HCT. CO., LTD.

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CERTIFICATE OF COMPLIANCE (ERM EVALUATION)

Manufacture: GS Instruments Co., Ltd.

1385-14, Juan-Dong, Nam-Ku, Incheon,,402-200 Korea

Date of Issue : October 01, 2010

Test Report No.: HCTR1010FR02

Test Site: HCT CO., LTD.

FCC ID:	**U88-GRS-TRIR-SPR**	
APPLICANT:	**GS Instruments Co., Ltd.**	
EUT Type:	**Digital TRI**	
Model:	**GRS-TRIR-SPR**	
Frequency Ranges:	**Uplink:**	**1850 MHz – 1915 MHz (PCS1900)** **806 MHz – 824 MHz (iDEN800-18 MHz)** **817 MHz – 824 MHz (iDEN800-7 MHz)** **896 MHz – 901 MHz (iDEN900)**
	Downlink:	**1930 MHz – 1995 MHz (PCS1900)** **851 MHz – 869 MHz (iDEN800-18 MHz)** **862 MHz – 869 MHz (iDEN800-7 MHz)** **935 MHz – 940 MHz (iDEN900)**
RF Output Power:	**Uplink:**	**24.0 dBm (PCS1900), 25.0 dBm (iDEN800 / iDEN900)**
	Downlink:	**24.0 dBm (PCS1900), 25.0 dBm (iDEN800 / iDEN900)**
FCC Rules Part(s):	**CFR 47, Part 24 Subpart E, Part 90**	

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 24 Subpart E of the FCC Rules under normal use and maintenance.

Chang Seok Choi

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

Approved by
: Sang Jun Lee
Manager of RF Team

CONTENTS

1. CLIENT INFORMATION

The EUT has been tested by request of

Company	**GS Instruments Co., Ltd.**
Contact Point	1385-14, Juan-Dong, Nam-Ku, Incheon,,402-200 Korea

■ **EUT Type:** **Digital TRI**

■ **FCC ID:** **U88-GRS-TRIR-SPR**

■ **Frequency Ranges:**

Uplink:
1850 MHz – 1915 MHz (PCS1900)
806 MHz – 824 MHz (iDEN800-18 MHz)
817 MHz – 824 MHz (iDEN800-7 MHz)
896 MHz – 901 MHz (iDEN900)

Downlink:
1930 MHz – 1995 MHz (PCS1900)
851 MHz – 869 MHz (iDEN800-18 MHz)
862 MHz – 869 MHz (iDEN800-7 MHz)
935 MHz – 940 MHz (iDEN900)

■ **RF Output Power:**

Uplink:
24.0 dBm (PCS1900)
25.0 dBm (iDEN800 / iDEN900)

Downlink:
24.0 dBm (PCS1900)
25.0 dBm (iDEN800 / iDEN900)

■ **FCC Rules Part(s):** **CFR Title 47 Part 24 Subpart E, Part90**

■ **Emission Designators:** **F9W(PCS1900), GXW(iDEN)**

2. TEST SPECIFICATIONS

2.1 Standards

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance With **Part 24 Subpart E, Part 90**

Reference	Description	Results
§2.1046; §24.232; §90.205	RF Power Output	Compliant
§2.1047	Modulation Characteristics	N/A
§2.1049	Occupied Bandwidth	Compliant
§2.1051; §24.238; §90.210	Spurious Emissions at Antenna Terminals	Compliant
§2.1053; §24.238; §90.210	Radiated Spurious Emissions	Compliant
§2.1055; §24.135; §90.213	Frequency Stability	Compliant

3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	**+ 15 ℃ to + 35 ℃**
Relative humidity:	**30 % to 60 %**
Air pressure	**860 mbar to 1060 mbar**

4. TEST SUMMARY

The results in this report apply only to sample tested

Test Case	Applied standard	Result
RF Power Output	§2.1046; §24.232; §90.205	Compliant
Occupied Bandwidth	§2.1049	Compliant
Spurious Emissions at Antenna Terminals	§2.1051; §24.238;§90.210	Compliant
Radiated Spurious Emissions	§2.1053; §24.238; §90.210	Compliant
Frequency Stability	§2.1055; §24.135; §90.213	Compliant

5. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Due	Serial No.
Agilent	E4438C /Signal Generator	Annual	12/15/2010	MY42082646
Agilent	E4416A /Power Meter	Annual	01/14/2011	GB41291412
WEINSCHEL	67-30-33/ATTENUATOR	Annual	01/14/2011	BR0530
Korea Eng	KR-1005L/ Temperature and Humidity Chamber	Annual	12/28/2010	KRAC05063-3CH
Agilent	N9020AA /Signal Analyzer	Annual	03/03/2011	US46220219
Schwarzbeck	VULB 9168/BI-LOG Antenna	Biennial	01/06/2011	9168-200
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	AFS44-00102650-42-10P44-PS	Annual	04/05/2011	1532439
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	04/13/2011	147
Schwarzbeck	BBHA 9120D/ Horn Antenna	Annual	09/23/2011	296
EMCO	6502/Loop Antenna	Biennial	01/13/2012	9009-2536
ADVANTEST	R3671/Spectrum Analyzer	Annual	06/10/2011	150900068
ADVANTEST	R3273/Spectrum Analyzer	Annual	04/14/2011	J004821

6. RF OUTPUT POWER

6.1 Test Procedure

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.

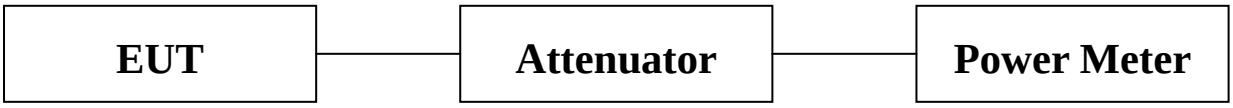
§ 24.232 (b): Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

§ 90.205 Power and antenna height limits. Refer to § 90.635

§ 90.635(b): The Effective radiated power (ERP) of base transmitters and cellular CDMA Inbuilding RF Repeaters must not exceed 500 watts.

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:

The EUT complies with the requirements of this section. The EUT conducted power does not exceed limit at the carrier frequency.

InPut Signal

	Modulation	Level (dBm)
iDEN	16QAM	-65.5
PCS	QPSK	-64.7

6.3.1 Test Results

(Downlink)

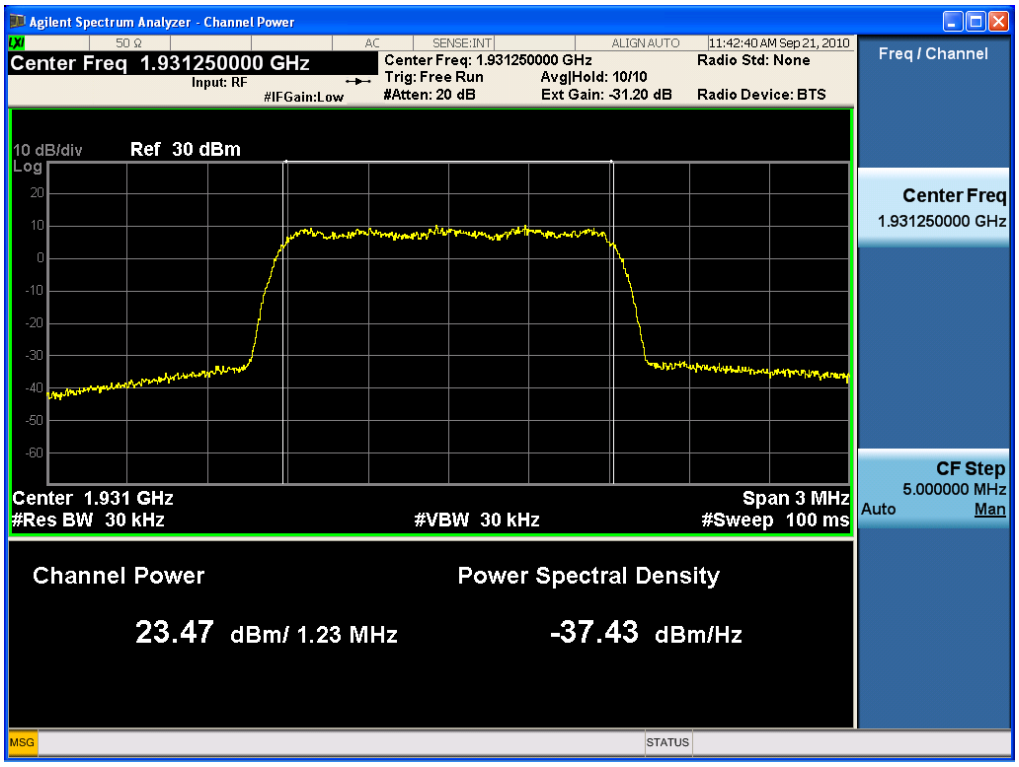
PCS1900 DownLink		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	1931.2500	23.47(222.3)
Mid	1962.5000	23.96(248.9)
High	1993.7500	23.98(250.0)
iDEN800 DownLink-18 MHz		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	851.0125	24.92(310.5)
Mid	858.6125	24.92(310.5)
High	868.9875	24.92(310.5)
iDEN800 DownLink-7 MHz		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	862.0125	24.85(305.5)
Mid	864.6125	24.98(314.8)
High	868.9875	24.27(267.3)
iDEN900 DownLink		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	935.0125	24.24(265.5)
Mid	937.5000	24.81(302.7)
High	939.9875	24.79(301.3)

6.3.2 Test Results

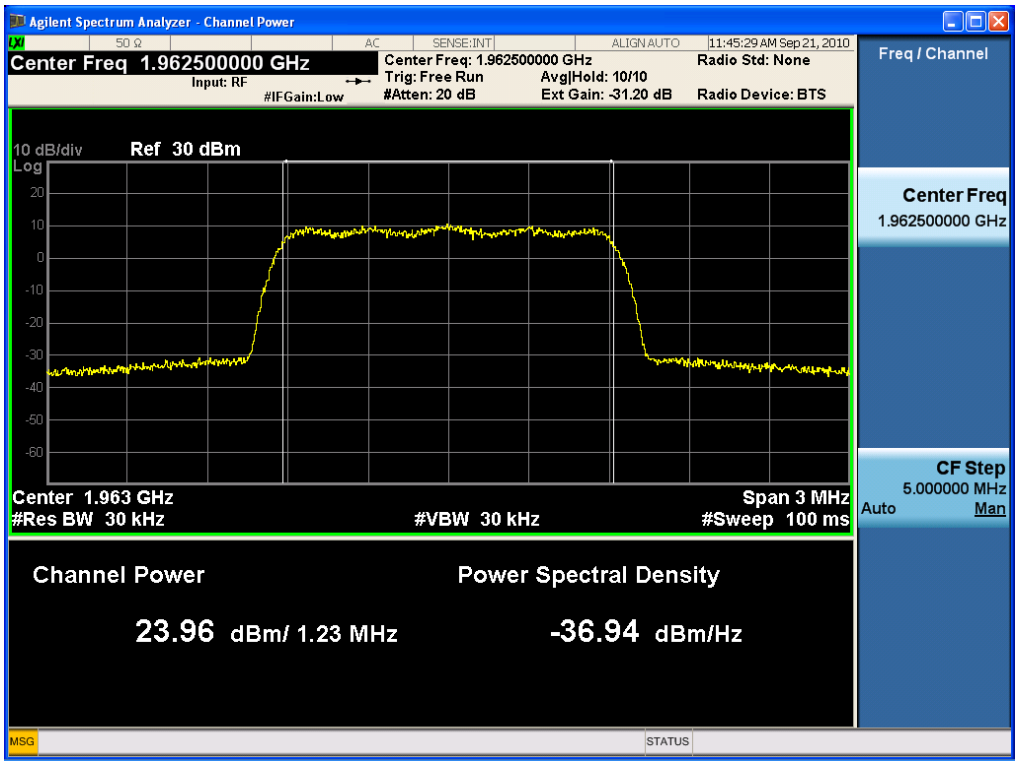
(Uplink)

PCS1900 UpLink		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	1851.2500	23.95(248.3)
Mid	1882.5000	23.86(243.2)
High	1913.7500	23.94(247.7)
iDEN800 UpLink-18 MHz		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	806.0125	25.06(320.6)
Mid	813.6125	24.70(295.1)
High	823.9875	24.53(283.8)
iDEN800 UpLink-7 MHz		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	817.0125	25.03(318.4)
Mid	819.6125	25.08(322.1)
High	823.9875	24.16(260.6)
iDEN900 UpLink		
Carrier Channel	**Frequency (MHz)**	**Measured Average Output Power dBm (mW)**
Low	896.0125	24.97(314.1)
Mid	898.5000	24.92(310.5)
High	900.9875	24.79(301.3)

Plots of RF Output Power-18 MHz



Downlink Low CH (PCS 1900)



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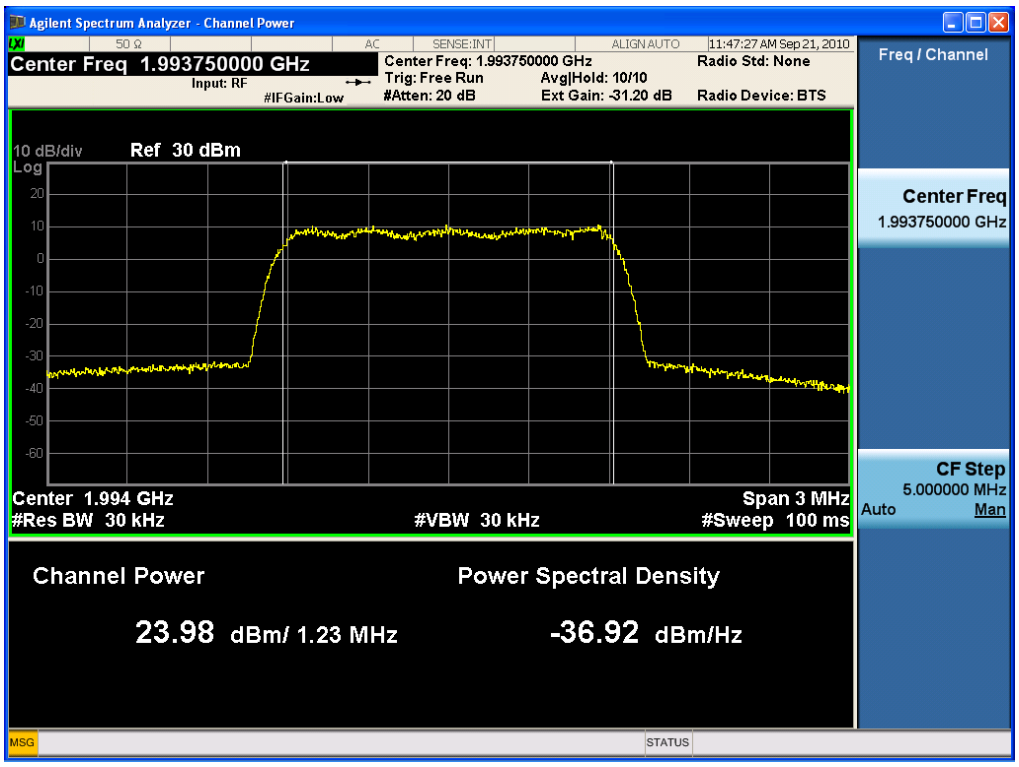

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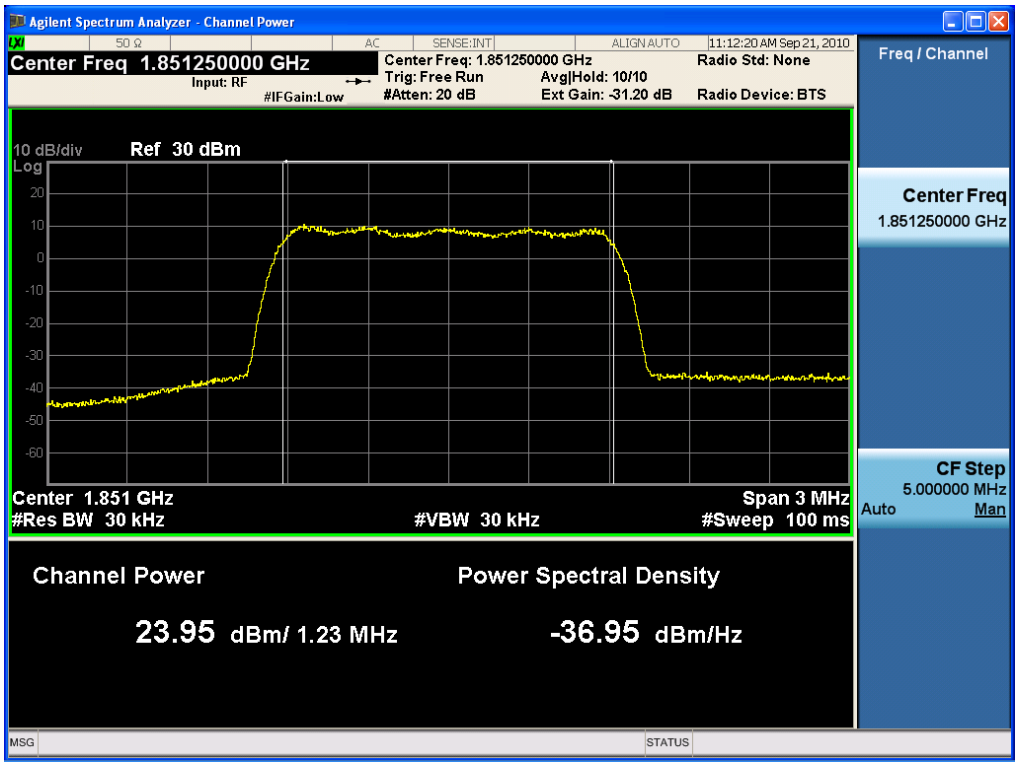
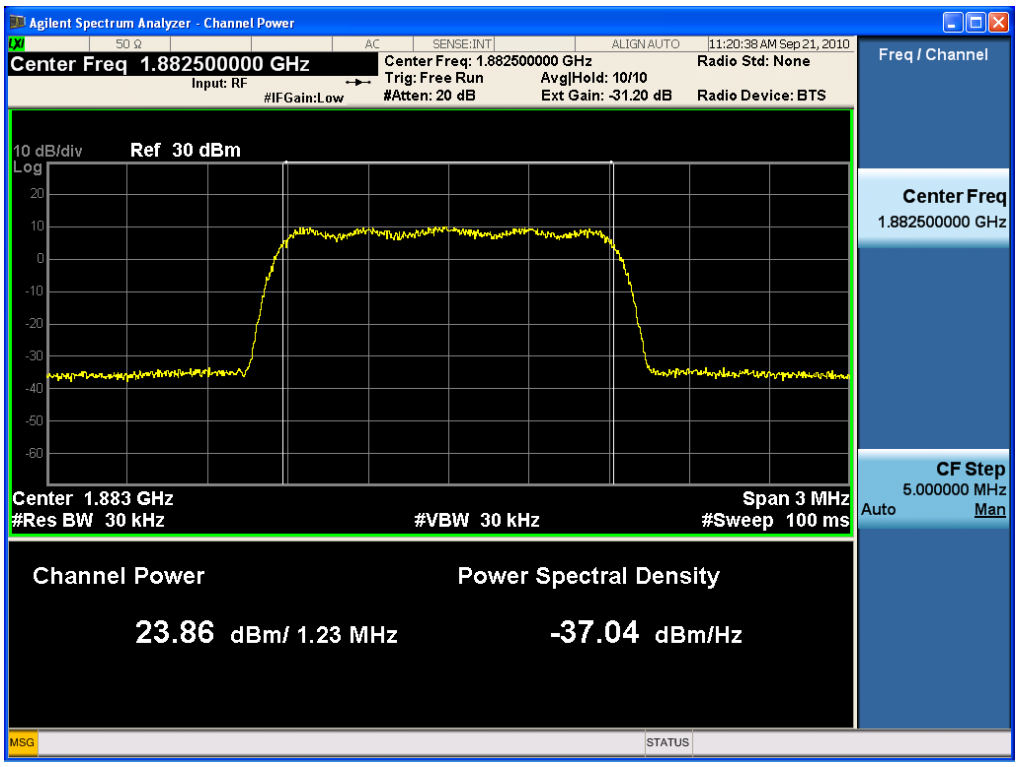


