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# TEST REPORT

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Report No.: SRMC2008-H024-E0049

Product Name: CDMA 1X Digital Mobile Phone

Product Model: RM-430

Applicant: Nokia Inc.

Manufacturer: BYD Company Limited

Specification: FCC Part24E, Part 2

FCC ID: QMNRN-430

The State Radio Monitoring Center, Equipment Testing Division

The 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, Equipment Testing Division  
The 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: Nokia Inc.  
Address: 12278 Scripps Summit Drive 92131  
City: San Diego, CA  
Country or Region: USA  
Grantee Code: QMN  
Contacted person: Mary Washington  
Tel: +1 858 831 5000  
Fax: +1 858 831 6500  
Email: mary.washington@Nokia.com

### 1.4 Manufacturer's details

Company: BYD Company Limited  
Address: No.1 Yan an Road, Kuichong, Longgang, 518119  
City: Shenzhen  
Country or Region: P. R. China  
Contacted person: Konger Kong  
Tel: +86-021-61009669-2102  
Fax: +86-021-61009668  
Email: konger.kong@byd.com

## 1.5 Application details

Date of reception of test sample: 12<sup>th</sup> June 2008  
Date of test: 12<sup>th</sup> June 2008 to 20<sup>th</sup> June 2008

## 1.6 Reference specification

FCC Part24E, Part 2

## 1.7 Information of EUT

### 1.7.1 General information

Name of EUT	CDMA 1X Digital Mobile Phone
FCC ID	QMNRN-430
Frequency range	Tx:1850~1910MHz Rx:1930~1990MHz
Rated RF output power	24.0dBm
E.I.R.P.	24.54dBm
Modulation type	OQPSK
Emission Designator	1M25F9W
Duplex mode	FDD
Duplex spacing:	80MHz
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: 3.1V Maximum: 4.2V
HW Version	3100
SW Version	DN_2003B_N1900_BET

### 1.7.2 EUT details

Name	Model	Serial number
CDMA 1X Digital Mobile Phone	RM-430	MEID 268435456102527027

### 1.7.3 Auxiliary equipment details

Equipment	Charger
Manufacturer	Nokia Inc.
Model Number	AC-6U

Equipment	Battery
Manufacturer	Nokia Inc.
Model Number	BL-4C
Capacity	860 mAh
Rated Voltage	3.7V

Equipment	Headset
Manufacturer	Nokia Inc.
Model Number	HS-9

## 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,	2.1049/24.238(a)	Pass
4	Spurious Emissions at antenna terminal	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

This Test Report Is Issued by: Mr. Kan Runtian, Director of the test lab 	Checked by: 
Tested by: 	Issued date: 2 <sup>nd</sup> July 2008

### Test report revision:

Revision	Report No.	Issue Date
0	SRMC2008-H024-E0026	19 <sup>th</sup> June 2008
1	SRMC2008-H024-E0033	20 <sup>th</sup> June 2008
2	SRMC2008-H024-E0041	23 <sup>th</sup> June 2008
3	SRMC2008-H024-E0046	25 <sup>th</sup> June 2008
4	SRMC2008-H024-E0049	2 <sup>nd</sup> July 2008

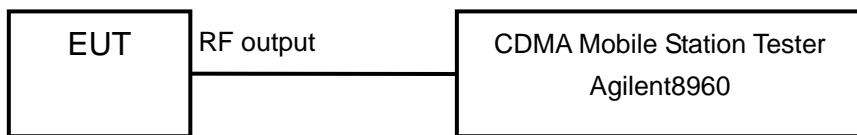
## 2.2 Test result

### 2.2.1 RF Power Output –FCC Part2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

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 No25, No600 and No1175 (Bottom, middle and top channels of CDMA 1X band)

Limits	$\leq 30\text{dBm}$

Test result:

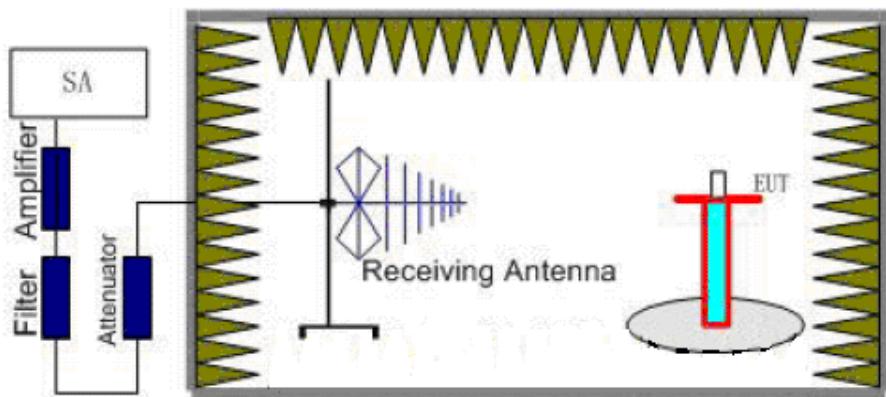
Carrier frequency (MHz)	Channel No.	Test Mode	RF Power Output (dBm)
1851.25	25	RC1/SO2	24.0
		RC1/SO55	24.0
		RC3/SO2	24.1
		<b>RC3/SO55</b>	<b>24.3</b>
1880.00	600	RC1/SO2	23.9
		RC1/SO55	24.0
		RC3/SO2	24.1
		<b>RC3/SO55</b>	<b>24.4</b>
1908.75	1175	RC1/SO2	23.9
		RC1/SO55	23.9
		RC3/SO2	24.1
		<b>RC3/SO55</b>	<b>24.2</b>

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

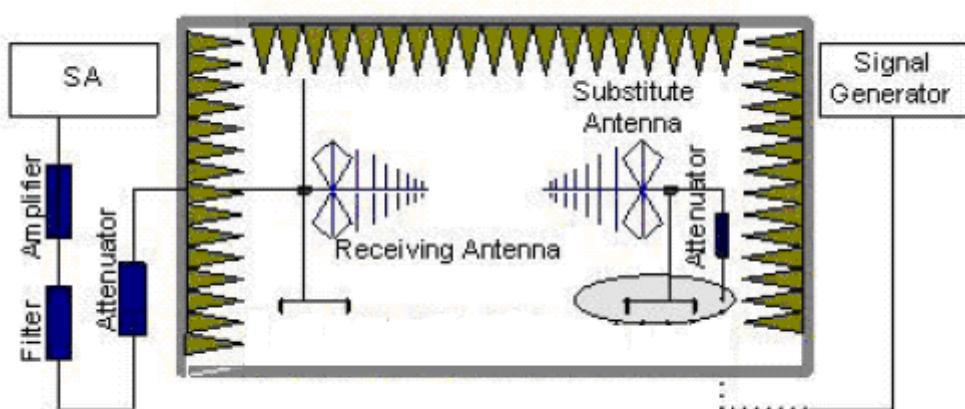
Ambient condition:

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

Test setup



Step 1



Step 2

Test procedure:

The measurement was done according to TIA/EIA 603C.

Step 1:

The measurement is carried out in the semi-anechoic chamber. EUT was placed on a 0.8 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. 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 while RBW and VBW are both set to 3MHz. During the measurement, the highest emission was recorded from analyzer power level(LVL) from the 360 degrees rotation of the turntable and the test antenna moved up and down over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.

Step 2:

A double-ridged waveguide horn antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a known power S.G. applied through a Tx cable. Then the maximum Analyzer reading is recorded while the antenna was moving up and down. The E.R.P. / E.I.R.P. 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 correction factor (in dB)=S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, E.I.R.P. = LVL + Correction factor.

The measurement will be conducted at three channels No25, No600 and No1175 (Bottom, middle and top channels of CDMA 1X band) in RC3/SO55 test mode.

Limits	$\leq 33\text{dBm}$
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Test result:

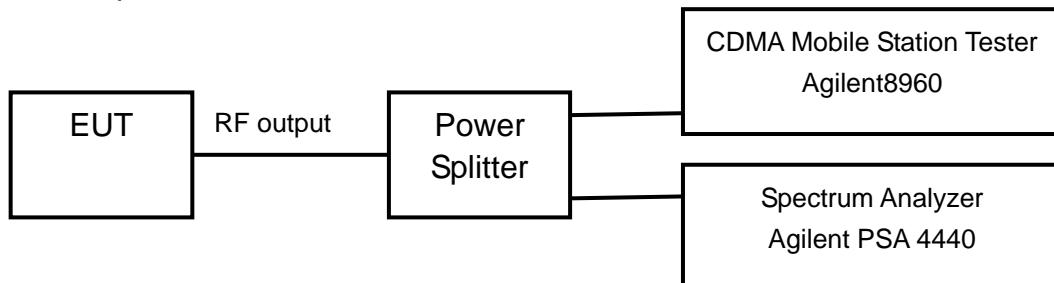
Channel No.	Frequency (MHz)	LVL (EUT)	S.G.	Gain (dBm)	Cable Loss	LVL (dBm)	Correction Factor (dBm)	EIRP (dBm)	EIRP (W)
25	1851.25	-24.53	0	9.30	1	-40.66	48.96	24.43	0.28
600	1880	-24.43	0	9.30	1	-40.67	48.97	24.54	0.28
1175	1908.75	-23.25	0	9.30	1	-39.30	47.60	24.35	0.27

### 2.2.3 Occupied Bandwidth-FCC Part2.1049/24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

Test Setup:



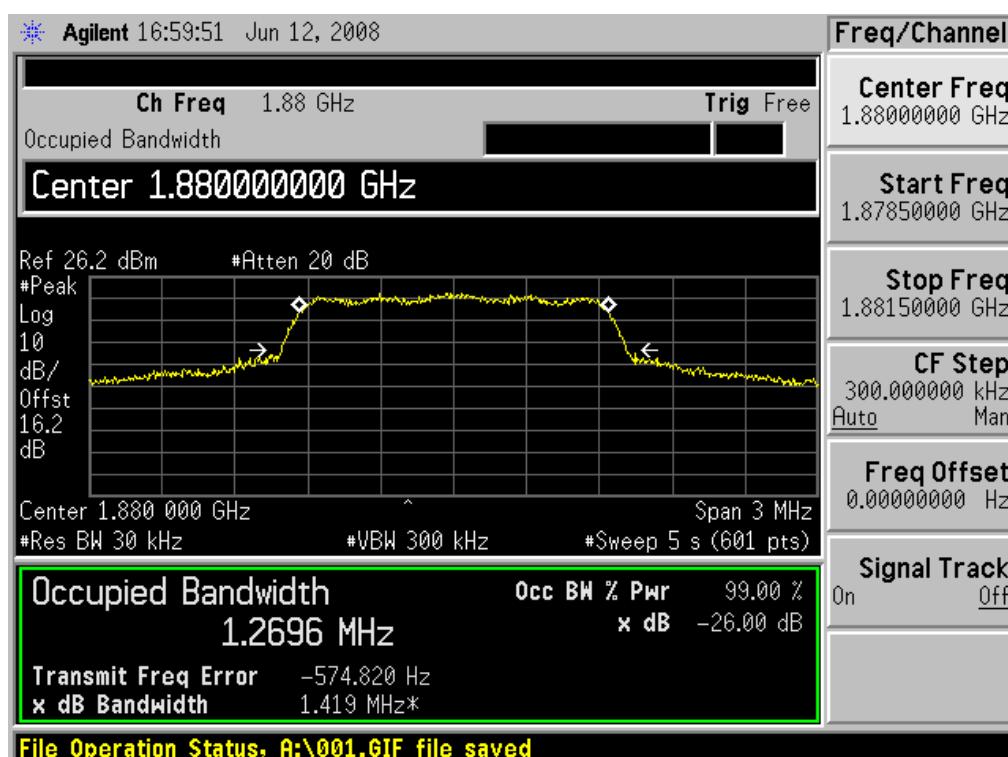
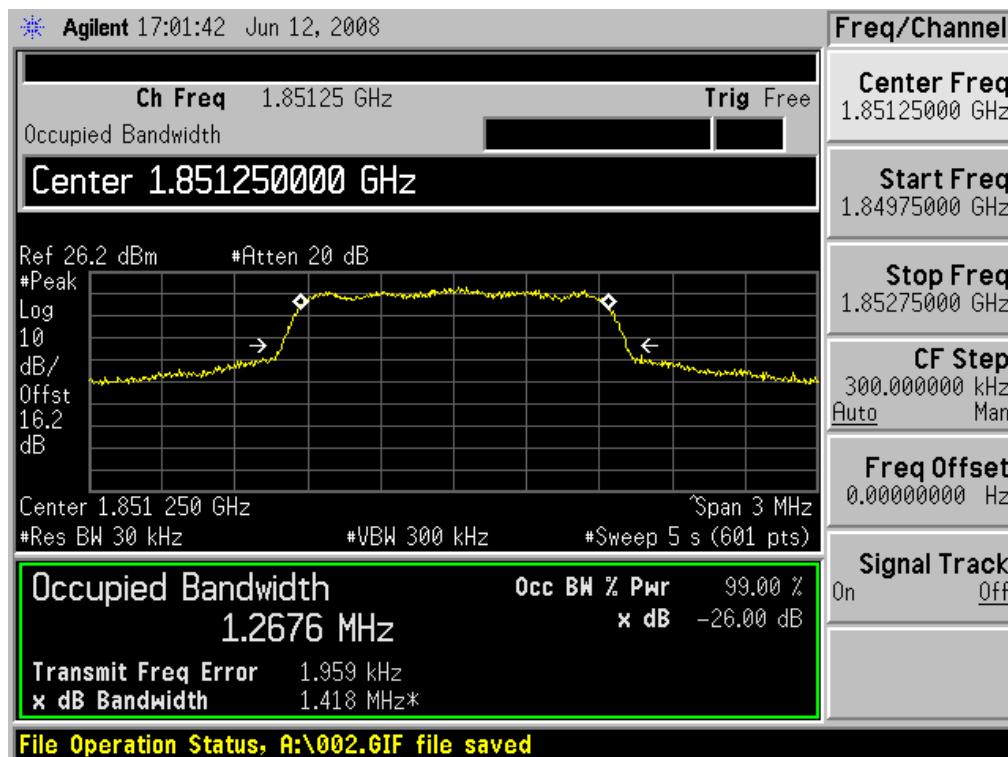
Test procedure:

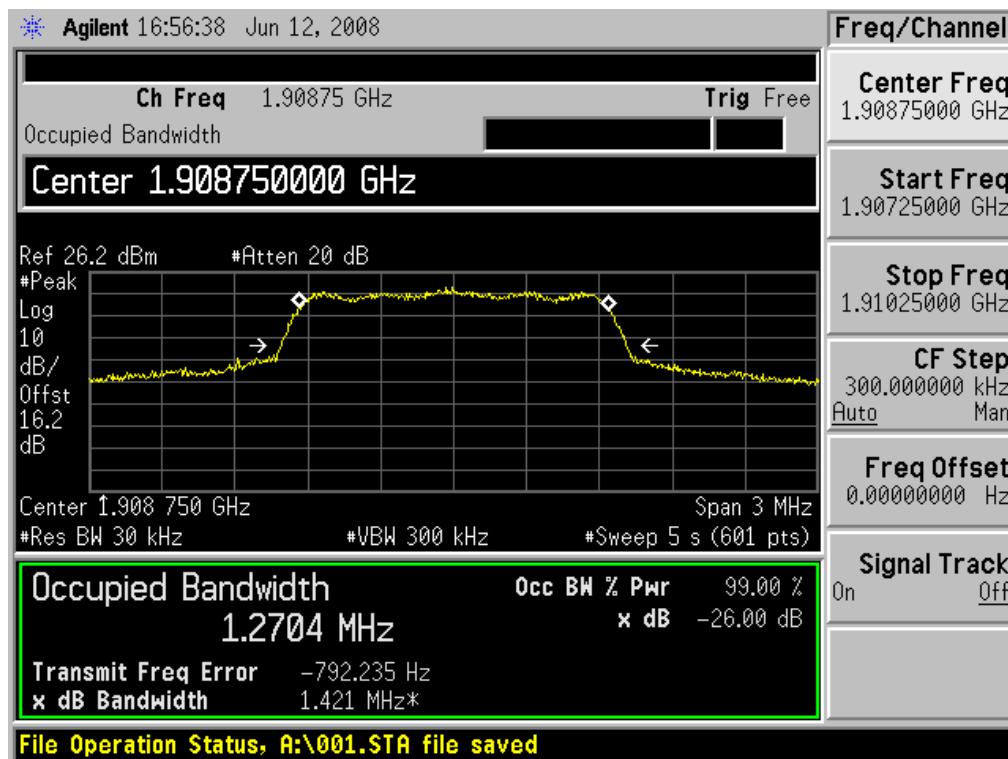
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer. The measurement will be conducted at three channels No25, No600 and No1175 (Bottom, middle and top channels of CDMA 1X band) in RC3/SO55 test mode.

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

Carrier frequency (MHz)	Channel No.	Test Mode	Bandwidth of 99% Power (MHz)
1851.25	25	RC3/SO55	1.2676
1880.00	600	RC3/SO55	1.2696
1908.75	1175	RC3/SO55	1.2704





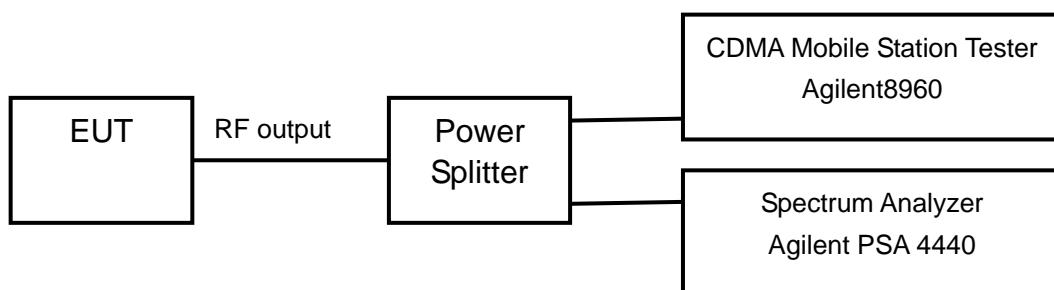
Channel 1175

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

Ambient condition:

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

Test Setup:



Test procedure:

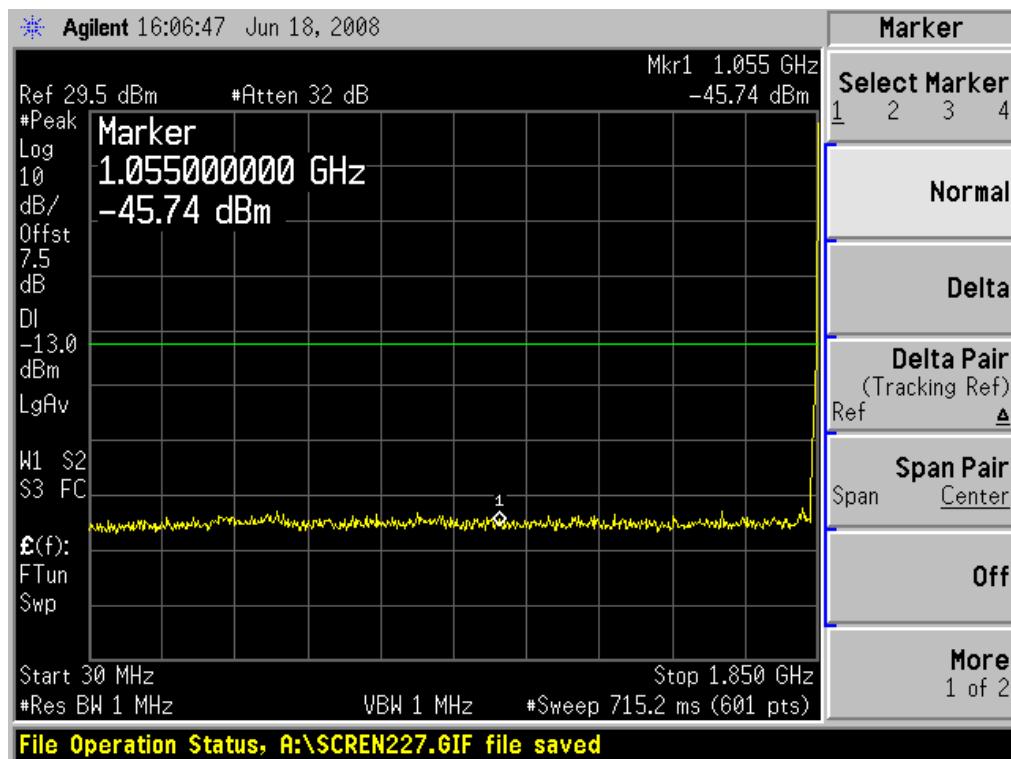
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (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 three channels No25, No600 and No1175 (Bottom, middle and top channels of CDMA 1X band) in RC3/SO55 test mode.

Limits	≤-13dBm
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Test result:

Refer to the following figures.

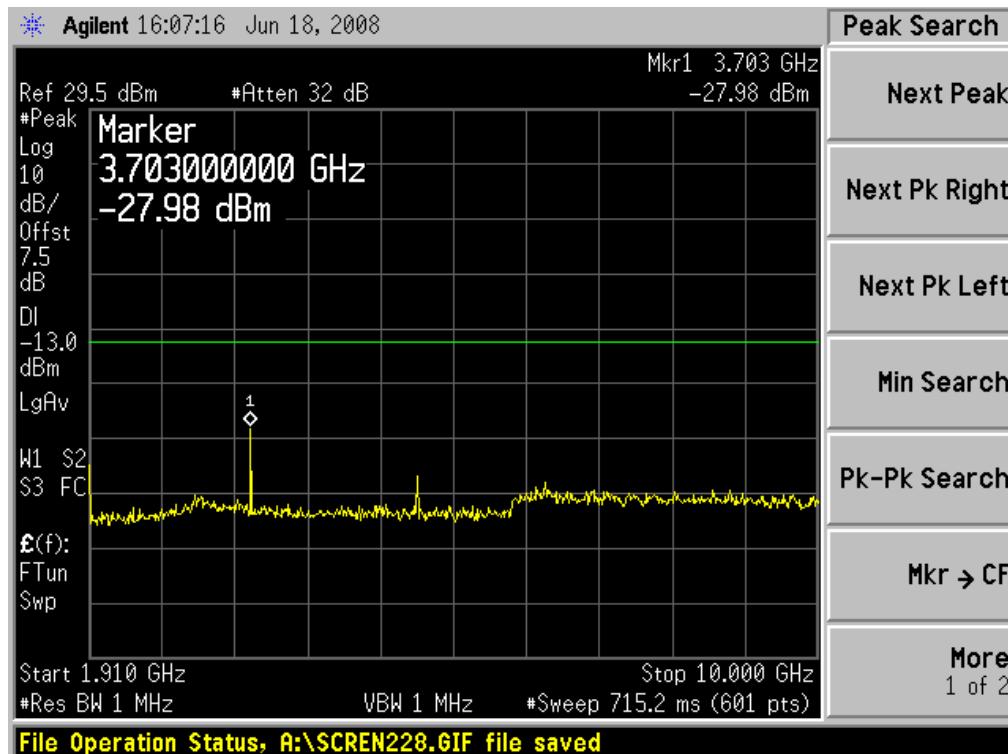


Channel 25, 30MHz~1850MHz

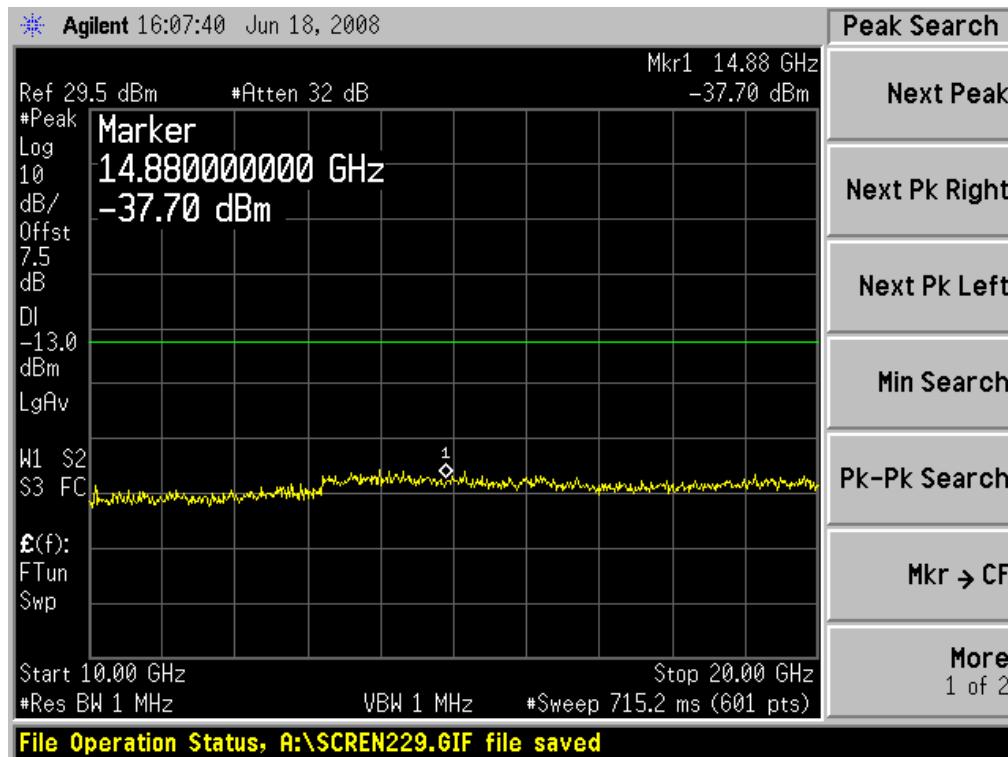


Channel 25, 1850MHz~1910MHz

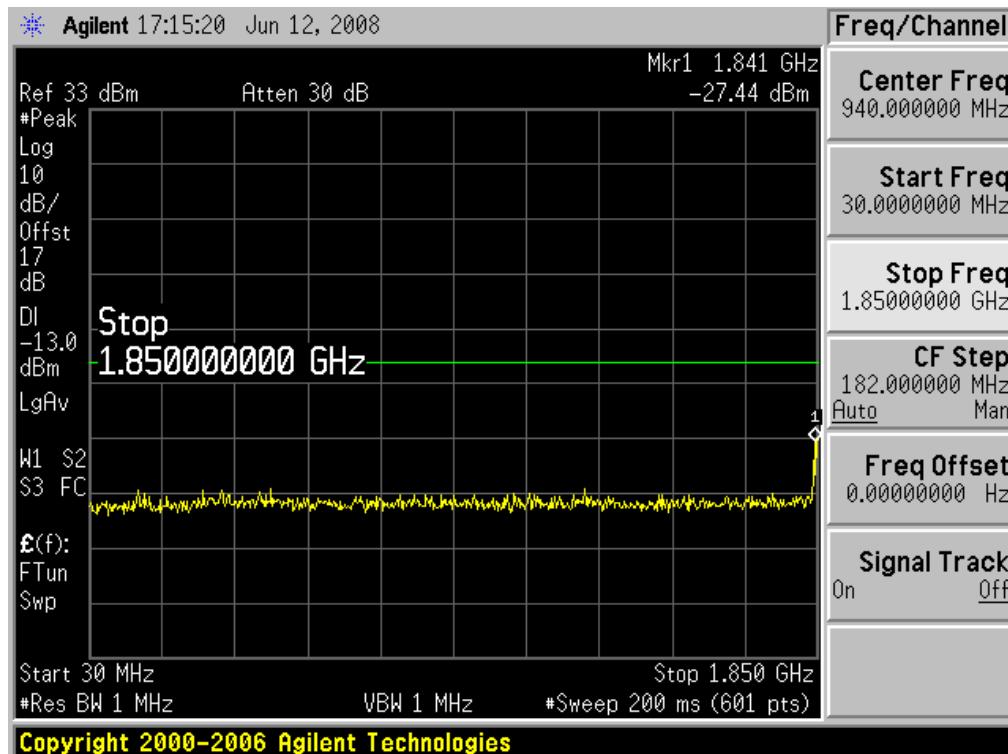
Note: The signal beyond the limit is carrier.



