D-PL-12111-01-01

CNAS L0447

Registration No.910917

TEST REPORT

Report No.: SRTC2014-H024-E0047

Product Name: GSM/GPRS/EDGE/UMTS

Digital Mobile Phone with Bluetooth and WiFi

Marketing Name: ONE TOUCH 7040E

Product Model: Yaris-5

Applicant: TCT Mobile Limited

Manufacturer: TCT Mobile Limited

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

(April 25, 2013 edition)

FCC ID: RAD520

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

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

CONTENTS

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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)
Address: No.80 Beilishi Road, Xicheng District, Beijing China
City: Beijing
Country or Region: China
Contacted person: Wang Junfeng
Tel: +86 10 68009181 +86 10 68009202
Fax: +86 10 68009195 +86 10 68009205
Email: wangjf@srrc.org.cn / wangjunfeng@srtc.org.cn

1.3 Applicant's details

Company: TCT Mobile Limited
Address: 5F, C 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@tcl.com

1.4 Manufacturer's details

Company: TCT Mobile Limited
Address: 5F, C 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@tcl.com

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1.5 Application details

Date of reception of test sample: 9th September 2013
Date of test: 9th September 2013 to 17th July 2014

1.6 Reference specification

FCC Part 24E, Part22H, Part 2 (April 25, 2013 edition)

1.7 Information of EUT

1.7.1 General information

Name of EUT	GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi
FCC ID	RAD520
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	Fixed Internal
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: 4.35V
HW Version	BAB33A000EC1
SW Version	AQU

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1.7.2 EUT details

Product Name	Marketing Name	Product Model	IMEI
GSM/GPRS/EDGE/UMTS Digital Mobile Phone with Bluetooth and WiFi	ONE TOUCH 7040E	Yaris-5	863603020000078

1.7.3 Auxiliary equipment details

Equipment	Charger
Manufacturer	Ten Pao Industrial Co., Ltd.
Model Number	S005UU0500100
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	TUUS050100-A00
Input Voltage	100V-240V a.c.
Output Voltage	5.0V d.c.
Frequency	50/60Hz

Equipment	Battery
Manufacturer	BYD COMPANY LIMITED
Model Number	TLi020F1
Capacity	2000mAh
Rated Voltage	4.35V d.c.

Equipment	Battery
Manufacturer	BYD COMPANY LIMITED
Model Number	TLi019B1
Capacity	1900mAh
Rated Voltage	4.35V d.c.

Equipment	Battery
Manufacturer	SCUD (FUJIAN) Electronics Co., Ltd.
Model Number	TLi019B2
Capacity	1900mAh
Rated Voltage	4.35V d.c.

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Equipment	Data Cable
Manufacturer	Shenzhen Juwei Electronics Co., Ltd.
Model Number	CDA3122002C1

Equipment	Data Cable
Manufacturer	Huizhou Shenghua Industry Co., Ltd.
Model Number	CDA3122002C2

Equipment	Data Cable
Manufacturer	Shenzhen Juwei Electronics Co., Ltd.
Model Number	CDA3122005C1

Equipment	Data Cable
Manufacturer	Huizhou Shenghua Industry Co., Ltd.
Model Number	CDA3122005C2

Note: As the information described above, there are two different models of charger manufactured by two different companies, three different models of battery manufactured by two different companies and four different models of data cable 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 charger, one model of battery and one model of data cable) 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 S005UU0500100, the battery TLi020F1 and the data cable CDA3122002C1.

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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 Effective Isotropic Radiated Power	22.913(a)/24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	22.917(b)/24.238(b)	Pass
5	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)	Pass
6	Band Edges Compliance	2.1051/22.917(a)/24.238(a)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	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 Bin Test engineer	Issued date: **2014.07.18**

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2.2 Test result

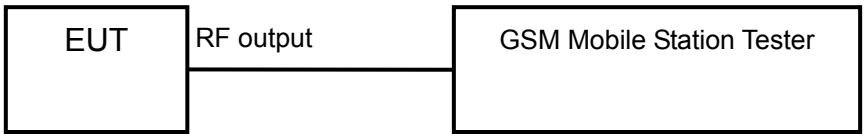
2.2.1 GSM850

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	≤33dBm

Test result:

GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	32.84
836.4	189	32.82
848.8	251	32.77

EDGE (GMSK, 1Slot) MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	32.83
836.4	189	32.80
848.8	251	32.76

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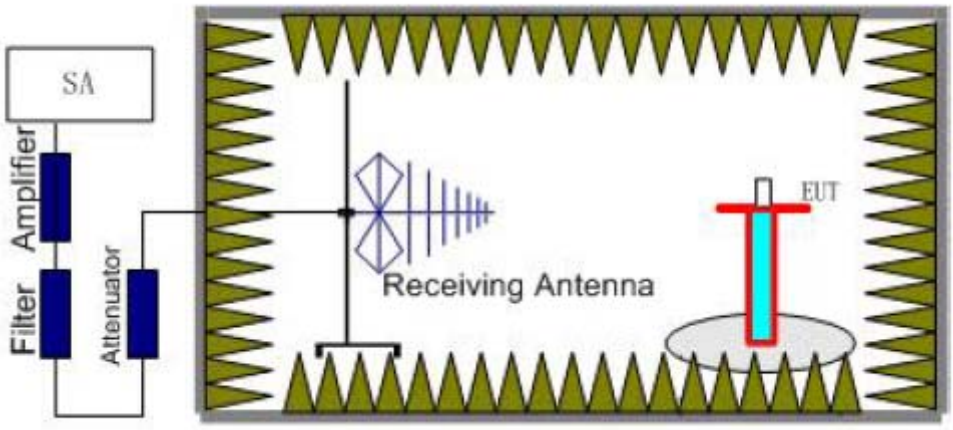
2.2.1.2 Effective Radiated Power-FCC Part22.913(a)

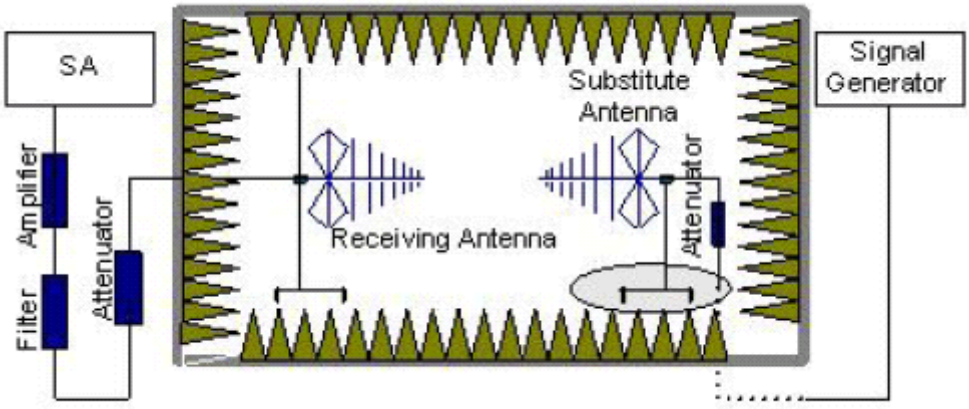
Ambient condition:

Temperature	Relative humidity	Pressure
23°C	43%	99.7kPa

Test setup:



Step 1



Step 2

Test procedure:
The measurements procedures in TIA-603C-2004 are used.
Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the

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

Step 2:

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

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

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

The measurement results are obtained as described below:

Power (EIRP) = Pmea+ Pca+ Ga

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

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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	32.50	-3.8	8.6	2.15	29.85	Vertical
836.4	5	32.48	-3.8	8.6	2.15	29.83	Vertical
848.8	5	32.98	-3.8	8.6	2.15	30.33	Vertical

EDGE (GMSK, 1Slot) MODE:

Frequency (MHz)	Power step	Peak ERP (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
824.2	5	32.70	-3.8	8.6	2.15	30.05	Vertical
836.4	5	32.57	-3.8	8.6	2.15	29.92	Vertical
848.8	5	32.87	-3.8	8.6	2.15	30.22	Vertical

Frequency: 848.8MHz

Peak ERP(dBm) = Pmea(30.33dBm)+Pca (-3.8dB)+Ga(8.6dB)–2.15dB = 32.98dBm

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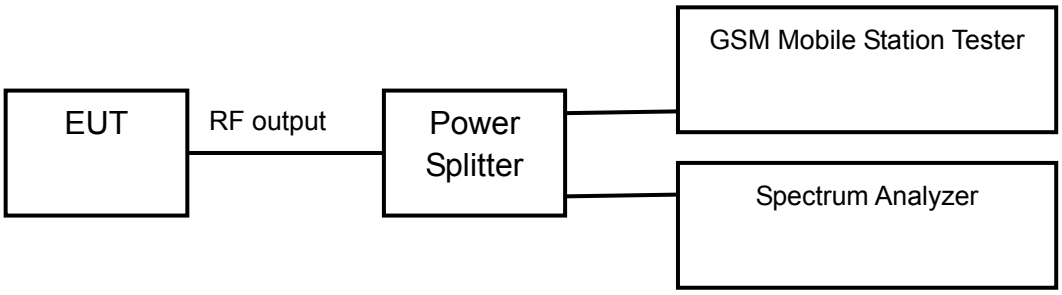
2.2.1.3 Occupied Bandwidth-FCC Part2.1049

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	247.77
836.4	189	247.77
848.8	251	247.37

EDGE (GMSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	247.64
836.4	189	246.55
848.8	251	247.46

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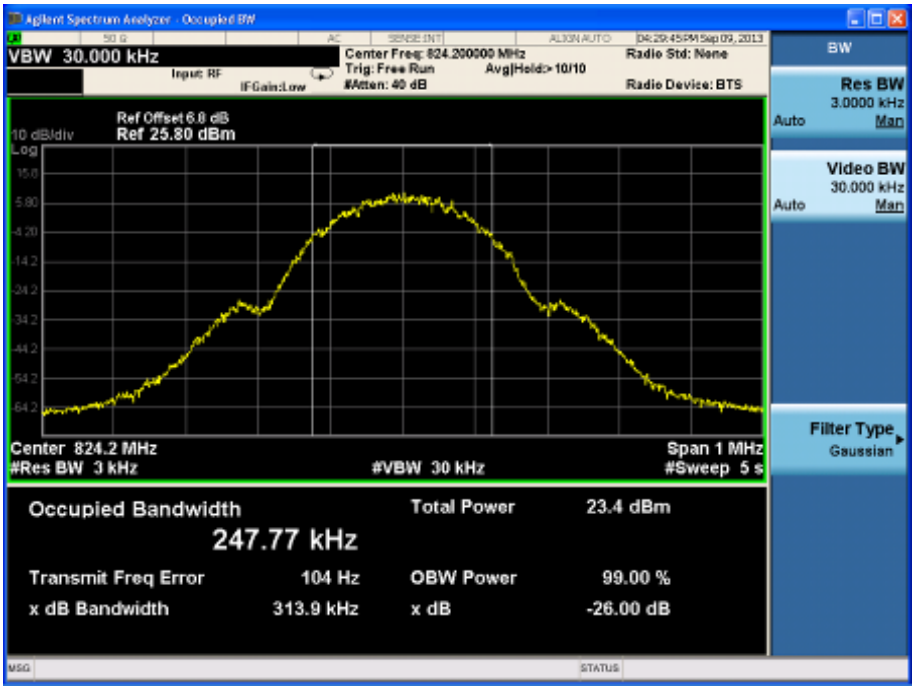
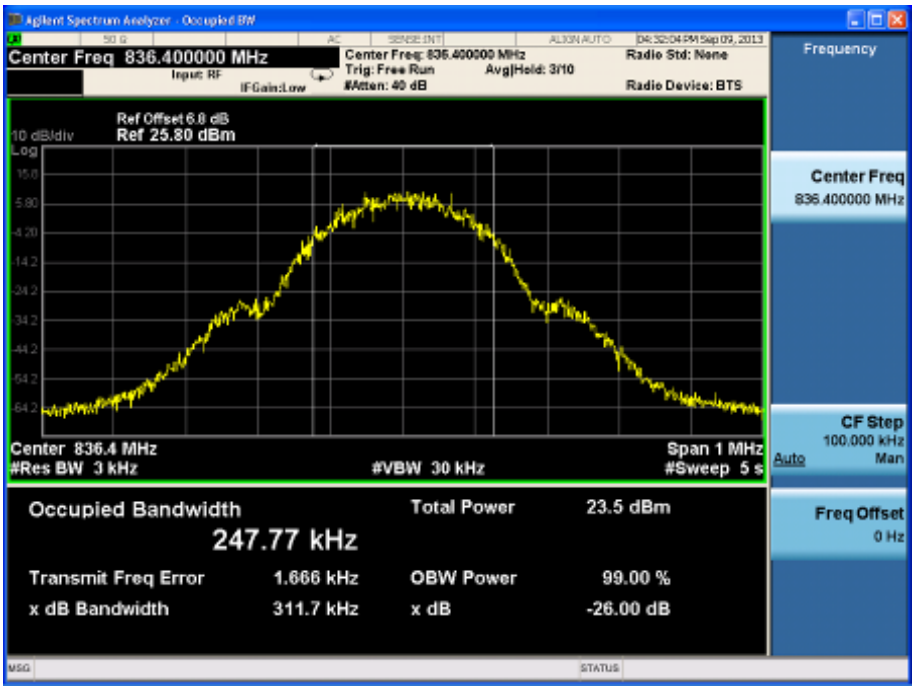
GSM/GPRS MODE:



Channel 128



Channel 189

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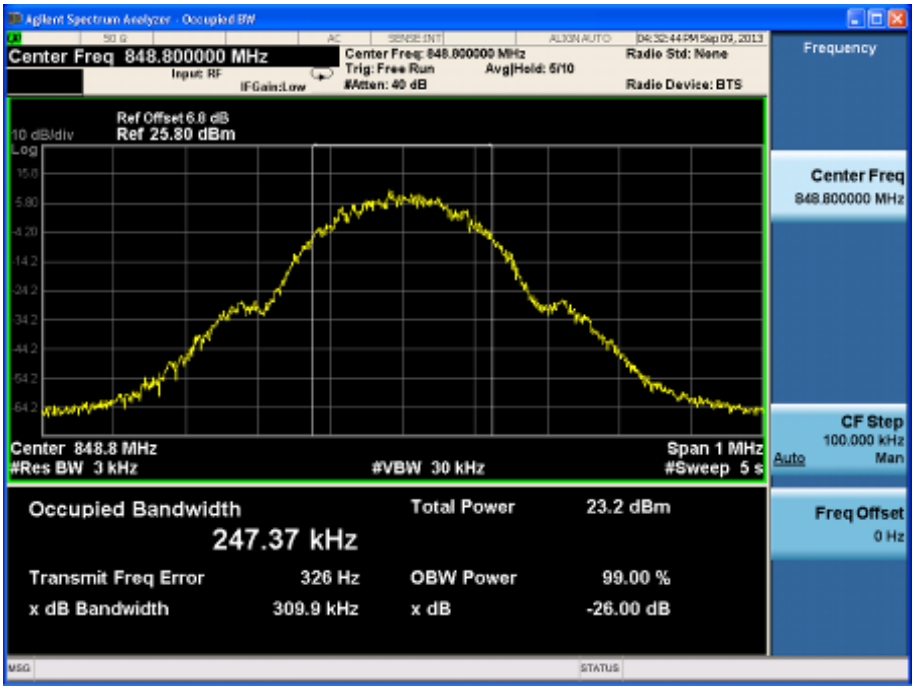
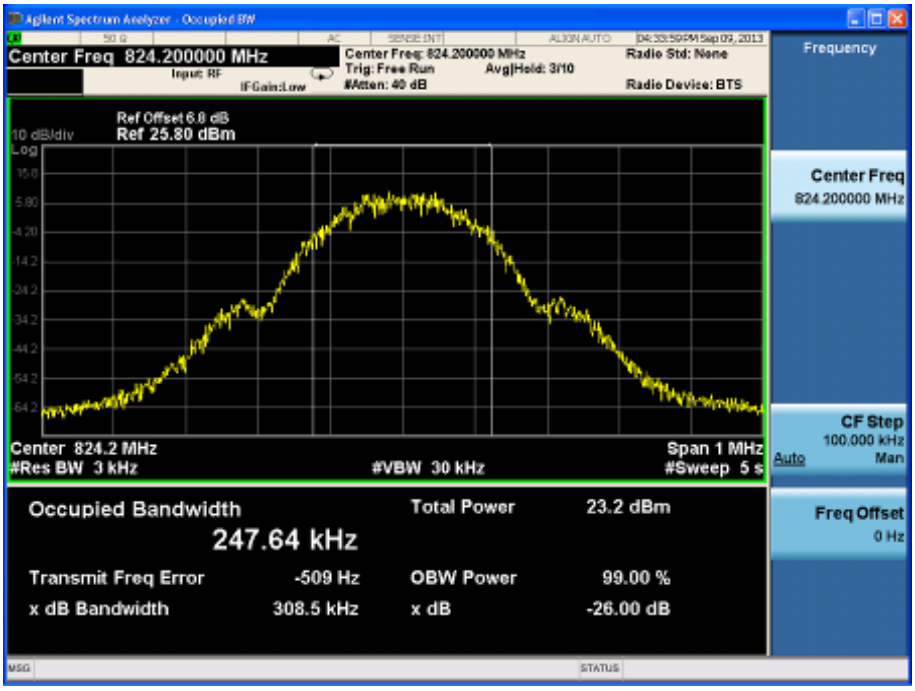


Channel 251

EDGE (GMSK) MODE:



Channel 128

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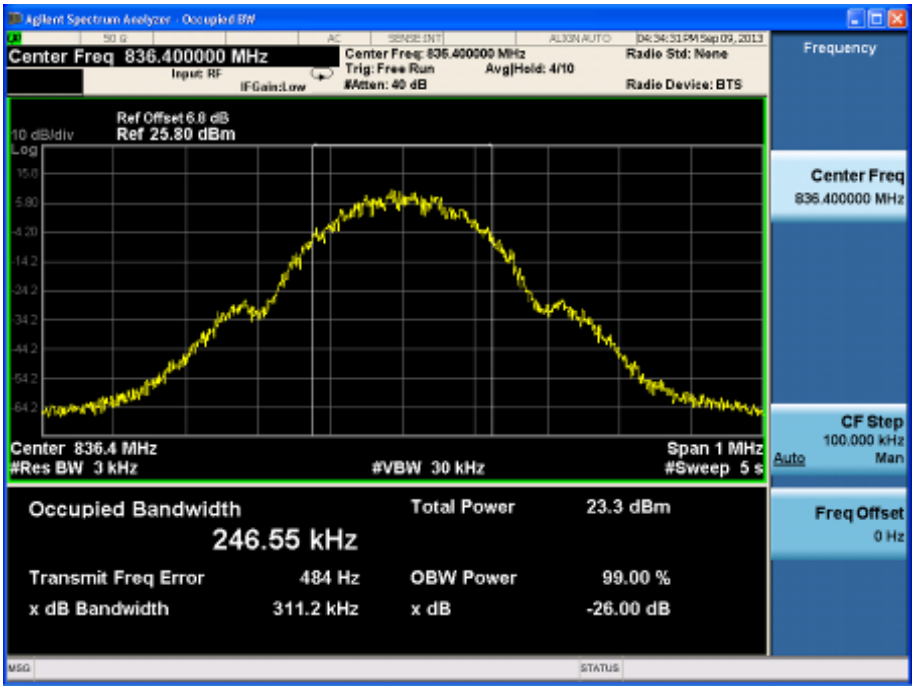
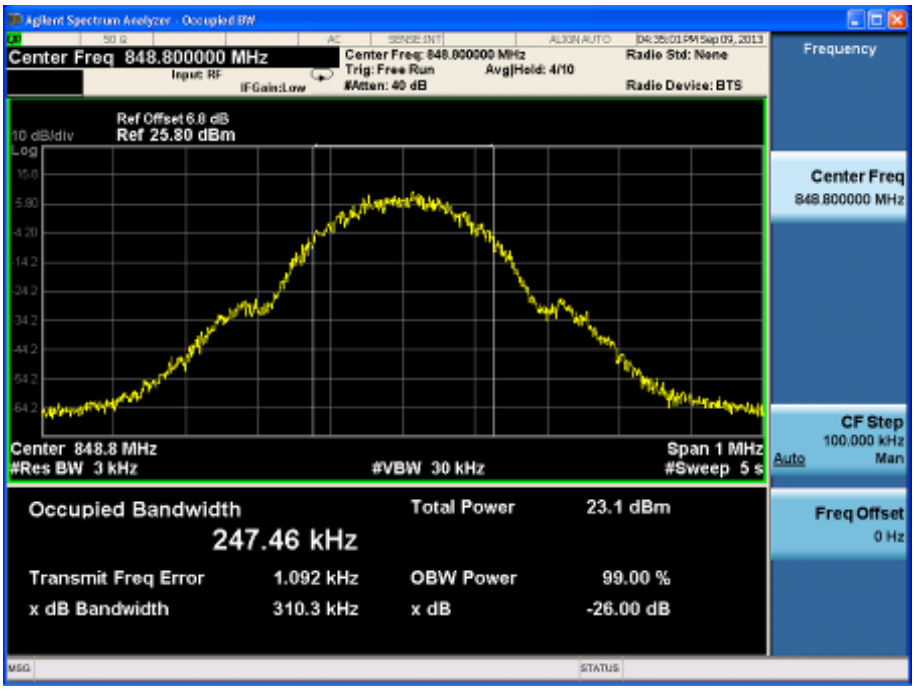


Channel 189



Channel 251

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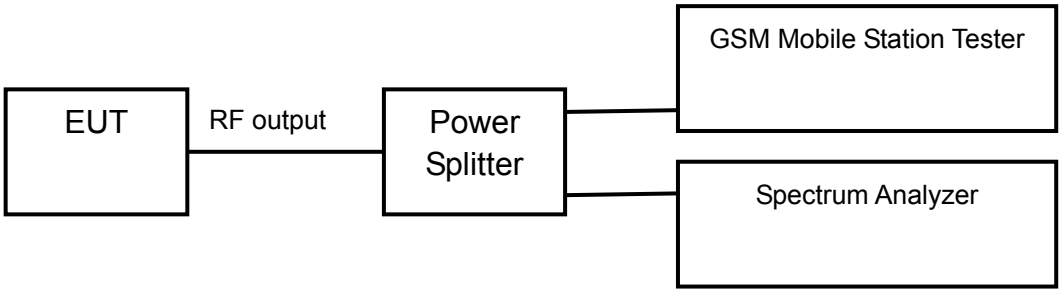
2.2.1.4 Emission Bandwidth-FCC Part22.917(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23℃	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 emission bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of -26dB transmitter 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 emission bandwidth requirements in part 22.917(b)

Test result:
GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
824.2	128	313.9
836.4	189	311.7
848.8	251	309.9

EDGE (GMSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
824.2	128	308.5
836.4	189	311.2
848.8	251	310.3

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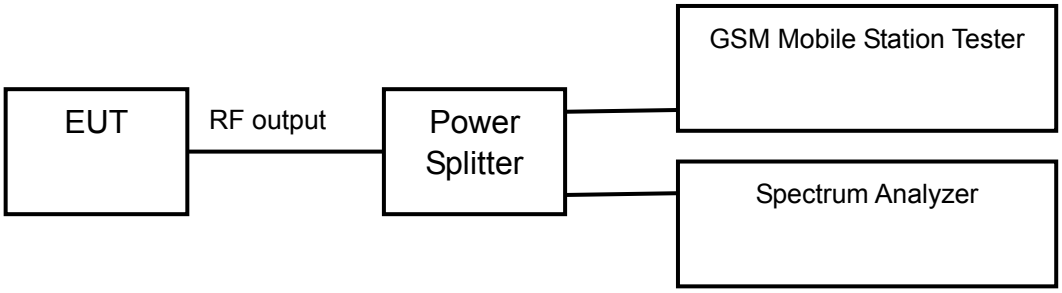
2.2.1.5 Spurious Emissions at antenna terminal-FCC Part2.1051/22.917(a)

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 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 No189 (middle channel of GSM850 band)

Limits	≤-13dBm

Test result:
Refer to the following figures.

