
TEST REPORT

Report No.: SRTC2010-H024-E0018

Product Name: GSM/GPRS/EDGE/

WCDMA/HSDPA/HSUPA/HSPA+ Module

Product Model: MC8705

Applicant: Sierra Wireless Inc.

Manufacture: Sierra Wireless Inc.

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

(October 1, 2009 edition)

IC RSS-132 (Issue 2, September 2005)

IC RSS-133 (Issue 5, February 2009)

FCC ID: N7NMC8705

IC: 2417C-MC8705

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-68009202 Fax: 86-10-68009205

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1. General information

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).

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: Sierra Wireless Inc.
Address: 13811 Wireless Way Richmond, British Columbia, Canada,
V6V 3A4.
Country or Region: Canada
Contacted person: Ying Wang
Tel: +1 604 232 1440
Fax: +1 604 231 1109
Email: ywang@sierrawireless.com

1.4 Manufacturer's details

Company: Sierra Wireless Inc.
Address: 13811 Wireless Way Richmond, British Columbia, Canada,
V6V 3A4.
Country or Region: Canada
Contacted person: Ying Wang
Tel: +1 604 232 1440
Fax: +1 604 231 1109
Email: ywang@sierrawireless.com

1.5 Application details

Date of reception of test sample: 26th September 2010

Date of test: 26th September 2010 to 27th October 2010

1.6 Reference specification

FCC Part 24E, Part22H, Part 2 (October 1, 2009 edition)

IC RSS-132 (Issue 2, September 2005)

IC RSS-133 (Issue 5, February 2009)

ANSI/TIA-603-C-2004

1.7 Information of EUT

1.7.1 General information

Name of EUT	GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/HSPA+ Module
FCC ID	N7NMC8705
IC	2417C-MC8705
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	BPSK
Emission Designator	4M50F9W
Duplex mode	FDD
Duplex spacing:	WCDMA Band II:80MHz WCDMA Band V:45MHz
Antenna type	External
Power Supply	USB docking card
Rated Power Supply Voltage	3.3V
Extreme Temperature	Lowest: -30°C Highest: +50°C
Extreme Voltage	Minimum: 3.2V Maximum: 3.6V
HW Version	Rev1.0
SW Version	T0.2.3.0

1.7.2 EUT details

Name	Model	IMEI
GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/HSPA+ Module	MC8705	354524040000946

1.7.3 Auxiliary equipment details

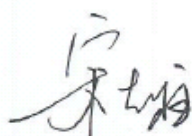
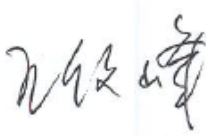
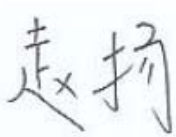
Equipment	USB docking card
Manufacturer	Flextronics Electronics Technology (Suzhou) Co. Ltd.
Model Number	-----

Equipment	Notebook
Manufacturer	IBM
Model Number	T23

2. Test information

2.1 Summary of the test results

No.	Test case	FCC reference	Verdict
1	RF Power Output	FCC Part22.913(a)/24.232(b) IC RSS-132 § 4.4 IC RSS-133 § 6.4	Pass
2	Type of Modulation	IC RSS-132 § 4.2 IC RSS-133 § 6.2	Pass
3	Occupied Bandwidth	FCC Part2.1049(h)(i) IC RSS-132 § 4.5 IC RSS-133 § 6.5	Pass
4	Emission Bandwidth	FCC Part22.917(b)/24.238(b) IC RSS-132 § 4.5 IC RSS-133 § 6.5	Pass
5	Spurious Emissions at antenna terminals	FCC Part2.1057/22.917/24.238 IC RSS-132 § 4.5 IC RSS-133 § 6.5	Pass
6	Band Edges Compliance	FCC Part22.917(b)/24.238(b) IC RSS-132 § 4.5 IC RSS-133 § 6.5	Pass
7	Frequency Stability	FCC Part2.1055 IC RSS-132 § 4.3 IC RSS-133 § 6.3	Pass
8	Radiated Spurious Emissions	FCC Part2.1051/22.917/24.238	Pass
9	Receiver Spurious Emission	IC RSS-Gen § 6a	Pass

This Test Report Is Issued by: Mr. Song Qizhu Director of the test lab 	Checked by: Mr. Wang Junfeng Deputy director of the test lab 
Tested by: Mr. Zhao Yang Test engineer 	Issued date: 2010.12.02

2.2 Test result

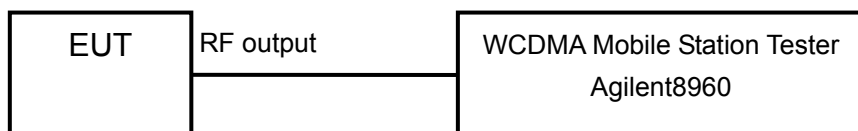
2.2.1 WCDMA Band II

2.2.1.1 RF Power Output-FCC Part 24.232(b)/IC RSS-133 § 6.4

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test Setup:



Test procedure:

WCDMA Mode:

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)

Release 6 HSDPA Mode:

The following 4 Sub-Test were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121 V8.4.0 specification. All TX RMS power requirements for power Class 3 were met according to table 5.2AA.5 and 5.2B.5. All UE channels and power ratio are set according to table C10.1.4&C11.1.3 in the 3GPP TS34.121 V8.4.0. RMC12.2kps is used for this testing.

HSDPA Sub-Test Setting:

Sub-Test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM(dB)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

*Note: the recommended HSDPA MPRs are implemented as per following sub-test.

Release 6 HSUPA Mode:

The following 5 Sub-Test were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121 V8.4.0 specification. All TX RMS power requirements for power Class 3 were met according to table 5.2AA.5 and 5.2B.5. All UE channels and power ratio are set according to table C11.1.3 in the 3GPP TS34.121 V8.4.0. RMC12.2kps is used for this testing.

HSUPA Sub-Test Setting:

Sub-Test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	β_{ec}
1	11/15	15/15	64	11/15	22/15	209/225
2	6/15	15/15	64	6/15	12/15	12/15
3	15/15	9/15	64	15/9	30/15	30/15
4	2/15	15/15	64	2/15	4/15	2/15
5	15/15	15/15	64	15/15	30/15	24/15

Sub-Test	β_{ed} (SF)	β_{ed} (Codes)	CM(dB)	MPR(dB)	AG Index	E-TFCI
1	4	1	1.0	0.0	20	75
2	4	1	3.0	2.0	12	67
3	4	2	2.0	1.0	15	92
4	4	1	3.0	2.0	17	71
5	4	1	1.0	0.0	21	81

*Note: the recommended HSUPA MPRs are implemented as per following sub-test.

Limits	$\leq 24\text{dBm}$
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Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1852.4	9262	23.0
1880.0	9400	23.0
1907.6	9538	22.8

HSDPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output in Sub-Test (dBm)			
		1	2	3	4
1852.4	9262	23.0	22.6	22.1	22.1
1880.0	9400	23.0	22.6	22.1	22.1
1907.6	9538	22.8	22.5	22.0	21.9

HSUPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output in Sub-Test (dBm)				
		1	2	3	4	5
1852.4	9262	22.3	20.5	21.5	21.8	21.2
1880.0	9400	21.5	20.8	21.6	21.9	21.4
1907.6	9538	22.2	20.6	21.4	21.6	22.2

2.2.1.2 Type of Modulation-IC RSS-133 § 6.2

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Applicable standard:

The devices may employ any type of modulation techniques. The type of modulation used must be reported.

Test result:

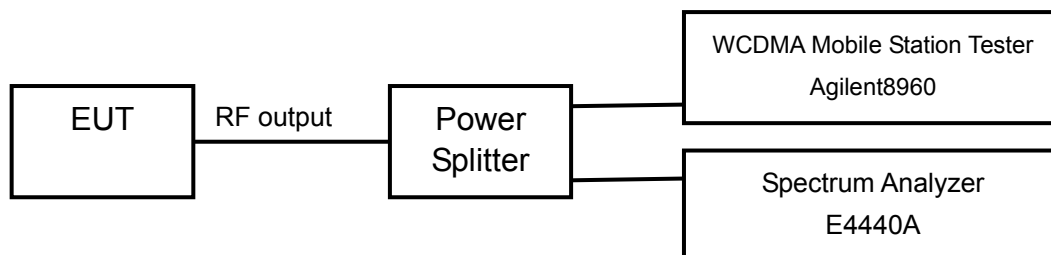
Please refer to section 1.7.1 of this report.

2.2.1.3 Occupied Bandwidth-FCC Part2.1049(h)(i)/IC RSS-133 § 6.5

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

Limits: No specific occupied bandwidth requirements

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.1105
1880.0	9400	4.1587
1907.6	9538	4.1840

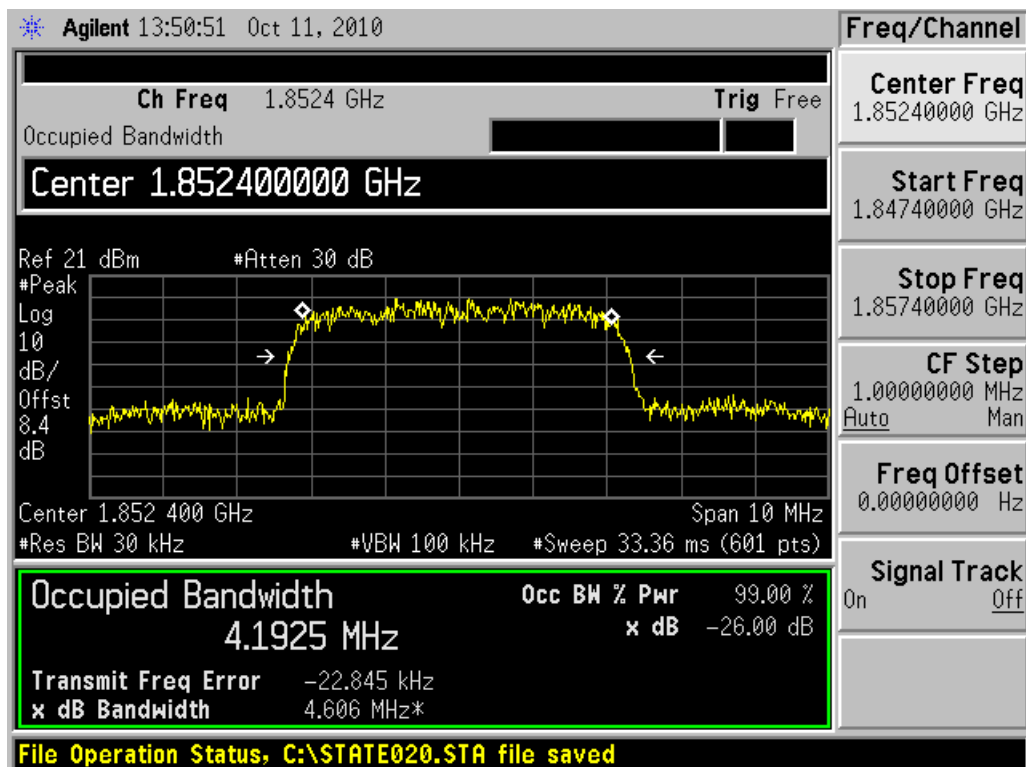
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.1600
1880.0	9400	4.1884
1907.6	9538	4.1640

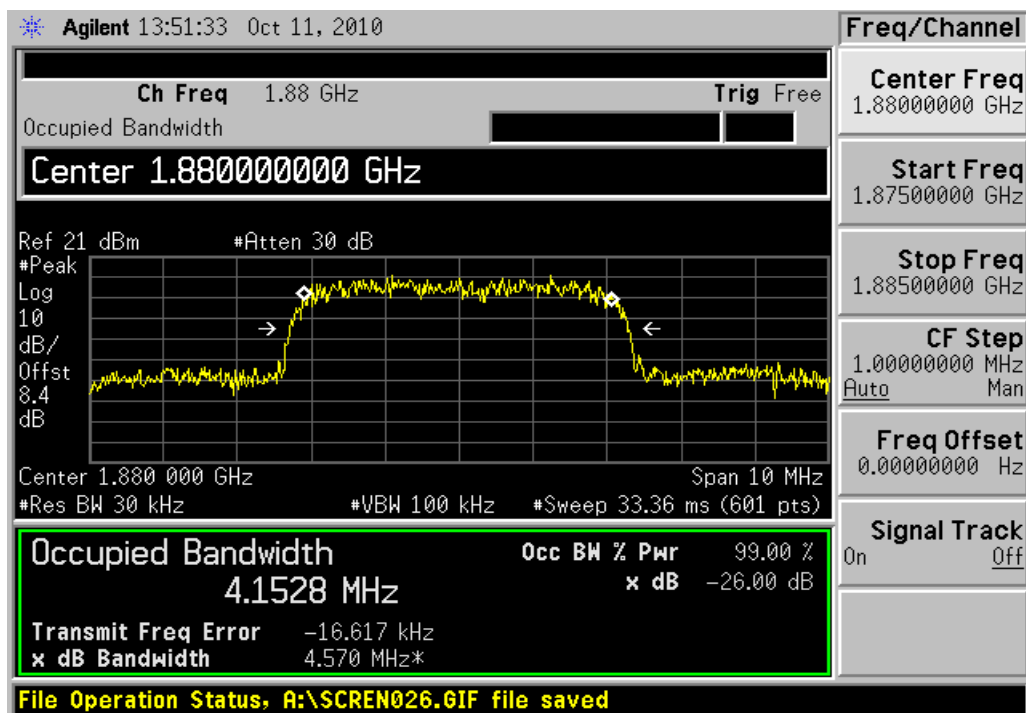
HSPA+ Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
1852.4	9262	4.1660
1880.0	9400	4.1111
1907.6	9538	4.1458

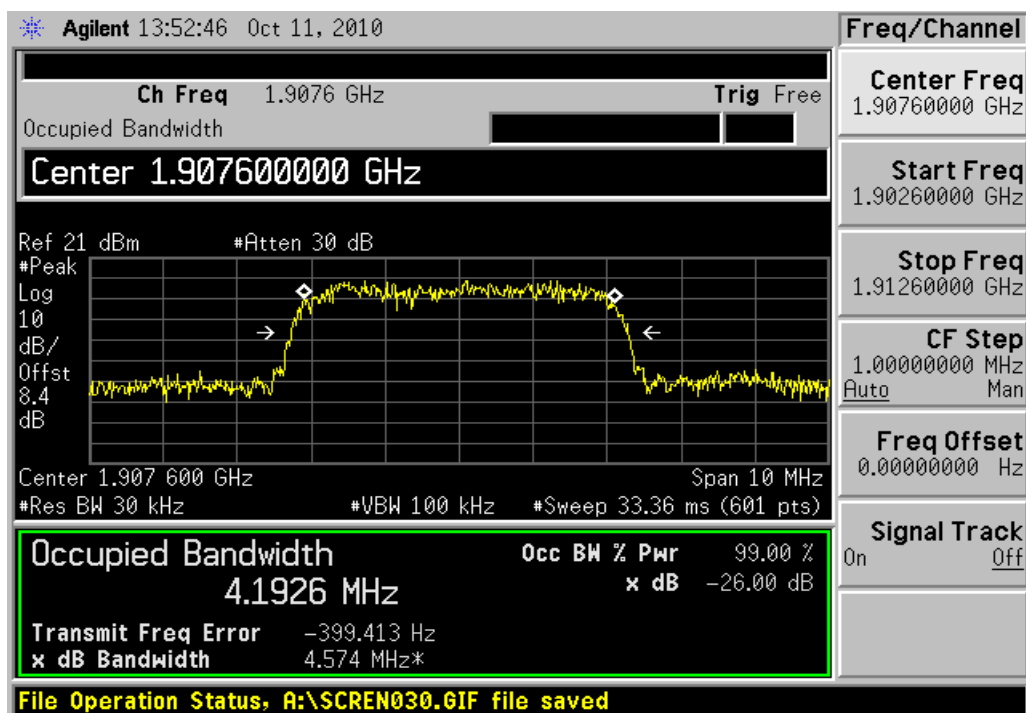
WCDMA Mode:



Channel 9262

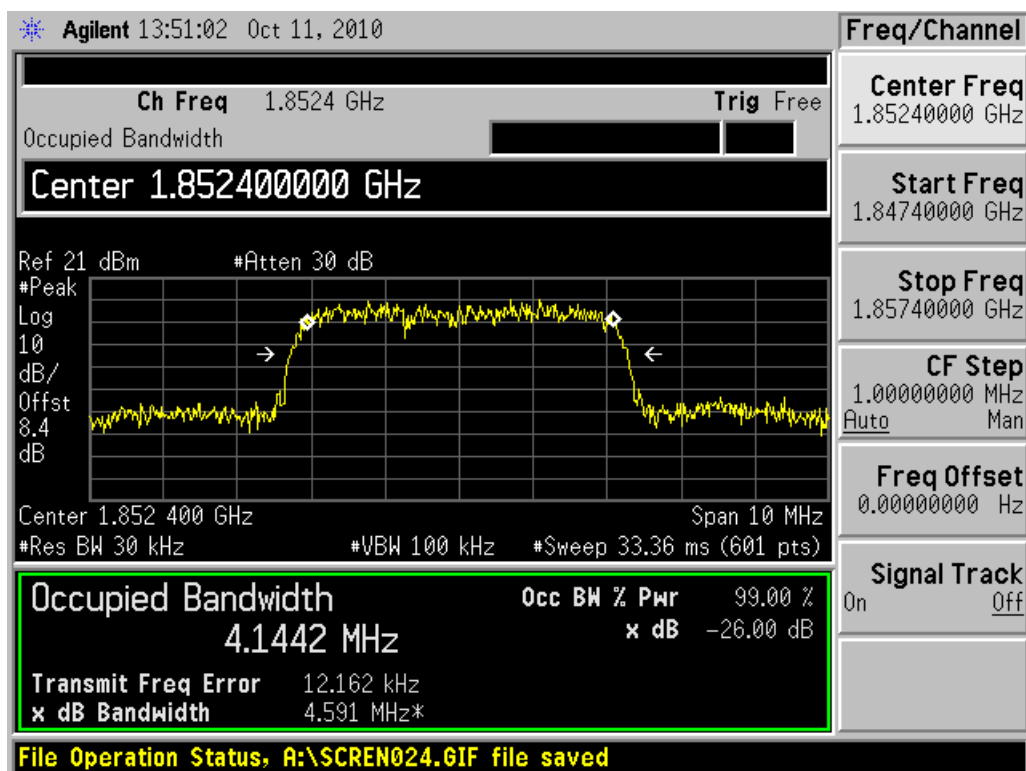


Channel 9400

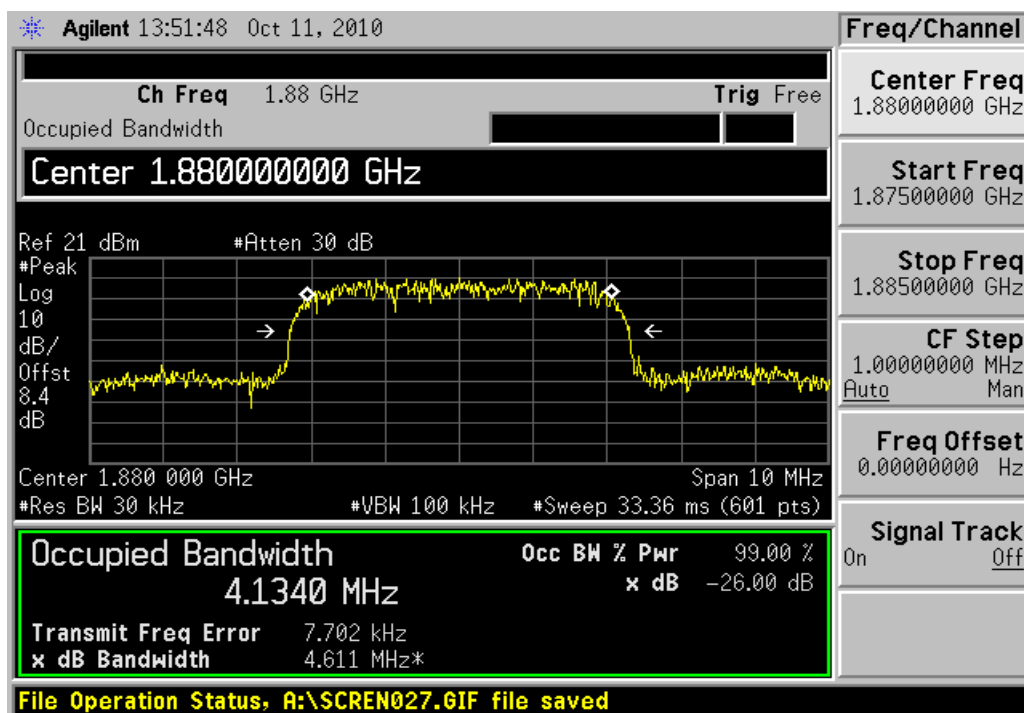


Channel 9538

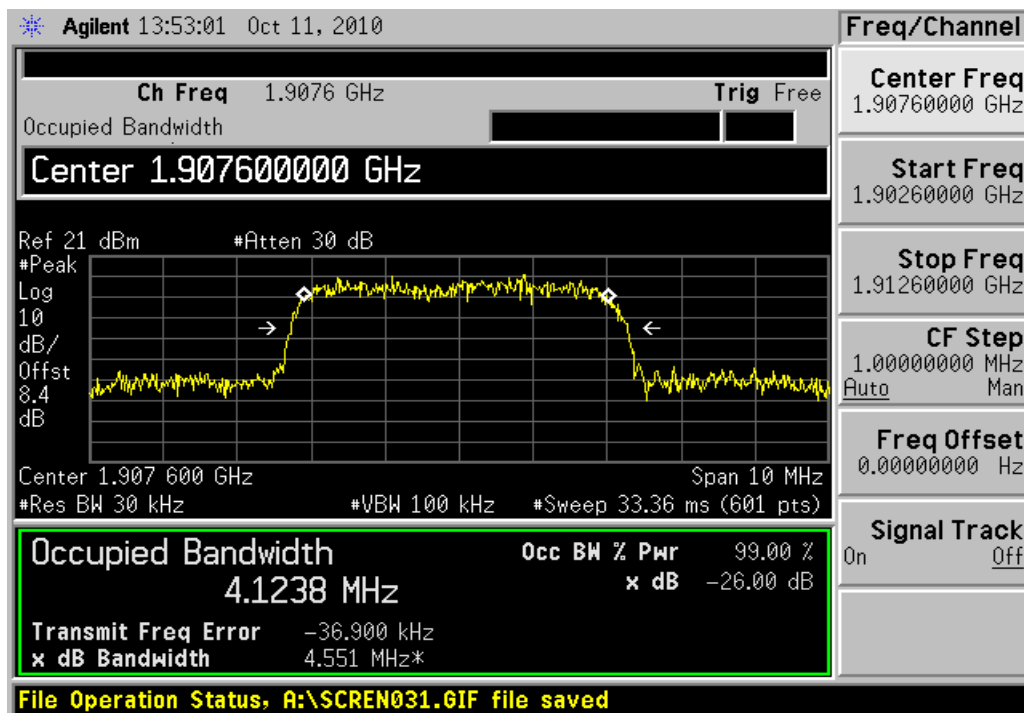
HSDPA/HSUPA Mode:



Channel 9262

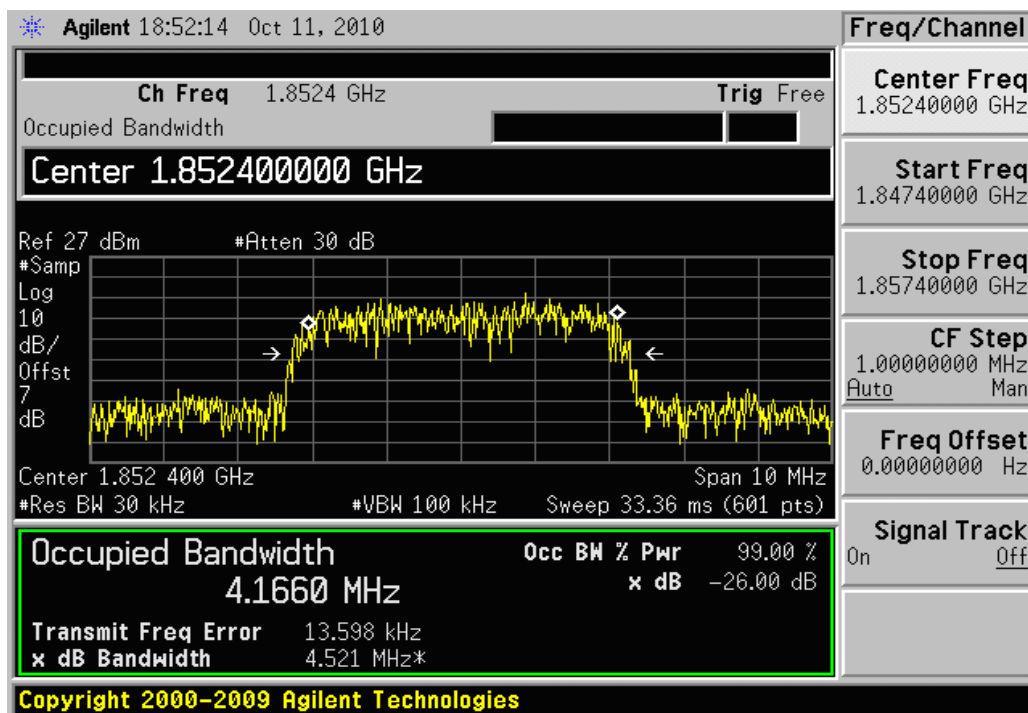


Channel 9400

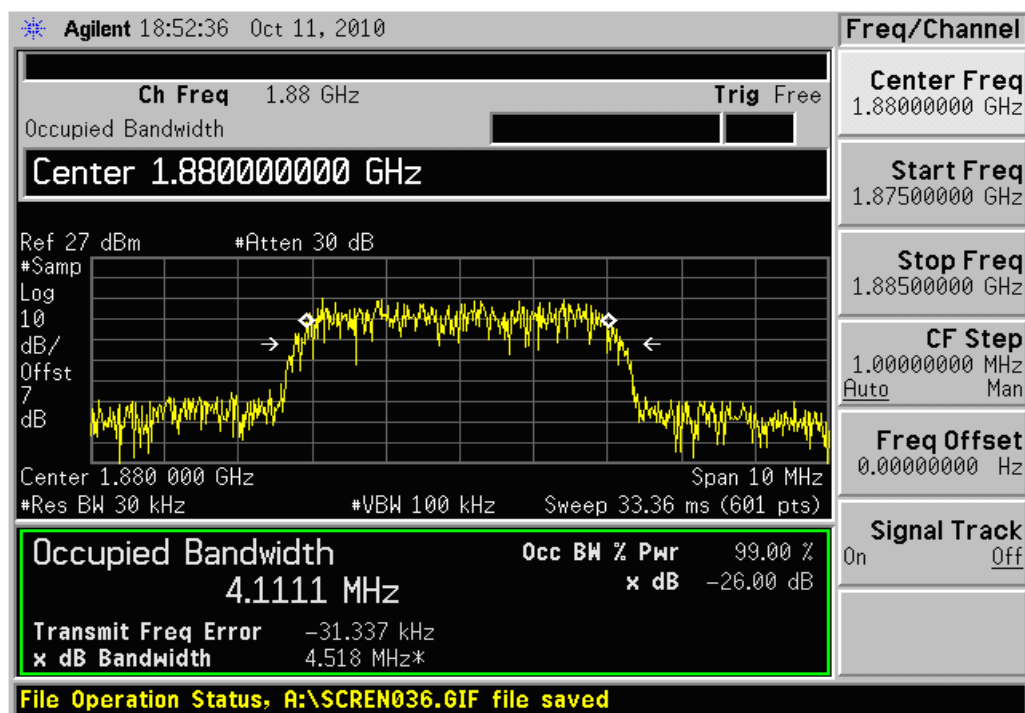


Channel 9538

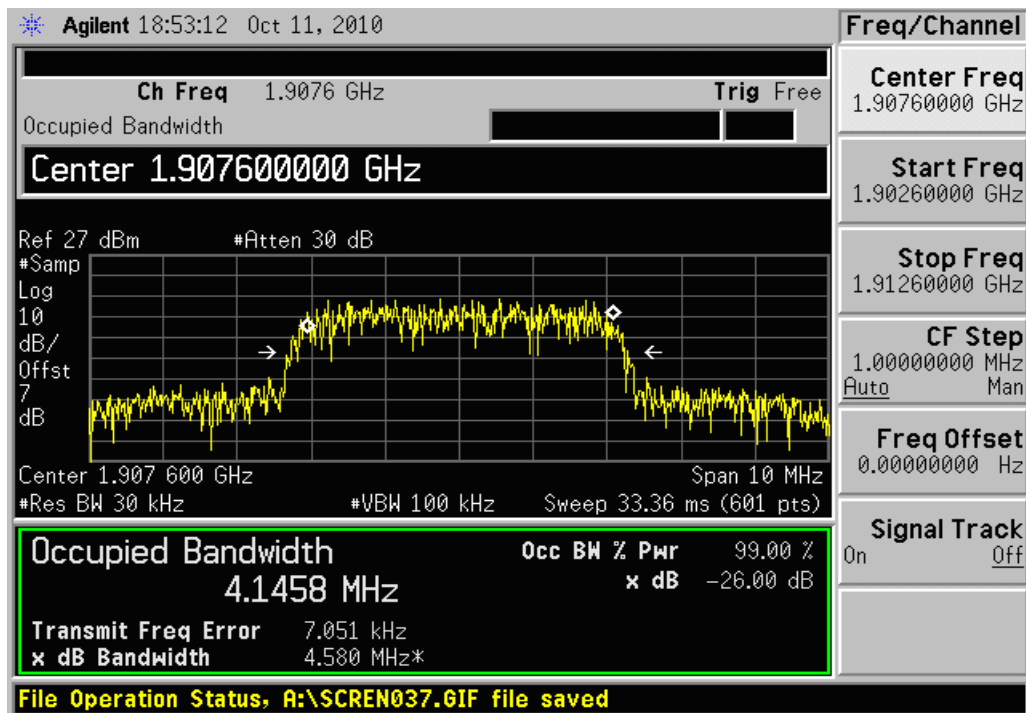
HSPA+ Mode:



Channel 9262



Channel 9400



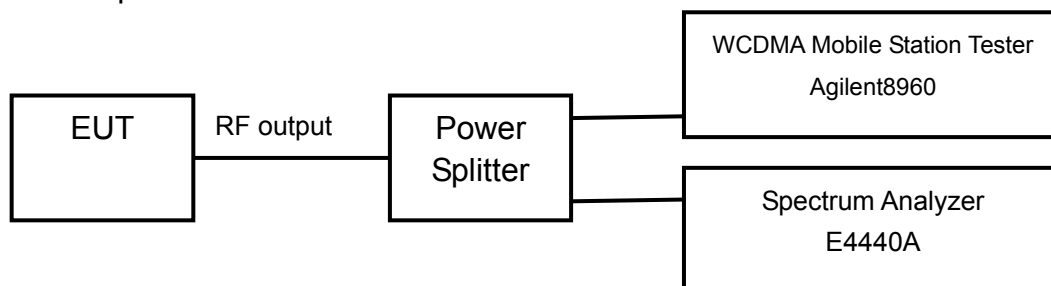
Channel 9538

2.2.1.4 Emission Bandwidth-Part 24.238(b)/IC RSS-133 § 6.5

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 occupied bandwidth requirements

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.588
1880.0	9400	4.572
1907.6	9538	4.598

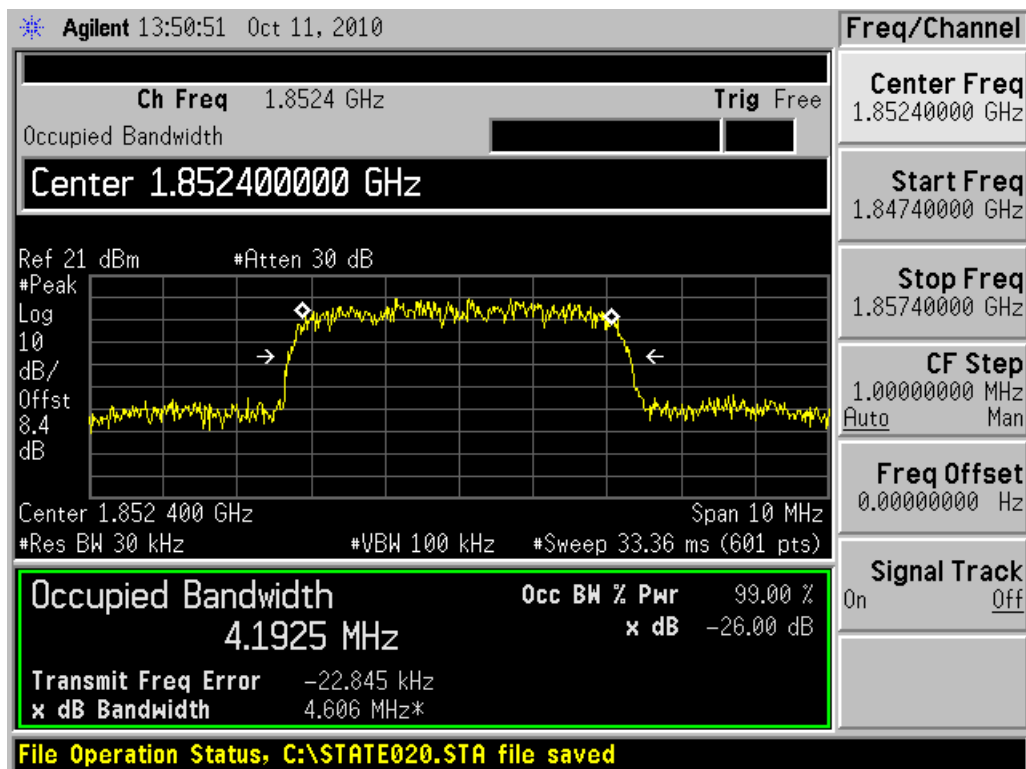
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.531
1880.0	9400	4.595
1907.6	9538	4.584

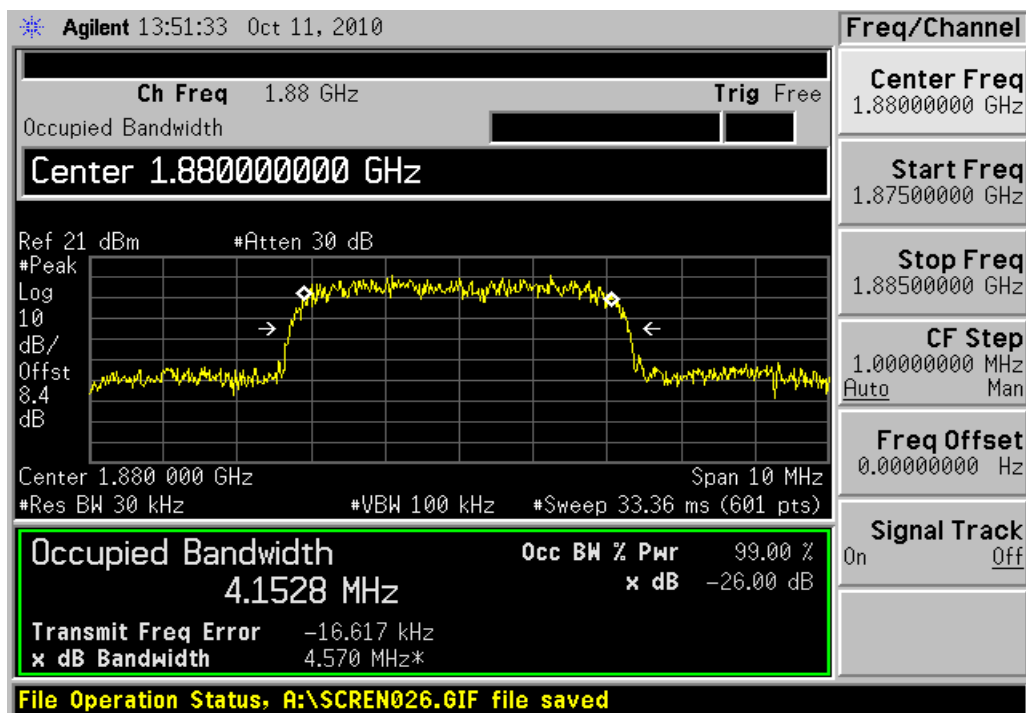
HSPA+ Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
1852.4	9262	4.521
1880.0	9400	4.518
1907.6	9538	4.580

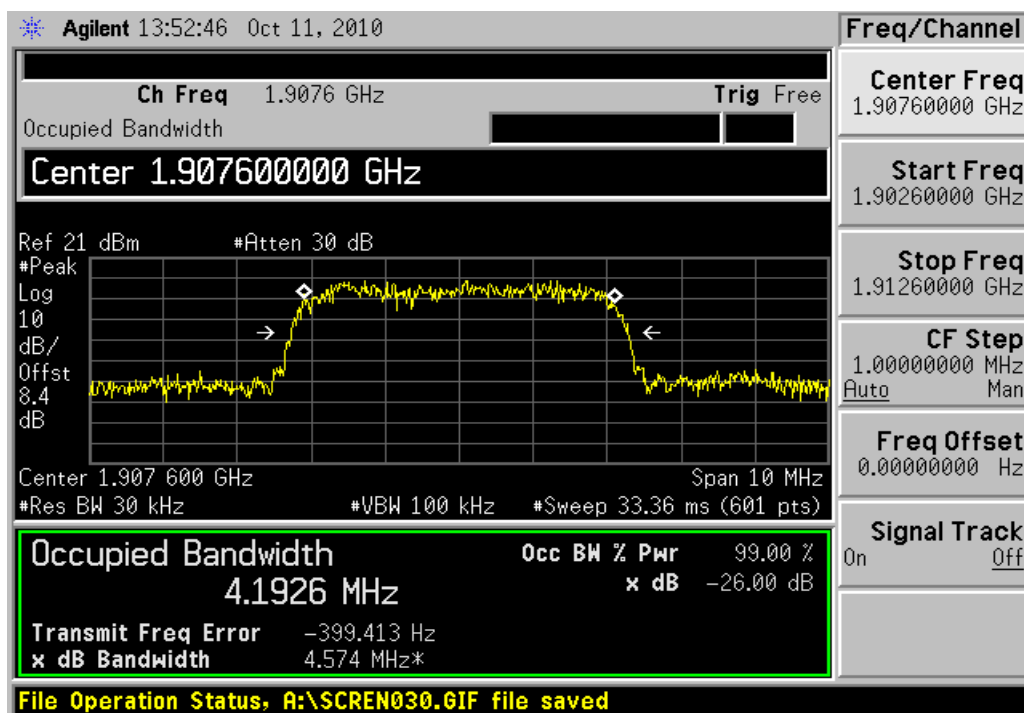
WCDMA Mode:



Channel 9262

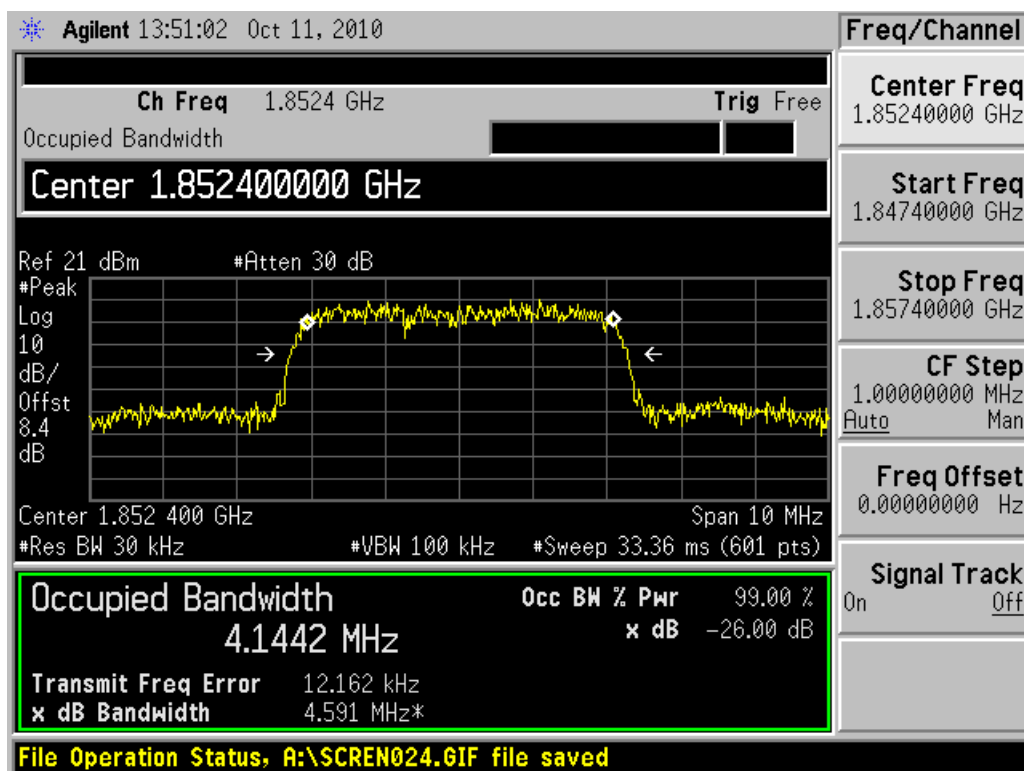


Channel 9400

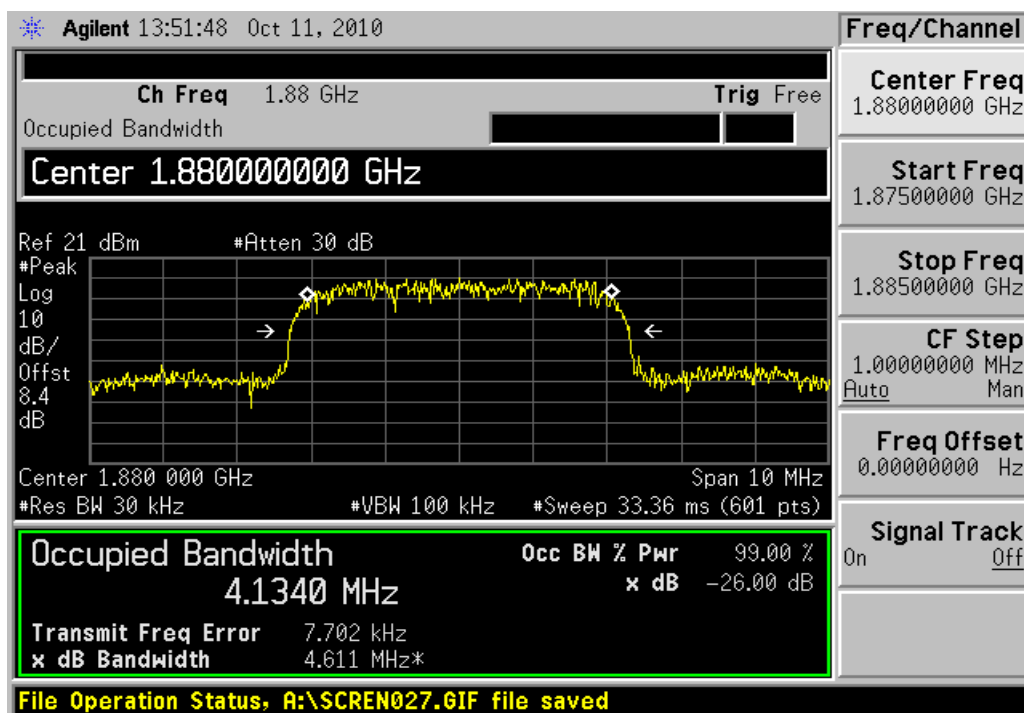


Channel 9538

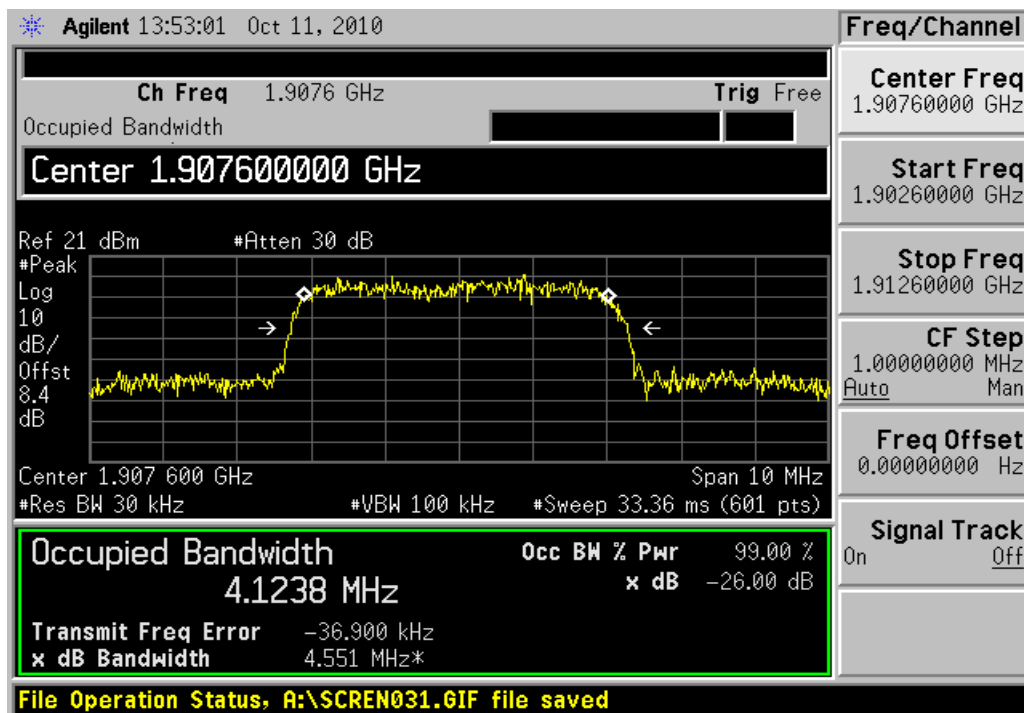
HSDPA/HSUPA Mode:



Channel 9262

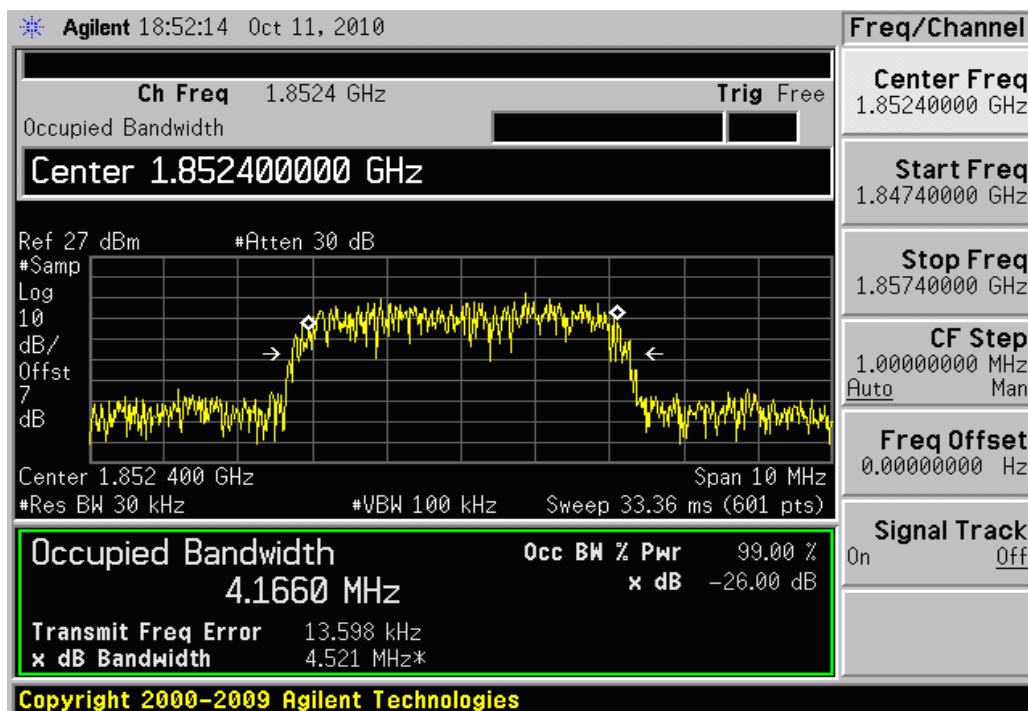


Channel 9400

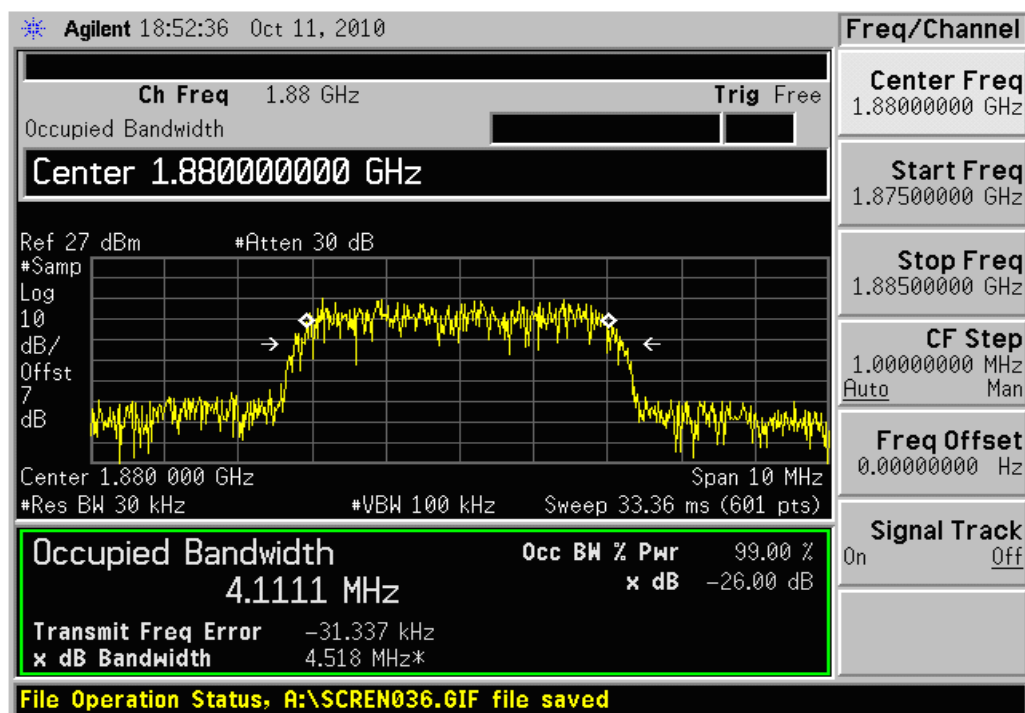


Channel 9538

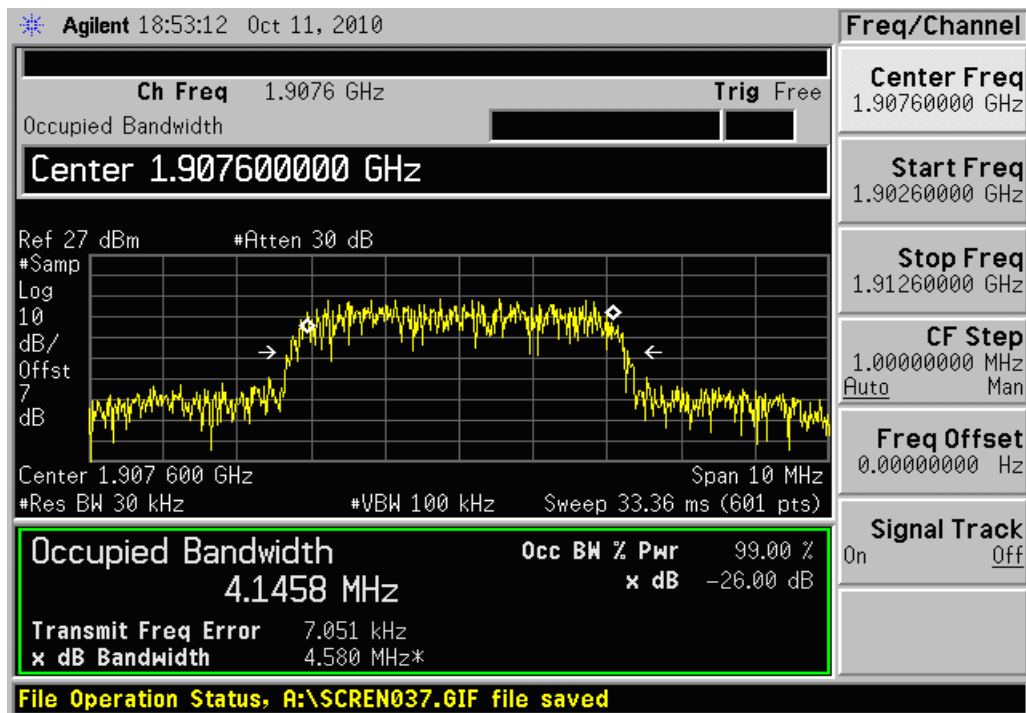
HSPA+ Mode:



Channel 9262



Channel 9400



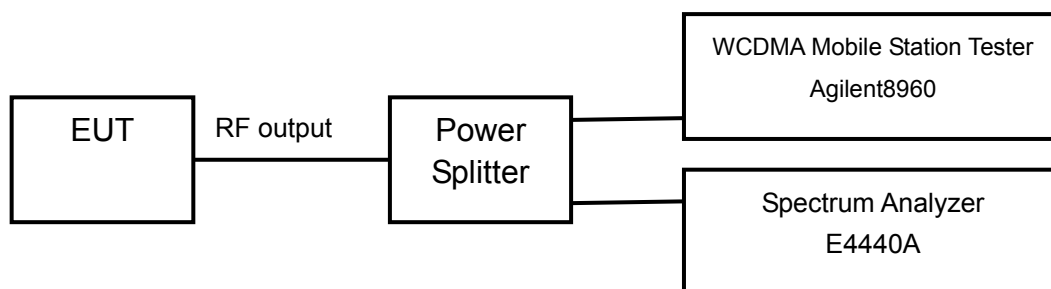
Channel 9538

2.2.1.5 Conducted Spurious Emissions-FCC Part2.1057/24.238/IC RSS-133 § 6.5

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

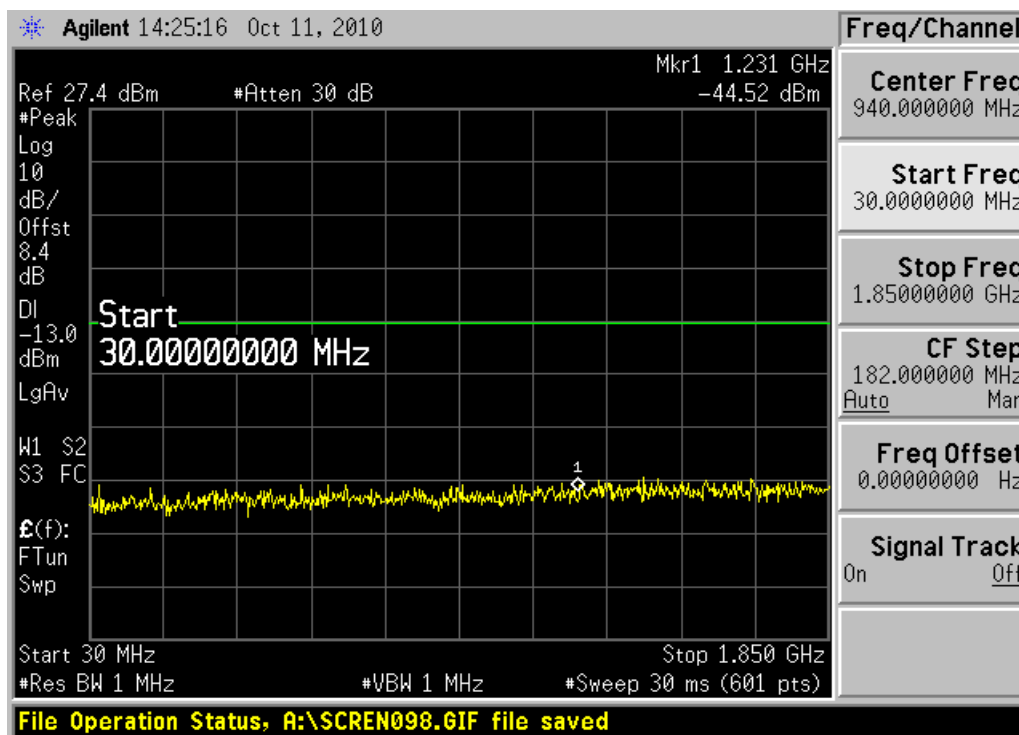
The measurement will be conducted at one channel No 9400 (middle channel of WCDMA band II)

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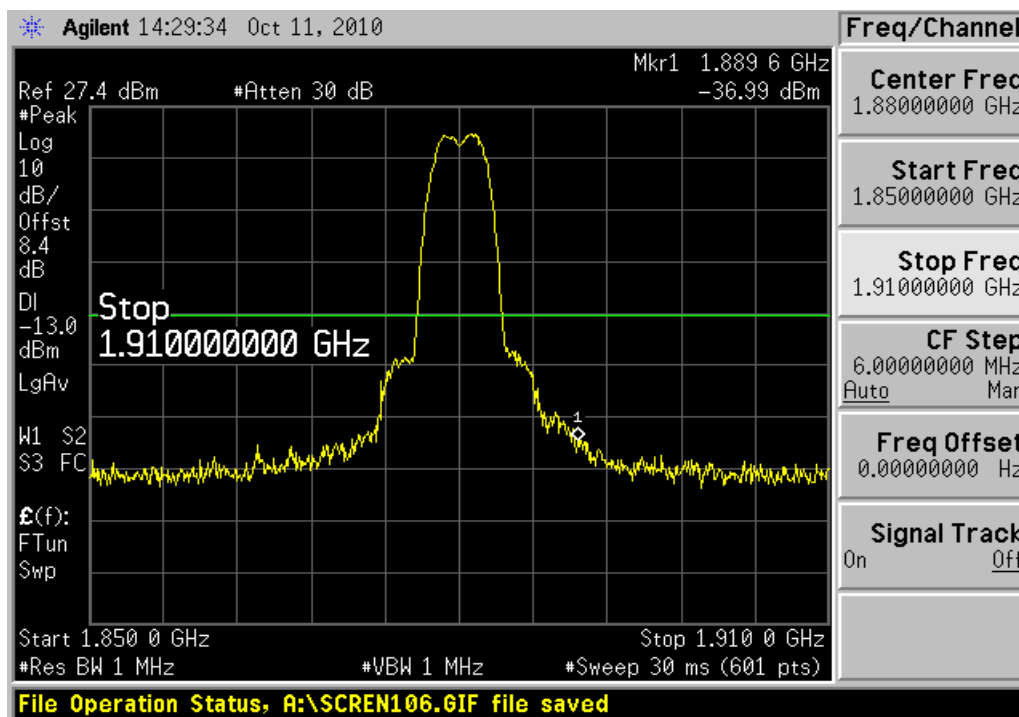
Test result:

Refer to the following figures.

