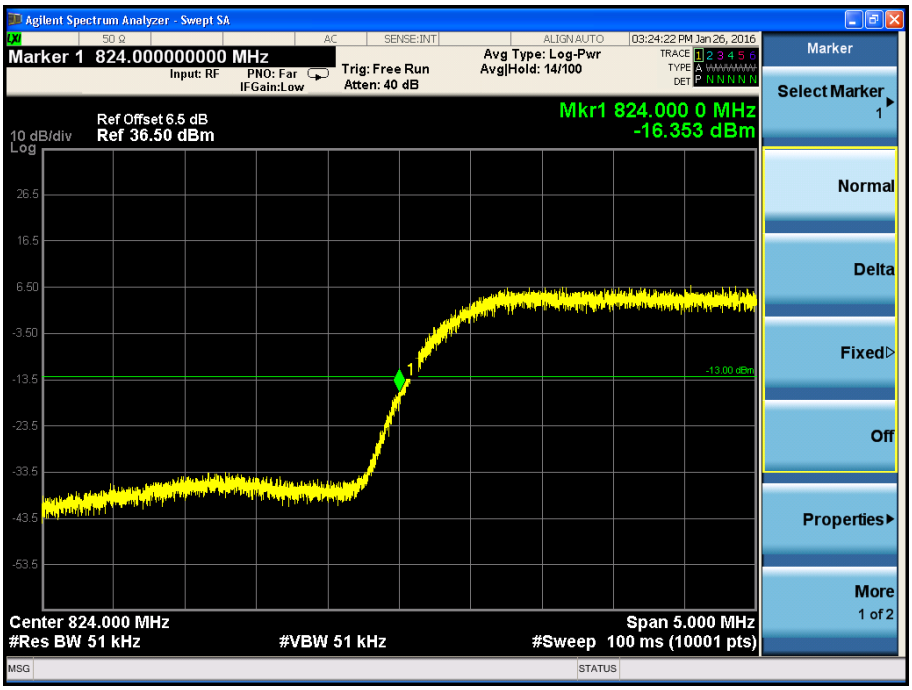
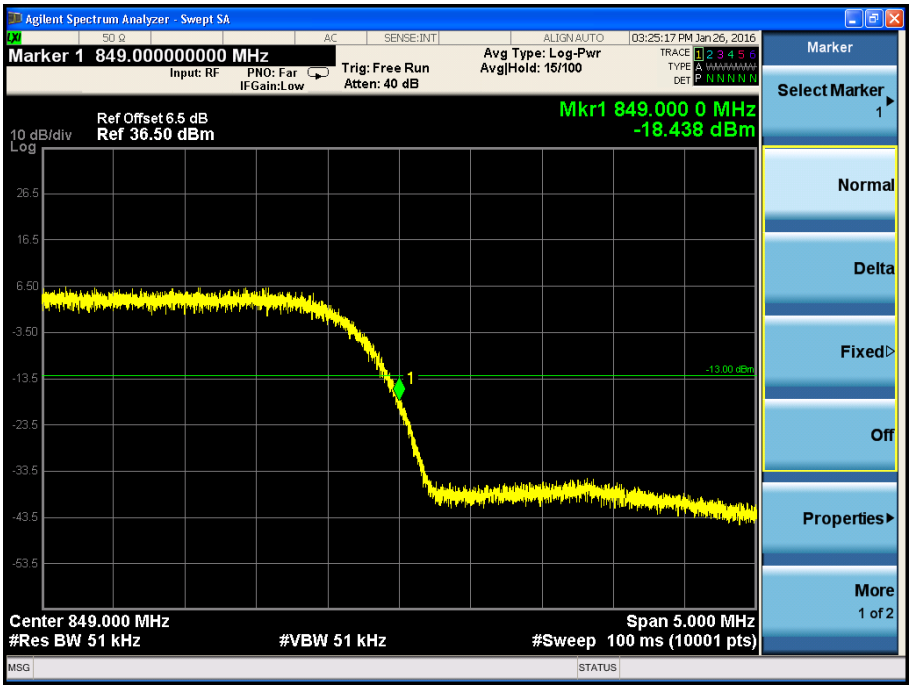
Test result:
Refer to the following figures.

