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CERTIFICATION DIVISION

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**CERTIFICATE OF COMPLIANCE (ERM EVALUATION)**

**Manufacture:** ADRF Korea, inc

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

**Date of Issue:**

June 3, 2014

**Location:**

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

**Test Report No.:** HCTR1401F016-3

**FCC ID:**

**N52-ADX-R-A43M**

**APPLICANT:**

**ADRF Korea, inc**

**EUT Type:**

**High Power Remote Unite (Distribute Antenna System)**

**Model:**

**ADX-R-A43M**

**Frequency Ranges:**

**DL : 2110 MHz ~ 2155 MHz**

**UL : 1710 MHz ~ 1755 MHz**

**Conducted Output Power:**

**DL : 20 W(43 dBm)**

**UL : 3.981 mW(6 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
HCTR1401FR016	January 22, 2014	- First Approval Report
HCTR1401FR016-1	February 17, 2014	- Added the measurement standards for "1. CLIENT INFORMATION"
HCTR1401FR016-2	May 19, 2014	- Added the uplink test result.
HCTR1401FR016-3	June 03, 2014	-Revision on page 4 units.

## CONTENTS

1. CLIENT INFORMATION.....	4
2. FACILITIES AND ACCREDITATIONS .....	5
2.1. FACILITIES .....	5
2.2. EQUIPMENT .....	5
3. TEST SUMMARY .....	6
3.1. STANDARDS .....	6
3.2. MODE OF OPERATION DURING THE TEST.....	6
4. STANDARDS ENVIRONMENTAL TEST CONDITIONS.....	7
5. TEST EQUIPMENT.....	8
6. RF OUTPUT POWER .....	9
7. OCCUPIED BANDWIDTH.....	18
8. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL.....	33
9. OUT OF BAND REJECTION.....	66
10. FIELD STRENGTH OF SPURIOUS RADIATION .....	68
11. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS .....	71
12. RF EXPOSURE STATEMENT .....	73

## 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@adrfttech.com Tel./ H.P. : +82-31-637-4435/ +82-10-3191-4773

- **FCC ID:** N52-ADX-R-A43M
- **APPLICANT:** ADRF Korea, inc
- **EUT Type:** High Power Remote Unite (Distribute Antenna System)
- **Model:** ADX-R-A43M
- **Frequency Ranges:** DL : 2110 MHz ~ 2155 MHz  
UL : 1710 MHz ~ 1755 MHz
- **Conducted Output Power:** DL : 20 W(43 dBm)  
UL : 3.981 mW(6 dBm)
- **Antenna Gain(s) :** 3 dBi
- **Date(s) of Tests:** 2013. 12. 23. ~ 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
WEINSCHHEL	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.

(d) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands:

(1) The power of each fixed or base station transmitting in the 2110–2155 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census

(2) The power of each fixed or base station transmitting in the 2110–2155 MHz band and situated in any geographic location other than that described in paragraph (d)(1) is limited to:

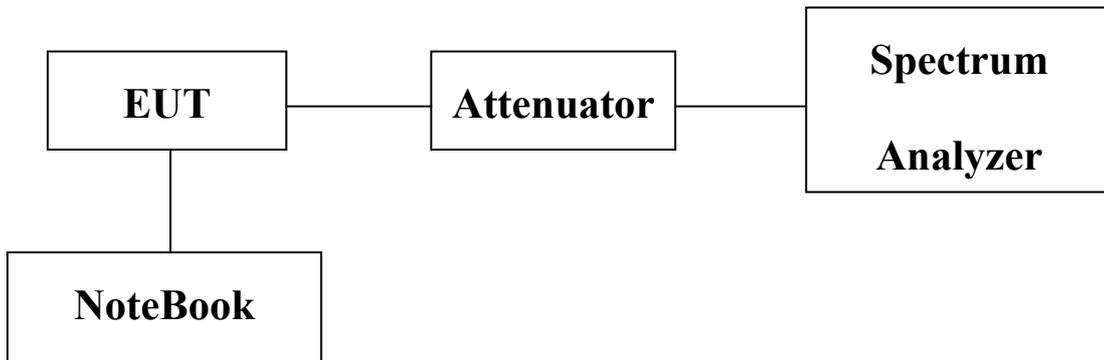
(A) an equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;

(B) an EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in this band must employ a means for limiting power to the minimum necessary for successful communications.

**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)
CDMA	DL/ UL: QPSK	DL : -18.0
		UL : -45.0
LTE	DL/ UL: QPSK	DL: -18.0
		UL : -45.0

**[Downlink]**

	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)

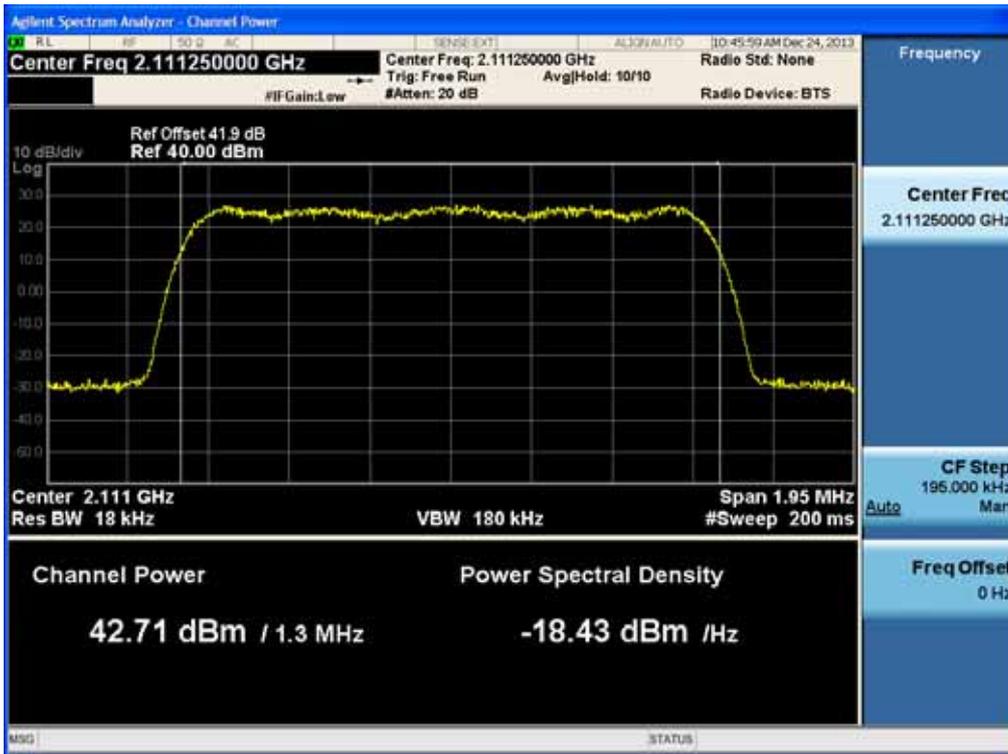
CDMA	Low	2111.25	42.71	18.664
	Middle	2132.50	42.87	19.360
	High	2153.75	43.03	20.086
LTE	Low	2115.0	42.48	17.721
	Middle	2132.5	42.85	19.275
	High	2150.0	42.81	19.094

**[Uplink]**

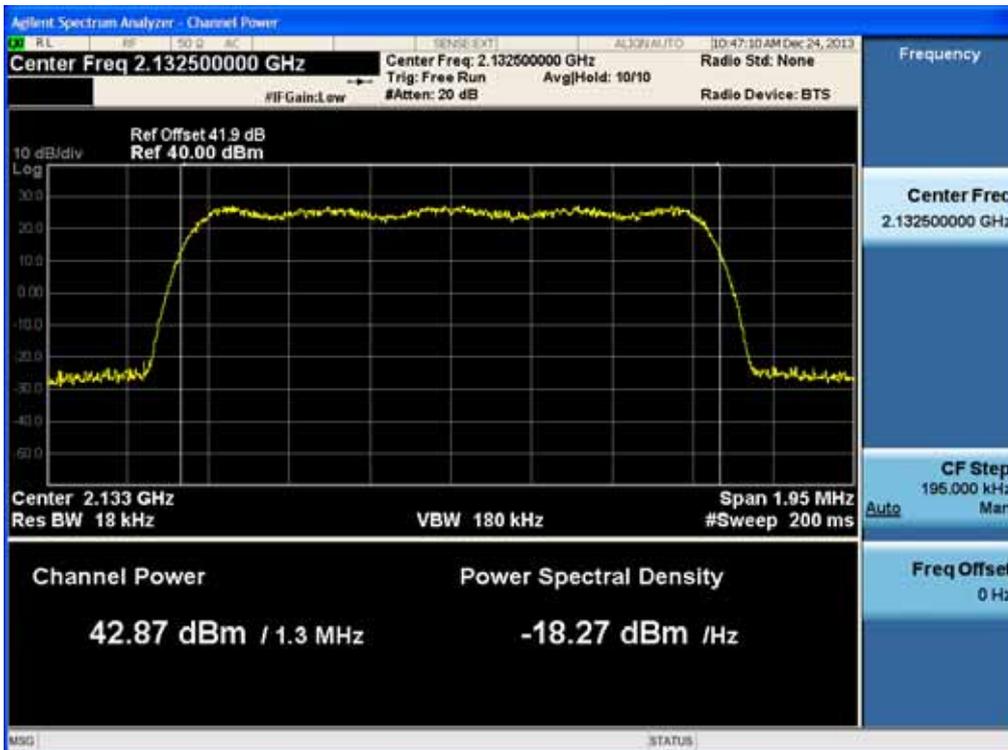
	Channel	Frequency (MHz)	Output Power	
			(dBm)	(mW)
CDMA	Low	1711.25	5.98	3.965
	Middle	1732.50	5.83	3.829
	High	1753.75	5.78	3.788
LTE	Low	1715.00	5.98	3.960
	Middle	1732.50	5.76	3.767
	High	1750.00	5.69	3.710

**Plots of RF Output Power**

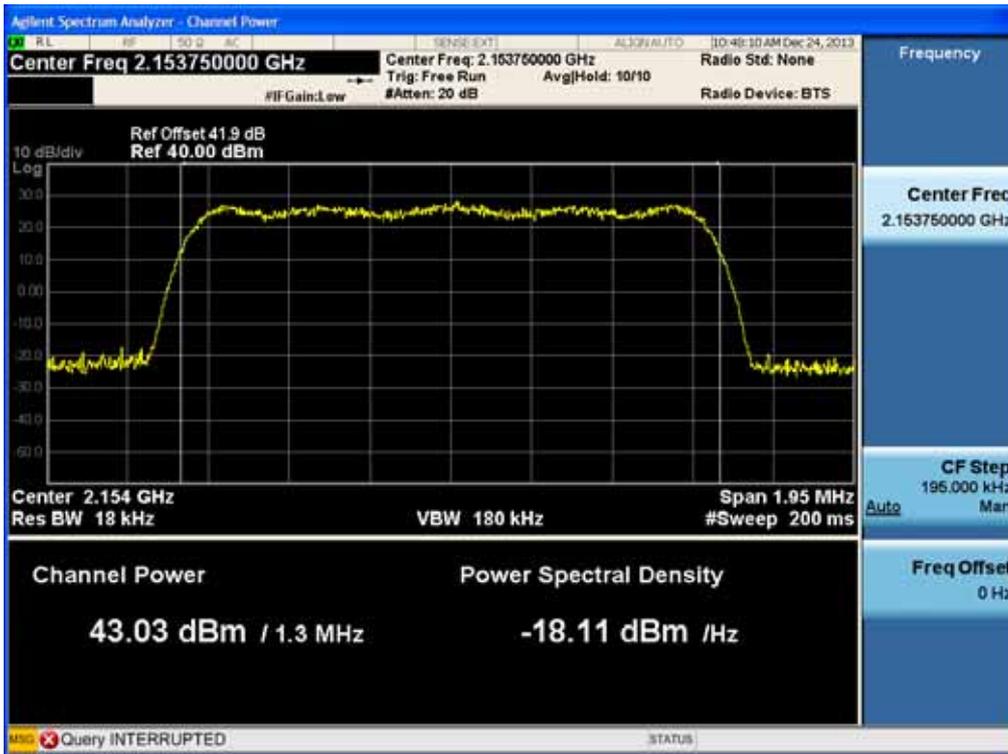
**[CDMA Downlink Low]**



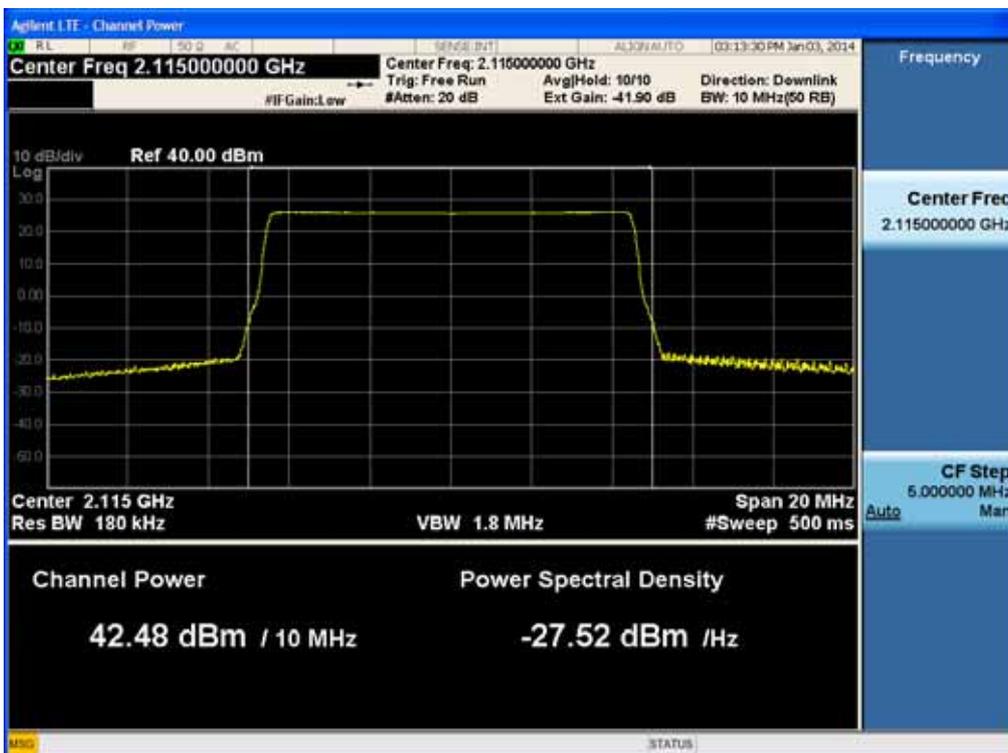
[CDMA Downlink Middle]



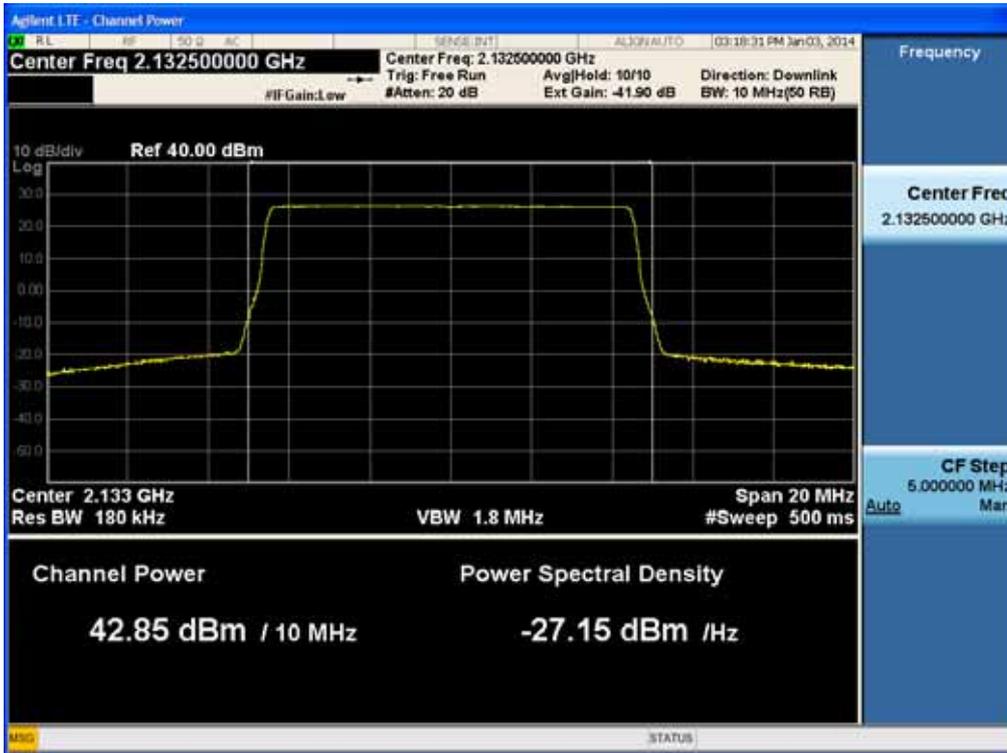
[CDMA Downlink High]



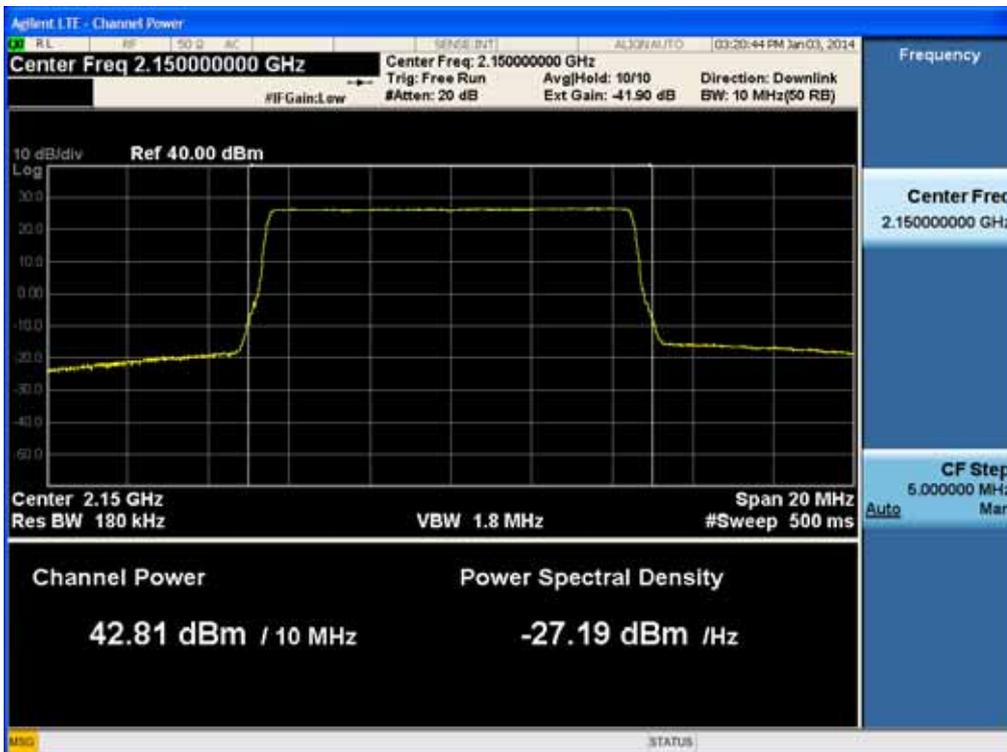
[LTE Downlink Low]



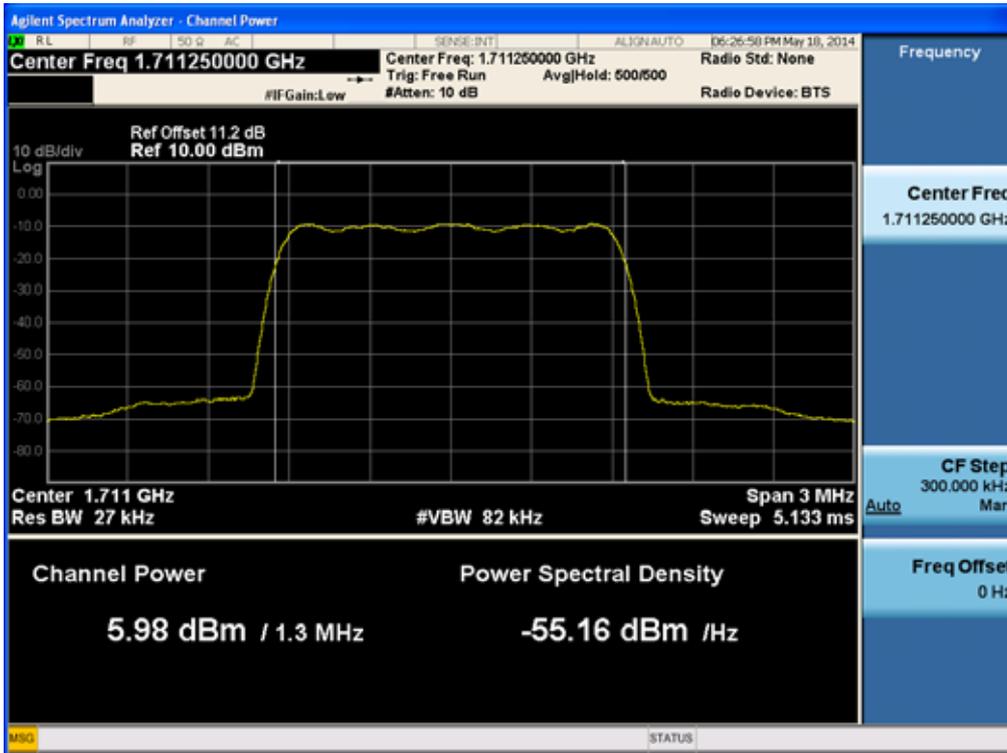
[LTE Downlink Middle]



[LTE Downlink High]



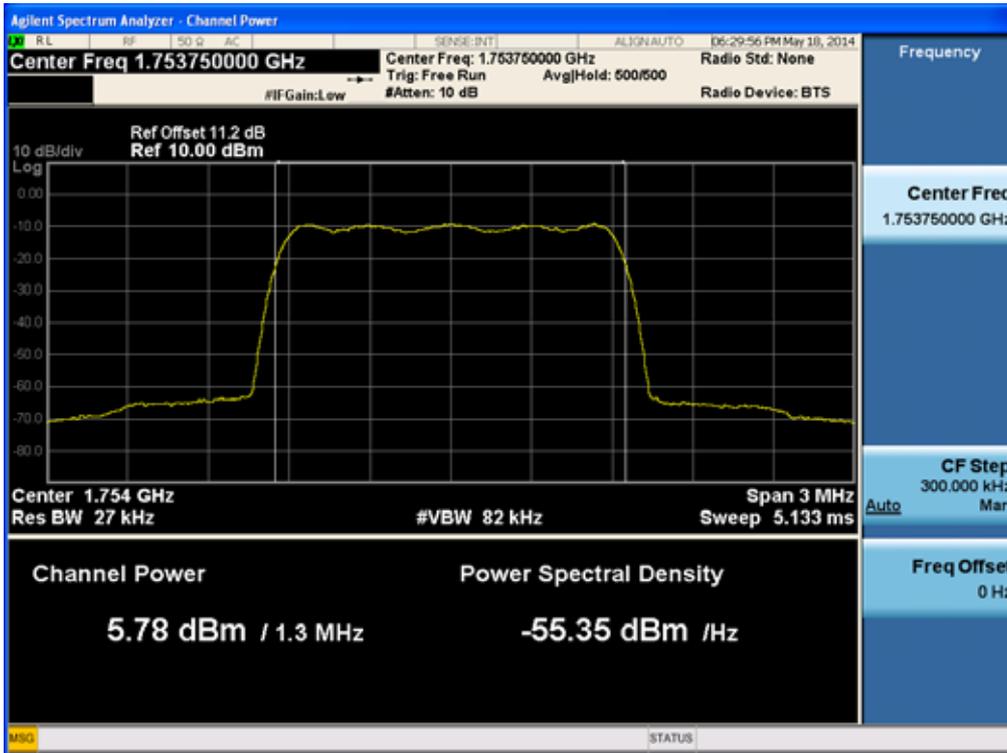
[CDMA Uplink Low]



[CDMA Uplink Middle]



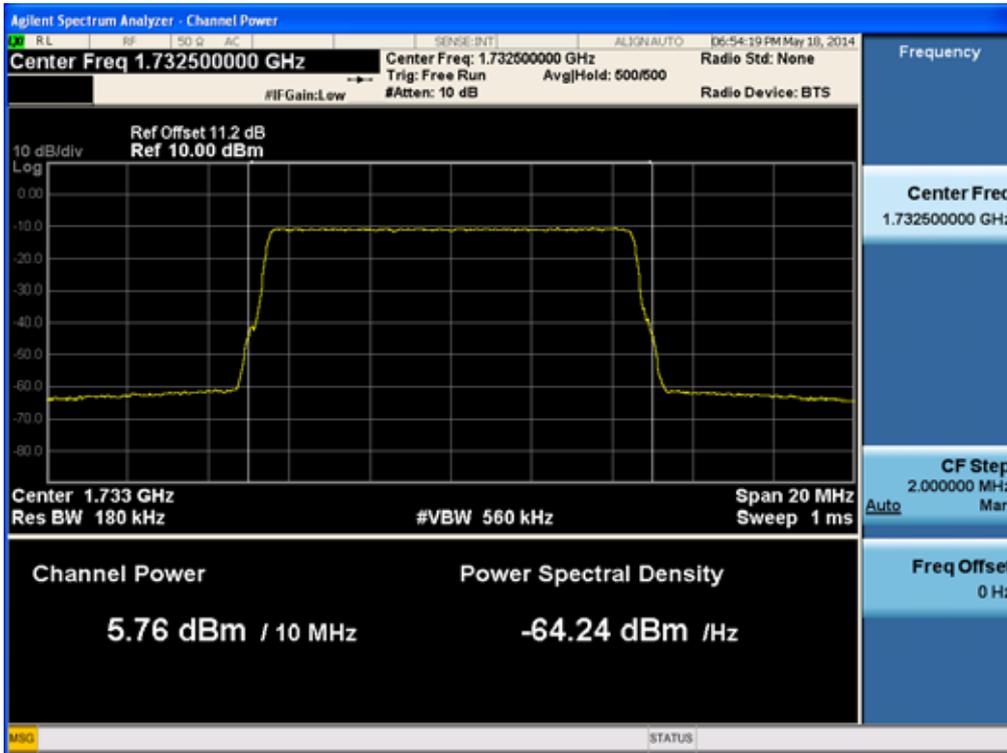
[CDMA Uplink High]



