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# TEST REPORT

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Report No.: SRTC2014-H024-E0064

Product Name: GSM/GPRS/EDGE/UMTS

Digital Mobile Phone with Bluetooth and WiFi

Product Model: Philips S308

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

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

Specification: FCC Part 24E, Part 22H, Part 2

(October1, 2013 edition)

FCC ID: VQRCTS308

The State Radio\_monitoring\_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

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## CONTENTS

1. General information .....	3
1.1 Notes of the test report .....	3
1.2 Information about the testing laboratory.....	3
1.3 Applicant's details .....	3
1.4 Manufacturer's details.....	3
1.5 Application details .....	4
1.6 Reference specification.....	4
1.7 Information of EUT.....	4
1.7.1 General information.....	4
1.7.2 EUT details .....	5
1.7.3 Auxiliary equipment details.....	5
2. Test information .....	6
2.1 Summary of the test results.....	6
2.2 Test result.....	7
2.2.1 WCDMA Band II.....	7
2.2.1.1 RF Power Output-FCC Part24.232(b).....	7
2.2.1.2 Effective Isotropic Radiated Power-FCC Part24.232(b).....	8
2.2.1.3 Occupied Bandwidth-FCC Part2.1049.....	11
2.2.1.4 Emission Bandwidth-FCC Part24.238(b).....	15
2.2.1.5 Spurious Emissions at antenna terminal-FCC Part2.1051/24.238 .....	16
2.2.1.6 Band Edges Compliance-FCC Part24.238(b).....	20
2.2.1.7 Frequency Stability-FCC Part2.1055/24.235 .....	23
2.2.1.8 Radiated Spurious Emissions-FCC Part2.1053/24.238 .....	25
2.2.2 WCDMA Band V .....	30
2.2.2.1 RF Power Output-FCC Part22.913(a).....	30
2.2.2.2 Effective Radiated Power-FCC Part22.913(a).....	31
2.2.2.3 Occupied Bandwidth-FCC Part2.1049.....	34
2.2.2.4 Emission Bandwidth-FCC Part22.917(b).....	38
2.2.2.5 Spurious Emissions at antenna terminal-FCC Part2.1051/22.917 .....	39
2.2.2.6 Band Edges Compliance-FCC Part22.917(b).....	43
2.2.2.7 Frequency Stability-FCC Part2.1055/22.355 .....	46
2.2.2.8 Radiated Spurious Emissions-FCC Part2.1053/22.917(a) .....	48
2.3. List of test equipments .....	53
Appendix .....	54

## 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, Beijing China  
City: Beijing  
Country or Region: China  
Contacted person: Wang Junfeng  
Tel: +86 10 68009181 +86 10 68009202  
Fax: +86 10 68009195 +86 10 68009205  
Email: wangjf@srrc.org.cn / wangjunfeng@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, Shenzhen  
City: Shenzhen  
Country or Region: P.R.China  
Grantee Code: VQRCT  
Contacted person: Helen.Lin  
Tel: 86-755-33308888  
Fax: 86-755-26614979  
Email: Helen.Lin@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, Shenzhen  
City: Shenzhen  
Country or Region: P.R.China  
Contacted person: Helen.Lin  
Tel: 86-755-33308888  
Fax: 86-755-26614979  
Email: Helen.Lin@sangfei.com

## 1.5 Application details

Date of reception of test sample: 26<sup>th</sup> August 2014  
Date of test: 27<sup>th</sup> August 2014 to 12<sup>nd</sup> September 2014

## 1.6 Reference specification

FCC Part 24E, Part22H, Part 2 (October1, 2013 edition)

## 1.7 Information of EUT

### 1.7.1 General information

Name of EUT	GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi
FCC ID	VQRCTS308
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:24.0dBm WCDMA Band V:24.0dBm
Modulation Type	QPSK
Emission Designator	4M50F9W
Duplex Mode	FDD
Duplex Spacing	WCDMA Band II:80MHz WCDMA Band V:45MHz
Antenna Type	Fixed Internal
Power Supply	Battery or Charger
Rated Power Supply Voltage	3.7V
Extreme Temperature	Lowest: -30°C Highest: +50°C
Extreme Voltage	Minimum: 3.5V Maximum: 4.35V
HW Version	TMB1a
SW Version	S308_M6572M_1432_V01A_AM_FCC

### 1.7.2 EUT details

Product Name	Product Model	IMEI
GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi	Philips S308	862391023896202

### 1.7.3 Auxiliary equipment details

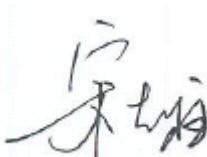
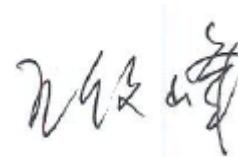
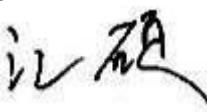
Equipment	Charger
Manufacturer	ShenZhen AoHai Technology Co., Ltd
Model Number	A31-500650
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Battery
Manufacturer	Shenzhen cyclelong power-tech Co., Ltd
Model Number	ABI400BWML
Capacity	1400 mAh
Rated Voltage	3.7V d.c.

## 2. Test information

### 2.1 Summary of the test results

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: Director of the test lab  	Checked by: Deputy director of the test lab  
Tested by: Mr. Jiang Shuo Test engineer  	Issued date:  <b>2014.09.16</b>

## 2.2 Test result

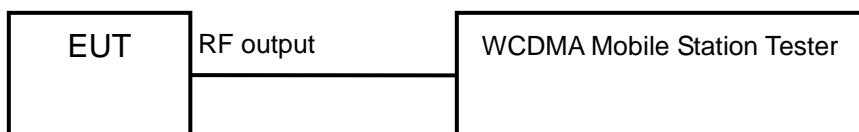
### 2.2.1 WCDMA Band II

#### 2.2.1.1 RF Power Output-FCC Part24.232(b)

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)

Limits	≤24dBm
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Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	22.03
1880.0	9400	21.71
1907.6	9538	21.69

HSDPA/HSUPA Mode:

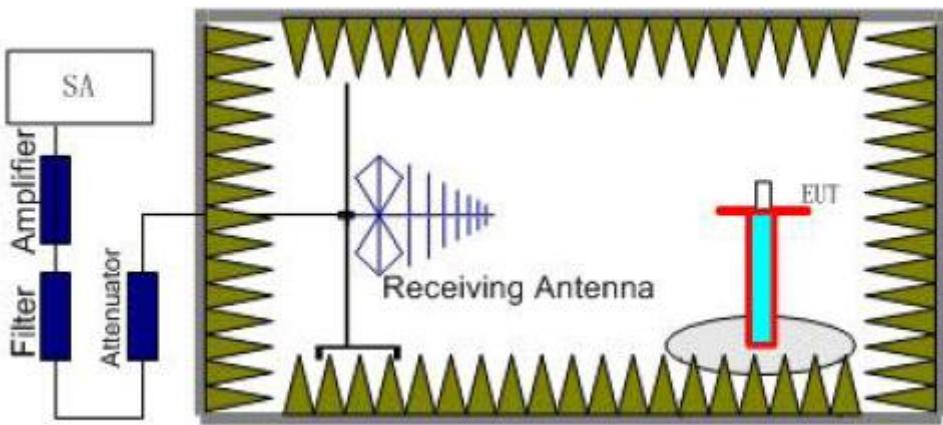
Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	20.99
1880.0	9400	20.86
1907.6	9538	20.74

### 2.2.1.2 Effective Isotropic Radiated Power-FCC Part24.232(b)

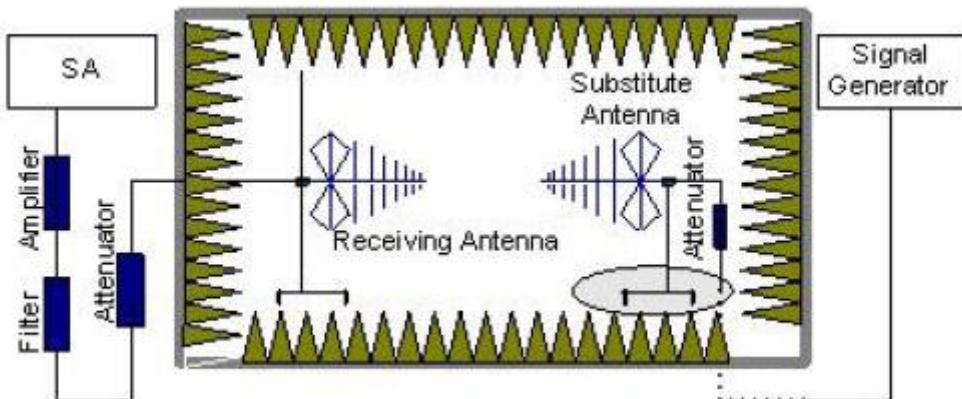
Ambient condition:

Temperature	Relative humidity	Pressure
23°C	43%	99.7kPa

Test setup:



Step 1



Step 2

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:

$$\text{Power (EIRP)} = \text{Pmea} + \text{Pca} + \text{Ga}$$

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

Limits	≤33dBm
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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	22.20	-5.0	8.6	18.60	Vertical
1880.0	21.37	-5.0	8.6	17.77	Vertical
1907.6	21.98	-5.0	8.6	18.38	Vertical

HSDPA/HSUPA Mode:

Frequency (MHz)	Peak EIRP(dBm)	Pca Cable loss	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1852.4	22.18	-5.0	8.6	18.58	Vertical
1880.0	21.42	-5.0	8.6	17.82	Vertical
1907.6	21.93	-5.0	8.6	18.33	Vertical

Frequency: 1852.4MHz

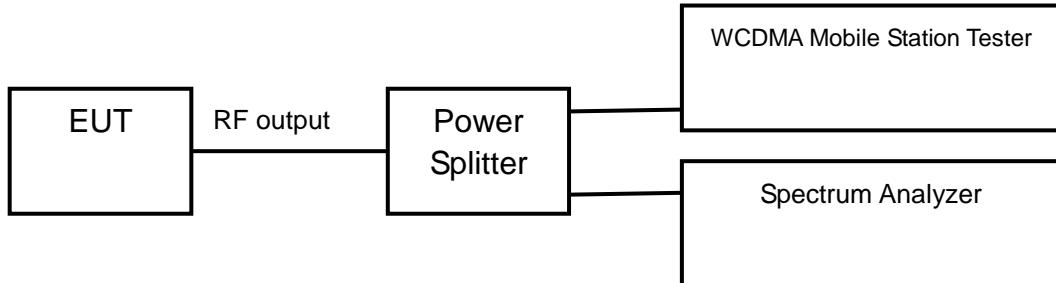
Peak EIRP(dBm) = Pmea(18.60dBm)+Pca(-5.0dB)+Ga(8.6dB) = 22.20dBm

### 2.2.1.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 51kHz on spectrum analyzer. The bandwidth of 99% 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 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	4.156
1880.0	9400	4.163
1907.6	9538	4.169

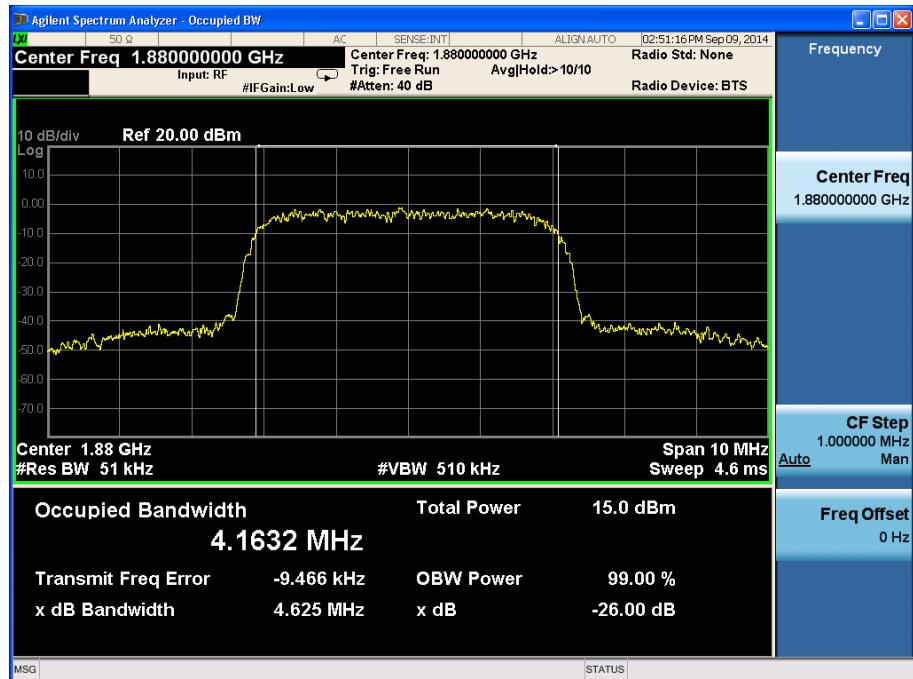
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.165
1880.0	9400	4.159
1907.6	9538	4.172

