HCT. CO., LTD.
CERTIFICATION DIVISION
105-1, JANGAM-RI, MAJANG-MYEON, ICHEON-SI, KYUNGGI-DO, KOREA
TEL : +82 31 645 6300 FAX : +82 31 645 6401

CERTIFICATE OF COMPLIANCE (ERM EVALUATION)

Manufacture: Advanced RF Technologies, Inc

3116 West VANOWEN STREET, BURBANK, CA 91505 U.S.A

Date of Issue:
January 19, 2012
Location:
HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea
Test Report No.: HCTR1201FR21
HCT FRN: 0005866421
IC Recognition No.: 5944A-3

FCC ID:	**S2O-SDR-A**
IC :	**6416A-SDRA**
APPLICANT:	**Advanced RF Technologies, Inc**
EUT Type:	**Software Define Modular Repeater**
Model:	**SDR-A**
Frequency Ranges:	**DL : 2110 MHz ~ 2155 MHz** **UL : 1710 MHz ~ 1755 MHz**
Conducted Output Power:	**DL : 30.08 dBm** **UL : 29.97 dBm**
FCC Rules Part(s):	**CFR 47, Part 27**
IC Rule Part(s):	**RSS-Gen (December 2010) , RSS-131 (July 2003)**

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.

Chang Seok Choi

Report prepared by
:Chang Seok Choi
Test engineer of RF Team

Sang Jun Lee

Approved by
: Sang Jun Lee
Manager of RF Team

CONTENTS

1. CLIENT INFORMATION

The EUT has been tested by request of

Company	Advanced RF Technologies, Inc 3116 WEST VANOWEN STREET, BURBANK, CA 91505 U.S.A
Contact Point	Attention: Ms. Julie Song Tel. : 800-313-9345

■ **FCC ID:**	**S2O-SDR-A**
■ **IC ID:**	**6416A-SDRA**
■ **APPLICANT:**	**Advanced RF Technologies, Inc**
■ **EUT Type:**	**Software Define Modular Repeater**
■ **Model:**	**SDR-A**
■ **Frequency Ranges:**	**DL : 2110 MHz ~ 2155 MHz** **UL : 1710 MHz ~ 1755 MHz**
■**ConductedOutput Power:**	**DL : 30.08 dBm** **UL : 29.97 dBm**
■ **Antenna Gain(s) :**	**DL(2110 ~ 2155 MHz) : 12 dBi** **UL(1710 ~ 1755 MHz) : 0 dBi**
■ **FCC Rules Part(s):**	**CFR Title 47 Part 27**
■ **IC Rules Part(s):**	**RSS-Gen (December 2010) , RSS-131 (July 2003)**
■ **Place of Tests:**	**105-1, Jangam-ri , Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA. (IC Recognition No. : 5944A-3)**

2. TEST SPECIFICATIONS

Description	Reference (FCC)	Reference (IC)	Results
RF Power Output	§2.1046; §27.50	RSS-GEN, Section 4.8 RSS-131, Section 4.3	Compliant
Occupied Bandwidth	§2.1049	RSS-131, Section 4.2 RSS-GEN, Section 4.6.1	Compliant
Spurious Emissions at Antenna Terminals	§2.1053, §27.53	RSS-131, Section 4.4 RSS-GEN, Section 4.9	Compliant
Radiated Spurious Emissions	§2.1053, §27.53	RSS-131, Section 4.4 RSS-GEN, Section 4.9	Compliant
Frequency Stability	§2.1055, §27.54	RSS-131, Section 4.5 RSS-GEN, Section 4.7	Compliant
Receiver Spurious	-	RSS-131, Section 4.4 RSS-GEN, Section 4.10	Compliant

3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

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

4. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Due	Serial No.
Agilent	E4438C /Signal Generator	Annual	11/08/2012	MY42082646
Agilent	N5182A /Signal Generator	Annual	08/23/2012	MY50141649
Agilent	E4416A /Power Meter	Annual	11/07/2012	GB41291412
Agilent	E9327A/ Power Sensor	Annual	05/02/2012	MY4442009
Korea Eng	KR-1005L/ Temperature and Humidity Chamber	Annual	11/07/2012	KRAC05063-3CH
Agilent	N9020A /Signal Analyzer	Annual	06/10/2012	MY51110020
Agilent	8498A /ATTENUATOR	Annual	11/07/2012	51162
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	12/26/2012	990893
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	10/17/2013	937
Schwarzbeck	VULB 9168/TRILOG Antenna	Biennial	02/09/2013	9168-200

5. 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 limits and duty cycle.

(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, is limited to:

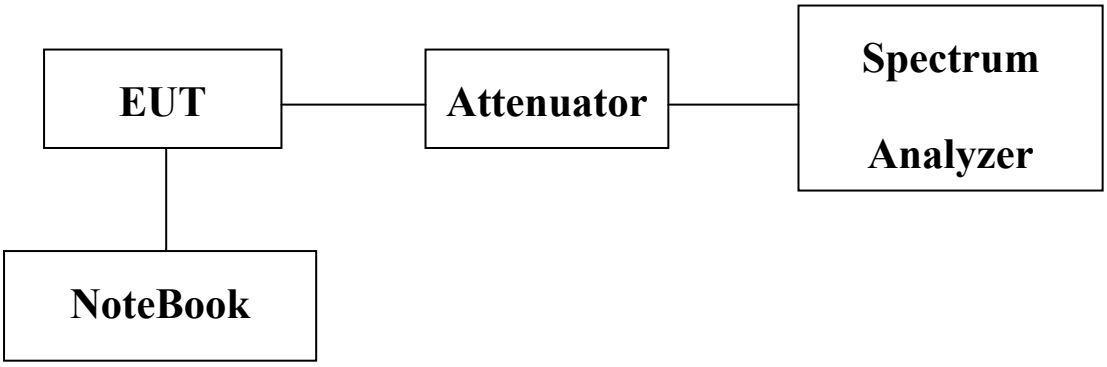
(A) an equivalent isotropically radiated power (EIRP) of 3280 watts when transmitting with an emission bandwidth of 1 MHz or less;

(B) an EIRP of 3280 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	QPSK	-60.0
WCDMA	QPSK	-59.3
LTE	16QAM	-60.0

[Downlink]

	Channel	Frequency (MHz)	Output Power (dBm)
CDMA	Low	2111.25	29.95
	Middle	2132.5	29.96
	High	2153.75	29.99
WCDMA	Low	2112.4	29.97
	Middle	2136.9	30.08
	High	2152.6	29.94
LTE	Low	2115.0	30.02
	Middle	2135.0	29.98
	High	2150.0	30.02

[Uplink]

	Channel	Frequency (MHz)	Output Power (dBm)
CDMA	Low	1711.25	29.03
	Middle	1732.5	29.11
	High	1753.75	29.02
WCDMA	Low	1712.4	29.14
	Middle	1736.9	29.22
	High	1752.6	29.13
LTE	Low	1715.0	29.97
	Middle	1735.0	29.97
	High	1750.0	29.96

Plots of RF Output Power

[CDMA Downlink Low]

[CDMA Downlink Middle]

[CDMA Downlink High]

[WCDMA Downlink Low]

[WCDMA Downlink Middle]

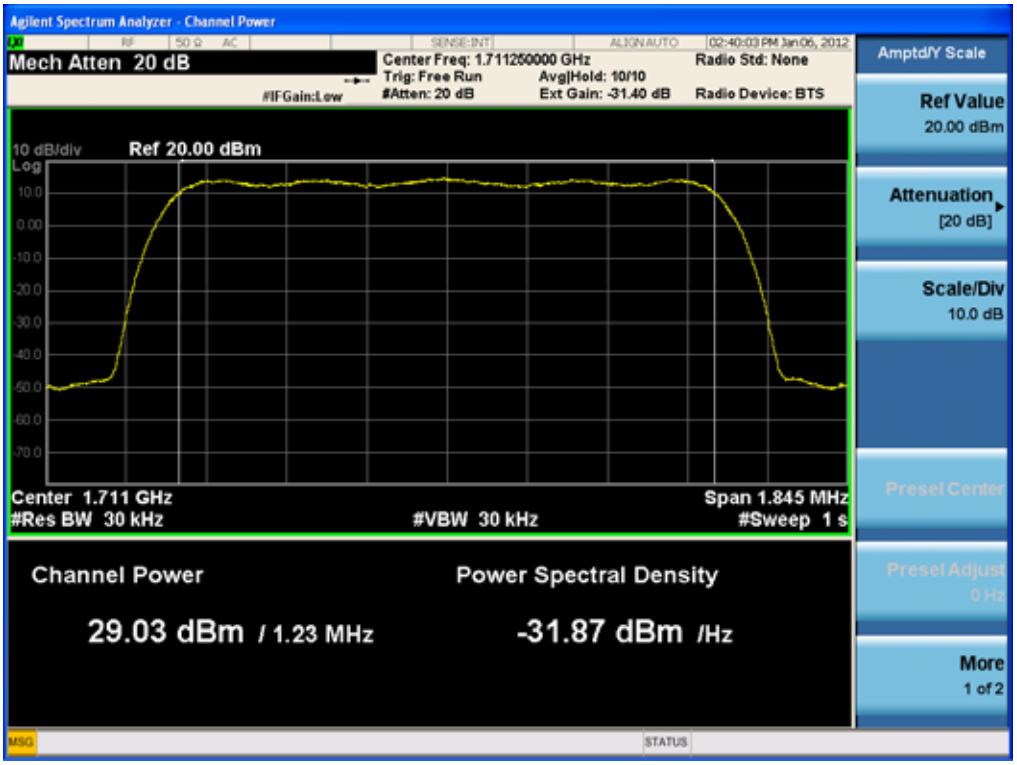
[WCDMA Downlink High]

[LTE Downlink Low]

[LTE Downlink Middle]

[LTE Downlink High]

[CDMA Uplink Low]



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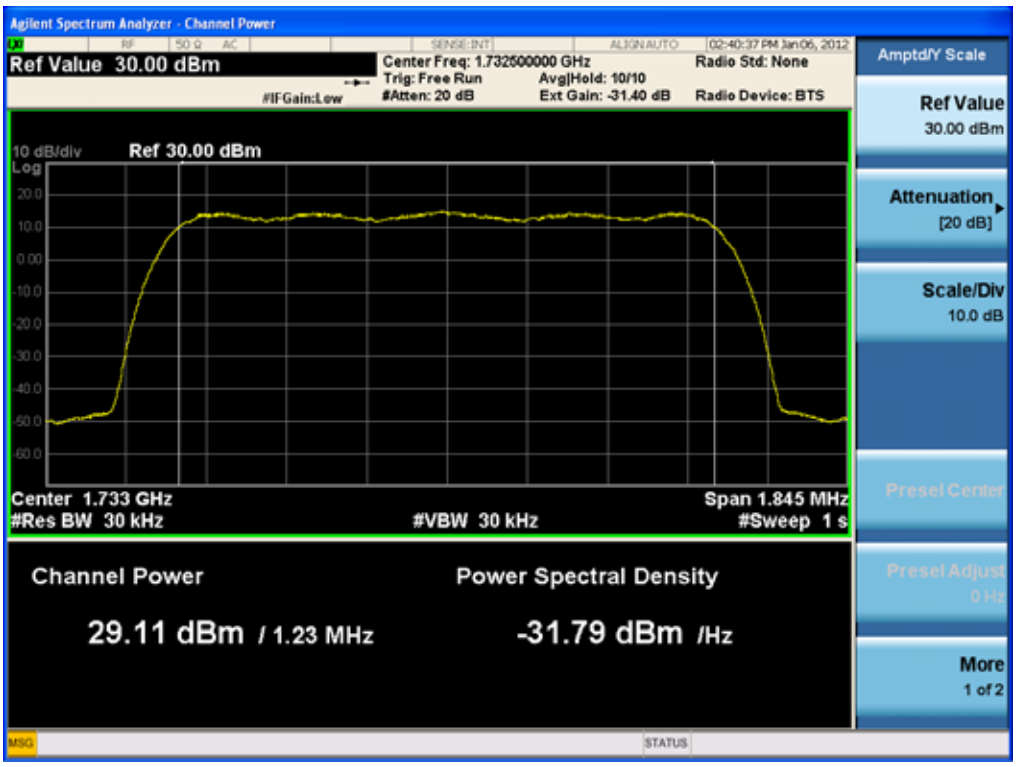

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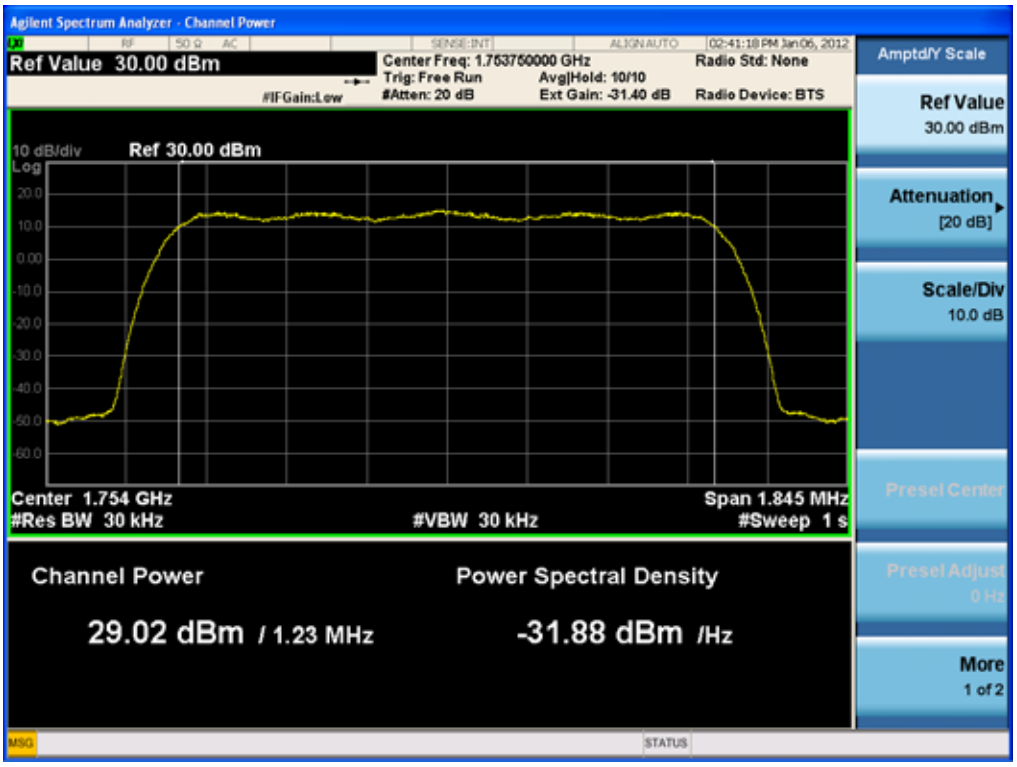
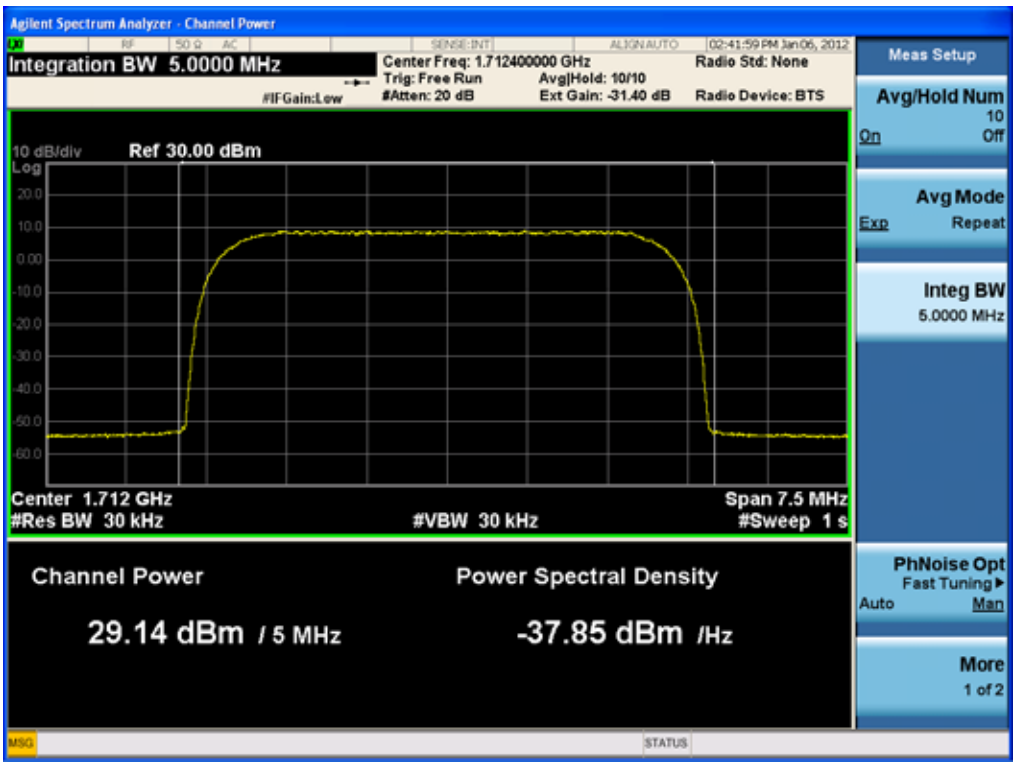
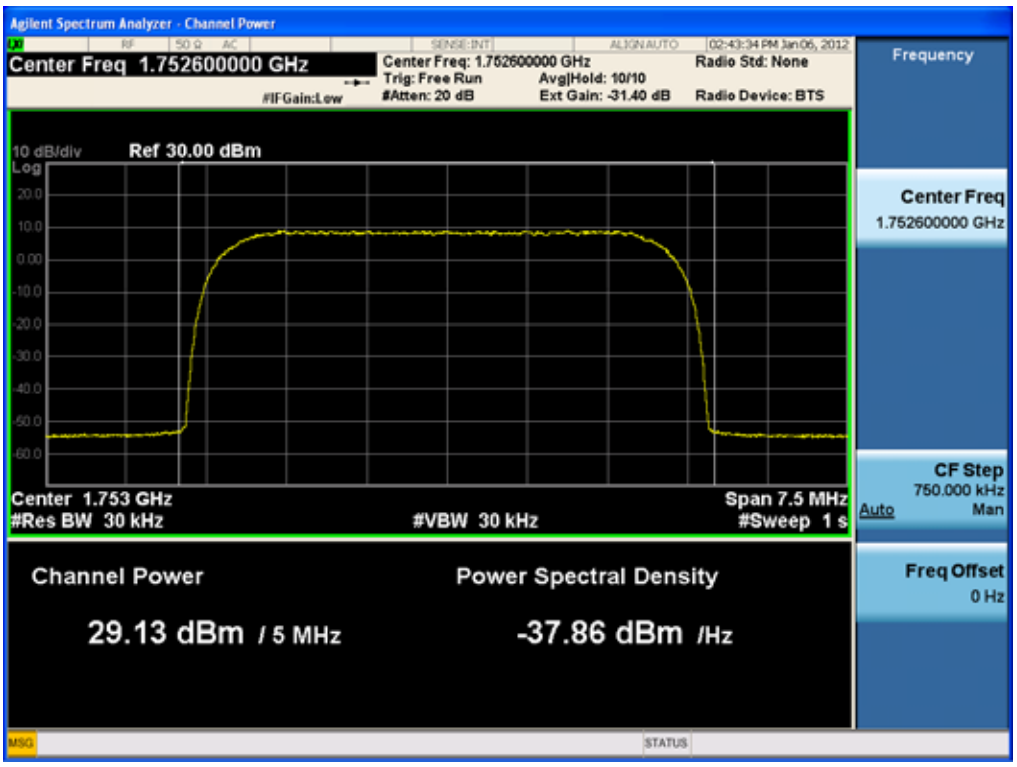


[WCDMA Uplink Low]



[WCDMA Uplink Middle]

[WCDMA Uplink High]



[LTE Uplink Low]

[LTE Uplink Middle]

[LTE Uplink High]

6. 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	QPSK	-60.0
WCDMA	QPSK	-59.3
LTE	16QAM	-60.0

[Downlink Output]

	Channel	Frequency (MHz)	OBW (MHz)
CDMA	Low	2111.25	1.2390
	Middle	2132.5	1.2329
	High	2153.75	1.2363
WCDMA	Low	2112.4	4.1567
	Middle	2136.9	4.1571
	High	2152.6	4.1628
LTE	Low	2115.0	8.9349
	Middle	2135.0	8.9394
	High	2150.0	8.8816

[Downlink Input]

	Channel	Frequency (MHz)	OBW (MHz)
CDMA	Low	2111.25	1.2348
	Middle	2132.5	1.2328
	High	2153.75	1.2321
WCDMA	Low	2112.4	4.2193
	Middle	2136.9	4.1969
	High	2152.6	4.1855
LTE	Low	2115.0	9.1714
	Middle	2135.0	9.1326
	High	2150.0	9.1274

[Uplink Output]

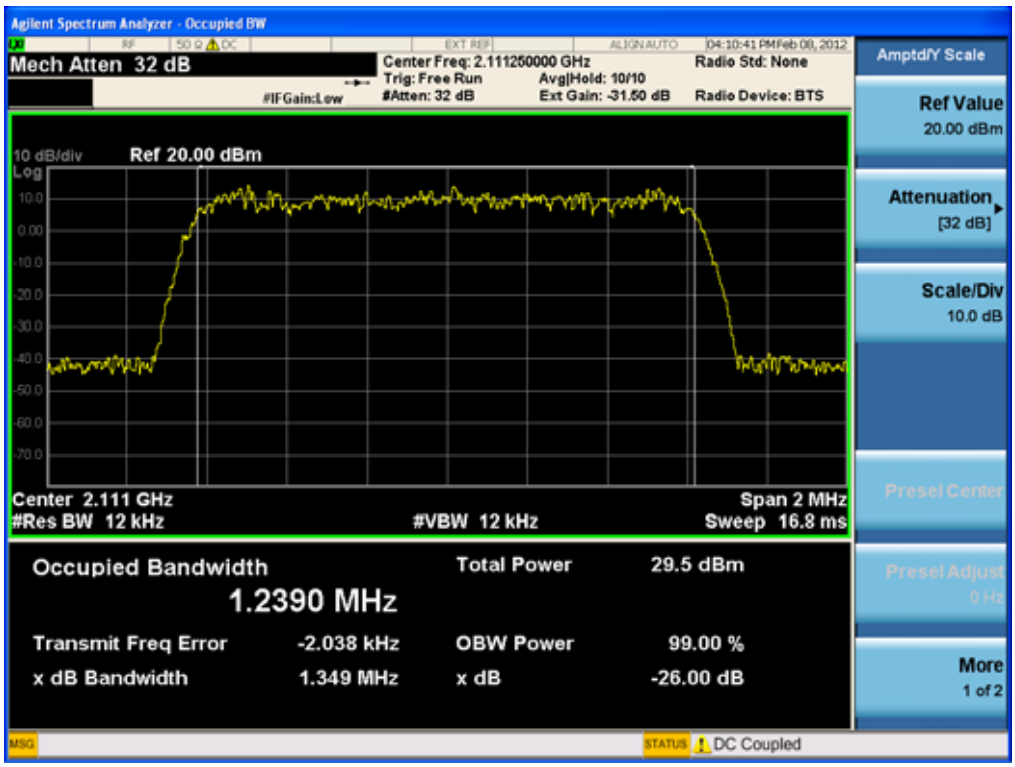
	Channel	Frequency (MHz)	OBW (MHz)
CDMA	Low	1711.25	1.2311
	Middle	1732.5	1.2321
	High	1753.75	1.2285
WCDMA	Low	1712.4	4.1681
	Middle	1736.9	4.1820
	High	1752.6	4.1751
LTE	Low	1715.0	8.9297
	Middle	1735.0	8.9321
	High	1750.0	8.9734

[Uplink Input]

