

CERTIFICATE OF COMPLIANCE (ERM EVALUATION)**Manufacture:** ADRF Korea, inc

5-5, Mojeon-Ri, Backsa-Myun, Icheon-City, Kyunggi-Do, Korea

Date of Issue:

May 19, 2014

Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Test Report No.: HCTR1401F026-2**FCC ID:****N52-ADX-R-743M****APPLICANT:****ADRF Korea, inc****EUT Type:**

High Power Remote Unite (Distribute Antenna System)

Model:

ADX-R-743M

Frequency Ranges:

DL : 728 MHz ~ 746 MHz, 746 MHz ~ 757 MHz

UL : 698 MHz ~ 716 MHz, 776 MHz ~ 787 MHz

Conducted Output Power:

DL : 20 W(43 dBm)

UL : 3.162 mW(5 dBm)

FCC Rules Part(s):

CFR 47, Part 27

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 27 of the FCC Rules under normal use and maintenance.



Report prepared by
: Yong Hyun Lee
Test engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

Version

| TEST REPORT NO. | DATE | DESCRIPTION |
|-----------------|-------------------|---|
| HCTR1401FR026 | January 22, 2014 | - First Approval Report |
| HCTR1401FR026-1 | February 17, 2014 | - Added the measurement standards for "1. CLIENT INFORMATION" |
| HCTR1401FR026-2 | May 19, 2014 | - Added the uplink test result. |
| | | |
| | | |

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1. CLIENT INFORMATION

The EUT has been tested by request of

| | |
|---------------|---|
| Company | ADRF Korea, inc 5-5, Mojeon-Ri, Backsa-Myun, Icheon-City, Kyunggi-Do, Korea |
| Contact Point | Attention/ E-Mail: HK Song/ hk4464@adrftech.com Tel./ H.P. : +82-31-637-4435/ +82-10-3191-4773 |

■ FCC ID: **N52-ADX-R-743M**

■ APPLICANT: **ADRF Korea, inc**

■ EUT Type: **High Power Remote Unite (Distribute Antenna System)**

■ Model: **ADX-R-743M**

■ Frequency Ranges: **DL : 728 MHz ~ 746 MHz, 746 MHz ~ 757 MHz
UL : 698 MHz ~ 710 MHz, 776 MHz ~ 787 MHz**

■ Conducted Output Power: **DL : 20 W(43 dBm)
UL : 3.162 mW(5 dBm)**

■ Antenna Gain(s) : **2 dBi**

■ Date(s) of Tests: **2013. 12. 19. ~ 2014. 05. 18**

■ FCC Rules Part(s): **CFR Title 47 Part 27 Sub Part C**

■ Measurement standard(s): **ANSI/TIA-603-C-2004, KDB 971168 D01 v02r01**

■ Place of Tests: **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. (IC Recognition No. : 5944A-3)**

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 21, 2011 (Registration Number: 90661).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

3. TEST SUMMARY

3.1. STANDARDS

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 27.

| Description | Reference | Results |
|---|-----------------------|-----------|
| Conducted RF Output Power | §2.1046; §27.50 | Compliant |
| Occupied Bandwidth | §2.1049 | Compliant |
| Spurious Emissions at Antenna Terminals | §2.1051, §27.53 | Compliant |
| Out of Band Rejection | KDB 935210 D02 v01r01 | Compliant |
| Radiated Spurious Emissions | §2.1053, §27.53 | Compliant |
| Frequency Stability | §2.1055, §27.54 | Compliant |

3.2. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.

During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

QPSK was only selected and tested since it's the worst case configuration among all here modulations (QPSK, 16QAM, 64QAM).

4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

| | |
|--------------------|------------------------|
| Temperature : | + 15 to + 35 |
| Relative humidity: | 30 % to 60 % |
| Air pressure | 860 mbar to 1 060 mbar |

5. TEST EQUIPMENT

| Manufacturer | Model / Equipment | Cal Interval | Calibration Due | Serial No. |
|--------------------|---|--------------|-----------------|----------------|
| Agilent | E4438C /Signal Generator | Annual | 09/05/2014 | MY42082646 |
| Agilent | N5182A /Signal Generator | Annual | 09/30/2014 | MY50141649 |
| Agilent | E4416A /Power Meter | Annual | 10/16/2014 | GB41291412 |
| Agilent | E9327A/ Power Sensor | Annual | 03/31/2015 | MY4442009 |
| NANGYEUL CO., LTD. | NY-THR18750/ Temperature and Humidity Chamber | Annual | 10/30/2014 | NY-2009012201A |
| Agilent | N9020A /Signal Analyzer | Annual | 04/16/2015 | US46220219 |
| WEINSCHEL | 67-30-33 / Fixed Attenuator | Annual | 11/05/2014 | BU5347 |
| MCE / Weinschel | 2-10 / Fixed Attenuator | Annual | 10/28/2014 | BR0554 |
| HD | MA240/ Antenna Position Tower | N/A | N/A | 556 |
| EMCO | 1050/ Turn Table | N/A | N/A | 114 |
| HD GmbH | HD 100/ Controller | N/A | N/A | 13 |
| HD GmbH | KMS 560/ SlideBar | N/A | N/A | 12 |
| MITEQ | AMF-6D-001180-35-20P/AMP | Annual | 09/12/2014 | 1081666 |
| Schwarzbeck | BBHA 9120D/ Horn Antenna | Biennial | 07/05/2015 | 1151 |
| Schwarzbeck | BBHA 9120D/ Horn Antenna | Biennial | 07/05/2015 | 1151 |
| Schwarzbeck | VULB 9168/TRILOG Antenna | Biennial | 07/02/2014 | 9168-255 |

6. RF OUTPUT POWER

Test Requirements:

§ 2.1046 Measurements required: RF power output:

§ 2.1046 (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

§ 2.1046 (b) For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

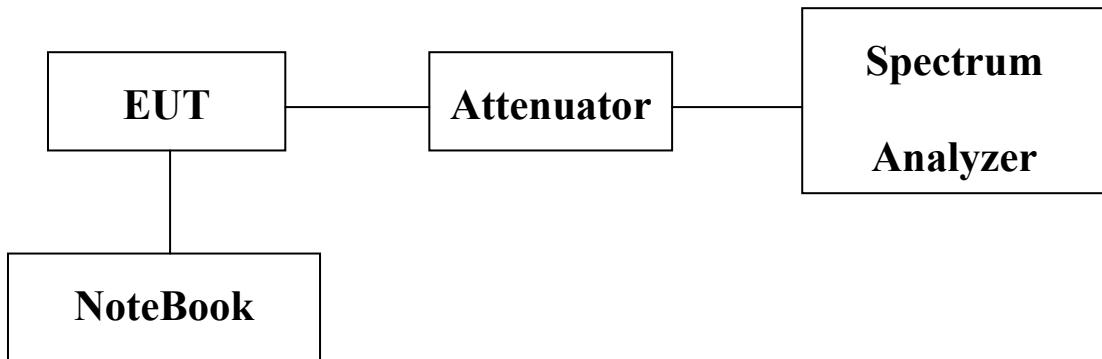
§ 2.1046 (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

§ 27.50 Power and antenna height limits. (c) The following power and antenna height requirements apply to stations transmitting in the 698–746 MHz band (9) Control and mobile stations are limited to 30 watts ERP

(b)(9) Control stations and mobile stations transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands and fixed stations transmitting in the 787–788 MHz and 805–806 MHz bands are limited to 30 watts ERP.

Test Procedures:

As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. This test was performed in all applicable modulations.

**Block Diagram 1. RF Power Output Test Setup****Test Results:**

| Input Signal | Modulation | Level (dBm) |
|--------------|--------------|------------------------|
| LTE | DL/ UL: QPSK | DL: -17.0 UL: -45.0 |

[Downlink]

| | Channel | Frequency (MHz) | Output Power | |
|---------------|---------|--------------------|--------------|--------|
| | | | (dBm) | (W) |
| LTE 10 MHz | Low | 734 | 42.95 | 19.715 |
| | Middle | 741 | 42.88 | 19.413 |
| | High | 751 | 42.78 | 18.950 |

[Uplink]

| | Channel | Frequency (MHz) | Output Power | |
|---------------|---------|--------------------|--------------|-------|
| | | | (dBm) | (mW) |
| LTE 10 MHz | Low | 704 | 4.74 | 2.979 |
| | Middle | 711 | 4.91 | 3.099 |
| | High | 781 | 4.88 | 3.075 |

Plots of RF Output Power

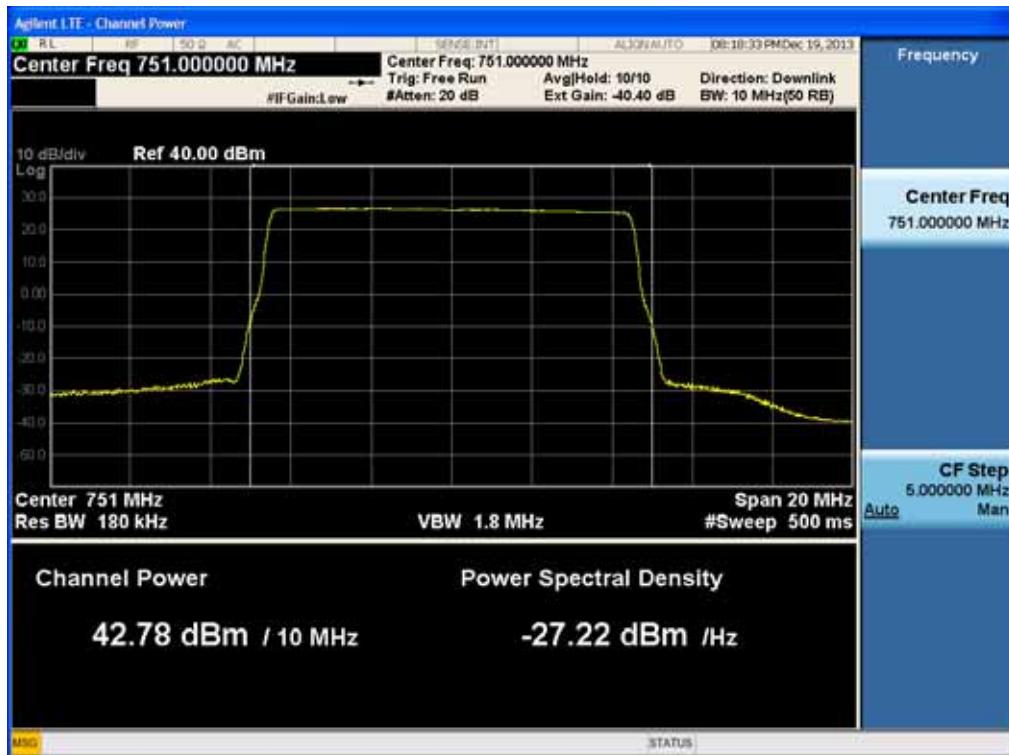
[LTE Downlink 10 MHz Low]



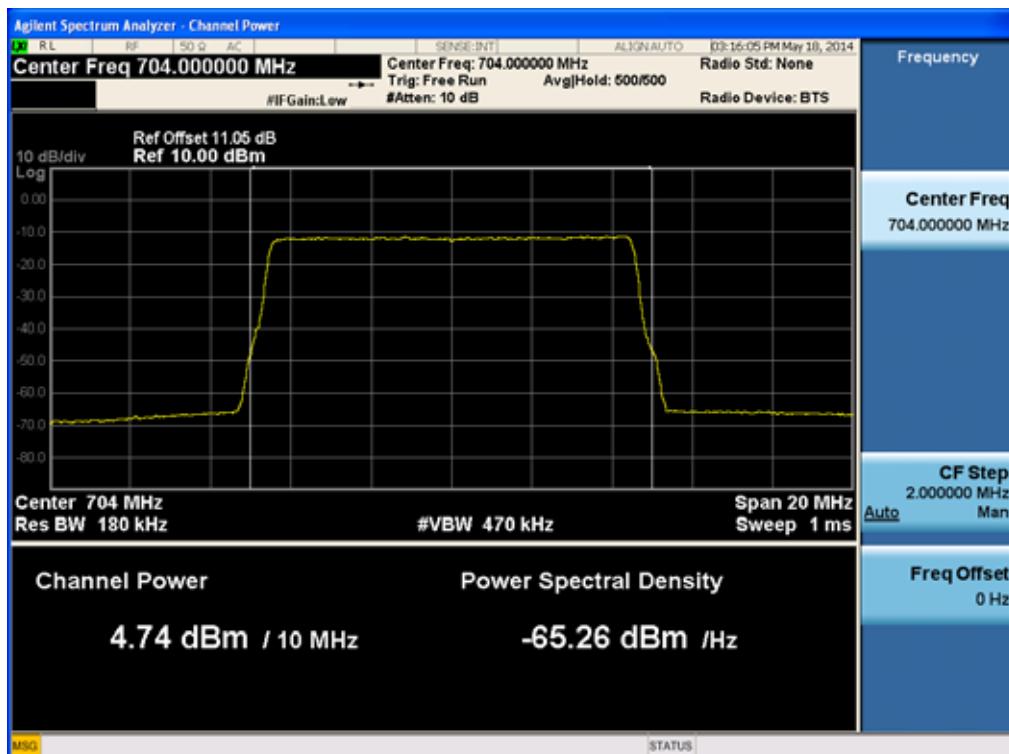
[LTE Downlink 10 MHz Middle]

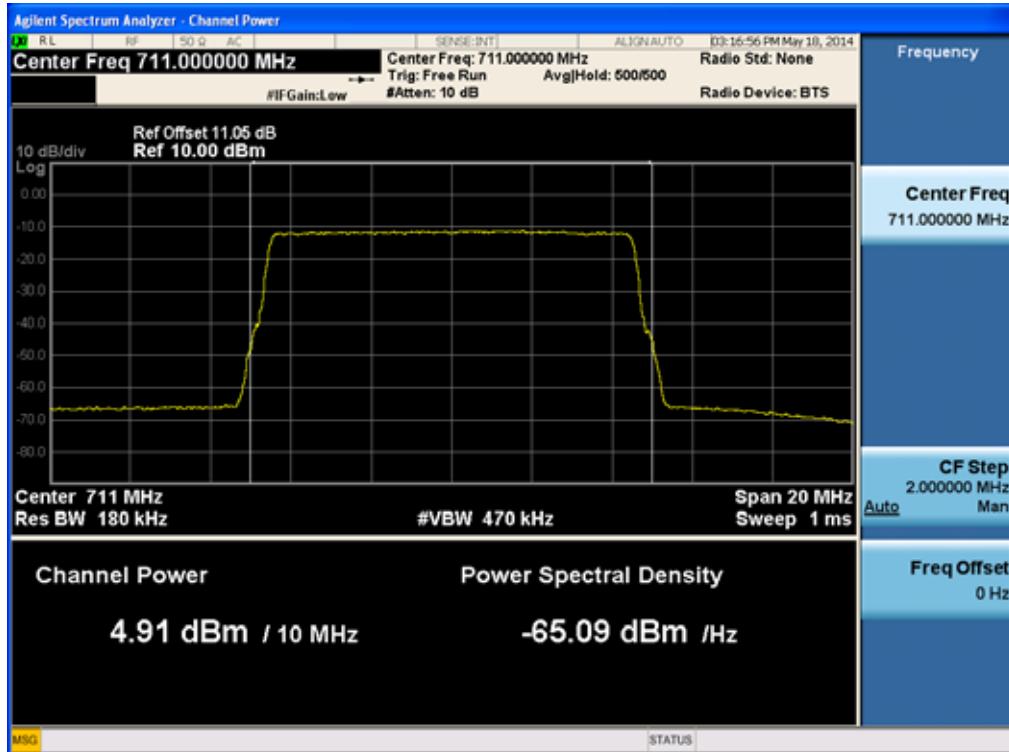
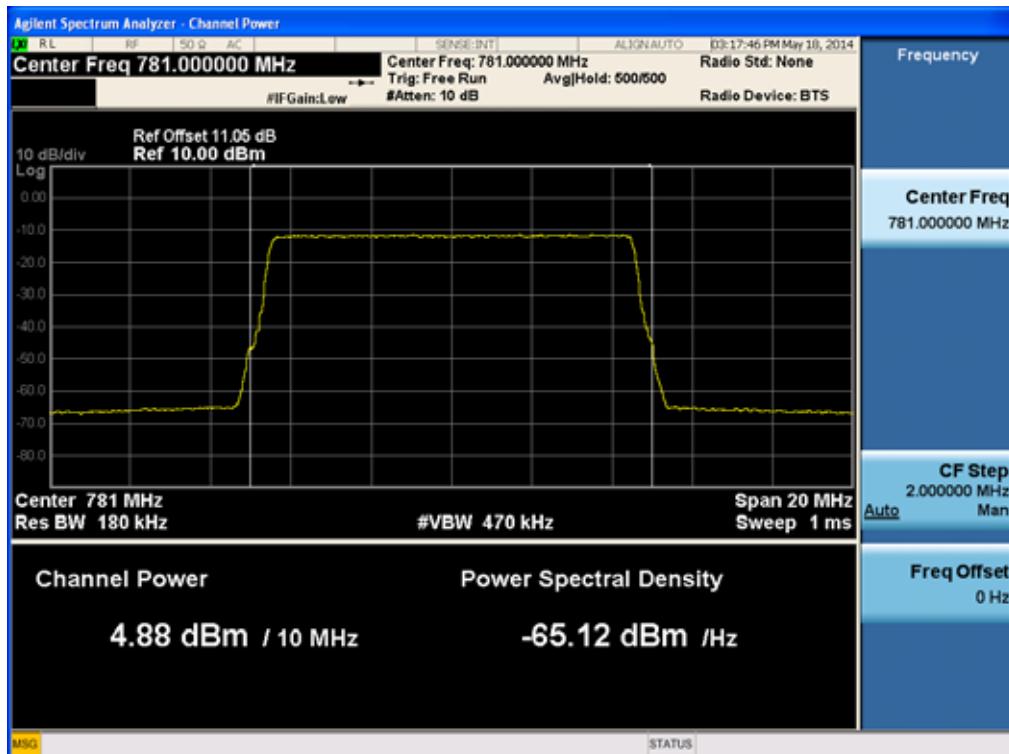


