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# TEST REPORT

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Report No.: SRTC2011-H024-E0036

Product Name: GSM/GPRS/EDGE/WCDMA

Digital Mobile Phone with Bluetooth

Marketing Name: one touch 900A

Product Model: yippee 3G\_A2

Applicant: TCT Mobile Limited

Manufacture: TCT Mobile Limited

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

(October 1, 2009 edition)

FCC ID: RAD197

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

No.80 Beilishi Road Xicheng District Beijing, China

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## 1. General information

### 1.1 Notes of the test report

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

### 1.2 Information about the testing laboratory

Company: The State Radio\_monitoring\_center Testing Center (SRTC)  
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City: Beijing  
Country or Region: China  
Contacted person: Wang Junfeng  
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Email: wangjf@srrc.org.cn / wangjunfeng@srtc.org.cn

### 1.3 Applicant's details

Company: TCT Mobile Limited  
Address: 5F, E building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area  
City: Shanghai  
Country or Region: P.R.China  
Grantee Code: RAD  
Contacted person: Gong Zhizhou  
Tel: +86-21-61460890  
Fax: +86-21-61460602  
Email: zhizhou.gong@jrdcom.com

### 1.4 Manufacturer's details

Company: TCT Mobile Limited  
Address: 5F, E building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area  
City: Shanghai  
Country or Region: P.R.China  
Contacted person: Gong Zhizhou  
Tel: +86-21-61460890  
Fax: +86-21-61460602  
Email: zhizhou.gong@jrdcom.com

## 1.5 Application details

Date of reception of test sample: 8<sup>th</sup> Mar 2011

Date of test: 9<sup>th</sup> Mar 2011 to 12<sup>th</sup> Apr 2011

## 1.6 Reference specification

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

## 1.7 Information of EUT

### 1.7.1 General information

Name of EUT	GSM/GPRS/EDGE/WCDMA Digital Mobile Phone with Bluetooth
FCC ID	RAD197
Frequency range	GSM850: Tx:824~849MHz Rx:869~894MHz PCS1900: Tx:1850~1910MHz Rx:1930~1990MHz
Rated output power	GSM850:33.0dBm PCS1900:30.0dBm
Modulation type	GSM/GPRS:GMSK EDGE: GMSK(Uplink direction) 8PSK(Downlink direction)
Emission Designator	300KGXW
Duplex mode	FDD
Duplex spacing	GSM850:45MHz PCS1900:80MHz
Antenna type	Integral
Power Supply	Battery or charger
Rated Power Supply Voltage	3.8V
Extreme Temperature	Lowest: -30°C Highest: +50°C
Extreme Voltage	Minimum: 3.5V Maximum: 4.2V
HW Version	LOT1
SW Version	sw53K

### 1.7.2 EUT details

Product Name	Marketing Name	Product Model	IMEI
GSM/GPRS/EDGE/WCDMA Digital Mobile Phone with Bluetooth	one touch 900A	yippee 3G_A2	012787000001042

### 1.7.3 Auxiliary equipment details

Equipment	Charger
Manufacturer	Ten Pao International Ltd.
Model Number	CBA3120AG0C2
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Charger
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Model Number	CBA3001AG0C1
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Battery
Manufacturer	BYD LITHIUM BATTERY CO., LTD
Model Number	CAB31L0000C1
Capacity	1000mAh
Rated Voltage	3.7V d.c.

Equipment	Battery
Manufacturer	SHENZHEN BAK BATTERY CO., LTD
Model Number	CAB31L0000C2
Capacity	1000mAh
Rated Voltage	3.7V d.c.

Equipment	Data Cable
Manufacturer	Shen Zhen Ju Wei Electronic Co.,LTD
Model Number	CDA3122001C1

Equipment	Data Cable
Manufacturer	Huizhou Shenghua Industry Co.,Ltd
Model Number	CDA3122001C2


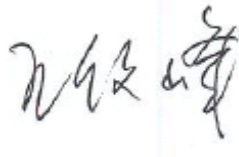

Note: As the information described above, there are two different models of charger manufactured by two different companies, and two different models of battery manufactured by two different companies.

The relevant tests have been performed in order to verify in which combination case (EUT exercised by only one model of battery and one model of charger) the EUT would have the worst features. So all the tests shown in this test report are performed when the EUT exercised by the charger CBA3120AG0C2 and the battery CAB31L0000C1.

## 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 Radiated Power and Equivalent Isotropically Radiated Power	22.913(a)/24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)	Pass
5	Band Edges Compliance	2.1051/22.917(a)/24.238(a)	Pass
6	Frequency Stability	2.1055/24.235/22.355	Pass
7	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	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. Li Boyu Test engineer 	Issued date:  <b>2011.06.08</b>

## 2.2 Test result

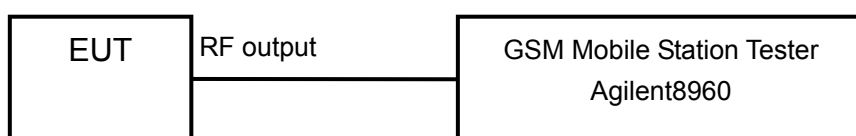
### 2.2.1 GSM850

#### 2.2.1.1 RF Power Output-FCC Part2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

The measurement will be conducted at three channels No128, No189 and No251 (Bottom, middle and top channels of GSM850 band)

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

GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	32.4
836.4	189	32.3
848.8	251	32.4

EDGE(GMSK) MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	27.6
836.4	189	27.4
848.8	251	27.6

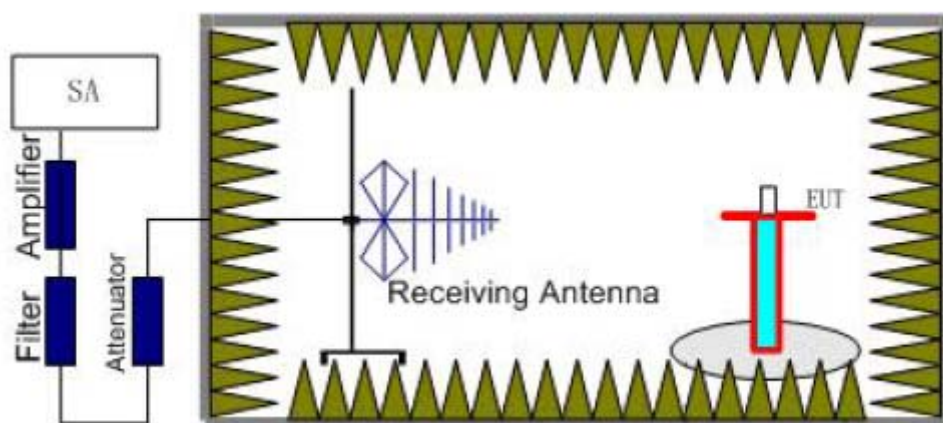


### 2.2.1.2 Effective Radiated Power-FCC Part22.913(a)

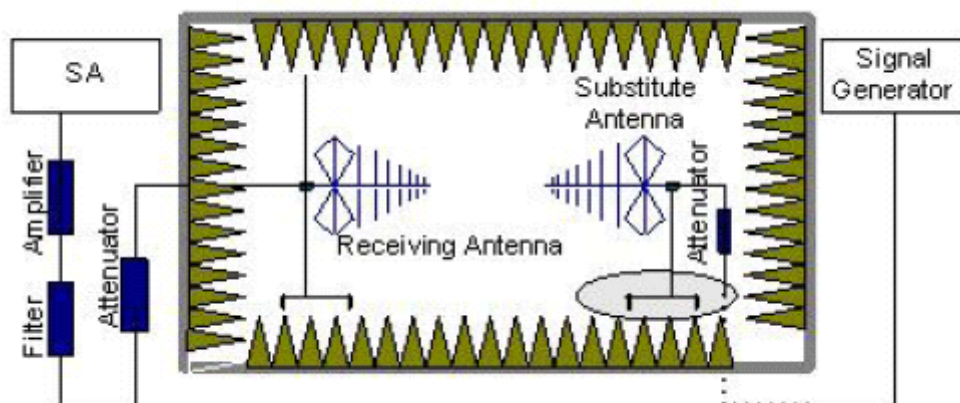
Ambient condition:

Temperature	Relative humidity	Pressure
26°C	43%	101.3kPa

Test setup:



Step 1



Step 2

Test procedure:

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

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna

most 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

**Step 2:**

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P<sub>mea</sub>) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (P<sub>mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (P<sub>ca</sub>) and the Substitution Antenna Gain (G<sub>a</sub>).

The measurement results are obtained as described below:

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

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

The measurement will be done at three channels No128, No189 and No251 (Bottom, middle and top channels of GSM850 band)

**Limits:**

Operation Mode	Power Step	E.R.P. (dBm)
GSM	5	≤38.45
GPRS	3	≤38.45
EDGE	6	≤38.45

Test result:

GSM/GPRS MODE:

Frequency (MHz)	Power step	Peak ERP (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
824.2	5	31.7	-3.8	8.6	2.15	29.05	Vertical
836.6	5	30.4	-3.8	8.6	2.15	27.75	Vertical
848.8	5	30.8	-3.8	8.6	2.15	28.15	Vertical

EDGE(GMSK) MODE:

Frequency (MHz)	Power step	Peak ERP (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
824.2	6	26.5	-3.8	8.6	2.15	23.85	Vertical
836.6	6	25.8	-3.8	8.6	2.15	23.15	Vertical
848.8	6	25.7	-3.8	8.6	2.15	23.05	Vertical

Frequency: 824.2MHz

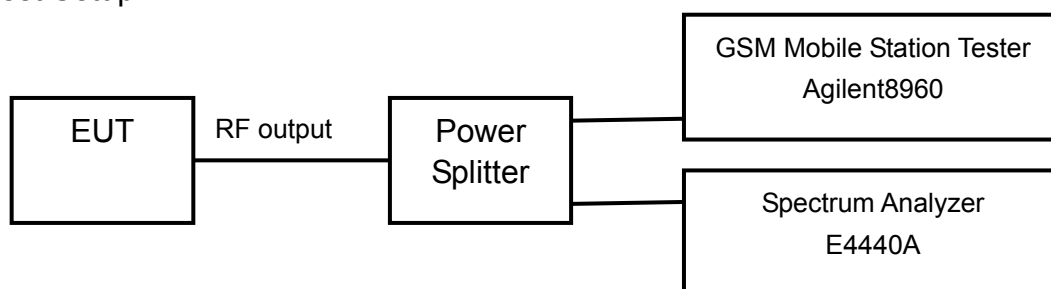
Peak ERP(dBm) =Pmea (29.05dBm)+Pca (-3.8dBm)+Ga(8.6dB)-2.15dB=31.7dBm

### 2.2.1.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer. The measurement will be conducted at three channels No128, No189 and No251 (Bottom, middle and top channels of GSM850 band)

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

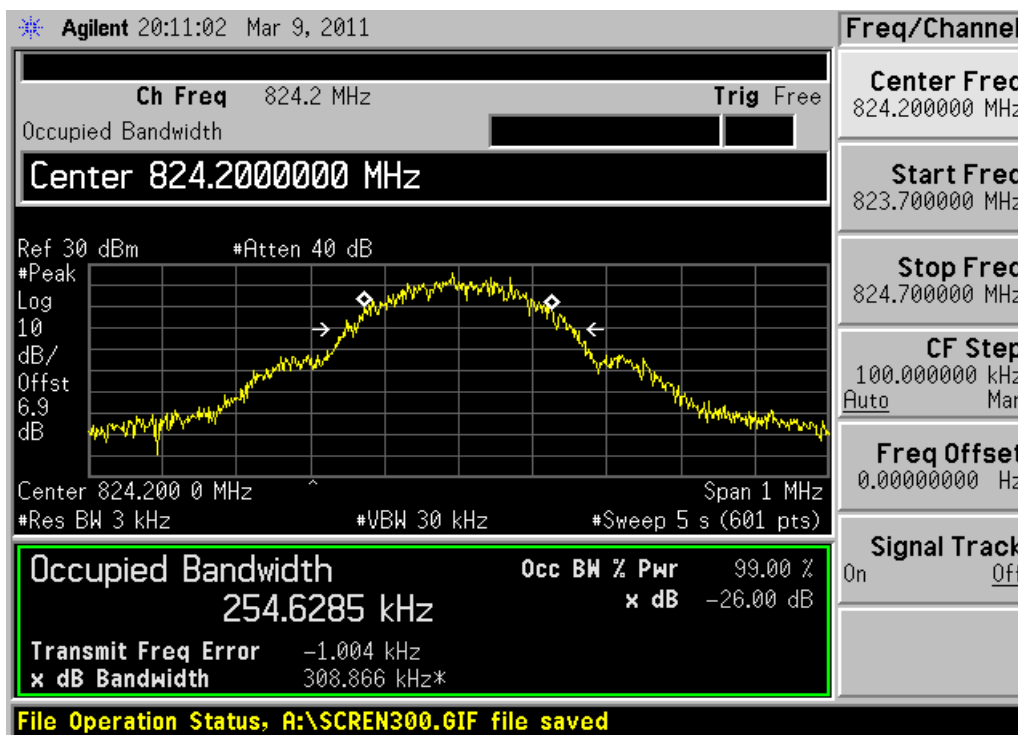
GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	254.63
836.4	189	248.81
848.8	251	249.12

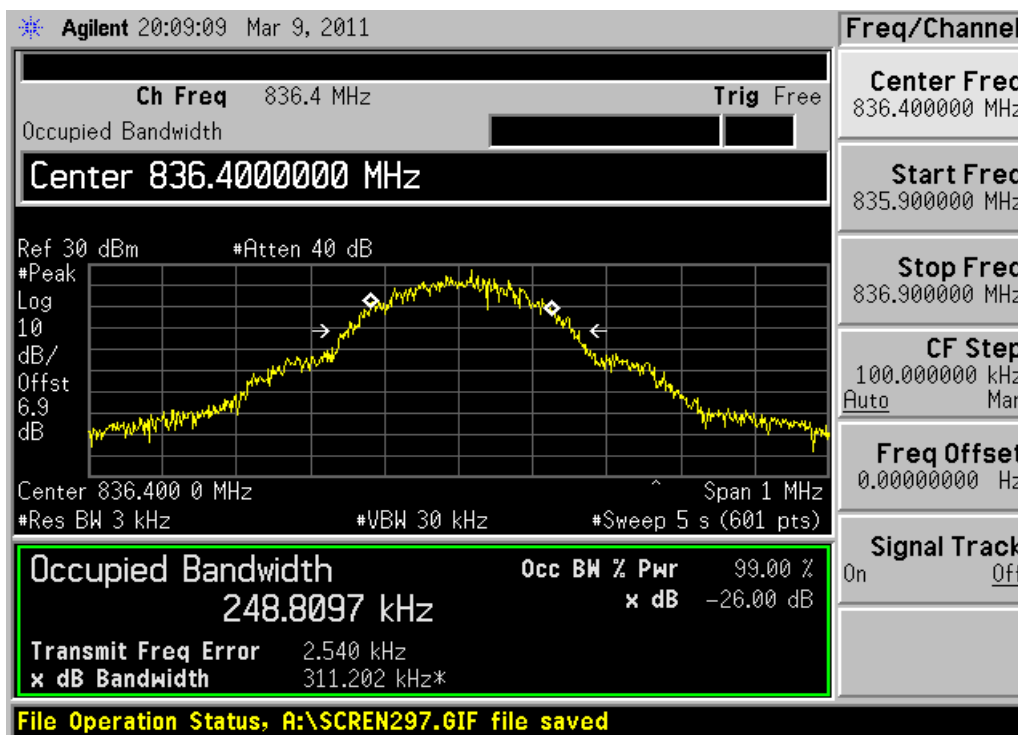
EDGE(GMSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	249.97
836.4	189	249.59
848.8	251	250.65

