



TEST REPORT

Report No.: SRMC2009-H024-E0001

Product Name: GSM/GPRS Module

Product Model: CM-G100

Applicant: Inventec Appliances (Jiangning) Corporation

Manufacturer: Inventec Appliances (Jiangning)

Corporation

Specification: FCC Part 24E, Part 2

(October 1, 2008 edition)

FCC ID: UPMJGW200001

The State Radio Monitoring Center

State Radio Spectrum Monitoring and Testing Center

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.

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
State Radio Spectrum Monitoring and Testing Center
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

1.3 Applicant's details

Company: Inventec Appliances (Jiangning) Corporation
Address: Jiangning Economic and Technological Development Zone
City: Nanjing, 211153 Jiangsu
Country or Region: P.R.China
Grantee Code: UPM
Contacted person: William Zhang
Tel: +86 25 52262313
Fax: +86 25 52218366
Email: zhang.hui-liang@inventec-inc.com

1.4 Manufacturer's details

Company: Inventec Appliances (Jiangning) Corporation
Address: Jiangning Economic and Technological Development Zone
City: Nanjing, 211153 Jiangsu
Country or Region: P.R.China
Grantee Code: UPM
Contacted person: William Zhang
Tel: +86 25 52262313
Fax: +86 25 52218366
Email: zhang.hui-liang@inventec-inc.com

1.5 Application details

Date of reception of test sample: 1st Dec 2008

Date of test: 1st Dec 2008 to 17th June 2009

1.6 Reference specification

FCC Part 24E, Part 2 (October 1, 2008 edition)

1.7 Information of EUT

1.7.1 General information

Name of EUT	GSM/GPRS Module
FCC ID	UPMJGW200001
Frequency range	PCS1900: Tx:1850~1910MHz Rx:1930~1990MHz
Rated output power	30.0dBm
E.I.R.P.	27.5dBm
Modulation type	GMSK
Emission Designator	300KGXW
Duplex mode	FDD
Duplex spacing	80MHz
Antenna type	Integral
Power Supply	USB docking card
Rated Power Supply Voltage	3.8V
Extreme Temperature	Lowest: -30°C Highest: +50°C
Extreme Voltage	Minimum: 3.6V Maximum: 4.2V
HW Version	2A
SW Version	1.00

1.7.2 EUT details

Name	Model	IMEI
GSM/GPRS Module	CM-G100	35980002000000

1.7.3 Auxiliary equipment details

Equipment	USB docking card
Manufacturer	Inventec Appliances (Jiangning) Corporation
Model Number	---

Equipment	Notebook
Manufacturer	IBM
Model Number	T23


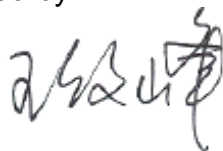
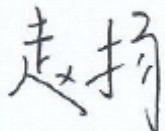
2. Test information:

2.1 Summary of the test results:

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Isotropic Radiated Power	24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Spurious Emissions at antenna terminals	2.1051/24.238(a)	Pass
5	Band Edges Compliance	2.1051/24.238(a)	Pass
6	Frequency Stability	2.1055/24.235	Pass
7	Radiated Spurious Emissions	2.1053/24.238(a)	Pass

*Note: The device CM-G100 (FCC ID: UPMJGW200001) is designed as module to be installed in other devices. This device is to be used only for fixed and mobile applications. If the final product after integration is intended for portable use, a new application and FCC is required.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This Test Report Is Issued by: Mr. Song Qizhu, Director of the test lab 	Checked by: 
Tested by: 	Issued date: 17th June 2009

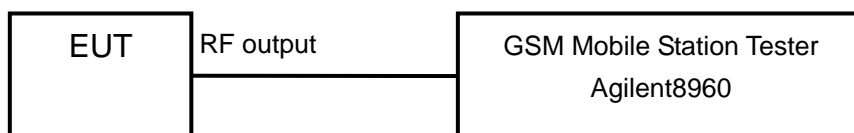
2.2 Test result

2.2.1 RF Power Output-FCC Part2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
22°C	55%	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 No512, No661 and No810 (Bottom, middle and top channels of PCS1900 band)

Limits	---
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Test result:

GSM MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	28.7
1880.0	661	29.0
1909.8	810	29.7

GPRS MODE:

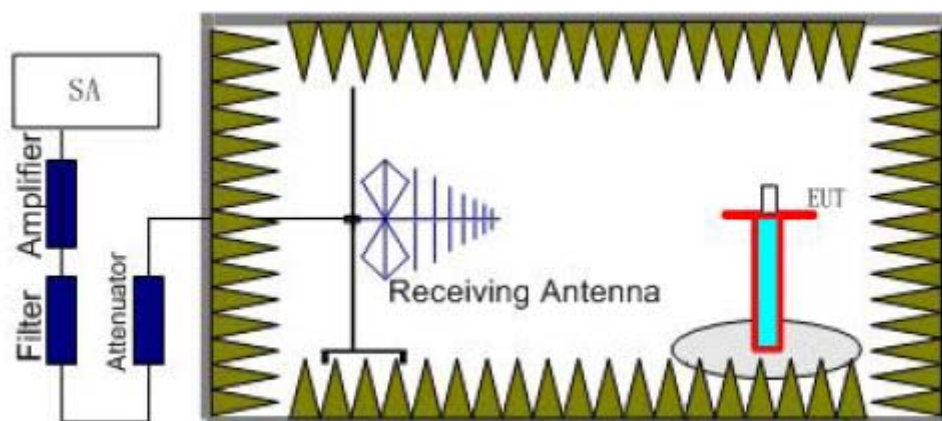
Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	28.5
1880.0	661	28.6
1909.8	810	28.8

2.2.2 Effective Isotropic Radiated Power-FCC Part24.232(c)

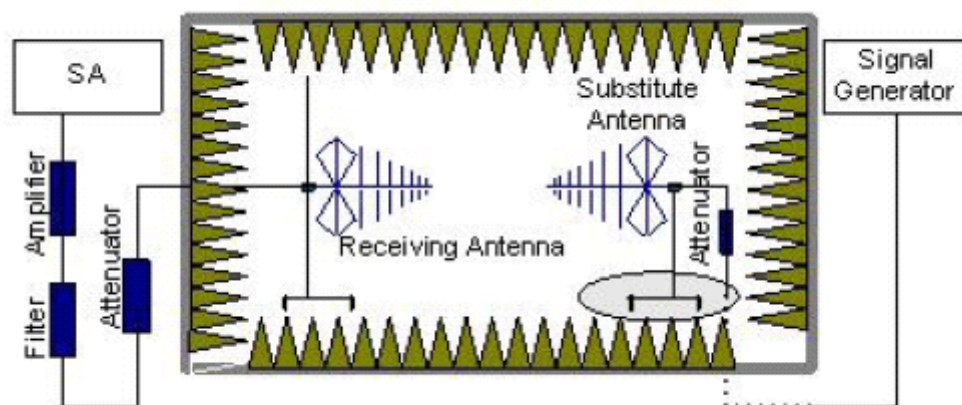
Ambient condition:

Temperature	Relative humidity	Pressure
22°C	55%	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 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 RMS detector is used and RBW is set to 3MHz. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver.

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.

The measurement will be conducted at three channels No512, No661 and No810 (Bottom, middle and top channels of PCS1900 band)

Limits	≤ 33dBm
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Test result:

GSM MODE:

Carrier frequency (MHz)	Channel No.	E.I.R.P. (dBm)
1850.2	512	27.4
1880.0	661	27.5
1909.8	810	27.4

GPRS MODE:

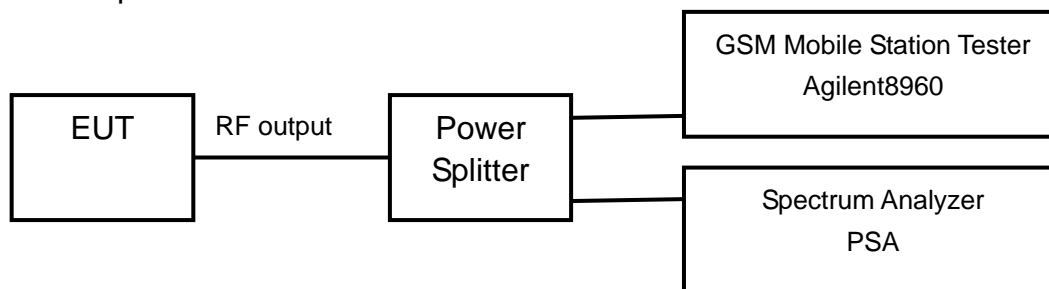
Carrier frequency (MHz)	Channel No.	E.I.R.P. (dBm)
1850.2	512	27.0
1880.0	661	26.9
1909.8	810	26.7