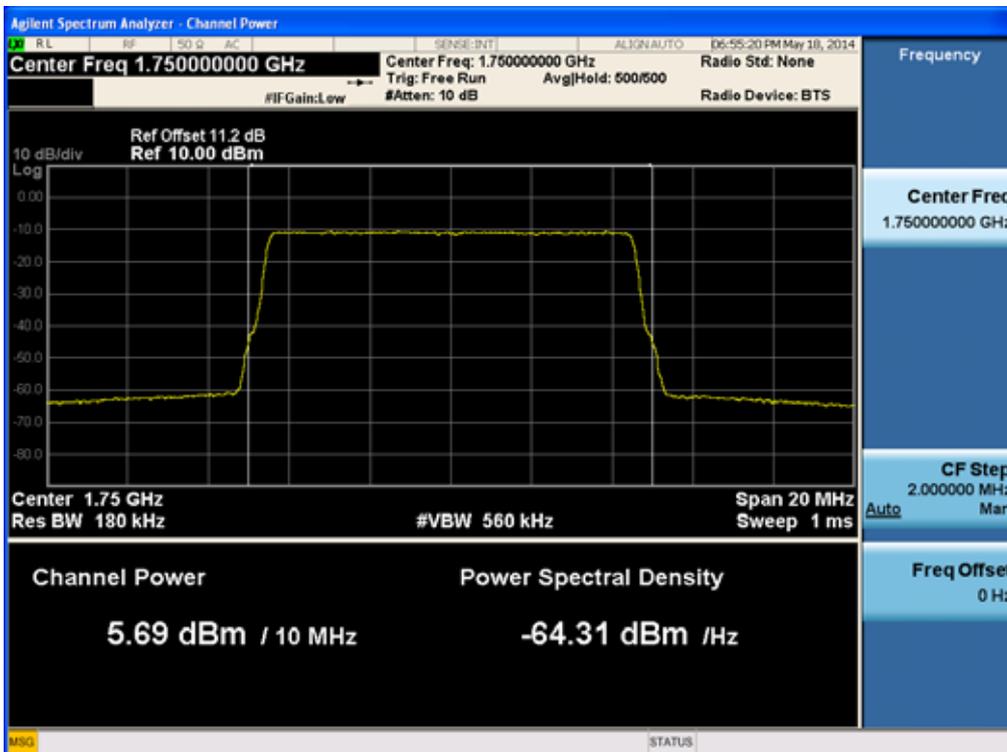
[LTE Uplink Low]



[LTE Uplink Middle]



[LTE Uplink 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)
CDMA	DL/ UL: QPSK	DL : -18.0
		UL : -45.0
LTE	DL/ UL: QPSK	DL: -18.0
		UL : -45.0

**[Downlink Output]**

	Channel	Frequency (MHz)	OBW (MHz)
CDMA	Low	2111.25	1.240
	Middle	2132.50	1.235
	High	2153.75	1.241
LTE	Low	2115.0	8.992
	Middle	2132.5	8.990
	High	2150.0	8.977

**[Downlink Input]**

	Channel	Frequency (MHz)	OBW (MHz)
CDMA	Low	2111.25	1.237
	Middle	2132.50	1.237
	High	2153.75	1.233
LTE	Low	2115.0	8.971
	Middle	2132.5	8.989
	High	2150.0	8.984

**[Uplink Output]**

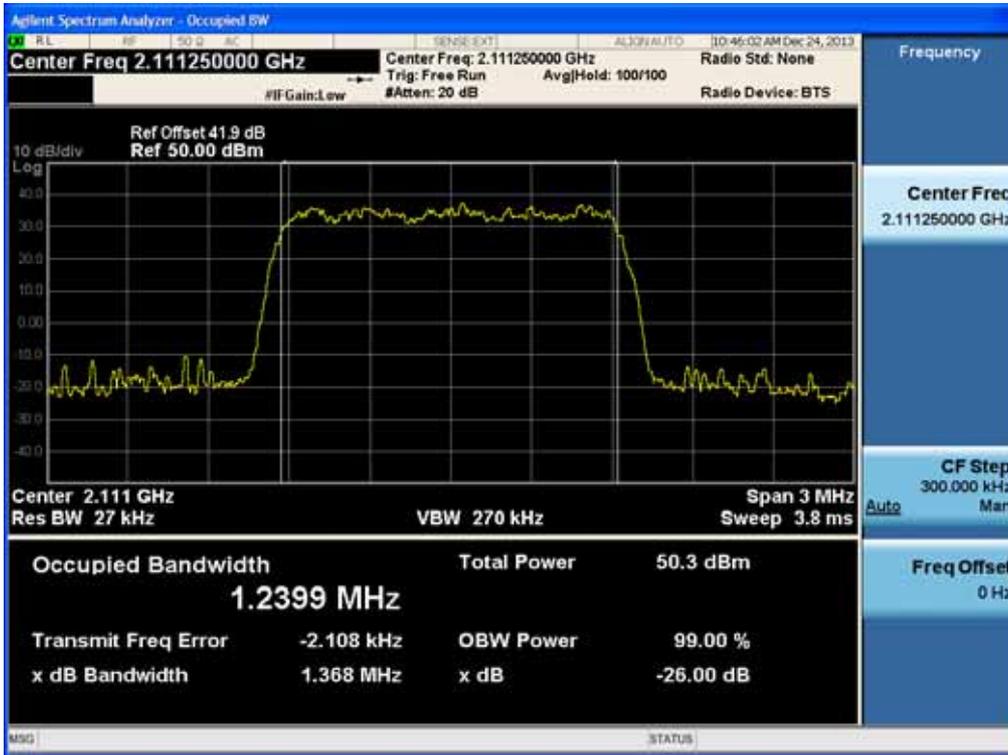
	<b>Channel</b>	<b>Frequency (MHz)</b>	<b>OBW (MHz)</b>
CDMA	Low	1711.25	1.245
	Middle	1732.50	1.240
	High	1753.75	1.238
LTE	Low	1715.00	8.997
	Middle	1732.50	8.999
	High	1750.00	9.013

**[Uplink Input]**

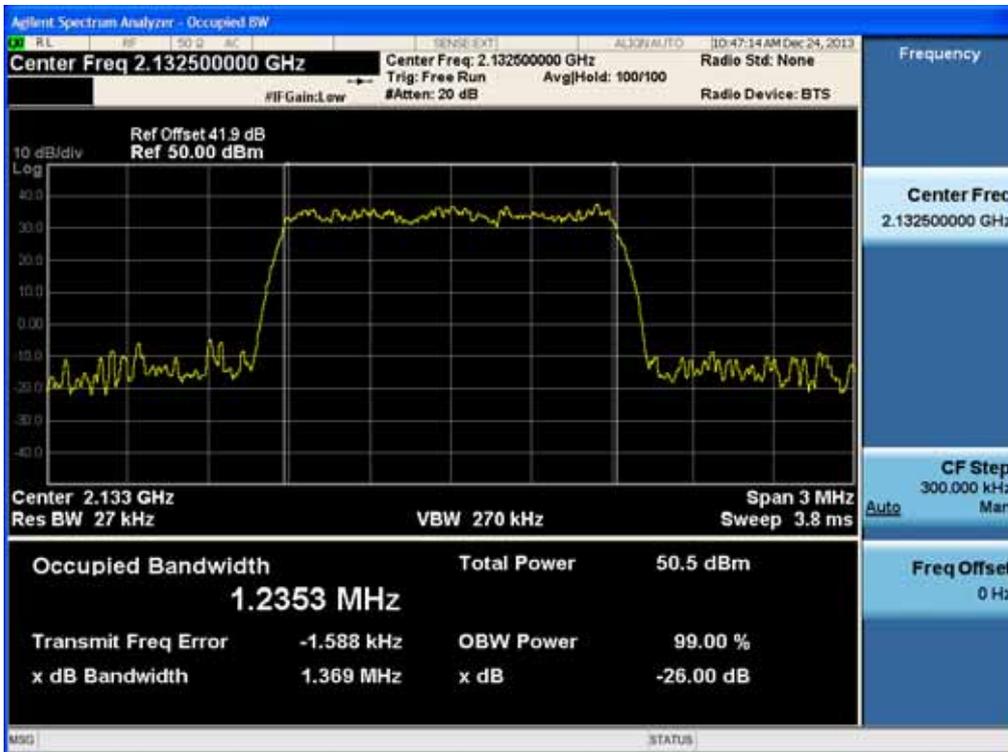
	<b>Channel</b>	<b>Frequency (MHz)</b>	<b>OBW (MHz)</b>
CDMA	Low	1711.25	1.239
	Middle	1732.50	1.246
	High	1753.75	1.244
LTE	Low	1715.00	9.009
	Middle	1732.50	9.008
	High	1750.00	9.010

**Plots of Occupied Bandwidth**

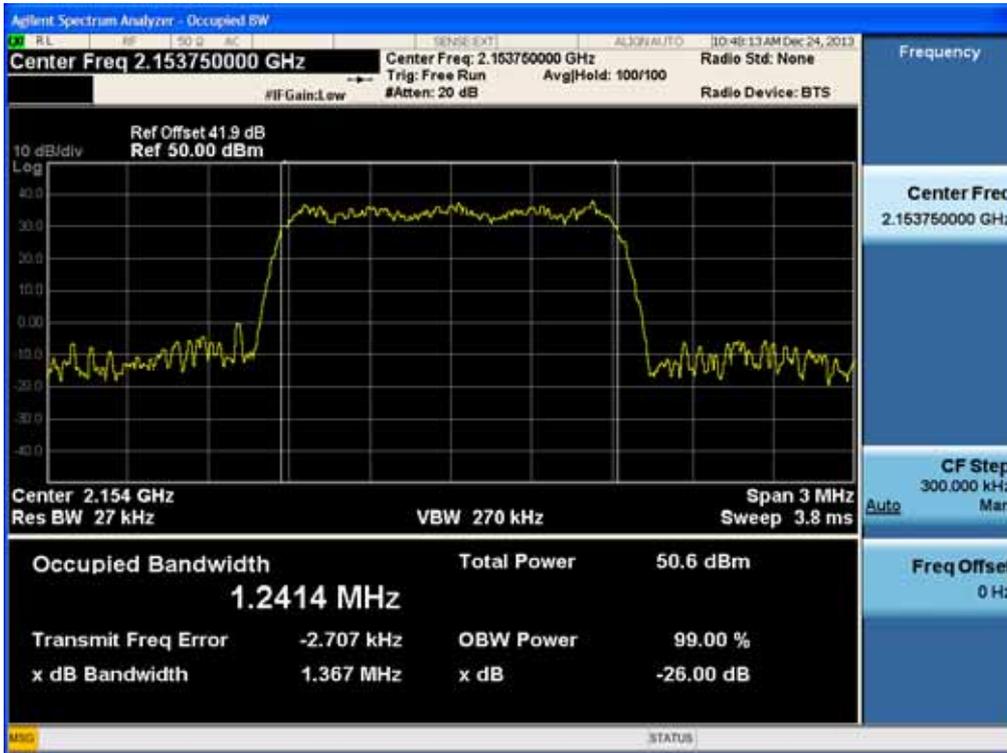
**[Output CDMA Downlink Low]**



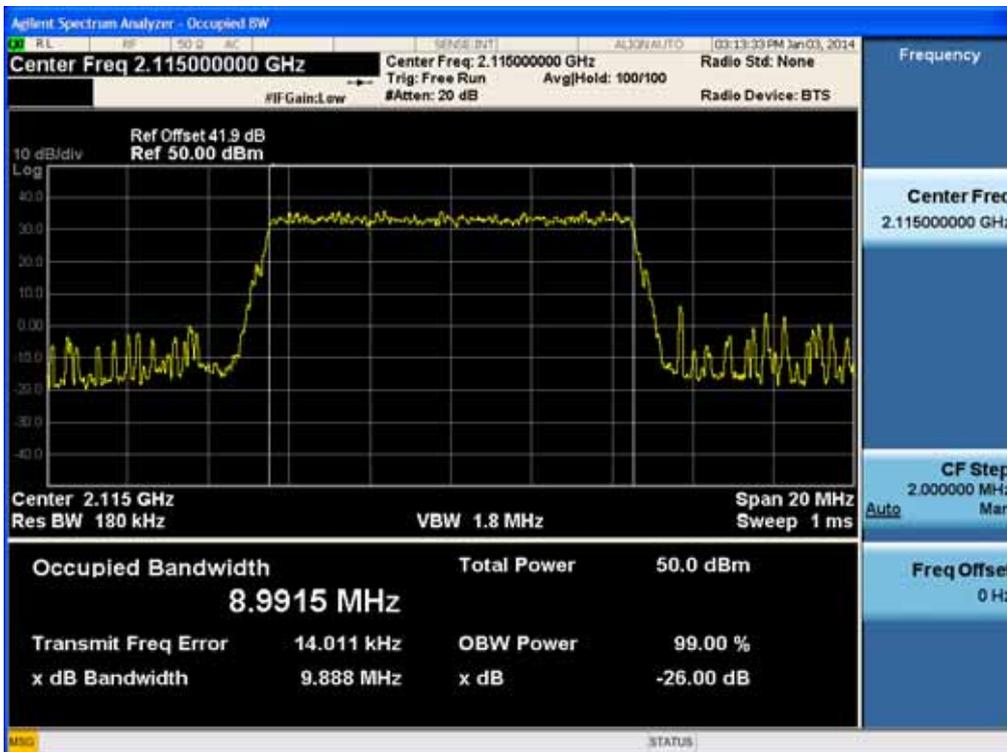
**[Output CDMA Downlink Middle]**



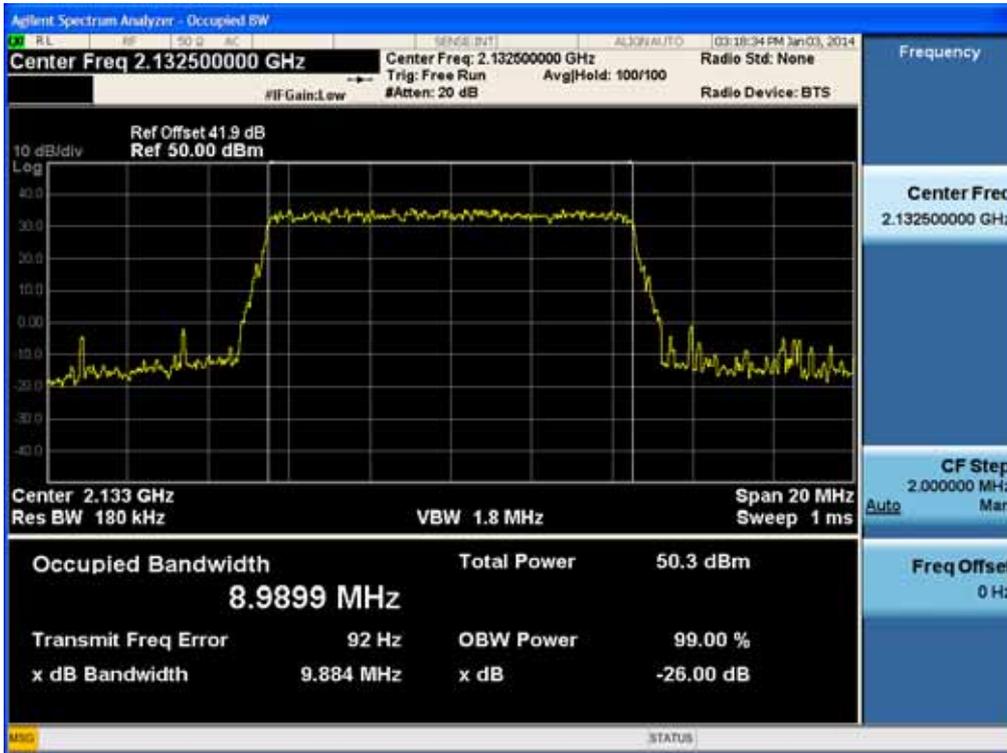
[Output CDMA Downlink High]



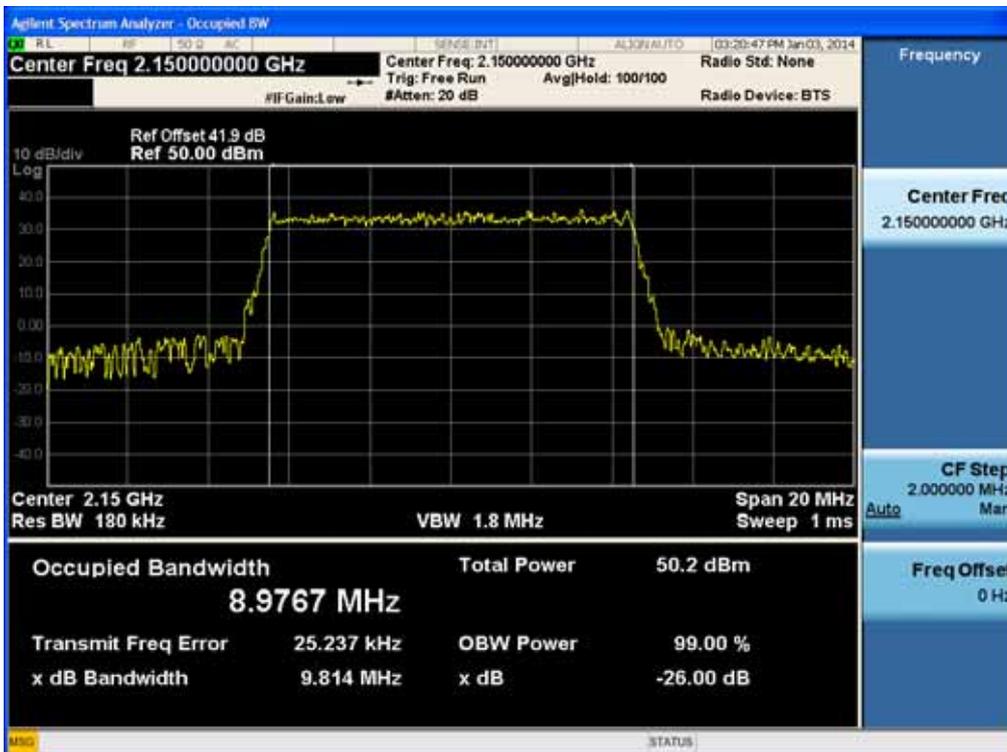
[Output LTE Downlink Low]



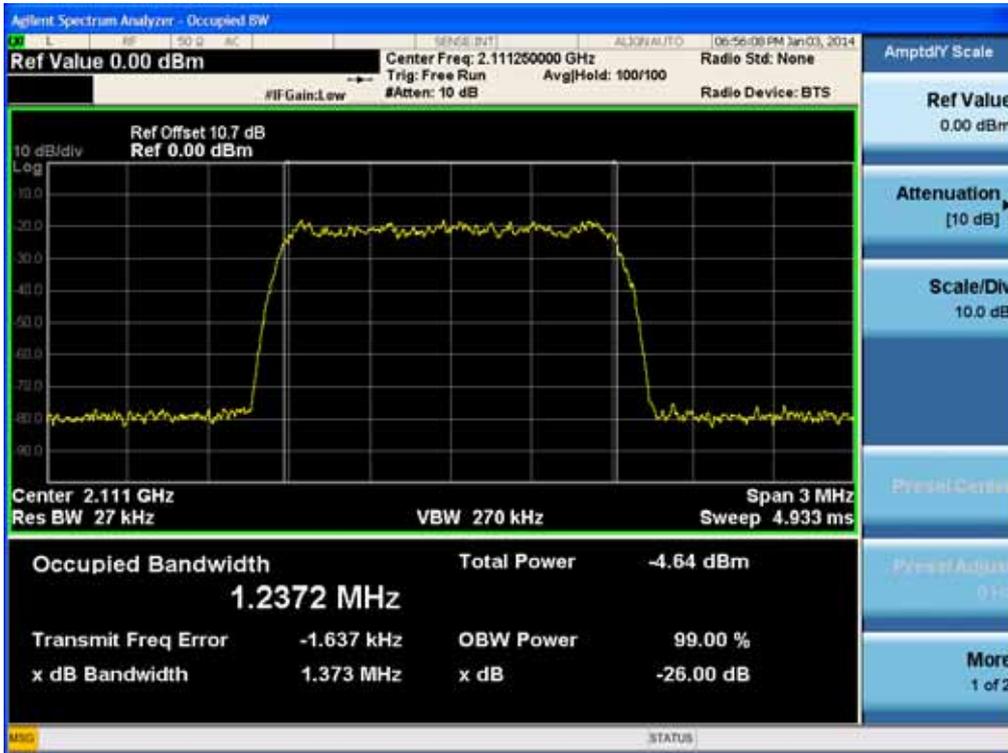
[Output LTE Downlink Middle]



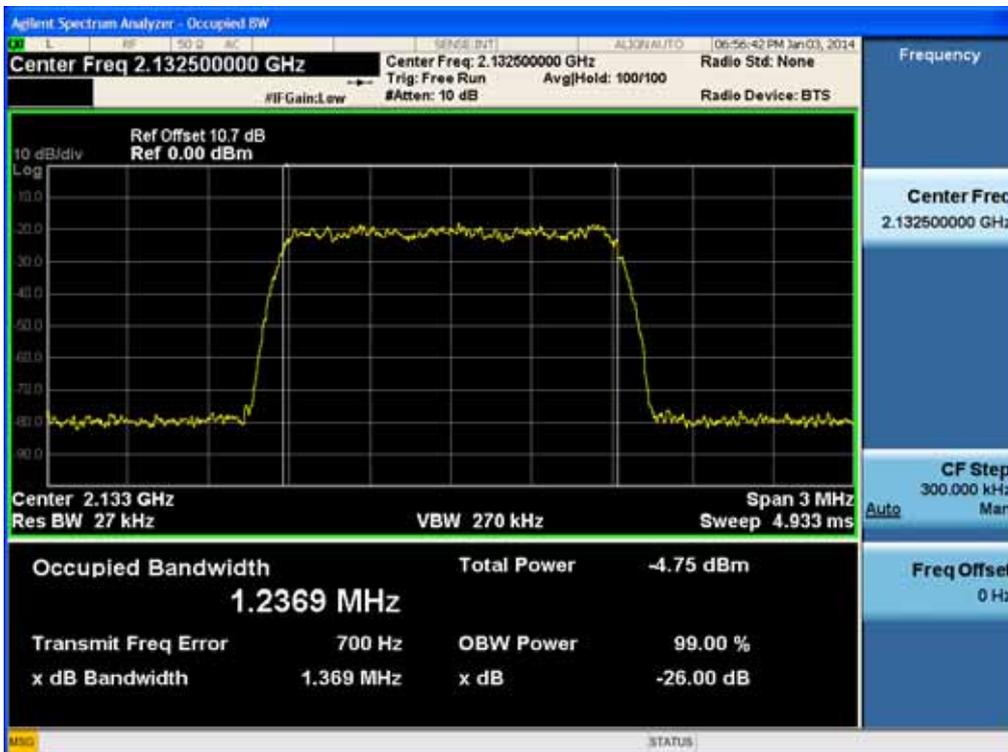
[Output LTE Downlink High]



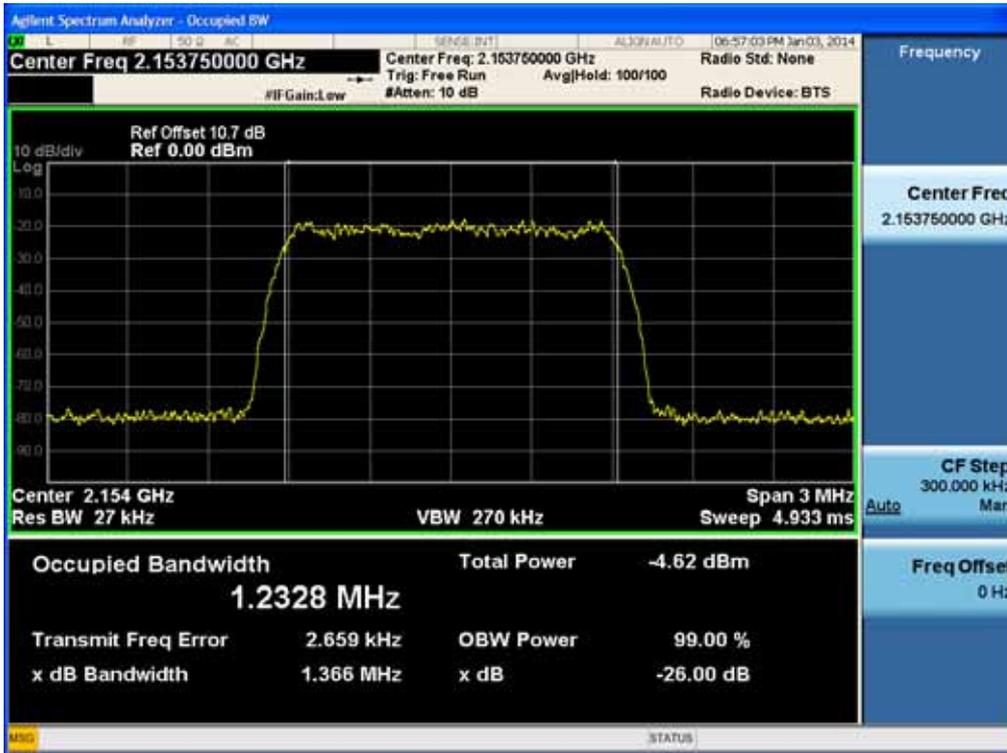
[Input CDMA Downlink Low]



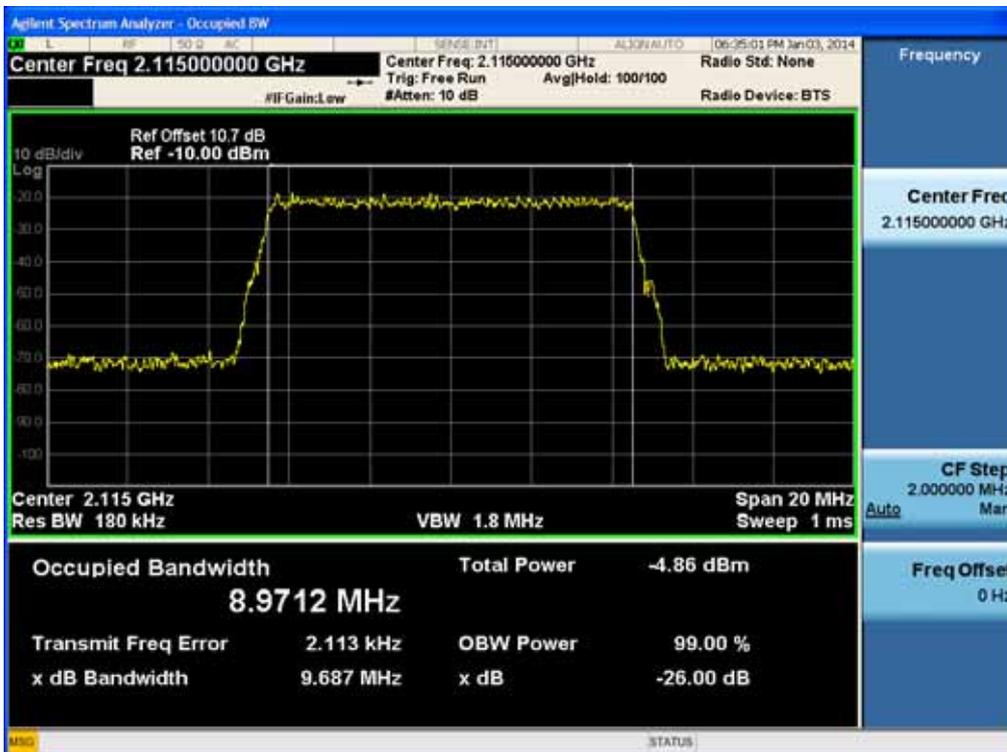
[Input CDMA Downlink Middle]



