



HCT. CO., LTD.
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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.: HCTR1201FR24

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID:

S2O-SDR-P

IC :

6416A-SDRP

APPLICANT:

Advanced RF Technologies, Inc

EUT Type:

Software Define Modular Repeater

Model:

SDR-P

Frequency Ranges:

**DL : 1930 MHz ~ 1995 MHz
UL : 1850 MHz ~ 1915 MHz**

Conducted Output Power:

**DL: 30.00 dBm
UL :30.08 dBm**

FCC Rules Part(s):

CFR 47, Part 24

IC Rule Part(s):

RSS-Gen (Issue 2, June 2007) , RSS-131 (Issue 2, 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

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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: S20-SDR-P
- IC: 6416A-SDRP
- APPLICANT: Advanced RF Technologies, Inc
- EUT Type: Software Define Modular Repeater
- Model: SDR-P
- Frequency Ranges: DL : 1930 MHz ~ 1995 MHz
UL : 1850 MHz ~ 1915 MHz
- ConductedOutput Power: DL : 30.00 dBm
UL : 30.08 dBm
- Antenna Gain(s) : 12 dBi
- FCC Rules Part(s): CFR Title 47 Part 24
- IC Rules Part(s): RSS-Gen (Issue 2, June 2007) , RSS-131 (Issue 2, 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; §24.232	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, §24.238	RSS-131, Section 4.4 RSS-GEN, Section 4.9	Compliant
Radiated Spurious Emissions	§2.1053, §24.238	RSS-131, Section 4.4 RSS-GEN, Section 4.9	Compliant
Frequency Stability	§2.1055, §22.235	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.

§ 24.232 Power and antenna height limits. (a)(1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

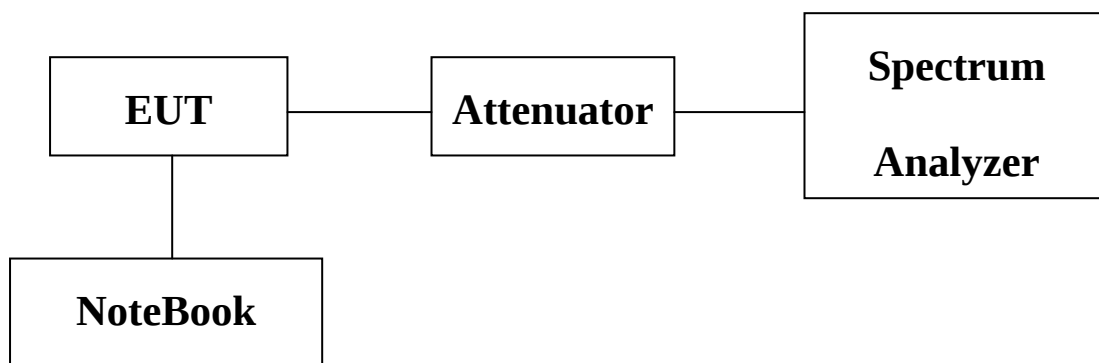
(2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(3) Base station antenna heights may exceed 300 meters HAAT with a corresponding reduction in power; see Tables 1 and 2 of this section.

(4) The service area boundary limit and microwave protection criteria specified in §§ 24.236 and 24.237 apply.

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	-57.9
WCDMA	QPSK	-58.7
GSM	GMSK	-60.4
LTE	16QAM	-59.5

[Downlink]

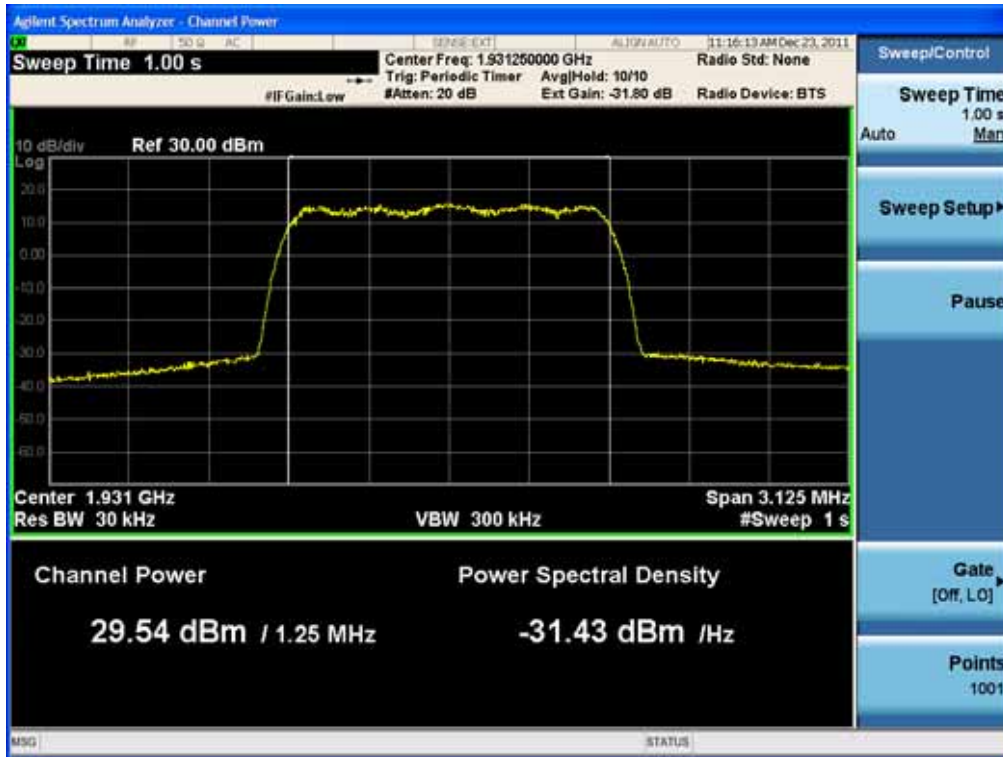
	Channel	Frequency (MHz)	Output Power (dBm)
CDMA	Low	1931.25	29.54
	Middle	1962.5	29.93
	High	1993.75	29.87
WCDMA	Low	1932.4	29.85
	Middle	1960.0	29.95
	High	1992.6	29.97
GSM	Low	1930.2	28.44
	Middle	1960.0	29.98
	High	1994.8	29.12
LTE	Low	1932.5	29.97
	Middle	1960.0	30.00
	High	1992.5	29.97

[Uplink]

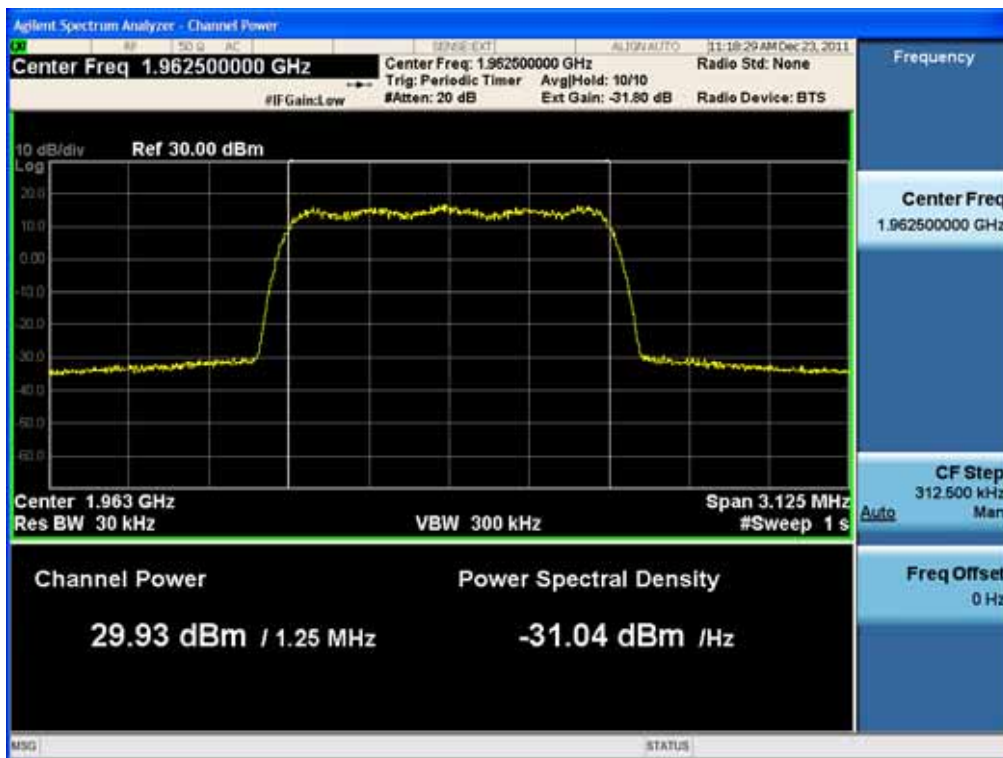
	Channel	Frequency (MHz)	Output Power (dBm)
CDMA	Low	1851.25	29.96
	Middle	1882.5	29.92
	High	1913.75	29.40
WCDMA	Low	1852.4	30.04
	Middle	1880.0	30.01
	High	1912.6	29.31
GSM	Low	1850.2	30.08
	Middle	1880.0	29.99
	High	1914.8	28.85
LTE	Low	1852.5	29.98
	Middle	1880.0	30.01
	High	1912.5	30.00

Plots of RF Output Power

[CDMA Downlink Low]



[CDMA Downlink Middle]



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- 10 / 106 -

[CDMA Downlink High]



[WCDMA Downlink Low]



[WCDMA Downlink Middle]



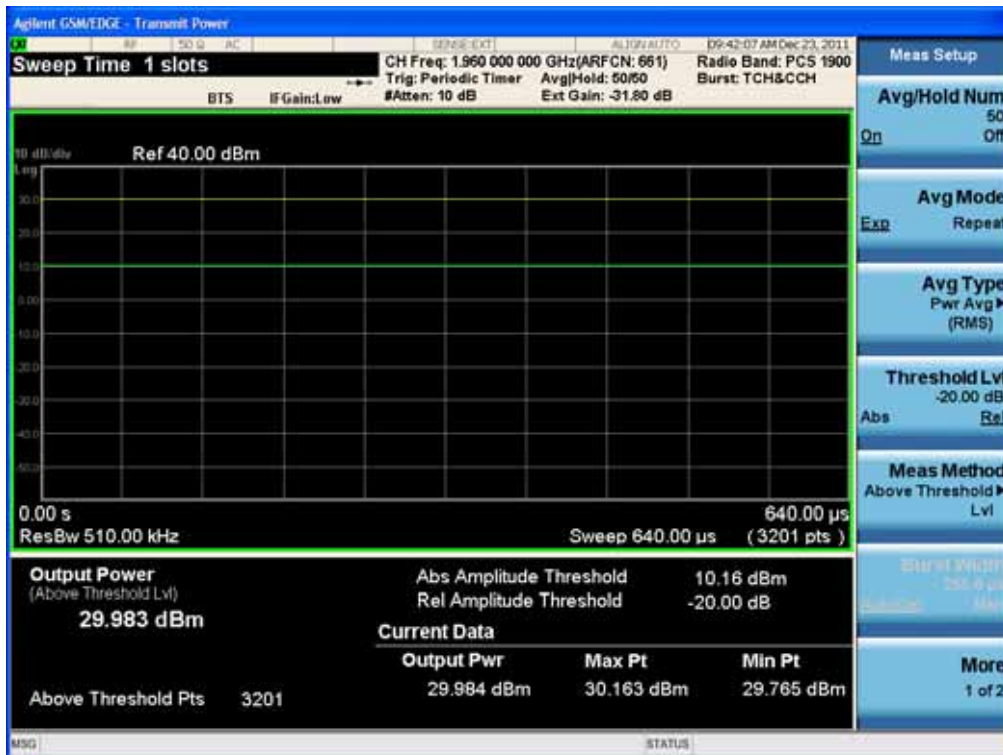
[WCDMA Downlink High]



[GSM Downlink Low]



[GSM Downlink Middle]



[GSM Downlink High]



[LTE Downlink Low]



[LTE Downlink Middle]



[LTE Downlink High]



[CDMA Uplink Low]



[CDMA Uplink Middle]



[CDMA Uplink High]



[WCDMA Uplink Low]



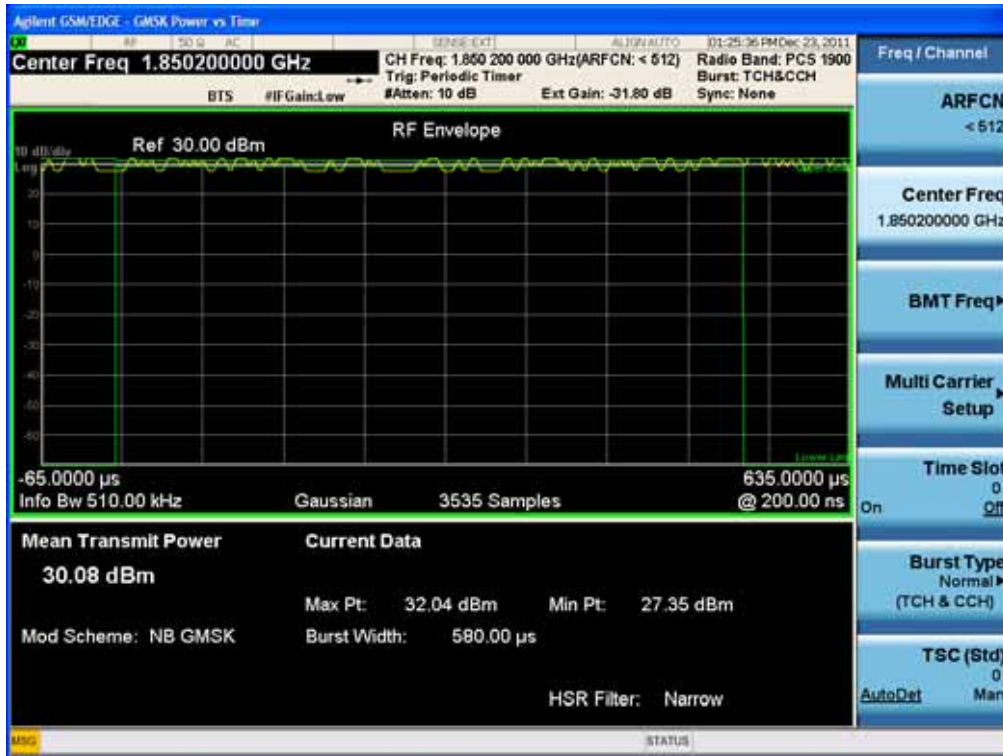
[WCDMA Uplink Middle]



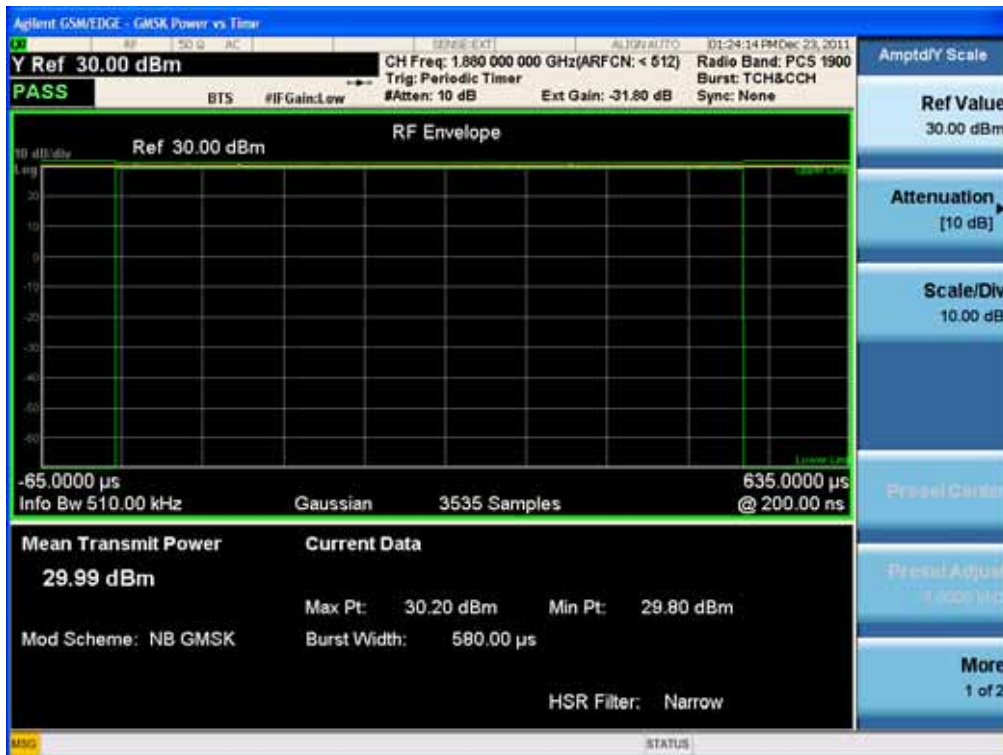
[WCDMA Uplink High]