[LTE Downlink 10 MHz High]



[LTE Uplink 10 MHz Low]



[LTE Uplink 10 MHz Middle]

[LTE Uplink 10 MHz High]


7. OCCUPIED BANDWIDTH

Test Requirement(s): § 2.1049 Measurements required: Occupied bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

Test Procedures: As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink. The modulation characteristics of signal generator's carrier was measured first at a maximum RF level prescribed by the OEM. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

Test Results: The EUT complies with the requirements of this section.

| Input Signal | Modulation | Level (dBm) |
|--------------|--------------|------------------------|
| LTE | DL/ UL: QPSK | DL: -17.0 UL: -45.0 |

[Downlink Output]

| | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) |
|-------------------|---------|-----------------|--------------------------|
| LTE 10 MHz | Low | 734 | 8.985 |
| | Middle | 741 | 8.981 |
| | High | 751 | 8.984 |

[Downlink Input]

| | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) |
|-------------------|---------|-----------------|--------------------------|
| LTE 10 MHz | Low | 734 | 8.968 |
| | Middle | 741 | 8.983 |
| | High | 751 | 8.984 |

[Uplink Output]

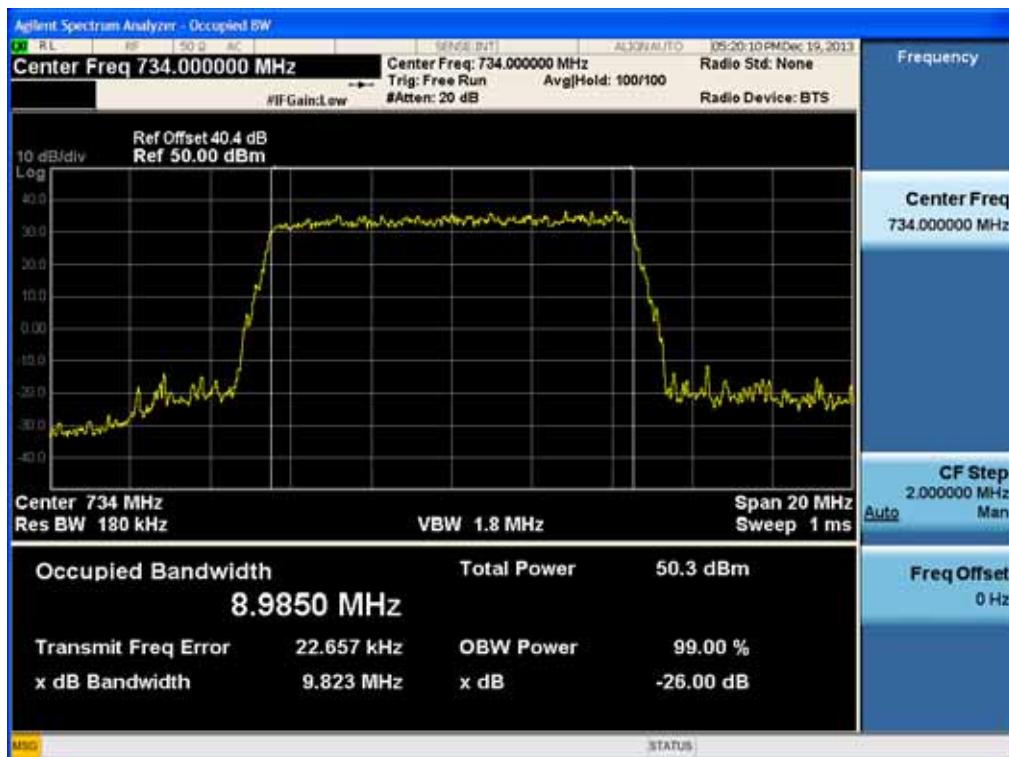
| | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) |
|-------------------|---------|-----------------|--------------------------|
| LTE 10 MHz | Low | 704 | 9.022 |
| | Middle | 711 | 8.983 |
| | High | 781 | 8.998 |

[Uplink Input]

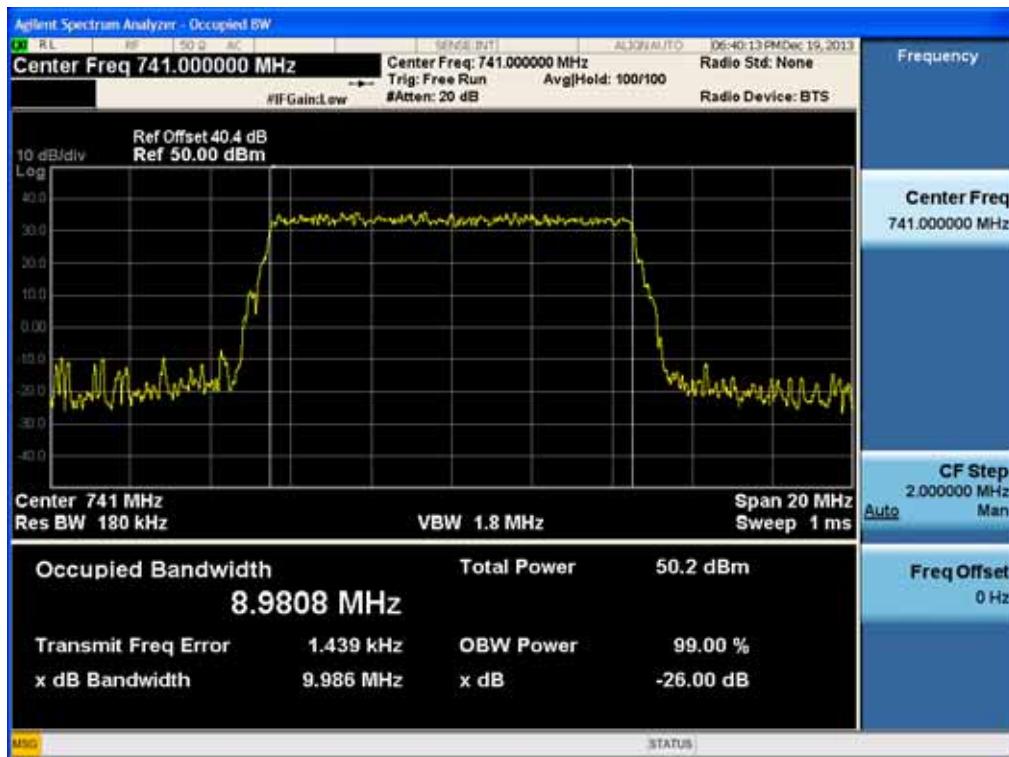
| | Channel | Frequency (MHz) | Occupied Bandwidth (MHz) |
|-------------------|---------|-----------------|--------------------------|
| LTE 10 MHz | Low | 704 | 8.992 |
| | Middle | 711 | 9.006 |
| | High | 781 | 8.999 |

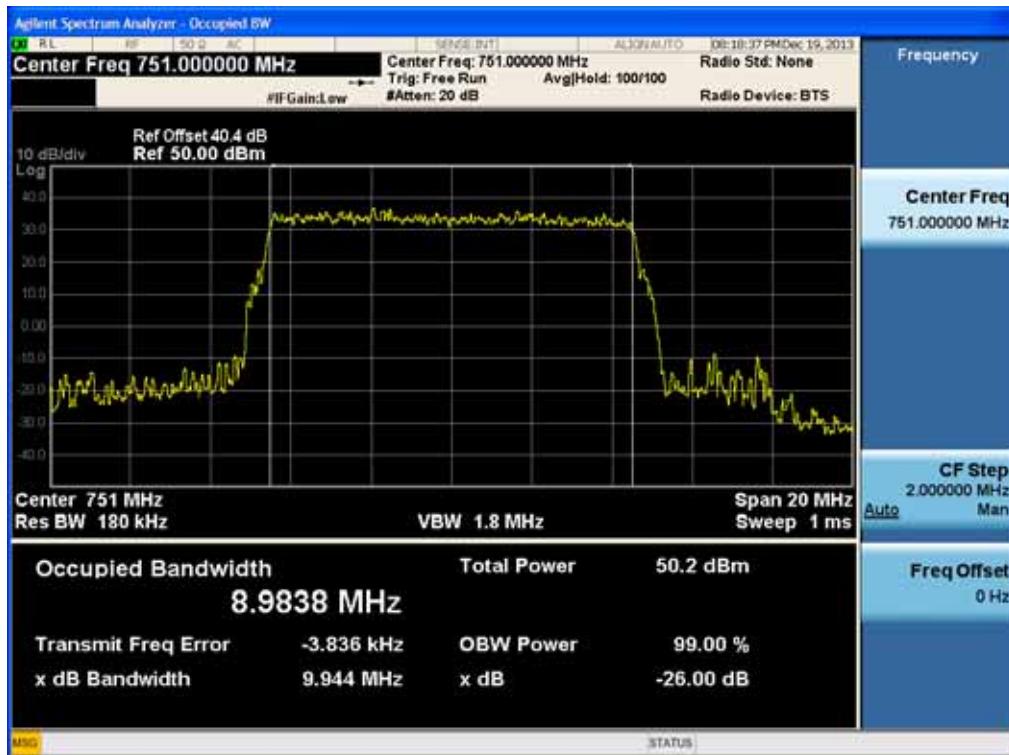
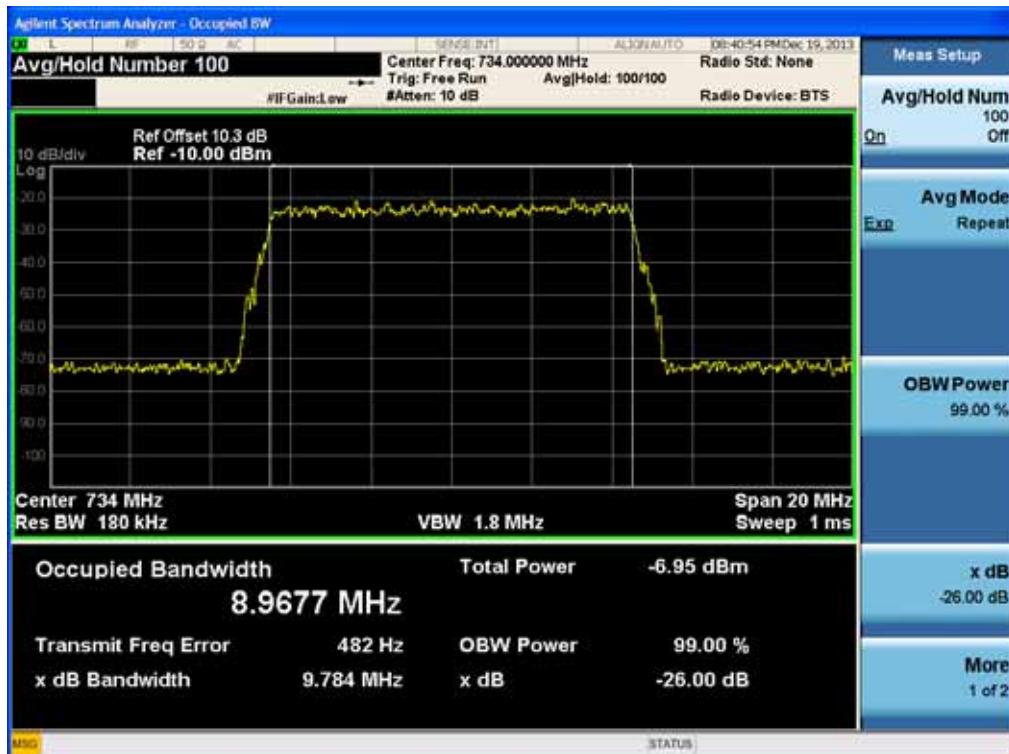
Plots of Occupied Bandwidth

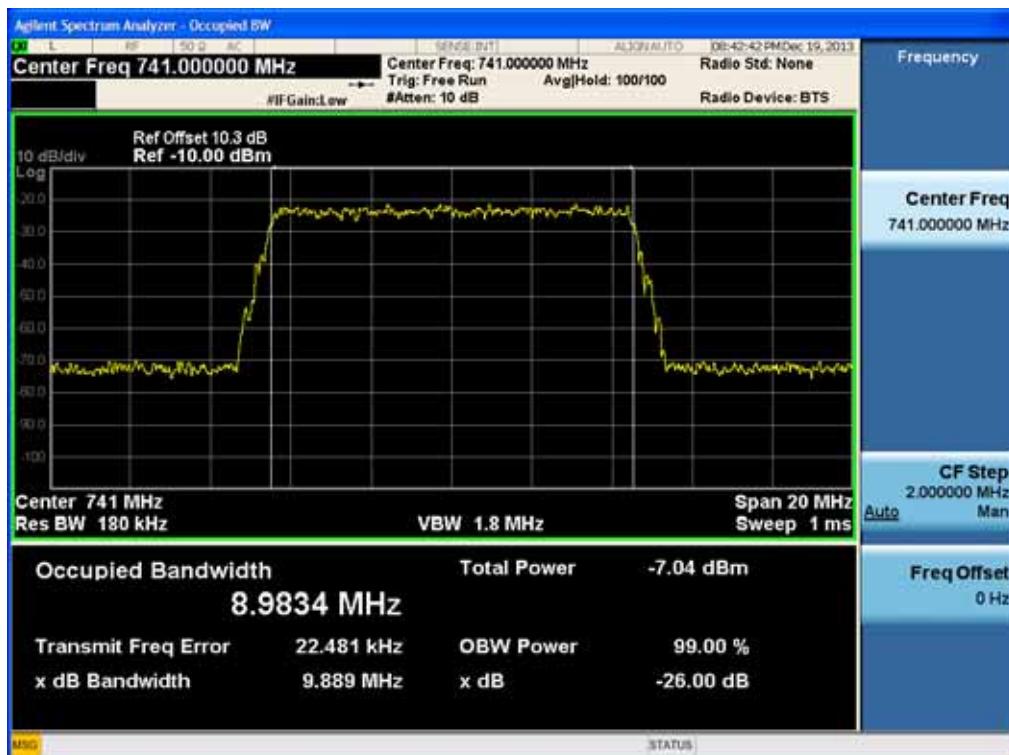
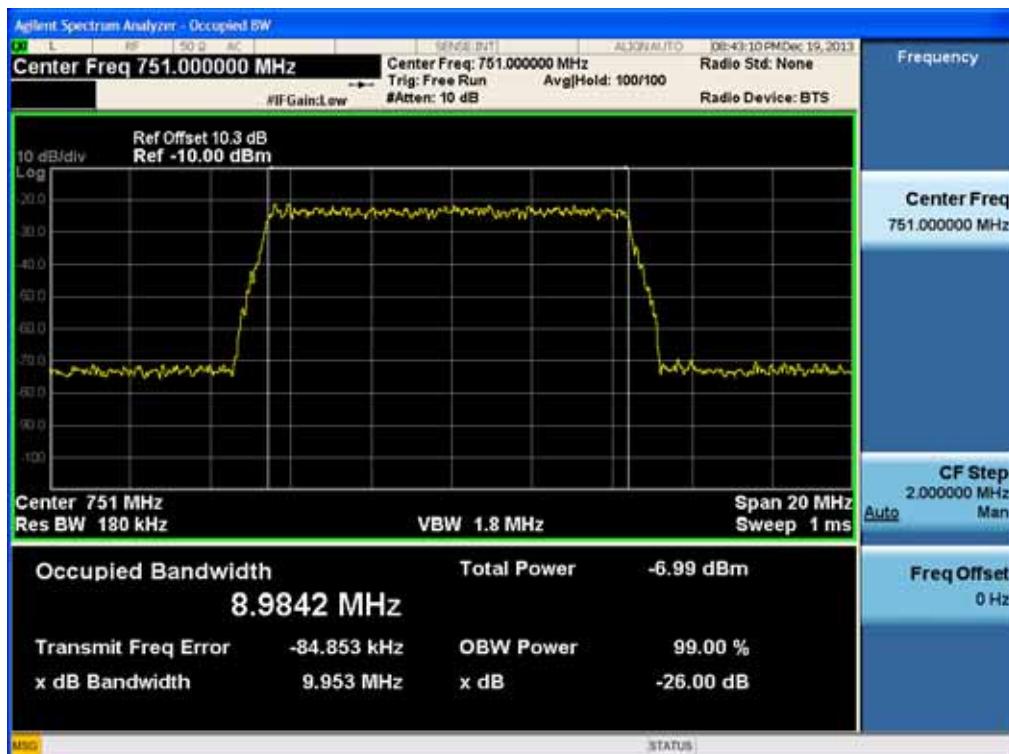
[Output LTE Downlink 10 MHz Low]