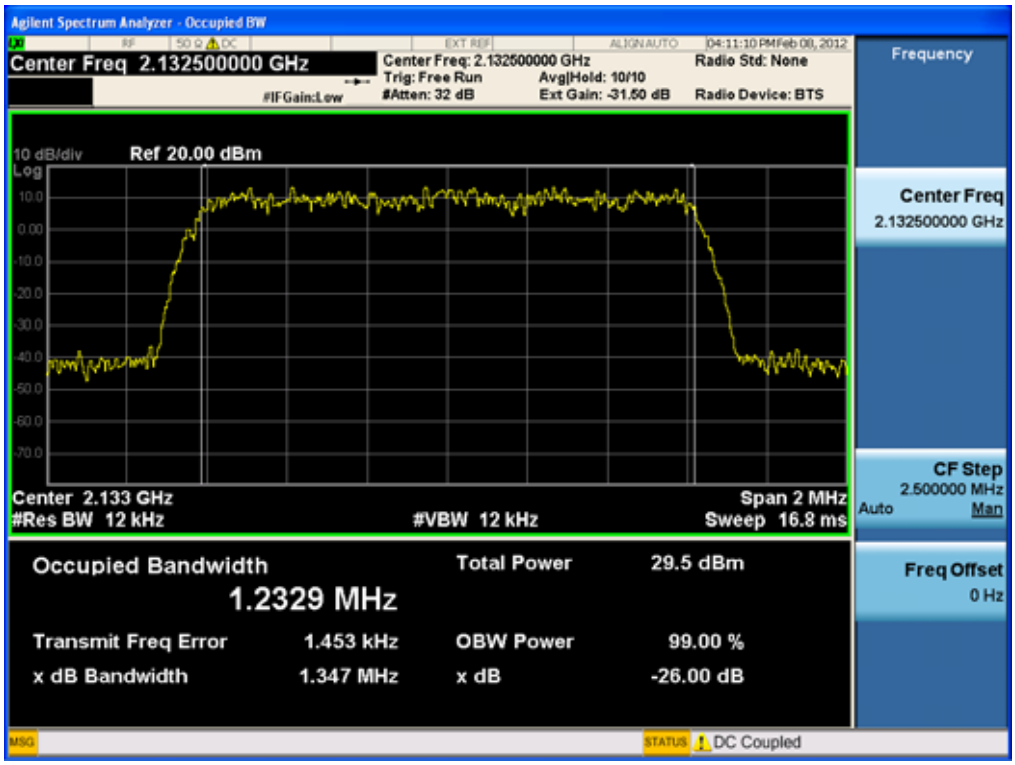
	Channel	Frequency (MHz)	OBW (MHz))
CDMA	Low	1711.25	1.2387
	Middle	1732.5	1.2300
	High	1753.75	1.2287
WCDMA	Low	1712.4	4.2109
	Middle	1736.9	4.2233
	High	1752.6	4.2326
LTE	Low	1715.0	9.1850
	Middle	1735.0	9.0798
	High	1750.0	9.0747

Plots of Occupied Bandwidth

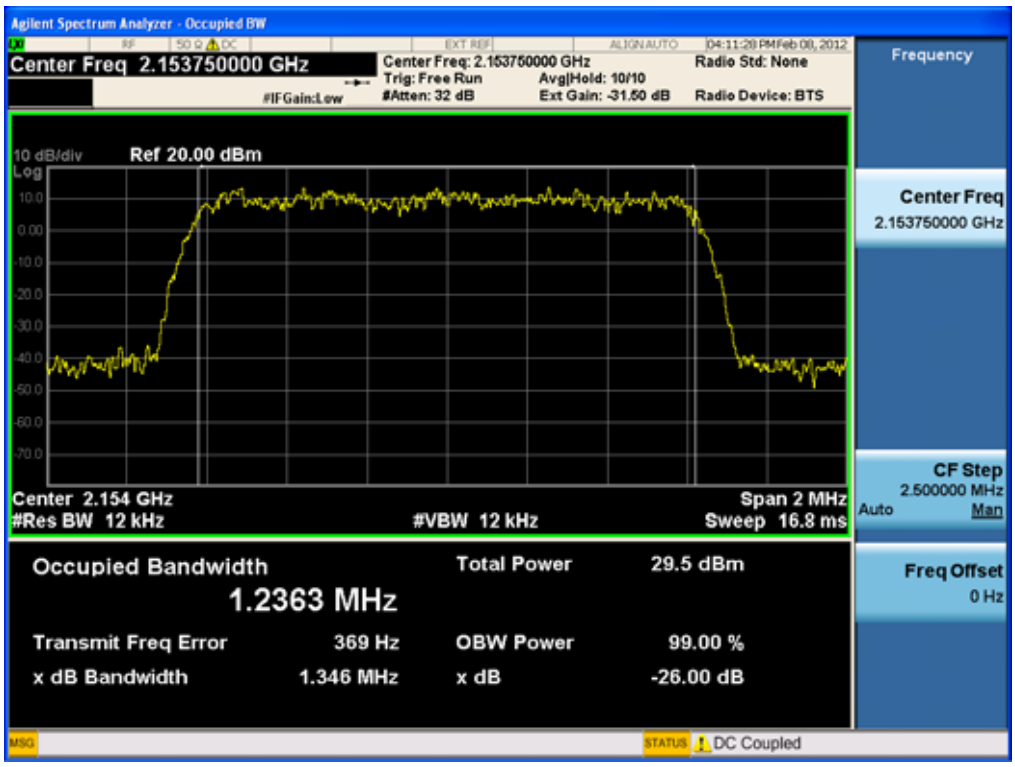
[Output CDMA Downlink Low]



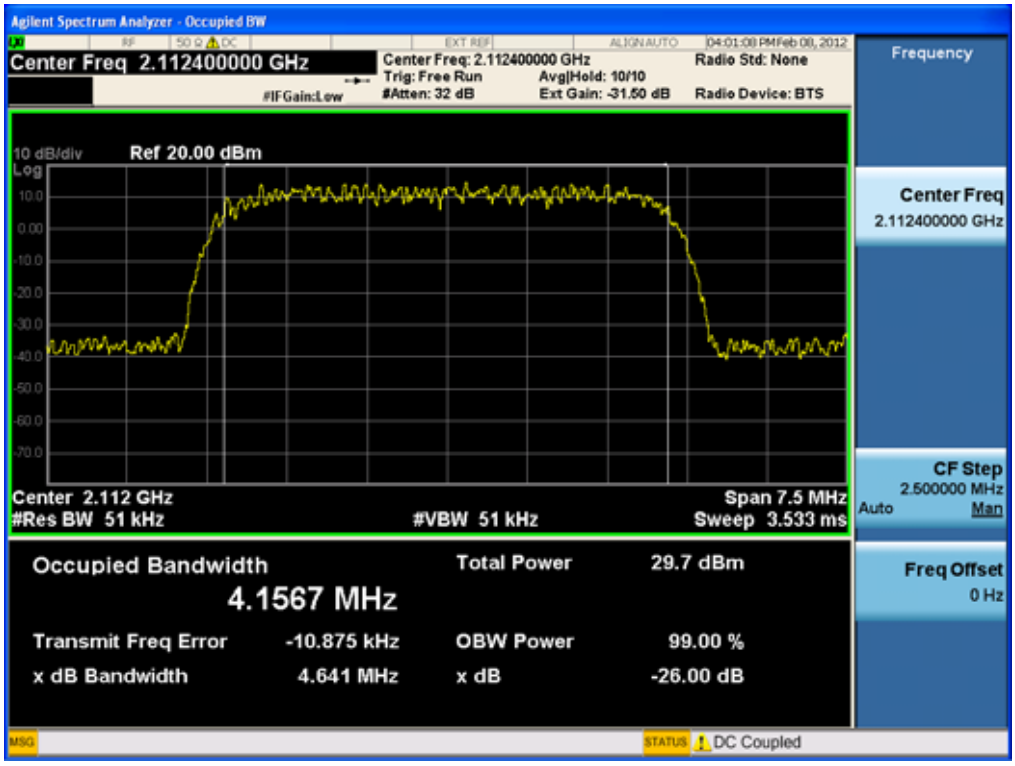
[Output CDMA Downlink Middle]



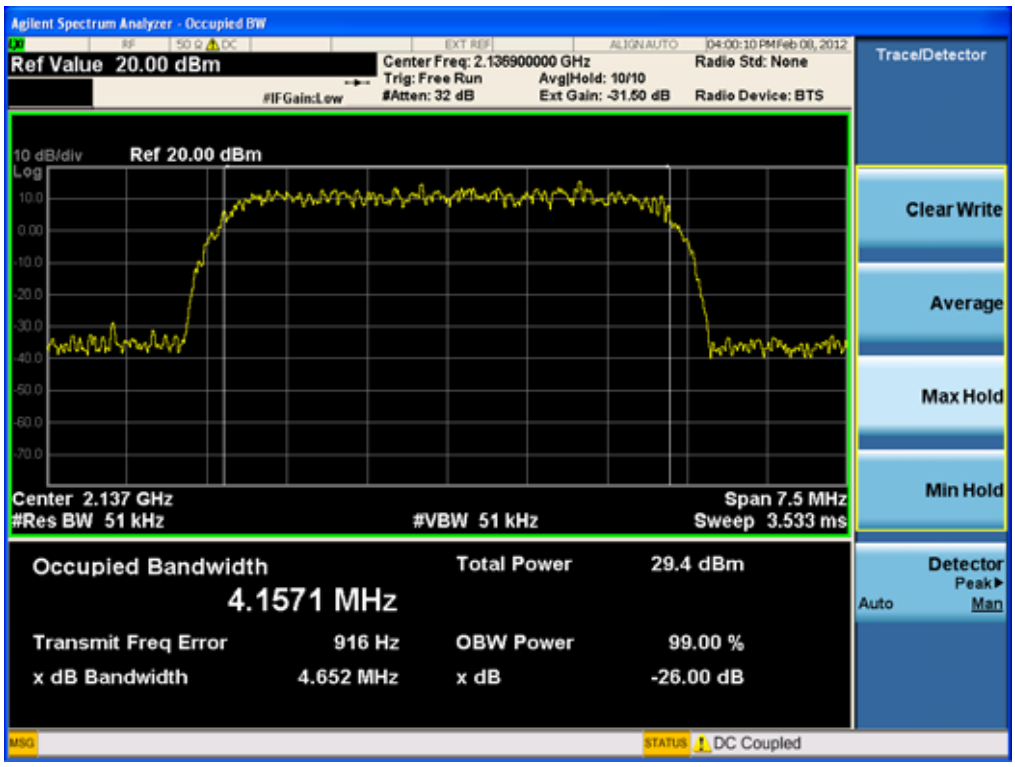
[Output CDMA Downlink High]



[Output WCDMA Downlink Low]



[Output WCDMA Downlink Middle]



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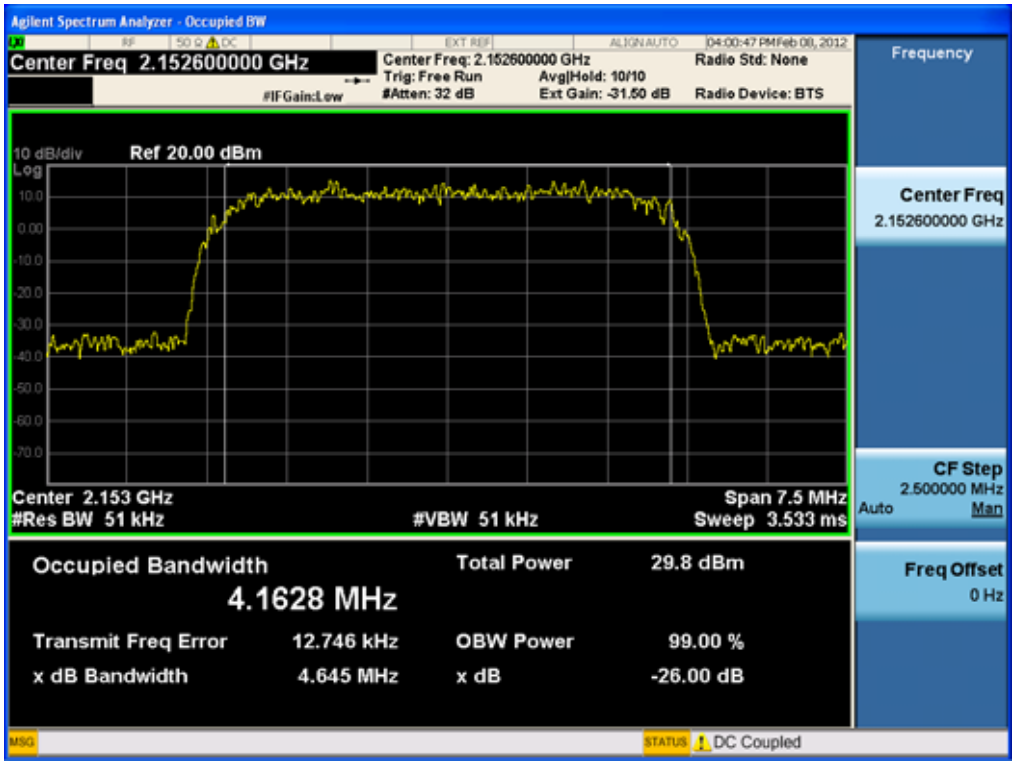

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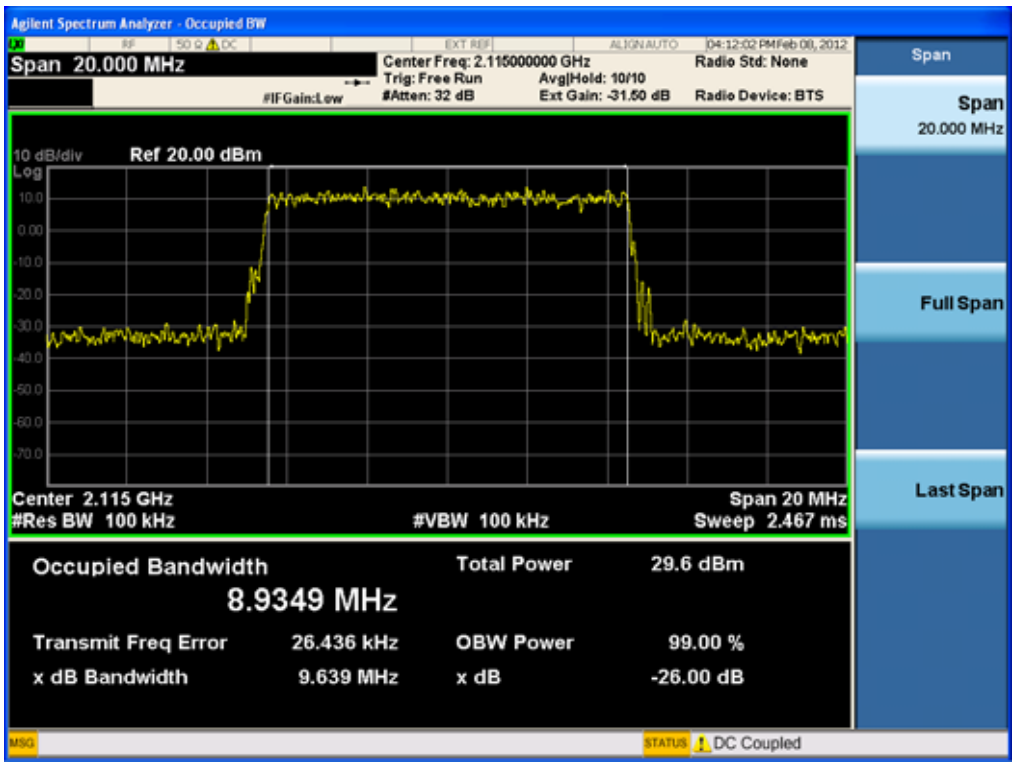

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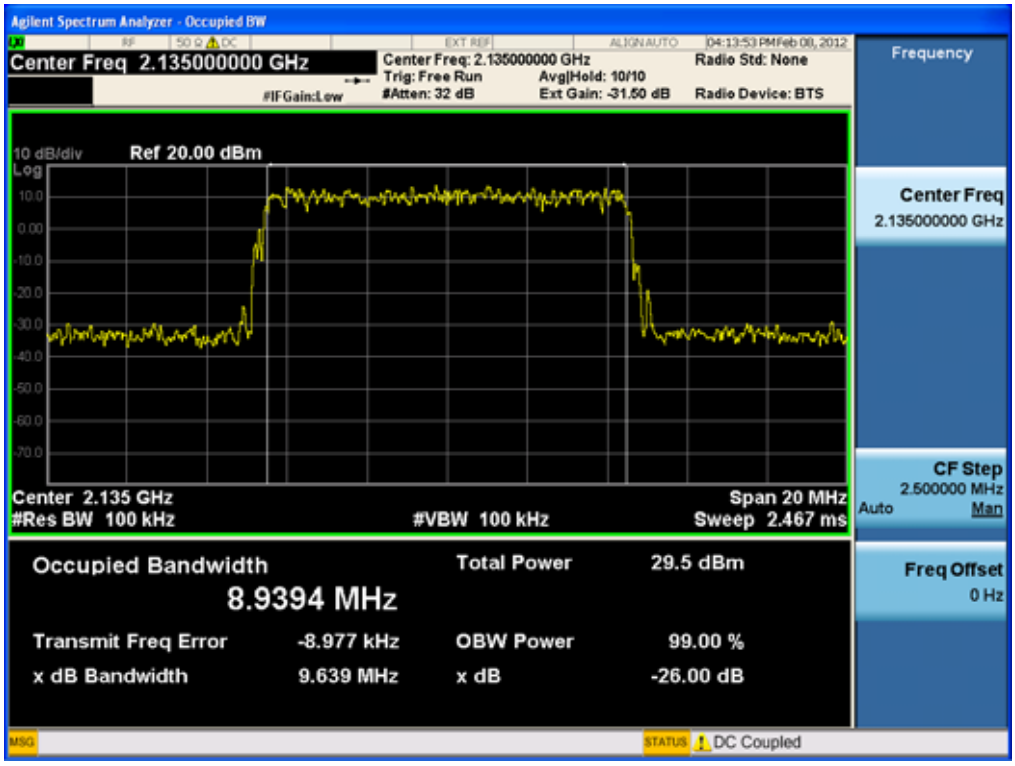

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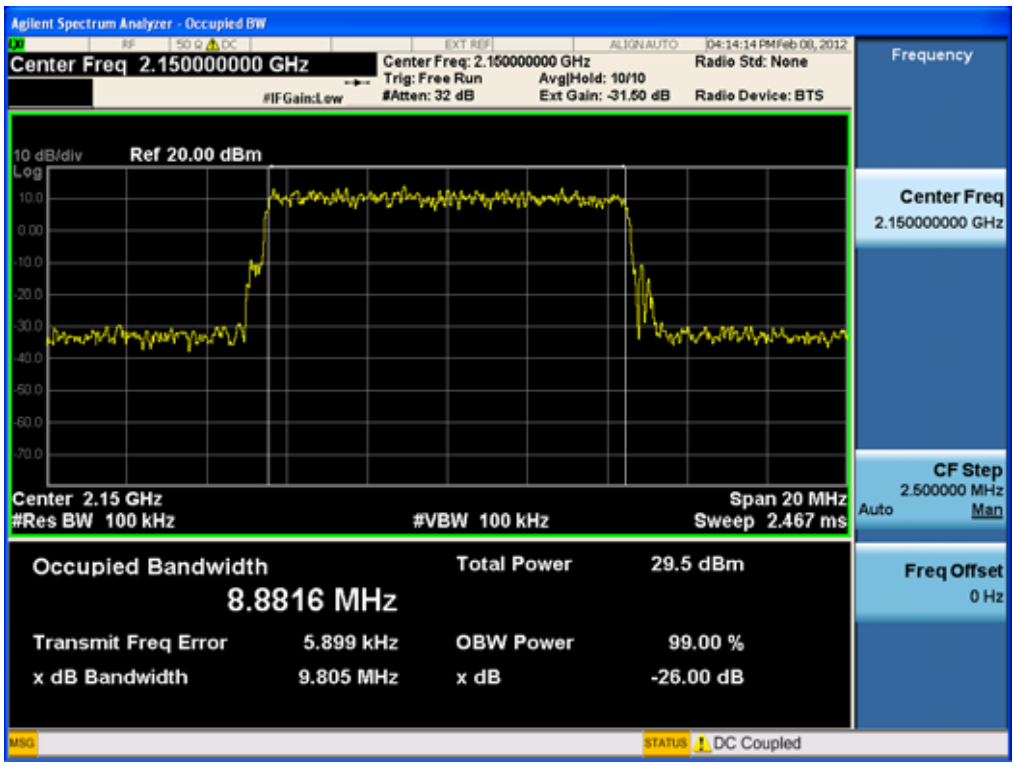

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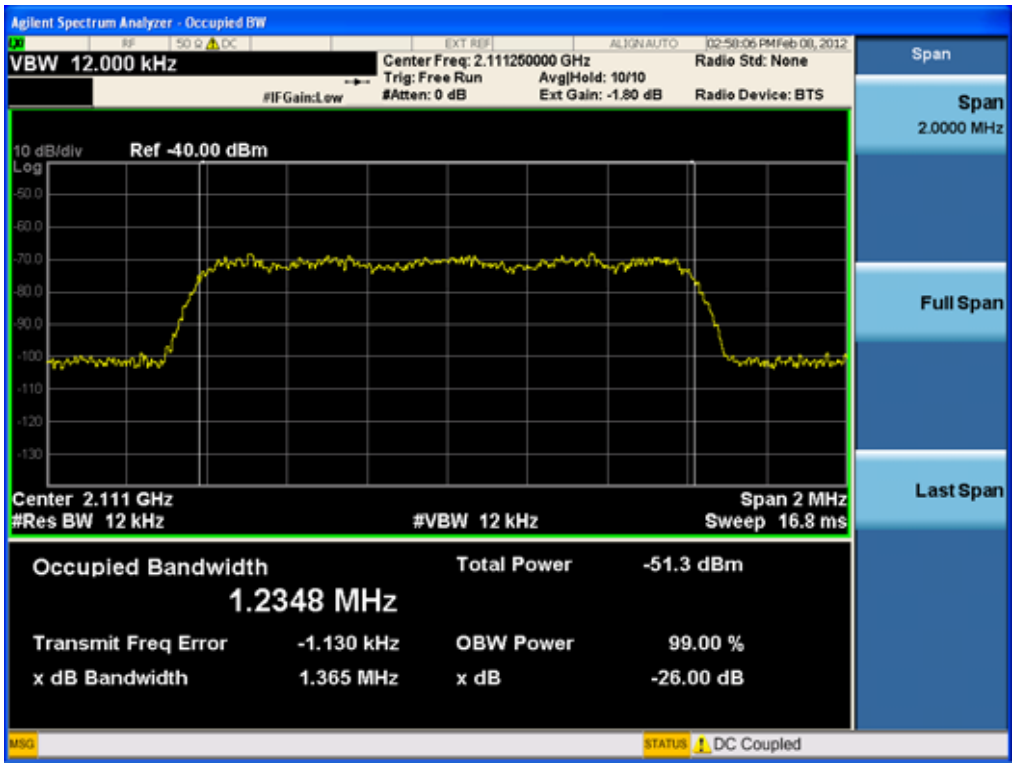

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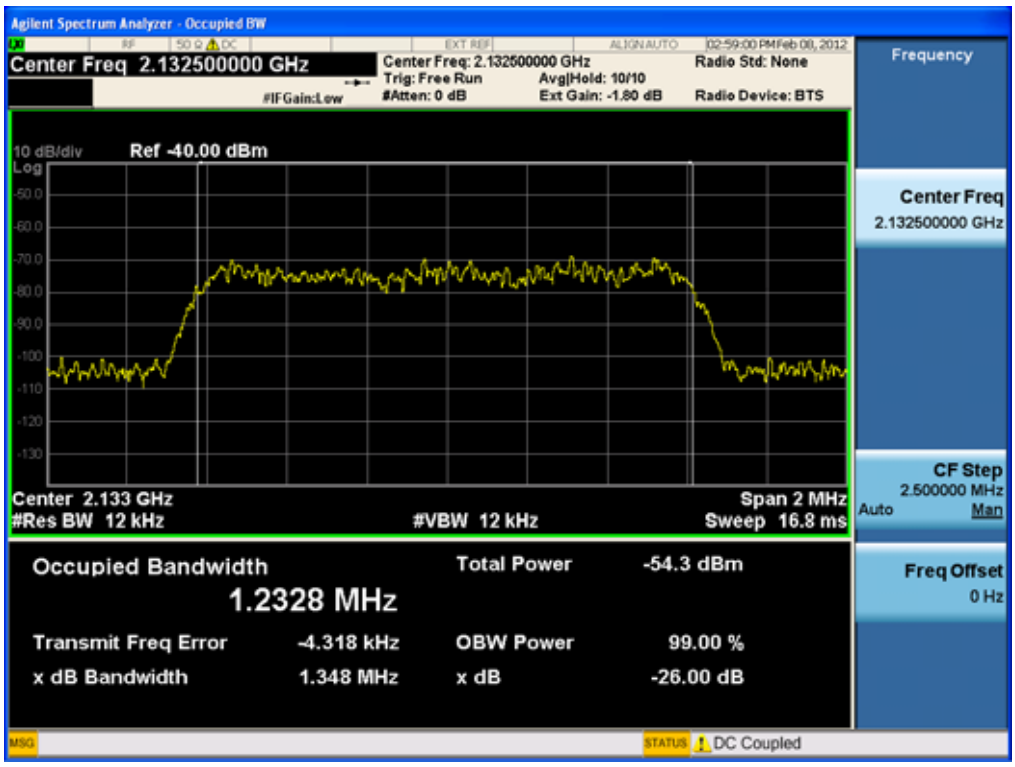