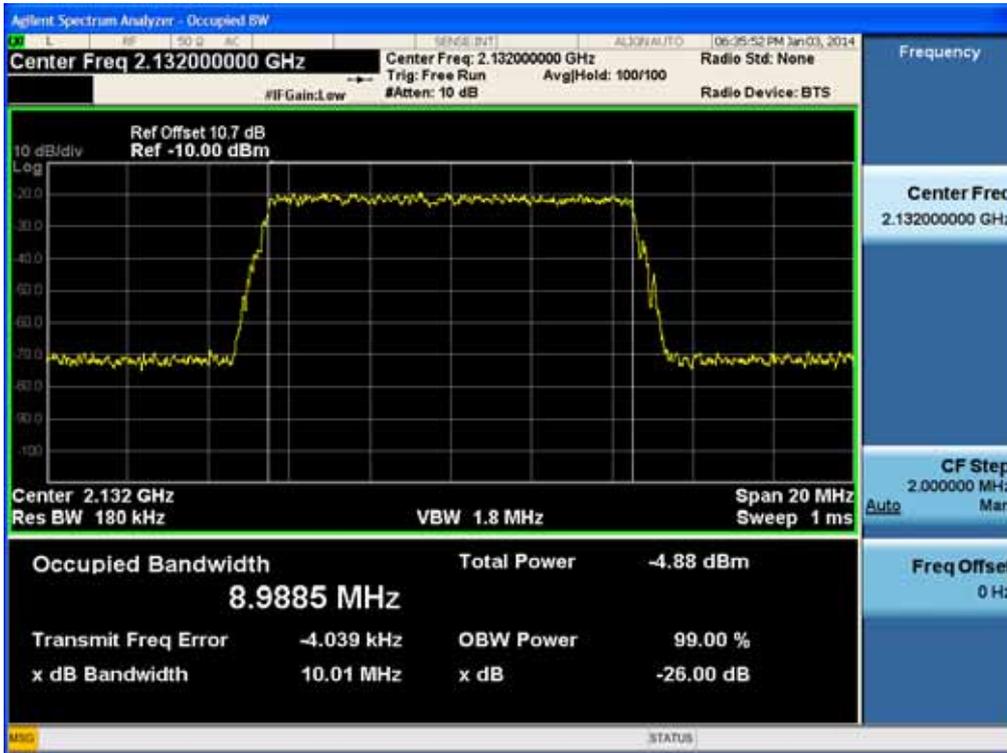
[Input CDMA Downlink High]



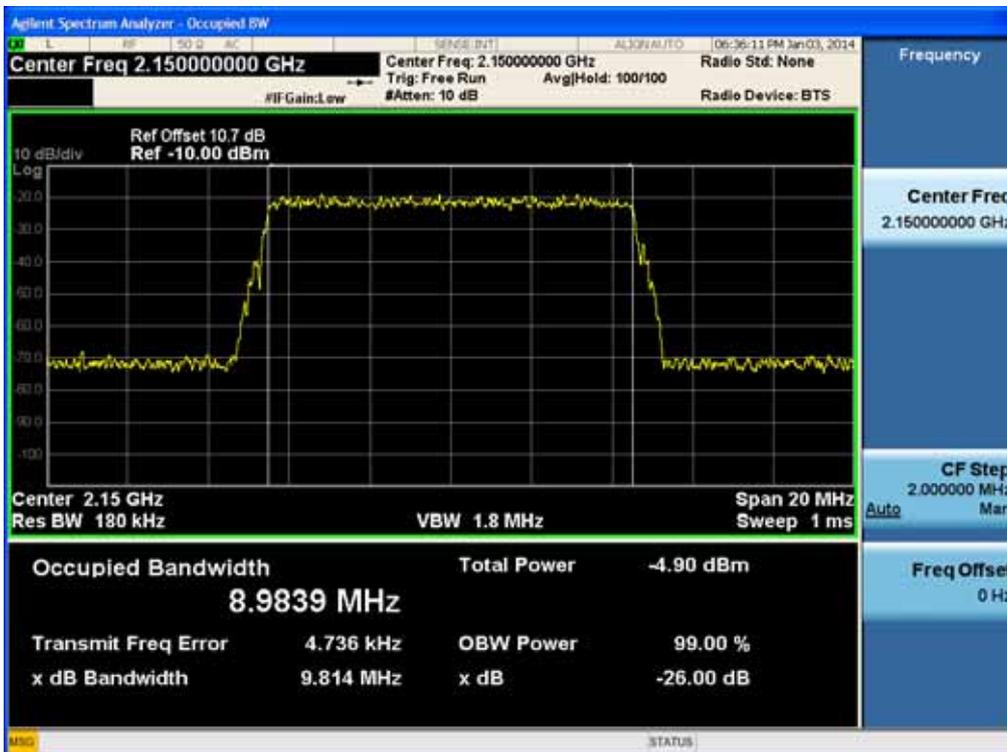
[Input LTE Downlink Low]



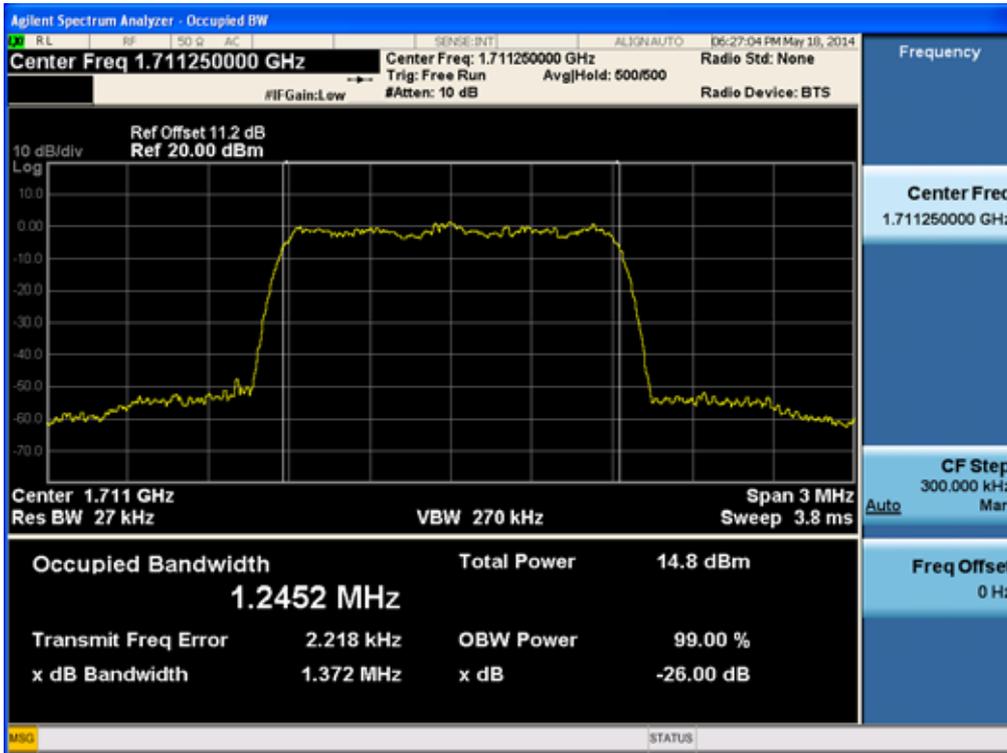
[Input LTE Downlink Middle]



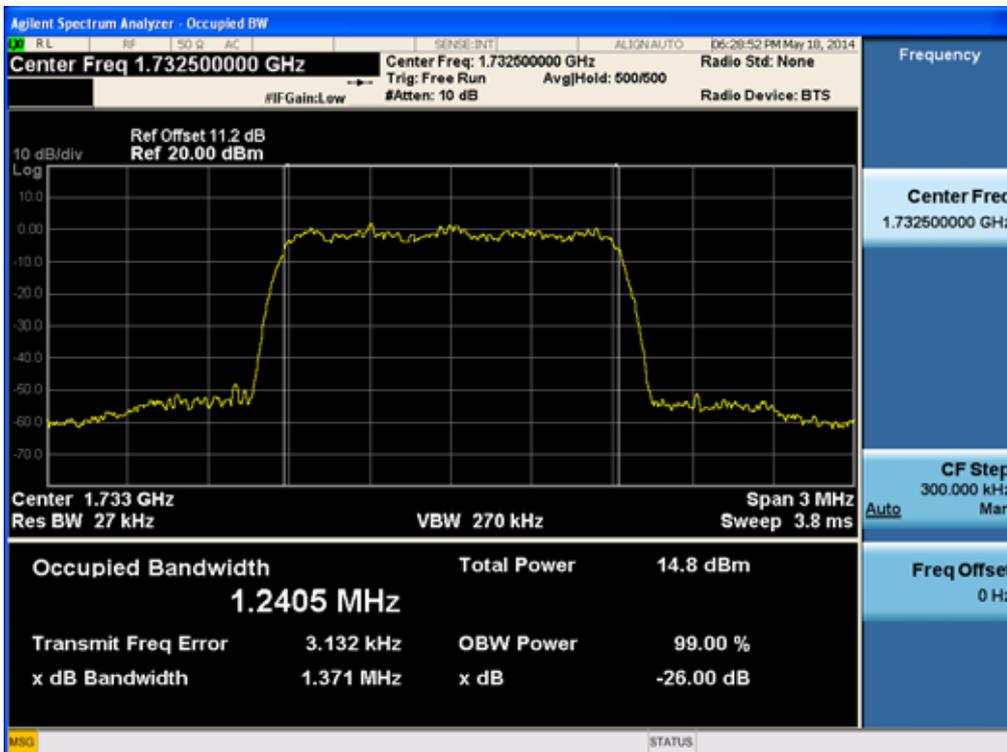
[Input LTE Downlink High]



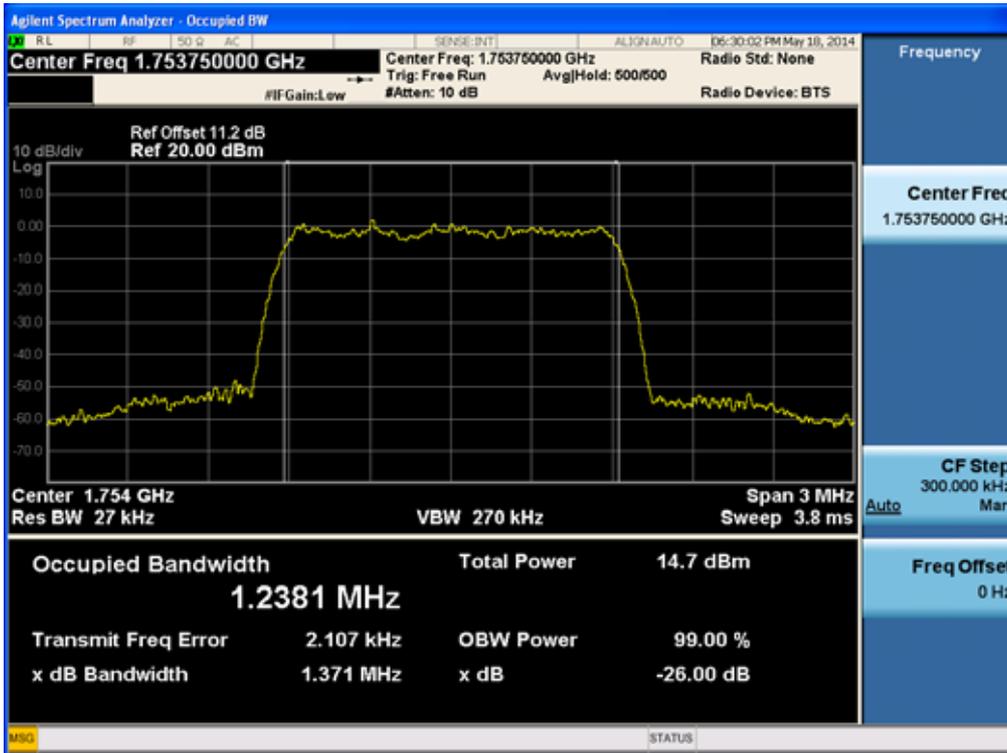
[Output CDMA Uplink Low]



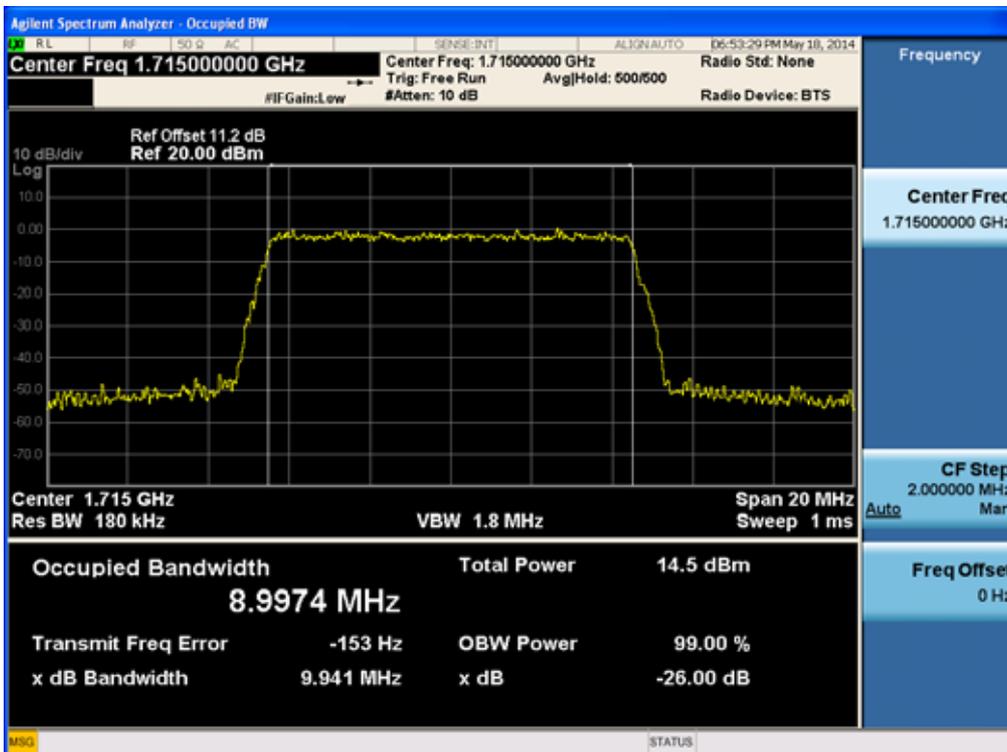
[Output CDMA Uplink Middle]



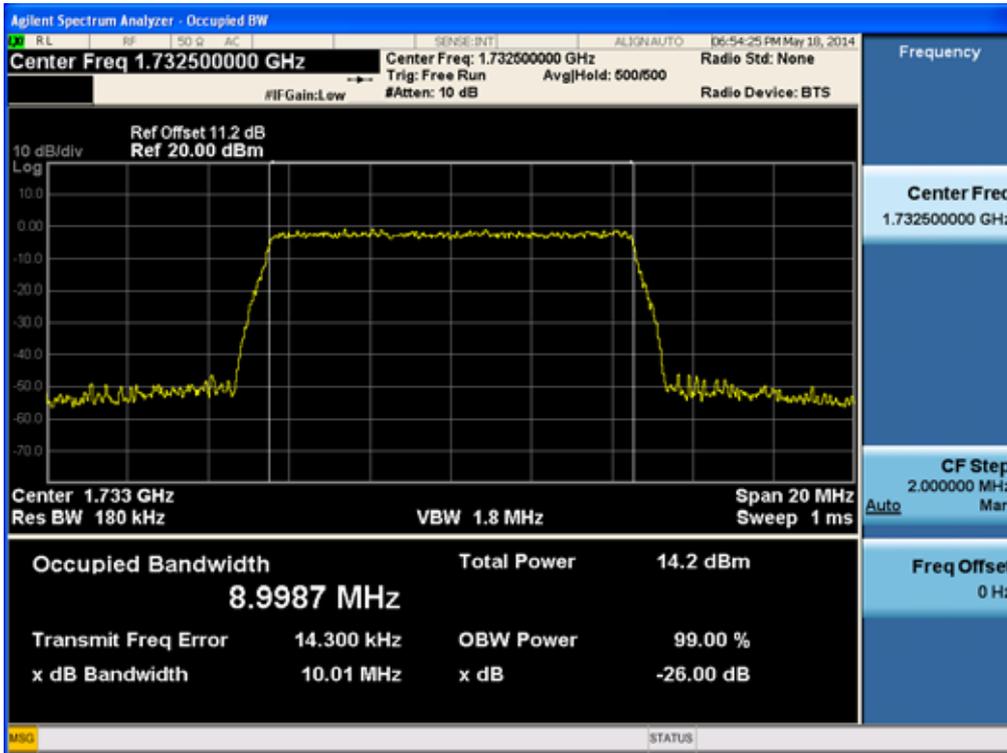
[Output CDMA Uplink High]



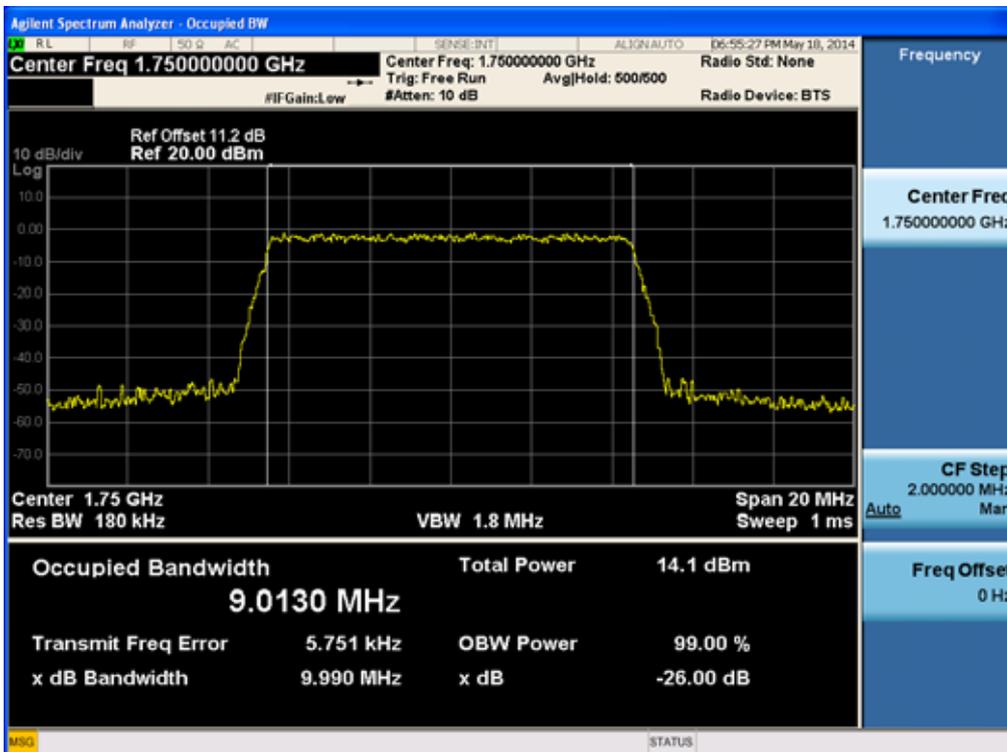
[Output LTE Uplink Low]



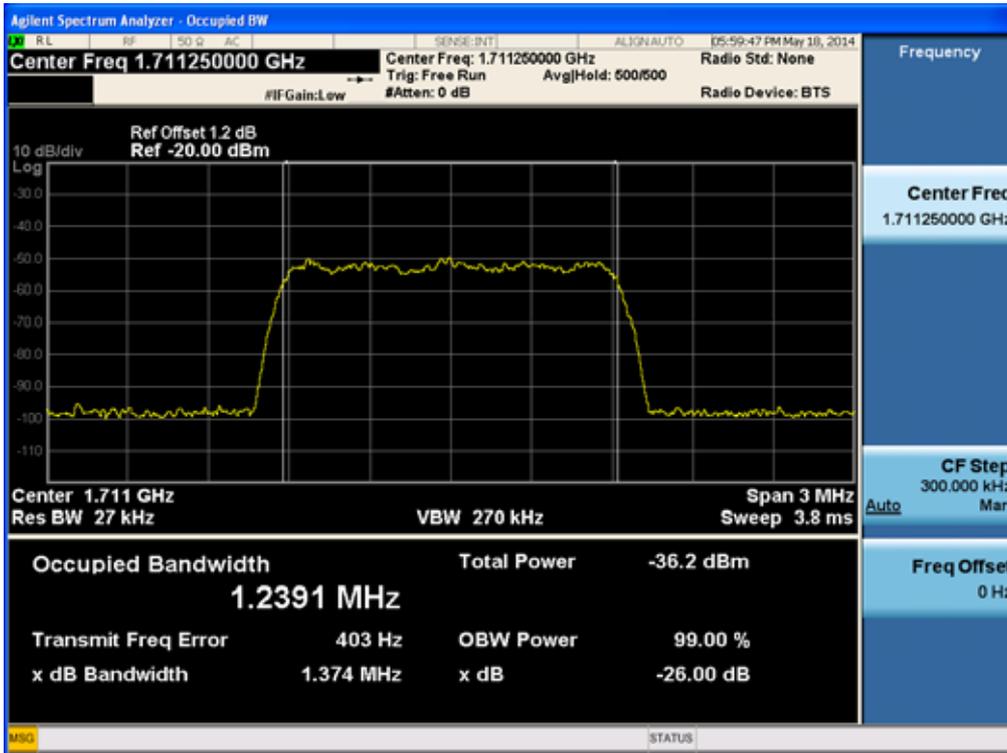
[Output LTE Uplink Middle]



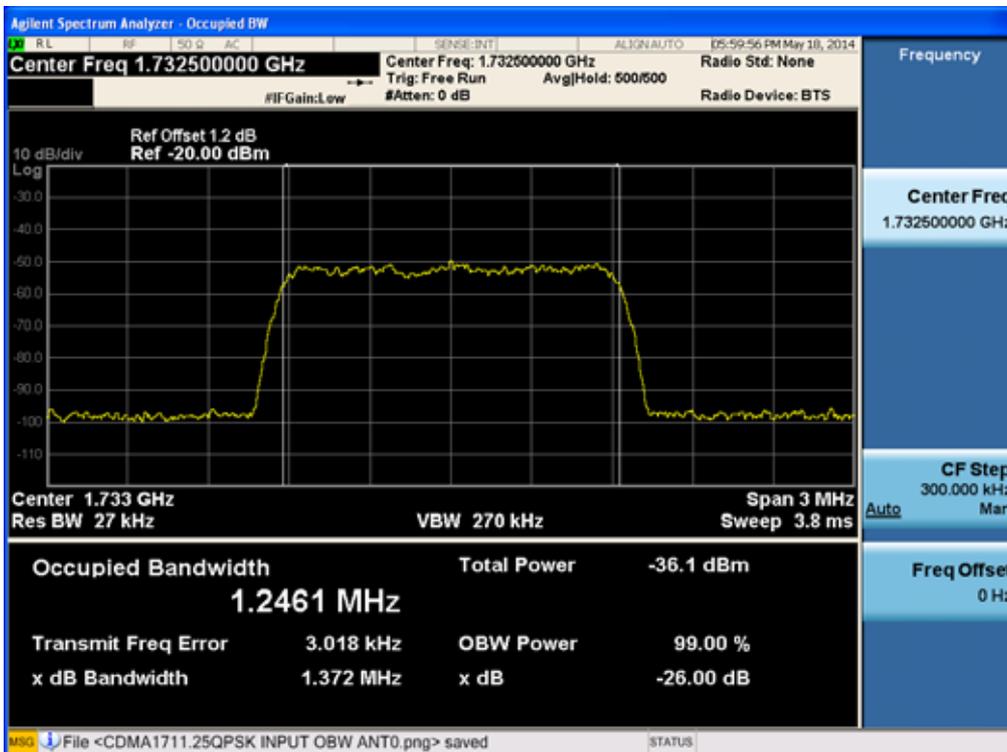
[Output LTE Uplink High]



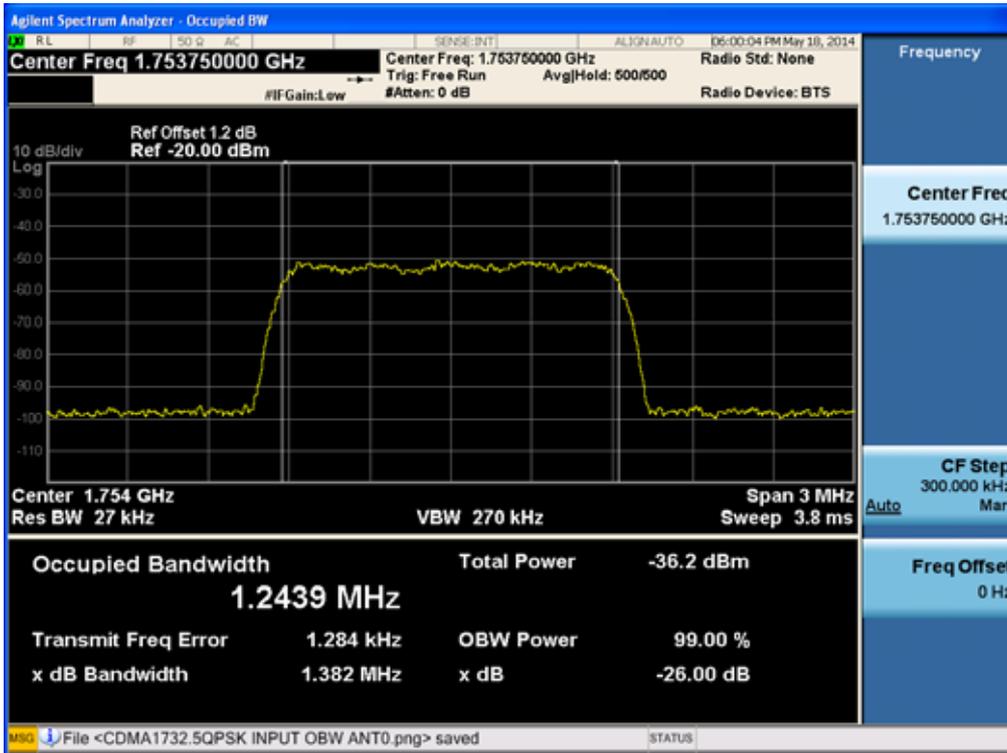
[Input CDMA Uplink Low]