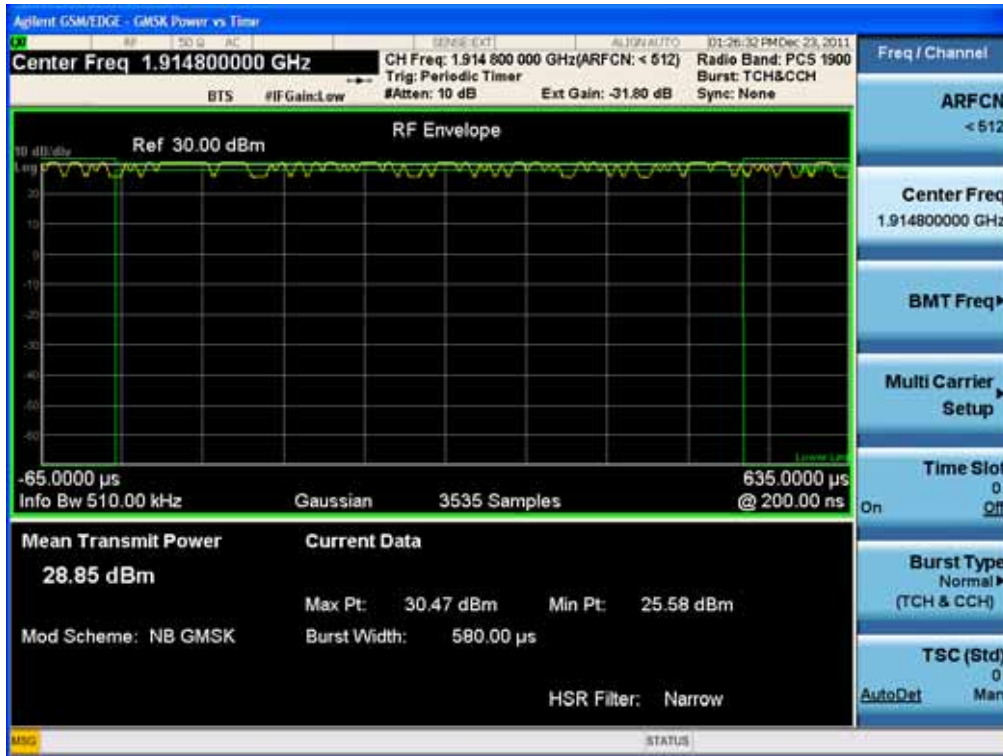
[GSM Uplink Low]



[GSM Uplink Middle]



[GSM 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	-57.9
WCDMA	QPSK	-58.7
GSM	GMSK	-60.4
LTE	16QAM	-59.5

[Downlink Output]

	Channel	Frequency (MHz)	Bandwidth(MHz)
CDMA	Low	1931.25	1.354
	Middle	1962.5	1.345
	High	1993.75	1.356
WCDMA	Low	1932.4	4.671
	Middle	1960.0	4.666
	High	1992.6	4.652
GSM	Low	1930.2	308.3
	Middle	1960.0	303.0
	High	1994.8	308.8
LTE	Low	1932.5	4.977
	Middle	1960.0	4.929
	High	1992.5	4.926

[Downlink Input]

	Channel	Frequency (MHz)	Bandwidth (MHz)
CDMA	Low	1931.25	1.359
	Middle	1962.5	1.348
	High	1993.75	1.353
WCDMA	Low	1932.4	4.699
	Middle	1960.0	4.717
	High	1992.6	4.702
GSM	Low	1930.2	300.1
	Middle	1960.0	308.5
	High	1994.8	296.4
LTE	Low	1932.5	4.993
	Middle	1960.0	4.981
	High	1992.5	4.943

[Uplink Output]

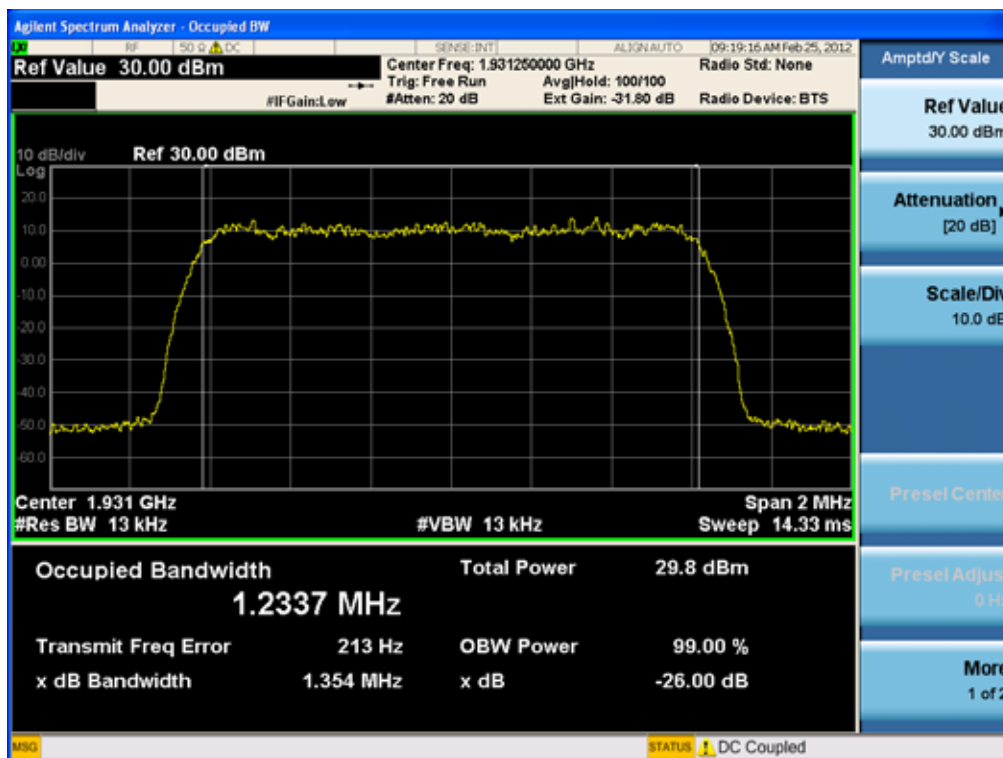
	Channel	Frequency (MHz)	Bandwidth (MHz)
CDMA	Low	1851.25	1.358
	Middle	1882.5	1.356
	High	1913.75	1.361
WCDMA	Low	1852.4	4.650
	Middle	1880.0	4.660
	High	1912.6	4.659
GSM	Low	1850.2	297.5
	Middle	1880.0	306.8
	High	1914.8	303.4
LTE	Low	1852.5	4.931
	Middle	1880.0	4.955
	High	1912.5	4.986

[Uplink Input]

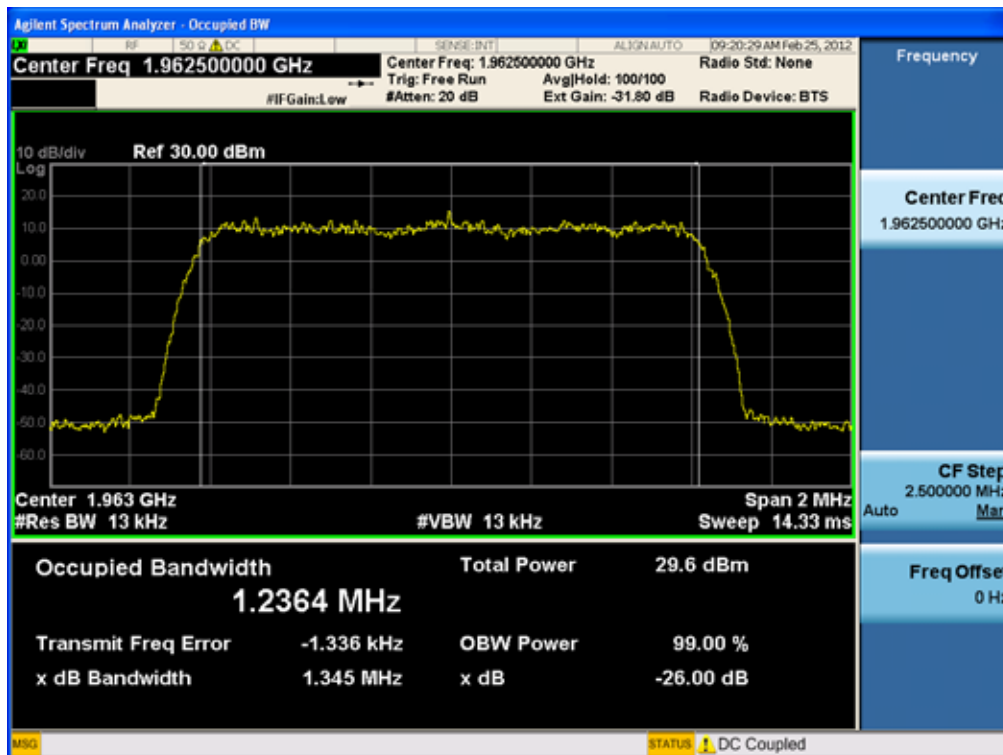
	Channel	Frequency (MHz)	Bandwidth (MHz)
CDMA	Low	1851.25	1.358
	Middle	1882.5	1.361
	High	1913.75	1.360
WCDMA	Low	1852.4	4.679
	Middle	1880.0	4.707
	High	1912.6	4.695
GSM	Low	1850.2	301.3
	Middle	1880.0	305.1
	High	1914.8	303.2
LTE	Low	1852.5	4.971
	Middle	1880.0	4.972
	High	1912.5	4.970

Plots of Occupied Bandwidth

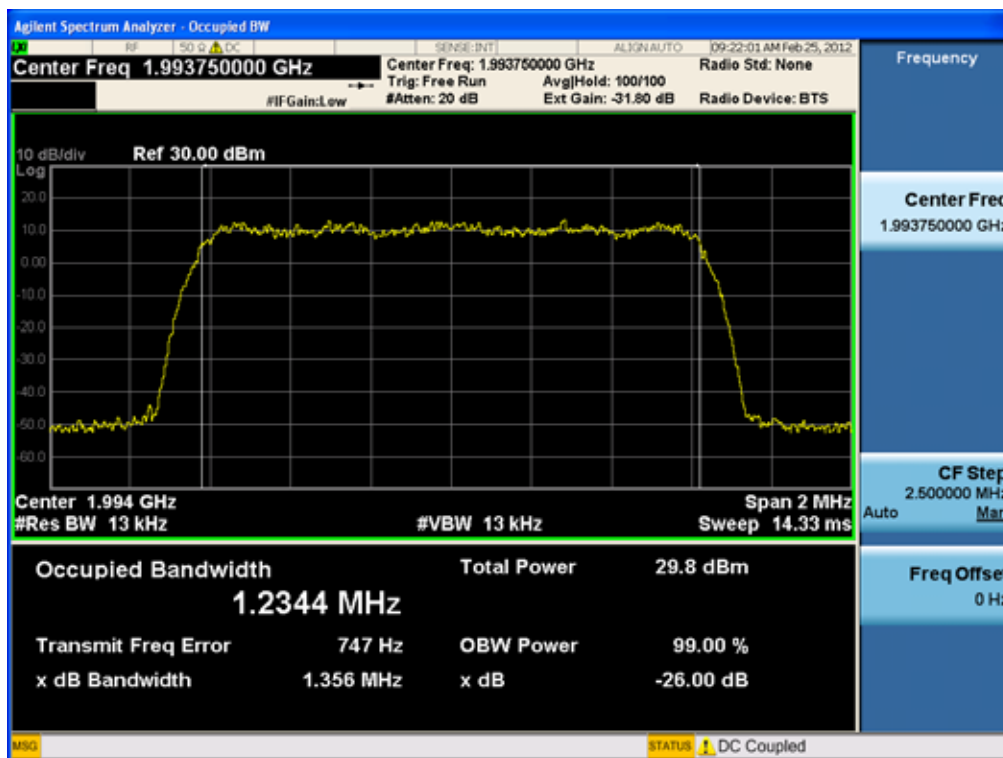
[Output CDMA Downlink Low]



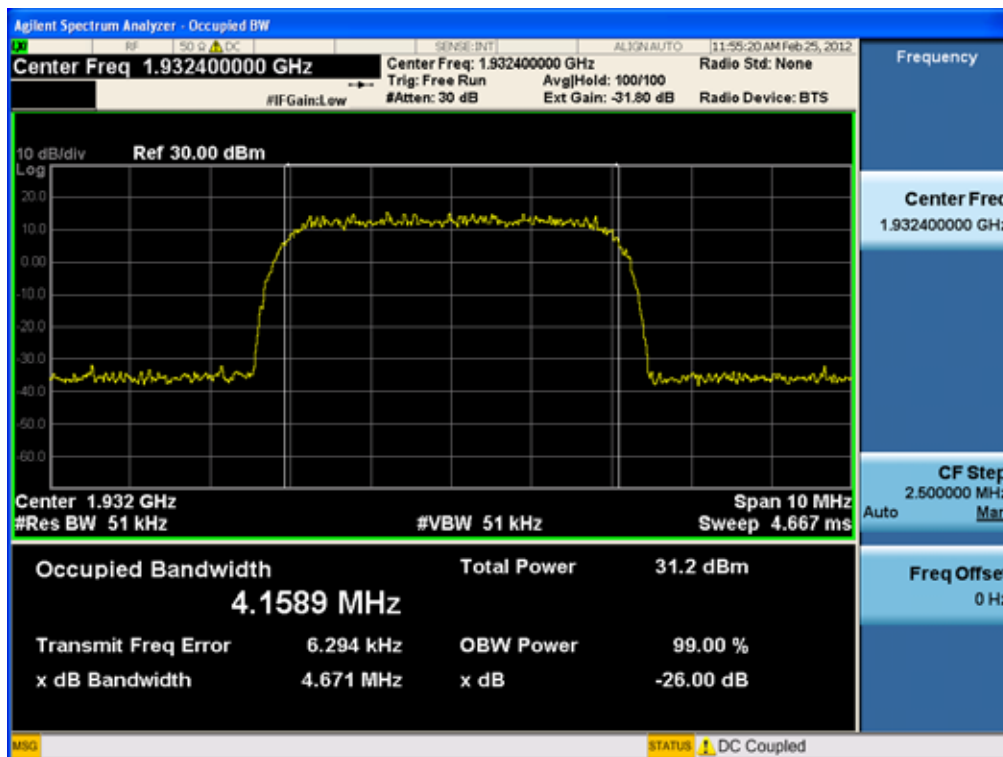
[Output CDMA Downlink Middle]



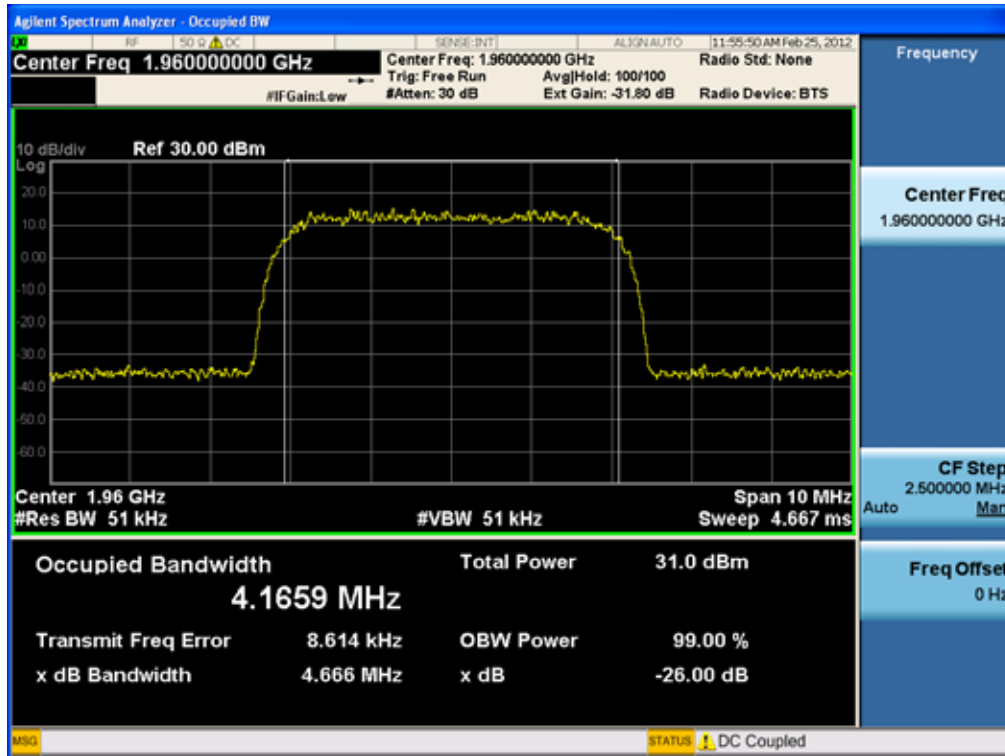
[Output CDMA Downlink High]