Uplink Low CH (PCS 1900)



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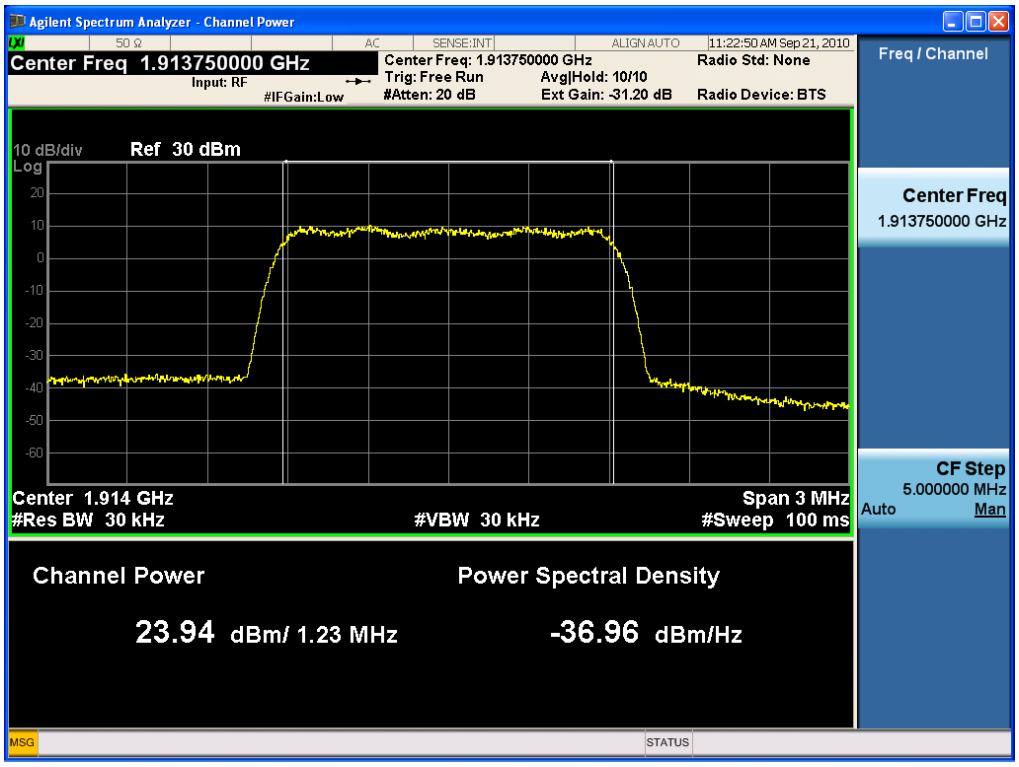
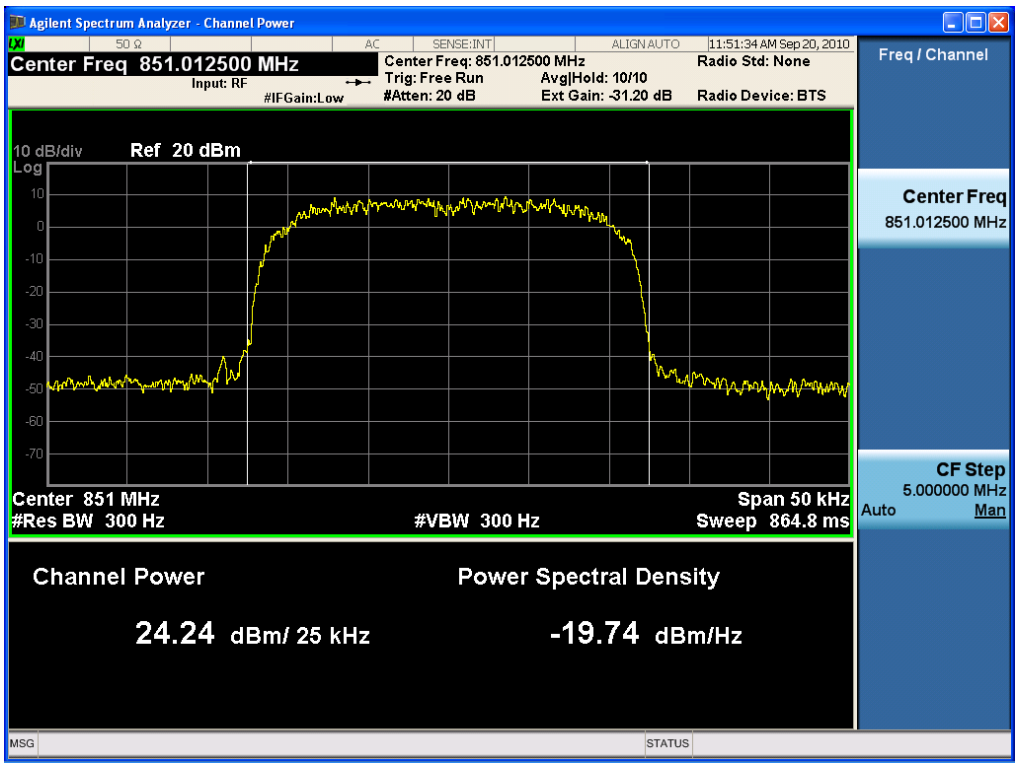
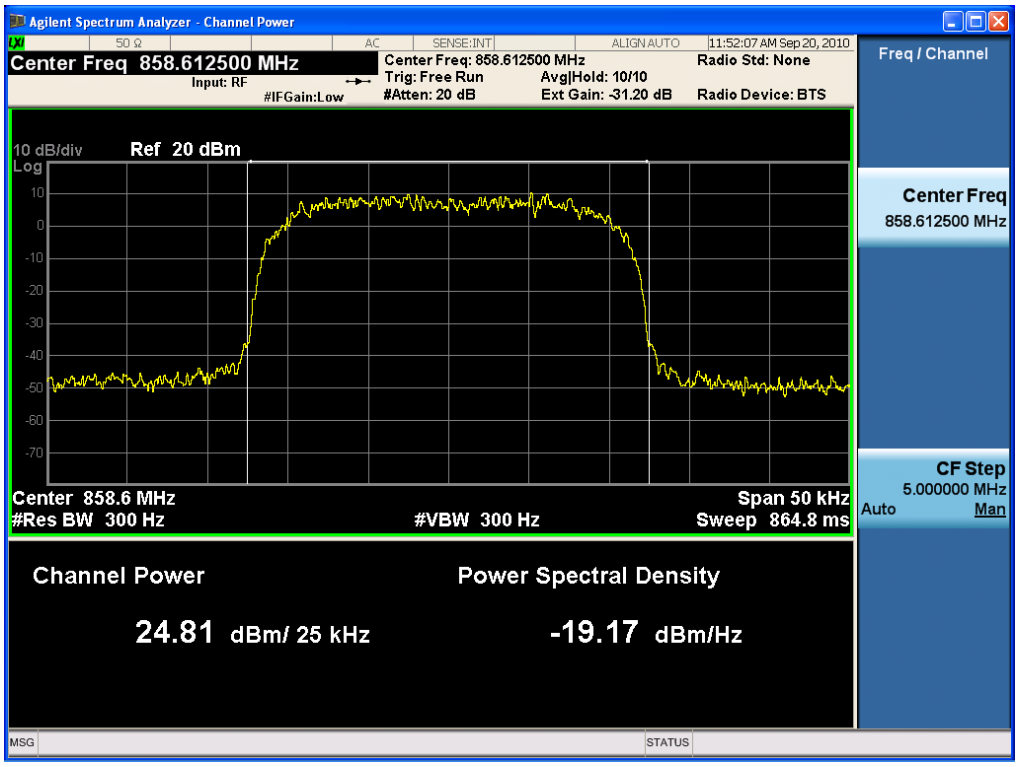


Uplink High CH (PCS 1900)



Downlink Low CH (iDEN 800)



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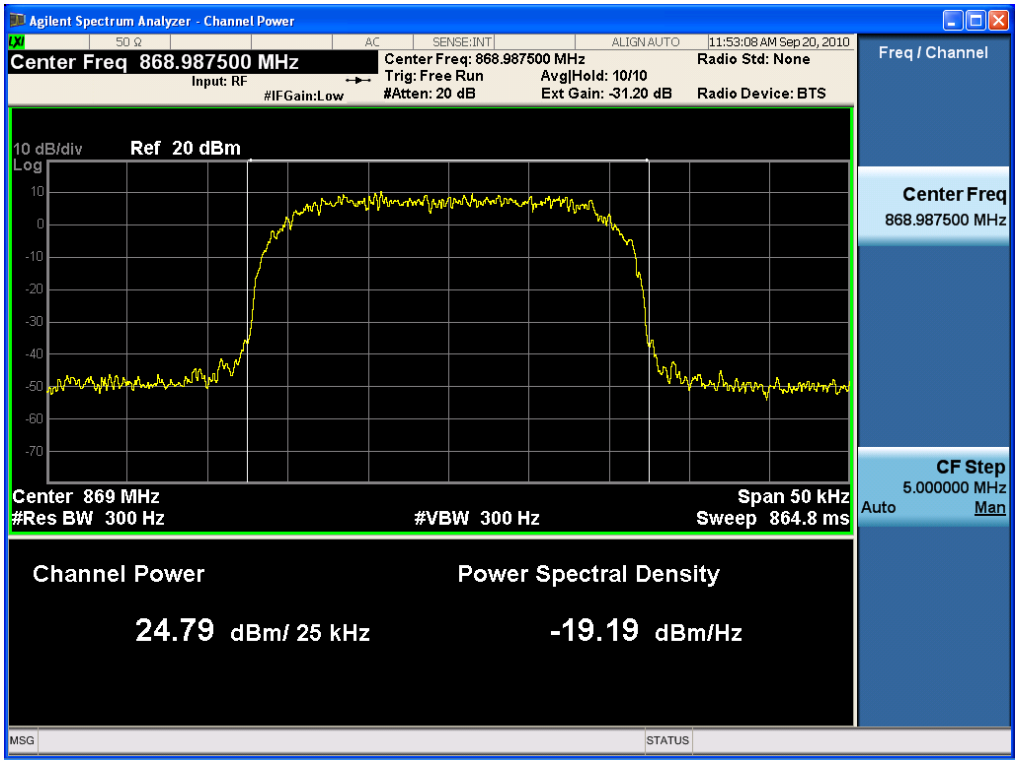

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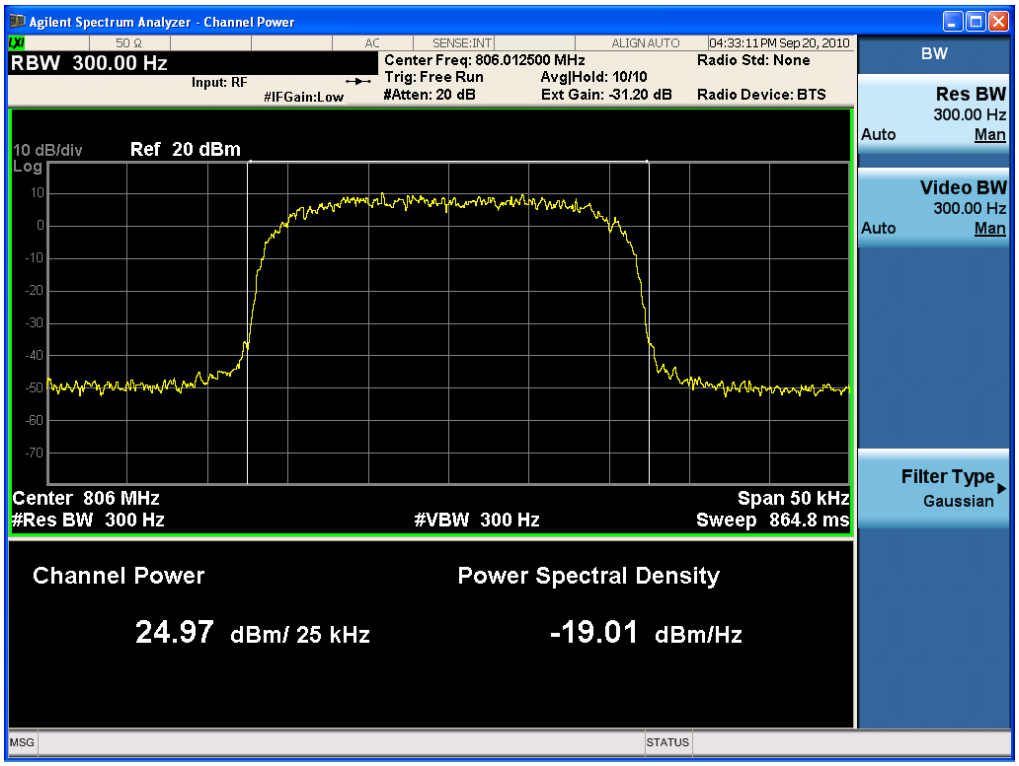

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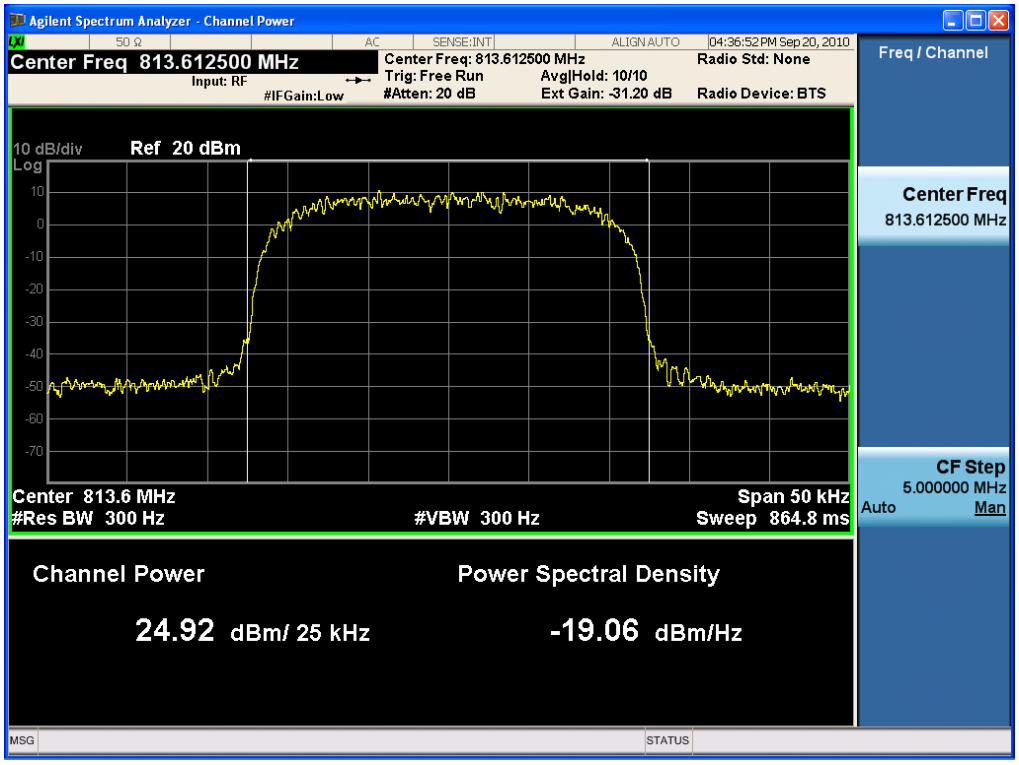

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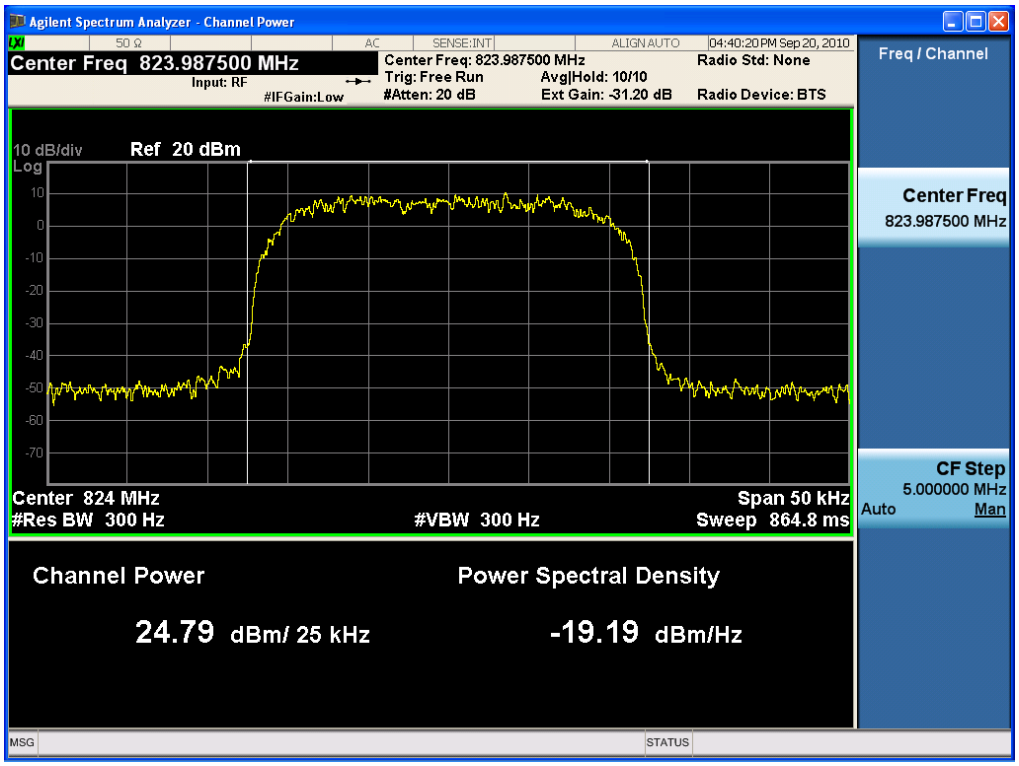
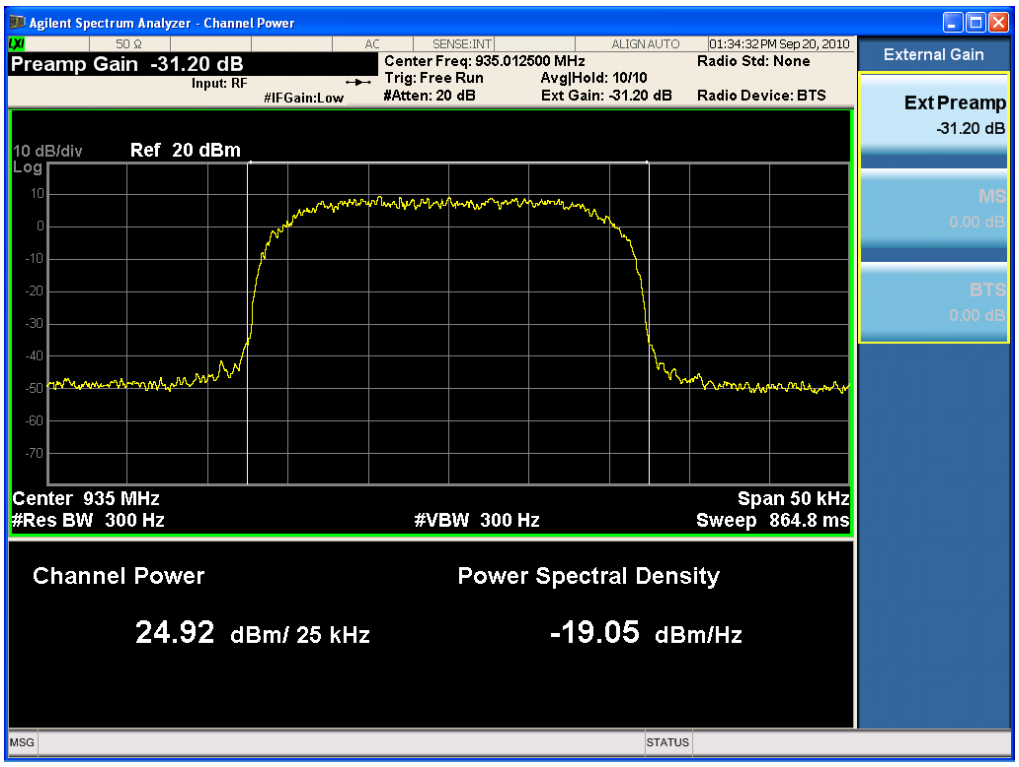
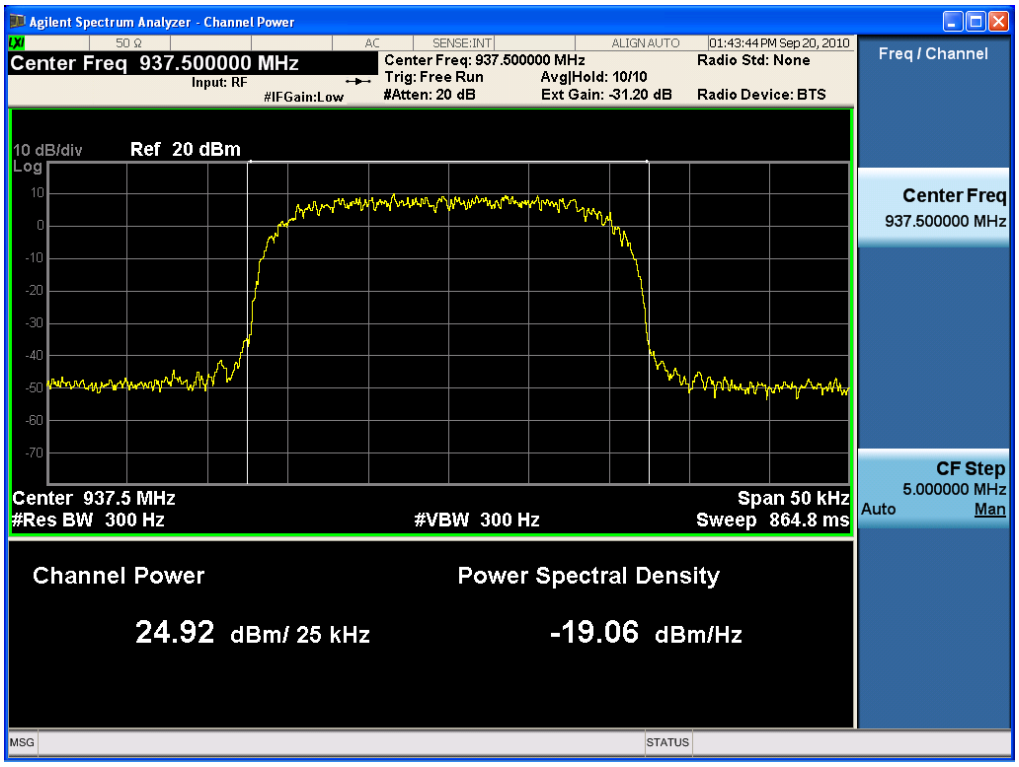