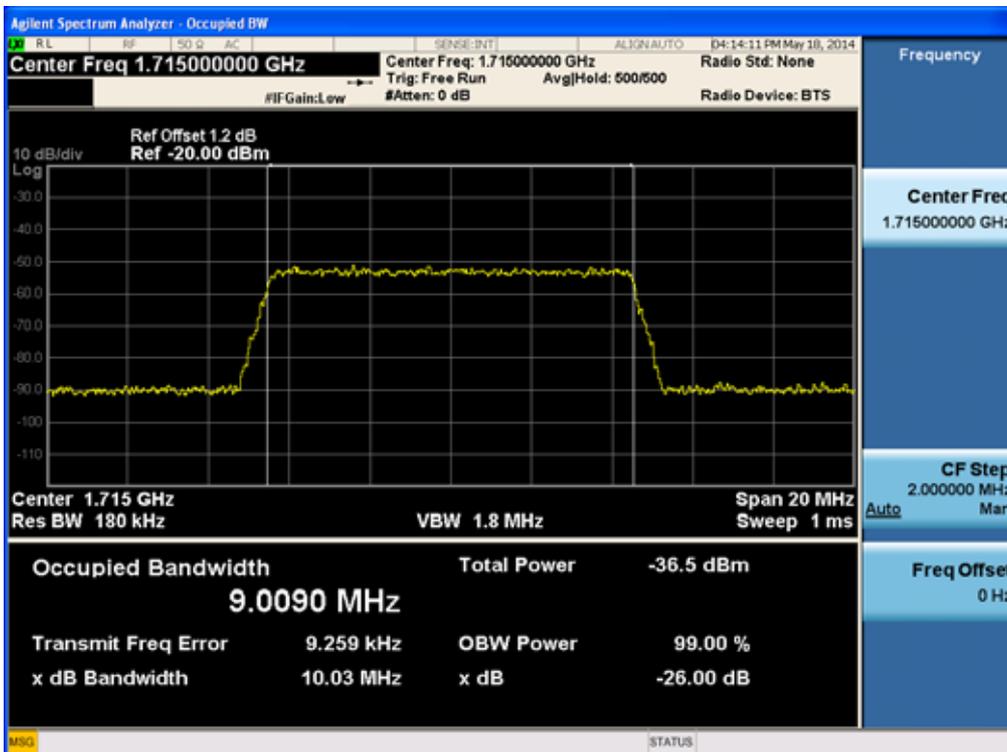
[Input CDMA Uplink Middle]



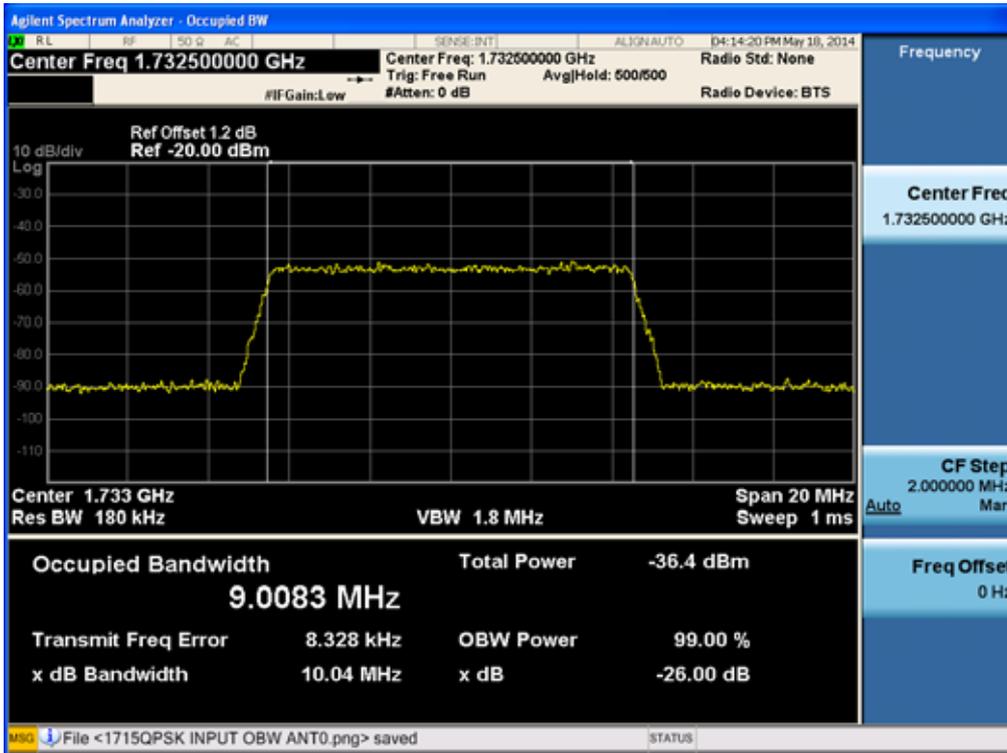
[Input CDMA Uplink High]



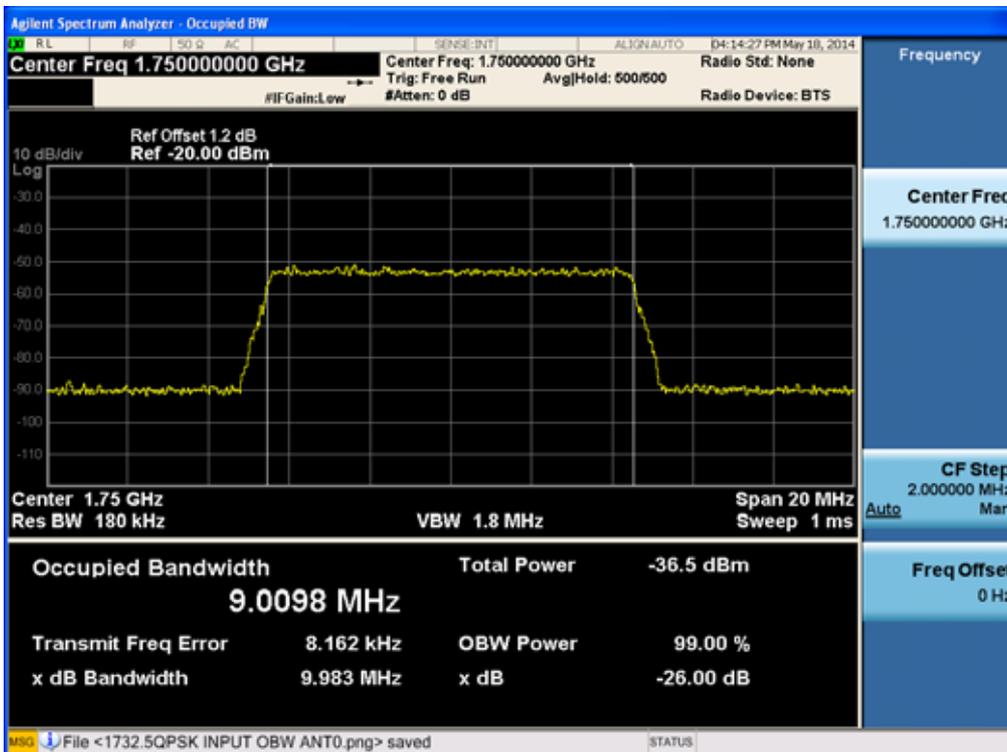
[Input LTE Uplink Low]



[Input LTE Uplink Middle]



[Input LTE Uplink 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

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

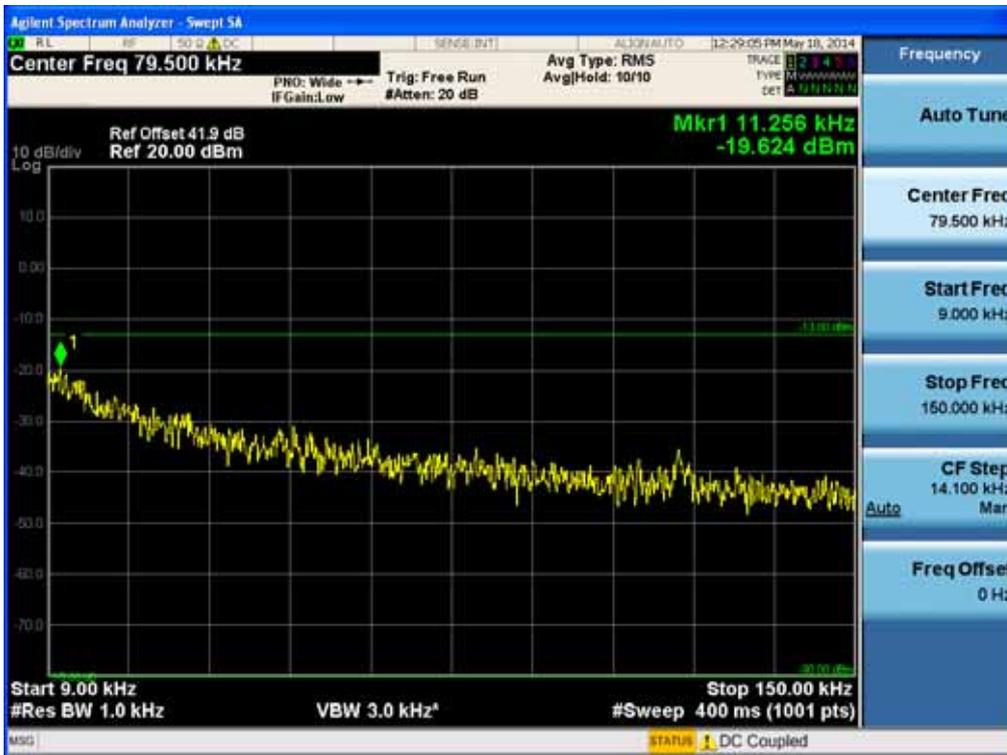
**Test Procedures:** A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured.

The spectrum was investigated from 9 kHz to the 26.5 of the carrier.

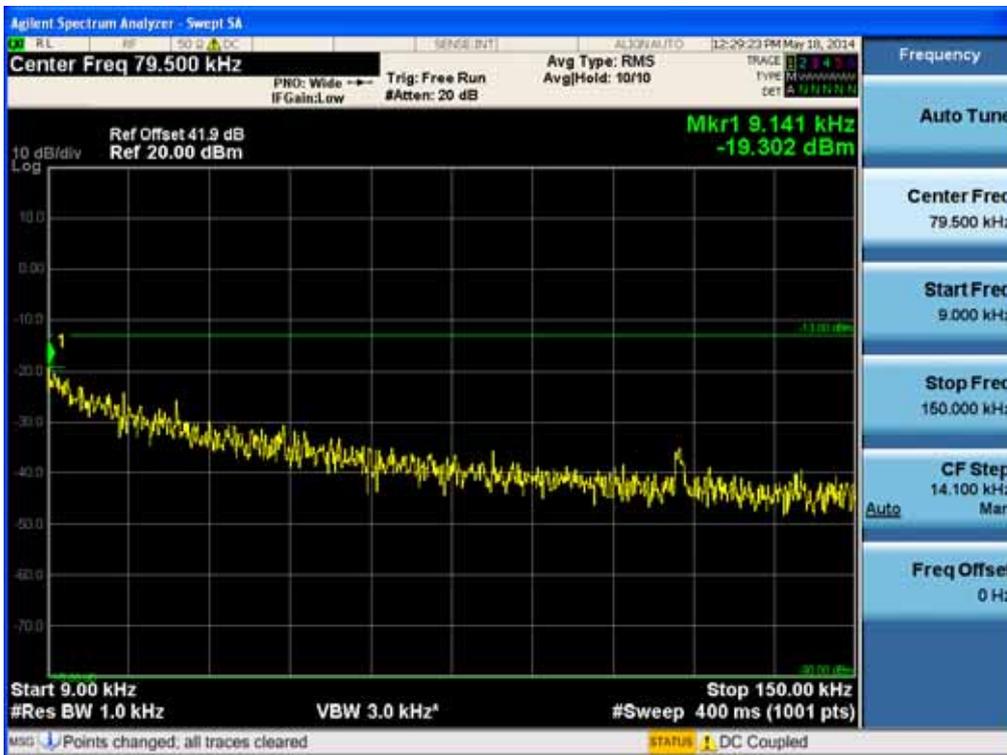
**Test Results:** The EUT complies with the requirements of this section. There were no detectable Spurious emissions for this EUT.

**Plots of Spurious Emission**  
Conducted Spurious Emissions (9 kHz – 150 kHz)

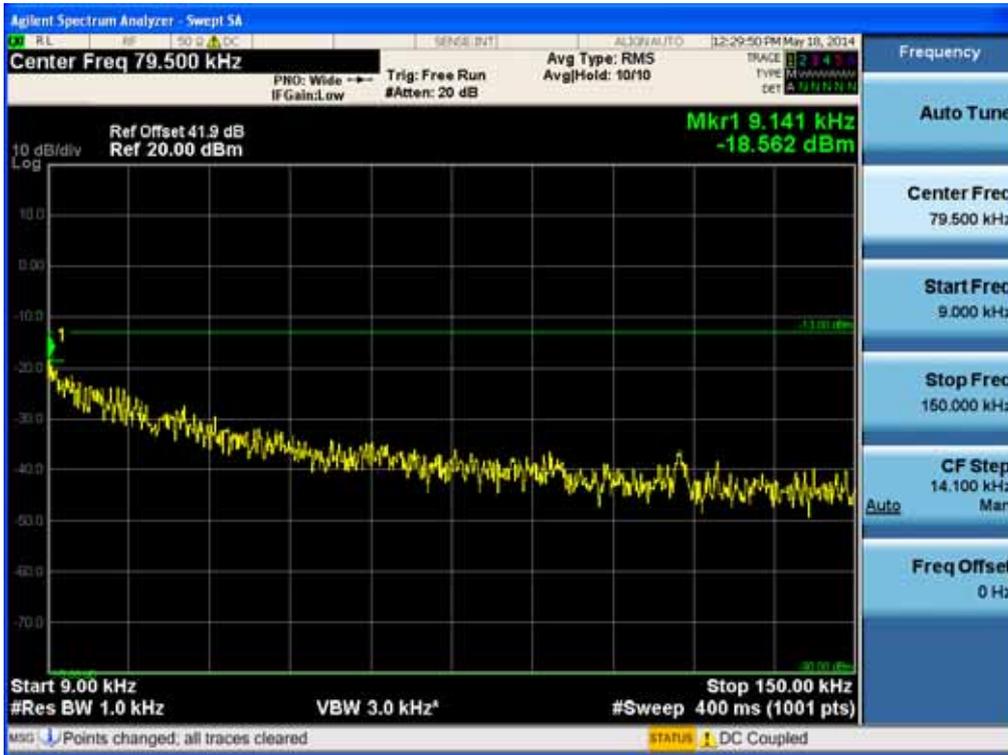
[CDMA Downlink Low]



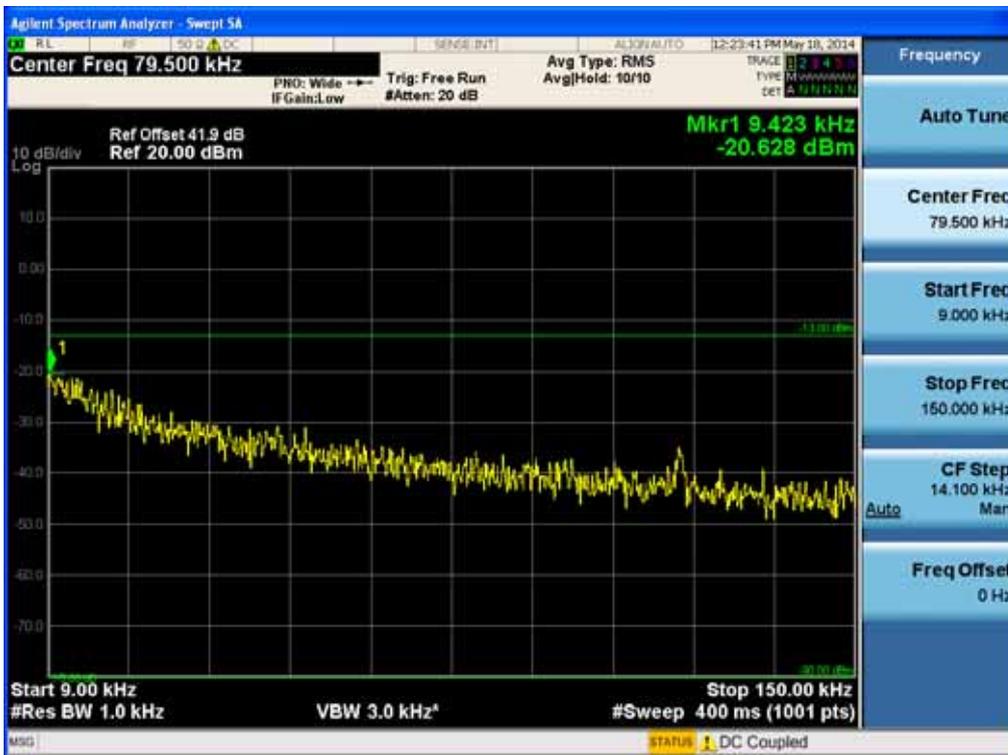
[CDMA Downlink Middle]



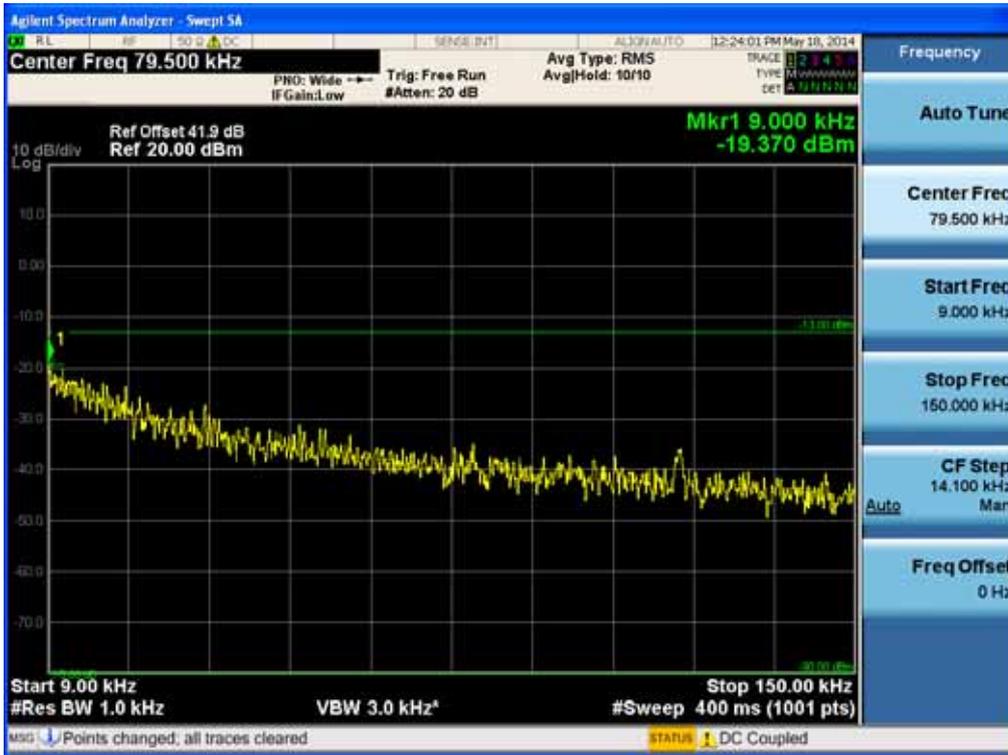
[CDMA Downlink High]



[LTE Downlink Low]



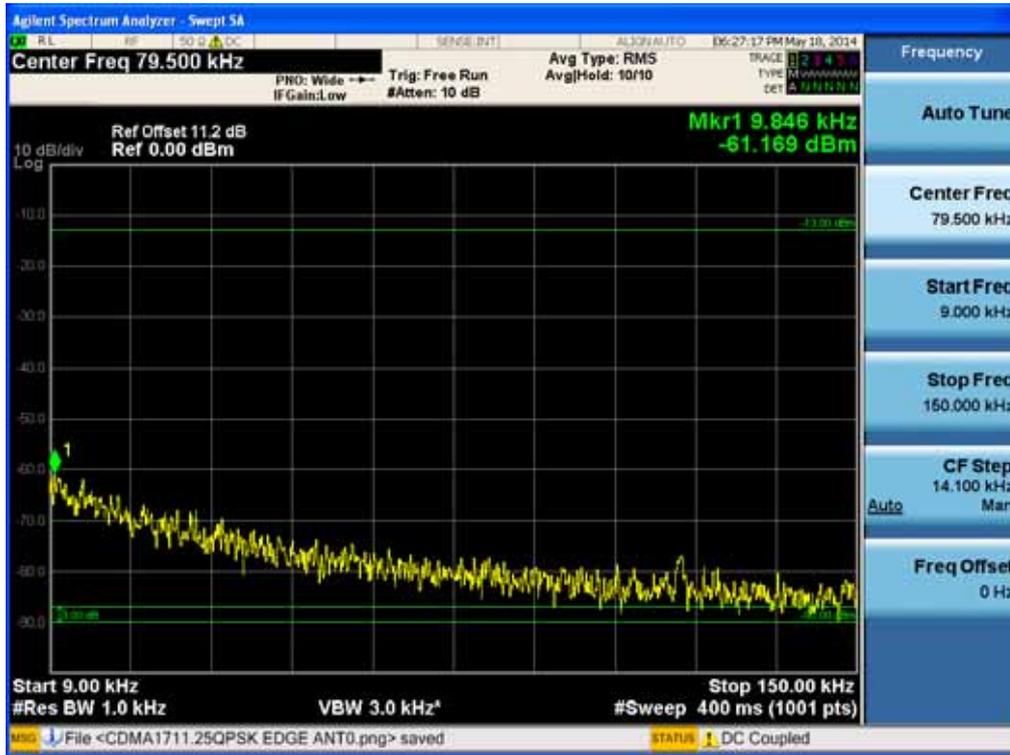
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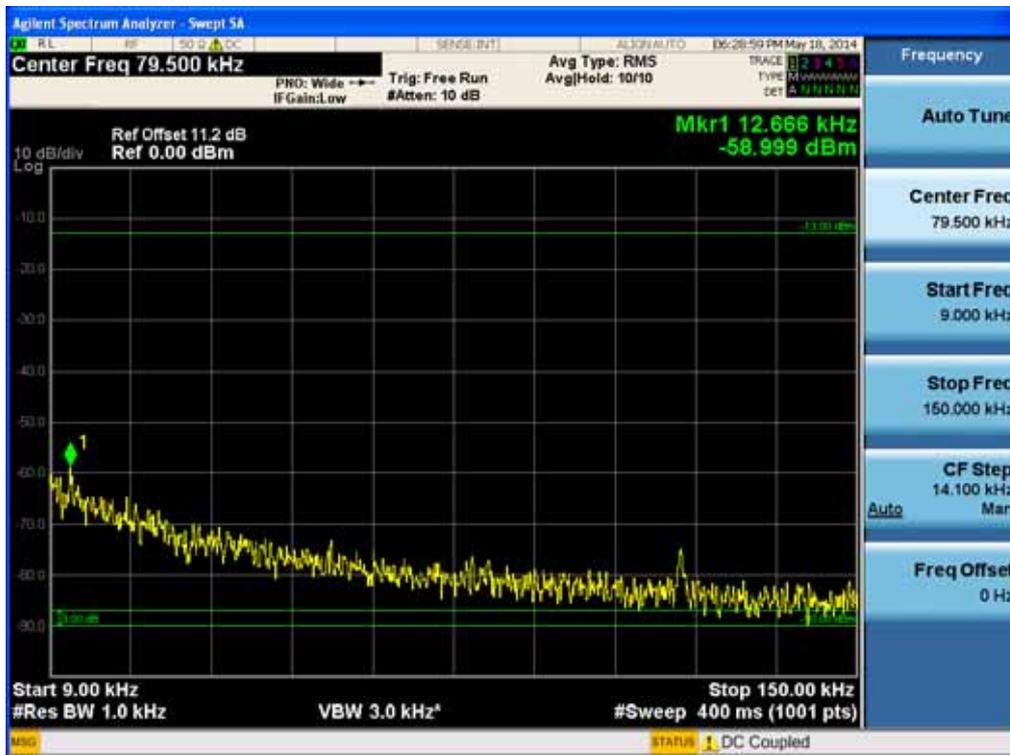
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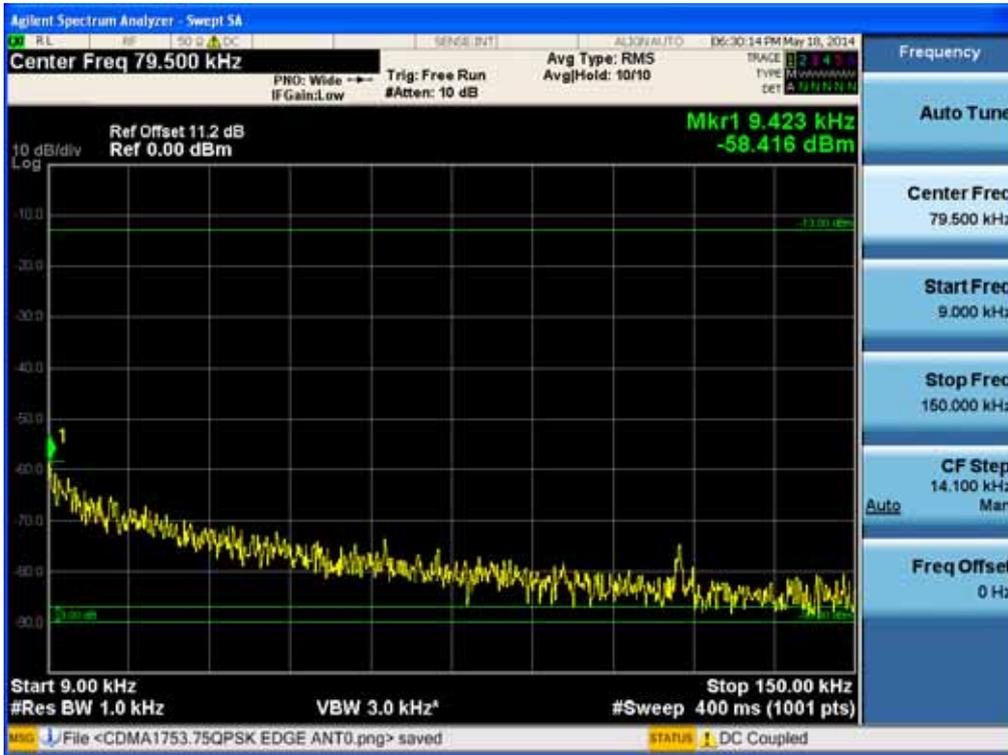
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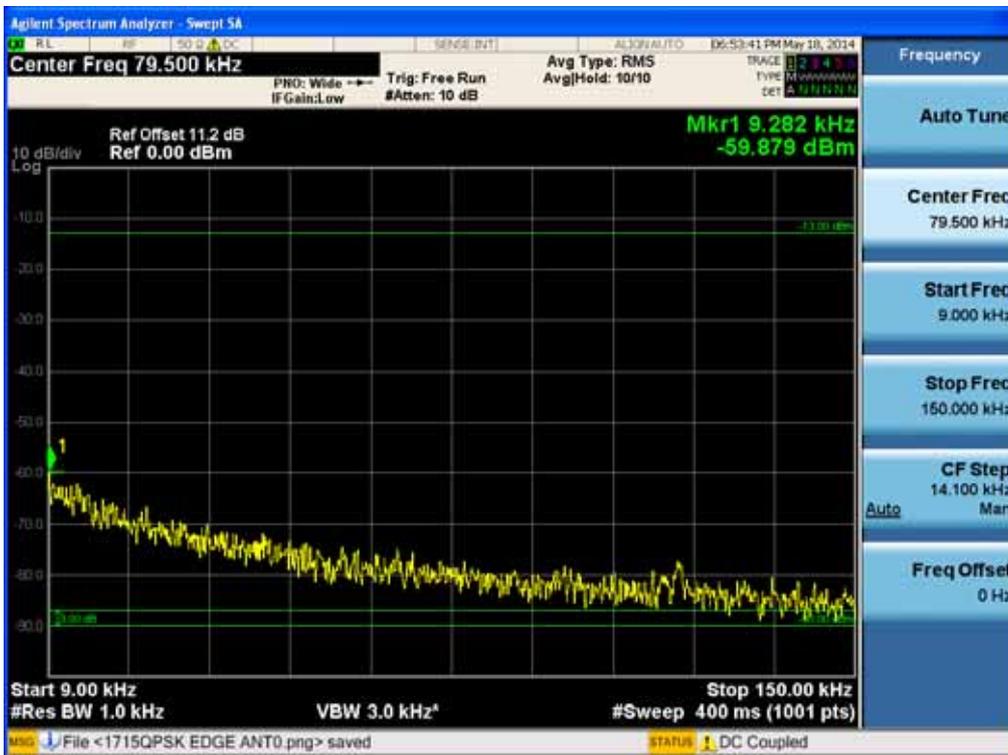
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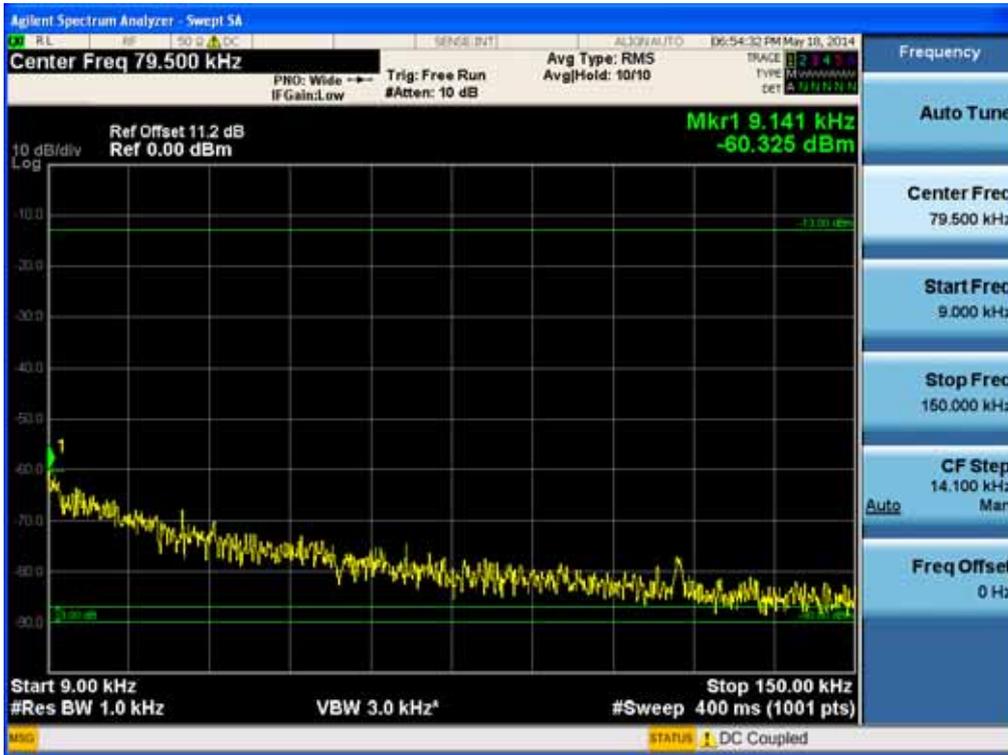
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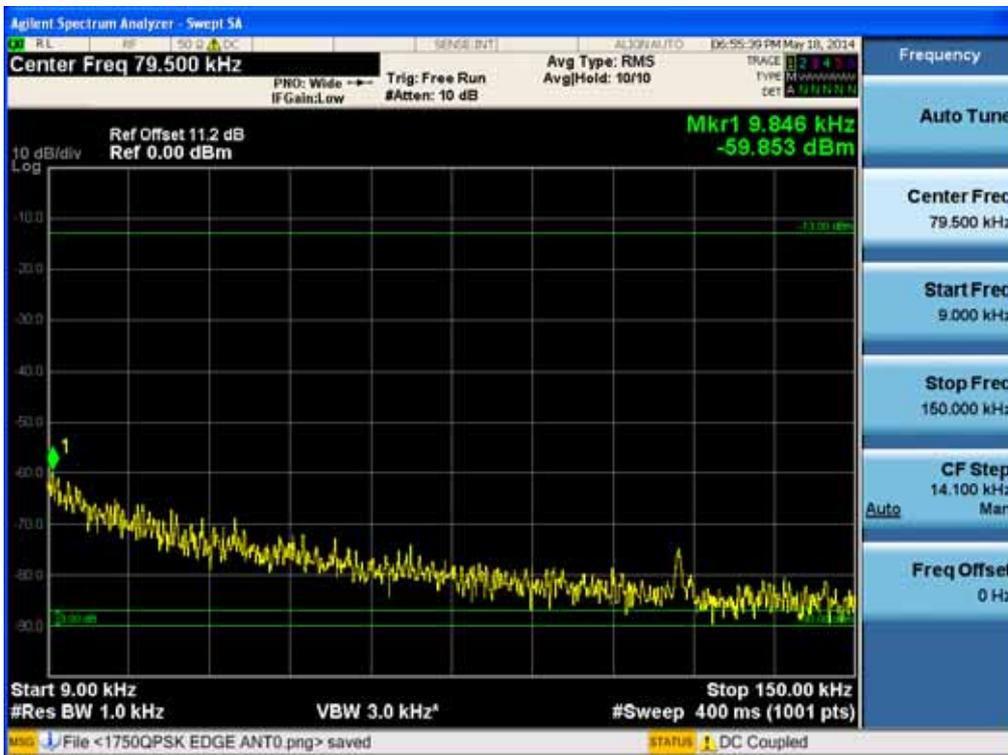
[LTE Uplink Low]