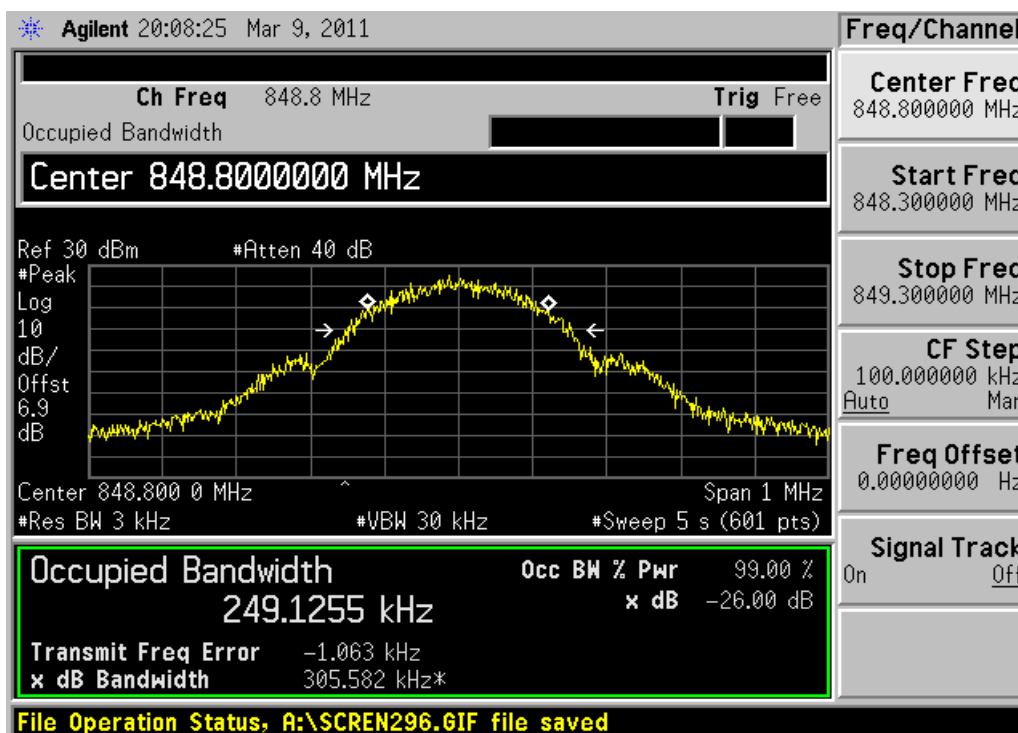
GSM/GPRS MODE:



Channel 128

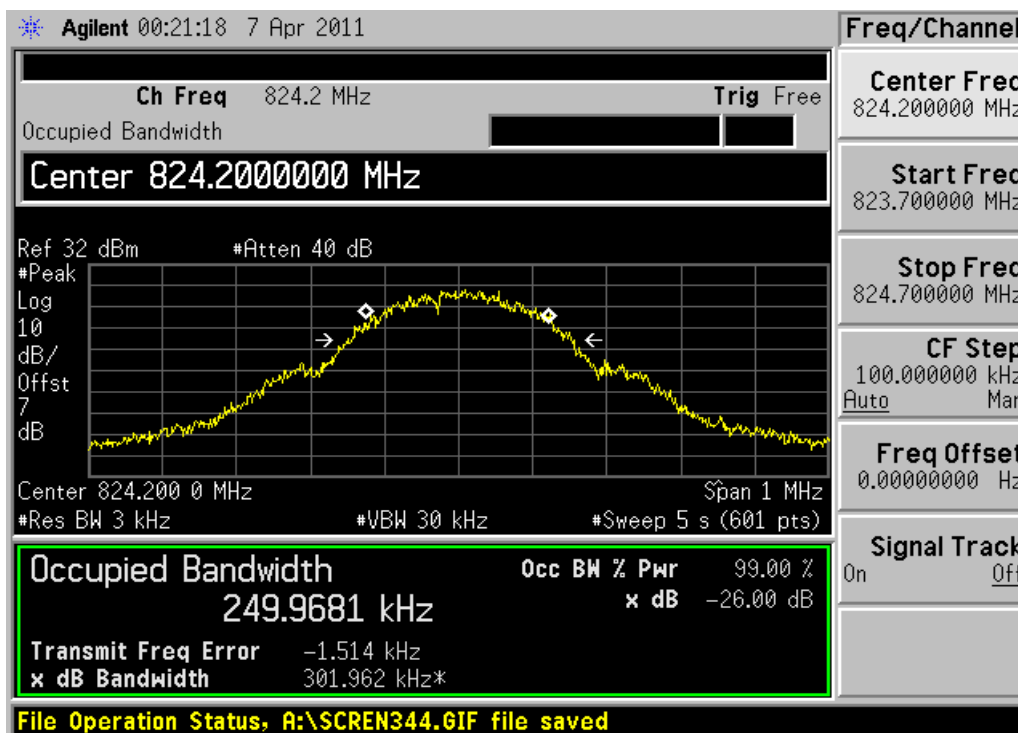


Channel 189

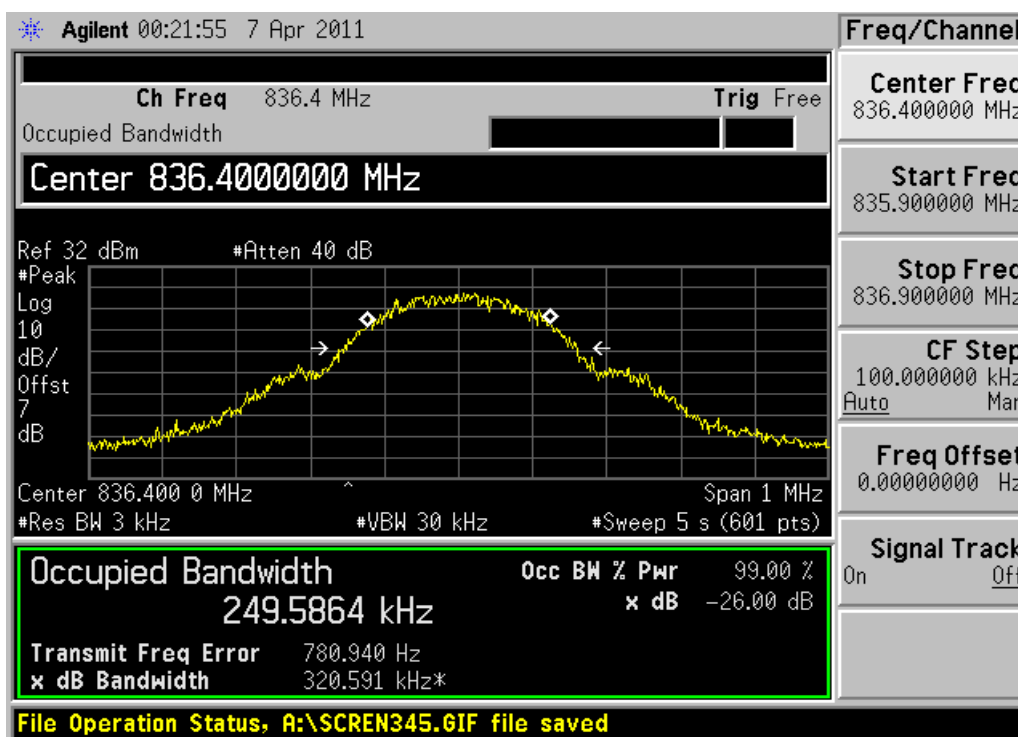


Channel 251

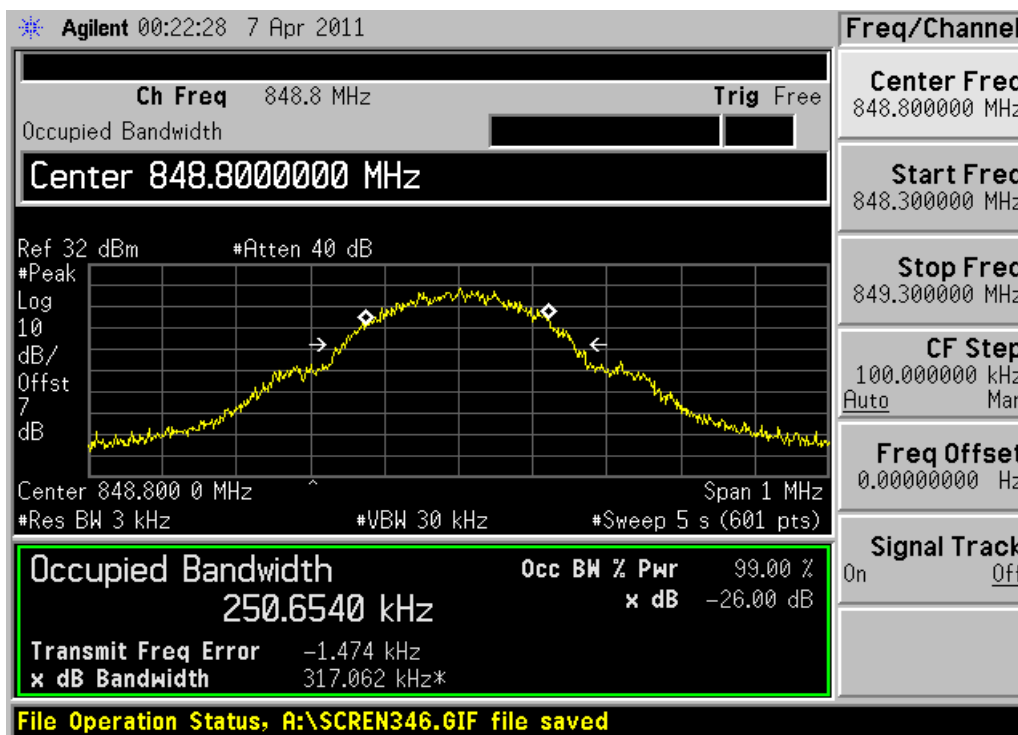
EDGE(GMSK) MODE:



Channel 128



Channel 189



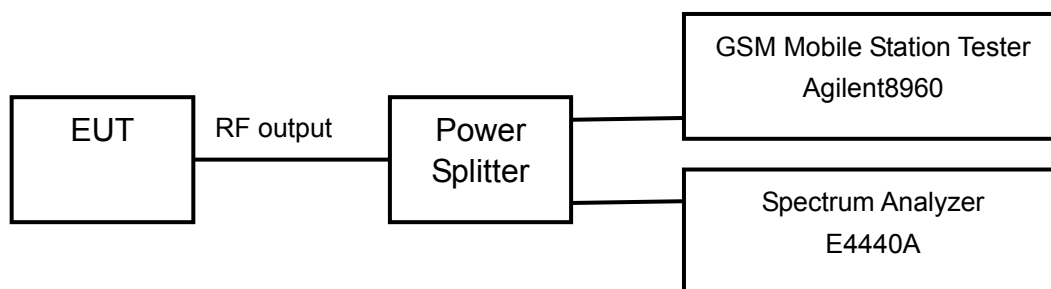
Channel 251

### 2.2.1.4 Spurious Emissions at antenna terminal-FCC Part2.1051/22.917(a)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

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

The measurement will be conducted at one channel No189 (middle channel of GSM850 band)

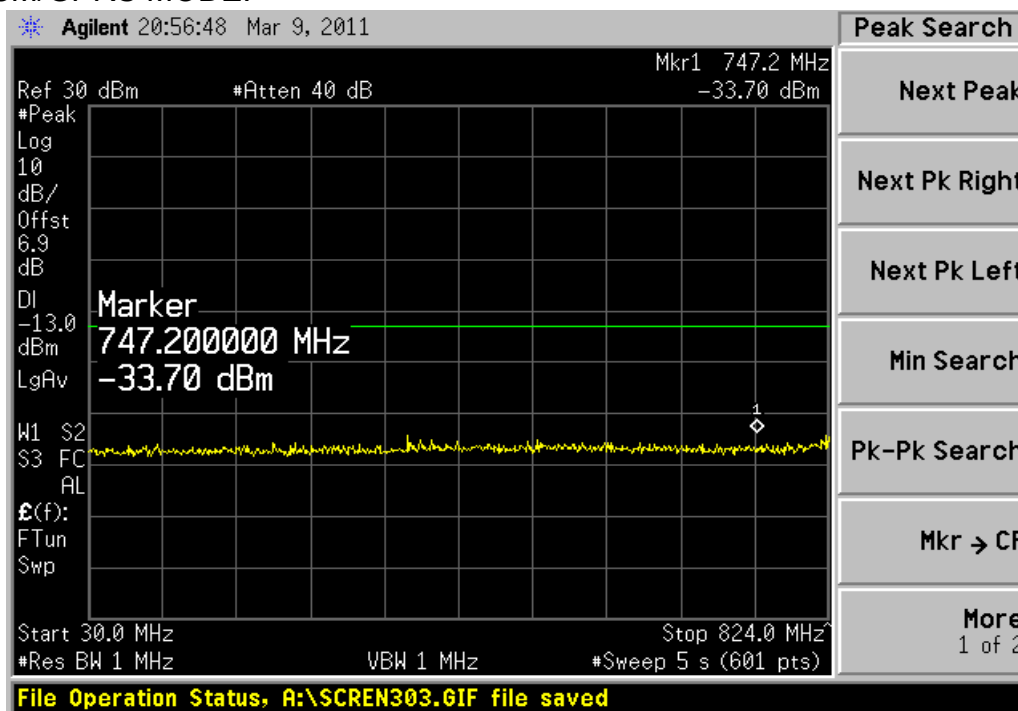
Limits	≤ -13dBm
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Test result:

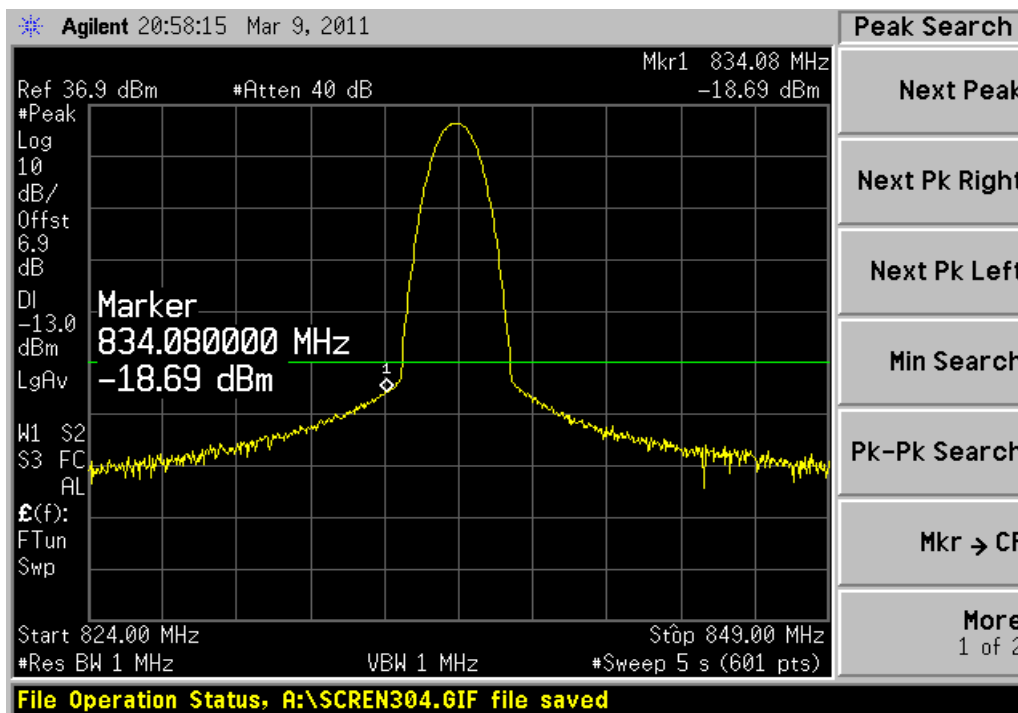
Refer to the following figures.



GSM/GPRS MODE:

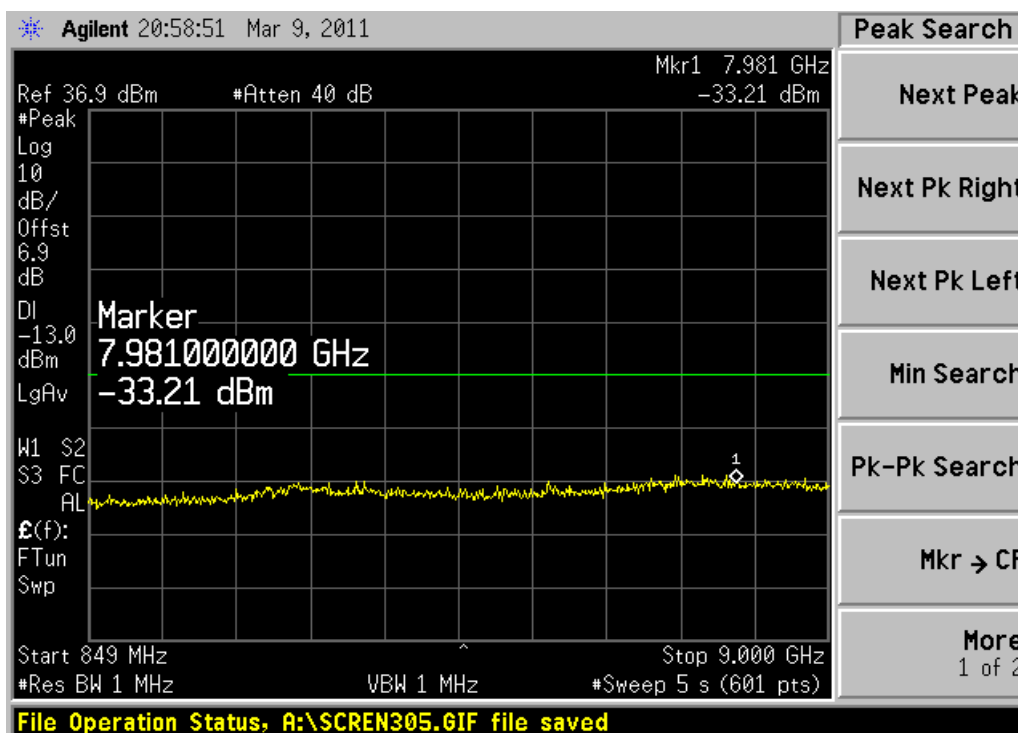


Channel 189, 30MHz~824MHz



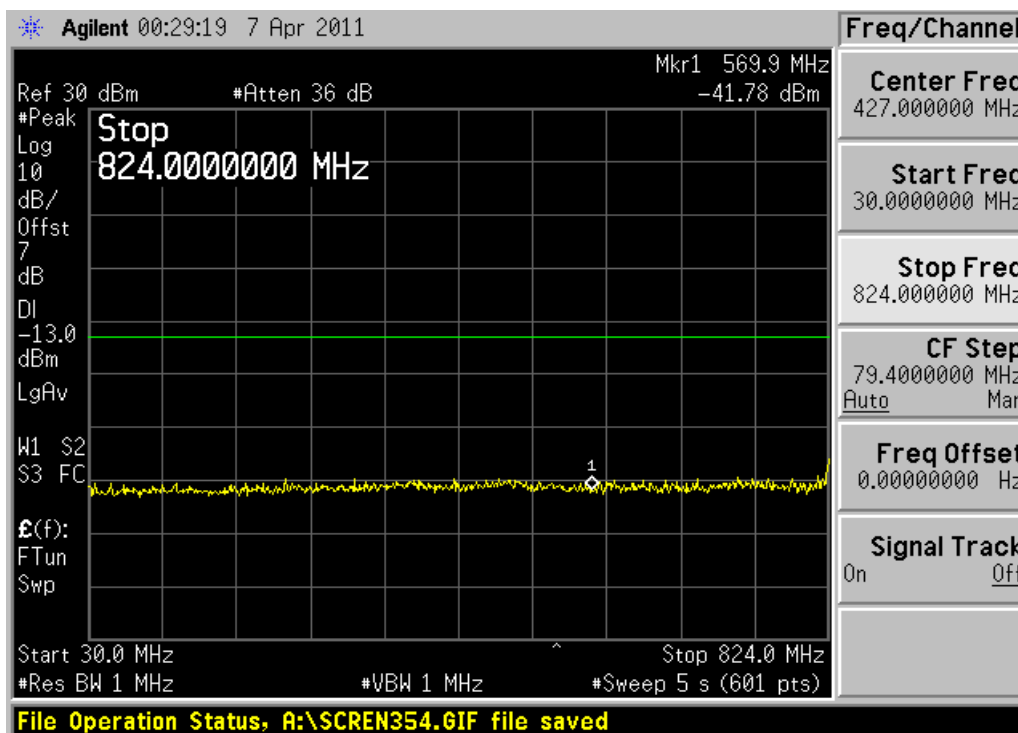
Channel 189, 824MHz~849MHz

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

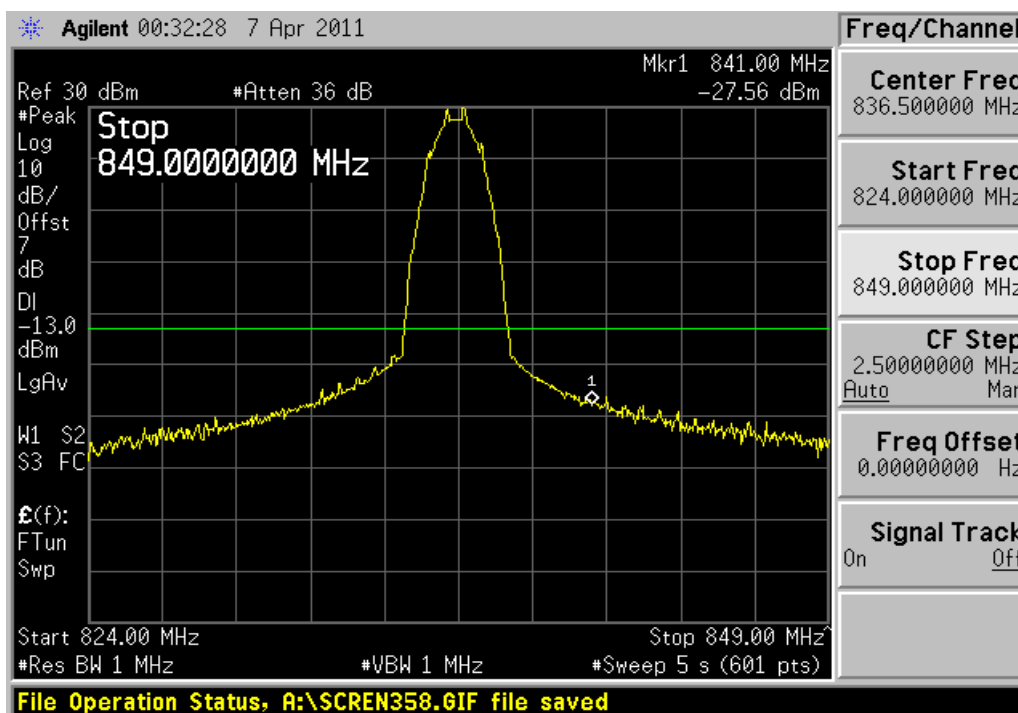


Channel 189, 849MHz~9GHz

EDGE(GMSK) MODE:

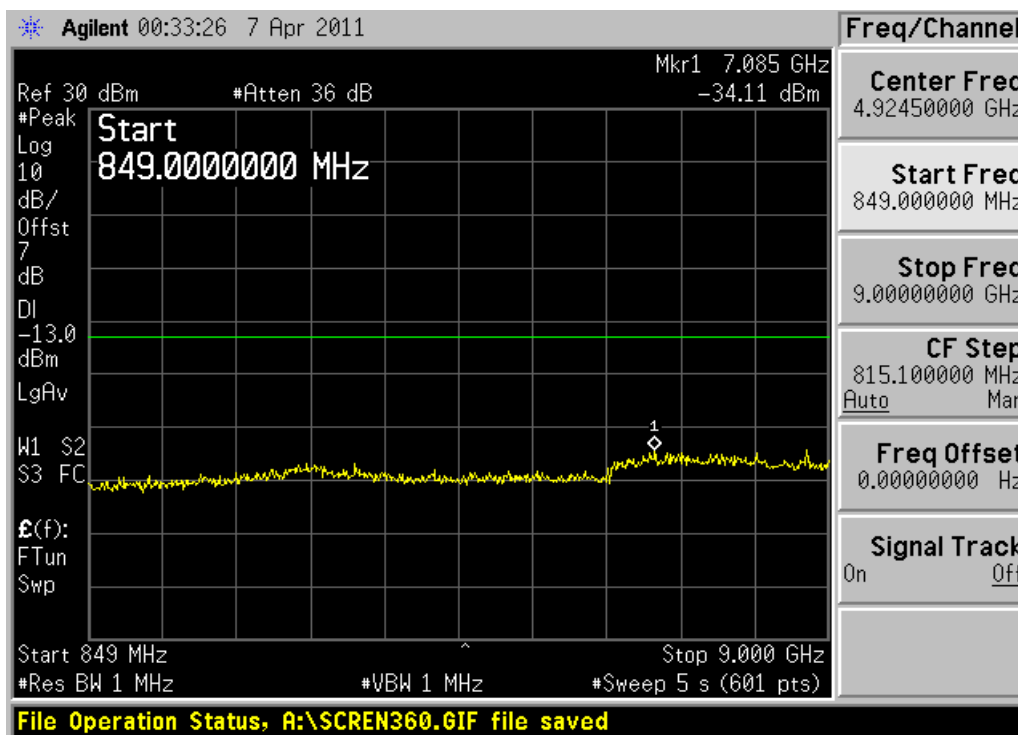


Channel 189, 30MHz~824MHz



Channel 189, 824MHz~849MHz

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



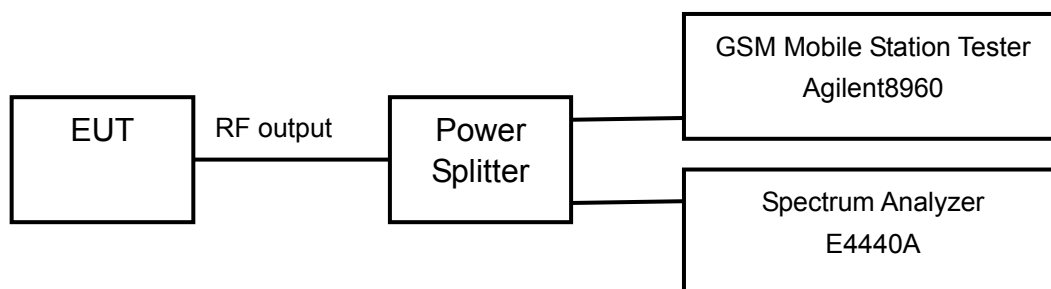
Channel 189, 849MHz~9GHz

### 2.2.1.5 Band Edges Compliance-FCC Part2.1051/22.917(a)

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

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

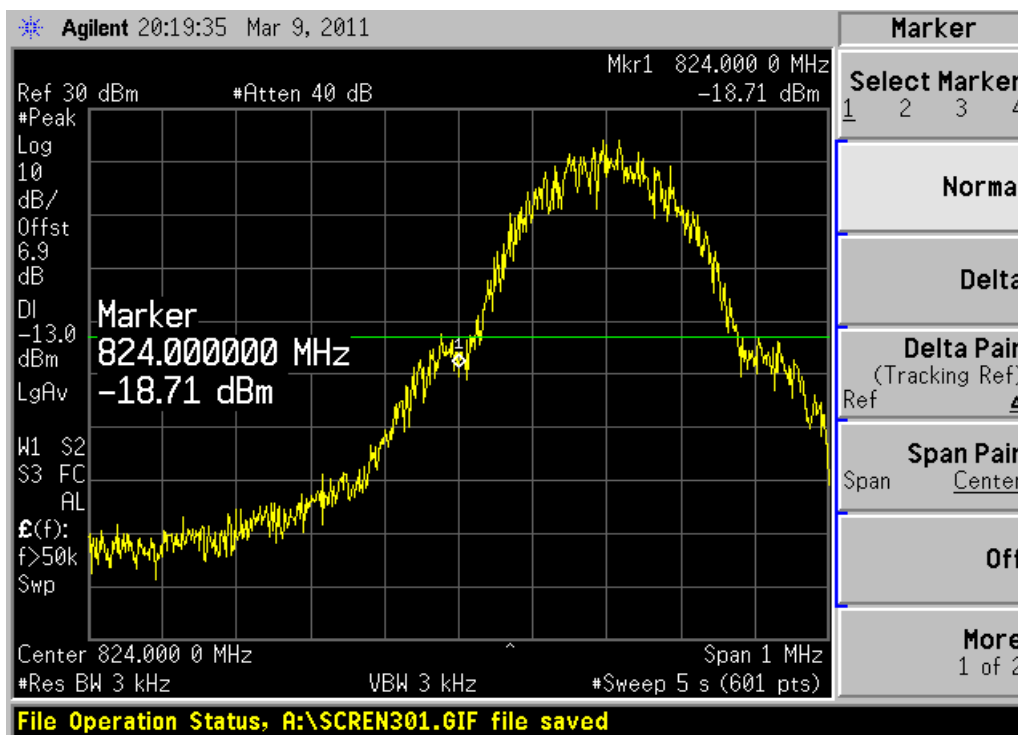
The measurement will be conducted at two channels No128 and No251 (Bottom and top channels of GSM850 band)