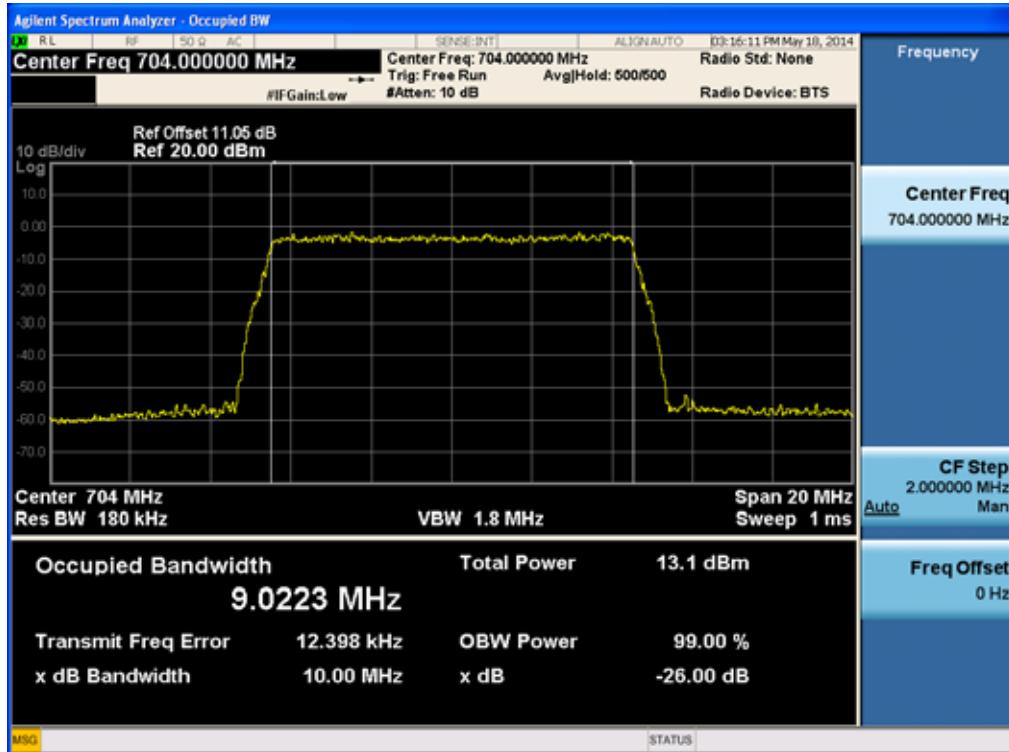
[Output LTE Downlink 10 MHz Middle]



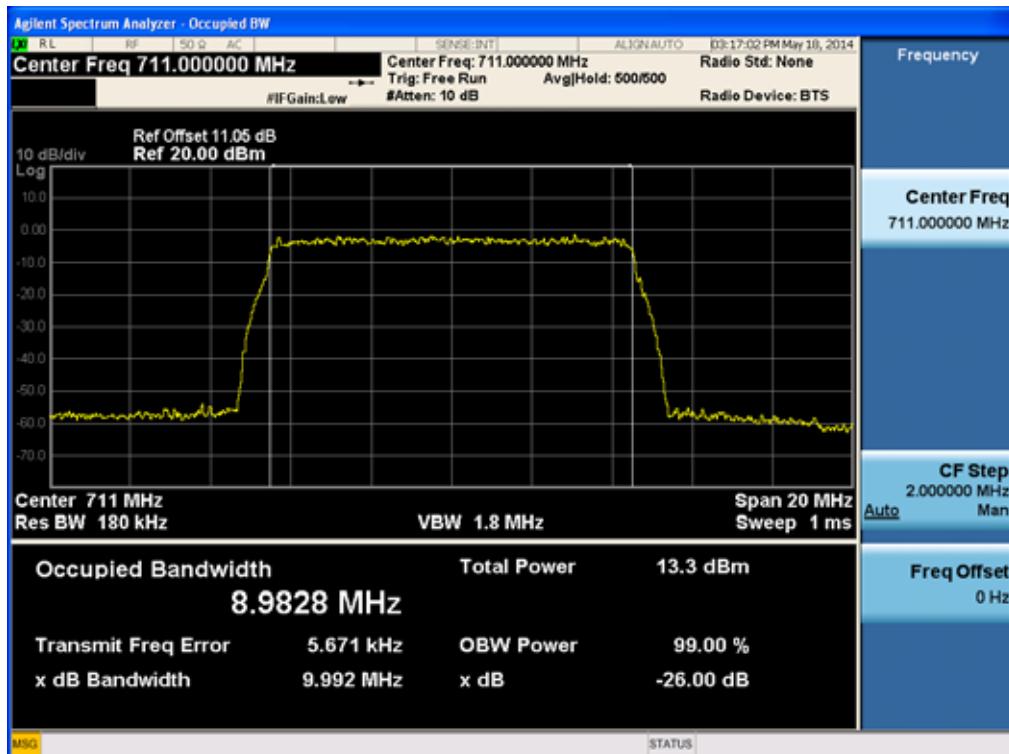
[Output LTE Downlink 10 MHz High]

[Input LTE Downlink 10 MHz Low]


[Input LTE Downlink 10 MHz Middle]

[Input LTE Downlink 10 MHz High]


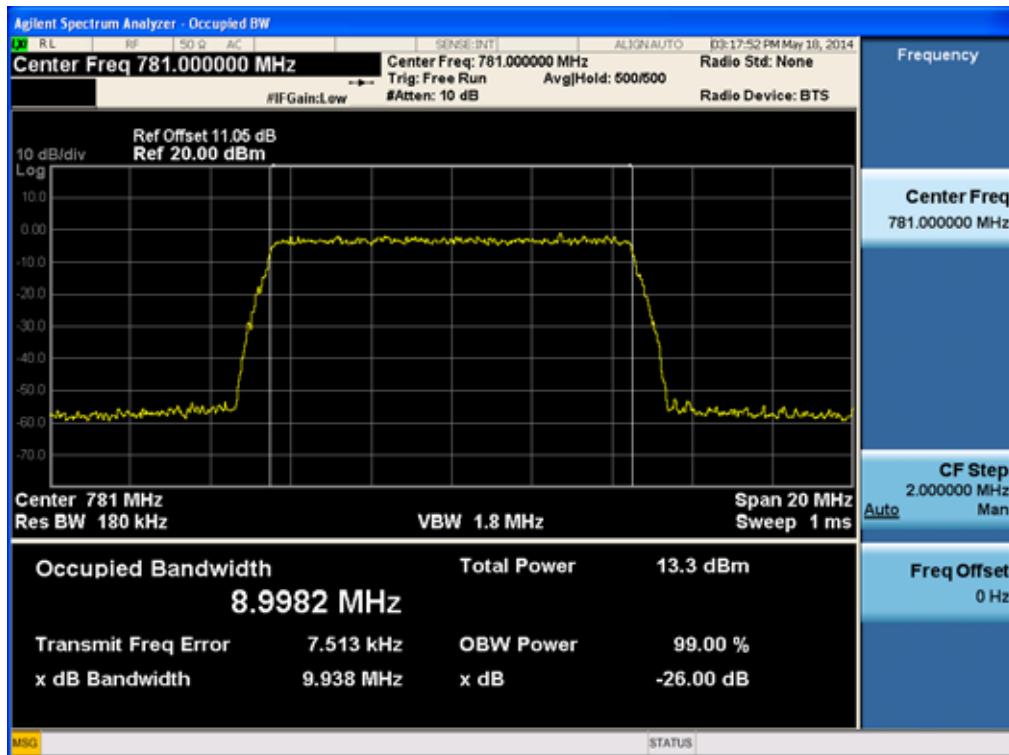
[Output LTE Uplink 10 MHz Low]



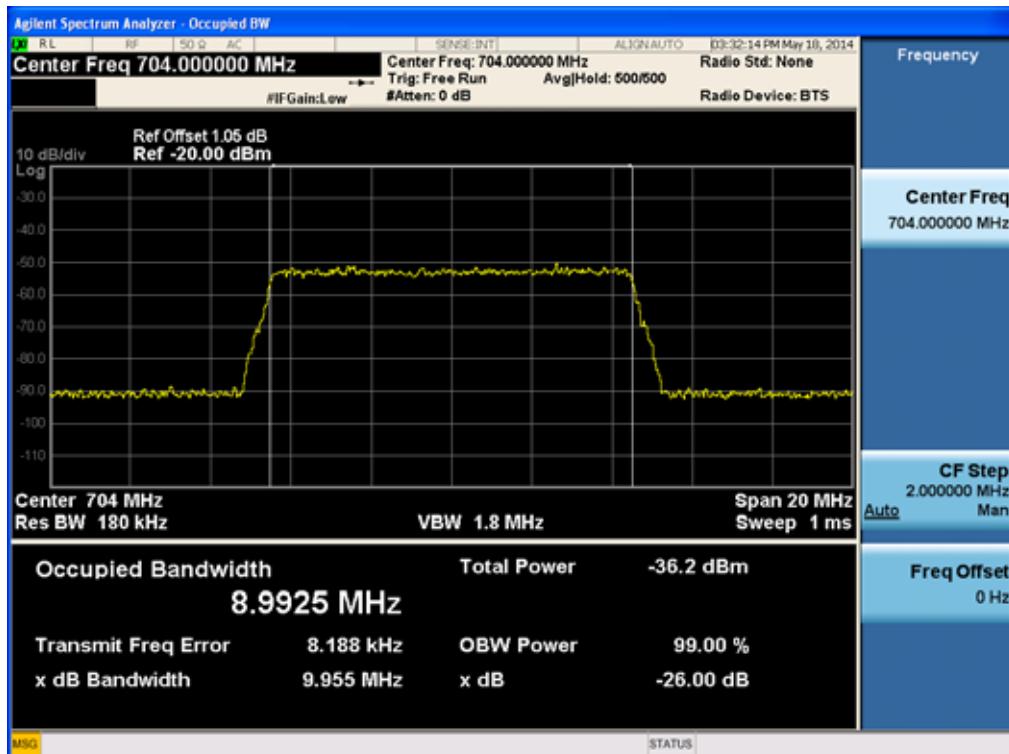
[Output LTE Uplink 10 MHz Middle]

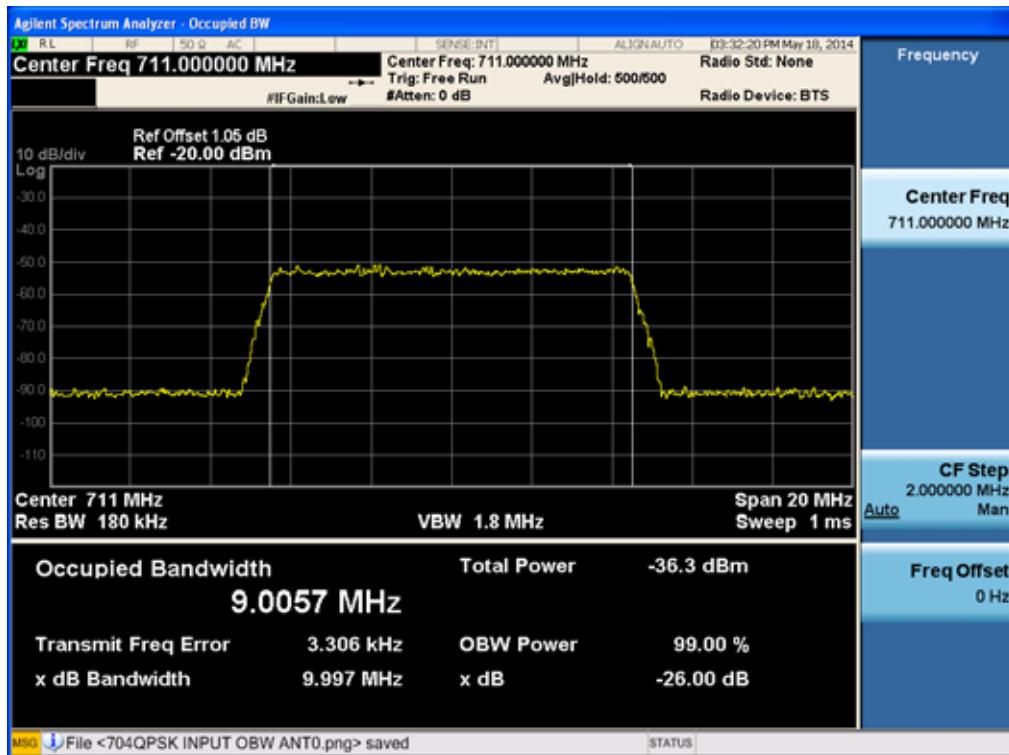
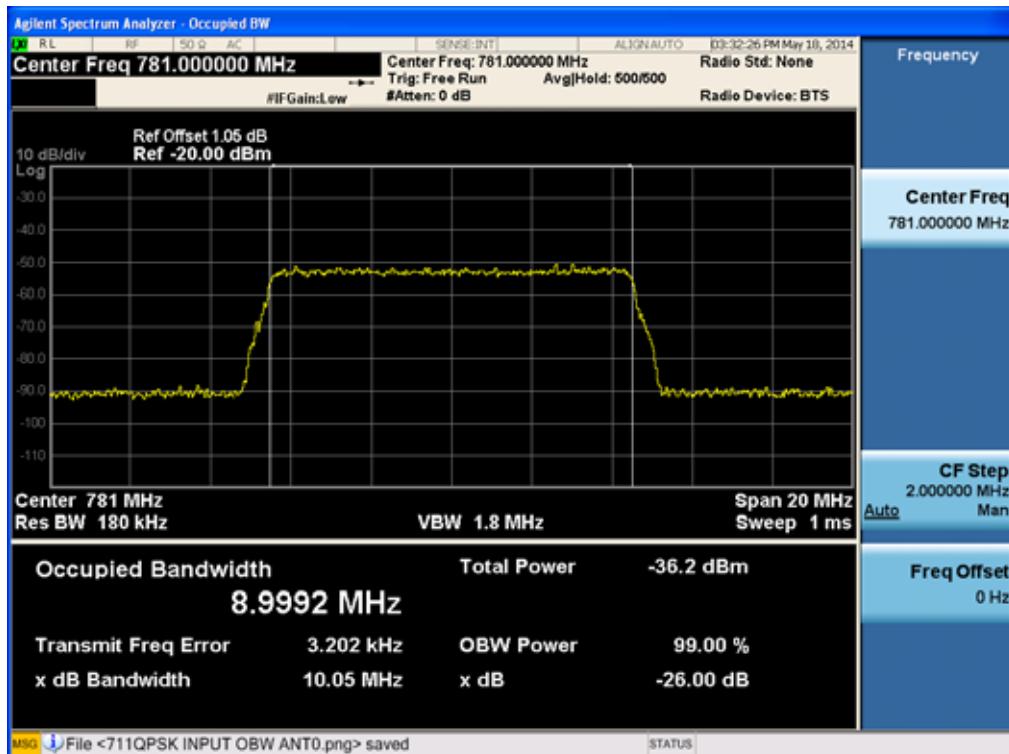


[Output LTE Uplink 10 MHz High]



[Input LTE Uplink 10 MHz Low]



[Input LTE Uplink 10 MHz Middle]

[Input LTE Uplink 10 MHz High]


8. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

Test Requirement(s): § 2.1051 Measurements required: Spurious emissions at antenna terminals:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§ 27.53 Emission limits

(c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(3) On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;

Test Procedures: A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured.