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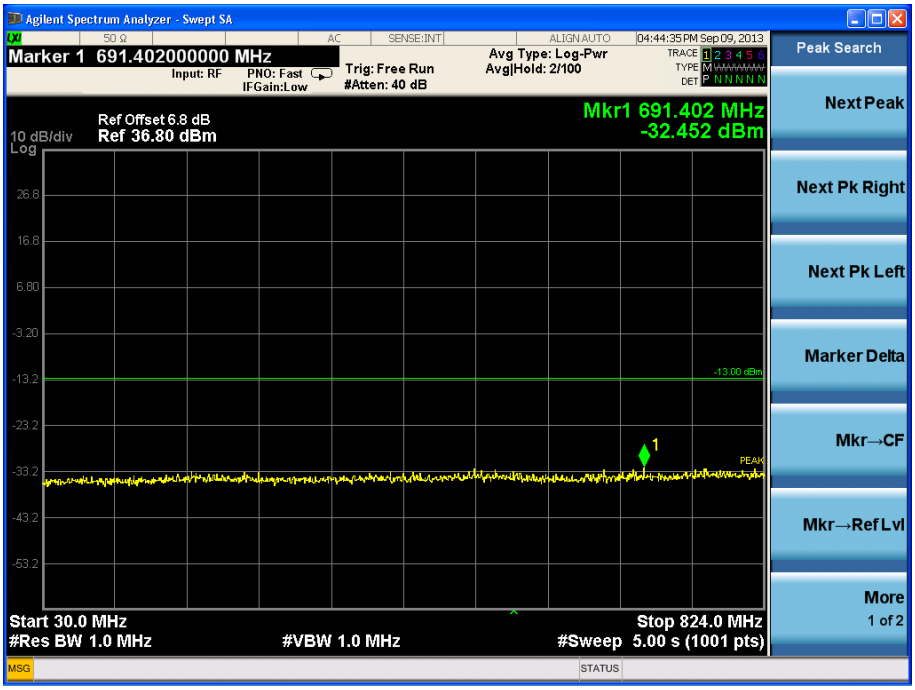
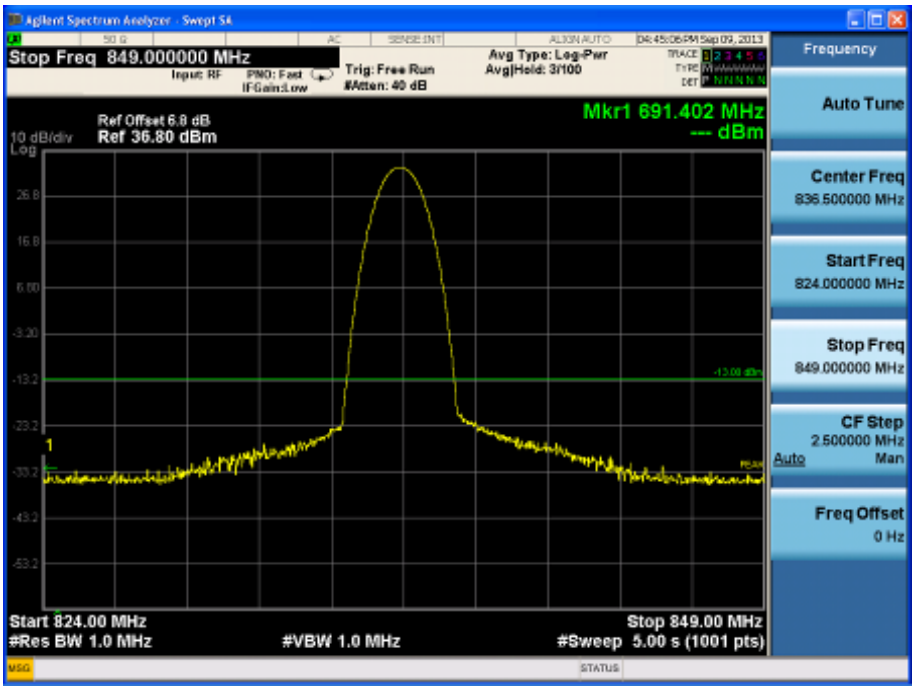
GSM/GPRS MODE:



Channel 189, 30MHz~824MHz



Channel 189, 824MHz~849MHz

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

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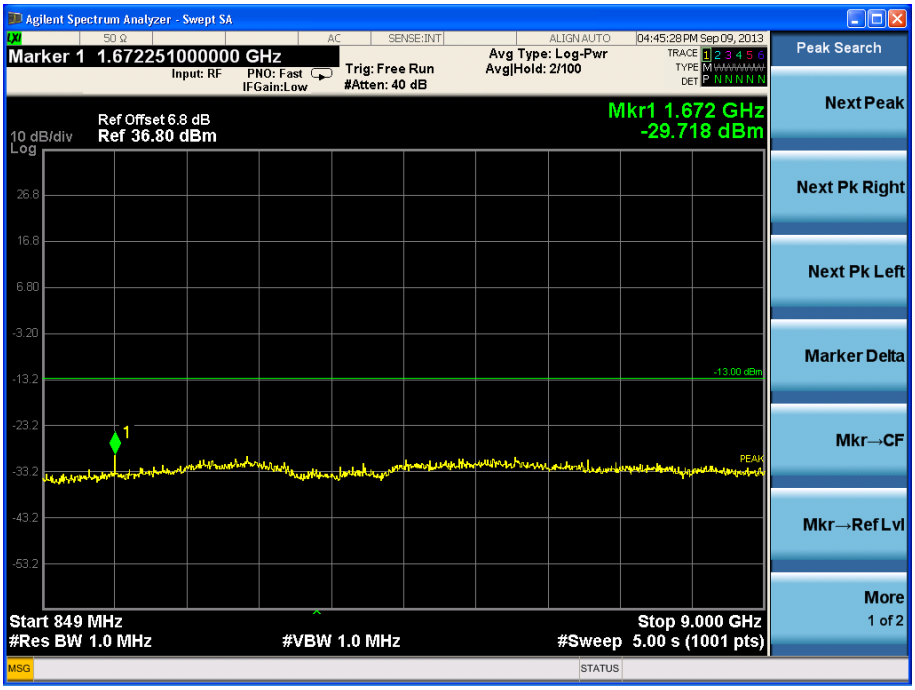
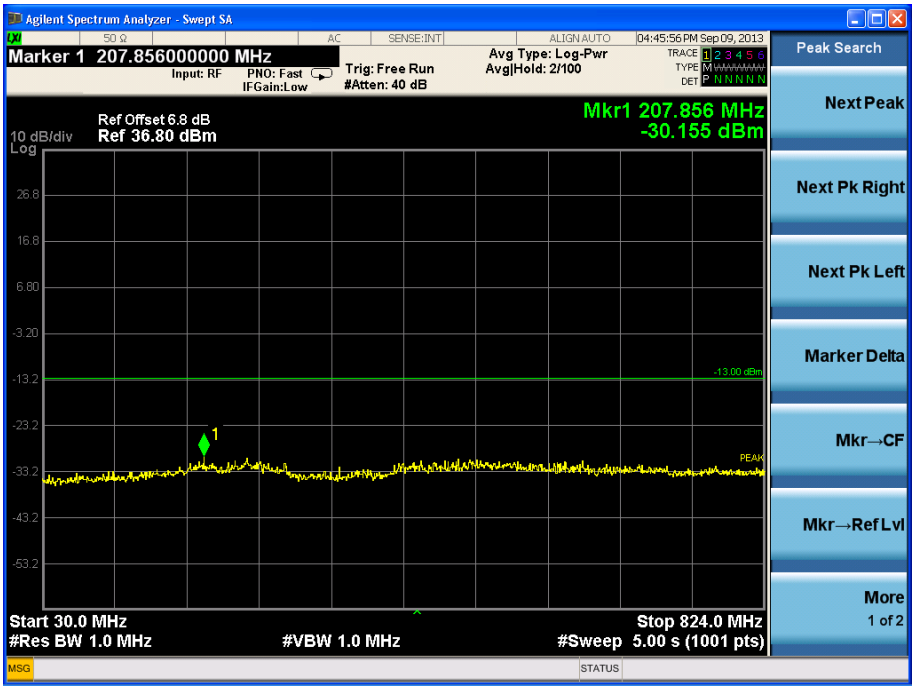


Channel 189, 849MHz~9GHz

EDGE (GMSK) MODE:



Channel 189, 30MHz~824MHz

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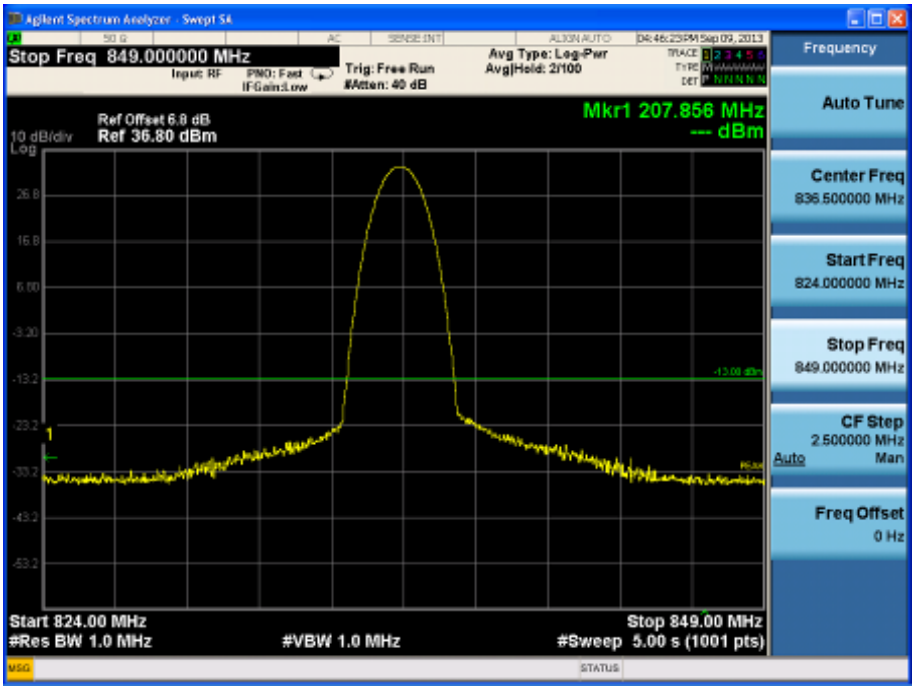
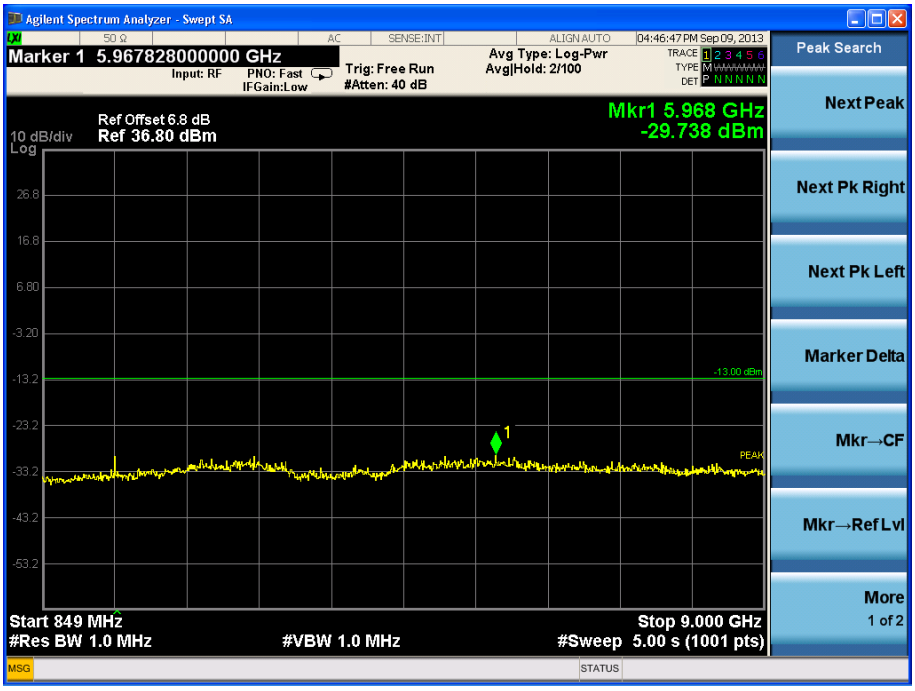


Channel 189, 824MHz~849MHz

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



Channel 189, 849MHz~9GHz

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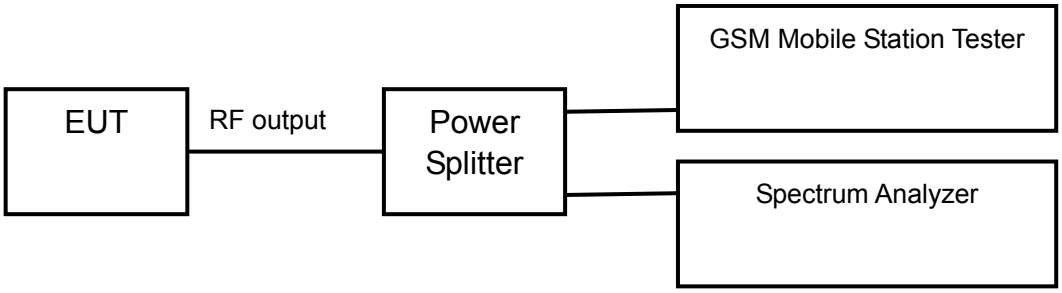
2.2.1.6 Band Edges Compliance-FCC Part2.1051/22.917(a)

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 at least 1% of the emission bandwidth on spectrum analyzer.
The measurement will be conducted at two channels No128 and No251 (Bottom and top channels of GSM850 band)

Limits	≤-13dBm

Test result:
Refer to the following figures.