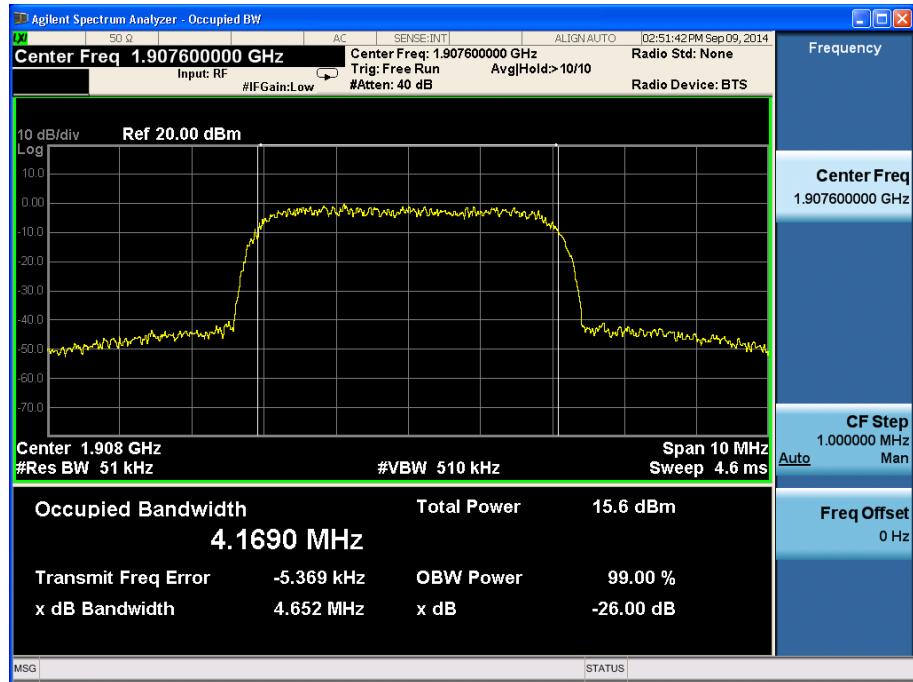
### WCDMA Mode:



Channel 9262

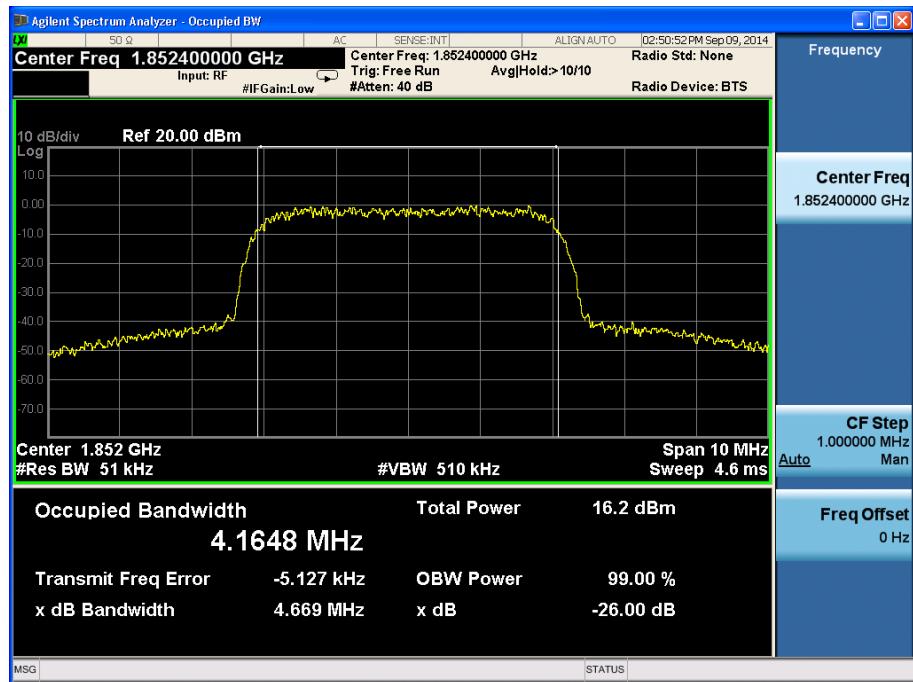


Channel 9400

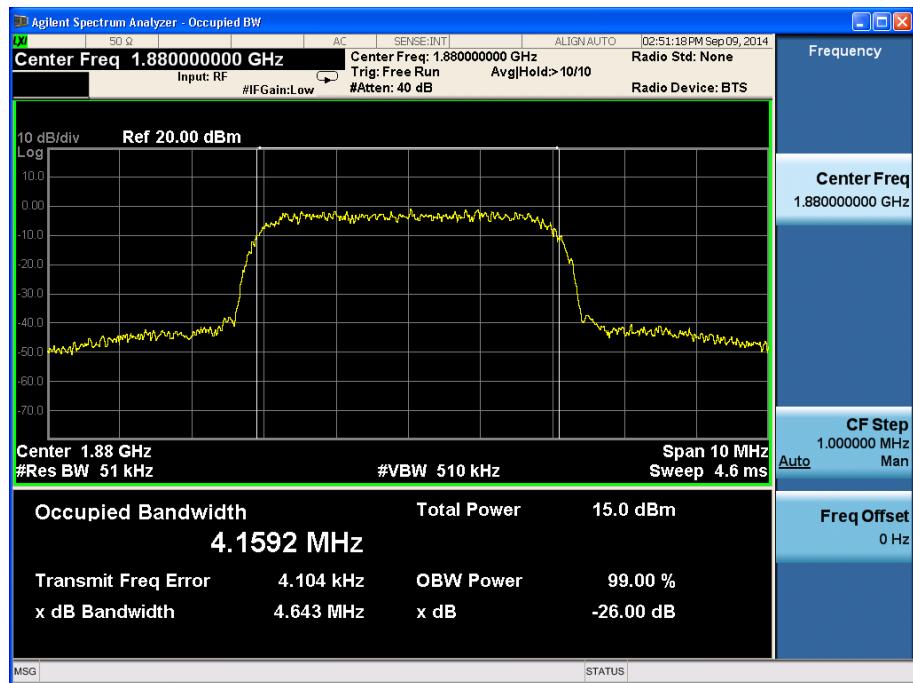


Channel 9538

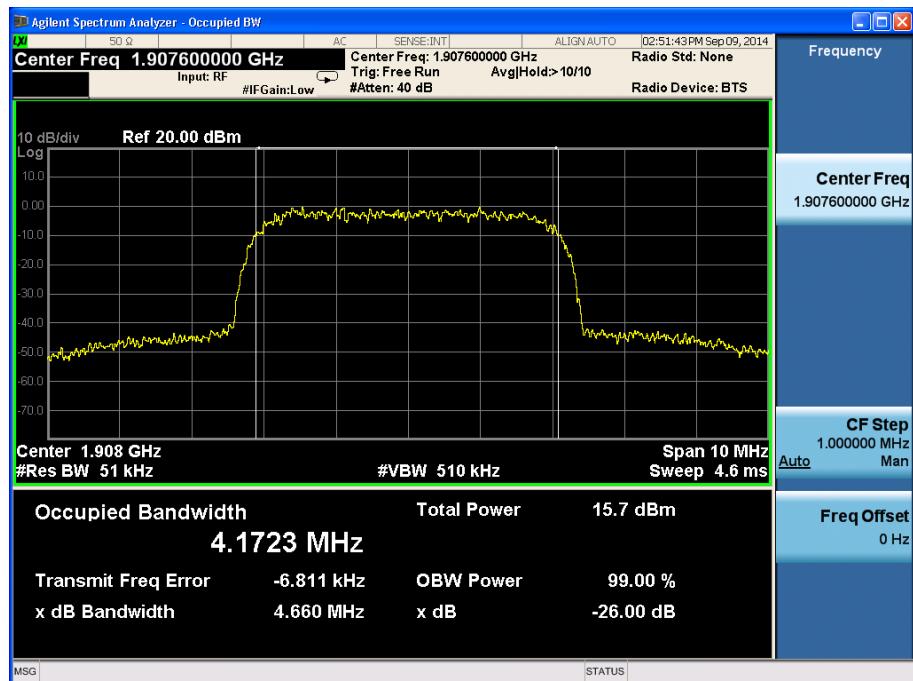
### HSDPA/HSUPA Mode:



Channel 9262



Channel 9400



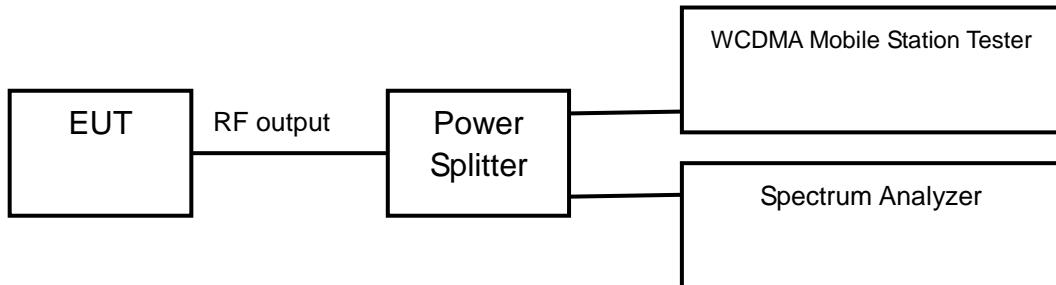
Channel 9538

### 2.2.1.4 Emission Bandwidth-FCC Part24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 II)

Limits: No specific emission bandwidth requirements in part 24.238(b)

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.652
1880.0	9400	4.625
1907.6	9538	4.652

HSDPA/HSUPA Mode:

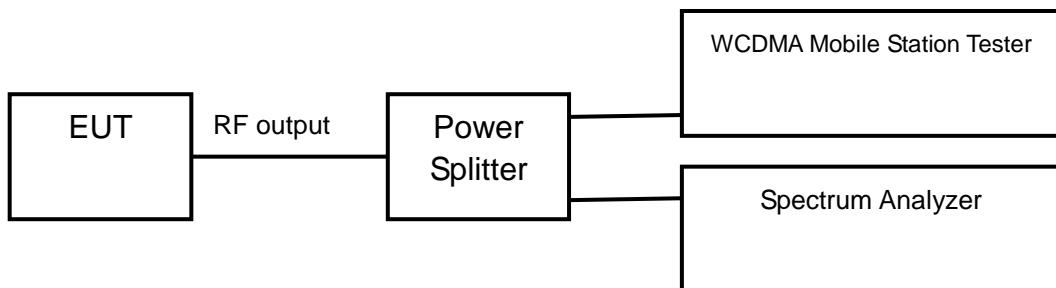
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.669
1880.0	9400	4.643
1907.6	9538	4.660

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

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 20GHz (higher than the 10<sup>th</sup> 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 No9400 (middle channel of WCDMA band II)