Uplink High CH (iDEN 800)



Downlink Low CH (iDEN 900)



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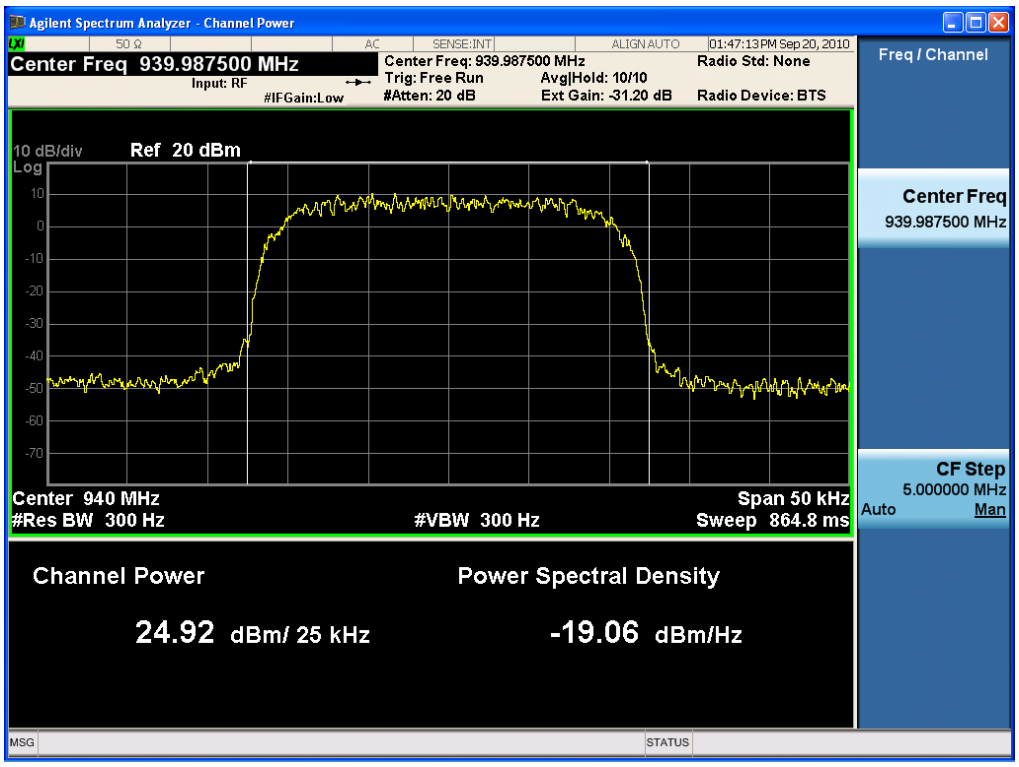
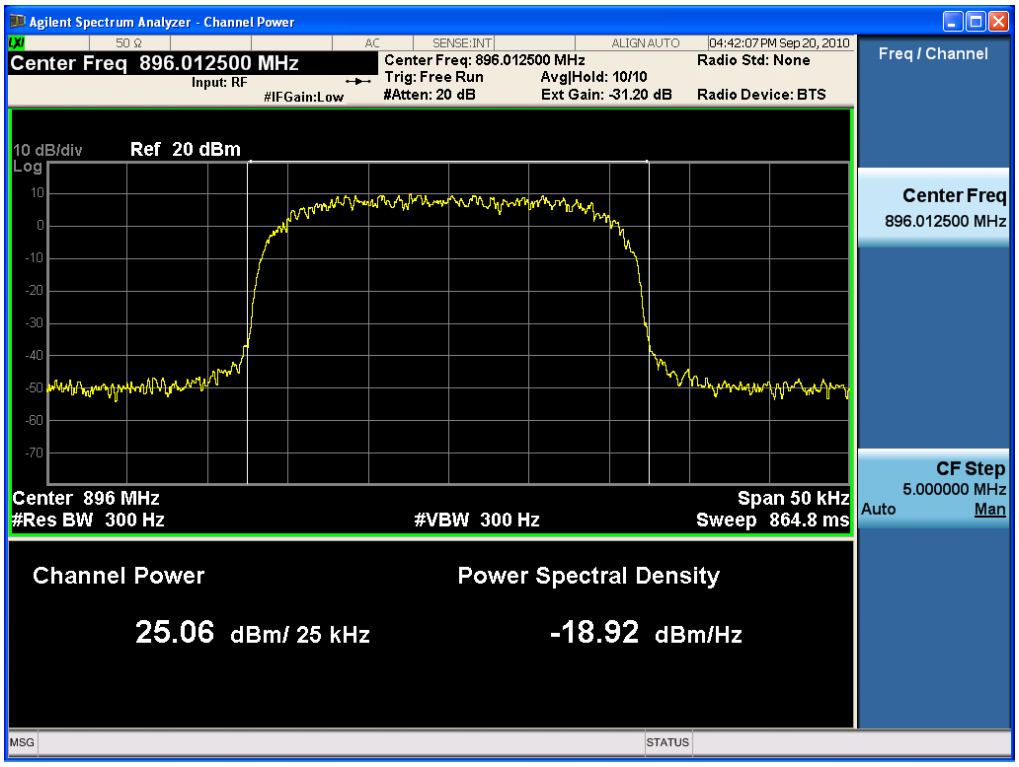


Downlink High CH (iDEN 900)



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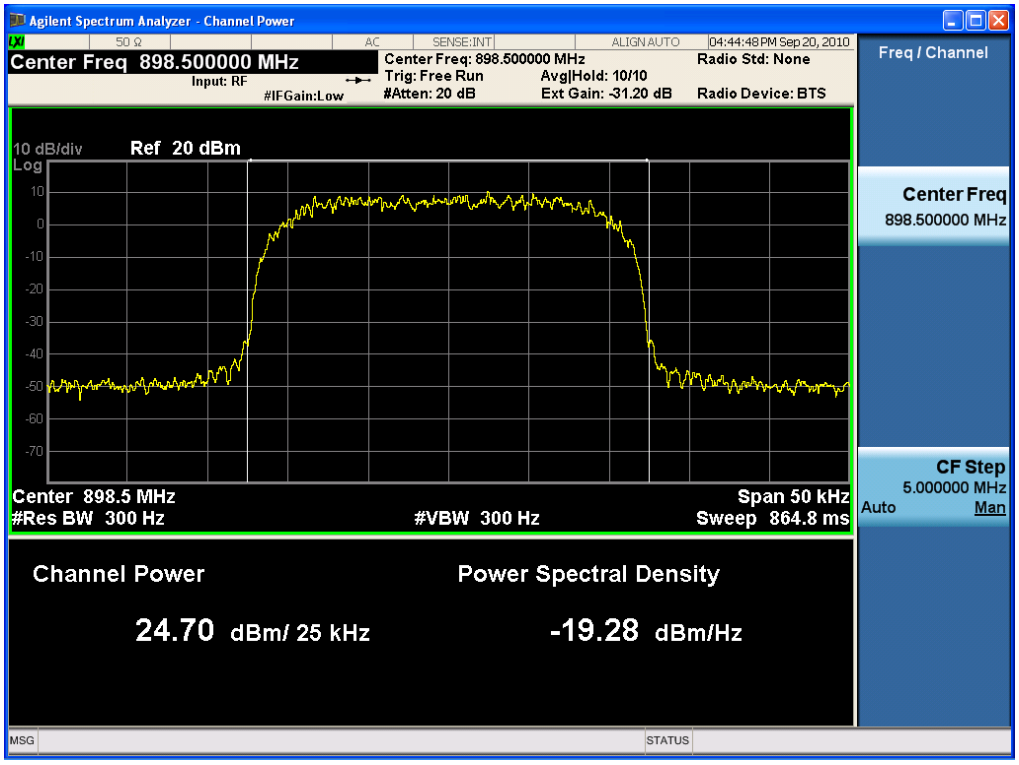
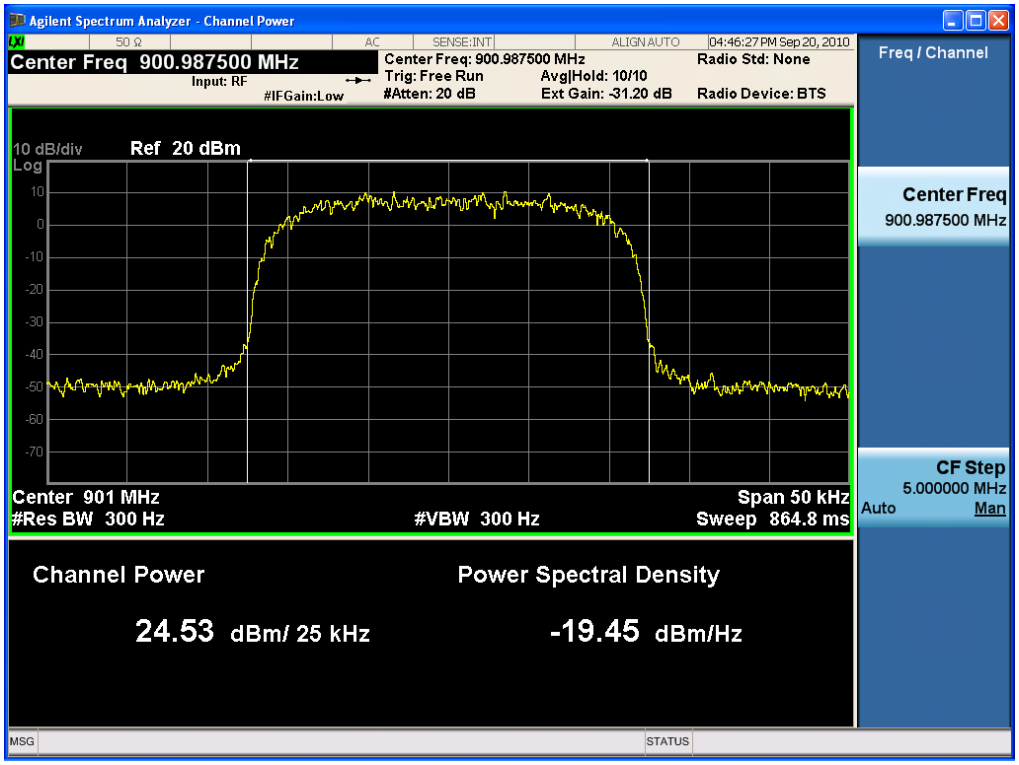
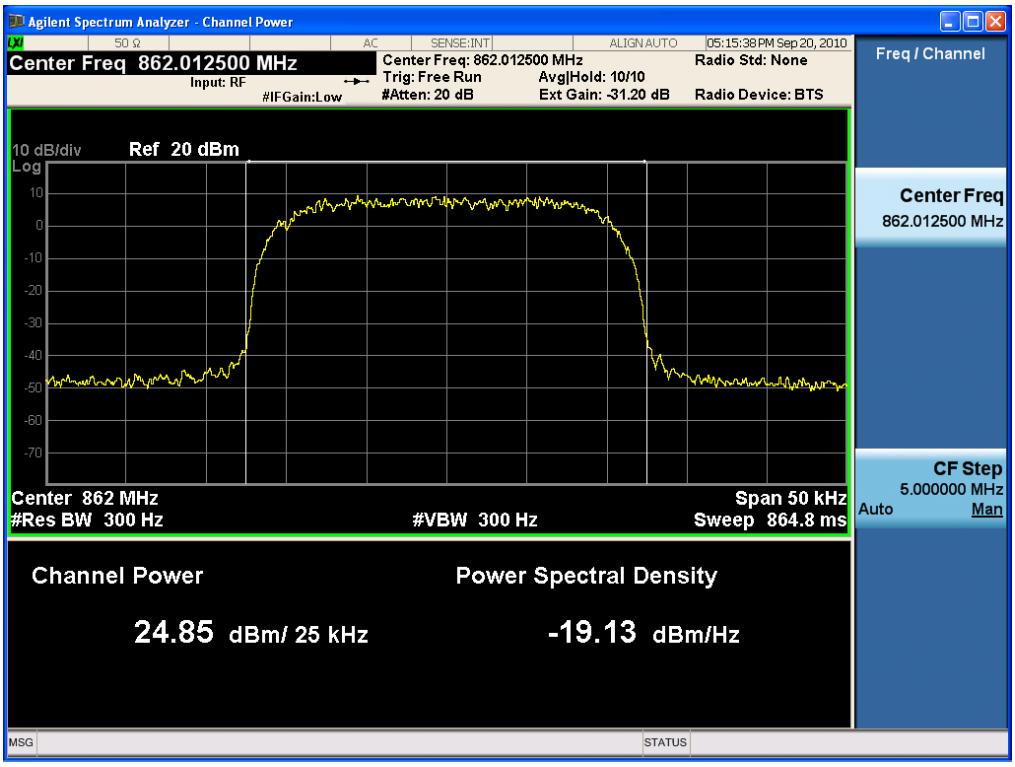


Uplink Middle CH (iDEN 900)



Uplink High CH (iDEN 900)