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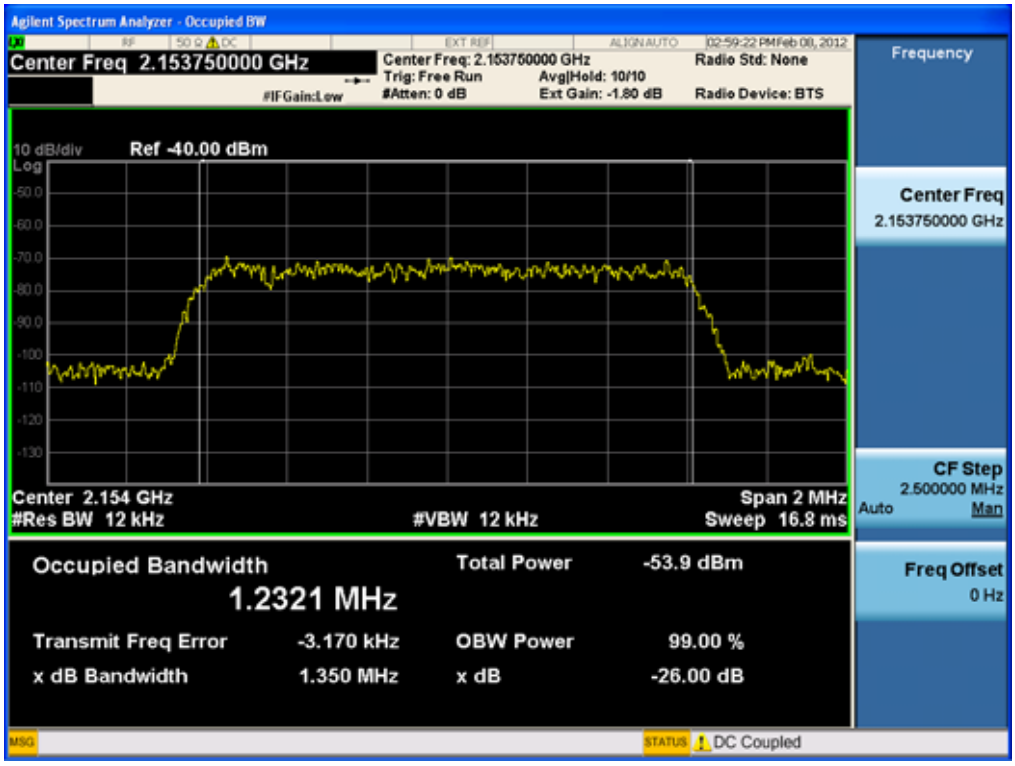

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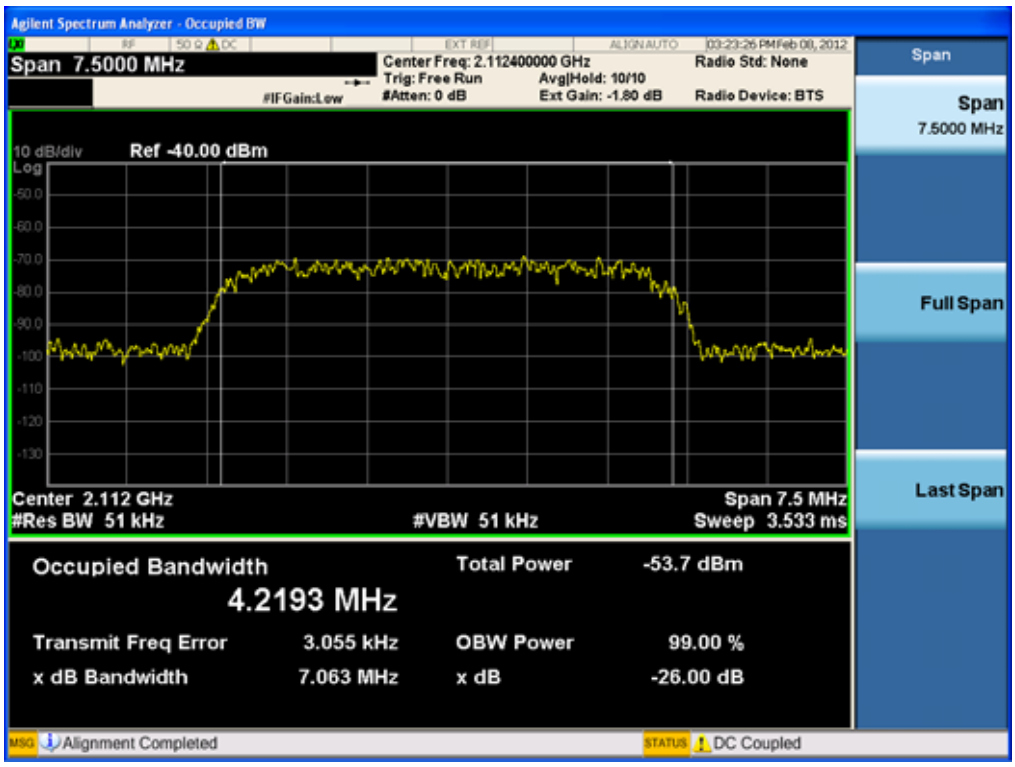

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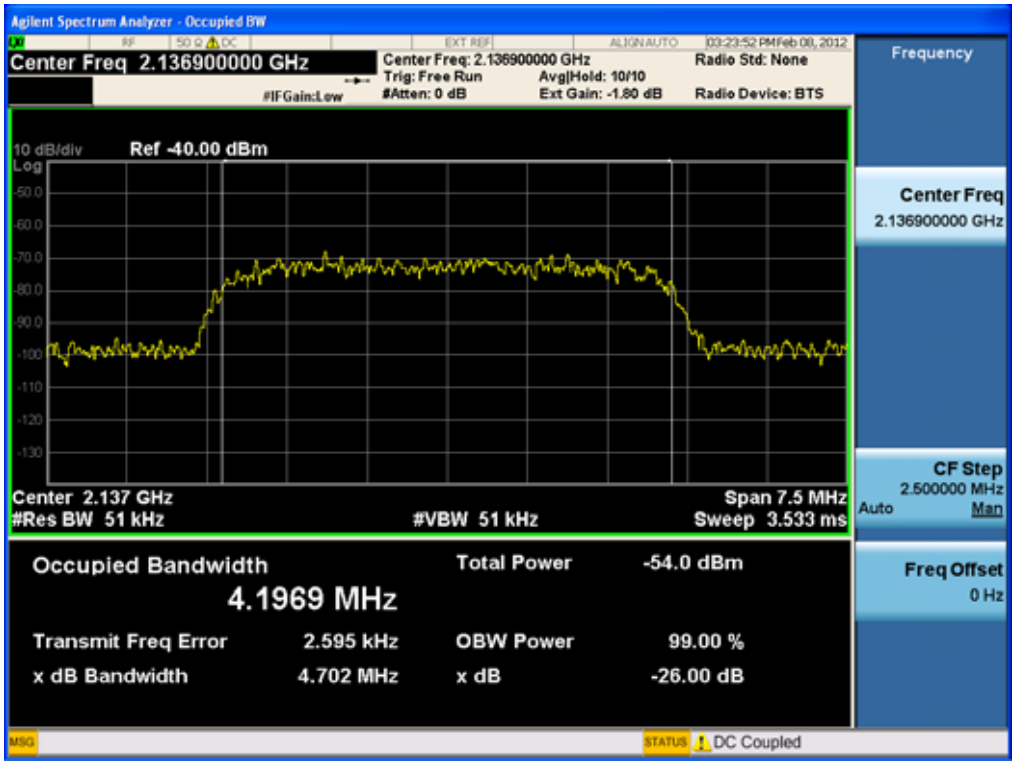

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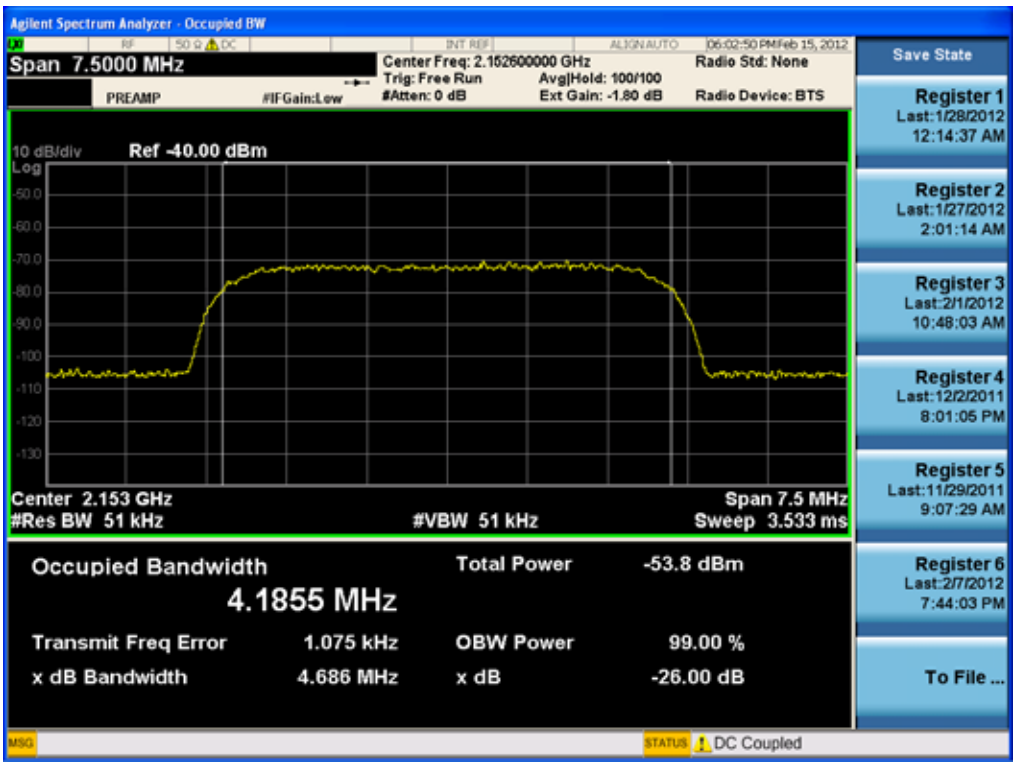

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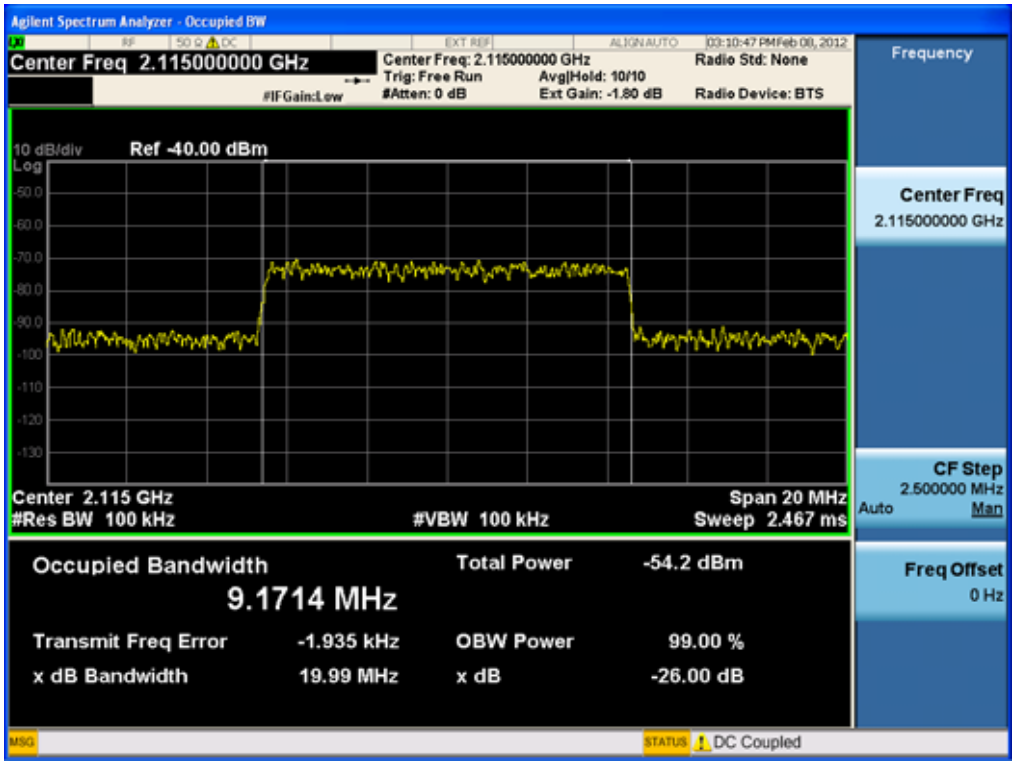

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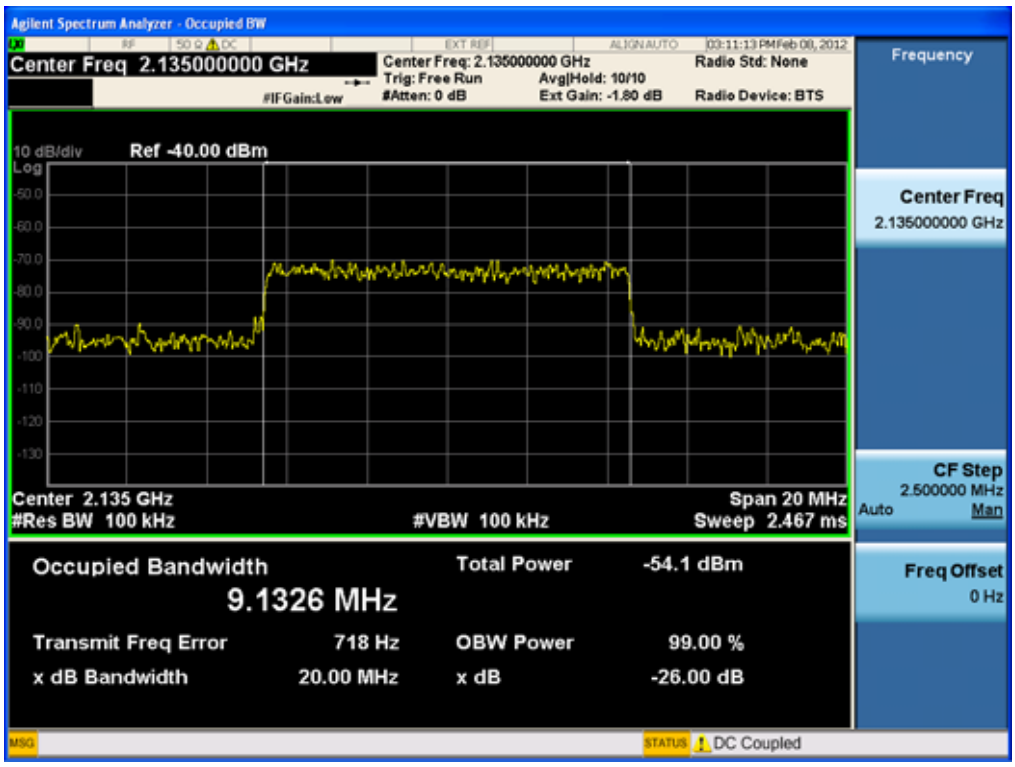

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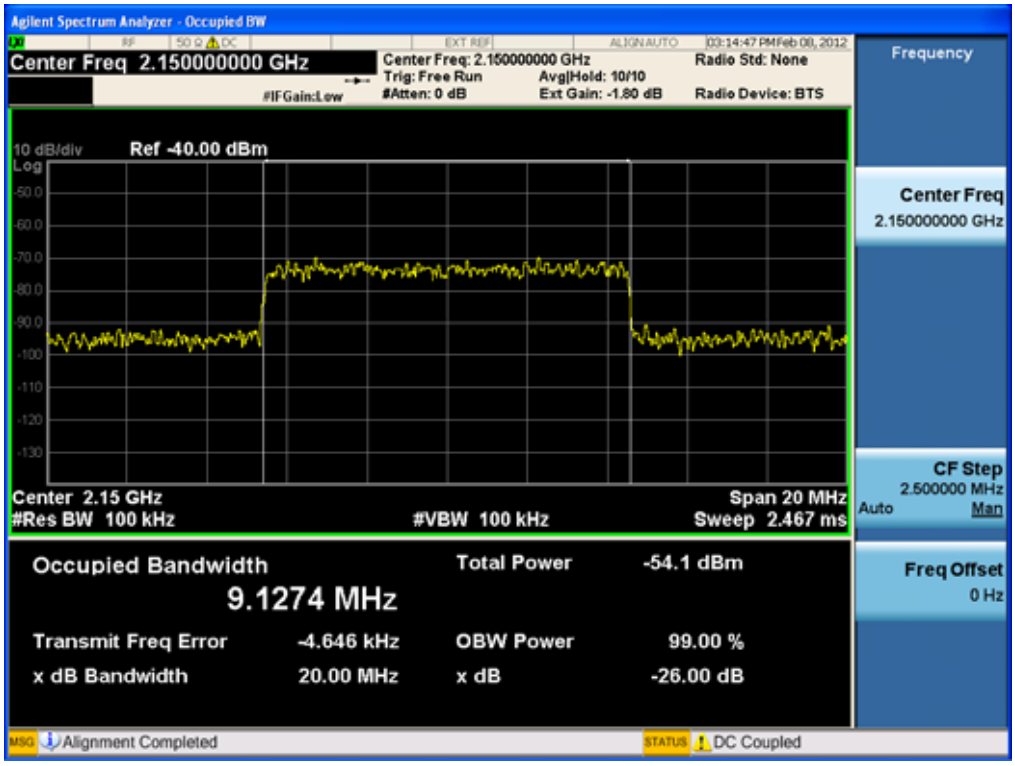

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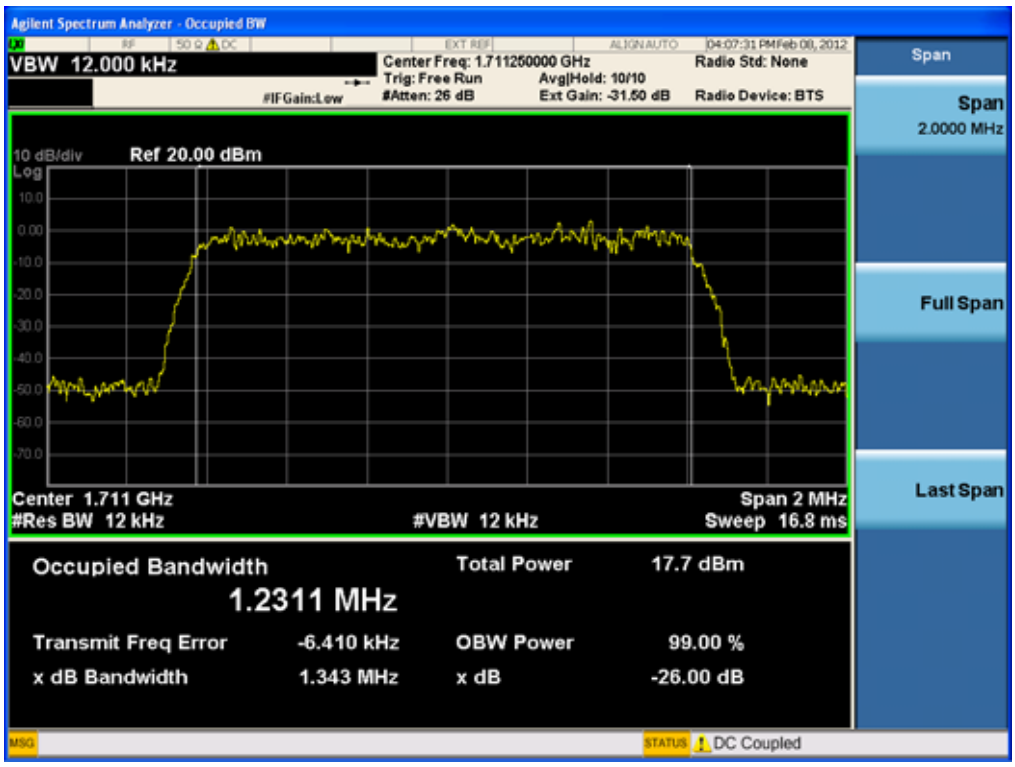

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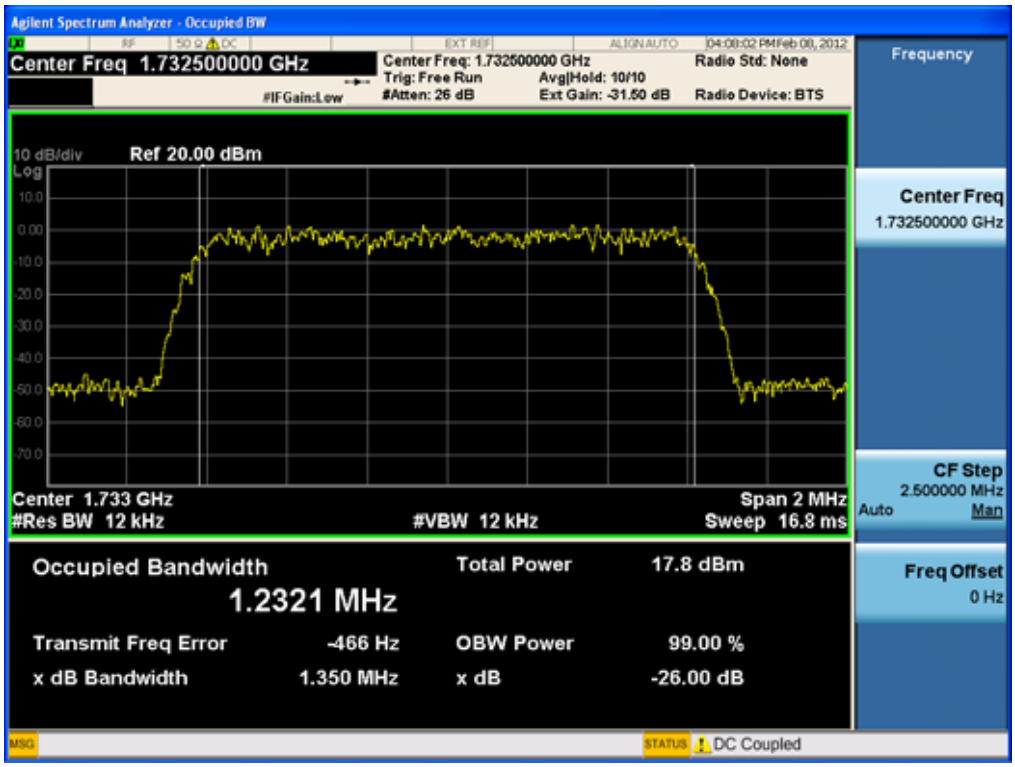

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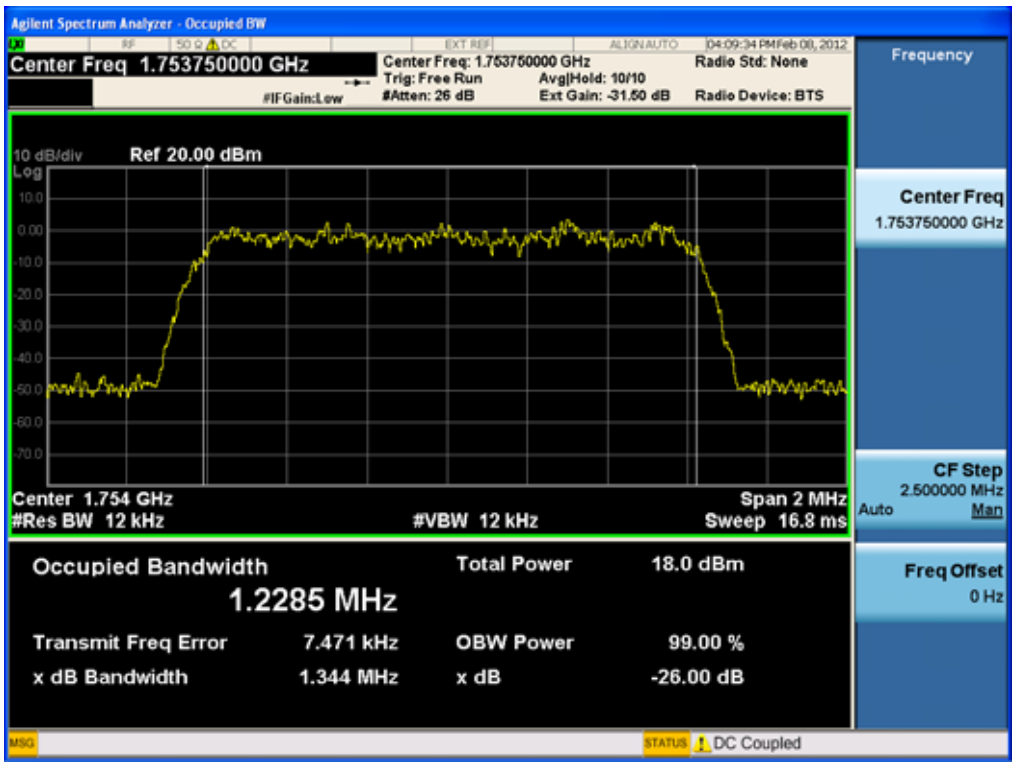