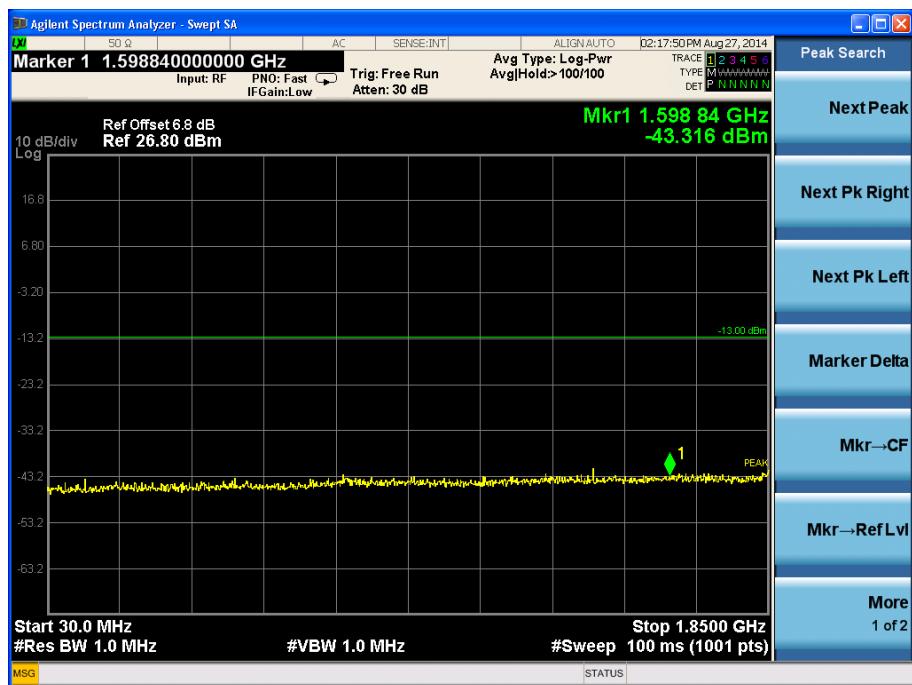
Limits	$\leq -13\text{dBm}$
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Test result:

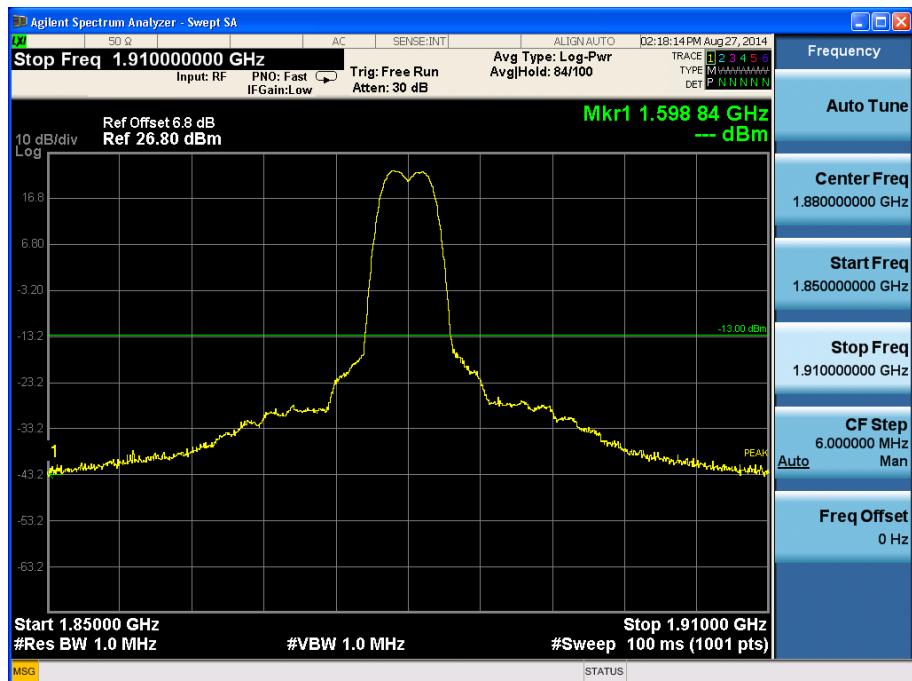
The results derive from Report No.: SRTC2013-H024-E0008.

Refer to the following figures.

## WCDMA Mode:



Channel 9400, 30MHz~1850MHz



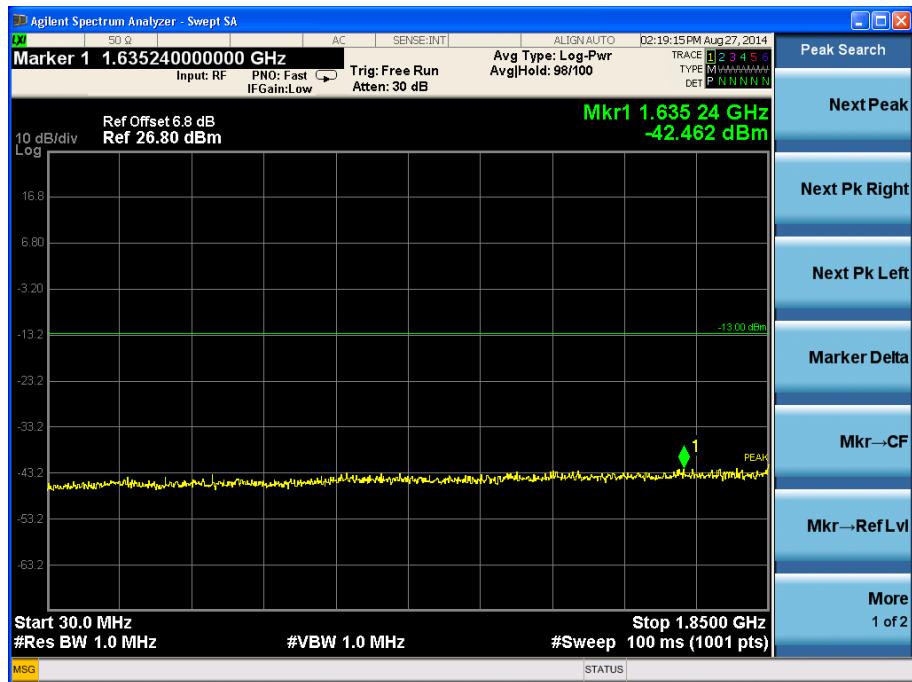
Channel 9400, 1850MHz~1910MHz

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

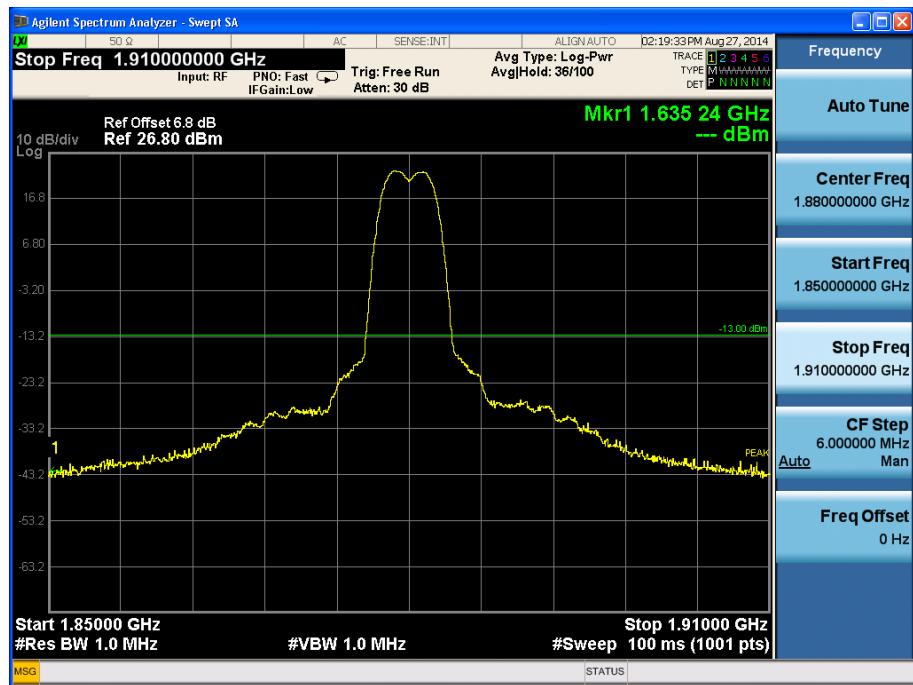


Channel 9400, 1910MHz~20GHz

### HSDPA/HSUPA Mode:



Channel 9400, 30MHz~1850MHz



Channel 9400, 1850MHz~1910MHz

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



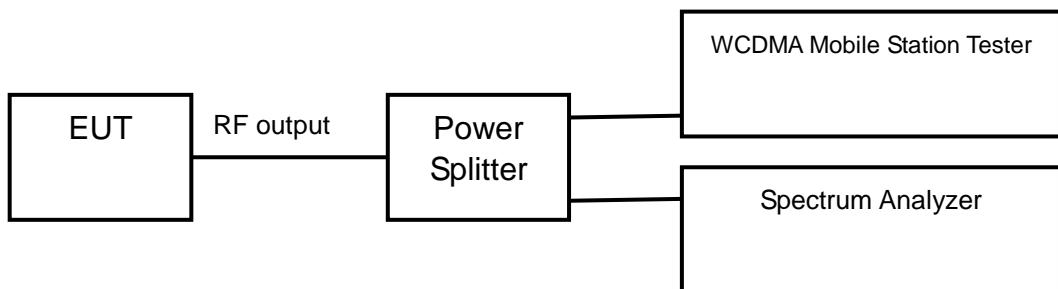
Channel 9400, 1910MHz~20GHz

### 2.2.1.6 Band Edges Compliance-FCC Part24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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.

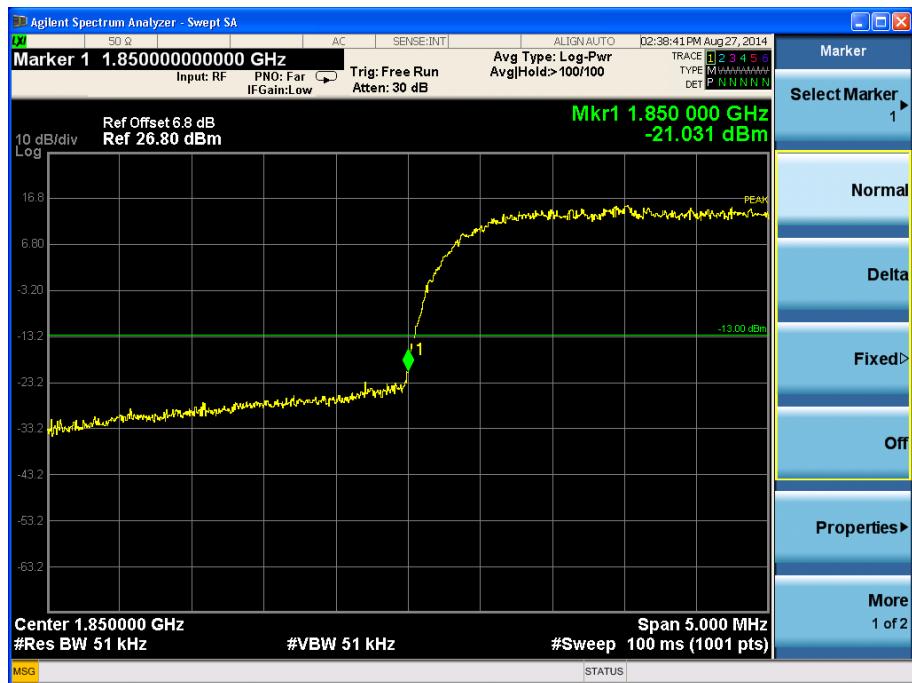
The measurement will be conducted at two channels No9262 and No9538 (Bottom and top channels of WCDMA band II)

Limits	$\leq -13\text{dBm}$
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Test result:

Refer to the following figures.

