



Registration
No.910917

TEST REPORT FOR WCDMA TESTING

Report No.: SRTC2017-9004(F)-0050

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

Product Model: ZTE BLADE A320

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

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

FCC ID: SRQ-ZTEBLADEA320A

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 6183 |
| Fax: | +86 10 5799 6288 |
| Email: | liuji@srctc.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: | 2017.03.27 |
| Testing Start Date: | 2017.03.27 |
| Testing End Date: | 2017.04.05 |

| Environmental Data: | Temperature (°C) | Humidity (%) |
|---------------------|------------------|--------------|
| Ambient | 25 | 38 |
| Maximum Extreme | 55 | 80 |
| Minimum Extreme | -10 | --- |

| | |
|--|------|
| Normal Supply Voltage (V d.c.): | 3.80 |
| Maximum Extreme Supply Voltage (V d.c.): | 4.20 |
| Minimum Extreme Supply Voltage (V d.c.): | 3.50 |

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

| | |
|---------------------|---|
| Frequency Range | WCDMA Band II: Tx:1850~1910MHz Rx:1930~1990MHz WCDMA Band V: Tx:824~849MHz Rx:869~894MHz |
| Rated Output Power | WCDMA Band II:24.0dBm WCDMA Band V:24.0dBm |
| Modulation Type | QPSK |
| Emission Designator | 4M50F9W |
| Duplex Mode | FDD |
| Duplex Spacing | WCDMA Band II:80MHz WCDMA Band V:45MHz |
| Antenna Type | Fixed Internal |
| Power Supply | Battery or Charger |
| HW Version | u4jB |
| SW Version | FLOW_CW_BA320_V1.0 |
| IMEI | 863916030015005 |

2.2 Support Equipment

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

| | |
|---------------|-----------------------------------|
| Equipment | Battery 1 |
| Manufacturer | Zhongshan Tianmao Battery Co.,Ltd |
| Model Number | Li3822T43P3h716043 |
| Serial Number | ---- |

| | |
|---------------|-------------------------------|
| Equipment | Battery 2 |
| Manufacturer | Zhengzhou BAK Battery Co.,Ltd |
| Model Number | Li3822T43P3h716043 |
| Serial Number | ---- |

As the information described above, there are one models of battery manufactured by two companies. The relevant tests have been performed in order to verify in which combination case (EUT exercised by one models of battery manufactured by two companies) the EUT would have the worst features. So all the tests shown in this test report are performed when the EUT exercised by the battery 1 manufactured by Zhongshan Tianmao Battery Co.,Ltd.

Note: The original test data derive from the report: SRTC2017-9004(F)-0016.

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 | 22.913(a)/24.232(b) | Pass |
| 2 | Effective Radiated Power and Effective Isotropic Radiated Power | 22.913(a)/24.232(b) | Pass |
| 3 | Occupied Bandwidth | 2.1049 | Pass |
| 4 | Emission Bandwidth | 22.917(b)/24.238(b) | Pass |
| 5 | Spurious Emissions at antenna terminal | 2.1051/22.917/24.238 | Pass |
| 6 | Band Edges Compliance | 22.917(b)/24.238(b) | Pass |
| 7 | Frequency Stability | 2.1055/22.355/24.235 | Pass |
| 8 | Radiated Spurious Emissions | 2.1053/22.917(a)/24.238 | 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. Li Bin  | Issued date: 20170609 |

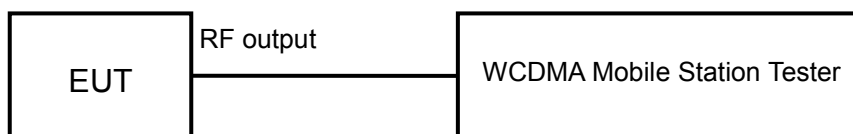
6 TEST RESULT

6.1 RF Power Output-FCC Part24.232(b)

Ambient condition:

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

Test Setup:



WCDMA band II

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 No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)

| | |
|--------|--------|
| Limits | ≤24dBm |
|--------|--------|

WCDMA band V

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 No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

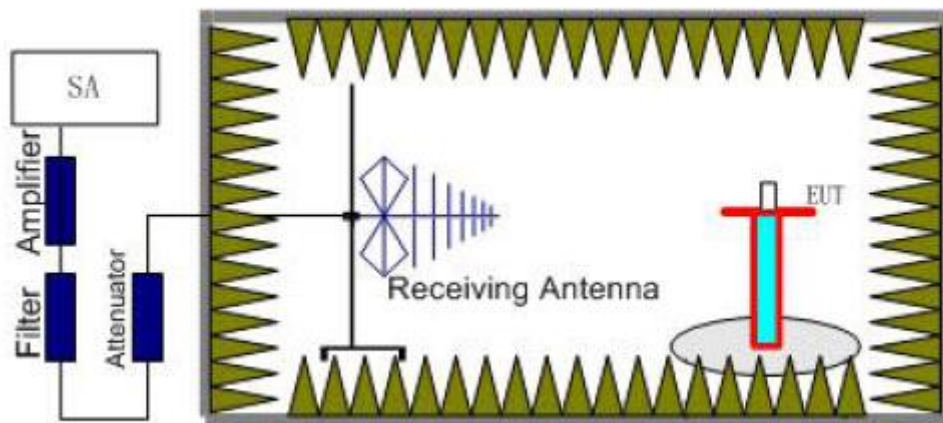
| | |
|--------|--------|
| Limits | ≤24dBm |
|--------|--------|

6.2 Effective Isotropic Radiated Power-FCC Part24.232(b)

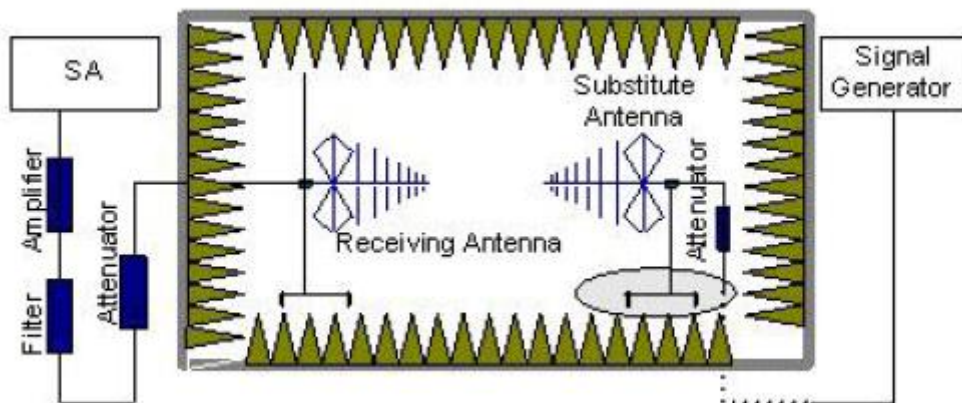
Ambient condition:

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

Test setup:



Step 1



Step 2

WCDMA band II

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 (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:

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

The measurement will be done at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II).

| | |
|--------|--------|
| Limits | ≤33dBm |
|--------|--------|

WCDMA band V

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:

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

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

The measurement will be done at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

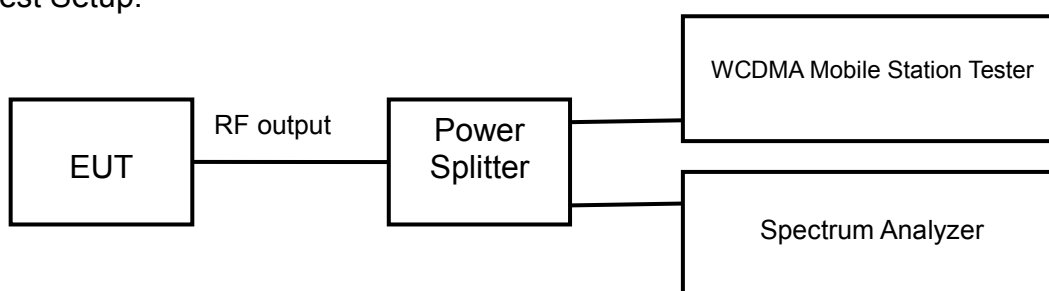
| | |
|--------|-----------------------|
| Limits | $\leq 38.5\text{dBm}$ |
|--------|-----------------------|

6.3 Occupied Bandwidth-FCC Part2.1049

Ambient condition:

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

Test Setup:



WCDMA band II

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 51kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)

Limits: No specific occupied bandwidth requirements in part 2.1049

WCDMA band V

Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz on spectrum analyzer. The bandwidth of 99% power can be read on spectrum analyzer.

The measurement will be conducted at three channels No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V)

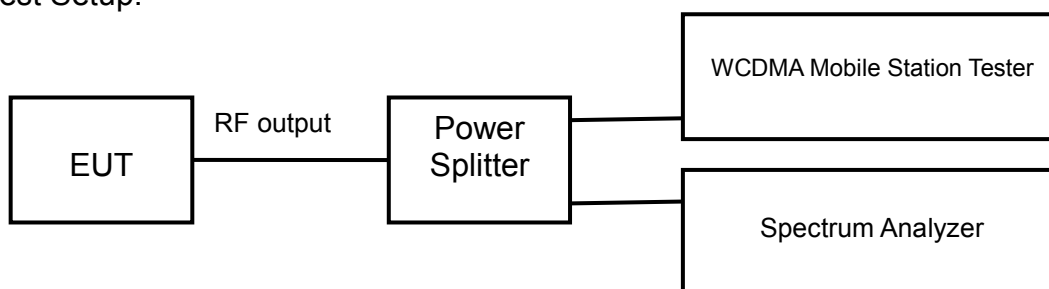
Limits: No specific occupied bandwidth requirements in part 2.1049

6.4 Emission Bandwidth-FCC Part24.238(b)

Ambient condition:

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

Test Setup:



WCDMA band II

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 30kHz on spectrum analyzer. The bandwidth of -26dBc power can be read on spectrum analyzer.

The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II)

Limits: No specific emission bandwidth requirements in part 24.238(b)

WCDMA band V

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 30kHz on spectrum analyzer. The bandwidth of -26dBc power can be read on spectrum analyzer.