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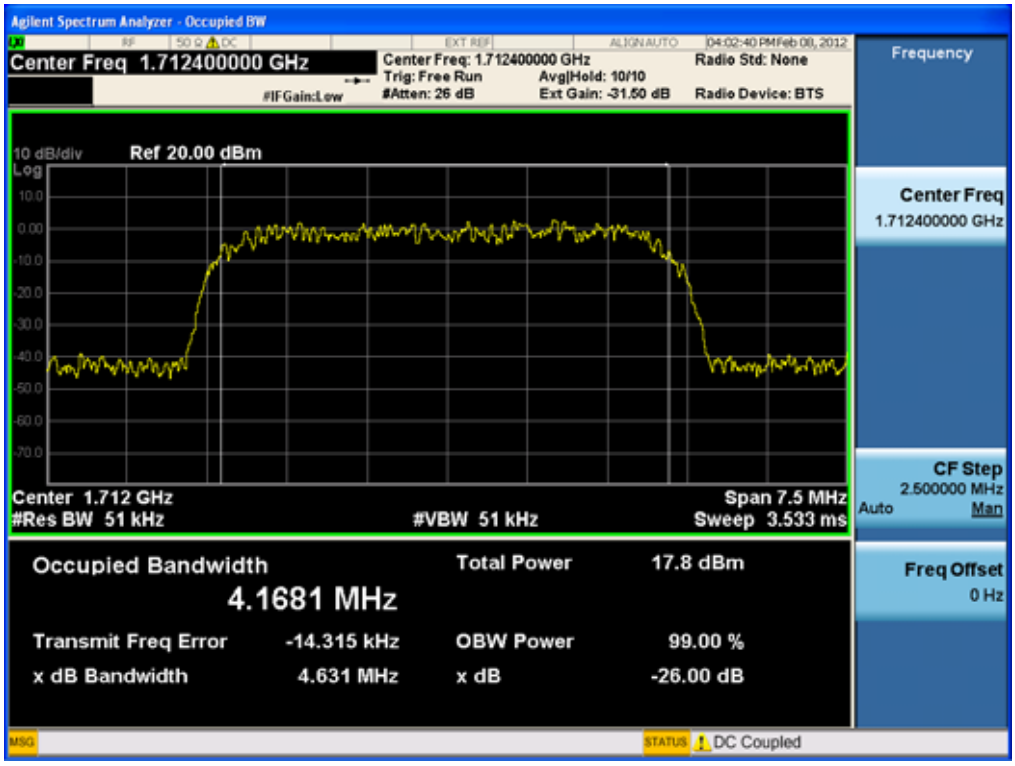

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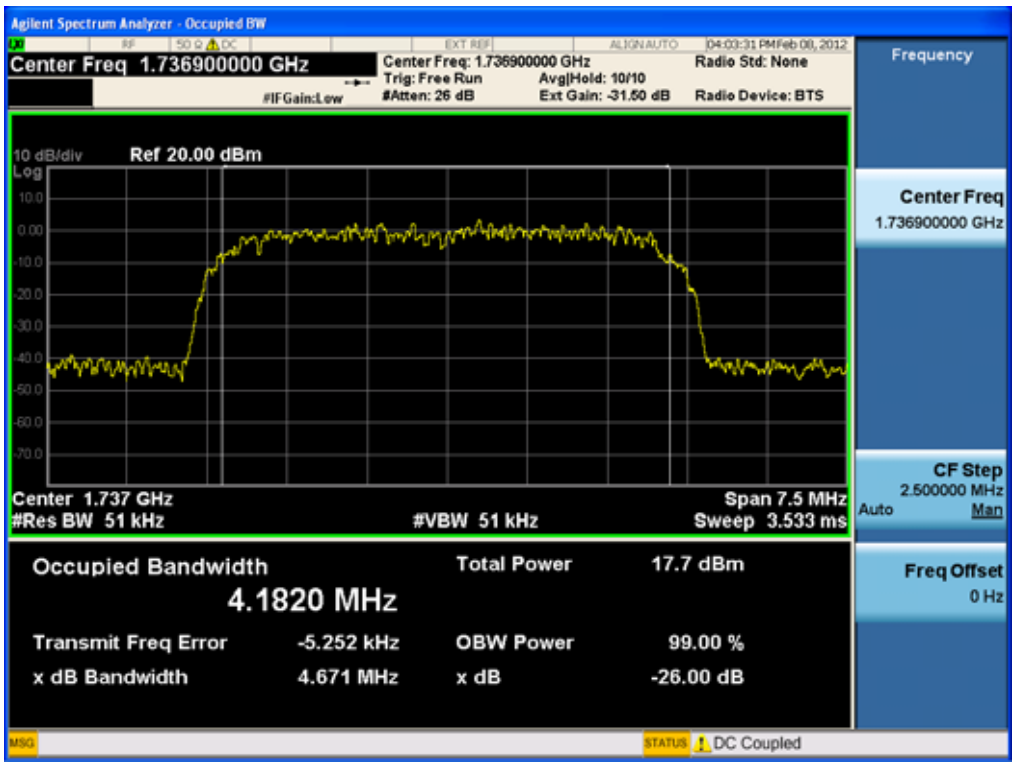

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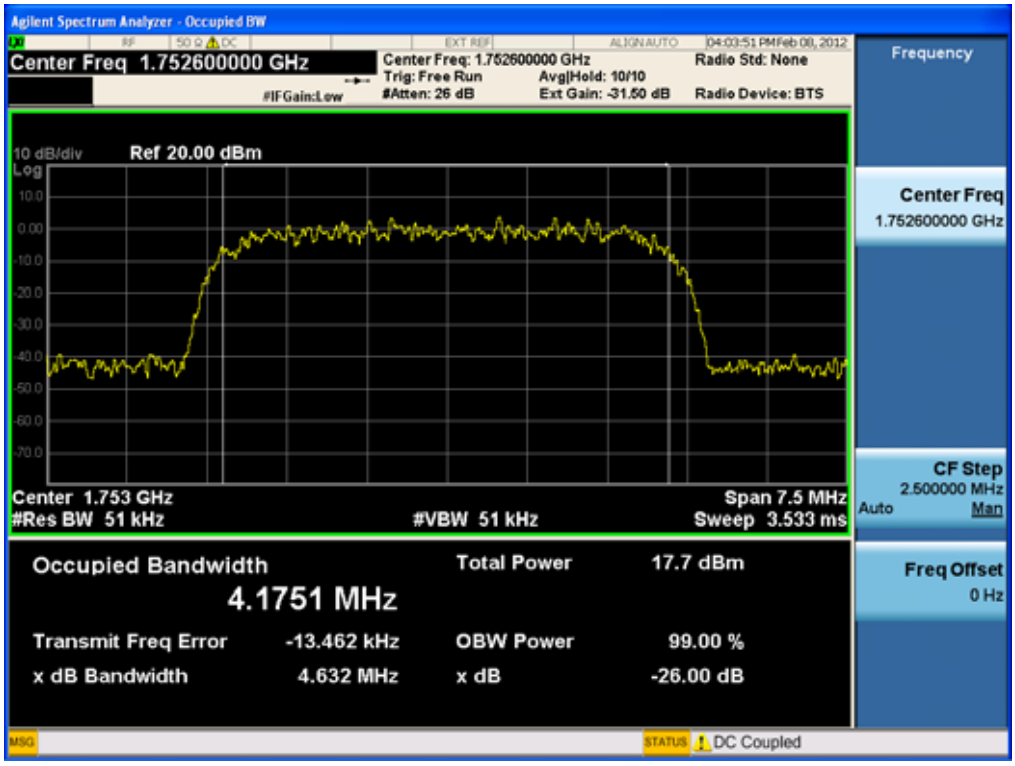

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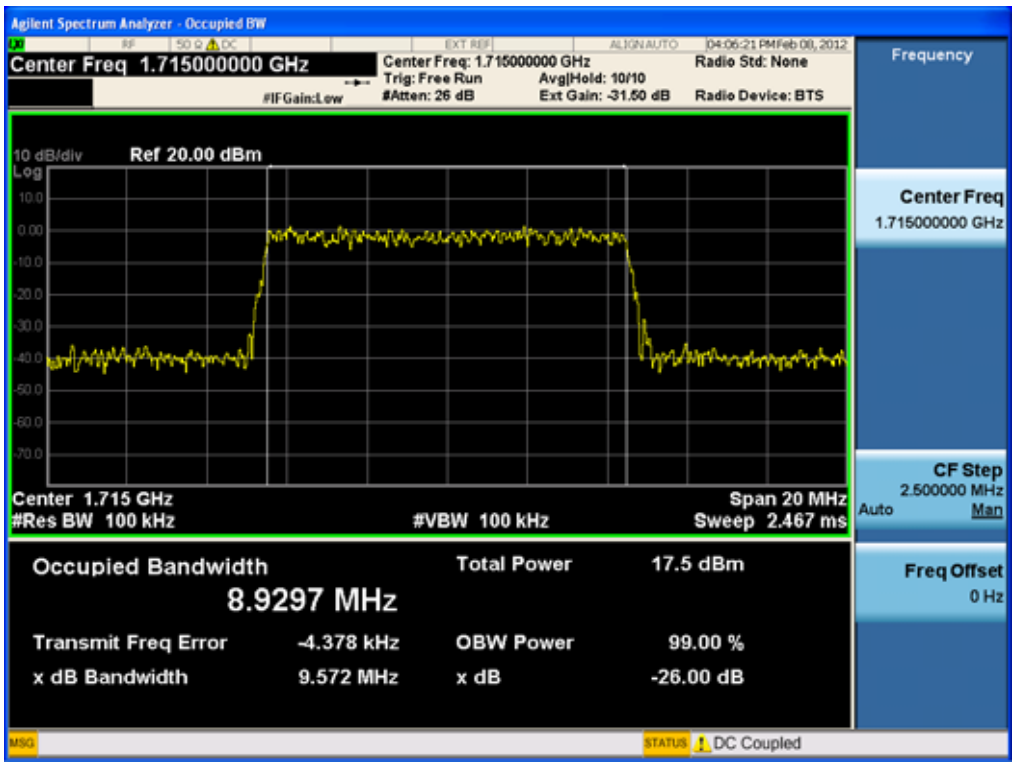
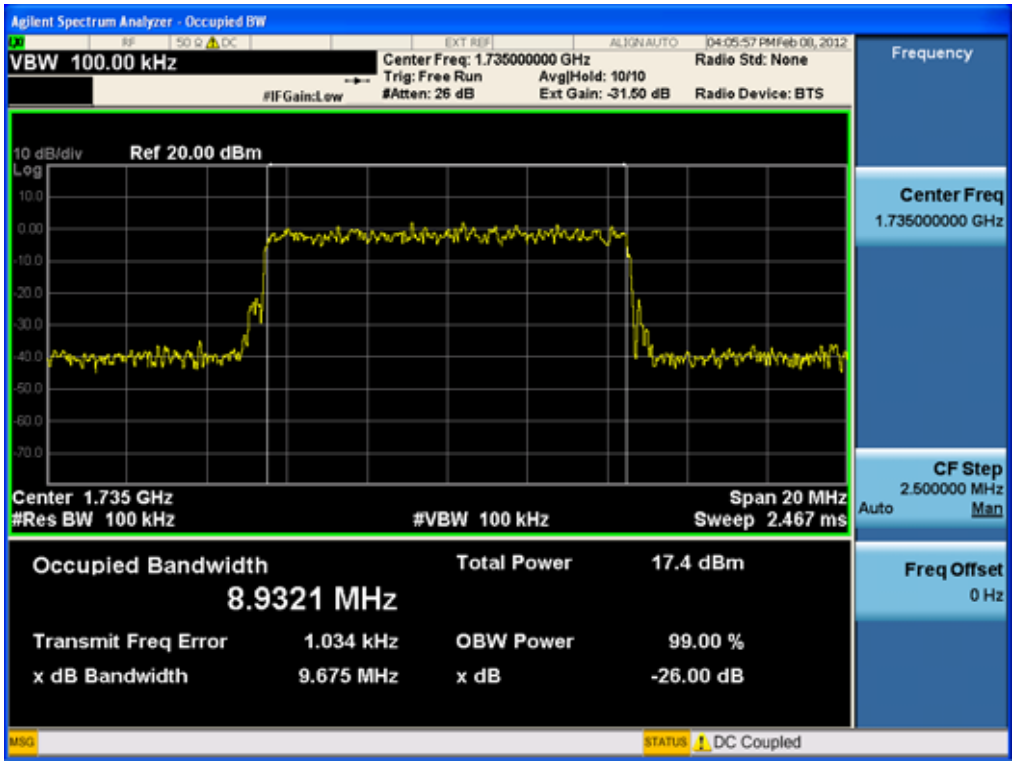
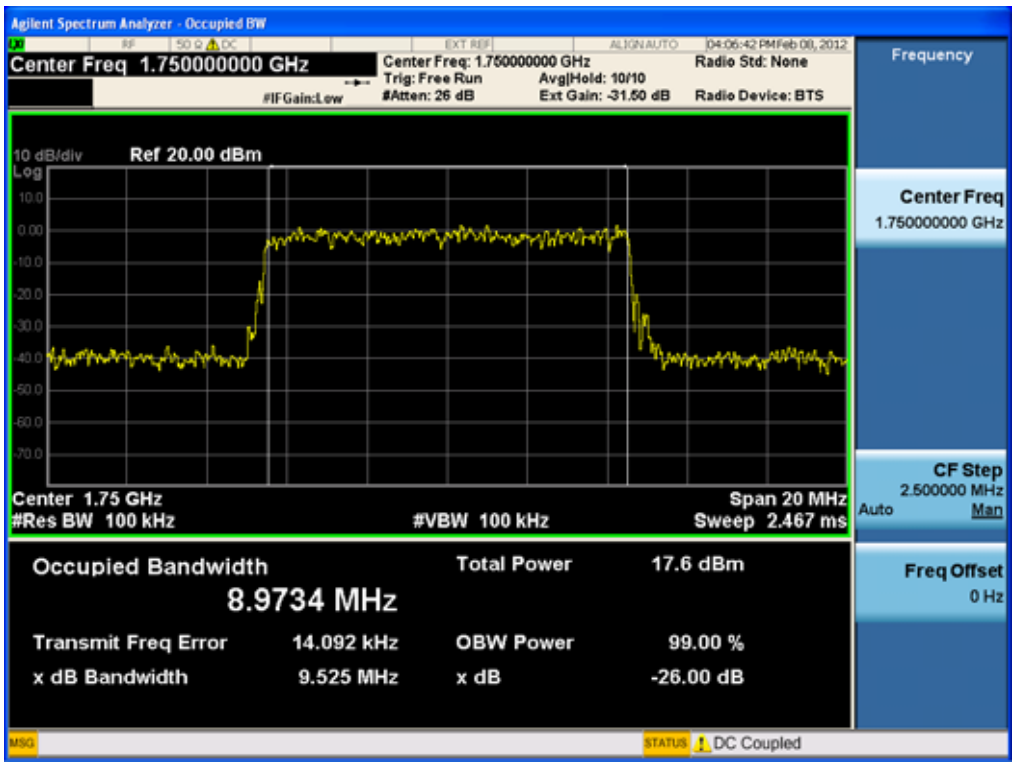


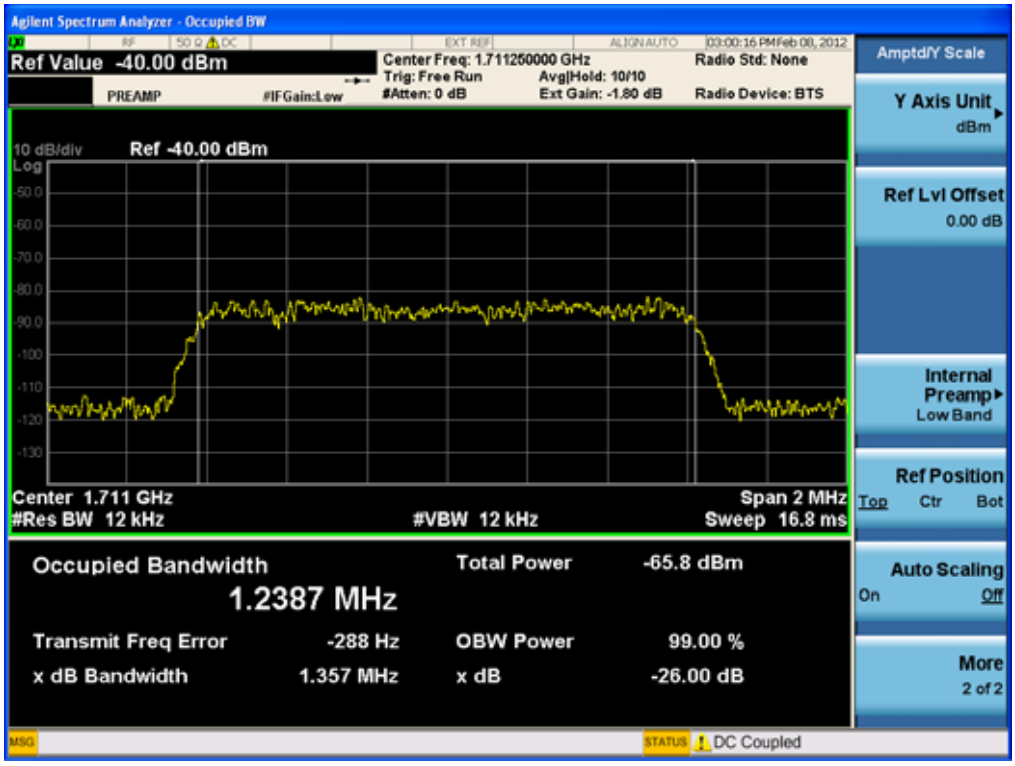
[Output LTE Uplink Middle]



[Output LTE Uplink High]



[Input CDMA Uplink Low]



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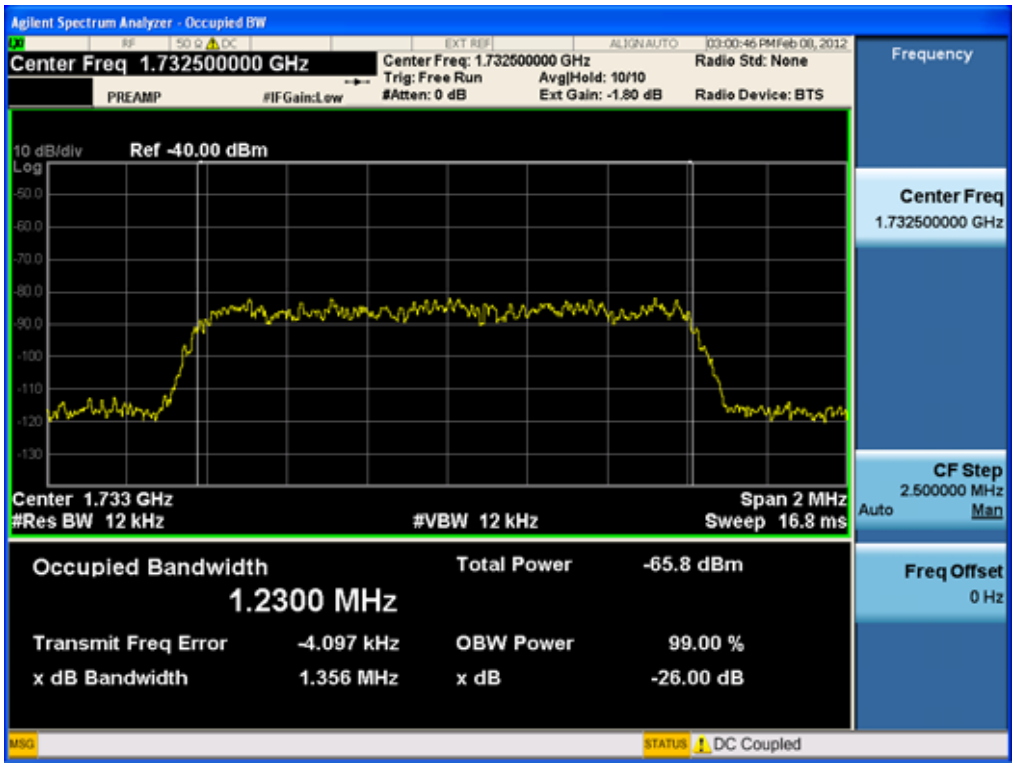
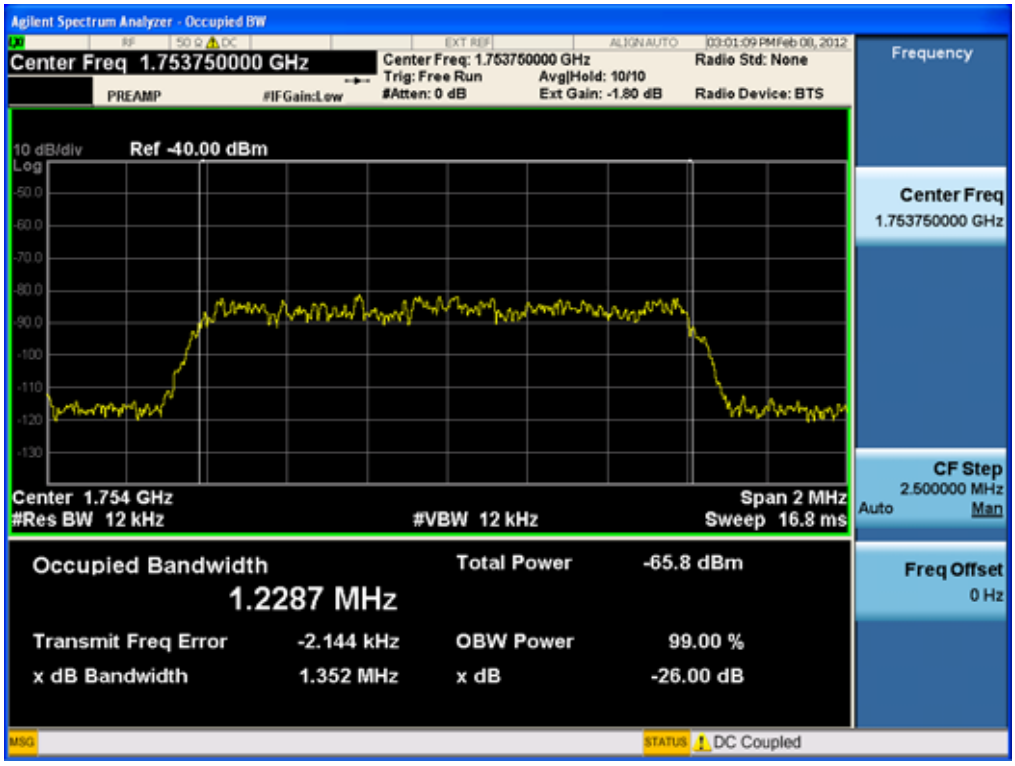
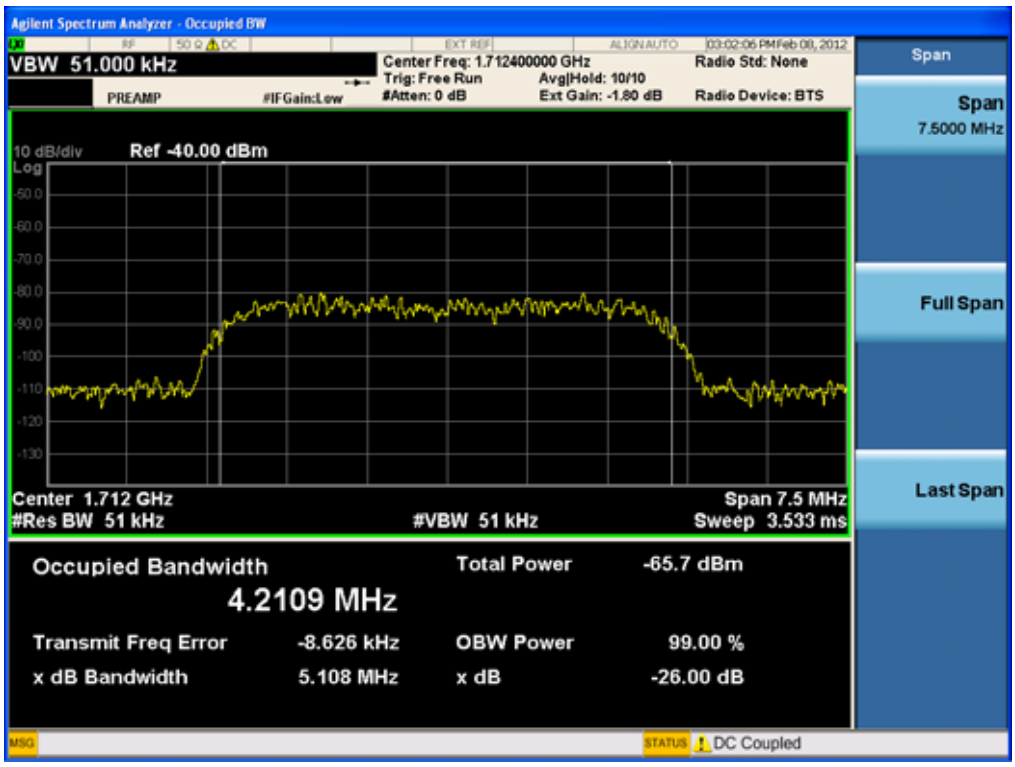