Plots of RF Output Power-7 MHz



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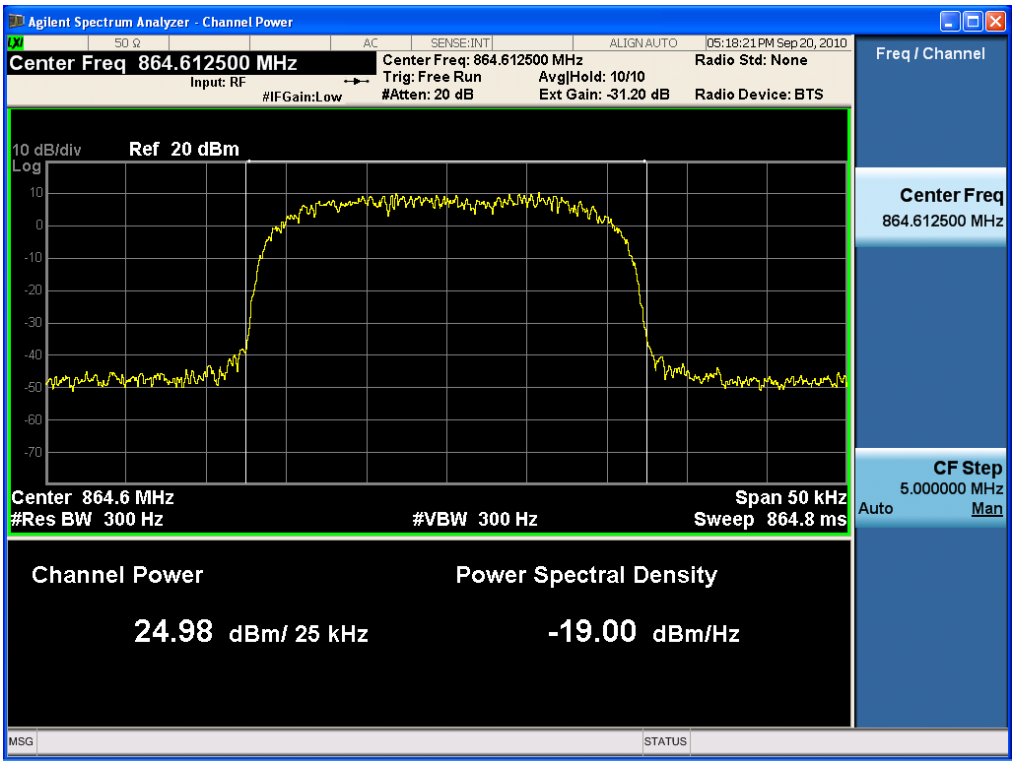
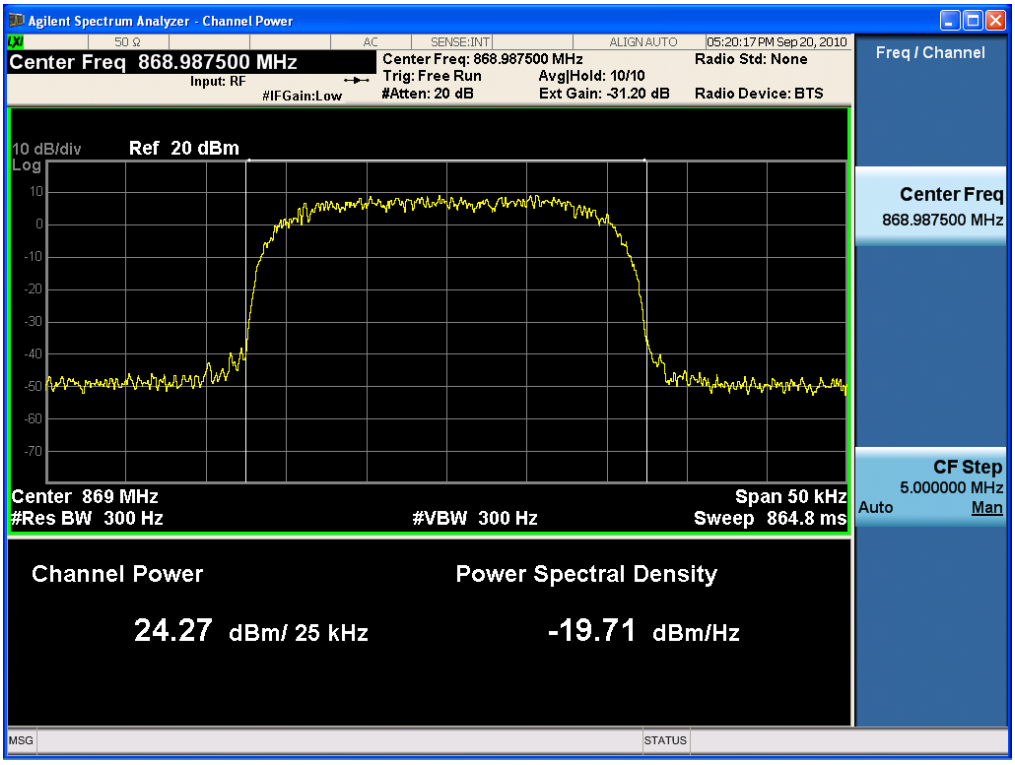
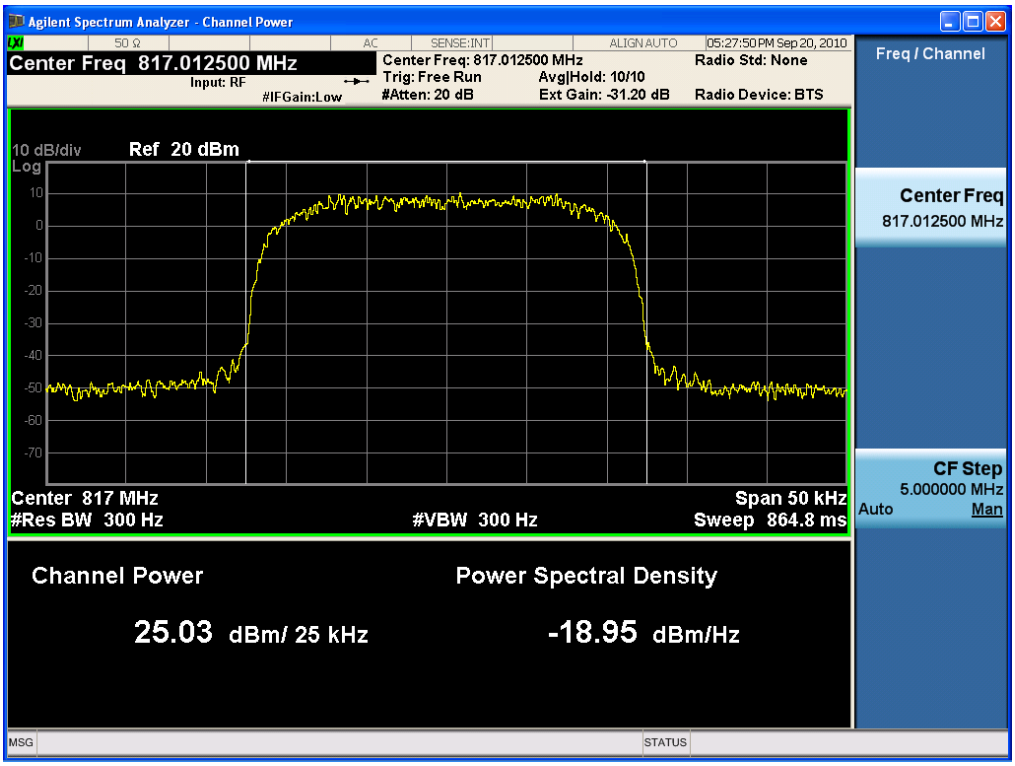


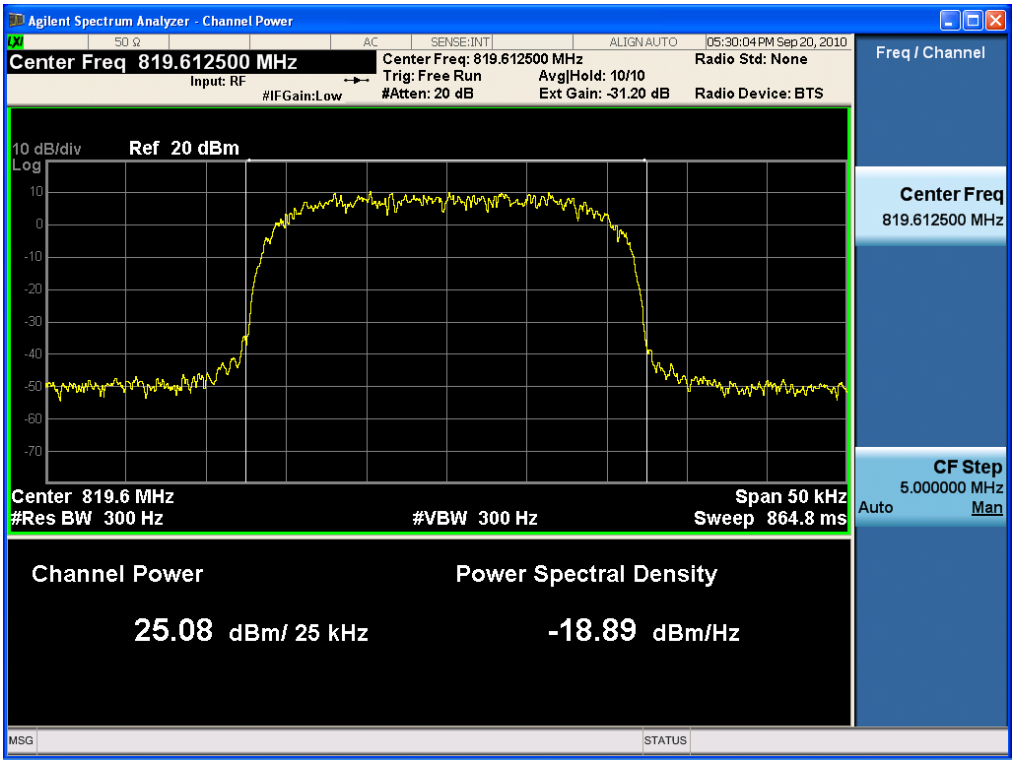
Downlink Middle CH (iDEN 800)



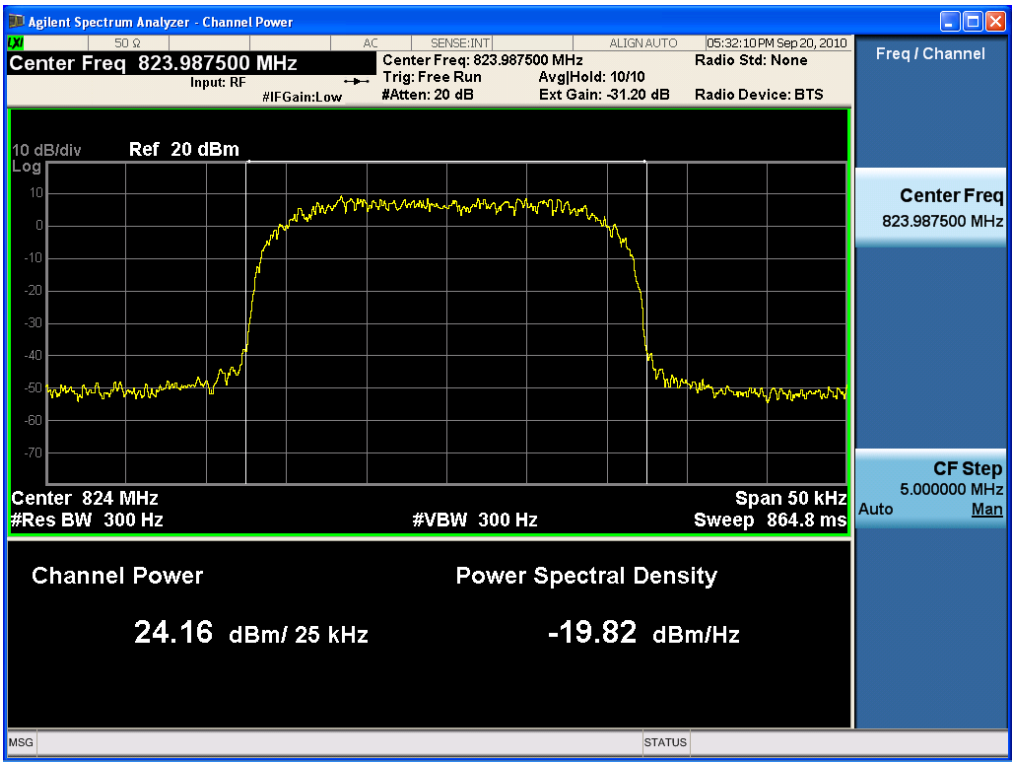
Downlink High CH (iDEN 800)



Uplink Low CH (iDEN 800)



Uplink Middle CH (iDEN 800)



Uplink High CH (iDEN 800)

7. OCCUPIED BANDWIDTH

7.1 Test Procedure

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.

NOTE: The EUT is a band selective repeater. The test was performed using all selective bands and there was not much difference between them. The test result is reported using the widest bands.

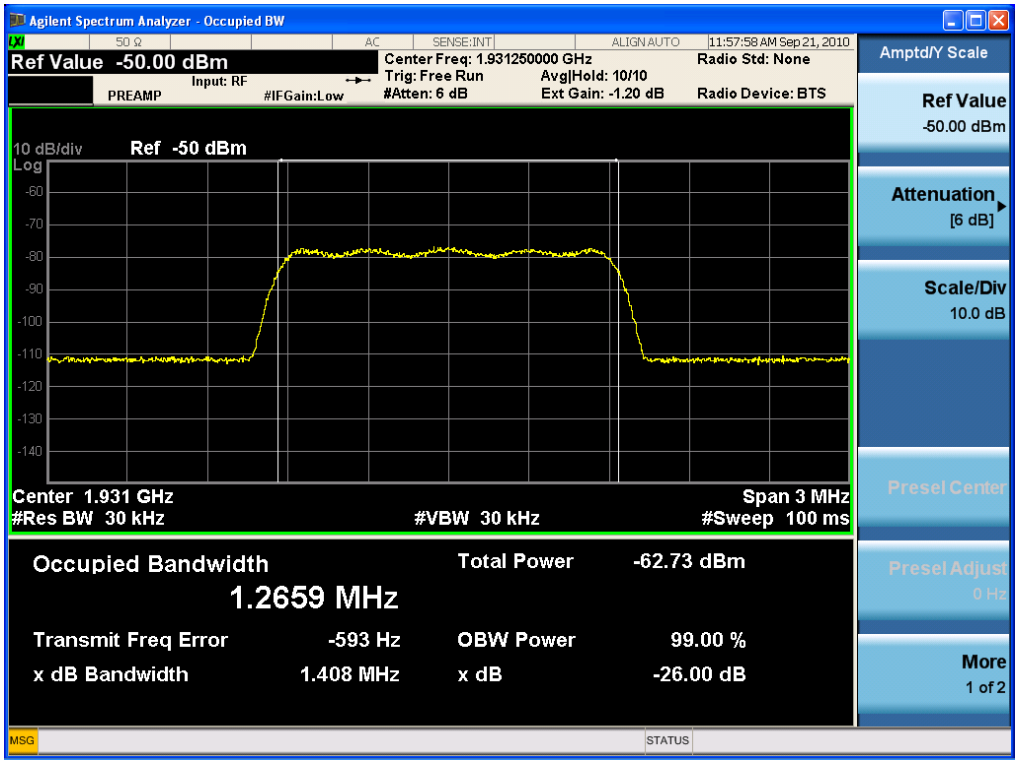
(Downlink)

PCS1900 DownLink		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(MHz)**
Low	1931.2500	1.405
Mid	1962.5000	1.407
High	1993.7500	1.398
iDEN800 DownLink-18 MHz		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(kHz)**
Low	851.0125	23.58
Mid	858.6125	23.81
High	868.9875	23.64
iDEN800 DownLink-7 MHz		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(kHz)**
Low	862.0125	23.59
Mid	864.6125	23.84
High	868.9875	23.44
iDEN900 DownLink		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(kHz)**
Low	935.0125	23.71
Mid	937.5000	23.89
High	939.9875	23.75

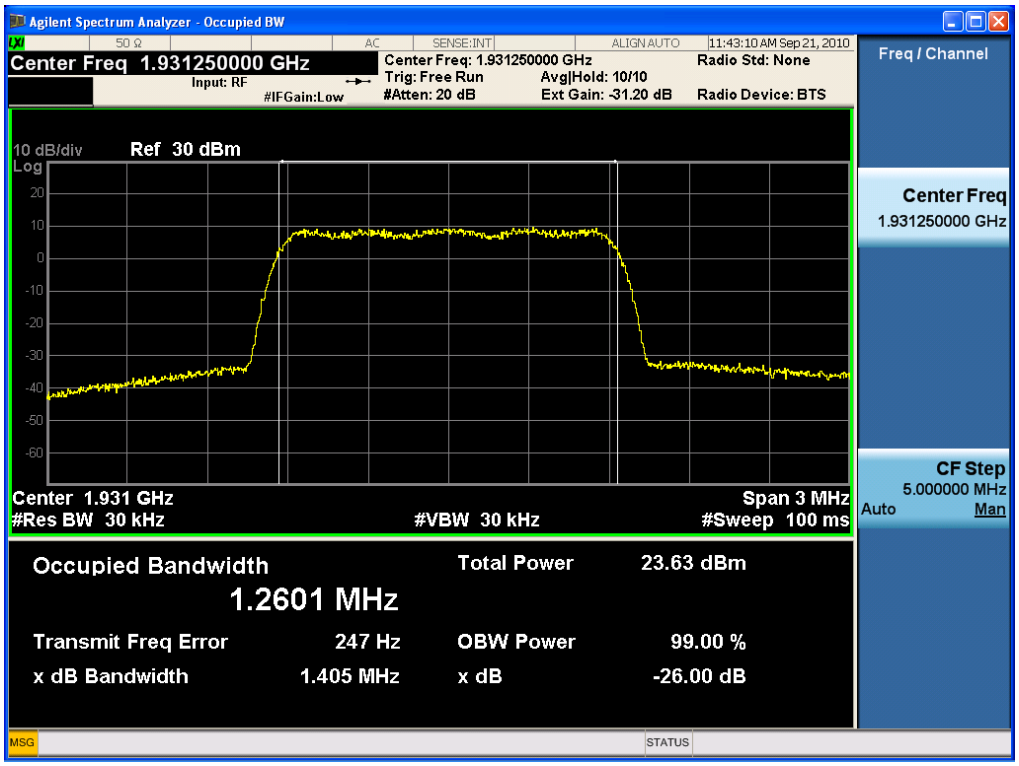
(Uplink)

PCS1900 UpLink		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(MHz)**
Low	1851.2500	1.404
Mid	1882.5000	1.405
High	1913.7500	1.400
iDEN800 UpLink-18 MHz		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(kHz)**
Low	806.0125	23.84
Mid	813.6125	23.77
High	823.9875	23.71
iDEN800 UpLink-7 MHz		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(kHz)**
Low	817.0125	23.81
Mid	819.6125	23.74
High	823.9875	23.78
iDEN900 UpLink		
Carrier Channel	**Frequency (MHz)**	**26dB Bandwidth(kHz)**
Low	896.0125	23.81
Mid	898.5000	23.89
High	900.9875	23.75