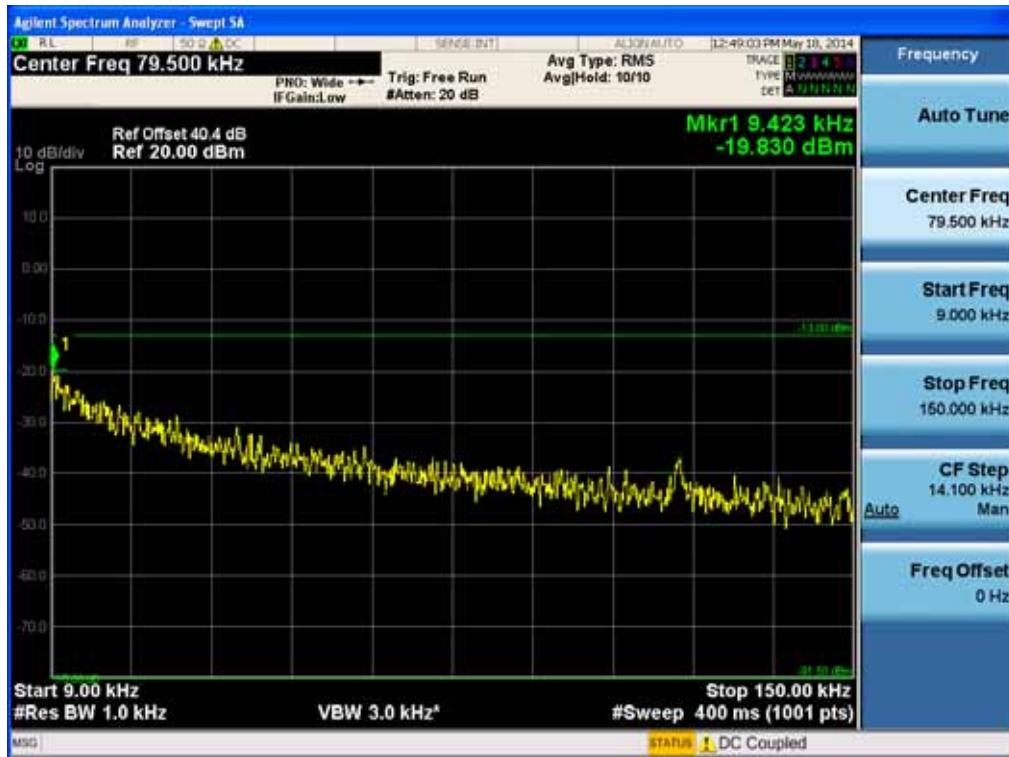
The spectrum was investigated from 9 kHz to the 12.75 GHz of the carrier.

Test Results: The EUT complies with the requirements of this section. There were no detectable Spurious emissions for this EUT.

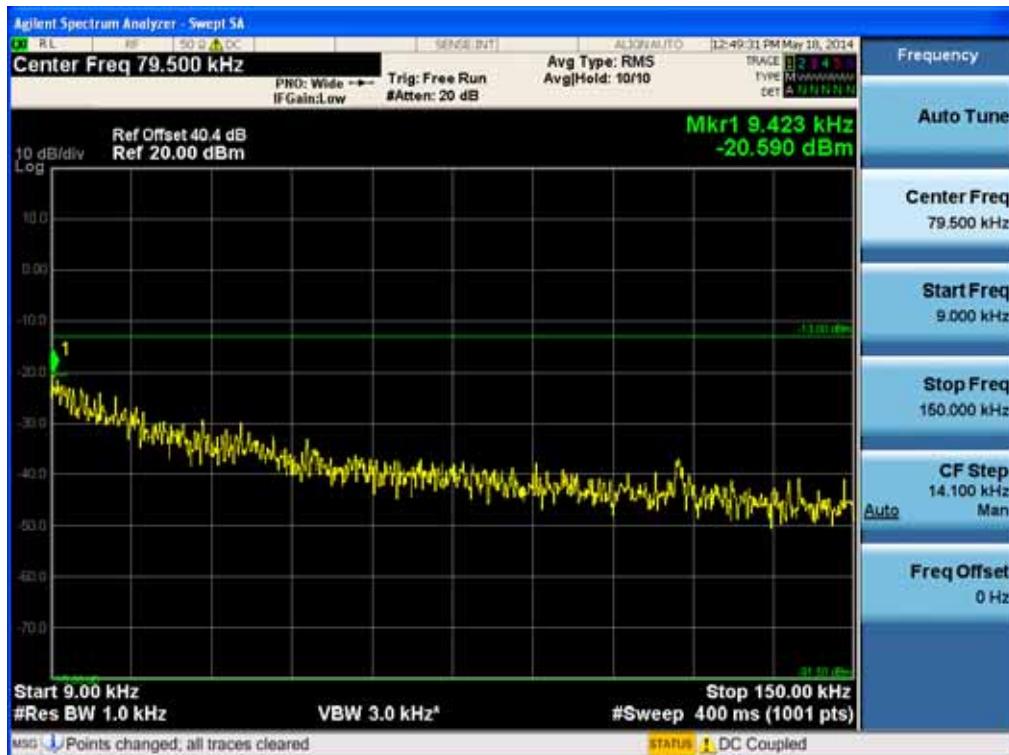
Plots of Spurious Emission

Conducted Spurious Emissions (9 kHz – 150 kHz)

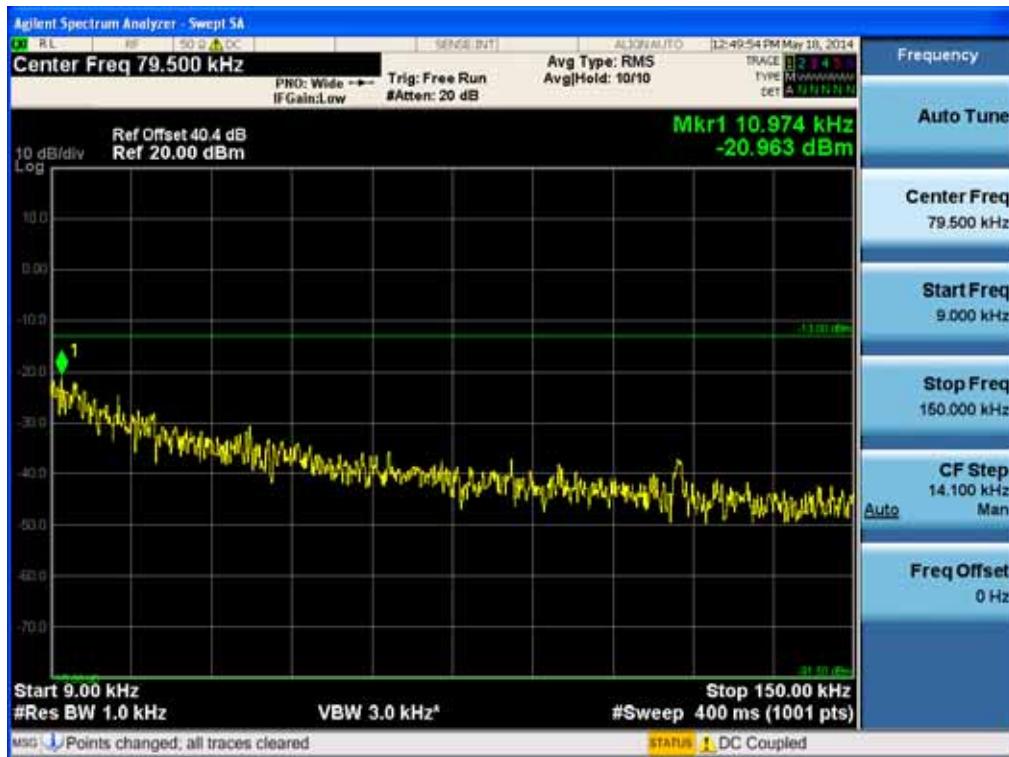
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

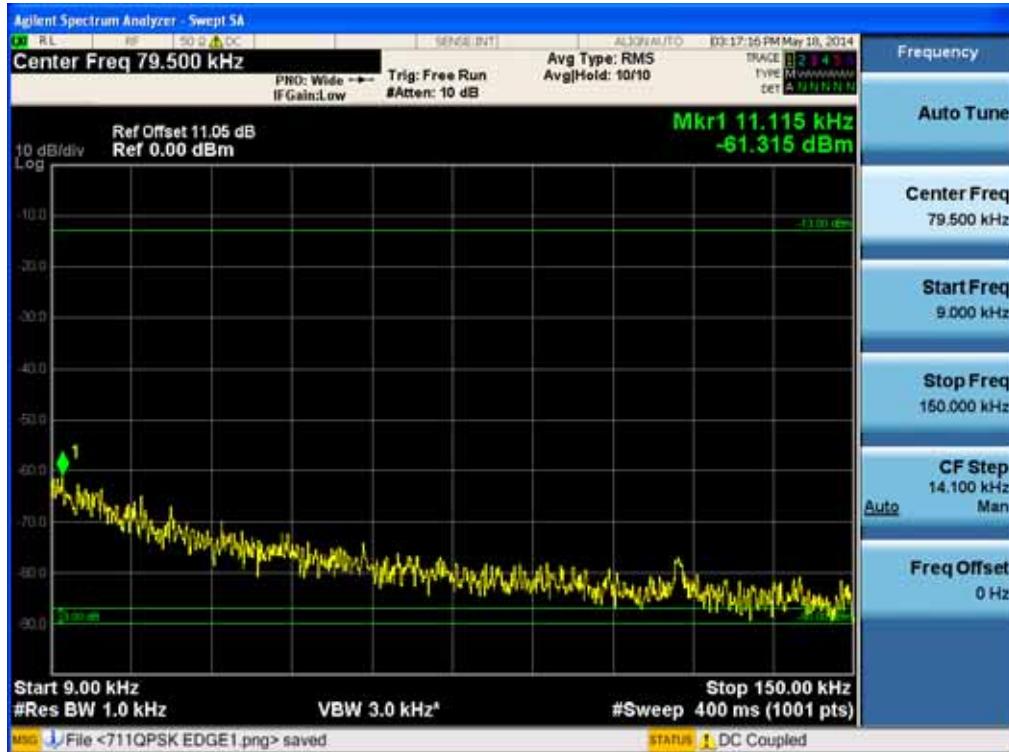
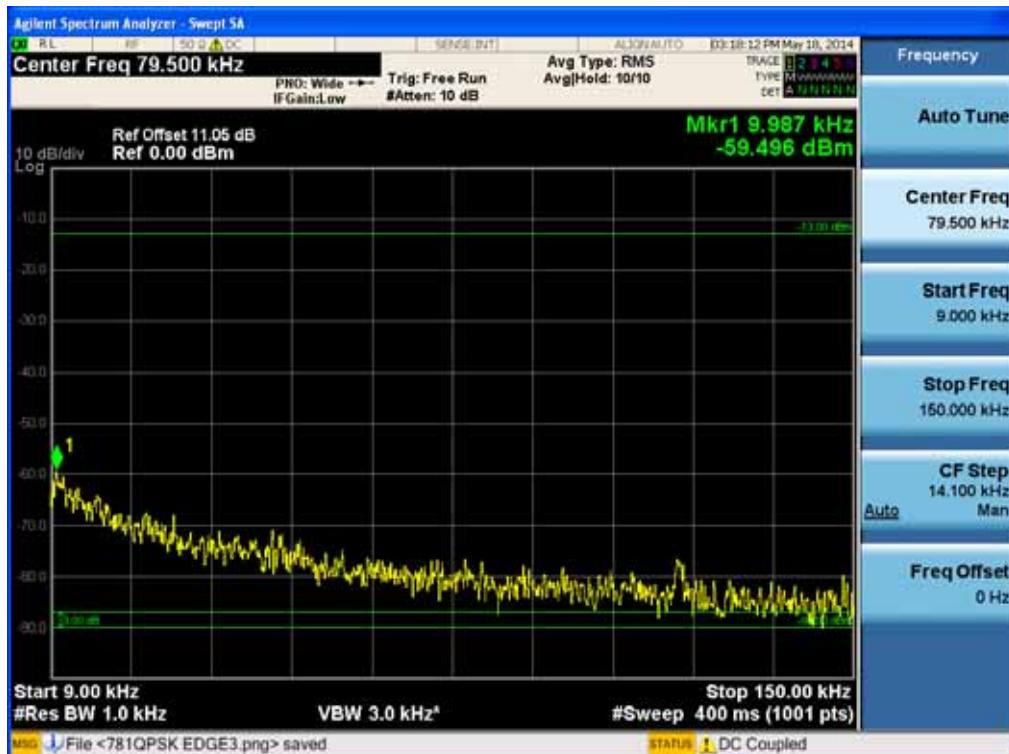


[LTE Downlink 10 MHz High]



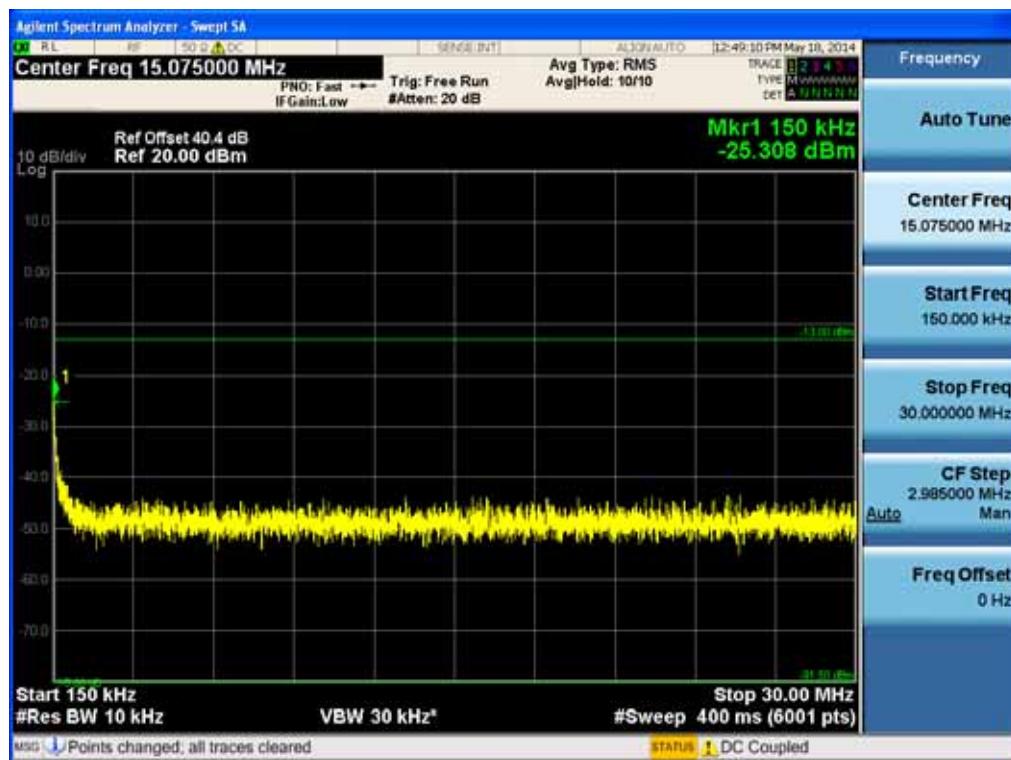
[LTE Uplink 10 MHz Low]



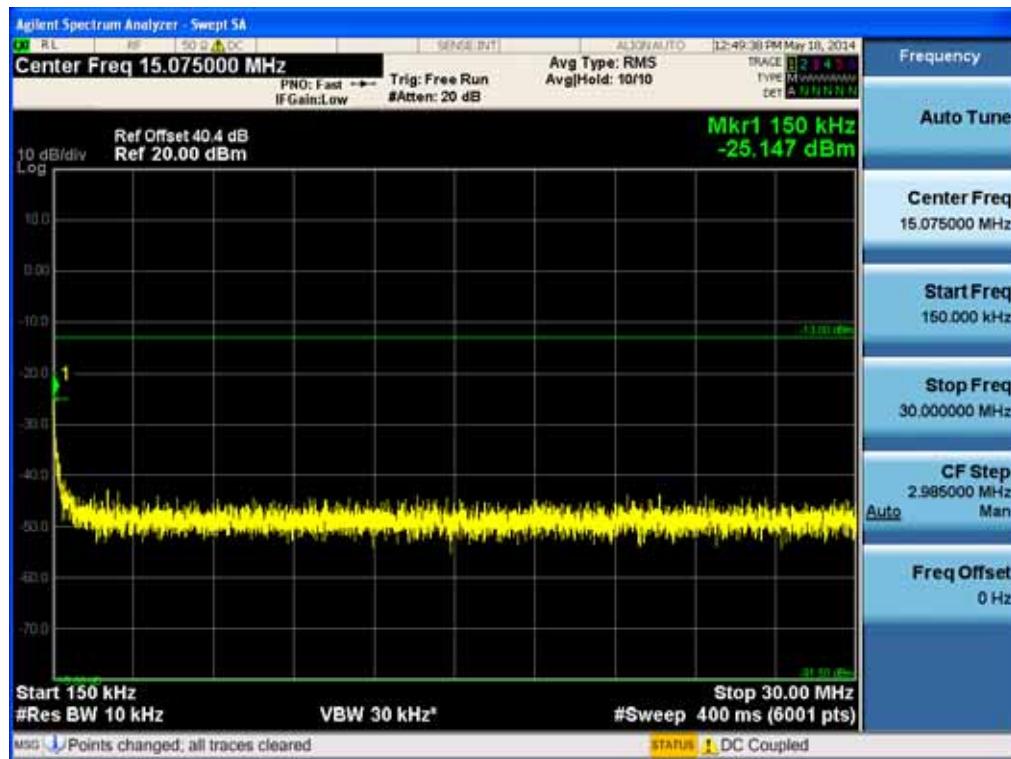
[LTE Uplink 10 MHz Middle]