[Input CDMA Uplink High]



[Input WCDMA Uplink Low]



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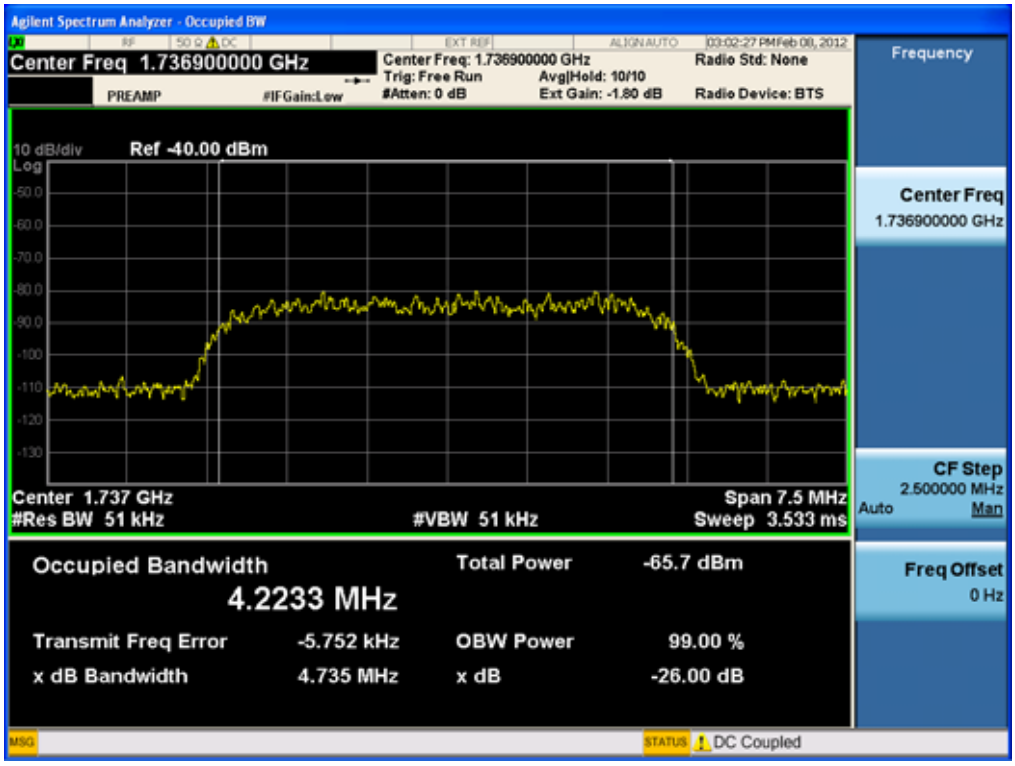

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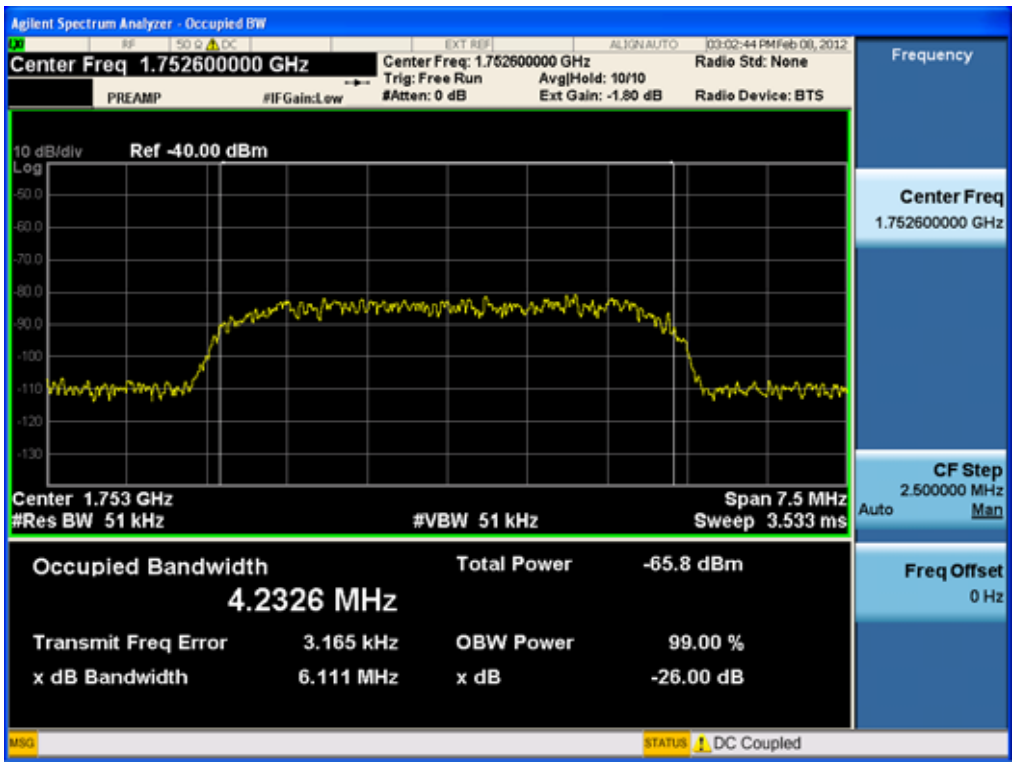
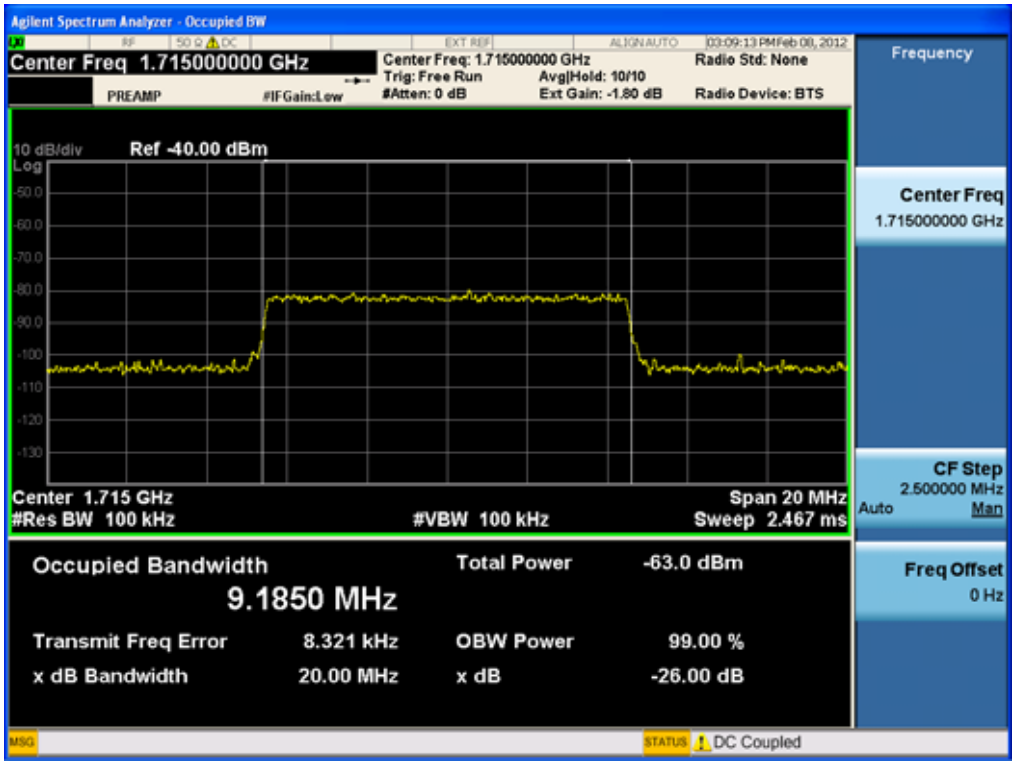
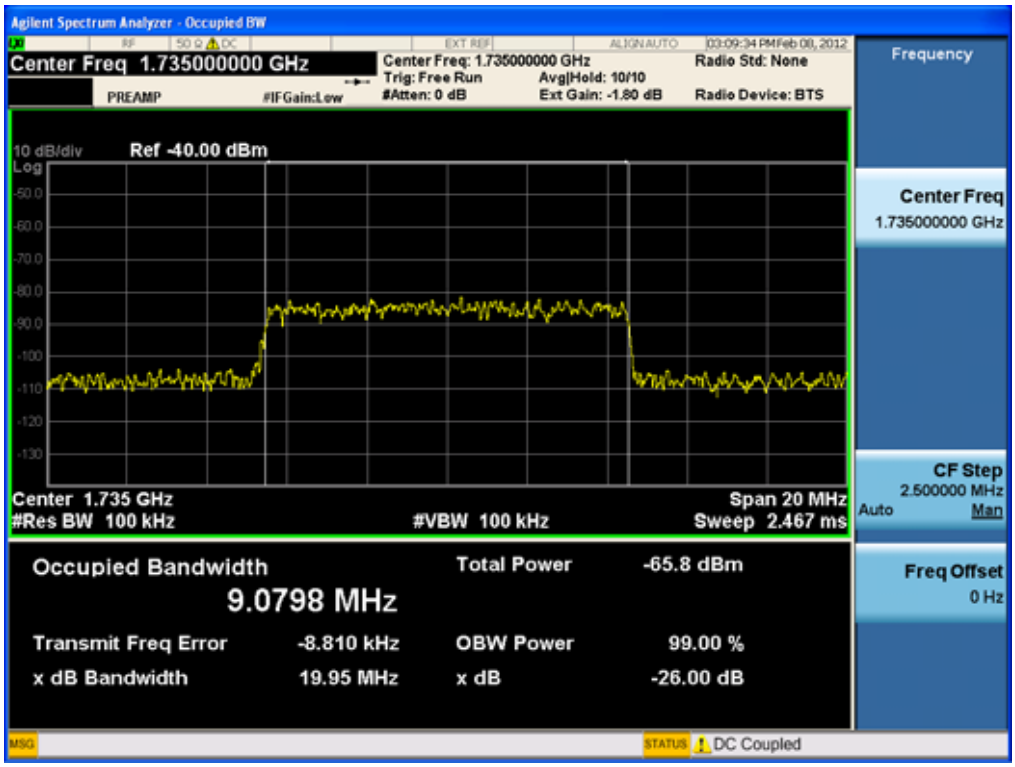


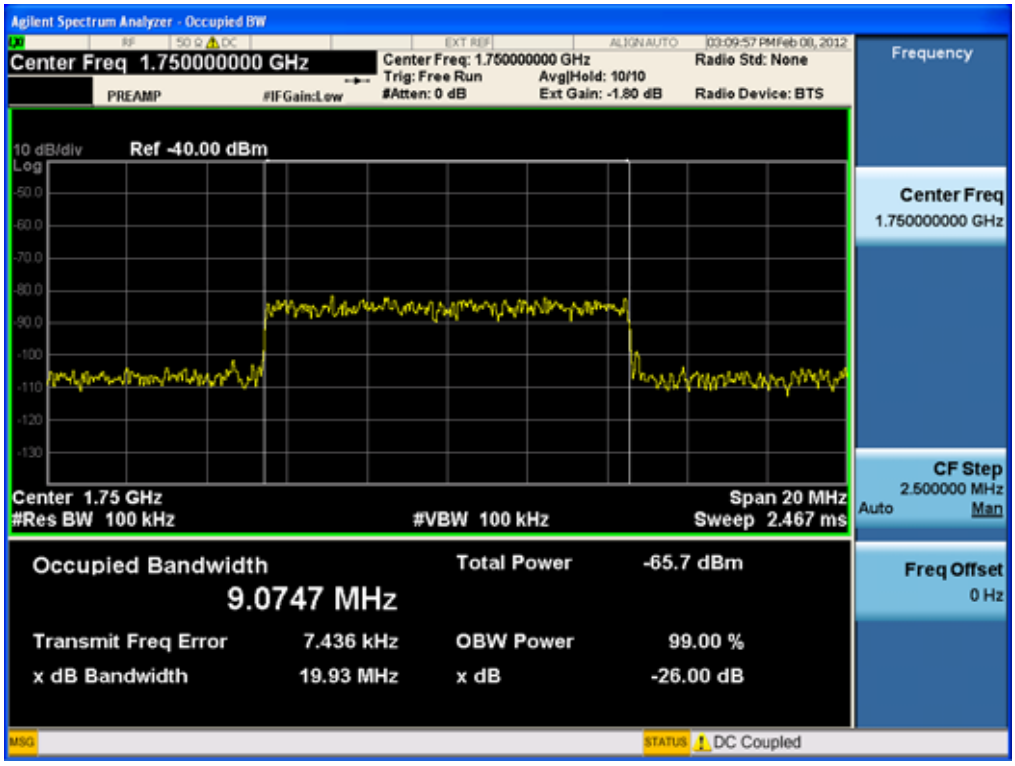
[Input LTE Uplink Low]



[Input LTE Uplink Middle]



[Input LTE Uplink High]



7. 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 30 MHz to the 26.5 GHz of the carrier.

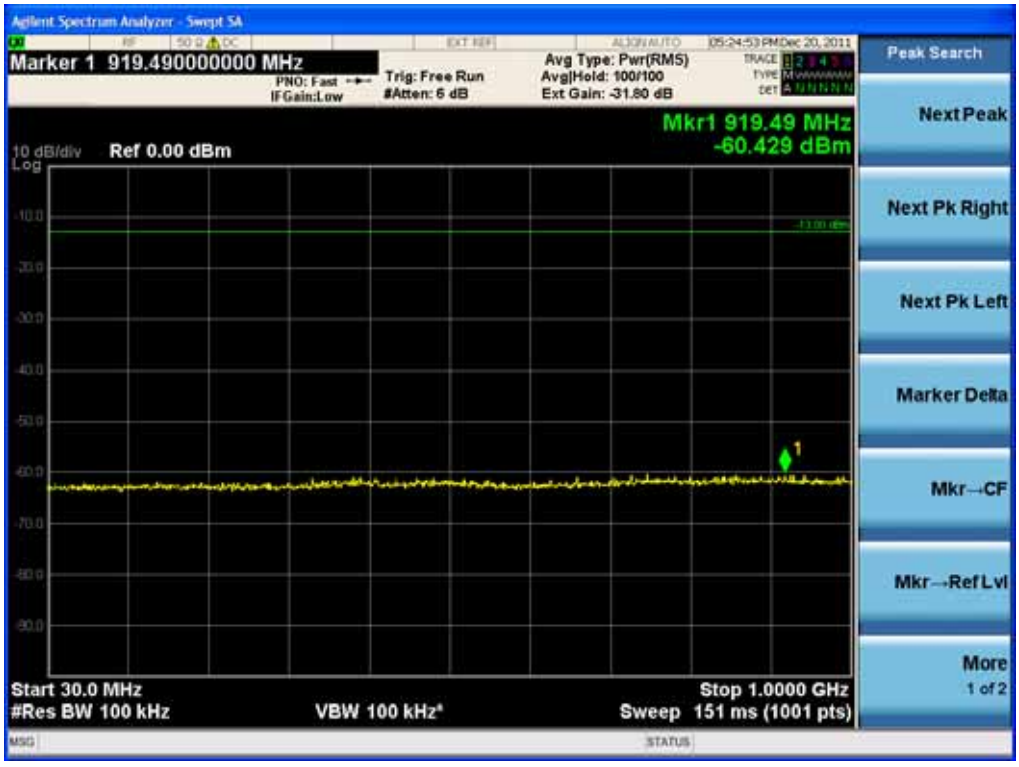
Test Results: The EUT complies with the requirements of this section. There were no detectable Spurious emissions for this EUT.

Plots of Spurious Emission

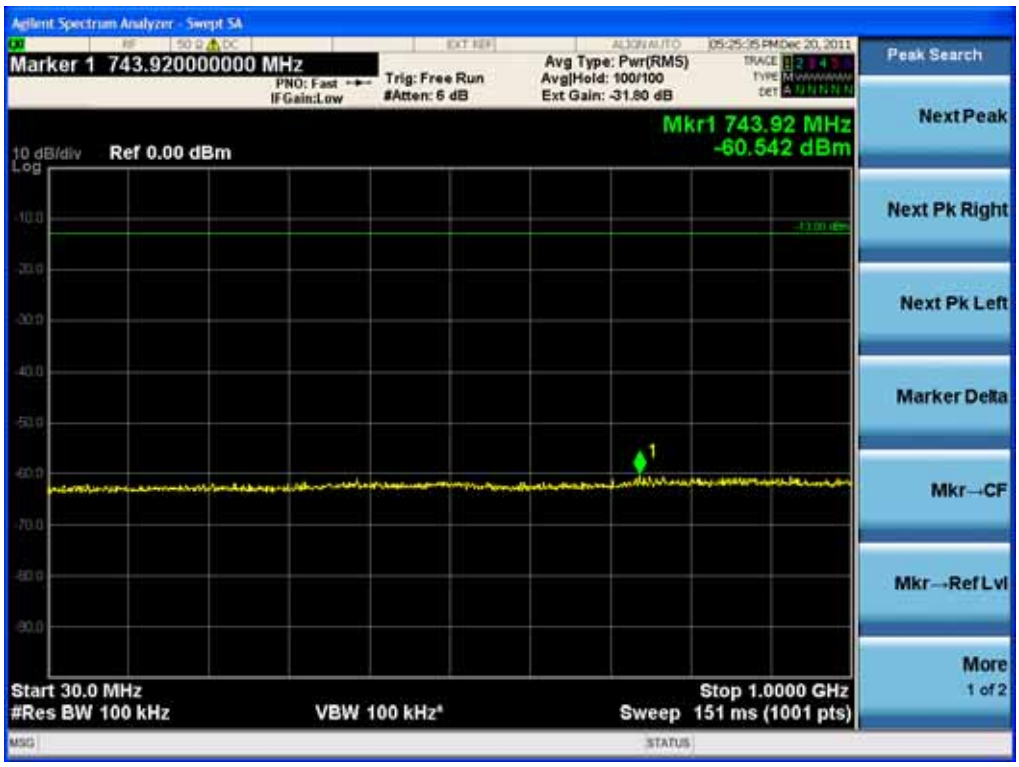
Conducted Spurious Emissions (30 MHz – 1 GHz)

[CDMA Downlink Low]

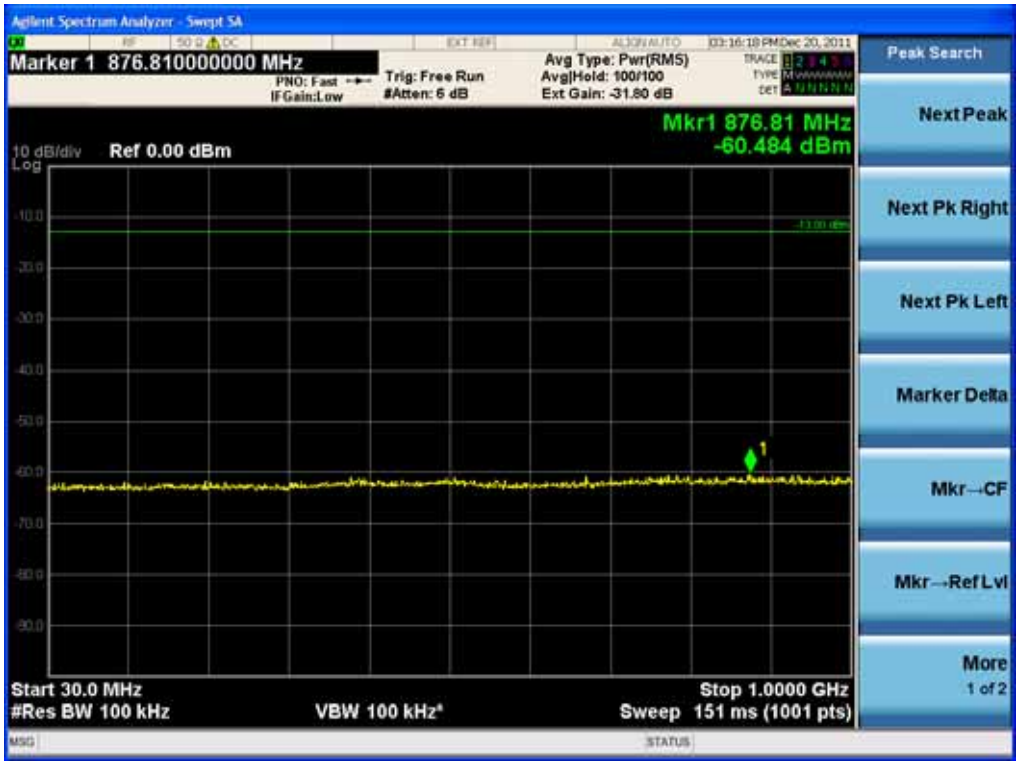
[CDMA Downlink Middle]



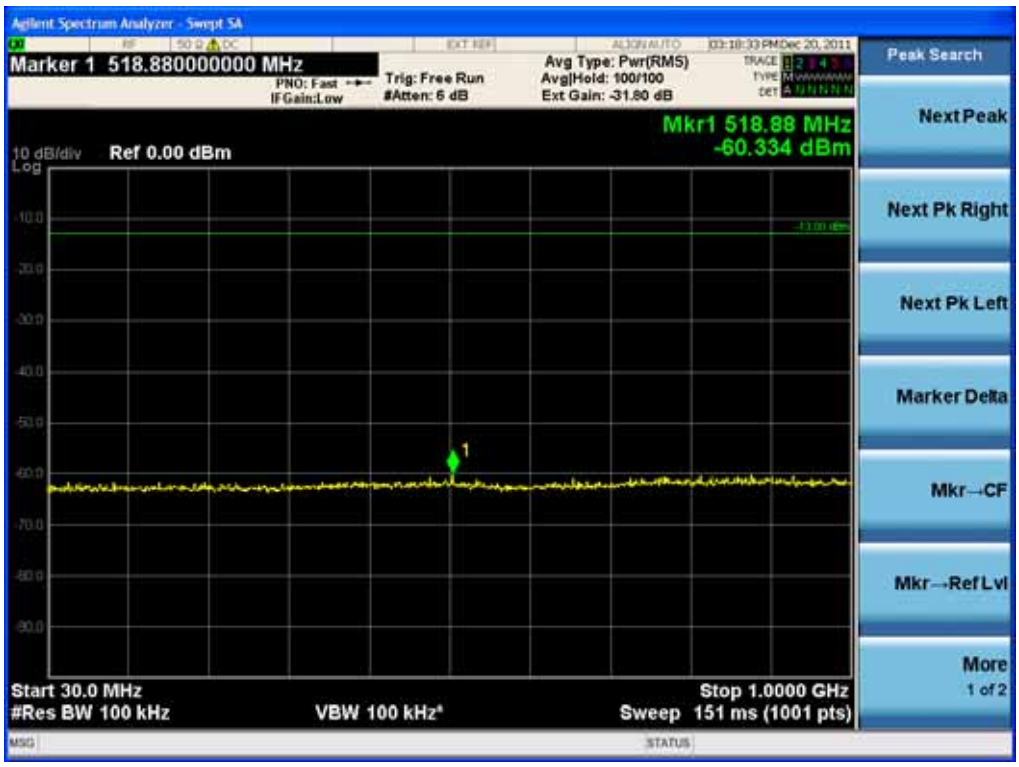
[CDMA Downlink High]



