



Registration
No.910917

TEST REPORT FOR GSM TESTING

Report No.: SRTC2017-9004(F)-0023

Product Name: LTE/WCDMA/GSM (GPRS) Multi-Mode Digital Mobile
Phone

Product Model: ZTE BLADE V0850/ZTE BLADE V8 MINI/BLADE V8
mini/ZTE BLADE V8 mini

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 24E, Part 22H, Part 2 (October, 2016 edition)

FCC ID: SRQ-BLADEV8MINI

The State Radio_monitoring_center Testing Center (SRTC)

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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 |
| City: | Beijing |
| Country or Region: | P.R.China |
| Contacted person: | Liu Jia |
| Tel: | +86 10 5799 6181 |
| Fax: | +86 10 5799 6288 |
| Email: | liujiaf@srtc.org.cn |

1.3 Applicant's details

| | |
|--------------------|--|
| Company: | ZTE Corporation |
| Address: | ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong |
| City: | Shenzhen |
| Country or Region: | P.R.China |
| Grantee Code: | SRQ |
| Contacted person: | Min Zhang |
| Tel: | 021-68897867 |
| Fax: | 021-50801070 |
| Email: | zhang.min13@zte.com.cn |

1.4 Manufacturer's details

| | |
|--------------------|--|
| Company: | ZTE Corporation |
| Address: | ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong |
| City: | Shenzhen |
| Country or Region: | P.R.China |
| Contacted person: | Min Zhang |
| Tel: | 021-68897867 |
| Fax: | 021-50801070 |
| Email: | zhang.min13@zte.com.cn |

1.5 Test Environment

| | |
|---|------------|
| Date of Receipt of test sample at SRTC: | 2017.03.23 |
| Testing Start Date: | 2017.03.24 |
| Testing End Date: | 2017.05.17 |

| Environmental Data: | Temperature (°C) | Humidity (%) |
|---------------------|------------------|--------------|
| Ambient | 25 | 38 |
| Maximum Extreme | 55 | 40 |
| Minimum Extreme | -10 | --- |

| | |
|--|-----|
| Normal Supply Voltage (V d.c.): | 3.7 |
| Maximum Extreme Supply Voltage (V d.c.): | 4.2 |
| Minimum Extreme Supply Voltage (V d.c.): | 3.5 |

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

| | |
|---------------------|---|
| 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/300KG7W |
| Duplex Mode | FDD |
| Duplex Spacing | GSM850:45MHz PCS1900:80MHz |
| Antenna Type | Fixed Internal |
| Power Supply | Battery or Charger |
| HW Version | ux9A |
| SW Version | GEN_LA_BV0850_V1.0 |
| IMEI | 863927030034813 |

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Battery 1

| | |
|---------------|--------------------------------|
| Equipment | Battery |
| Manufacturer | Harbin Coslight Power CO.,LTD. |
| Model Number | Li3928T44P8h475371 |
| Serial Number | ----- |

There are two SIM (SIM1/2) of EUT. The relevant tests have been performed in order to verify in which combination case the EUT would have the worst features. So all the tests shown in this test report are performed when the EUT use SIM 1.

3 REFERENCE SPECIFICATION

| Specification | Version | Title |
|---------------|---------------|---|
| 2.1046 | July 7, 1998 | Measurements required: RF power output. |
| 2.1049 | July 7, 1998 | Measurements required: Occupied bandwidth. |
| 2.1051 | July 7, 1998 | Measurements required: Spurious emissions at antenna terminals. |
| 2.1053 | July 7, 1998 | Measurements required: Field strength of spurious radiation. |
| 2.1055 | Dec. 9, 2003 | Measurements required: Frequency stability. |
| 22.355 | Oct. 17, 1996 | Frequency tolerance. |
| 22.913 | Dec. 15, 2004 | Effective radiated power limits. |
| 22.917 | Dec. 17, 2002 | Emission limitations for cellular equipment. |
| 24.232 | May 2, 2008 | Power and antenna height limits. |
| 24.235 | N/A | Frequency stability. |
| 24.238 | Dec. 17, 2002 | Emission limitations for Broadband PCS equipment. |

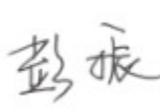
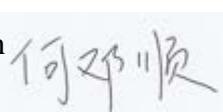
4 KEY TO NOTES AND RESULT CODES

The following are the definition of the test result.

| Code | Meaning |
|------|--|
| PASS | Test result shows that the requirements of the relevant specification have been met. |
| FAIL | Test result shows that the requirements of the relevant specification have not been met. |
| N/T | Test case is not tested. |
| NTC | Nominal voltage, Normal Temperature |
| HV | High voltage, Normal Temperature |
| LV | Low voltage, Normal Temperature |
| HTHV | high voltage, High Temperature |
| LTHV | High voltage, Low Temperature |
| HTLV | Low voltage, High Temperature |
| LTLV | Low voltage, Low Temperature |

5 RESULT SUMMARY

| 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 |
| 9 | Peak-Average Ratio | 24.232(d) | Pass |

| | |
|--|--|
| This Test Report Is Issued by: Mr. Peng Zhen  | Checked by: Ms. Liu Jia  |
| Tested by: Mr. He Dengshun  | Issued date: 20170517 |

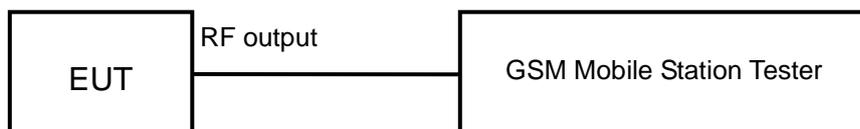
6 TEST RESULT

6.1 RF Power Output-FCC Part2.1046

Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C | 42% | 101.9kPa |

Test Setup:



GSM850

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 | ≤33.0dBm |
|--------|----------|
|--------|----------|

PCS1900

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 | ≤30.0dBm |
|--------|----------|
|--------|----------|

Test result:

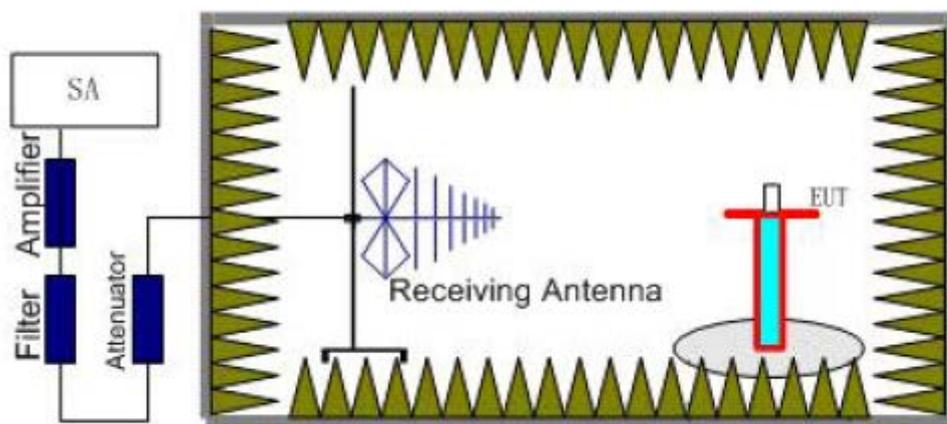
The test results are shown in Appendix A.

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

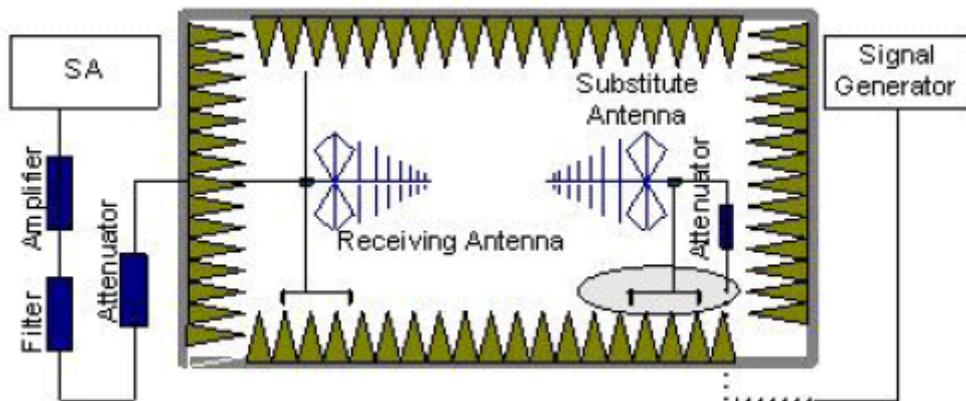
Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 20.8°C | 36.5% | 100.9kPa |

Test setup:



Step 1



Step 2

GSM850

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 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 (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 (Pr). 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).

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 |

PCS1900

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 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 (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 (Pr). 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).

The measurement results are obtained as described below:

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

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:

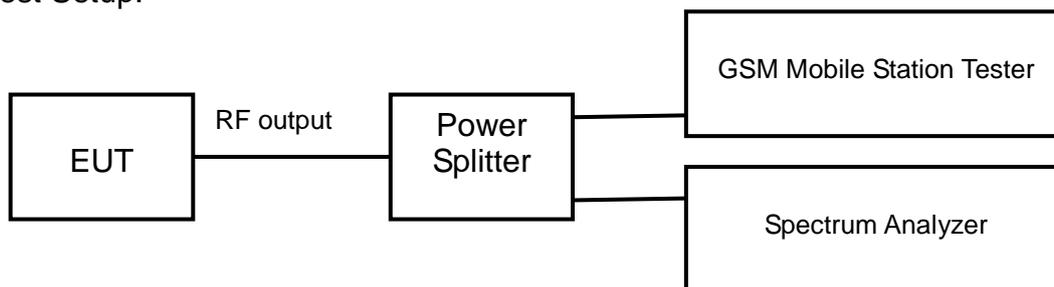
The test results are shown in Appendix B.

6.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C | 42% | 101.9kPa |

Test Setup:



GSM850

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

PCS1900

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:

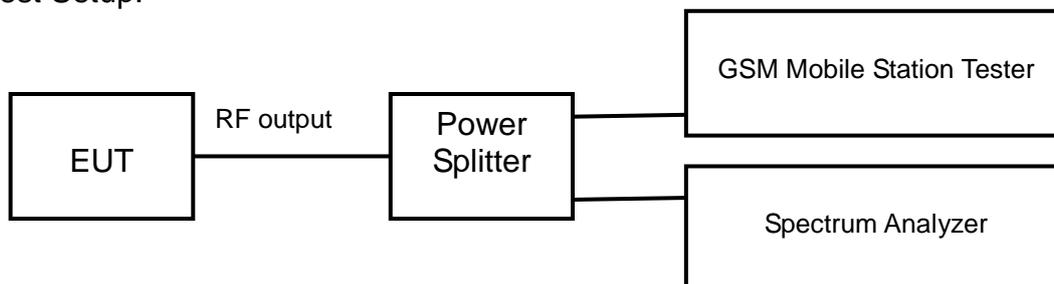
The test results are shown in Appendix A.

6.4 Emission Bandwidth-FCC Part22.917(b)

Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C | 42% | 101.9kPa |

Test Setup:



GSM850

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)

PCS1900

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:

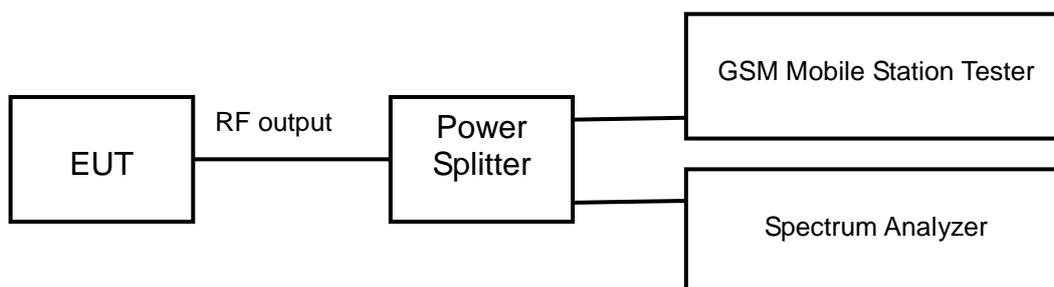
The test results are shown in Appendix A.