WCDMA Mode:



Channel 4132



Channel 4233

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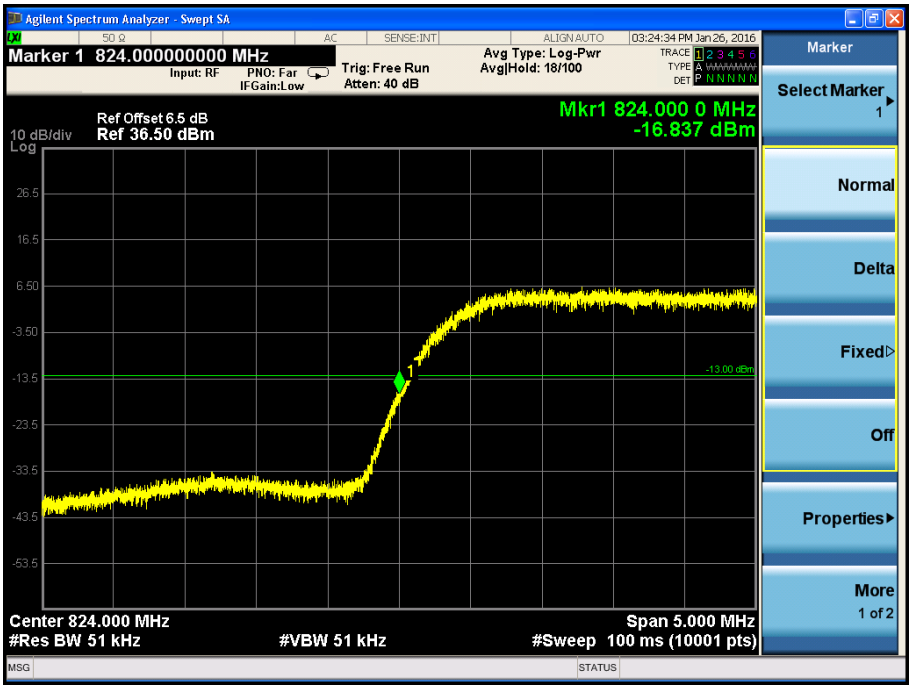
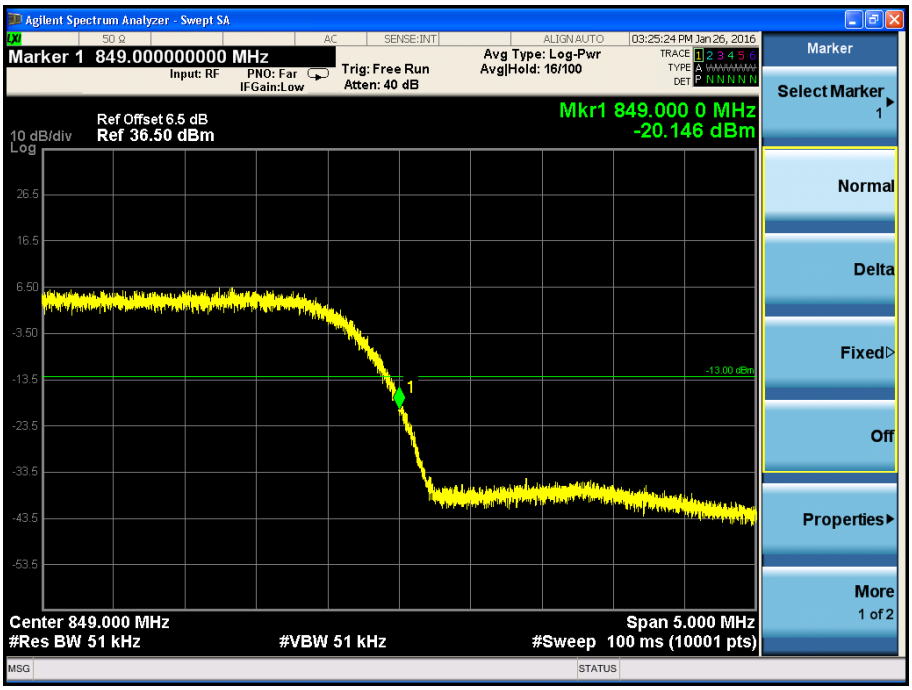
HSDPA/HSUPA Mode:



Channel 4132



Channel 4233

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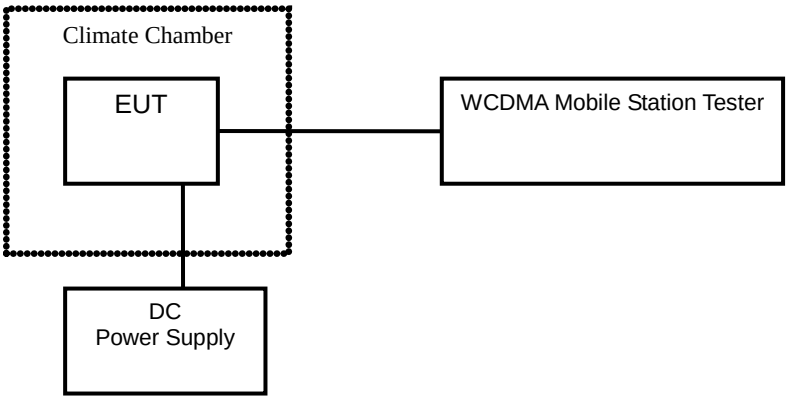
6.2.7 Frequency Stability-FCC Part2.1055/22.355

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test setup:



Test Procedure:
A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size, and also the DC power supply voltage to the EUT is varied from LV to HV. The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V).

Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

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Test result:
WCDMA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 4132	Channel 4183	Channel 4233
-30	0.012	0.013	0.012
-20	0.012	0.012	0.013
-10	0.013	0.012	0.014
0	0.014	0.013	0.013
+10	0.013	0.013	0.012
+20	0.012	0.014	0.015
+30	0.013	0.015	0.013
+40	0.014	0.012	0.012
+50	0.012	0.012	0.013

Voltage	Test Result (ppm)@NT		
	Channel 4132	Channel 4183	Channel 4233
LV	0.013	0.014	0.013
HV	0.013	0.014	0.013

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 4132	Channel 4183	Channel 4233
-30	0.013	0.014	0.012
-20	0.013	0.013	0.012
-10	0.013	0.012	0.014
0	0.012	0.012	0.014
+10	0.012	0.012	0.015
+20	0.014	0.014	0.015
+30	0.014	0.011	0.013
+40	0.012	0.012	0.013
+50	0.014	0.013	0.012

Voltage	Test Result (ppm)@NT		
	Channel 4132	Channel 4183	Channel 4233
LV	0.012	0.014	0.016
HV	0.012	0.014	0.018

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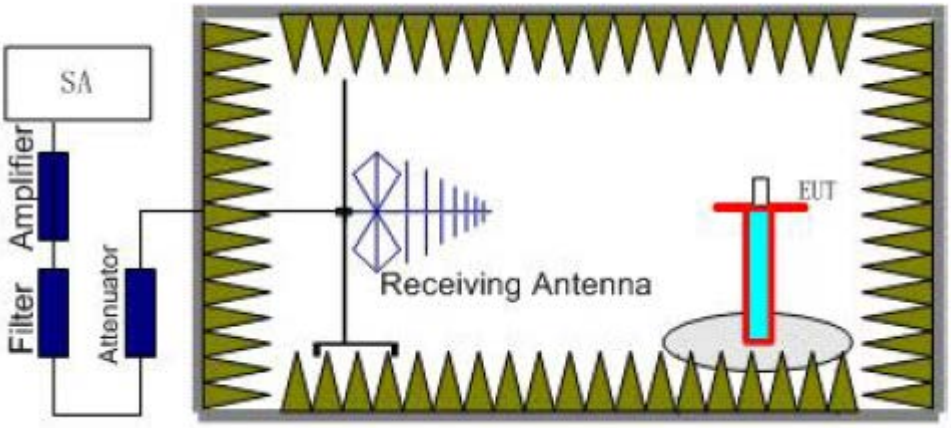
6.2.8 Radiated Spurious Emissions-FCC Part2.1053/22.917(a)

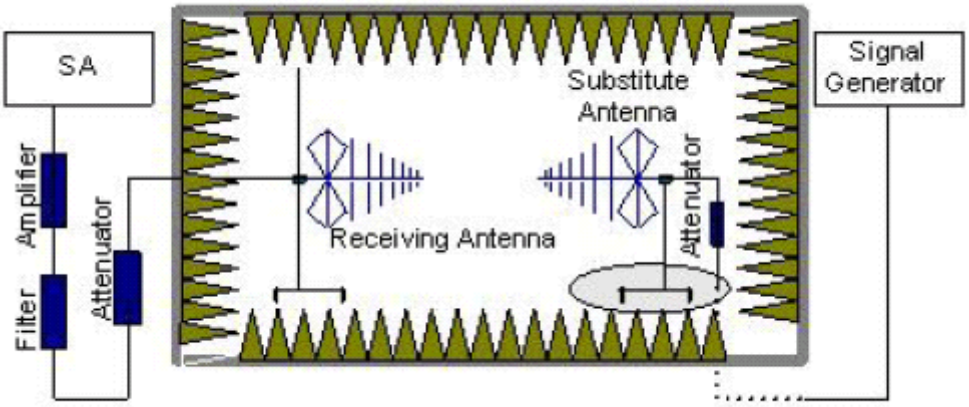
Ambient condition:

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

Test Setup:



Step 1



Step 2

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Test procedure:
The measurements procedures in TIA-603C-2004 are used.
The spectrum was scanned from 30MHz to the 10th harmonic of the highest frequency generated within the equipment.

Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

Calculation procedure:
The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:
Power(EIRP) = Pmea+ Pca + Ga
This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP – 2.15 (dB).

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Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
P=Pmea+Pca+Ga=(-20dBm)+(-30dB)+(11dB)= -39dBm

The measurement will be done at carrier frequencies that pertain to bottom (Channel 4132, middle (Channel 4183and top (Channel 4233)channels of WCDMA band V.

Test result:
WCDMA Mode:
Channel 4357

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.81	-52.09	-13.0	Vertical
2776.91	-51.18	-13.0	Horizontal
3728.43	-43.36	-13.0	Vertical
6678.30	-43.11	-13.0	Vertical
9963.41	-40.14	-13.0	Vertical
17824.72	-35.75	-13.0	Vertical

Channel 4408

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2455.61	-51.93	-13.0	Vertical
2778.11	-51.33	-13.0	Vertical
3729.27	-43.38	-13.0	Vertical
6675.86	-42.73	-13.0	Vertical
9962.97	-39.25	-13.0	Vertical
17823.16	-35.72	-13.0	Horizontal

Channel 4458

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2455.89	-51.92	-13.0	Vertical
2779.28	-51.05	-13.0	Vertical
3726.10	-43.50	-13.0	Vertical
6676.80	-43.01	-13.0	Vertical
9963.42	-39.55	-13.0	Vertical
17822.17	-35.83	-13.0	Vertical

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HSDPA/HSUPA Mode:
Channel 4357

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2455.41	-52.06	-13.0	Vertical
2778.89	-51.06	-13.0	Vertical
3728.00	-43.79	-13.0	Vertical
6678.05	-42.66	-13.0	Vertical
9961.47	-39.41	-13.0	Vertical
17824.26	-35.66	-13.0	Vertical

Channel 4408

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.17	-52.15	-13.0	Vertical
2780.31	-51.26	-13.0	Vertical
3728.53	-43.88	-13.0	Vertical
6677.50	-43.09	-13.0	Vertical
9962.67	-39.63	-13.0	Vertical
17824.83	-35.28	-13.0	Horizontal

Channel 4458

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.37	-52.71	-13.0	Horizontal
2778.32	-51.25	-13.0	Vertical
3729.91	-44.12	-13.0	Vertical
6677.56	-43.53	-13.0	Vertical
9962.84	-39.84	-13.0	Vertical
17822.23	-35.29	-13.0	Vertical

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7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
RF Power Output	0.60 dB	
Occupied Bandwidth	3kHz	
Spurious Emissions	9kHz~2GHz	1.20dB
	2G~3.6GHz	1.40dB
	3.6G~8GHz	2.20dB
	8G~12.75GHz	2.70dB
Band Edges Compliance	1.20dB	
Frequency Stability	48 Hz	

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8 TEST EQUIPMENTS

No.	Name/Model	Manufacturer	S/N	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	MY48367401	2016.08.20
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2016.08.20
3	DC Power Supply E3645A	Agilent	MY40000740	2016.08.20
4	Power Splitter 11850C	Agilent	026057	2016.08.20
5	Temperature chamber SH241	ESPEC	92000390	2016.08.20
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----
7	Turn table Diameter:1m	HD	-----	-----
8	Antenna master FAC(MA4.0)	MATURO	-----	-----
9	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2016.08.20
10	HL562 Ultra log antenna	R&S	100016	2016.08.20
11	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2016.08.20
12	ESI 40 EMI test receiver	R&S	100015	2016.08.20
13	CMU 200 Radio tester	R&S	114667	2016.08.20
14	FSV40 Spectrum Analyzer	R&S	101065	2016.08.20

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APPENDIX

Appendix Test Setup

---End of Test Report---

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