2.2.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
22°C	55%	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 3kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer. The measurement will be conducted at three channels No512, No661 and No810 (Bottom, middle and top channels of PCS1900 band)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

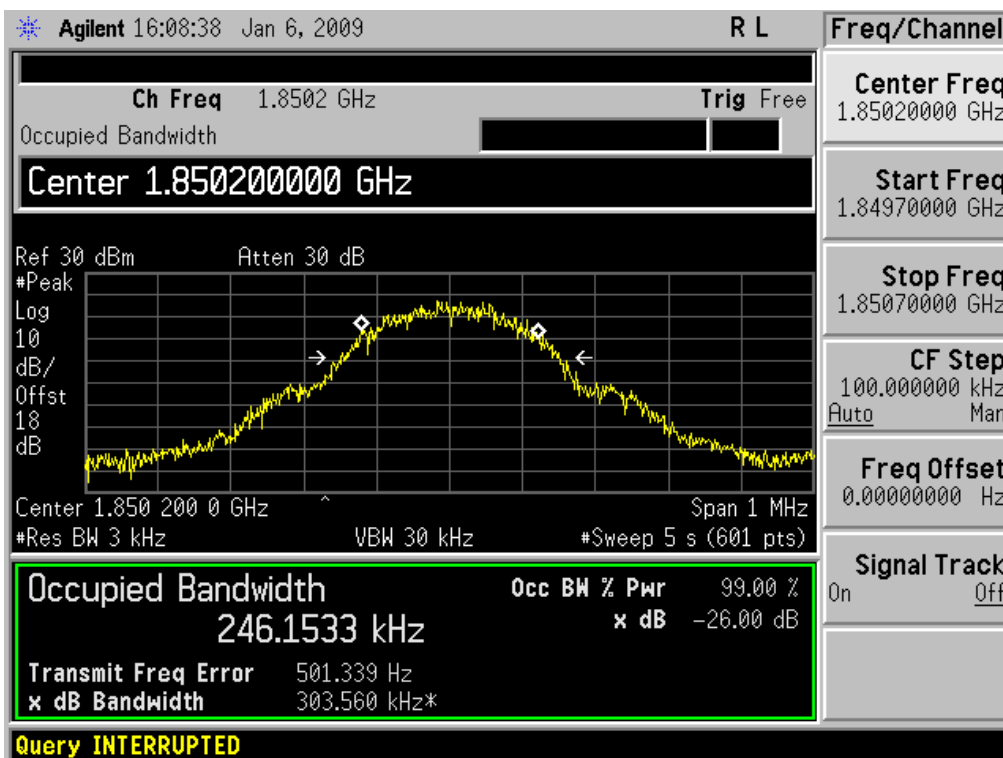
GSM MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	246.2
1880.0	661	244.5
1909.8	810	245.3

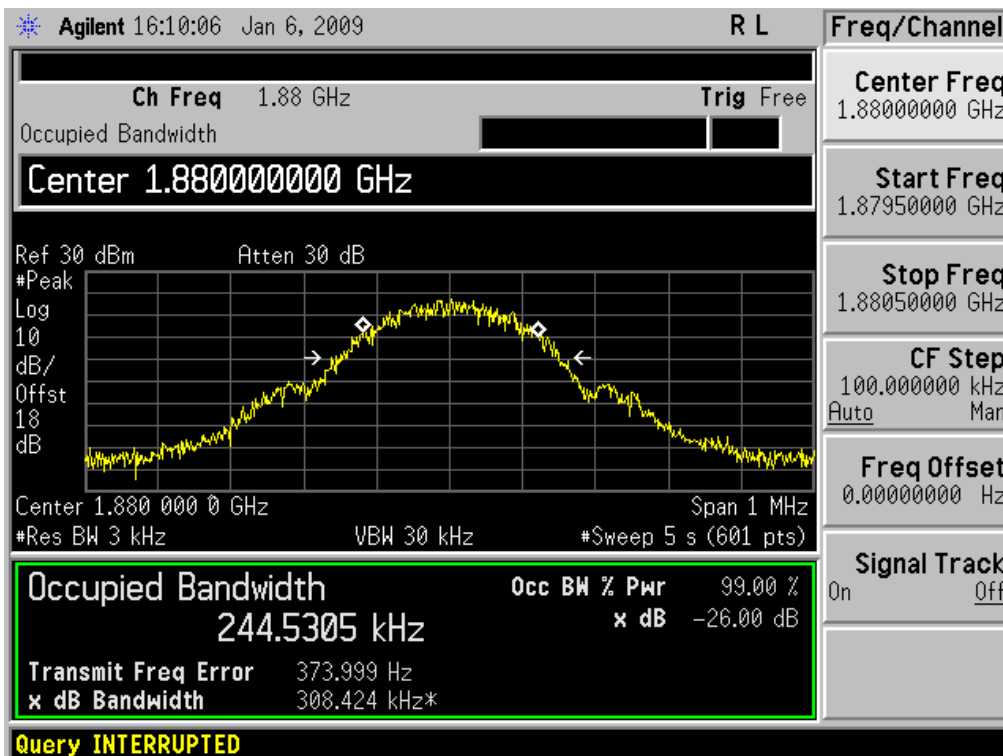
GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	245.8
1880.0	661	245.4
1909.8	810	242.2

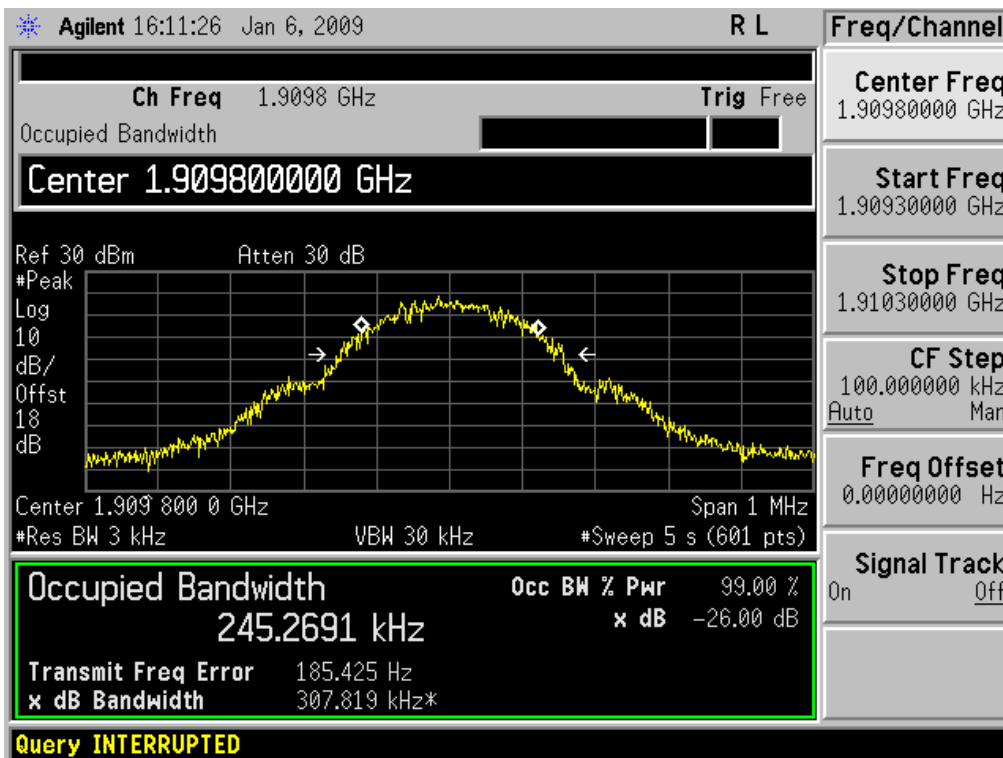
GSM MODE:



Channel 512

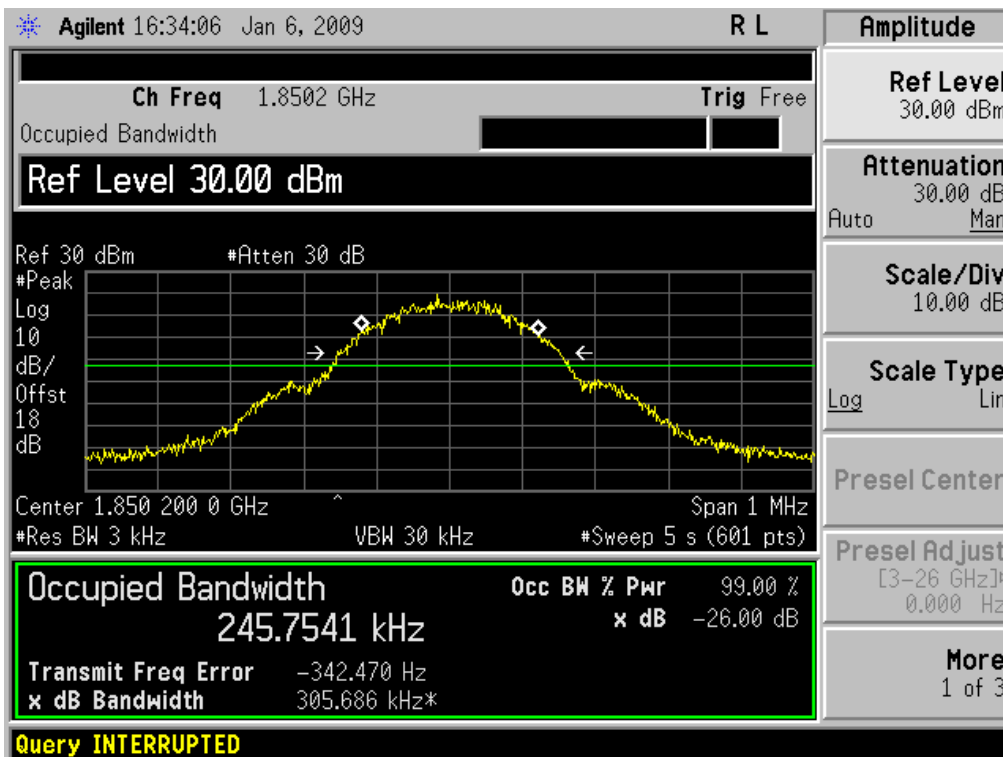


Channel 661

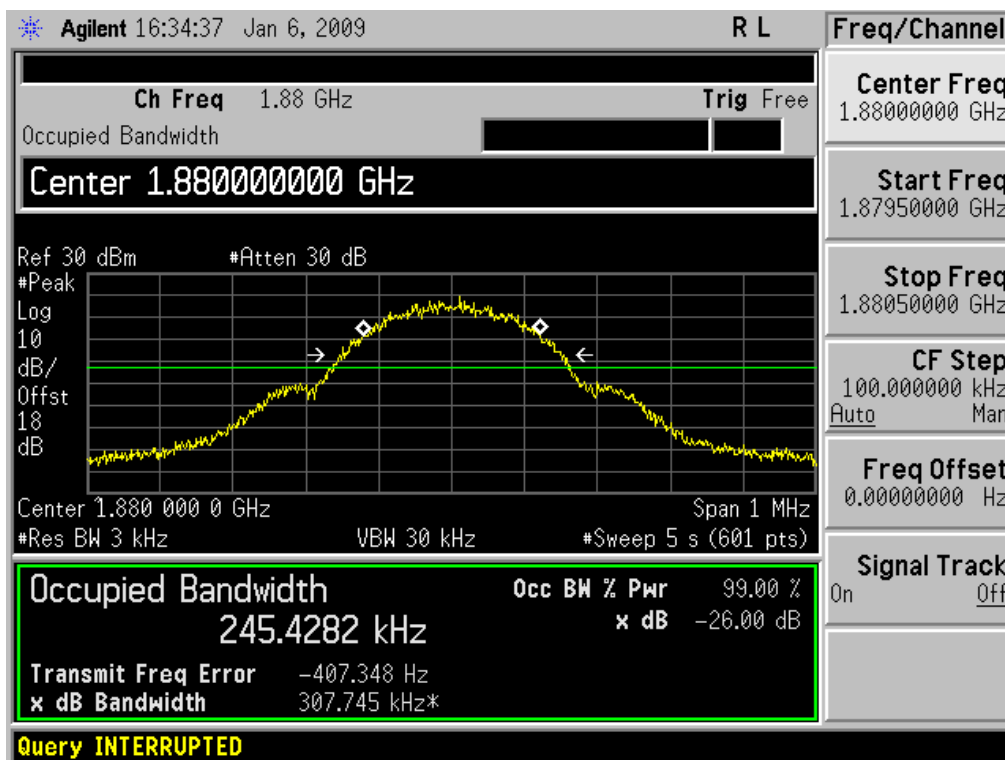


Channel 810

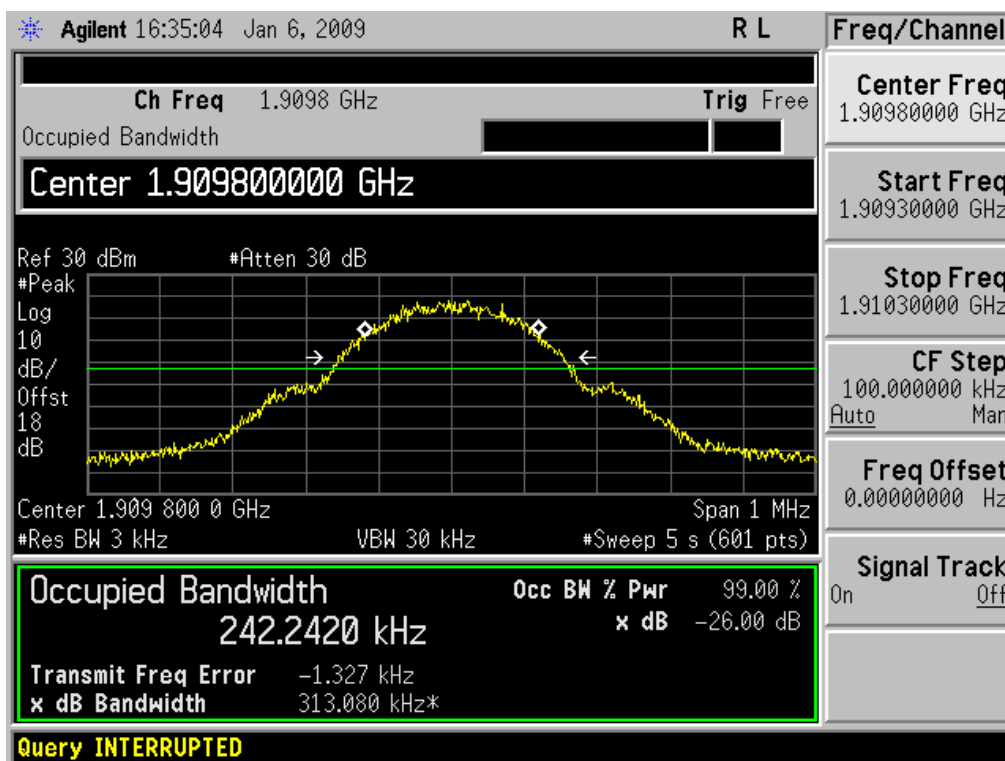
GPRS MODE:



Channel 512



Channel 661



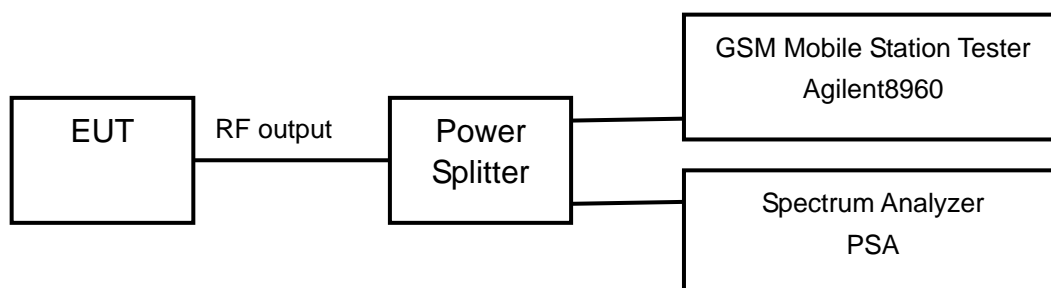
Channel 810

2.2.4 Spurious Emissions at antenna terminal-FCC Part2.1051/24.238 (a)

Ambient condition:

Temperature	Relative humidity	Pressure
22°C	55%	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.