[LTE Uplink 10 MHz High]


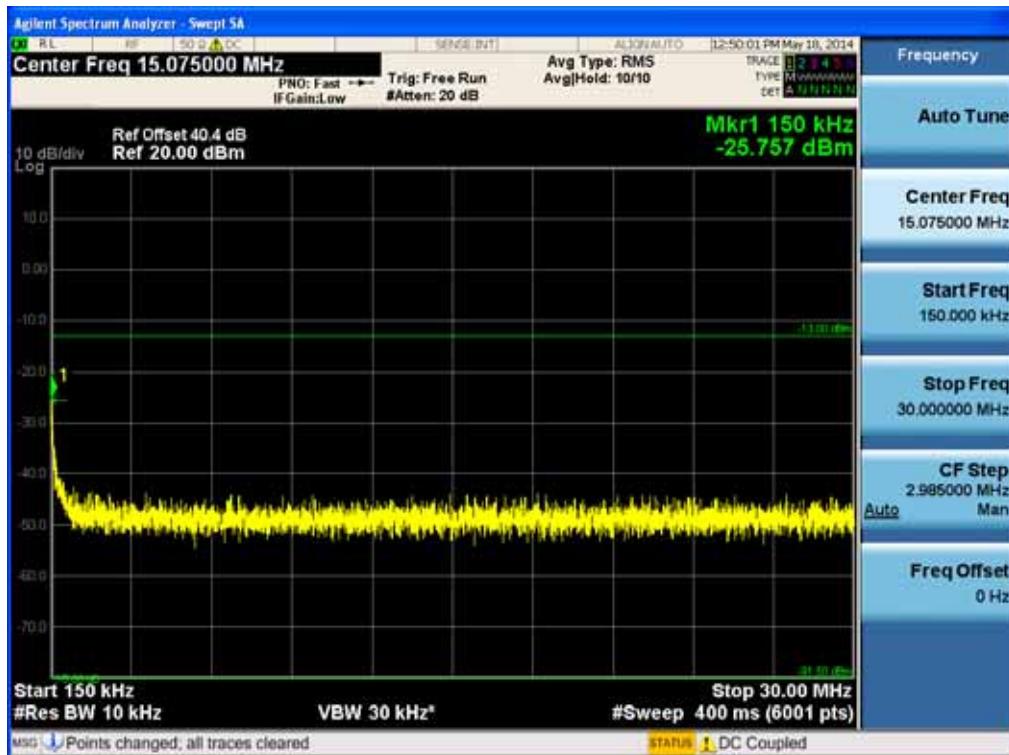
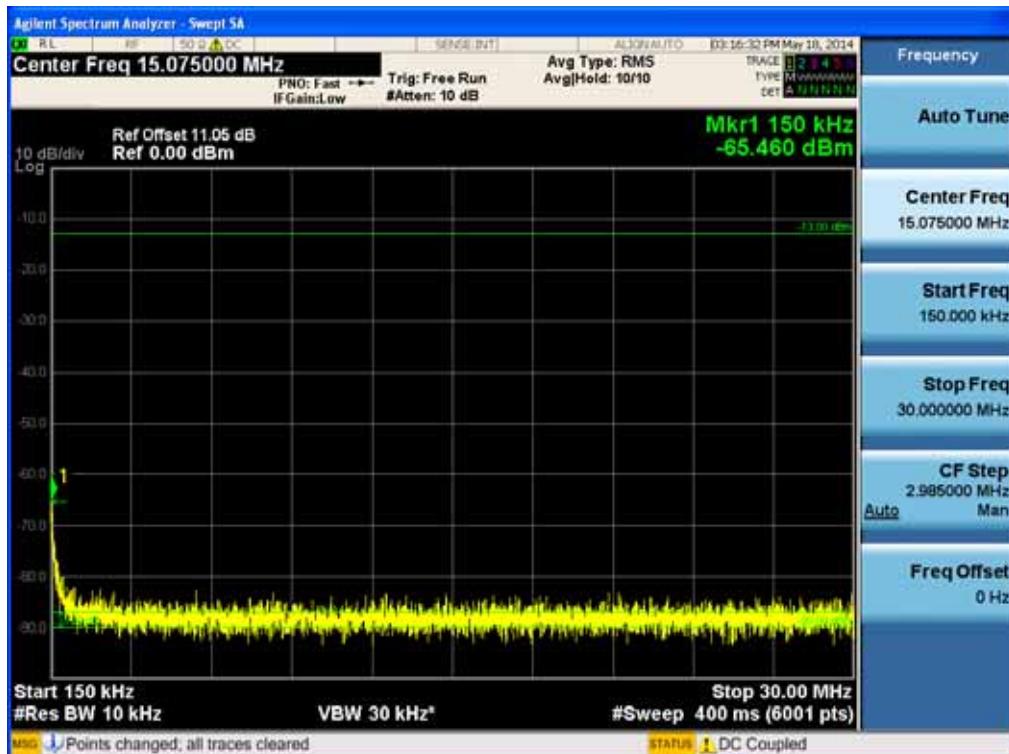
Conducted Spurious Emissions (150 kHz – 30 MHz)

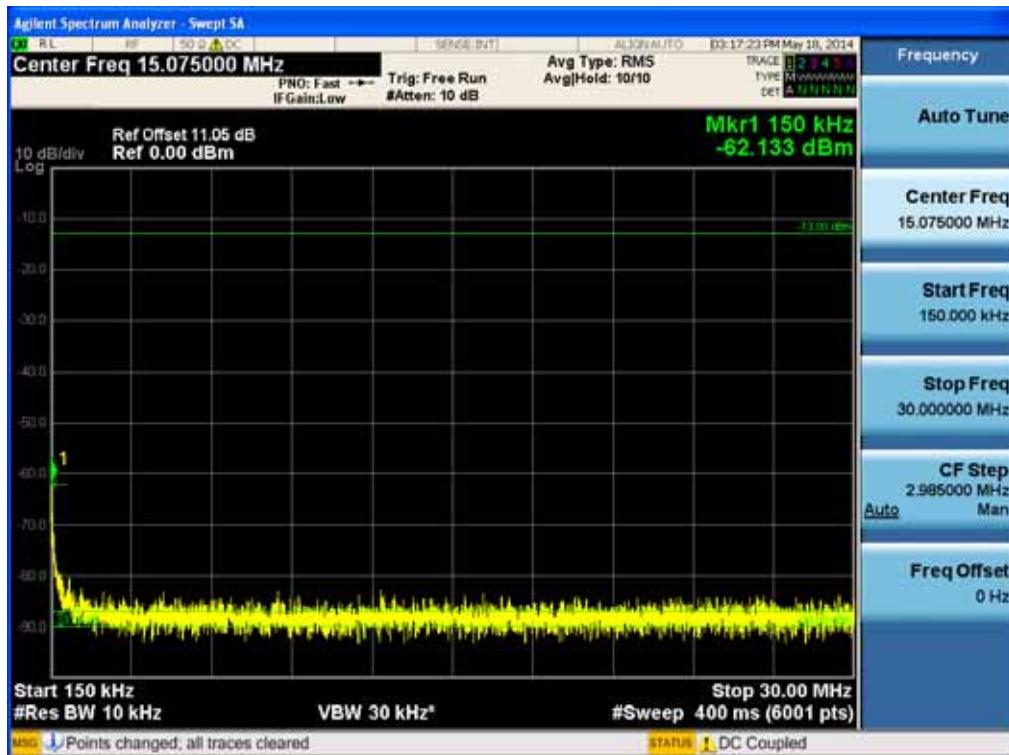
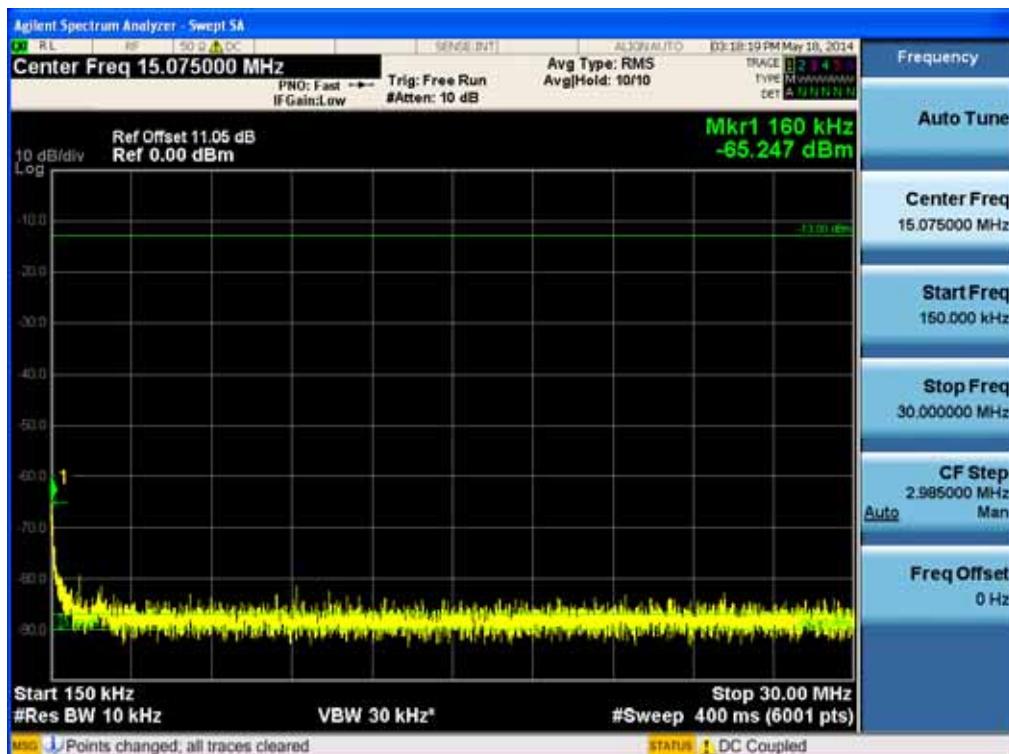
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

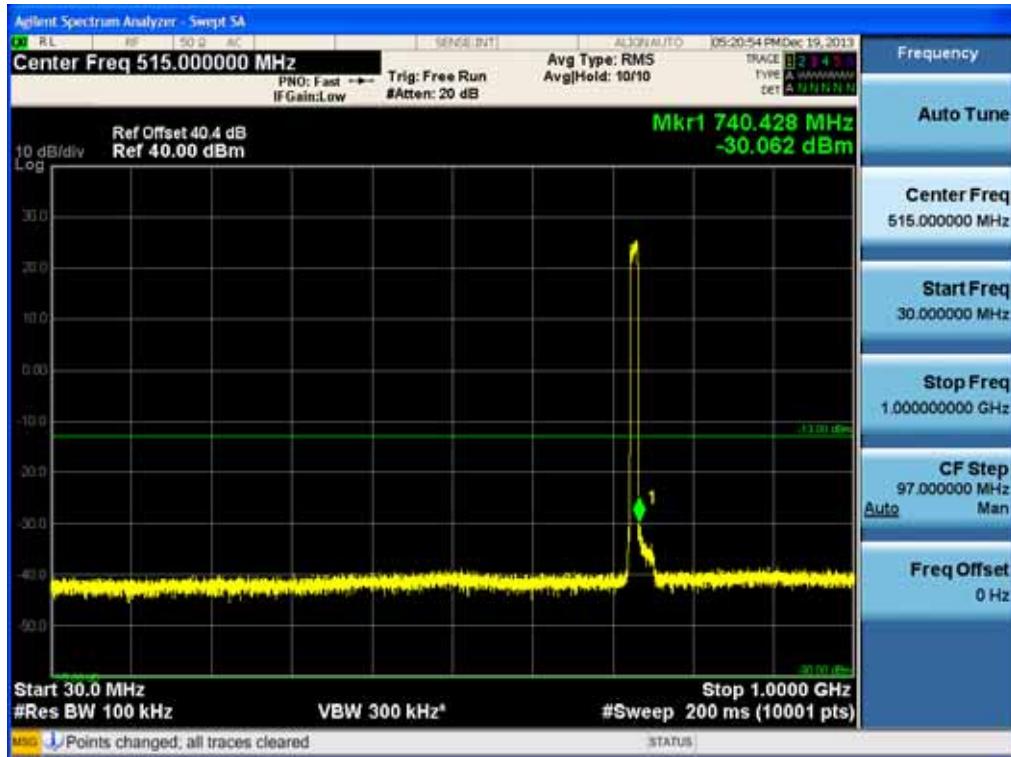


[LTE Downlink 10 MHz High]

[LTE Uplink 10 MHz Low]


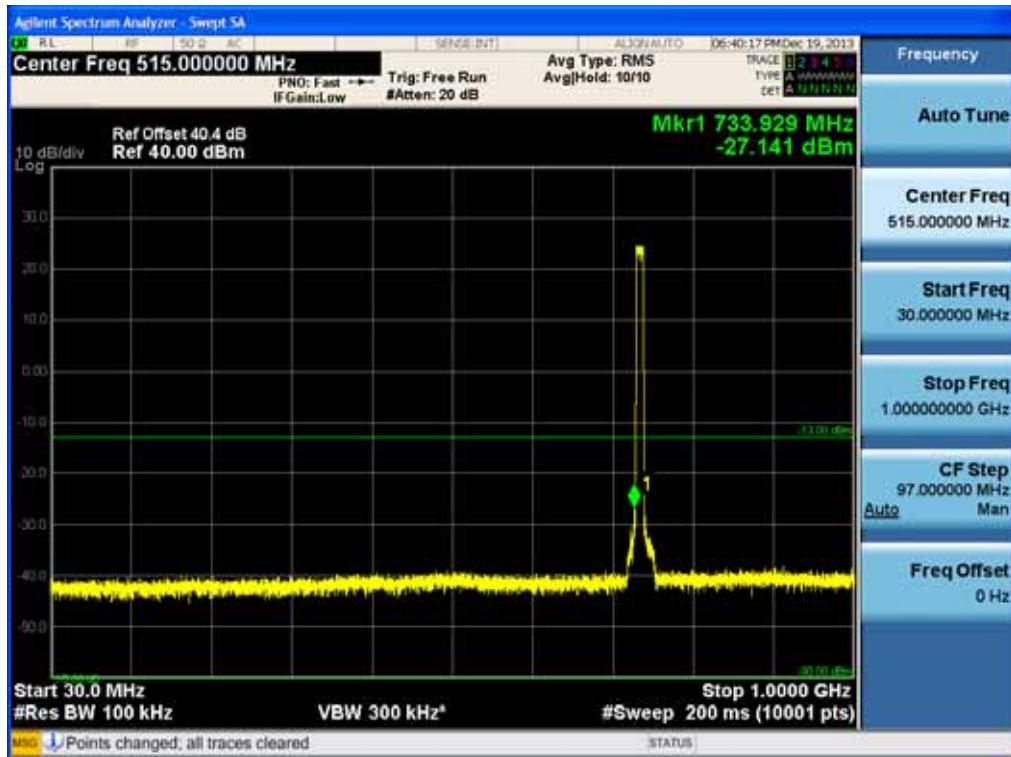
[LTE Uplink 10 MHz Middle]

[LTE Uplink 10 MHz High]