Limits	≤-13dBm
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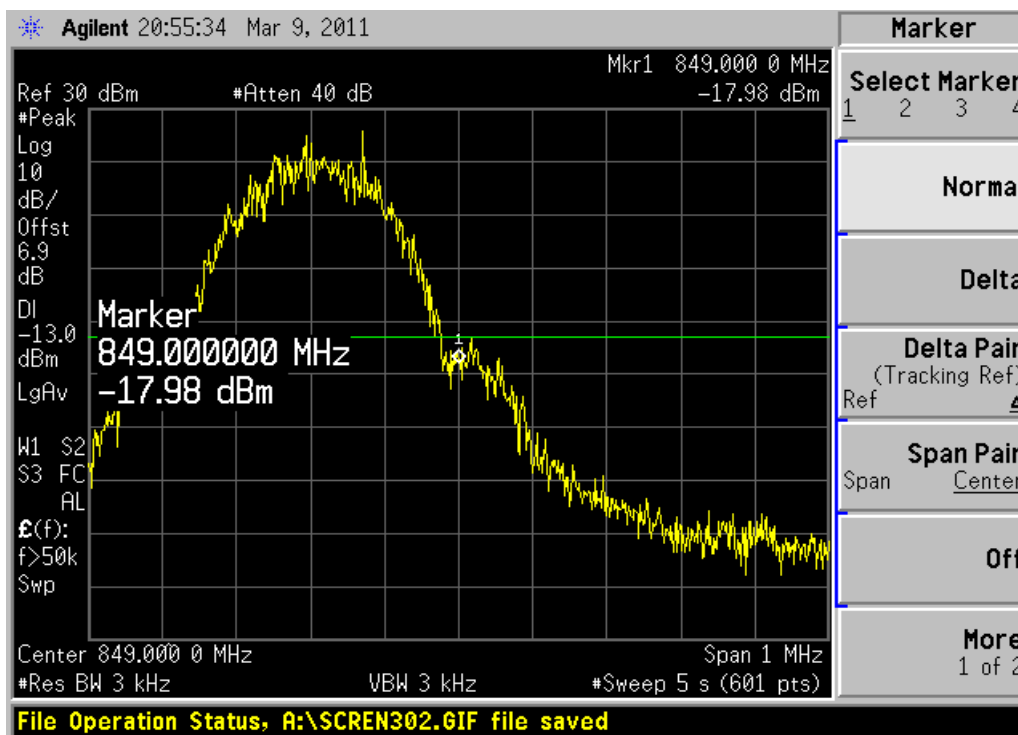
Test result:

Refer to the following figures.

GSM/GPRS MODE:

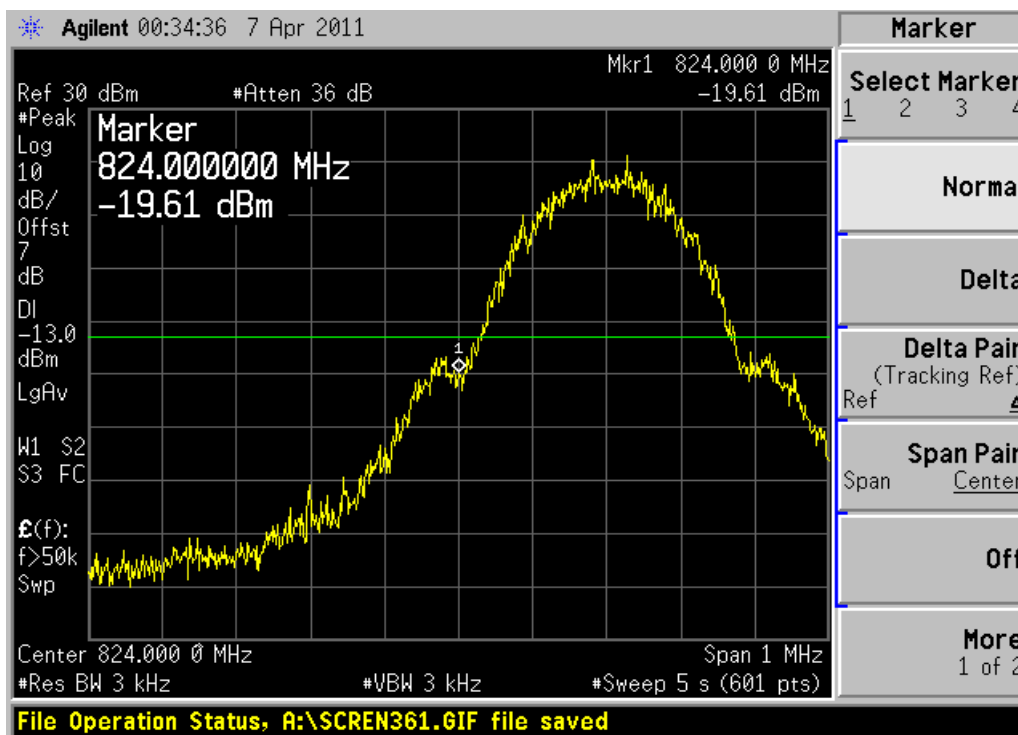


Channel 128

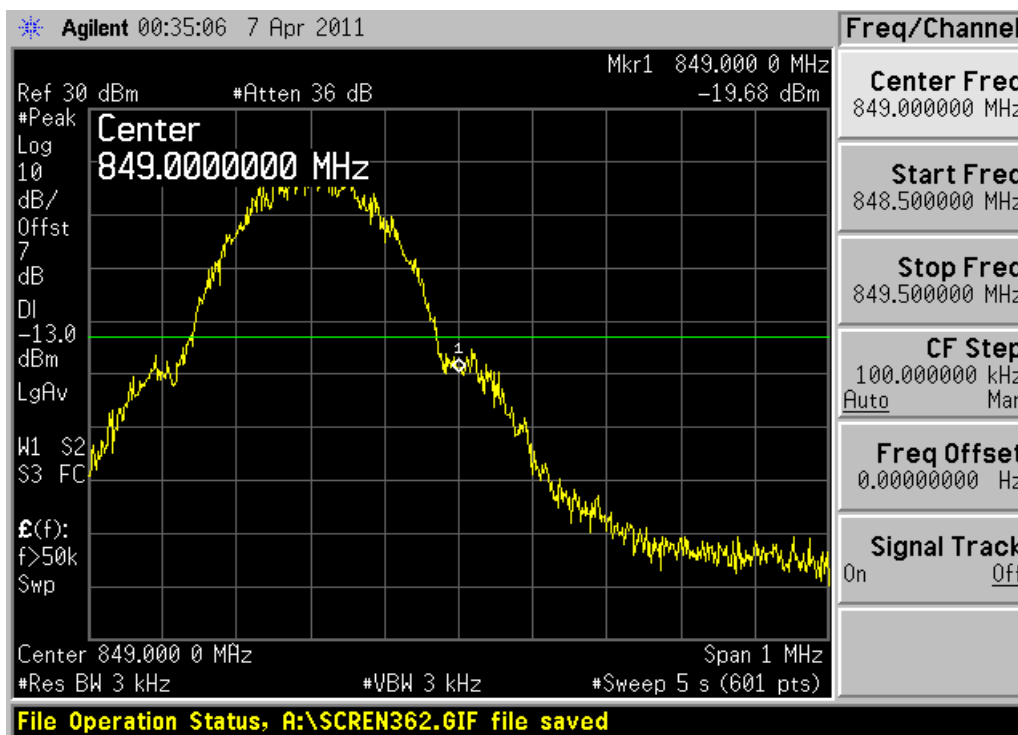


Channel 251

EDGE(GMSK) MODE:



Channel 128



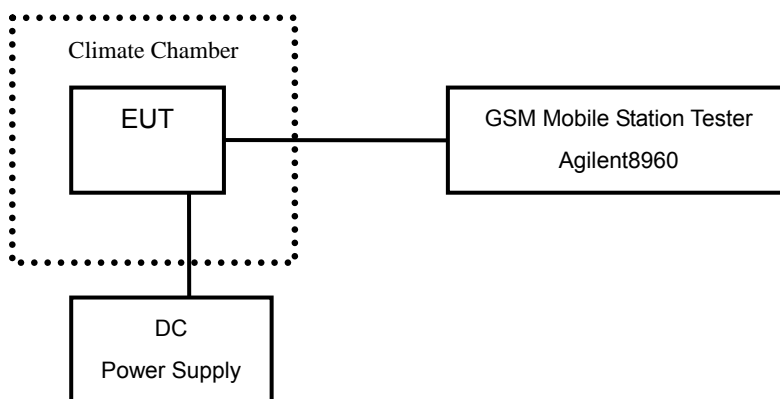
Channel 251

### 2.2.1.6 Frequency Stability-FCC Part2.1055/Part22.355

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test setup:



Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50° C in 10° C step size, and also the DC power supply voltage to the EUT is varied from 3.5 to 4.2 V. The measurement will be conducted at three channels No128, No189 and No251 (Bottom, middle and top channels of GSM850 band).

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

Test result:

GSM/GPRS MODE:

Temperature(° C)	Test Result (ppm)@3.8V		
	Channel 128	Channel 189	Channel 251
-30	0.007	0.004	0.014
-20	0.008	0.007	0.010
-10	0.007	0.005	0.004
0	0.010	0.004	0.014
+10	0.002	0.009	0.011
+20	0.001	0.010	0.007
+30	0.008	0.011	0.011
+40	0.005	0.014	0.012
+50	0.012	0.012	0.009

Voltage (V)	Test Result (ppm)@20°C		
	Channel 128	Channel 189	Channel 251
3.5	0.006	0.007	0.011
4.2	0.012	0.011	0.011

EDGE(GMSK) MODE:

Temperature(° C)	Test Result (ppm)@3.8V		
	Channel 128	Channel 189	Channel 251
-30	0.010	0.009	0.013
-20	0.009	0.006	0.013
-10	0.005	0.014	0.004
0	0.006	0.006	0.010
+10	0.005	0.014	0.004
+20	0.004	0.006	0.007
+30	0.006	0.008	0.003
+40	0.008	0.013	0.005
+50	0.006	0.014	0.008

Voltage (V)	Test Result (ppm)@20°C		
	Channel 128	Channel 189	Channel 251
3.5	0.006	0.013	0.004
4.2	0.009	0.006	0.004

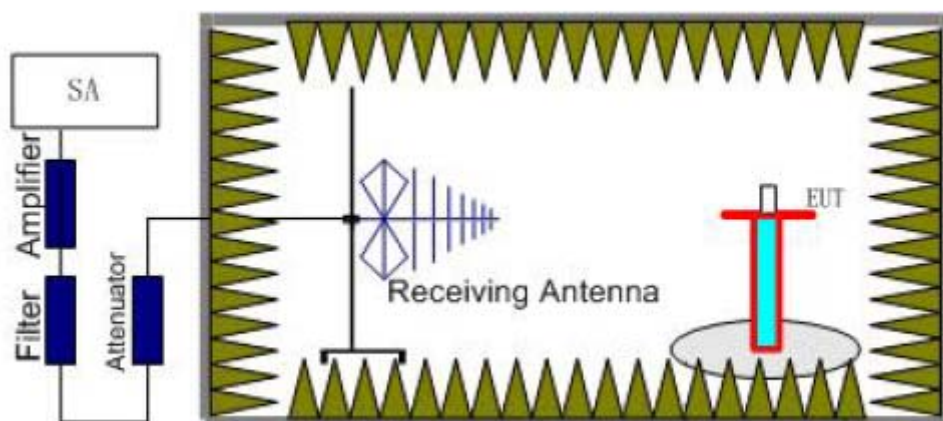


### 2.2.1.7 Radiated Spurious Emissions-FCC Part2.1053/22.917(a)

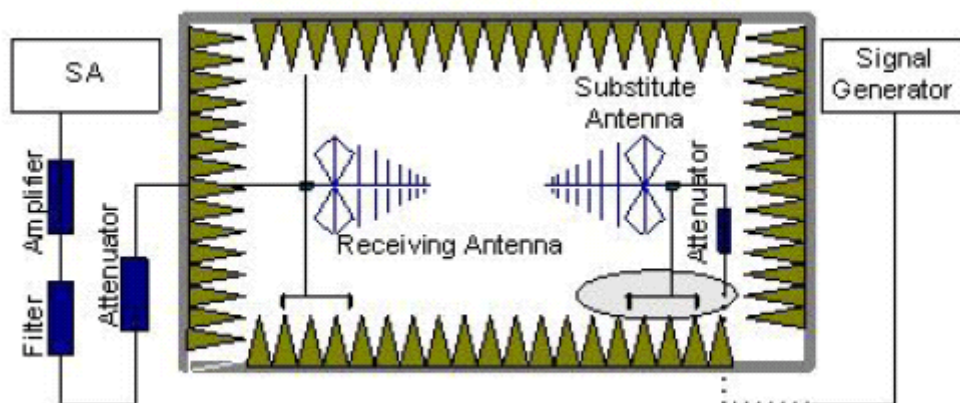
Ambient condition

Temperature	Relative humidity	Pressure
26°C	43%	101.3kPa

Test Setup:



Step 1



Step 2

Test procedure:

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

The spectrum was scanned from 30MHz to the 10<sup>th</sup> harmonic of the highest frequency generated within the equipment.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was

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

#### Step 2:

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

A power ( $P_{mea}$ ) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna ( $P_{ca}$ ) and the Substitution Antenna Gain ( $G_a$ ).

#### Calculation procedure:

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

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

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

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

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

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

The measurement will be done at carrier frequencies that pertain to bottom (Channel 128), middle (Channel 189) and top (Channel 251) channels of the GSM 850 band.