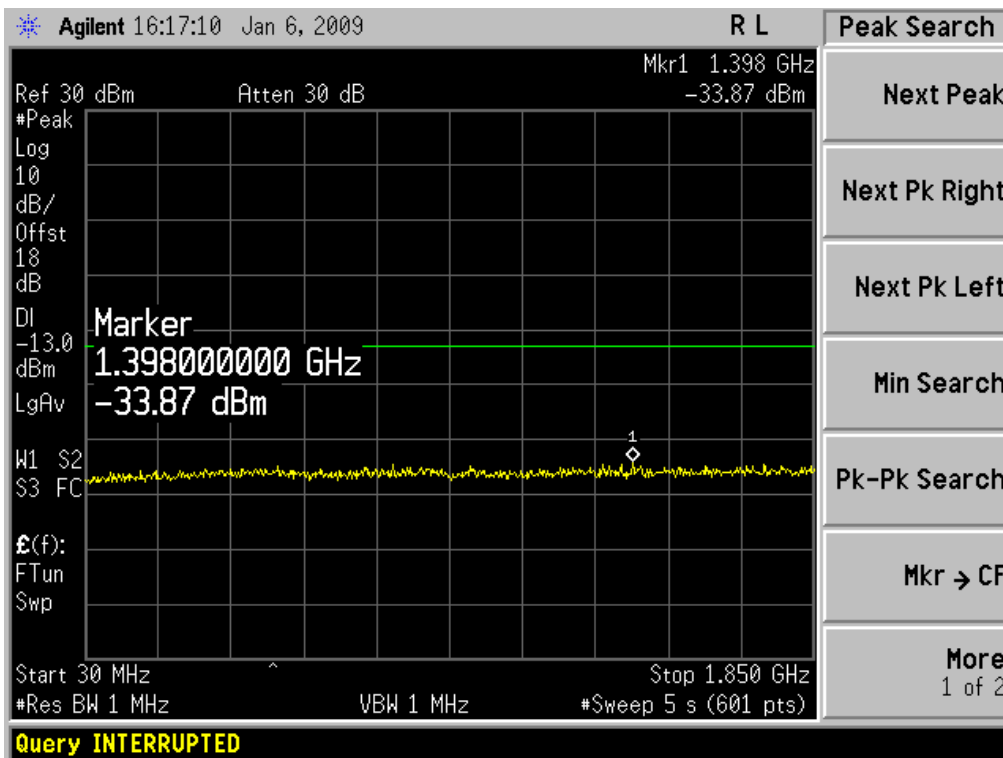
The measurement will be conducted at one channel No661 (middle channel of PCS1900 band)

Limits	≤ -13dBm
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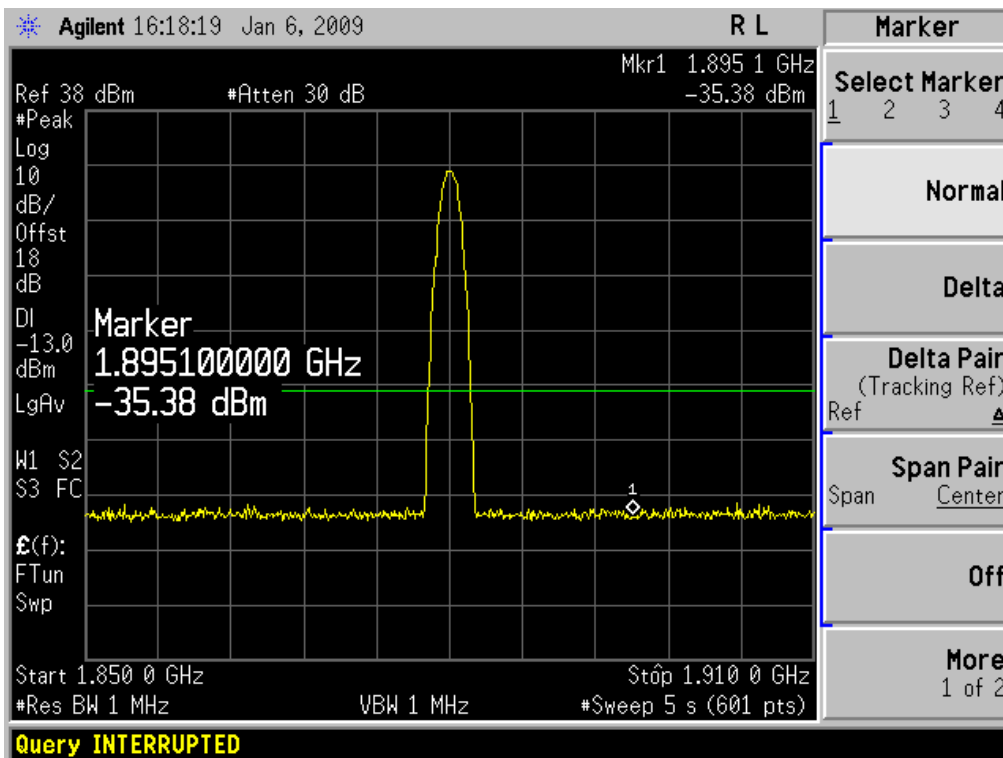
Test result:

Refer to the following figures.

GSM MODE:

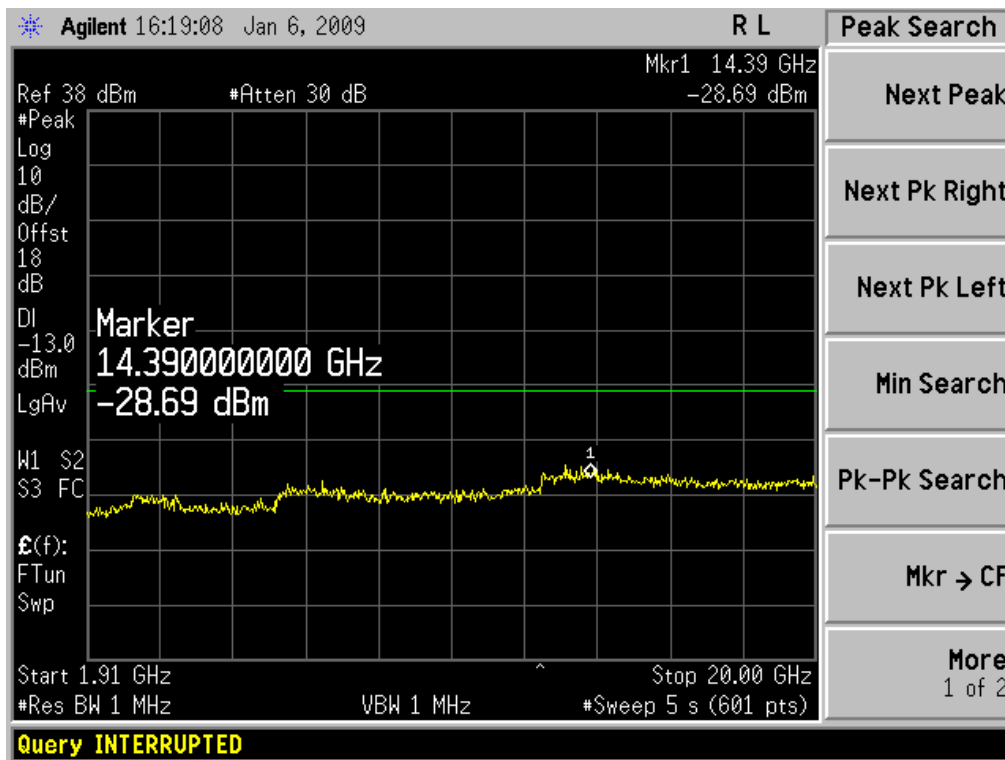


Channel 661, 30MHz~1850MHz



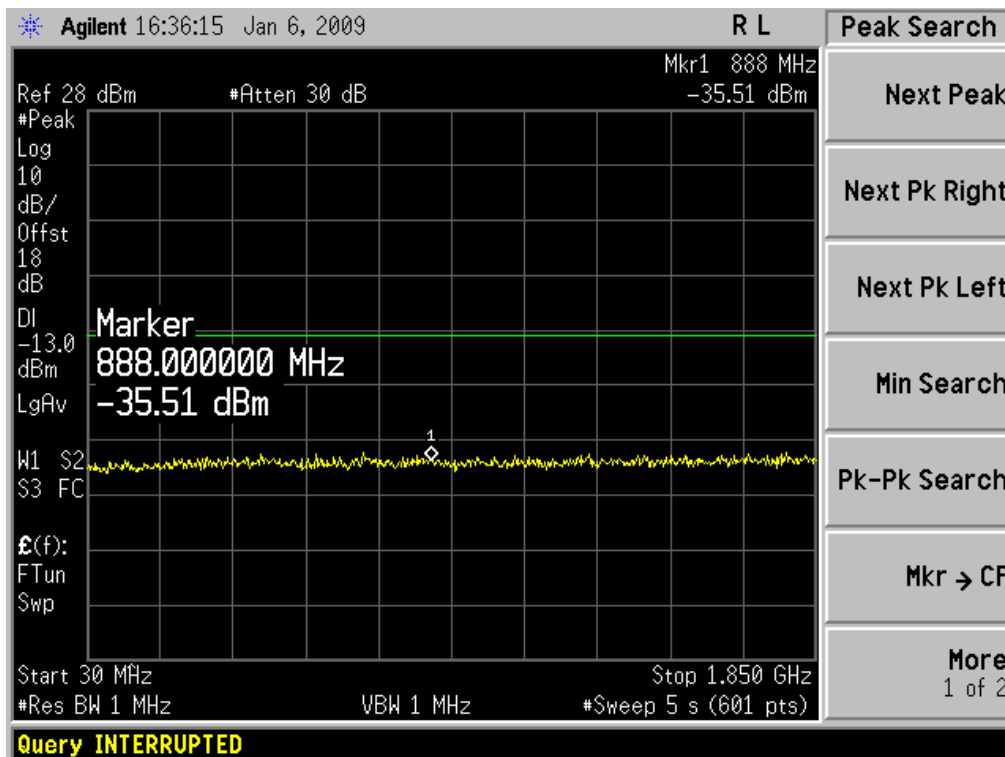
Channel 661, 1850MHz~1910MHz

Note: The signal beyond the limit is carrier.