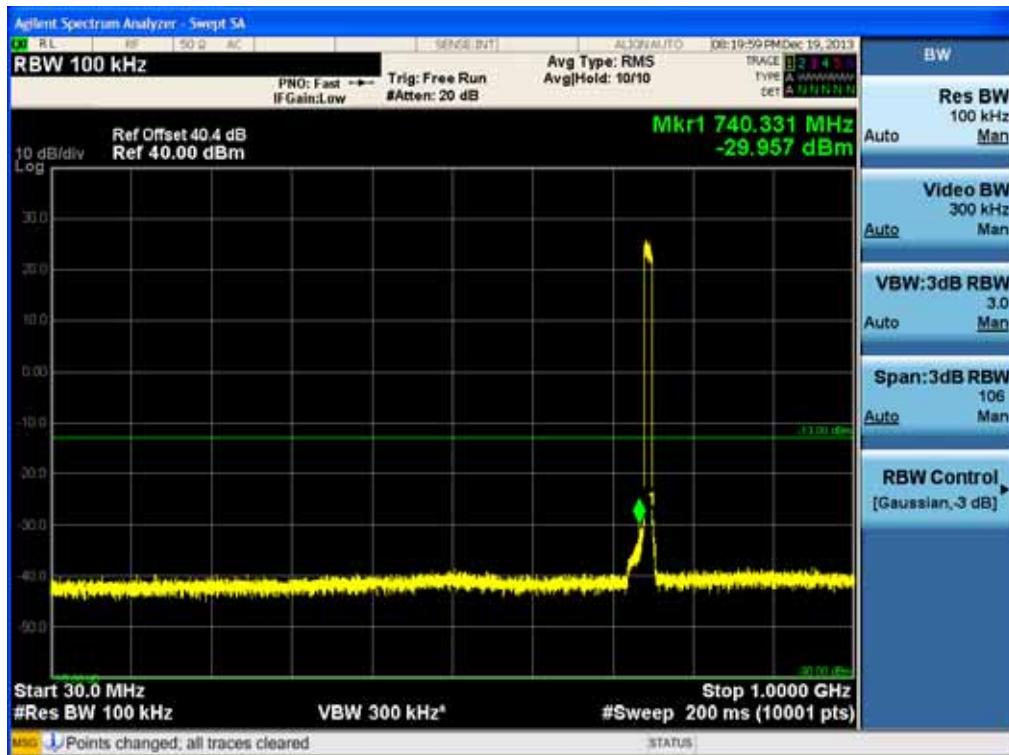
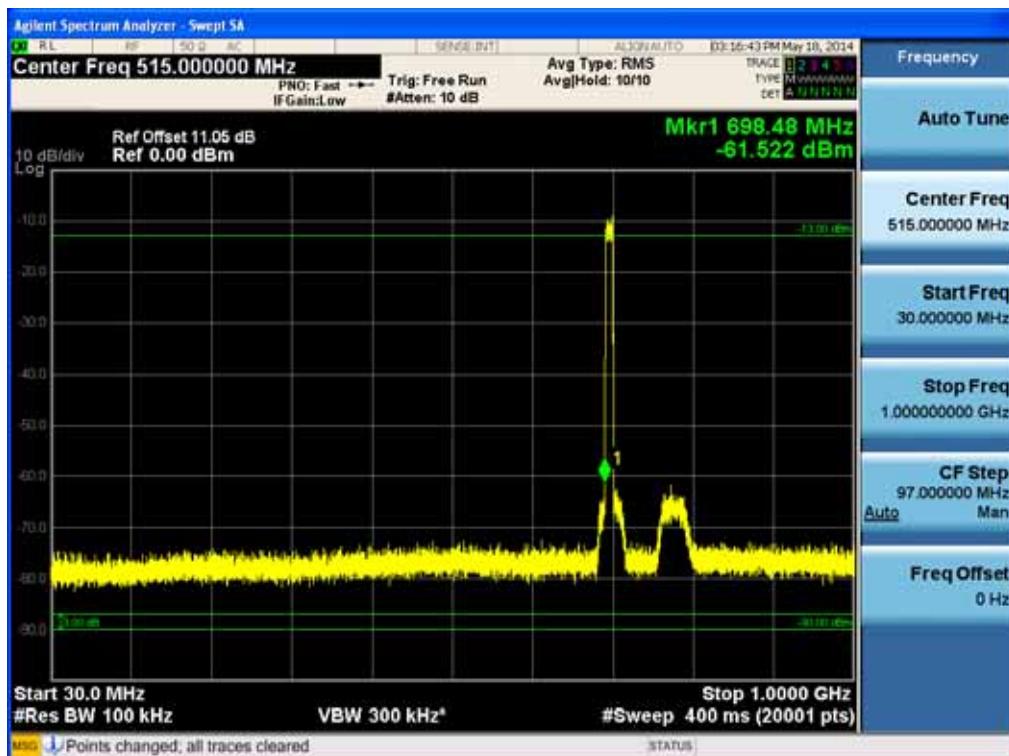
Conducted Spurious Emissions (30 MHz – 1 GHz)

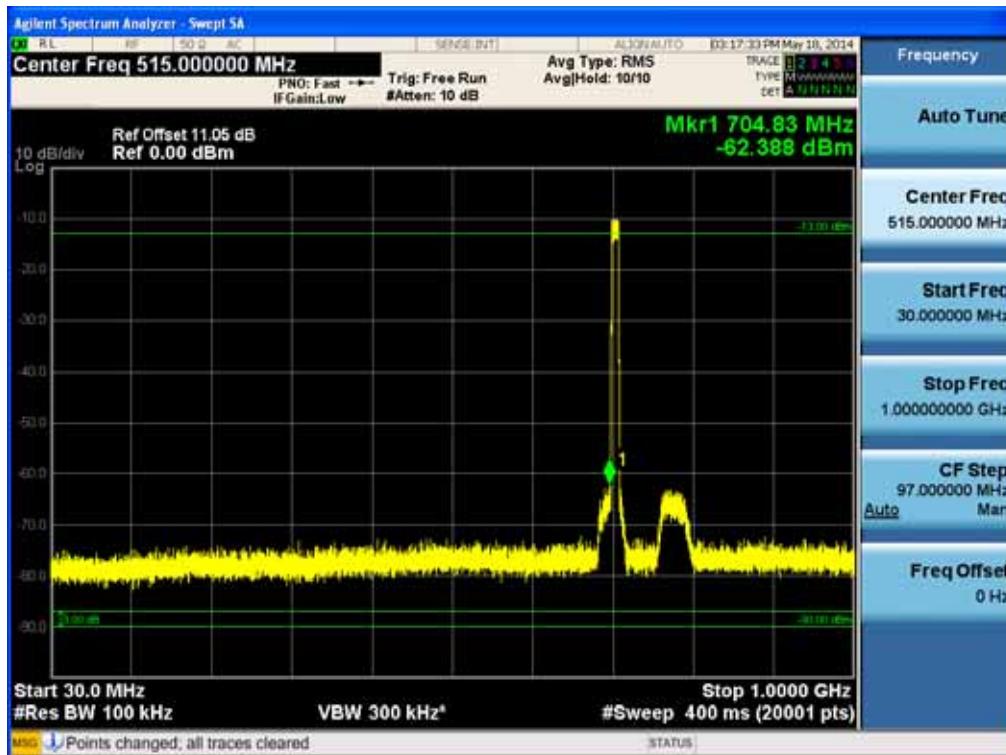
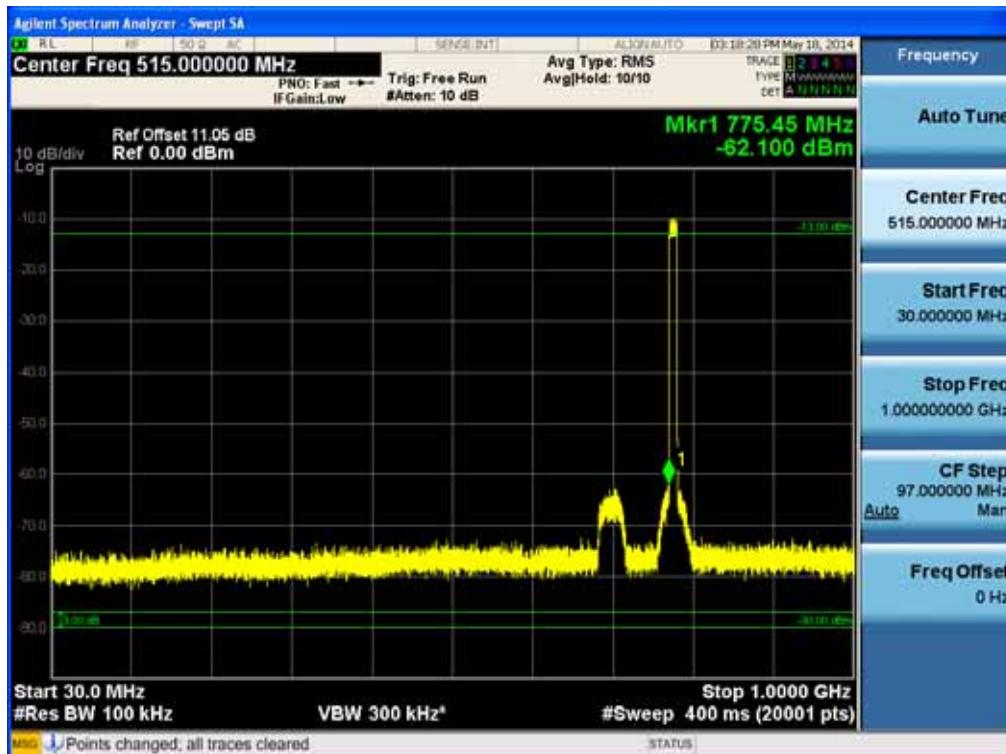
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]

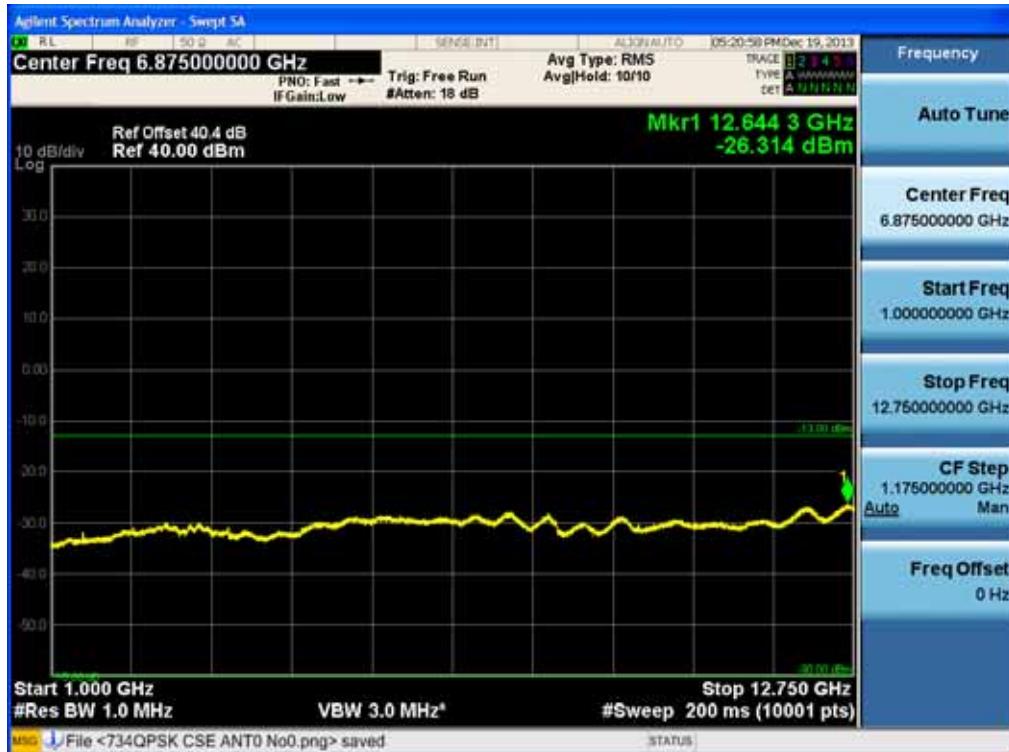


[LTE Downlink 10 MHz High]

[LTE Uplink 10 MHz Low]


[LTE Uplink 10 MHz Middle]

[LTE Uplink 10 MHz High]


Conducted Spurious Emissions (1 GHz – 12.75 GHz)

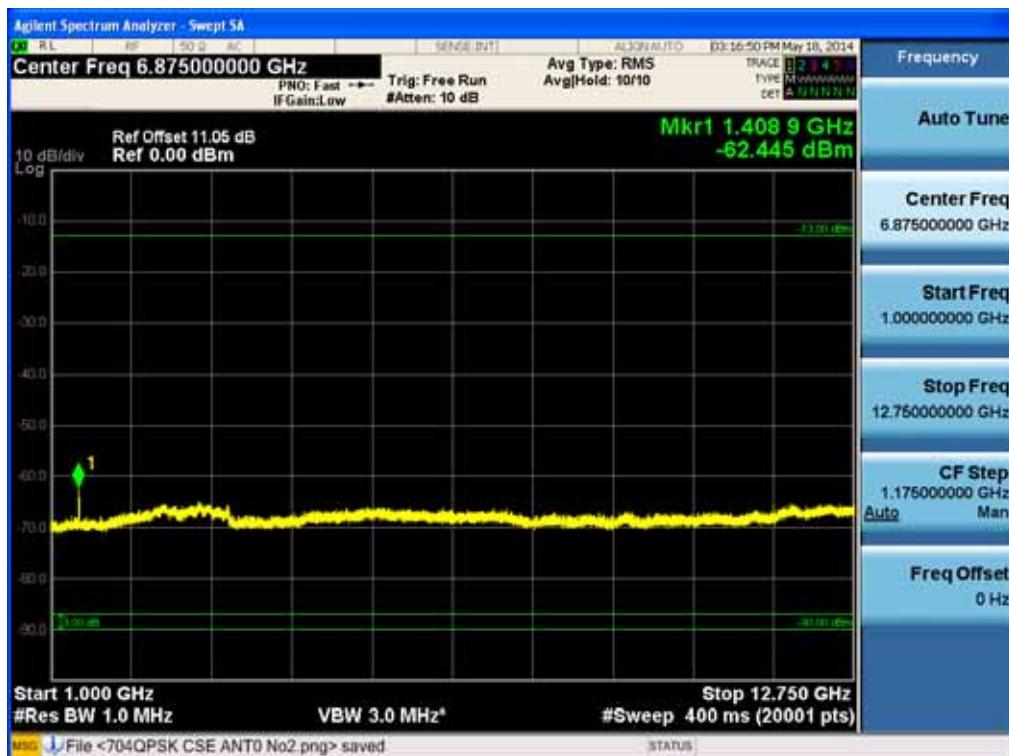
[LTE Downlink 10 MHz Low]



[LTE Downlink 10 MHz Middle]



[LTE Downlink 10 MHz High]

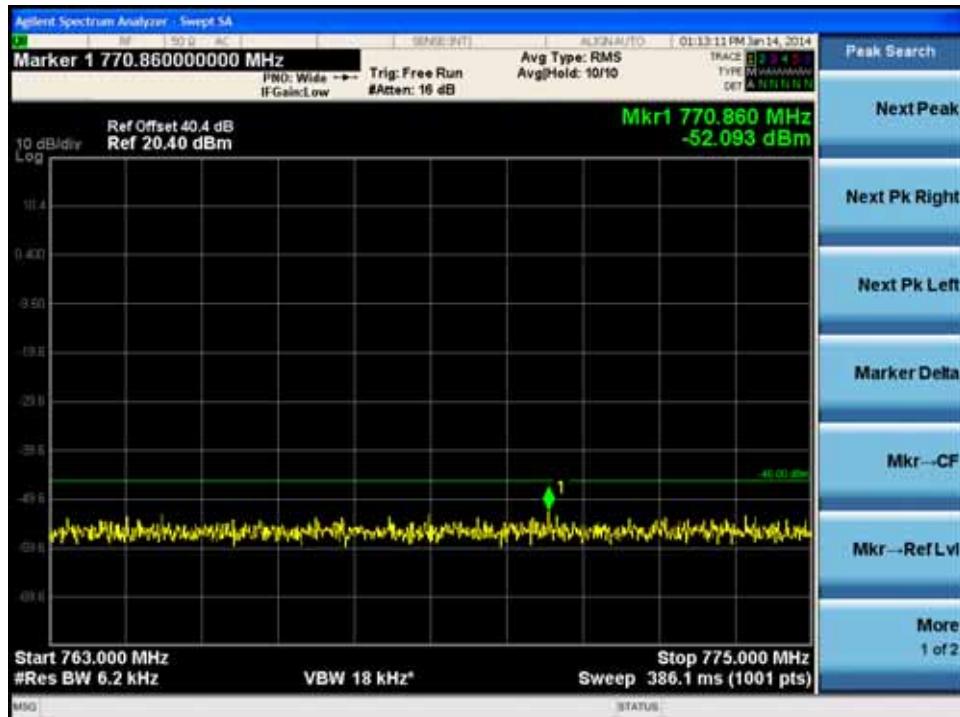
[LTE Uplink 10 MHz Low]


[LTE Uplink 10 MHz Middle]

[LTE Uplink 10 MHz High]

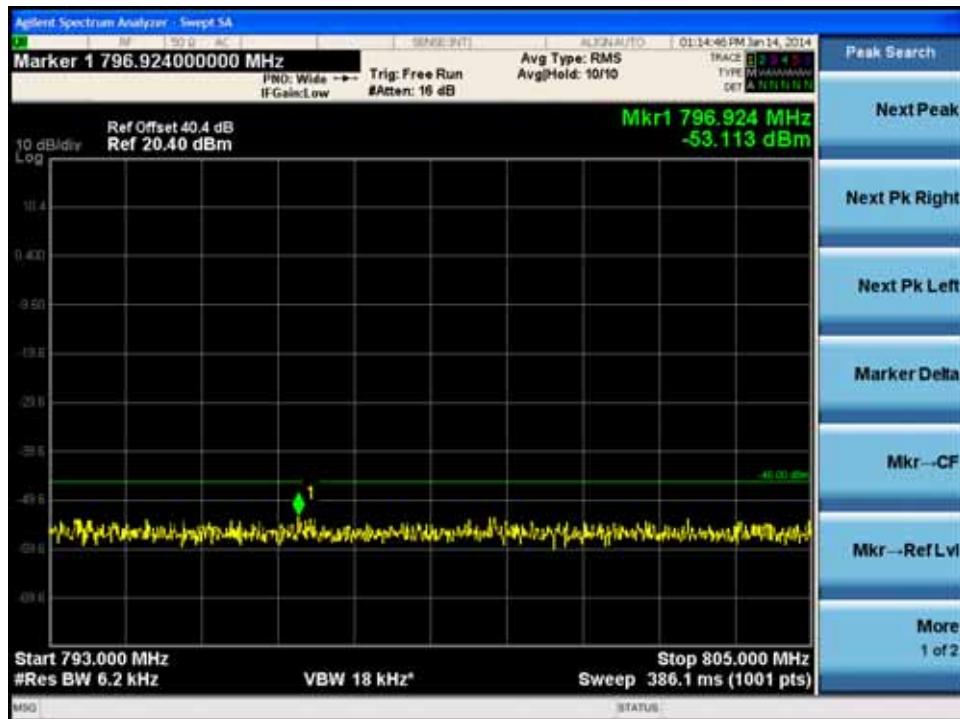

Conducted Spurious Emissions (763~775: -46 dBm/6.25 kHz)