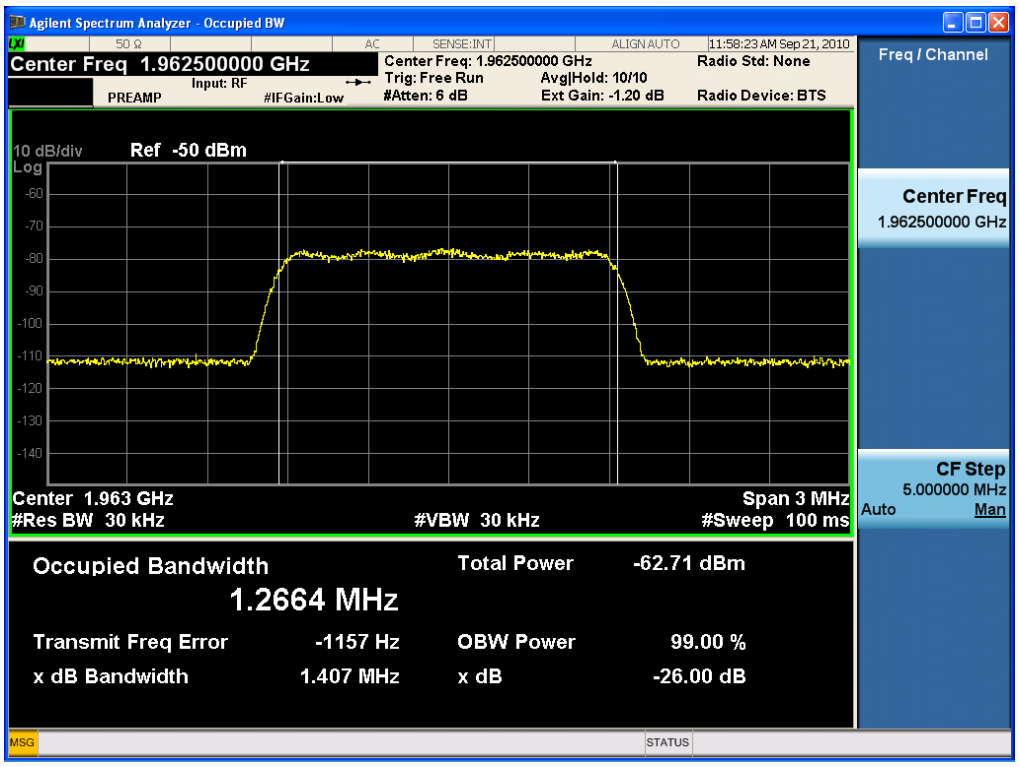
Plots of Occupied Bandwidth-18 MHz



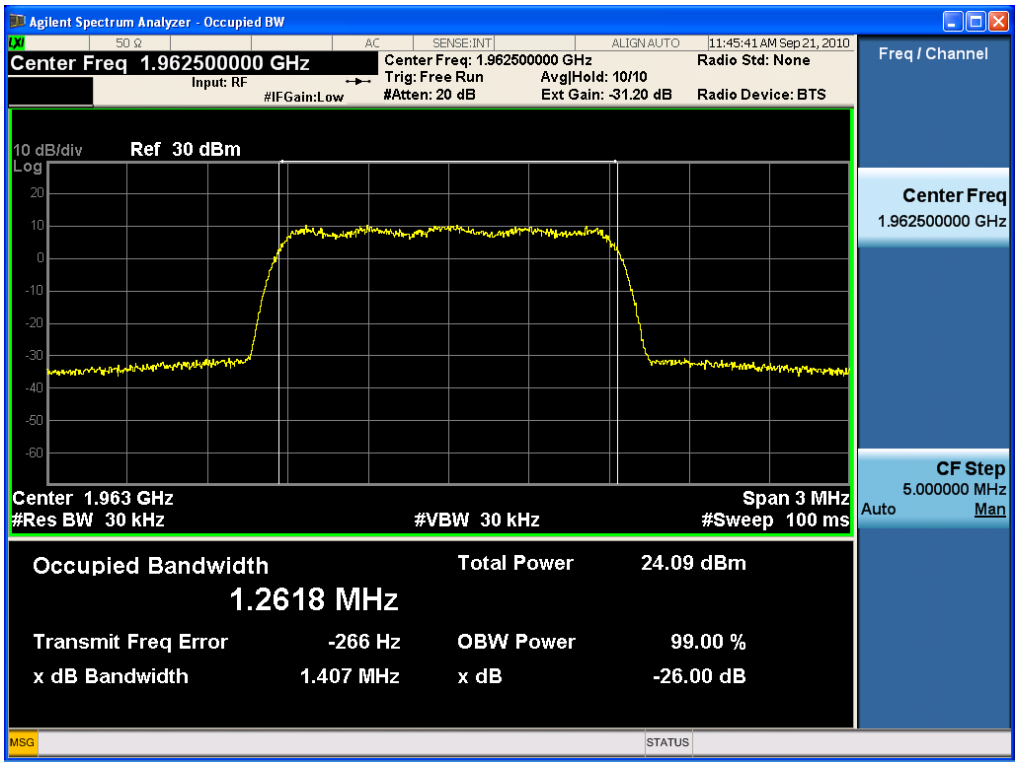
PCS1900 Downlink Low CH Input



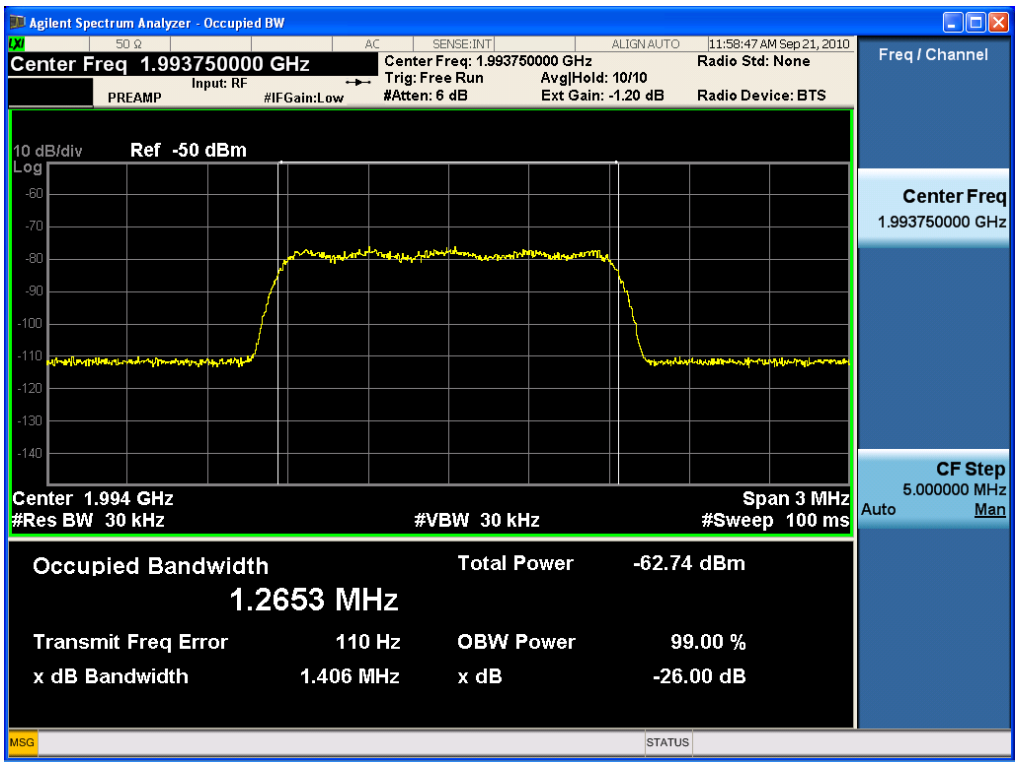
PCS1900 Downlink Low CH Output



PCS1900 Downlink Mid CH Input



PCS1900 Downlink Mid CH Output



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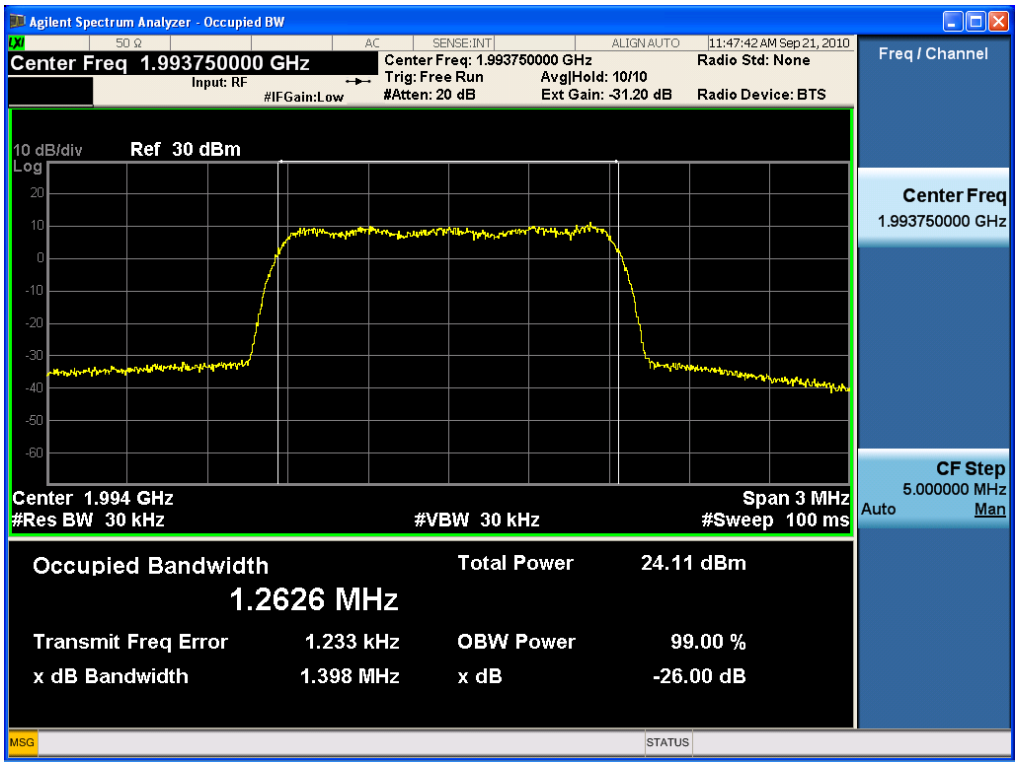

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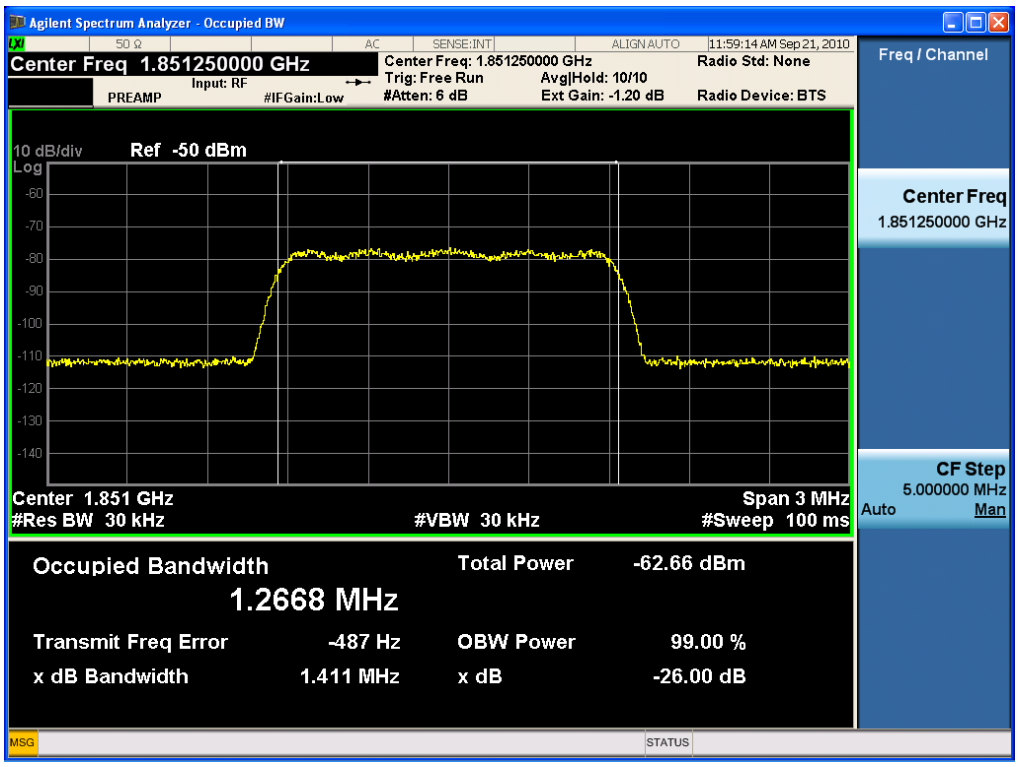

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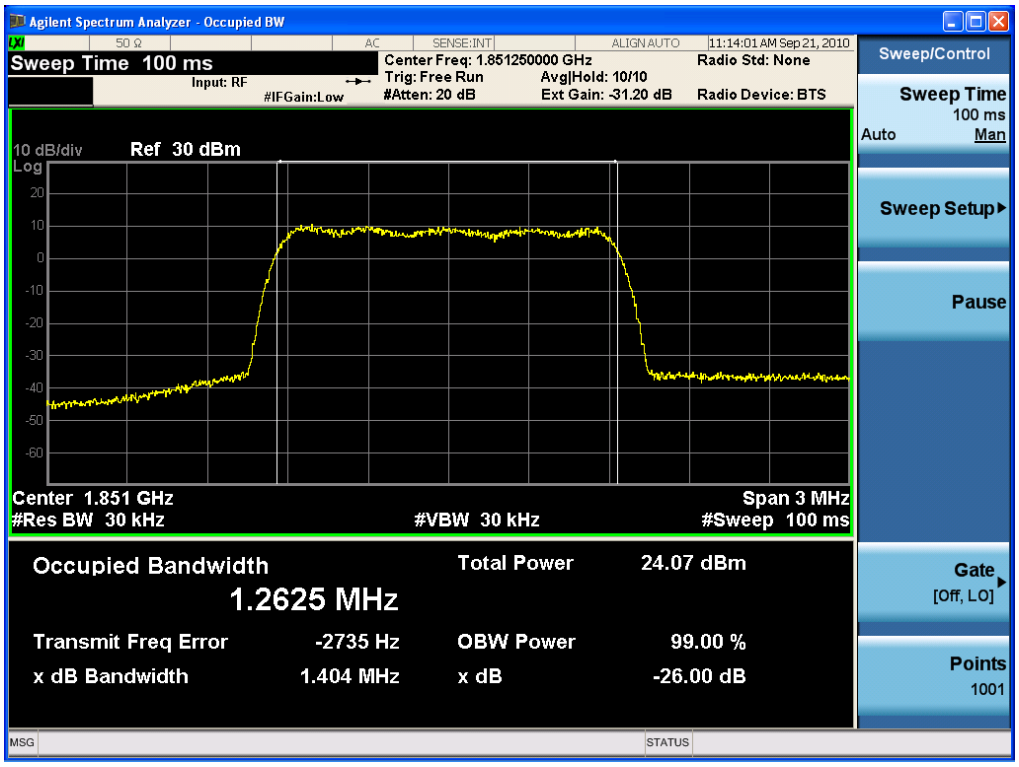

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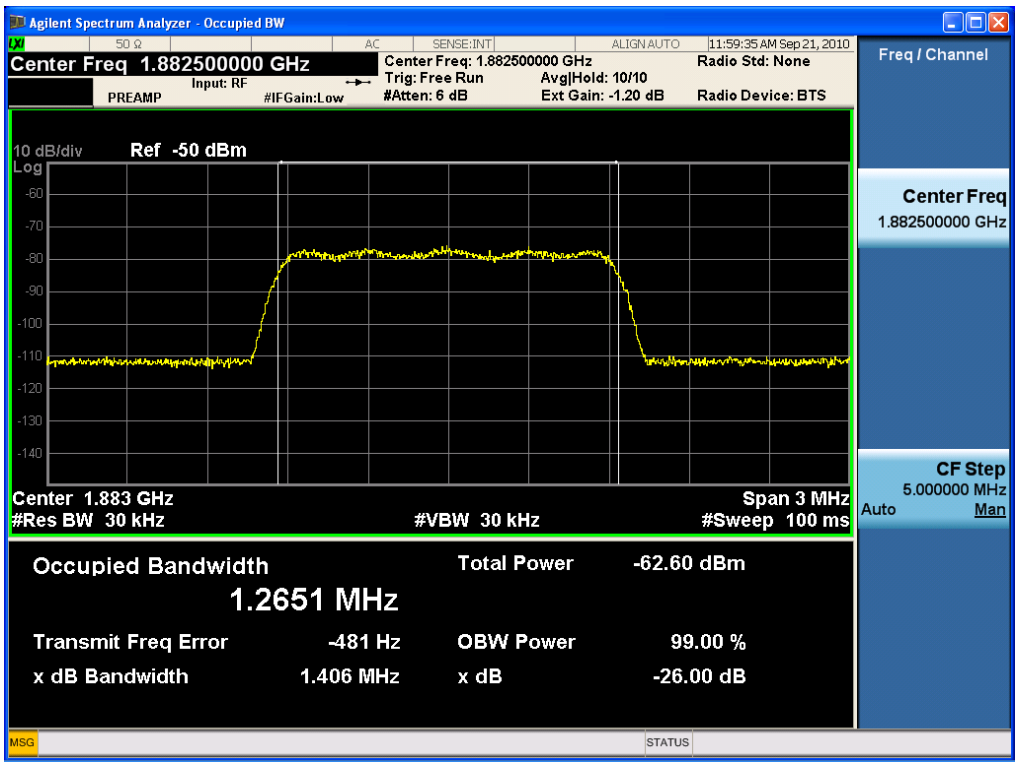

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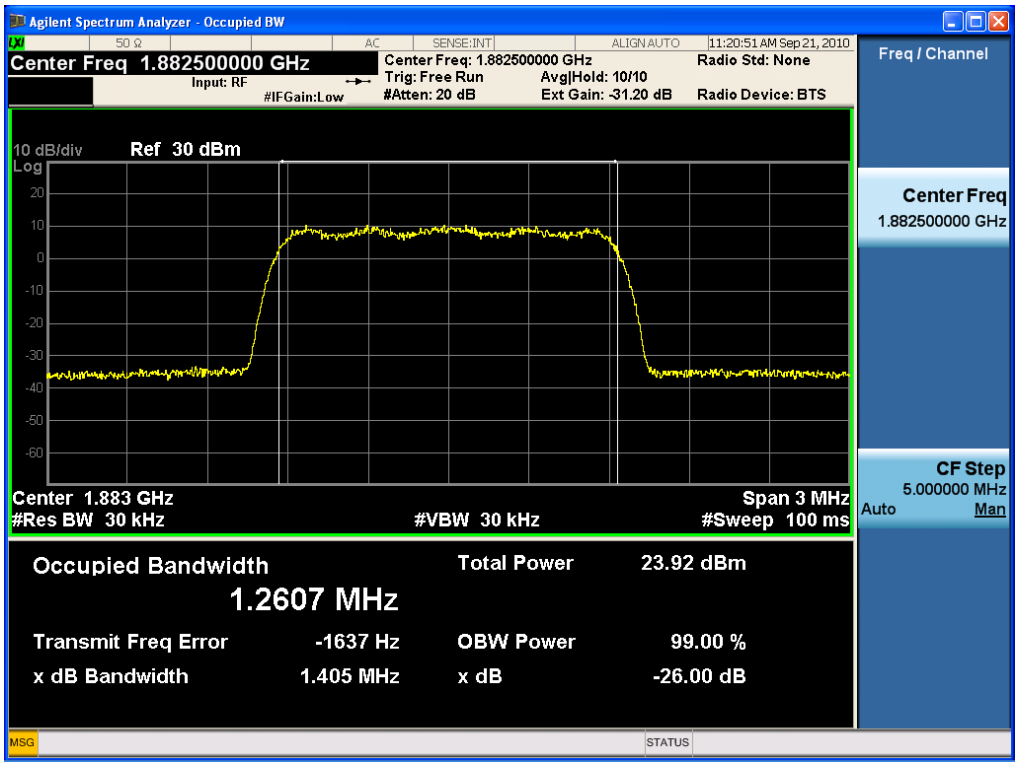

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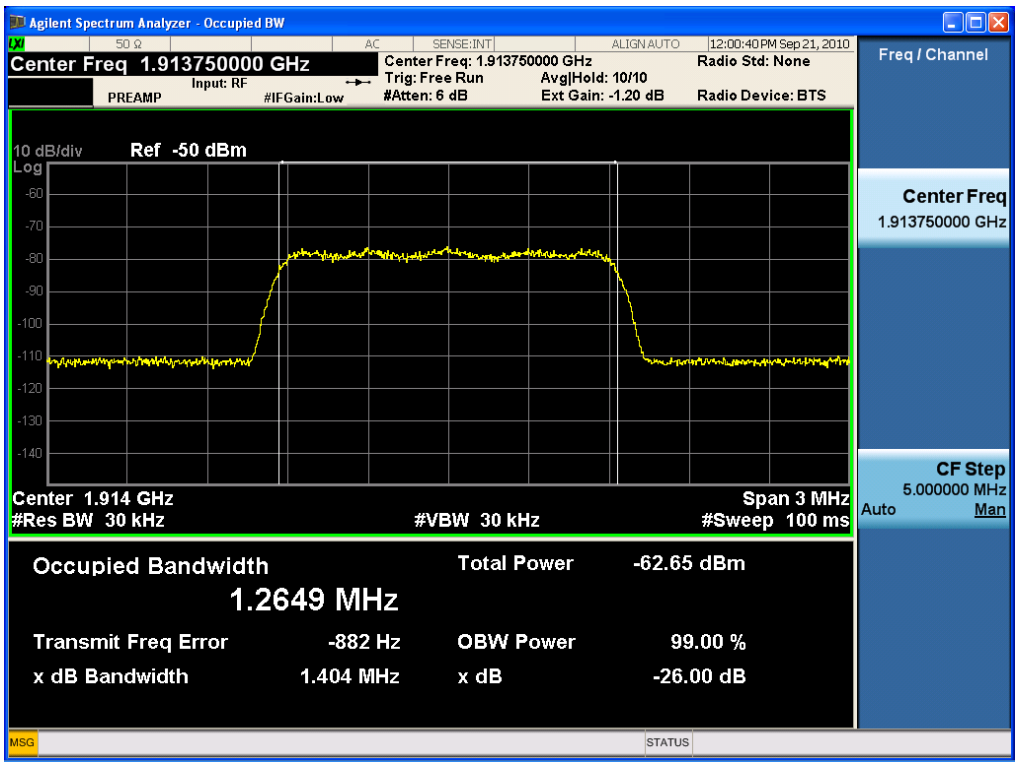