[LTE Uplink Middle]

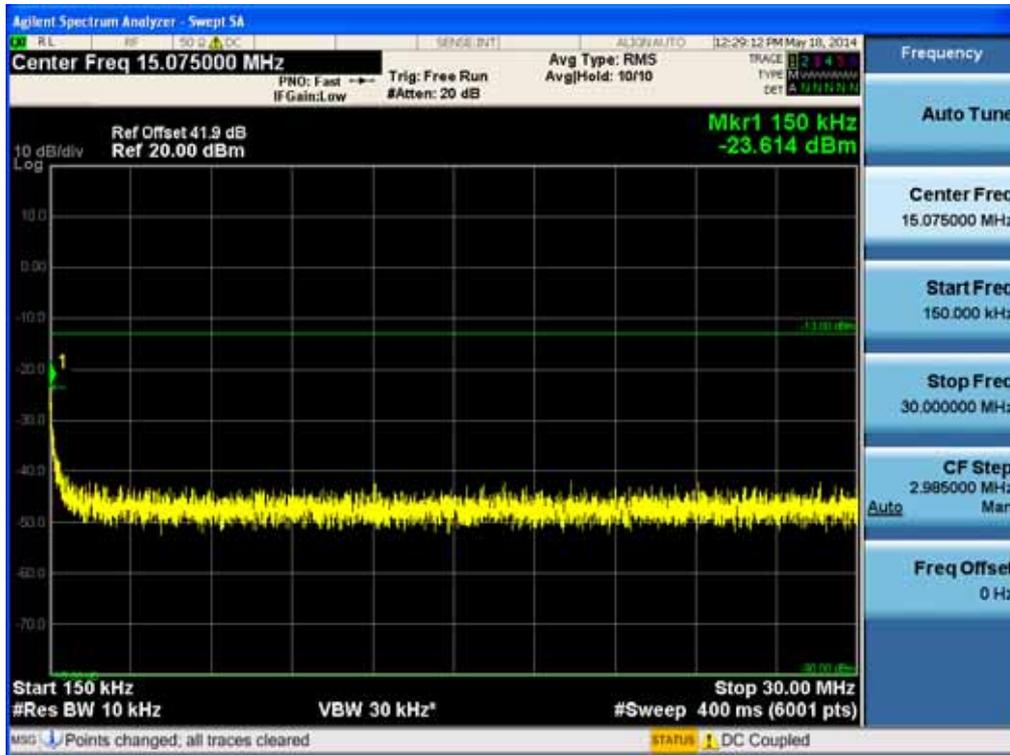


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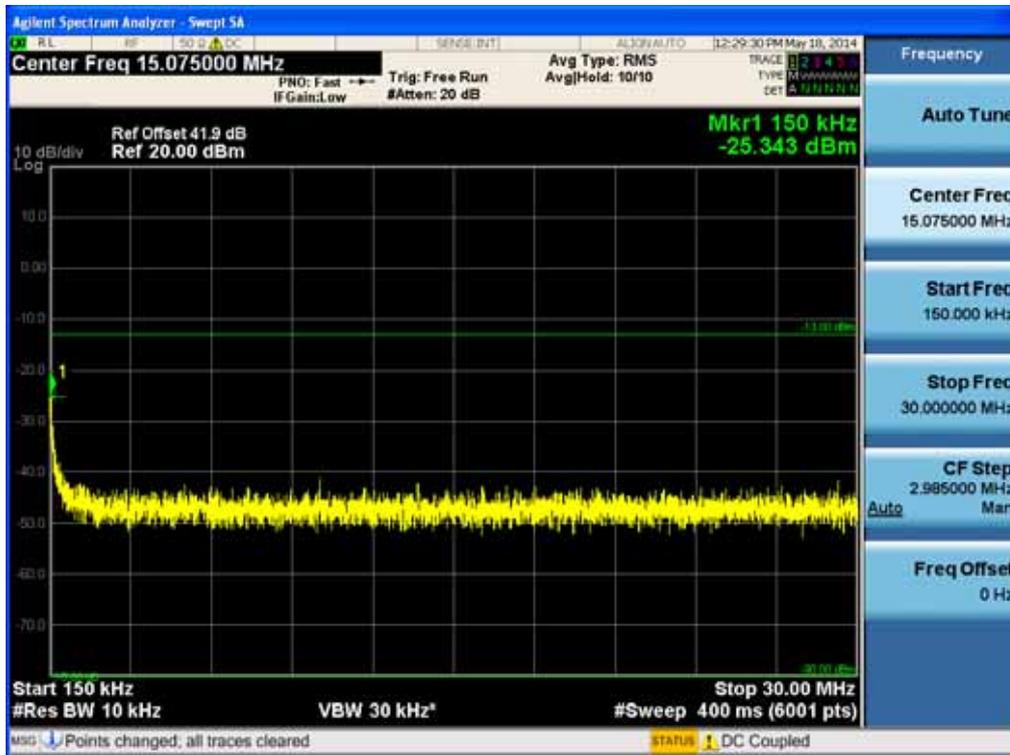


Conducted Spurious Emissions (150 kHz – 30 MHz)

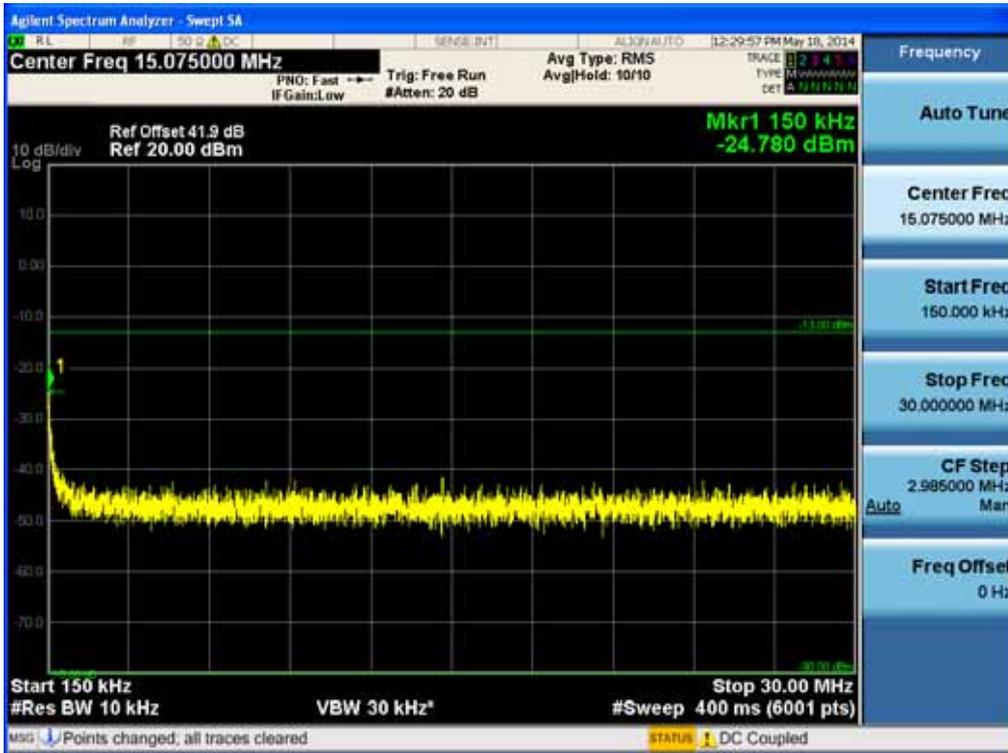
[CDMA Downlink Low]



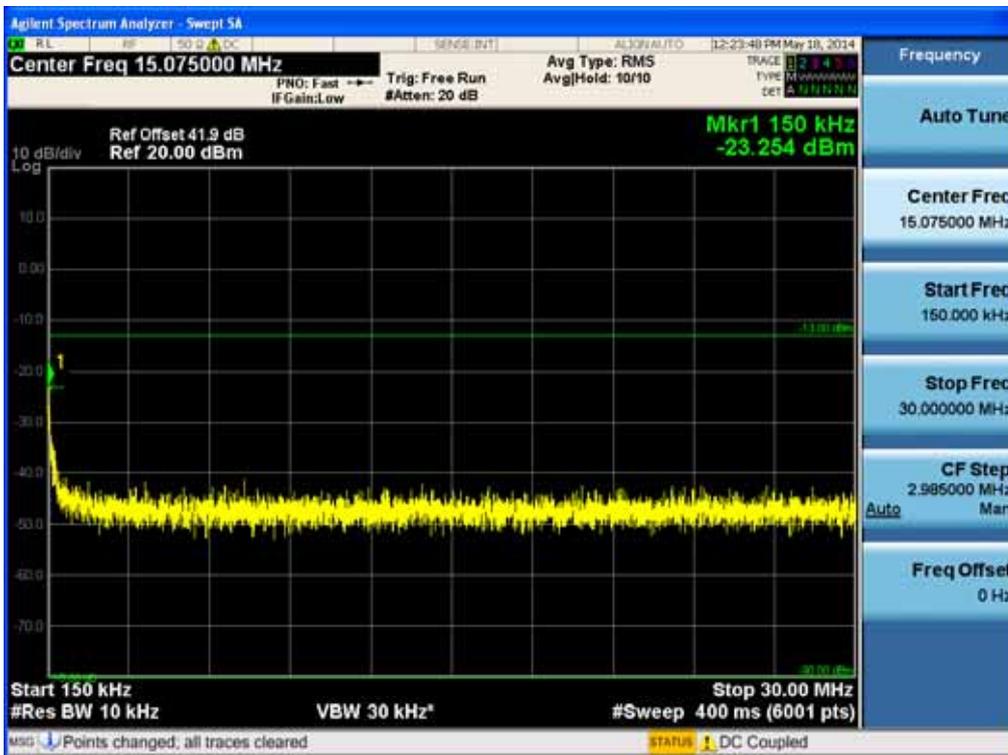
[CDMA Downlink Middle]



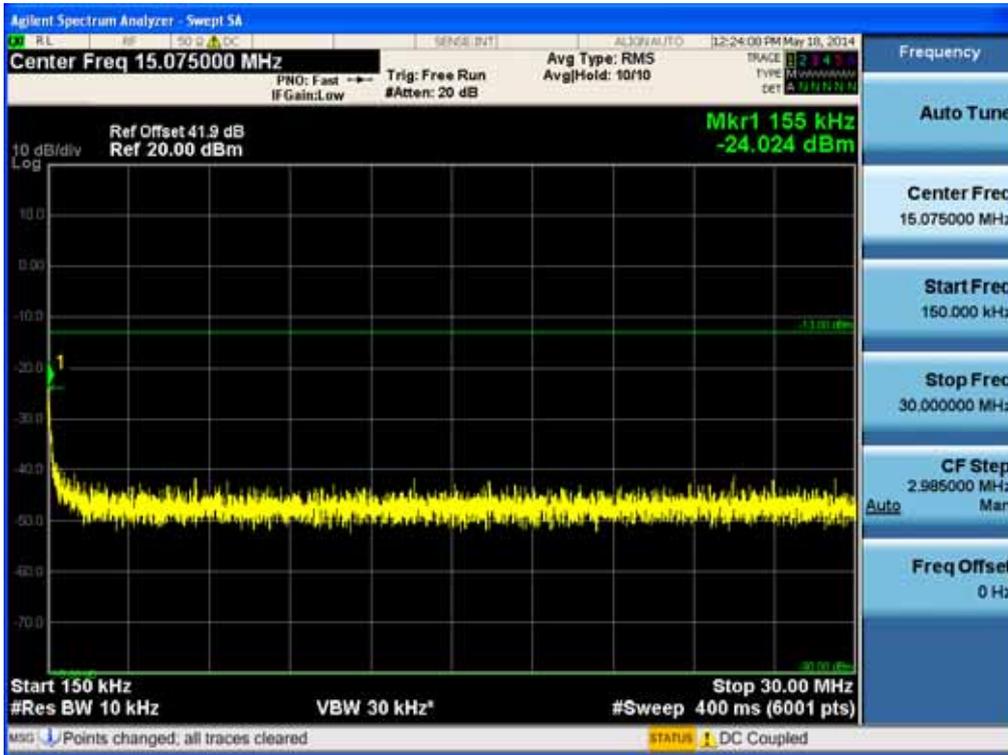
[CDMA Downlink High]



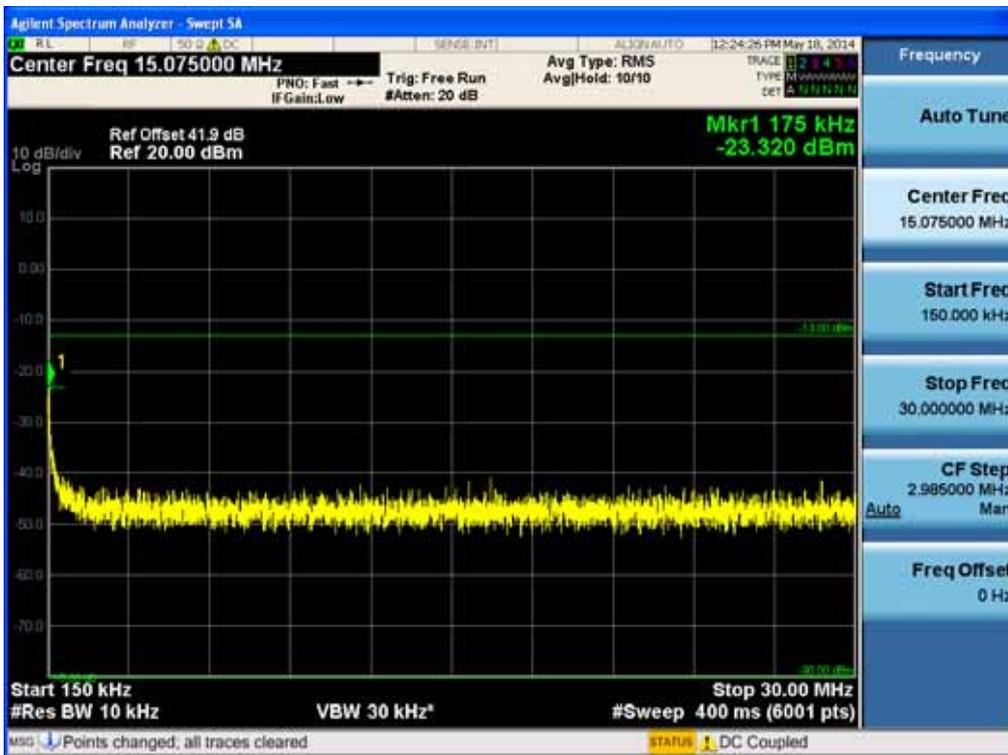
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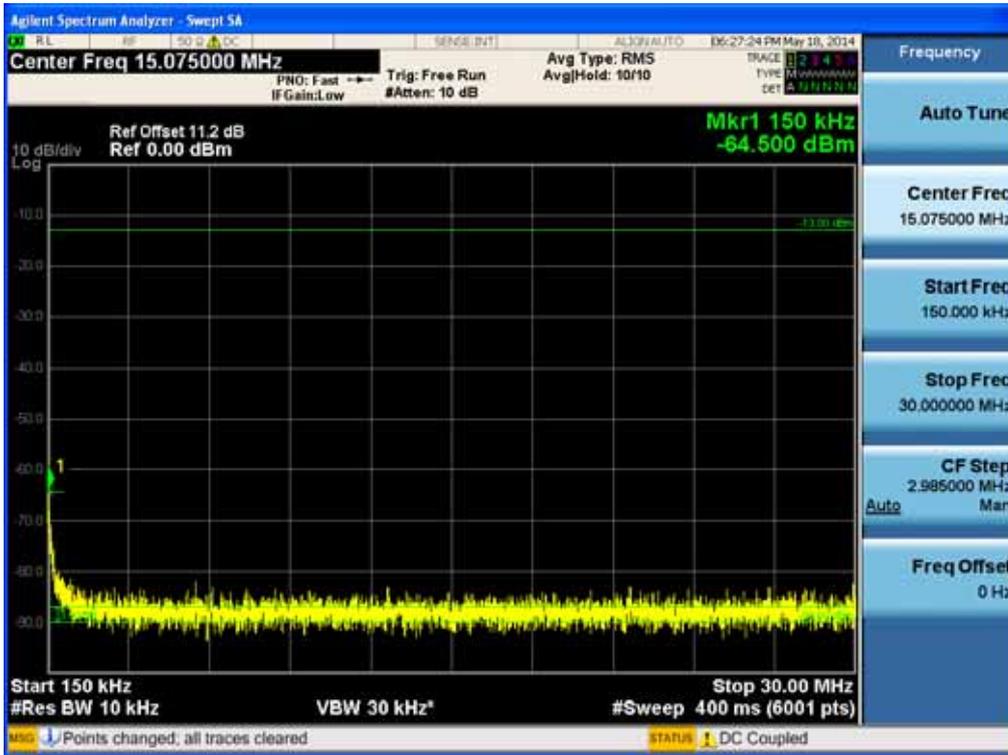
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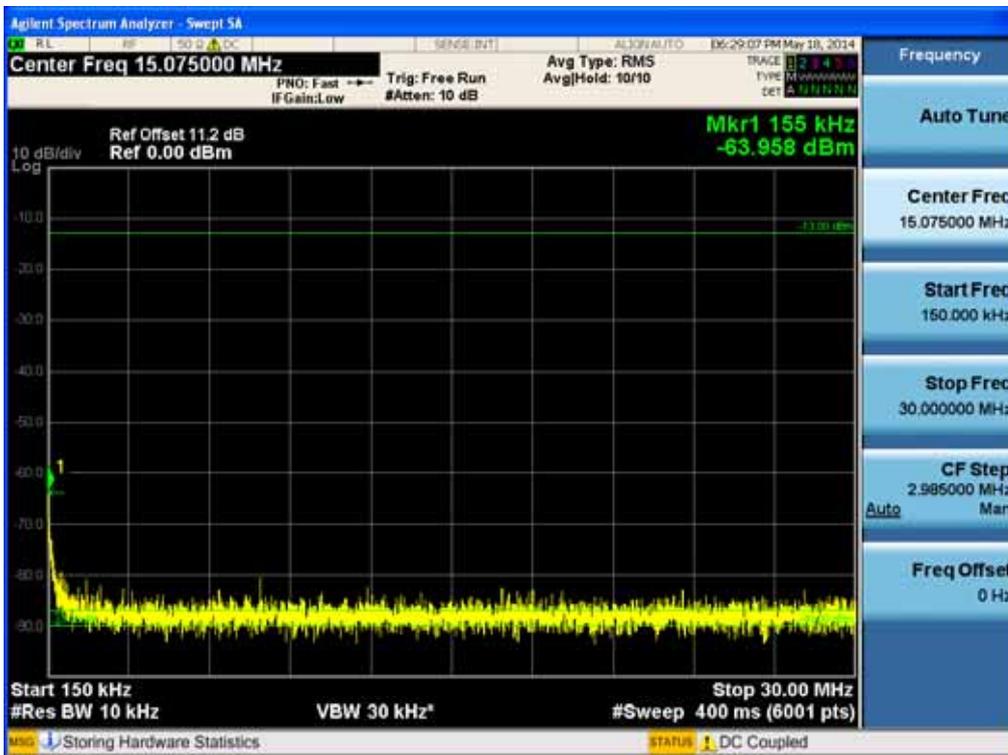
[LTE Downlink High]