WCDMA Mode:

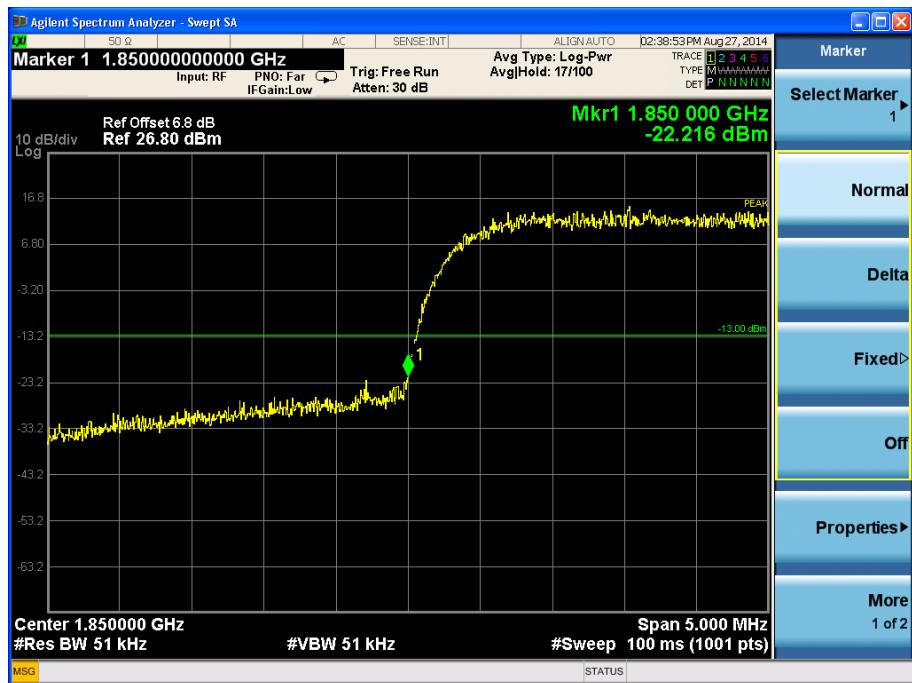


Channel 9262

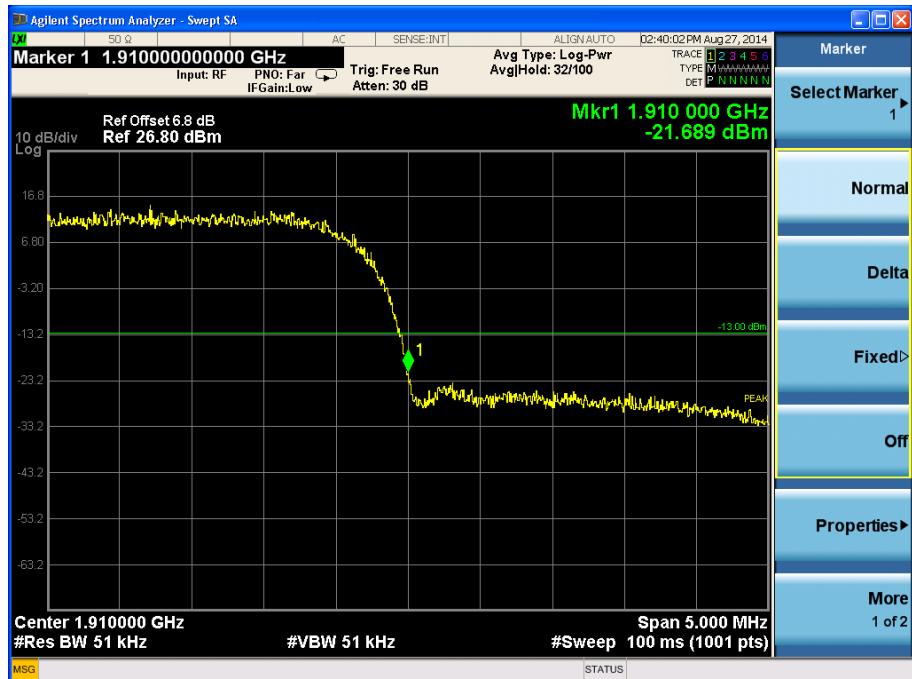


Channel 9538

HSDPA/HSUPA Mode:



Channel 9262



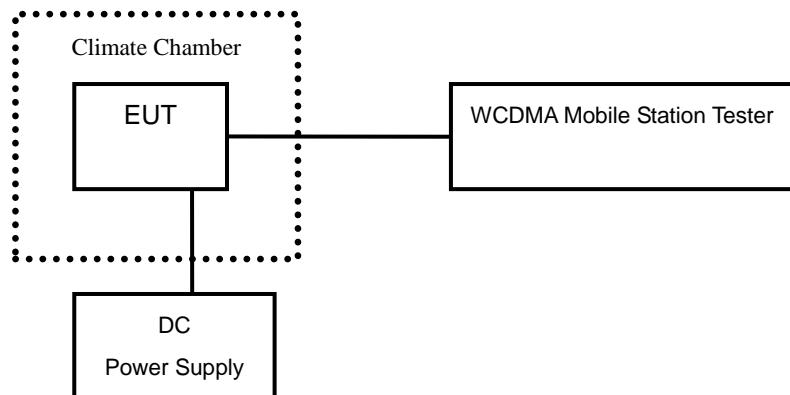
Channel 9538

### 2.2.1.7 Frequency Stability-FCC Part2.1055/24.235

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 3.5 to 4.35V. The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II).

Limits: No specific frequency stability requirements in part 2.1055 and part 24.235.

Test result:

WCDMA Mode:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 9262	Channel 9400	Channel 9538
-30	0.002	0.004	0.002
-20	0.004	0.003	0.002
-10	0.002	0.002	0.001
0	0.002	0.001	0.004
+10	0.002	0.002	0.002
+20	0.003	0.001	0.003
+30	0.001	0.001	0.001
+40	0.001	0.004	0.002
+50	0.002	0.003	0.001

Voltage (V)	Test Result (ppm)@20°C		
	Channel 9262	Channel 9400	Channel 9538
3.5	0.001	0.004	0.002
4.35	0.005	0.003	0.001

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 9262	Channel 9400	Channel 9538
-30	0.001	0.002	0.001
-20	0.002	0.003	0.001
-10	0.001	0.002	0.002
0	0.001	0.002	0.004
+10	0.001	0.002	0.003
+20	0.002	0.003	0.000
+30	0.002	0.002	0.003
+40	0.003	0.001	0.002
+50	0.003	0.001	0.001

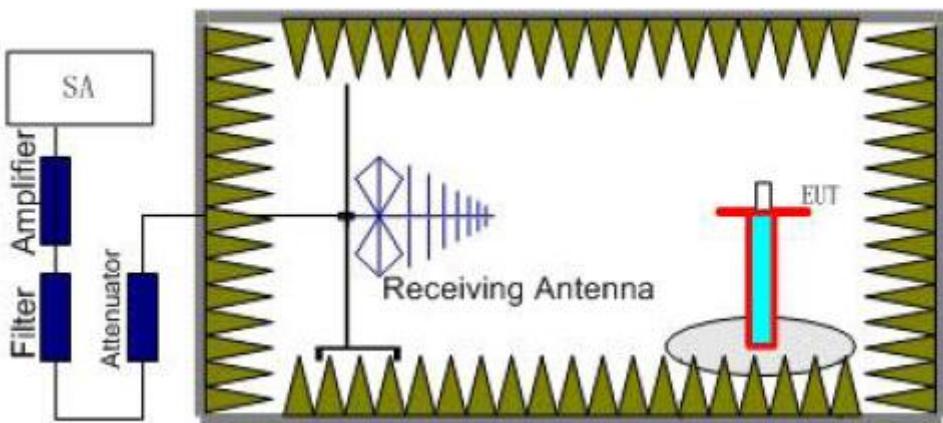
Voltage (V)	Test Result (ppm)@20°C		
	Channel 9262	Channel 9400	Channel 9538
3.5	0.002	0.001	0.002
4.35	0.003	0.003	0.002

### 2.2.1.8 Radiated Spurious Emissions-FCC Part2.1053/24.238

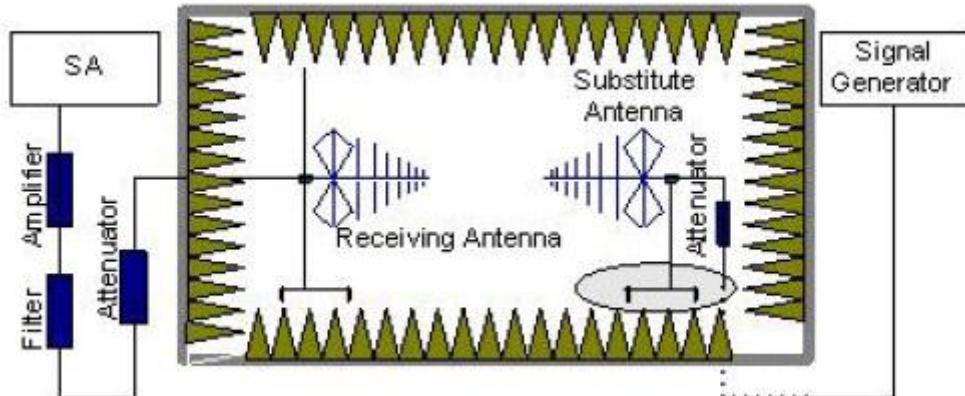
Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test Setup:



Step 1



Step 2

Test procedure:

The measurements procedures in TIA-603C-2004 are used.

The spectrum was scanned from 30MHz to the 10<sup>th</sup> 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 10<sup>th</sup> 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:

$$\text{Power(EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_a$$

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,  $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$ .

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{\text{mea}} + P_{\text{ca}} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

The measurement will be done at carrier frequencies that pertain to bottom (Channel 9262), middle (Channel 9400) and top (Channel 9538) channels of WCDMA band II.

Test result:

WCDMA Mode:

Channel 9262

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1318.63	-43.95	-13	Vertical
1931.06	-32.96	-13	Vertical
2907.41	-37.77	-13	Vertical
6565.13	-46.55	-13	Horizontal
9490.98	-40.11	-13	Vertical
15172.88	-34.73	-13	Vertical

Channel 9400

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1307.81	-44.15	-13	Vertical
1961.92	-36.54	-13	Vertical
2424.84	-36.33	-13	Vertical
6625.25	-47.18	-13	Vertical
9911.82	-41.11	-13	Vertical
15149.94	-34.47	-13	Vertical

Channel 9538

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1414.82	-43.63	-13	Vertical
1987.17	-32.50	-13	Vertical
2971.94	-37.69	-13	Vertical
6320.64	-46.43	-13	Vertical
9923.84	-41.10	-13	Horizontal
15185.51	-34.32	-13	Vertical

HSDPA/HSUPA Mode:

Channel 9262

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1393.18	-43.81	-13	Horizontal
1931.06	-33.61	-13	Vertical
2887.77	-37.83	-13	Vertical
6629.25	-46.92	-13	Vertical
9507.01	-40.25	-13	Vertical
15824.66	-35.63	-13	Vertical

Channel 9400

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1482.16	-44.28	-13	Vertical
1961.92	-37.37	-13	Vertical
2949.49	-37.23	-13	Vertical
6621.24	-46.42	-13	Vertical
9490.98	-40.86	-13	Vertical
15182.02	-35.69	-13	Vertical

Channel 9538

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1393.18	-43.80	-13	Vertical
1987.17	-32.15	-13	Vertical
2966.33	-38.08	-13	Horizontal
6380.76	-46.94	-13	Vertical
9911.82	-40.76	-13	Vertical
15174.33	-35.46	-13	Vertical

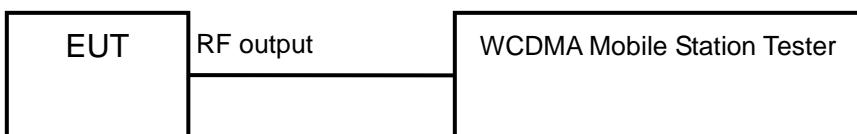
## 2.2.2 WCDMA Band V

### 2.2.2.1 RF Power Output-FCC Part22.913(a)

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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	≤24dBm
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Test result:.