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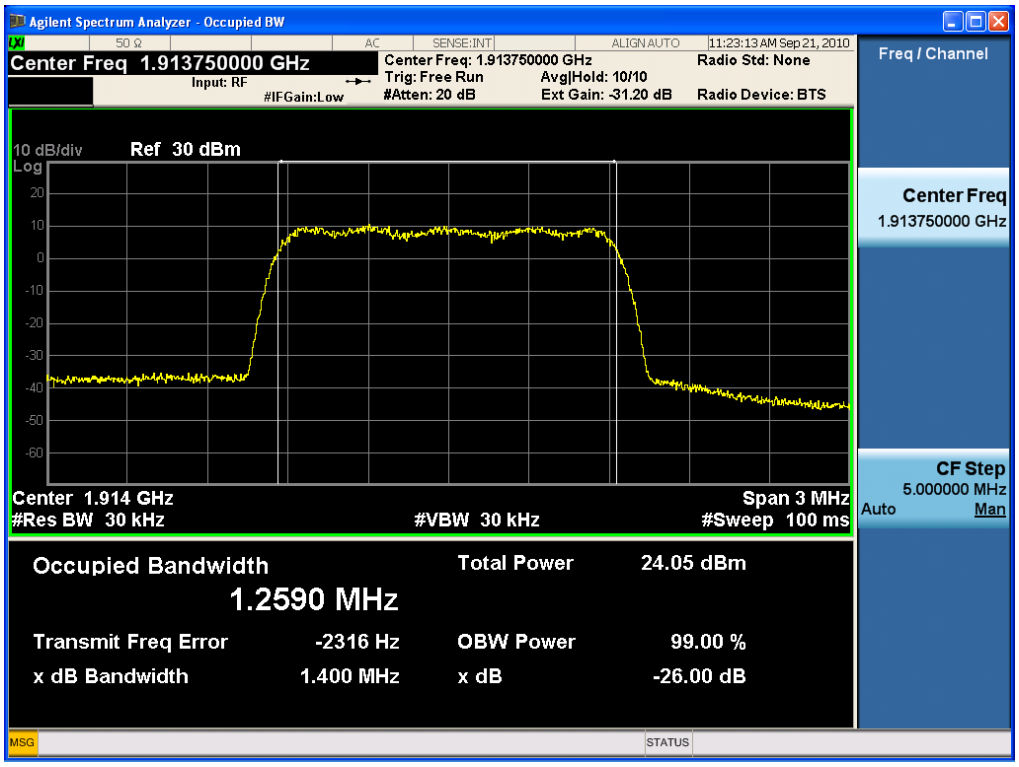

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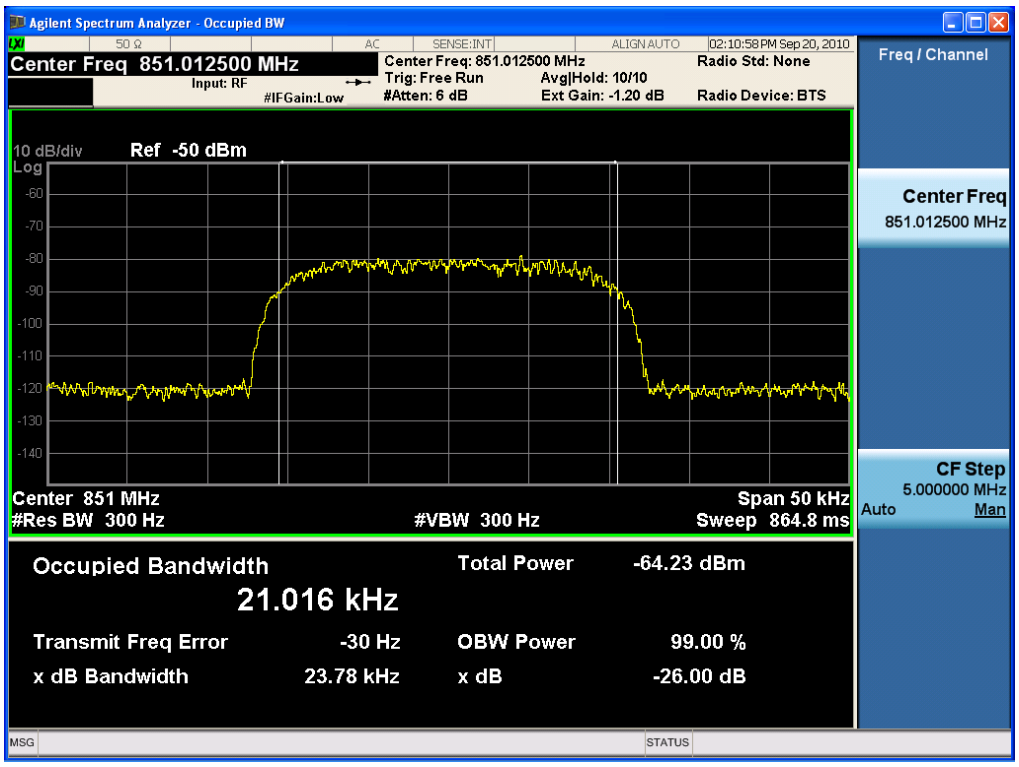

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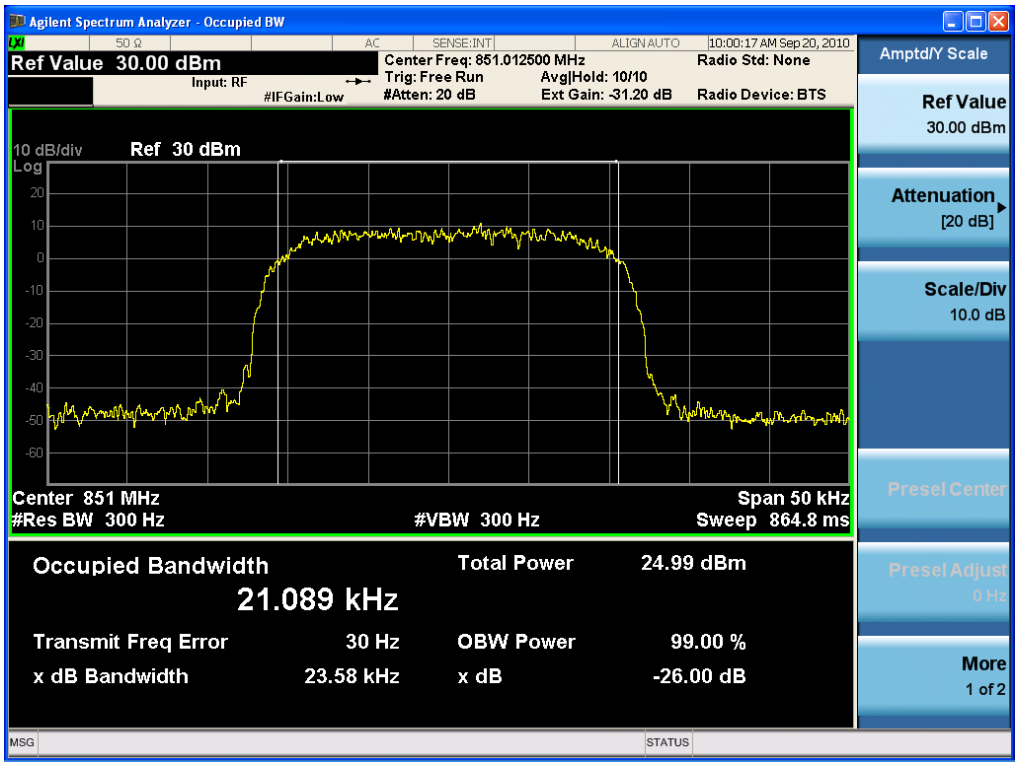

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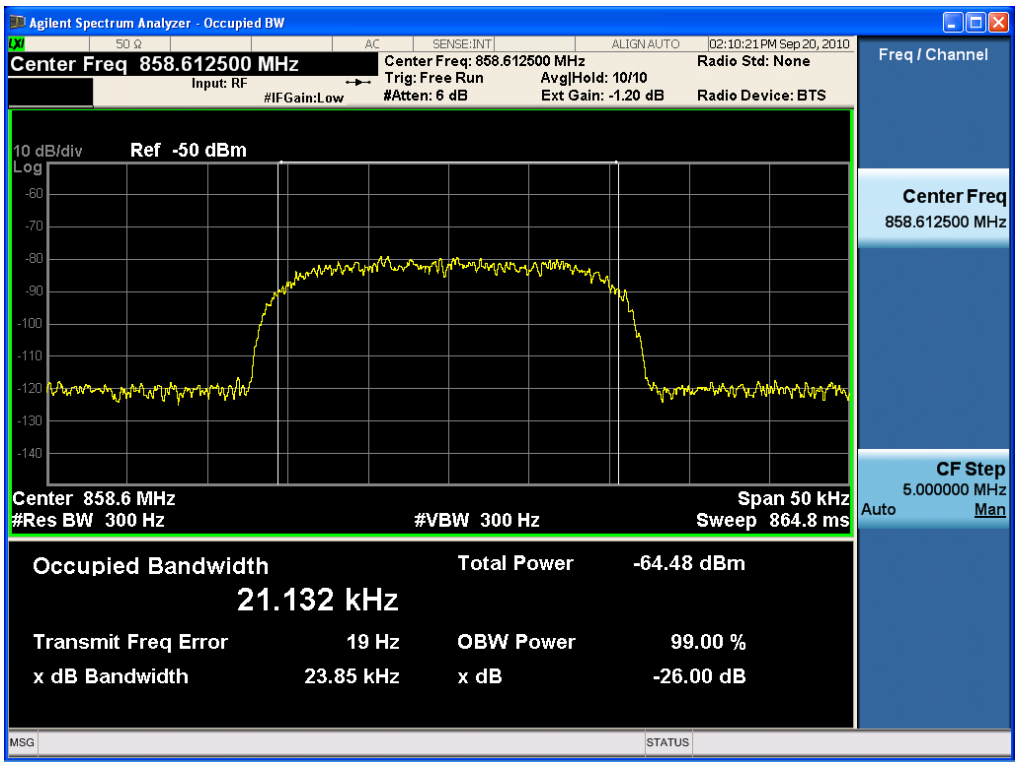

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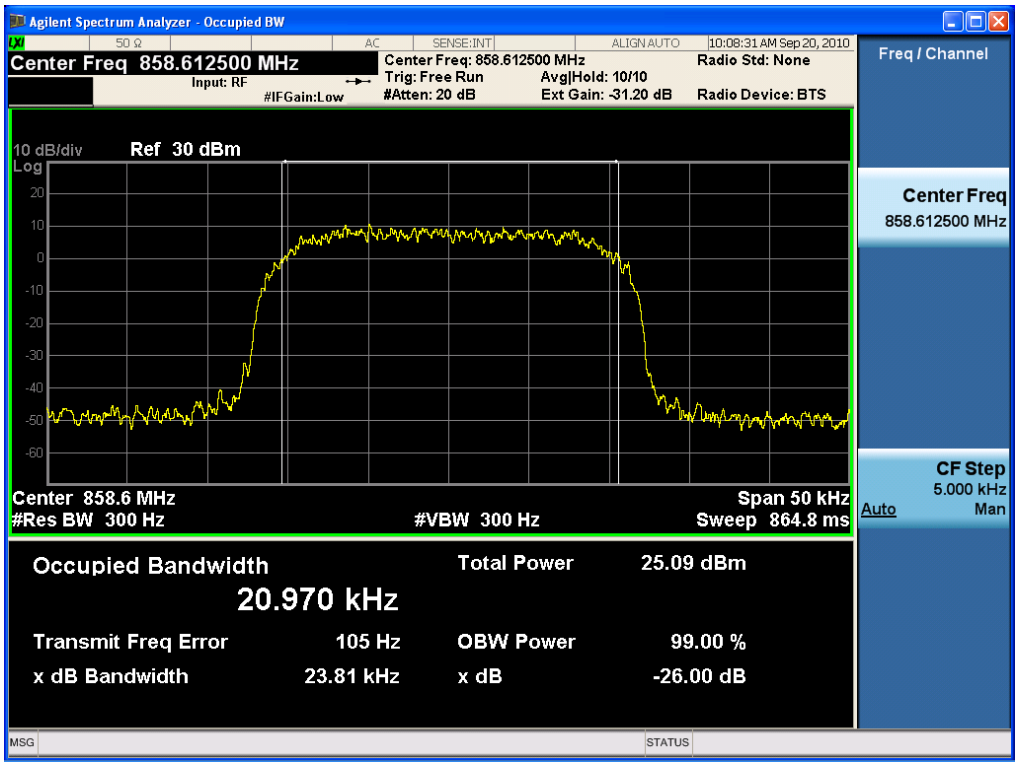

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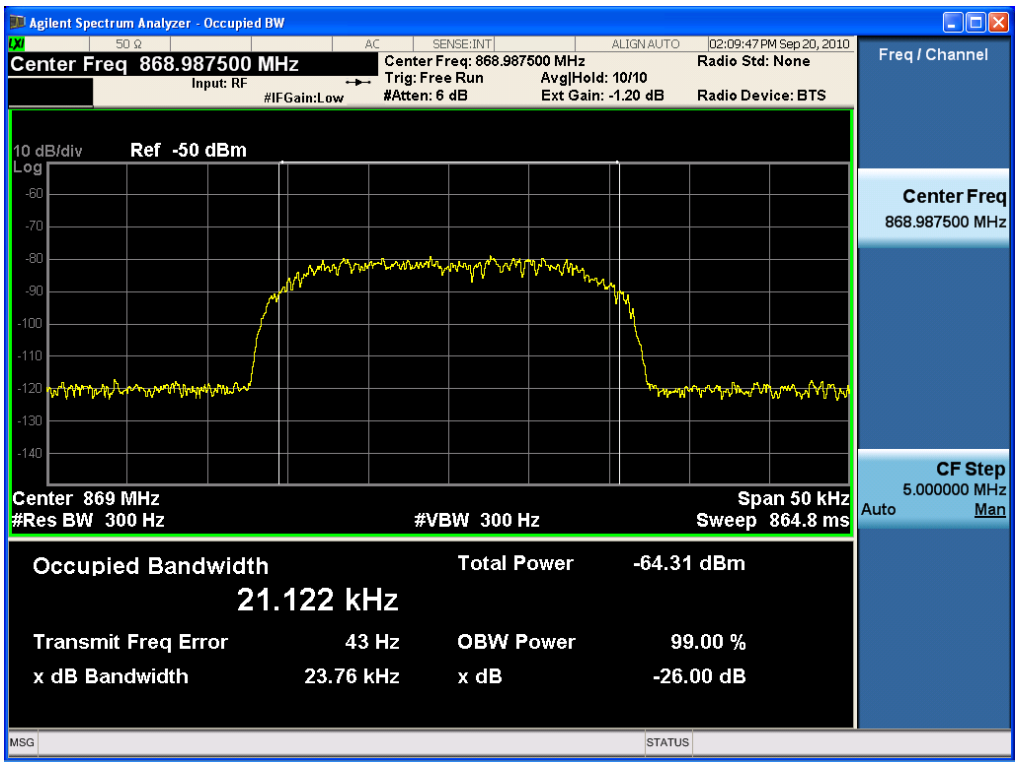

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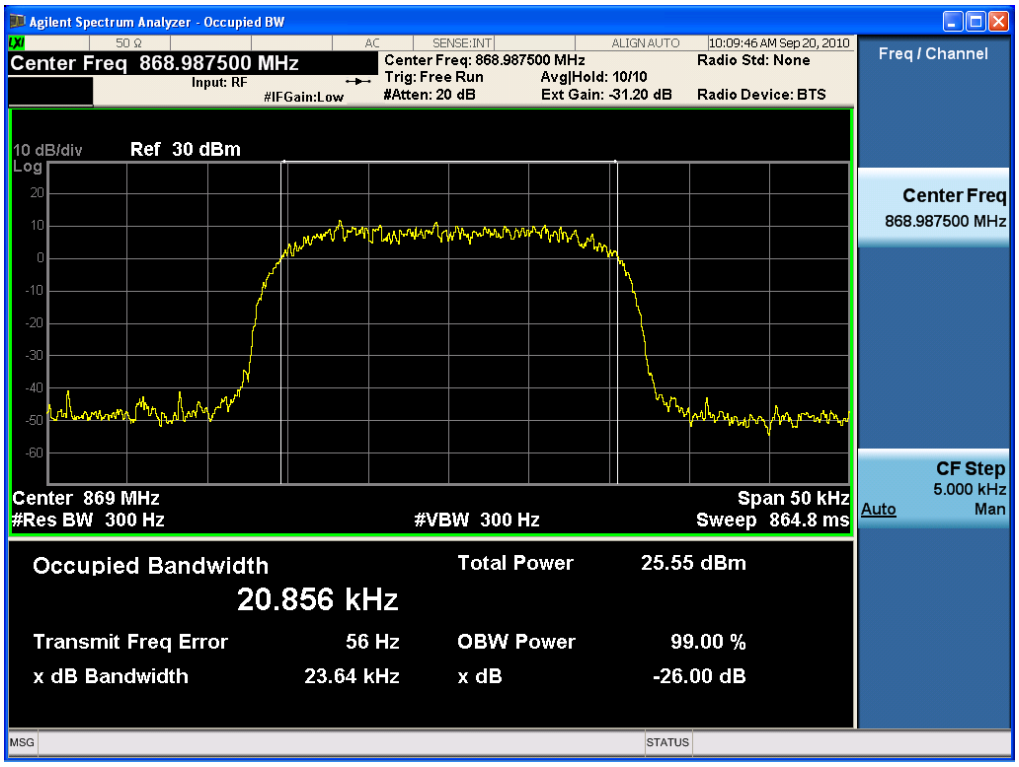

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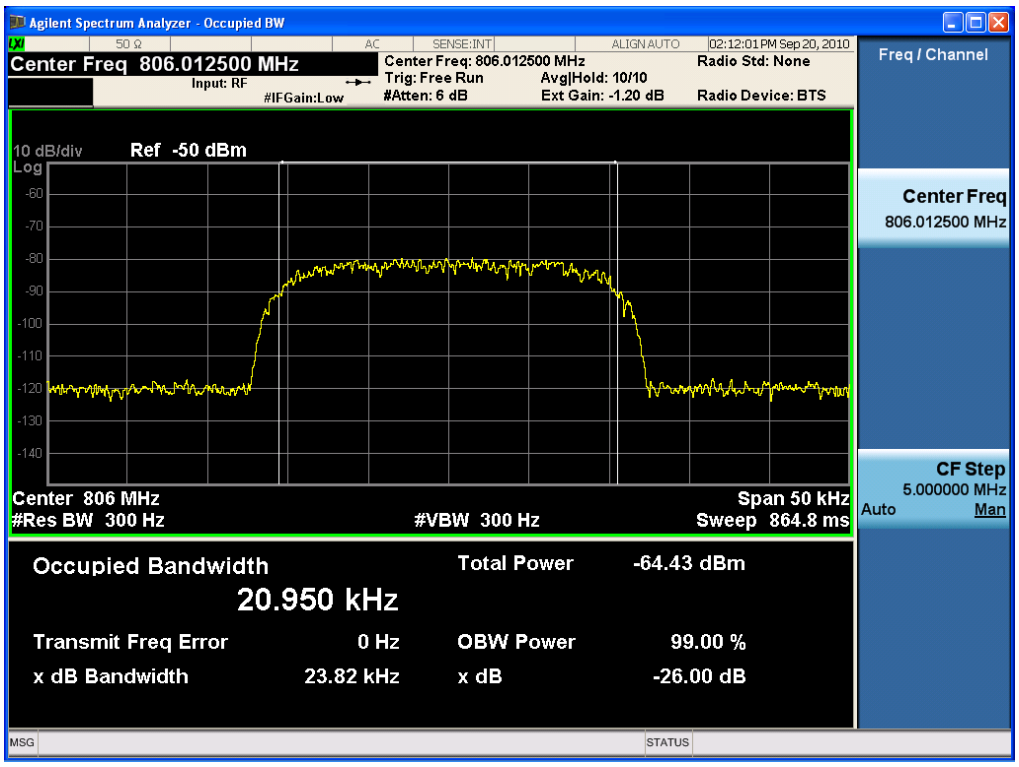