### Test result

#### GSM/GPRS MODE Channel 128:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1648.43	-41.1	-4.6	8.3	-44.8	-13	Vertical
2536.24	-43.2	-5.9	8.9	-46.2	-13	Vertical
2813.47	-42.7	-5.9	8.9	-45.7	-13	Vertical
3367.32	-52.9	-7.5	10.2	-55.6	-13	Vertical
6991.35	-55.1	-9.4	12.0	-57.7	-13	Horizontal
9952.62	-55.8	-11.4	13.8	-58.2	-13	Vertical

#### EDGE(GMSK) MODE Channel 128:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1648.43	-41.1	-4.6	8.3	-44.8	-13	Vertical
2542.87	-43.2	-5.9	8.9	-46.2	-13	Vertical
2807.17	-43.2	-5.9	8.9	-46.2	-13	Vertical
3372.05	-52.7	-7.5	10.2	-55.4	-13	Vertical
7008.66	-55.0	-9.4	12.0	-57.6	-13	Vertical
9963.11	-55.3	-11.4	13.8	-57.7	-13	Vertical

GSM/GPRS MODE Channel 189:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1673.24	-41.1	-4.6	8.3	-44.8	-13	Vertical
2517.57	-43.3	-5.9	8.9	-46.3	-13	Vertical
2816.24	-43.0	-5.9	8.9	-46.0	-13	Vertical
3365.70	-52.6	-7.5	10.2	-55.3	-13	Vertical
6985.75	-55.1	-9.4	12.0	-57.7	-13	Vertical
9962.33	-56.2	-11.4	13.8	-58.6	-13	Horizontal

EDGE(GMSK) MODE Channel 189:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1673.24	-41.0	-4.6	8.3	-44.7	-13	Vertical
2548.36	-43.1	-5.9	8.9	-46.1	-13	Vertical
2794.32	-43.1	-5.9	8.9	-46.1	-13	Vertical
3356.10	-53.3	-7.5	10.2	-56.0	-13	Horizontal
6975.51	-55.4	-9.4	12.0	-58.0	-13	Vertical
9949.02	-55.6	-11.4	13.8	-58.0	-13	Vertical

GSM/GPRS MODE Channel 251:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1670.24	-41.5	-4.6	8.3	-45.2	-13	Vertical
2542.57	-43.0	-5.9	8.9	-46.0	-13	Horizontal
2819.12	-42.6	-5.9	8.9	-45.6	-13	Vertical
3365.94	-53.4	-7.5	10.2	-56.1	-13	Vertical
6982.21	-54.9	-9.4	12.0	-57.5	-13	Vertical
9971.92	-55.3	-11.4	13.8	-57.7	-13	Vertical

EDGE(GMSK) MODE Channel 251:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1687.32	-41.5	-4.6	8.3	-45.2	-13	Vertical
2524.10	-43.4	-5.9	8.9	-46.4	-13	Vertical
2814.55	-42.7	-5.9	8.9	-45.7	-13	Vertical
3381.26	-53.1	-7.5	10.2	-55.8	-13	Horizontal
7010.23	-55.4	-9.4	12.0	-58.0	-13	Vertical
9956.29	-55.9	-11.4	13.8	-58.3	-13	Vertical

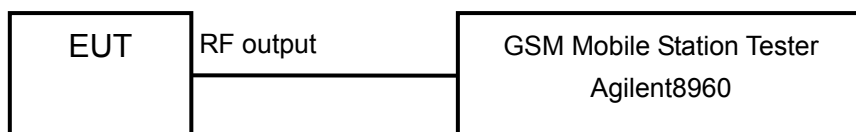
## 2.2.2 PCS1900

### 2.2.2.1 RF Power Output-FCC Part2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

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

Limits	≤ 30dBm

Test result:

GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	29.5
1880.0	661	29.5
1909.8	810	29.4

EDGE(GMSK) MODE:

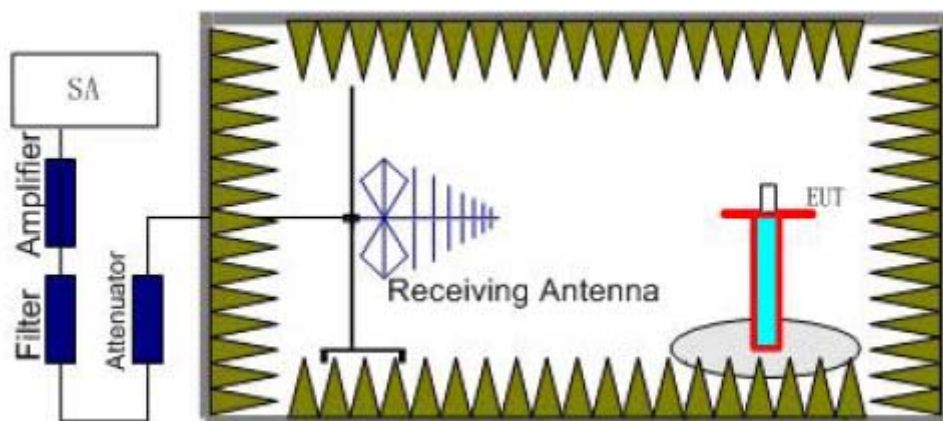
Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	24.4
1880.0	661	24.4
1909.8	810	24.3

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

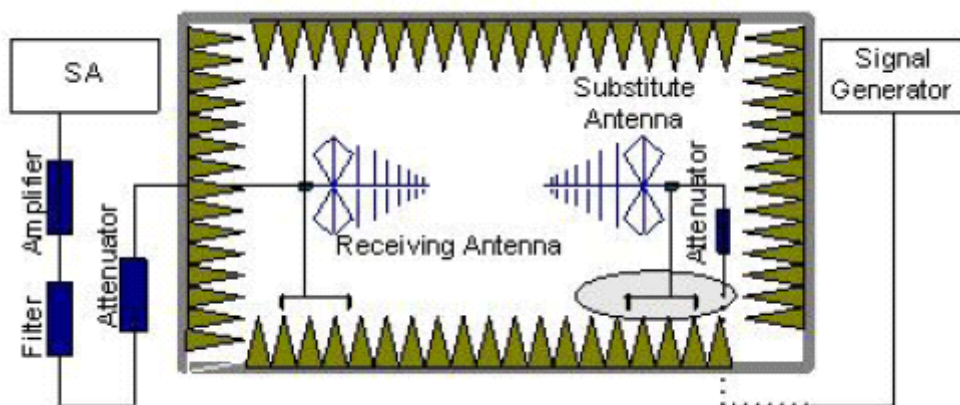
Ambient condition:

Temperature	Relative humidity	Pressure
26°C	43%	101.3kPa

Test setup:



Step 1



Step 2

Test procedure:

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

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna



most 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

**Step 2:**

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (P<sub>mea</sub>) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (P<sub>mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (P<sub>ca</sub>) and the Substitution Antenna Gain (G<sub>a</sub>).

The measurement results are obtained as described below:

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

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

**Limits:**

Operation Mode	Power Step	E.I.R.P. (dBm)
GSM	0	≤33
GPRS	3	≤33
EDGE	5	≤33



Test result:

GSM/GPRS MODE:

Frequency (MHz)	Power step	Peak EIRP(dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1850.2	0	26.1	-4.8	8.6	22.3	Vertical
1880.0	0	25.5	-4.8	8.6	21.7	Vertical
1909.8	0	26.2	-4.8	8.6	22.4	Vertical

EDGE(GMSK) MODE:

Frequency (MHz)	Power step	Peak EIRP(dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1850.2	5	20.9	-4.8	8.6	17.1	Vertical
1880.0	5	21.6	-4.8	8.6	17.8	Vertical
1909.8	5	21.9	-4.8	8.6	18.1	Vertical

Frequency: 1909.8MHz

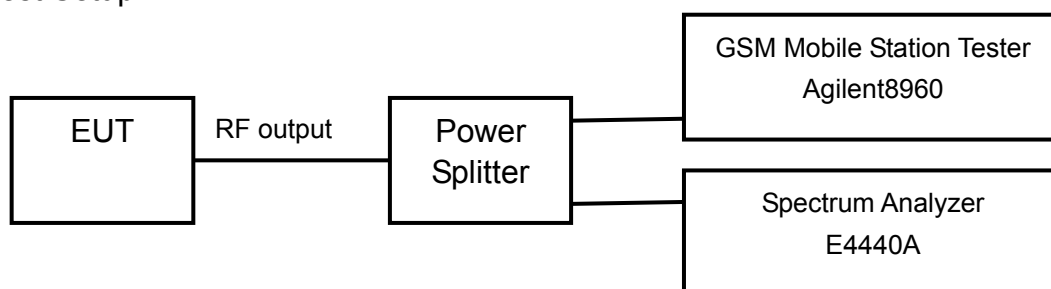
Peak EIRP (dBm) =Pmea (22.4dBm)+Pca(-4.8dBm)+Ga(8.6dB) =26.2dBm

### 2.2.2.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

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

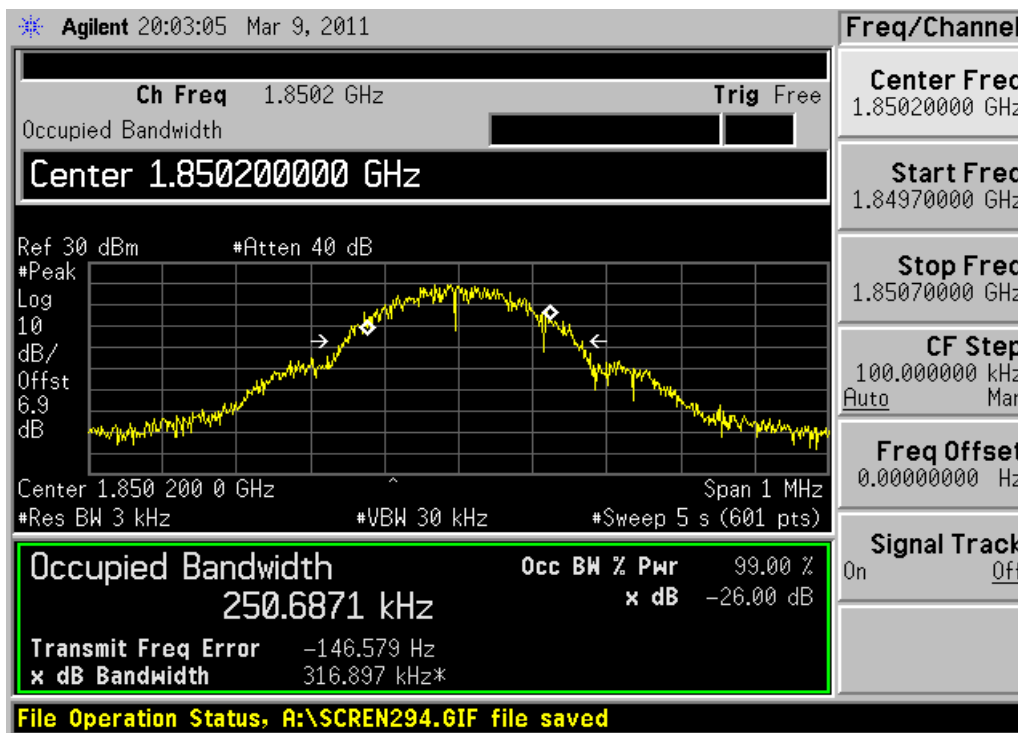
GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	250.69
1880.0	661	253.46
1909.8	810	251.42

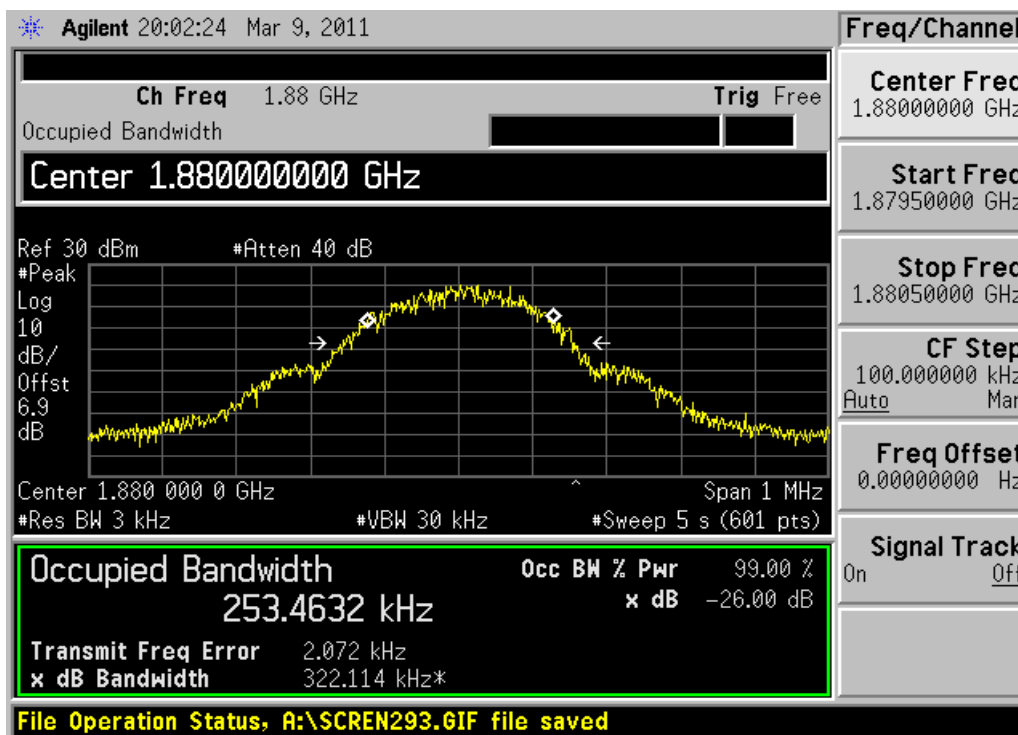
EDGE(GMSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	251.52
1880.0	661	245.61
1909.8	810	250.12