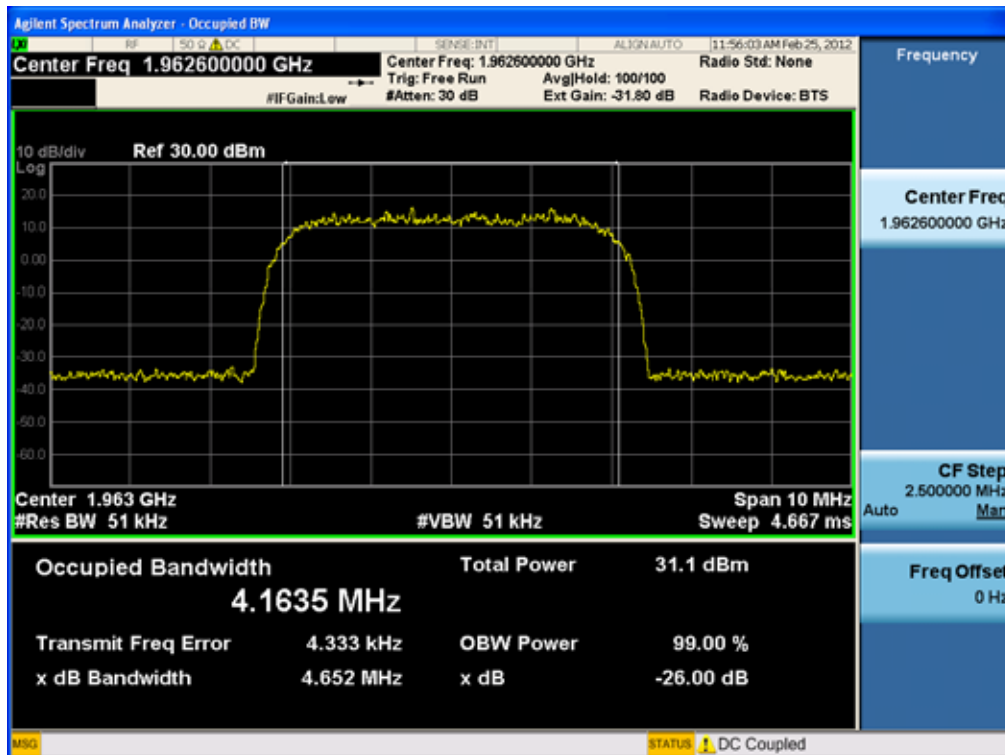
[Output WCDMA Downlink Low]



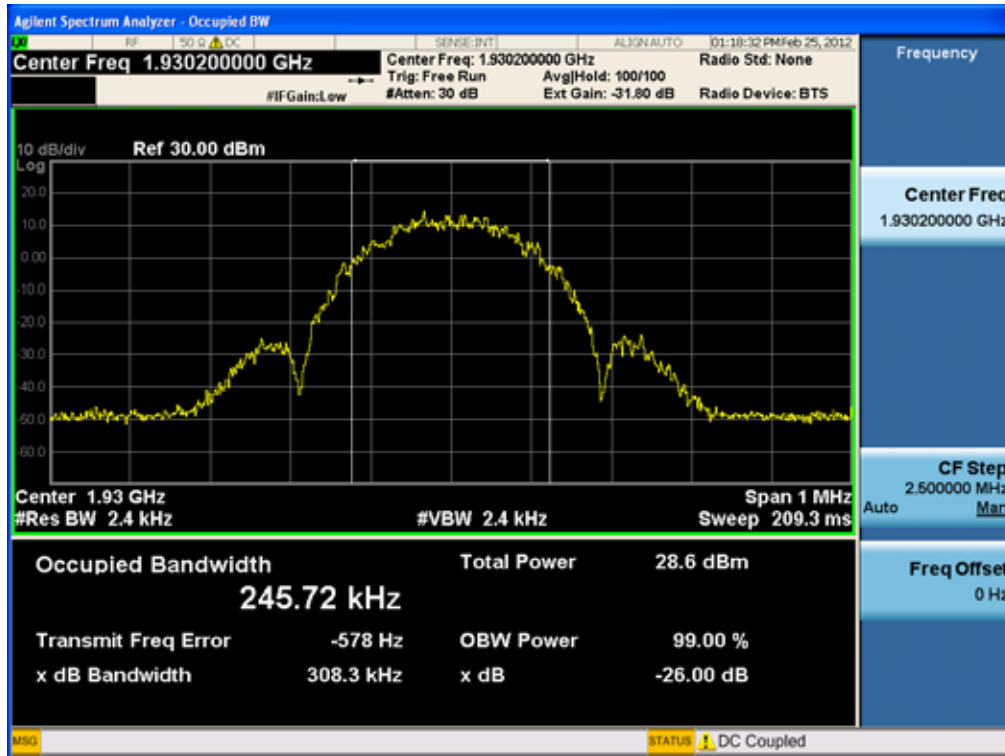
[Output WCDMA Downlink Middle]



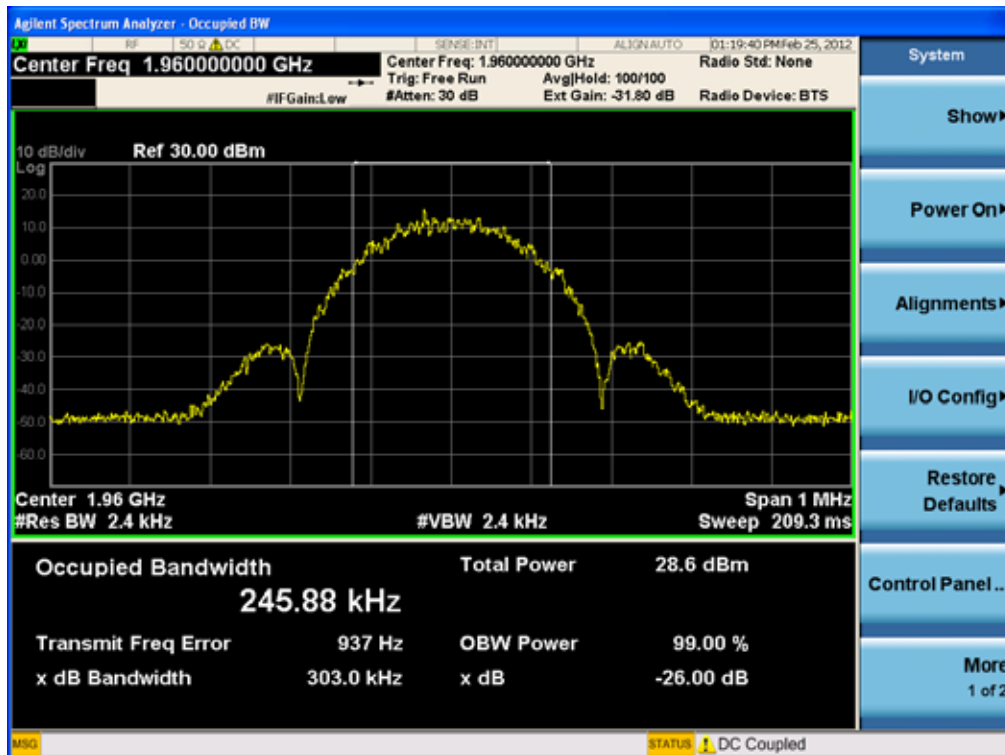
[Output WCDMA Downlink High]



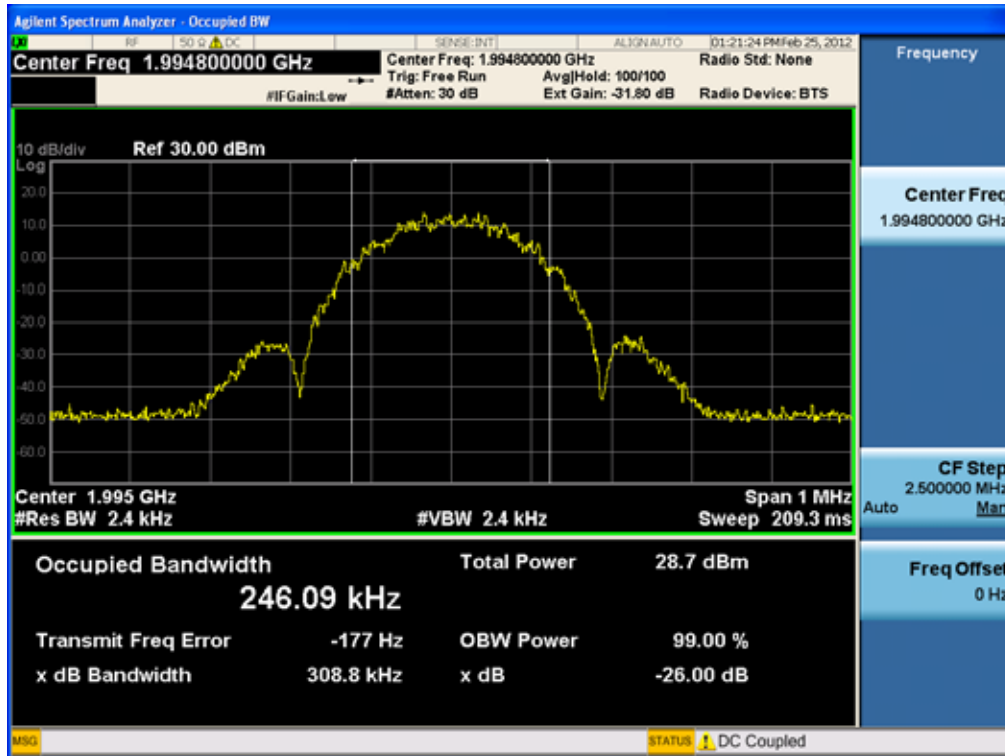
[Output GSM Downlink Low]



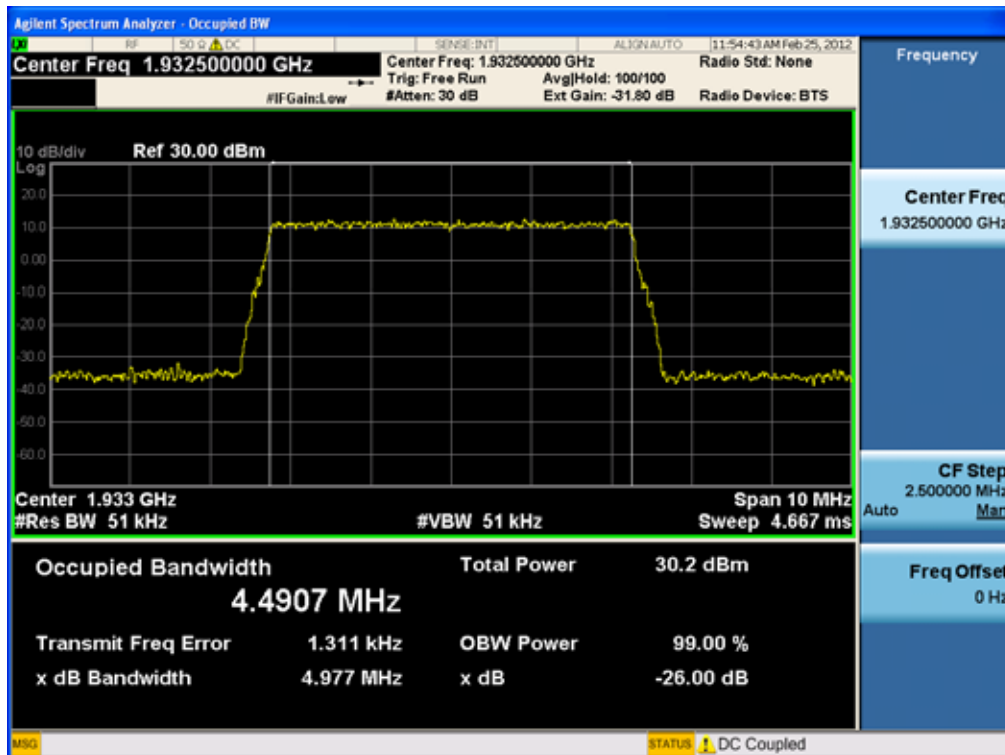
[Output GSM Downlink Middle]



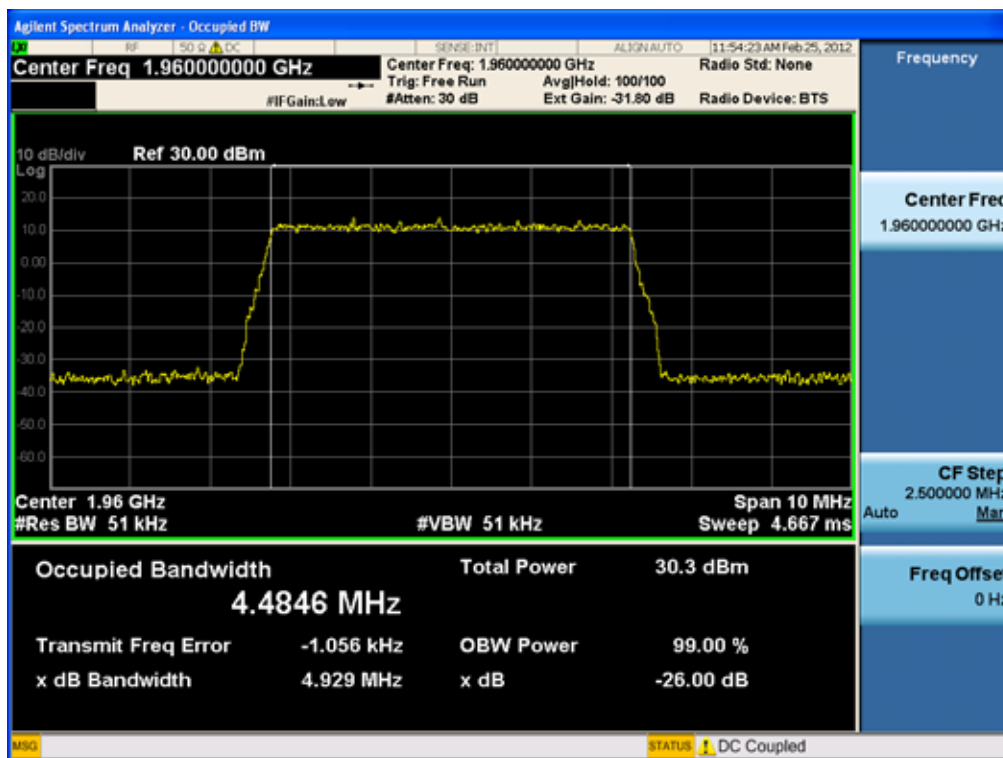
[Output GSM Downlink High]