The measurement will be conducted at three channels No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band V)

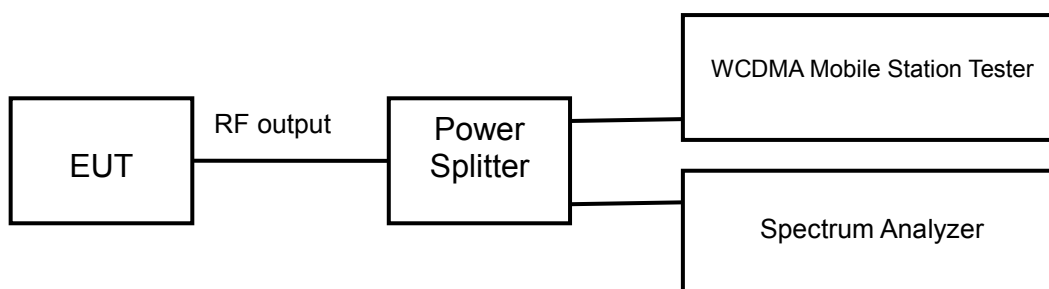
Limits: No specific emission bandwidth requirements in part 22.917(b)

6.5 Spurious Emissions at antenna terminal-FCC Part2.1051/24.238

Ambient condition:

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

Test Setup:



WCDMA band II

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 No9400 (middle channel of WCDMA band II)

| | |
|--------|---------|
| Limits | ≤-13dBm |
|--------|---------|

WCDMA band V

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 No4183 (middle channel of WCDMA band V)

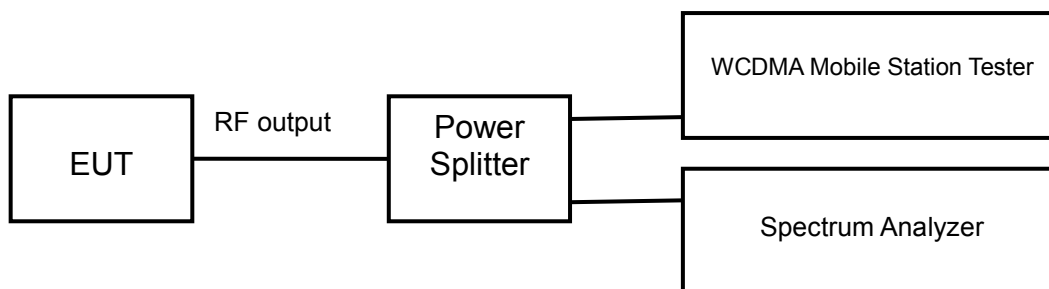
| | |
|--------|---------|
| Limits | ≤-13dBm |
|--------|---------|

6.6 Band Edges Compliance-FCC Part24.238(b)

Ambient condition:

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

Test Setup:



WCDMA band II

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 No9262 and No9538 (Bottom and top channels of WCDMA band II)

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

WCDMA band V

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 No4132 and No4233 (Bottom and top channels of WCDMA band V)

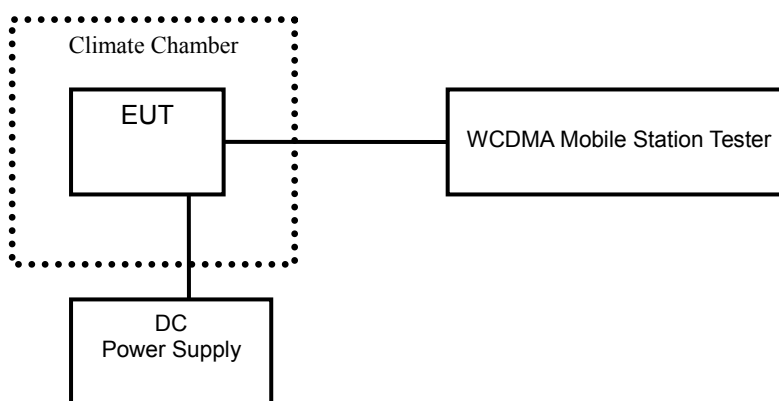
| | |
|--------|----------------------|
| Limits | $\leq -13\text{dBm}$ |
|--------|----------------------|

6.7 Frequency Stability-FCC Part2.1055/24.235

Ambient condition:

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

Test setup:



WCDMA band II

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 No9262, No9400 and No9538 (Bottom, middle and top channels of WCDMA band II).

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

WCDMA band V

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 No4132, No4183 and No4233 (Bottom, middle and top channels of WCDMA band V).

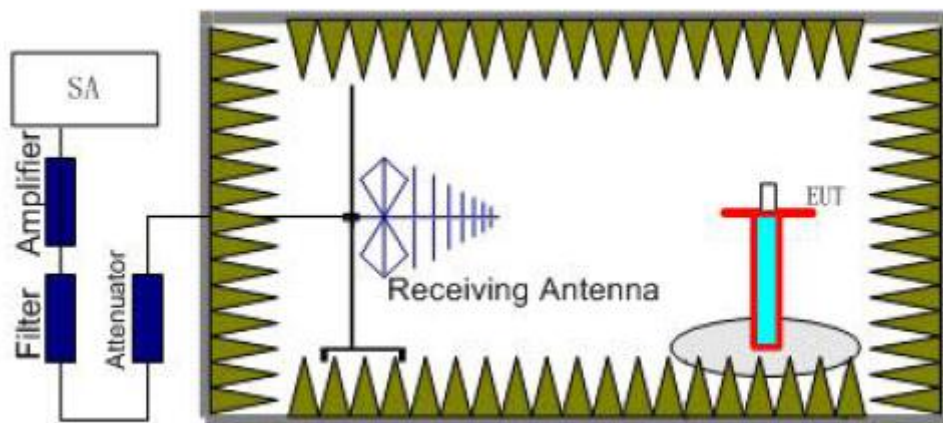
Limits: No specific frequency stability requirements in part 2.1055 and part 22.355.

6.8 Radiated Spurious Emissions-FCC Part2.1053/24.238

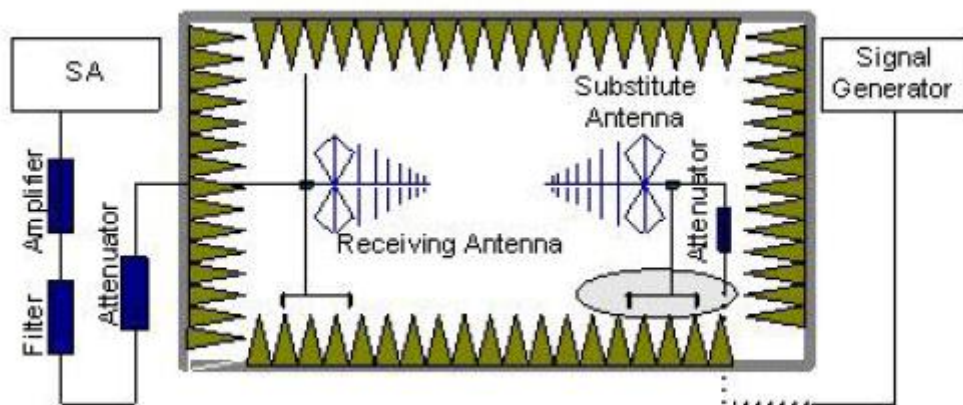
Ambient condition:

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

Test Setup:



Step 1



Step 2

WCDMA band II

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

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

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

The measurement will be done at carrier frequencies that pertain to bottom (Channel 9262), middle (Channel 9400) and top (Channel 9538) channels of WCDMA band II.

WCDMA band V

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, ERP = EIRP – 2.15 (dB).

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

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

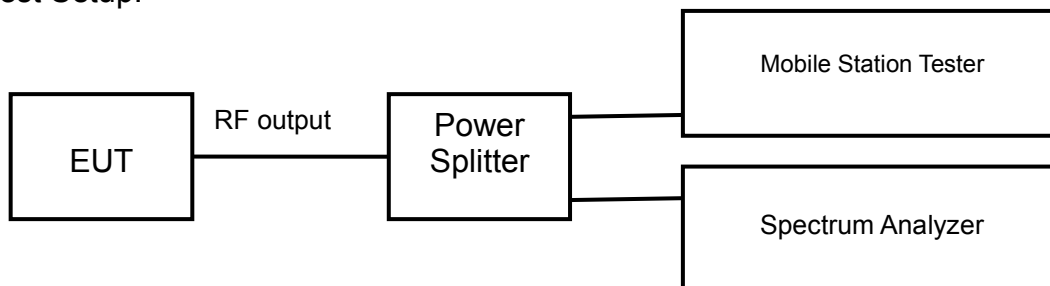
The measurement will be done at carrier frequencies that pertain to bottom (Channel 4132), middle (Channel 4183) and top (Channel 4233) channels of WCDMA band V.

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 | |
|-----------------------|-------------|---------|
| RF Power Output | U=0.6 dB | |
| Occupied Bandwidth | 3kHz | |
| Spurious Emissions | 9kHz~2GHz | U=1.2dB |
| | 2G~3.6GHz | U=1.4dB |
| | 3.6G~8GHz | U=2.2dB |
| | 8G~12.75GHz | U=2.7dB |
| Band Edges Compliance | 1.2dB | |
| Frequency Stability | U=48 Hz | |

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 Part24.232(b)

WCDMA band II

WCDMA Mode:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 1852.4 | 9262 | 22.22 |
| 1880.0 | 9400 | 22.43 |
| 1907.6 | 9538 | 22.14 |

HSDPA/HSUPA Mode:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 1852.4 | 9262 | 20.76 |
| 1880.0 | 9400 | 21.32 |
| 1907.6 | 9538 | 20.56 |

WCDMA band V

WCDMA Mode:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 826.4 | 4132 | 22.19 |
| 836.6 | 4183 | 22.22 |
| 846.6 | 4233 | 22.10 |

HSDPA/HSUPA Mode:

| Carrier frequency (MHz) | Channel No. | RF Power Output (dBm) |
|-------------------------|-------------|-----------------------|
| 826.4 | 4132 | 20.24 |
| 836.6 | 4183 | 20.56 |
| 846.6 | 4233 | 20.78 |

Occupied Bandwidth-FCC Part2.1049

WCDMA band II

WCDMA Mode:

| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (MHz) |
|-------------------------|-------------|------------------------------|
| 1852.4 | 9262 | 4.1554 |
| 1880.0 | 9400 | 4.1462 |
| 1907.6 | 9538 | 4.1482 |

HSDPA/HSUPA Mode:

| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (MHz) |
|-------------------------|-------------|------------------------------|
| 1852.4 | 9262 | 4.1512 |
| 1880.0 | 9400 | 4.1454 |
| 1907.6 | 9538 | 4.1618 |

WCDMA band V

WCDMA Mode:

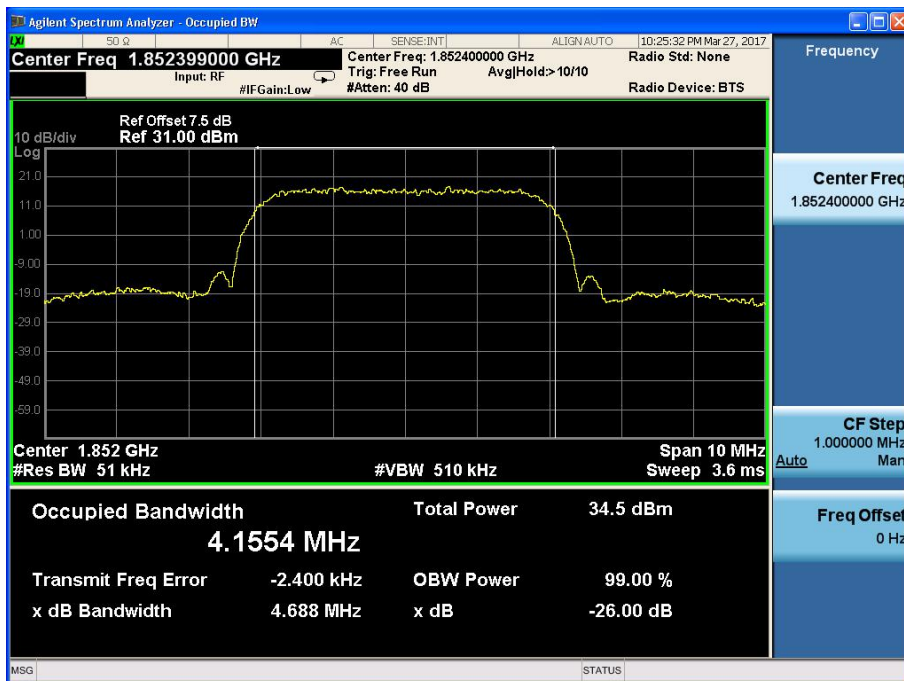
| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (MHz) |
|-------------------------|-------------|------------------------------|
| 826.4 | 4132 | 4.1343 |
| 836.6 | 4183 | 4.1412 |
| 846.6 | 4233 | 4.1530 |

HSDPA/HSUPA Mode:

| Carrier frequency (MHz) | Channel No. | Bandwidth of 99% Power (MHz) |
|-------------------------|-------------|------------------------------|
| 826.4 | 4132 | 4.1406 |
| 836.6 | 4183 | 4.1468 |
| 846.6 | 4233 | 4.1509 |