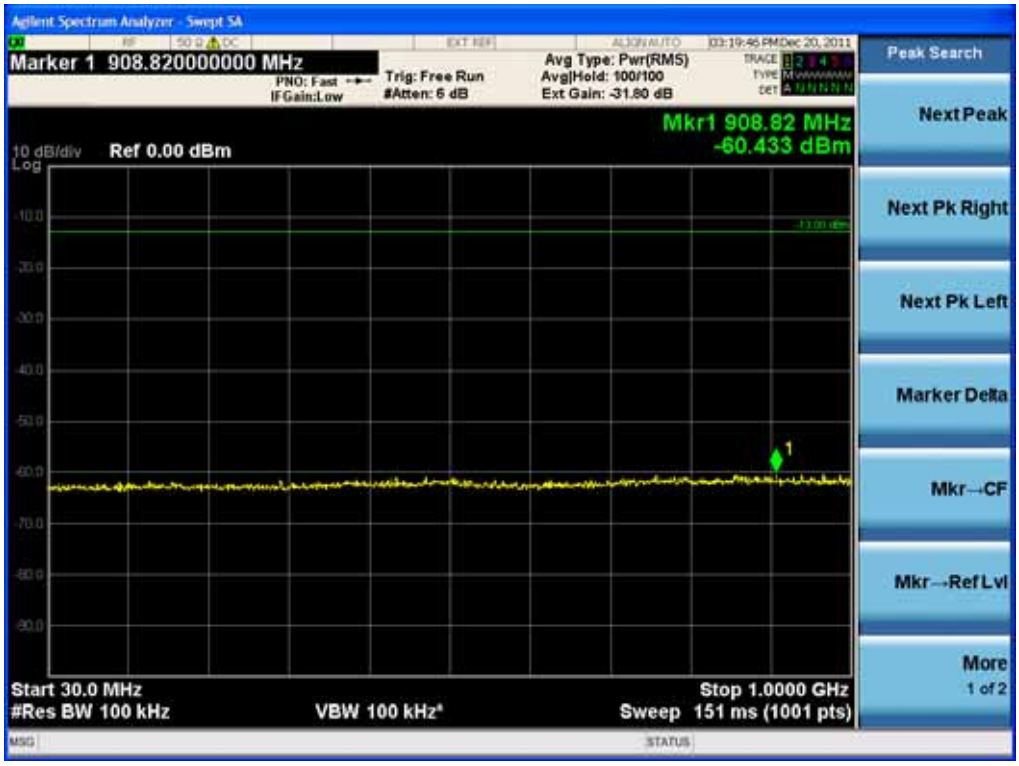
[WCDMA Downlink Low]



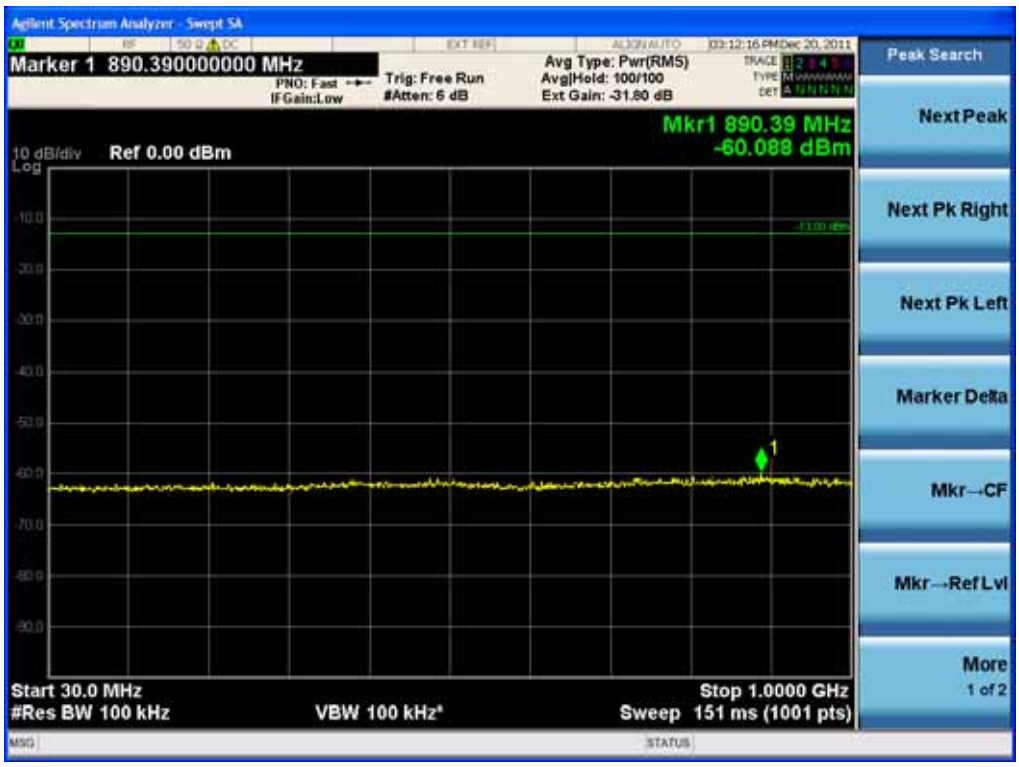
[WCDMA Downlink Middle]



[WCDMA Downlink High]



[LTE Downlink Low]



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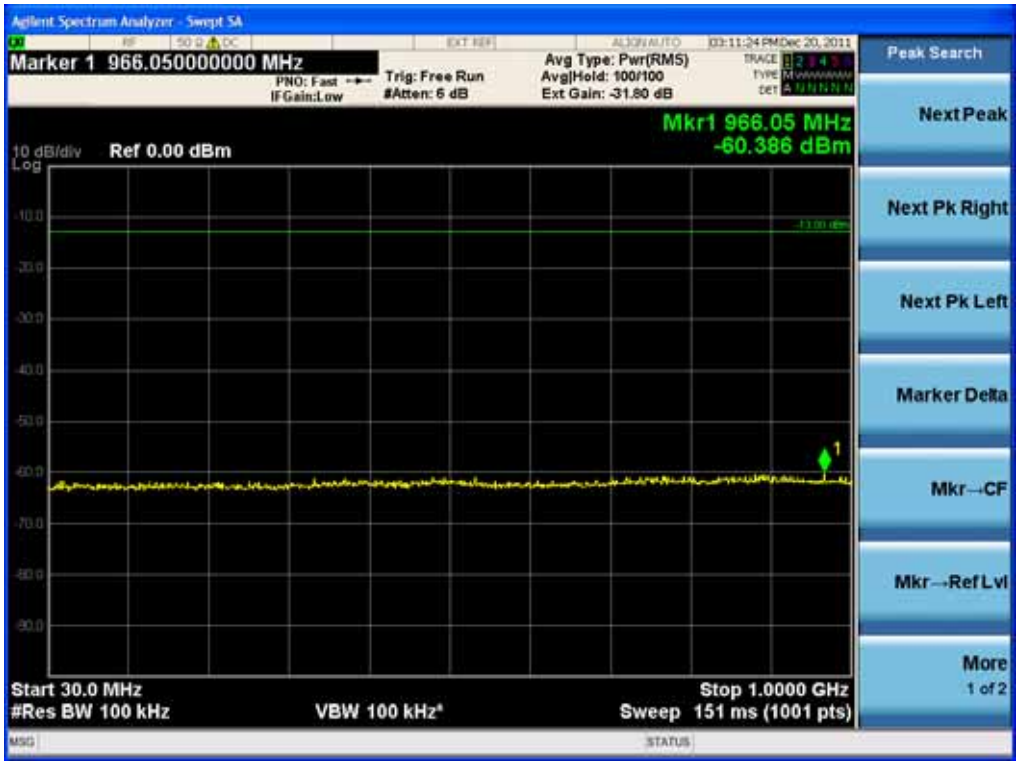
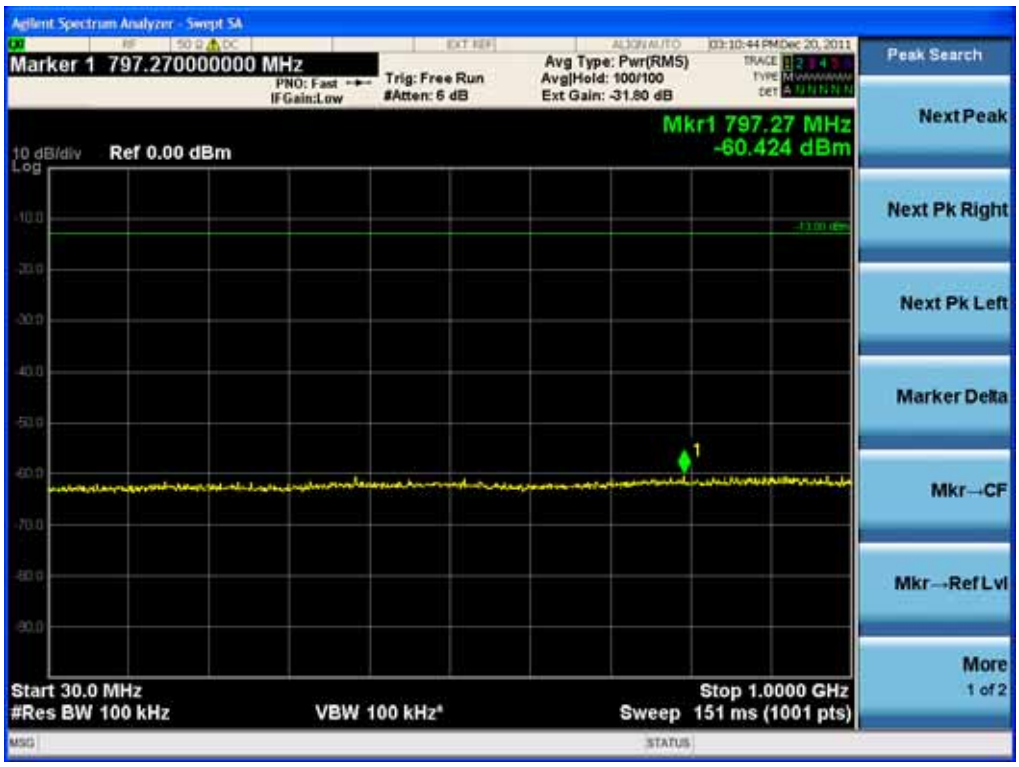
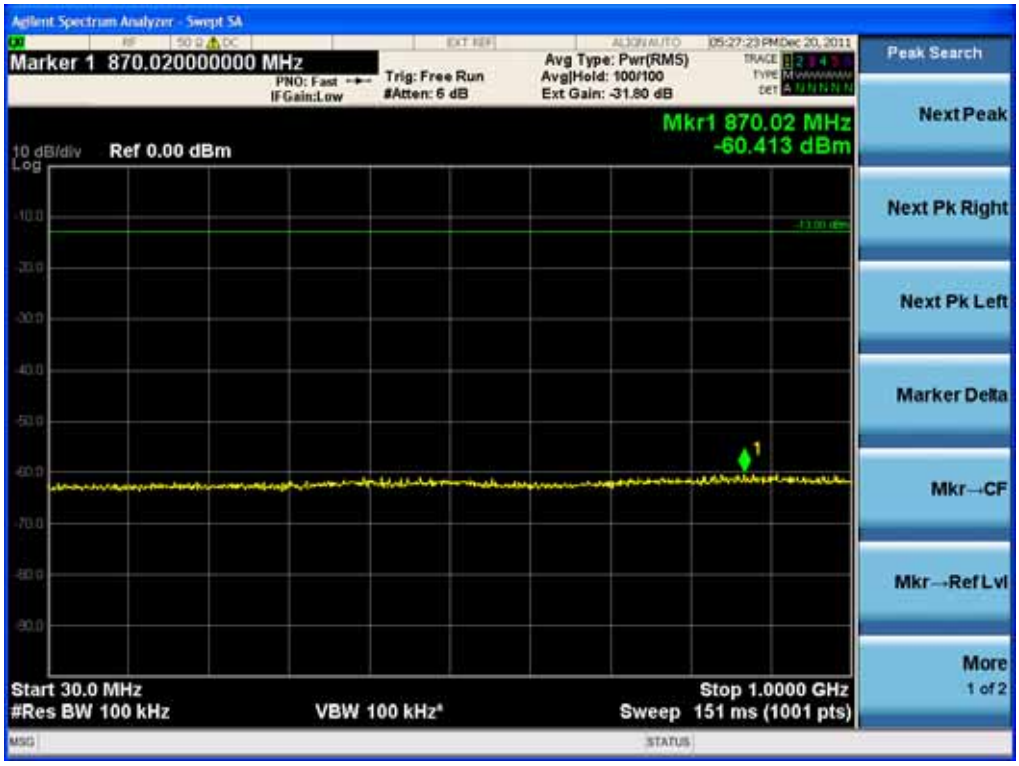


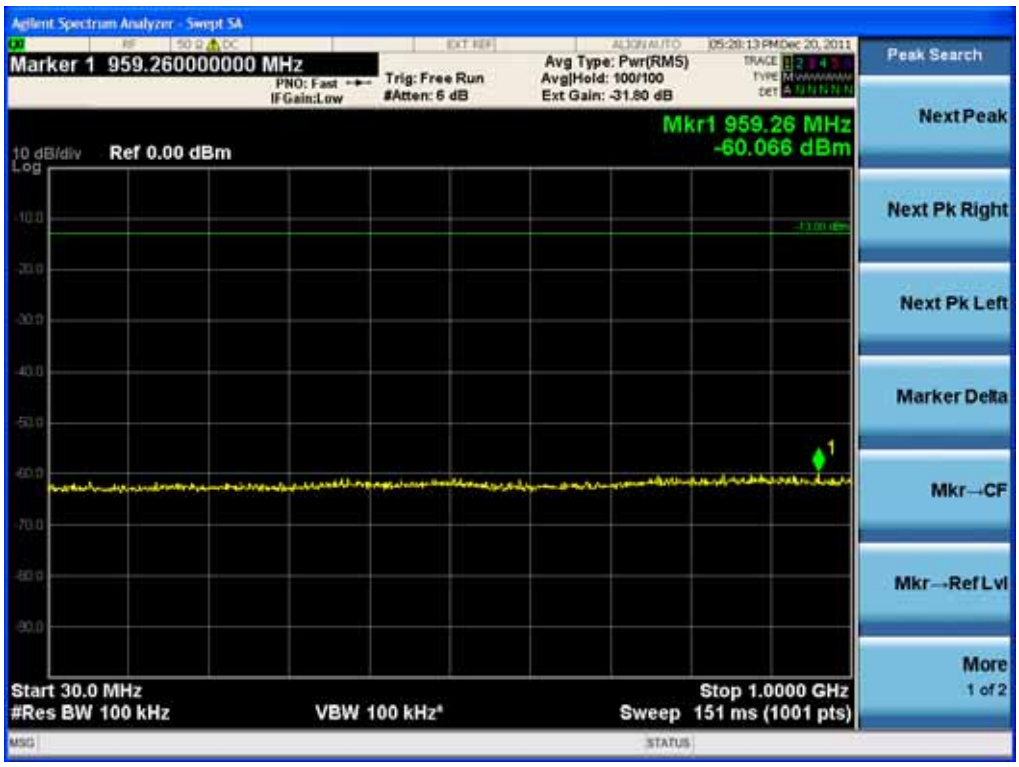
[LTE Downlink High]



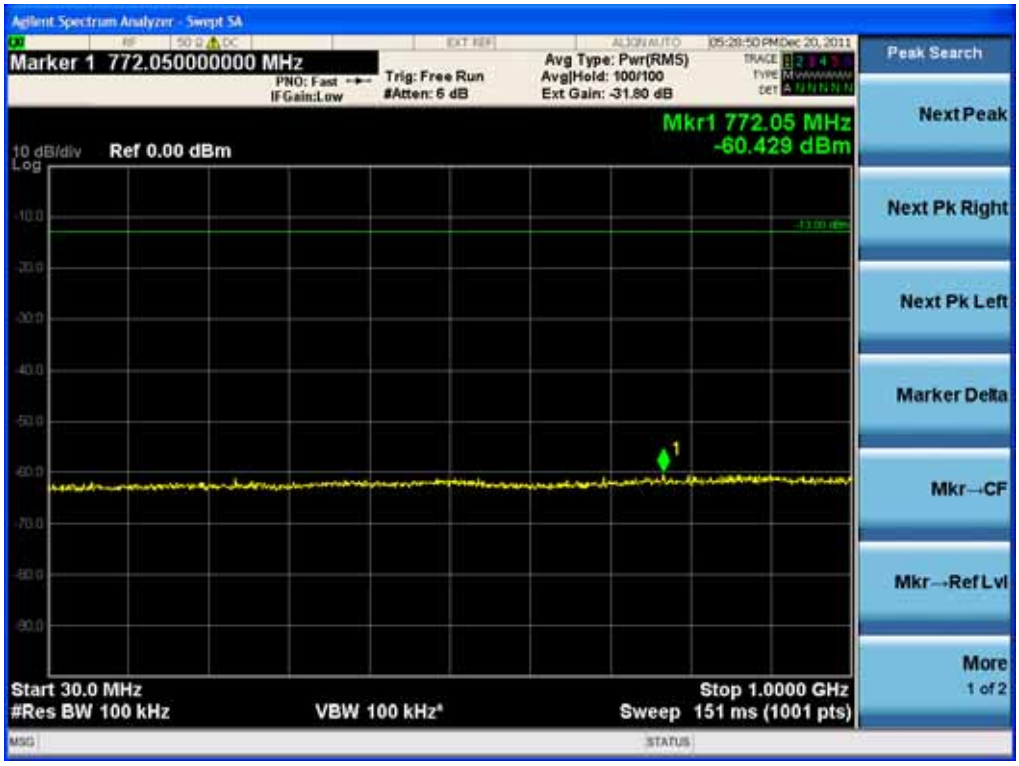
[CDMA Uplink Low]



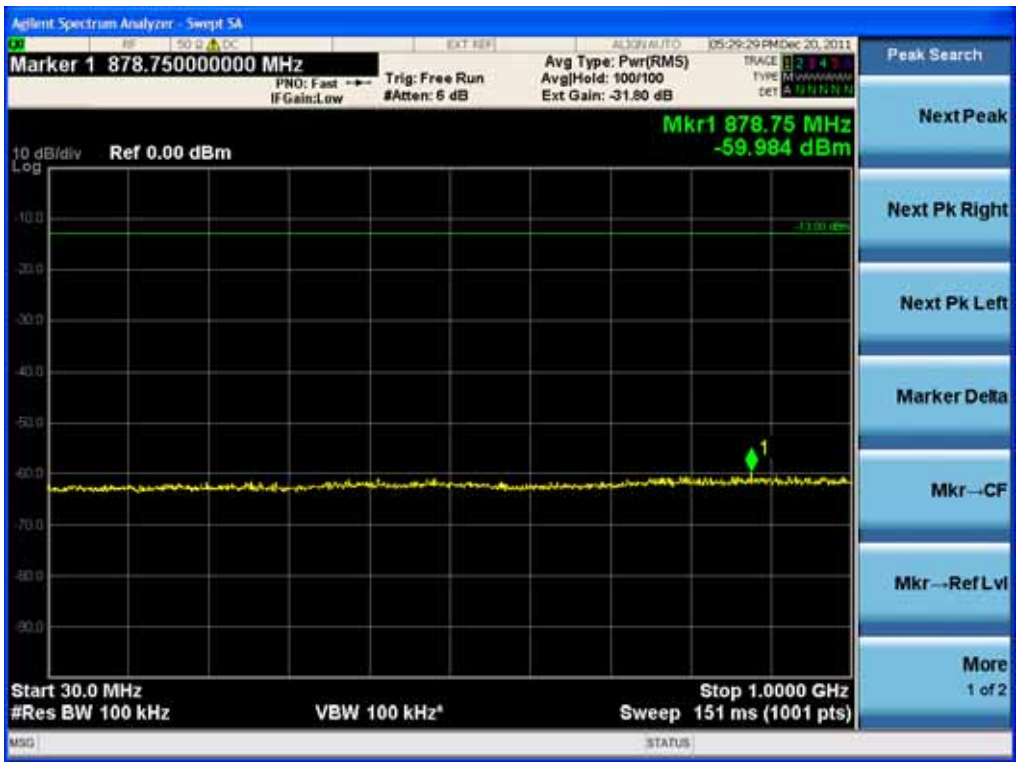
[CDMA Uplink Middle]



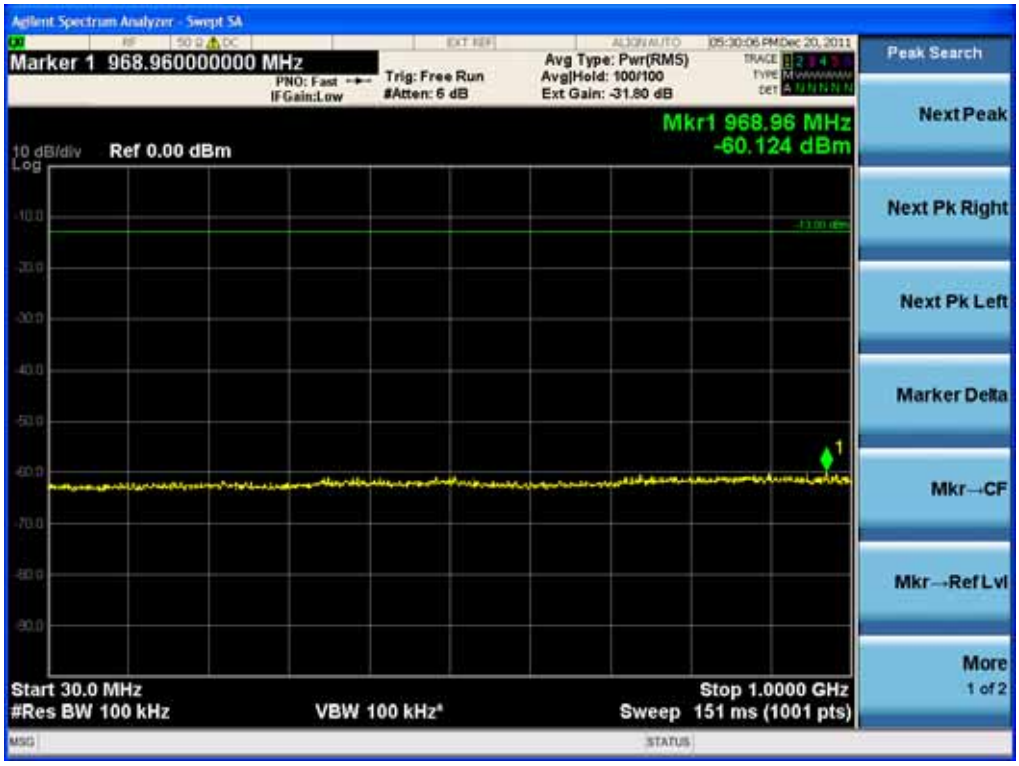
[CDMA Uplink High]



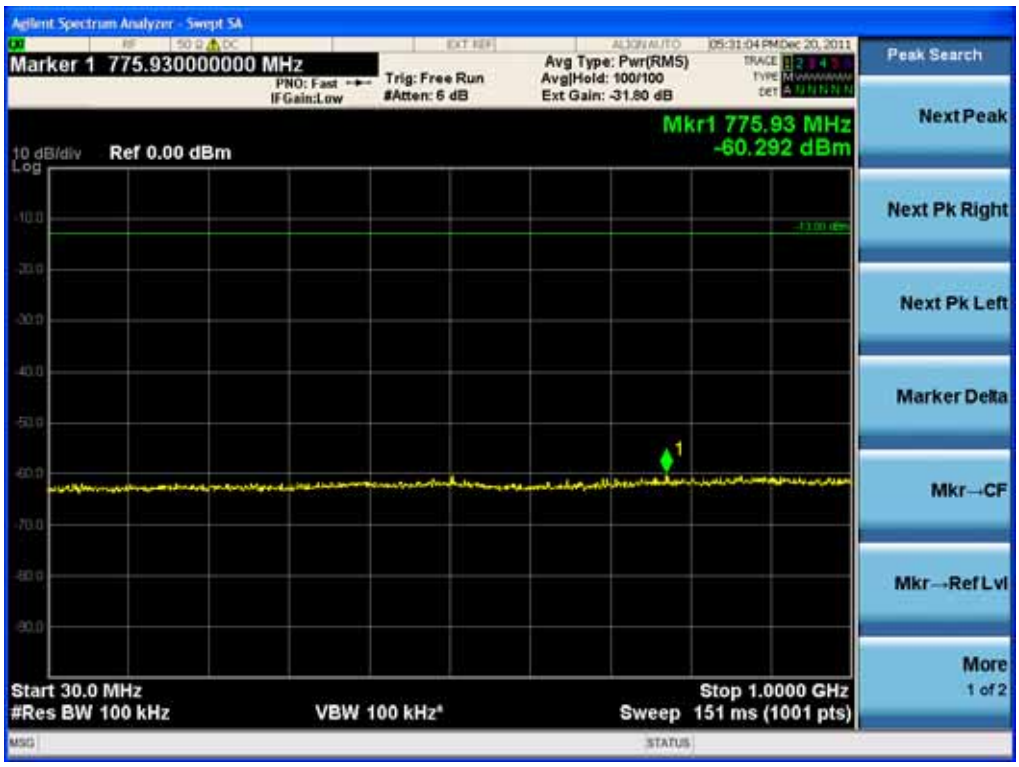
[WCDMA Uplink Low]