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	22.23
836.6	4183	22.24
846.6	4233	22.28

HSDPA/HSUPA Mode:

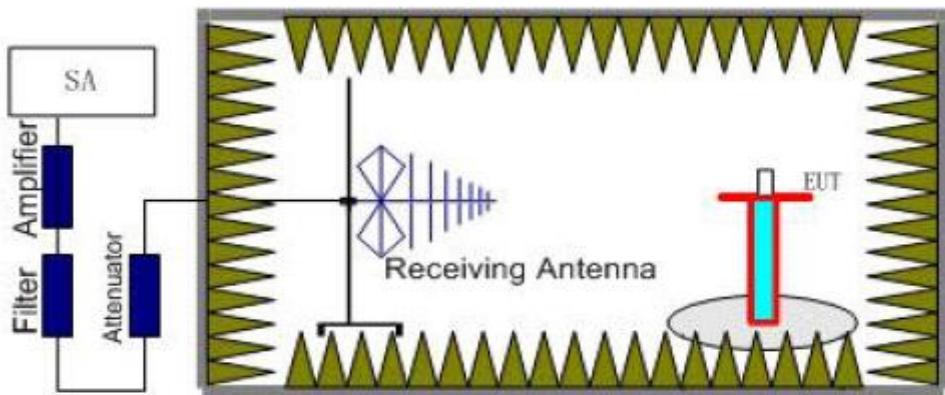
Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	20.89
836.6	4183	20.58
846.6	4233	20.65

### 2.2.2.2 Effective Radiated Power-FCC Part22.913(a)

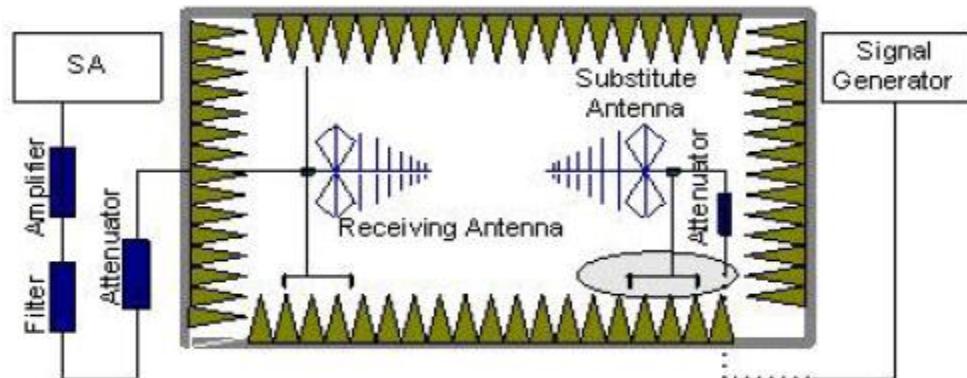
Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test setup:



Step 1



Step 2

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:

$$\text{Power (EIRP)} = \text{Pmea} + \text{Pca} + \text{Ga}$$

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,  $\text{ERP} = \text{EIRP} - 2.15$  (dB).

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

Limits	$\leq 38.5\text{dBm}$
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Test result:

WCDMA Mode:

Frequency (MHz)	Peak ERP (dBm)	Pca Cable loss (dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
826.4	19.62	-3.8	8.6	2.15	16.97	Vertical
836.6	20.88	-3.8	8.6	2.15	18.23	Vertical
846.6	20.42	-3.8	8.6	2.15	17.77	Vertical

HSDPA/HSUPA Mode:

Frequency (MHz)	Peak ERP (dBm)	Pca Cable loss (dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
826.4	19.55	-3.8	8.6	2.15	16.90	Vertical
836.6	20.82	-3.8	8.6	2.15	18.17	Vertical
846.6	20.37	-3.8	8.6	2.15	17.72	Vertical

Frequency: 836.6MHz

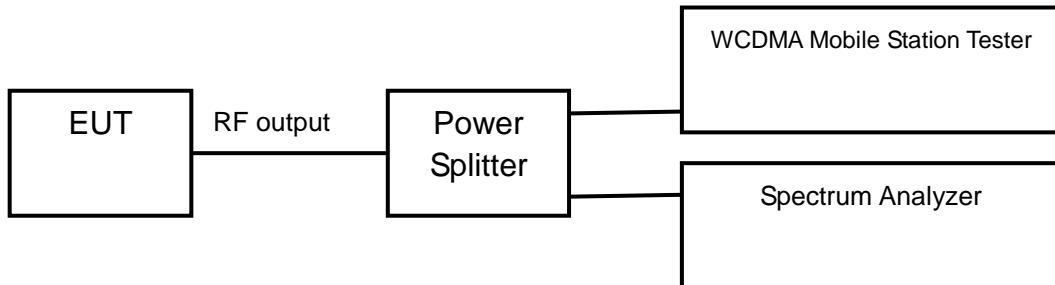
Peak ERP(dBm) = Pmea(18.23dBm)+Pca(-3.8dB)+Ga(8.6dB) = 20.88dBm

### 2.2.2.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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:

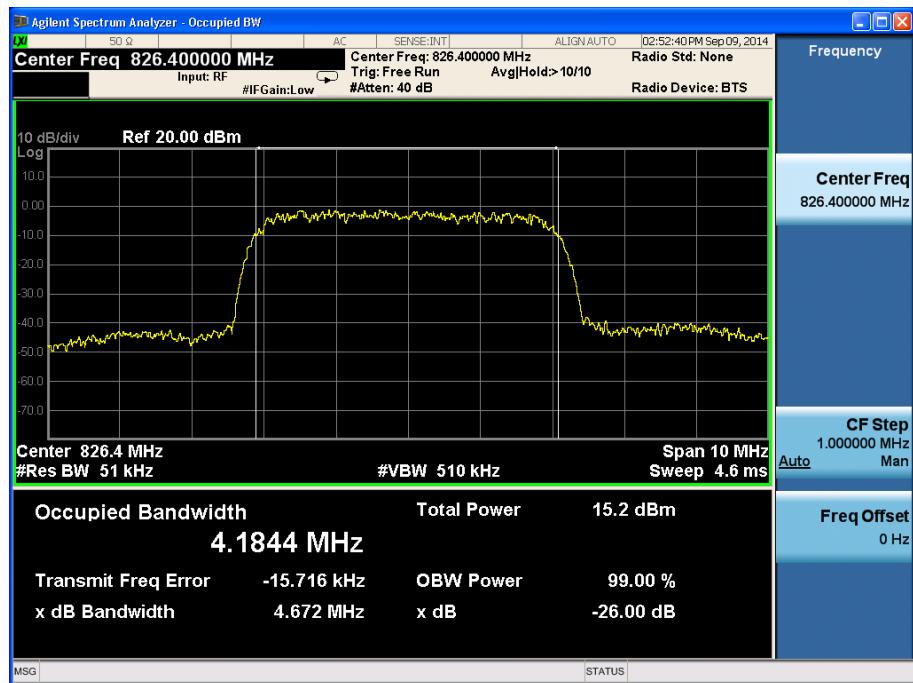
WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.184
836.6	4183	4.148
846.6	4233	4.182

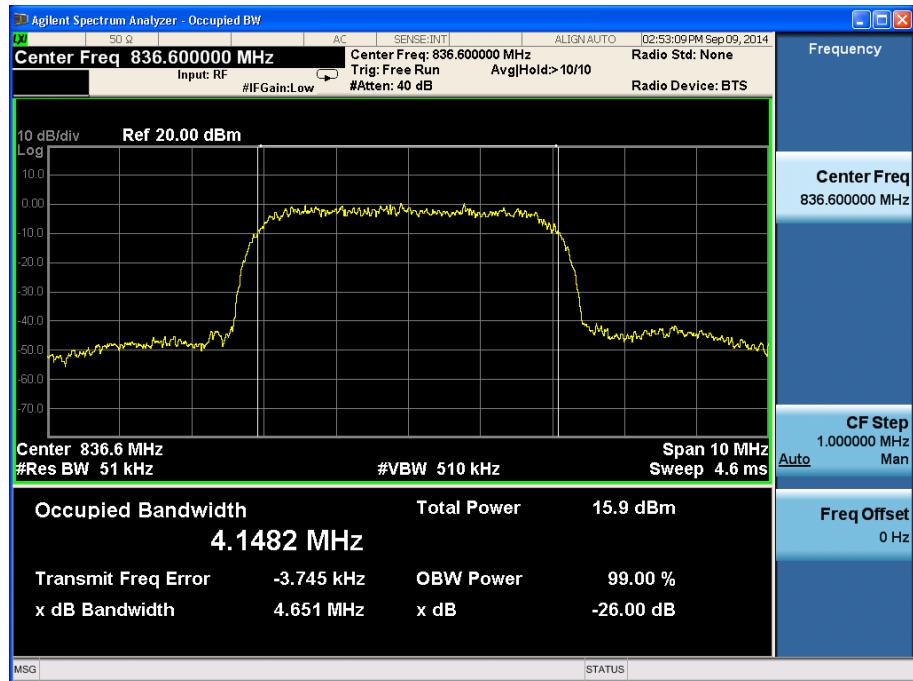
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.153
836.6	4183	4.164
846.6	4233	4.186

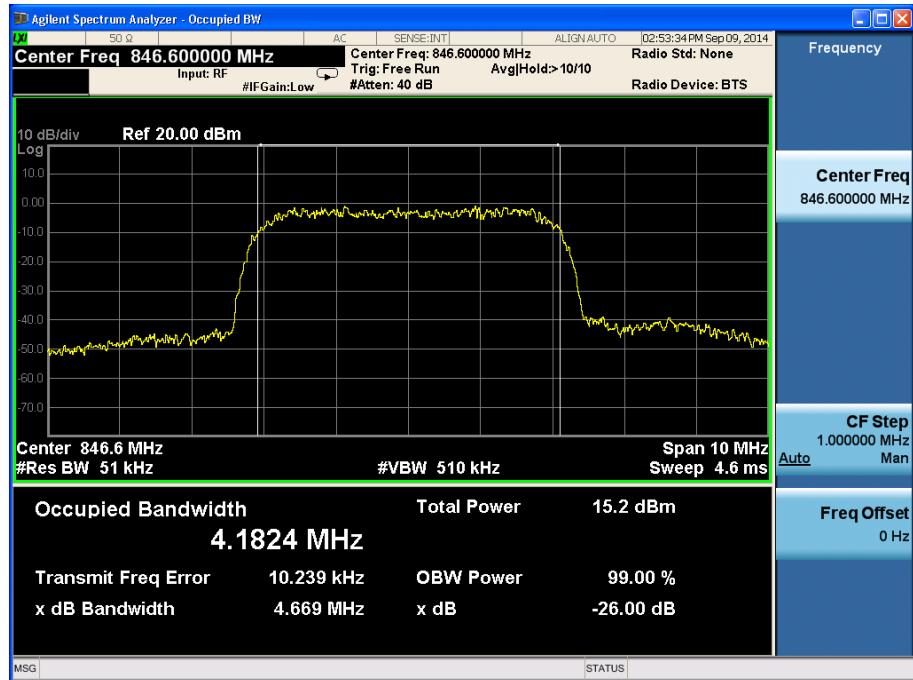
### WCDMA Mode:



Channel 4132

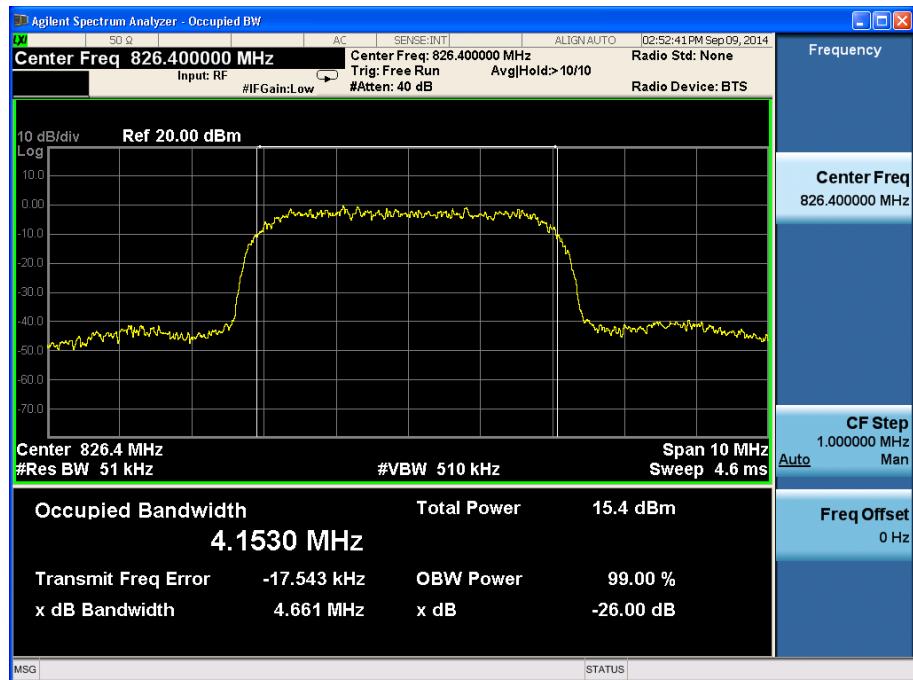


Channel 4183

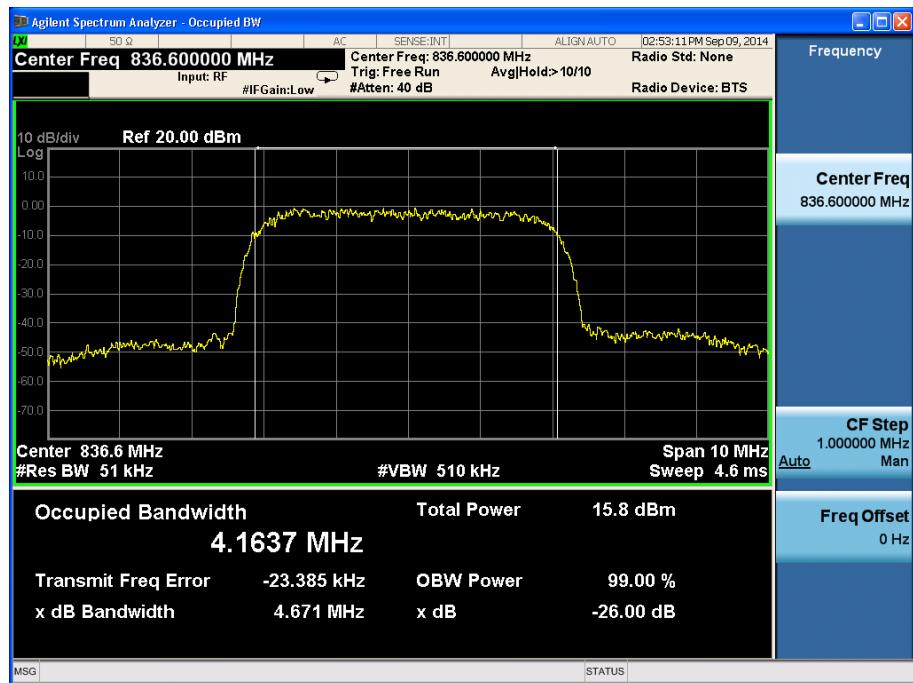


Channel 4233

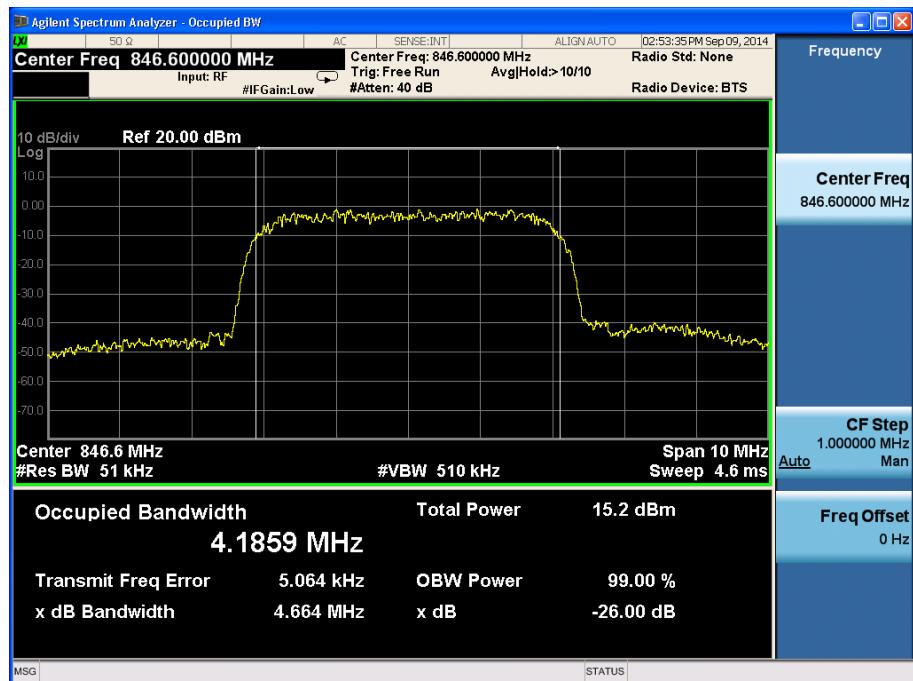
### HSDPA/HSUPA Mode:



Channel 4132



Channel 4183



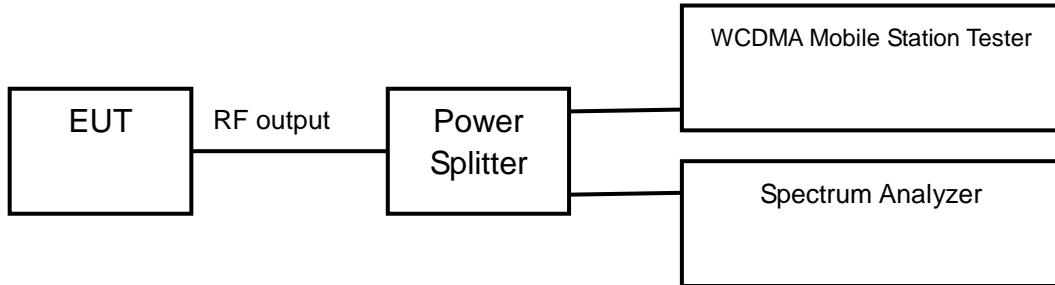
Channel 4233

#### 2.2.2.4 Emission Bandwidth-FCC Part22.917(b)

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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	4.672
836.6	4183	4.651
846.6	4233	4.669

HSDPA/HSUPA Mode:

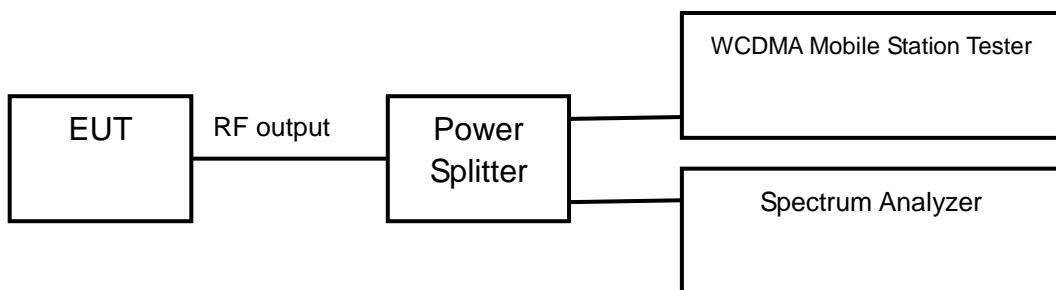
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.661
836.6	4183	4.671
846.6	4233	4.664

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

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 10<sup>th</sup> harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

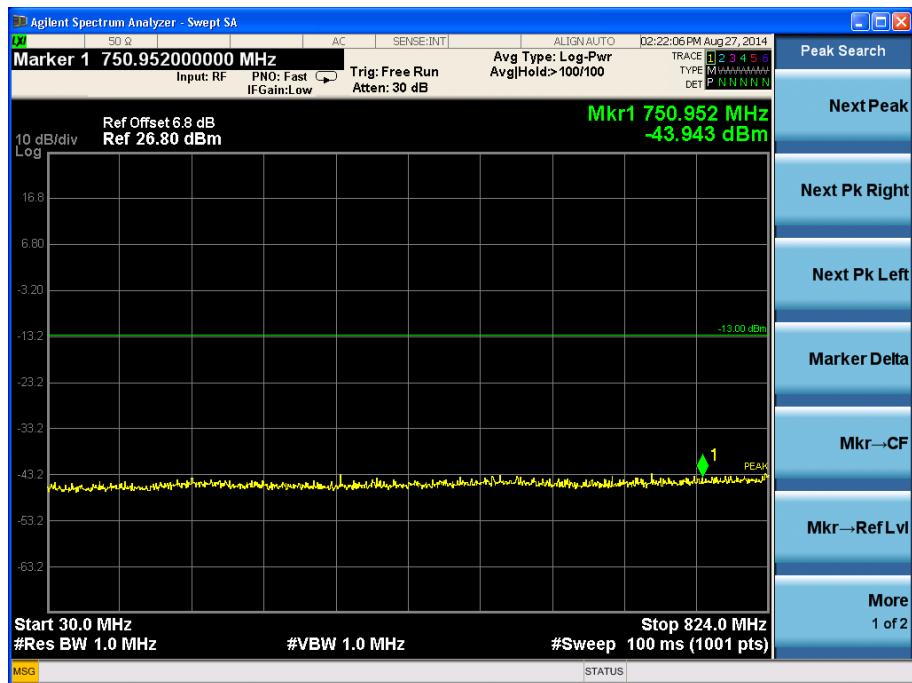
The measurement will be conducted at one channel No4183 (middle channel of WCDMA band V)

Limits	$\leq -13\text{dBm}$
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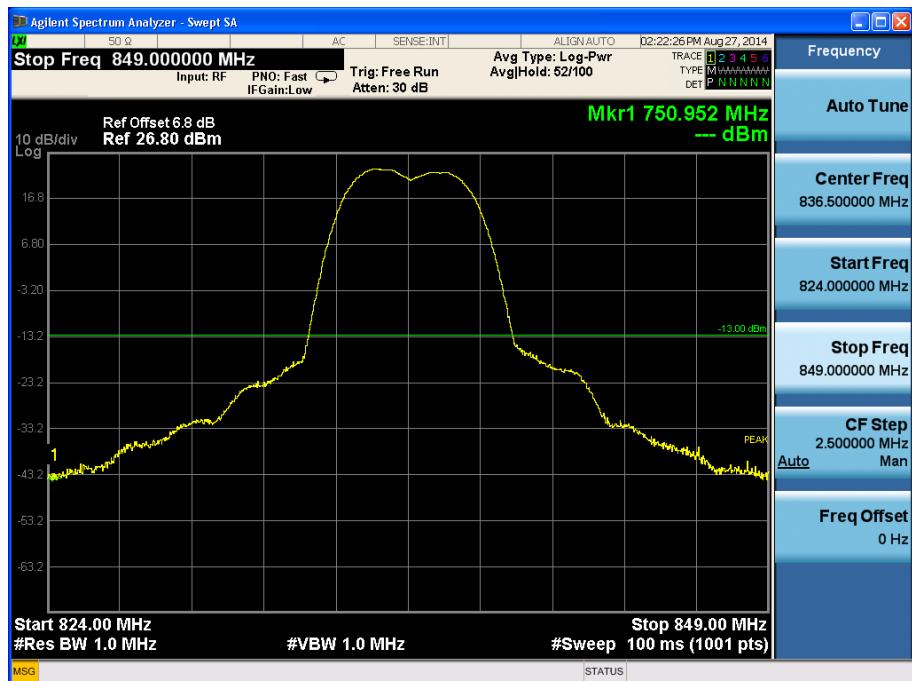
Test result:

Refer to the following figures.