WCDMA band II

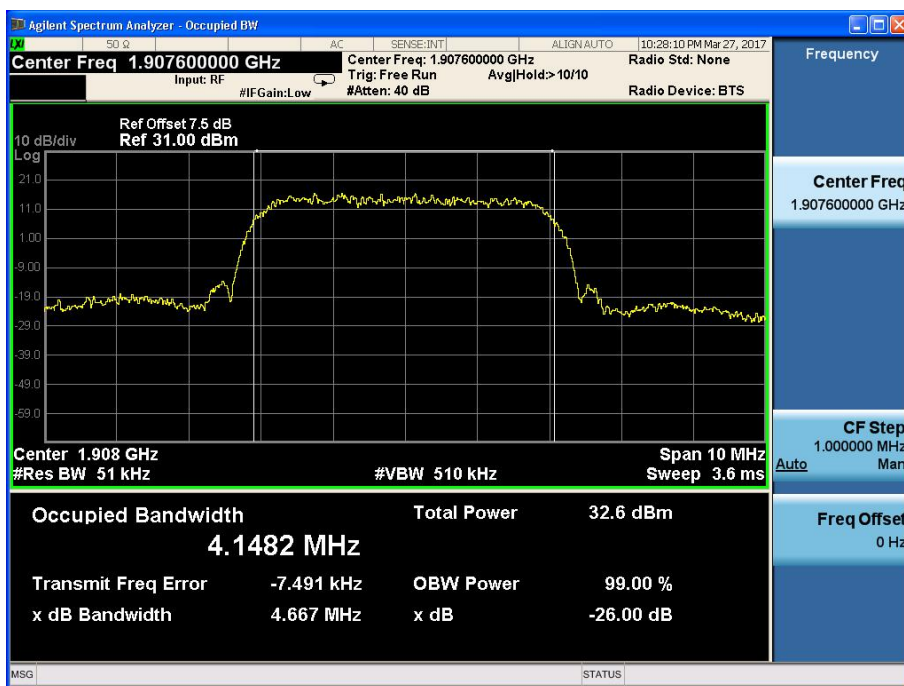
WCDMA Mode:



Channel 9262

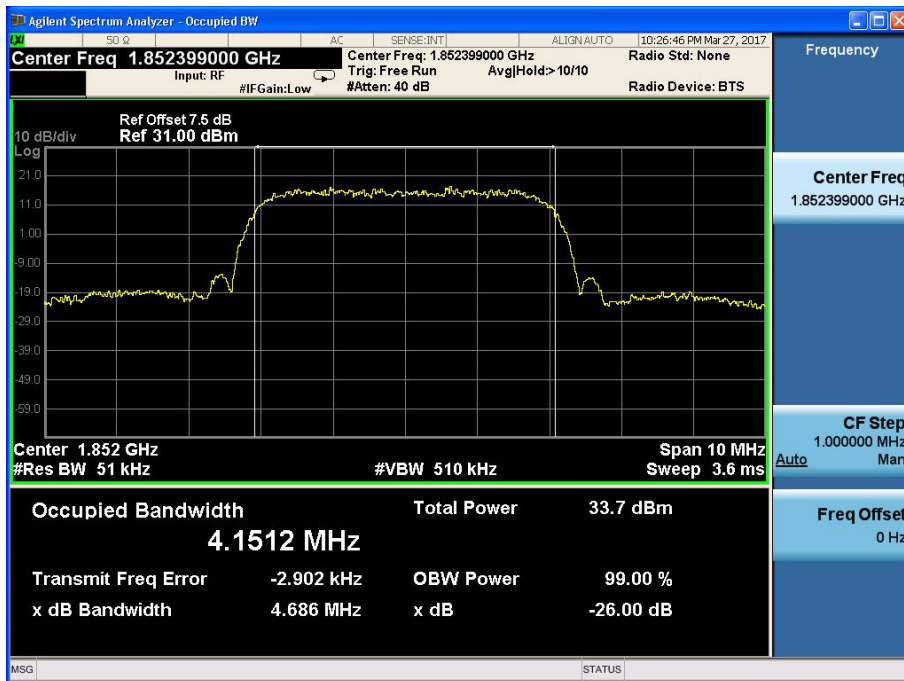


Channel 9400

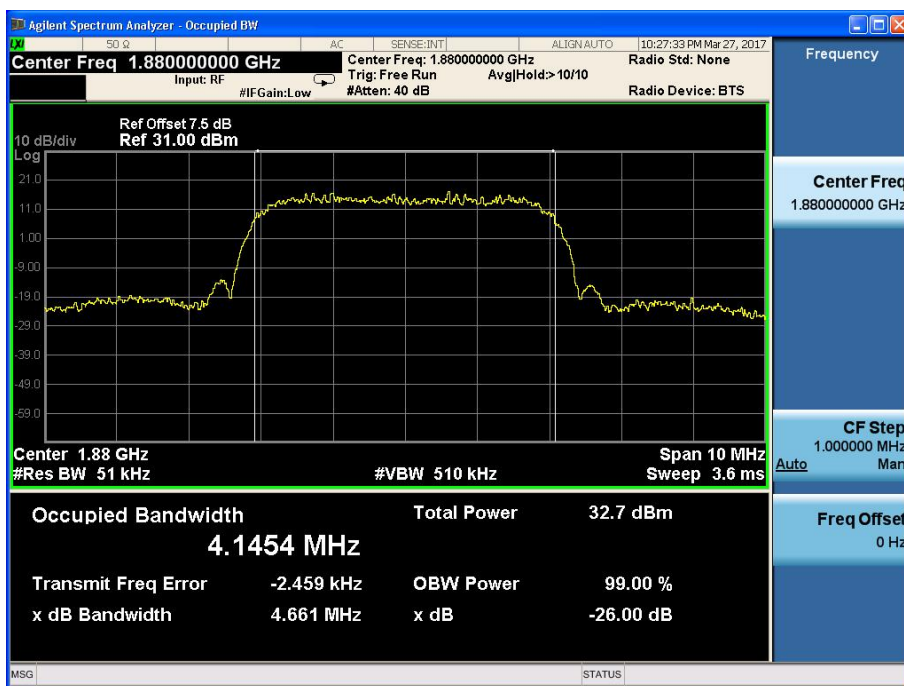


Channel 9538

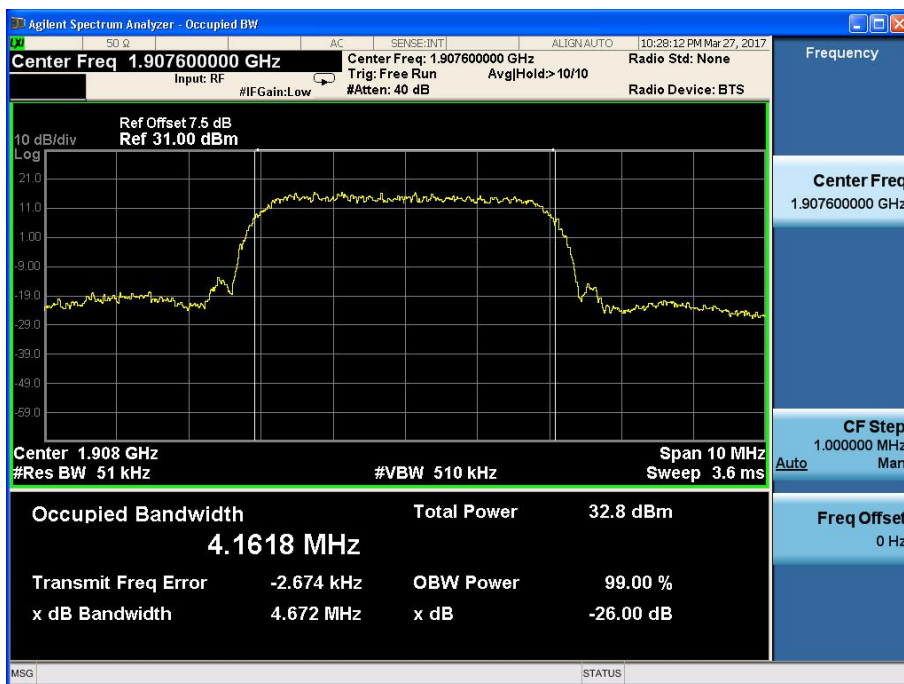
HSDPA/HSUPA Mode:



Channel 9262



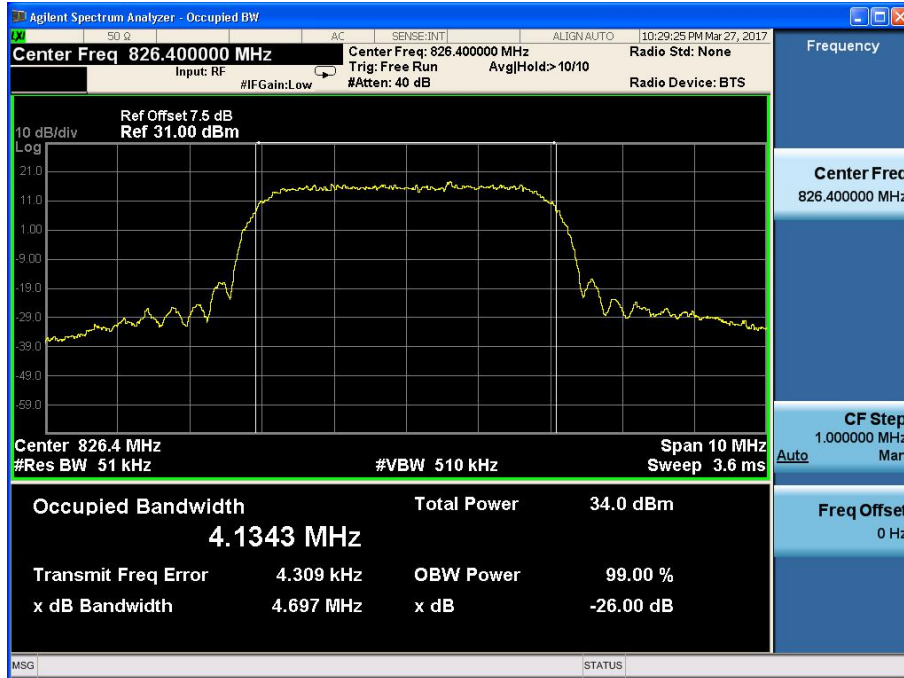
Channel 9400



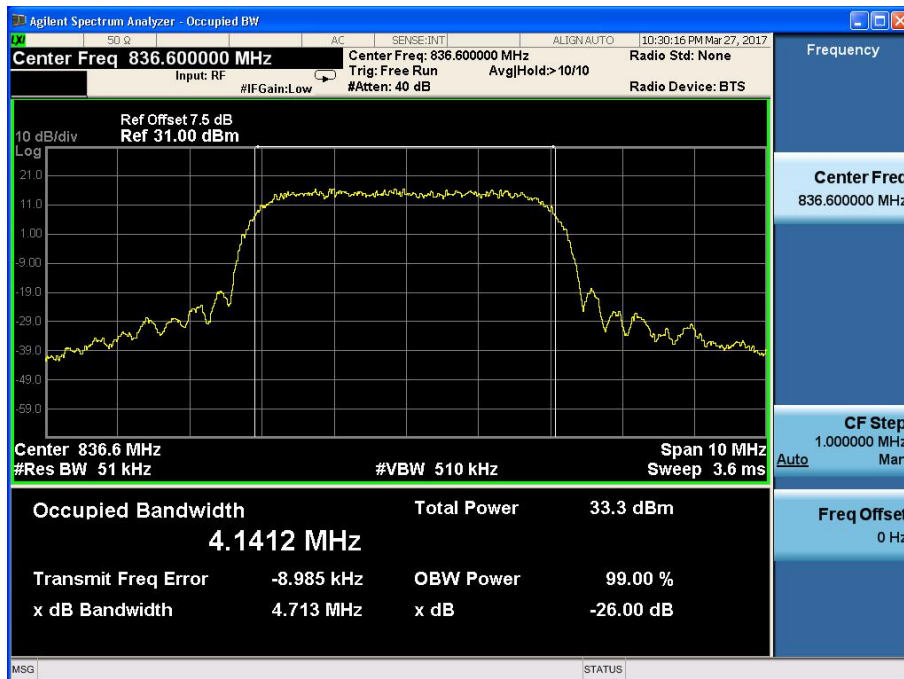
Channel 9538

WCDMA band V

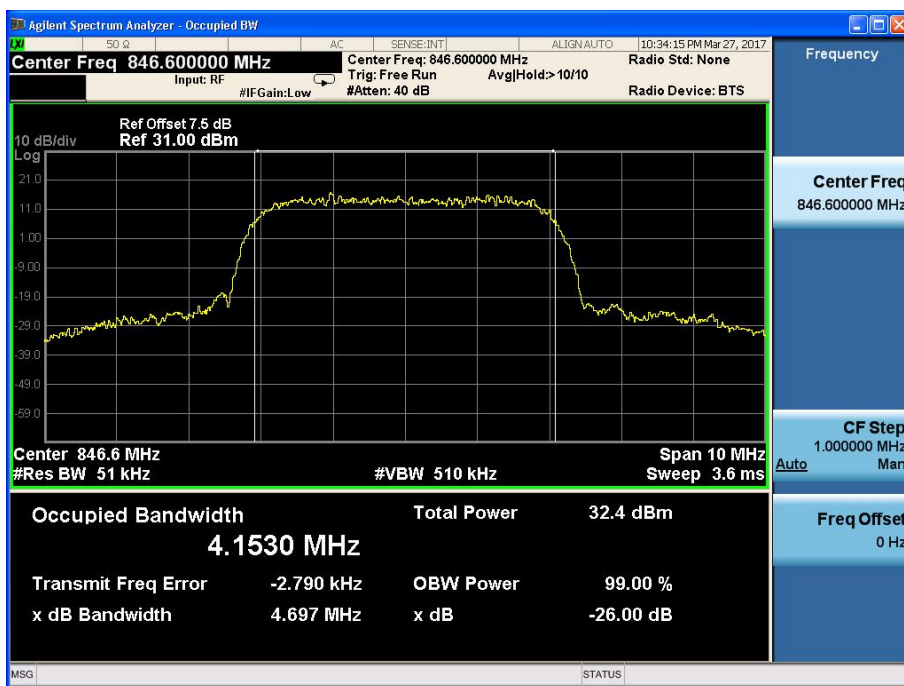
WCDMA Mode:



Channel 4132



Channel 4183

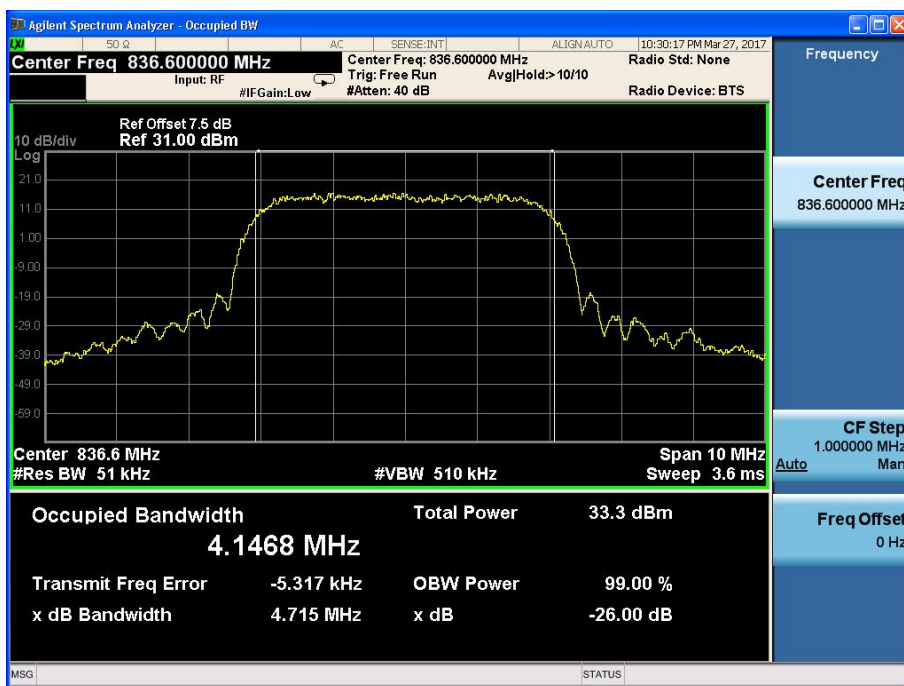


Channel 4233

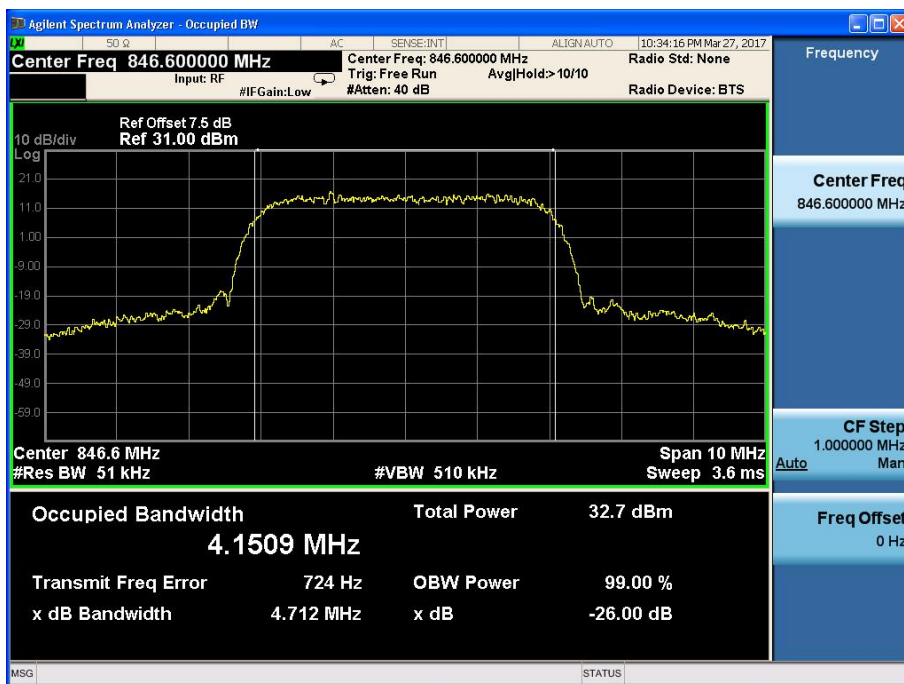
HSDPA/HSUPA Mode:



Channel 4132



Channel 4183



Channel 4233

Emission Bandwidth-FCC Part24.238(b)

WCDMA band II

WCDMA Mode:

| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dBc Power (MHz) |
|-------------------------|-------------|---------------------------------|
| 1852.4 | 9262 | 4.688 |
| 1880.0 | 9400 | 4.660 |
| 1907.6 | 9538 | 4.667 |

HSDPA/HSUPA Mode:

| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dBc Power (MHz) |
|-------------------------|-------------|---------------------------------|
| 1852.4 | 9262 | 4.686 |
| 1880.0 | 9400 | 4.661 |
| 1907.6 | 9538 | 4.672 |

WCDMA band V

WCDMA Mode:

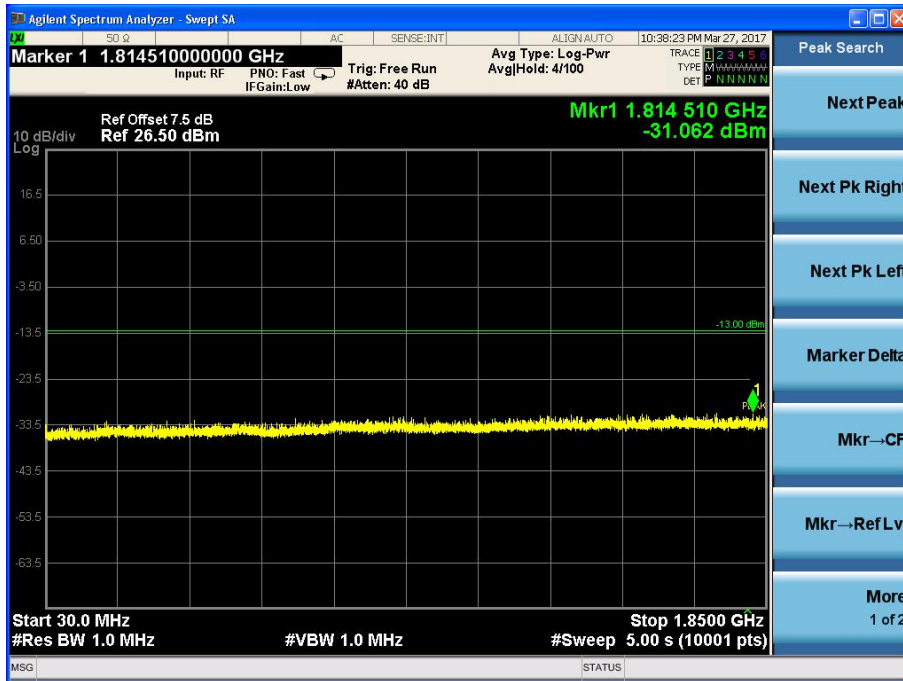
| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dBc Power (MHz) |
|-------------------------|-------------|---------------------------------|
| 826.4 | 4132 | 4.697 |
| 836.6 | 4183 | 4.713 |
| 846.6 | 4233 | 4.697 |

HSDPA/HSUPA Mode:

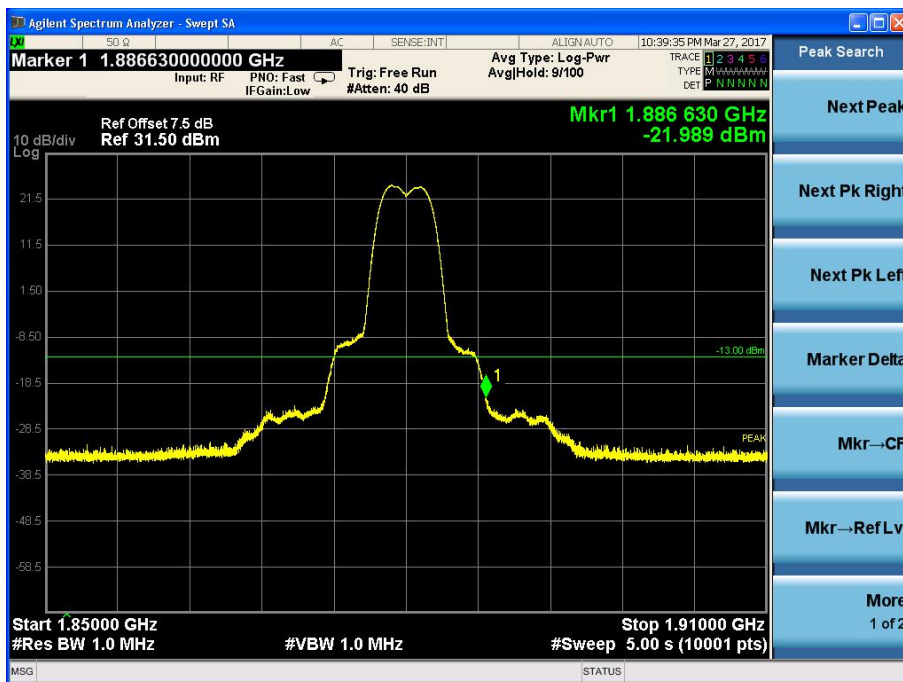
| Carrier frequency (MHz) | Channel No. | Bandwidth of -26dBc Power (MHz) |
|-------------------------|-------------|---------------------------------|
| 826.4 | 4132 | 4.685 |
| 836.6 | 4183 | 4.715 |
| 846.6 | 4233 | 4.712 |