[LTE Downlink 10 MHz High]



Conducted Spurious Emissions (793~805: -46 dBm/6.25 kHz)

[LTE Downlink 10 MHz High]



Plots of BAND EDGE

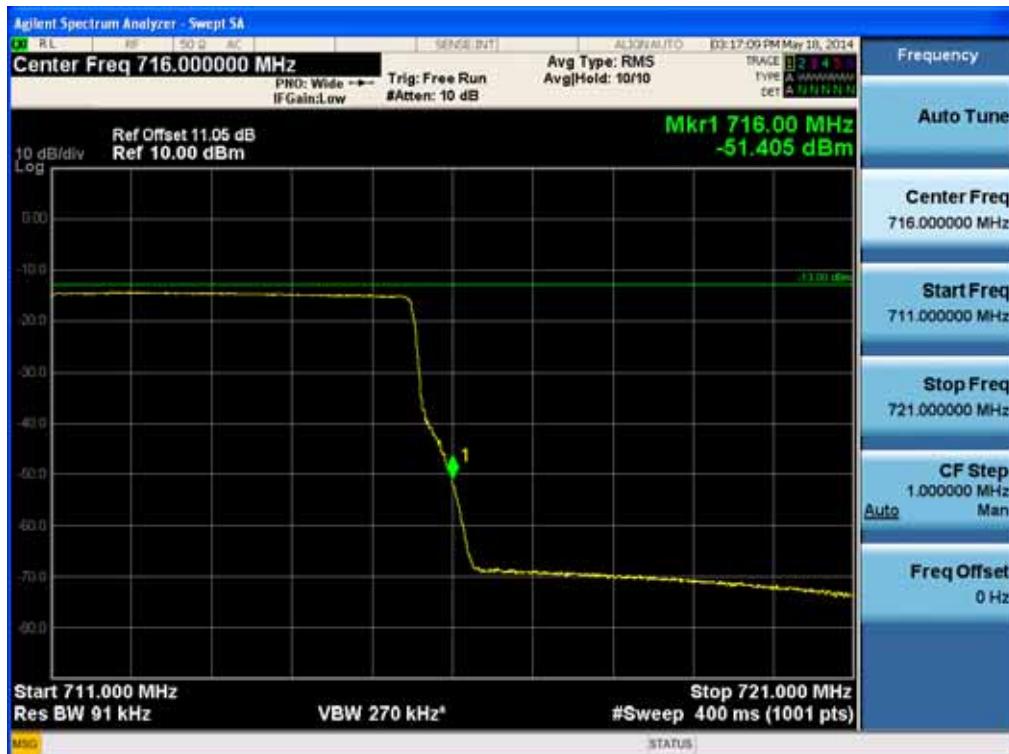
[LTE Downlink 10 MHz Low]

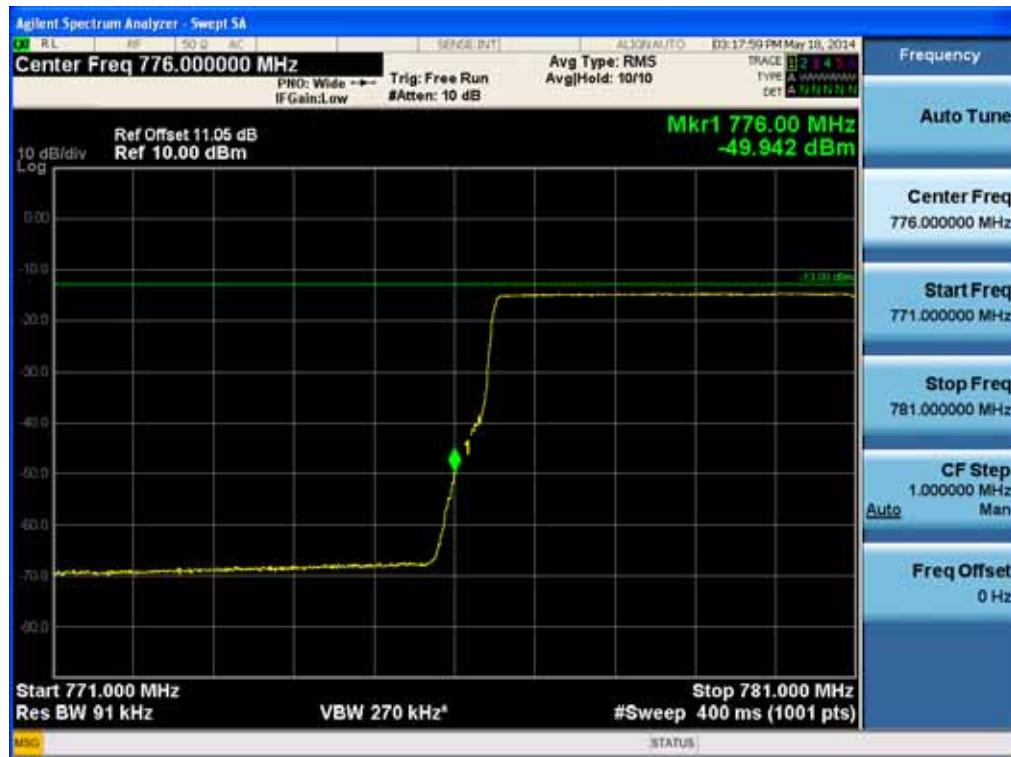


[LTE Downlink 10 MHz High]



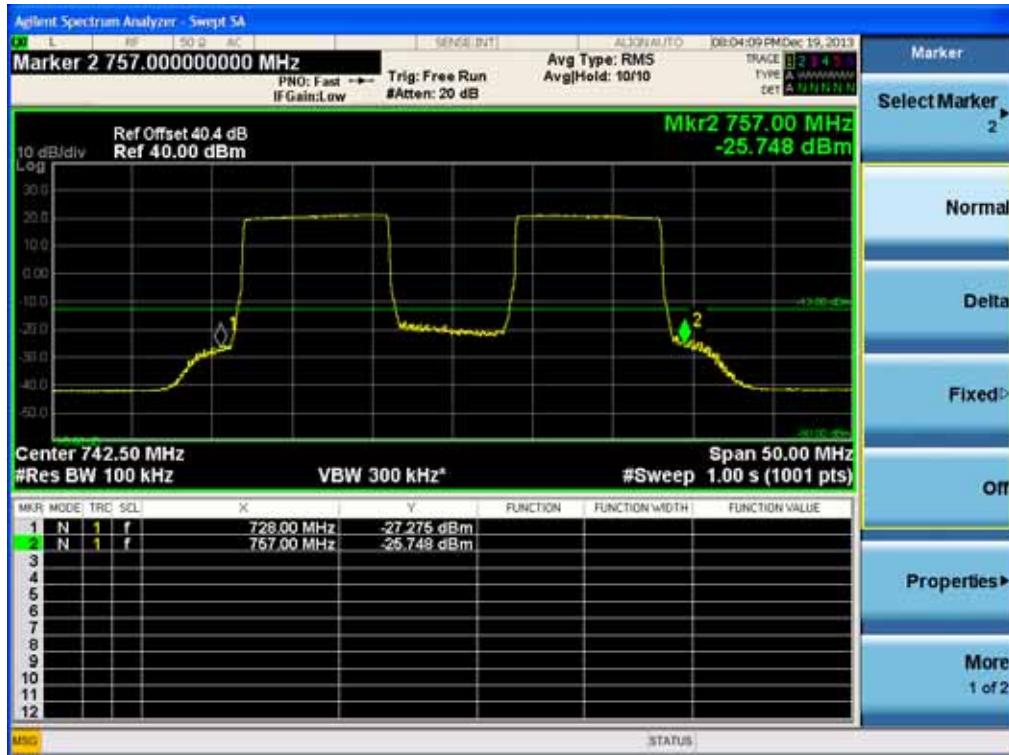
[LTE Uplink 10 MHz Low]

[LTE Uplink 10 MHz Middle]


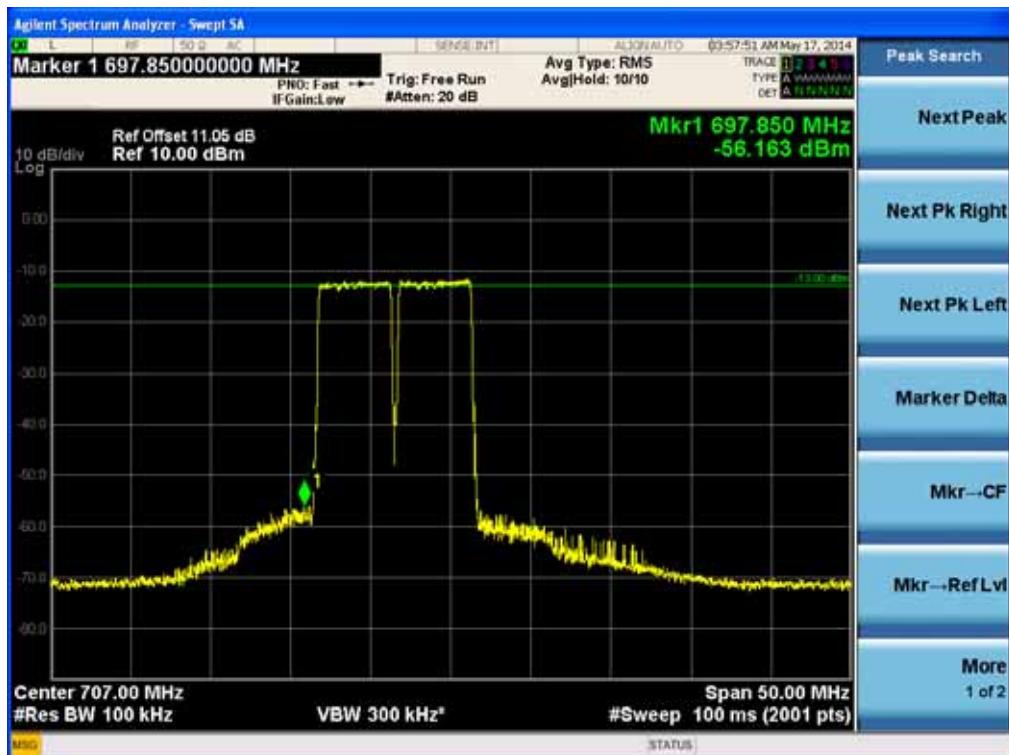
[LTE Uplink 10 MHz High]


Intermodulation Spurious Emissions

[Downlink]



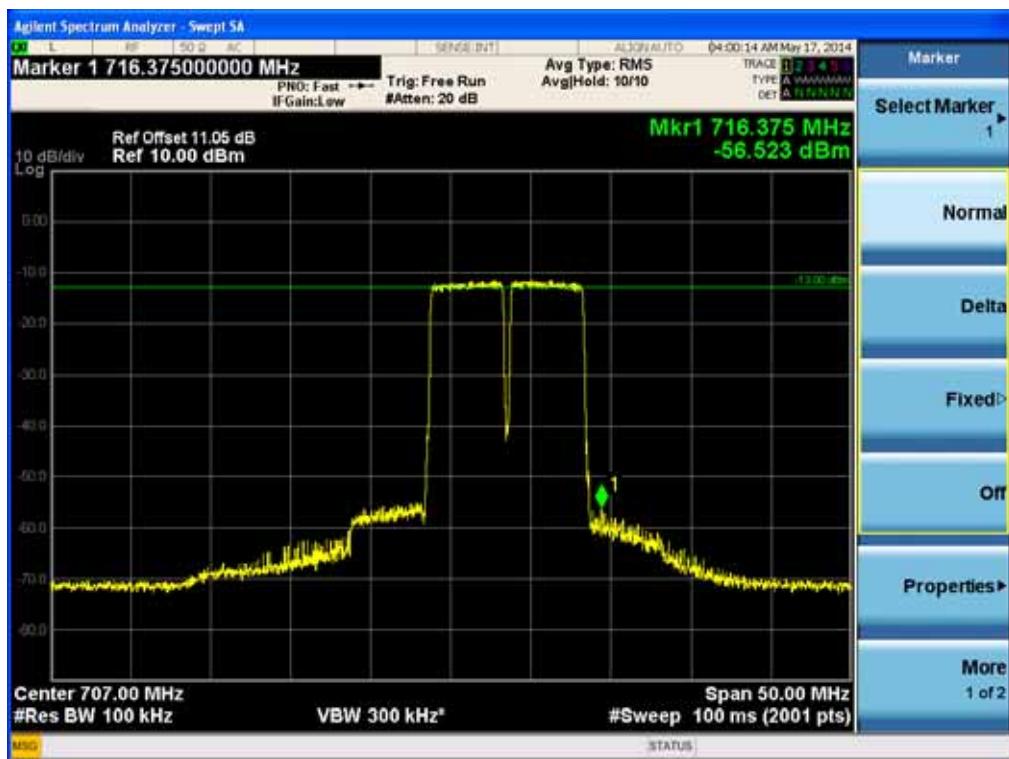
[Uplink Low range]



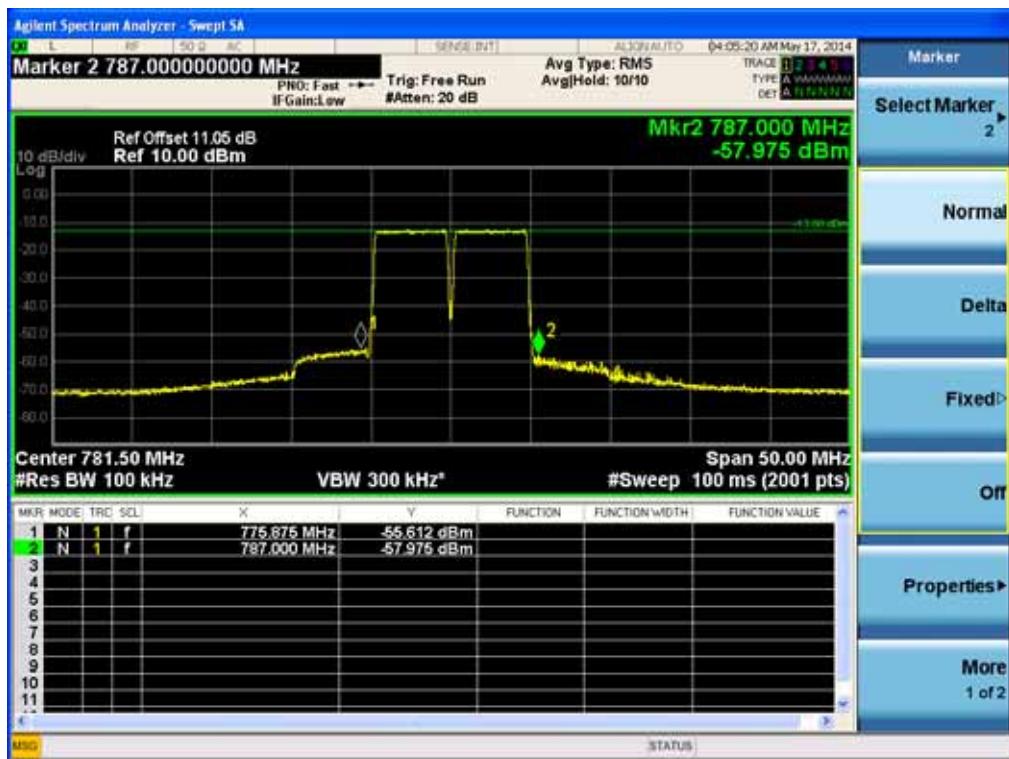
HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL : +82 31 645 6300 FAX : +82 31 645 6401 www.hct.co.kr

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[Uplink High range]



9. OUT OF BAND REJECTION

Test Requirement(s): **KDB 935210 D02 v01r01**

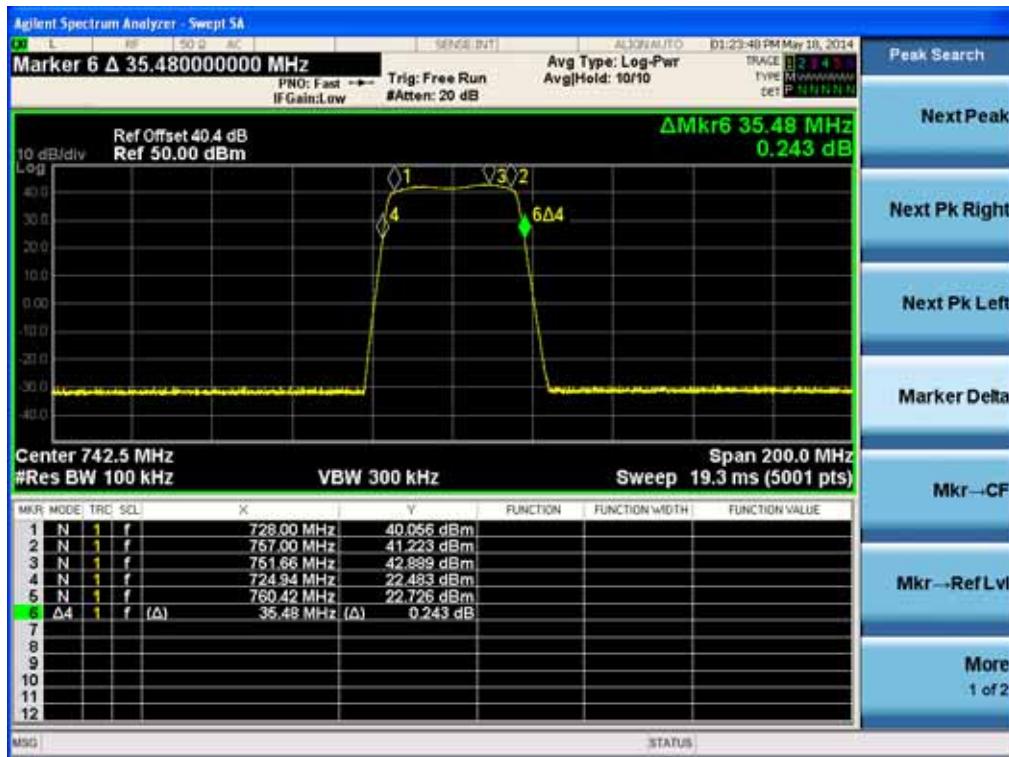
Out of Band Rejection – Test for rejection of out of band signals. Filter freq. response plots are acceptable.