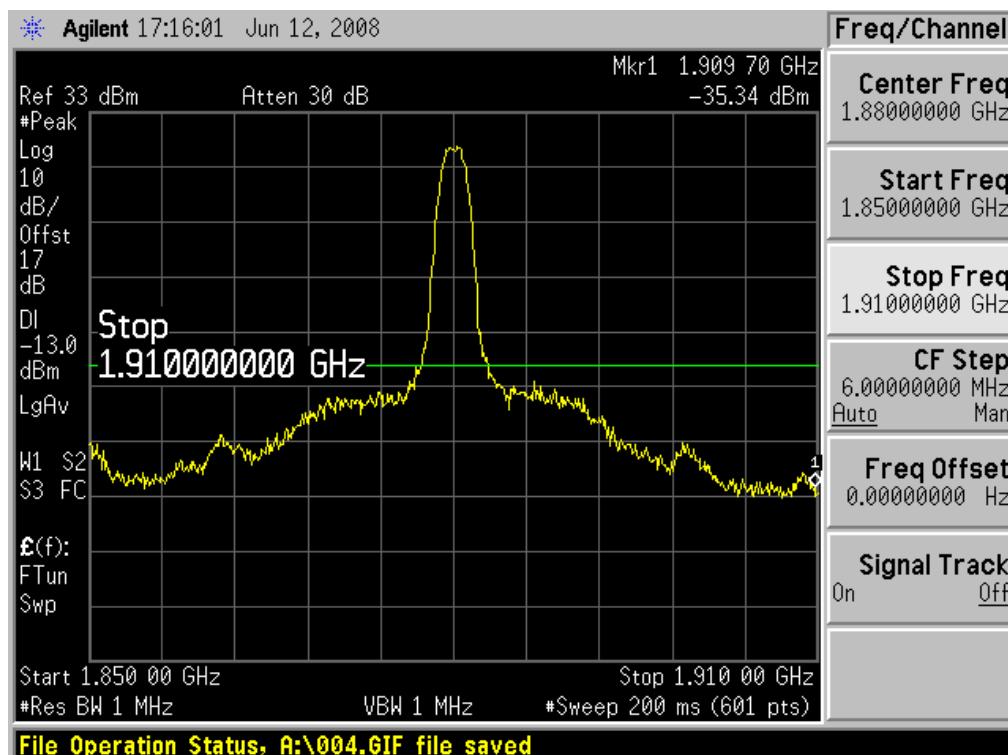
Channel 25, 1910MHz~10GHz



Channel 25, 10GHz~20GHz

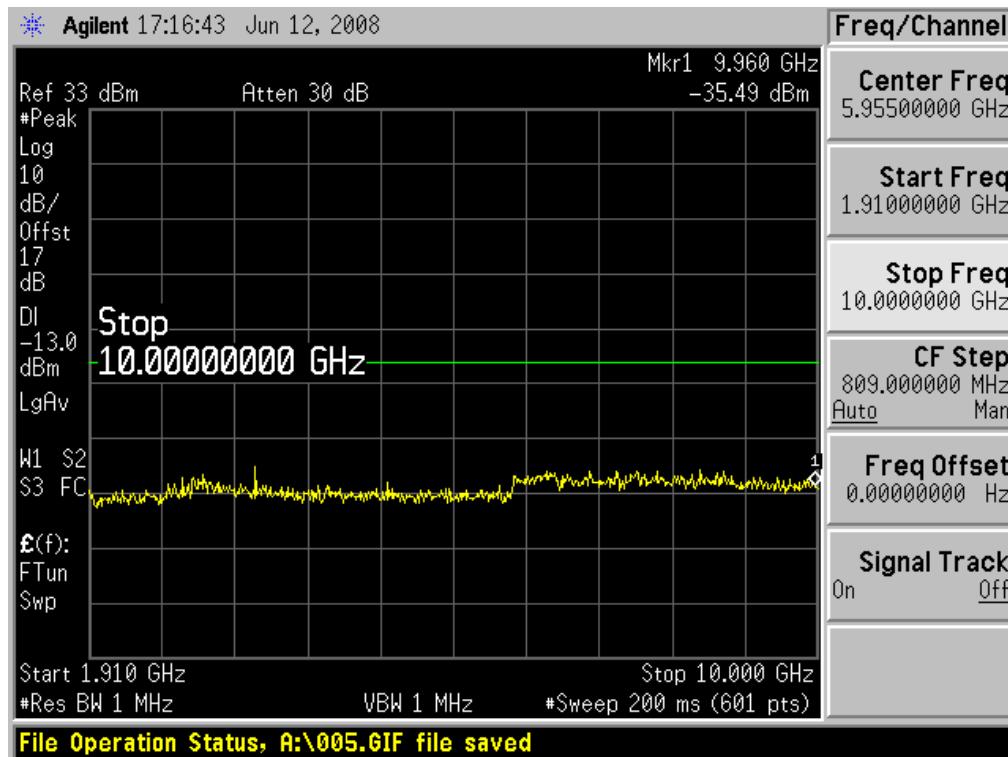


Channel 600, 30MHz~1850MHz

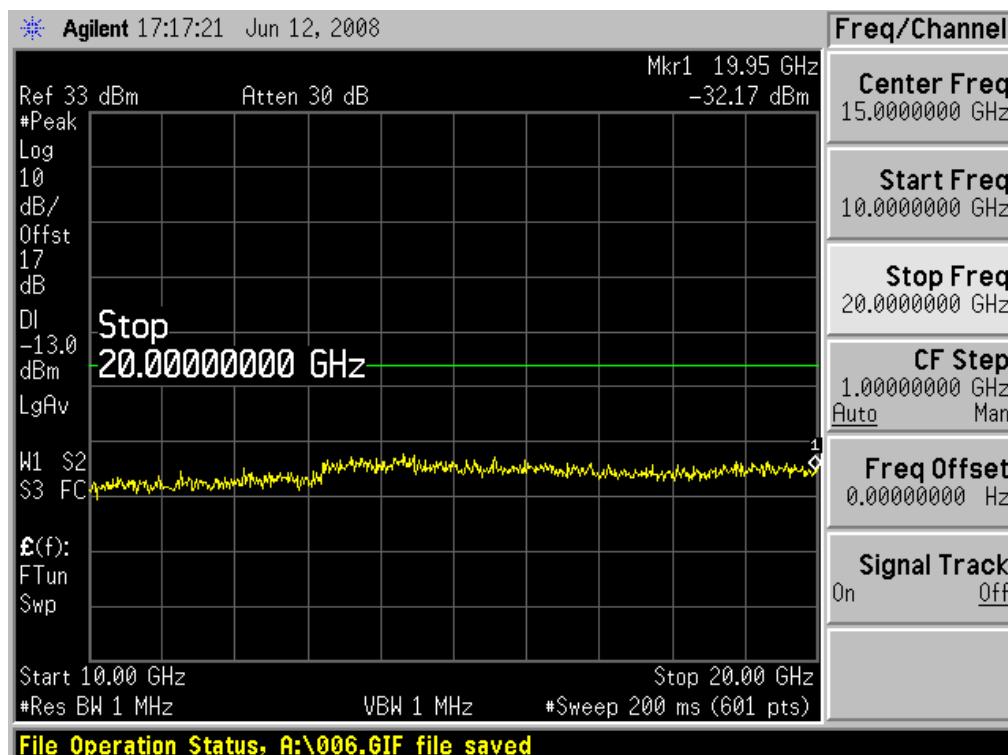


Channel 600, 1850MHz~1910MHz

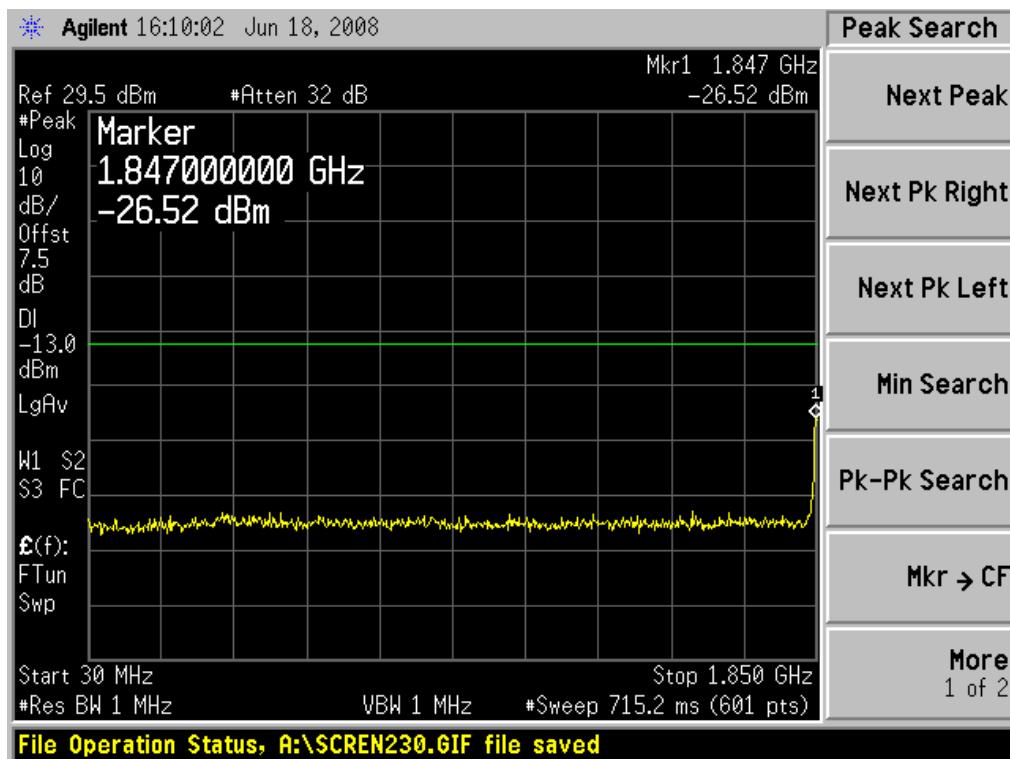
Note: The signal beyond the limit is carrier.