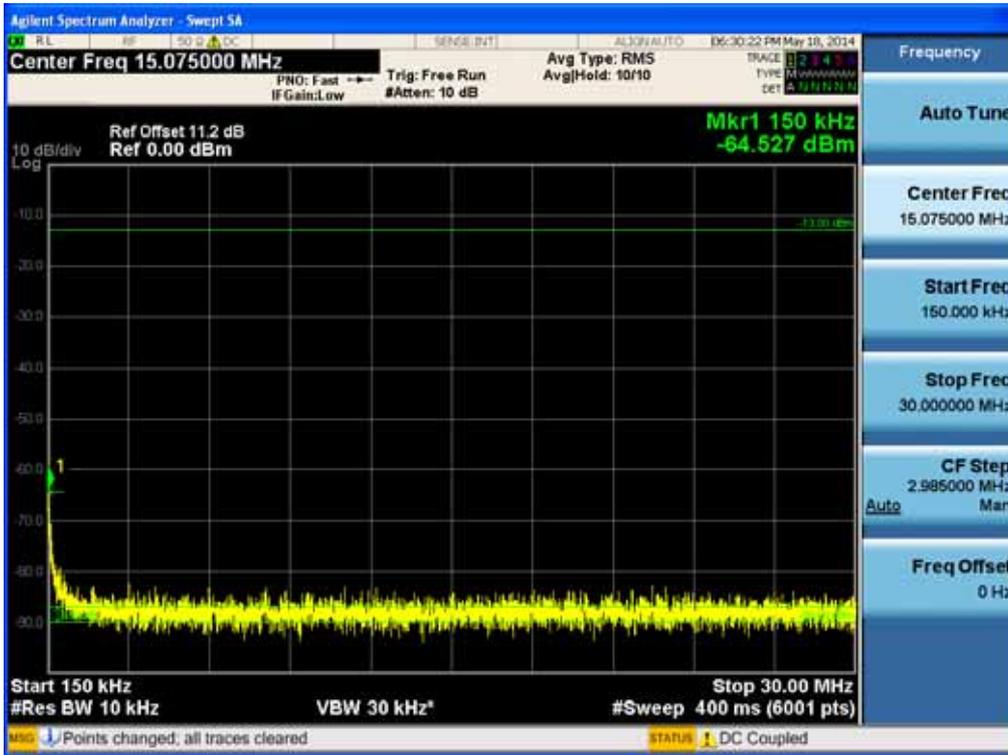
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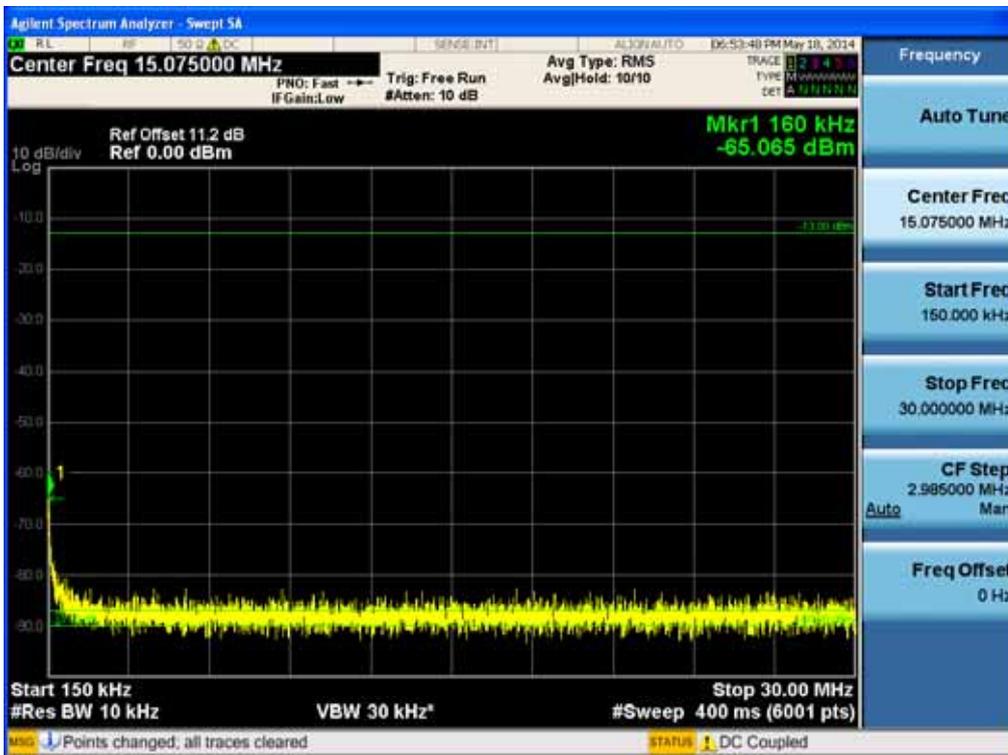
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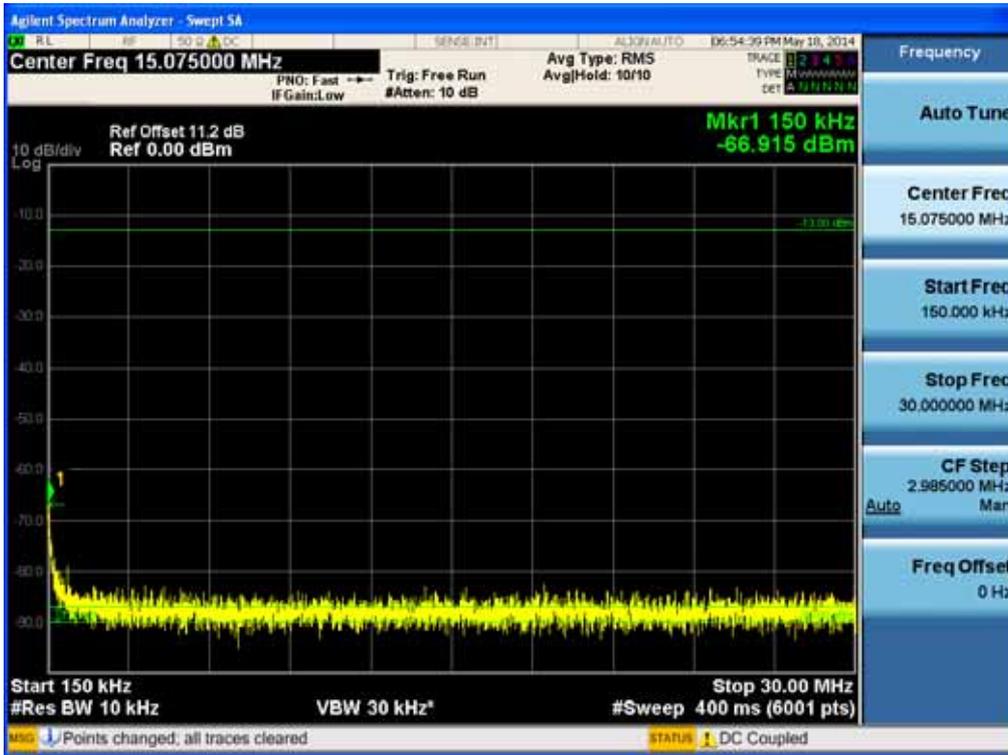
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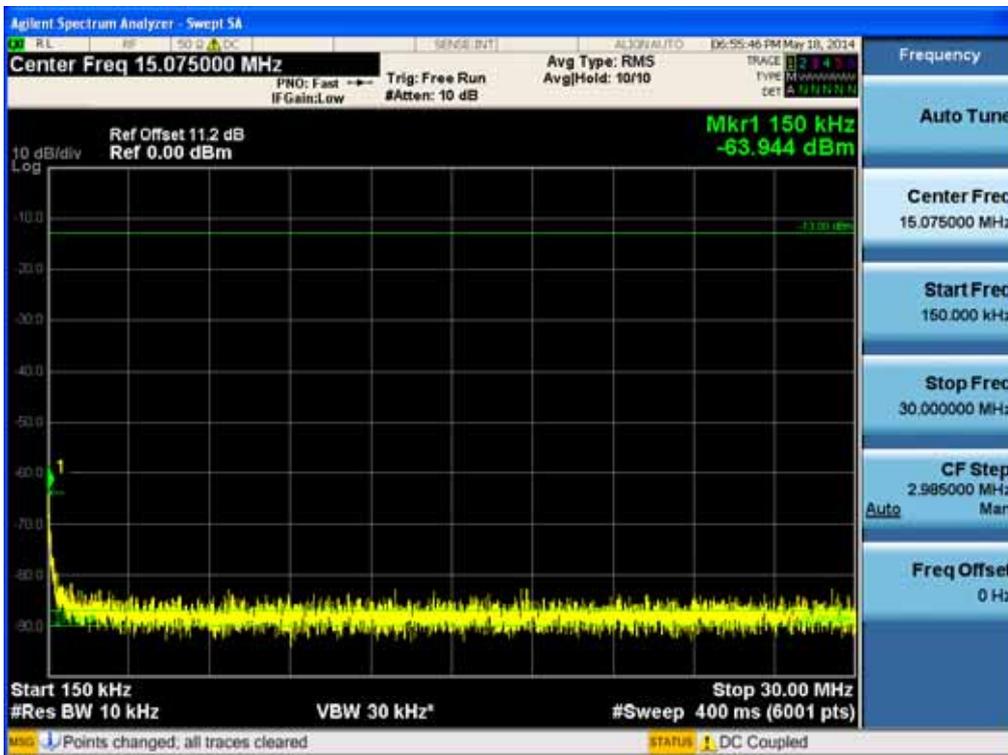
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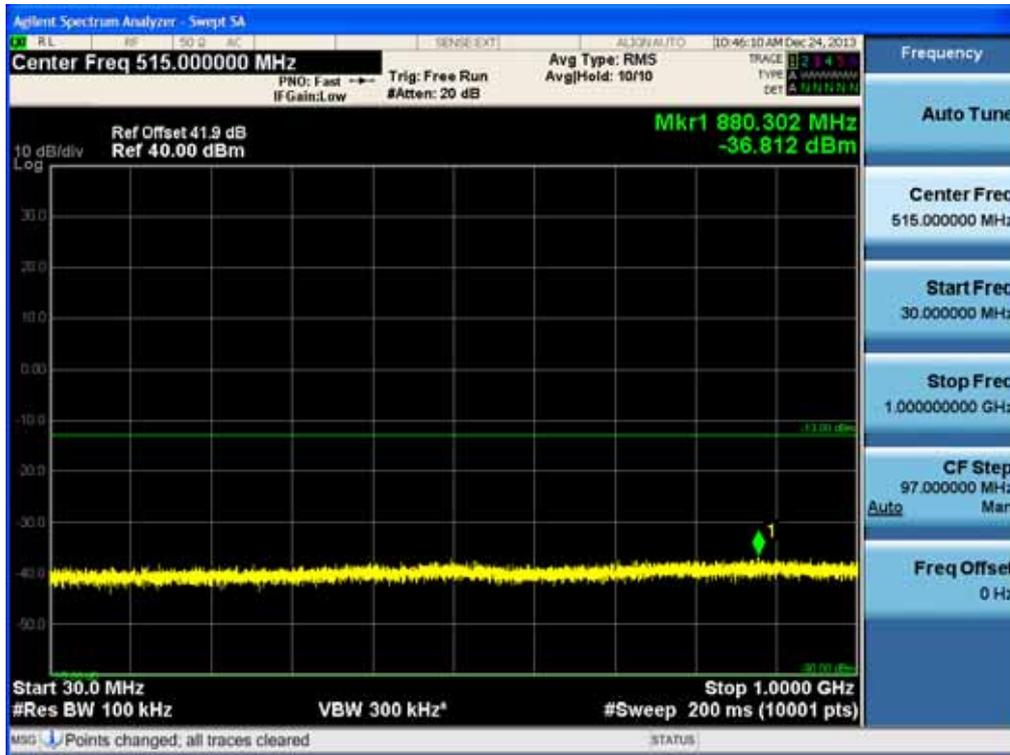


[LTE Uplink High]

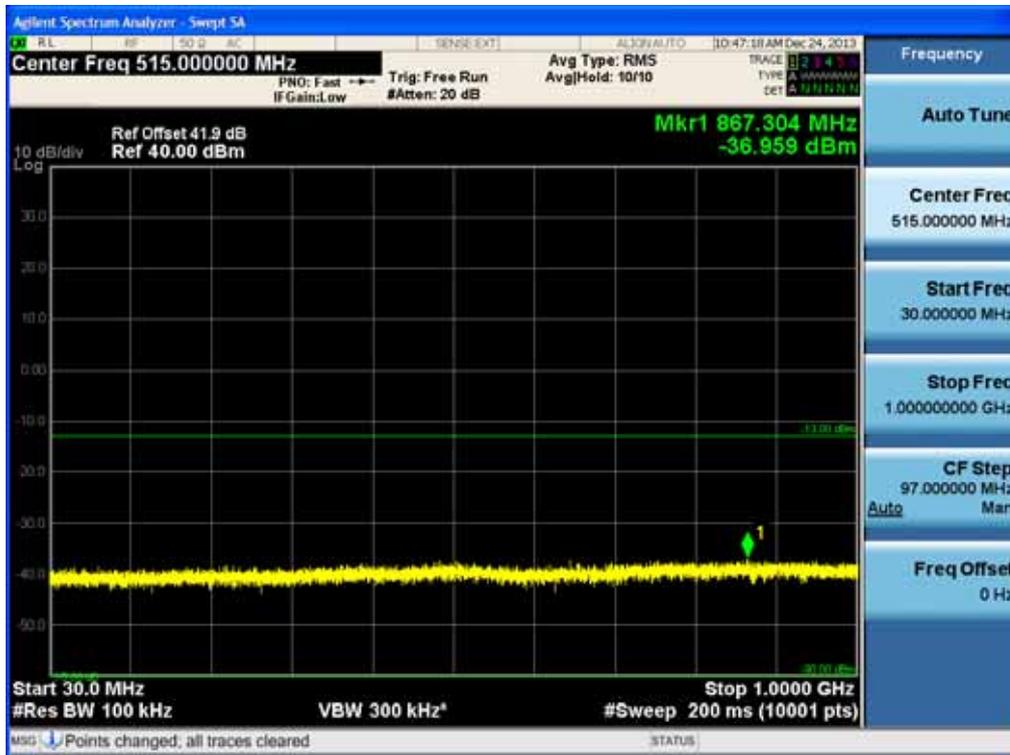


Conducted Spurious Emissions (30 MHz – 1 GHz)

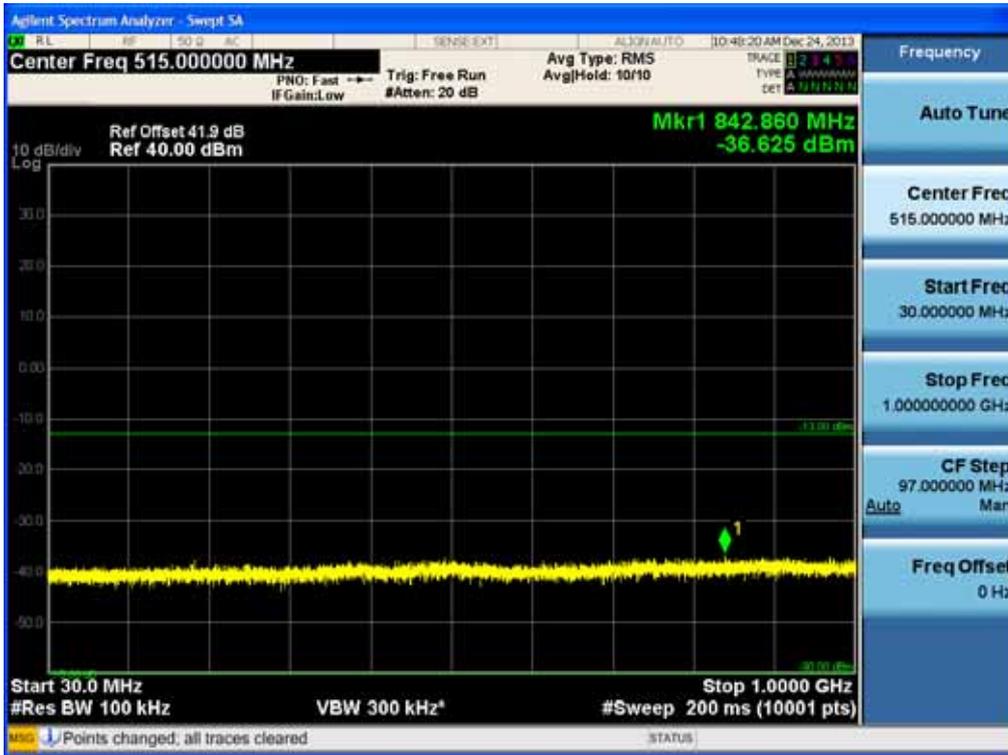
[CDMA Downlink Low]



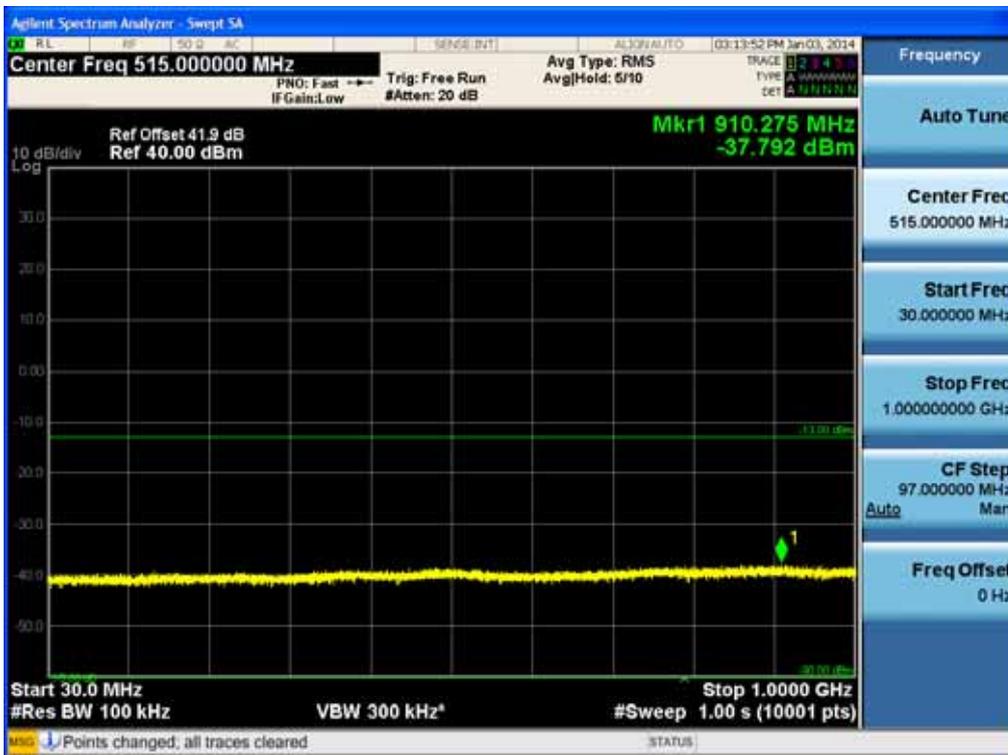
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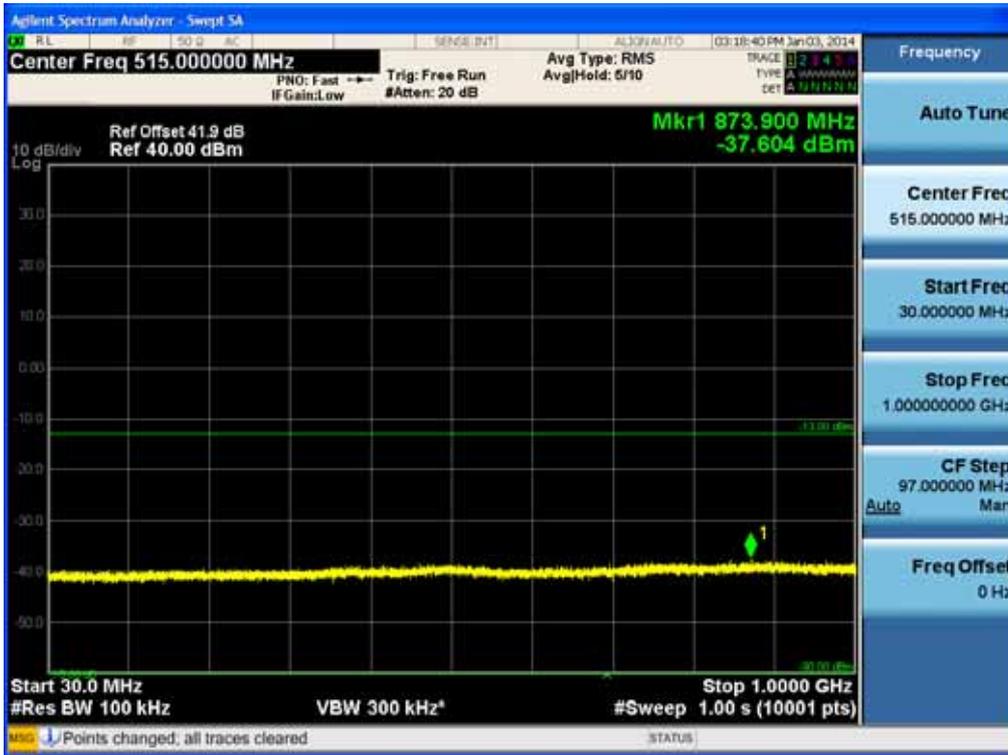
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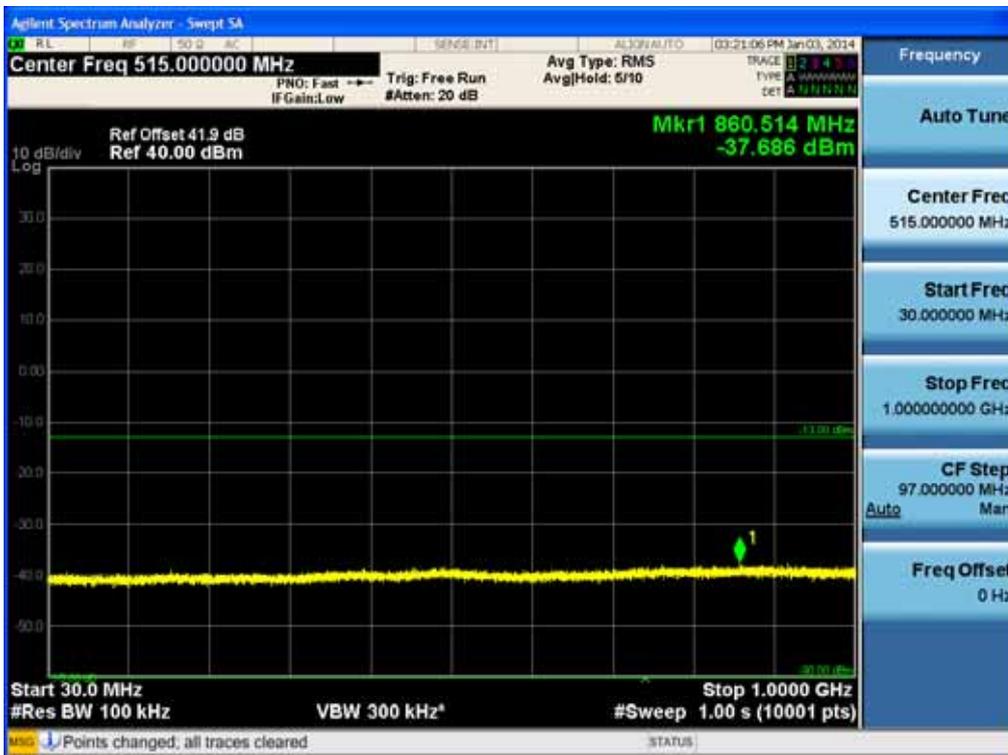
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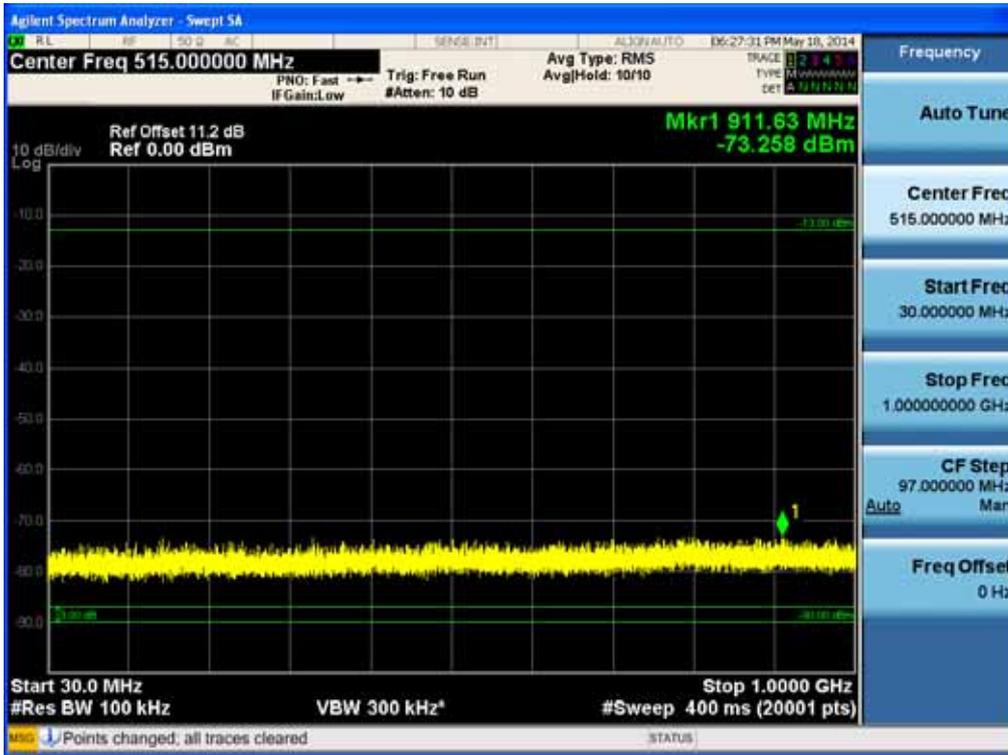
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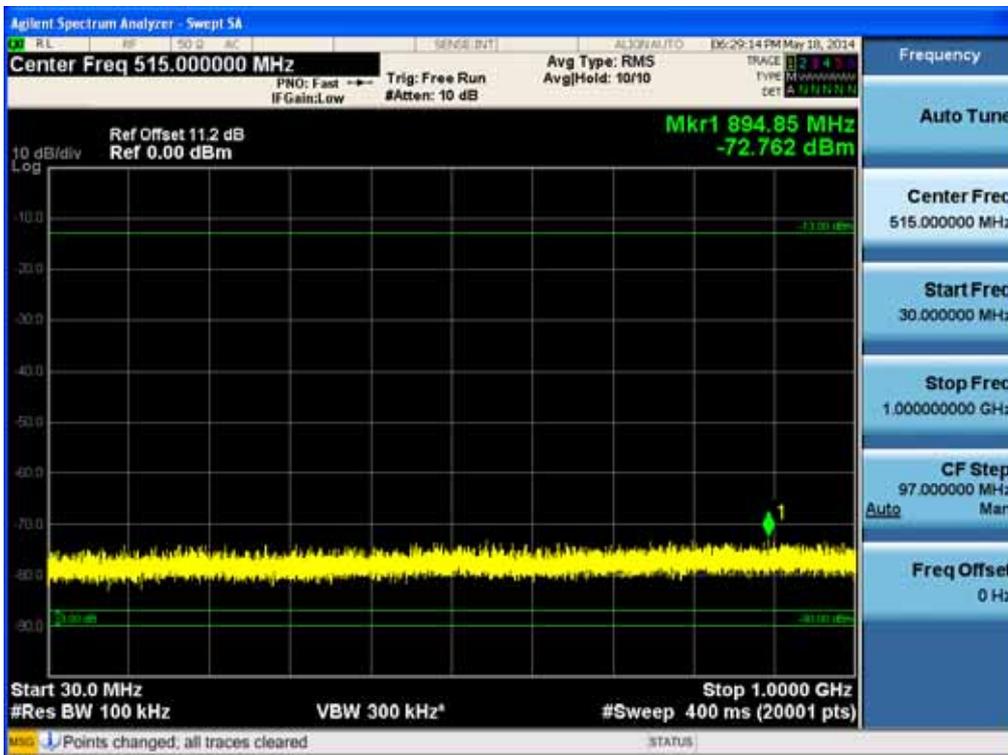
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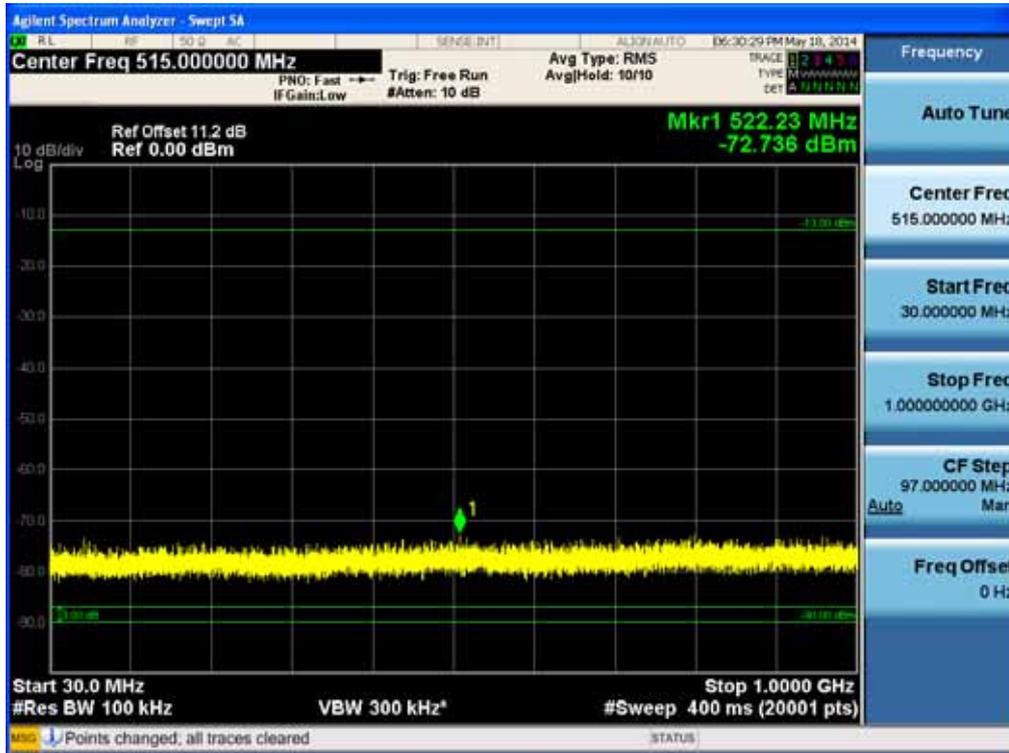
[CDMA Uplink Low]