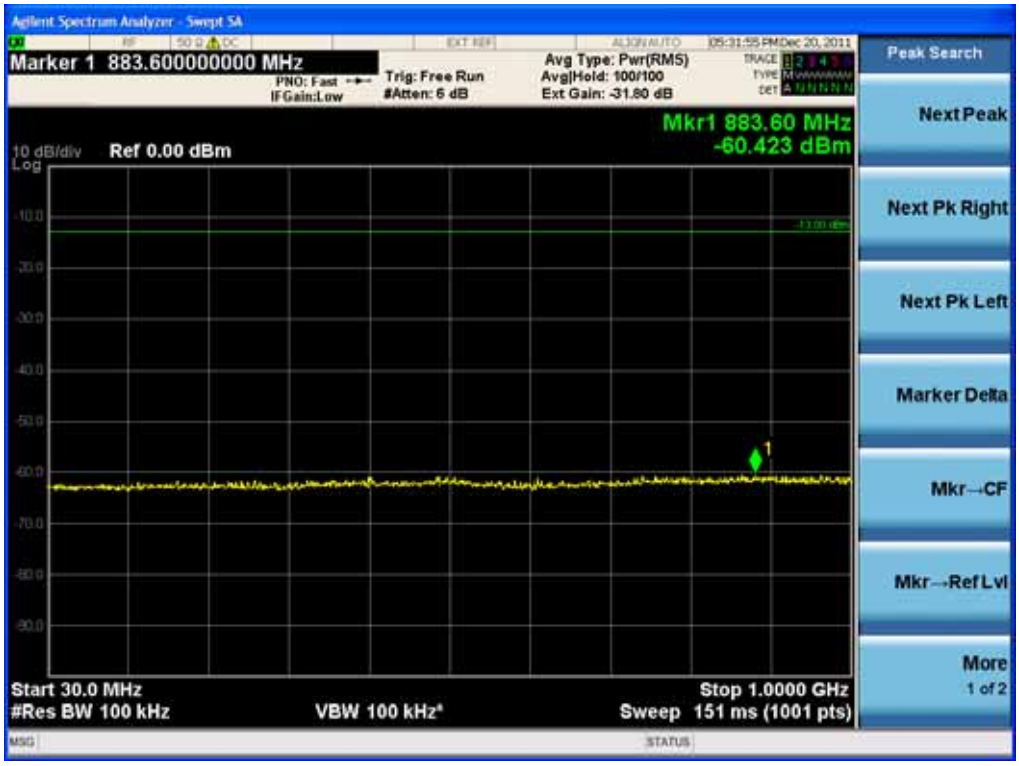
[WCDMA Uplink Middle]



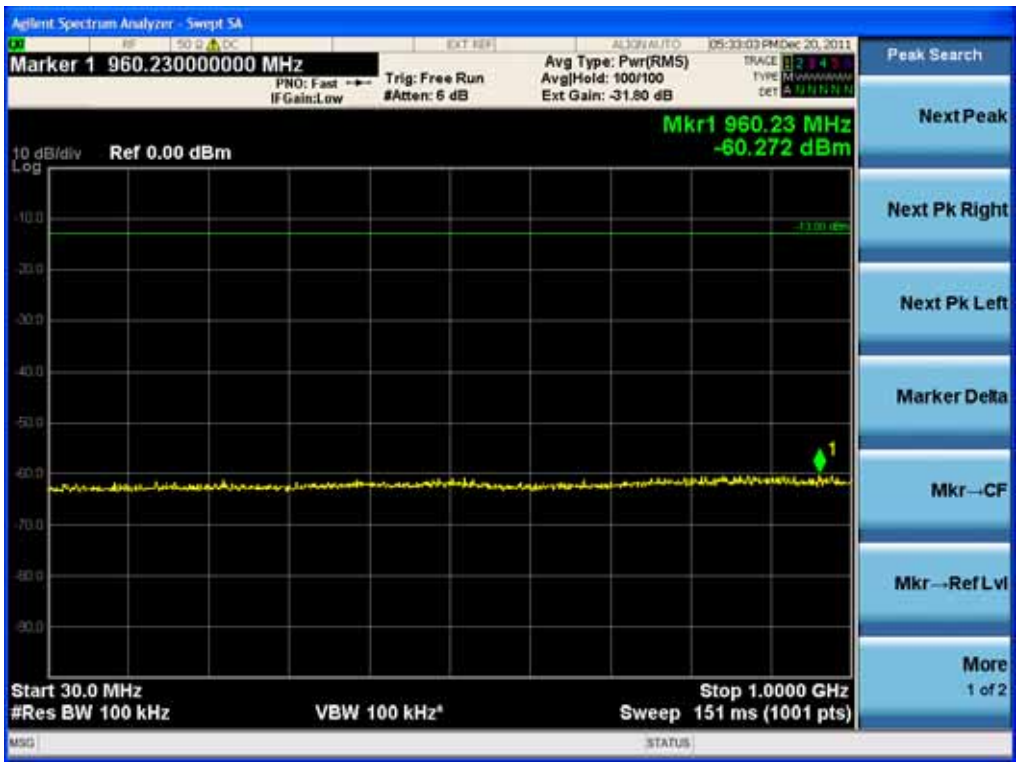
[WCDMA Uplink High]



[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]

[WCDMA Downlink Low]

[WCDMA Downlink Middle]

[WCDMA Downlink High]

[LTE Downlink Low]

[LTE Downlink Middle]

[LTE Downlink High]

[CDMA Uplink Low]

[CDMA Uplink Middle]

[CDMA Uplink High]

[WCDMA Uplink Low]

[WCDMA Uplink Middle]

[WCDMA Uplink High]

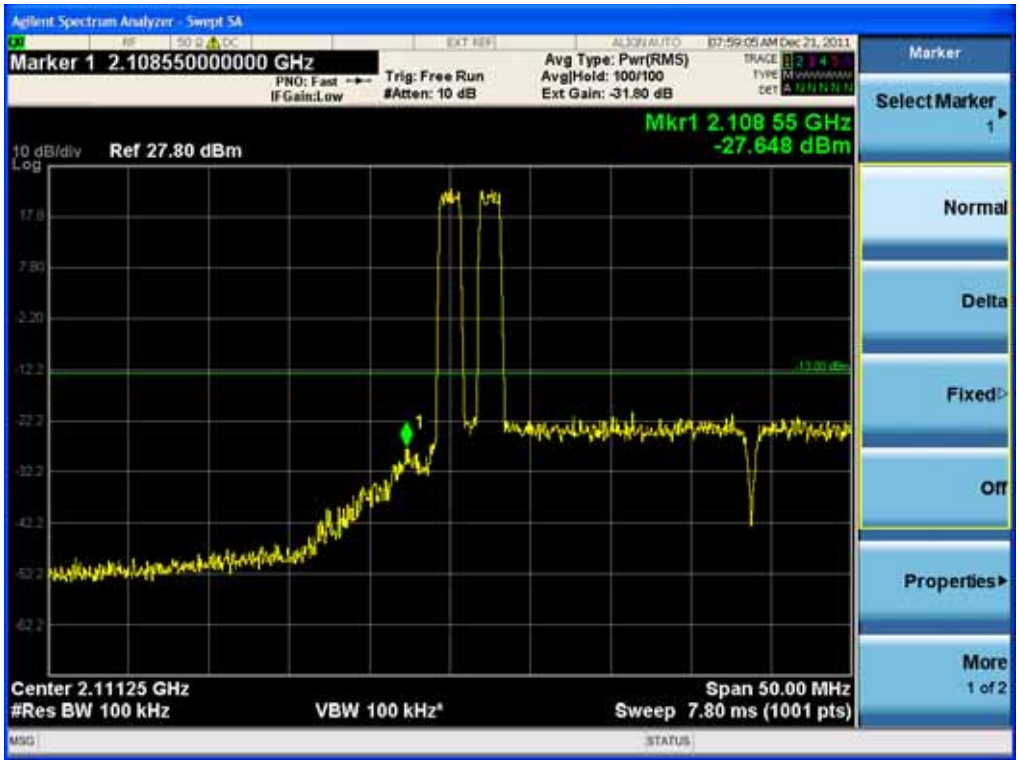
[LTE Uplink Low]

[LTE Uplink Middle]

[LTE Uplink High]

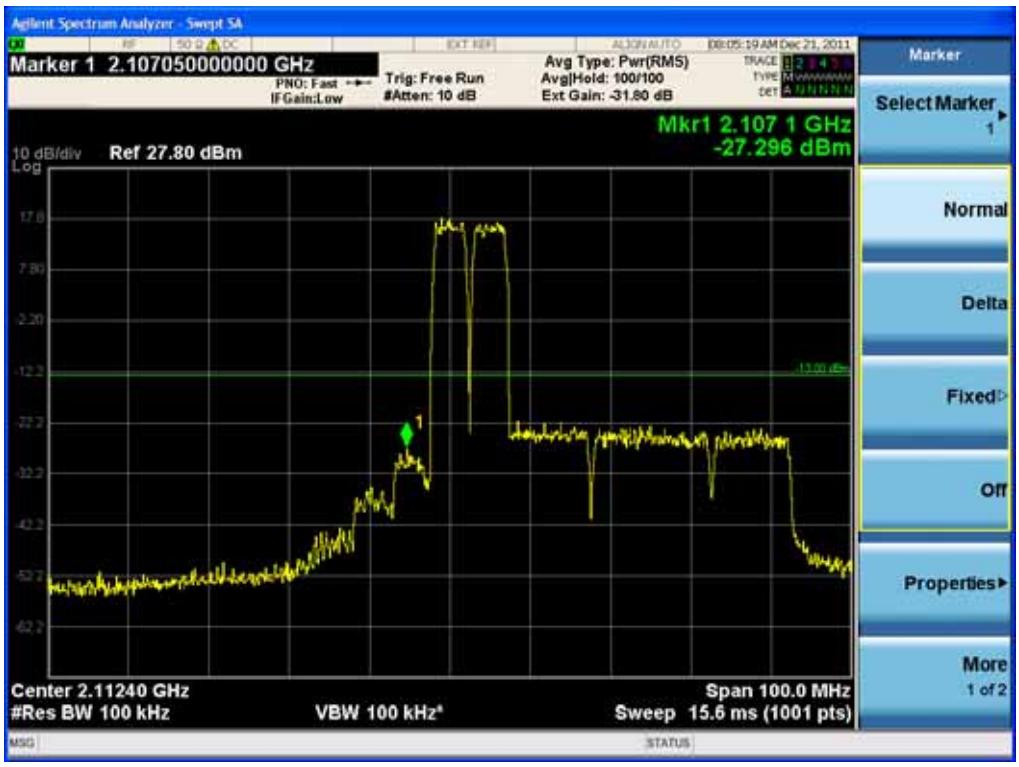
Intermodulation Spurious Emissions

[CDMA Downlink Low]



[CDMA Downlink High]

[WCDMA Downlink Low]

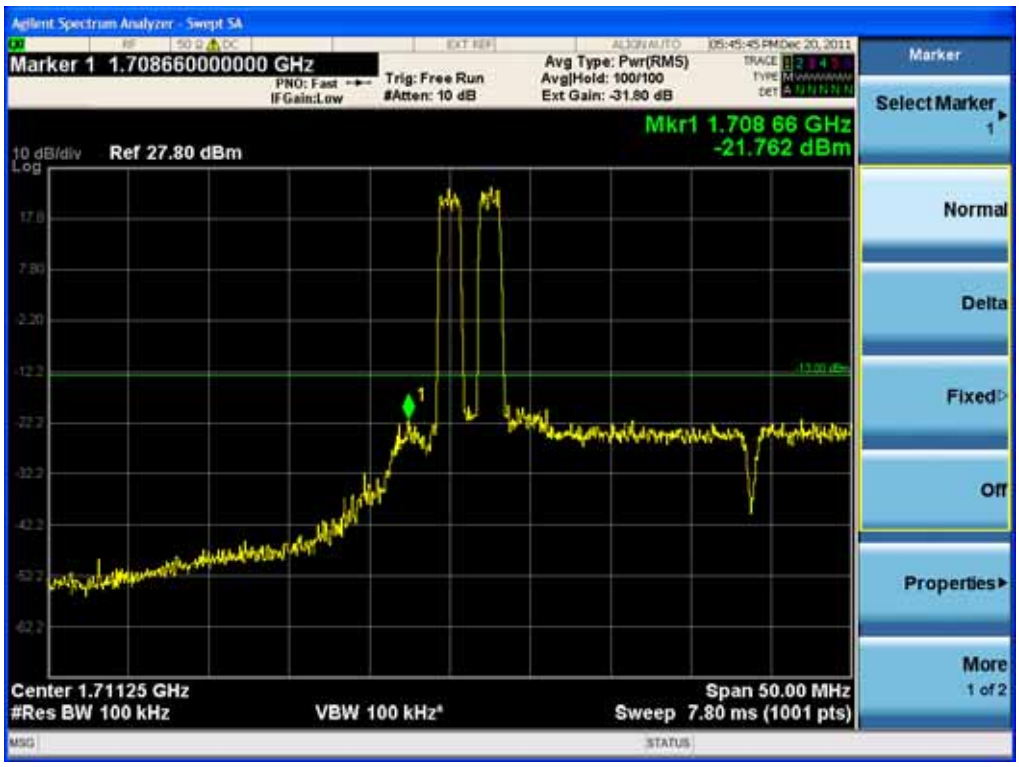


[WCDMA Downlink High]

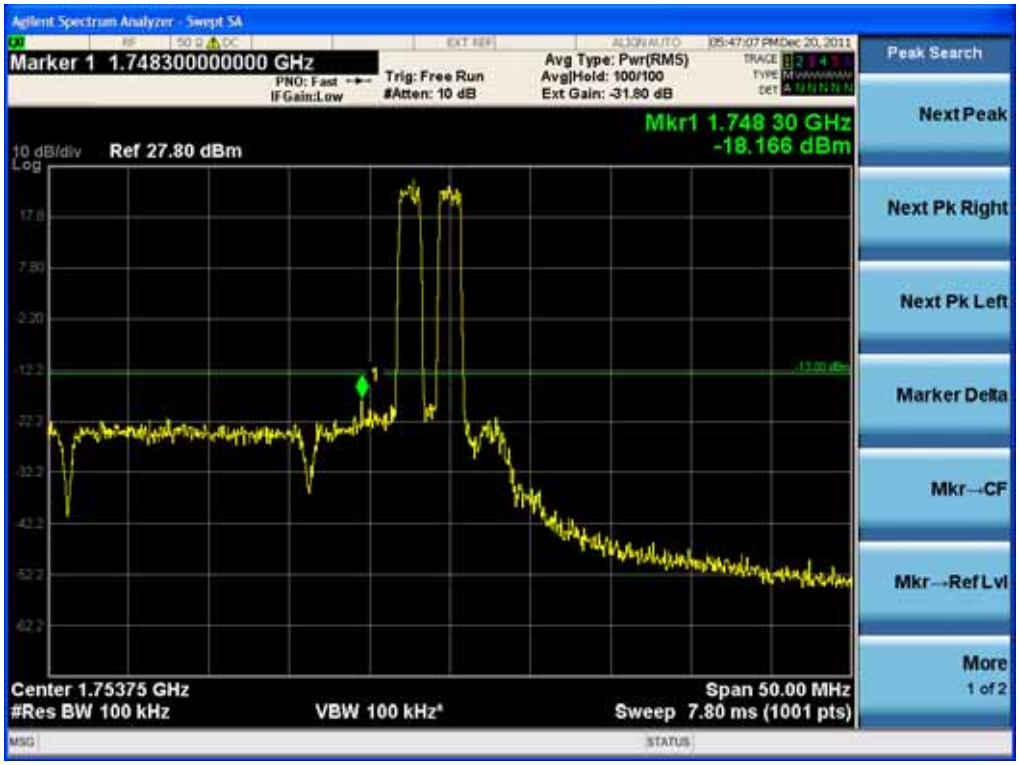
[LTE Downlink Low]

[LTE Downlink High]

[CDMA Uplink Low]



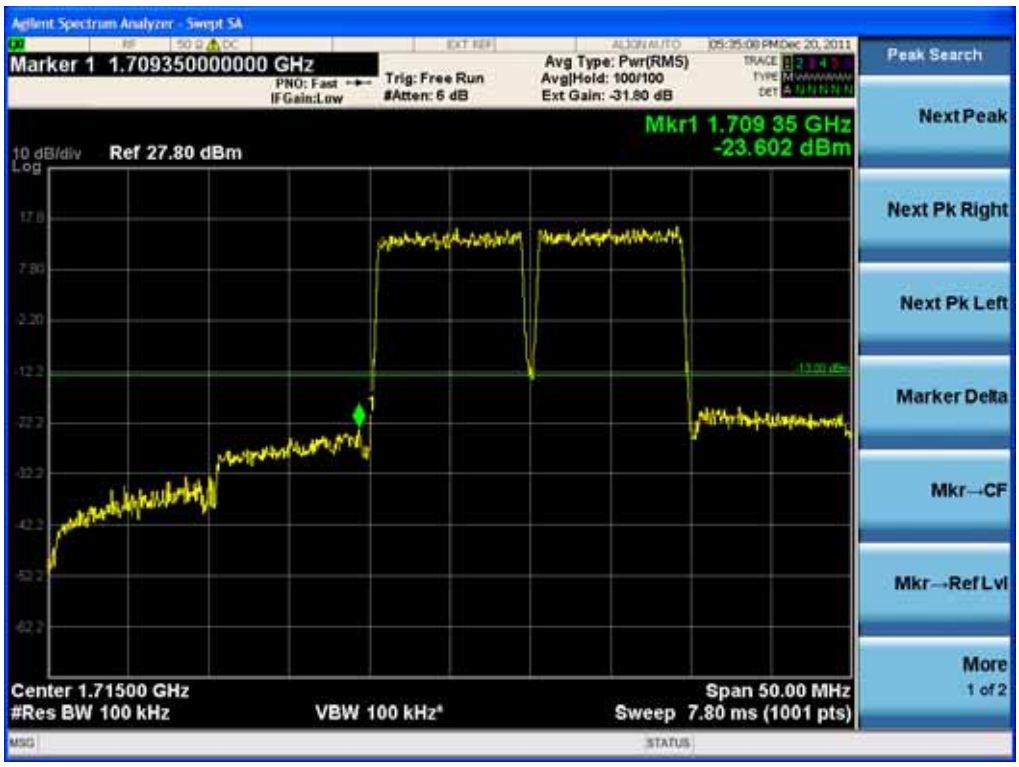
[CDMA Uplink High]



[WCDMA Uplink Low]

[WCDMA Uplink High]

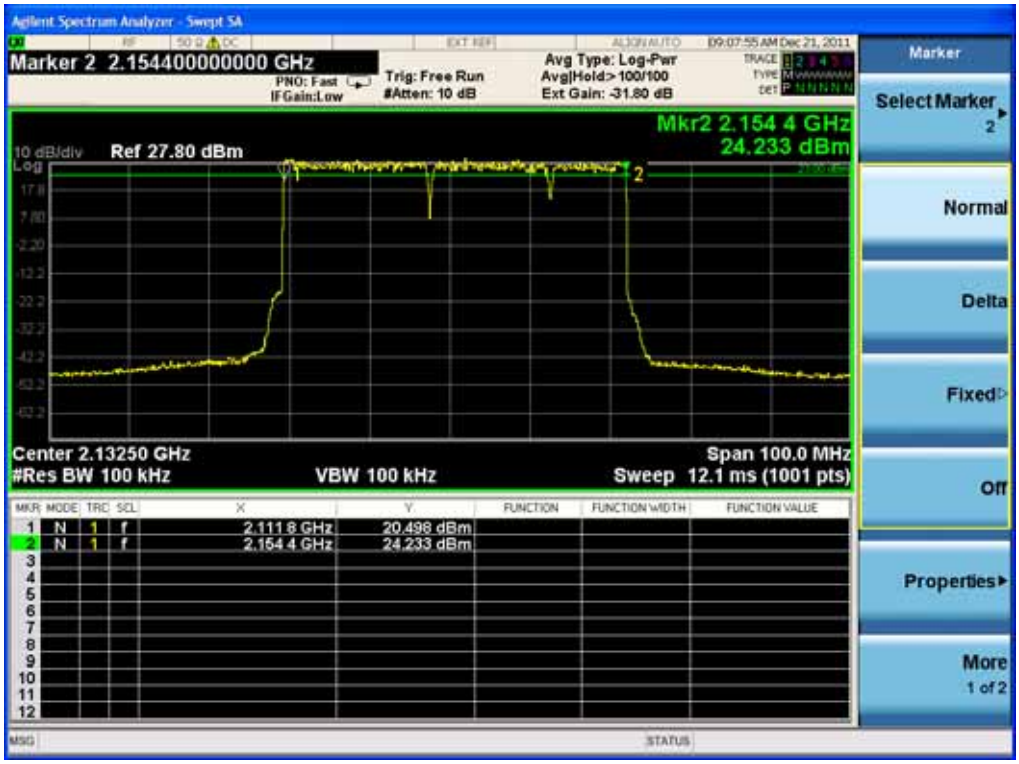
[LTE Uplink Low]



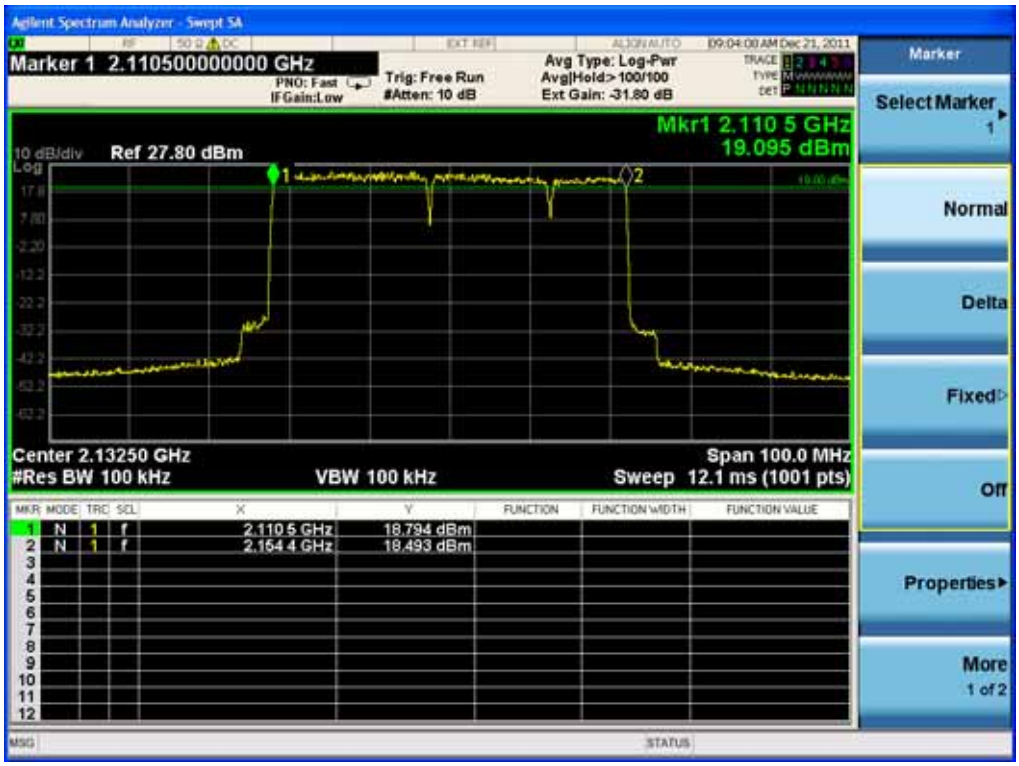
[LTE Uplink High]