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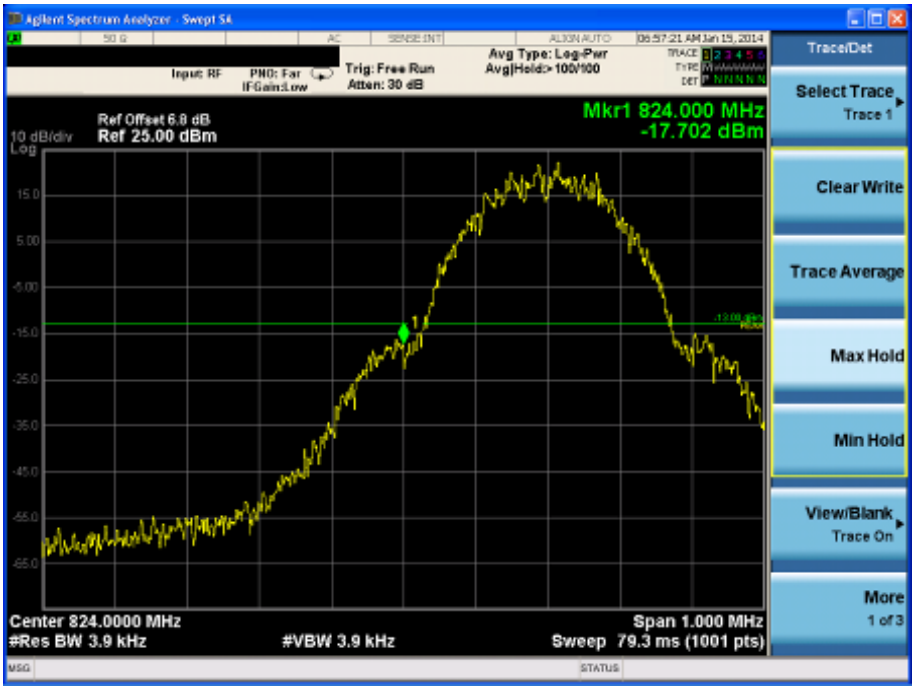
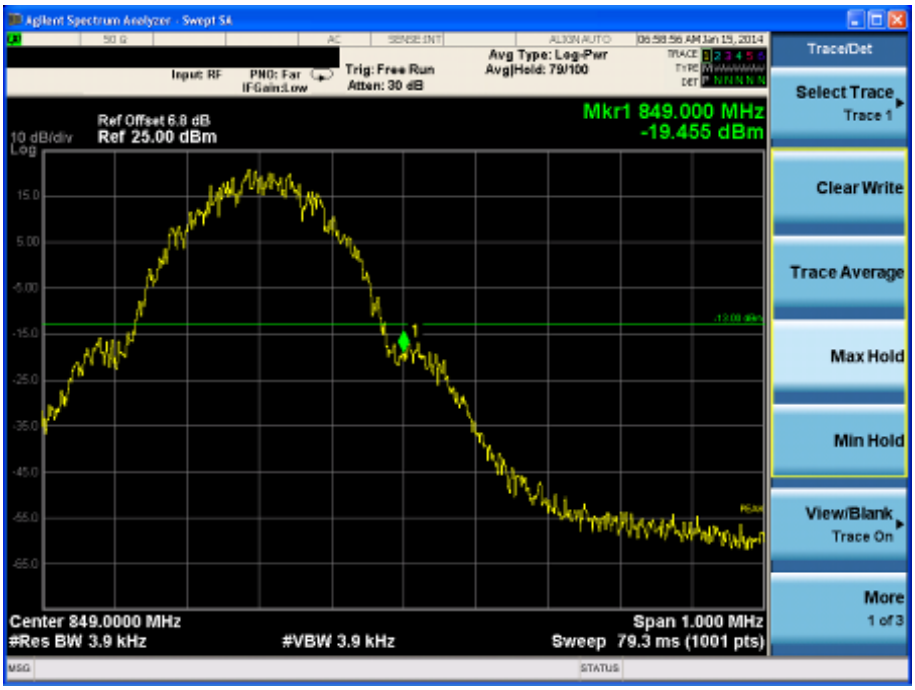
GSM/GPRS MODE:



Channel 128



Channel 251

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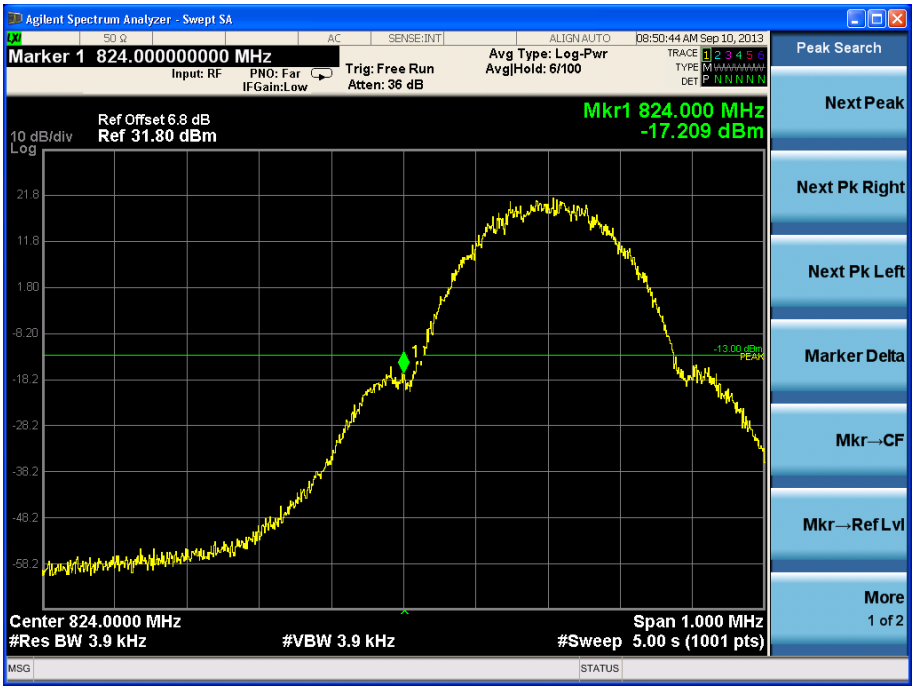
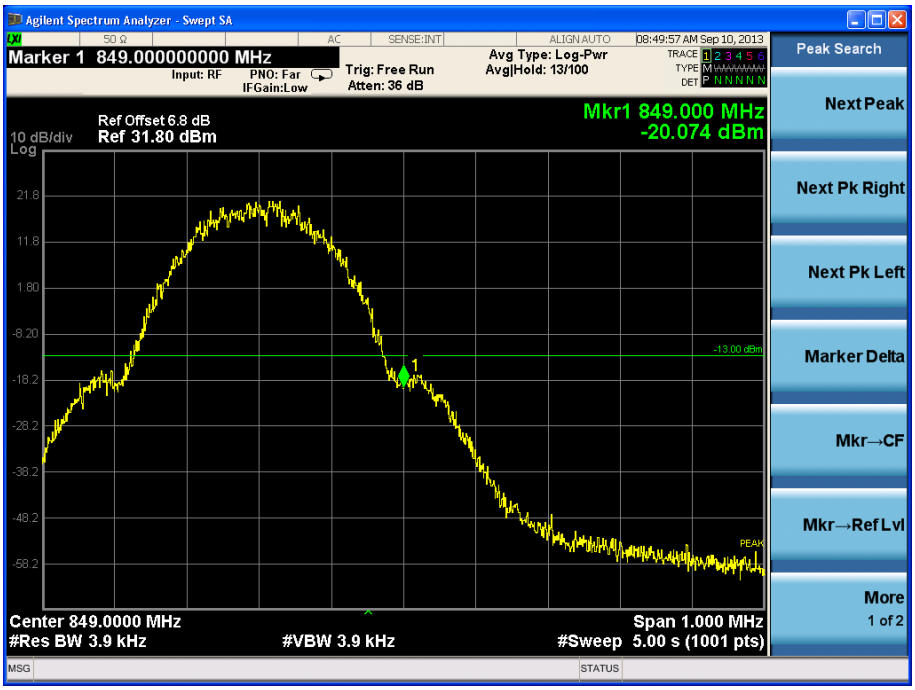
EDGE (GMSK) MODE:



Channel 128



Channel 251

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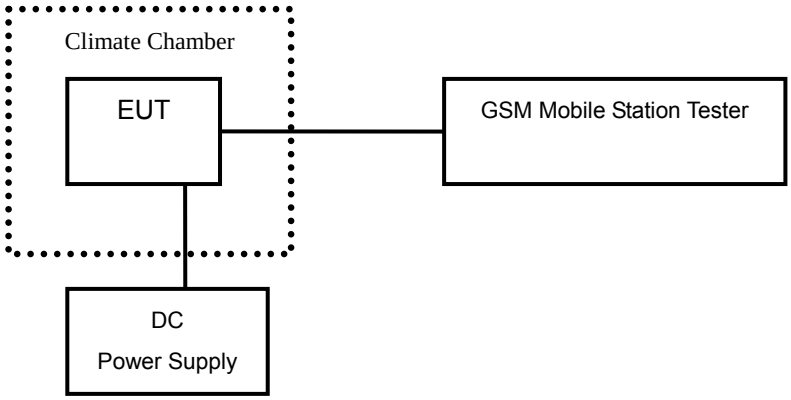
2.2.1.7 Frequency Stability-FCC Part2.1055/22.355

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 4.35V. 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.

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Test result:

GSM/GPRS MODE:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 128	Channel 189	Channel 251
-30	0.016	0.015	0.015
-20	0.014	0.013	0.015
-10	0.011	0.012	0.014
0	0.010	0.011	0.012
+10	0.010	0.012	0.010
+20	0.010	0.012	0.010
+30	0.009	0.014	0.010
+40	0.013	0.016	0.011
+50	0.014	0.017	0.012

Voltage (V)	Test Result (ppm)@20°C		
	Channel 128	Channel 189	Channel 251
3.5	0.010	0.007	0.012
4.35	0.010	0.006	0.012

EDGE (GMSK) MODE:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 128	Channel 189	Channel 251
-30	0.013	0.012	0.016
-20	0.011	0.010	0.015
-10	0.014	0.012	0.015
0	0.008	0.013	0.014
+10	0.009	0.010	0.013
+20	0.007	0.011	0.013
+30	0.008	0.012	0.015
+40	0.009	0.011	0.019
+50	0.008	0.013	0.016

Voltage (V)	Test Result (ppm)@20°C		
	Channel 128	Channel 189	Channel 251
3.5	0.010	0.011	0.013
4.35	0.009	0.012	0.015

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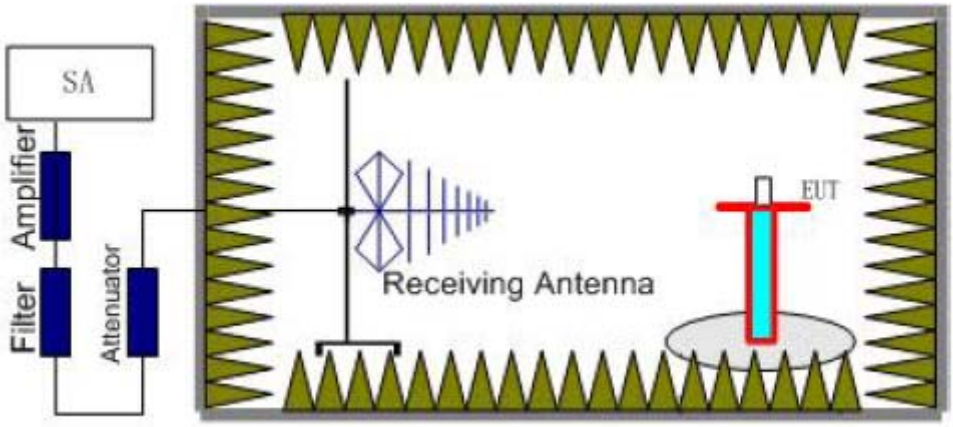
2.2.1.8 Radiated Spurious Emissions-FCC Part2.1053/22.917(a)

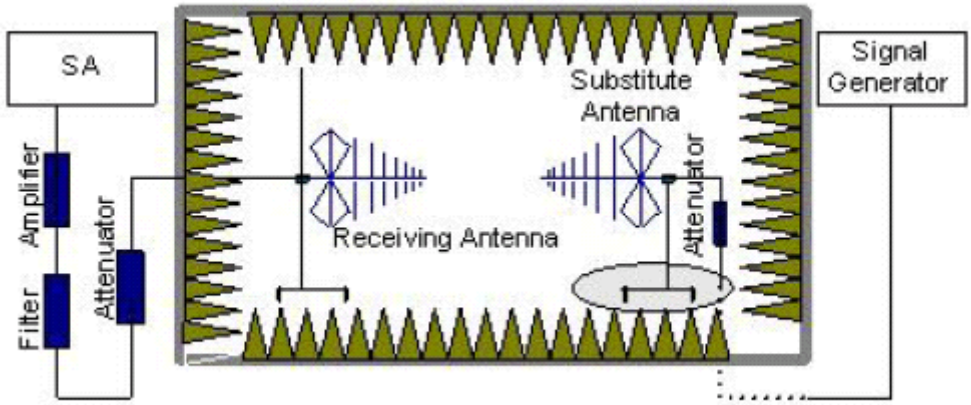
Ambient condition:

Temperature	Relative humidity	Pressure
23°C	43%	99.7kPa

Test Setup:



Step 1



Step 2

Test procedure:

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

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

Step 1:

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

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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^{th} harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

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

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

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Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.
$P=P_{mea}+P_{ca}+G_a=(-20dBm)+(-30dB)+(11dB)= -39dBm$

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
1636.31	-52.25	-5.0	8.7	-56.00	-13	Vertical
2559.81	-52.54	-6.4	8.6	-54.69	-13	Vertical
2846.56	-43.32	-6.1	10.2	-47.47	-13	Vertical
3376.80	-43.54	-7.9	10.5	-46.17	-13	Vertical
7023.51	-39.81	-9.8	11.8	-41.75	-13	Vertical
9936.26	-35.92	-11.1	12.6	-37.46	-13	Horizontal

EDGE (GMSK) MODE Channel 128:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1639.02	-41.33	-4.7	8.3	-44.90	-13	Vertical
2562.20	-42.10	-5.8	8.8	-45.18	-13	Vertical
2848.08	-40.77	-6.4	11.0	-45.37	-13	Vertical
3375.31	-52.47	-7.7	10.4	-55.13	-13	Vertical
7025.32	-53.93	-9.7	11.6	-55.81	-13	Horizontal
9931.38	-56.17	-11.6	12.6	-57.13	-13	Vertical

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GSM/GPRS MODE Channel 189:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1637.01	-40.92	-4.5	8.6	-45.05	-13	Vertical
2558.27	-43.05	-5.8	8.7	-45.97	-13	Vertical
2821.04	-41.11	-6.4	10.5	-45.16	-13	Vertical
3317.17	-53.04	-7.4	10.2	-55.79	-13	Horizontal
6978.65	-55.19	-9.1	11.6	-57.72	-13	Vertical
9973.77	-56.87	-11.6	12.5	-57.76	-13	Vertical

EDGE (GMSK) MODE Channel 189:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1644.94	-41.67	-5.0	8.1	-44.74	-13	Vertical
2548.34	-40.62	-5.8	9.4	-44.20	-13	Vertical
2769.10	-41.69	-6.7	10.0	-44.98	-13	Vertical
3357.02	-51.15	-7.1	10.3	-54.34	-13	Horizontal
6968.52	-54.63	-9.2	11.8	-57.15	-13	Vertical
9976.15	-55.80	-11.1	13.3	-58.00	-13	Vertical

GSM/GPRS MODE Channel 251:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1636.59	-41.92	-5.1	8.4	-45.24	-13	Vertical
2563.56	-41.92	-5.5	9.1	-45.46	-13	Horizontal
2854.21	-41.85	-6.3	10.5	-46.10	-13	Vertical
3347.48	-52.85	-7.1	10.5	-56.29	-13	Vertical
7024.27	-54.19	-9.9	12.3	-56.60	-13	Vertical
9972.81	-55.54	-11.5	13.4	-57.38	-13	Vertical

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EDGE (GMSK) MODE Channel 251:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
1654.41	-42.02	-5.0	8.5	-45.54	-13	Vertical
2567.81	-43.43	-6.2	8.8	-46.08	-13	Horizontal
2763.88	-40.70	-6.4	10.8	-45.12	-13	Vertical
3347.36	-53.22	-7.5	10.4	-56.06	-13	Vertical
6997.28	-54.22	-9.4	11.9	-56.74	-13	Vertical
9967.45	-56.39	-11.4	12.5	-57.49	-13	Vertical

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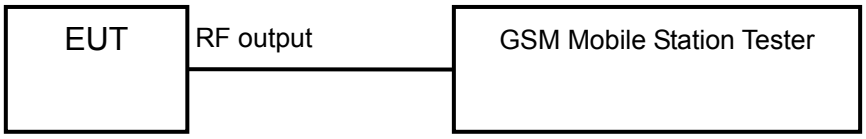
2.2.2 PCS1900

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	29.73
1880.0	661	29.81
1909.8	810	29.95

EDGE (GMSK, 1Slot) MODE:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	29.71
1880.0	661	29.80
1909.8	810	29.82

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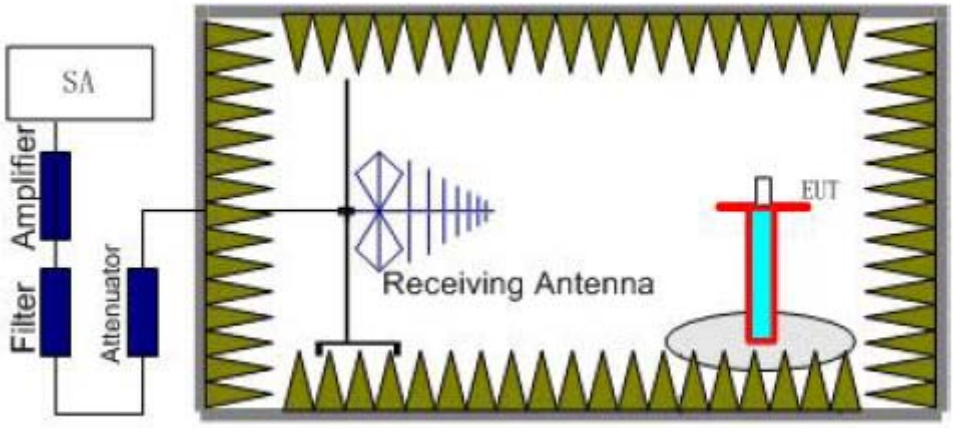
2.2.2.2 Effective Isotropic Radiated Power-FCC Part24.232(c)

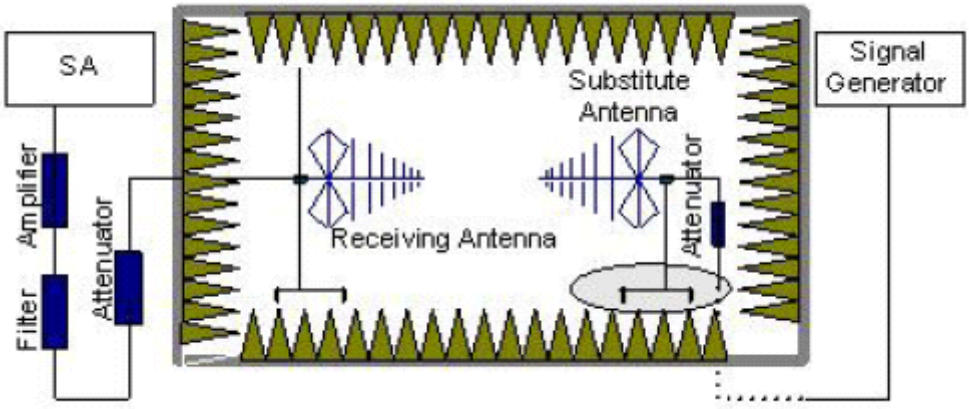
Ambient condition:

Temperature	Relative humidity	Pressure
23°C	43%	99.7kPa

Test setup:



Step 1



Step 2

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

Step 1:
The measurement is carried out in the fully anechoic chamber. EUT was placed

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

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

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

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).
The measurement results are obtained as described below:
Power (EIRP) = Pmea+ Pca+ Ga

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

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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	30.02	-4.8	8.6	26.22	Vertical
1880.0	0	30.50	-4.8	8.6	26.70	Vertical
1909.8	0	30.16	-4.8	8.6	26.36	Vertical

EDGE (GMSK, 1Slot) MODE:

Frequency (MHz)	Power step	Peak EIRP(dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1850.2	5	30.04	-4.8	8.6	26.24	Vertical
1880.0	5	30.11	-4.8	8.6	26.31	Vertical
1909.8	5	29.78	-4.8	8.6	25.98	Vertical

Frequency: 1909.8MHz
Peak EIRP(dBm) = Pmea(26.70dBm)+Pca(-4.8dB)+Ga(8.6dB) = 30.5dBm

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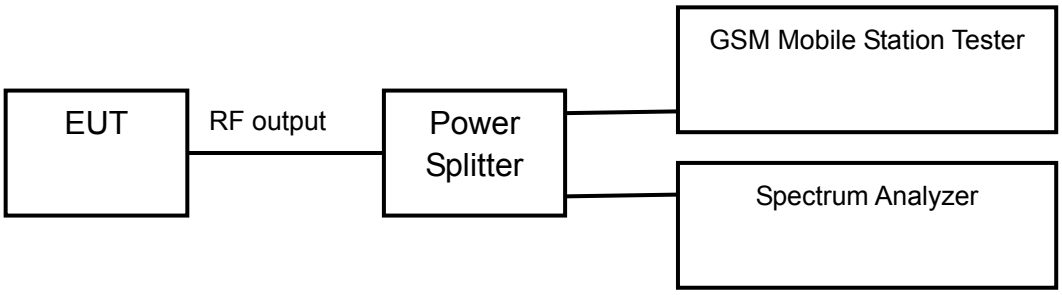
2.2.2.3 Occupied Bandwidth-FCC Part2.1049

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	247.70
1880.0	661	247.89
1909.8	810	248.03

EDGE (GMSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	247.25
1880.0	661	247.26
1909.8	810	248.03

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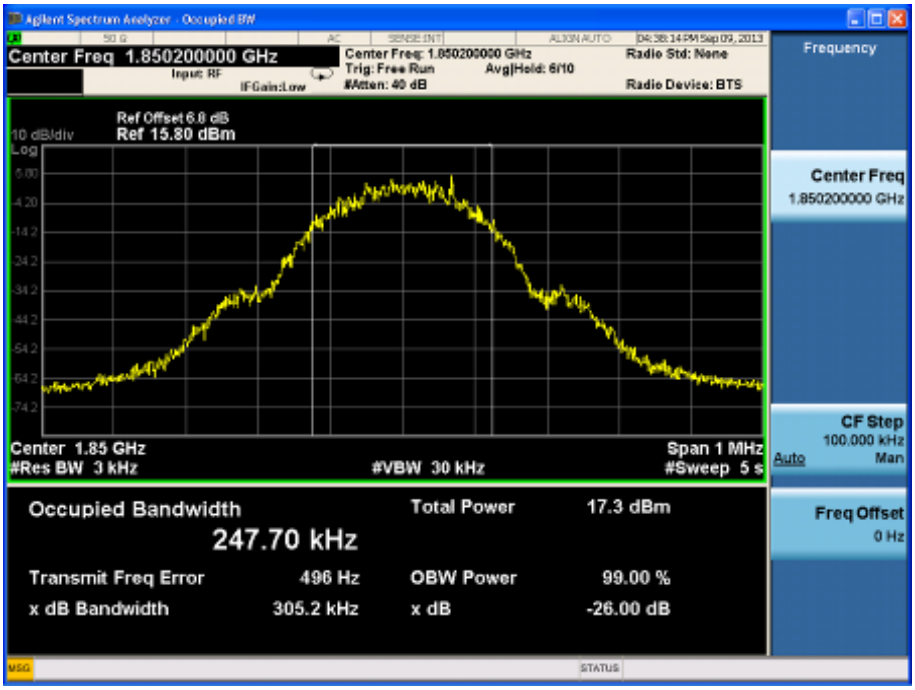
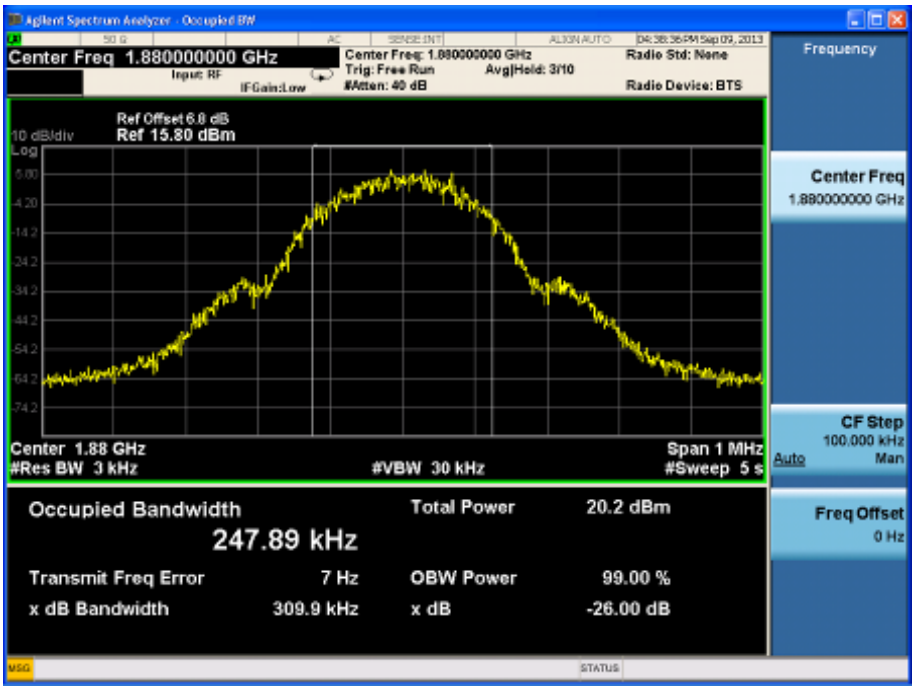
GSM/GPRS MODE:



Channel 512



Channel 661

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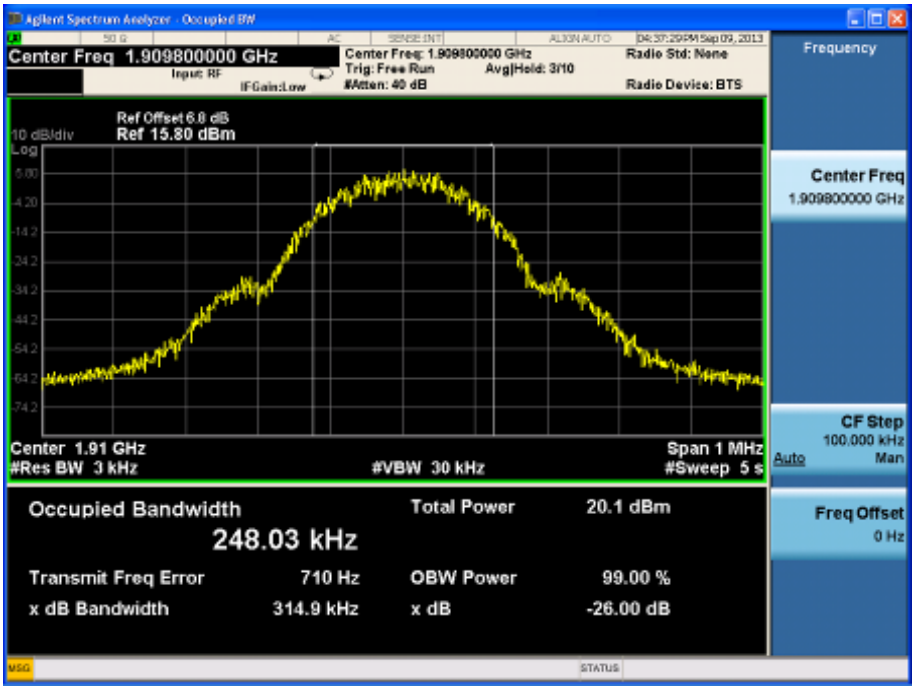
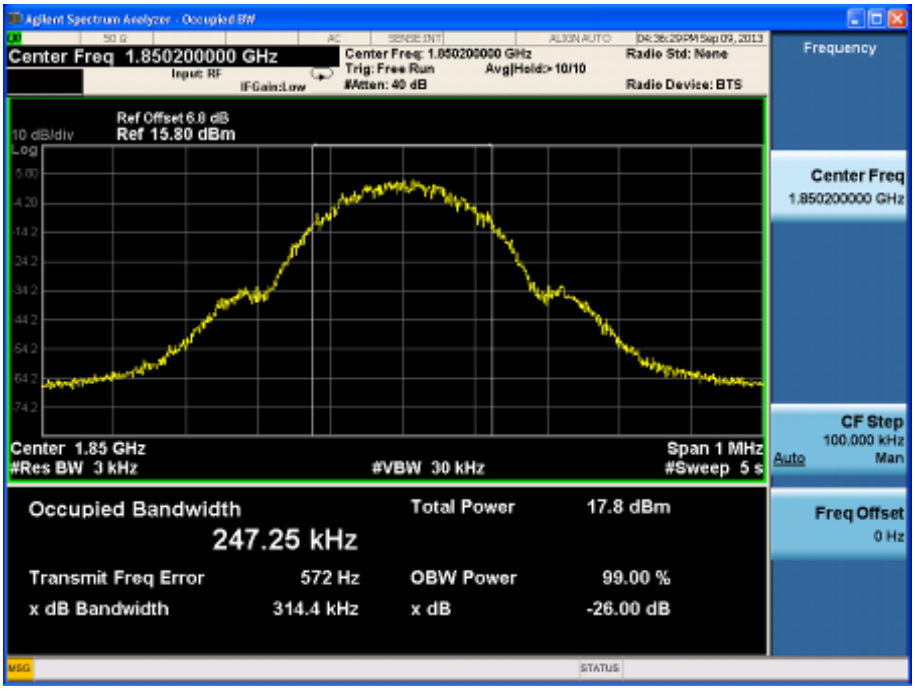


Channel 810

EDGE (GMSK) MODE:



Channel 512

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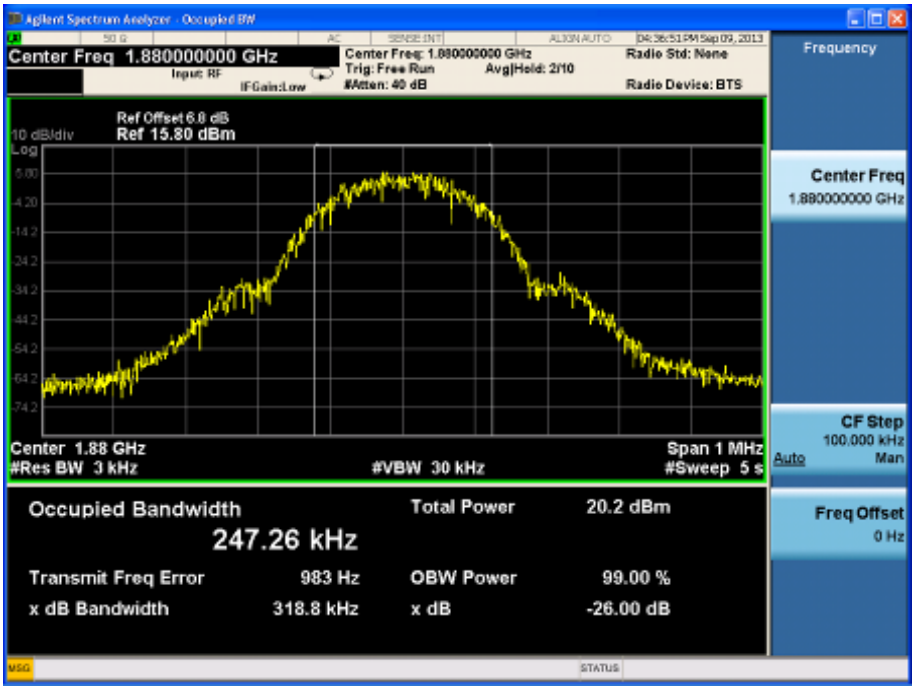
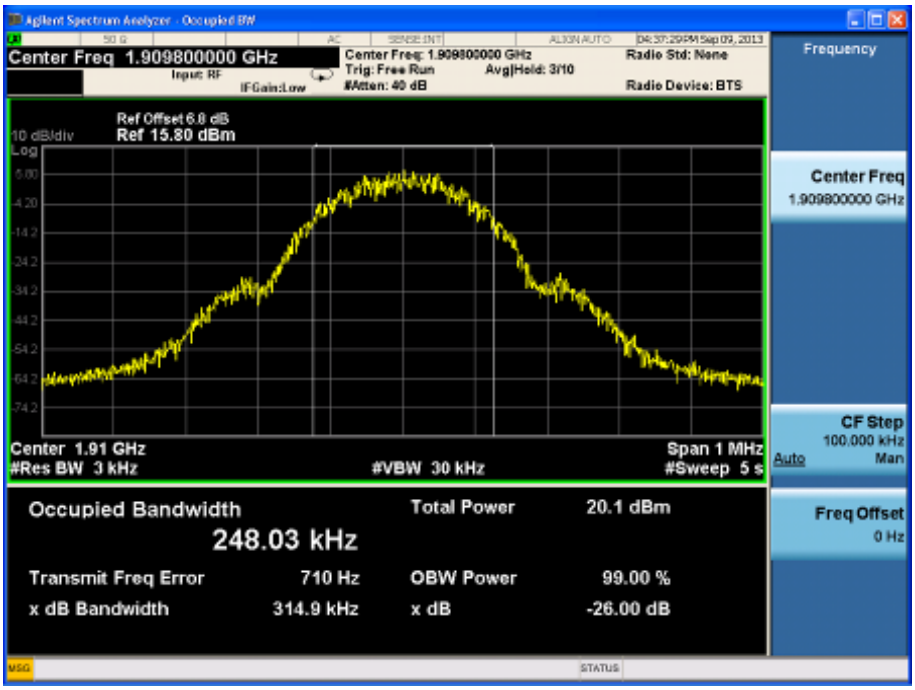


Channel 661



Channel 810

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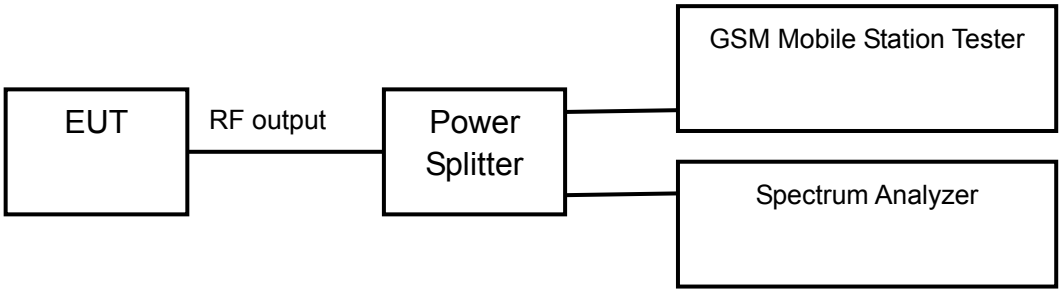
2.2.2.4 Emission Bandwidth-FCC Part24.238(b)

Ambient condition:

Temperature	Relative humidity	Pressure
23℃	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 emission bandwidth is measured using spectrum analyzer. RBW is set to 3kHz on spectrum analyzer. The bandwidth of -26dB transmitter 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 emission bandwidth requirements in part 24.238(b)

Test result:
GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
1850.2	512	305.2
1880.0	661	309.9
1909.8	810	314.9

EDGE (GMSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
1850.2	512	314.4
1880.0	661	318.8
1909.8	810	314.9

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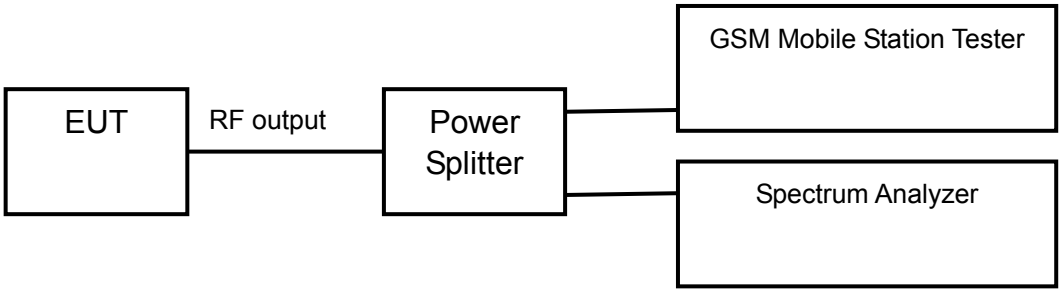
2.2.2.5 Spurious Emissions at antenna terminal-FCC Part2.1051/24.238(a)

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^{th} 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

Test result:
Refer to the following figures.