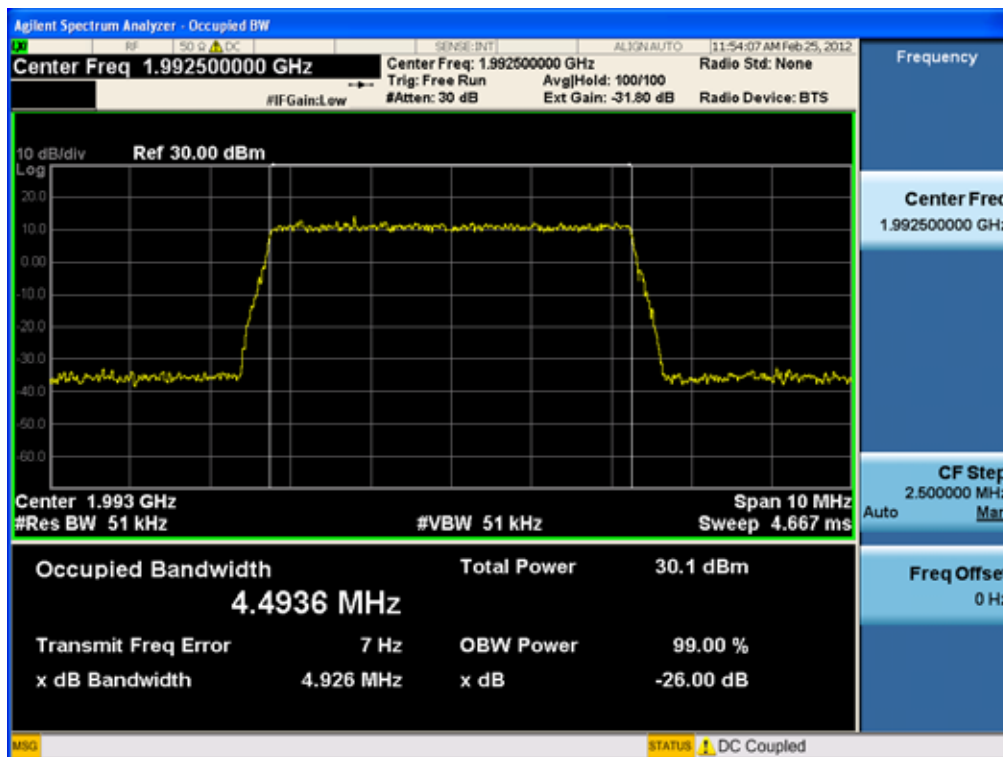
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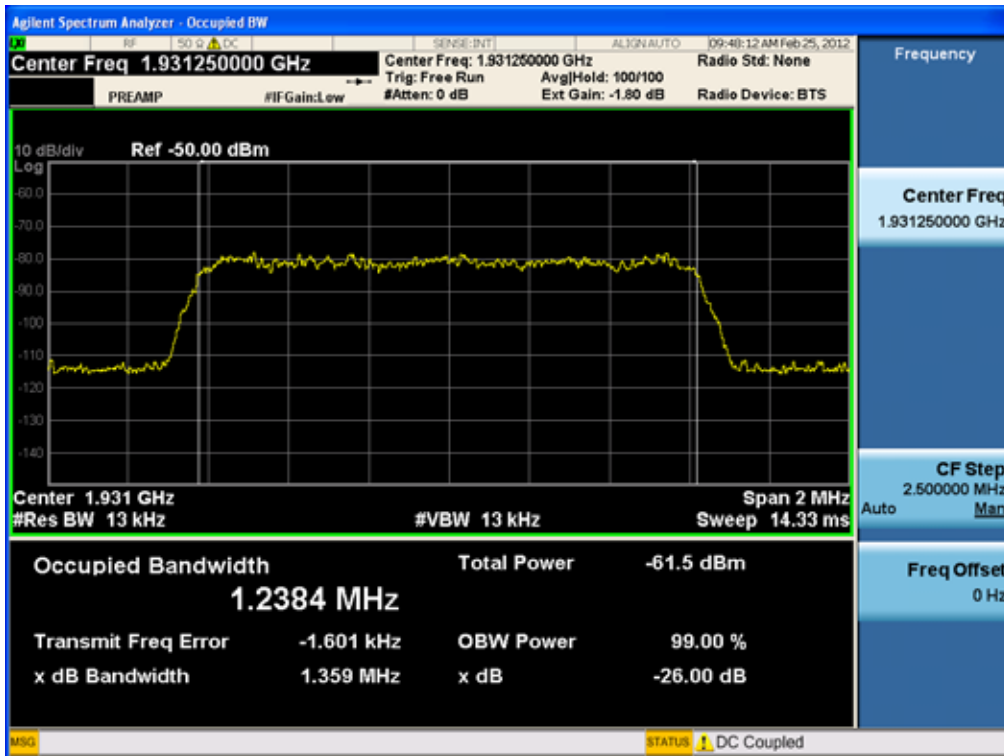
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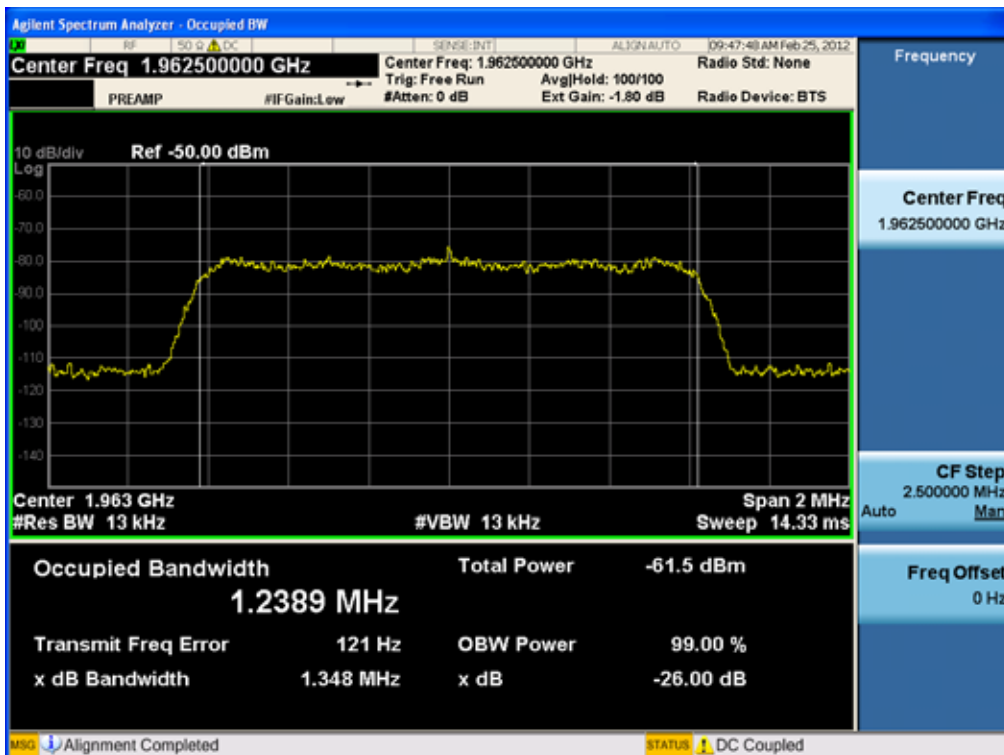
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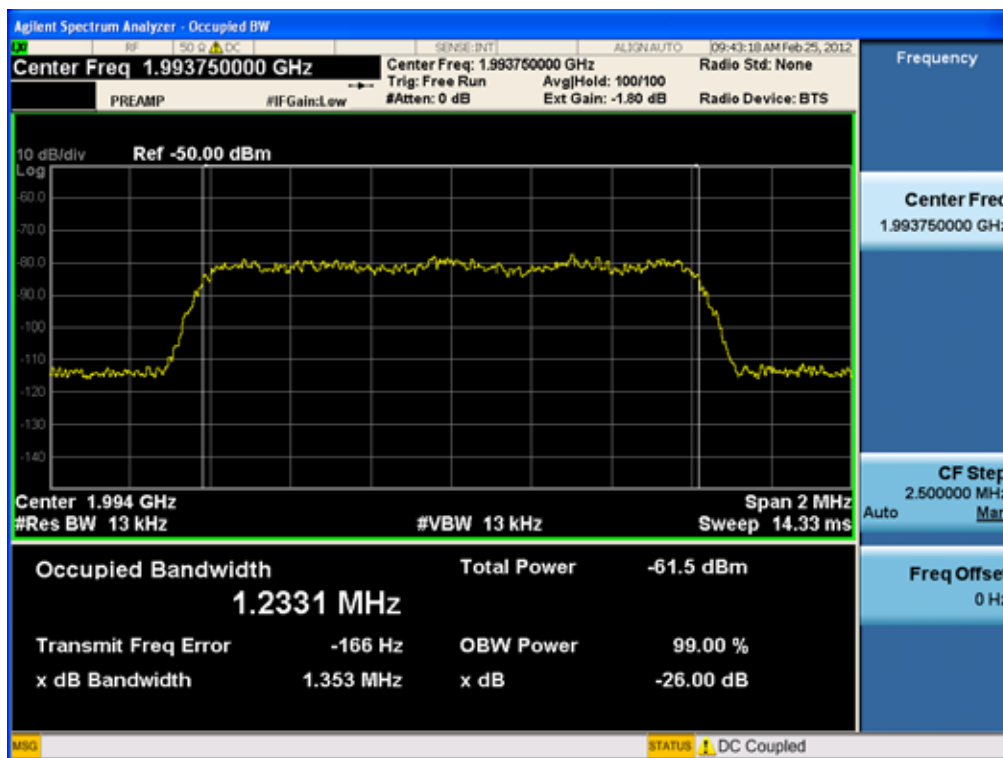
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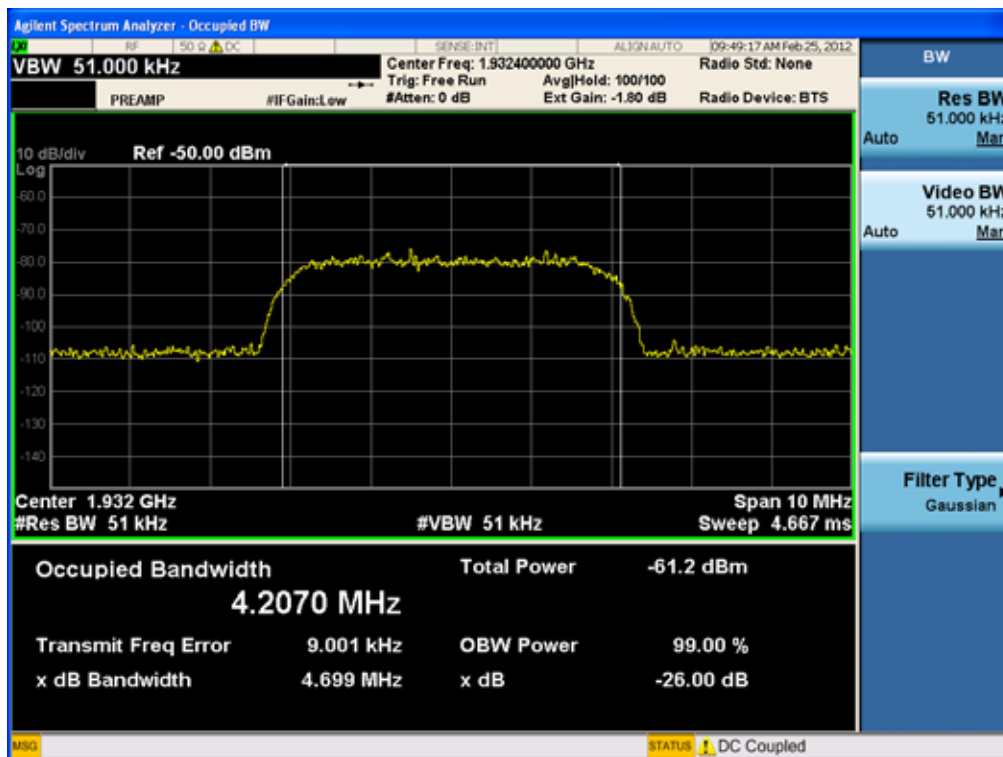
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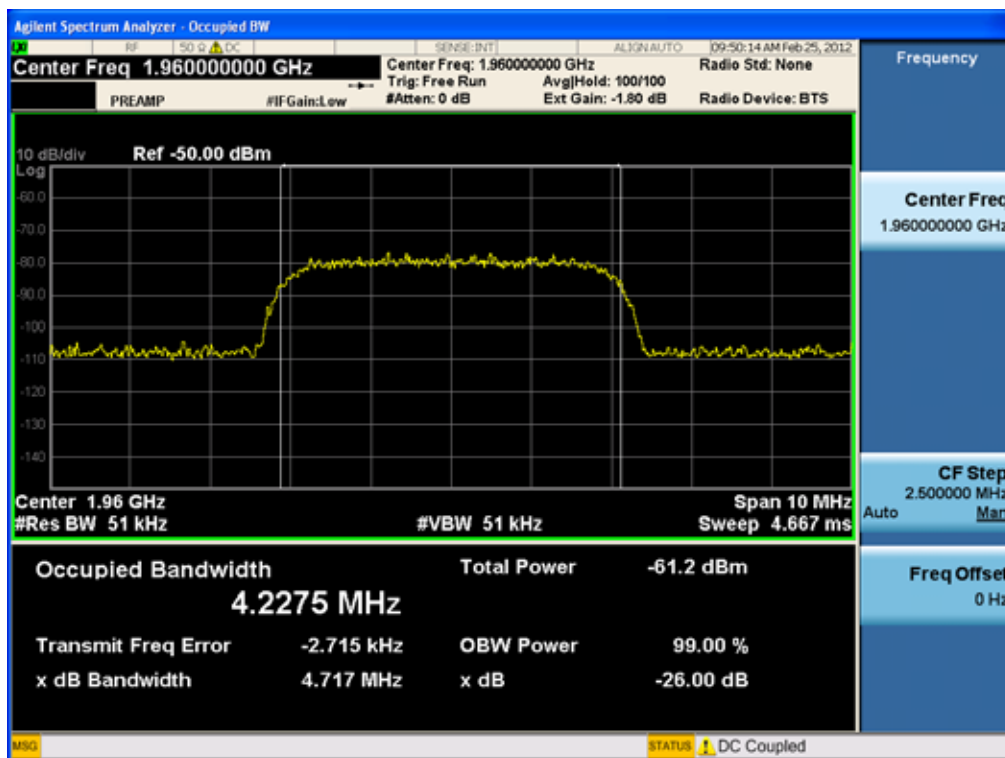
[Input CDMA Downlink High]



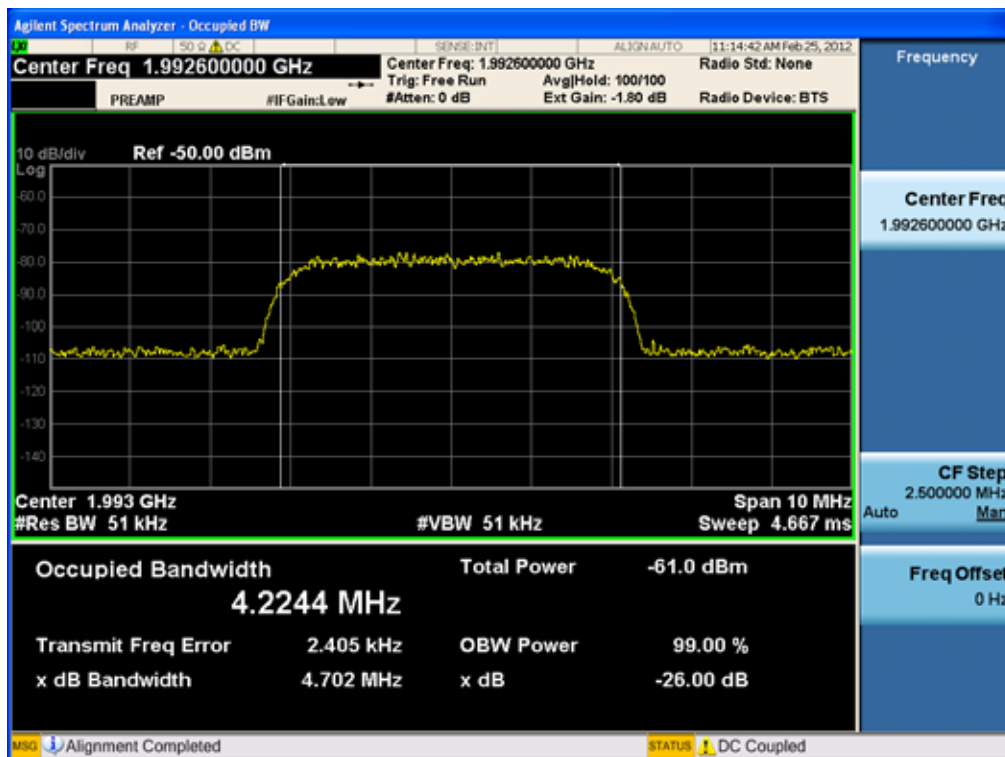
[Input WCDMA Downlink Low]



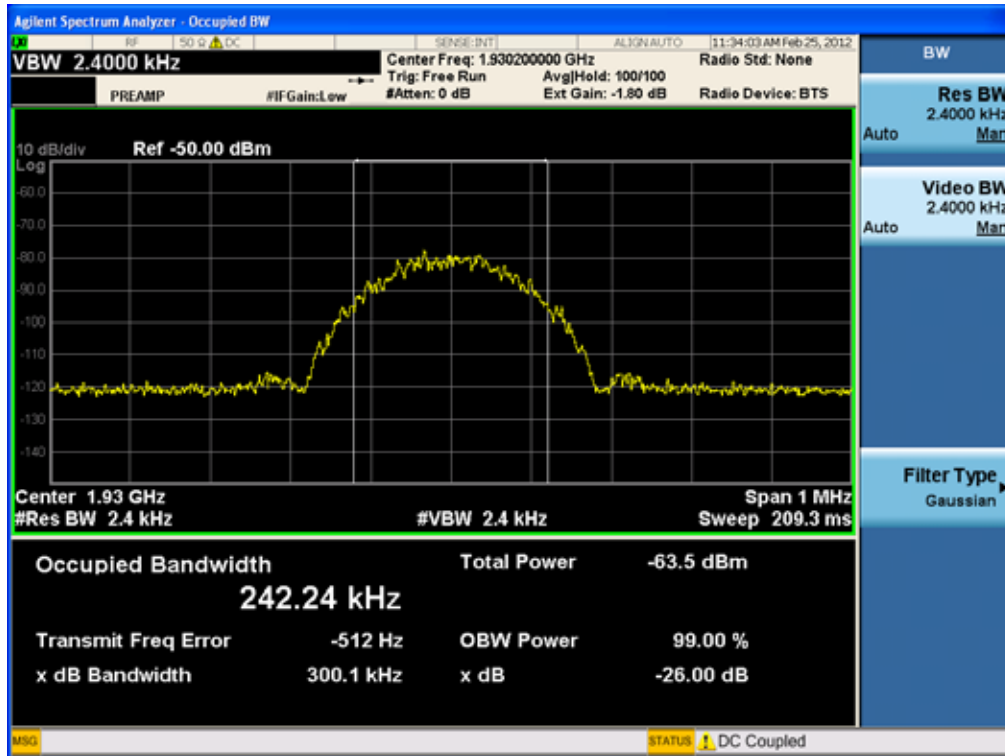
[Input WCDMA Downlink Middle]