## WCDMA Mode:

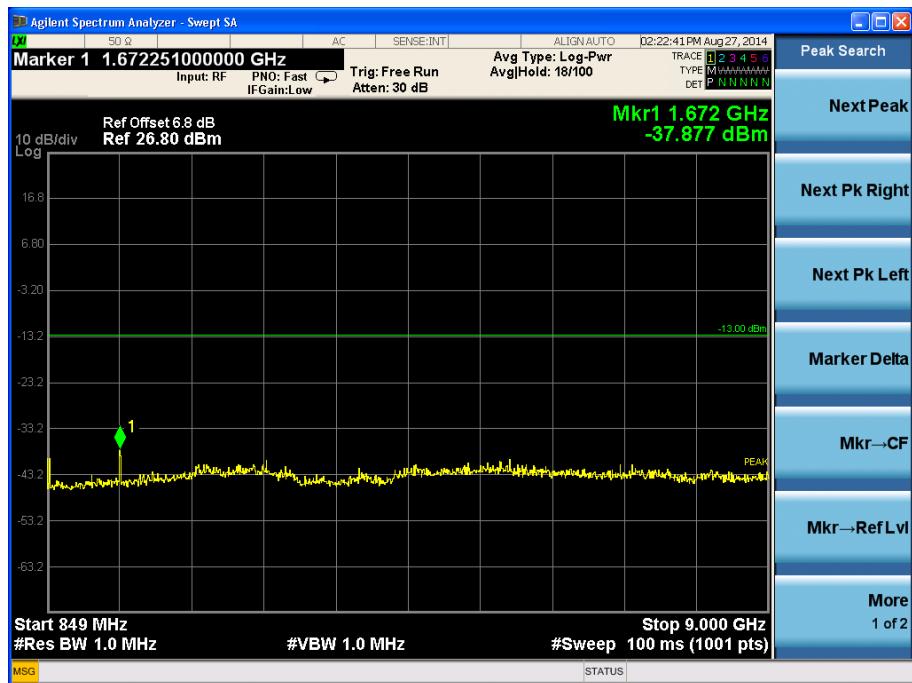


Channel 4183, 30MHz~824MHz



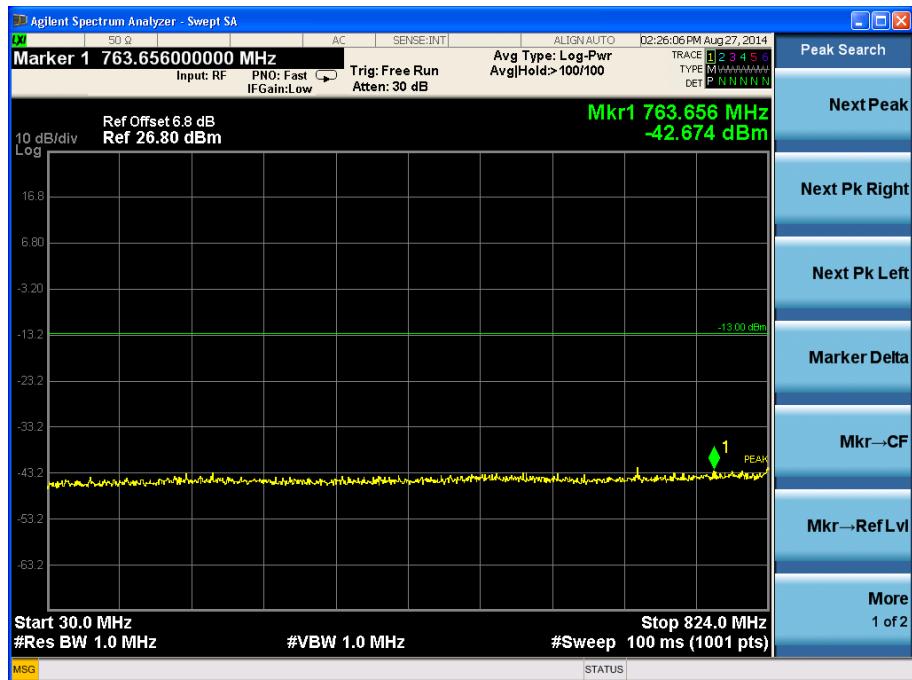
Channel 4183, 824MHz~849MHz

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

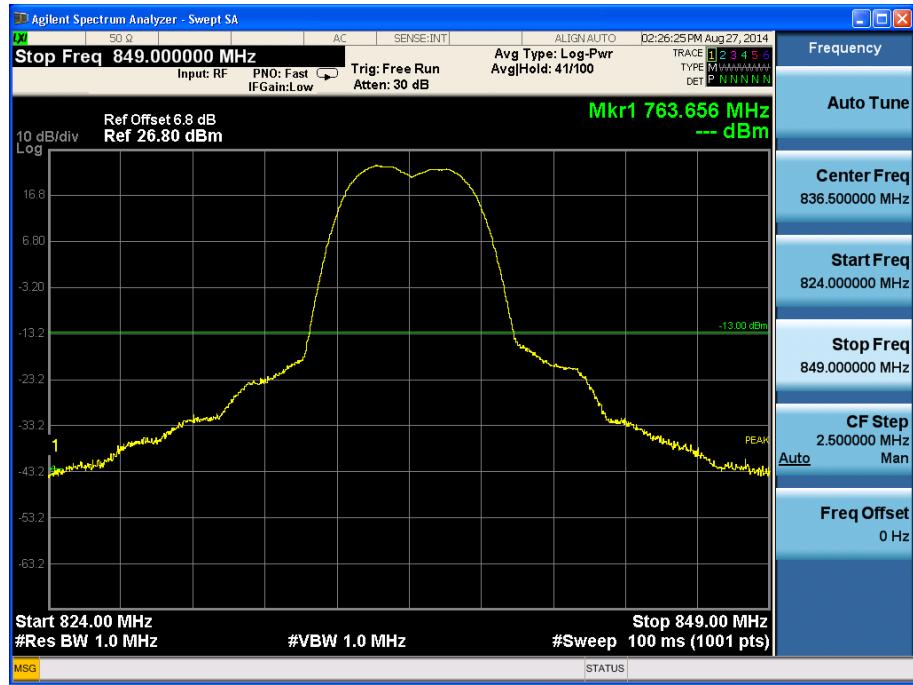


Channel 4183, 849MHz~9GHz

### HSDPA/HSUPA Mode:

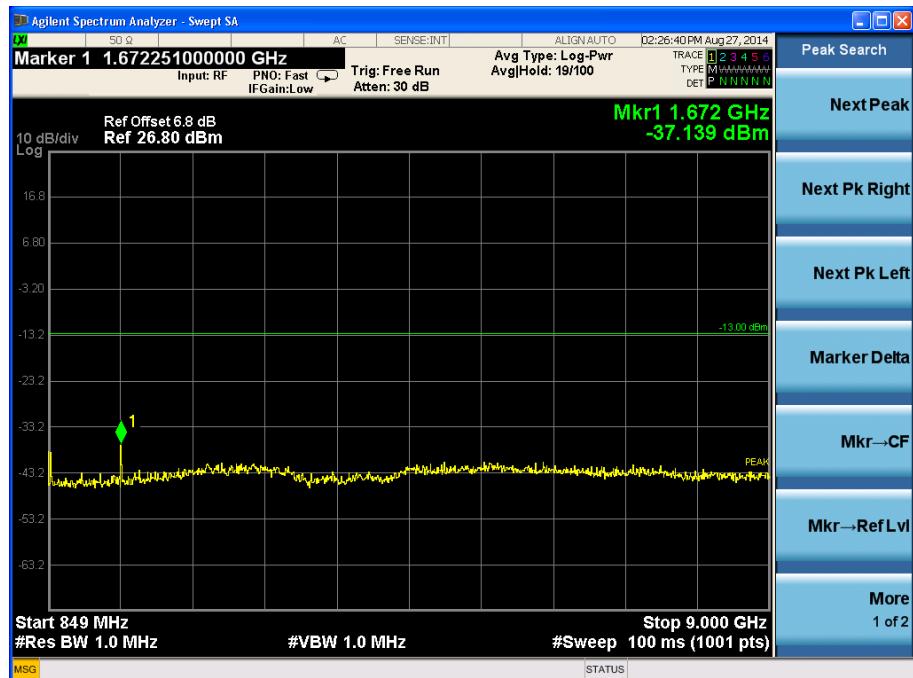


Channel 4183, 30MHz~824MHz



### Channel 4183, 824MHz~849MHz

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



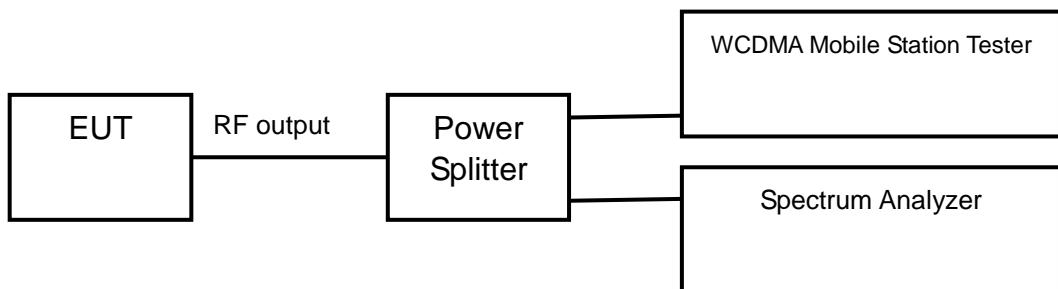
### Channel 4183, 849MHz~9GHz

### 2.2.2.6 Band Edges Compliance-FCC Part22.917(b)

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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.

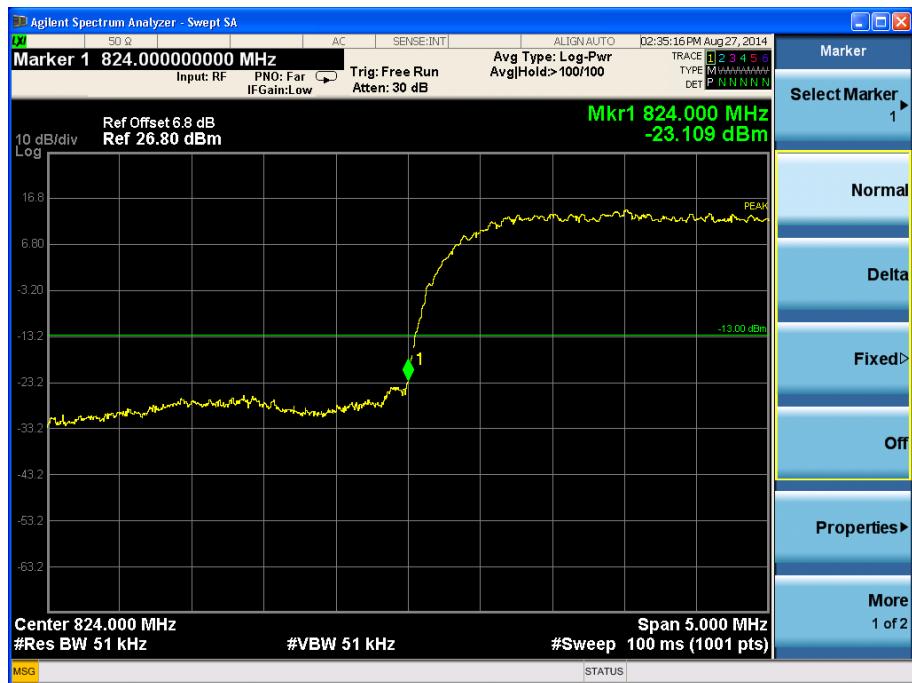
The measurement will be conducted at two channels No4132 and No4233 (Bottom and top channels of WCDMA band V)