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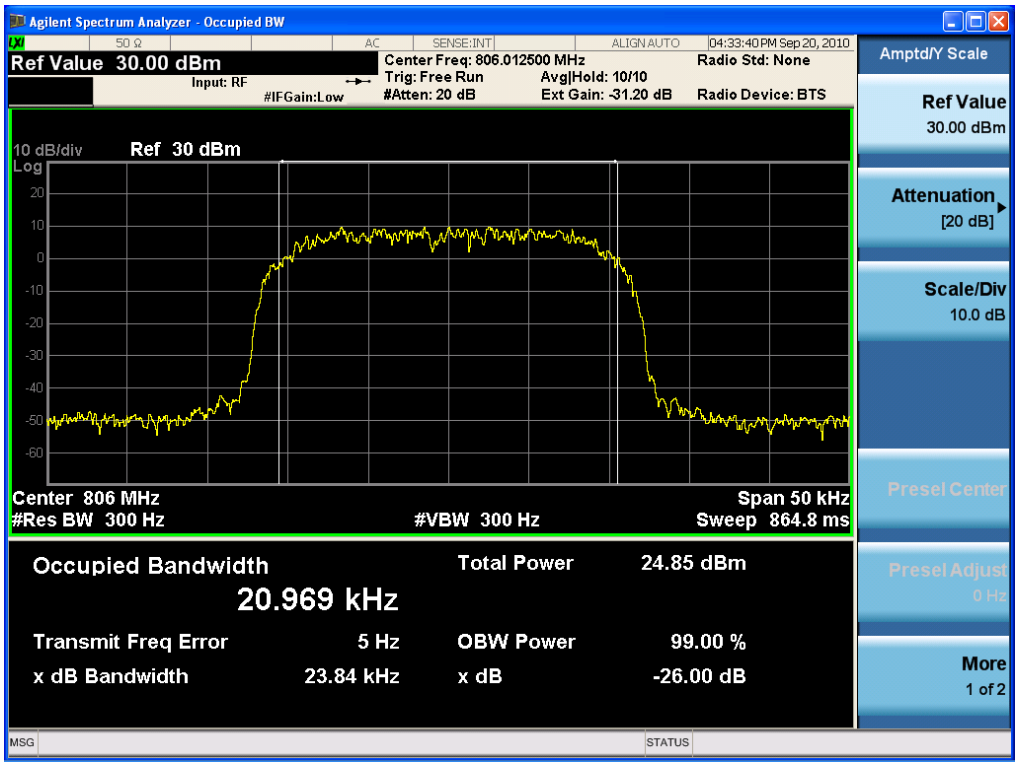

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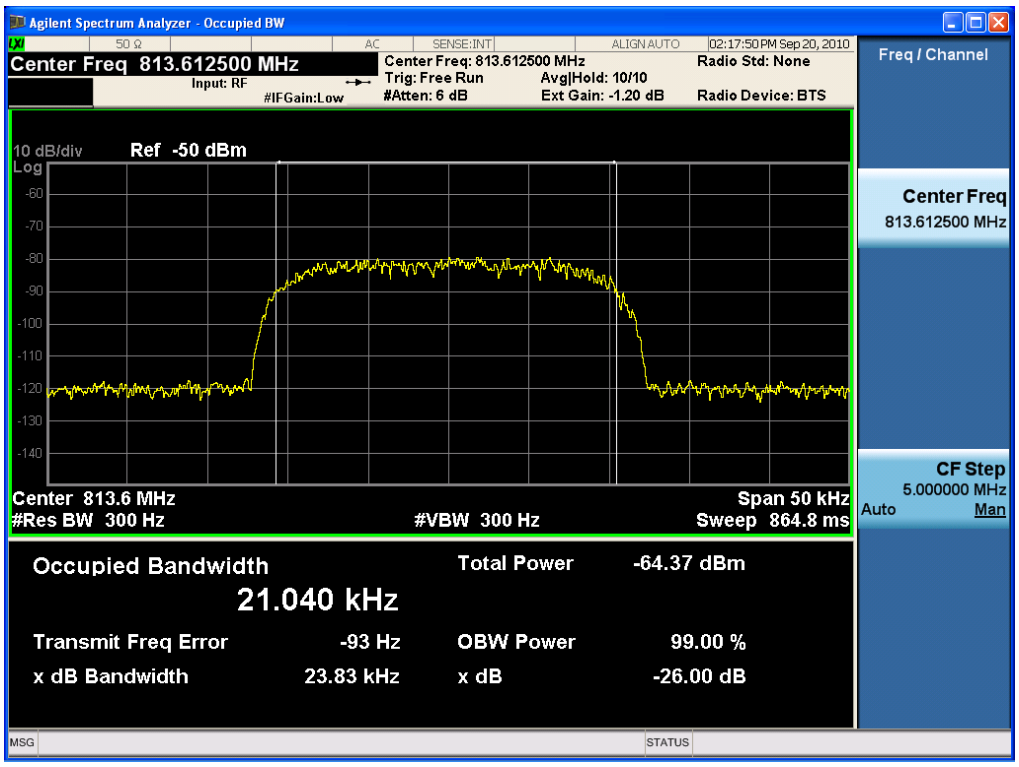

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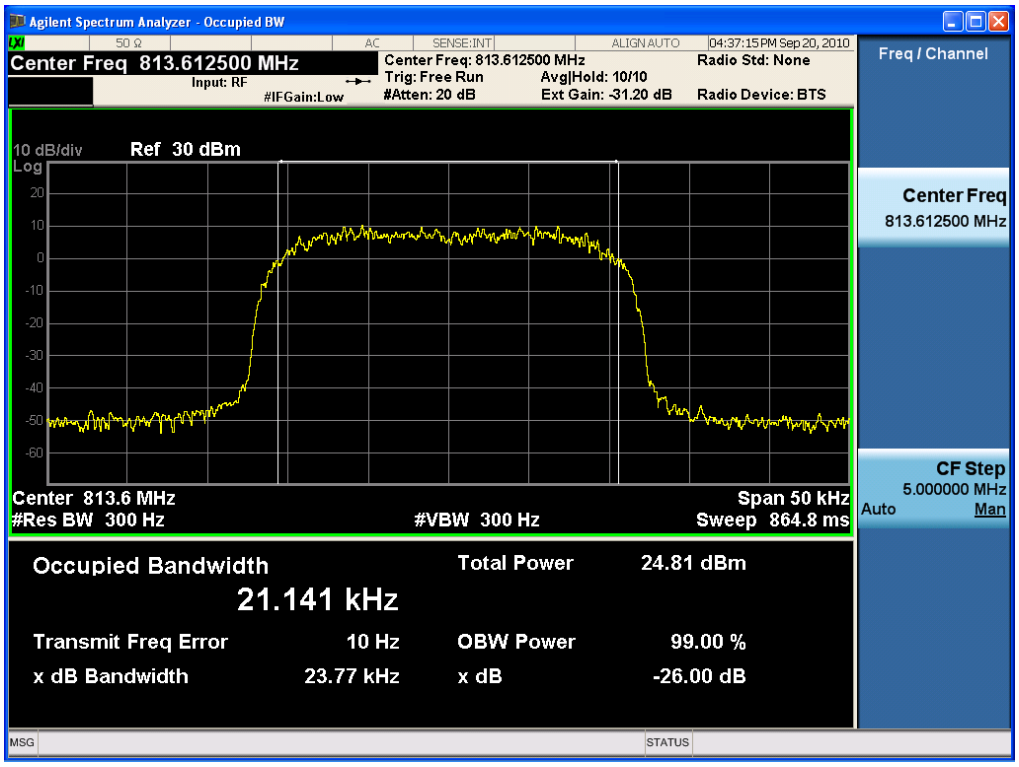

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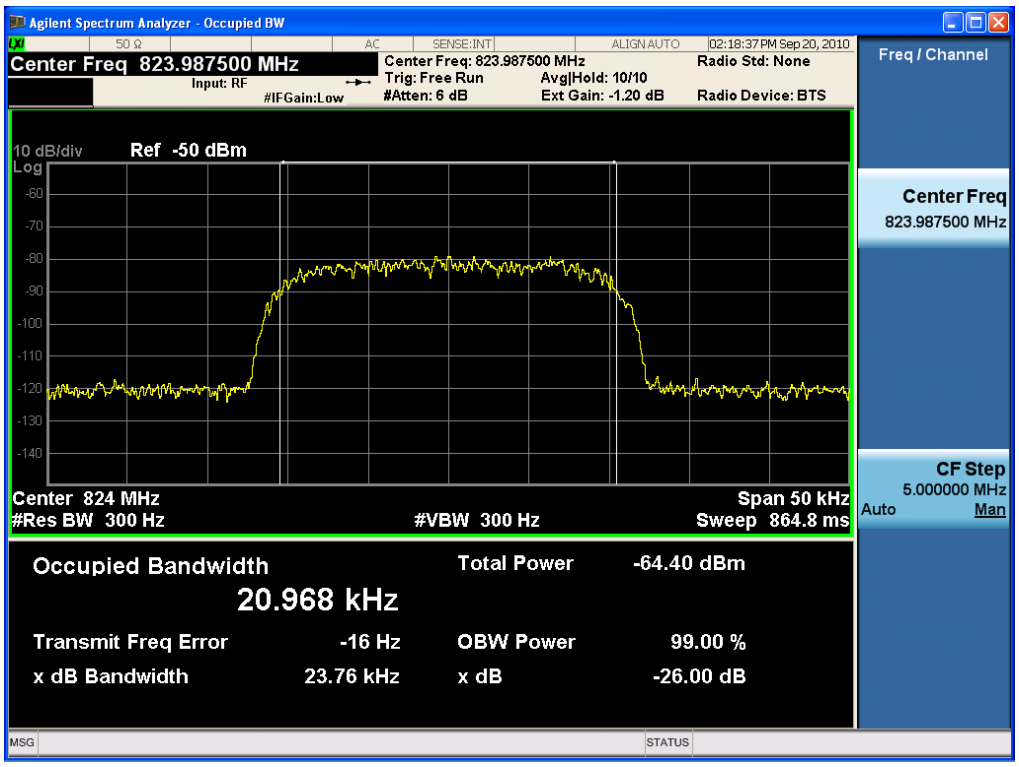

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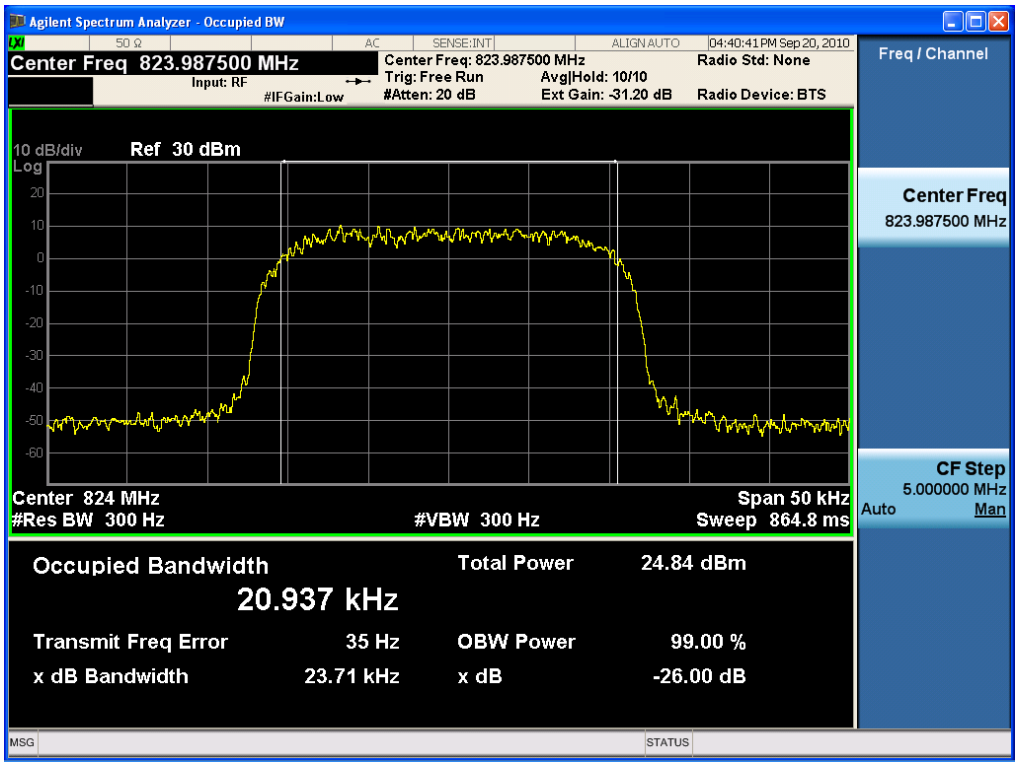

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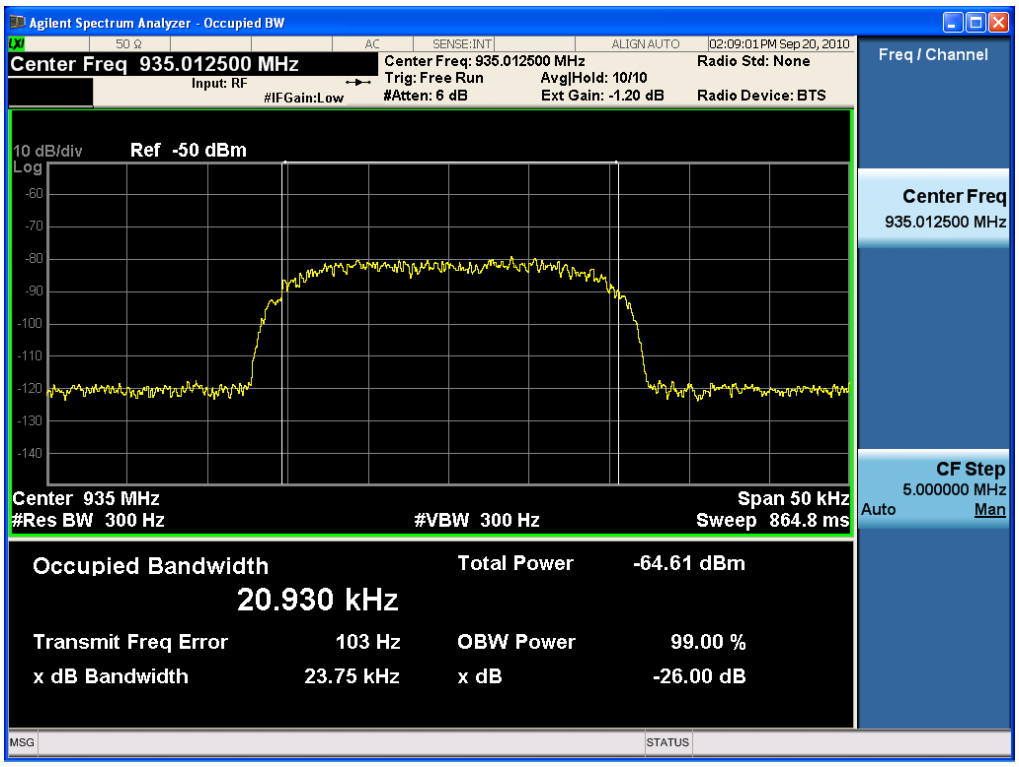

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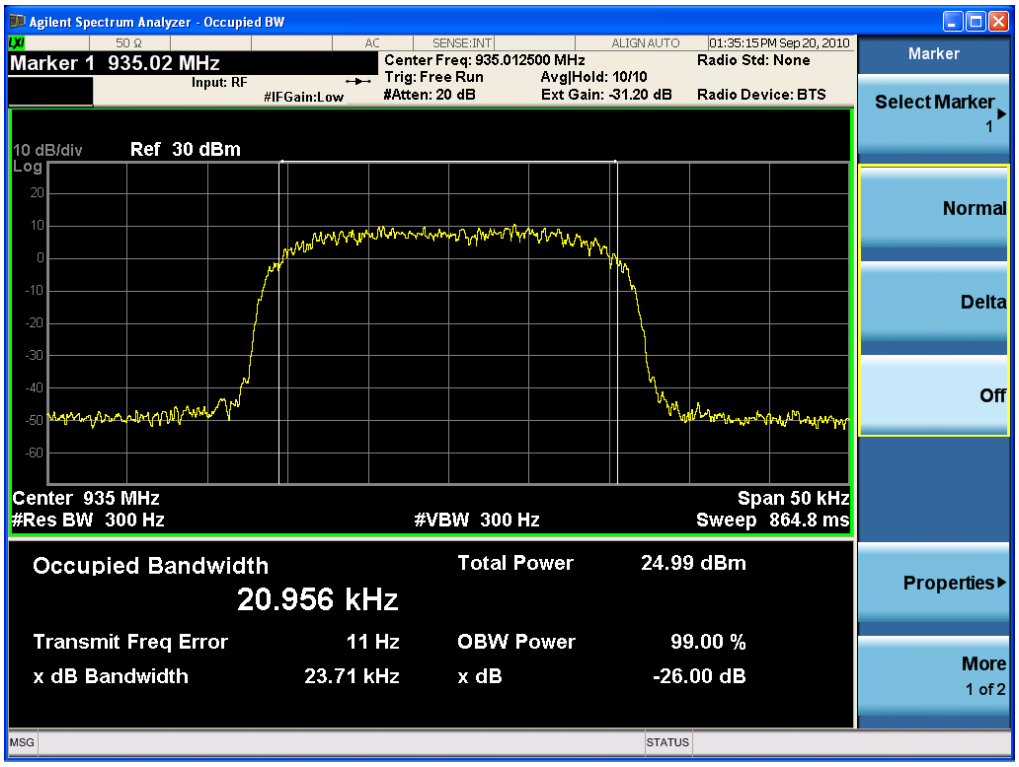

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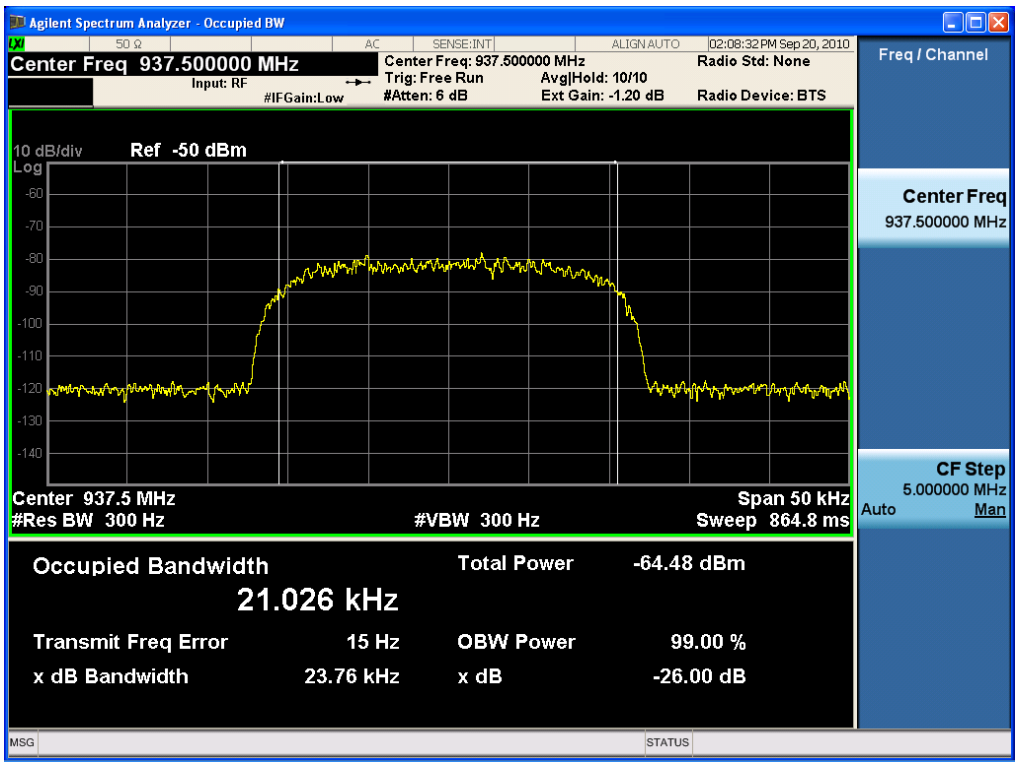