WCDMA Mode:

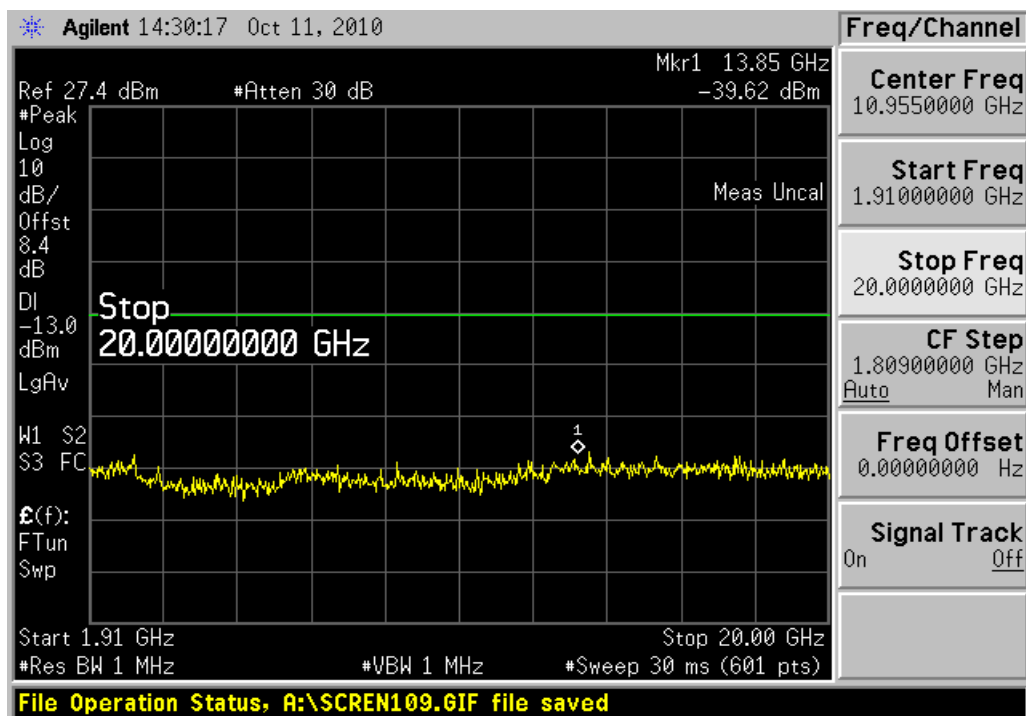


Channel 9400, 30MHz~1850MHz



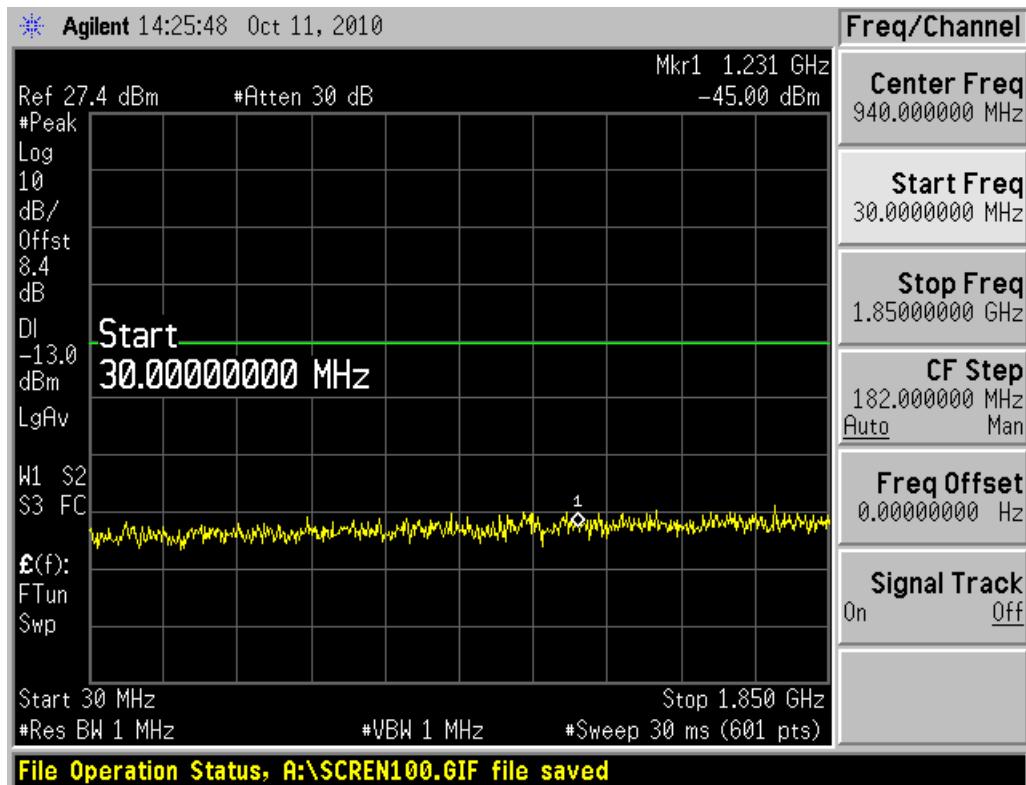
Channel 9400, 1850MHz~1910MHz

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

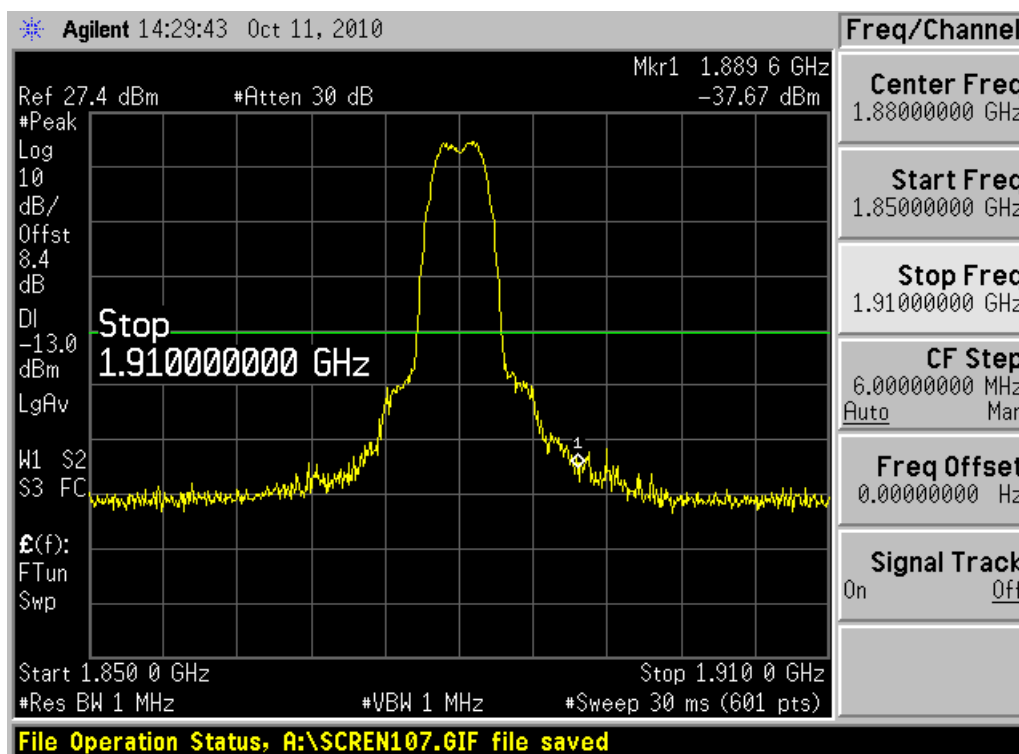


Channel 9400, 1910MHz~20GHz

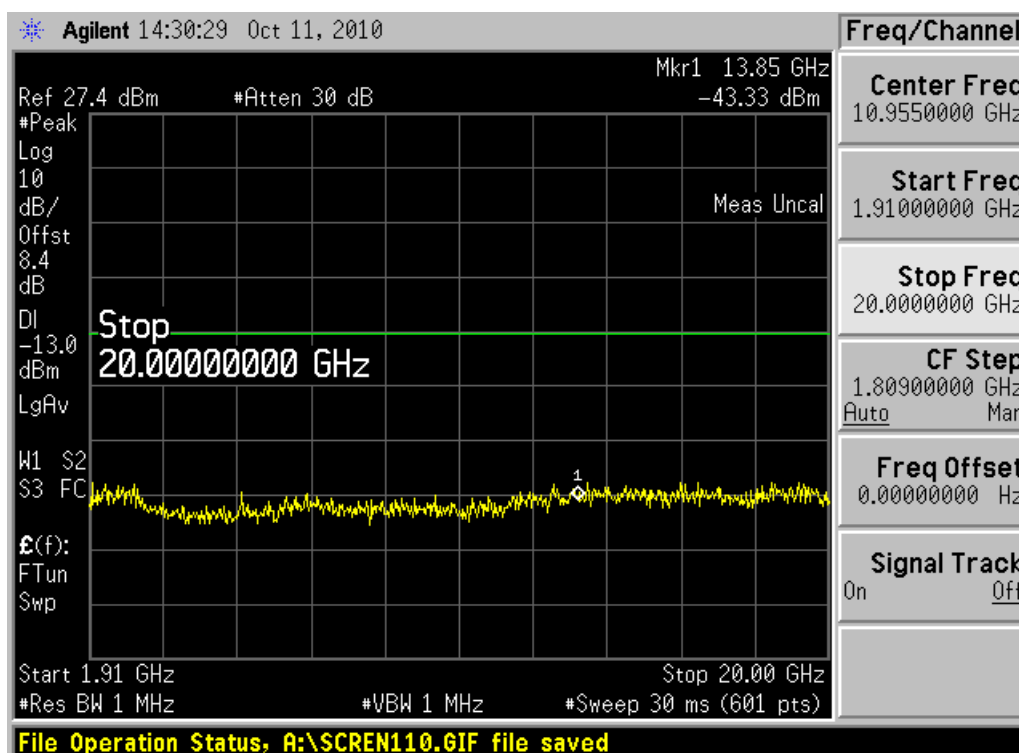
HSDPA/HSUPA MODE:



Channel 9400, 30MHz~1850MHz

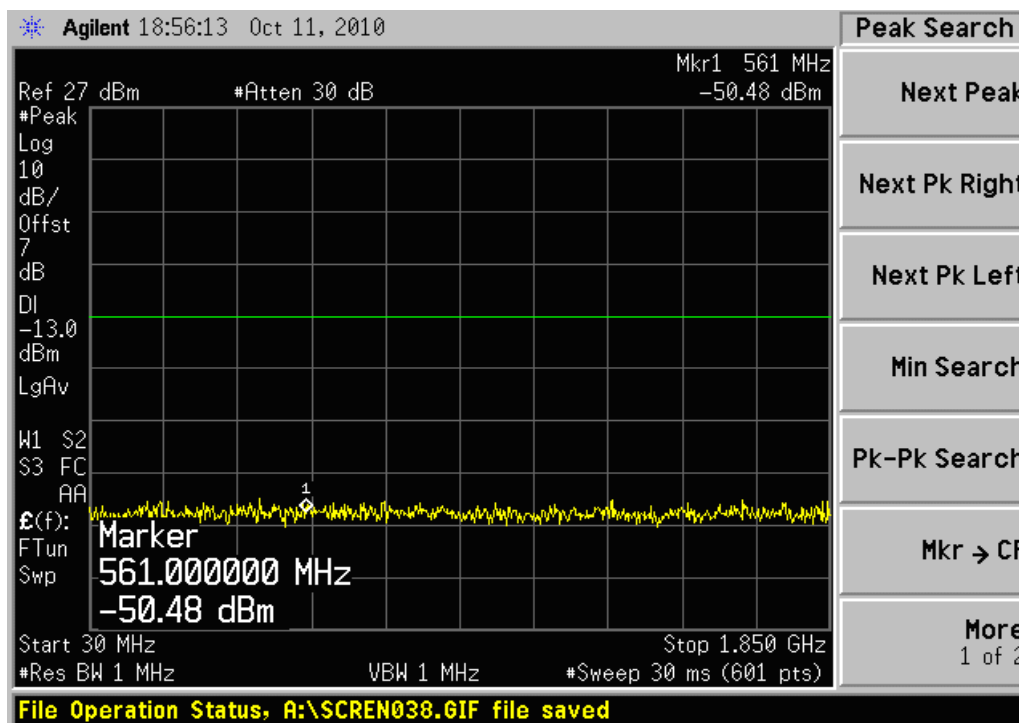


Channel 9400, 1850MHz~1910MHz

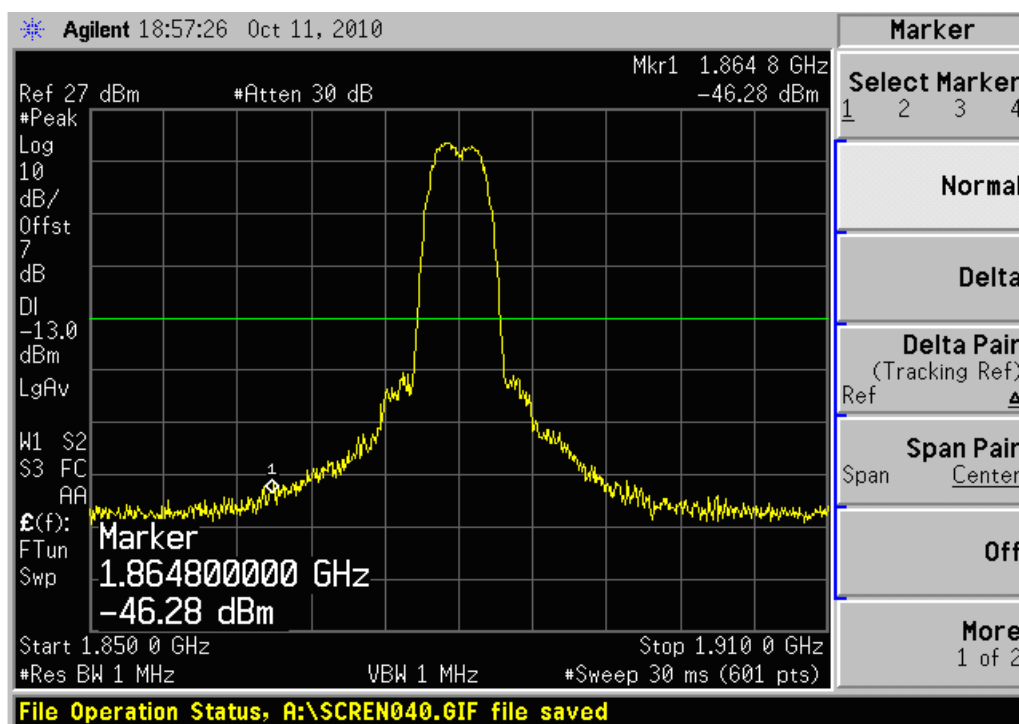


Channel 9400, 1910MHz~20GHz

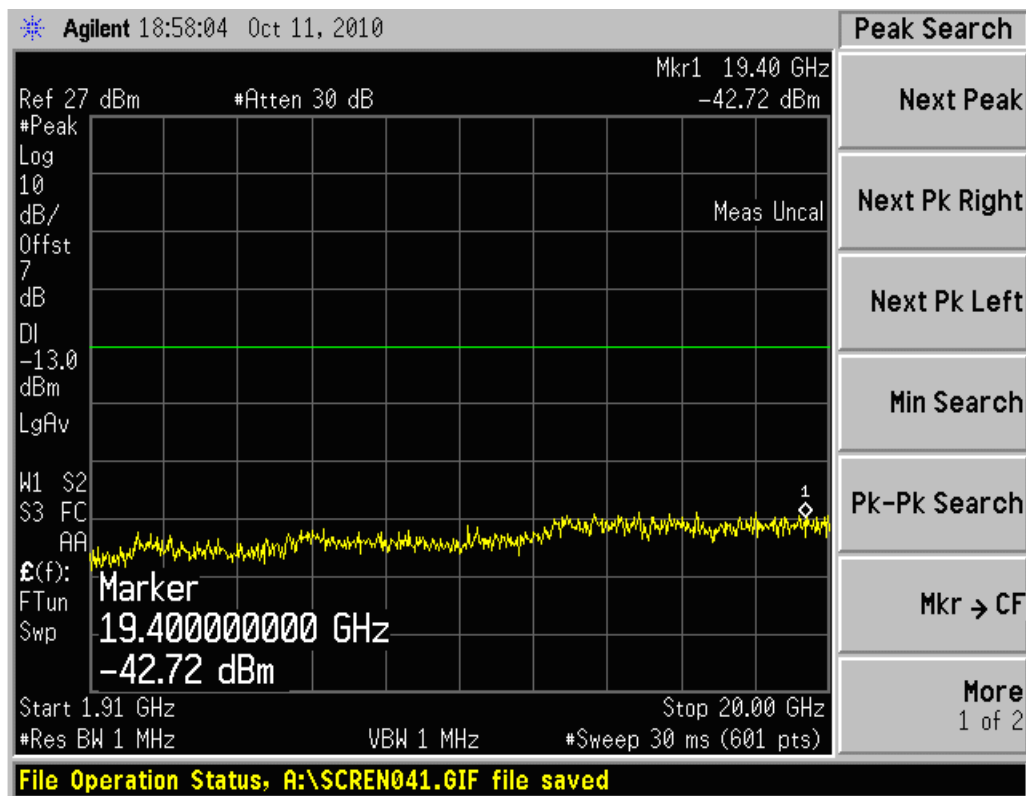
HSPA+ MODE:



Channel 9400, 30MHz~1850MHz



Channel 9400, 1850MHz~1910MHz



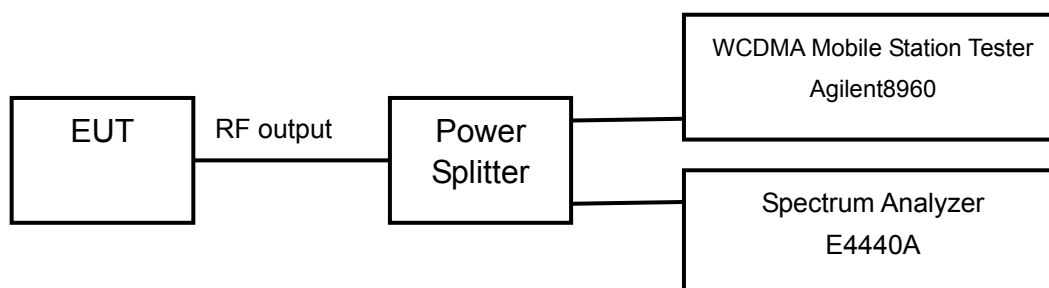
Channel 9400, 1910MHz~20GHz

2.2.1.6 Band Edges Compliance-FCC Part 24.238(b)/IC RSS-133 § 6.5

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 30KHz on spectrum analyzer.

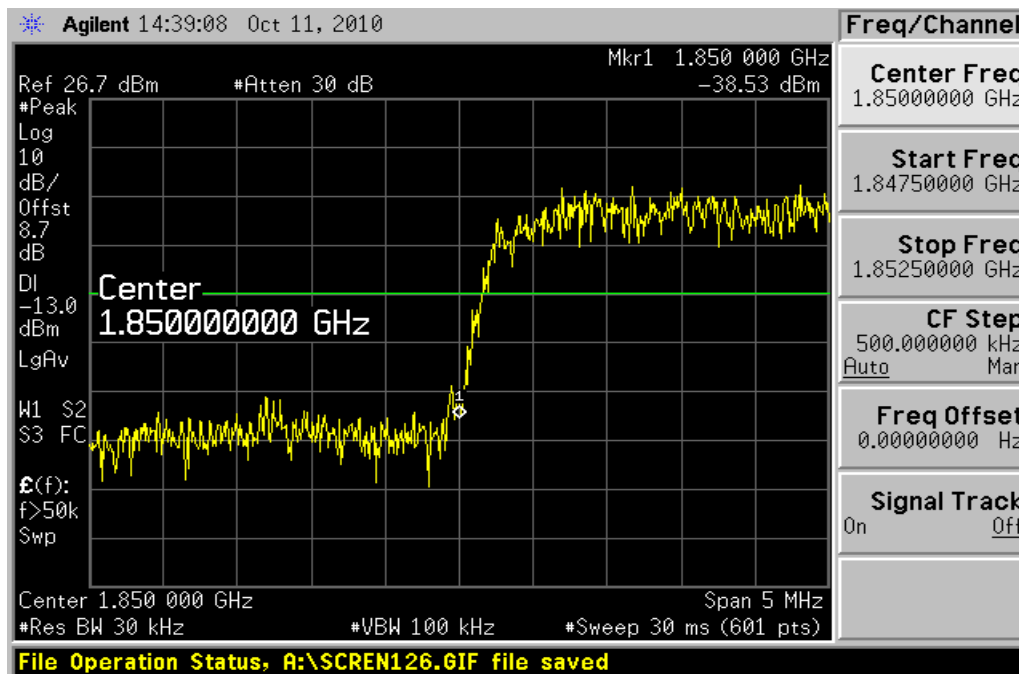
The measurement will be conducted at two channels No9262 and No9538 (Bottom and top channels of WCDMA band II)

Limits	$\leq -13\text{dBm}$
--------	----------------------

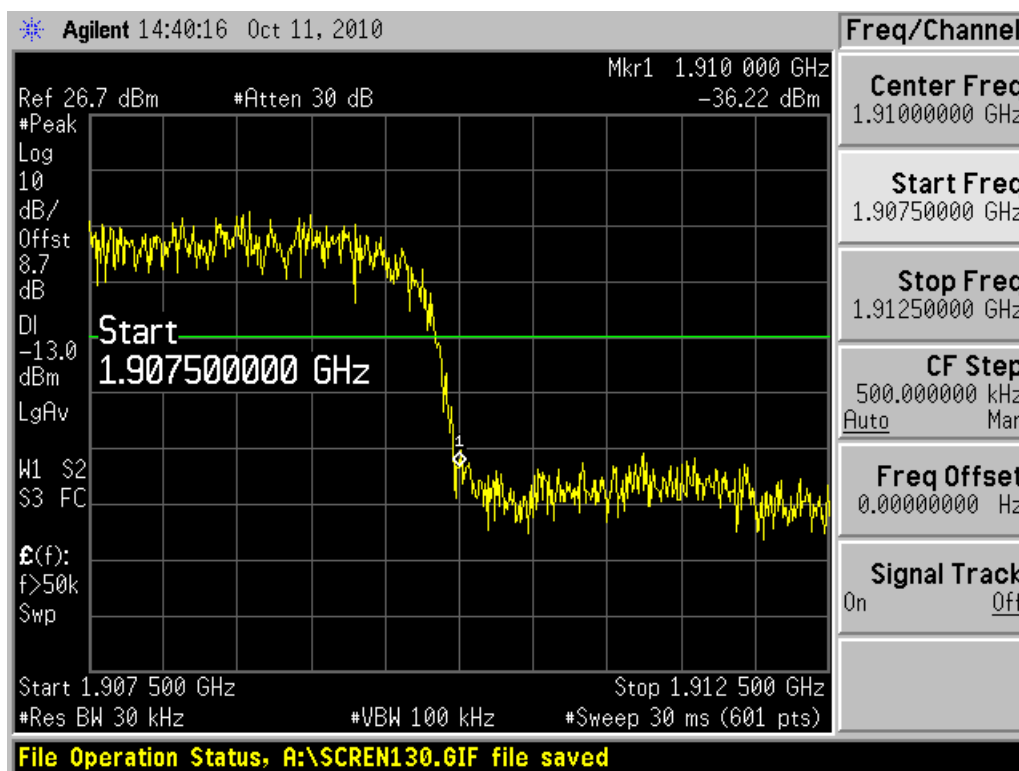
Test result:

Refer to the following figures.