Limits	$\leq -13\text{dBm}$
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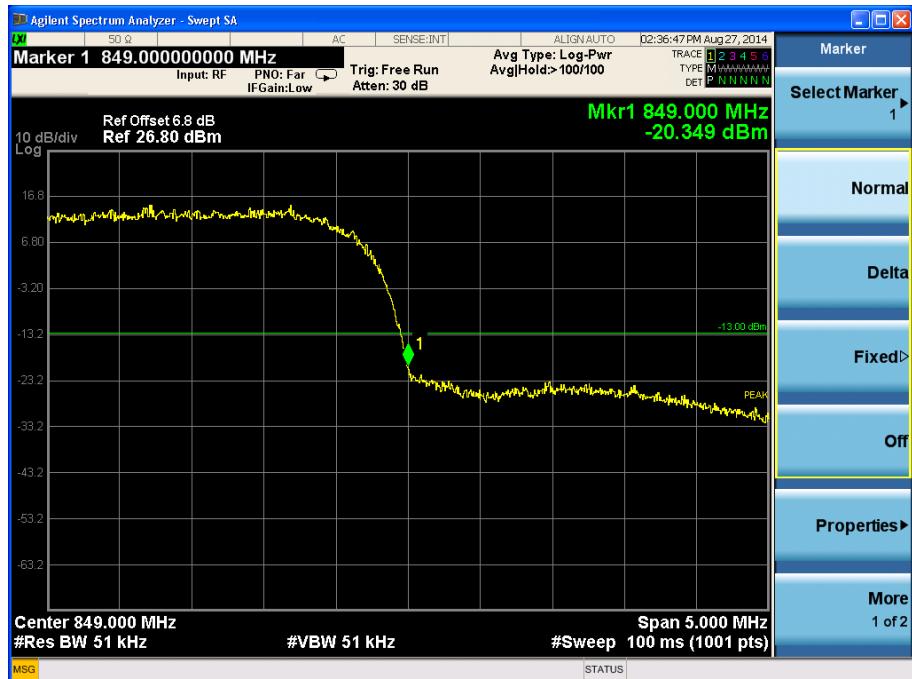
Test result:

Refer to the following figures.

WCDMA Mode:

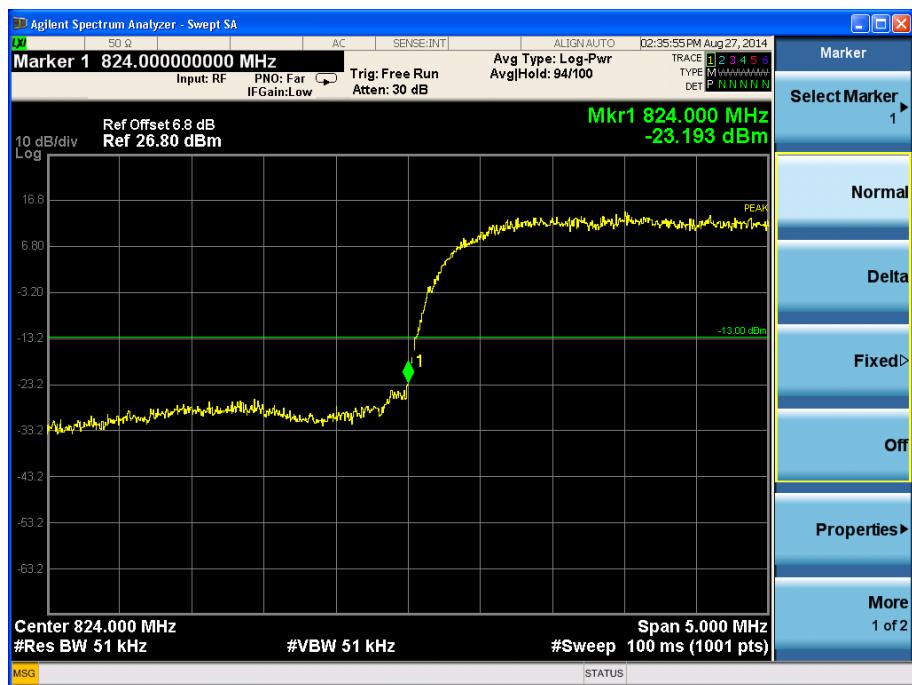


Channel 4132



Channel 4233

HSDPA/HSUPA Mode:



Channel 4132



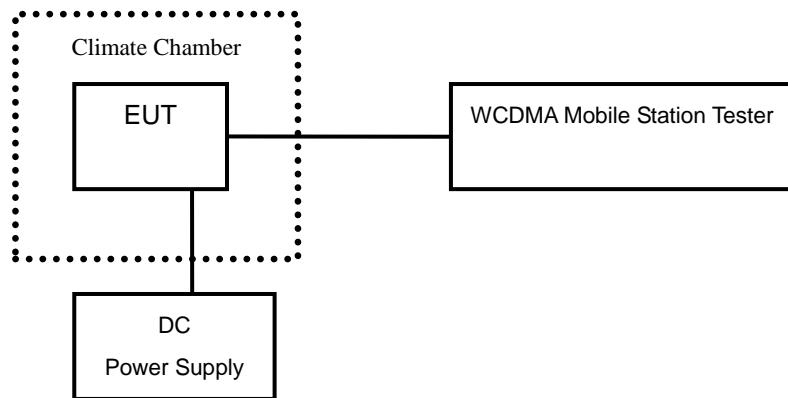
Channel 4233

### 2.2.2.7 Frequency Stability-FCC Part2.1055/22.355

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

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 3.5 to 4.35V. 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.

Test result:

WCDMA Mode:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 4132	Channel 4183	Channel 4233
-30	0.002	0.001	0.001
-20	0.001	0.001	0.002
-10	0.002	0.002	0.003
0	0.003	0.002	0.002
+10	0.001	0.004	0.001
+20	0.002	0.004	0.003
+30	0.004	0.002	0.003
+40	0.001	0.003	0.002
+50	0.003	0.005	0.002

Voltage (V)	Test Result (ppm)@20°C		
	Channel 4132	Channel 4183	Channel 4233
3.5	0.002	0.002	0.002
4.35	0.001	0.004	0.001

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 4132	Channel 4183	Channel 4233
-30	0.001	0.004	0.001
-20	0.001	0.004	0.003
-10	0.003	0.003	0.002
0	0.002	0.002	0.001
+10	0.002	0.002	0.005
+20	0.002	0.003	0.004
+30	0.001	0.001	0.004
+40	0.003	0.003	0.004
+50	0.005	0.002	0.003

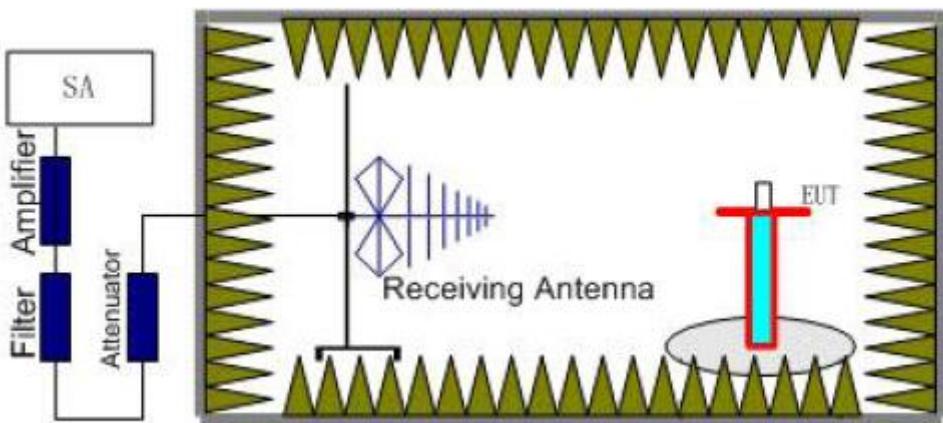
Voltage (V)	Test Result (ppm)@20°C		
	Channel 4132	Channel 4183	Channel 4233
3.5	0.001	0.004	0.001
4.35	0.001	0.006	0.003

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

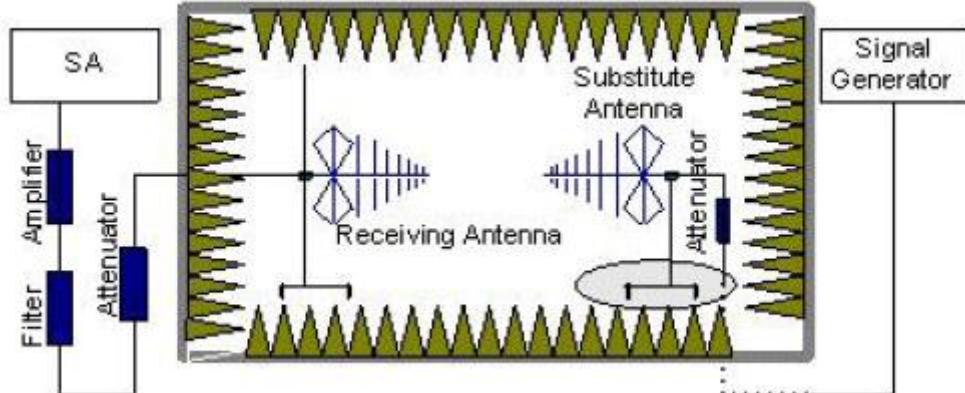
Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test Setup:



Step 1



Step 2

Test procedure:

The measurements procedures in TIA-603C-2004 are used.

The spectrum was scanned from 30MHz to the 10<sup>th</sup> 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 10<sup>th</sup> 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:

$$\text{Power(EIRP)} = P_{\text{mea}} + P_{\text{ca}} + G_a$$

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,  $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$ .

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{\text{mea}} + P_{\text{ca}} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

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

Test result:

WCDMA Mode:

Channel 4132

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1434.06	-44.34	-13	Vertical
1483.06	-44.32	-13	Vertical
2604.40	-44.90	-13	Vertical
2683.52	-45.01	-13	Horizontal
6933.86	-46.04	-13	Vertical
9478.95	-41.17	-13	Vertical

Channel 4183

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1670.14	-43.32	-13	Vertical
1692.34	-48.17	-13	Horizontal
2427.65	-41.41	-13	Vertical
2502.35	-45.80	-13	Vertical
7006.01	-45.85	-13	Vertical
9983.96	-40.88	-13	Vertical

## Channel 4233

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1541.08	-44.18	-13	Vertical
1695.39	-36.70	-13	Vertical
2538.23	-45.12	-13	Horizontal
2997.19	-44.89	-13	Vertical
7042.08	-45.04	-13	Vertical
9911.82	-40.41	-13	Vertical

## HSDPA/HSUPA Mode:

## Channel 4132

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1482.16	-43.84	-13	Vertical
1665.40	-47.87	-13	Vertical
2416.43	-39.11	-13	Vertical
2573.01	-43.57	-13	Horizontal
7066.13	-45.63	-13	Vertical
9931.86	-40.53	-13	Vertical

## Channel 4183

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1486.97	-43.97	-13	Vertical
1670.14	-42.50	-13	Vertical
2991.58	-44.90	-13	Vertical
2991.58	-44.90	-13	Vertical
7026.05	-46.00	-13	Vertical
9923.84	-39.80	-13	Vertical

Channel 4233

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1456.91	-44.06	-13	Vertical
1695.39	-36.86	-13	Vertical
2637.92	-44.26	-13	Vertical
2997.19	-44.55	-13	Vertical
6541.08	-46.03	-13	Horizontal
9967.93	-40.75	-13	Vertical

### 2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	MY48367401	2015.8
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2015.8
3	DC Power Supply E3645A	Agilent	MY40000740	2015.8
4	Power Splitter 11850C	Agilent	026057	2015.8
5	Temperature chamber SH241	ESPEC	92000390	2015.8
6	12.65mx8.03mx7.50m 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	2015.8
10	HL562 Ultra log antenna	R&S	100016	2015.8
11	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2015.8
12	ESI 40 EMI test receiver	R&S	100015	2015.8
13	Radio tester	CMU 200	114667	2015.8

## Appendix

### Appendix1 Test Setup