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

Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C | 42% | 101.9kPa |

Test Setup:



GSM850

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

PCS1900

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10th harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. The measurement will be conducted at one channel No661 (middle channel of PCS1900 band)

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

Test result:

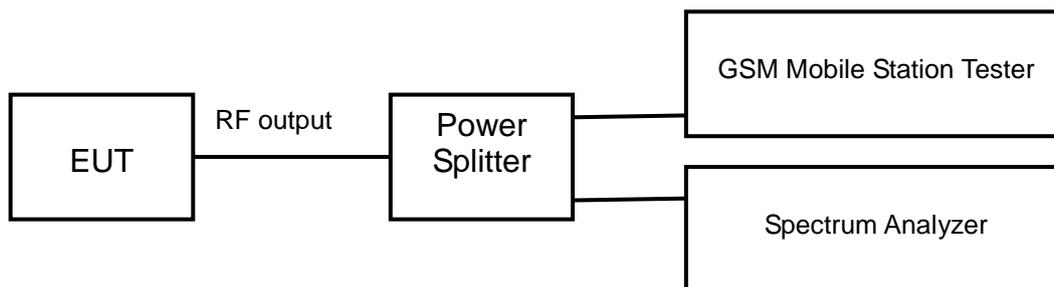
The test results are shown in Appendix A.

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

Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C | 42% | 101.9kPa |

Test Setup:



GSM850

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

PCS1900

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

Test result:

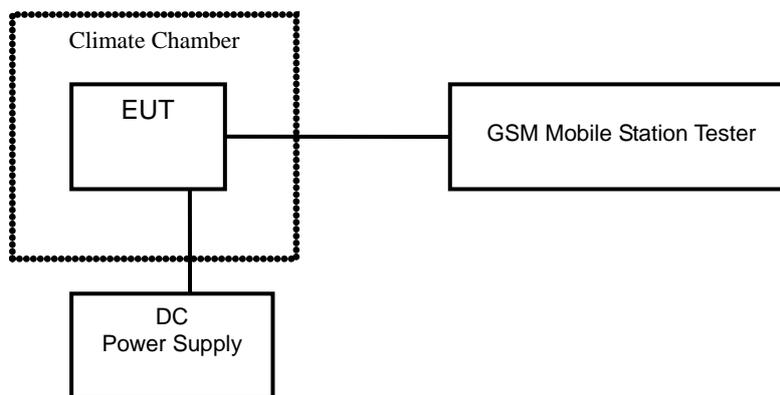
The test results are shown in Appendix A.

6.7 Frequency Stability-FCC Part2.1055/22.355

Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C | 42% | 101.9kPa |

Test setup:



GSM850

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 LV to HV. 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.

PCS1900

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 LV to HV. 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:

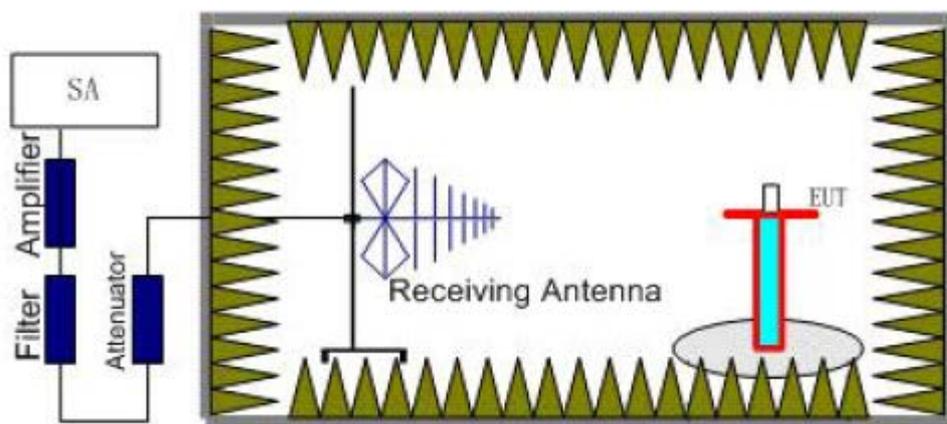
The test results are shown in Appendix A.

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

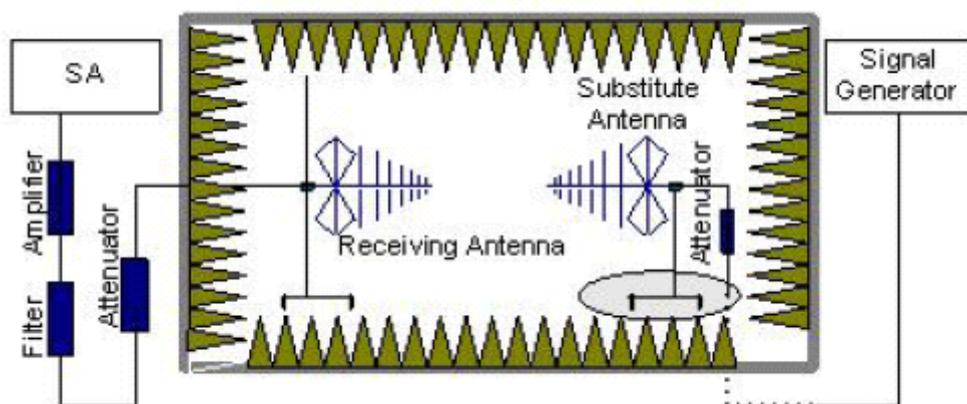
Ambient condition:

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 20.8°C | 36.5% | 100.9kPa |

Test Setup:



Step 1



Step 2

GSM850

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

Step 2:

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

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.

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

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.

PCS1900

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

Step 2:

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

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:

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

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, $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$.

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:

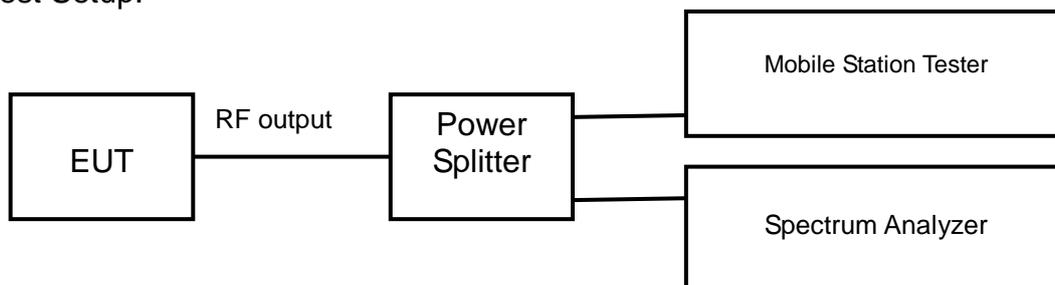
The test results are shown in Appendix B.

6.9 Peak-Average Ratio -FCC Part 24.232(d)

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 Peak-Average Ratio is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The Peak-Average Ratio can be read on spectrum analyzer.

Limits: the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test result:

The test results are shown in Appendix A

7 MEASUREMENT UNCERTAINTIES

| Items | Uncertainty | |
|----------------------|----------------|--------|
| Occupied Bandwidth | 3kHz | |
| Peak power output | 0.67dB | |
| Band edge compliance | 1.20dB | |
| Spurious emissions | 30MHz~1GHz | 2.83dB |
| | 1GHz~12.75GHz | 2.50dB |
| | 12.75GHz~25GHz | 2.75dB |

8 TEST EQUIPMENTS

| No. | Name/Model | Manufacturer | S/N | Calibration Due Date |
|-----|---|--------------|------------|----------------------|
| 1 | E5515C(8960) Mobile Station Tester | Agilent | MY48367401 | 2017.8.20 |
| 2 | N9020A Spectrum Analyzer | Agilent | MY48010771 | 2017.8.20 |
| 3 | DC Power Supply E3645A | Agilent | MY40000740 | 2017.8.20 |
| 4 | Power Splitter 11850C | Agilent | 026057 | 2017.8.20 |
| 5 | Temperature chamber SH241 | ESPEC | 92000390 | 2017.8.20 |
| 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 | 2017.8.20 |
| 10 | HL562 Ultra log antenna | R&S | 100016 | 2017.8.20 |
| 11 | 3160-09 Receive antenna | SCHWARZ-BECK | 002058-002 | 2017.8.20 |
| 12 | ESI 40 EMI test receiver | R&S | 100015 | 2017.8.20 |
| 13 | Radio tester | CMU 200 | 114667 | 2017.8.20 |

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.

APPENDIX C – TEST SETUP

Please refer to the attachment.

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

RF Power Output-FCC Part2.1046

GSM850

GSM/GPRS MODE:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 824.2 | 128 | 32.48 |
| 836.4 | 189 | 31.05 |
| 848.8 | 251 | 32.19 |

EDGE MODE:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 824.2 | 128 | 32.13 |
| 836.4 | 189 | 32.22 |
| 848.8 | 251 | 32.26 |

PCS1900

GSM/GPRS MODE:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 1850.2 | 512 | 29.73 |
| 1880.0 | 661 | 29.12 |
| 1909.8 | 810 | 29.17 |

EDGE MODE:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 1850.2 | 512 | 28.53 |
| 1880.0 | 661 | 29.47 |
| 1909.8 | 810 | 29.24 |

Occupied Bandwidth-FCC Part2.1049

GSM850

GSM/GPRS MODE:

| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (kHz) |
|-------------------------|-------------|------------------------------|
| 824.2 | 128 | 254.1 |
| 836.4 | 189 | 243.1 |
| 848.8 | 251 | 246.5 |

EDGE (GMSK) MODE:

| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (kHz) |
|-------------------------|-------------|------------------------------|
| 824.2 | 128 | 244.4 |
| 836.4 | 189 | 245.2 |
| 848.8 | 251 | 244.1 |

PCS1900

GSM/GPRS MODE:

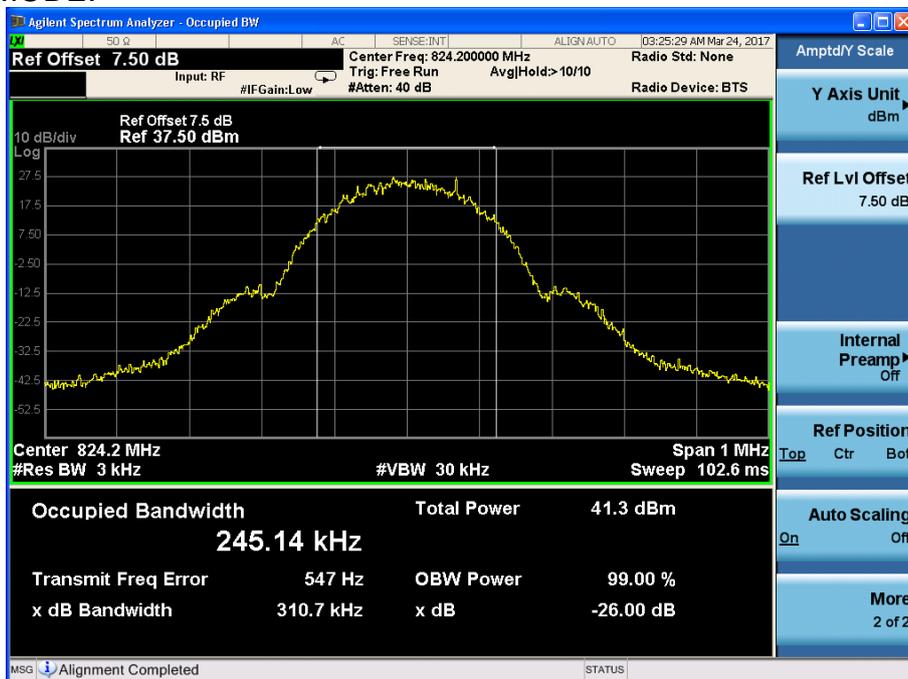
| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (kHz) |
|-------------------------|-------------|------------------------------|
| 1850.2 | 512 | 245.8 |
| 1880.0 | 661 | 246.9 |
| 1909.8 | 810 | 244.7 |

EDGE (GMSK) MODE:

| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (kHz) |
|-------------------------|-------------|------------------------------|
| 1850.2 | 512 | 246.5 |
| 1880.0 | 661 | 243.9 |
| 1909.8 | 810 | 247.0 |