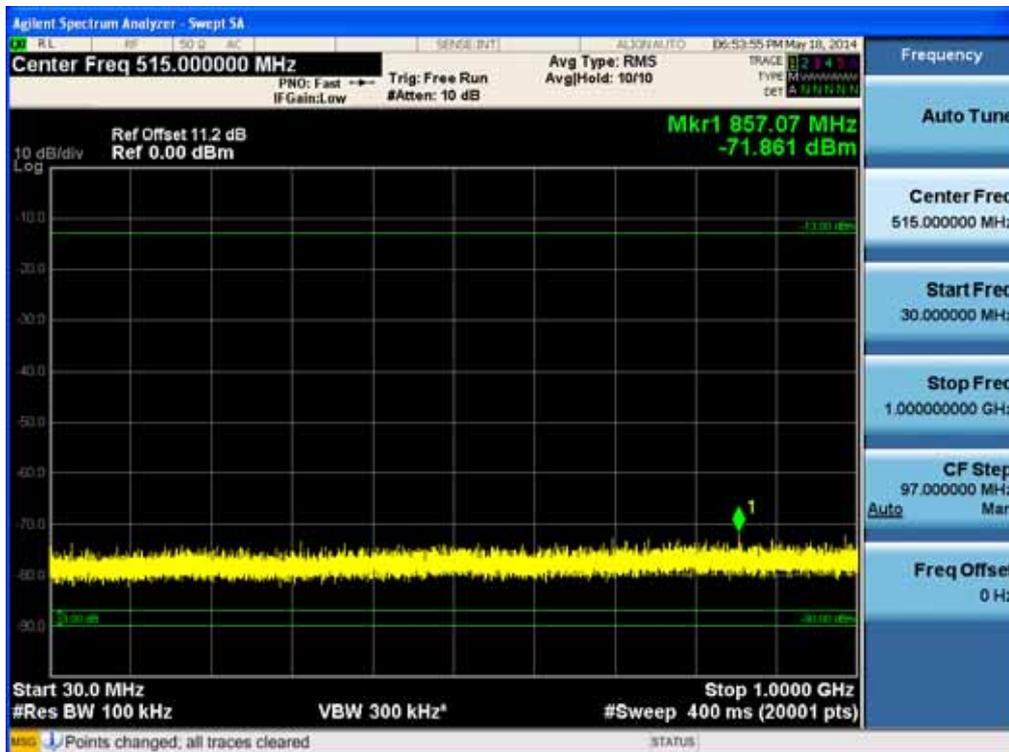
[CDMA Uplink Middle]



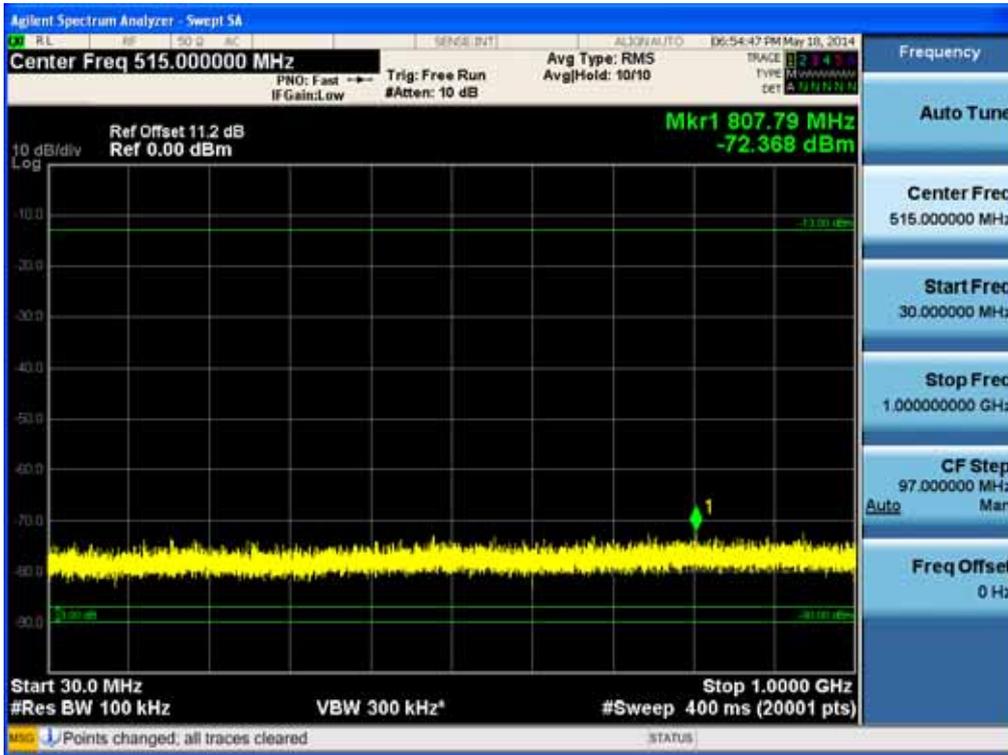
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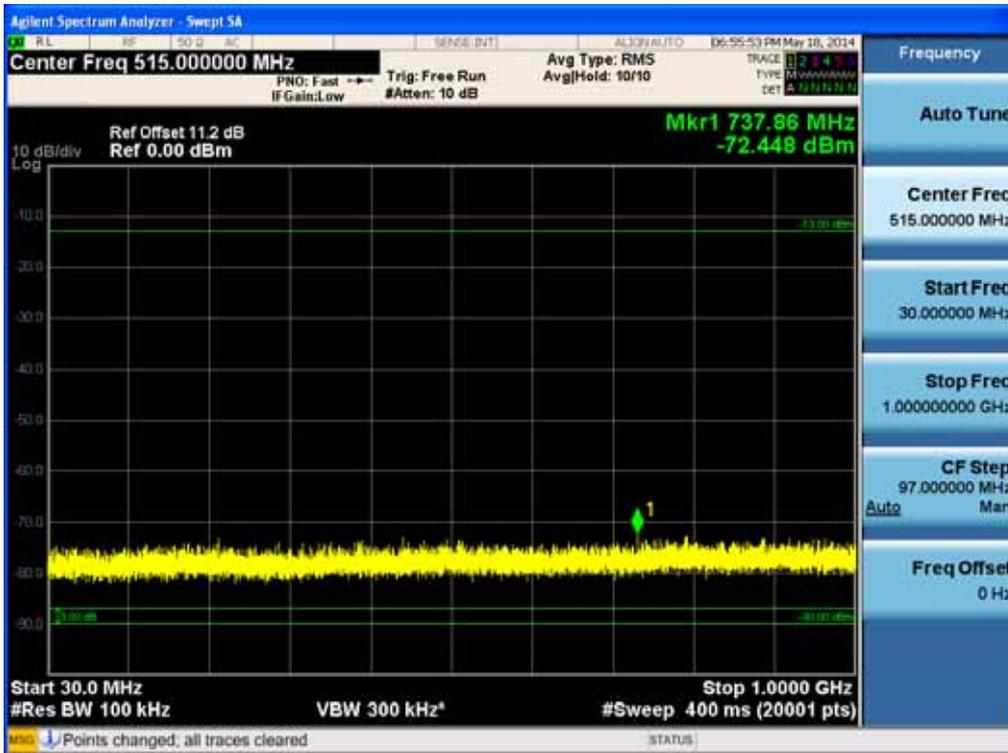
[LTE Uplink Low]



[LTE Uplink Middle]



[LTE Uplink High]



Conducted Spurious Emissions (1 GHz –26.5 GHz)

[CDMA Downlink Low]



[CDMA Downlink Middle]



[CDMA Downlink High]



[LTE Downlink Low]



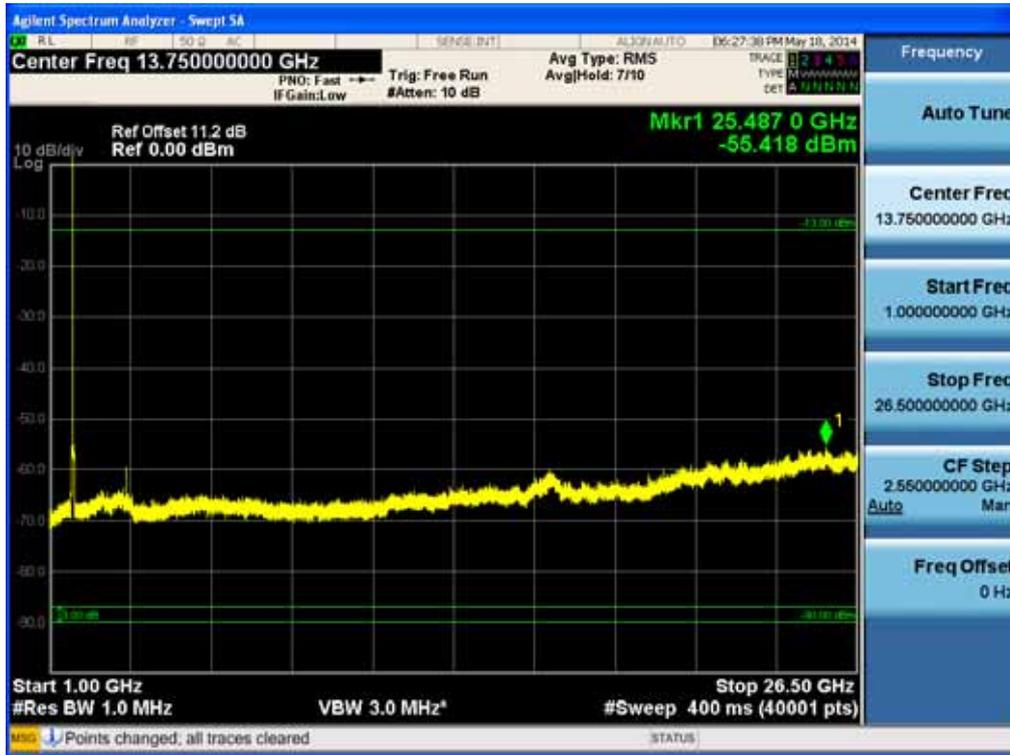
[LTE Downlink Middle]



[LTE Downlink High]



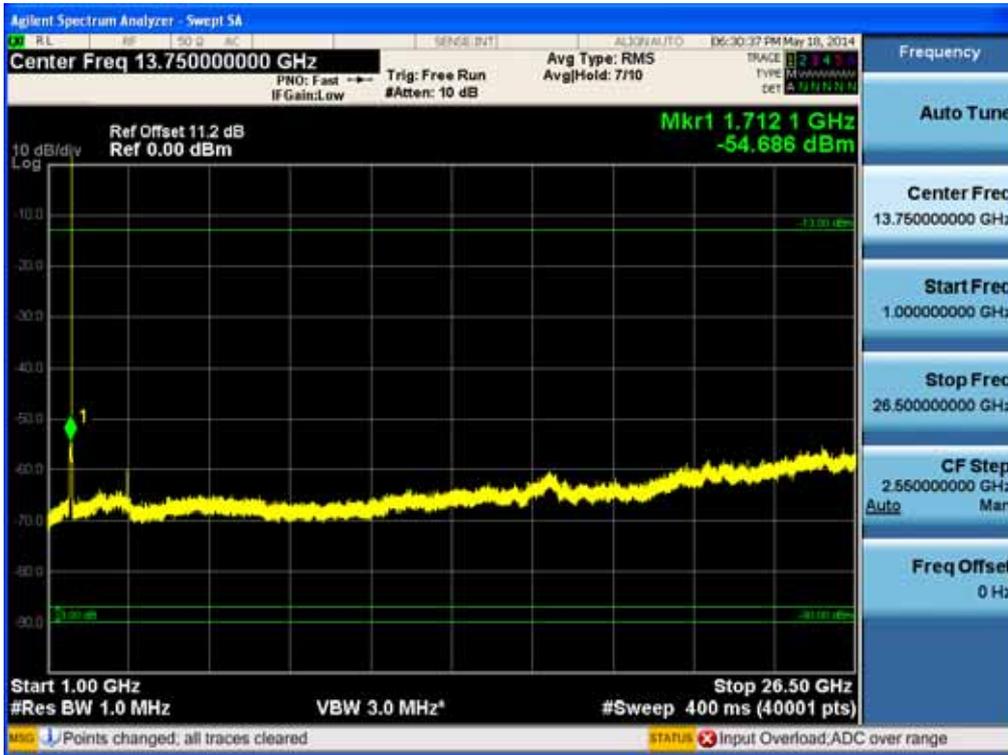
[CDMA Uplink Low]



[CDMA Uplink Middle]



[CDMA Uplink High]



[LTE Uplink Low]



[LTE Uplink Middle]

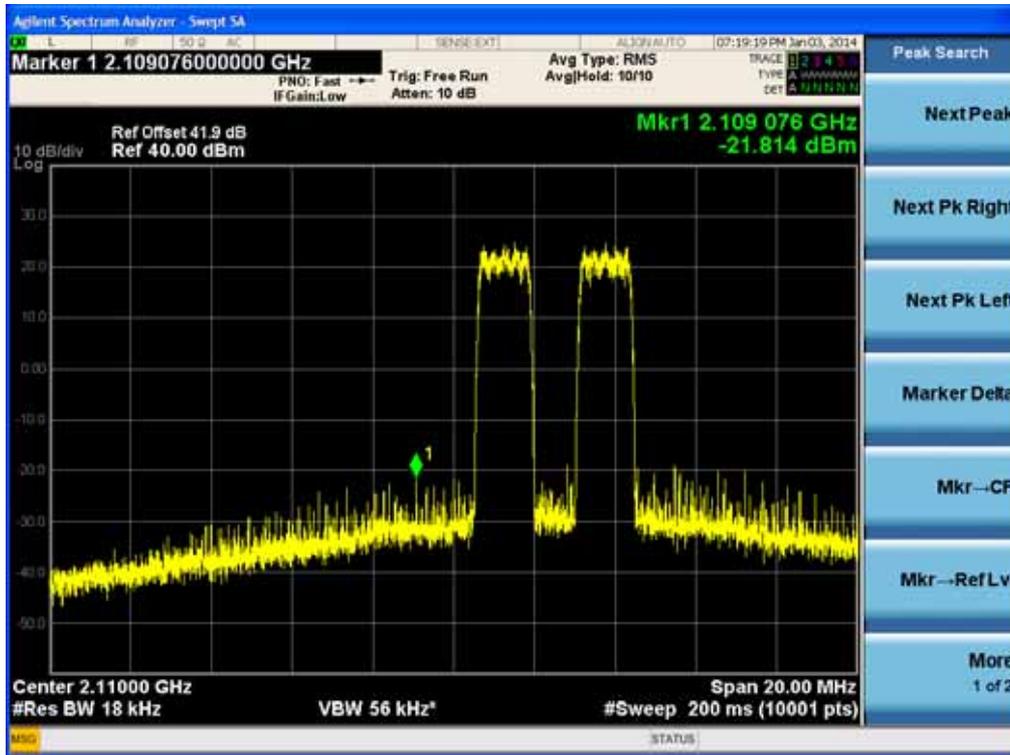


[LTE Uplink High]

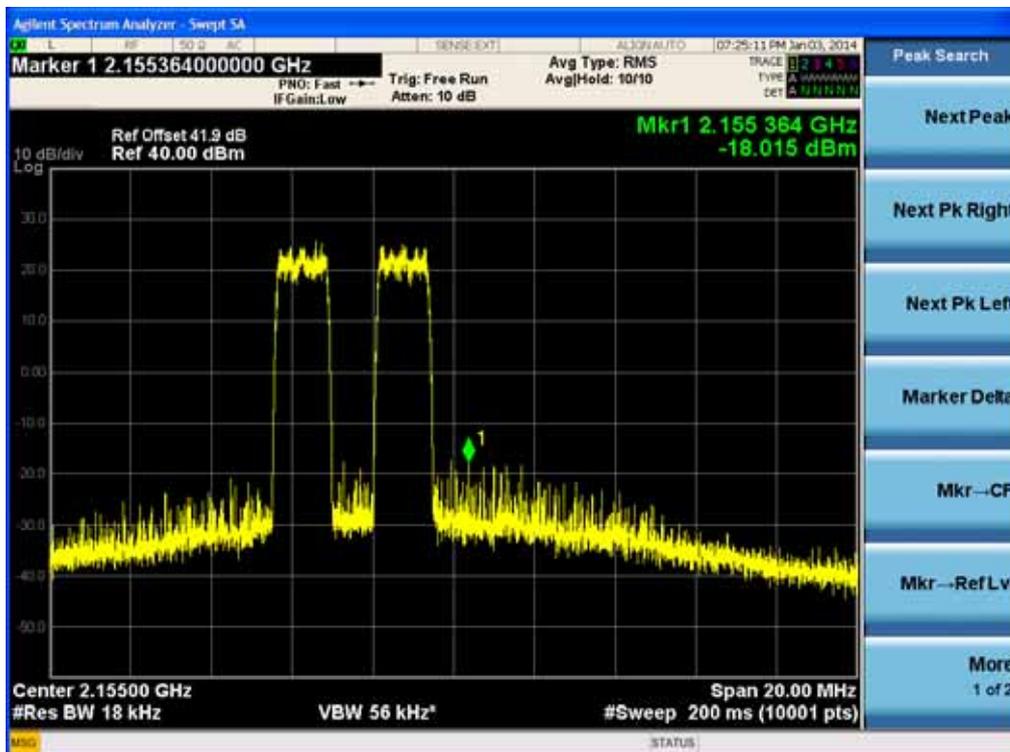


Intermodulation Spurious Emissions

[CDMA Downlink Low]



[CDMA Downlink High]



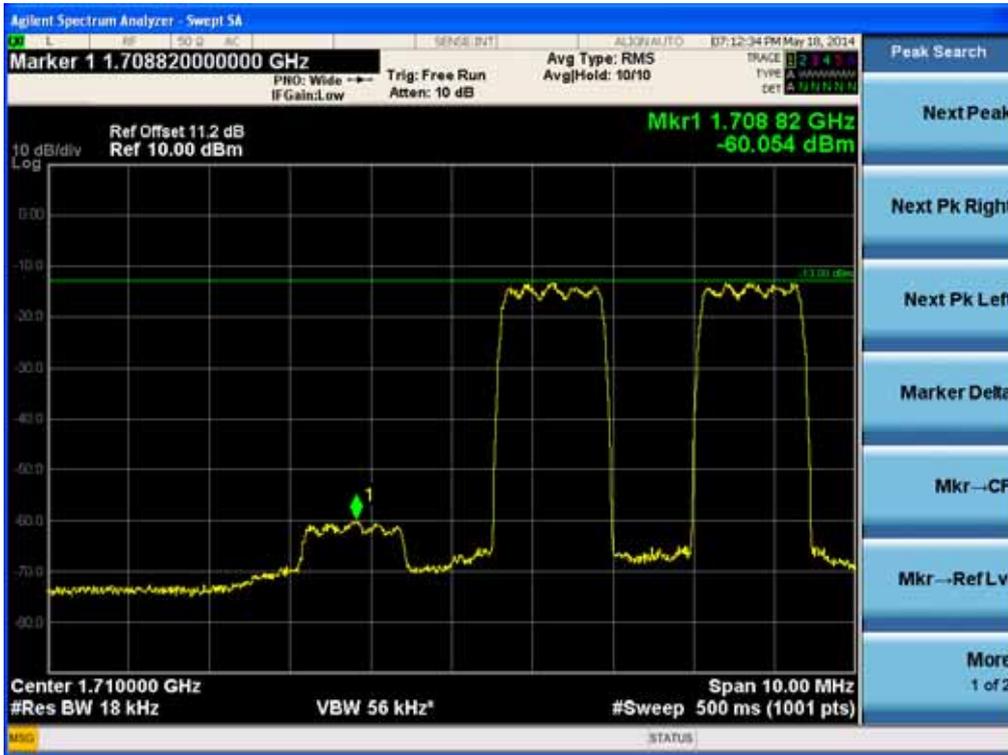
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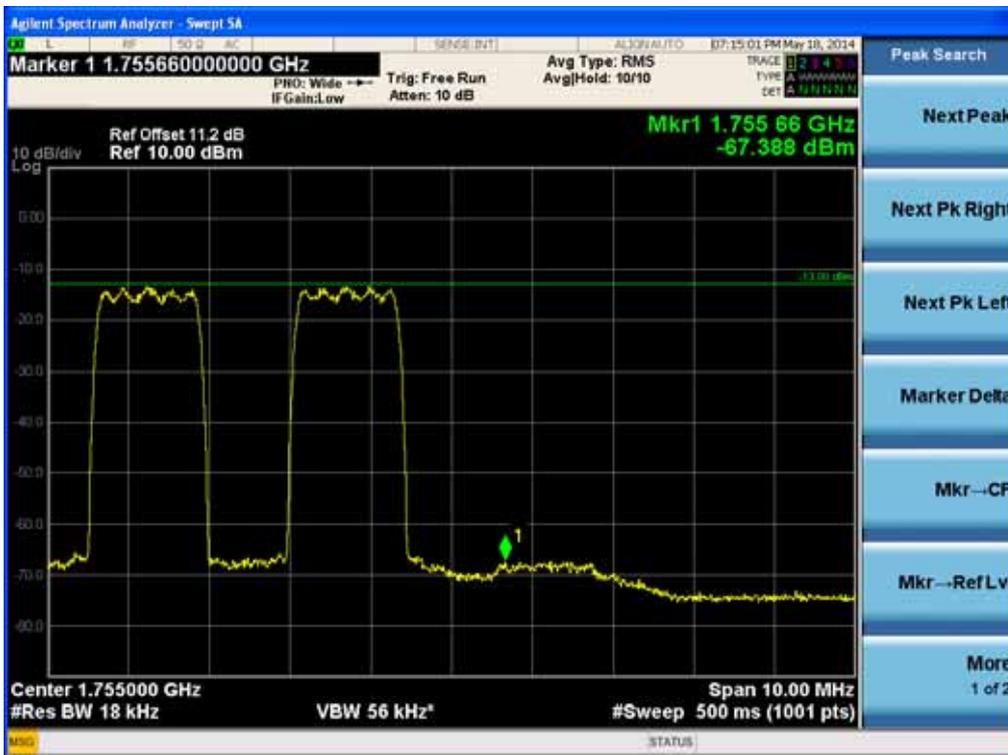
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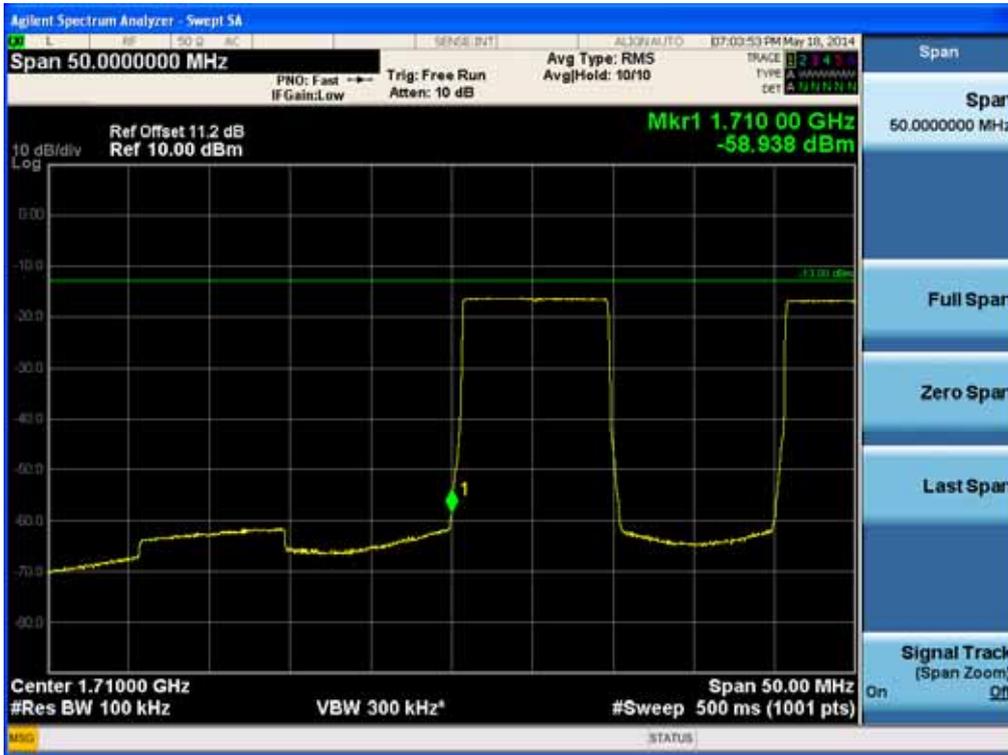
[CDMA Uplink Low]



[CDMA Uplink High]



[LTE Uplink Low]