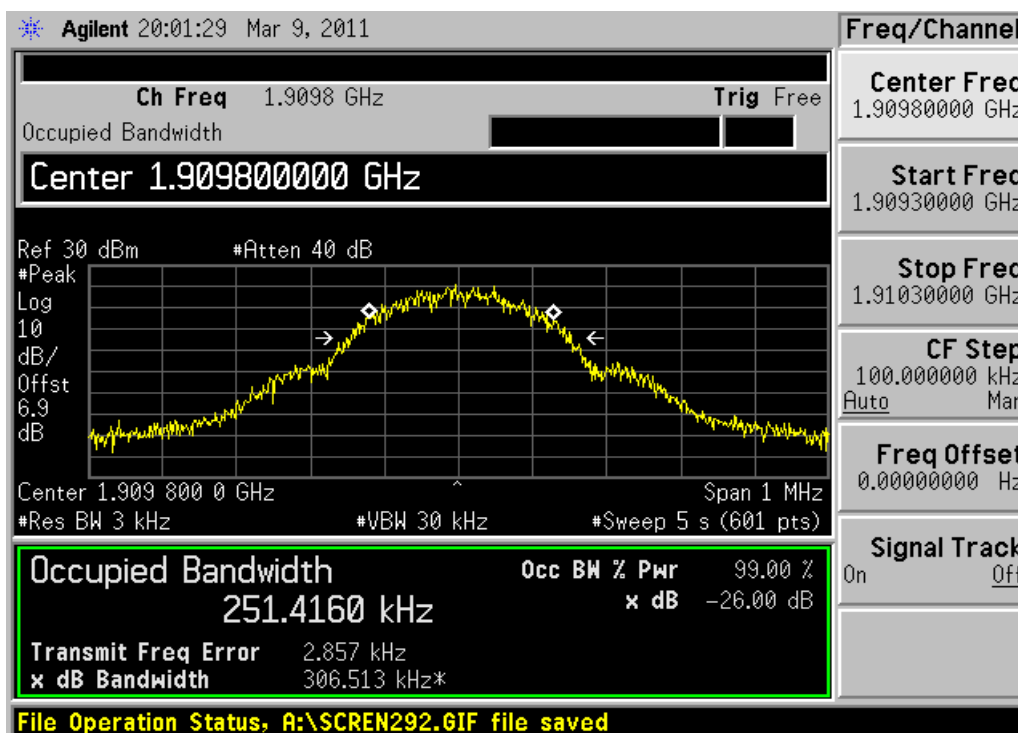
GSM/GPRS MODE:



Channel 512

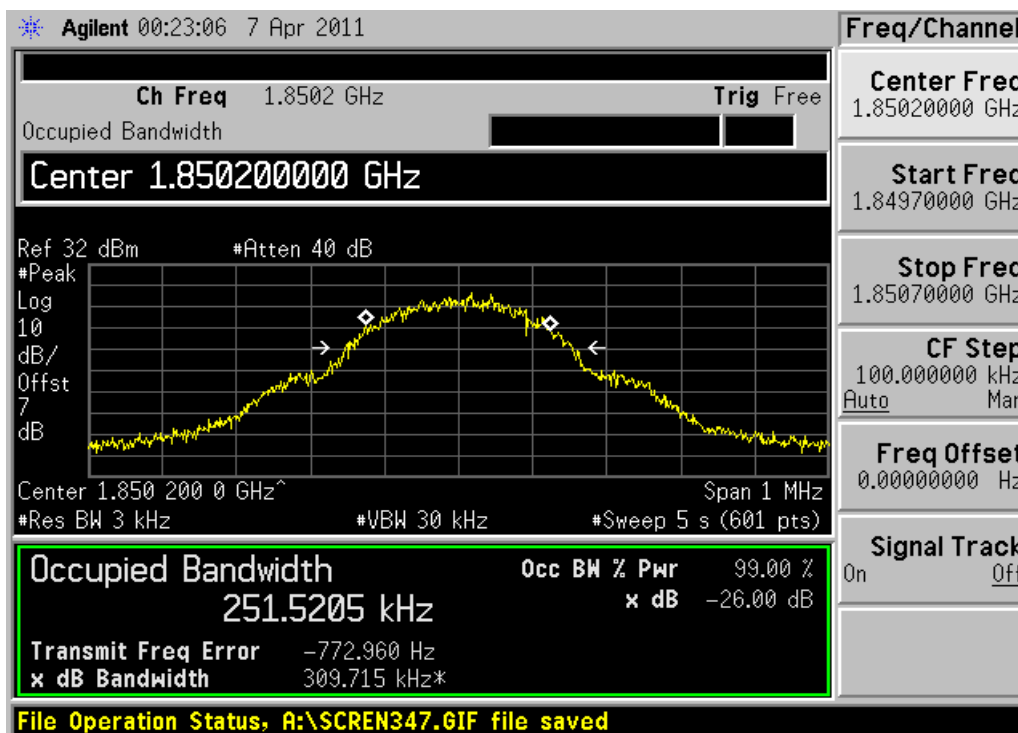


Channel 661

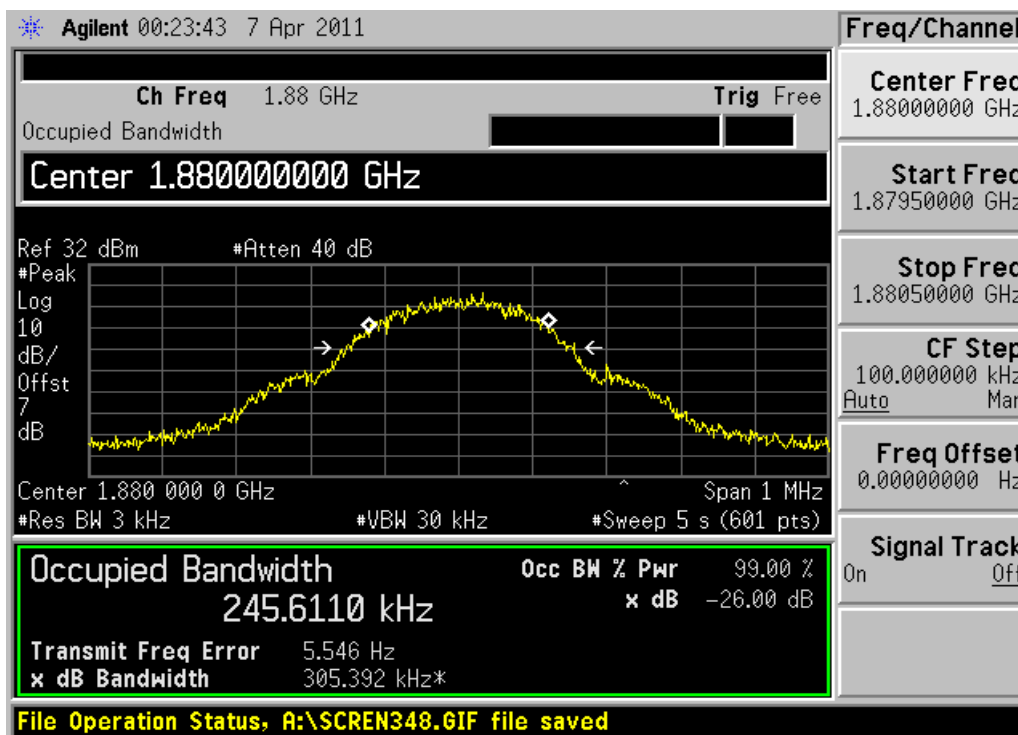


Channel 810

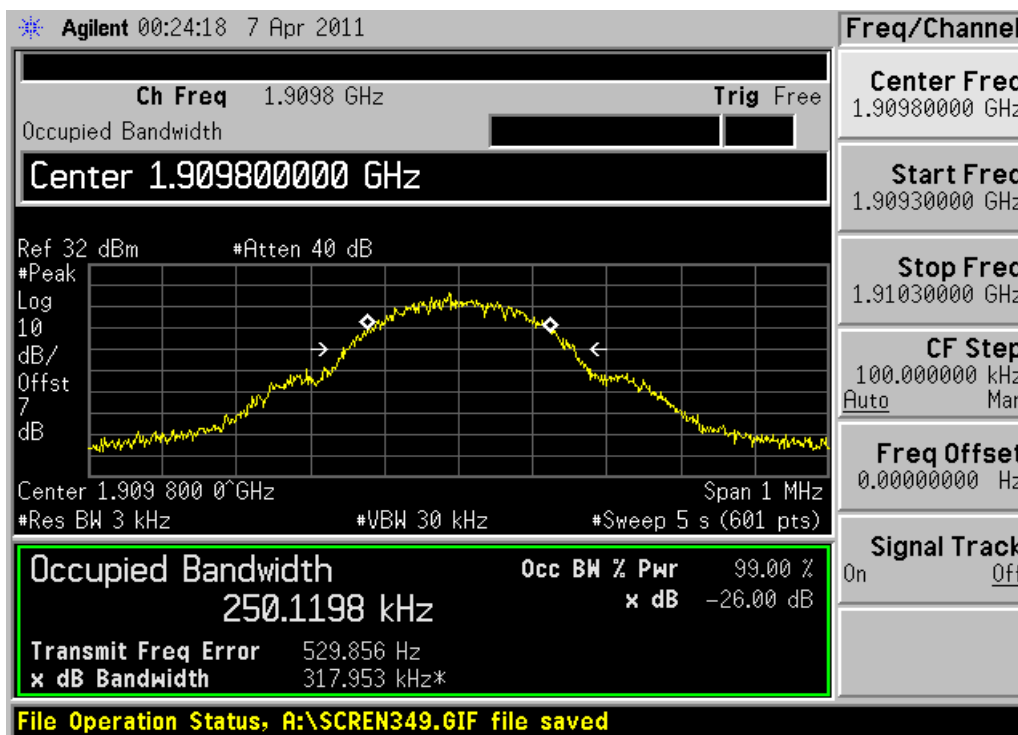
EDGE(GMSK) MODE:



Channel 512



Channel 661



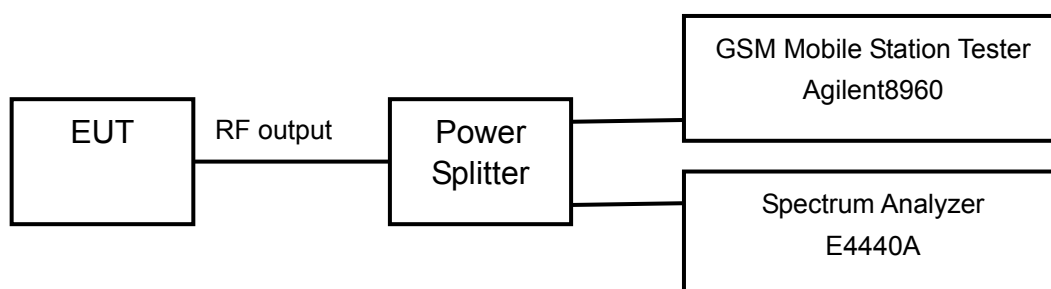
Channel 810

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

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10<sup>th</sup> harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer.

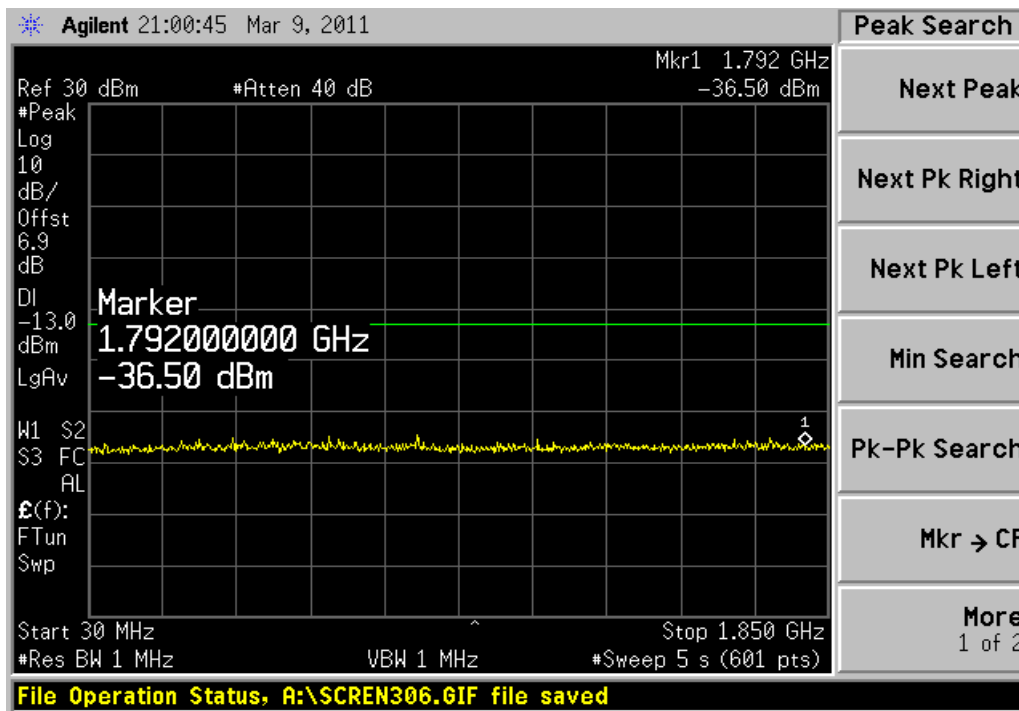
The measurement will be conducted at one channel No661 (middle channel of PCS1900 band)

Limits	≤ -13dBm
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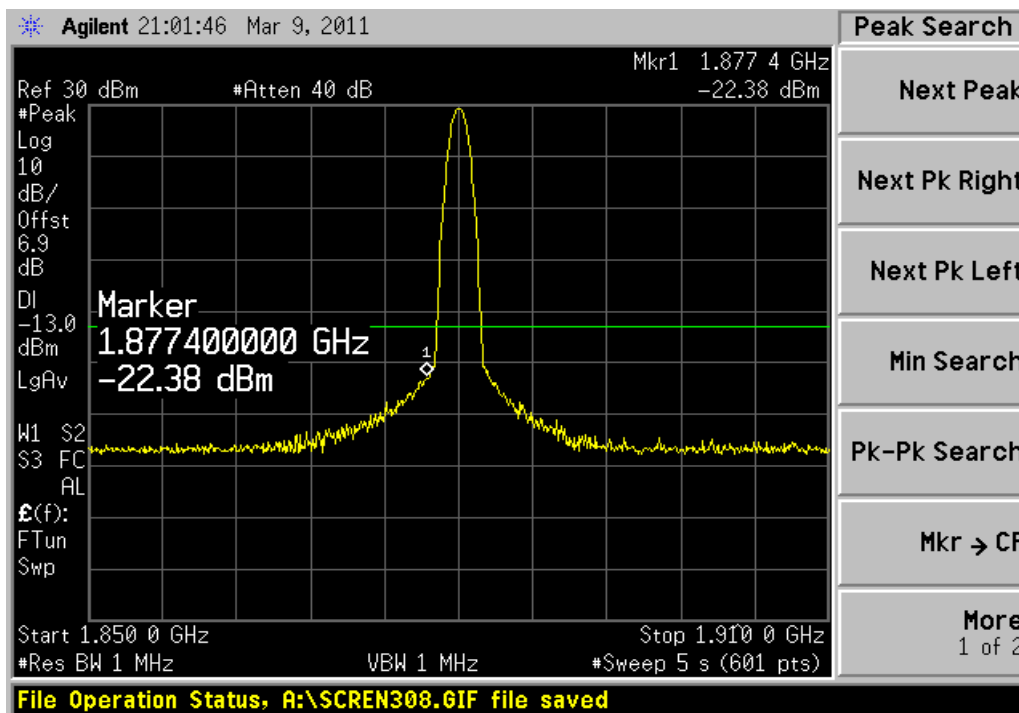
Test result:

Refer to the following figures.