GSM850

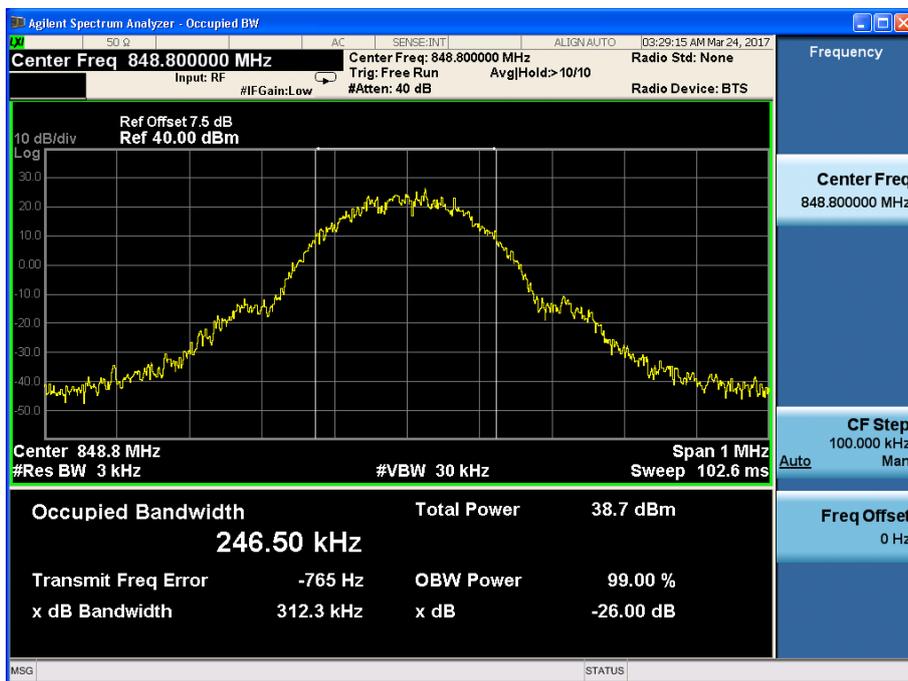
GSM/GPRS MODE:



Channel 128

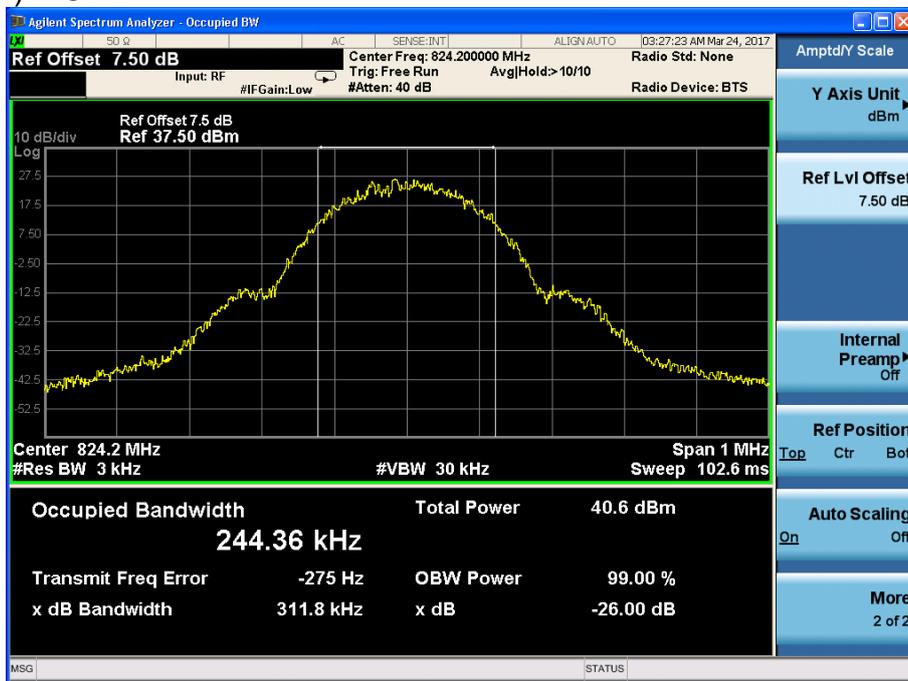


Channel 189

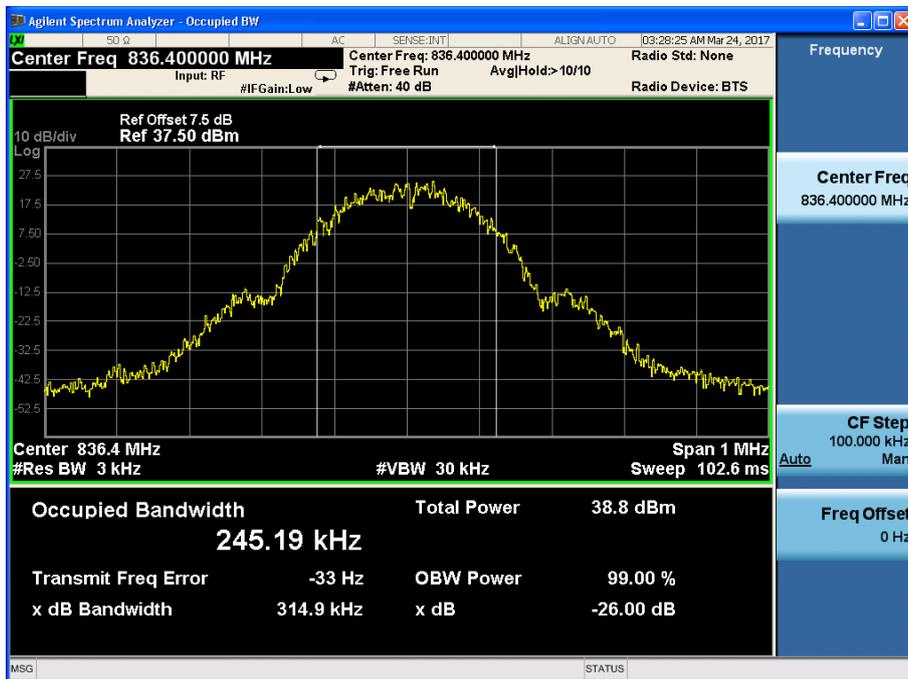


Channel 251

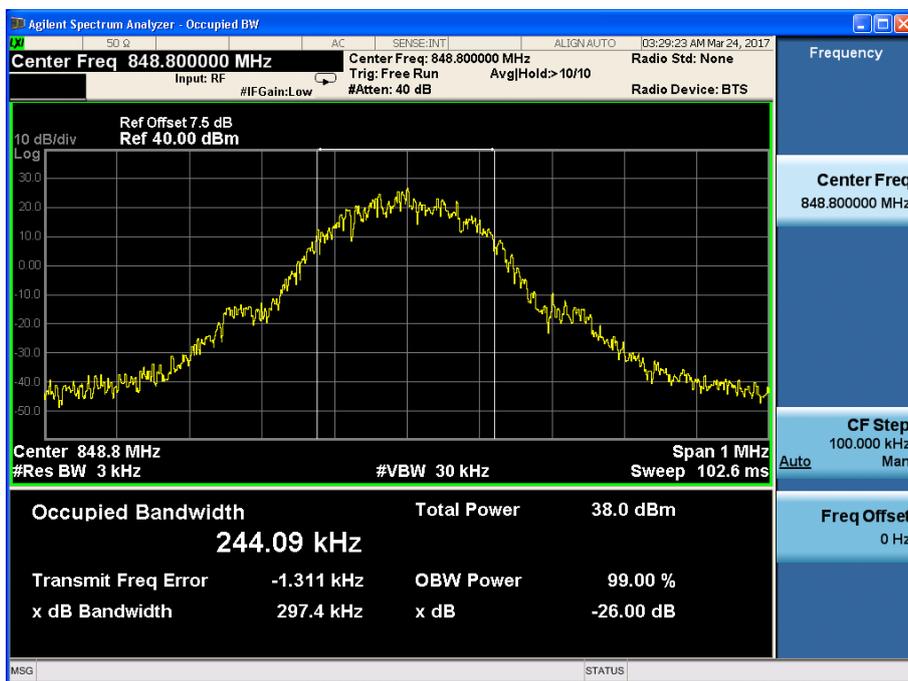
EDGE (GMSK) MODE:



Channel 128



Channel 189



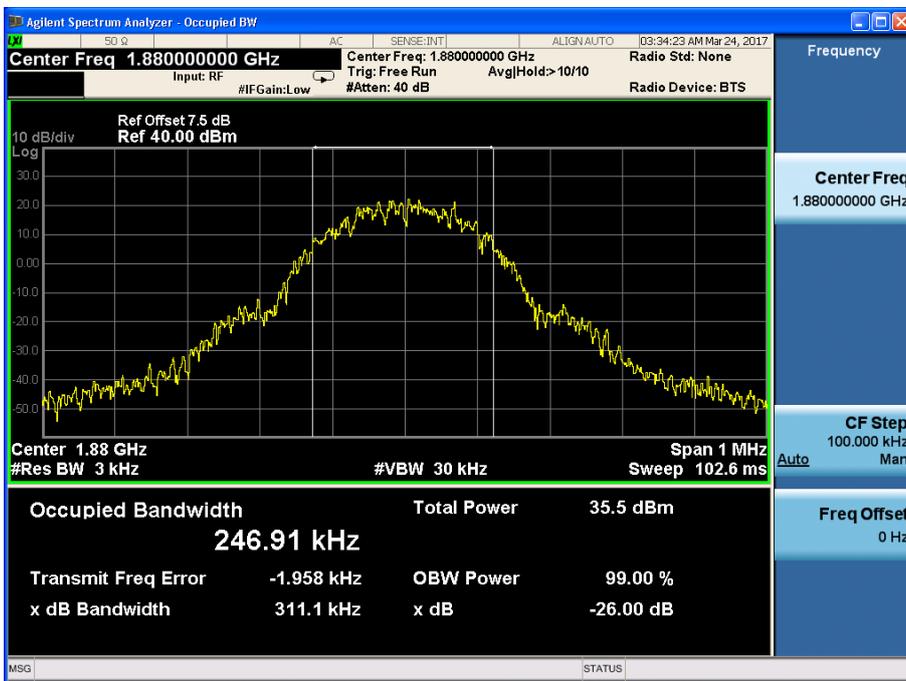
Channel 251

PCS1900

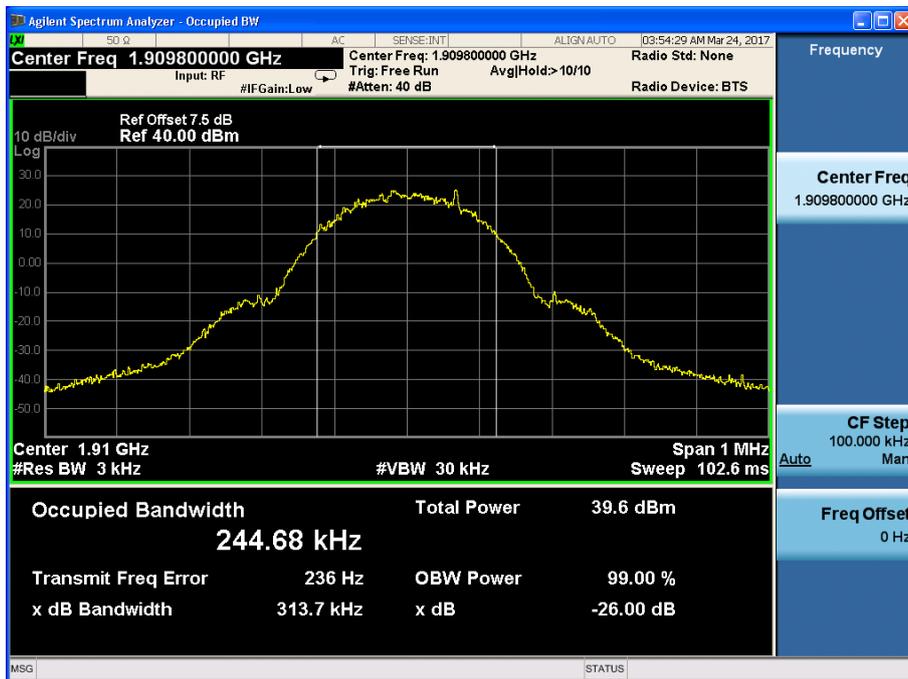
GSM/GPRS MODE:



Channel 512

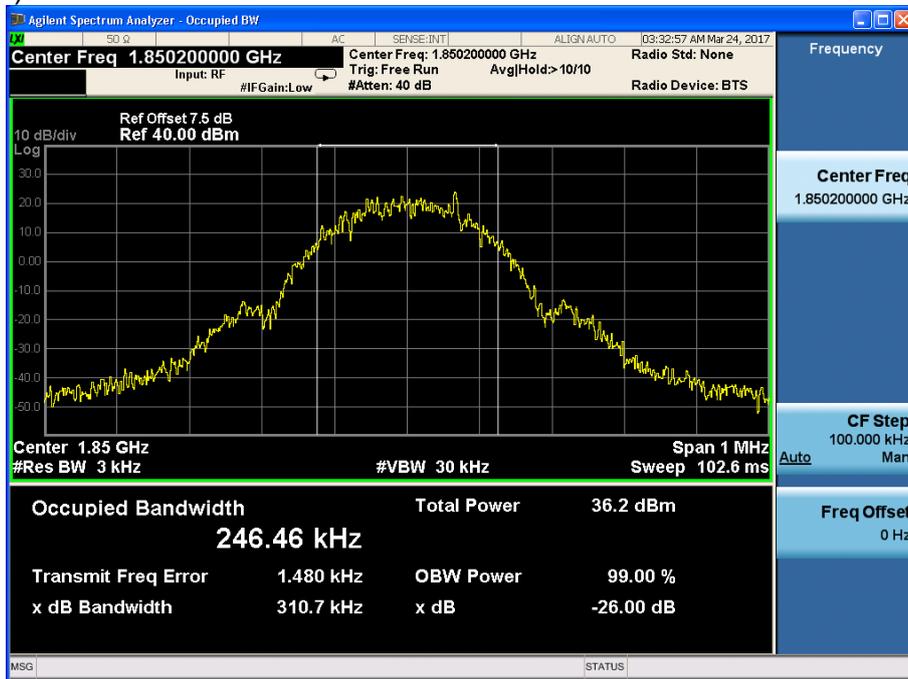


Channel 661

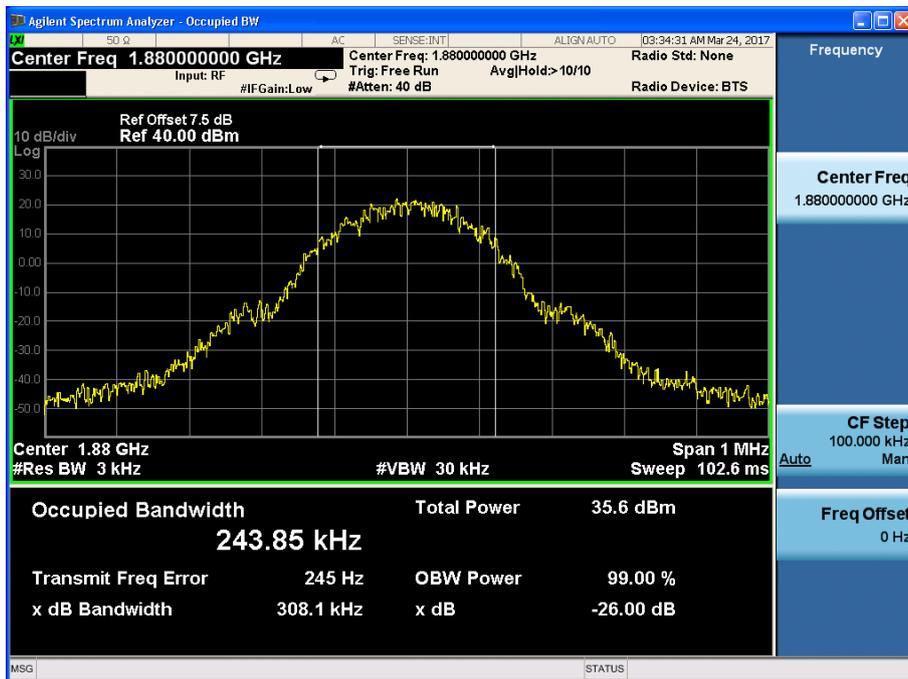


Channel 810

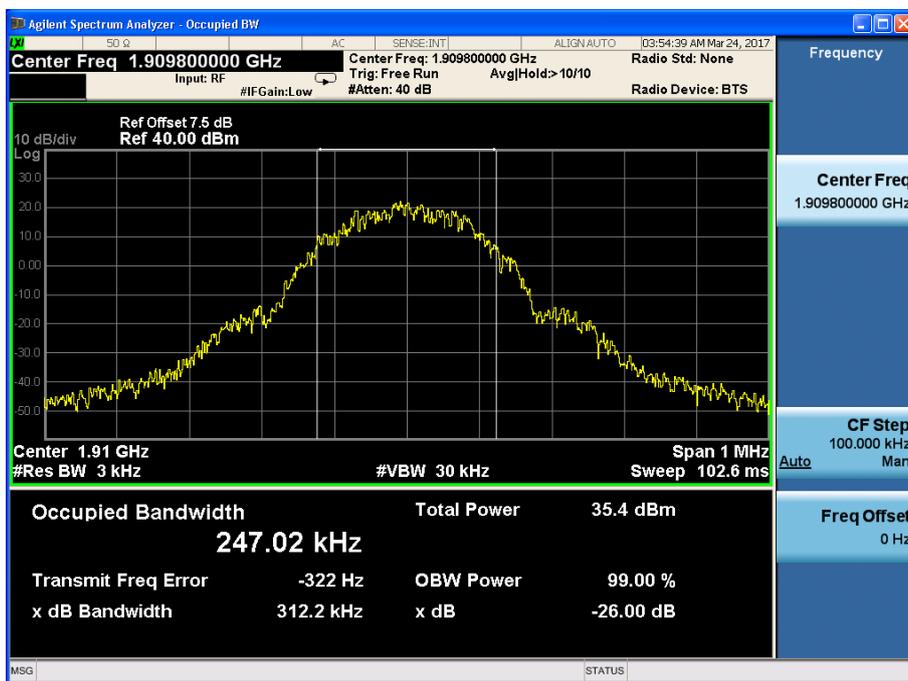
EDGE (GMSK) MODE:



Channel 512



Channel 661



Channel 810

Emission Bandwidth-FCC Part22.917(b)

GSM850

GSM/GPRS MODE:

| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dB transmitter power (kHz) |
|-------------------------|-------------|--|
| 824.2 | 128 | 310.7 |
| 836.4 | 189 | 304.2 |
| 848.8 | 251 | 312.3 |

EDGE (GMSK) MODE:

| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dB transmitter power (kHz) |
|-------------------------|-------------|--|
| 824.2 | 128 | 311.8 |
| 836.4 | 189 | 314.9 |
| 848.8 | 251 | 297.4 |

PCS1900

GSM/GPRS MODE:

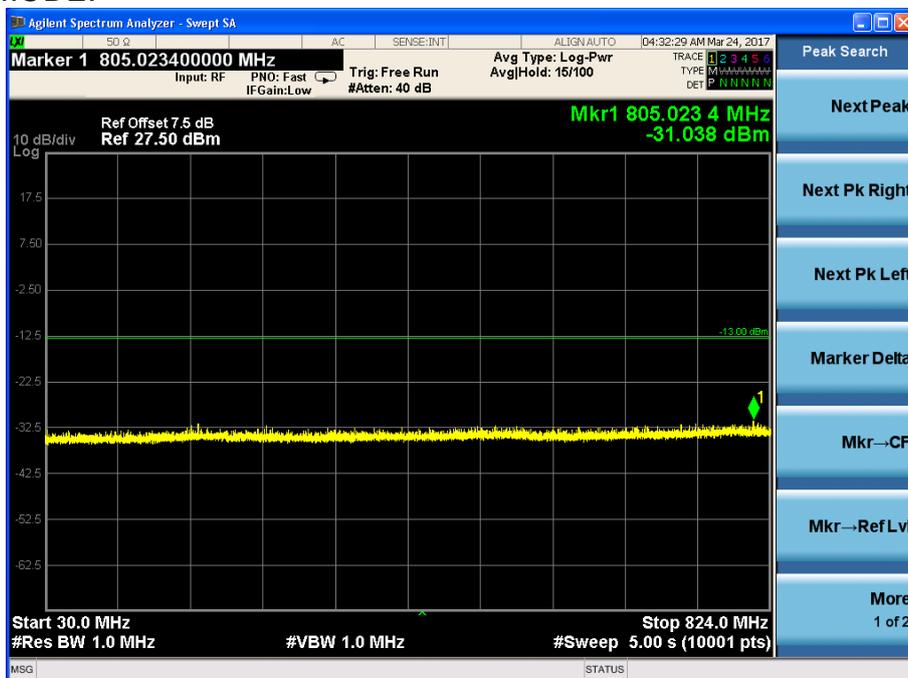
| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dB transmitter power (kHz) |
|-------------------------|-------------|--|
| 1850.2 | 512 | 312.9 |
| 1880.0 | 661 | 311.1 |
| 1909.8 | 810 | 313.7 |

EDGE (GMSK) MODE:

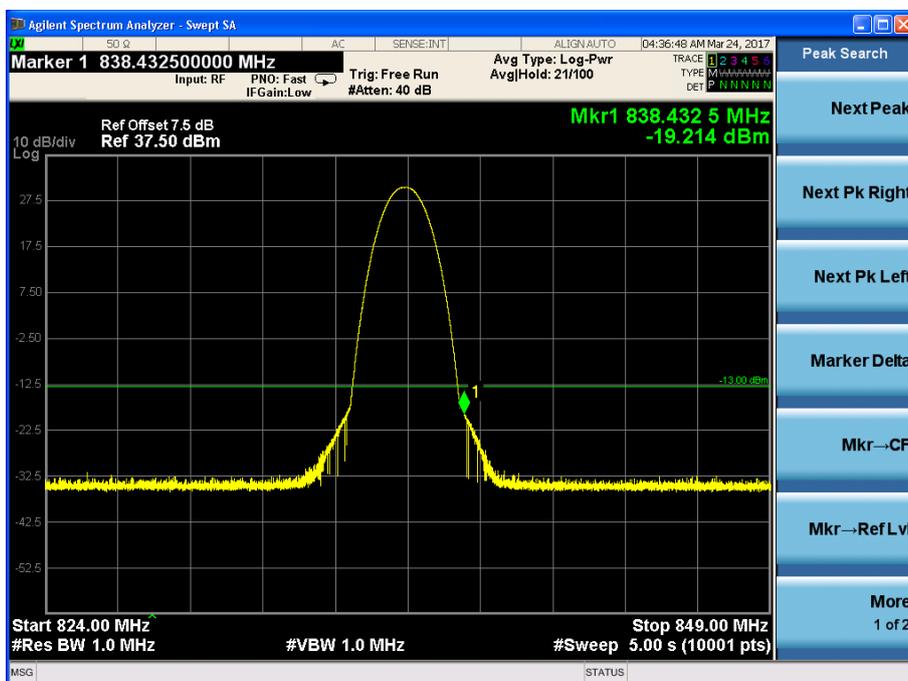
| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dB transmitter power (kHz) |
|-------------------------|-------------|--|
| 1850.2 | 512 | 310.7 |
| 1880.0 | 661 | 308.1 |
| 1909.8 | 810 | 312.2 |

Spurious Emissions at antenna terminal-FCC Part2.1051/22.917(a) GSM850

GSM/GPRS MODE:

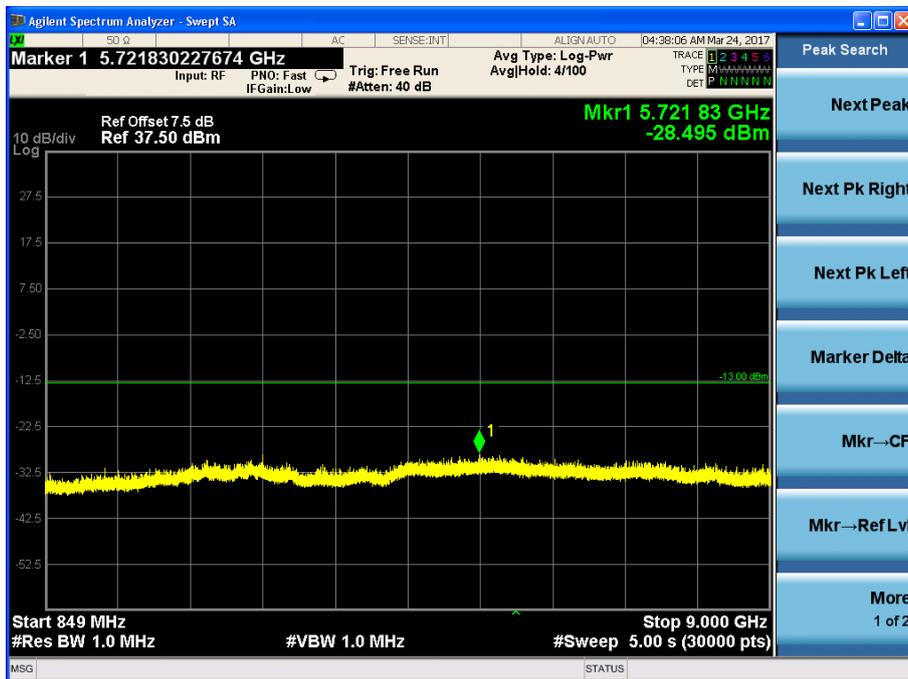


Channel 189, 30MHz~824MHz



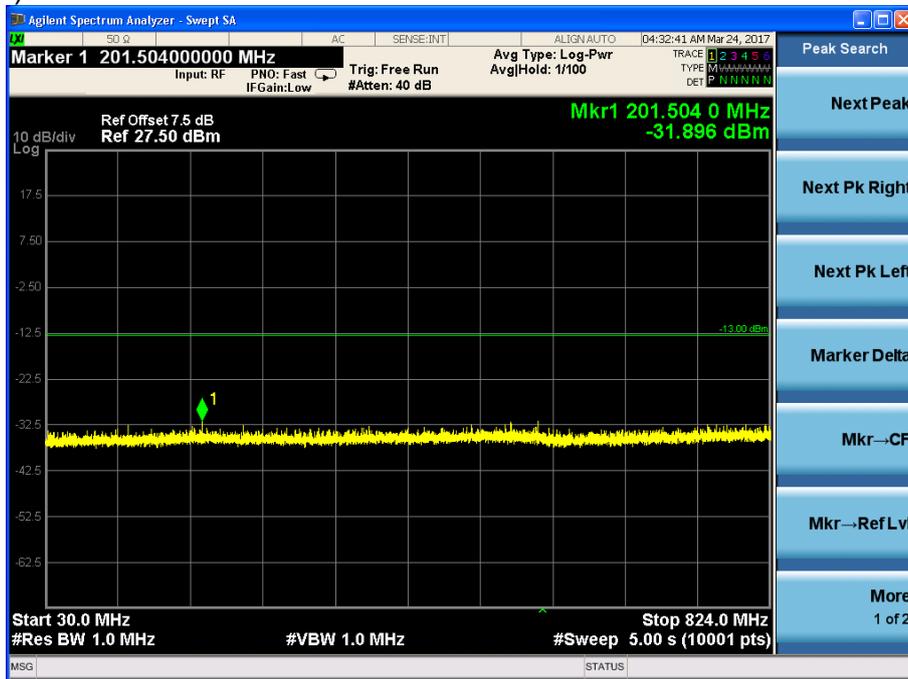
Channel 189, 824MHz~849MHz

Note: The signal beyond the limit is the signal transmitted by EUT.

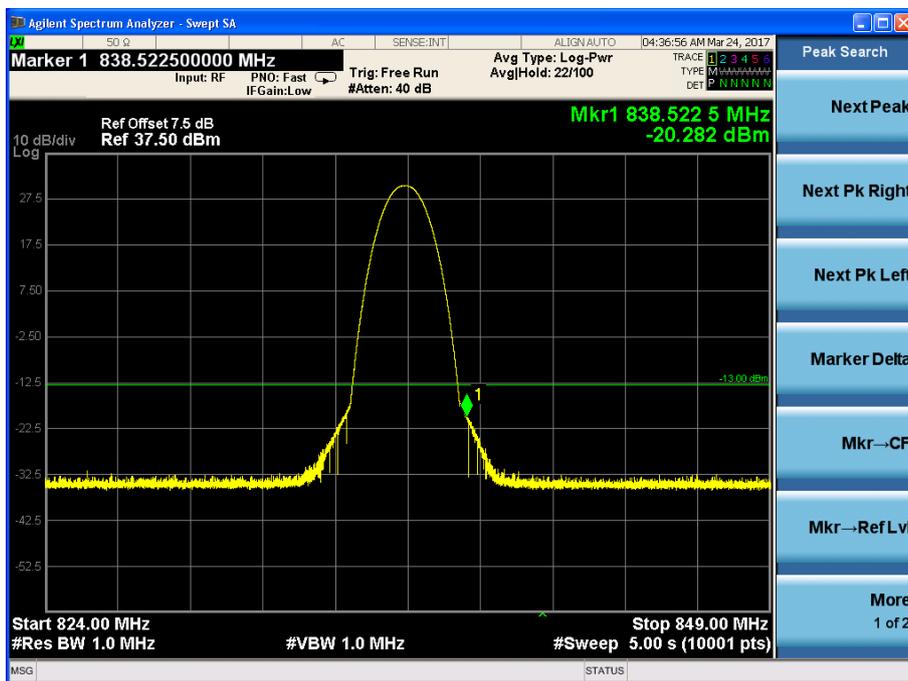


Channel 189, 849MHz~9GHz

EDGE (GMSK) MODE:

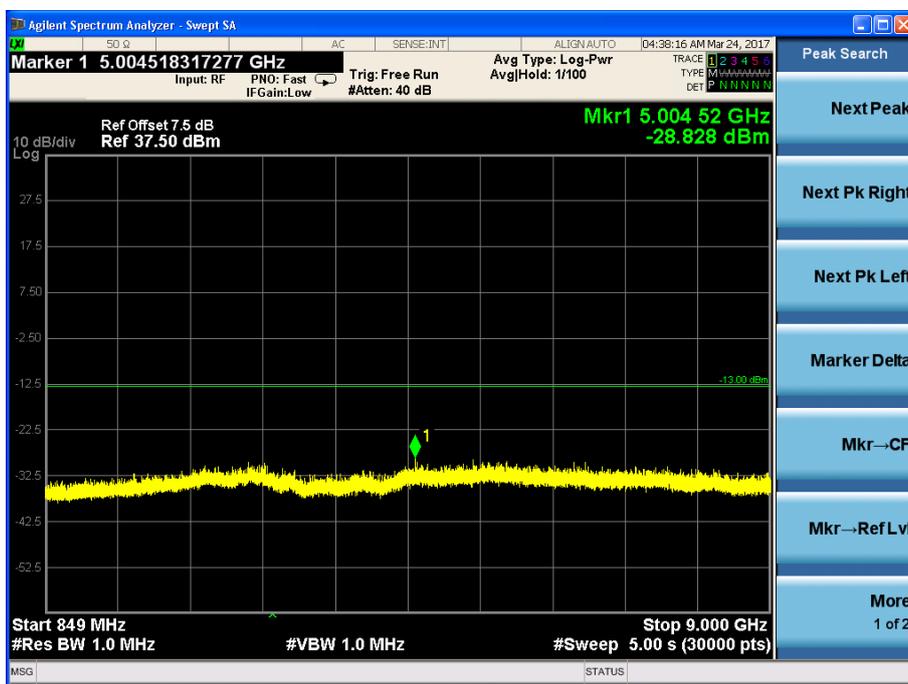


Channel 189, 30MHz~824MHz



Channel 189, 824MHz~849MHz

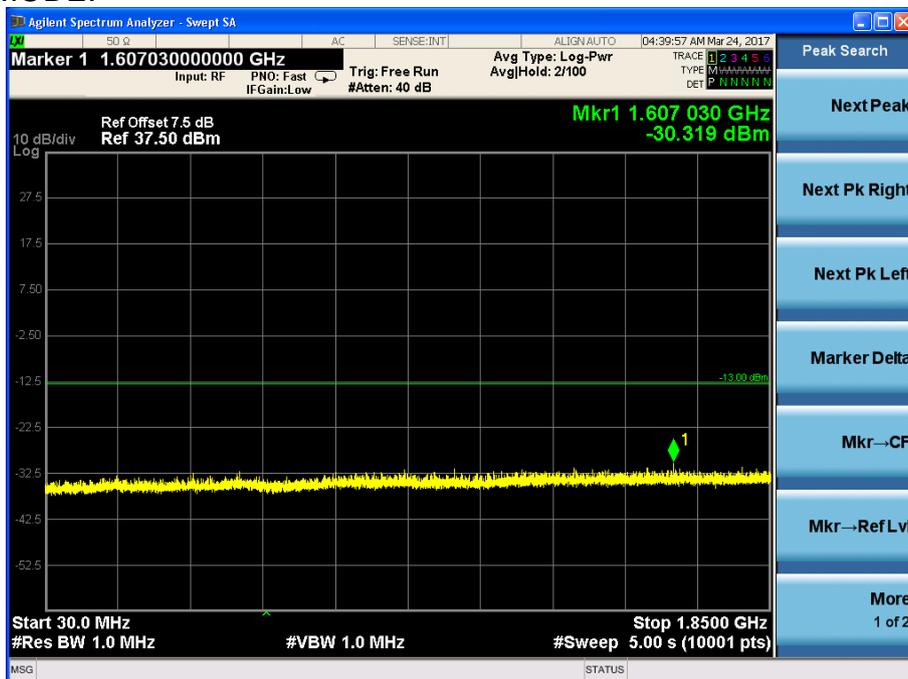
Note: The signal beyond the limit is the signal transmitted by EUT.



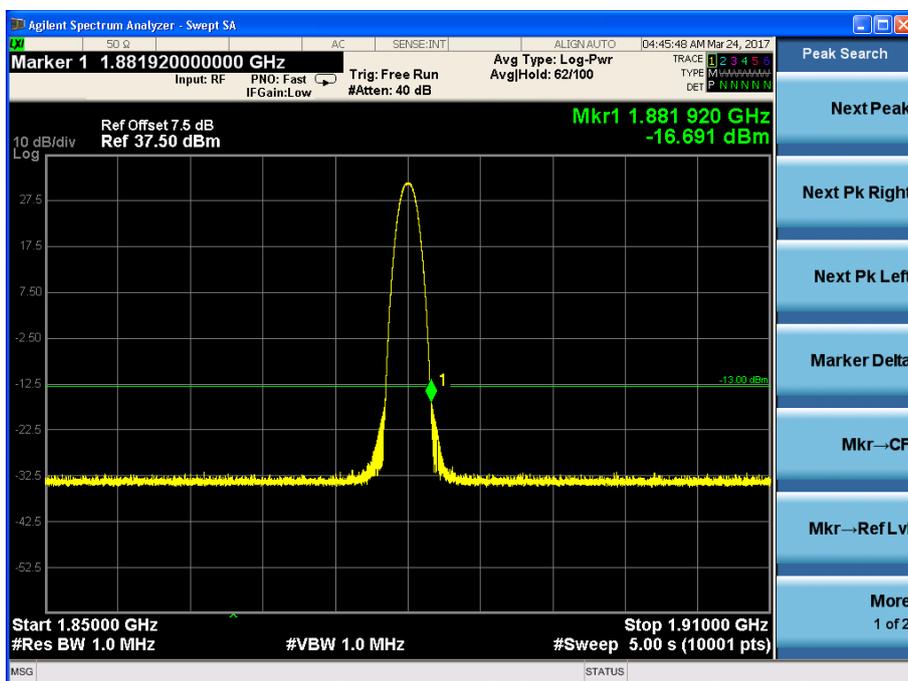
Channel 189, 849MHz~9GHz

PCS1900

GSM/GPRS MODE:



Channel 661, 30MHz~1850MHz



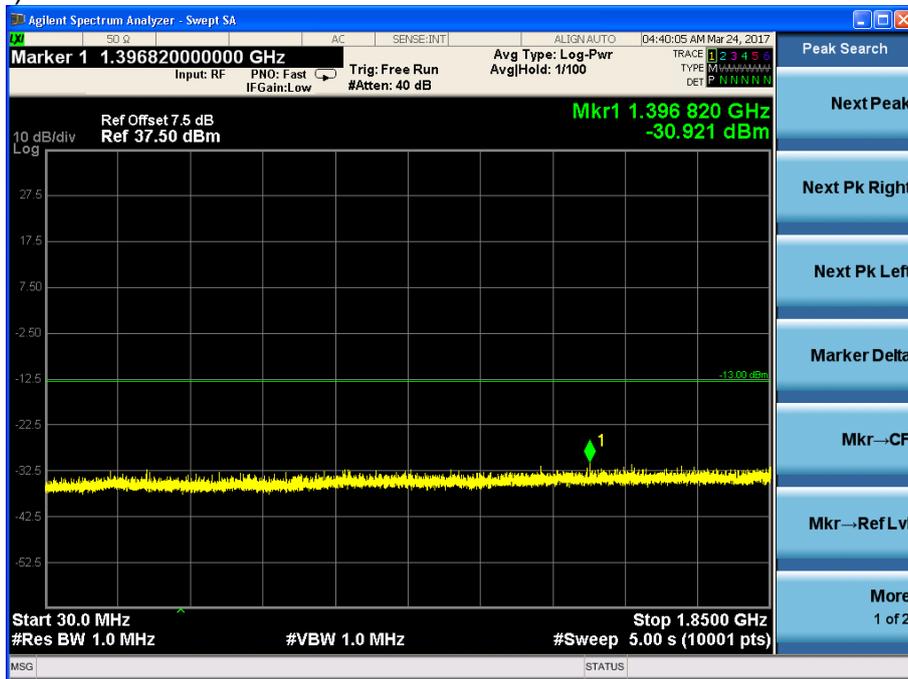
Channel 661, 1850MHz~1910MHz

Note: The signal beyond the limit is the signal transmitted by EUT.