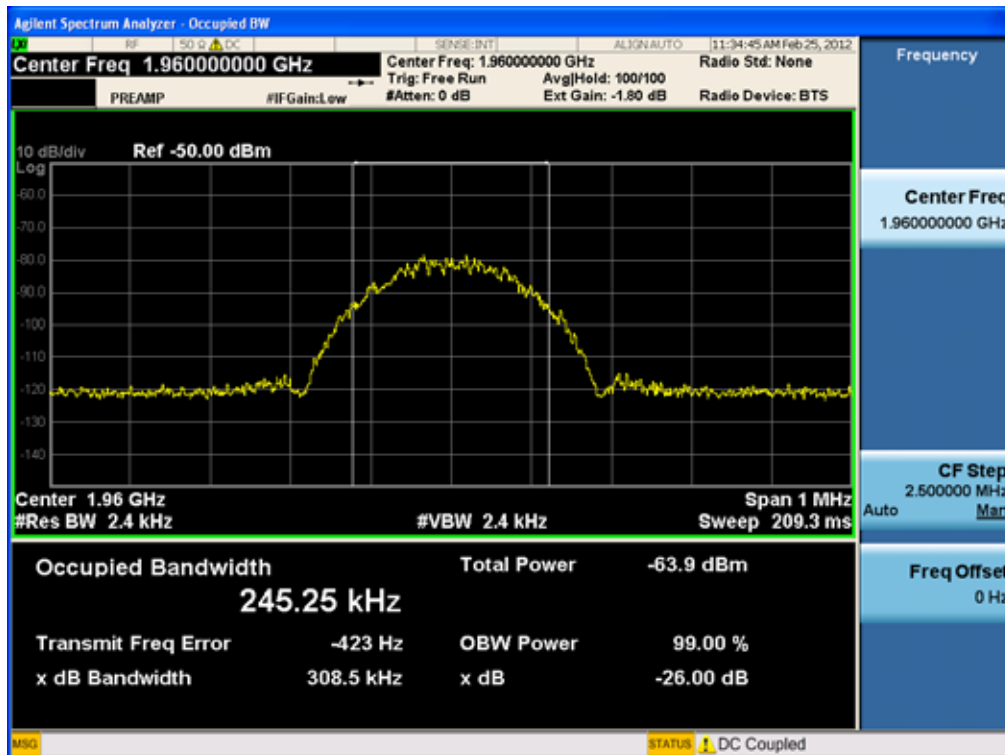
[Input WCDMA Downlink High]



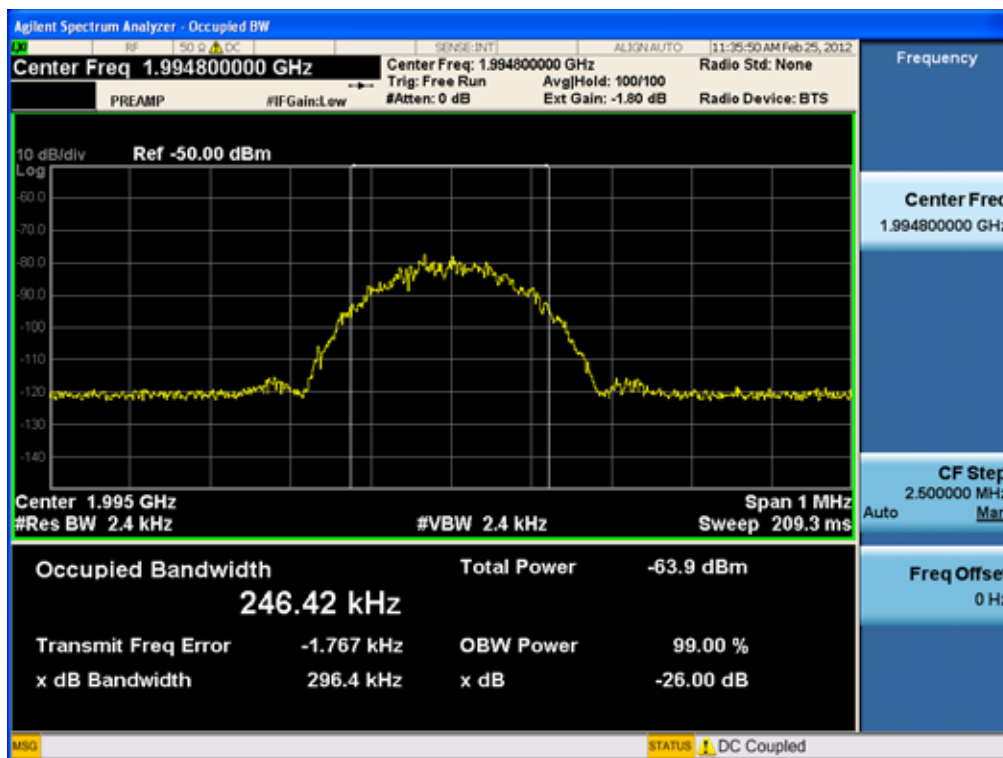
[Input GSM Downlink Low]



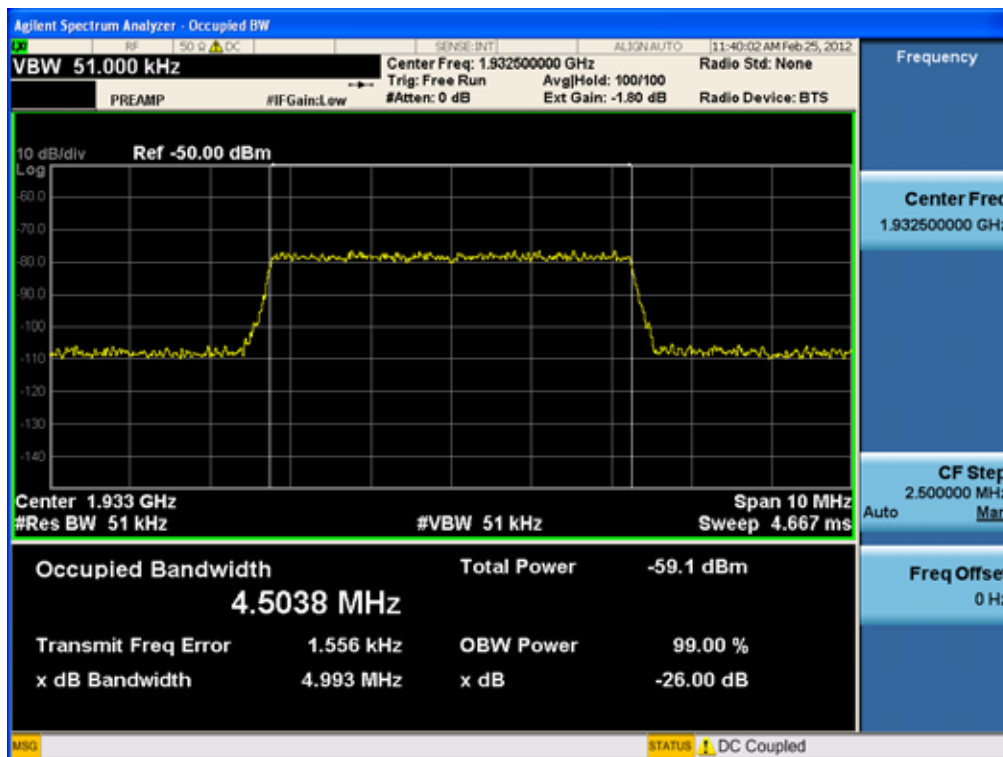
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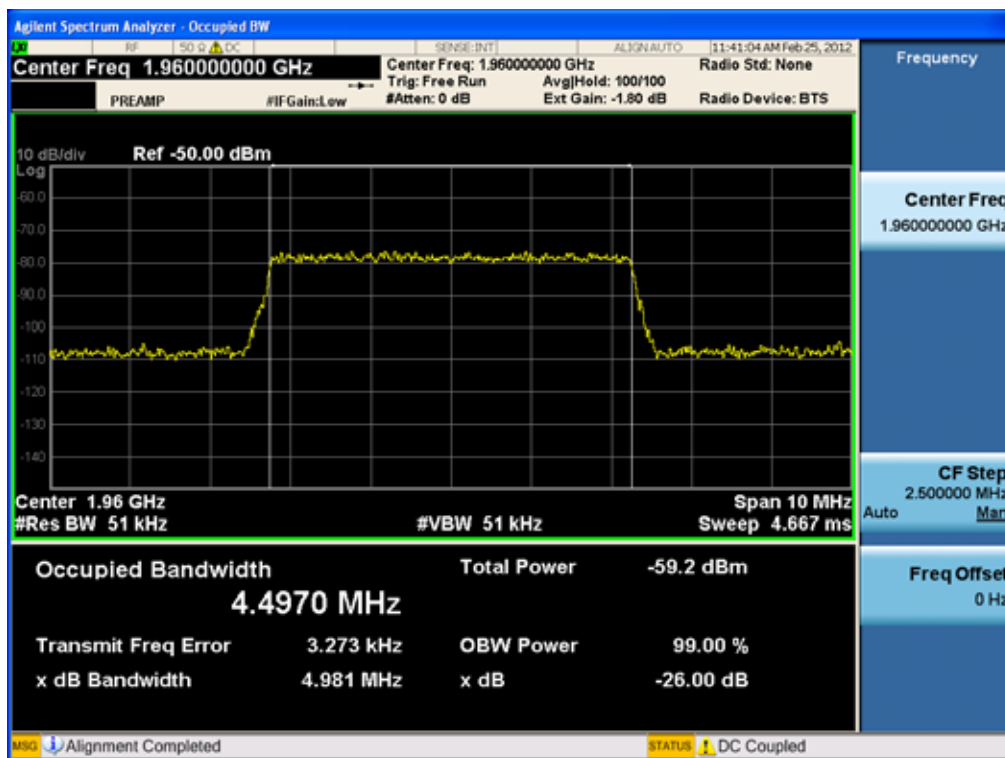
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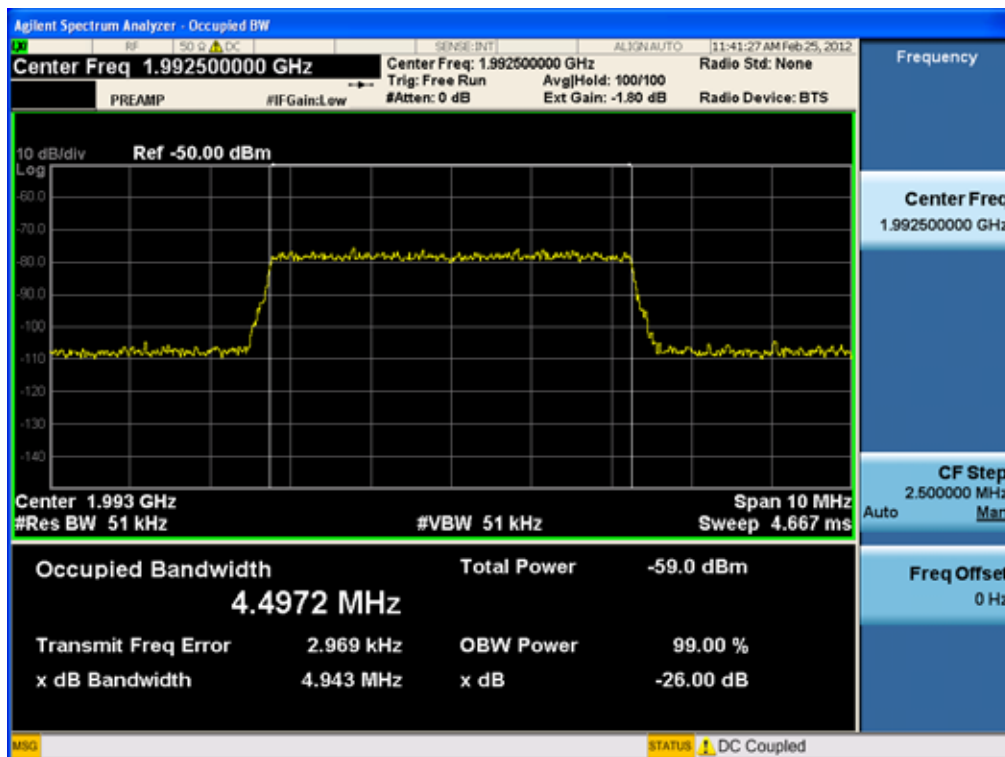
[Input LTE Downlink Low]



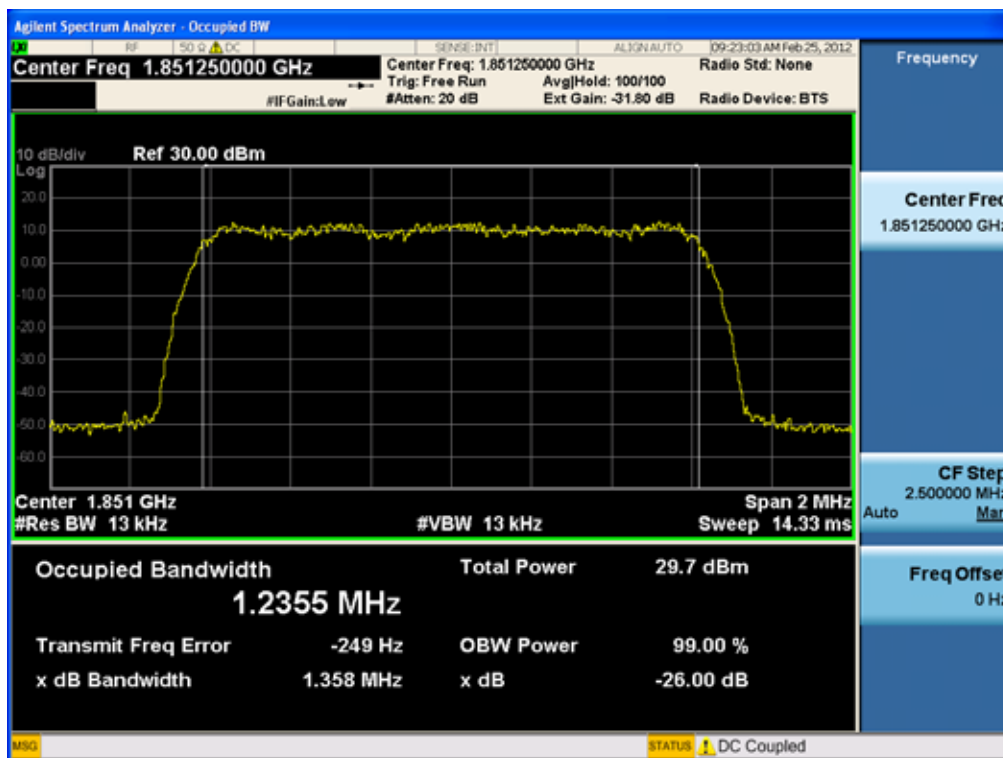
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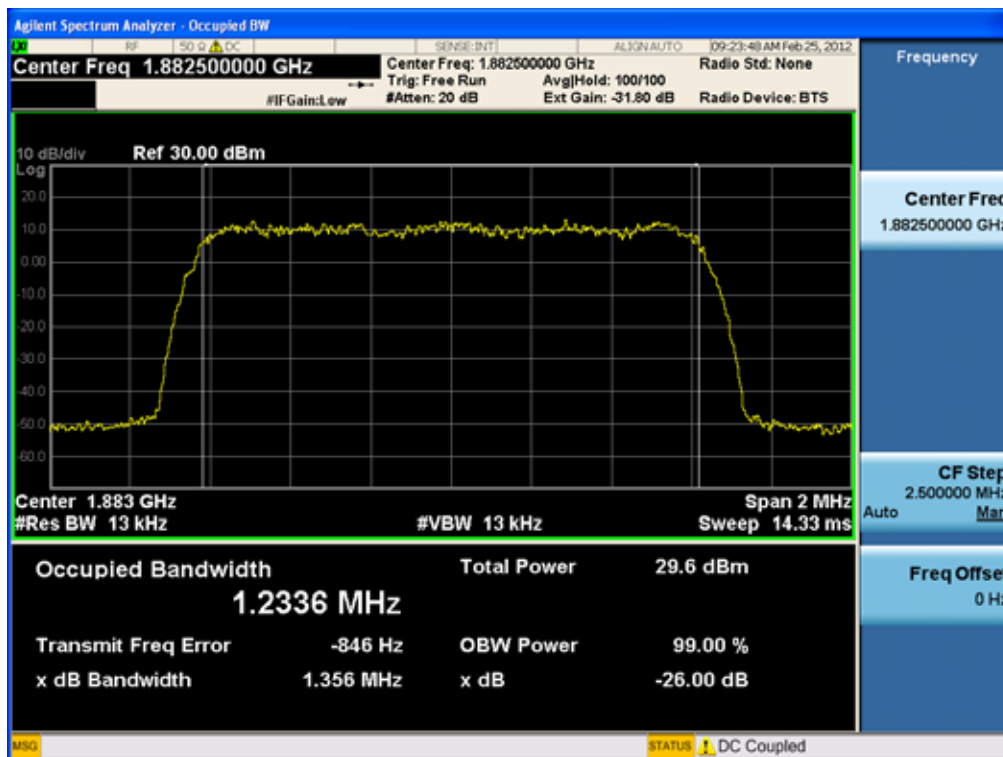
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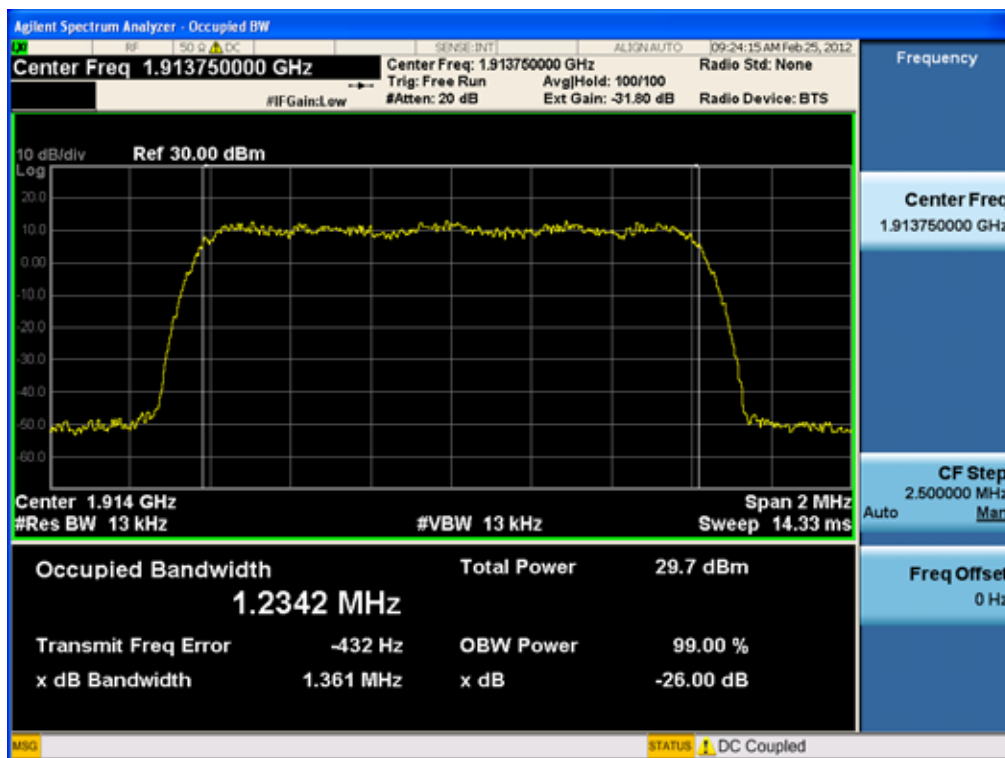
[Output CDMA Uplink Low]