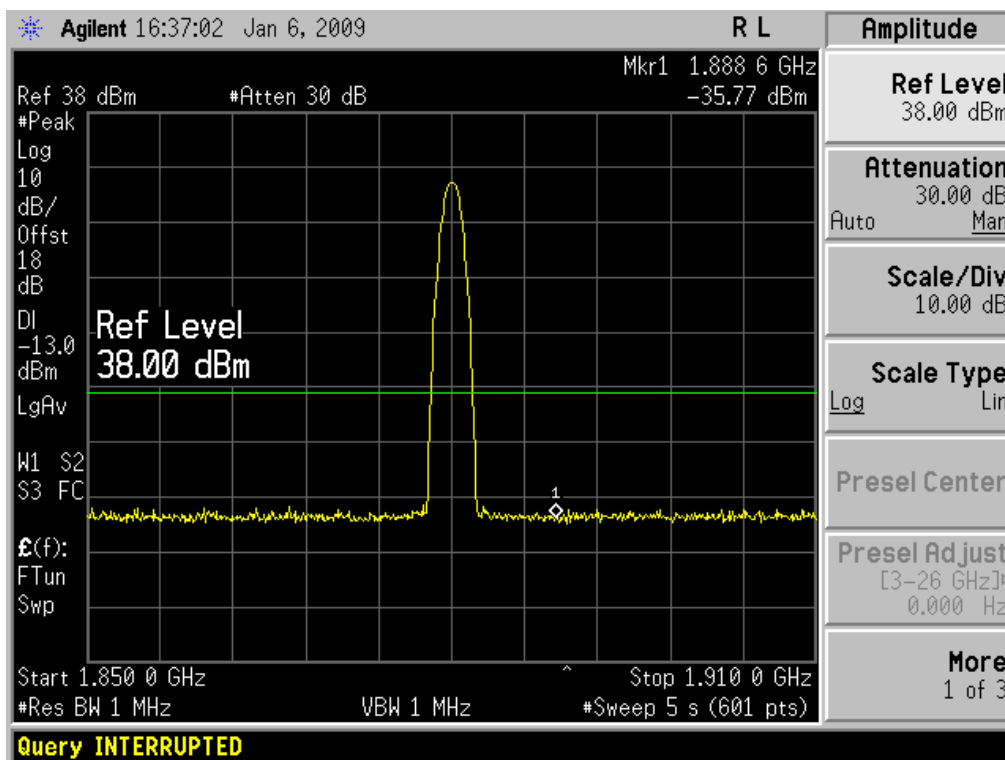


Channel 661, 1910MHz~20GHz

GPRS MODE:

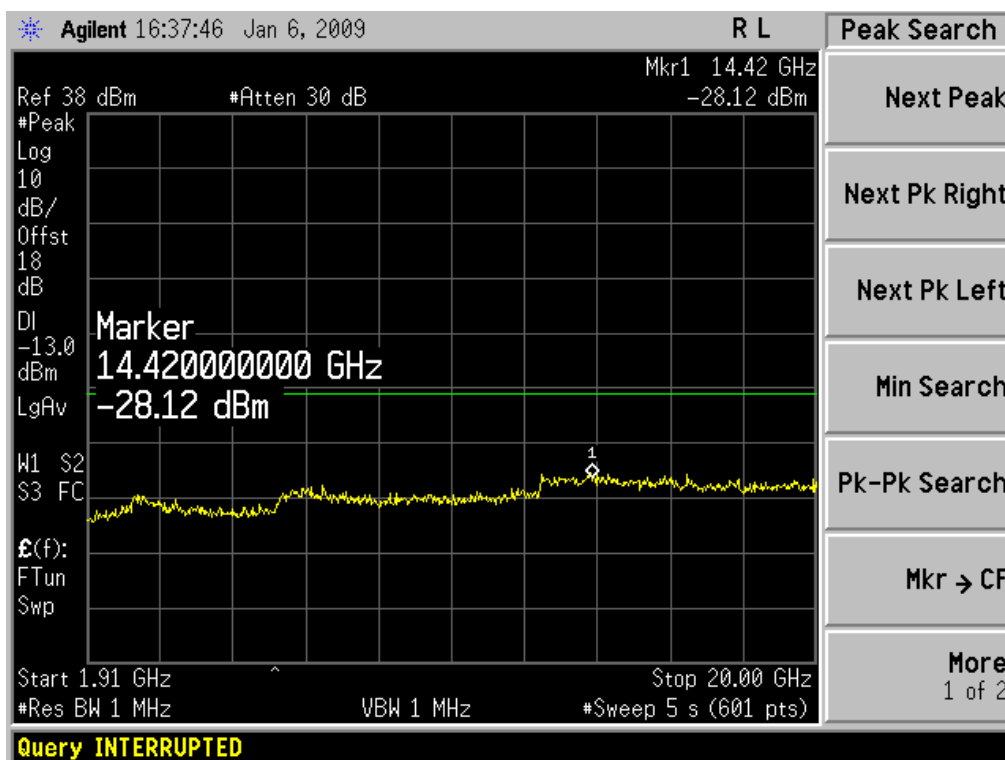


Channel 661, 30MHz~1850MHz



Channel 661, 1850MHz~1910MHz

Note: The signal beyond the limit is carrier.



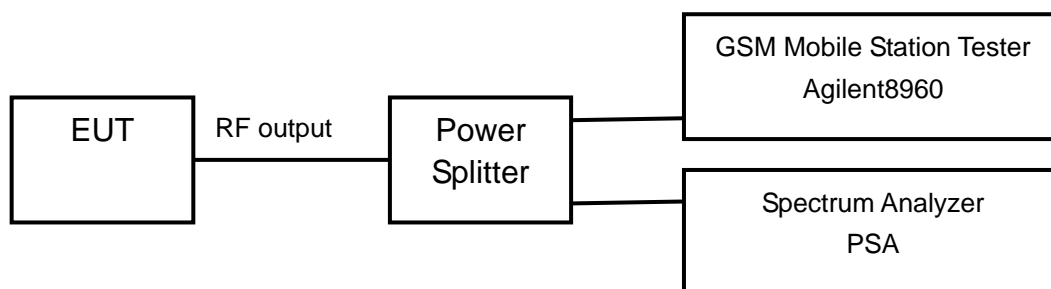
Channel 661, 1910MHz~20GHz

2.2.5 Band Edges Compliance-FCC Part2.1051/24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
22°C	55%	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 3KHz on spectrum analyzer.