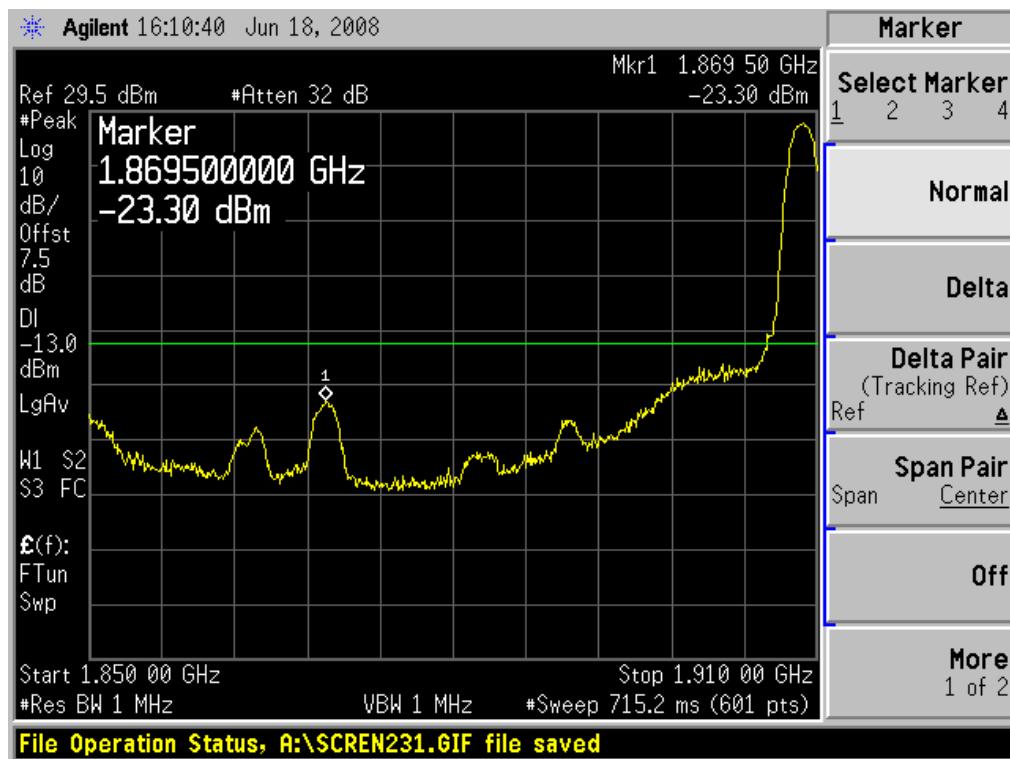
Channel 600, 1910MHz~10GHz



Channel 600, 10GHz~20GHz

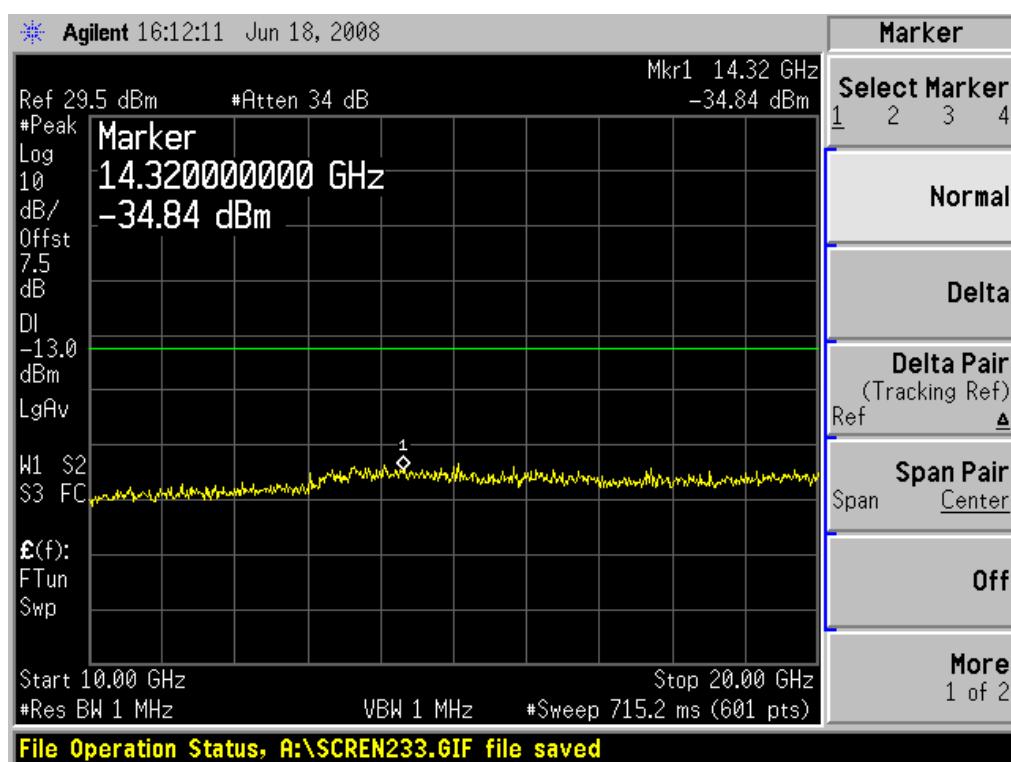
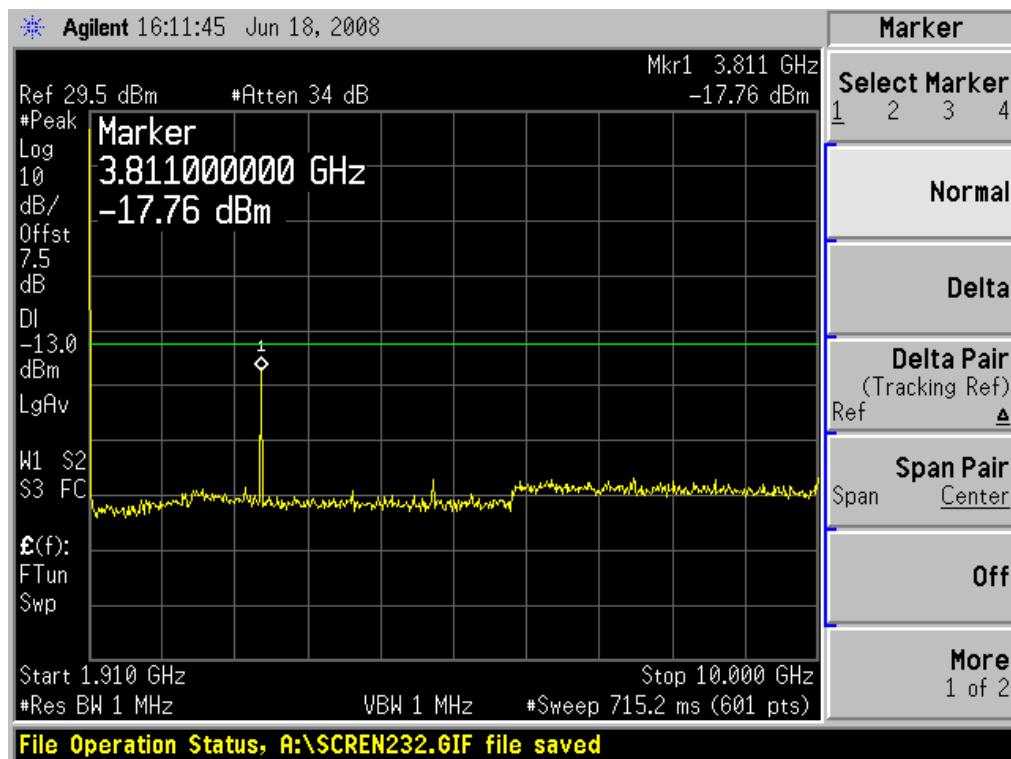


Channel 1175, 30MHz~1850MHz



Channel 1175, 1850MHz~1910MHz

Note: The signal beyond the limit is carrier.