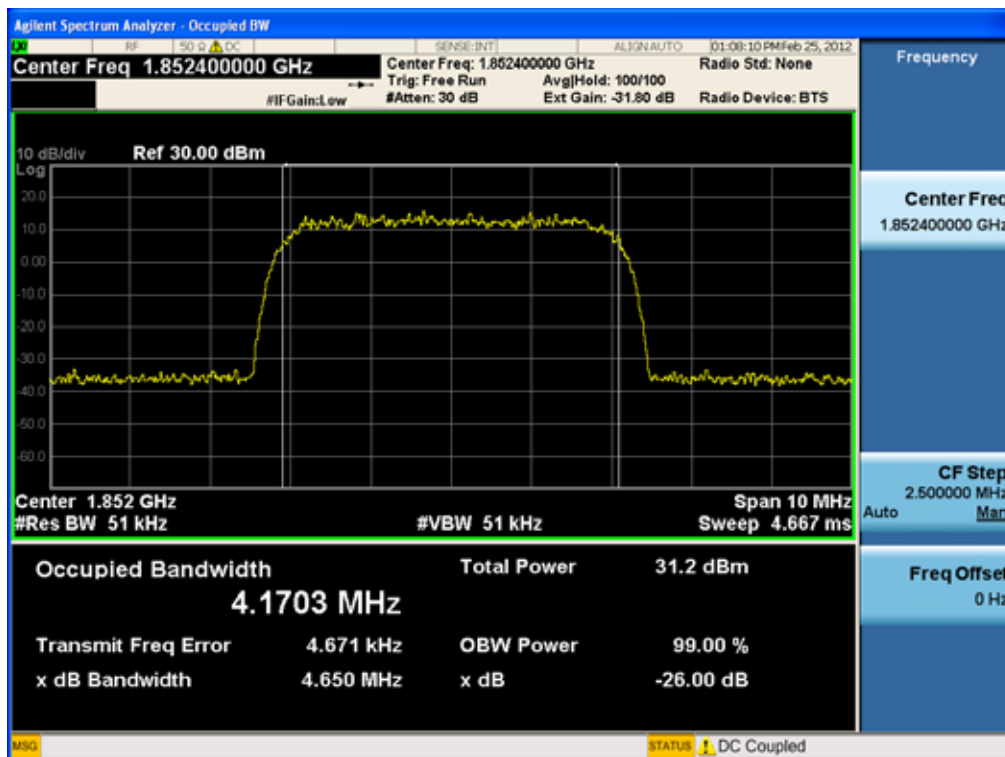
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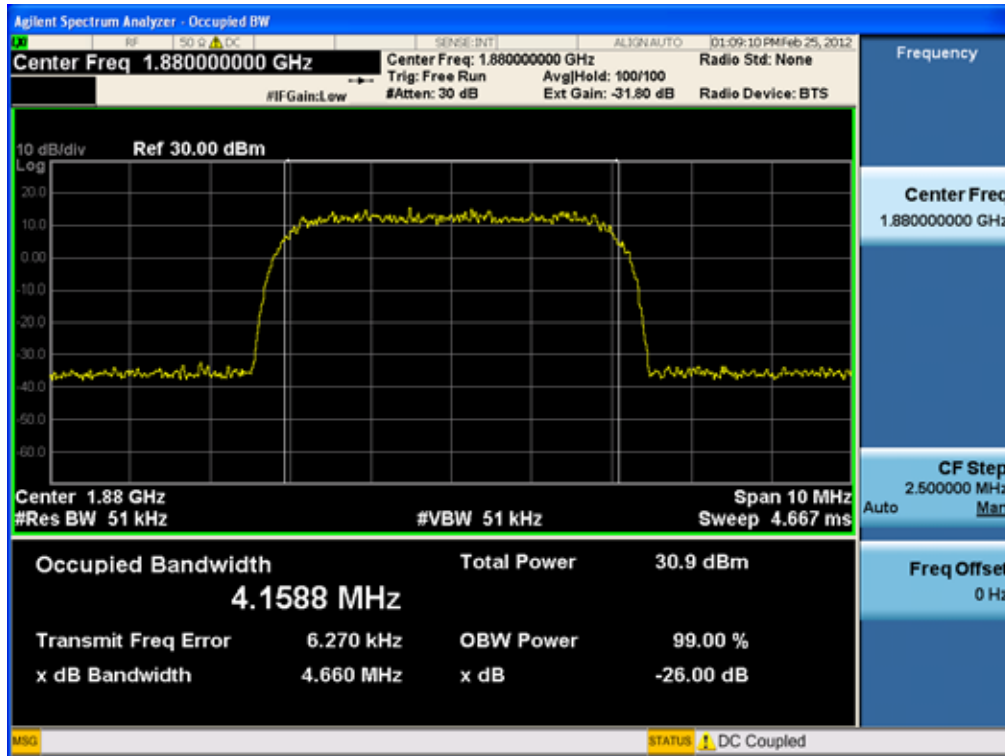
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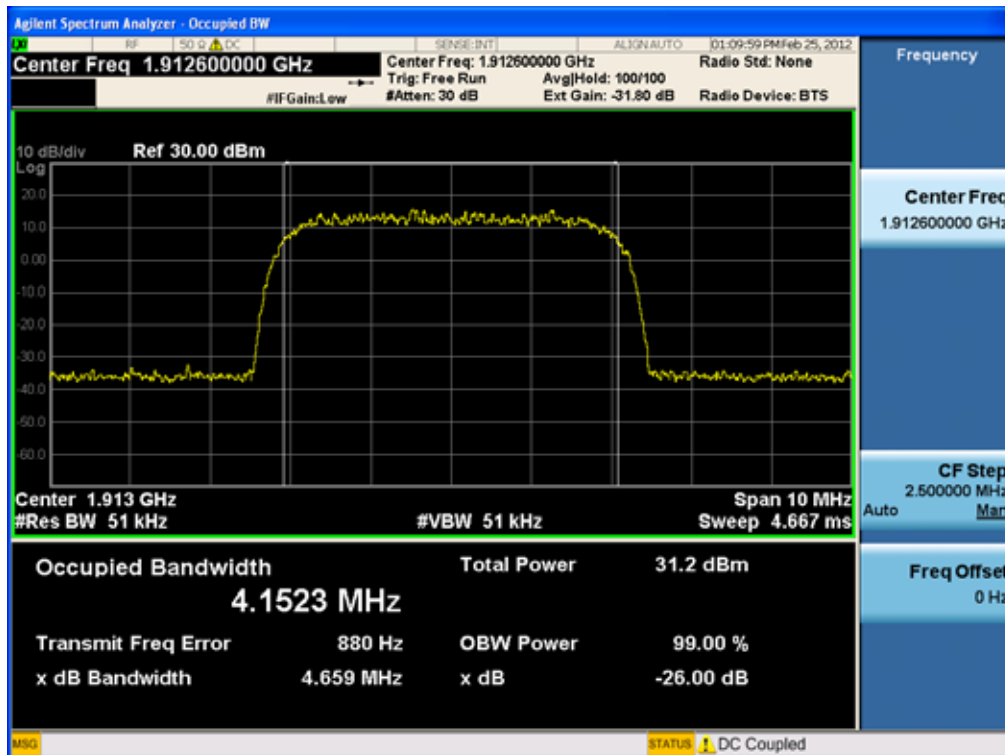
[Output WCDMA Uplink Low]



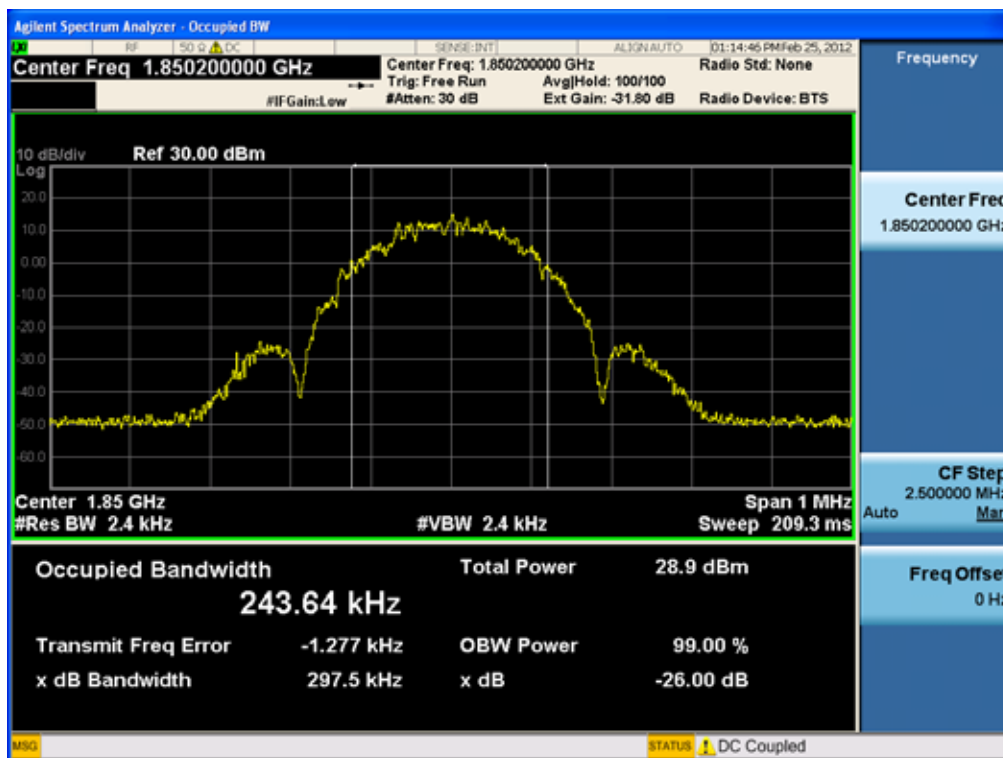
[Output WCDMA Uplink Middle]



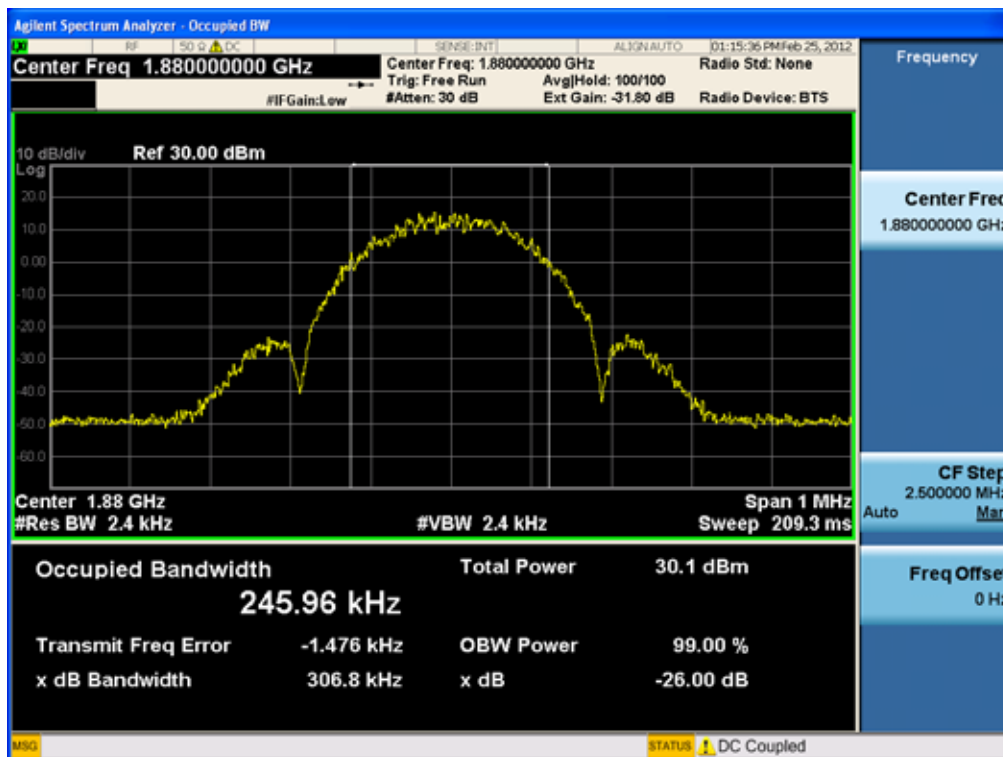
[Output WCDMA Uplink High]



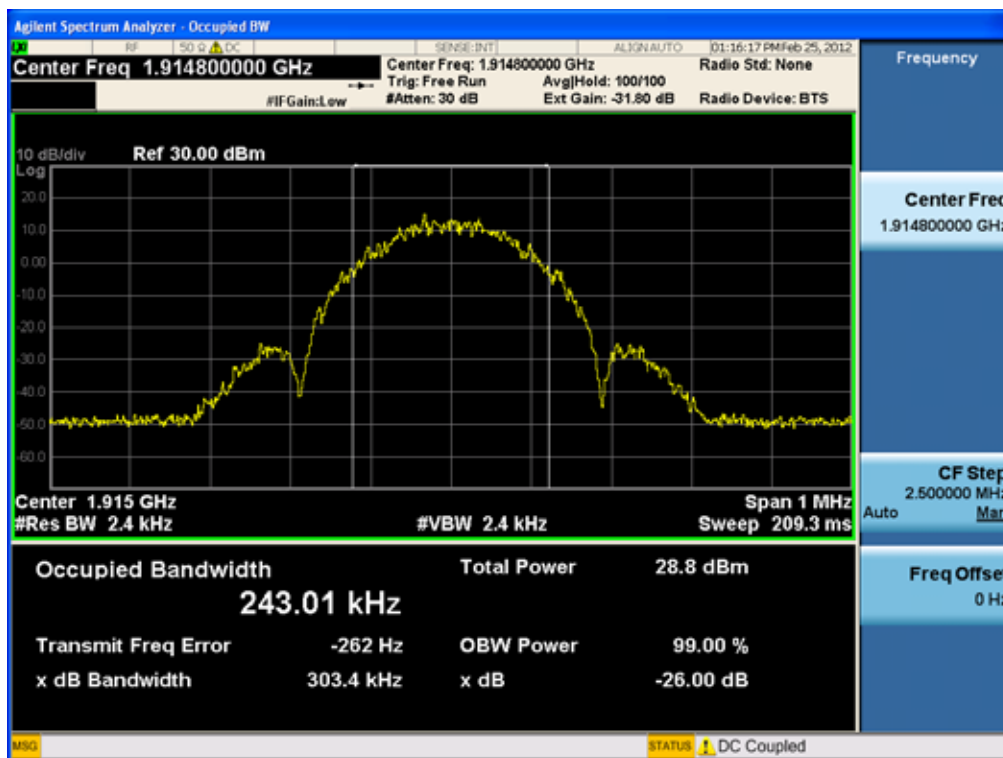
[Output GSM Uplink Low]