Spurious Emissions at antenna terminal-FCC Part2.1051/24.238

WCDMA band II
WCDMA Mode:



Channel 9400, 30MHz~1850MHz



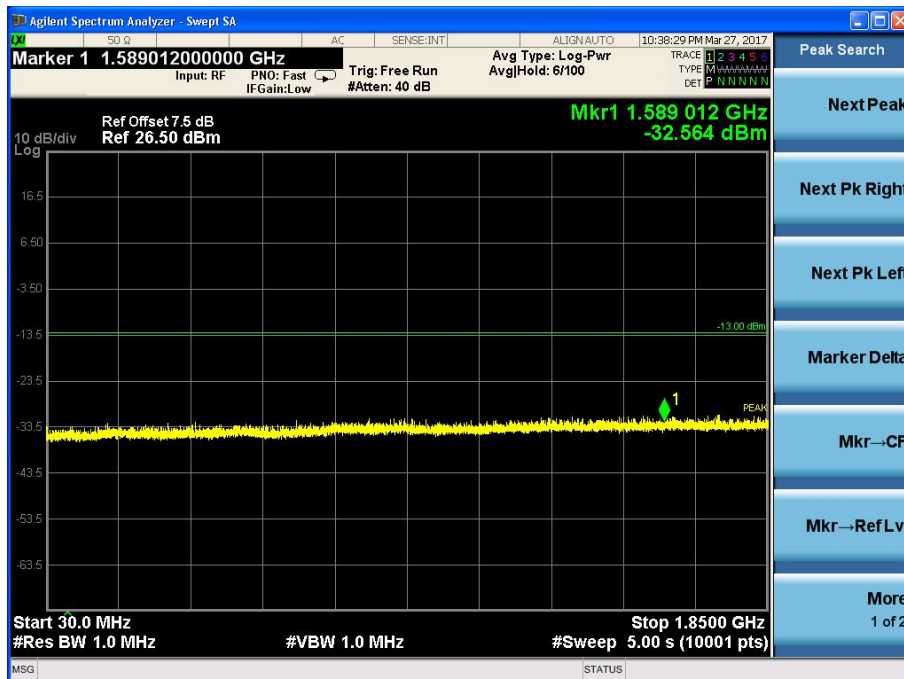
Channel 9400, 1850MHz~1910MHz

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

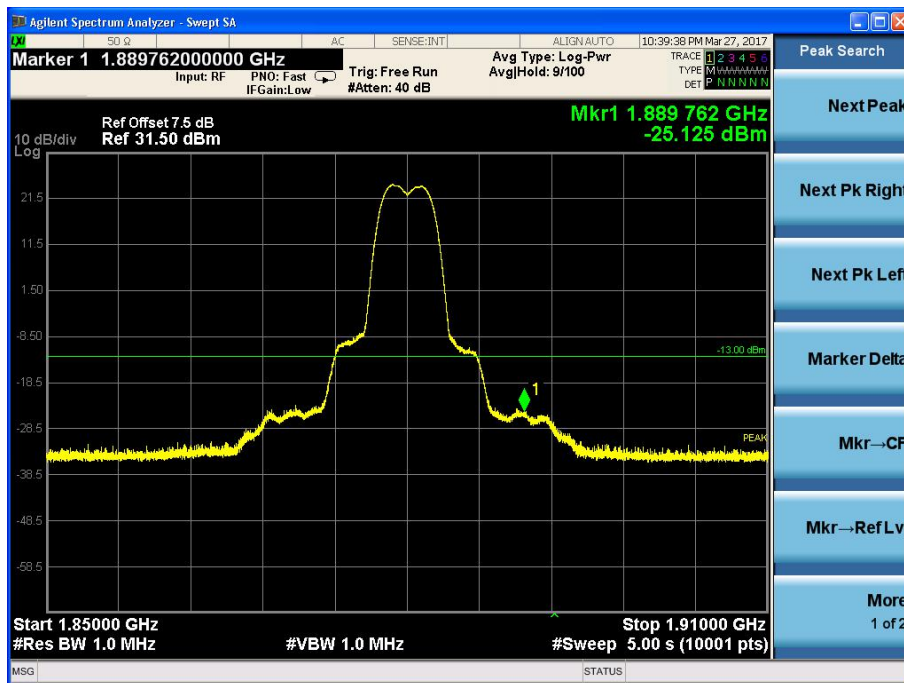


Channel 9400, 1910MHz~20GHz

HSDPA/HSUPA Mode:



Channel 9400, 30MHz~1850MHz



Channel 9400, 1850MHz~1910MHz

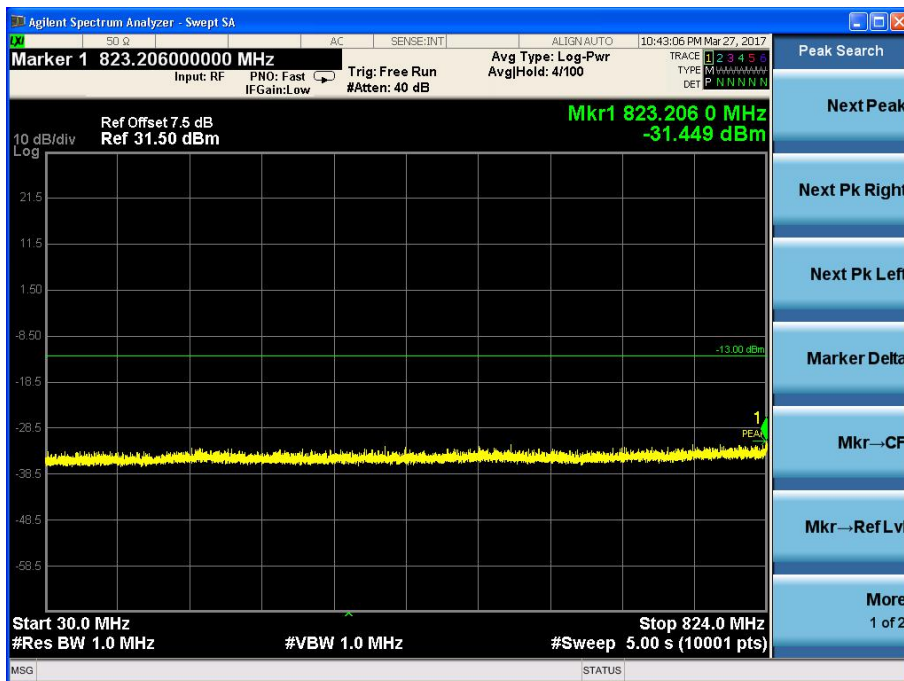
Note: The signal beyond the limit is the signal transmitted by EUT.



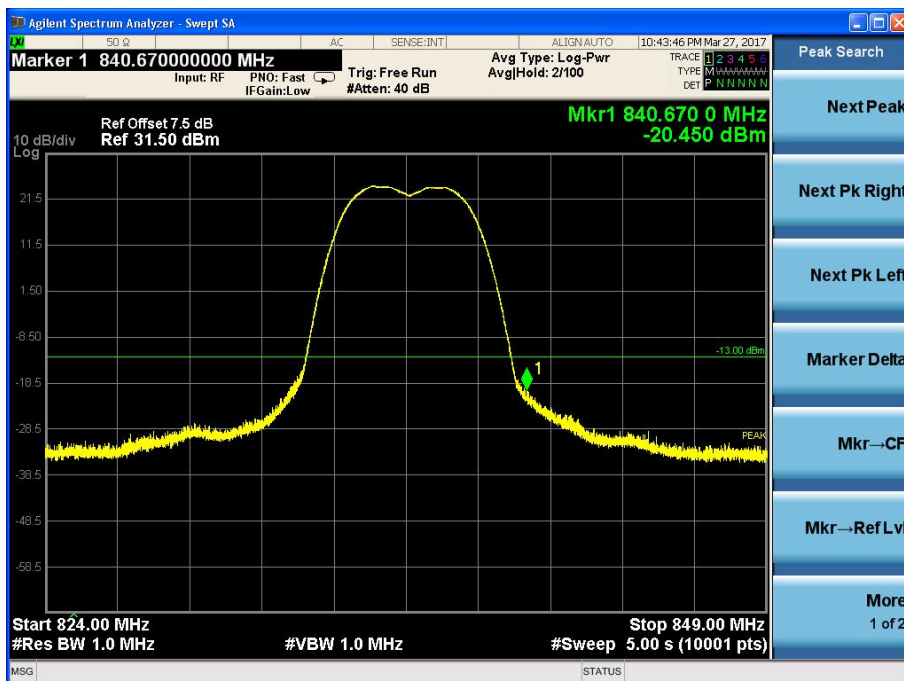
Channel 9400, 1910MHz~20GHz

WCDMA band V

WCDMA Mode:



Channel 4183, 30MHz~824MHz



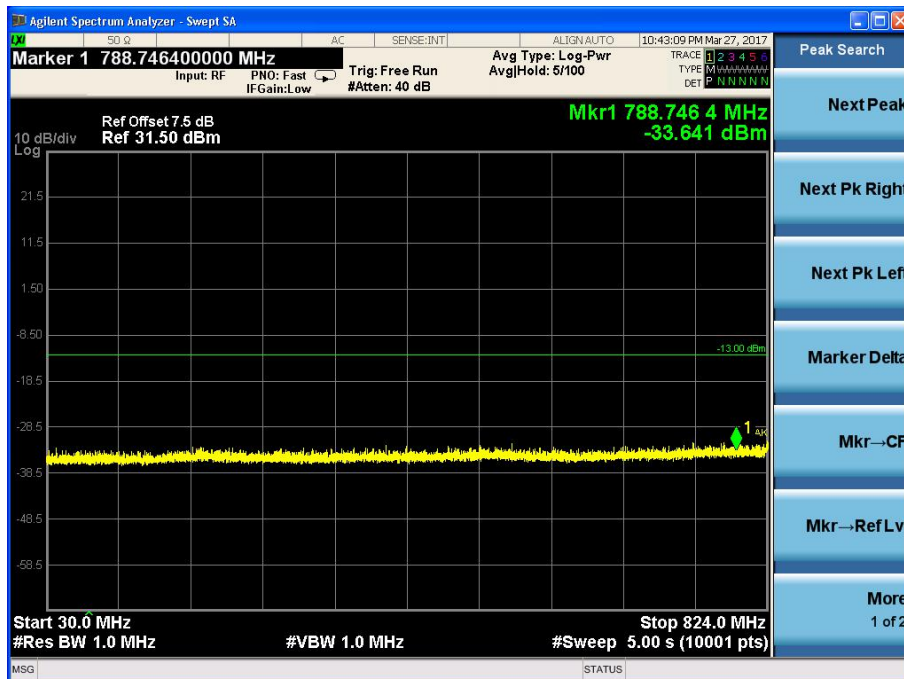
Channel 4183, 824MHz~849MHz

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

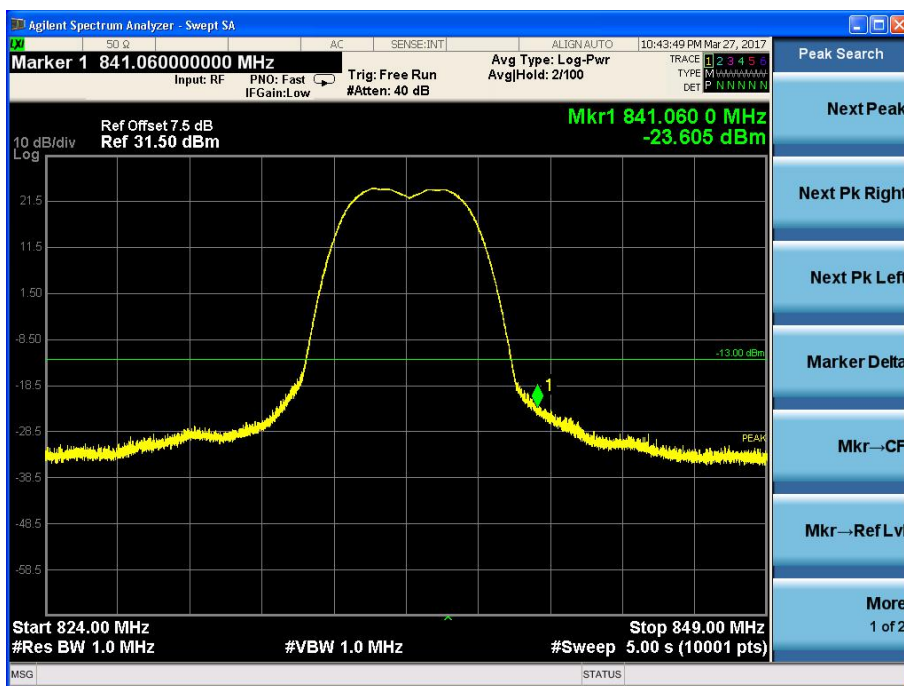


Channel 4183, 849MHz~9GHz

HSDPA/HSUPA Mode:



Channel 4183, 30MHz~824MHz



Channel 4183, 824MHz~849MHz

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



Channel 4183, 849MHz~9GHz

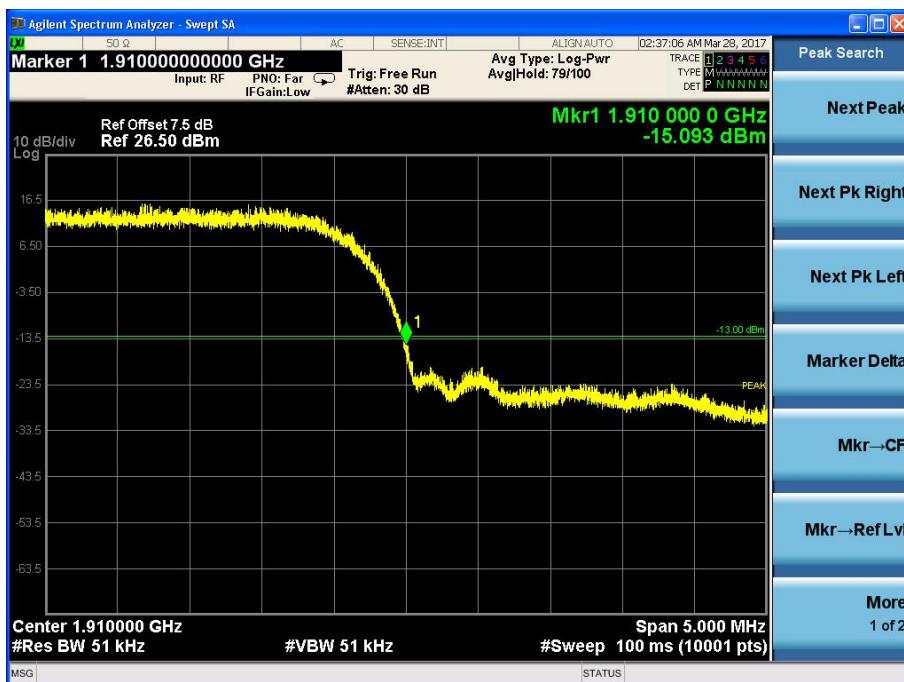
Band Edges Compliance-FCC Part24.238(b)

WCDMA band II

WCDMA Mode:

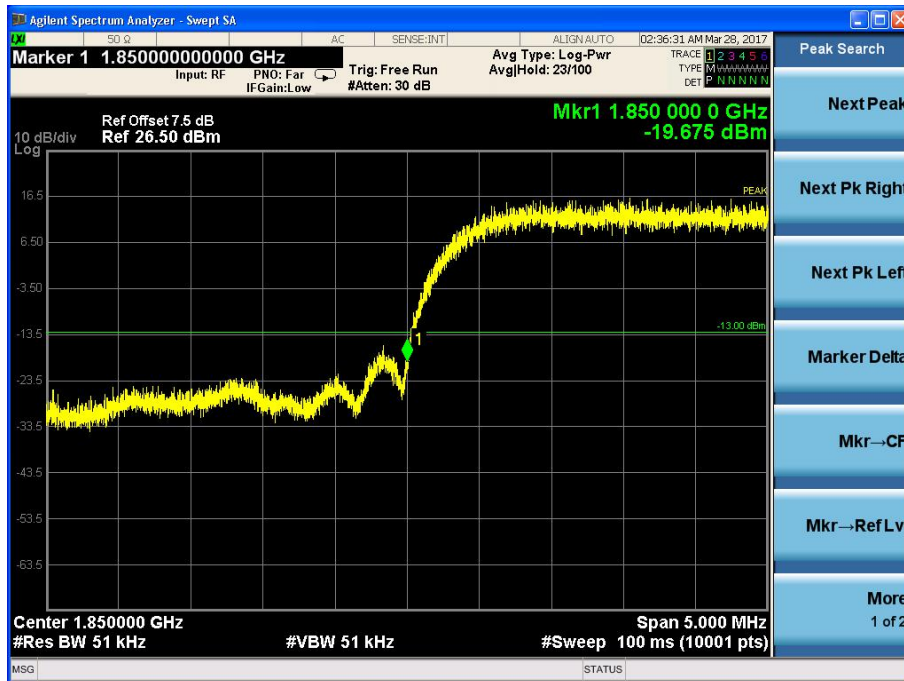


Channel 9262

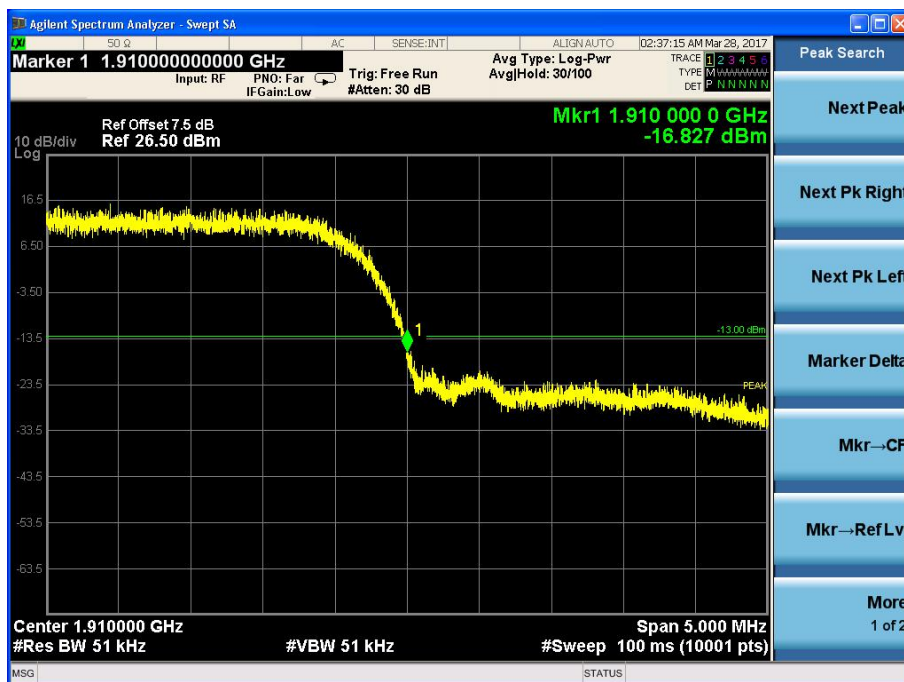


Channel 9538

HSDPA/HSUPA Mode:



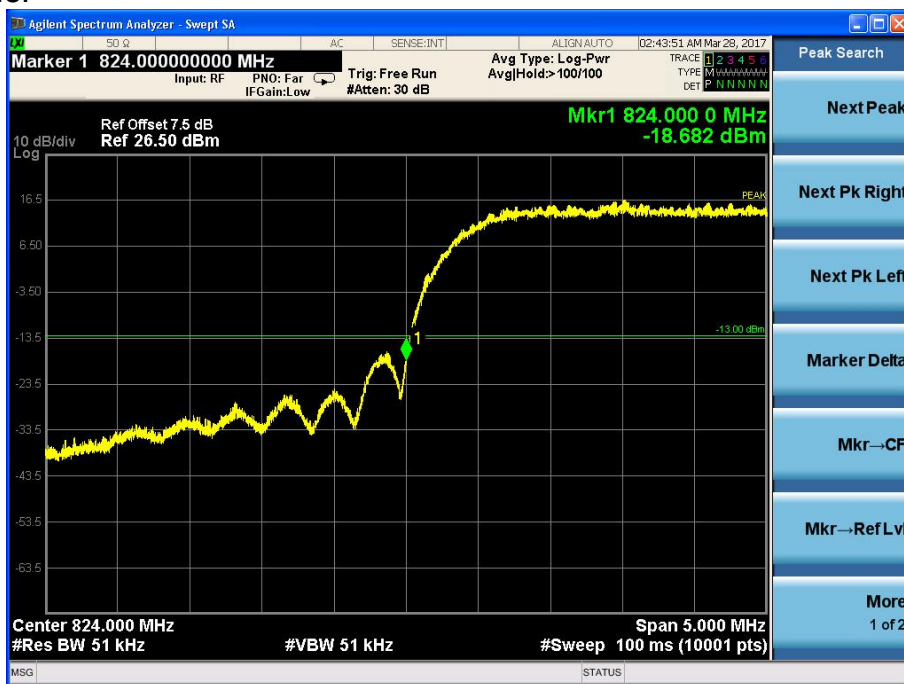
Channel 9262



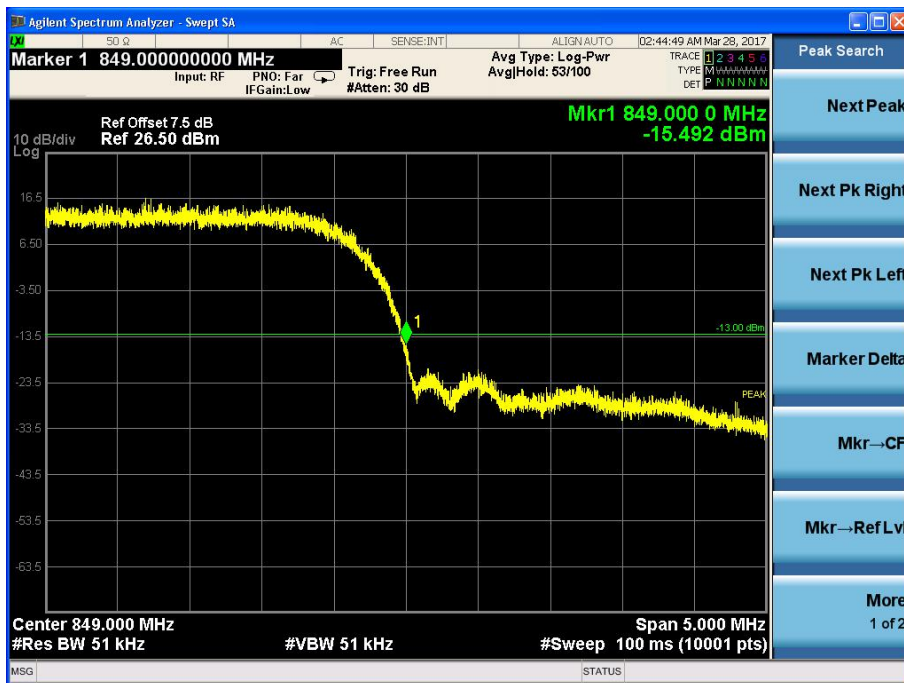
Channel 9538

WCDMA band V

WCDMA Mode:

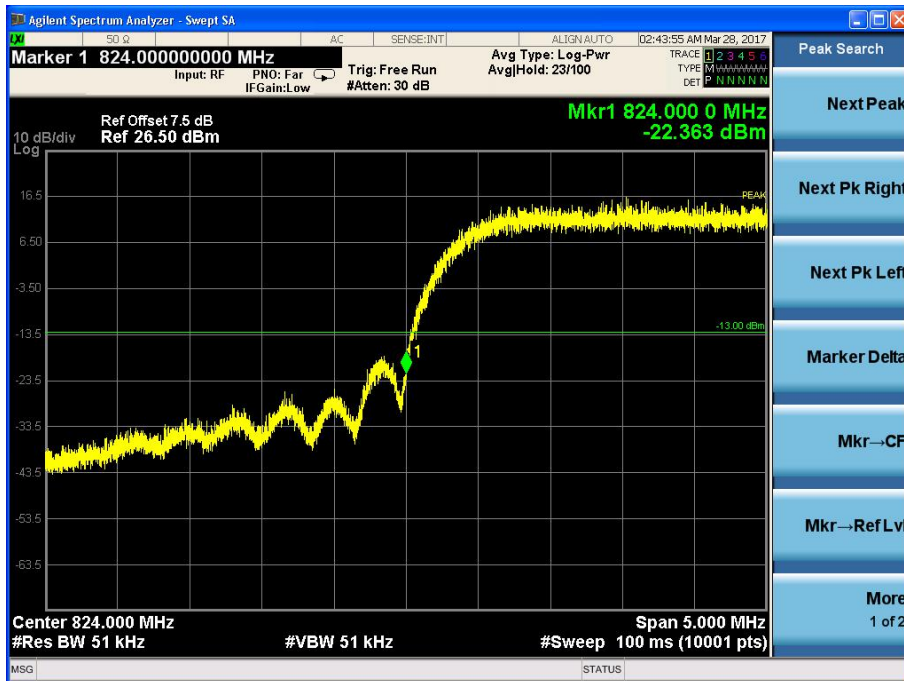


Channel 4132

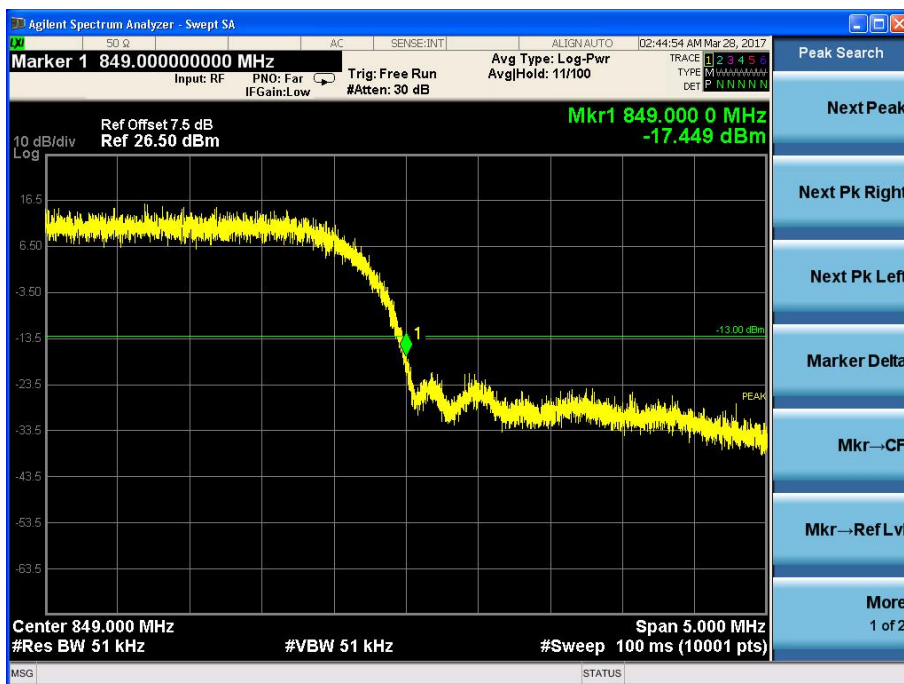


Channel 4233

HSDPA/HSUPA Mode:



Channel 4132



Channel 4233

Frequency Stability-FCC Part2.1055/24.235

WCDMA band II

WCDMA Mode:

| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|--------------|--------------|
| | Channel 9262 | Channel 9400 | Channel 9538 |
| -30 | 0.001 | 0.003 | 0.001 |
| -20 | 0.002 | 0.001 | 0.003 |
| -10 | 0.004 | 0.004 | 0.002 |
| 0 | 0.001 | 0.002 | 0.003 |
| +10 | 0.004 | 0.001 | 0.003 |
| +20 | 0.002 | 0.005 | 0.003 |
| +30 | 0.002 | 0.003 | 0.002 |
| +40 | 0.001 | 0.003 | 0.004 |
| +50 | 0.003 | 0.002 | 0.002 |

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|--------------|--------------|
| | Channel 9262 | Channel 9400 | Channel 9538 |
| LV | 0.001 | 0.001 | 0.003 |
| HV | 0.002 | 0.002 | 0.006 |

HSDPA/HSUPA Mode:

| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|--------------|--------------|
| | Channel 9262 | Channel 9400 | Channel 9538 |
| -30 | 0.002 | 0.002 | 0.003 |
| -20 | 0.003 | 0.002 | 0.002 |
| -10 | 0.002 | 0.003 | 0.002 |
| 0 | 0.002 | 0.002 | 0.002 |
| +10 | 0.001 | 0.002 | 0.002 |
| +20 | 0.001 | 0.002 | 0.001 |
| +30 | 0.002 | 0.003 | 0.004 |
| +40 | 0.003 | 0.005 | 0.003 |
| +50 | 0.002 | 0.002 | 0.004 |

| Voltage | Test Result (ppm)NT | | |
|---------|---------------------|--------------|--------------|
| | Channel 9262 | Channel 9400 | Channel 9538 |
| LV | 0.001 | 0.003 | 0.003 |
| HV | 0.001 | 0.002 | 0.004 |

WCDMA band V

WCDMA Mode:

| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|--------------|--------------|
| | Channel 4132 | Channel 4183 | Channel 4233 |
| -30 | 0.001 | 0.002 | 0.002 |
| -20 | 0.002 | 0.001 | 0.003 |
| -10 | 0.003 | 0.003 | 0.001 |
| 0 | 0.002 | 0.002 | 0.002 |
| +10 | 0.002 | 0.002 | 0.002 |
| +20 | 0.004 | 0.003 | 0.001 |
| +30 | 0.003 | 0.002 | 0.002 |
| +40 | 0.002 | 0.004 | 0.005 |
| +50 | 0.002 | 0.002 | 0.002 |

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|--------------|--------------|
| | Channel 4132 | Channel 4183 | Channel 4233 |
| LV | 0.001 | 0.003 | 0.002 |
| HV | 0.002 | 0.001 | 0.002 |

HSDPA/HSUPA Mode:

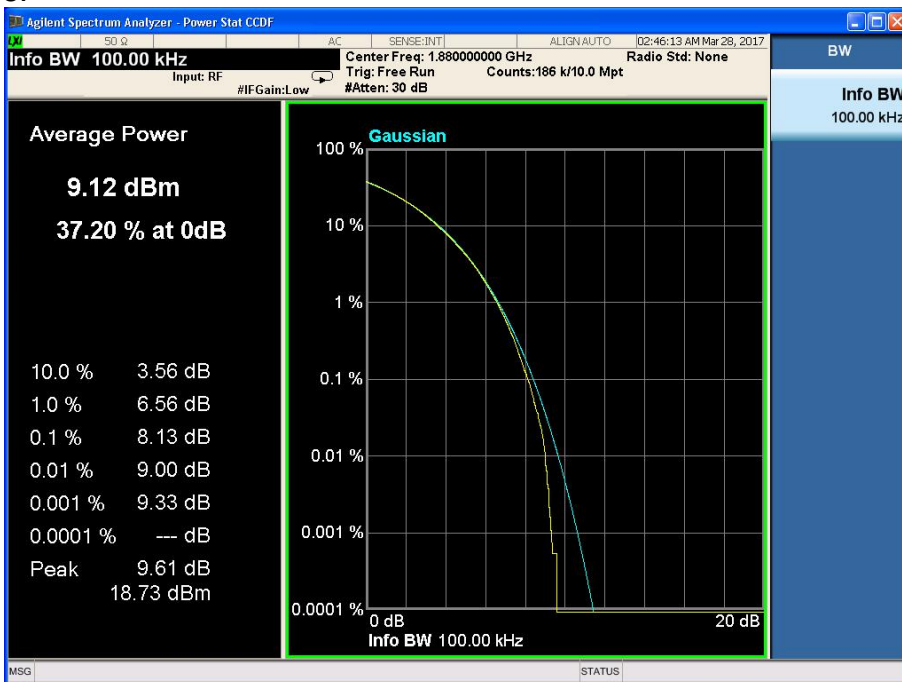
| Temperature(°C) | Test Result (ppm)@NV | | |
|-----------------|----------------------|--------------|--------------|
| | Channel 4132 | Channel 4183 | Channel 4233 |
| -30 | 0.002 | 0.004 | 0.001 |
| -20 | 0.001 | 0.001 | 0.001 |
| -10 | 0.004 | 0.003 | 0.003 |
| 0 | 0.001 | 0.004 | 0.004 |
| +10 | 0.003 | 0.003 | 0.003 |
| +20 | 0.004 | 0.002 | 0.004 |
| +30 | 0.001 | 0.001 | 0.001 |
| +40 | 0.002 | 0.004 | 0.006 |
| +50 | 0.006 | 0.001 | 0.002 |

| Voltage | Test Result (ppm)@NT | | |
|---------|----------------------|--------------|--------------|
| | Channel 4132 | Channel 4183 | Channel 4233 |
| LV | 0.002 | 0.005 | 0.005 |
| HV | 0.002 | 0.008 | 0.006 |

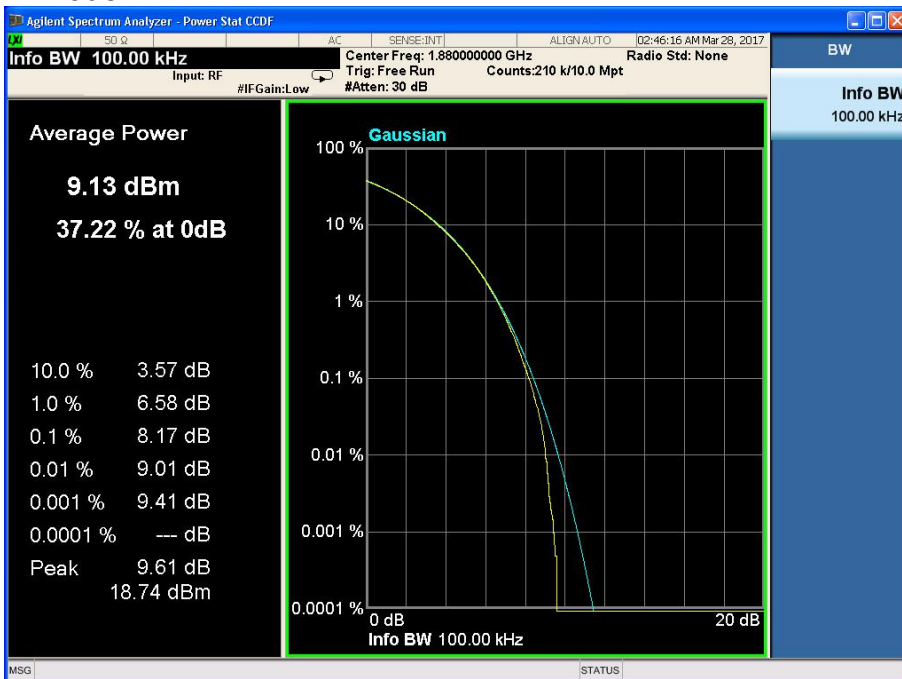
Peak-Average Ratio -FCC Part 24.232(d)