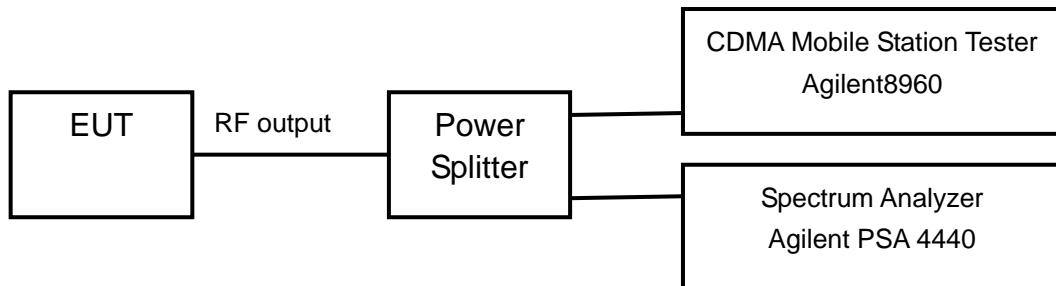


## 2.2.5 Band Edges Compliance-FCC Part2.1051/24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

Test Setup:



Test procedure:

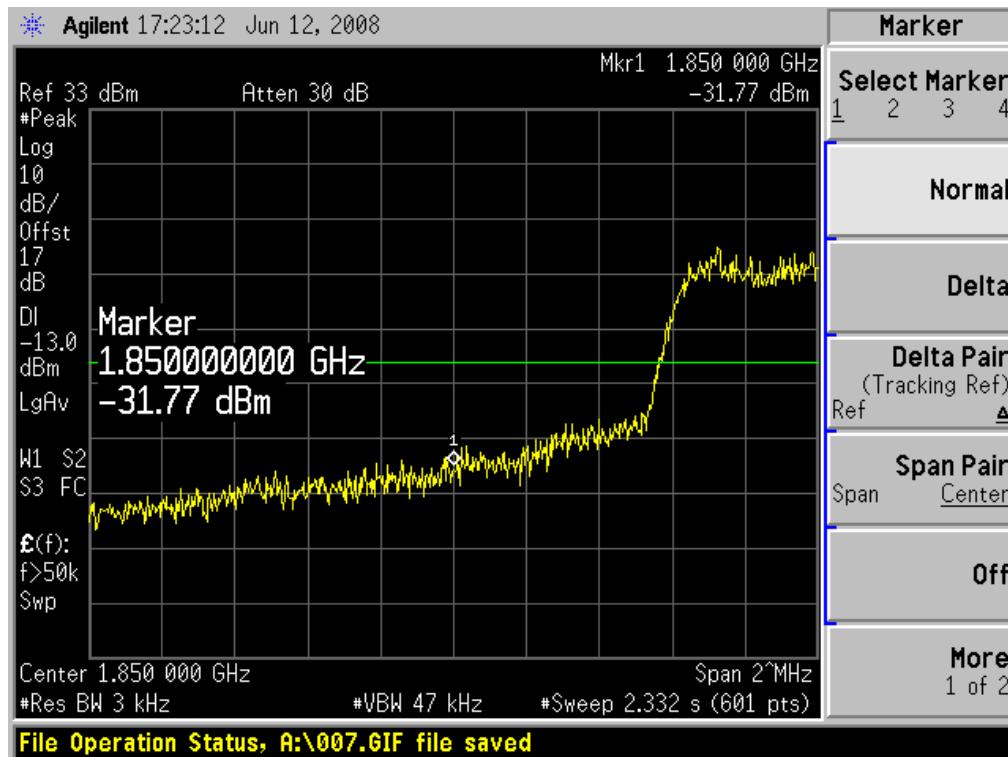
After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to 3kHz on spectrum analyzer.

The measurement will be conducted at two channels No25, and No1175 (Bottom and top channels of CDMA 1X band) in RC3/SO55 test mode.

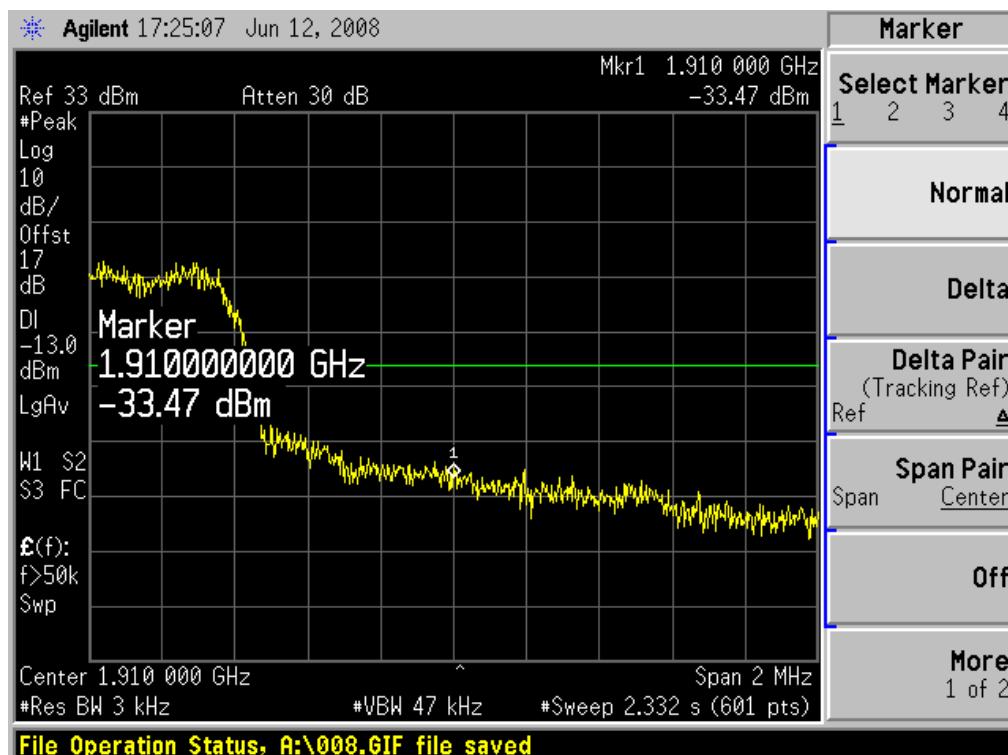
Limits	$\leq -13\text{dBm}$
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Test result:

Refer to the following figures.



Channel 25



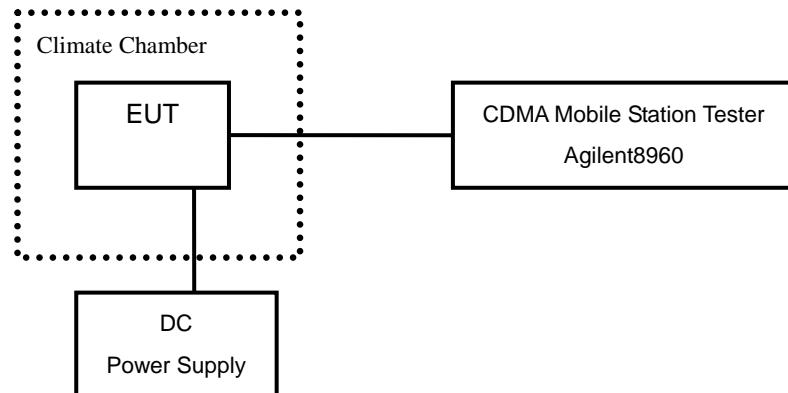
Channel 1175

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

Ambient condition:

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

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 3.1V to 4.2 V. The measurement will be conducted at three channels No25, No600 and No1175 (Bottom, middle and top channels of CDMA 1X band) in RC3/SO55 test mode.

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

Test Result:

Temperature(° C)	Test Result (ppm)@3.7V power supply		
	Channel 25	Channel 600	Channel 1175
-30	0.002	0.002	0.002
-20	0.001	0.001	0.002
-10	0.002	0.002	0.002
0	0.002	0.001	0.001
+10	0.001	0.004	0.002
+20	0.002	0.003	0.002
+30	0.002	0.006	0.001
+40	0.001	0.003	0.002
+50	0.001	0.001	0.002

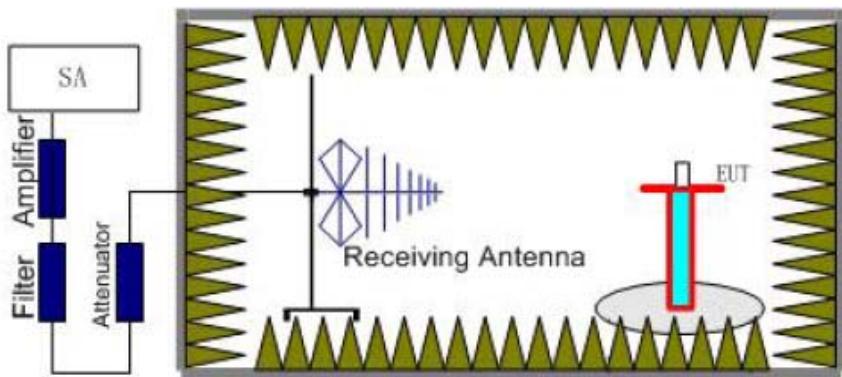
Voltage (V)	Test Result (ppm)@20° C		
	Channel 25	Channel 600	Channel 1175
3.1	0.011	0.007	0.008
4.2	0.005	0.005	0.005

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

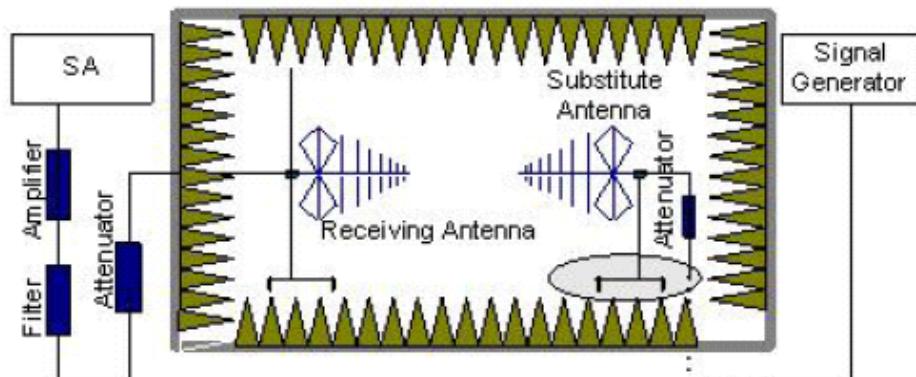
Ambient condition

Temperature	Relative humidity	Pressure
18°C	40%	102.5kPa

Test Setup:



Step 1



Step 2

Test procedure:

The measurement was done according to TIA/EIA 603C.