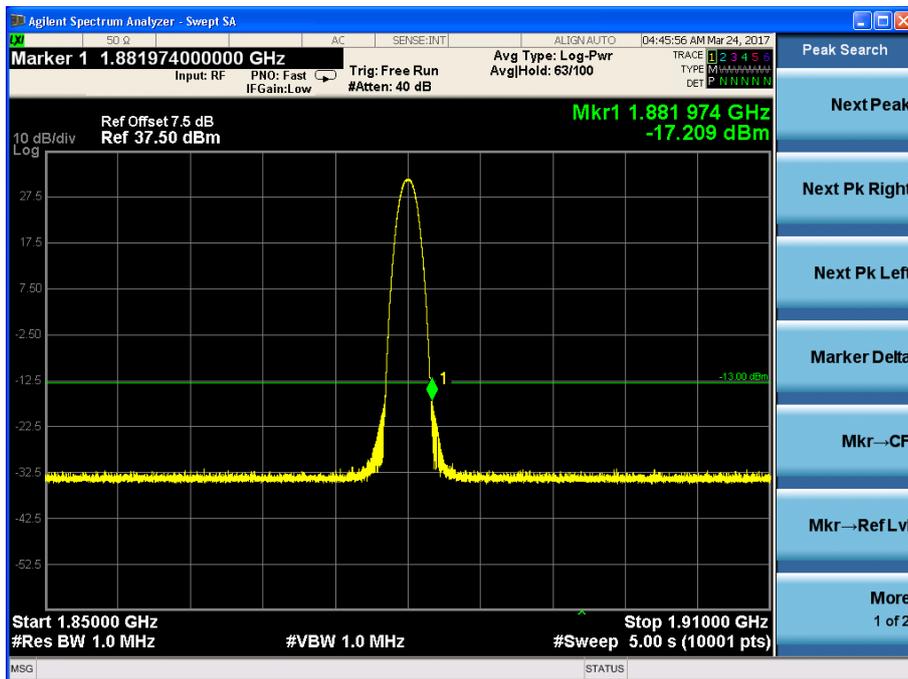


Channel 661, 1910MHz~20GHz

EDGE (GMSK) MODE:

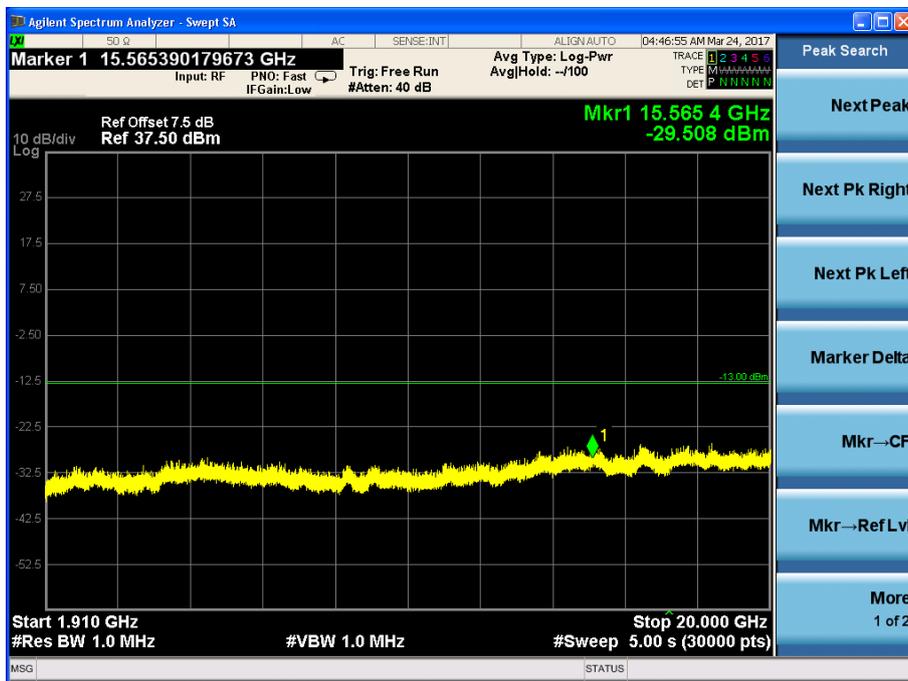


Channel 661, 30MHz~1850MHz



Channel 661, 1850MHz~1910MHz

Note: The signal beyond the limit is the signal transmitted by EUT.

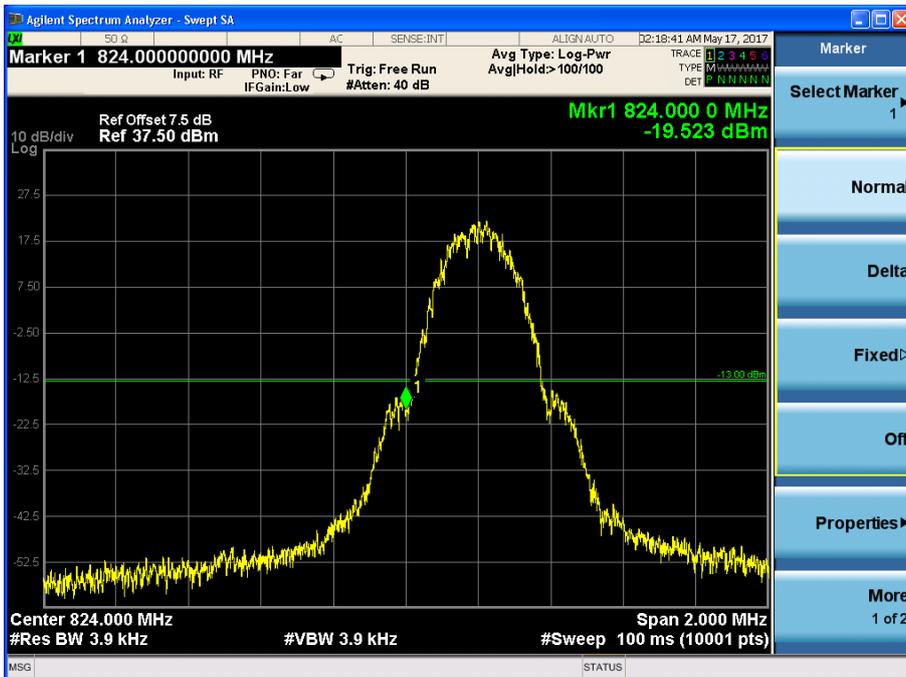


Channel 661, 1910MHz~20GHz

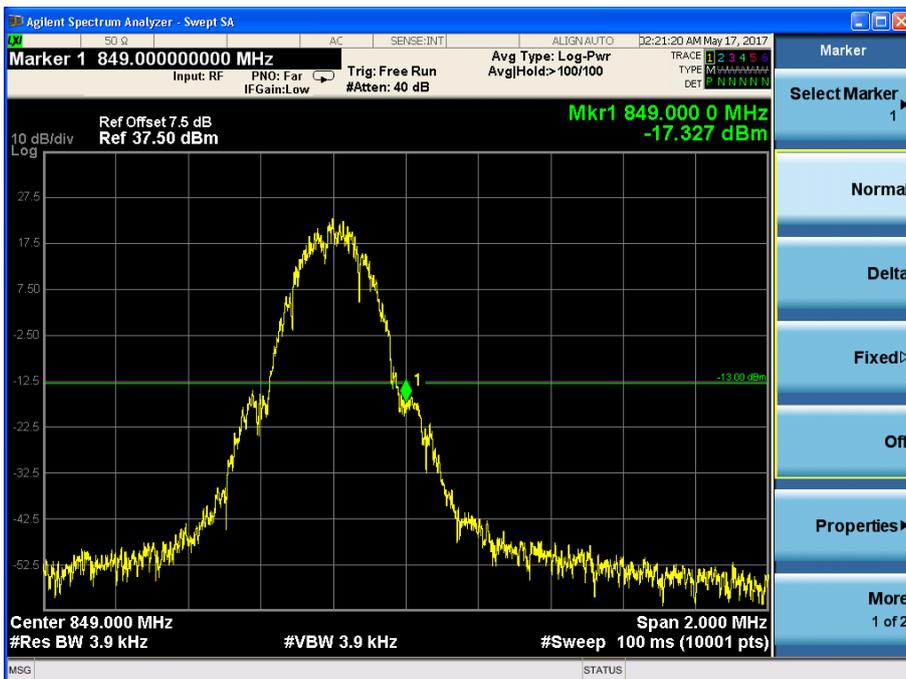
Band Edges Compliance-FCC Part2.1051/22.917(a)

GSM850

GSM/GPRS MODE:

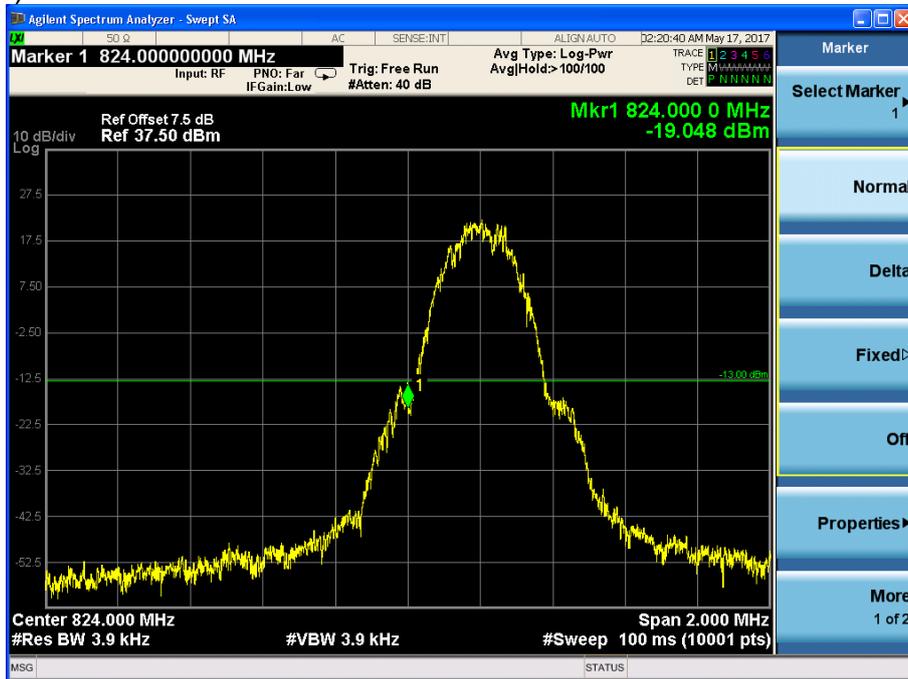


Channel 128

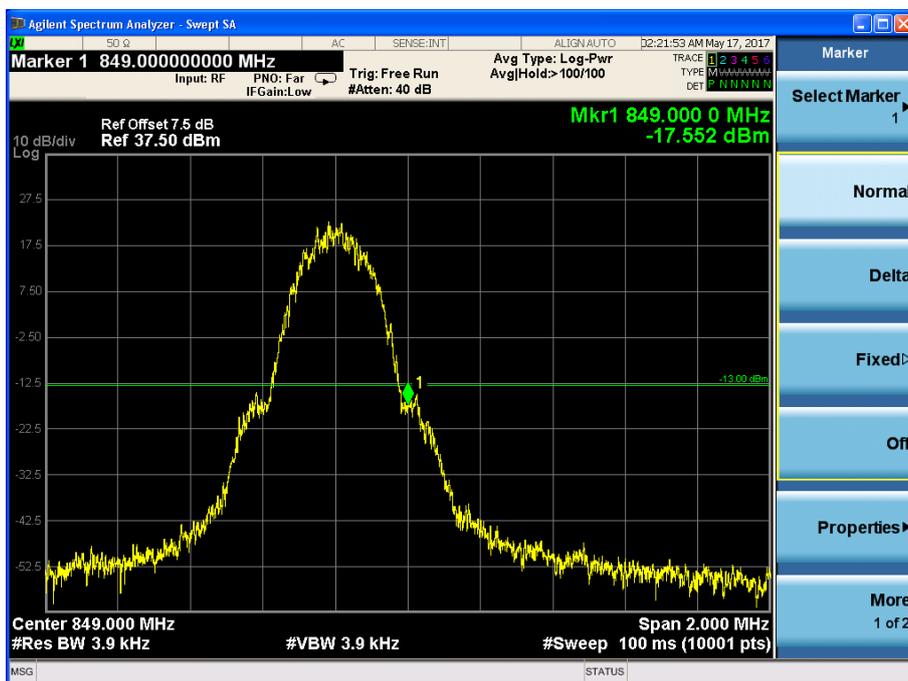


Channel 251

EDGE (GMSK) MODE:



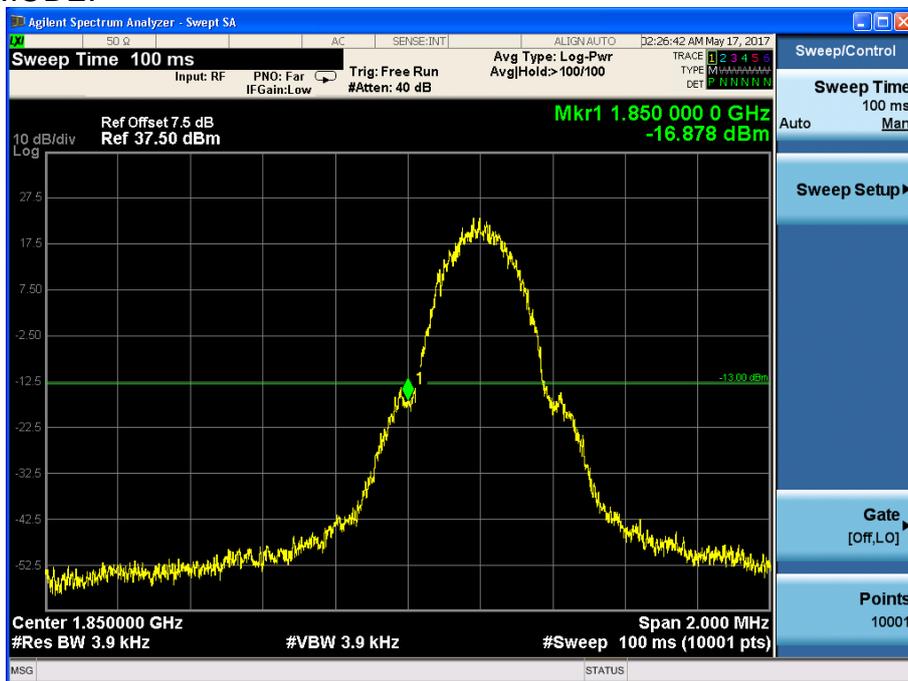
Channel 128



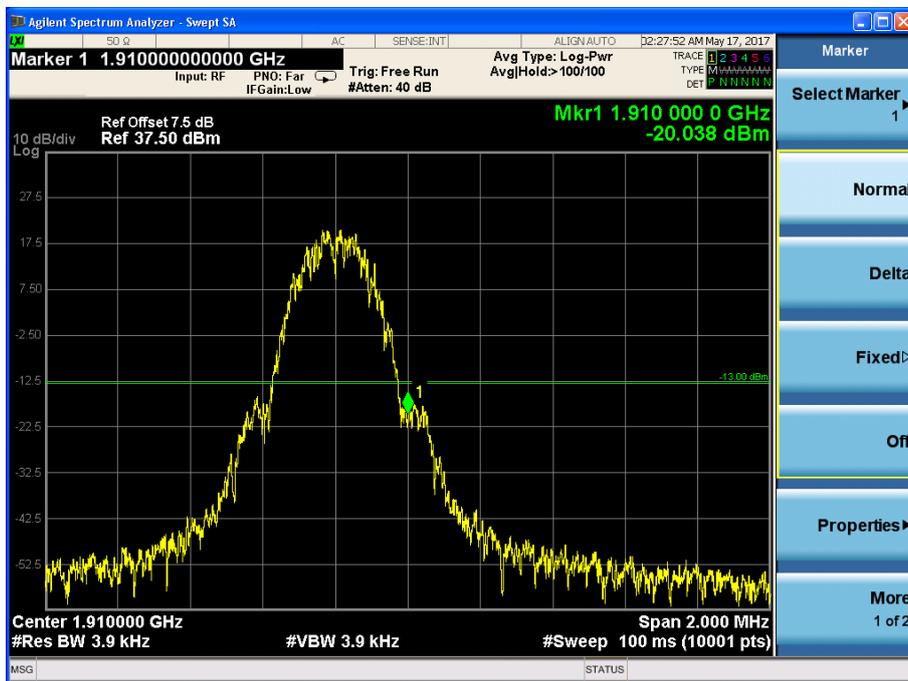
Channel 251

PCS1900

GSM/GPRS MODE:

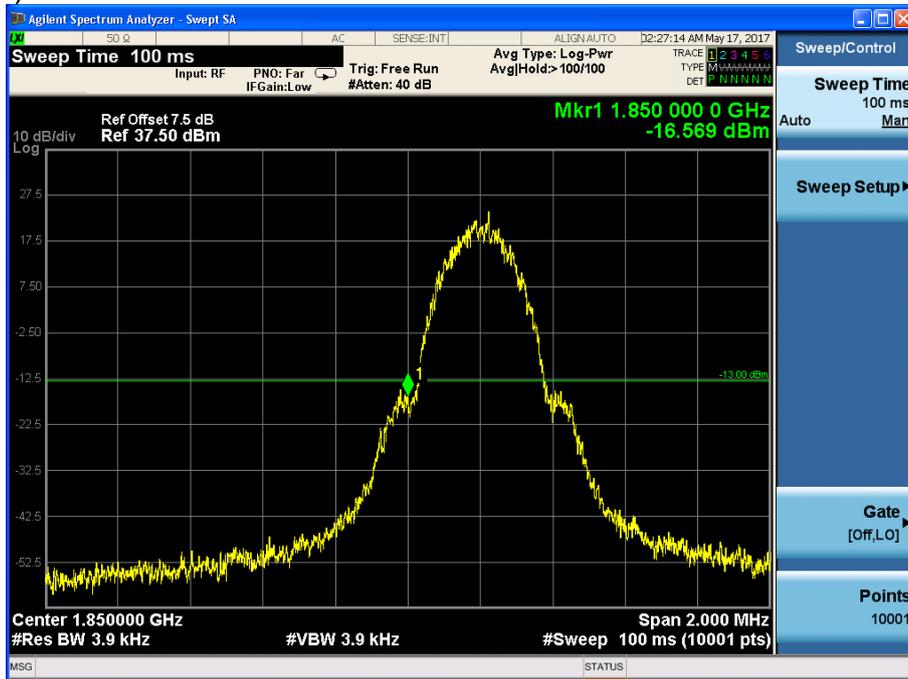


Channel 512

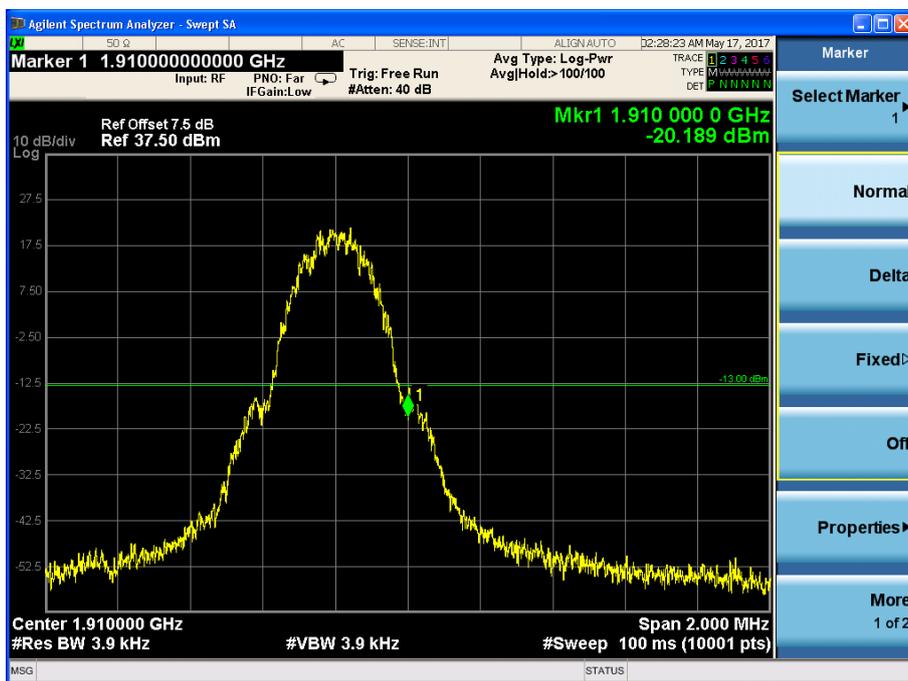


Channel 810

EDGE (GMSK) MODE:



Channel 512



Channel 810

Frequency Stability-FCC Part2.1055/22.355

GSM850

GSM/GPRS MODE:

| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|-------------|-------------|
| | Channel 128 | Channel 189 | Channel 251 |
| -30 | 0.011 | 0.011 | 0.012 |
| -20 | 0.014 | 0.012 | 0.011 |
| -10 | 0.011 | 0.013 | 0.011 |
| 0 | 0.007 | 0.011 | 0.013 |
| +10 | 0.007 | 0.013 | 0.012 |
| +20 | 0.009 | 0.012 | 0.009 |
| +30 | 0.010 | 0.012 | 0.012 |
| +40 | 0.012 | 0.011 | 0.011 |
| +50 | 0.012 | 0.010 | 0.012 |

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|-------------|-------------|
| | Channel 128 | Channel 189 | Channel 251 |
| LV | 0.010 | 0.009 | 0.012 |
| HV | 0.013 | 0.009 | 0.011 |

EDGE (GMSK) MODE:

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

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|-------------|-------------|
| | Channel 128 | Channel 189 | Channel 251 |
| LV | 0.009 | 0.010 | 0.012 |
| HV | 0.008 | 0.011 | 0.013 |

PCS1900

GSM/GPRS MODE:

| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|-------------|-------------|
| | Channel 512 | Channel 661 | Channel 810 |
| -30 | 0.013 | 0.013 | 0.011 |
| -20 | 0.013 | 0.015 | 0.012 |
| -10 | 0.011 | 0.014 | 0.011 |
| 0 | 0.011 | 0.013 | 0.012 |
| +10 | 0.014 | 0.012 | 0.012 |
| +20 | 0.011 | 0.012 | 0.010 |
| +30 | 0.013 | 0.014 | 0.014 |
| +40 | 0.009 | 0.012 | 0.011 |
| +50 | 0.011 | 0.011 | 0.012 |

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|-------------|-------------|
| | Channel 512 | Channel 661 | Channel 810 |
| LV | 0.012 | 0.013 | 0.011 |
| HV | 0.013 | 0.012 | 0.012 |