WCDMA Mode:

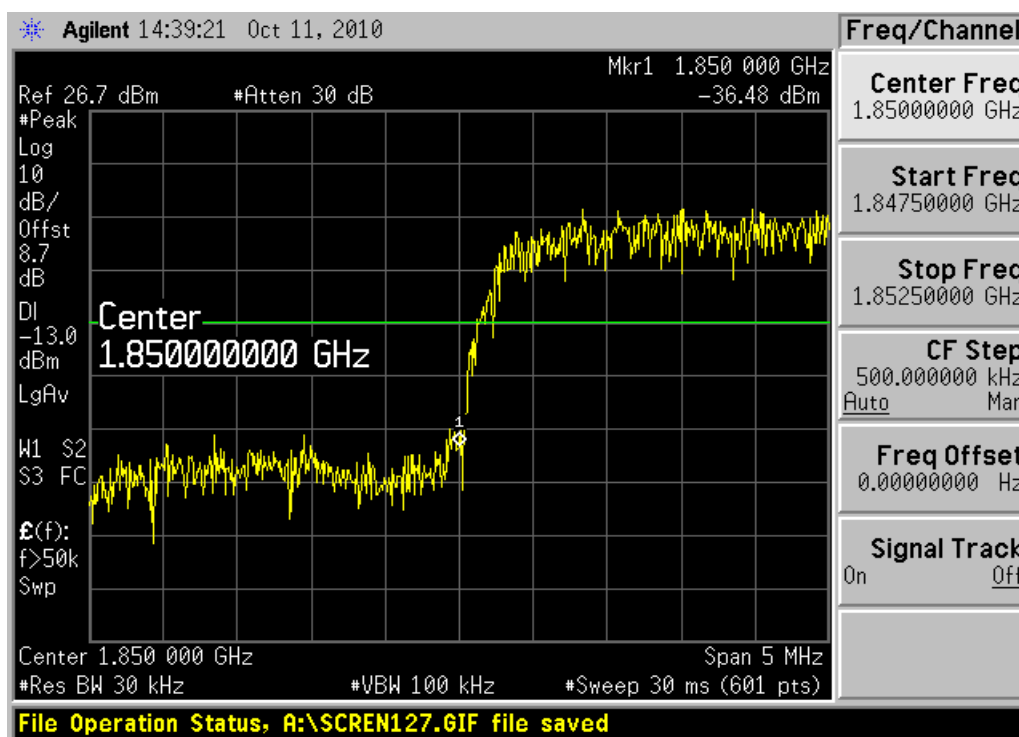


Channel 9262

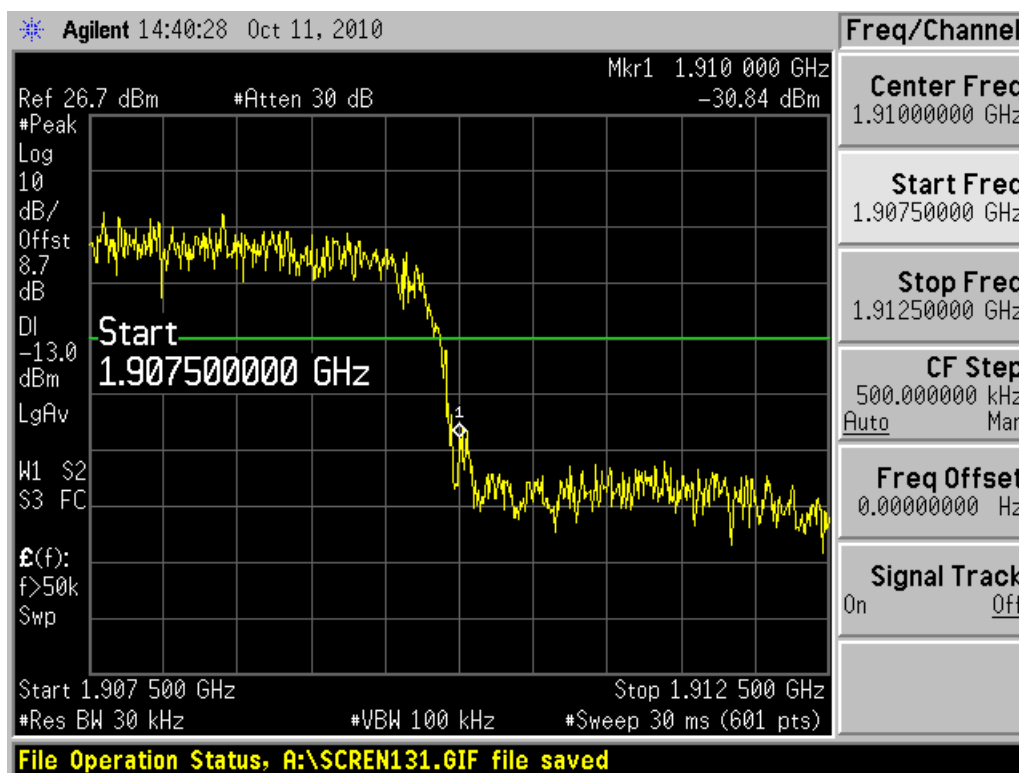


Channel 9538

HSDPA/HSUPA Mode:

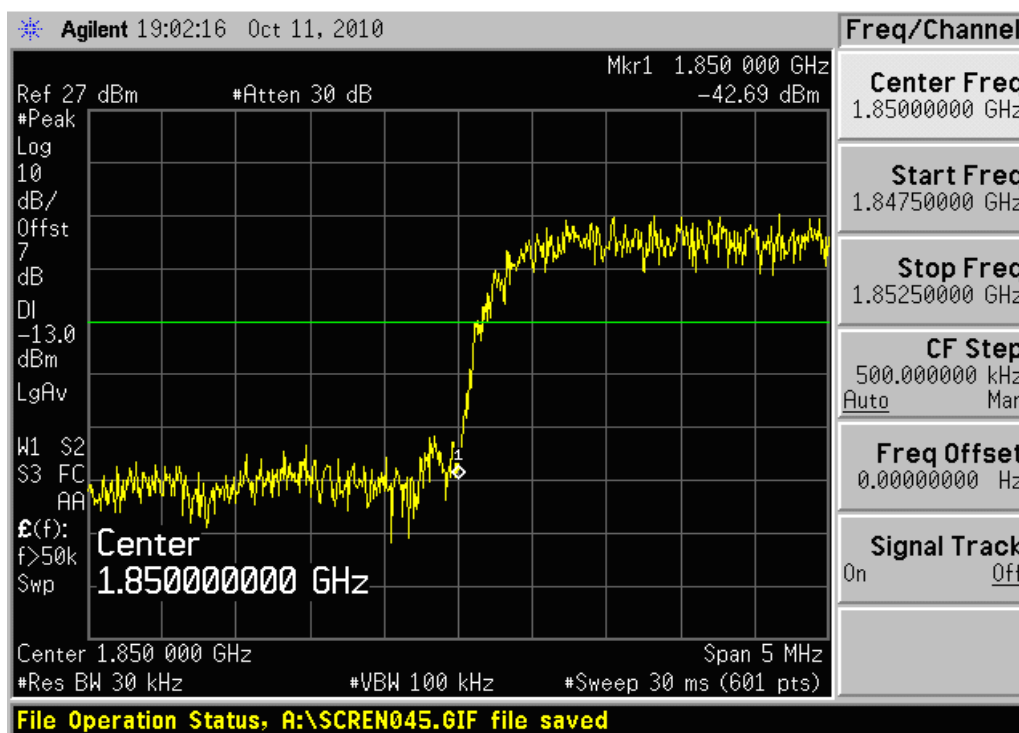


Channel 9262

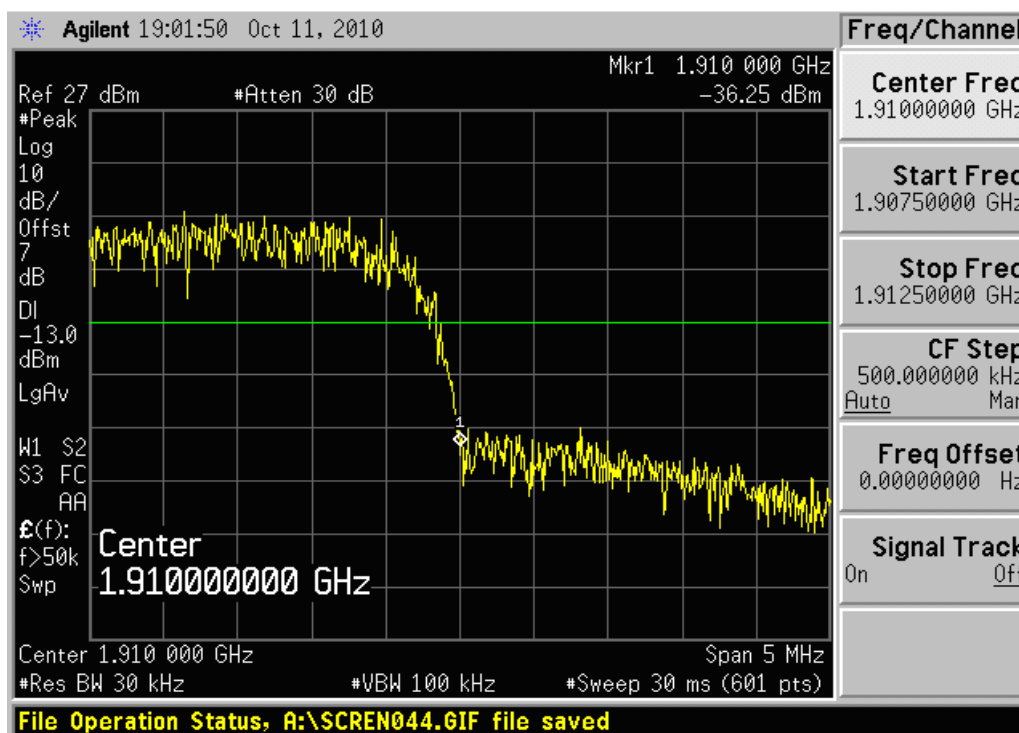


Channel 9538

HSPA+ Mode:



Channel 9262



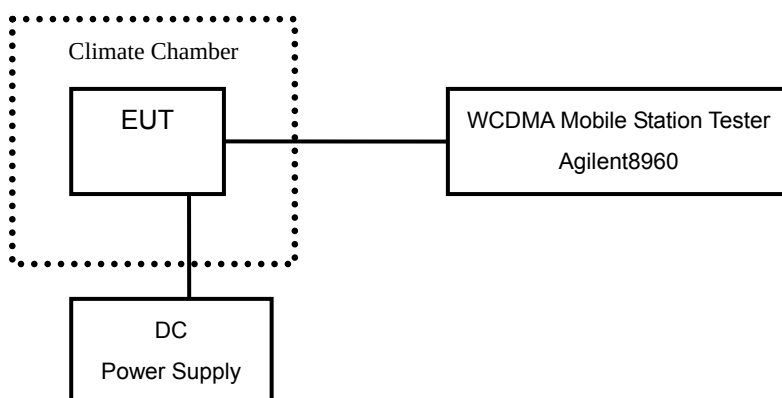
Channel 9538

2.2.1.7 Frequency Stability-FCC Part2.1055/IC RSS-133 § 6.3

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 3.2 to 3.6 V. 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 FCC Part2.1055.

According to the standard of RSS-133 § 6.3, the carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

Test result:

WCDMA Mode:

Temperature(°C)	Test Result (ppm)@3.3V		
	Channel 9262	Channel 9400	Channel 9538
-30	0.002	0.001	0.001
-20	0.002	0.001	0.001
-10	0.002	0.003	0.001
0	0.001	0.003	0.001
+10	0.002	0.001	0.002
+20	0.001	0.001	0.001
+30	0.002	0.002	0.002
+40	0.002	0.004	0.001
+50	0.002	0.001	0.001

Voltage (V)	Test Result (ppm)@20°C		
	Channel 9262	Channel 9400	Channel 9538
3.2	0.002	0.001	0.000
3.6	0.002	0.002	0.002

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@3.3V		
	Channel 9262	Channel 9400	Channel 9538
-30	0.002	0.001	0.001
-20	0.002	0.001	0.001
-10	0.002	0.003	0.001
0	0.001	0.003	0.001
+10	0.002	0.001	0.002
+20	0.001	0.001	0.001
+30	0.002	0.002	0.002
+40	0.002	0.004	0.001
+50	0.002	0.001	0.001

Voltage (V)	Test Result (ppm)@20°C		
	Channel 9262	Channel 9400	Channel 9538
3.2	0.002	0.001	0.000
3.6	0.002	0.002	0.002

HSPA+ Mode:

Temperature(°C)	Test Result (ppm)@3.3V		
	Channel 9262	Channel 9400	Channel 9538
-30	0.008	0.013	0.006
-20	0.009	0.006	0.007
-10	0.019	0.020	0.023
0	0.020	0.016	0.017
+10	0.022	0.025	0.036
+20	0.038	0.026	0.024
+30	0.023	0.024	0.041
+40	0.021	0.017	0.017
+50	0.007	0.006	0.026

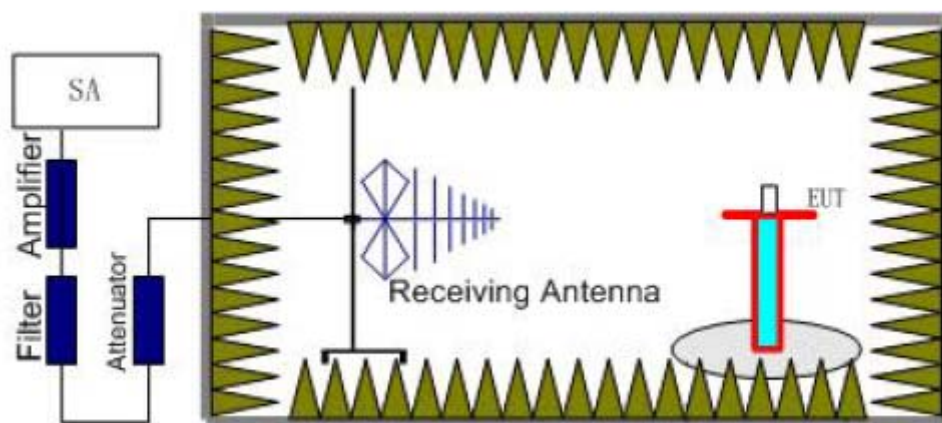
Voltage (V)	Test Result (ppm)@20°C		
	Channel 9262	Channel 9400	Channel 9538
3.2	0.036	0.025	0.032
3.6	0.019	0.016	0.022

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

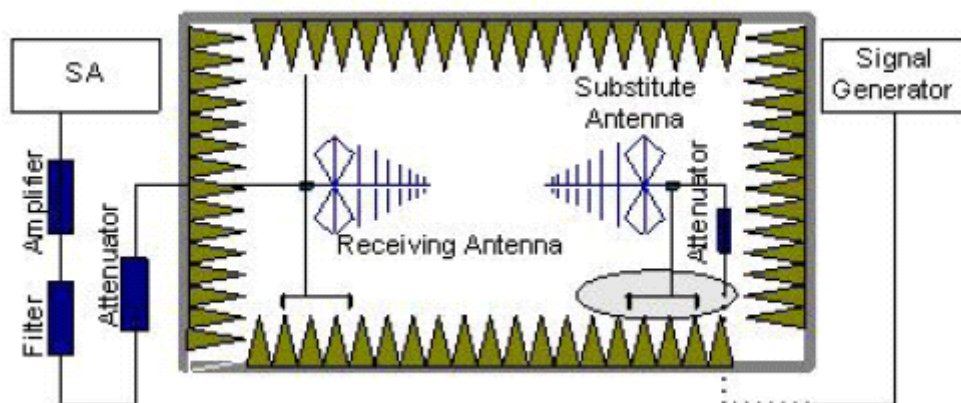
Ambient condition

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test Setup:



Step 1



Step 2

Test procedure:

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 9GHz (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.

Calculation procedure:

The data of cable loss, antenna gain and air loss 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, antenna gain and air loss. The basic equation with a sample calculation is as followed:

$$P=P_R+L_C+L_A-G$$

Where

P: Power of the Radiated Spurious Emissions (dBm)

P_R: reading of the receiver (dBm)

L_C: Cable Lose (dB)

L_A: Air loss (dB)

G: Antenna Gain (dBi)

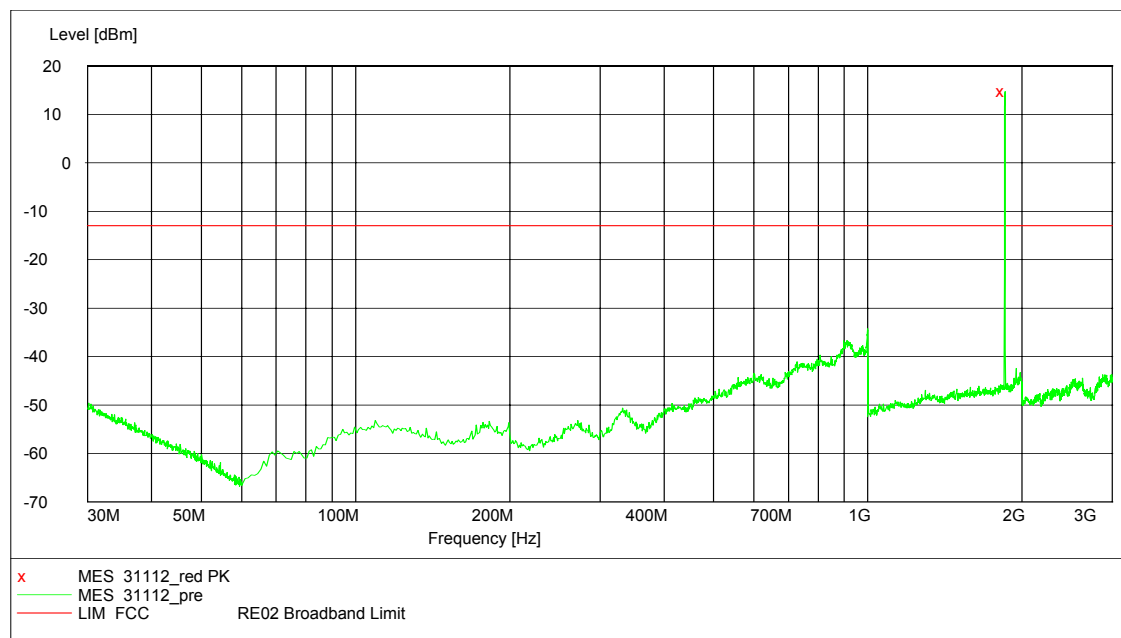
Assumed the reading of the receiver is -60dBm. A cable lose of 10dB, an air lose of 30dB and an antenna gain of 11dBi are added.

$$P=P_R+L_C+L_A-G=-60+10+30-11=-31\text{dBm}$$

The measurement will be conducted at one channel No9400 (middle channels of WCDMA band II)

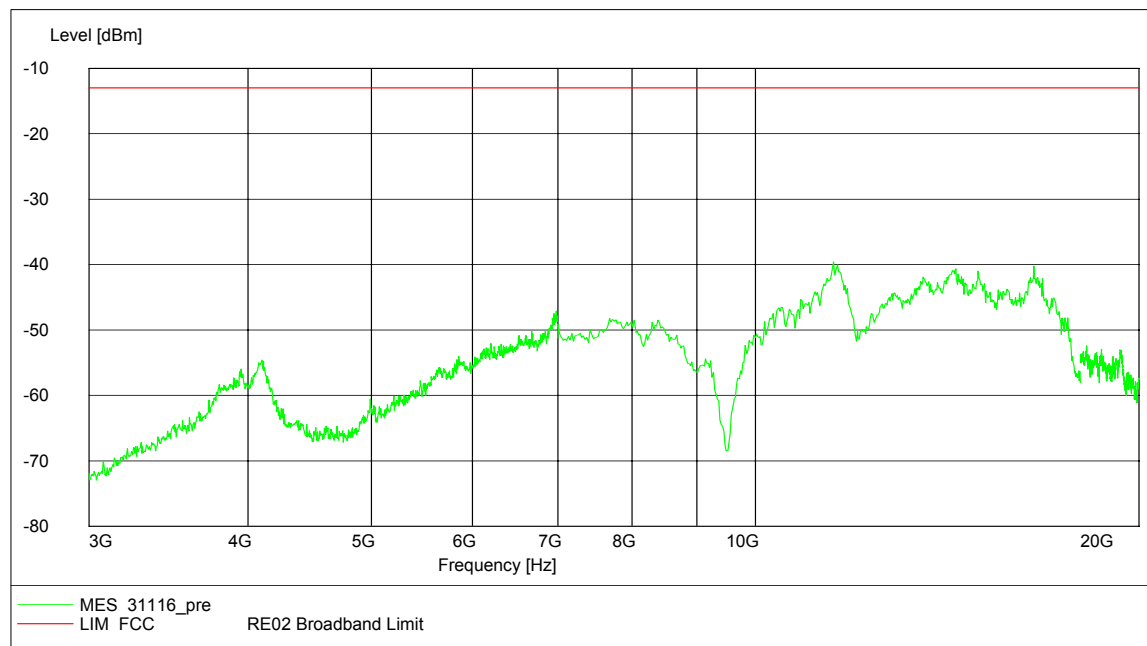
Limits	≤ -13dBm
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Test result:
WCDMA Mode:



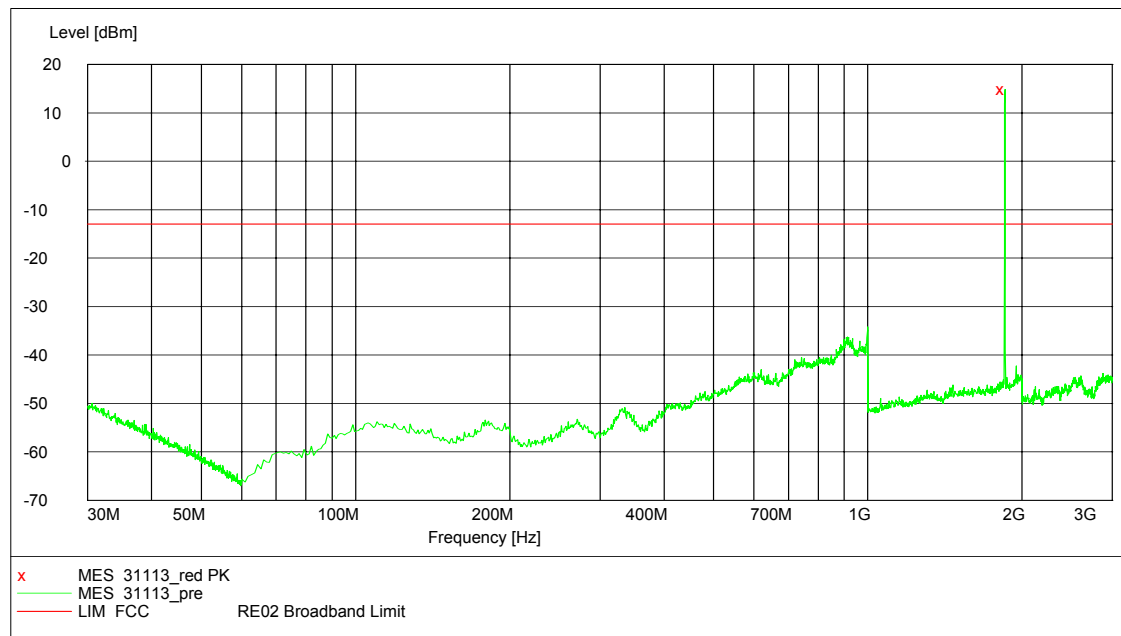
Channel 9400, 30MHz~3GHz

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



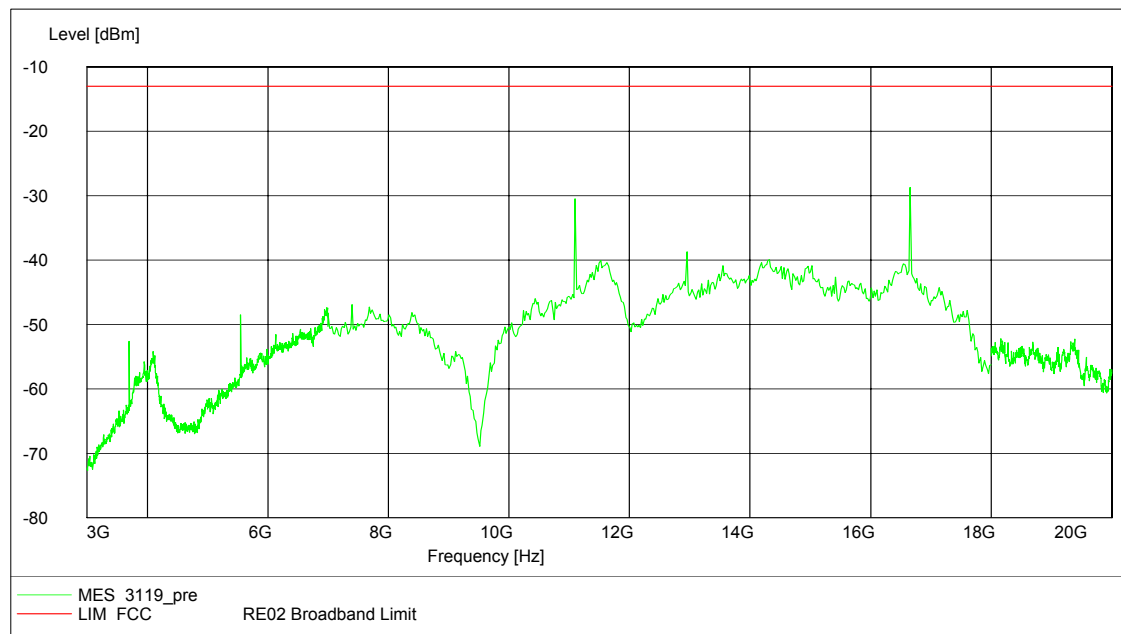
Channel 9400, 3GHz~20GHz

HSDPA/HSUPA Mode:



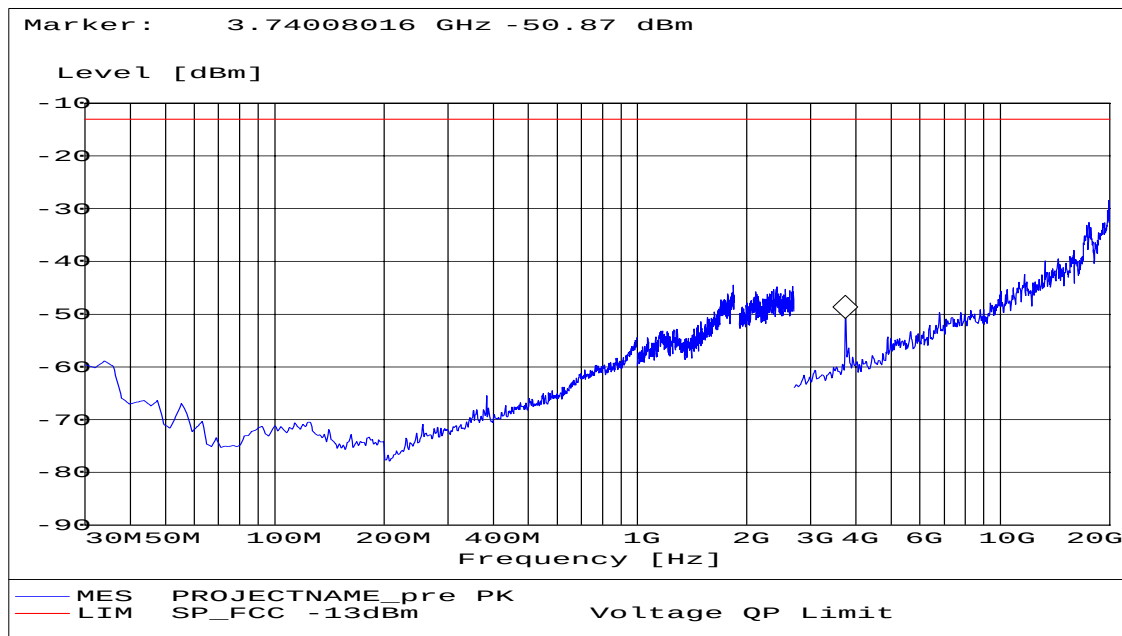
Channel 9400, 30MHz~3GHz

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



Channel 9400, 3GHz~20GHz

HSPA+ Mode:



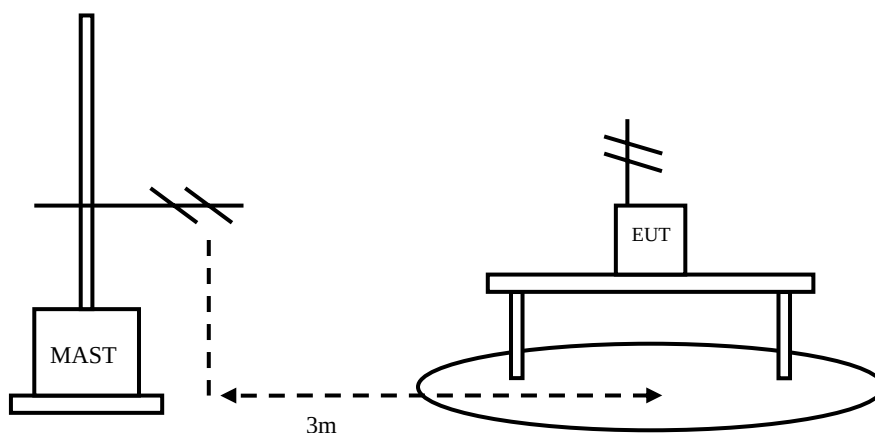
Channel 9400, 30MHz~20GHz

2.2.1.9 Receiver Spurious Emission-IC RSS-Gen § 6a

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	54%	101.5kPa

Test Setup:



Test Procedure:

The EUT should be placed on a non-metallic table 80cm above the ground plane. The receive antennas shall be moved from 1 to 4 meters. The distance between EUT and receive antenna should be 3 meters.

The accessories of the EUT are connected with the EUT such as headset etc. During the test the data transferring via USB cable between EUT and laptop is maintained.

Then start the test software ES-K1. Sweep the whole frequency band through the range from 30MHz to 1GHz, using receive log period antenna HL562.