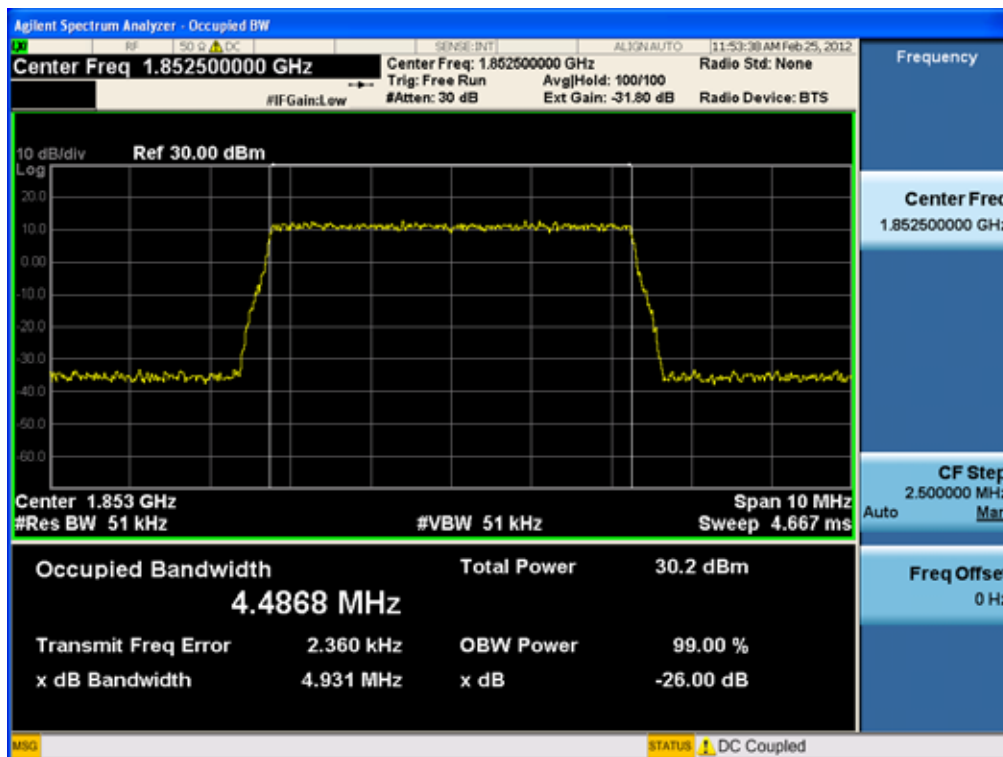
[Output GSM Uplink Middle]



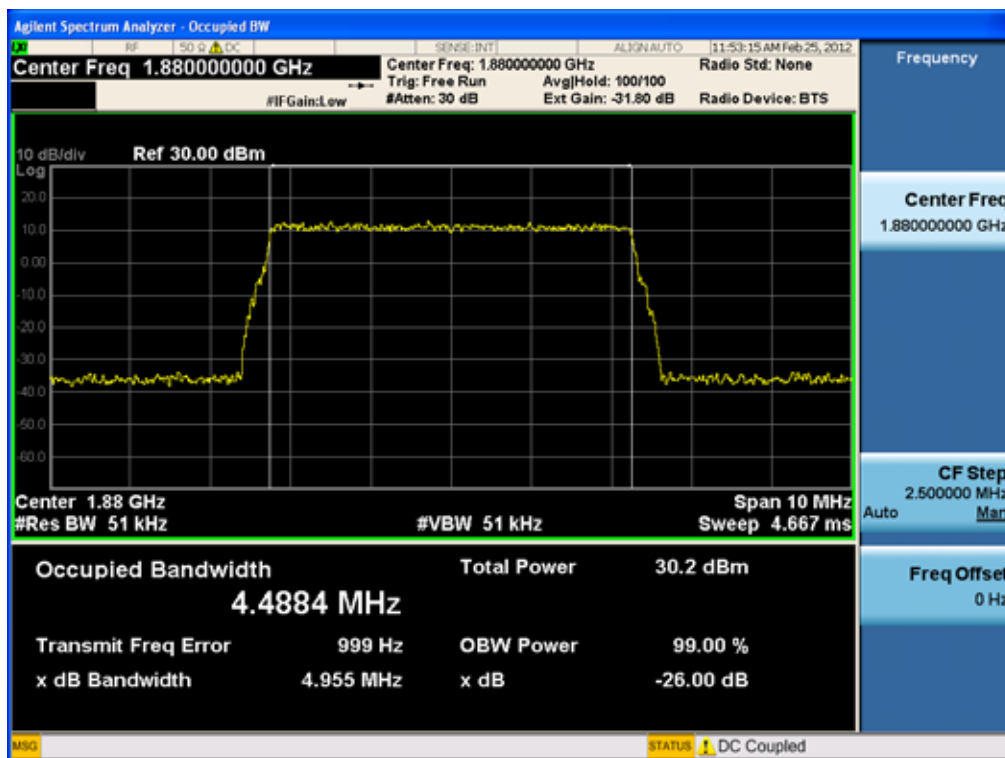
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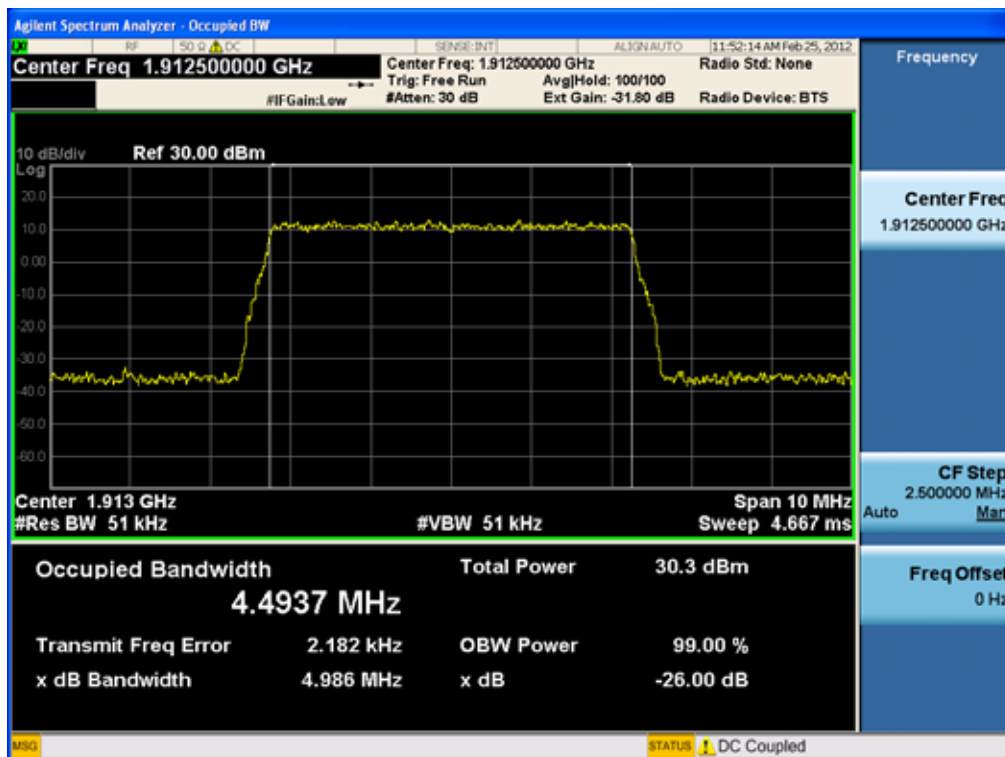
[Output LTE Uplink Low]



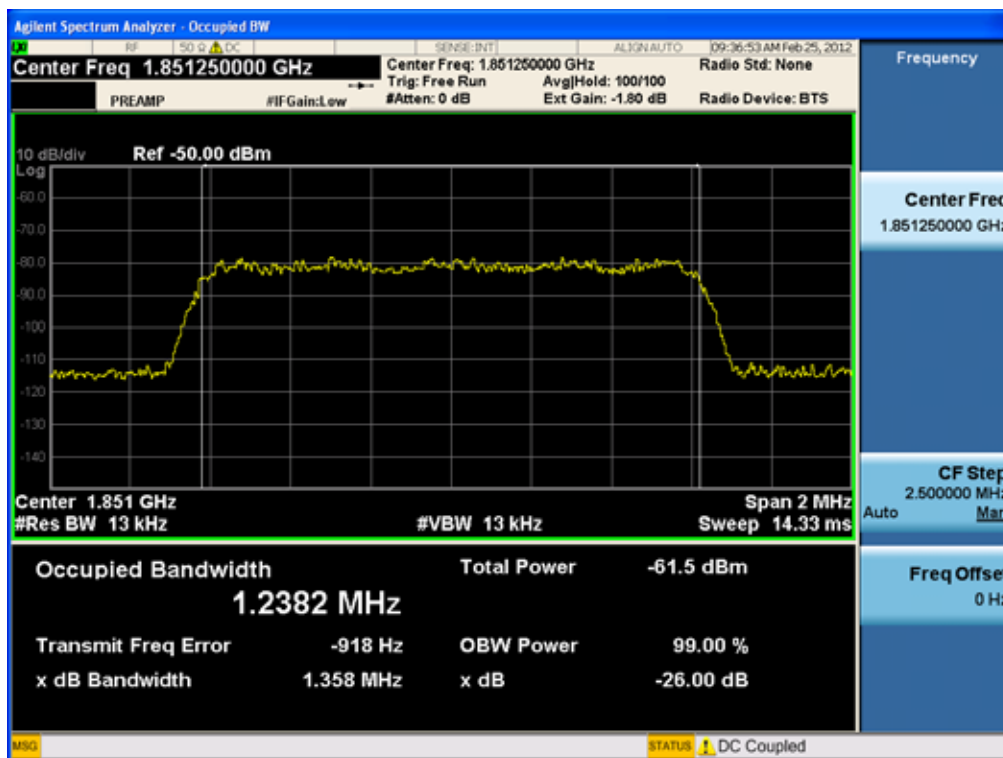
[Output LTE Uplink Middle]



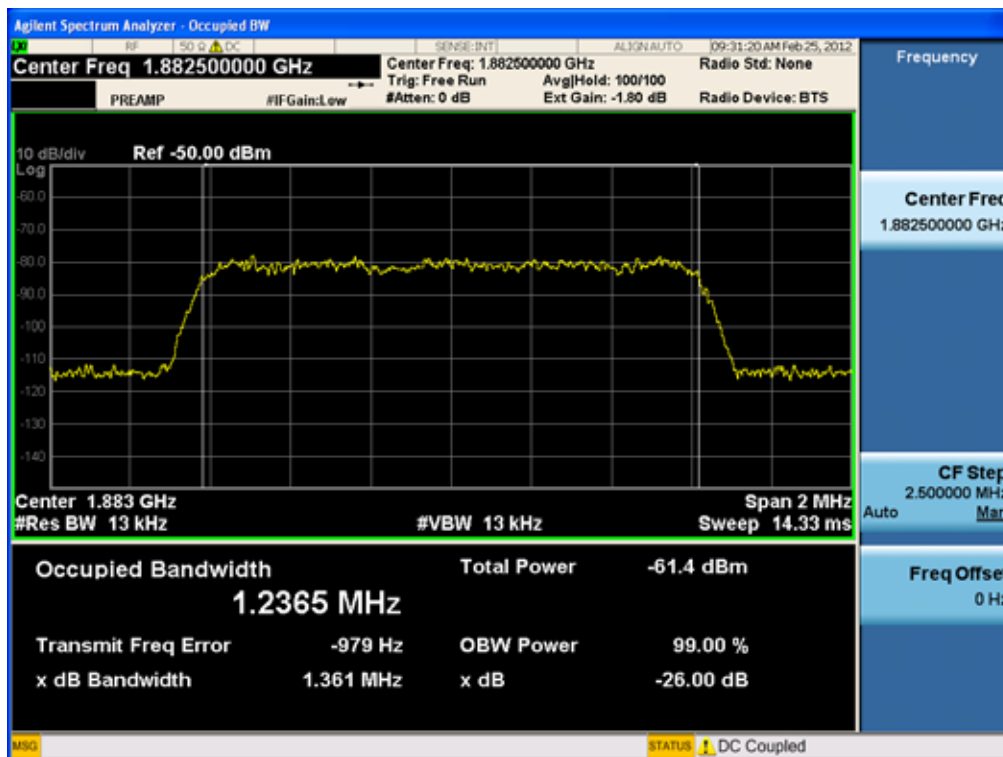
[Output LTE Uplink High]



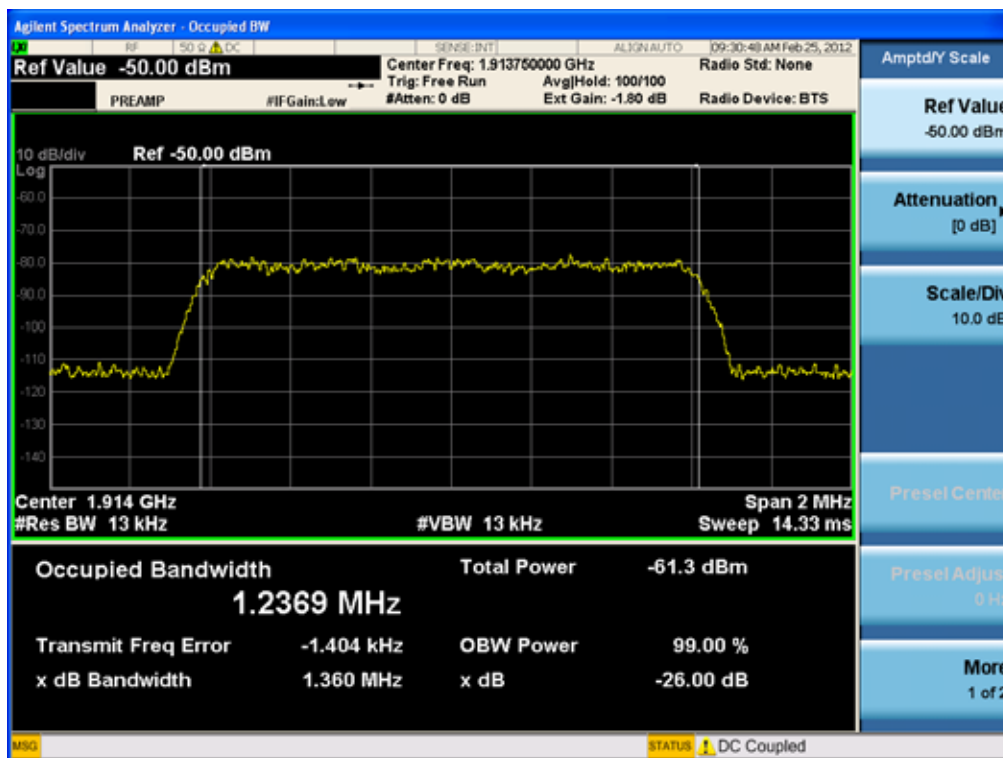
[Input CDMA Uplink Low]



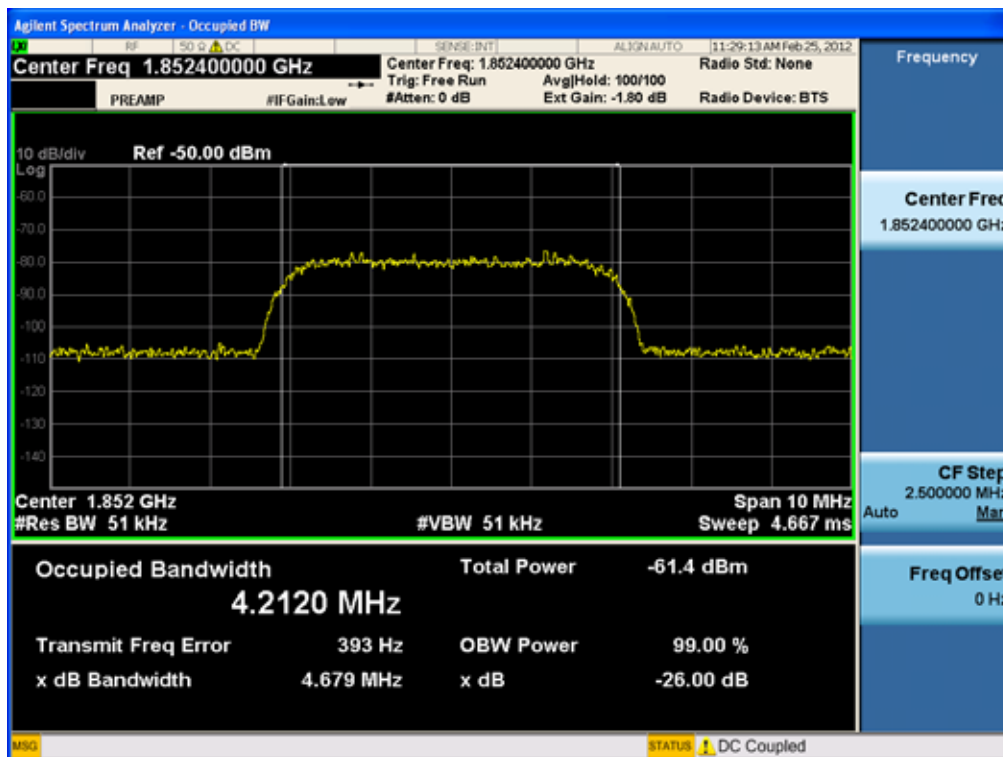
[Input CDMA Uplink Middle]