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.

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<sub>R</sub>: reading of the receiver (dBm)

L<sub>C</sub>: Cable Lose (dB)

L<sub>A</sub>: 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.

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

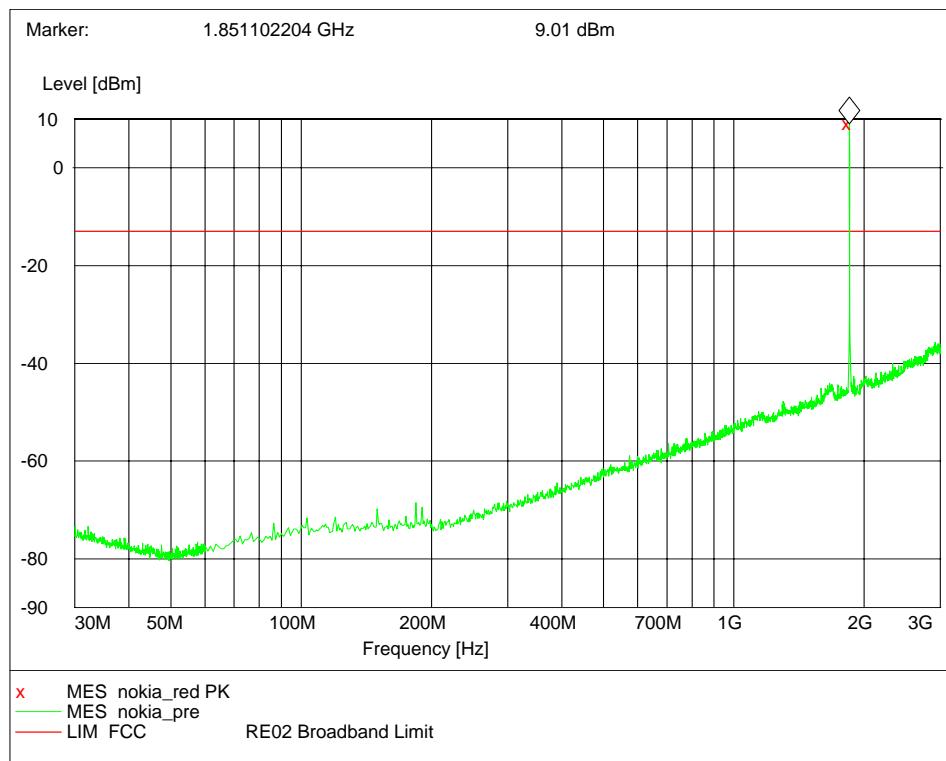
The measurement will be conducted at three channels No25, No600 and No1175 (Bottom, middle and top channels of CDMA 1X band) in RC3/SO55 test mode.

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

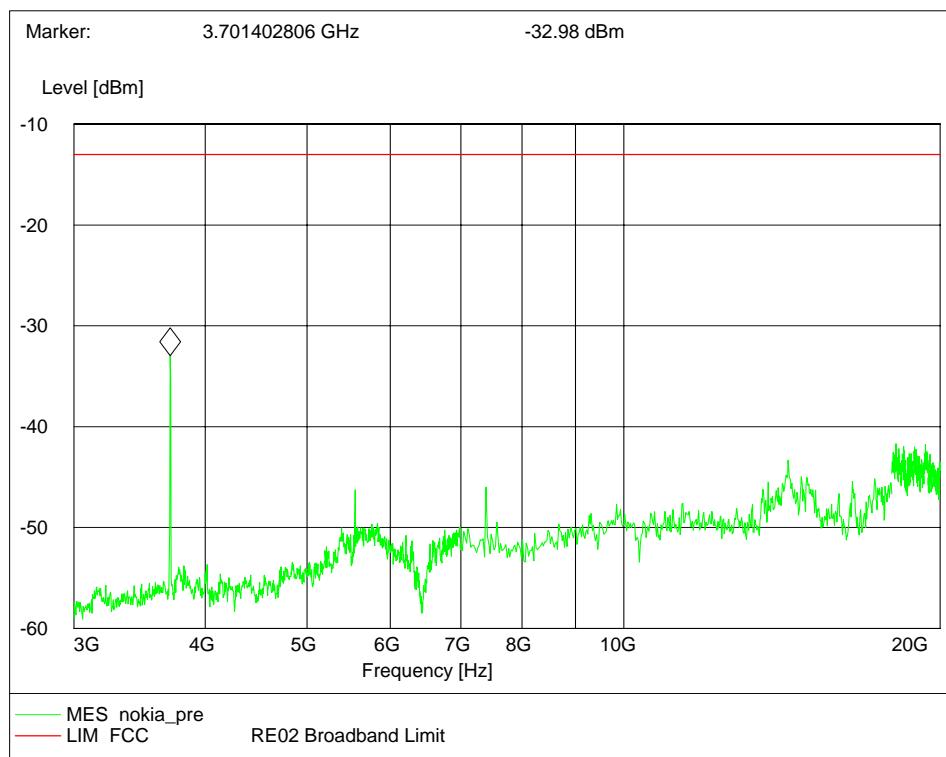
Refer to the following figures.

Channel 25:



Channel 25, 30MHz~3GHz

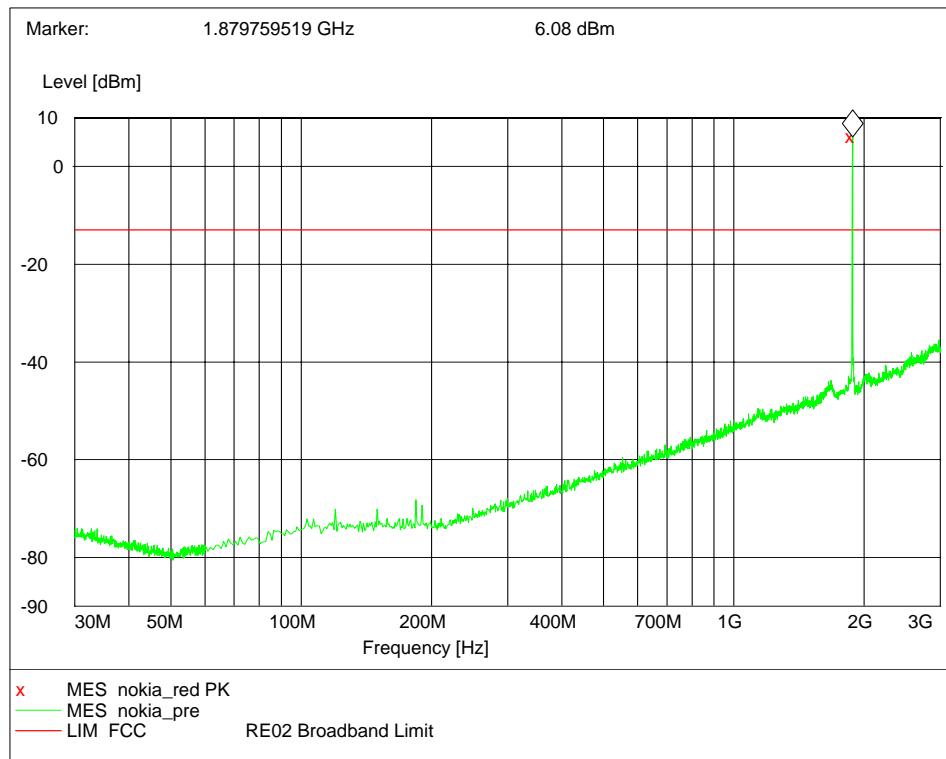
Note: The signal beyond the limit is carrier.