Passband Gain

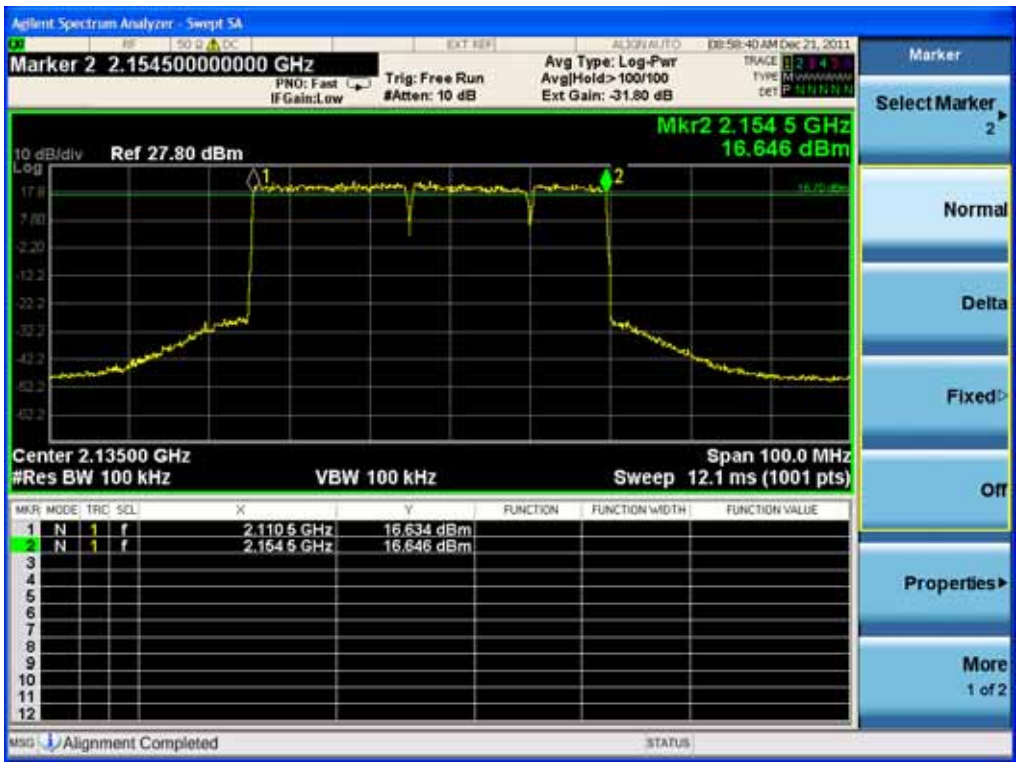
[CDMA Downlink Middle]



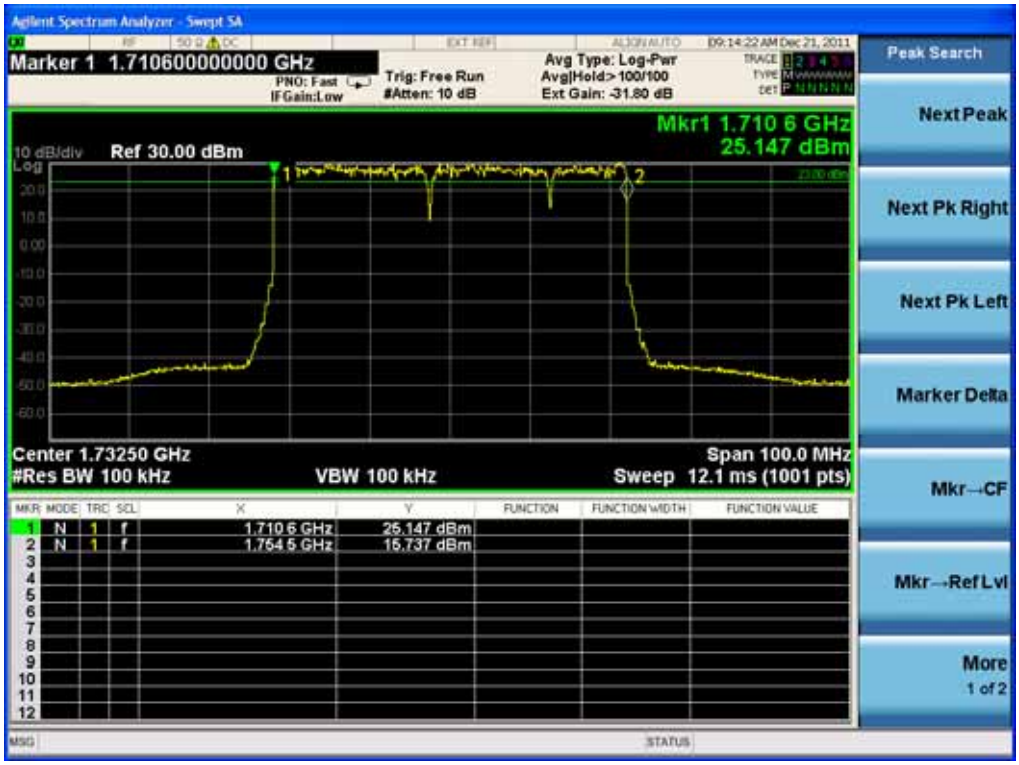
[WCDMA Downlink Middle]



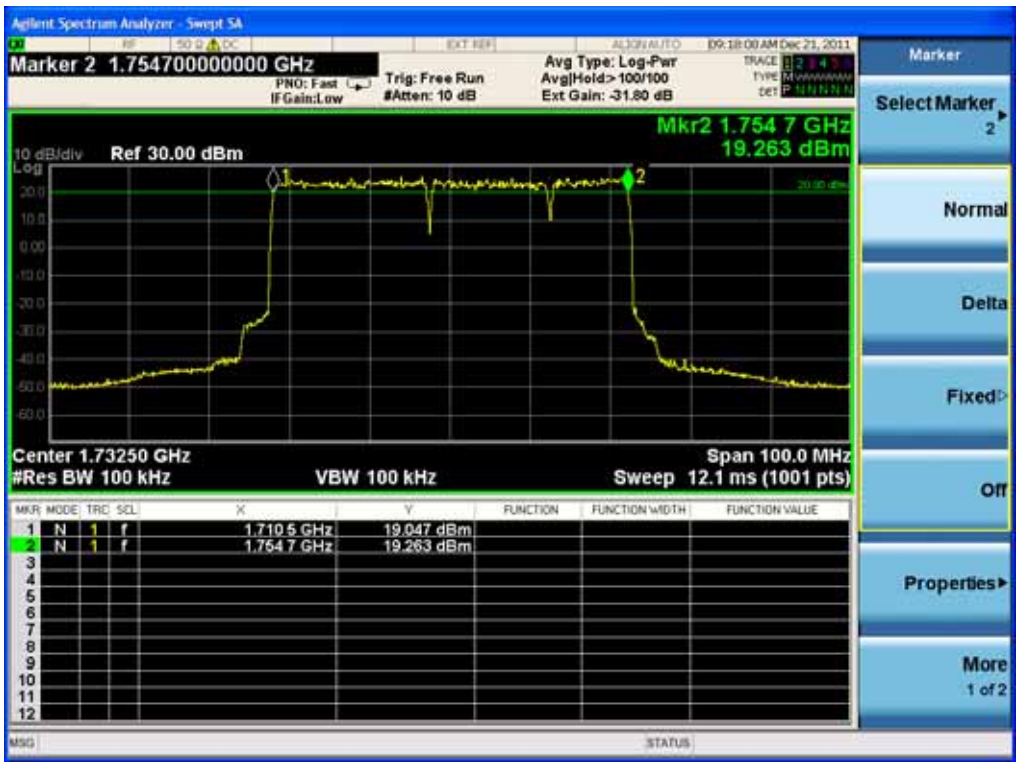
[LTE Downlink Middle]



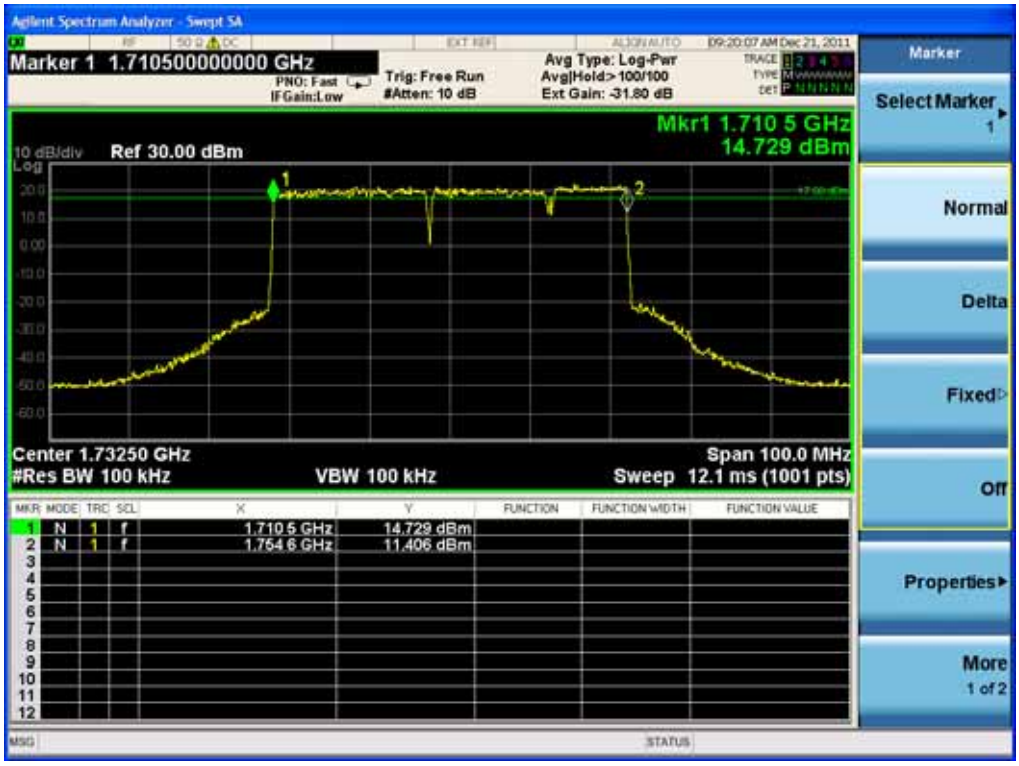
[CDMA Uplink Middle]



[WCDMA Uplink Middle]



[LTE Uplink Middle]



Band Edge

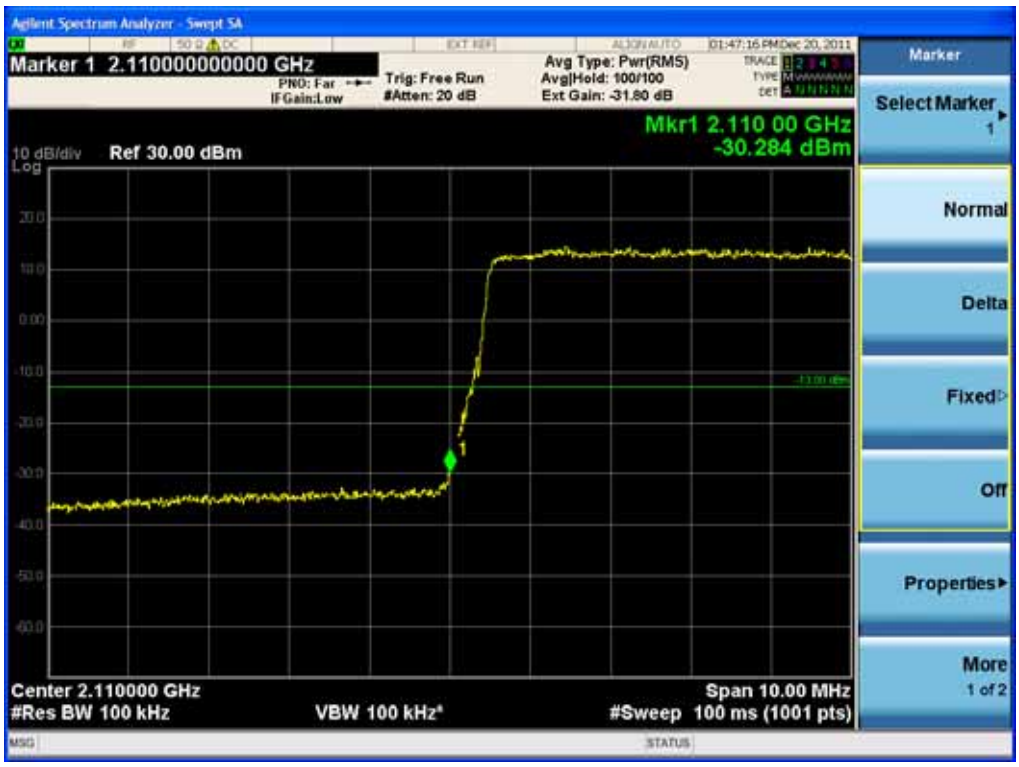
[CDMA Downlink Low]

[CDMA Downlink High]

[WCDMA Downlink Low]

[WCDMA Downlink High]

[LTE Downlink Low]

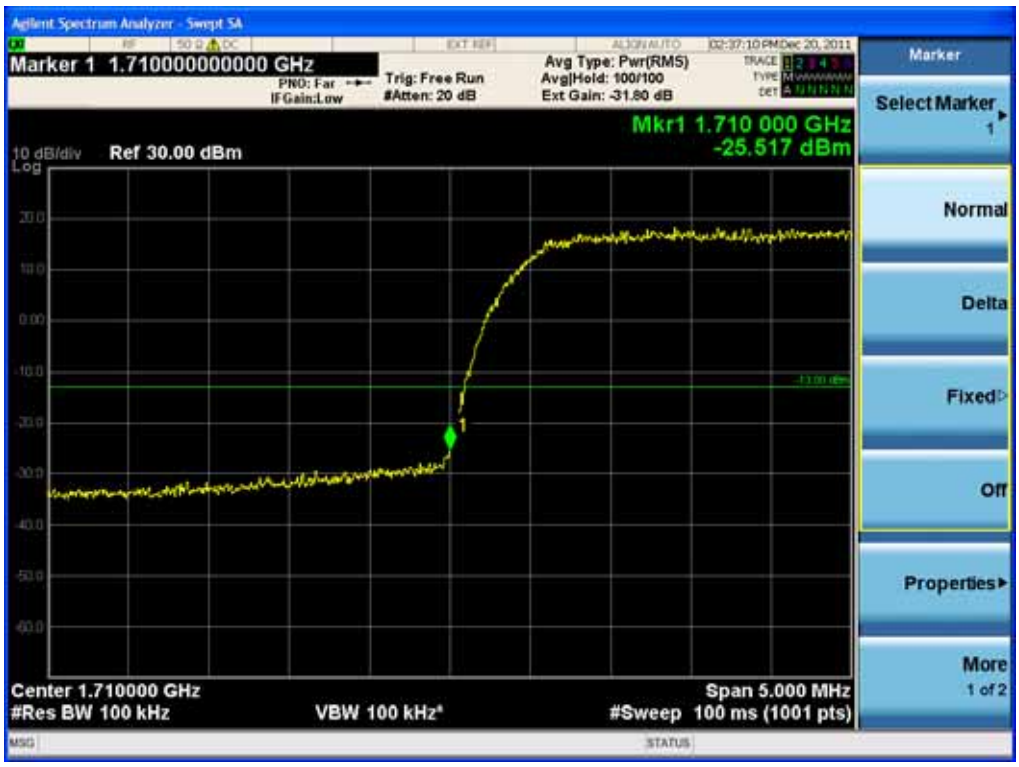


[LTE Downlink High]

[CDMA Uplink Low]

[CDMA Uplink High]

[WCDMA Uplink Low]



[WCDMA Uplink High]

[LTE Uplink Low]

[LTE Uplink High]

8. 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 TIA/EIA-603-A-2001 "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.

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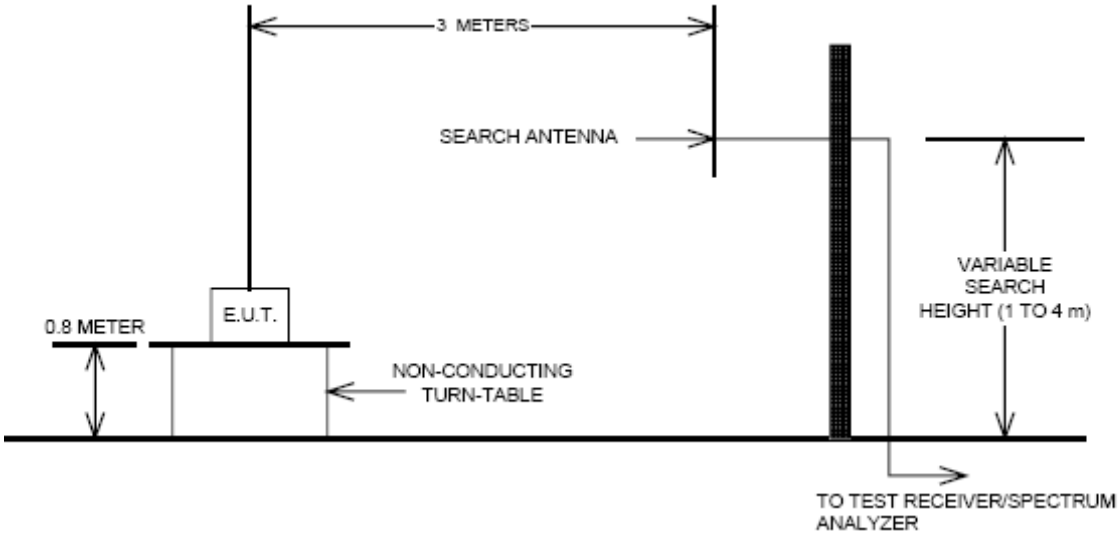
Radiated Spurious Emissions Test Setup



Test Result:

[Downlink]

Mode	Frequency	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBd)	C.L	Pol.	ERP (dBm)	Margin (dB)
CDMA	2132.5	4265.00	-48.80	10.30	8.36	V	-46.86	-33.86
		6397.50	-47.60	9.90	10.97	V	-48.67	-35.67
WCDMA	2136.9	4273.80	-49.30	10.30	8.45	V	-47.45	-34.45
		6410.70	-46.80	9.92	11.01	V	-47.89	-34.89
LTE	2135	4270.00	-49.40	10.30	8.42	V	-47.52	-34.52
		6405.00	-47.70	9.91	11.00	V	-48.79	-35.79

[Uplink]

Mode	Frequency	Freq.(MHz)	Substitute Level [dBm]	Ant. Gain (dBd)	C.L	Pol.	ERP (dBm)	Margin (dB)
CDMA	1732.5	3465.00	-50.30	10.17	7.17	V	-47.30	-34.30
		5197.50	-49.60	10.37	9.35	V	-48.58	-35.58
WCDMA	1736.9	3473.80	-51.10	10.19	7.32	V	-48.23	-35.23
		5210.70	-50.50	10.38	9.36	V	-49.48	-36.48
LTE	1735	3470.00	-51.30	10.18	7.20	V	-48.32	-35.32
		5205.00	-50.90	10.37	9.35	V	-49.88	-36.88

9. 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.

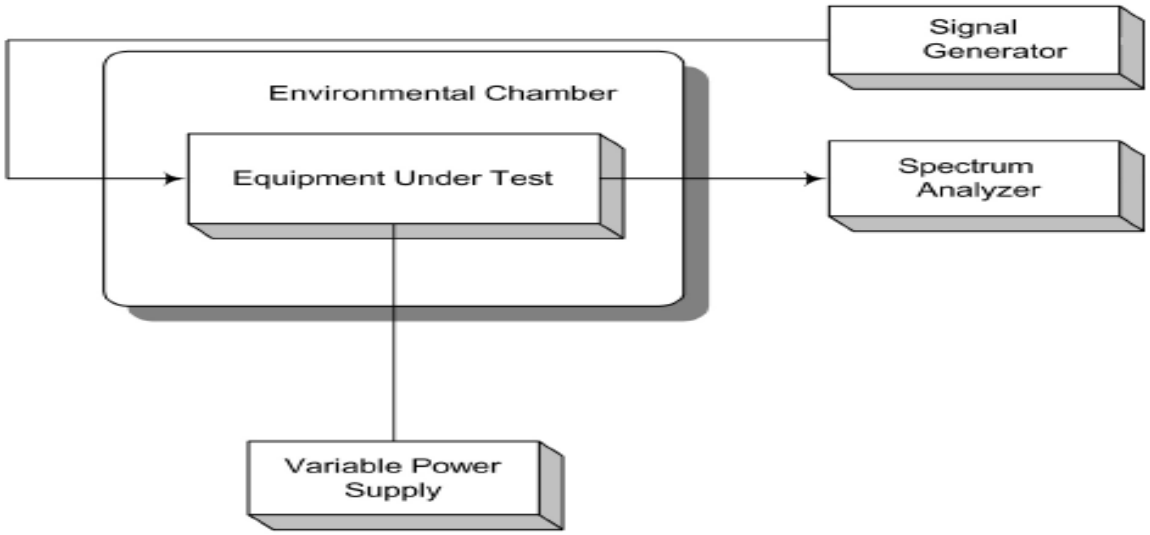
A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations.

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 ± 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)	2134 999 998	-2.5	0.0	0.0000
	-30	2134 999 998	-2.3	0.2	0.0001
	-20	2134 999 997	-3.5	-1.0	-0.0005
	-10	2134 999 997	-2.8	-0.3	-0.0001
	0	2134 999 998	-1.9	0.6	0.0003
	+10	2134 999 998	-2.4	0.1	0.0000
	+30	2134 999 998	-2.1	0.4	0.0002
	+40	2134 999 998	-1.6	0.9	0.0004
	+50	2134 999 998	-2.0	0.5	0.0002
115%	+20	2134 999 998	-1.8	0.7	0.0003
85%	+20	2134 999 998	-1.9	0.6	0.0003

[Downlink]

Reference: 110 Vac at 20°C **Freq.** = 1735.0 MHz

Voltage (%)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	1734 999 997	-3.0	0.0	0.0000
	-30	1734 999 996	-4.4	-1.4	-0.0008
	-20	1734 999 996	-4.1	-1.1	-0.0006
	-10	1734 999 996	-4.0	-1.0	-0.0006
	0	1734 999 997	-3.4	-0.4	-0.0002
	+10	1734 999 997	-3.1	-0.1	-0.0001
	+30	1734 999 997	-3.0	0.0	0.0000
	+40	1734 999 997	-2.8	0.2	0.0001
	+50	1734 999 997	-3.0	0.0	0.0000
115%	+20	1734 999 997	-2.9	0.1	0.0001
85%	+20	1734 999 997	-3.1	-0.1	-0.0001

[Uplink]

10. RECEIVER SPURIOUS EMISSIONS

Test Requirement(s): RSS-GEN 4.10

The receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate.

Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions.

Radiated emission measurements are to be performed using a calibrated open-area test site. As an alternative, the conducted measurement method may be used when the antenna is detachable. In such a case, the receiver spurious signal may be measured at the antenna port.

If the receiver is super-regenerative, stabilize it by coupling to it an unmodulated carrier on the receiver frequency (antenna conducted measurement) or by transmitting an unmodulated carrier on the receiver frequency from an antenna in the proximity of the receiver (radiated measurement). Taking care not to overload the receiver, vary the amplitude and frequency of the stabilizing signal to obtain the highest level of the spurious emissions from the receiver.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

Test Requirement(s): RSS-131 6.4

Spurious emissions of zone enhancers and translators shall be suppressed as much as possible.
Spurious emissions shall be attenuated below the rated power of the enhancer by at least:
$43 + 10 \text{ Log}_{10}(P_{rated} \text{ in watts})$, or 70 dB, whichever is less stringent.

Note: If the minimum standard is not met, check to see if the input signal generators have a high harmonic content.

Test Procedures:

The receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate.

Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions.

Radiated emission measurements are to be performed using a calibrated open-area test site. As an alternative, the conducted measurement method may be used when the antenna is detachable. In such a case, the receiver spurious signal may be measured at the antenna port.

If the receiver is super-regenerative, stabilize it by coupling to it an unmodulated carrier on the receiver frequency (antenna conducted measurement) or by transmitting an unmodulated carrier on the receiver frequency from an antenna in the proximity of the receiver (radiated measurement). Taking care not to overload the receiver, vary the amplitude and frequency of the stabilizing signal to obtain the highest level of the spurious emissions from the receiver.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

Spurious Frequency (MHz)	Field Strength (microvolts/m) at 3 metres
30-88	100
88-216	150
216-960	200
960-1610	500
Above 1610	1000

30 MHz ~ 1 GHz

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
116	18.8	10.7	1.1	V	29.6	43.0	13.4
337	15.6	13.6	2.0	H	31.2	46.0	14.8

Above 1 GHz

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
No Peaks Found							

11. 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 - 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 (DownLink)

Max Peak output Power at antenna input terminal	30.08000	dBm
Max Peak output Power at antenna input terminal	1.01859	mW
Prediction distance	60.00000	cm
Prediction frequency	2136.90000	MHz
Antenna Gain(typical)	12.00000	dBi
Antenna Gain(numeric)	15.84893	-
Power density at prediction frequency (S)	0.356852	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm^2

2-2 Limit UpLink)

Max Peak output Power at antenna input terminal	29.97000	dBm
Max Peak output Power at antenna input terminal	993.1	mW
Prediction distance	60.00000	cm
Prediction frequency	1715.00000	MHz
Antenna Gain(typical)	00.00000	dBi
Antenna Gain(numeric)	1.00000	-
Power density at prediction frequency (S)	0.021953	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm^2

3. RESULTS

The power density level at 60 cm is 0.356852 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at 2136.9 MHz

The power density level at 60 cm is 0.021953 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at 1715.0 MHz

Simultaneous MPE at 60 cm is (0.356852/1.0) + (0.021953/1) = 0.3788< 1

Warning: In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, it must also have a minimum distance of 60 cm from the body during normal operation.