Test Procedures: A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured. Signal generator sweep from the frequency more lower than the operating frequency to the frequency more higher than it, find the product band filter characteristic

Test Results: The EUT complies with the requirements of this section.

Out of Band Rejection

[Downlink]

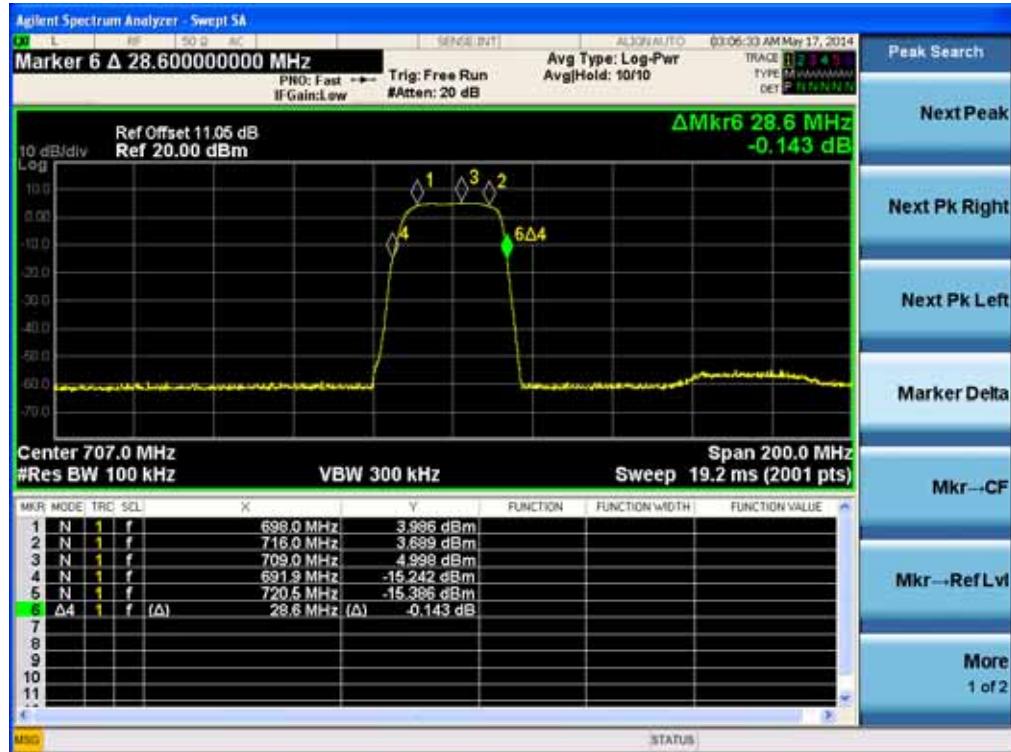
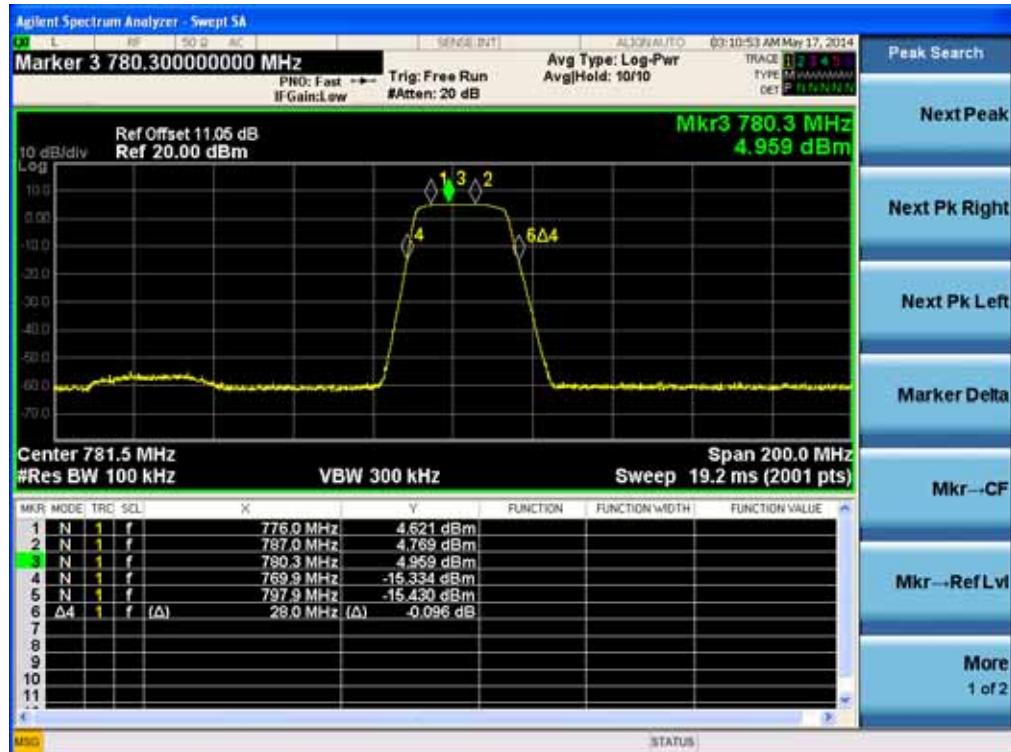


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[Uplink Low range]

[Uplink High range]


10. FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.

§ 2.1053 (a) Measurements shall be made to detect spurious emissions that may be Radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (1)** Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2)** All equipment operating on frequencies higher than 25 MHz.
- (3)** All equipment where the antenna is an integral part of, and attached directly to The transmitter.
- (4)** Other types of equipment as required, when deemed necessary by the Commission.

§ 27.53 Emission limit (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(f) For operations in the 746–763 MHz, 775–793 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test Procedures: As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of ANSI/TIA-603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

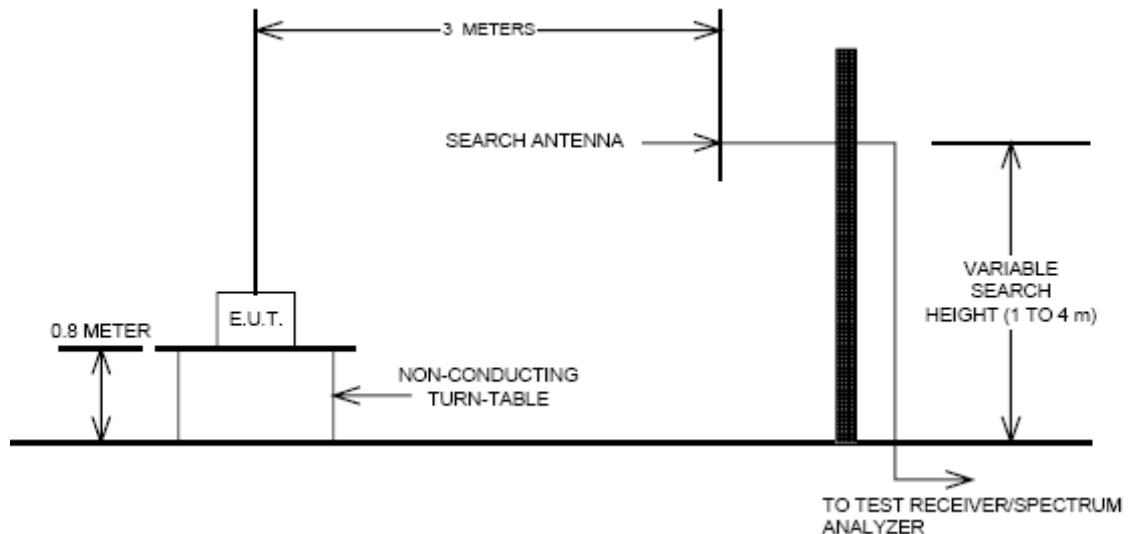
Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360

and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

Test Results:

Radiated Spurious Emissions Test Setup



[Downlink]

| Frequency (MHz) | Freq.(MHz) | Substitute Level[dBm] | Ant. Gain (dBi) | C.L | Pol. | ERP (dBm) | Margin (dB) |
|-----------------|------------|-----------------------|-----------------|------|------|-----------|-------------|
| 741 | 1482 | -47.8 | 5.01 | 4.67 | H | -47.45 | 34.45 |
| | 2223 | -51.0 | 8.45 | 6.01 | V | -48.56 | 35.56 |
| | 2964 | -50.0 | 8.41 | 7.11 | V | -48.70 | 35.70 |

[Uplink]

| Frequency (MHz) | Freq.(MHz) | Substitute Level[dBm] | Ant. Gain (dBi) | C.L | Pol. | ERP (dBm) | Margin (dB) |
|-----------------|------------|-----------------------|-----------------|------|------|-----------|-------------|
| 704 | 1408 | -46.69 | 5.10 | 4.54 | H | -46.14 | 33.14 |
| | 2319 | -48.47 | 8.42 | 6.17 | V | -46.21 | 33.21 |
| 781 | 1562 | -47.25 | 6.79 | 4.81 | H | -45.27 | 32.27 |
| | 2319 | -48.62 | 8.42 | 6.17 | V | -46.36 | 33.36 |

11. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

Test Requirement(s): §2.1055 (a) The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

Test Procedures:

As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Spectrum Analyzer.

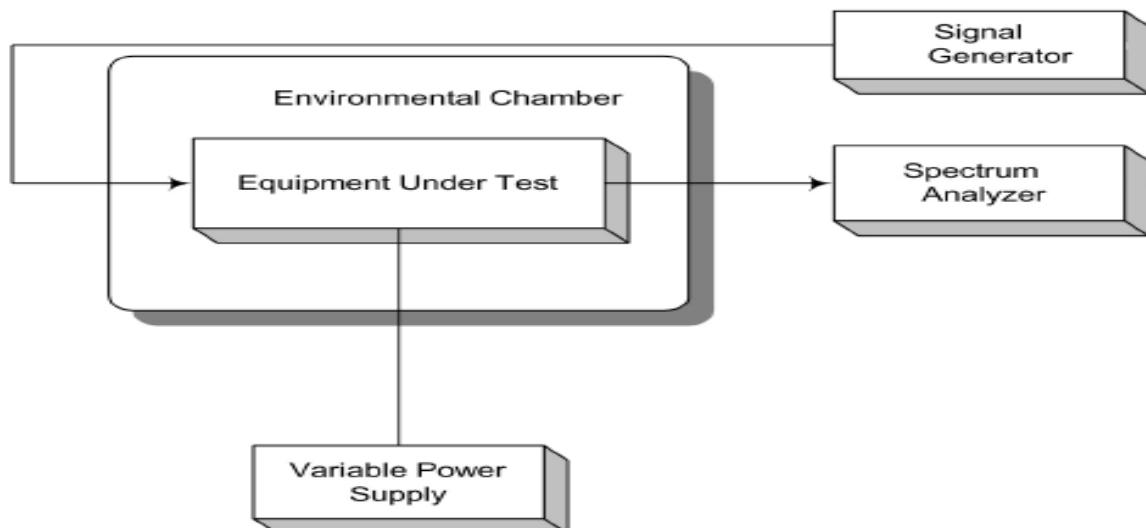
The EUT was placed in the Environmental Chamber.

A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations. The frequency drift was investigated for every 10°C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50°C .

Voltage supplied to EUT is 110 Vac reference temperature was done at 20°C .

The voltage was varied by $\pm 15\%$ of nominal

Test Setup:



Test Results:

The E.U.T was found in compliance for Frequency Stability and Voltage Test

Frequency Stability and Voltage Test Results

Reference: 110 Vac at 20°C Freq. = 742.5 MHz

| Voltage (%) | Temp. () | Frequency (Hz) | Frequency Error (Hz) | Deviation (Hz) | ppm |
|-------------|-----------|----------------|----------------------|----------------|--------|
| 100% | +20(Ref) | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | -30 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | -20 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | -10 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | 0 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | +10 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | +30 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | +40 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| | +50 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| 115% | +20 | 742 500 000 | 0.0 | 0.0 | 0.0000 |
| 85% | +20 | 742 500 000 | 0.0 | 0.0 | 0.0000 |

[Downlink]

Reference: 110 Vac at 20°C Freq. = 711.0 MHz

| Voltage (%) | Temp. () | Frequency (Hz) | Frequency Error (Hz) | Deviation (Hz) | ppm |
|-------------|-----------|----------------|----------------------|----------------|--------|
| 100% | +20(Ref) | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | -30 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | -20 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | -10 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | 0 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | +10 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | +30 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | +40 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| | +50 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| 115% | +20 | 711 000 000 | 0.0 | 0.0 | 0.0000 |
| 85% | +20 | 711 000 000 | 0.0 | 0.0 | 0.0000 |

[Uplink]

12. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

| Frequency range (MHz) | Electric field Strength (V/m) | Magnetic field Strength (A/m) | Power density (mW/cm ²) | Averaging time (minutes) |
|-----------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| 0.3 | - | - | - | - |
| 1.34..... | 614 | 1.63 | *(100) | 30 |
| 1.34 - 30..... | 824/f | 2.19/f | *(180/ f ²) | 30 |
| 30 - 300..... | 27.5 | 0.073 | 0.2 | 30 |
| 300 - 1500..... | | | f/1500 | 30 |
| 1500 | - | | 1.0 | 30 |
| 100.000..... | | | | |

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

2-1 Limit (Down Link)

| | | |
|---|----------|--------------------|
| Max Peak output Power at antenna input terminal | 29.920 | dBm |
| Max Peak output Power at antenna input terminal | 981.748 | mW |
| Prediction distance | 20.000 | cm |
| Prediction frequency | 731.0000 | MHz |
| Antenna Gain(typical) | 2.000 | dBi |
| Antenna Gain(numeric) | 1.585 | - |
| Power density at prediction frequency(S) | 0.310 | mW/cm ² |
| MPE limit for uncontrolled exposure at prediction frequency | 0.487 | mW/cm ² |

2-2 Limit (Up Link)

| | | |
|---|---------|--------------------|
| Max Peak output Power at antenna input terminal | 4.910 | dBm |
| Max Peak output Power at antenna input terminal | 3.097 | mW |
| Prediction distance | 20.000 | cm |
| Prediction frequency | 711.000 | MHz |
| Antenna Gain(typical) | 2.000 | dBi |
| Antenna Gain(numeric) | 1.585 | - |
| Power density at prediction frequency(S) | 0.00098 | mW/cm ² |
| MPE limit for uncontrolled exposure at prediction frequency | 0.474 | mW/cm ² |

3. RESULTS

The power density level at 20 cm is 0.31 mW/cm², which is below the uncontrolled exposure limit of 0.487 mW/cm² at Down Link

The power density level at 20 cm is 0.00098 mW/cm², which is below the uncontrolled exposure limit of 0.474 mW/cm² at Up Link

Simultaneous MPE is 20cm is $(0.31/1.0)+(0.00004/1.0)= 0.31004 < 1.0$

Warning: In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, it must also have a minimum distance of 20 cm from the body during normal operation.