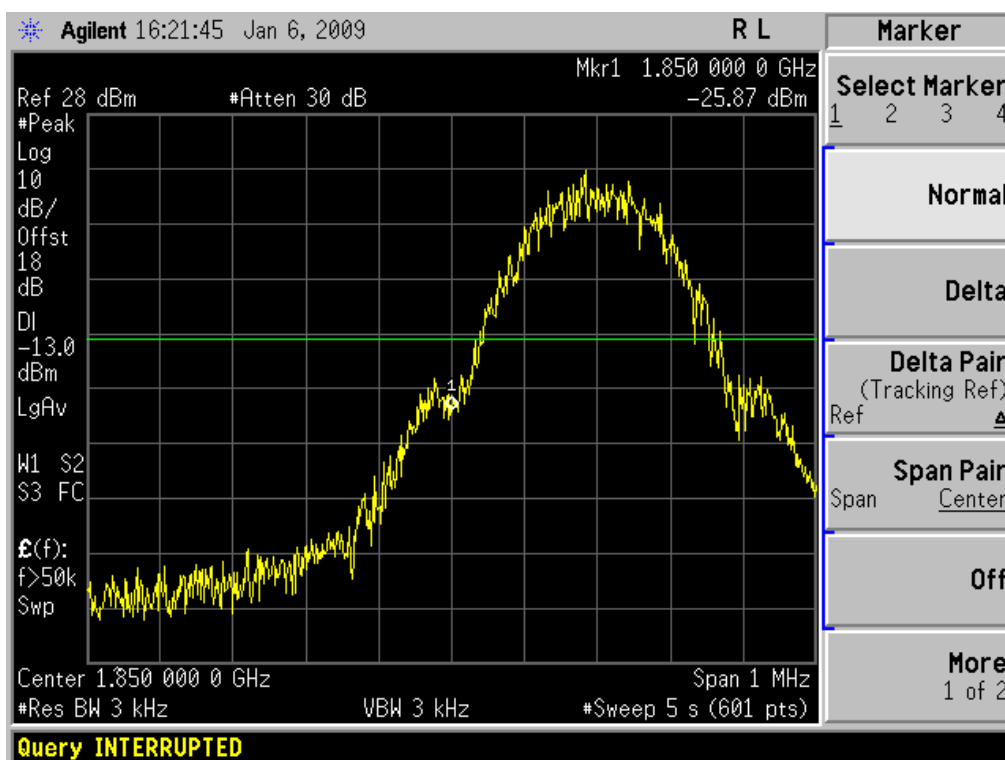
The measurement will be conducted at two channels No512 and No810 (Bottom and top channels of PCS1900 band)

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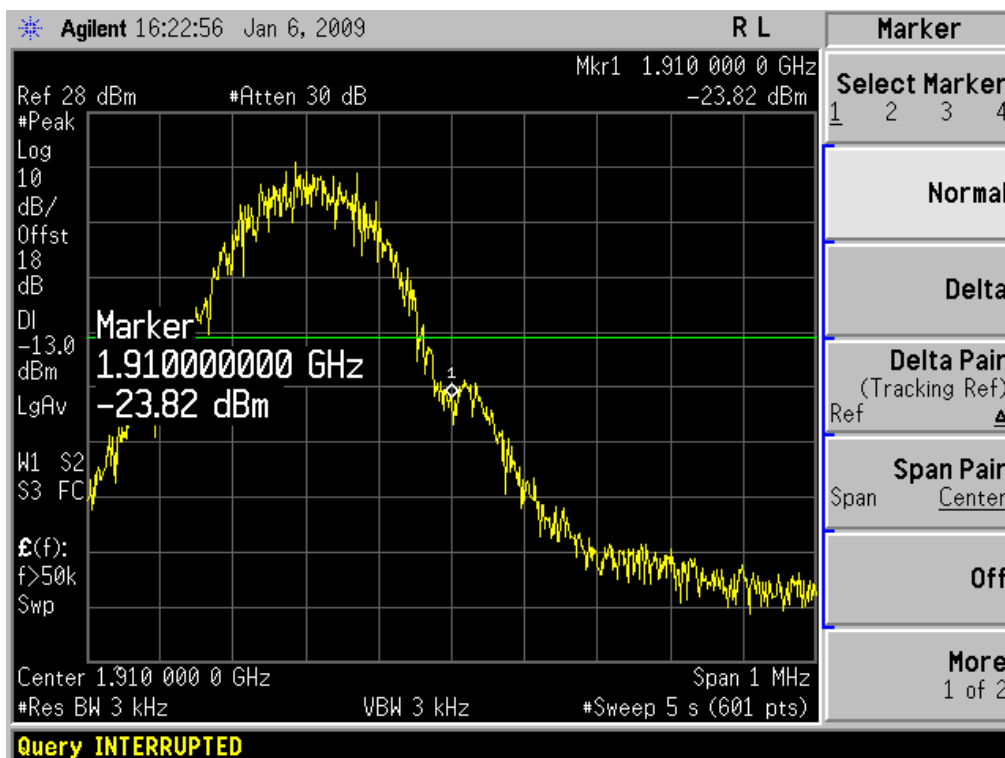
Test result:

Refer to the following figures.

GSM MODE:

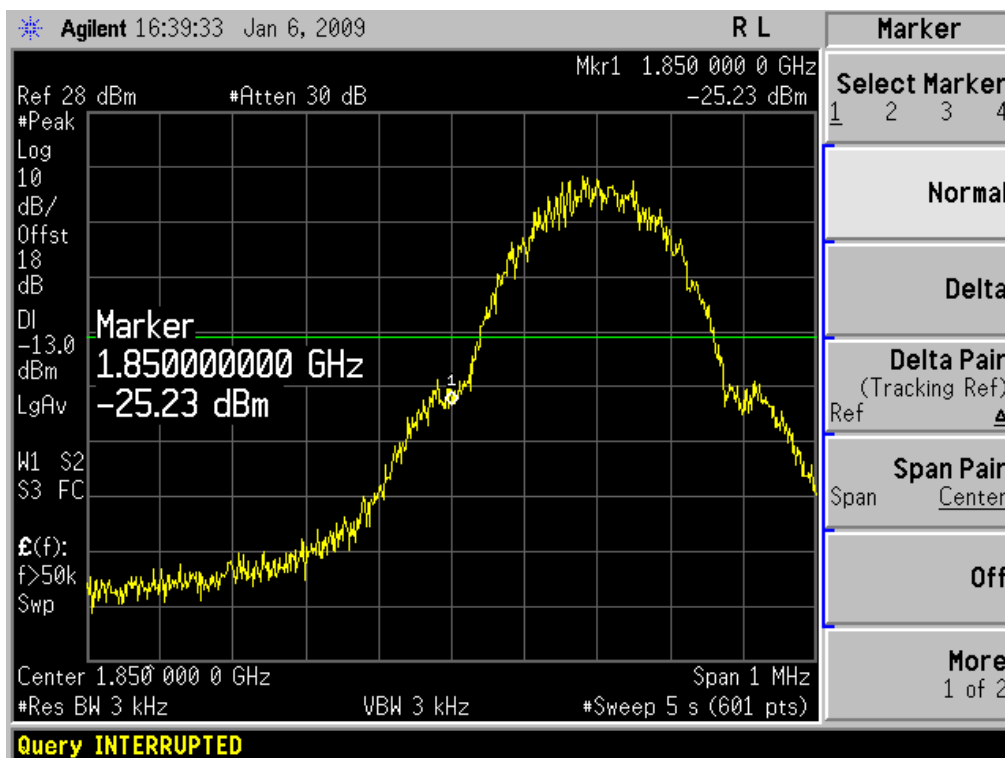


Channel 512

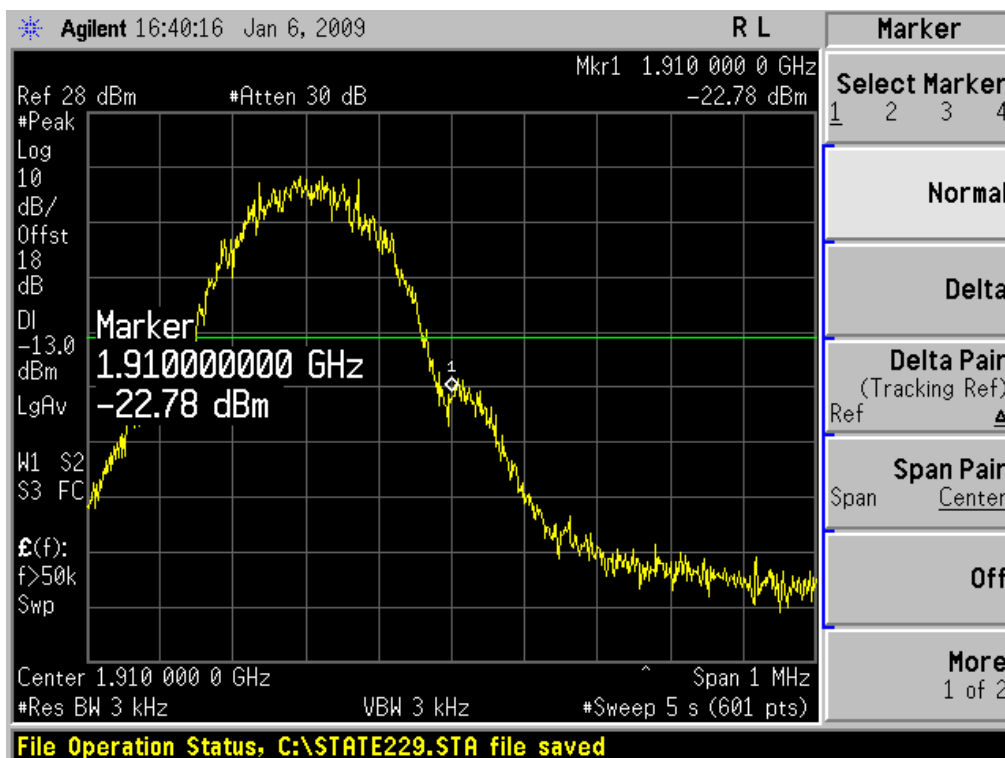


Channel 810

GPRS MODE:



Channel 512



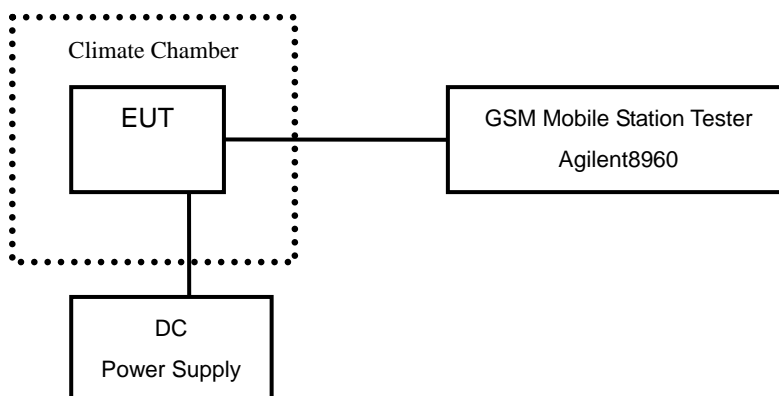
Channel 810

2.2.6 Frequency Stability-FCC Part2.1055/Part24.235

Ambient condition:

Temperature	Relative humidity	Pressure
22°C	55%	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 3.6 to 4.2 V.

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

Test Result:

GSM MODE:

Temperature(° C)	Test Result (ppm)@3.8V		
	Channel 512	Channel 661	Channel 810
-30	0.003	0.004	0.006
-20	0.001	0.005	0.008
-10	0.010	0.016	0.017
0	0.008	0.007	0.009
+10	0.009	0.008	0.005
+20	0.009	0.005	0.007
+30	0.012	0.010	0.009
+40	0.010	0.011	0.012
+50	0.005	0.012	0.002

Voltage (V)	Test Result (ppm)@20° C		
	Channel 512	Channel 661	Channel 810
3.6	0.005	0.002	0.004
4.2	0.006	0.005	0.010

GPRS MODE:

Temperature(° C)	Test Result (ppm)@3.8V		
	Channel 512	Channel 661	Channel 810
-30	0.003	0.006	0.010
-20	0.005	0.009	0.007
-10	0.012	0.010	0.006
0	0.010	0.007	0.006
+10	0.005	0.003	0.004
+20	0.004	0.002	0.024
+30	0.002	0.004	0.010
+40	0.008	0.007	0.004
+50	0.054	0.051	0.073

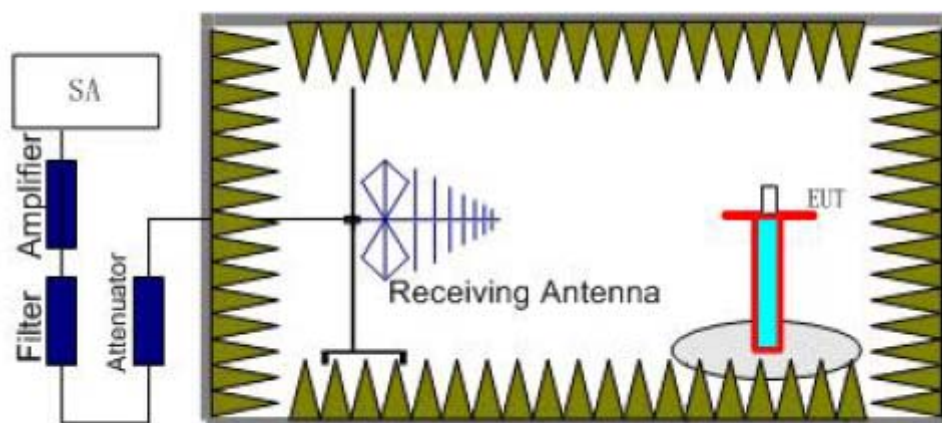
Voltage (V)	Test Result (ppm)@20° C		
	Channel 512	Channel 661	Channel 810
3.6	0.000	0.011	0.021
4.2	0.032	0.046	0.050

2.2.7 Radiated Spurious Emissions-FCC Part2.1053/24.238(a)

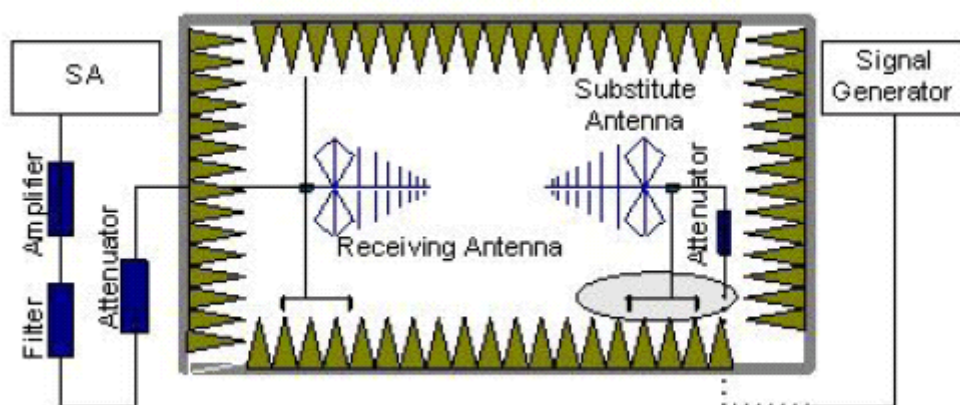
Ambient condition

Temperature	Relative humidity	Pressure
22°C	55%	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 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

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.

$$P=P_R+L_C+L_A-G=-60+10+30-11=-31dBm$$

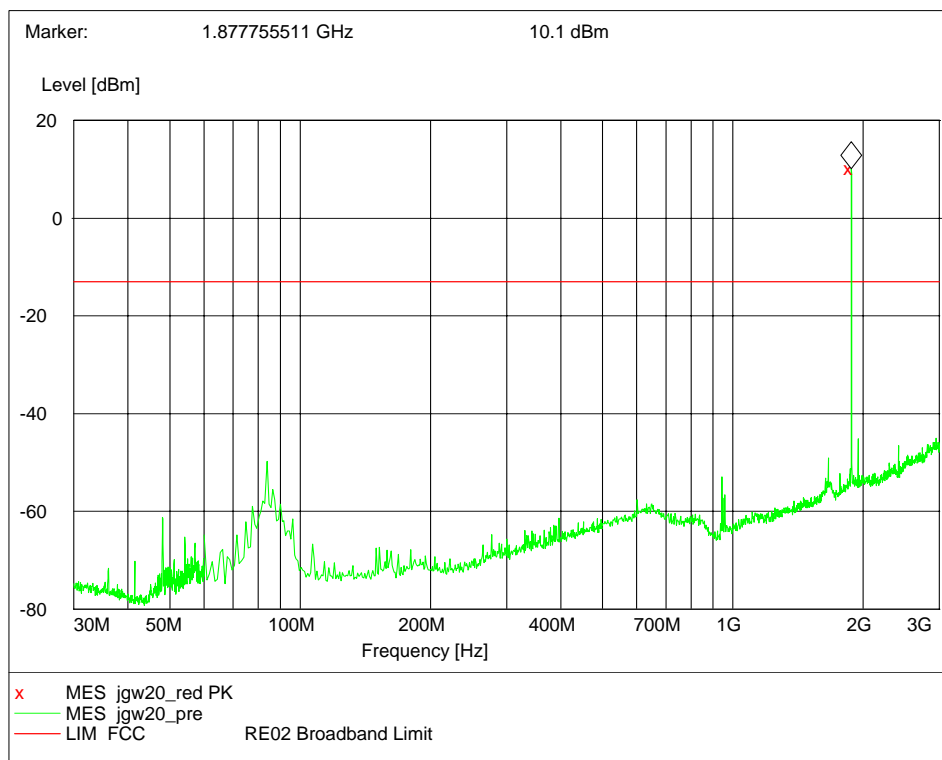
The measurement will be conducted at one channel No661 (middle channels of PCS1900 band)

Limits	≤ -13dBm
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Test result:

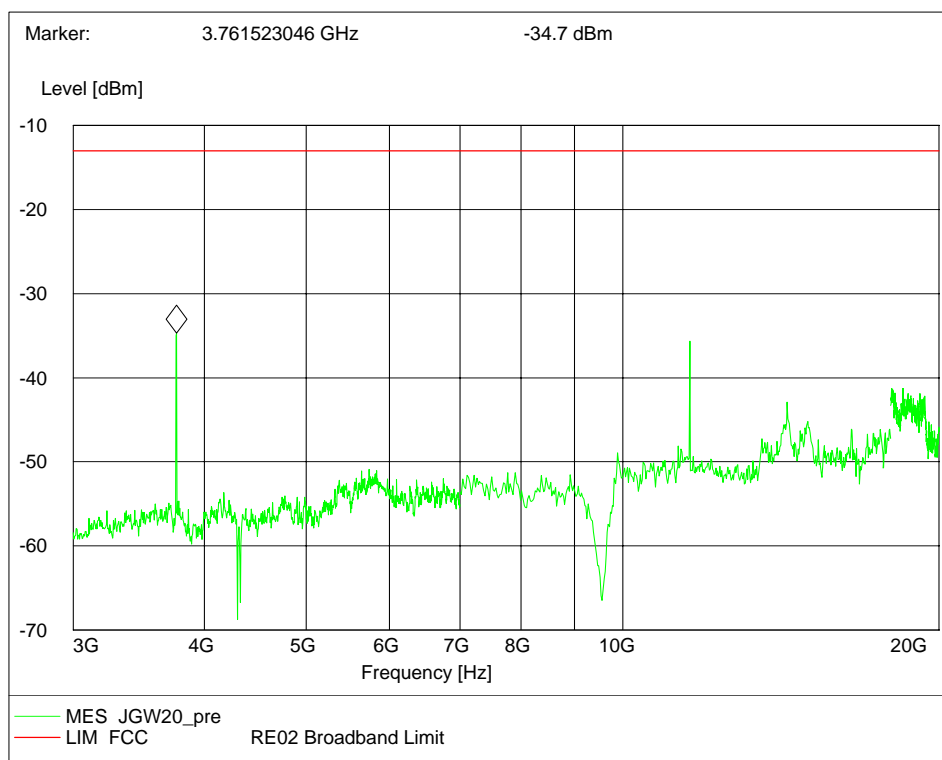
Refer to the following figures.

GSM MODE:



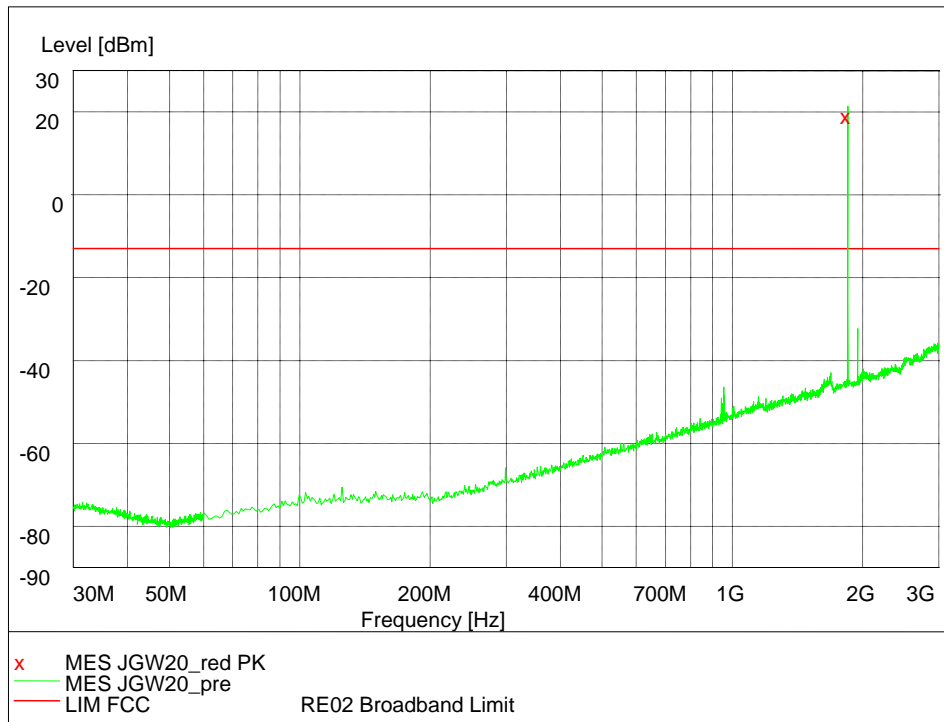
Channel 661, 30MHz~3GHz (Traffic Mode)

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



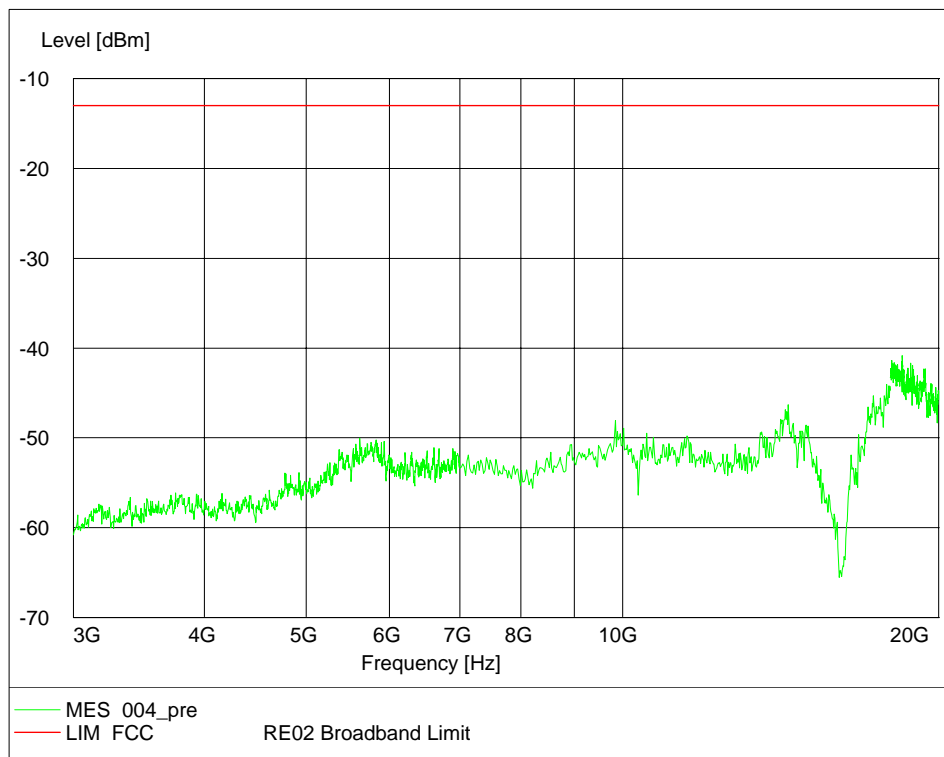
Channel 661, 3GHz~20GHz (Traffic Mode)

GPRS MODE:



Channel 661, 30MHz~3GHz (Traffic Mode)

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



Channel 661, 3GHz~20GHz (Traffic Mode)

2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Date
1	E5515C(8960) Mobile Station Tester	Agilent	GB44050904	19 th Aug. 2008
2	PSA E4440A Spectrum Analyzer	Agilent	MY41000183	19 th Aug. 2008
3	66309B DC Power Supply	Agilent	MY43000461	19 th Aug. 2008
4	1506A Power Splitter	Weinschel	MN154	19 th Aug. 2008
5	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	19 th Aug. 2008
6	ESI 40 EMI test receiver	R&S	100015	19 th Aug. 2008
7	SMR 20 Signal generator	R&S	100086	19 th Aug. 2008
8	CMU 200 Radio tester	R&S	100313	19 th Aug. 2008
9	12.65m*8.03m*7.50m Fully-Anechoic Chamber	FRANKONIA	-----	19 th Aug. 2008
10	HL562 Ultra log test antenna	R&S	100016	19 th Aug. 2008
11	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	-----	19 th Aug. 2008
12	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	19 th Aug. 2008
13	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	19 th Aug. 2008
14	PS2000 Turn Table	FRANKONIA	-----	19 th Aug. 2008
15	MA260 Antenna Master	FRANKONIA	-----	19 th Aug. 2008
16	SH-241 Climatic Chamber	ESPEC	92000389	19 th Aug. 2008
17	ES-K1 EMI test software	R&S	-----	19 th Aug. 2008
18	HL562 Receive antenna	R&S	100167	19 th Aug. 2008

Appendix

Appendix1 Test Setup