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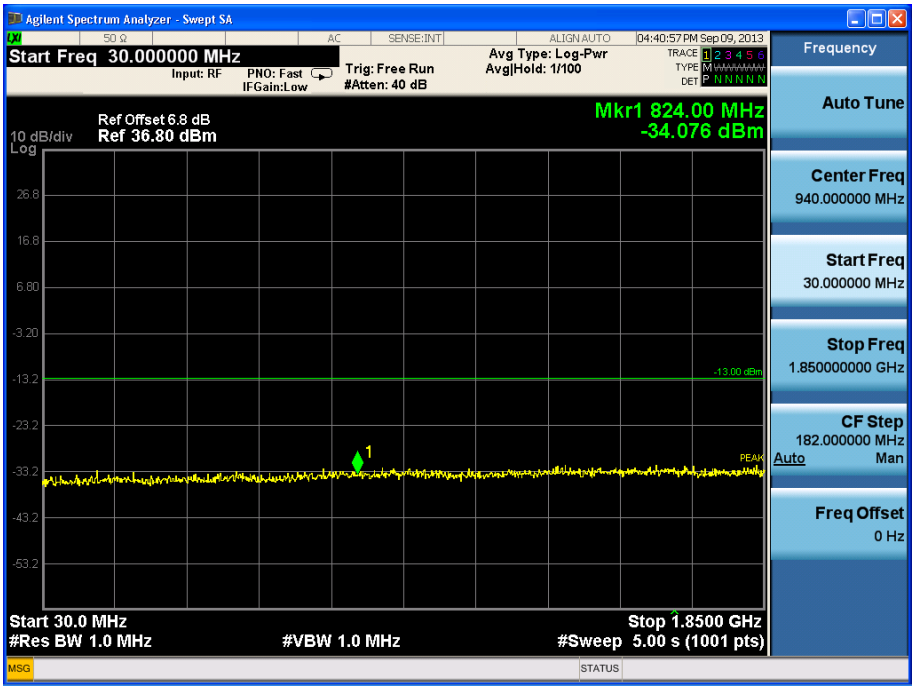
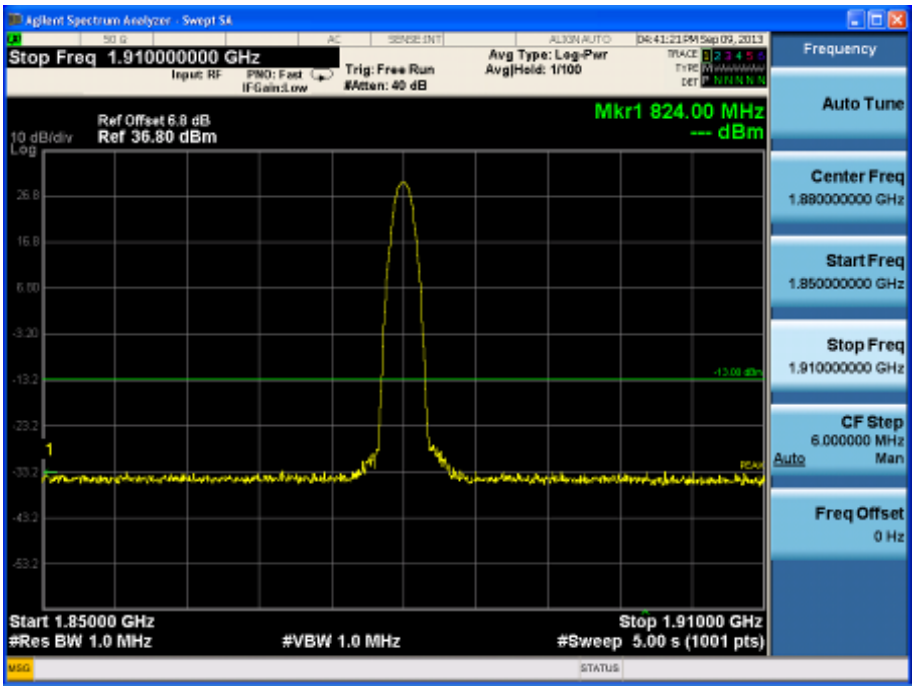
GSM/GPRS MODE:



Channel 661, 30MHz~1850MHz



Channel 661, 1850MHz~1910MHz

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

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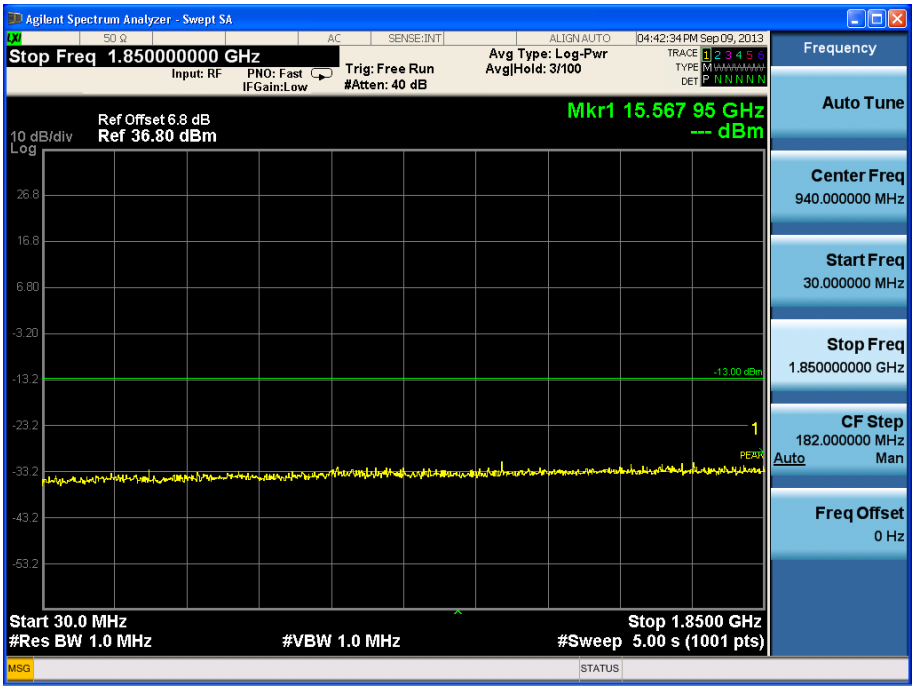
Channel 661, 1910MHz~20GHz

EDGE (GMSK) MODE:



Channel 661, 30MHz~1850MHz

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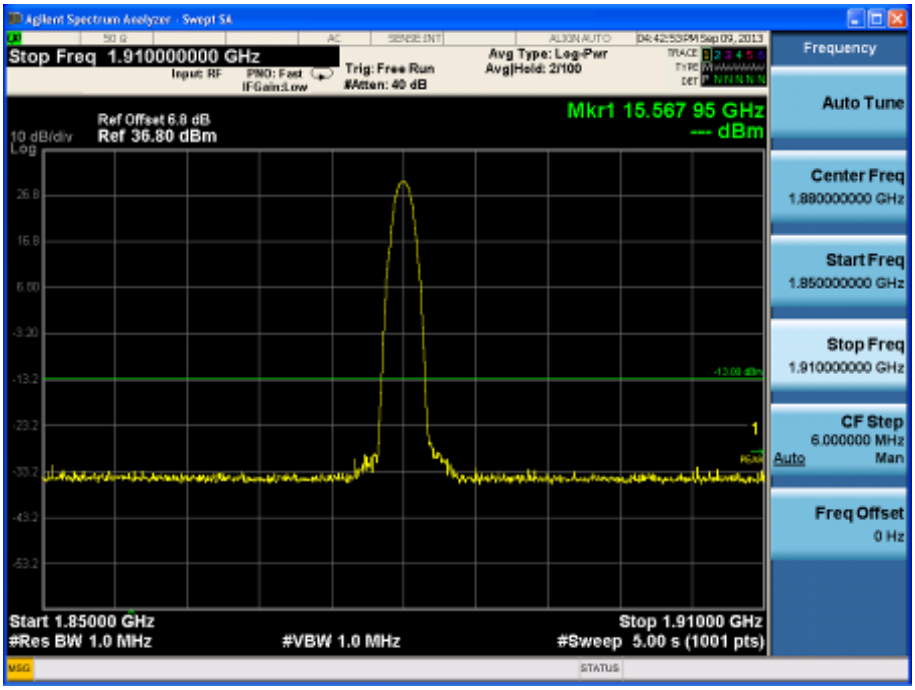

Channel 661, 1850MHz~1910MHz

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

Channel 661, 1910MHz~20GHz

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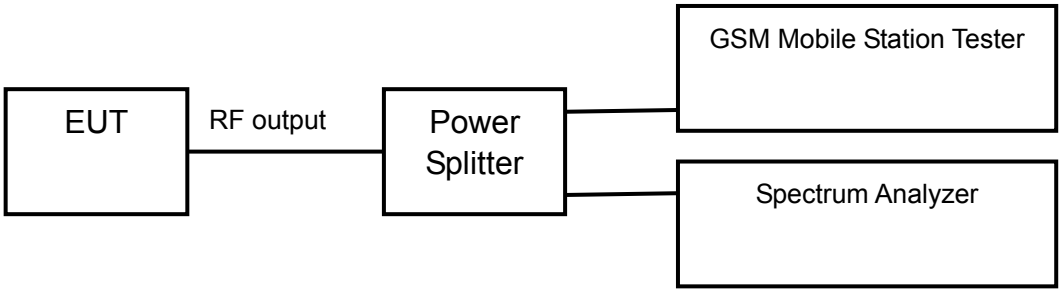
2.2.2.6 Band Edges Compliance-FCC Part2.1051/24.238(a)

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 at least 1% of the emission bandwidth on spectrum analyzer.
The measurement will be conducted at two channels No512 and No810 (Bottom and top channels of PCS1900 band)

Limits	≤-13dBm

Test result:
Refer to the following figures.

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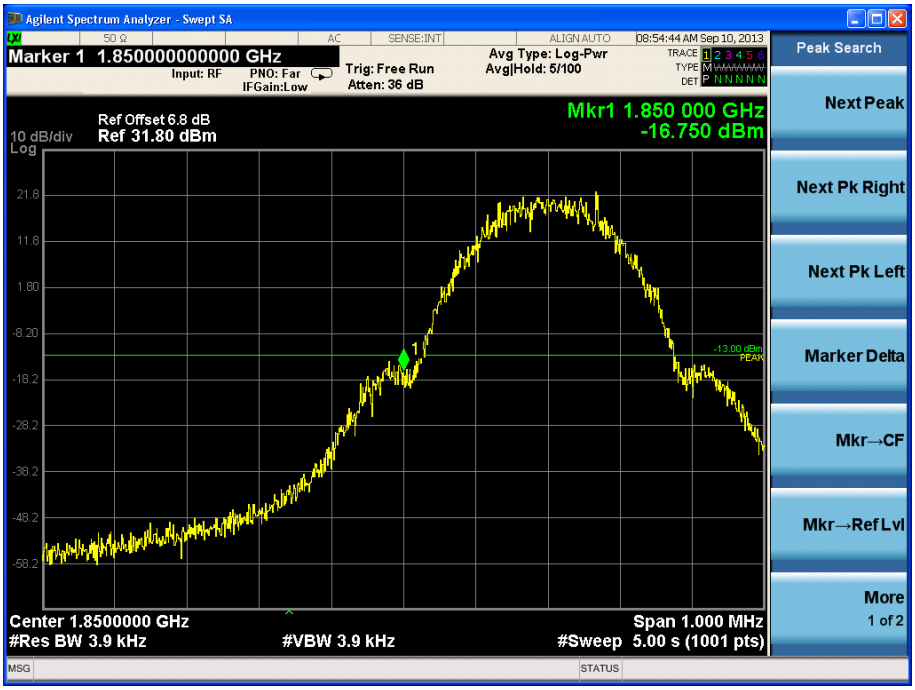
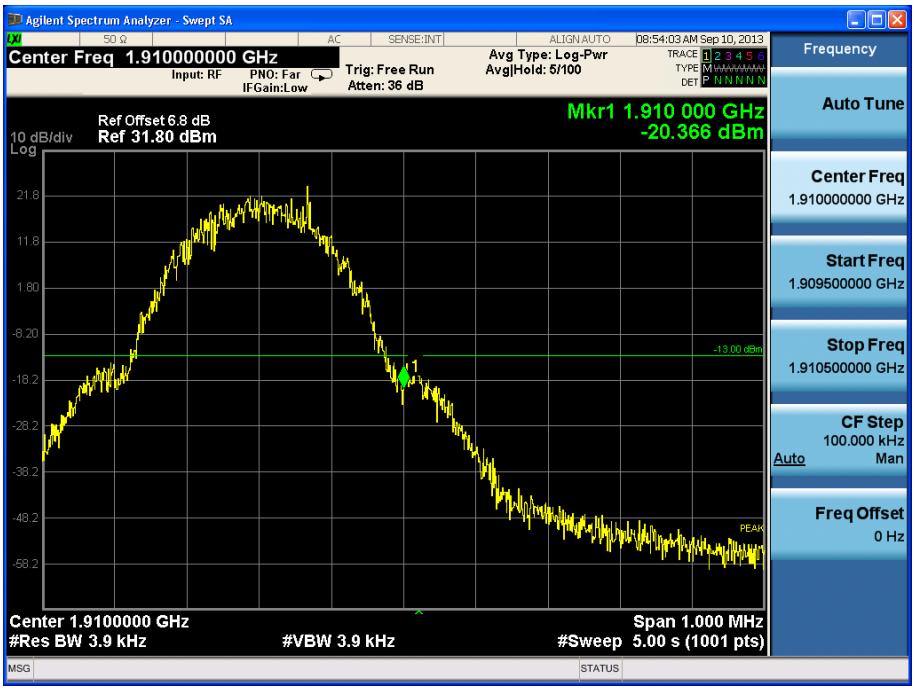
GSM/GPRS MODE:



Channel 512



Channel 810

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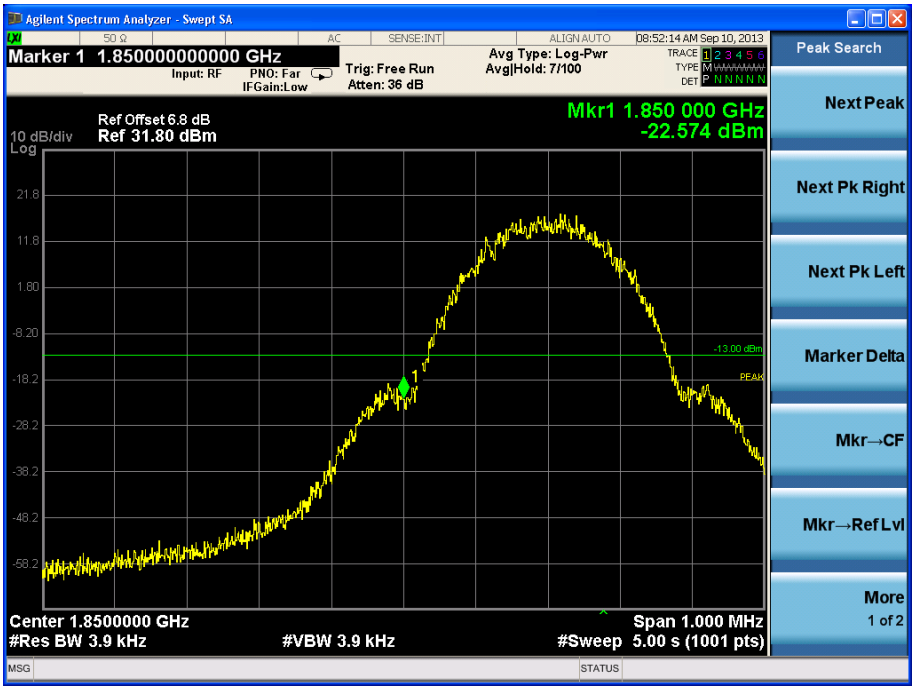
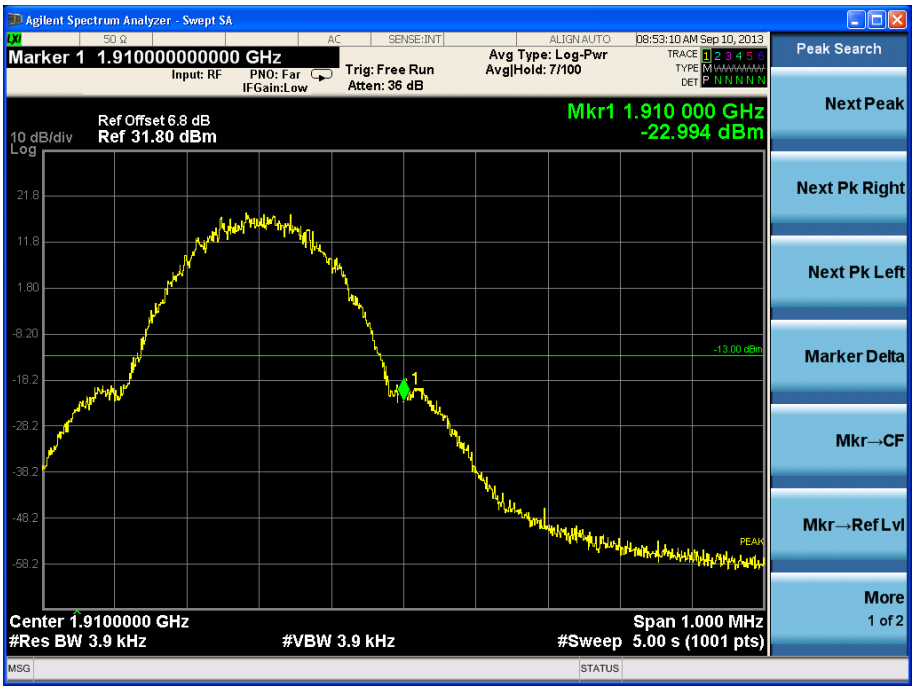
EDGE (GMSK) MODE:



Channel 512



Channel 810

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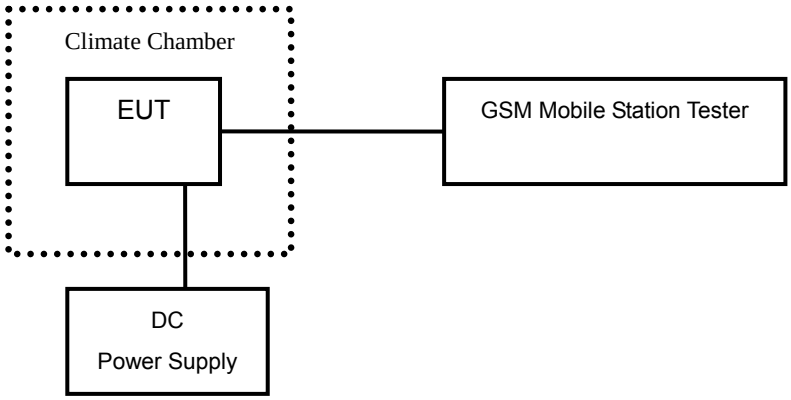
2.2.2.7 Frequency Stability-FCC Part2.1055/24.235

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 4.35V. 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.

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Test result:

GSM/GPRS MODE:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 512	Channel 661	Channel 810
-30	0.017	0.022	0.020
-20	0.016	0.020	0.016
-10	0.014	0.017	0.015
0	0.013	0.015	0.013
+10	0.011	0.013	0.011
+20	0.011	0.012	0.010
+30	0.011	0.015	0.012
+40	0.010	0.014	0.013
+50	0.011	0.016	0.019

Voltage (V)	Test Result (ppm)@20°C		
	Channel 512	Channel 661	Channel 810
3.5	0.014	0.010	0.014
4.35	0.012	0.008	0.015

EDGE (GMSK) MODE:

Temperature(°C)	Test Result (ppm)@3.8V		
	Channel 512	Channel 661	Channel 810
-30	0.024	0.014	0.017
-20	0.020	0.013	0.015
-10	0.019	0.012	0.019
0	0.024	0.015	0.013
+10	0.022	0.019	0.015
+20	0.019	0.015	0.016
+30	0.018	0.014	0.013
+40	0.019	0.017	0.015
+50	0.017	0.013	0.014

Voltage (V)	Test Result (ppm)@20°C		
	Channel 512	Channel 661	Channel 810
3.5	0.020	0.015	0.013
4.35	0.019	0.011	0.015

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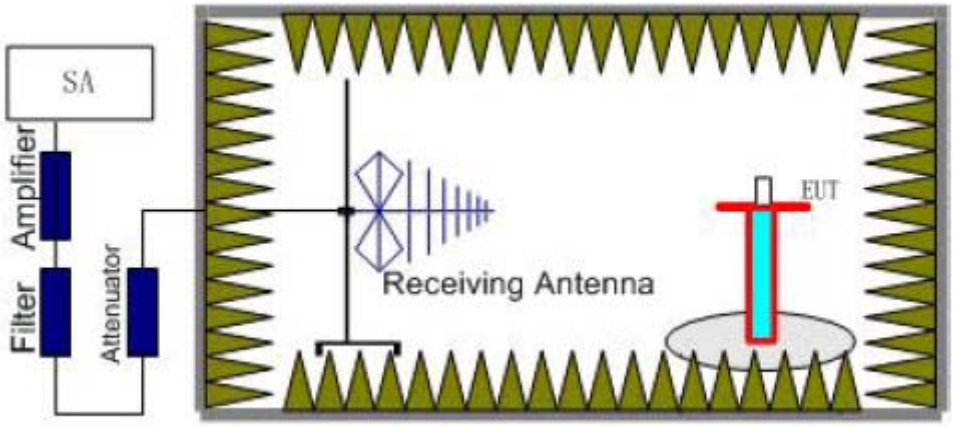
2.2.2.8 Radiated Spurious Emissions-FCC Part2.1053/24.238(a)

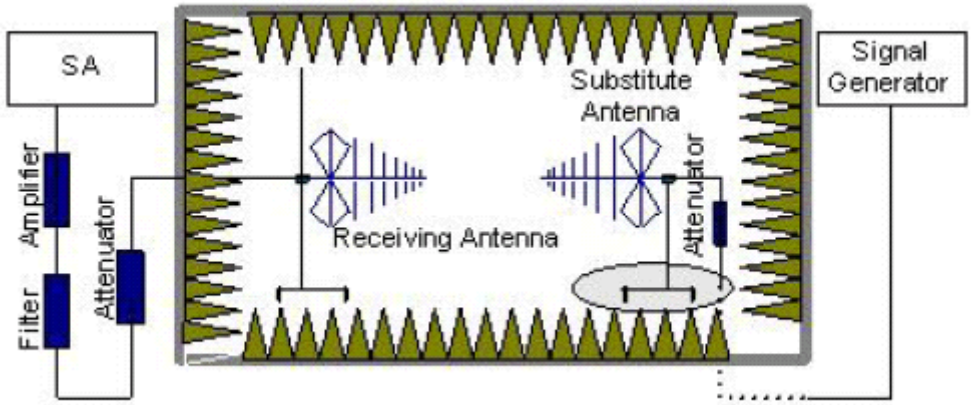
Ambient condition:

Temperature	Relative humidity	Pressure
23°C	43%	99.7kPa

Test Setup:



Step 1



Step 2

Test procedure:

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

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

Step 1:

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

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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^{th} harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

Step 2:
A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

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

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

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Assumed the power of signal source record is -20dBm. A cable loss of -30dB and an antenna gain of 11dB are added.
$P=P_{mea}+P_{ca}+G_a=(-20dBm)+(-30dB)+(11dB)= -39dBm$

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
2845.70	-52.55	-4.9	8.7	-56.31	-13	Vertical
2870.19	-52.92	-6.0	9.3	-56.22	-13	Vertical
3671.74	-52.02	-6.3	11.0	-56.67	-13	Vertical
6978.36	-54.97	-7.6	10.1	-57.55	-13	Vertical
7558.24	-53.35	-9.1	12.1	-56.30	-13	Vertical
17352.20	-52.51	-11.3	13.0	-54.23	-13	Vertical

EDGE (GMSK) MODE Channel 512:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2870.06	-52.48	-4.8	8.8	-56.47	-13	Vertical
2875.07	-53.63	-5.8	9.2	-57.12	-13	Vertical
3672.91	-52.85	-6.2	10.2	-56.85	-13	Vertical
6993.34	-54.10	-7.1	10.3	-57.27	-13	Vertical
7562.77	-54.05	-9.9	12.1	-56.25	-13	Vertical
17347.50	-52.33	-11.6	13.0	-53.72	-13	Vertical

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GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2822.91	-53.09	-5.4	8.5	-56.16	-13	Vertical
2876.56	-53.82	-6.1	8.6	-56.68	-13	Vertical
3711.37	-52.01	-6.0	11.0	-56.68	-13	Vertical
6954.89	-54.64	-7.9	10.3	-57.08	-13	Vertical
7554.61	-53.17	-9.0	12.5	-56.53	-13	Horizontal
17354.63	-52.09	-11.5	13.2	-53.91	-13	Vertical

EDGE (GMSK) MODE Channel 661:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2834.92	-52.51	-4.7	8.0	-55.86	-13	Vertical
2860.39	-53.30	-6.1	9.1	-56.27	-13	Horizontal
3770.13	-53.32	-6.7	10.2	-56.80	-13	Vertical
6976.17	-54.26	-7.2	10.4	-57.53	-13	Vertical
7549.14	-54.29	-9.8	12.0	-56.57	-13	Vertical
17364.87	-52.36	-11.5	13.0	-53.91	-13	Vertical

GSM/GPRS MODE Channel 810:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2844.49	-52.81	-5.1	8.5	-56.19	-13	Vertical
2861.20	-54.21	-5.9	8.7	-57.07	-13	Vertical
3756.97	-51.84	-6.2	10.8	-56.46	-13	Vertical
6992.56	-54.14	-7.7	10.1	-56.59	-13	Vertical
7543.45	-54.65	-9.9	12.3	-57.01	-13	Vertical
17340.33	-52.13	-11.1	13.2	-54.27	-13	Vertical

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EDGE (GMSK) MODE Channel 810:

Frequency (MHz)	Power (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Limited (dBm)	Polarization
2855.24	-52.82	-5.0	8.5	-56.26	-13	Vertical
2868.70	-53.65	-6.2	9.5	-56.92	-13	Horizontal
3768.65	-52.68	-6.3	10.3	-56.66	-13	Vertical
6991.91	-54.37	-7.5	10.7	-57.51	-13	Vertical
7571.74	-53.72	-9.0	11.7	-56.39	-13	Vertical
17326.86	-52.29	-11.1	12.9	-54.04	-13	Vertical

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2.3. List of test equipments

No.	Name/Model	Manufacturer	S/N	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	MY48367401	2014.8
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2014.8
3	DC Power Supply E3645A	Agilent	MY40000740	2014.8
4	Power Splitter 11850C	Agilent	026057	2014.8
5	Temperature chamber SH241	ESPEC	92000390	2014.8
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----
7	Turn table Diameter:1m	HD	-----	-----
8	Antenna master FAC(MA4.0)	MATURO	-----	-----
9	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2014.8
10	HL562 Ultra log antenna	R&S	100016	2014.8
11	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2014.8
12	ESI 40 EMI test receiver	R&S	100015	2014.8
13	Radio tester	CMU 200	114667	2014.8

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Appendix

Appendix1 Test Setup

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