GSM/GPRS MODE:

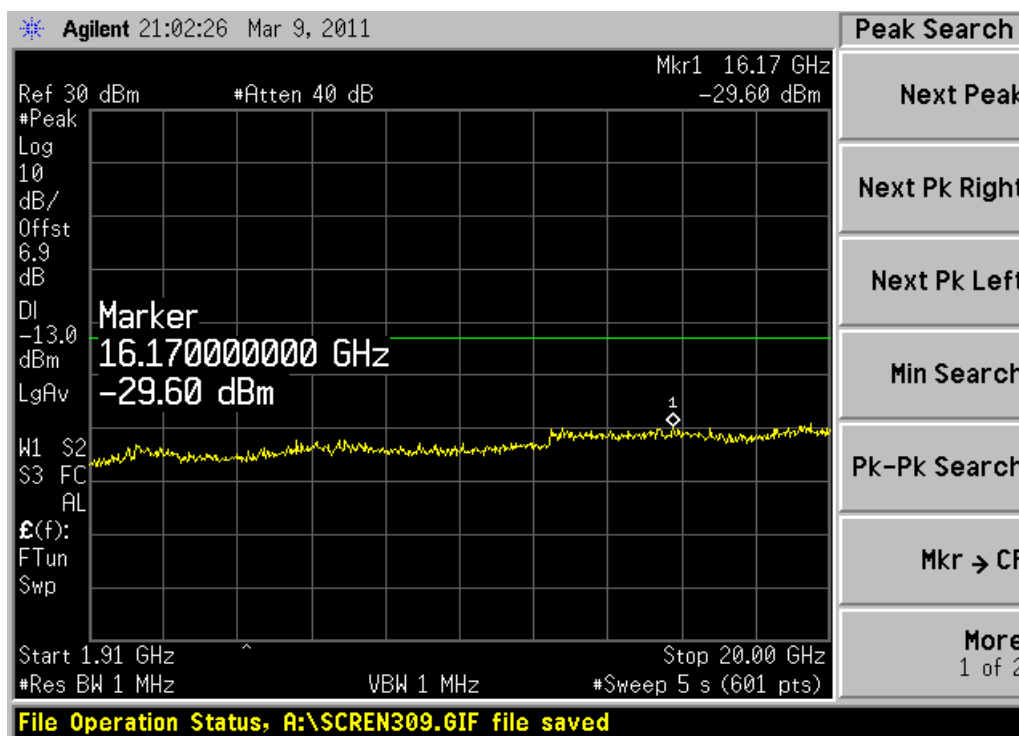


Channel 661, 30MHz~1850MHz



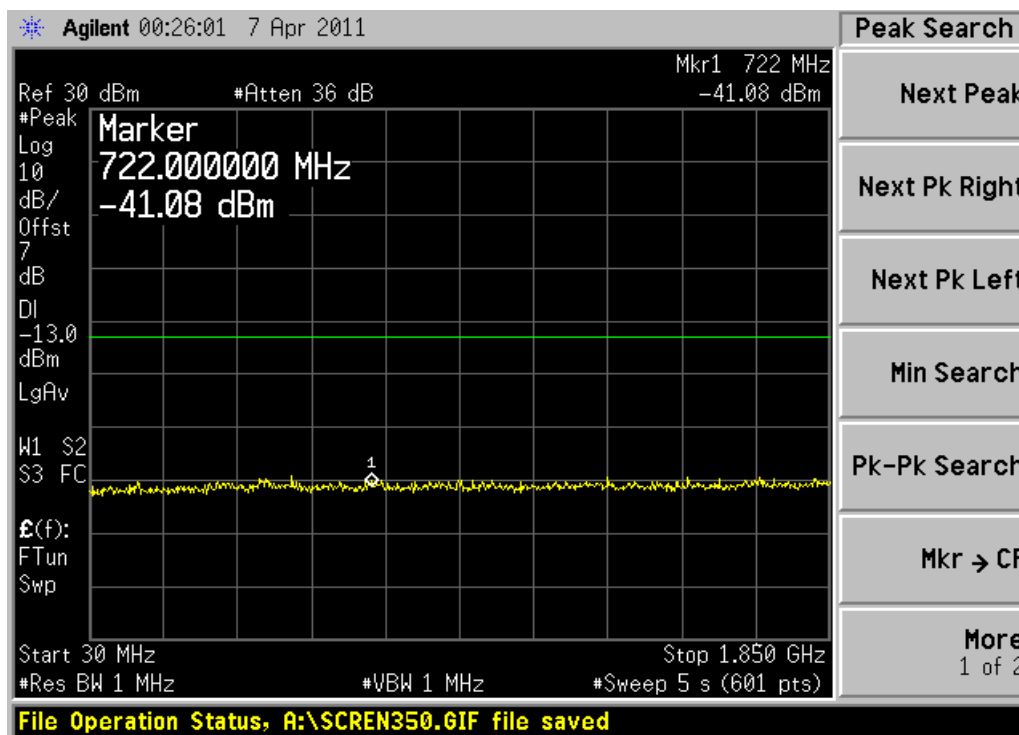
Channel 661, 1850MHz~1910MHz

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



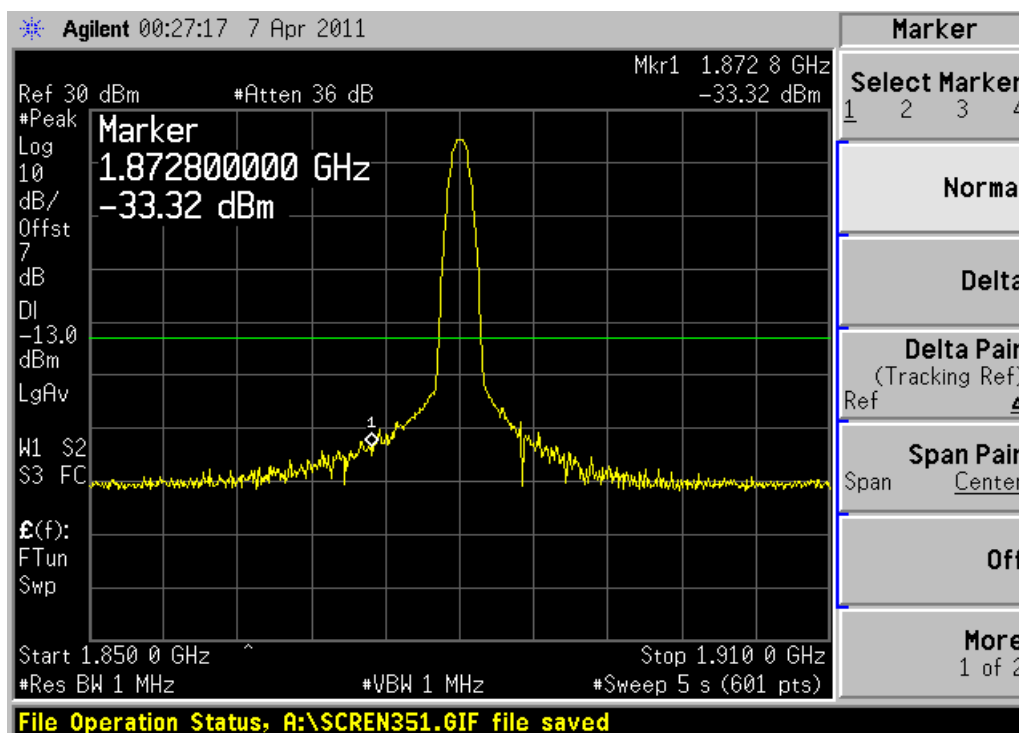
Channel 661, 1910MHz~20GHz

EDGE(GMSK) MODE:



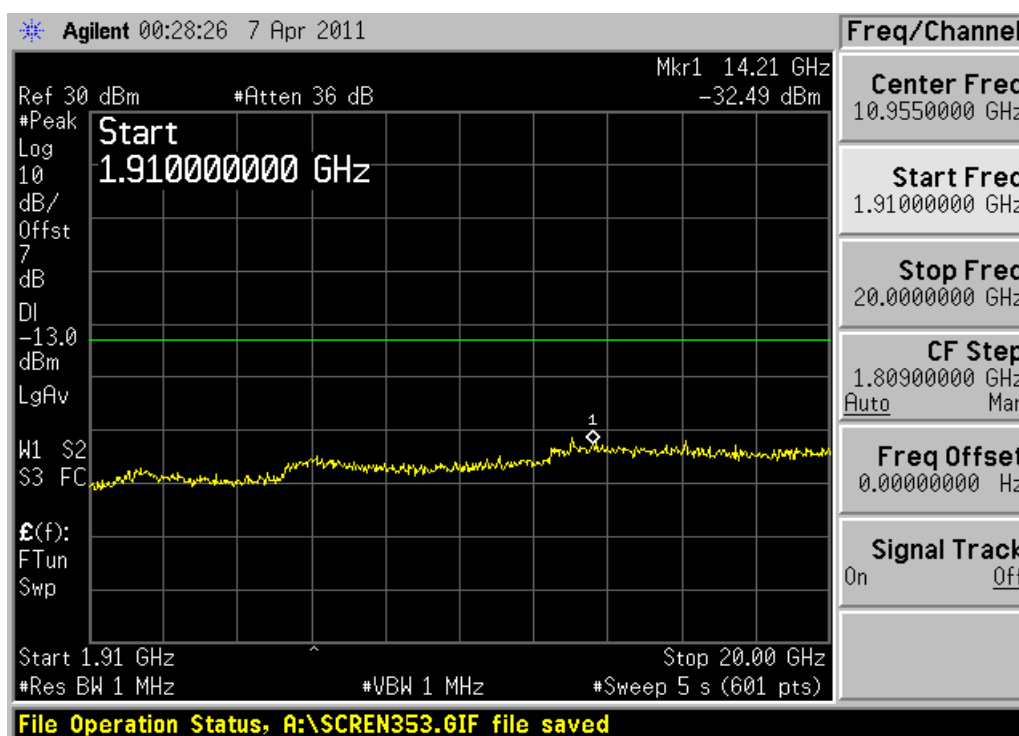
Channel 661, 30MHz~1850MHz





Channel 661, 1850MHz~1910MHz

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



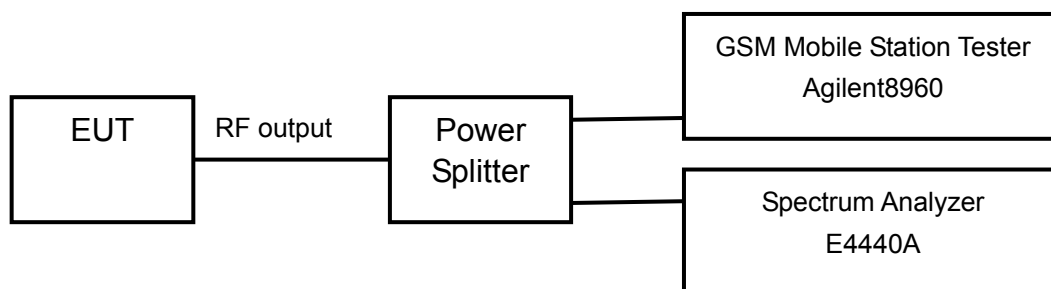
Channel 661, 1910MHz~20GHz

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

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test Setup:



Test procedure:

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

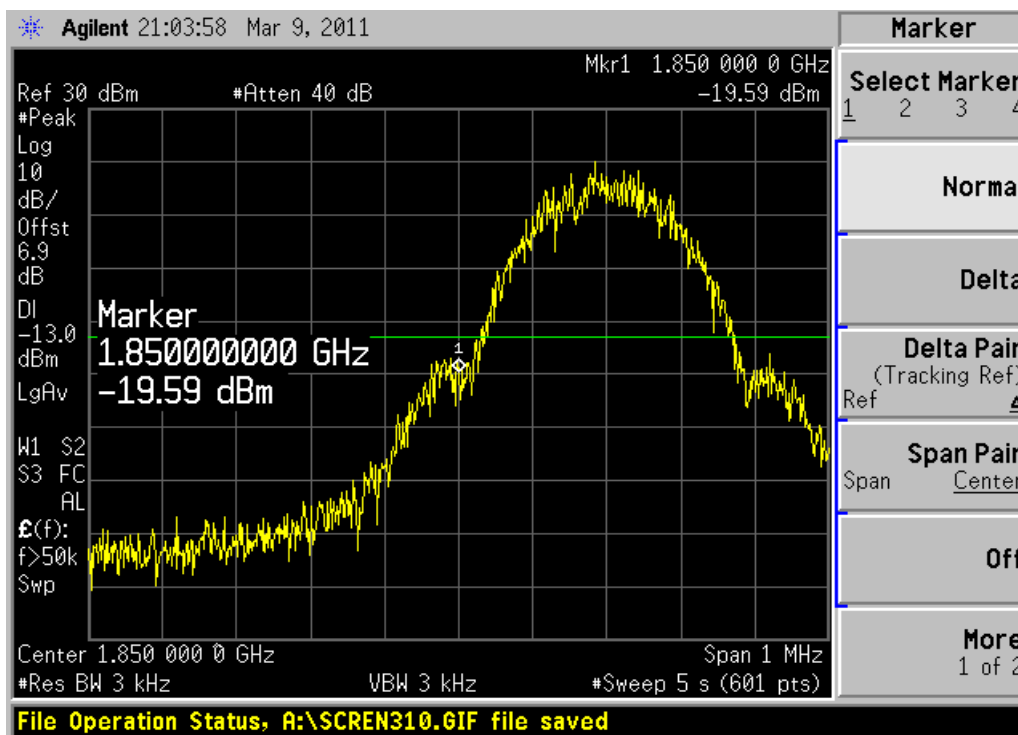
The measurement will be conducted at two channels No512 and No810 (Bottom and top channels of PCS1900 band)

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

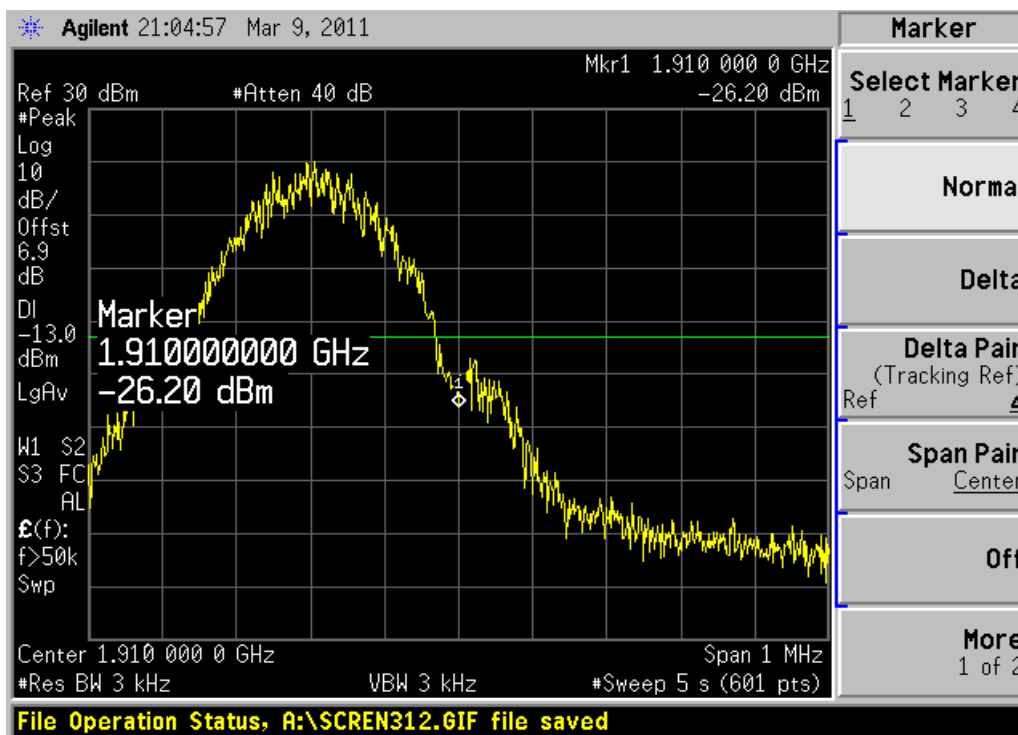
Test result:

Refer to the following figures.