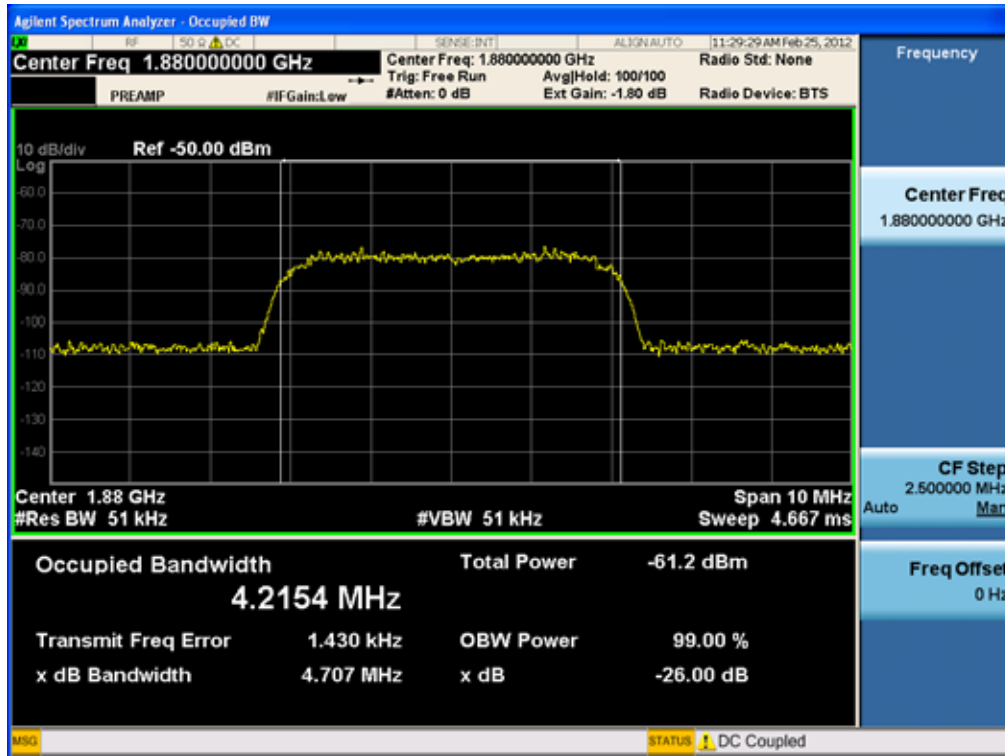
[Input CDMA Uplink High]



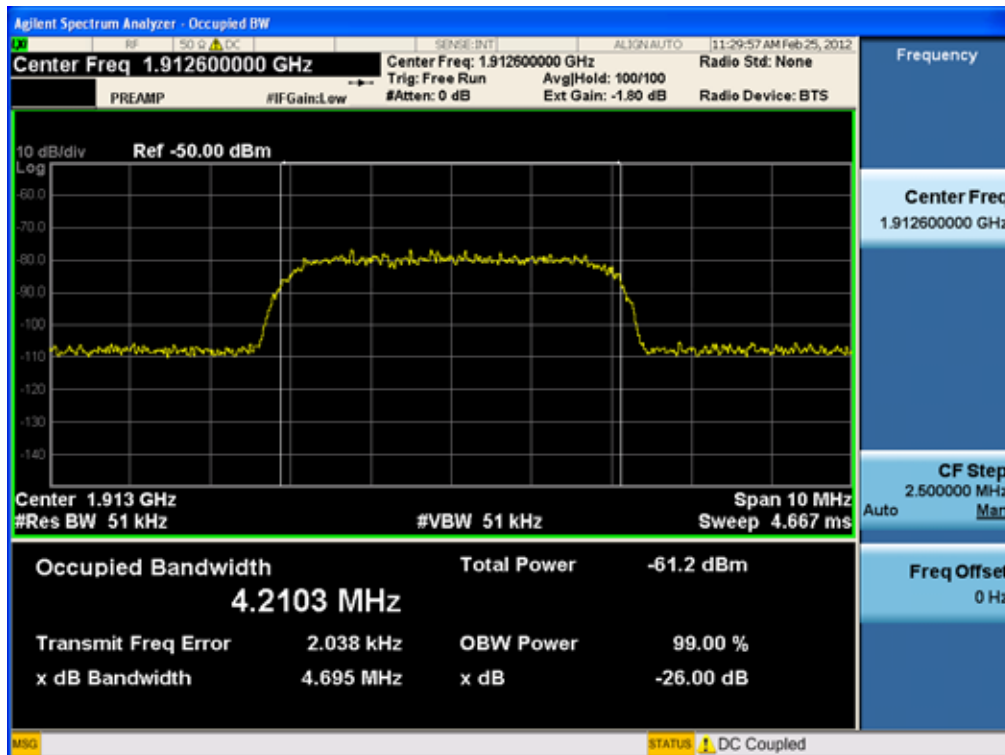
[Input WCDMA Uplink Low]



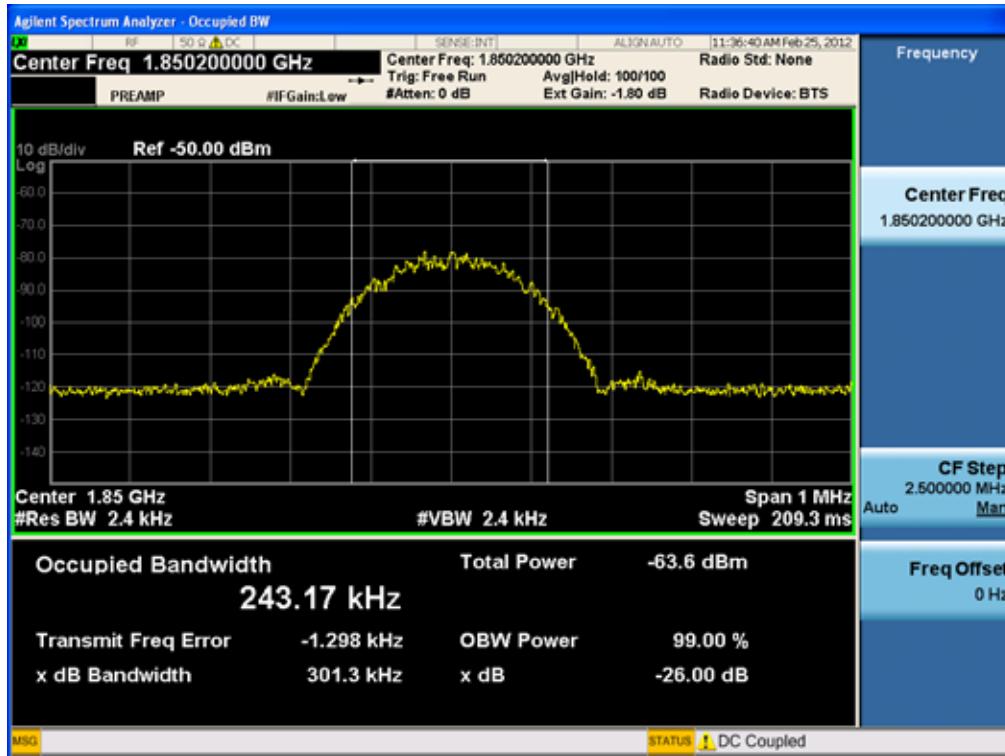
[Input WCDMA Uplink Middle]



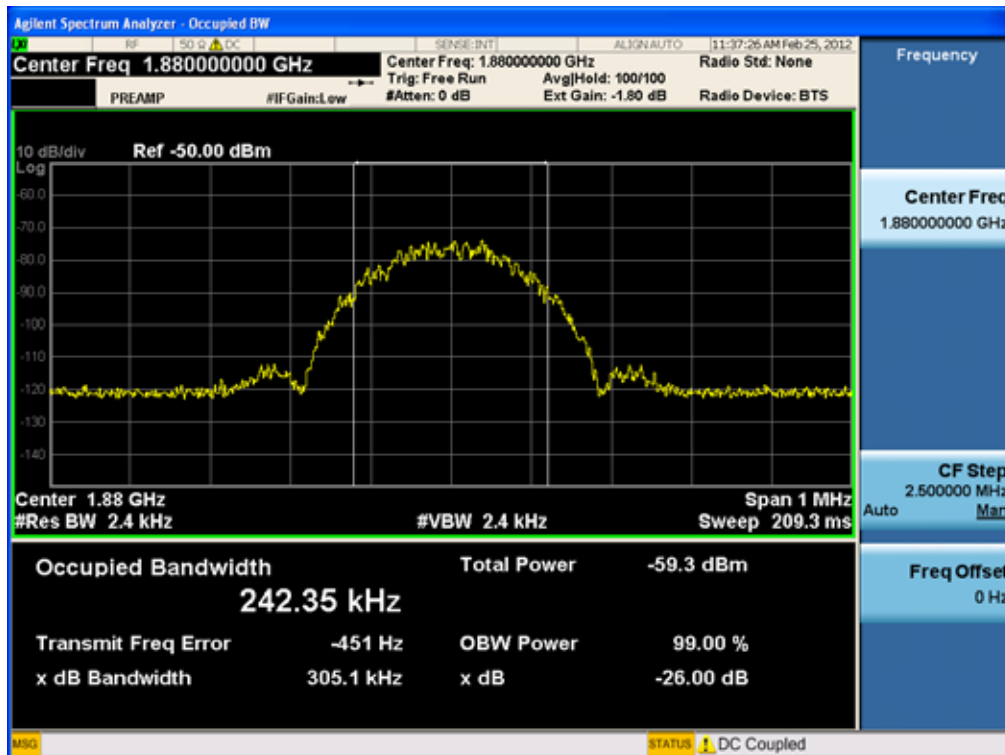
[Input WCDMA Uplink High]



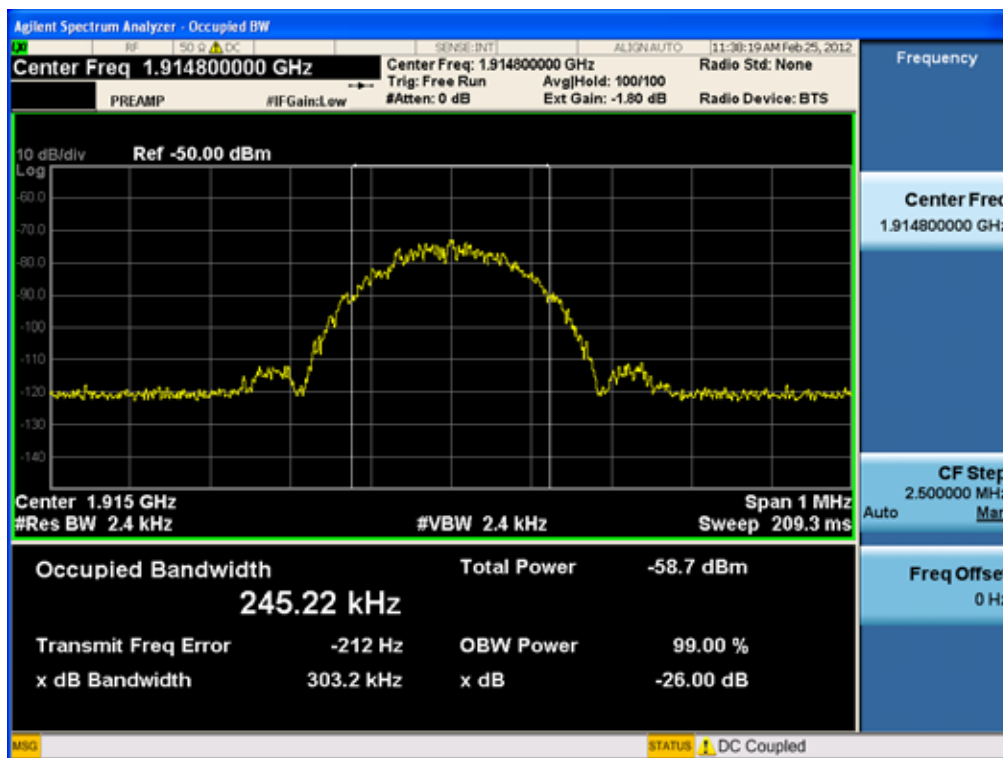
[Input GSM Uplink Low]



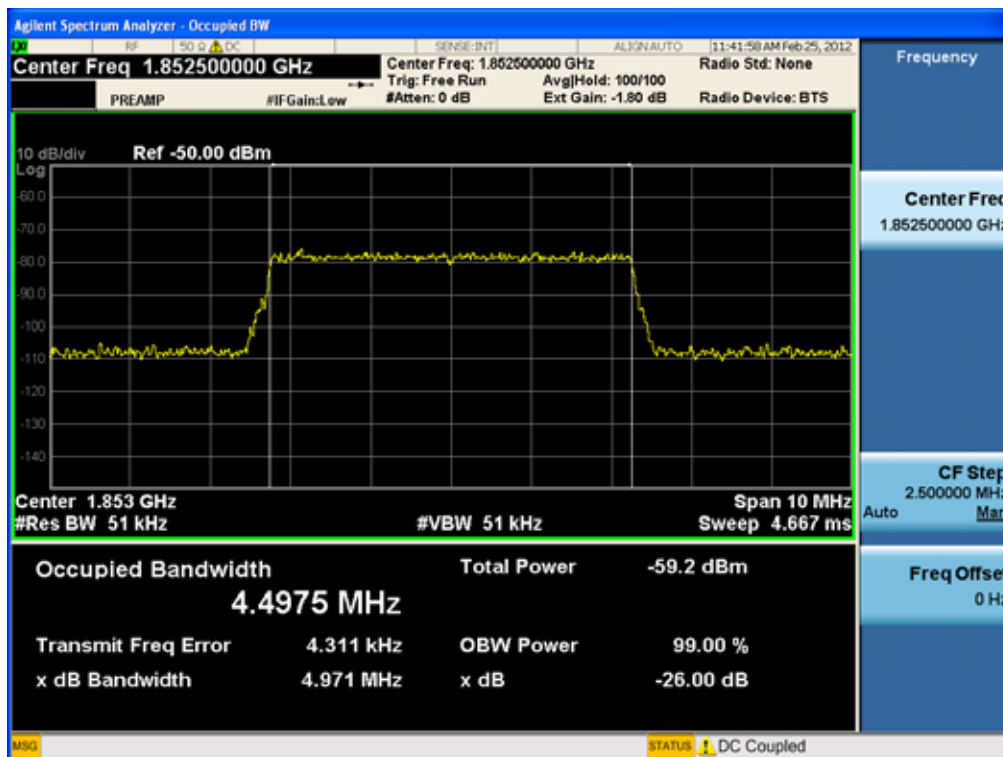
[Input GSM Uplink Middle]



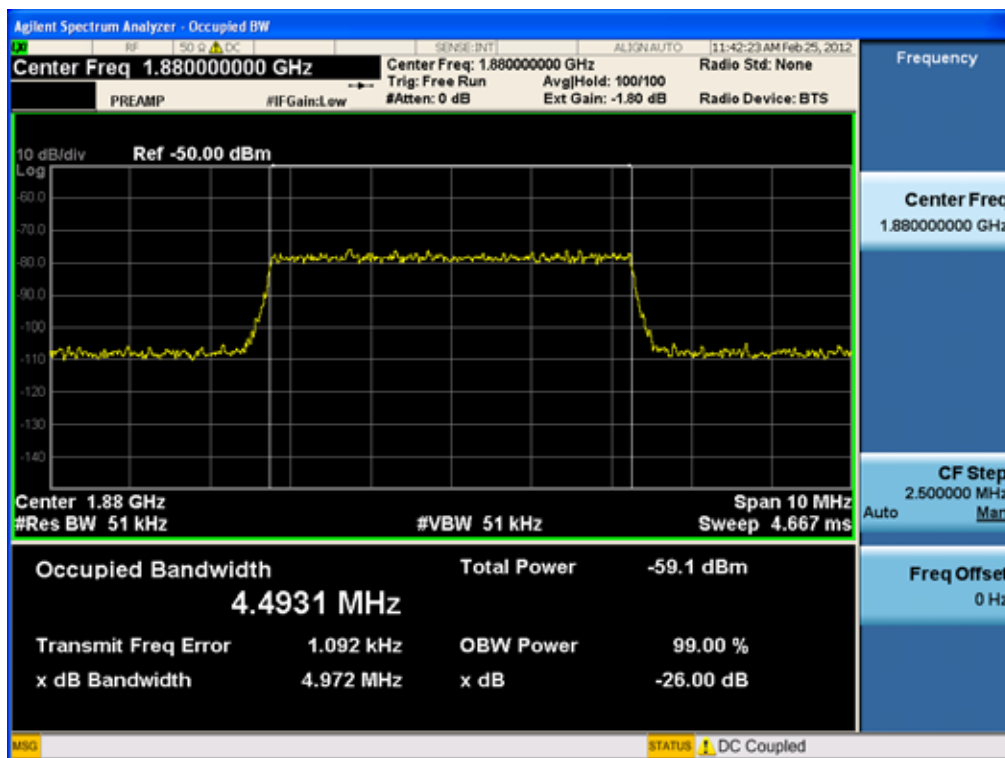
[Input GSM Uplink High]



[Input LTE Uplink Low]



[Input LTE Uplink Middle]



[Input LTE Uplink High]