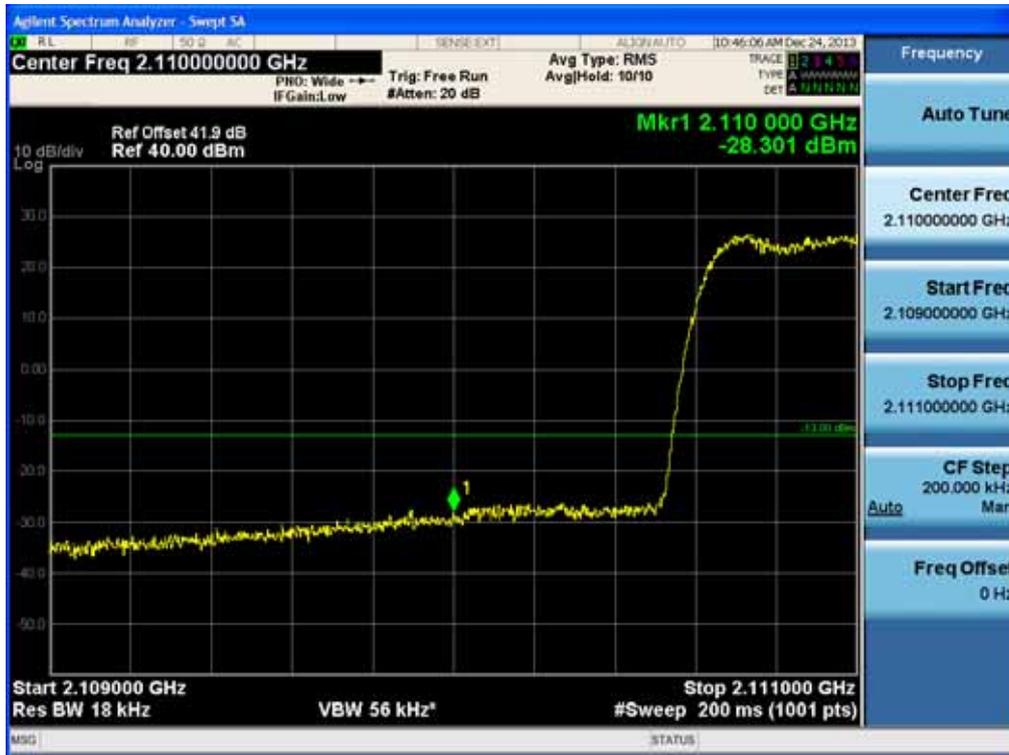


[LTE Uplink High]

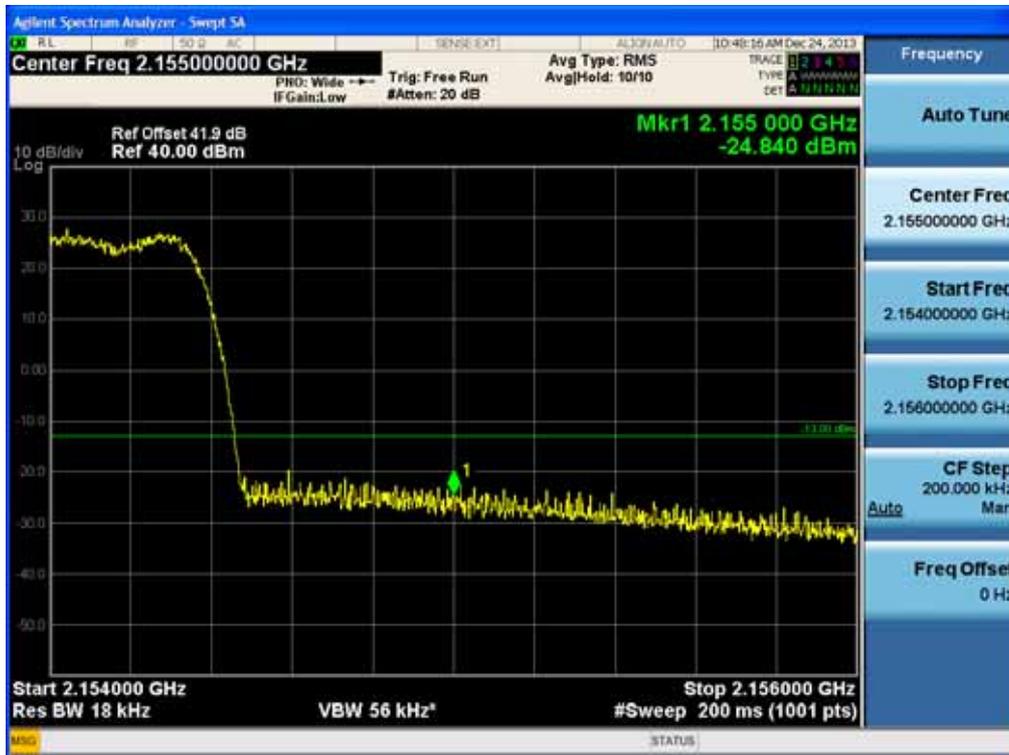


Band Edge

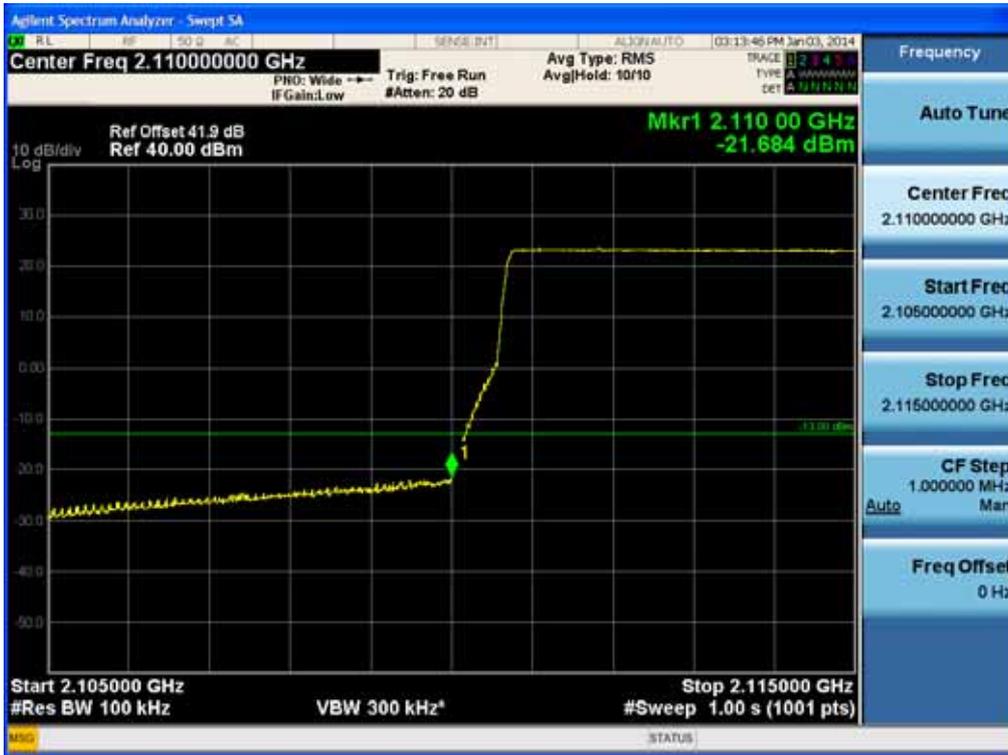
[CDMA Downlink Low]



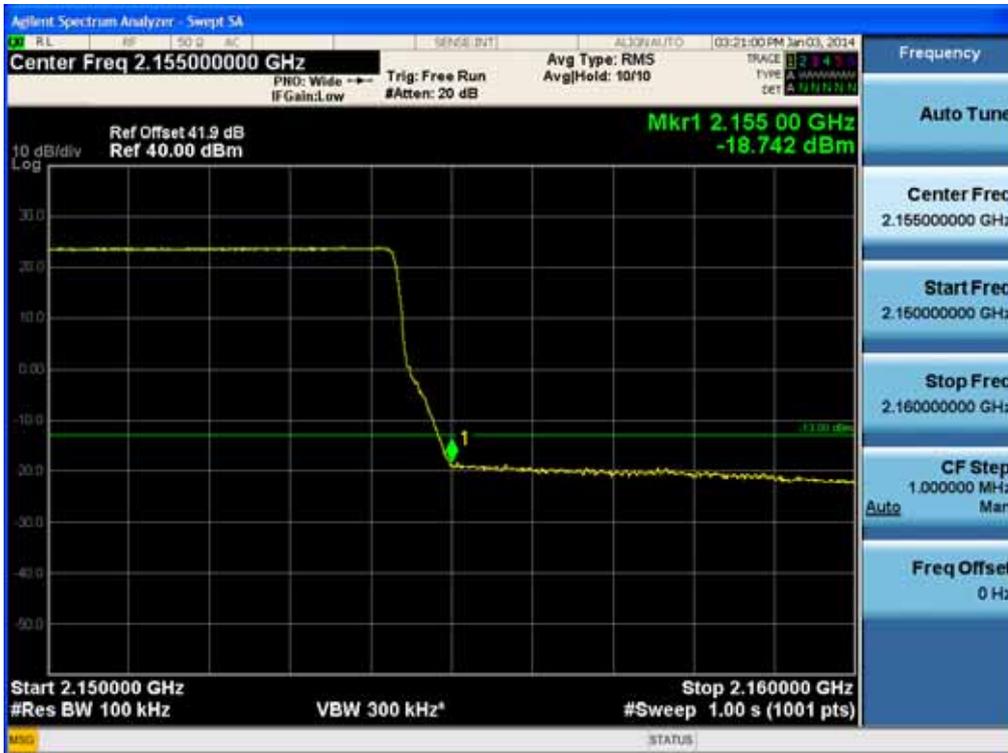
[CDMA Downlink High]



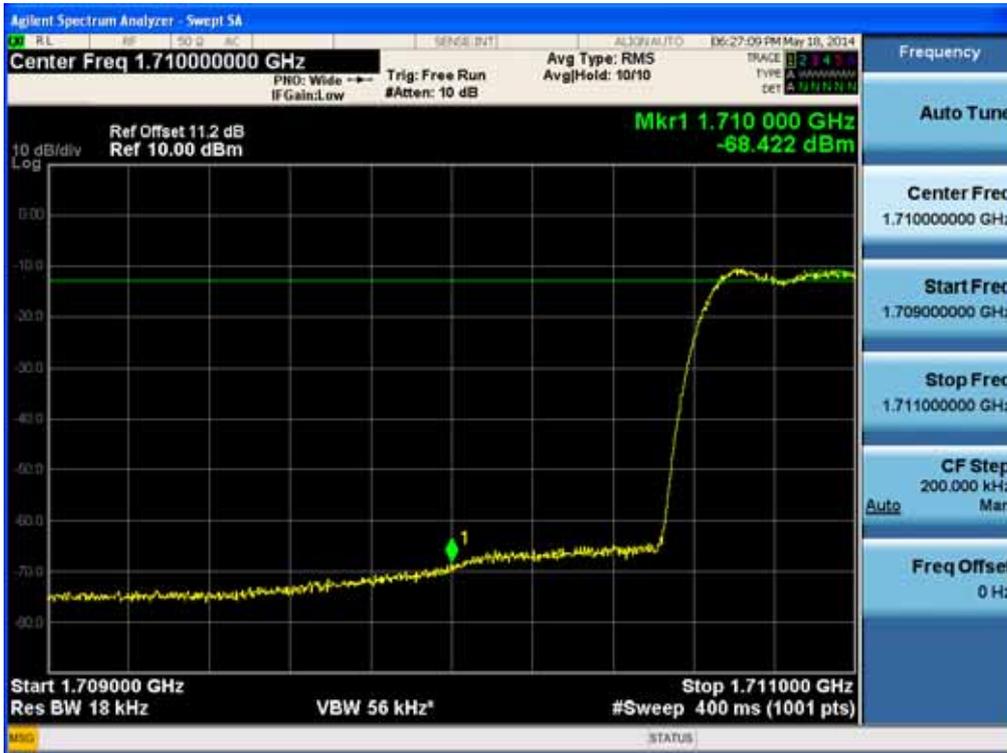
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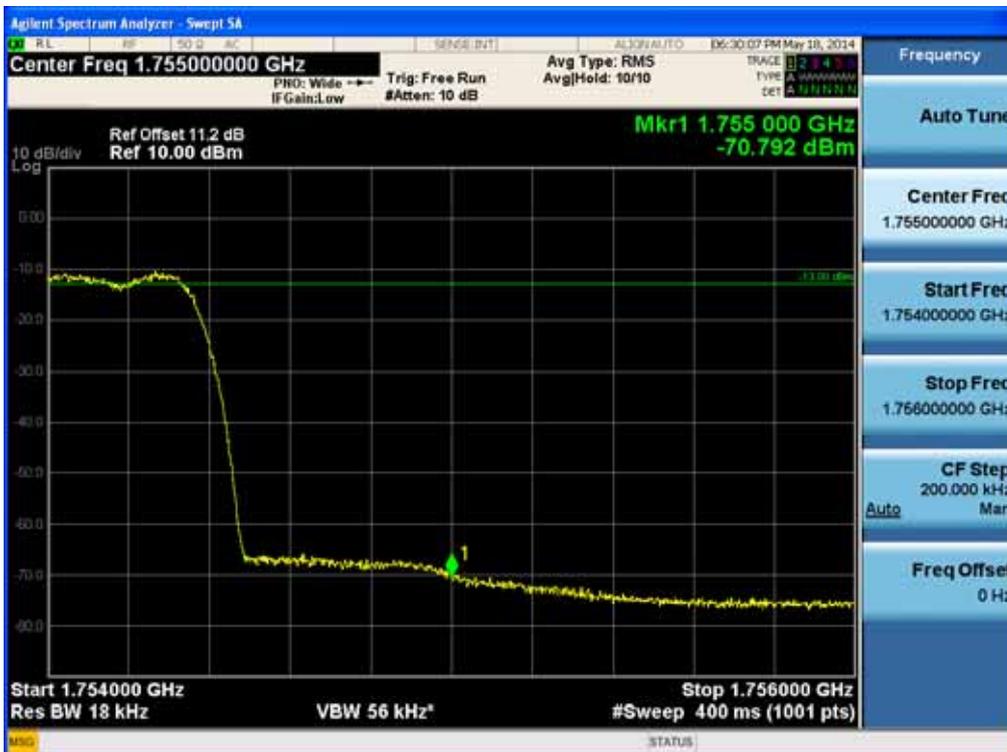
[LTE Downlink High]



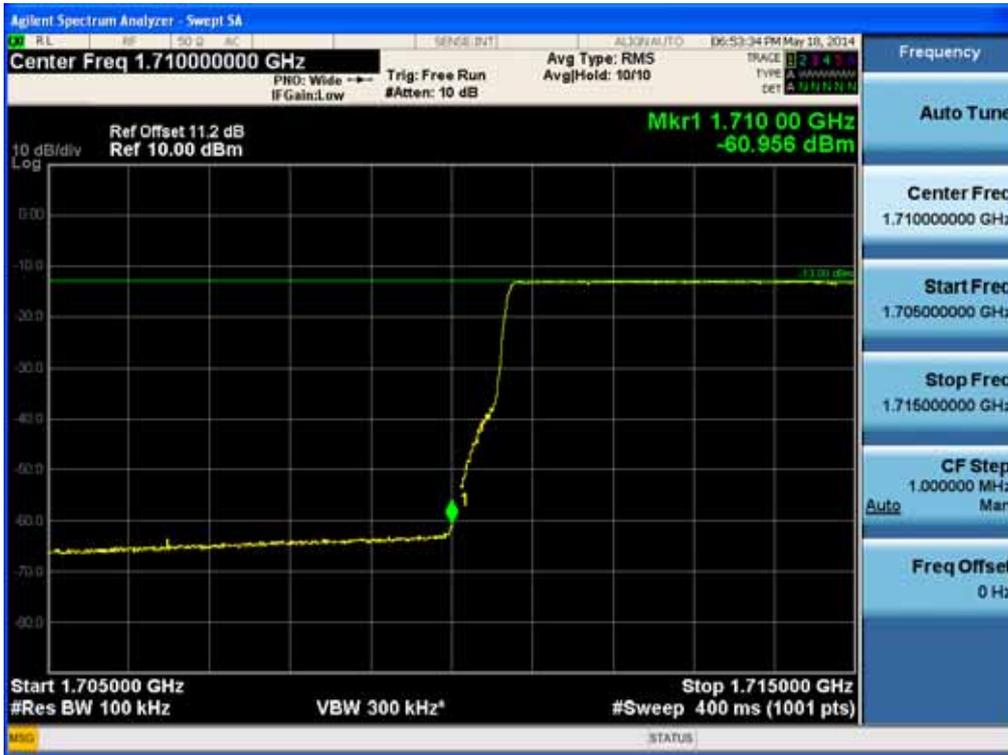
[CDMA Uplink Low]



[CDMA Uplink High]



[LTE Uplink Low]



[LTE Uplink High]



## 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

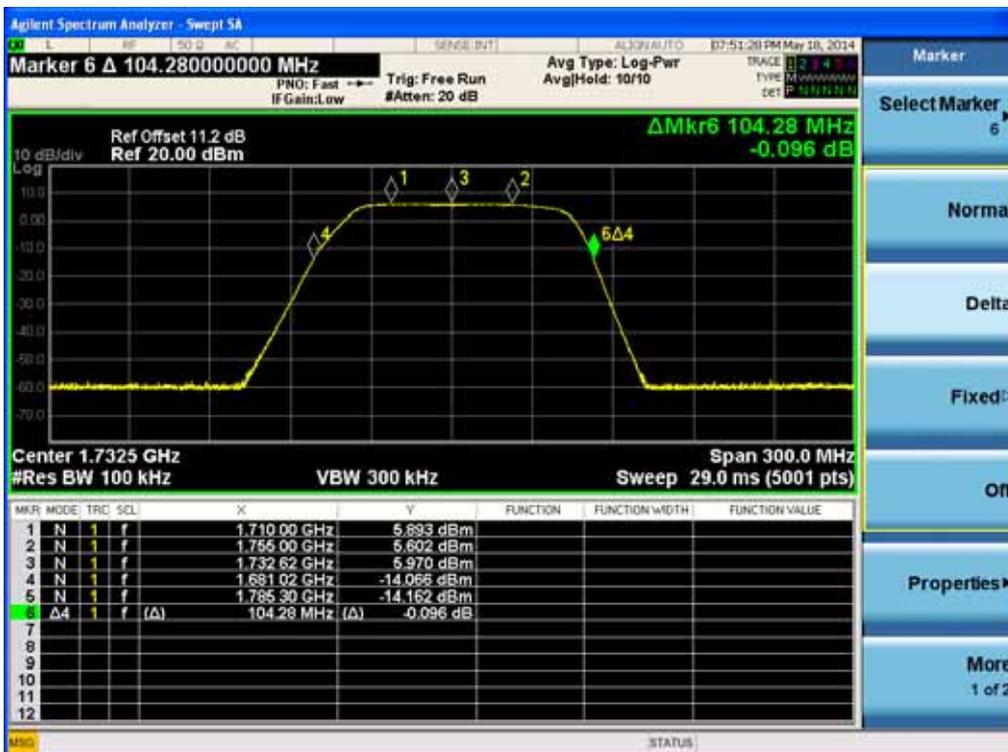
**Test Results:** The EUT complies with the requirements of this section.

Out of Band Rejection

[Downlink]



[Uplink]



## 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.

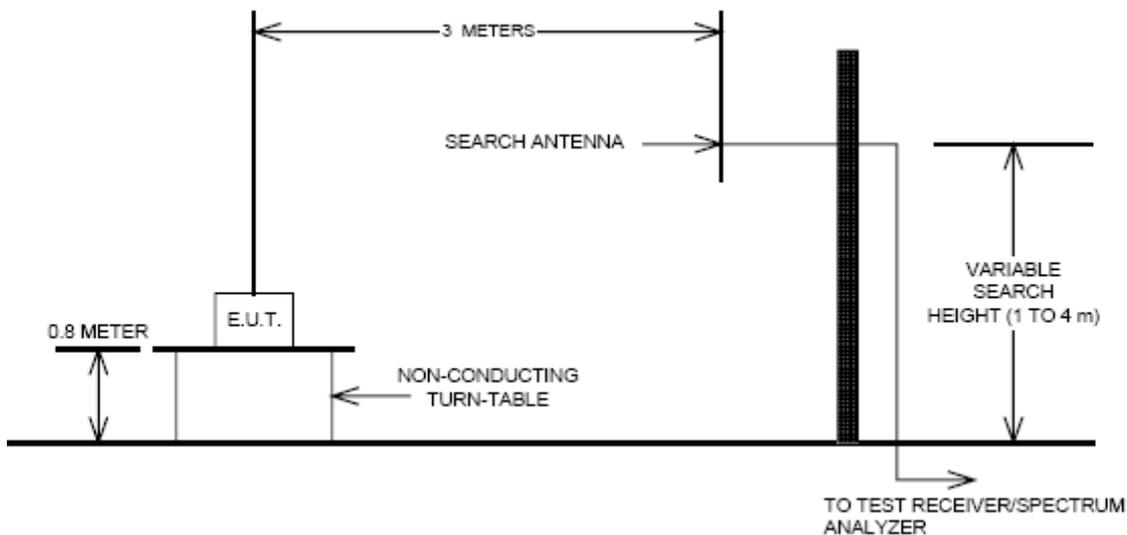
§ 2.1053 (b): The measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (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.

**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 40 GHz, whichever was the lesser, were investigated.

## Radiated Spurious Emissions Test Setup



**Test Result:**

**[Downlink]**

Mode	Frequency	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBi)	C.L	Pol.	EIRP (dBm)	Margin (dB)
CDMA	2132.5	4265	-42.27	12.73	8.71	H	-43.26	30.26
		6398	-46.73	13.11	10.99	H	-44.61	31.61
LTE	2132.5	4265	-48.87	12.73	8.71	H	-44.86	31.86
		6398	-48.01	13.11	10.99	H	-45.89	32.89

**[Uplink]**

Mode	Frequency	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBi)	C.L	Pol.	EIRP (dBm)	Margin (dB)
CDMA	1732.5	3465	-49.45	12.25	7.53	H	-44.73	31.73
		5198	-48.64	12.68	9.73	H	-45.70	32.70
LTE	1732.5	3465	-51.14	12.25	7.53	H	-46.42	33.42
		5198	-49.04	12.68	9.73	H	-46.10	33.10

## 11. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

**Test Requirement(s):** §2.1055(a)(1) , § 27.54

**Test Procedures:**

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

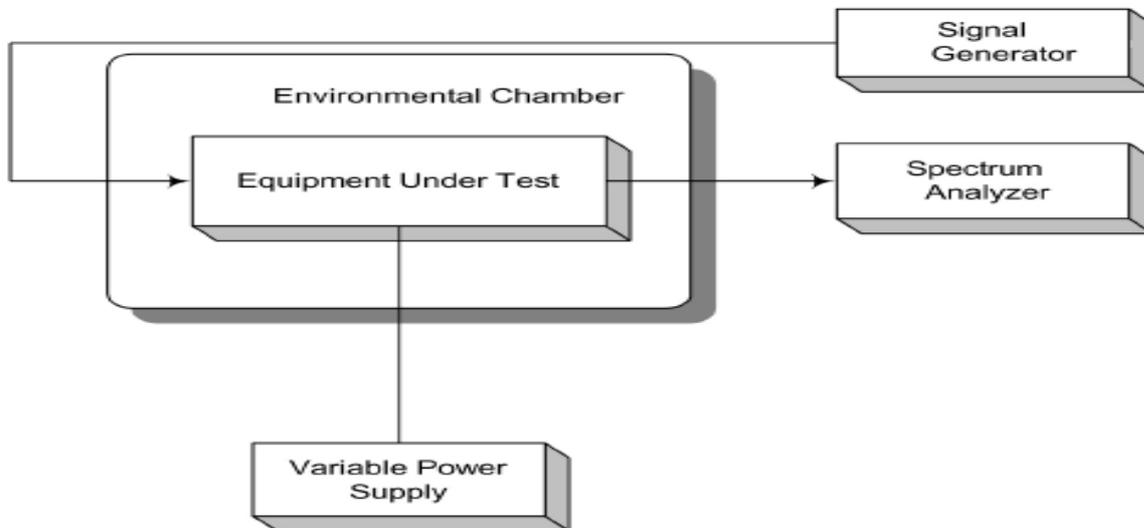
The EUT was placed in the Environmental Chamber.

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. = 2135.0 MHz**

Voltage (%)	Temp. ( )	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	2132 500 000	0.0	0.0	0.0000
	-30	2132 500 000	0.0	0.0	0.0000
	-20	2132 500 000	0.0	0.0	0.0000
	-10	2132 500 000	0.0	0.0	0.0000
	0	2132 500 000	0.0	0.0	0.0000
	+10	2132 500 000	0.0	0.0	0.0000
	+30	2132 500 000	0.0	0.0	0.0000
	+40	2132 500 000	0.0	0.0	0.0000
	+50	2132 500 000	0.0	0.0	0.0000
115%	+20	2132 500 000	0.0	0.0	0.0000
85%	+20	2132 500 000	0.0	0.0	0.0000

[Downlink]

**Reference: 110 Vac at 20°C      Freq. = 1732.5 MHz**

Voltage (%)	Temp. ( )	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1732 500 000	0.0	0.0	0.0000
	-30	1732 500 000	0.0	0.0	0.0000
	-20	1732 500 000	0.0	0.0	0.0000
	-10	1732 500 000	0.0	0.0	0.0000
	0	1732 500 000	0.0	0.0	0.0000
	+10	1732 500 000	0.0	0.0	0.0000
	+30	1732 500 000	0.0	0.0	0.0000
	+40	1732 500 000	0.0	0.0	0.0000
	+50	1732 500 000	0.0	0.0	0.0000
115%	+20	1732 500 000	0.0	0.0	0.0000
85%	+20	1732 500 000	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 <sup>2</sup> )	Averaging time (minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/ f <sup>2</sup> )	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	.....	.....	f/1500	30
1500 - 100.000	.....	.....	1.0	30

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	42.87	dBm
Max Peak output Power at antenna input terminal	19364.2	mW
Prediction distance	100.0000	cm
Prediction frequency	2132.500	MHz
Antenna Gain(typical)	3.00000	dBi
Antenna Gain(numeric)	1.99526	-
Power density at prediction frequency (S)	0.307461	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm <sup>2</sup>

## 2-2 Limit (Up Link)

Max Peak output Power at antenna input terminal	5.9800	dBm
Max Peak output Power at antenna input terminal	3.963	mW
Prediction distance	100.0000	cm
Prediction frequency	1711.250	MHz
Antenna Gain(typical)	3.00000	dBi
Antenna Gain(numeric)	1.99526	-
Power density at prediction frequency (S)	0.000063	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm <sup>2</sup>

## 3. RESULTS

The power density level at 100 cm is 0.307461 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0 mW/cm<sup>2</sup> at Down Link

The power density level at 100 cm is 0.000063mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 1.0 mW/cm<sup>2</sup> at Up Link

Simultaneous MPE at 100 cm is  $(0.307461/1.0) + (0.000063/1.0) = 0.3075241 < 1.0$