Channel 25, 30MHz~3GHz

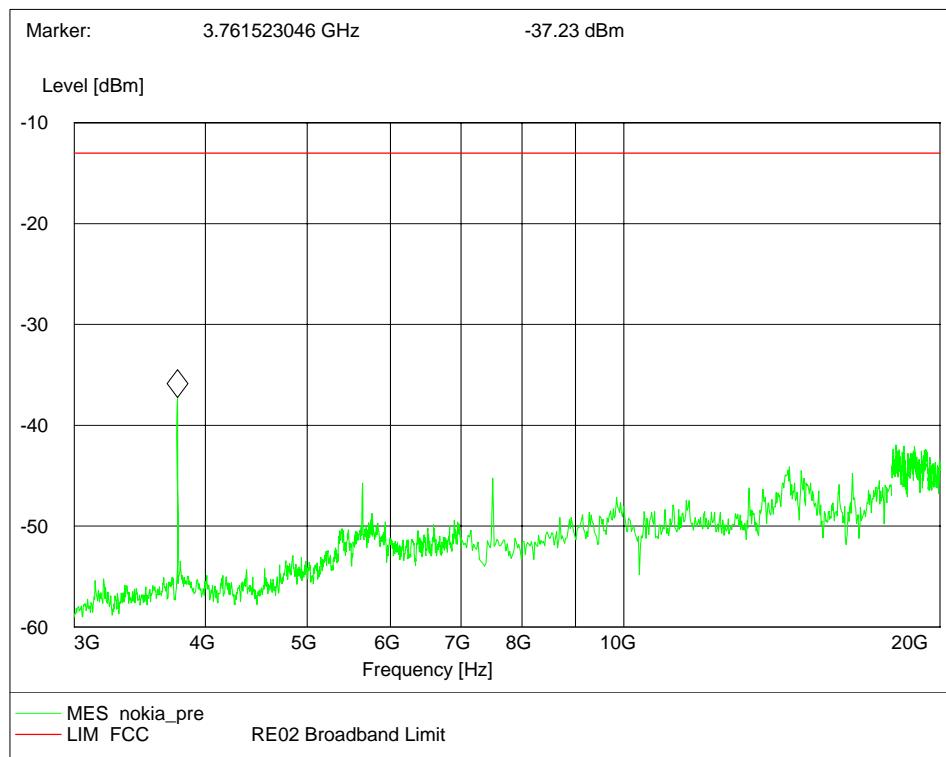
Frequency (MHz)	Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3701.40	Vertical	-32.98	-13	19.98
5553.10	Vertical	-46.26	-13	33.26
7396.79	Vertical	-45.99	-13	32.99

Channel 600:



Channel 600, 30MHz~3GHz

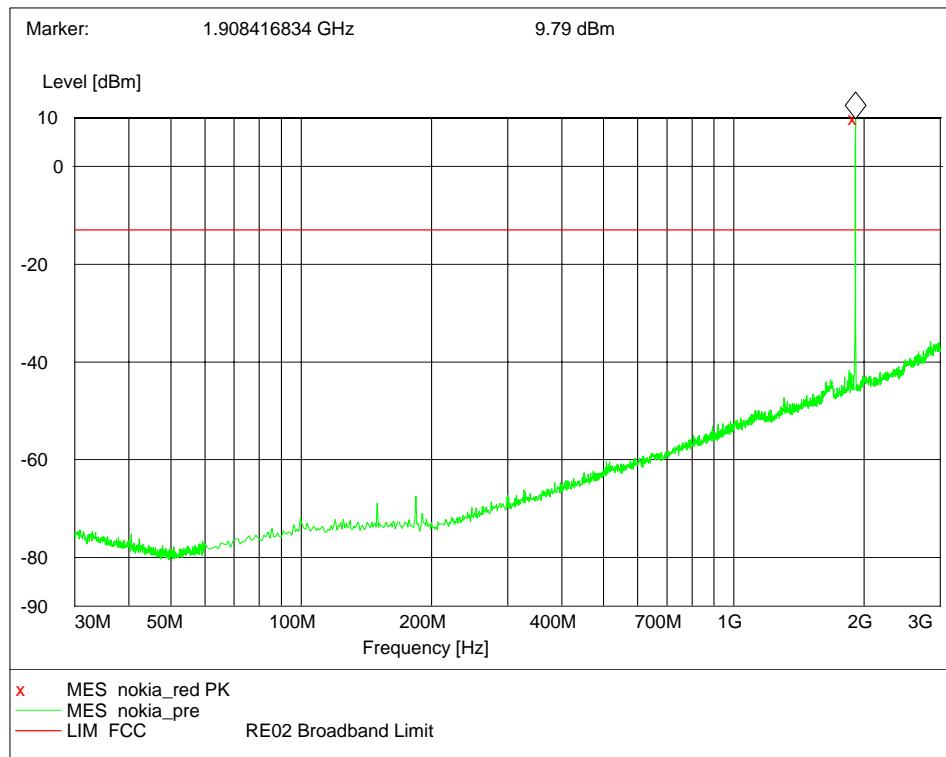
Note: The signal beyond the limit is carrier.



Channel 600, 3GHz~20GHz (Traffic Mode)

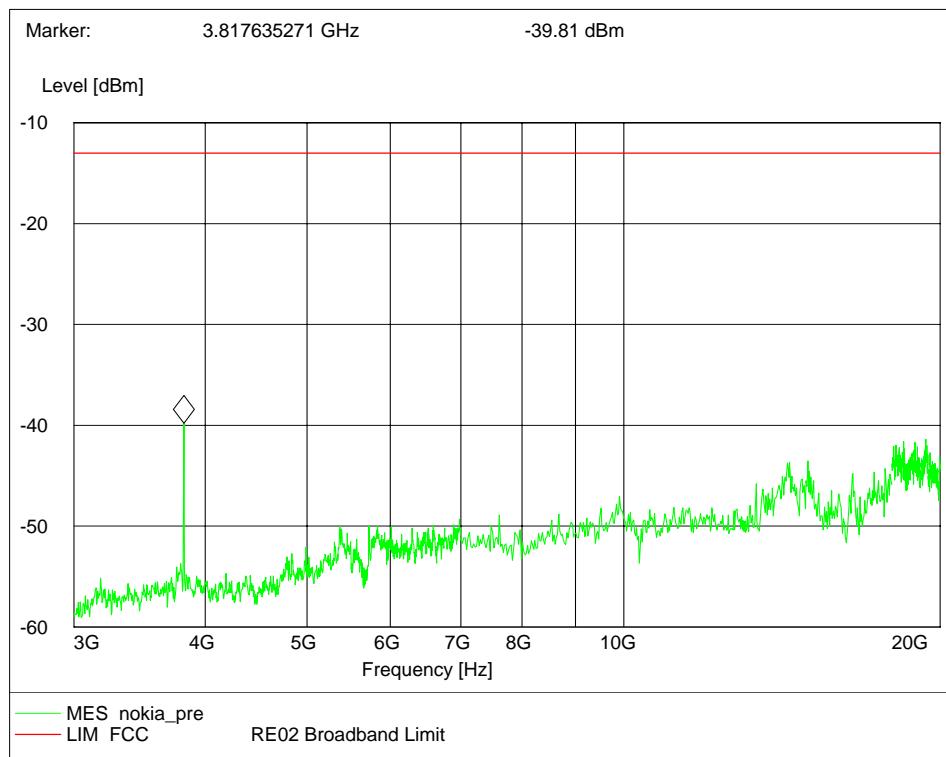
Frequency (MHz)	Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3761.52	Vertical	-37.23	-13	24.23
5641.28	Vertical	-45.72	-13	32.72
7507.01	Vertical	-45.25	-13	32.25

Channel 1175 :



Channel 1175, 30MHz~3GHz

Note: The signal beyond the limit is carrier.



Channel 1175, 3GHz~20GHz

Frequency (MHz)	Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
3817.63	Vertical	-39.81	-13	26.81
5725.45	Vertical	-49.98	-13	36.98
7617.23	Vertical	-48.89	-13	35.89

## 2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Date
1	E5515C(8960) Mobile Station Tester	Agilent	GB44050904	19 <sup>th</sup> Aug. 2007
2	PSA E4440A Spectrum Analyzer	Agilent	MY41000183	19 <sup>th</sup> Aug. 2007
5	66309B DC Power Supply	Agilent	MY43000461	19 <sup>th</sup> Aug. 2007
6	1506A Power Splitter	Weinschel	MN154	19 <sup>th</sup> Aug. 2007
7	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	19 <sup>th</sup> Aug. 2007
8	ESI 40 EMI test receiver	R&S	100015	19 <sup>th</sup> Aug. 2007
9	SMR 20 Signal generator	R&S	100086	19 <sup>th</sup> Aug. 2007
10	CMU 200 Radio tester	R&S	100313	19 <sup>th</sup> Aug. 2007
11	12.65m*8.03m*7.50m Fully-Anechoic Chamber	FRANKONIA	-----	19 <sup>th</sup> Aug. 2007
12	HL562 Ultra log test antenna	R&S	100016	19 <sup>th</sup> Aug. 2007
13	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	-----	19 <sup>th</sup> Aug. 2007
14	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	19 <sup>th</sup> Aug. 2007
15	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	19 <sup>th</sup> Aug. 2007
16	PS2000 Turn Table	FRANKONIA	-----	19 <sup>th</sup> Aug. 2007
17	MA260 Antenna Master	FRANKONIA	-----	19 <sup>th</sup> Aug. 2007
18	SH-241Climatic Chamber	ESPEC	92000389	19 <sup>th</sup> Aug. 2007
19	ES-K1EMI test software	R&S	-----	19 <sup>th</sup> Aug. 2007
20	HL562 Receive antenna	R&S	100167	19 <sup>th</sup> Aug. 2007

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## **Appendix**