GSM/GPRS MODE:

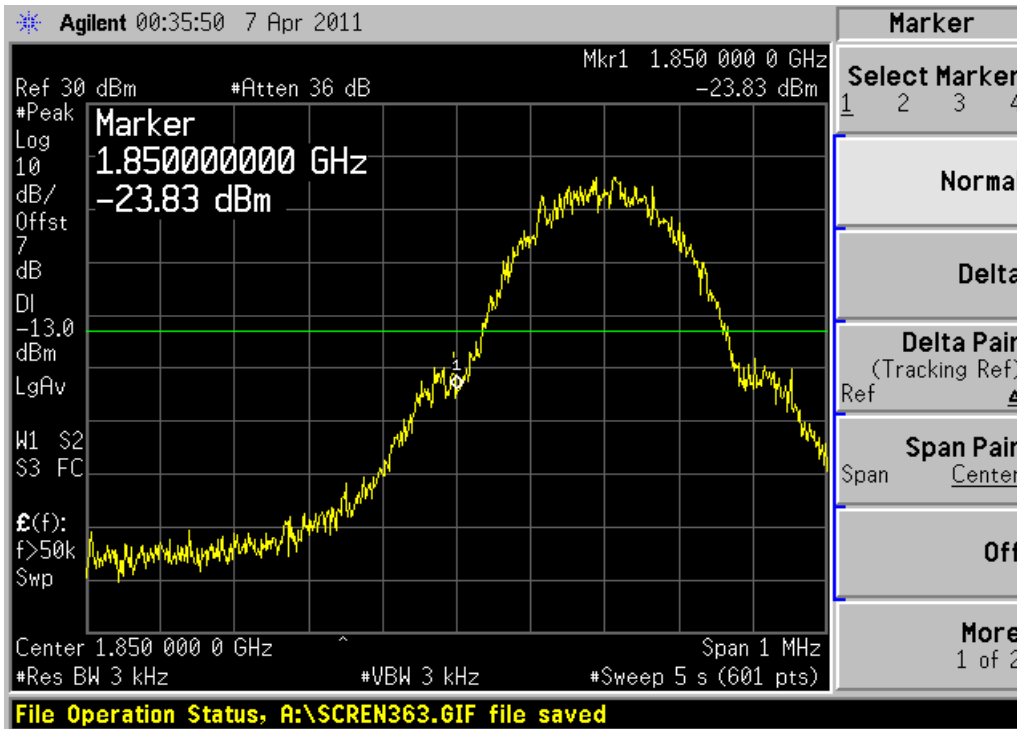


Channel 512

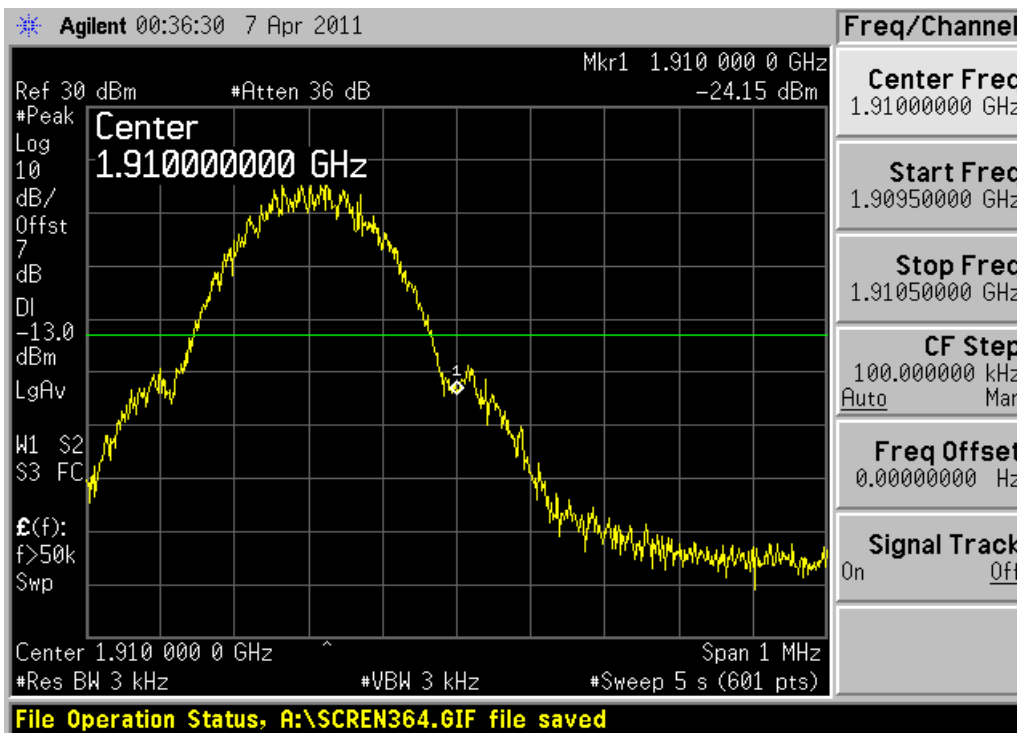


Channel 810

EDGE(GMSK) MODE:



Channel 512



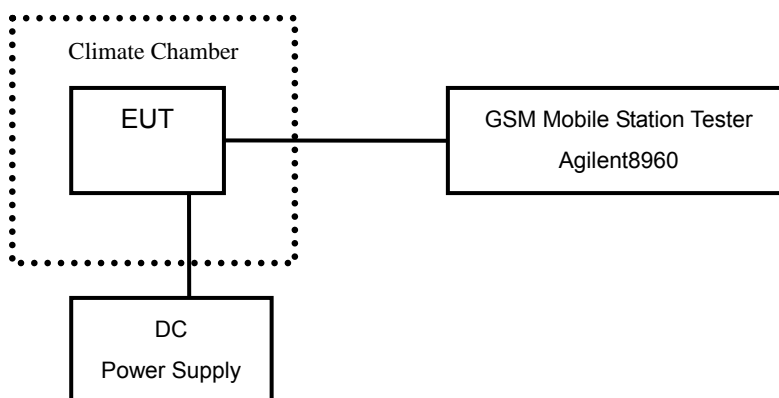
Channel 810

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

Ambient condition:

Temperature	Relative humidity	Pressure
23°C	42%	101.9kPa

Test setup:



Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50° C in 10° C step size, and also the DC power supply voltage to the EUT is varied from 3.5 to 4.2 V. The measurement will be conducted at three channels No512, No661 and No810 (Bottom, middle and top channels of PCS1900 band).

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

Test result:

GSM/GPRS MODE:

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

Voltage (V)	Test Result (ppm)@20° C		
	Channel 512	Channel 661	Channel 810
3.5	0.004	0.005	0.003
4.2	0.005	0.003	0.003

EDGE(GMSK) MODE:

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

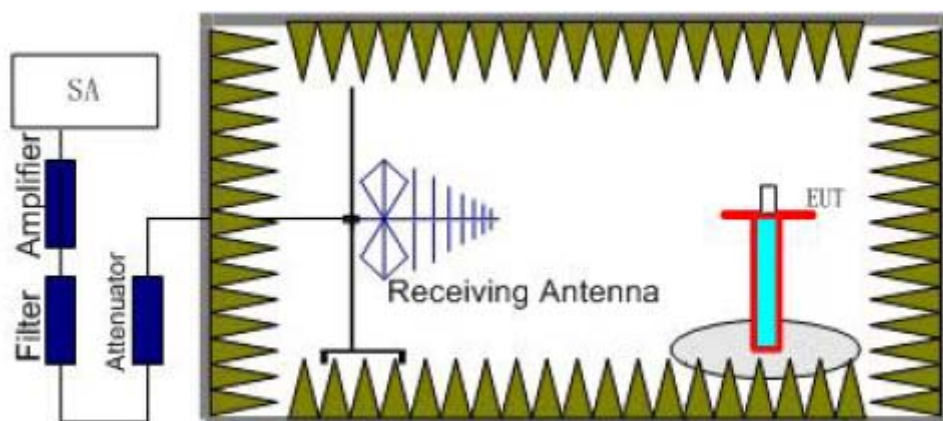
Voltage (V)	Test Result (ppm)@20° C		
	Channel 512	Channel 661	Channel 810
3.5	0.003	0.004	0.004
4.2	0.003	0.003	0.004

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

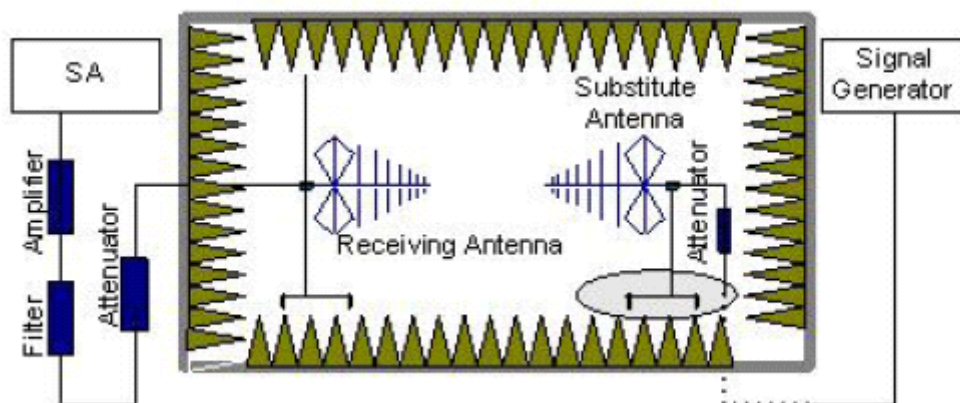
Ambient condition

Temperature	Relative humidity	Pressure
26°C	43%	101.3kPa

Test Setup:



Step 1



Step 2

Test procedure:

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

The spectrum was scanned from 30MHz to the 10<sup>th</sup> harmonic of the highest frequency generated within the equipment.

Step 1:

The measurement is carried out in the fully anechoic chamber. EUT was

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

#### Step 2:

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

A power ( $P_{mea}$ ) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna ( $P_{ca}$ ) and the Substitution Antenna Gain ( $G_a$ ).

#### Calculation procedure:

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

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

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

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



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

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

The measurement will be done at carrier frequencies that pertain to bottom (Channel 512), middle (Channel 661) and top (Channel 810) channels of PCS 1900 band.

Test result:

#### GSM/GPRS MODE Channel 512

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2894.86	-55.1	-5.8	8.9	-58.2	-13	Vertical
2901.24	-55.5	-5.8	8.9	-58.6	-13	Vertical
3700.40	-45.1	-7.9	10.4	-47.6	-13	Vertical
7519.43	-56.6	-10.8	12.0	-57.8	-13	Vertical
17348.79	-54.1	-13.9	12.3	-52.5	-13	Vertical

#### EDGE(GMSK) MODE Channel 512:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2895.02	-55.3	-5.8	8.9	-58.4	-13	Vertical
2901.87	-55.8	-5.8	8.9	-58.9	-13	Vertical
3700.40	-45.7	-7.9	10.4	-48.2	-13	Vertical
7518.25	-56.8	-10.8	12.0	-58.0	-13	Horizontal
17349.01	-54.3	-13.9	12.3	-52.7	-13	Vertical

GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2889.63	-54.7	-5.8	8.9	-57.8	-13	Vertical
2917.15	-55.5	-5.8	8.9	-58.6	-13	Vertical
3760.00	-44.9	-7.9	10.4	-47.4	-13	Vertical
7538.35	-56.9	-10.8	12.0	-58.1	-13	Horizontal
17348.97	-53.6	-13.9	12.3	-52.0	-13	Vertical

EDGE(GMSK) MODE Channel 661:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2902.21	-55.5	-5.8	8.9	-58.6	-13	Horizontal
2888.65	-55.3	-5.8	8.9	-58.4	-13	Vertical
3760.00	-45.3	-7.9	10.4	-47.8	-13	Vertical
7527.57	-56.9	-10.8	12.0	-58.1	-13	Vertical
17338.64	-54.6	-13.9	12.3	-53.0	-13	Vertical

GSM/GPRS MODE Channel 810:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2881.13	-55.3	-5.8	8.9	-58.4	-13	Vertical
2888.50	-55.5	-5.8	8.9	-58.6	-13	Vertical
3819.60	-44.8	-7.9	10.4	-47.3	-13	Horizontal
7509.25	-56.3	-10.8	12.0	-57.5	-13	Vertical
17350.55	-54.3	-13.9	12.3	-52.7	-13	Vertical

EDGE(GMSK) MODE Channel 810:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2901.37	-55.1	-5.8	8.9	-58.2	-13	Vertical
2897.17	-55.5	-5.8	8.9	-58.6	-13	Horizontal
3819.60	-45.3	-7.9	10.4	-47.8	-13	Vertical
7522.17	-56.6	-10.8	12.0	-57.8	-13	Vertical
17339.64	-54.2	-13.9	12.3	-52.6	-13	Vertical

### 2.3. List of test equipments

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

## Appendix

### Appendix1 Test Setup