EDGE (GMSK) MODE:

| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|-------------|-------------|
| | Channel 512 | Channel 661 | Channel 810 |
| -30 | 0.014 | 0.014 | 0.012 |
| -20 | 0.012 | 0.013 | 0.012 |
| -10 | 0.013 | 0.011 | 0.014 |
| 0 | 0.009 | 0.014 | 0.011 |
| +10 | 0.013 | 0.016 | 0.012 |
| +20 | 0.013 | 0.013 | 0.011 |
| +30 | 0.012 | 0.015 | 0.012 |
| +40 | 0.015 | 0.011 | 0.011 |
| +50 | 0.013 | 0.014 | 0.012 |

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|-------------|-------------|
| | Channel 512 | Channel 661 | Channel 810 |
| LV | 0.012 | 0.011 | 0.011 |
| HV | 0.012 | 0.012 | 0.012 |

Peak-Average Ratio -FCC Part 24.232(d)

PCS1900

GSM/GPRS MODE:



EDGE (GMSK) MODE:



APPENDIX B – TEST DATA OF RADIATED EMISSION

Effective Radiated Power-FCC Part22.913(a)

GSM850

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 | 31.19 | -3.8 | 8.6 | 2.15 | 28.54 | Vertical |
| 836.6 | 5 | 30.60 | -3.8 | 8.6 | 2.15 | 27.95 | Vertical |
| 848.8 | 5 | 30.73 | -3.8 | 8.6 | 2.15 | 28.08 | Vertical |

EDGE MODE:

| Frequency (MHz) | Power step | Peak ERP (dBm) | Pca Cable loss(dB) | Ga Antenna Gain (dB) | Correction (dB) | Pmea (dBm) | Polarization |
|-----------------|------------|----------------|--------------------|----------------------|-----------------|------------|--------------|
| 824.2 | 5 | 30.77 | -3.8 | 8.6 | 2.15 | 28.12 | Vertical |
| 836.6 | 5 | 30.62 | -3.8 | 8.6 | 2.15 | 27.97 | Vertical |
| 848.8 | 5 | 31.01 | -3.8 | 8.6 | 2.15 | 28.36 | Vertical |

PCS1900

GSM/GPRS MODE:

| Frequency (MHz) | Power step | Peak EIRP(dBm) | Pca Cable loss(dB) | Ga Antenna Gain (dB) | Pmea (dBm) | Polarization |
|-----------------|------------|----------------|--------------------|----------------------|------------|--------------|
| 1850.2 | 0 | 31.15 | -4.8 | 8.6 | 27.35 | Vertical |
| 1880.0 | 0 | 29.94 | -4.8 | 8.6 | 26.14 | Vertical |
| 1909.8 | 0 | 30.80 | -4.8 | 8.6 | 27.00 | Vertical |

EDGE MODE:

| Frequency (MHz) | Power step | Peak EIRP(dBm) | Pca Cable loss(dB) | Ga Antenna Gain (dB) | Pmea (dBm) | Polarization |
|-----------------|------------|----------------|--------------------|----------------------|------------|--------------|
| 1850.2 | 0 | 30.31 | -4.8 | 8.6 | 26.51 | Vertical |
| 1880.0 | 0 | 30.99 | -4.8 | 8.6 | 27.19 | Vertical |
| 1909.8 | 0 | 30.13 | -4.8 | 8.6 | 26.33 | Vertical |

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

GSM850

GSM/GPRS MODE Channel 128:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1635.19 | -52.79 | -13 | Vertical |
| 2561.01 | -51.05 | -13 | Vertical |
| 2846.46 | -43.97 | -13 | Vertical |
| 3376.79 | -43.54 | -13 | Vertical |
| 7025.62 | -40.16 | -13 | Vertical |
| 9934.54 | -36.59 | -13 | Vertical |

EDGE (GMSK) MODE Channel 128:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1636.70 | -52.38 | -13 | Vertical |
| 2561.35 | -51.45 | -13 | Vertical |
| 2842.71 | -43.56 | -13 | Vertical |
| 3373.10 | -43.40 | -13 | Vertical |
| 7026.97 | -39.90 | -13 | Vertical |
| 9932.83 | -35.99 | -13 | Vertical |

GSM/GPRS MODE Channel 189:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1636.22 | -53.31 | -13 | Vertical |
| 2559.75 | -51.61 | -13 | Vertical |
| 2843.86 | -44.38 | -13 | Vertical |
| 3375.61 | -43.39 | -13 | Vertical |
| 7026.46 | -39.88 | -13 | Vertical |
| 9932.03 | -36.69 | -13 | Vertical |

EDGE (GMSK) MODE Channel 189:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1636.66 | -53.30 | -13 | Vertical |
| 2561.81 | -51.58 | -13 | Vertical |
| 2845.82 | -43.69 | -13 | Vertical |
| 3373.21 | -43.28 | -13 | Vertical |
| 7025.11 | -39.70 | -13 | Vertical |
| 9934.13 | -36.40 | -13 | Vertical |

GSM/GPRS MODE Channel 251:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1637.57 | -52.52 | -13 | Vertical |
| 2561.62 | -51.54 | -13 | Vertical |
| 2844.35 | -43.52 | -13 | Vertical |
| 3374.26 | -43.94 | -13 | Vertical |
| 7023.90 | -39.47 | -13 | Vertical |
| 9935.04 | -36.71 | -13 | Vertical |

EDGE (GMSK) MODE Channel 251:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1637.83 | -53.02 | -13 | Vertical |
| 2561.99 | -50.73 | -13 | Vertical |
| 2843.49 | -44.41 | -13 | Vertical |
| 3375.47 | -43.45 | -13 | Vertical |
| 7025.19 | -39.32 | -13 | Vertical |
| 9931.51 | -36.28 | -13 | Vertical |

PCS1900

GSM/GPRS MODE Channel 512

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1635.80 | -52.77 | -13 | Vertical |
| 2560.97 | -50.72 | -13 | Vertical |
| 2843.73 | -44.16 | -13 | Vertical |
| 3374.89 | -43.54 | -13 | Vertical |
| 7025.51 | -40.02 | -13 | Vertical |
| 9934.39 | -36.28 | -13 | Vertical |

EDGE (GMSK) MODE Channel 512:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1637.28 | -52.83 | -13 | Vertical |
| 2561.33 | -50.68 | -13 | Vertical |
| 2846.37 | -43.96 | -13 | Vertical |
| 3375.69 | -43.60 | -13 | Vertical |
| 7025.21 | -40.08 | -13 | Vertical |
| 9934.93 | -36.24 | -13 | Vertical |

GSM/GPRS MODE Channel 661:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1634.46 | -52.47 | -13 | Vertical |
| 2560.70 | -51.52 | -13 | Vertical |
| 2845.20 | -43.79 | -13 | Vertical |
| 3374.58 | -43.79 | -13 | Vertical |
| 7026.89 | -40.12 | -13 | Vertical |
| 9932.07 | -36.52 | -13 | Vertical |

EDGE (GMSK) MODE Channel 661:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1636.18 | -52.55 | -13 | Vertical |
| 2559.43 | -51.02 | -13 | Vertical |
| 2843.78 | -43.94 | -13 | Vertical |
| 3375.29 | -43.20 | -13 | Vertical |
| 7027.37 | -39.72 | -13 | Vertical |
| 9934.21 | -36.48 | -13 | Vertical |

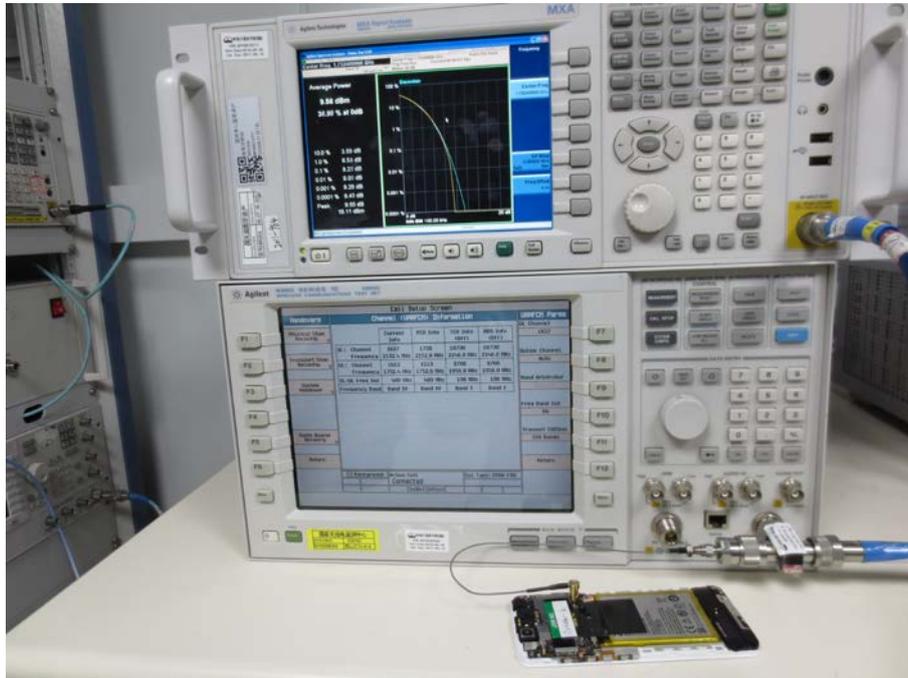
GSM/GPRS MODE Channel 810:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1635.37 | -53.30 | -13 | Vertical |
| 2562.31 | -51.08 | -13 | Vertical |
| 2846.03 | -44.18 | -13 | Vertical |
| 3373.78 | -43.55 | -13 | Vertical |
| 7027.10 | -39.98 | -13 | Vertical |
| 9934.48 | -36.58 | -13 | Vertical |

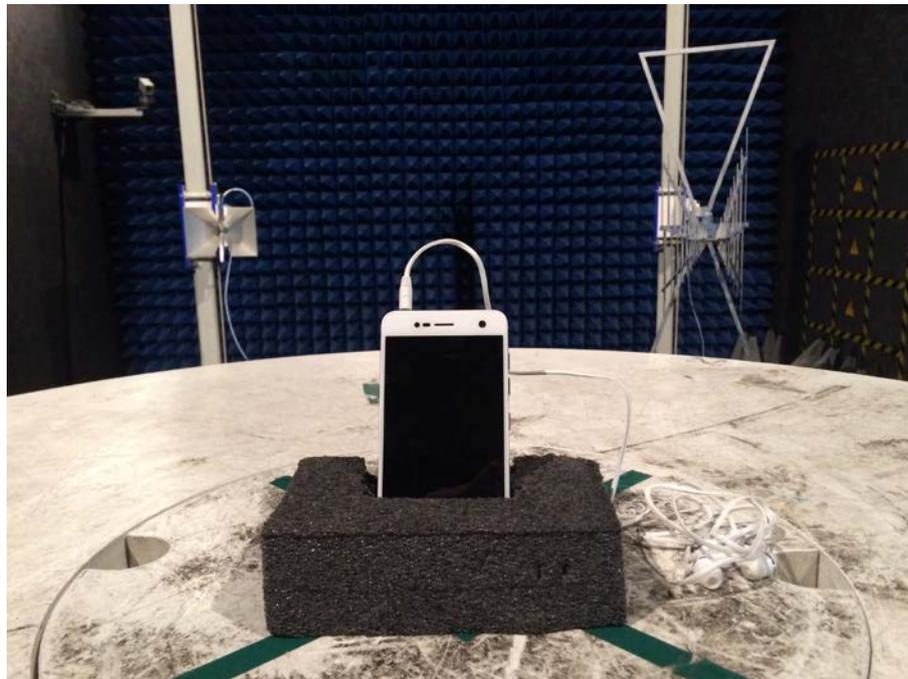
EDGE (GMSK) MODE Channel 810:

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 1637.82 | -52.46 | -13 | Vertical |
| 2561.27 | -51.44 | -13 | Vertical |
| 2846.35 | -44.32 | -13 | Vertical |
| 3373.55 | -43.62 | -13 | Vertical |
| 7024.61 | -40.16 | -13 | Vertical |
| 9932.83 | -36.30 | -13 | Vertical |

APPENDIX C – TEST SETUP



Spurious RF Conducted Emissions Test setup



Radiated Spurious Emissions Test setup

---End of Test Report---