WCDMA band II

WCDMA Mode:



HSDPA/HSUPA Mode:



APPENDIX B – TEST DATA OF RADIATED EMISSION

Effective Isotropic Radiated Power-FCC Part24.232(b)

WCDMA band II

WCDMA Mode:

| Frequency (MHz) | Peak EIRP(dBm) | Pca Cable loss | Ga Antenna Gain (dB) | Pmea (dBm) | Polarization |
|-----------------|----------------|----------------|----------------------|------------|--------------|
| 1852.4 | 22.67 | -4.8 | 8.6 | 18.87 | Vertical |
| 1880.0 | 22.06 | -4.8 | 8.6 | 18.26 | Vertical |
| 1907.6 | 22.71 | -4.8 | 8.6 | 18.91 | Vertical |

HSDPA/HSUPA Mode:

| Frequency (MHz) | Peak EIRP(dBm) | Pca Cable loss | Ga Antenna Gain (dB) | Pmea (dBm) | Polarization |
|-----------------|----------------|----------------|----------------------|------------|--------------|
| 1852.4 | 20.10 | -4.8 | 8.6 | 16.30 | Vertical |
| 1880.0 | 20.80 | -4.8 | 8.6 | 17.00 | Vertical |
| 1907.6 | 20.36 | -4.8 | 8.6 | 16.56 | Vertical |

WCDMA band V

WCDMA Mode:

| Frequency (MHz) | Peak ERP (dBm) | Pca Cable loss (dB) | Ga Antenna Gain (dB) | Pmea (dBm) | Polarization |
|-----------------|----------------|---------------------|----------------------|------------|--------------|
| 826.4 | 22.58 | -3.8 | 8.6 | 17.78 | Vertical |
| 836.6 | 22.51 | -3.8 | 8.6 | 17.71 | Vertical |
| 846.6 | 20.94 | -3.8 | 8.6 | 16.14 | Vertical |

HSDPA/HSUPA Mode:

| Frequency (MHz) | Peak ERP (dBm) | Pca Cable loss (dB) | Ga Antenna Gain (dB) | Pmea (dBm) | Polarization |
|-----------------|----------------|---------------------|----------------------|------------|--------------|
| 826.4 | 21.65 | -3.8 | 8.6 | 16.85 | Vertical |
| 836.6 | 21.00 | -3.8 | 8.6 | 16.20 | Vertical |
| 846.6 | 20.55 | -3.8 | 8.6 | 15.75 | Vertical |

Radiated Spurious Emissions-FCC Part2.1053/24.238

WCDMA band II

WCDMA Mode:
Channel 9262

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2455.80 | -52.95 | -13 | Vertical |
| 2781.00 | -51.62 | -13 | Vertical |
| 3729.79 | -44.16 | -13 | Horizontal |
| 6676.59 | -43.36 | -13 | Horizontal |
| 9963.75 | -40.10 | -13 | Vertical |
| 17821.18 | -35.73 | -13 | Vertical |

Channel 9400

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2451.13 | -52.07 | -13 | Vertical |
| 2779.87 | -51.99 | -13 | Vertical |
| 3729.77 | -43.29 | -13 | Horizontal |
| 6678.79 | -43.42 | -13 | Vertical |
| 9960.26 | -40.23 | -13 | Vertical |
| 17823.15 | -35.89 | -13 | Horizontal |

Channel 9538

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2456.15 | -51.90 | -13 | Vertical |
| 2780.95 | -51.14 | -13 | Vertical |
| 3726.15 | -44.45 | -13 | Horizontal |
| 6676.68 | -43.98 | -13 | Vertical |
| 9964.56 | -39.91 | -13 | Horizontal |
| 17820.70 | -35.99 | -13 | Vertical |

HSDPA/HSUPA Mode:
Channel 9262

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2456.23 | -53.66 | -13 | Vertical |
| 2781.99 | -51.81 | -13 | Vertical |
| 3731.47 | -43.03 | -13 | Vertical |
| 6677.17 | -43.02 | -13 | Horizontal |
| 9965.13 | -40.15 | -13 | Vertical |
| 17820.56 | -35.67 | -13 | Vertical |

Channel 9400

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2454.44 | -52.82 | -13 | Vertical |
| 2777.04 | -52.40 | -13 | Horizontal |
| 3732.57 | -43.29 | -13 | Vertical |
| 6680.17 | -43.02 | -13 | Vertical |
| 9963.23 | -40.18 | -13 | Horizontal |
| 17820.22 | -36.06 | -13 | Vertical |

Channel 9538

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2451.31 | -52.17 | -13 | Vertical |
| 2779.10 | -51.67 | -13 | Horizontal |
| 3729.01 | -43.69 | -13 | Vertical |
| 6679.04 | -43.12 | -13 | Vertical |
| 9965.63 | -39.40 | -13 | Horizontal |
| 17820.49 | -36.32 | -13 | Vertical |

WCDMA band V

WCDMA Mode:
Channel 4132

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2457.01 | -52.59 | -13 | Vertical |
| 2779.94 | -52.56 | -13 | Horizontal |
| 3728.75 | -43.37 | -13 | Vertical |
| 6678.84 | -43.61 | -13 | Vertical |
| 9966.37 | -40.51 | -13 | Horizontal |
| 17821.11 | -36.52 | -13 | Vertical |

Channel 4183

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2457.31 | -52.59 | -13 | Horizontal |
| 2780.45 | -51.51 | -13 | Vertical |
| 3726.06 | -43.11 | -13 | Vertical |
| 6678.34 | -43.49 | -13 | Vertical |
| 9963.30 | -39.84 | -13 | Vertical |
| 17824.99 | -35.93 | -13 | Horizontal |

Channel 4233

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2454.25 | -53.17 | -13 | Vertical |
| 2781.41 | -51.38 | -13 | Vertical |
| 3727.45 | -43.29 | -13 | Vertical |
| 6681.09 | -42.92 | -13 | Vertical |
| 9963.66 | -39.48 | -13 | Vertical |
| 17824.22 | -35.68 | -13 | Vertical |

HSDPA/HSUPA Mode:
Channel 4132

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2454.53 | -52.84 | -13 | Vertical |
| 2780.59 | -51.02 | -13 | Vertical |
| 3729.28 | -44.10 | -13 | Horizontal |
| 6676.56 | -43.13 | -13 | Horizontal |
| 9964.53 | -40.82 | -13 | Vertical |
| 17824.32 | -36.26 | -13 | Vertical |

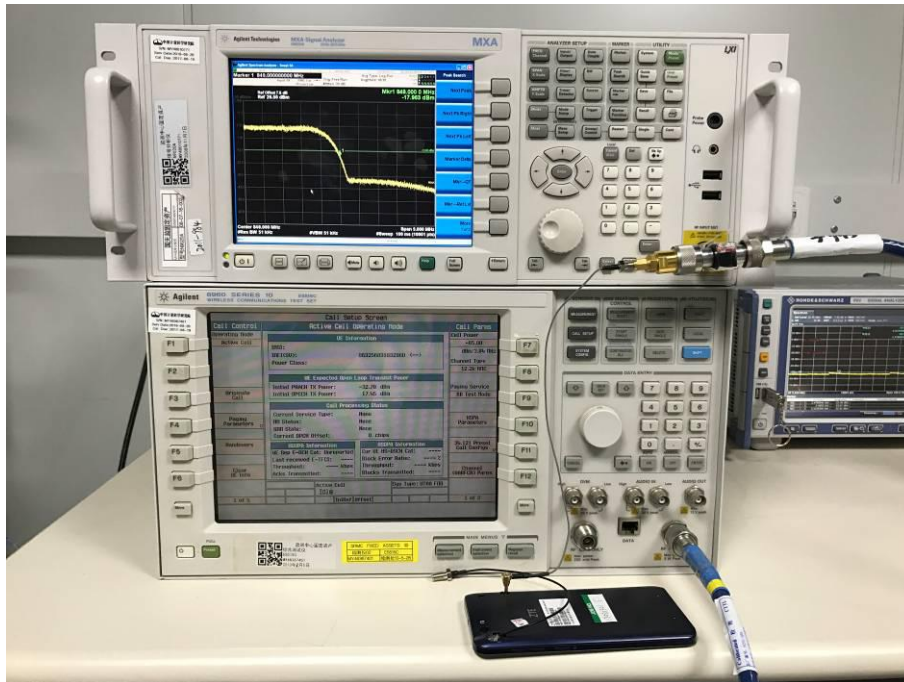
Channel 4183

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2455.57 | -53.30 | -13 | Vertical |
| 2781.21 | -51.92 | -13 | Vertical |
| 3730.61 | -42.99 | -13 | Vertical |
| 6676.08 | -43.98 | -13 | Horizontal |
| 9963.49 | -40.62 | -13 | Vertical |
| 17821.67 | -35.88 | -13 | Horizontal |

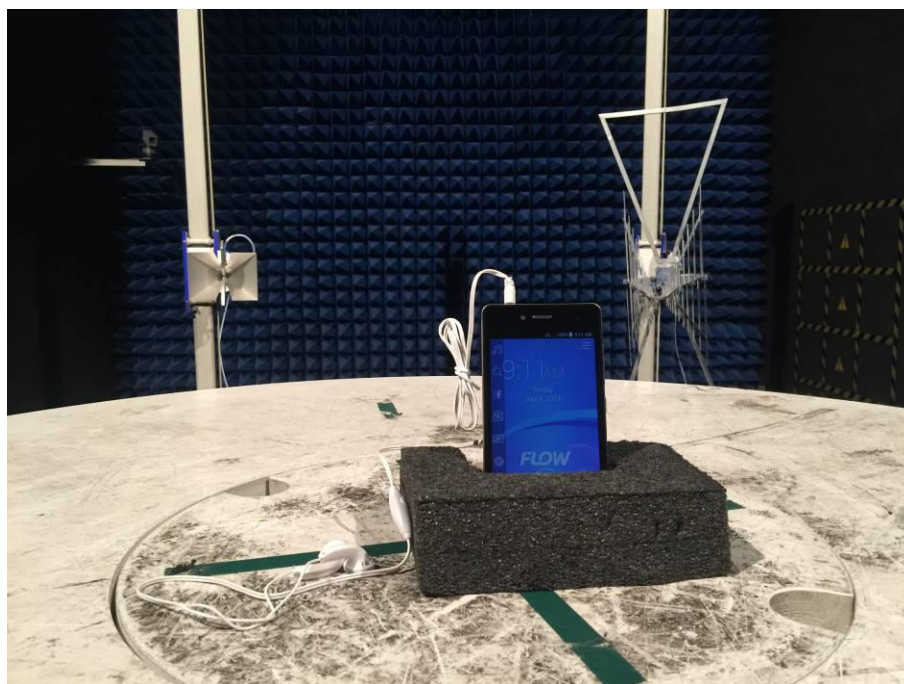
Channel 4233

| Frequency (MHz) | Power (dBm) | Limited (dBm) | Polarization |
|-----------------|-------------|---------------|--------------|
| 2454.44 | -52.67 | -13 | Vertical |
| 2781.47 | -51.47 | -13 | Vertical |
| 3727.52 | -43.48 | -13 | Vertical |
| 6676.37 | -43.51 | -13 | Horizontal |
| 9961.07 | -39.84 | -13 | Horizontal |
| 17825.61 | -35.67 | -13 | Vertical |

APPENDIX C – TEST SETUP



Spurious RF Conducted Emissions Test setup



Radiated Spurious Emissions Test setup