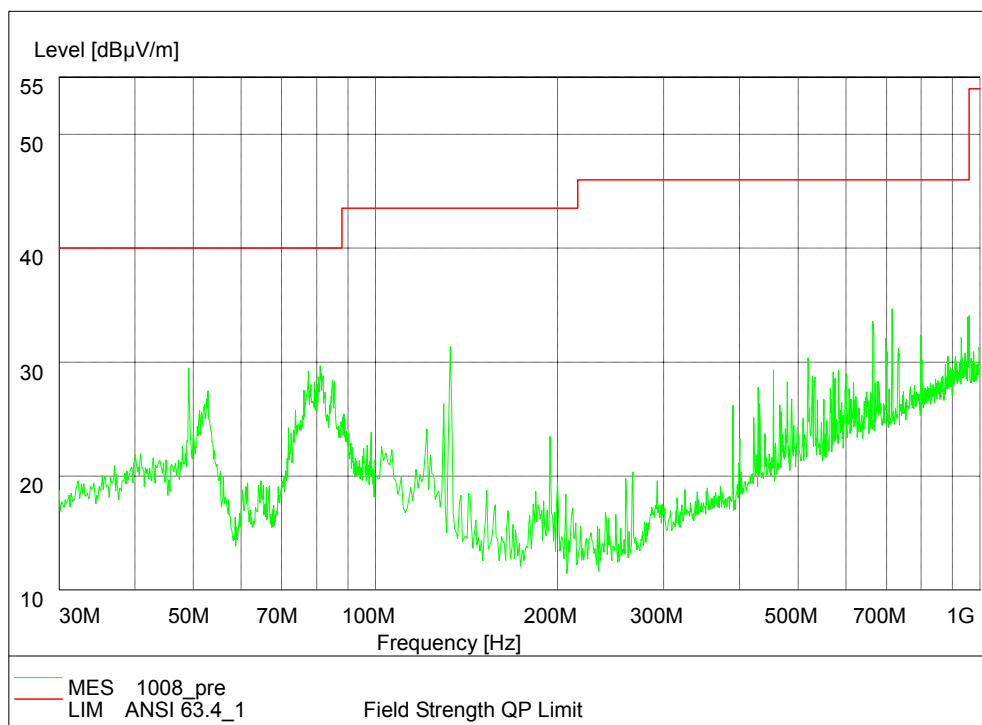
During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Limit:

Spurious Frequency (MHz)	Field Strength at 3 metres	
	Detector	Unit (microvolts/m)
30~88	Quasi-peak	100
88~216	Quasi-peak	150
216~960	Quasi-peak	200
960~1000	Quasi-peak	500
Above 1000	Average	500

Test result:



WCDMA band II

Note: For measurement above 1GHz, all emissions level measured were more than 10dB below the limit.

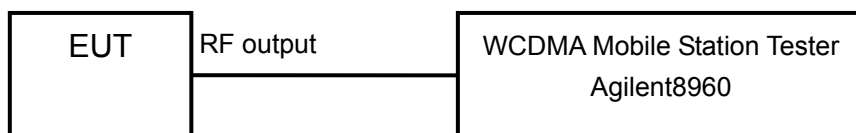
2.2.2 WCDMA Band V

2.2.2.1 RF Power Output-FCC Part 22.913(a)/IC RSS-132 § 4.4

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test Setup:



Test procedure:

WCDMA Mode:

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)

Release 6 HSDPA Mode:

The following 4 Sub-Test were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121 V8.4.0 specification. All TX RMS power requirements for power Class 3 were met according to table 5.2AA.5 and 5.2B.5. All UE channels and power ratio are set according to table C10.1.4&C11.1.3 in the 3GPP TS34.121 V8.4.0. RMC12.2kps is used for this testing.

HSDPA Sub-Test Setting:

Sub-Test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM(dB)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

*Note: the recommended HSDPA MPRs are implemented as per following sub-test.

Release 6 HSUPA Mode:

The following 5 Sub-Test were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121 V8.4.0 specification. All TX RMS power requirements for power Class 3 were met according to table 5.2AA.5 and 5.2B.5. All UE channels and power ratio are set according to table C11.1.3 in the 3GPP TS34.121 V8.4.0. RMC12.2kps is used for this testing.

HSUPA Sub-Test Setting:

Sub-Test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	β_{ec}
1	11/15	15/15	64	11/15	22/15	209/225
2	6/15	15/15	64	6/15	12/15	12/15
3	15/15	9/15	64	15/9	30/15	30/15
4	2/15	15/15	64	2/15	4/15	2/15
5	15/15	15/15	64	15/15	30/15	24/15

Sub-Test	β_{ed} (SF)	β_{ed} (Codes)	CM(dB)	MPR(dB)	AG Index	E-TFCI
1	4	1	1.0	0.0	20	75
2	4	1	3.0	2.0	12	67
3	4	2	2.0	1.0	15	92
4	4	1	3.0	2.0	17	71
5	4	1	1.0	0.0	21	81

*Note: the recommended HSUPA MPRs are implemented as per following sub-test.

Limits	$\leq 24\text{dBm}$
--------	---------------------

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
826.4	4132	22.5
836.6	4183	22.6
846.6	4233	22.2

HSDPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output in Sub-Test (dBm)			
		1	2	3	4
826.4	4132	22.6	22.1	21.5	21.4
836.6	4183	22.7	22.4	21.8	21.7
846.6	4233	22.3	22.0	21.4	21.4

HSUPA Mode:

Carrier frequency (MHz)	Channel No.	RF Power Output in Sub-Test (dBm)				
		1	2	3	4	5
826.4	4132	21.1	20.4	21.4	21.3	21.9
836.6	4183	21.2	20.6	21.3	21.5	21.2
846.6	4233	20.9	20.2	20.9	21.2	20.9

2.2.2.2 Type of Modulation-IC RSS-132 § 4.2

Ambient condition:

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Applicable standard:

Equipment certified under this standard shall use digital modulation. However supervisory and other control function signals may use any type of modulation technique. The type of modulation used shall be reported.

Test result:

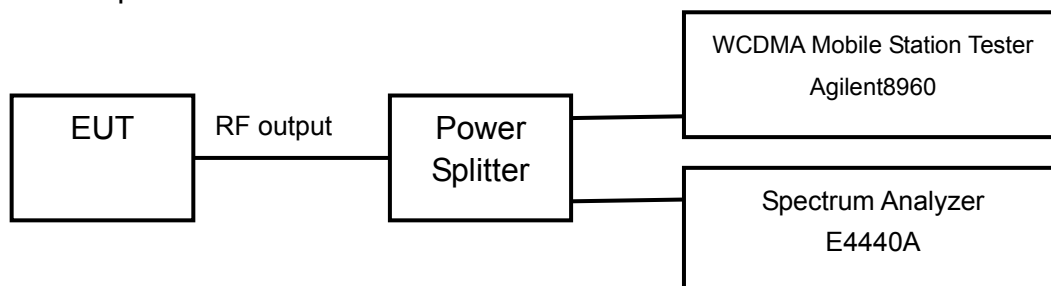
Please refer to section 1.7.1 of this report.

2.2.2.3 Occupied Bandwidth-FCC Part2.1049(h)(i)/IC RSS-132 § 4.5

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

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.1105
836.6	4183	4.1587
846.6	4233	4.1840

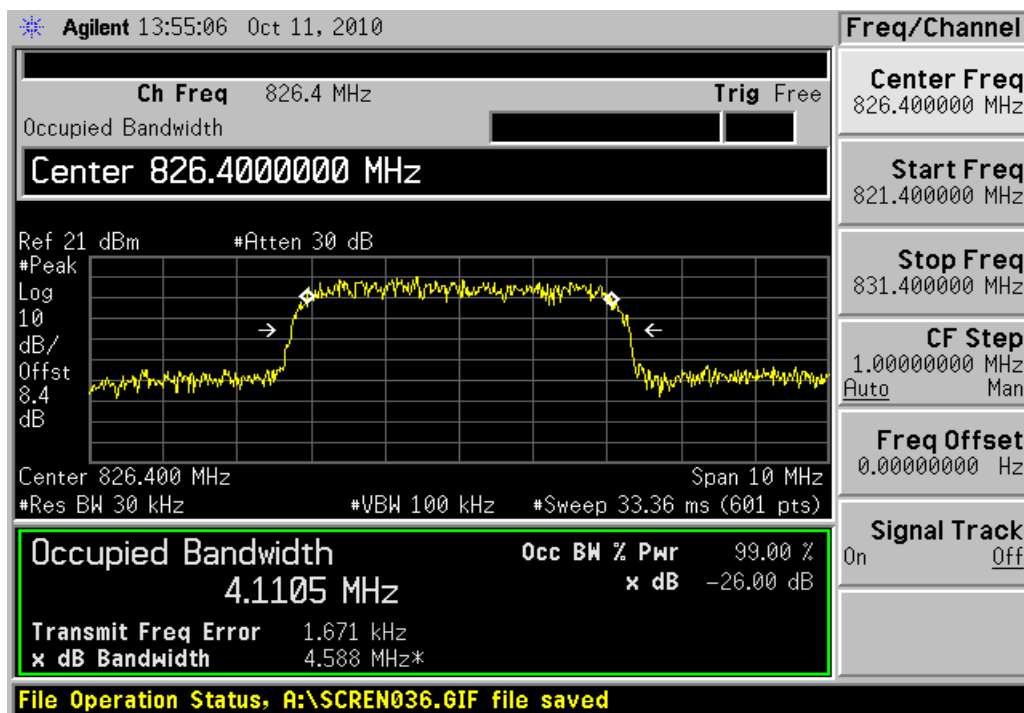
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.1600
836.6	4183	4.1684
846.6	4233	4.1640

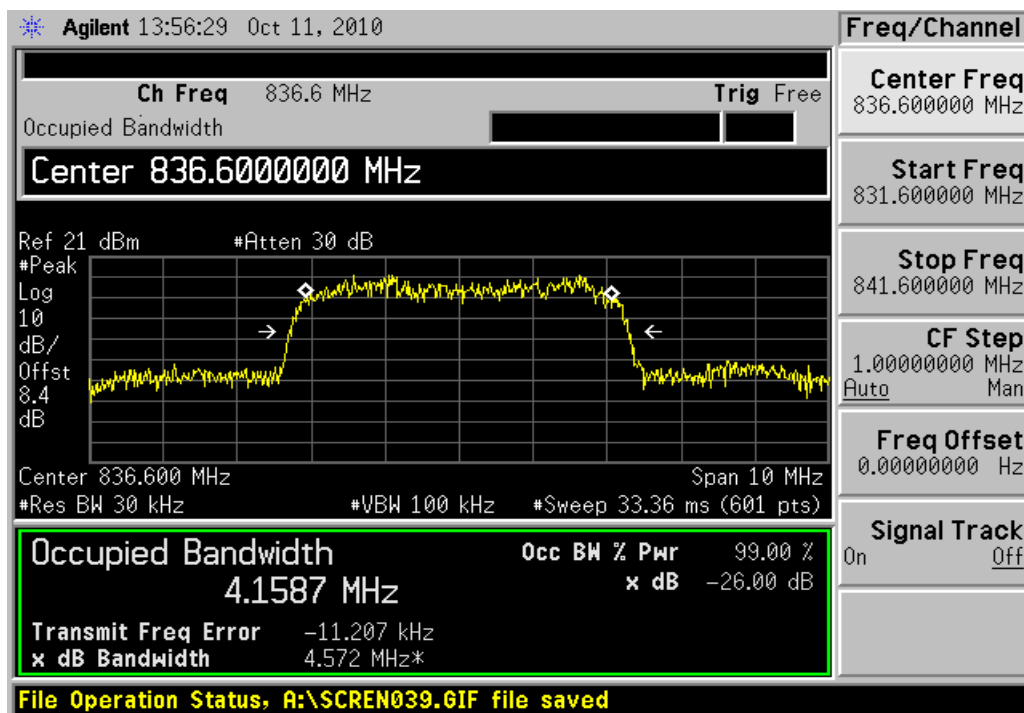
HSPA+ Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (MHz)
826.4	4132	4.1965
836.6	4183	4.1811
846.6	4233	4.1603

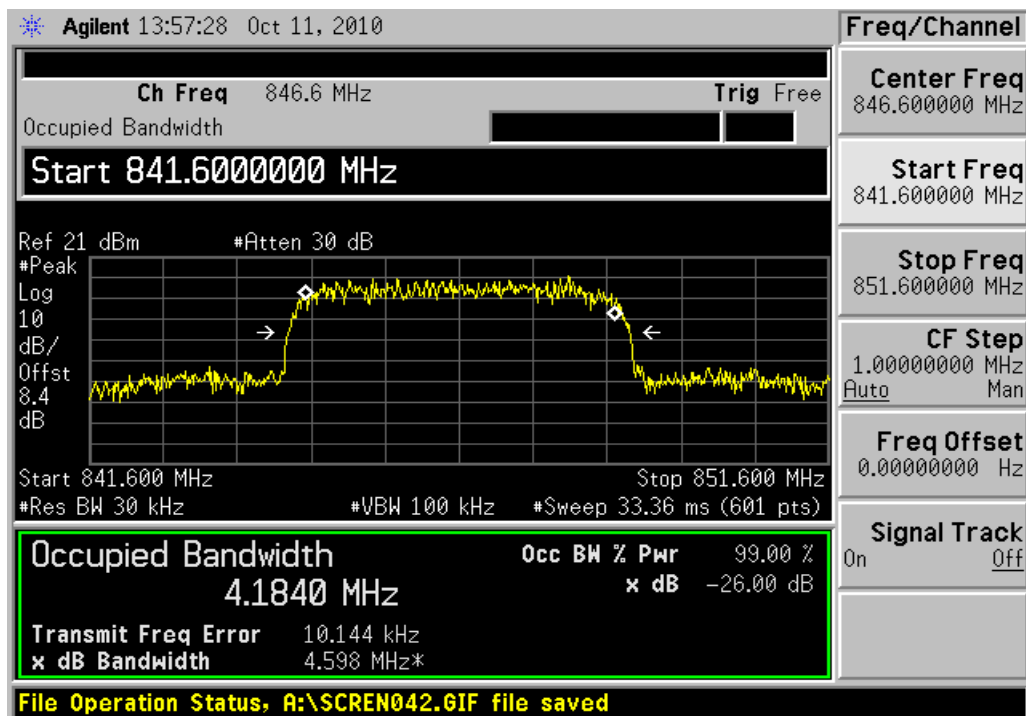
WCDMA Mode:



Channel 4132

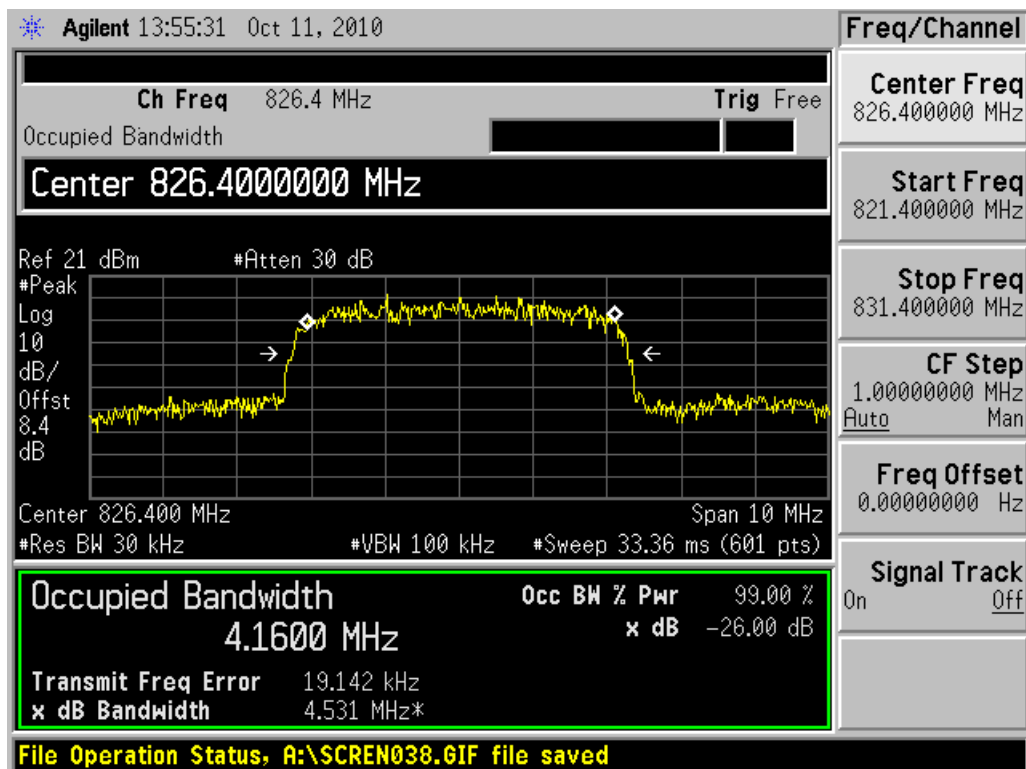


Channel 4183

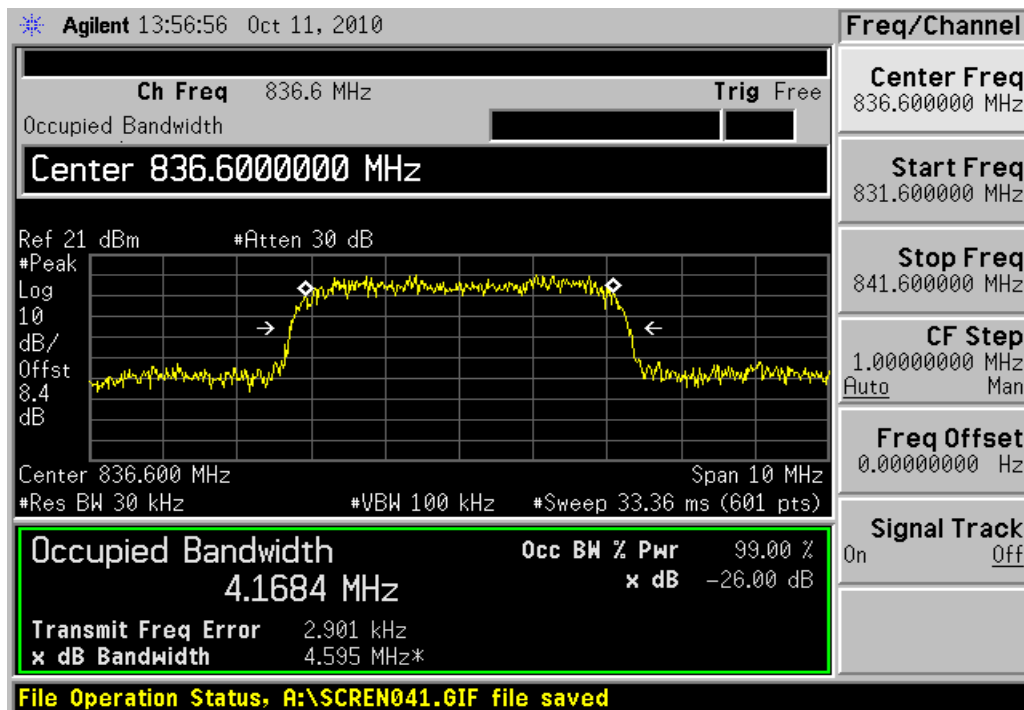


Channel 4233

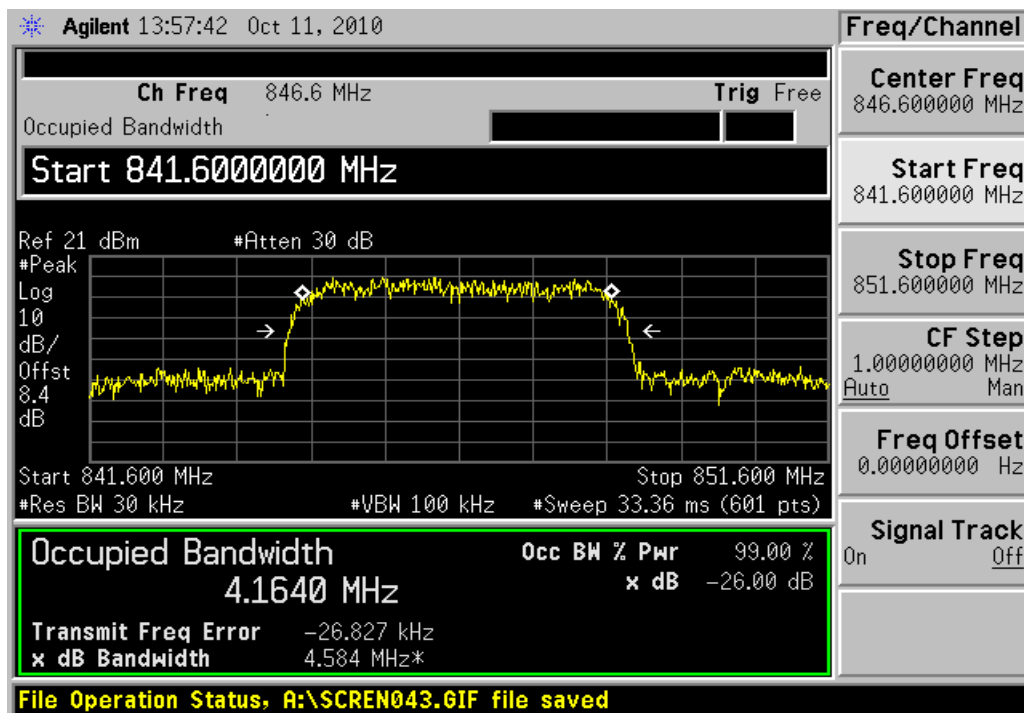
HSDPA/HSUPA Mode:



Channel 4132

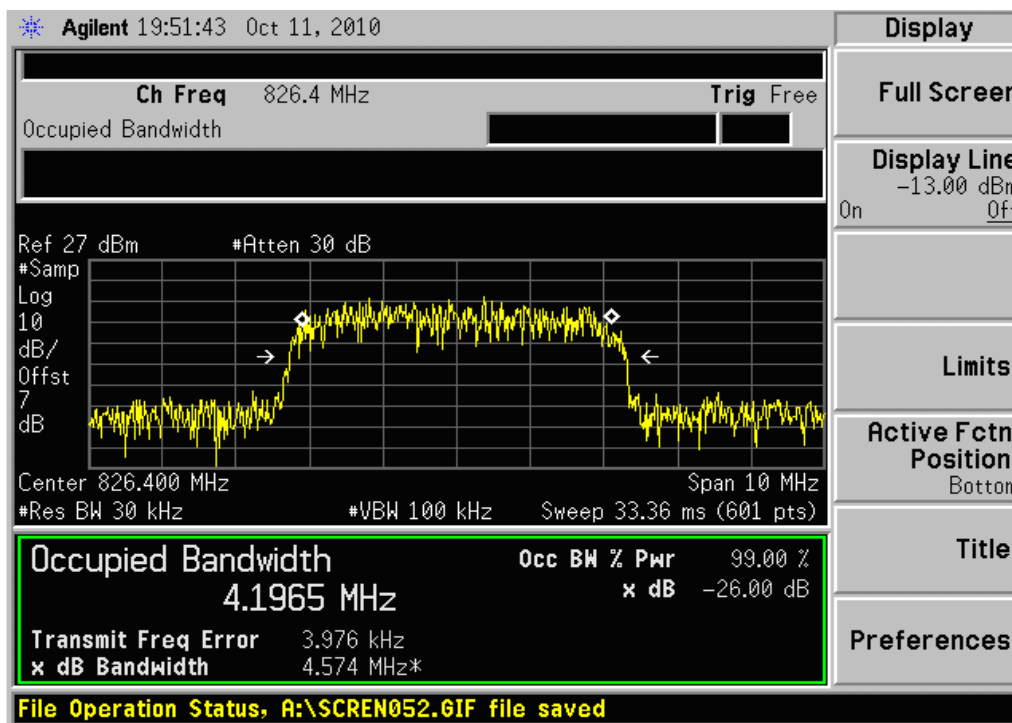


Channel 4183

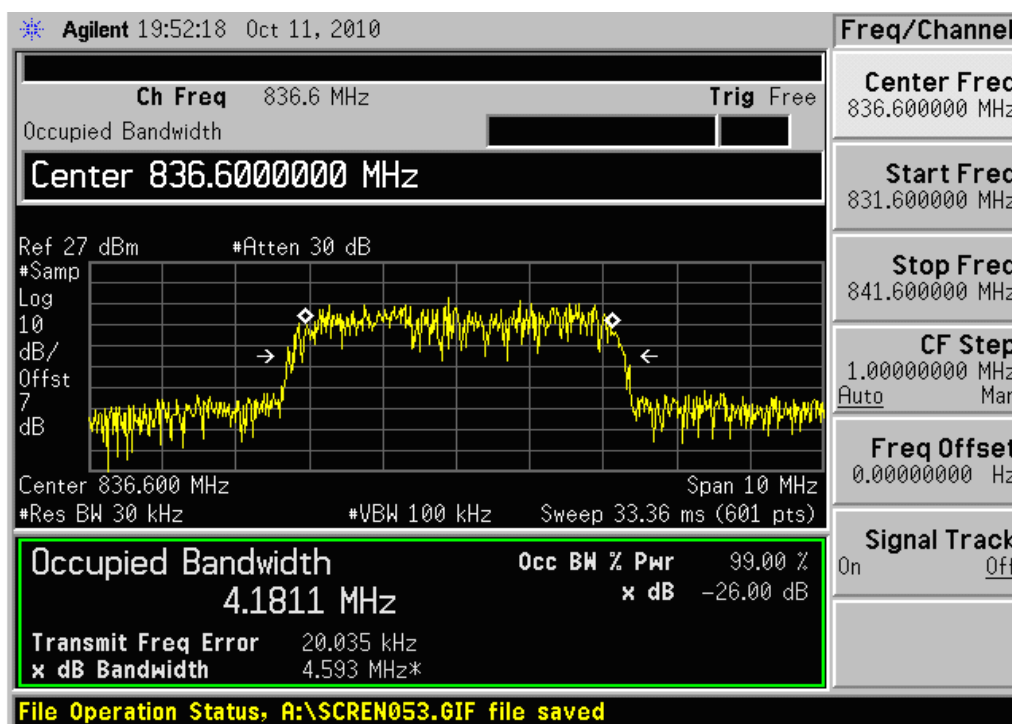


Channel 4233

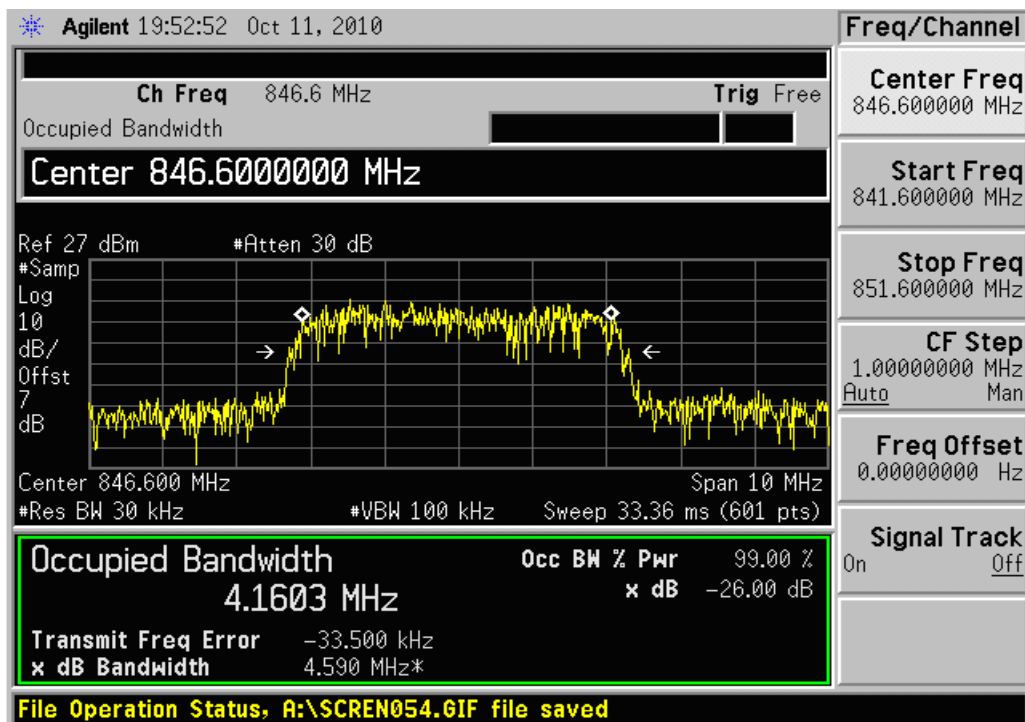
HSPA+ Mode:



Channel 4132



Channel 4183



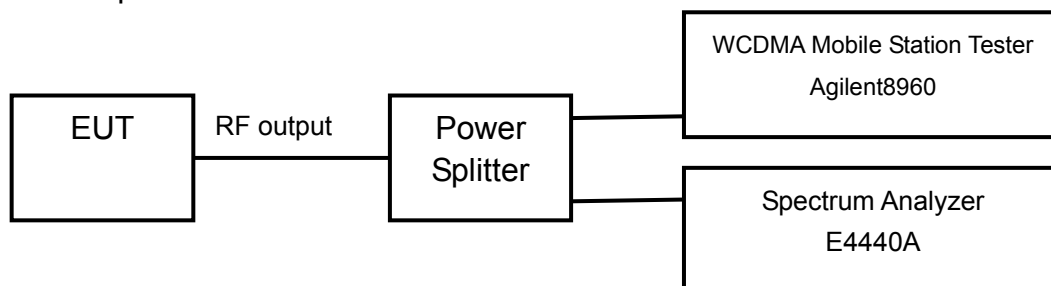
Channel 4233

2.2.2.4 Emission Bandwidth-FCC Part 22.917(b)/IC RSS-132 § 4.5

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 -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 occupied bandwidth requirements in part 22.917/24.238

Test result:

WCDMA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.588
836.6	4183	4.572
846.6	4233	4.598

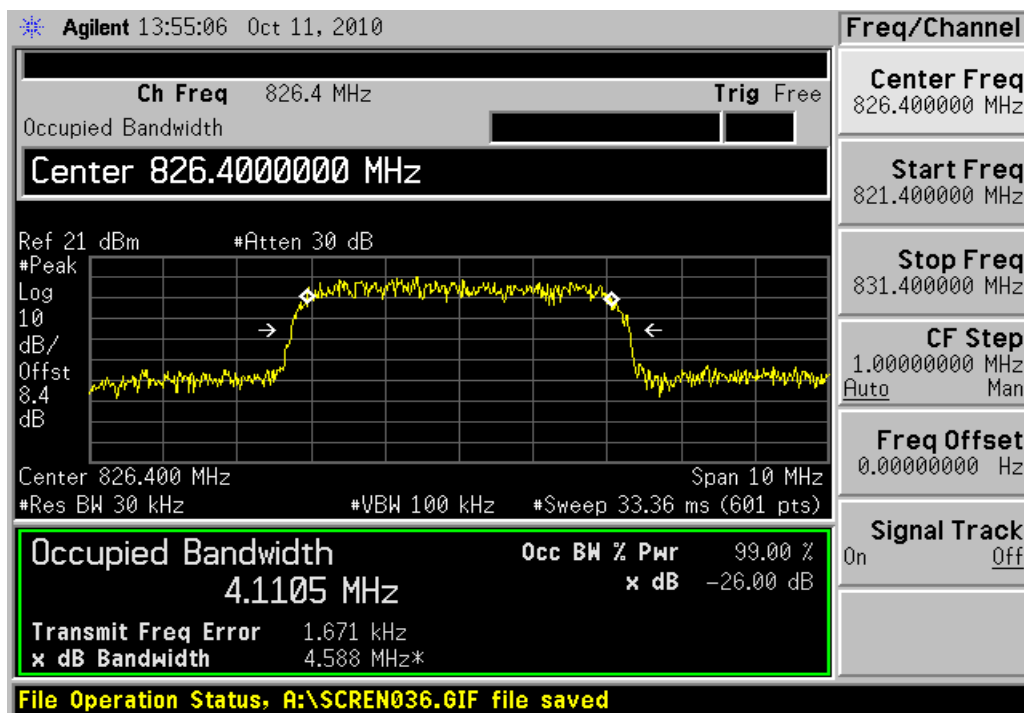
HSDPA/HSUPA Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.531
836.6	4183	4.595
846.6	4233	4.584

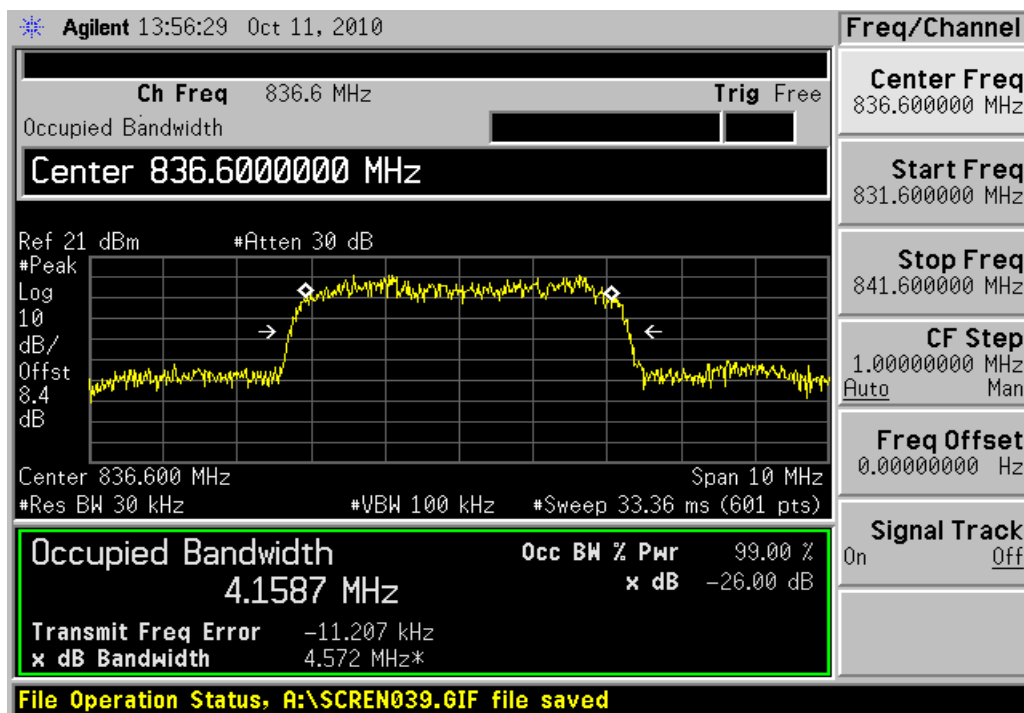
HSPA+ Mode:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dBc Power (MHz)
826.4	4132	4.574
836.6	4183	4.593
846.6	4233	4.590

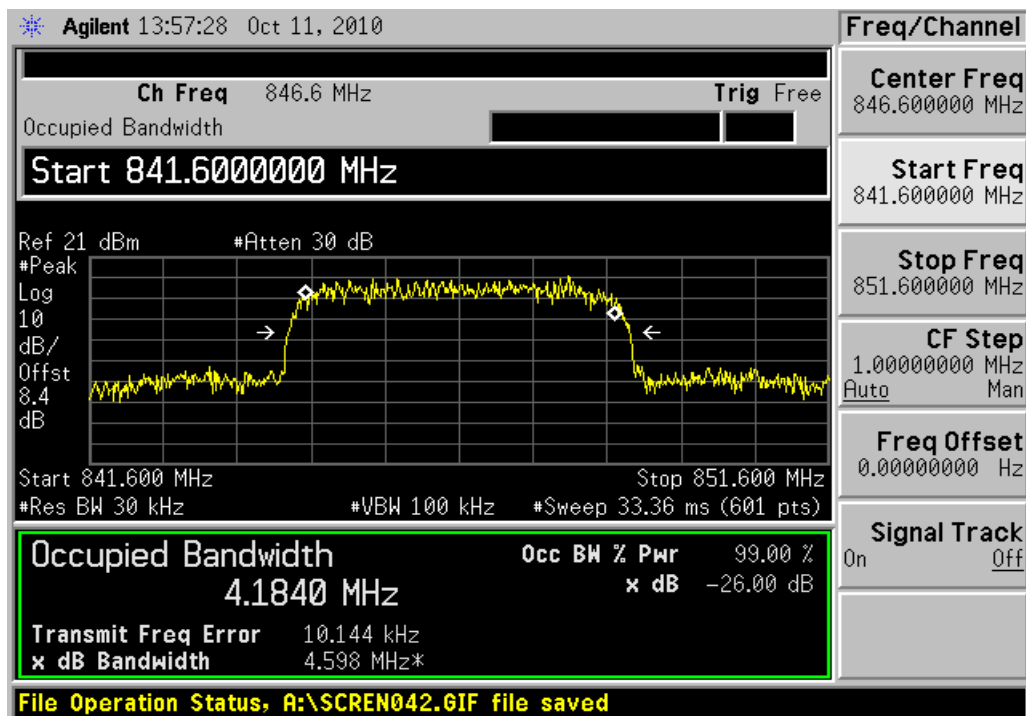
WCDMA Mode:



Channel 4132

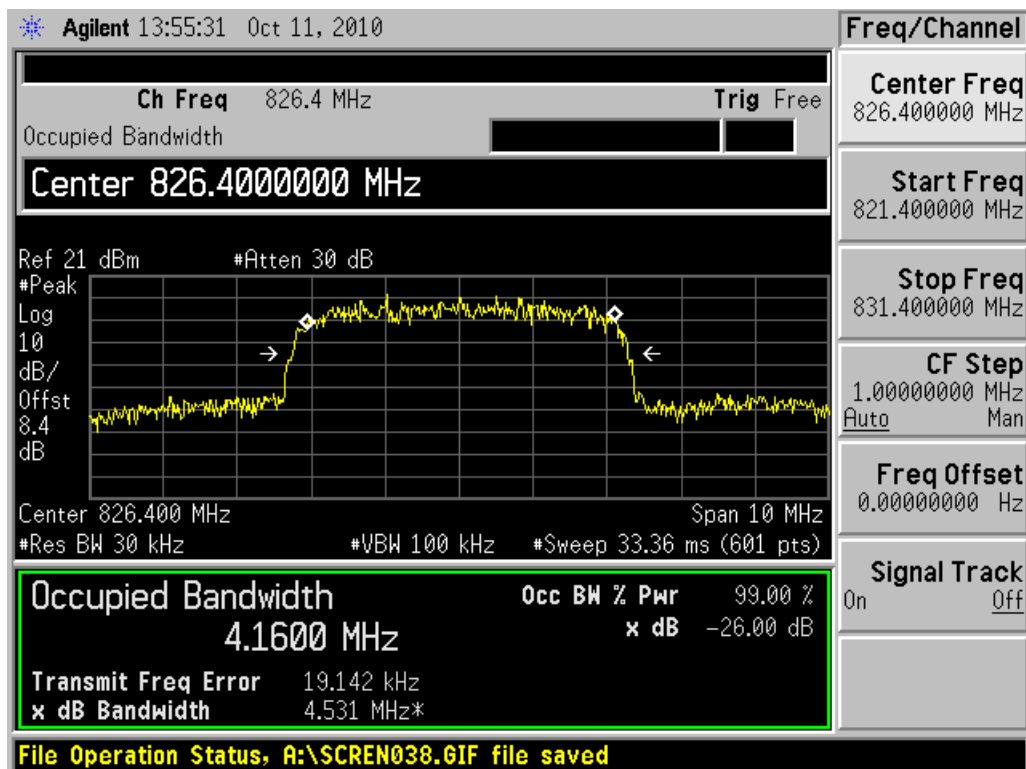


Channel 4183

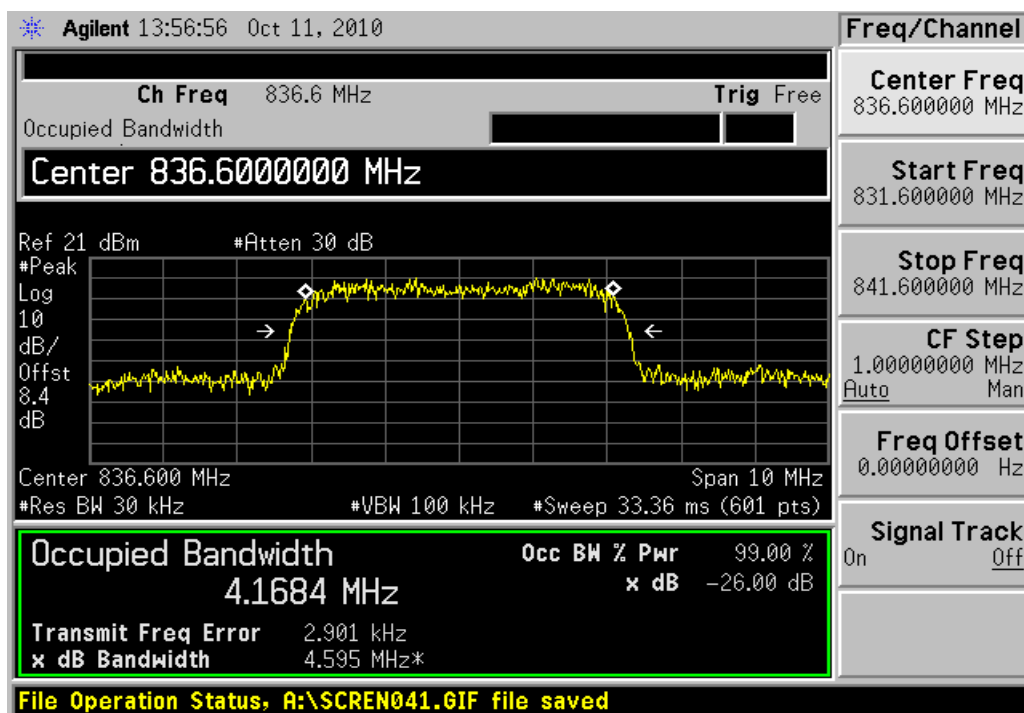


Channel 4233

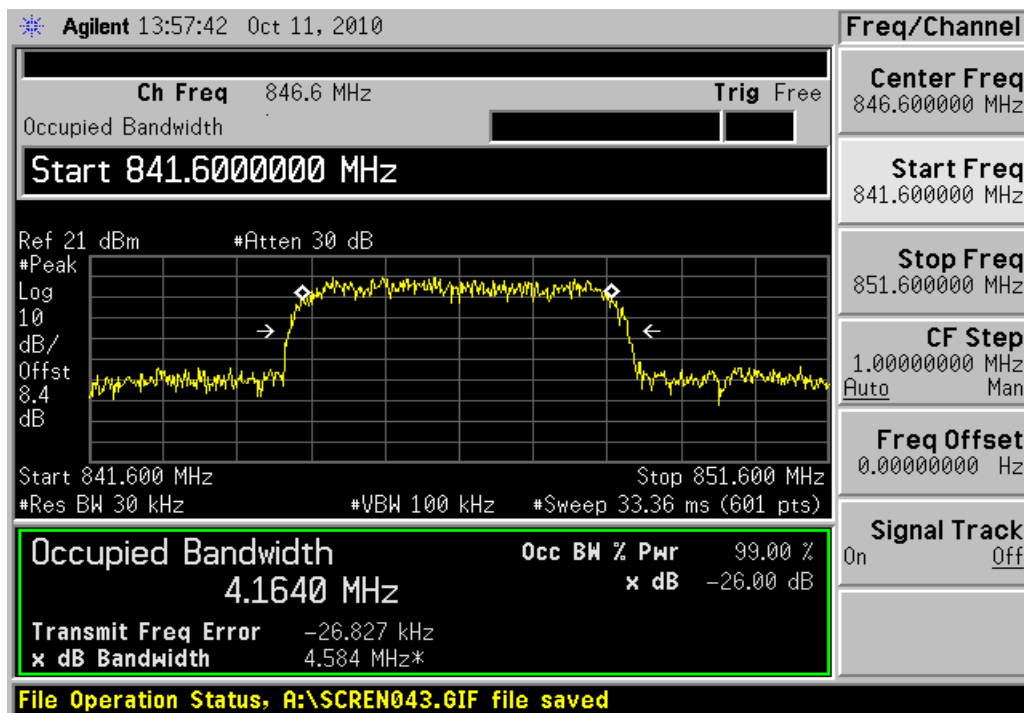
HSDPA/HSUPA Mode:



Channel 4132

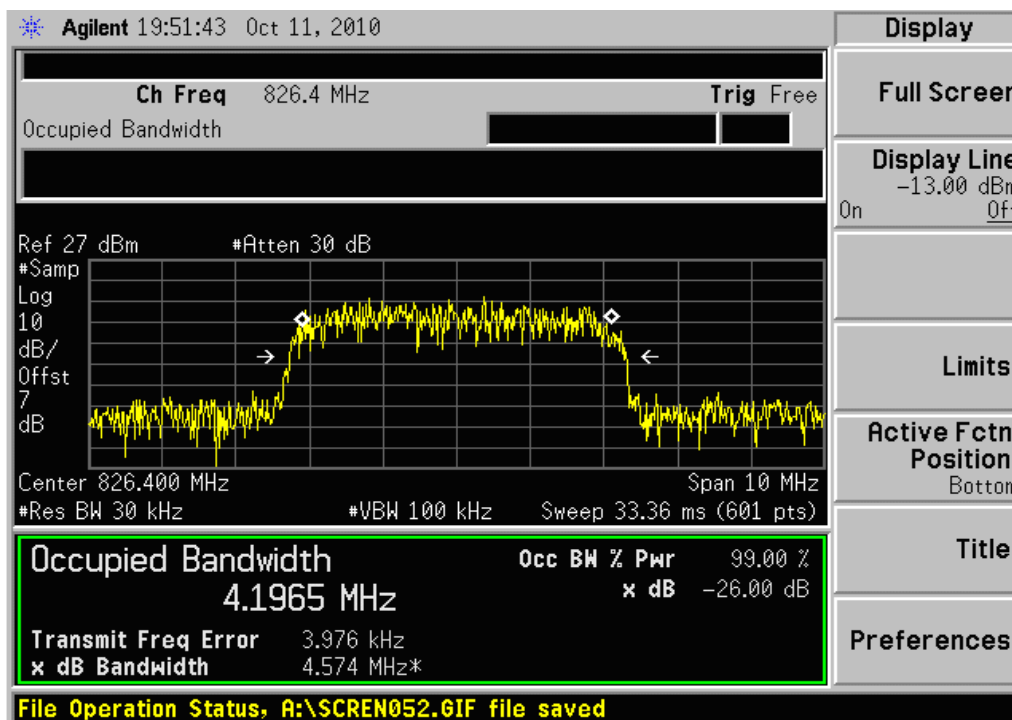


Channel 4183

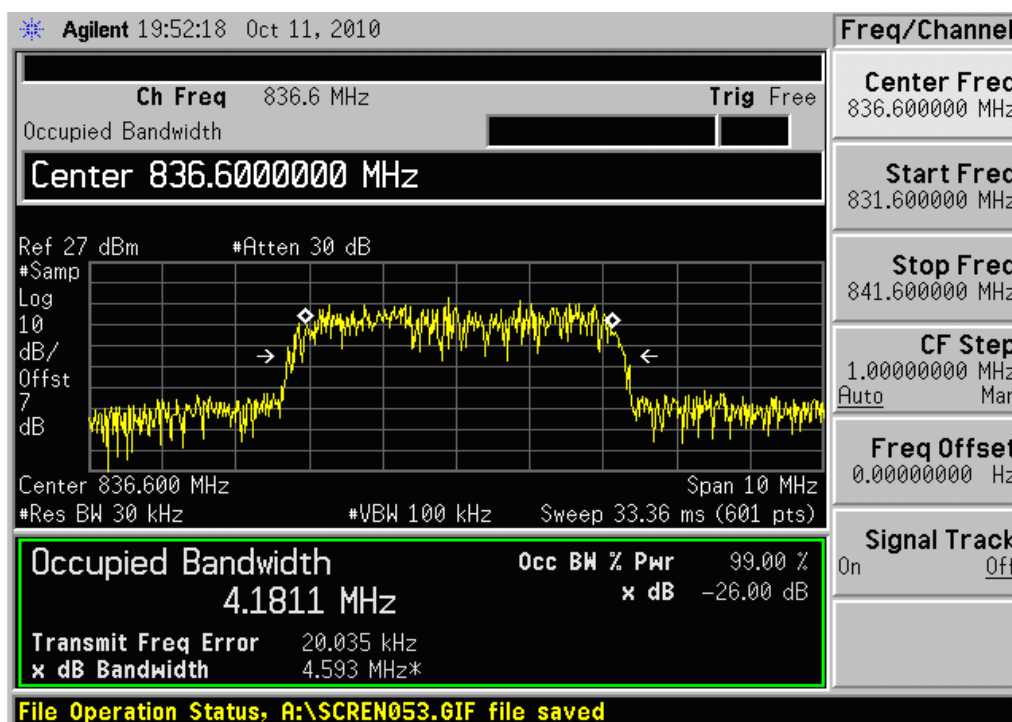


Channel 4233

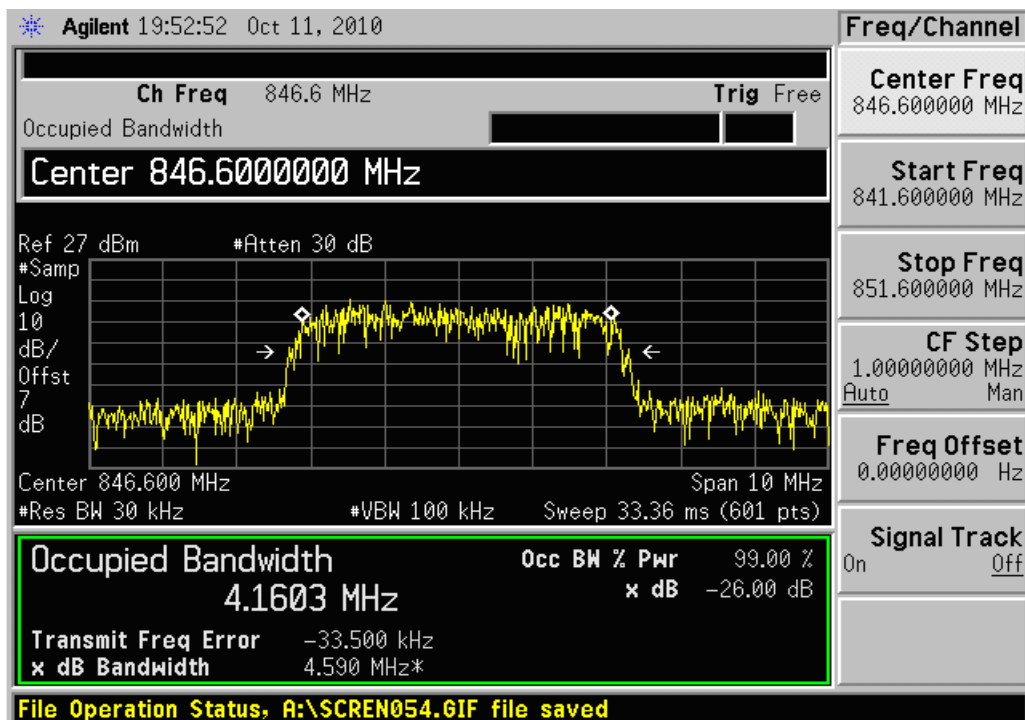
HSPA+ Mode:



Channel 4132



Channel 4183



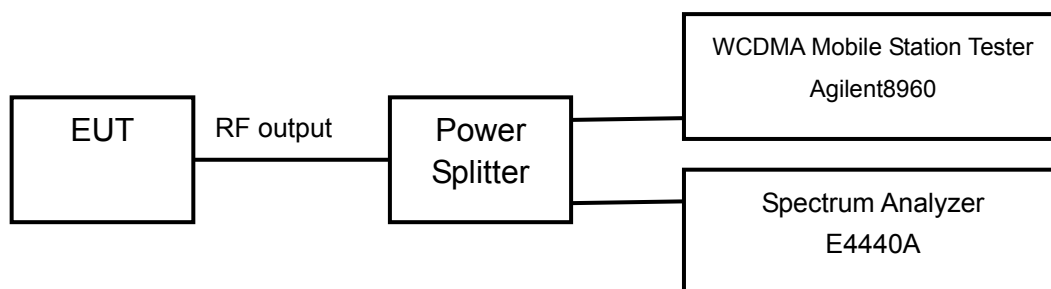
Channel 4233

2.2.2.5 Conducted Spurious Emissions-FCC Part2.1057/22.917/IC RSS-132 § 4.5

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

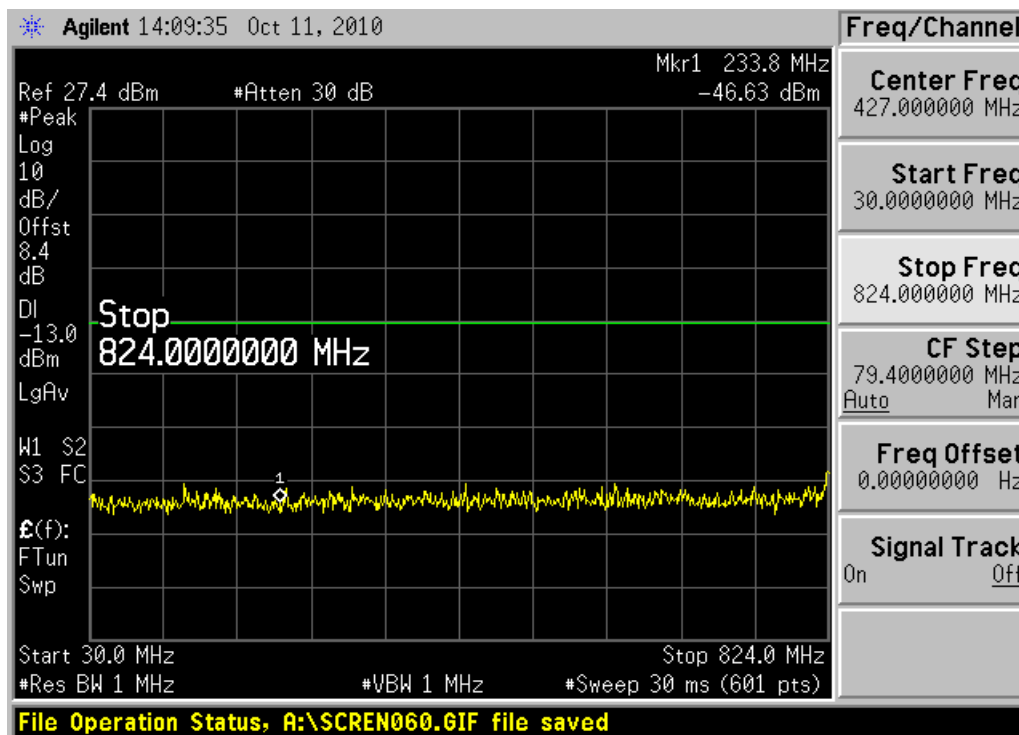
The measurement will be conducted at one channel No 4183 (middle channel of WCDMA band V)

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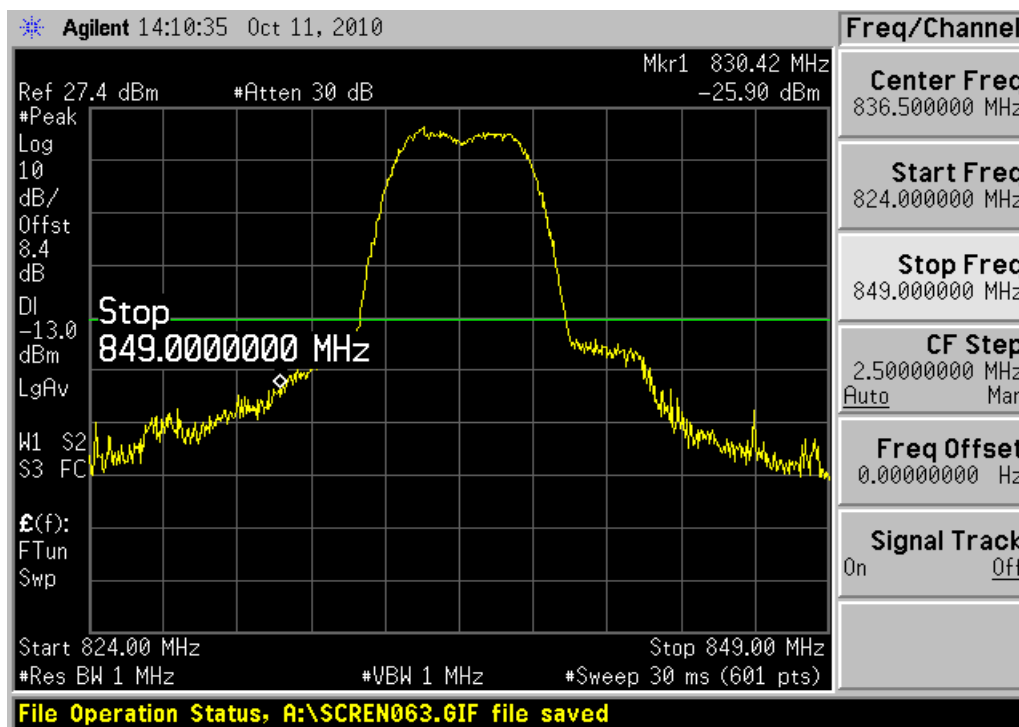
Test result:

Refer to the following figures.

WCDMA Mode:

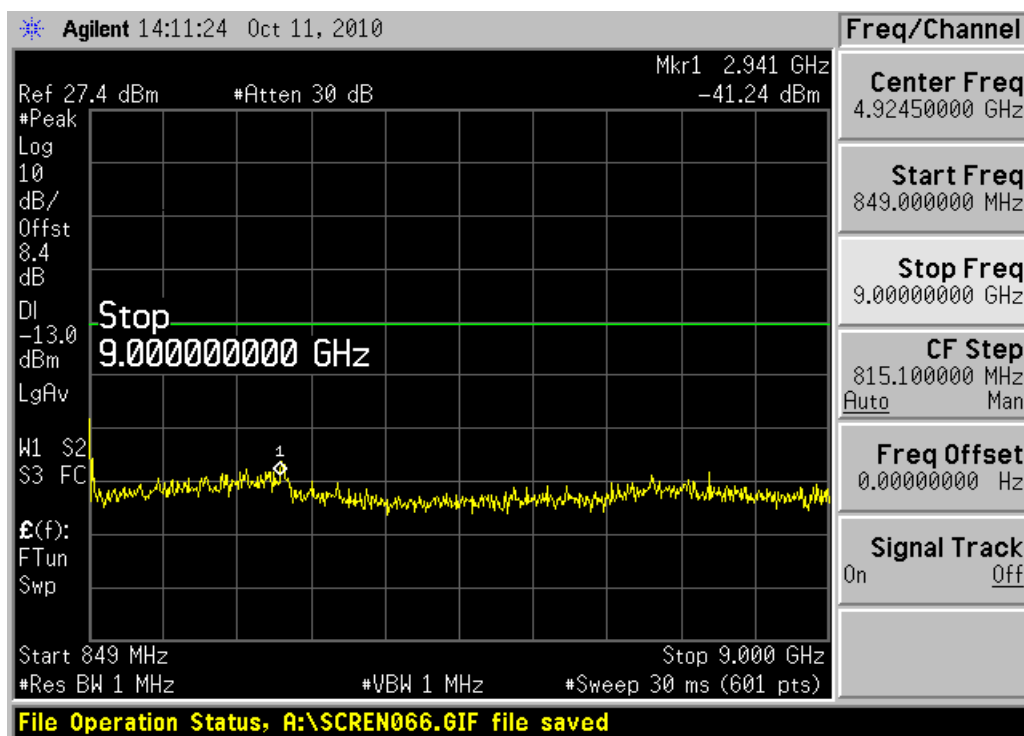


Channel 4183, 30MHz~824MHz



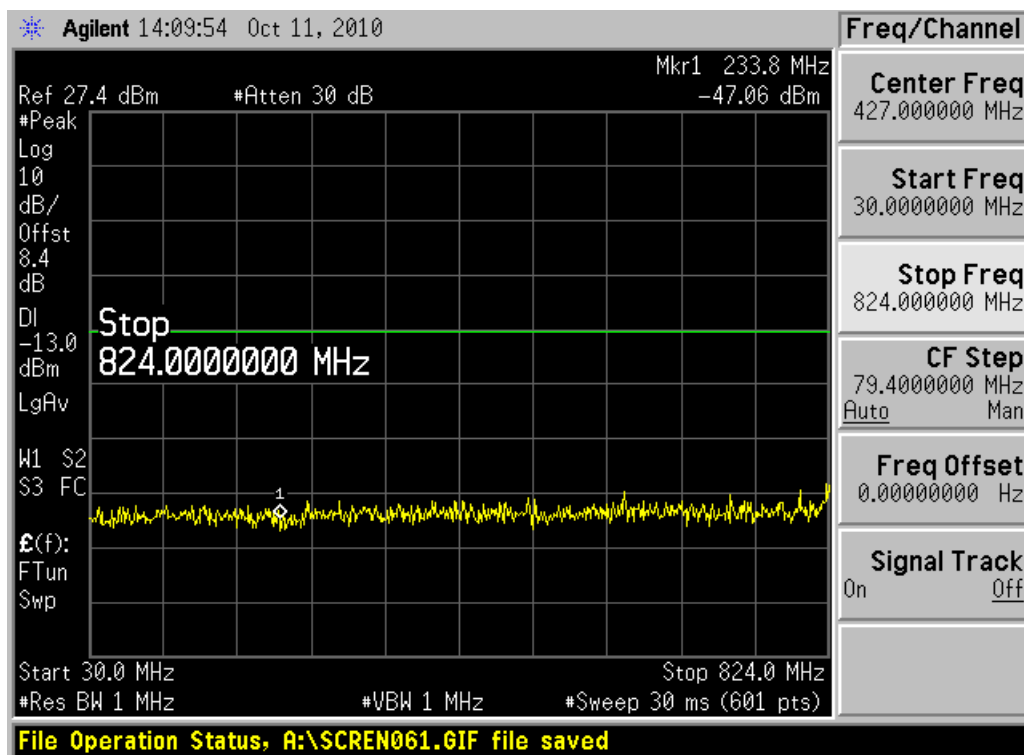
Channel 4183, 824MHz~849MHz

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

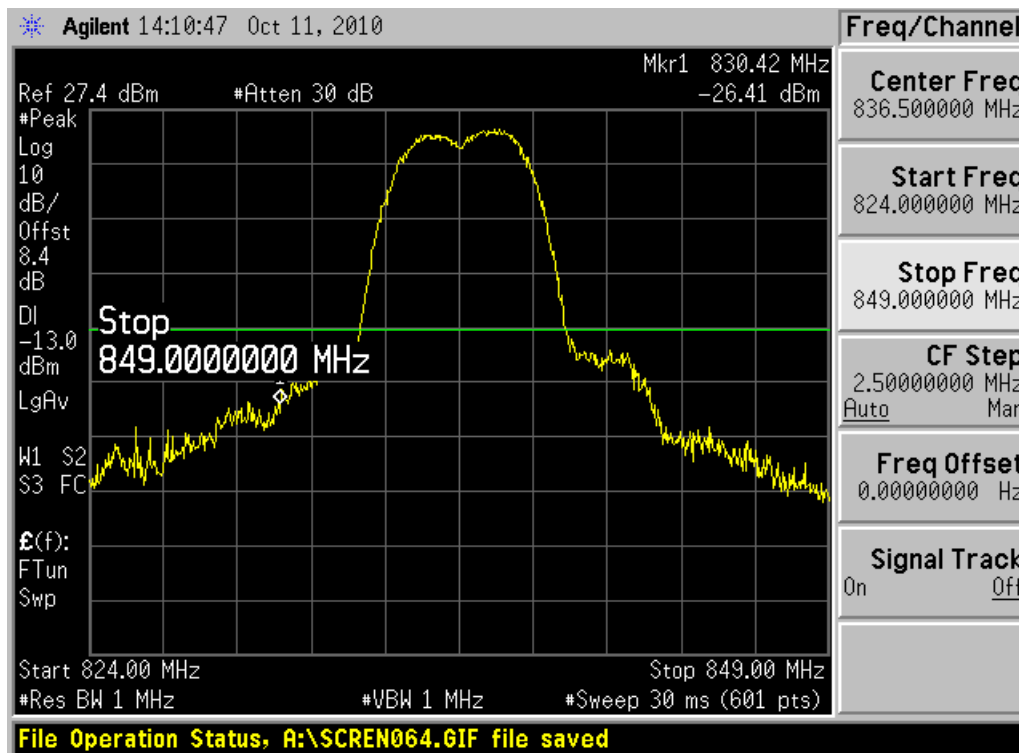


Channel 4183, 849MHz~9GHz

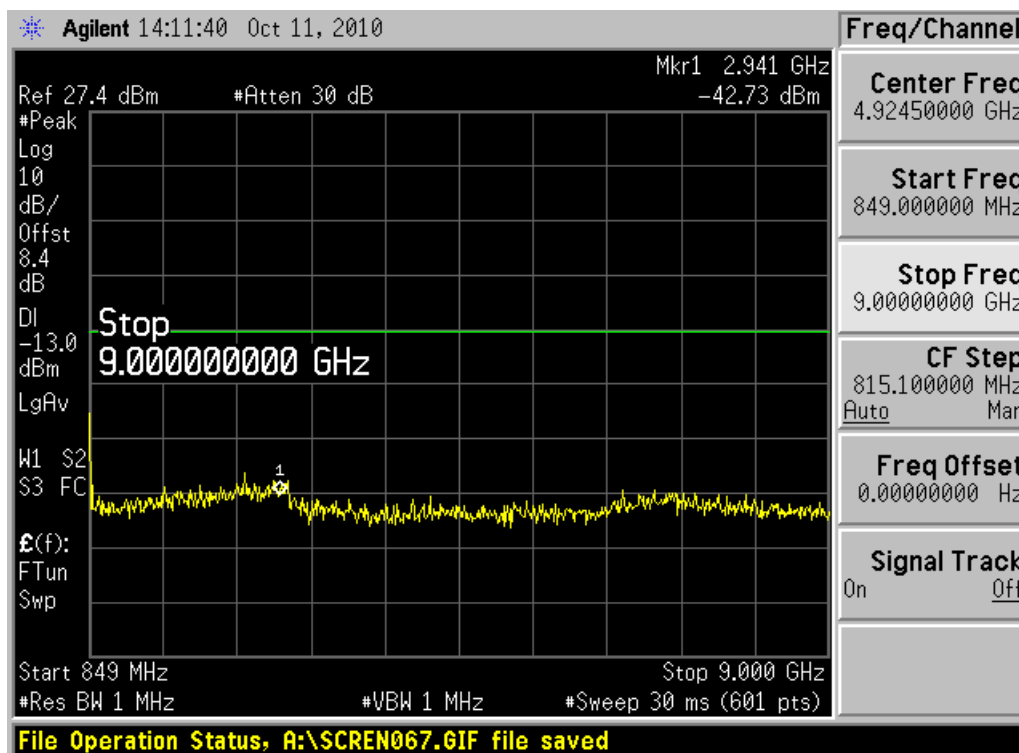
HSDPA/HSUPA Mode:



Channel 4183, 30MHz~824MHz

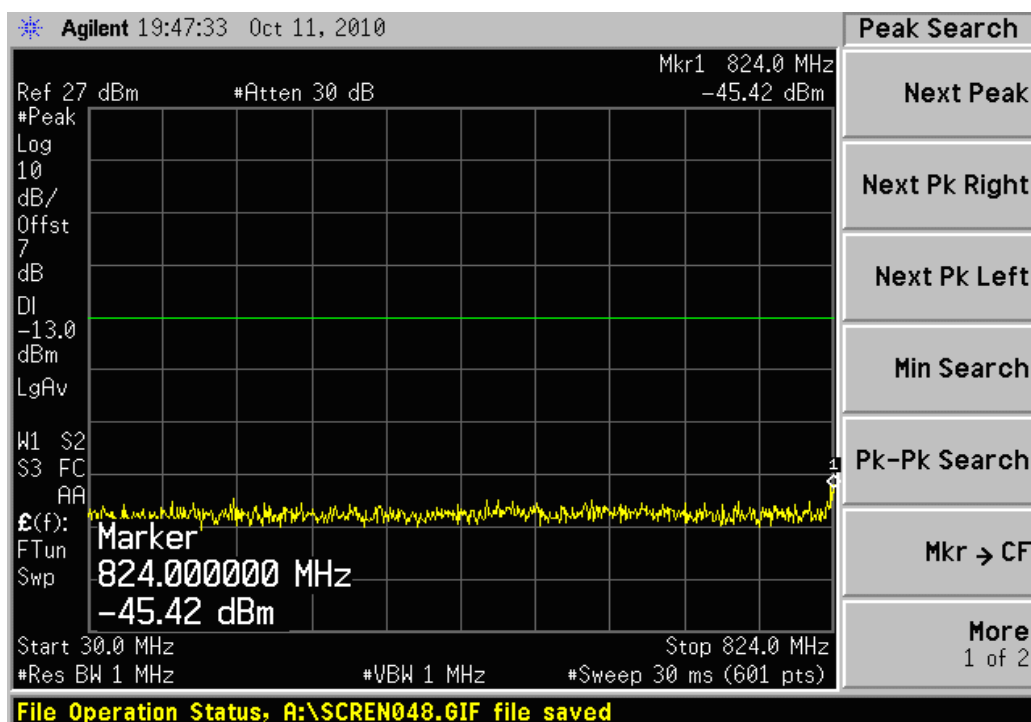


Channel 4183, 824MHz~849MHz

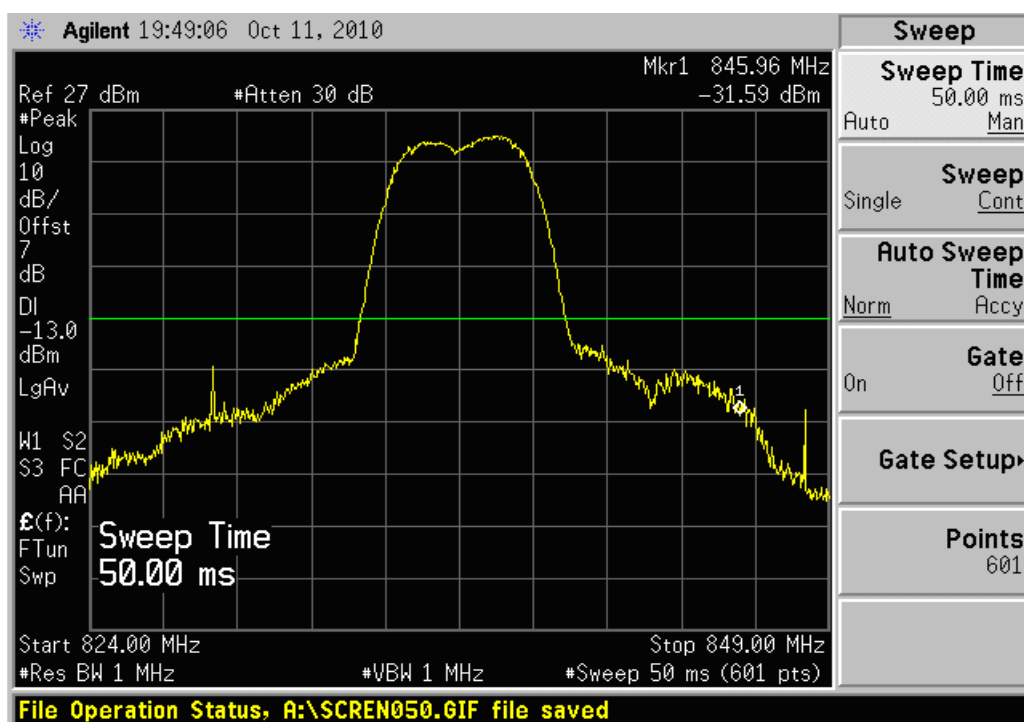


Channel 4183, 849MHz~9GHz

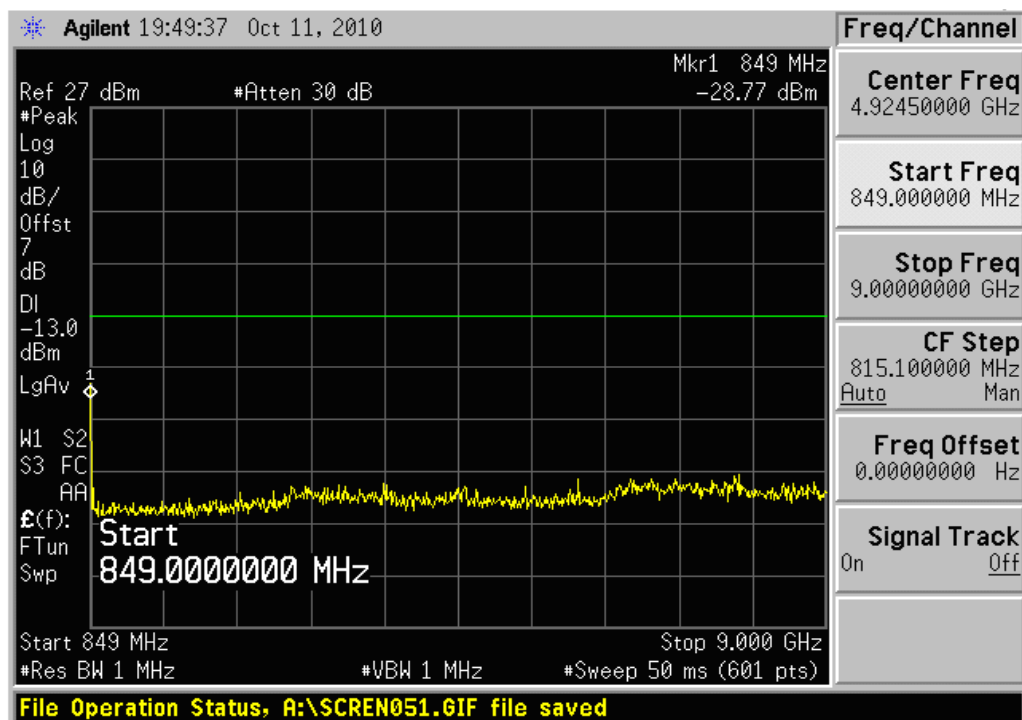
HSPA+ Mode:



Channel 4183, 30MHz~824MHz



Channel 4183, 824MHz~849MHz



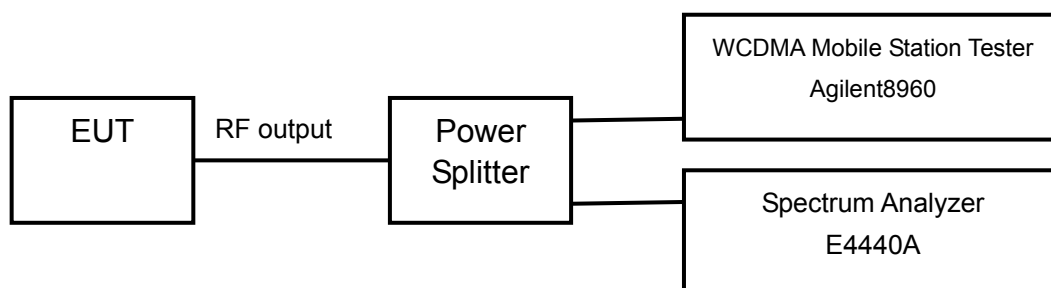
Channel 4183, 849MHz~9GHz

2.2.2.6 Band Edges Compliance-FCC Part 22.917(b)/IC RSS-132 § 4.5

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 30KHz on spectrum analyzer.

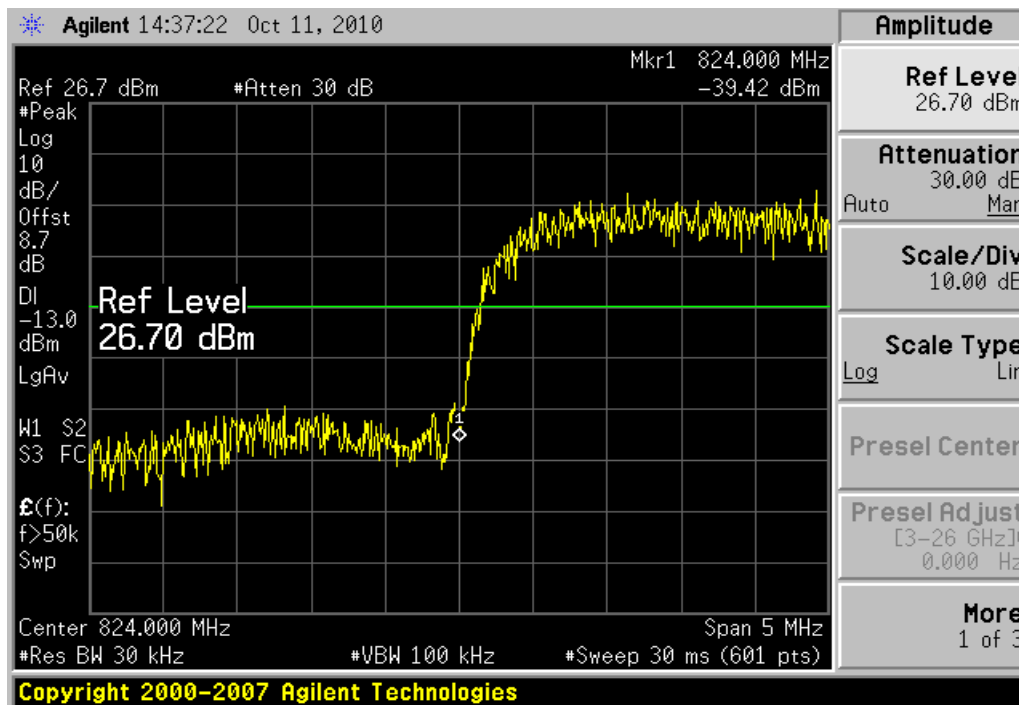
The measurement will be conducted at two channels No4132 and No4233 (Bottom and top channels of WCDMA band V)

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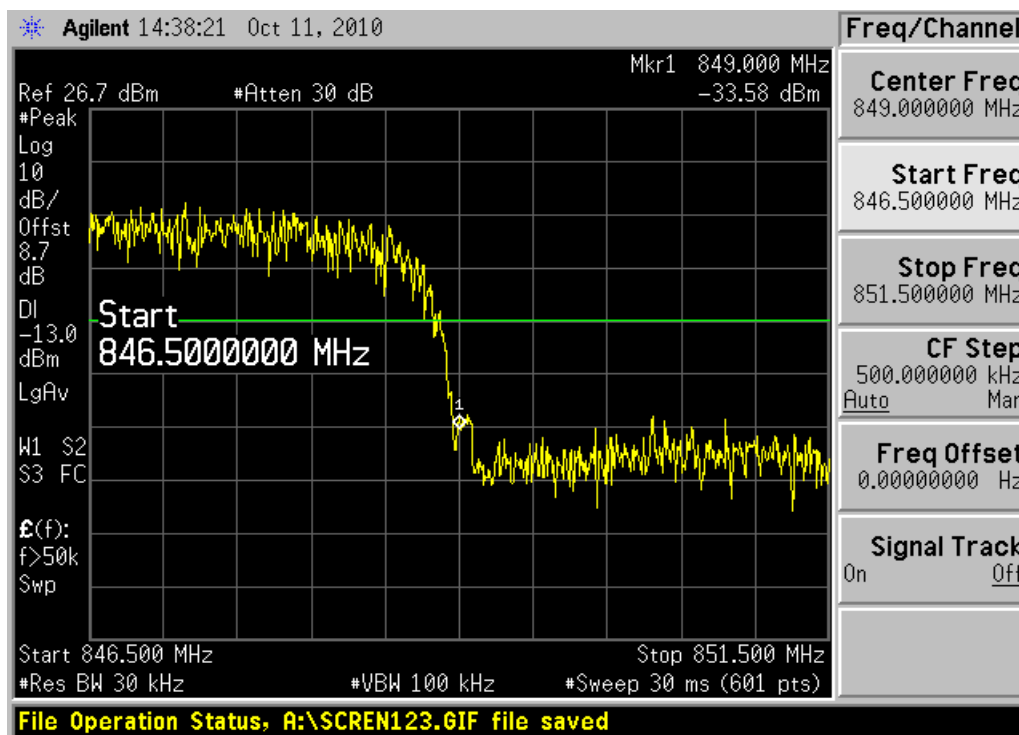
Test result:

Refer to the following figures.

WCDMA Mode:

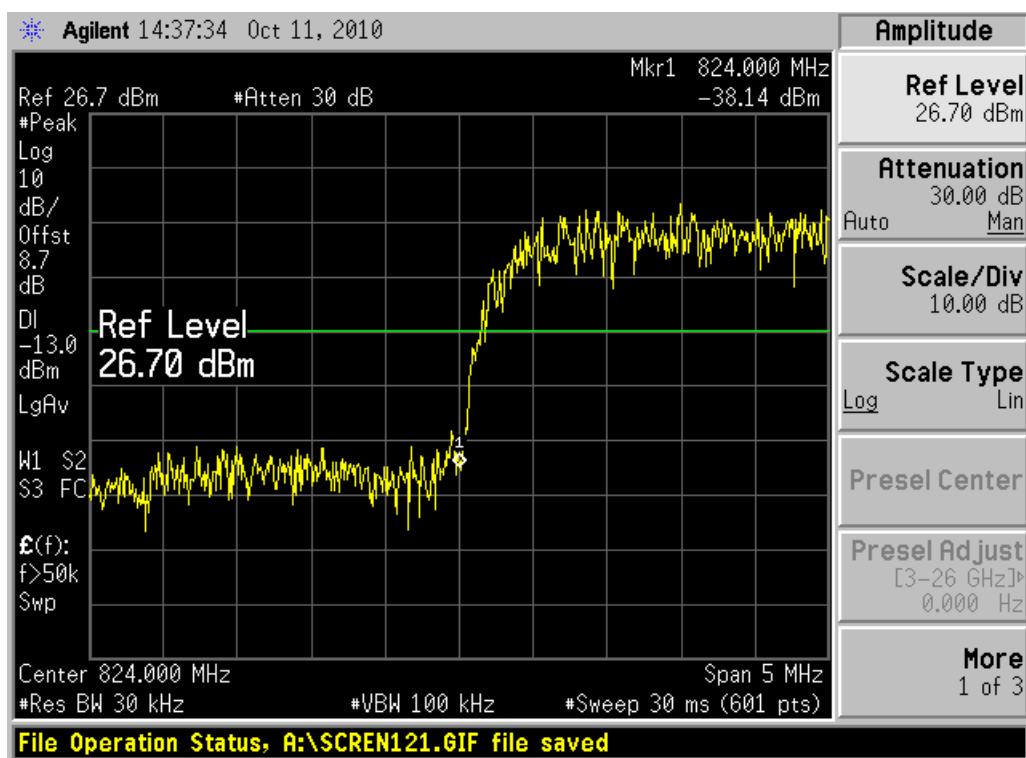


Channel 4132

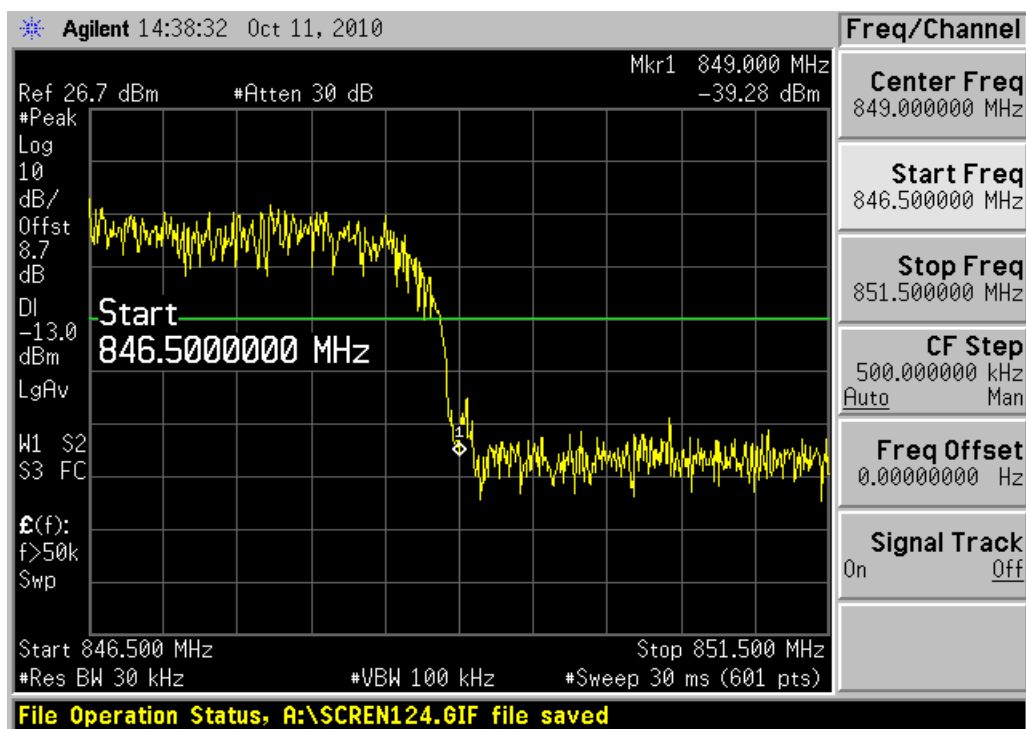


Channel 4233

HSDPA/HSUPA Mode:

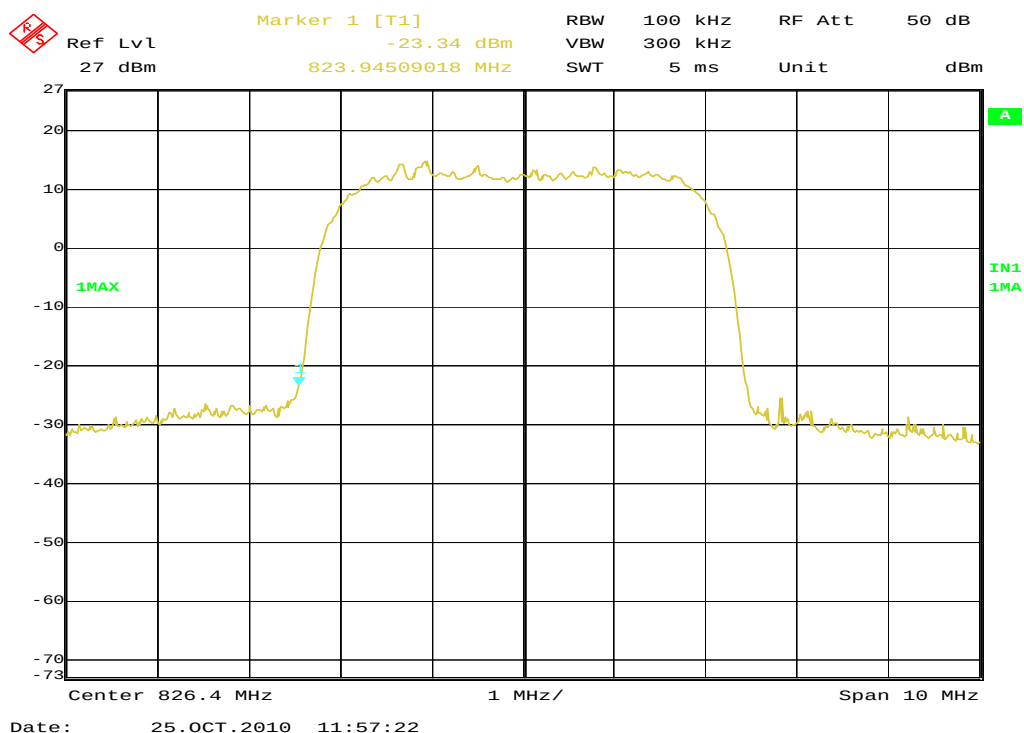


Channel 4132

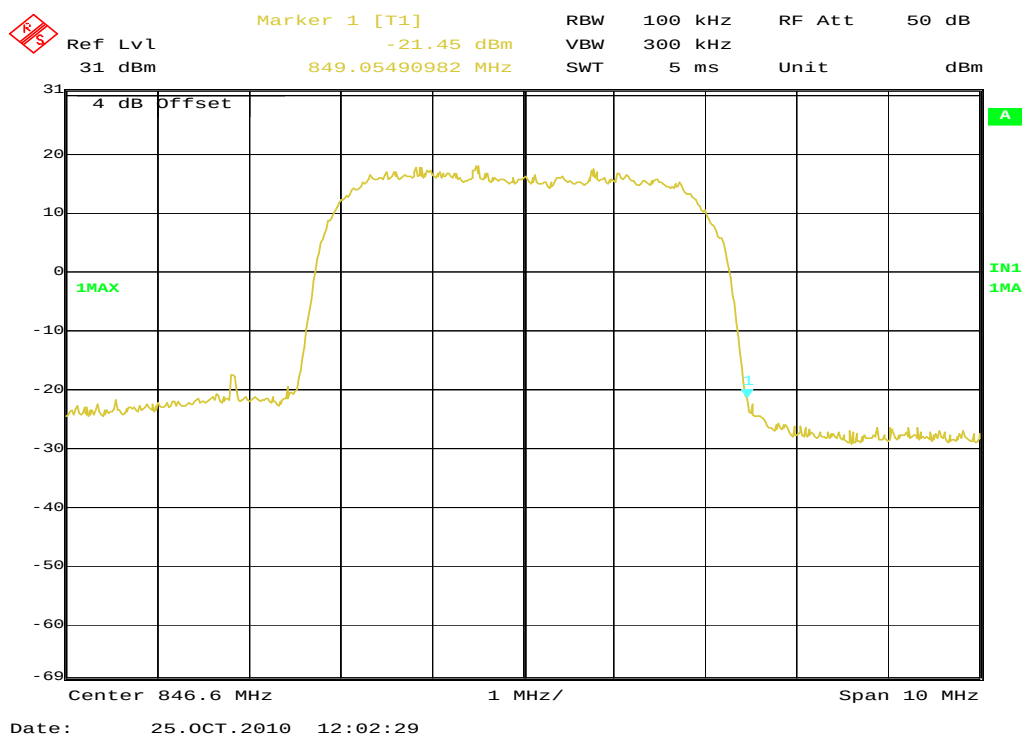


Channel 4233

HSPA+ Mode:



Channel 4132



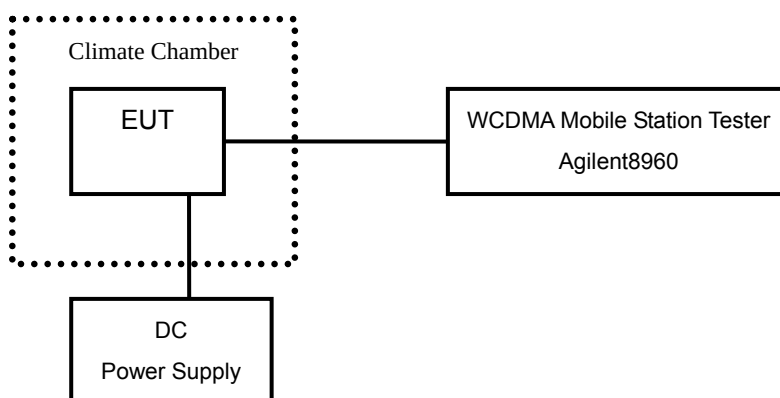
Channel 4233

2.2.2.7 Frequency Stability-FCC Part2.1055/IC RSS-132 § 4.3

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 3.2 to 3.6 V. 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 FCC Part2.1055.

According to the standard of RSS-132 § 4.3, the carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

Test result:

WCDMA Mode:

Temperature(°C)	Test Result (ppm)@3.3V		
	Channel 4132	Channel 4183	Channel 4233
-30	0.002	0.001	0.001
-20	0.002	0.001	0.001
-10	0.002	0.003	0.001
0	0.001	0.003	0.001
+10	0.002	0.001	0.002
+20	0.001	0.001	0.001
+30	0.002	0.002	0.002
+40	0.002	0.004	0.001
+50	0.002	0.001	0.001

Voltage (V)	Test Result (ppm)@20°C		
	Channel 4132	Channel 4183	Channel 4233
3.2	0.002	0.001	0.000
3.6	0.002	0.002	0.002

HSDPA/HSUPA Mode:

Temperature(°C)	Test Result (ppm)@3.3V		
	Channel 4132	Channel 4183	Channel 4233
-30	0.002	0.001	0.001
-20	0.002	0.001	0.001
-10	0.002	0.003	0.001
0	0.001	0.003	0.001
+10	0.002	0.001	0.002
+20	0.001	0.001	0.001
+30	0.002	0.002	0.002
+40	0.002	0.004	0.001
+50	0.002	0.001	0.001

Voltage (V)	Test Result (ppm)@20°C		
	Channel 4132	Channel 4183	Channel 4233
3.2	0.002	0.001	0.000
3.6	0.002	0.002	0.002

HSPA+ Mode:

Temperature(°C)	Test Result (ppm)@3.3V		
	Channel 4132	Channel 4183	Channel 4233
-30	0.008	0.008	0.007
-20	0.009	0.008	0.015
-10	0.009	0.008	0.020
0	0.021	0.012	0.038
+10	0.024	0.019	0.047
+20	0.019	0.019	0.043
+30	0.017	0.013	0.028
+40	0.012	0.007	0.033
+50	0.015	0.010	0.033

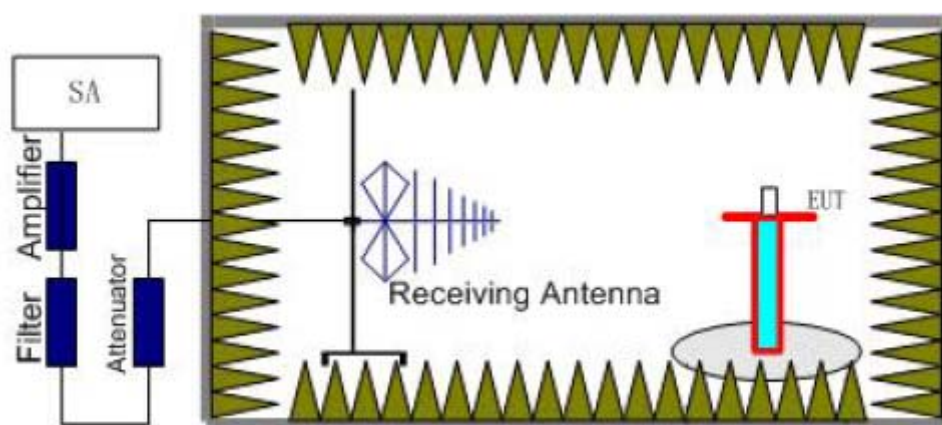
Voltage (V)	Test Result (ppm)@20°C		
	Channel 4132	Channel 4183	Channel 4233
3.2	0.019	0.014	0.029
3.6	0.032	0.006	0.015

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

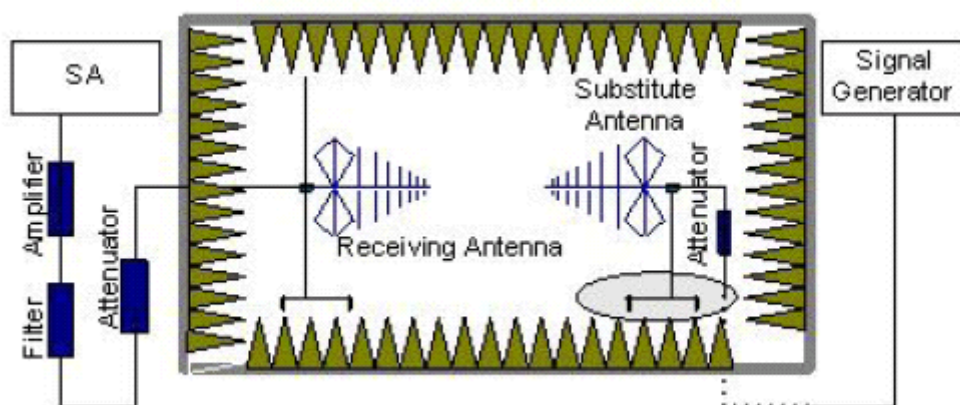
Ambient condition

Temperature	Relative humidity	Pressure
21°C	44%	101.5kPa

Test Setup:



Step 1



Step 2

Test procedure:

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 9GHz (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.

Calculation procedure:

The data of cable loss, antenna gain and air loss 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, antenna gain and air loss. The basic equation with a sample calculation is as followed:

$$P=P_R+L_C+L_A-G$$

Where

P: Power of the Radiated Spurious Emissions (dBm)

P_R: reading of the receiver (dBm)

L_C: Cable Lose (dB)

L_A: Air loss (dB)

G: Antenna Gain (dBi)

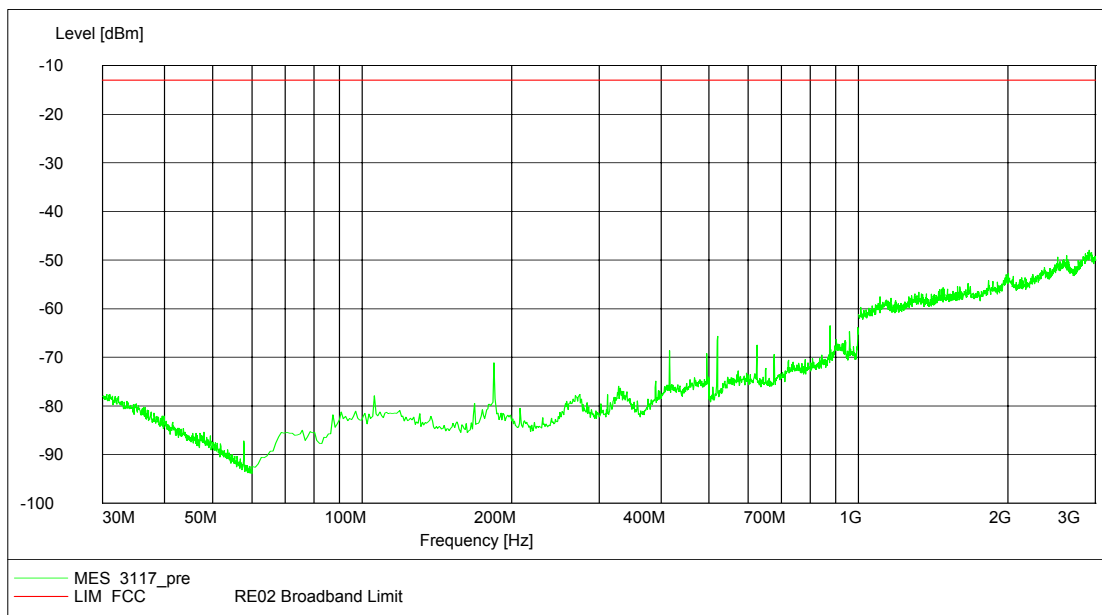
Assumed the reading of the receiver is -60dBm. A cable lose of 10dB, an air lose of 30dB and an antenna gain of 11dBi are added.

$$P=P_R+L_C+L_A-G=-60+10+30-11=-31\text{dBm}$$

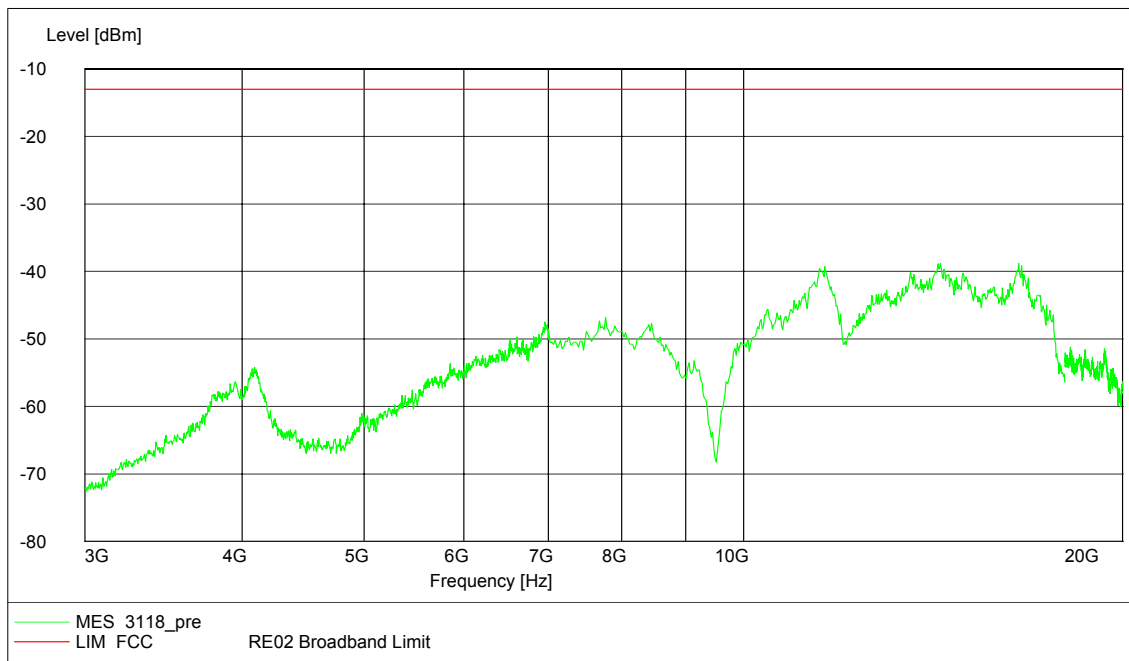
The measurement will be conducted at one channel No4183 (middle channels of WCDMA band V)

Limits	≤ -13dBm
--------	----------

Test result:
WCDMA Mode:

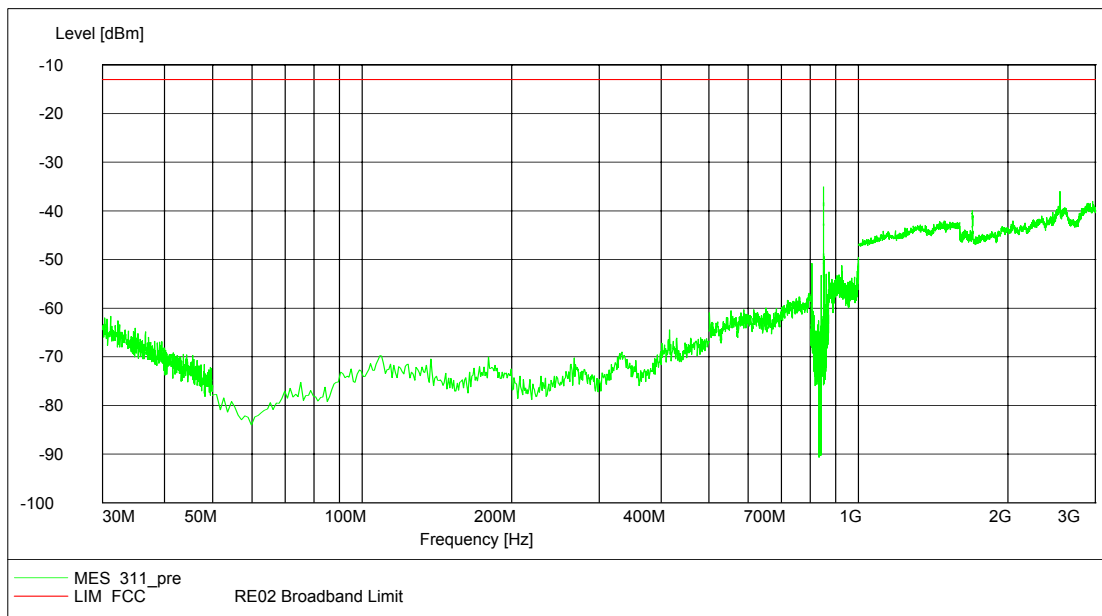


Channel 4183, 30MHz~3GHz

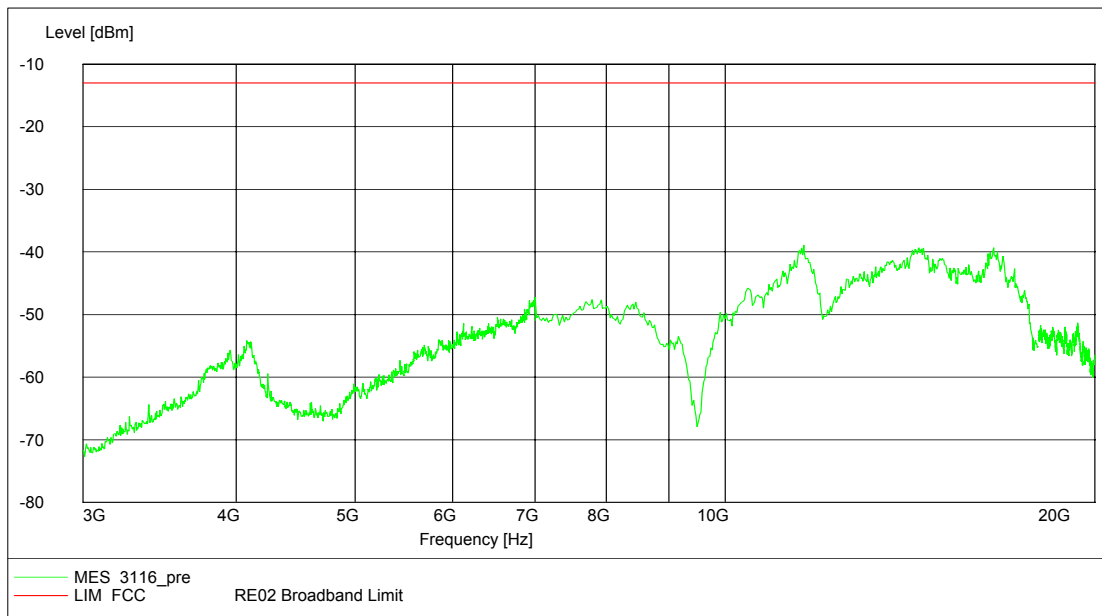


Channel 4183, 3GHz~20GHz

HSDPA/HSUPA Mode:

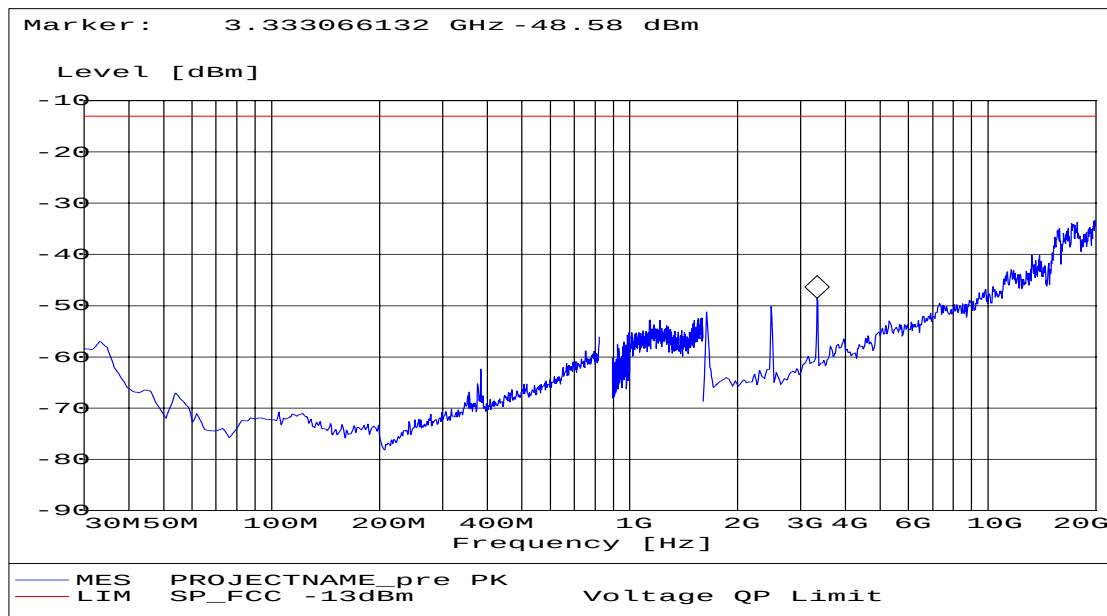


Channel 4183, 30MHz~3GHz



Channel 4183, 3GHz~20GHz

HSPA+ Mode:



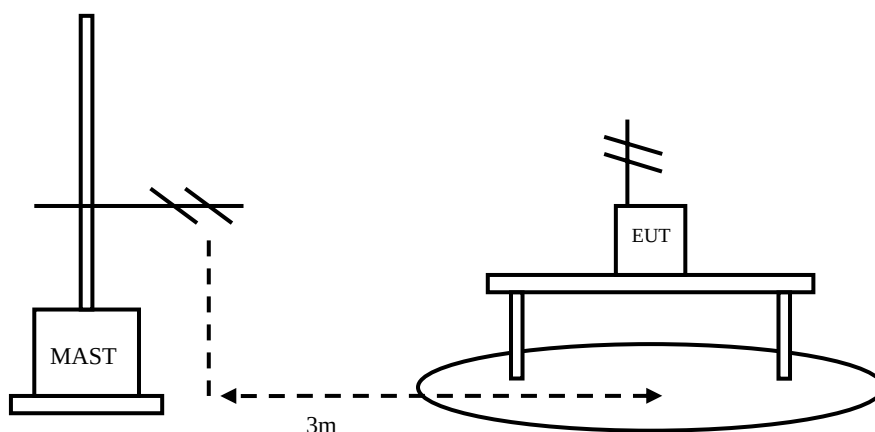
Channel 4183, 30MHz~20GHz

2.2.2.9 Receiver Spurious Emission-IC RSS-Gen § 6a

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	54%	101.5kPa

Test Setup:



Test Procedure:

The EUT should be placed on a non-metallic table 80cm above the ground plane. The receive antennas shall be moved from 1 to 4 meters. The distance between EUT and receive antenna should be 3 meters.

The accessories of the EUT are connected with the EUT such as headset etc. During the test the data transferring via USB cable between EUT and laptop is maintained.

Then start the test software ES-K1. Sweep the whole frequency band through the range from 30MHz to 1GHz, using receive log period antenna HL562.

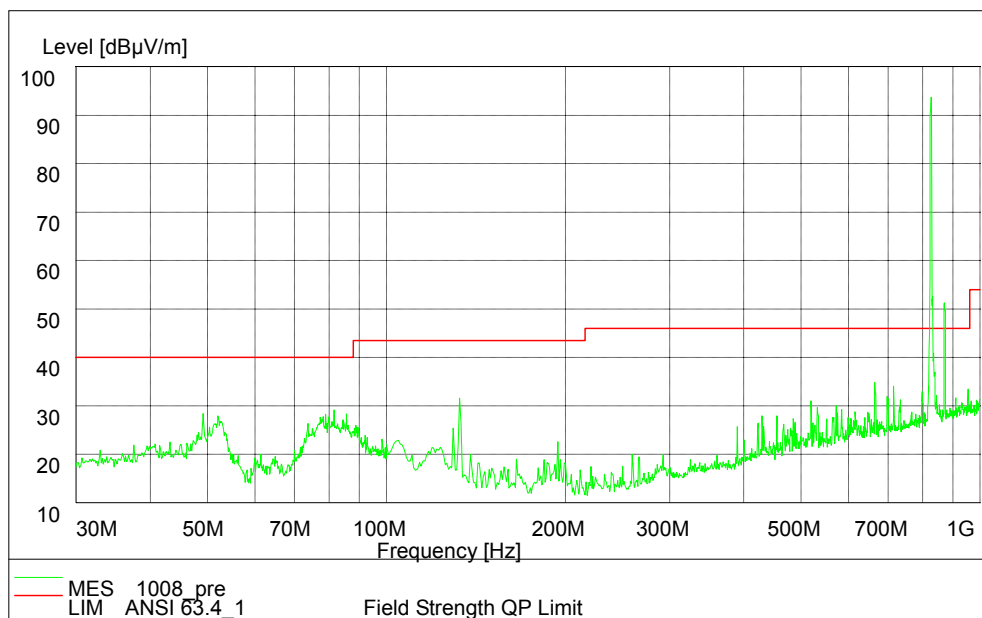
During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Limit:

Spurious Frequency (MHz)	Field Strength at 3 metres	
	Detector	Unit (microvolts/m)
30~88	Quasi-peak	100
88~216	Quasi-peak	150
216~960	Quasi-peak	200
960~1000	Quasi-peak	500
Above 1000	Average	500

Test result:



WCDMA band V

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

For measurement above 1GHz, all emissions level measured were more than 10dB below the limit.

2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	GB44050904	19 th Aug. 2011
2	8820B Radio Communication Analyzer	Anritsu	6200772659	12 th Sep. 2011
3	PSA E4440A Spectrum Analyzer	Agilent	MY41000183	19 th Aug. 2011
4	FSP 30 Spectrum Analyzer	R&S	100118	19 th Aug. 2011
5	66309B DC Power Supply	Agilent	MY43000461	19 th Aug. 2011
6	1506A Power Splitter	Weinschel	MN154	19 th Aug. 2011
7	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	19 th Aug. 2011
8	ESI 40 EMI test receiver	R&S	100015	19 th Aug. 2011
9	SMR 20 Signal generator	R&S	100086	19 th Aug. 2011
10	CMU 200 Radio tester	R&S	100313	19 th Aug. 2011
11	12.65m*8.03m*7.50m Fully-Anechoic Chamber	FRANKONIA	-----	19 th Aug. 2011
12	HL562 Ultra log test antenna	R&S	100016	19 th Aug. 2011
13	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	-----	19 th Aug. 2011
14	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	19 th Aug. 2011
15	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	19 th Aug. 2011
16	PS2000 Turn Table	FRANKONIA	-----	19 th Aug. 2011
17	MA260 Antenna Master	FRANKONIA	-----	19 th Aug. 2011
18	SH-241 Climatic Chamber	ESPEC	92000389	19 th Aug. 2011
19	ES-K1 EMI test software	R&S	-----	19 th Aug. 2011
20	HL562 Receive antenna	R&S	100167	19 th Aug. 2011

2.4. EUT Photograph

The front view of EUT (with docking card)

The rear view of EUT (with docking card)

The front view of EUT

The rear view of EUT

Appendix

Appendix1 Test Setup