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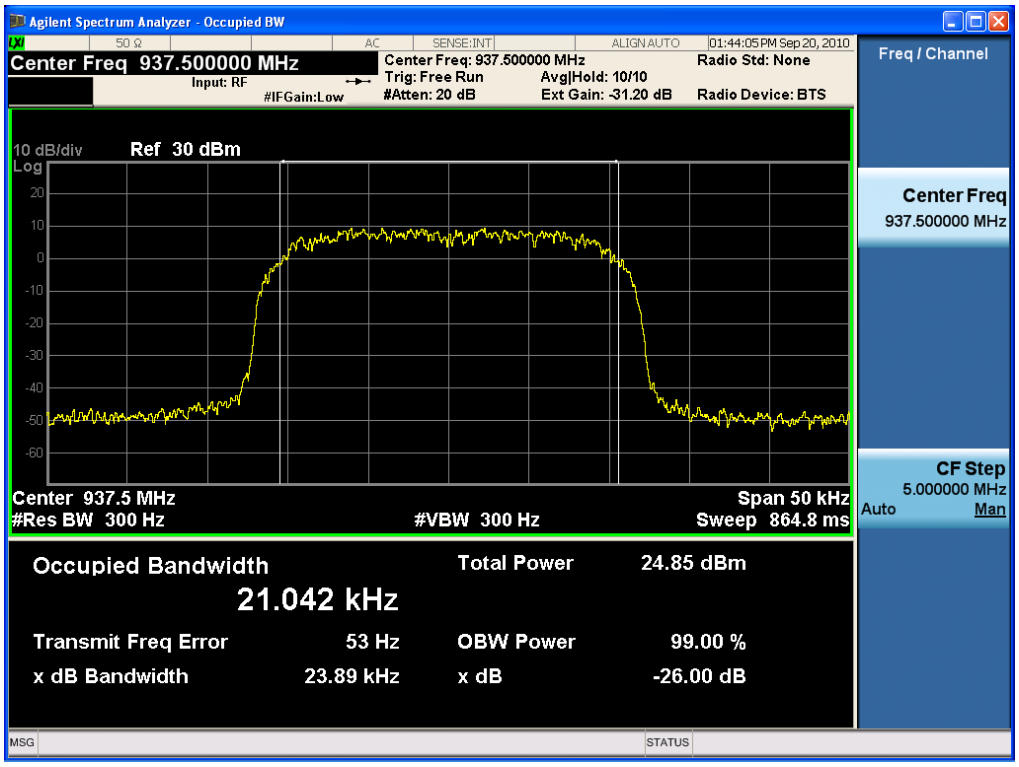

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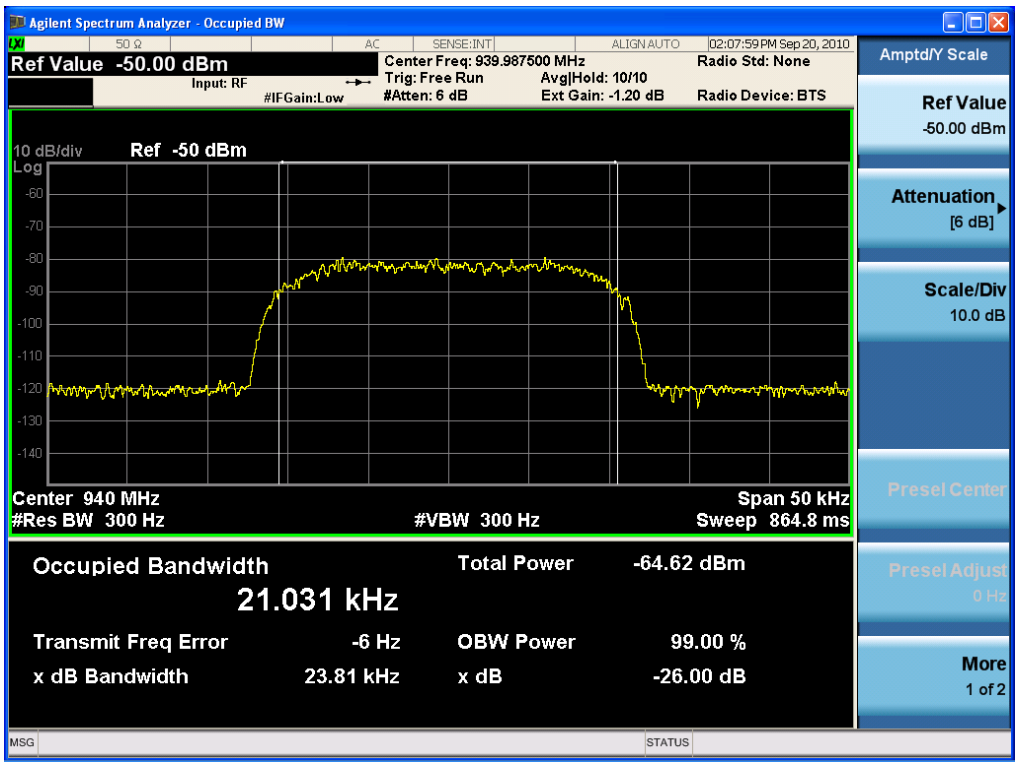

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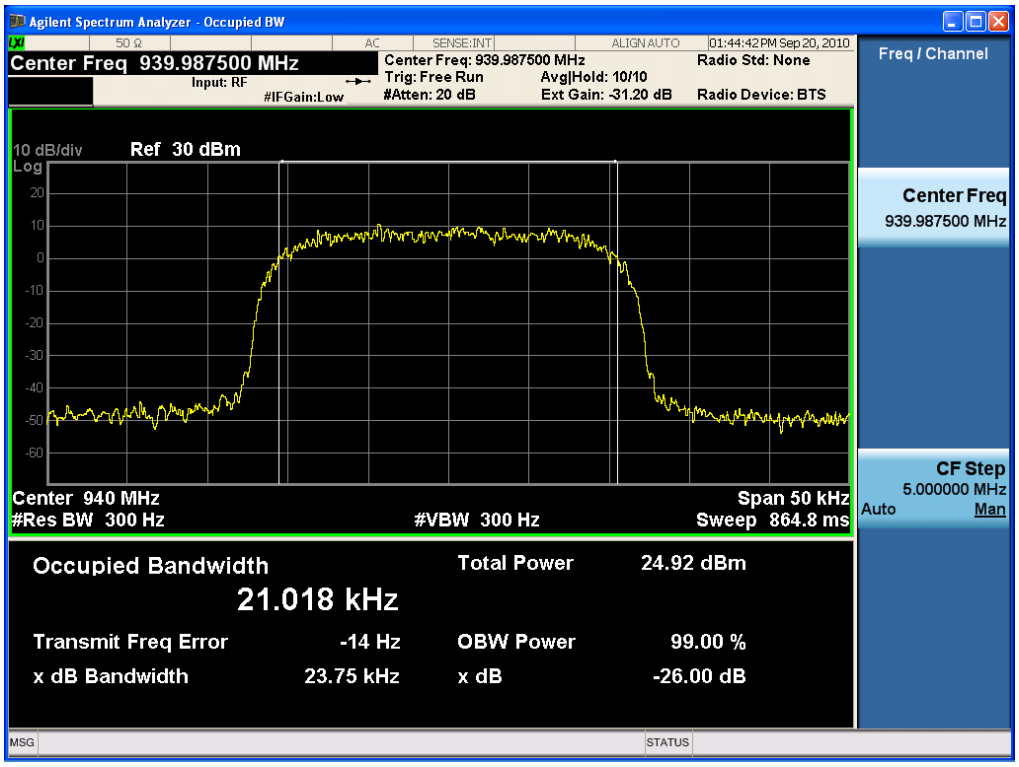

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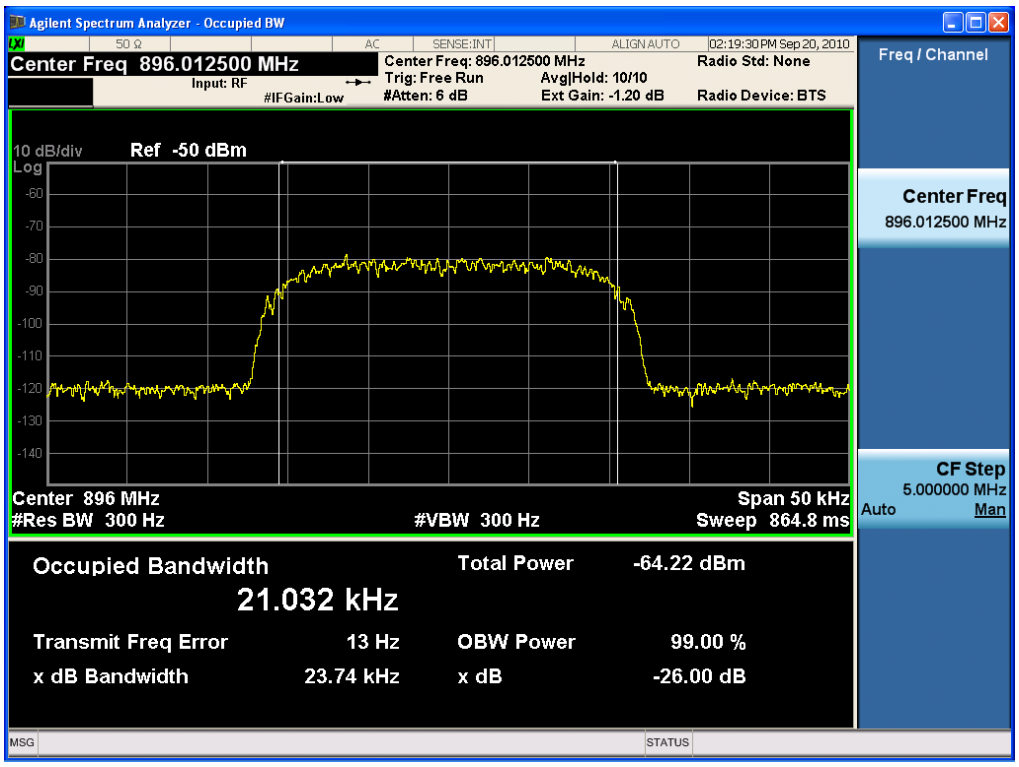

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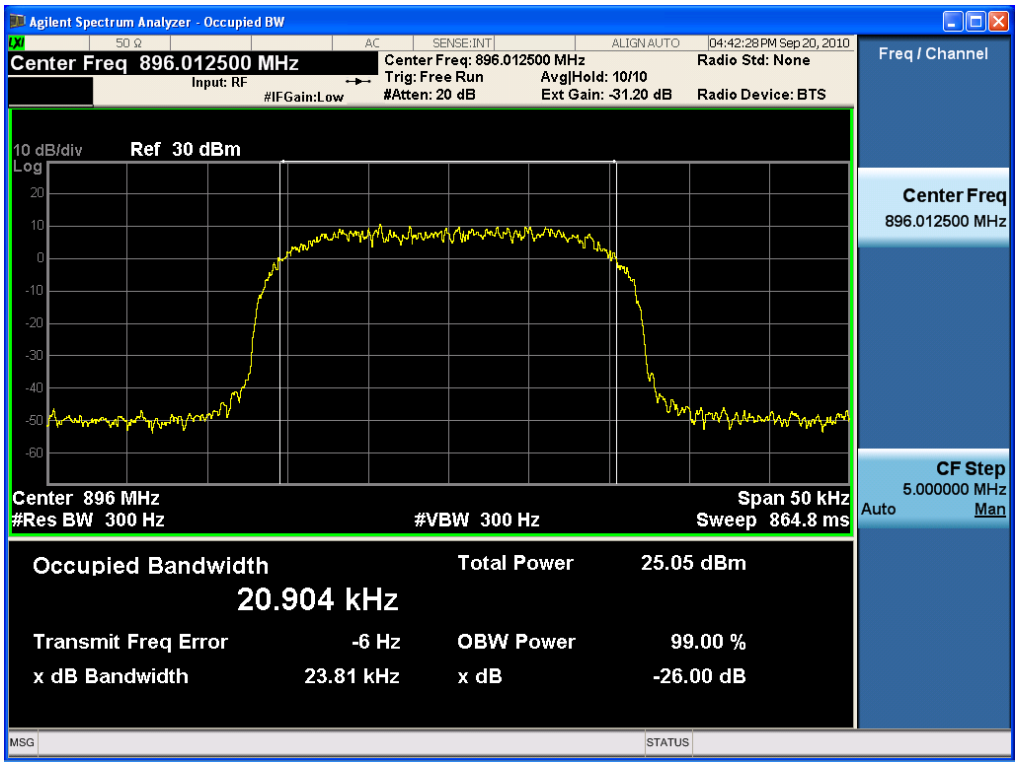

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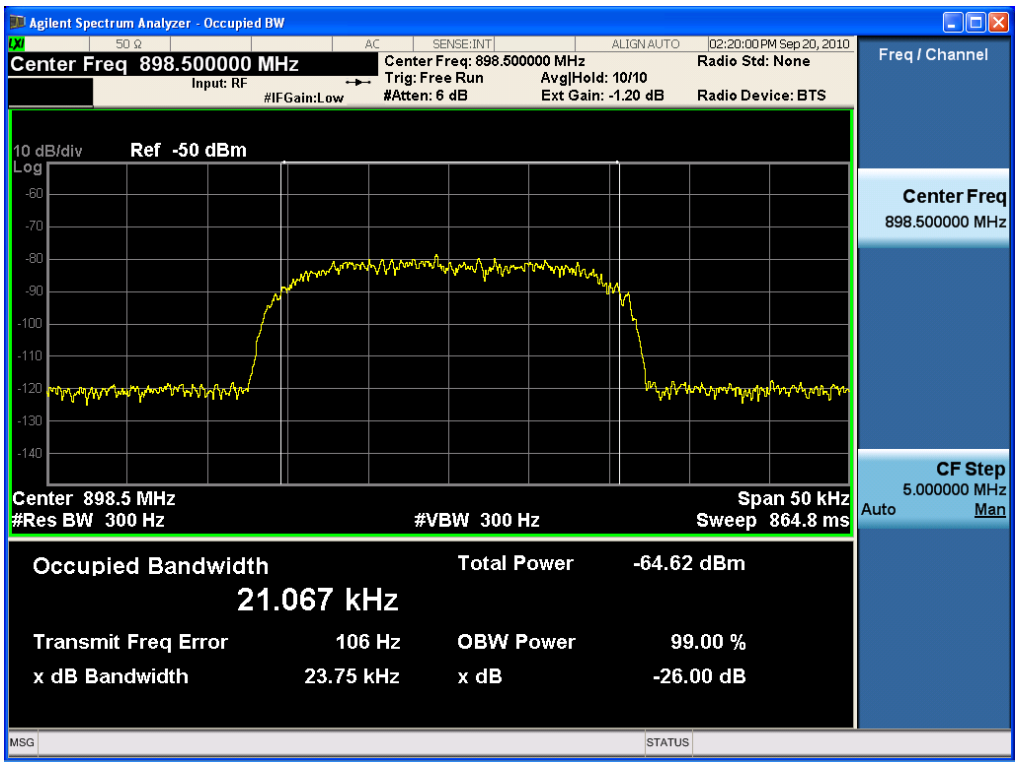

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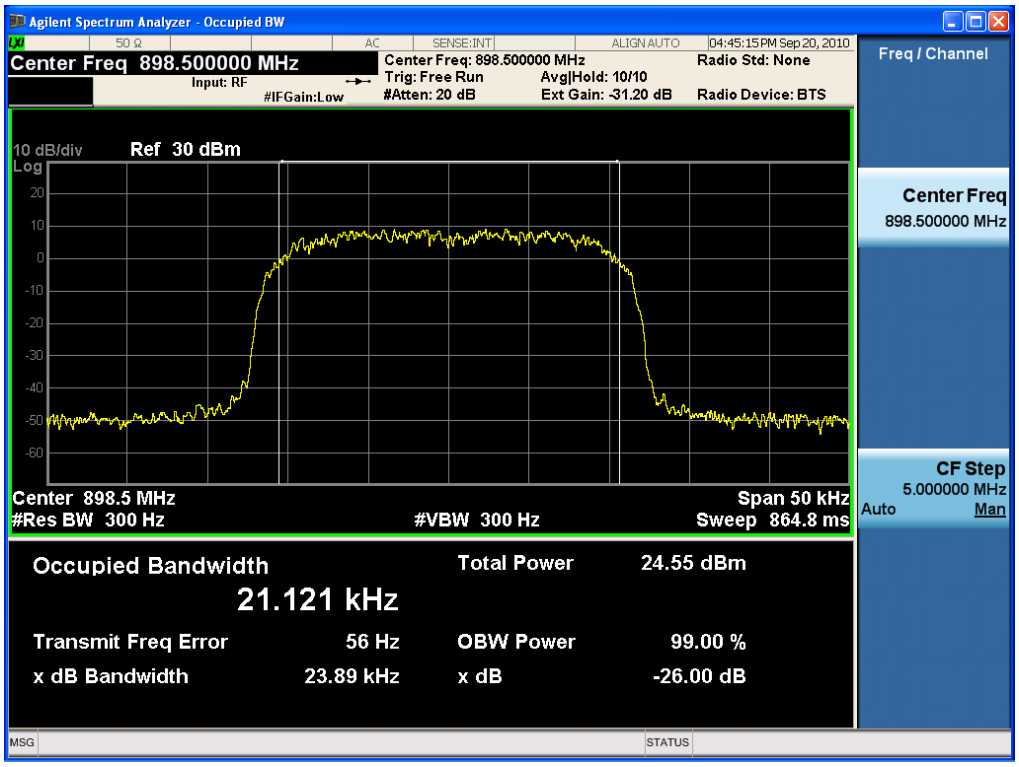

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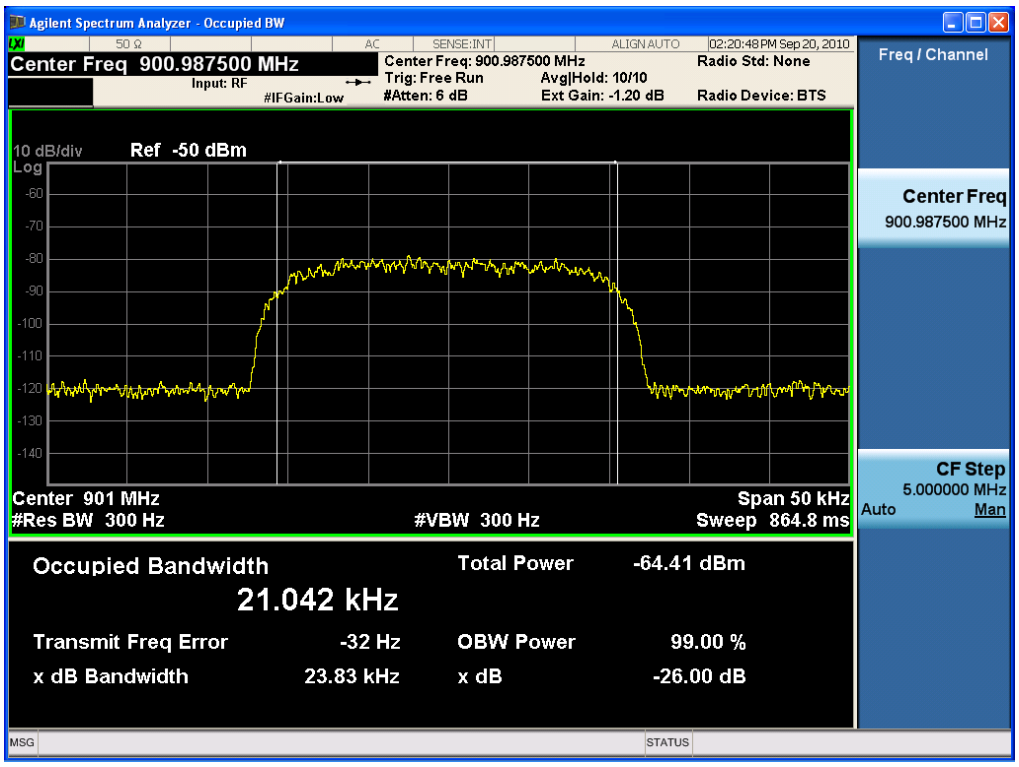

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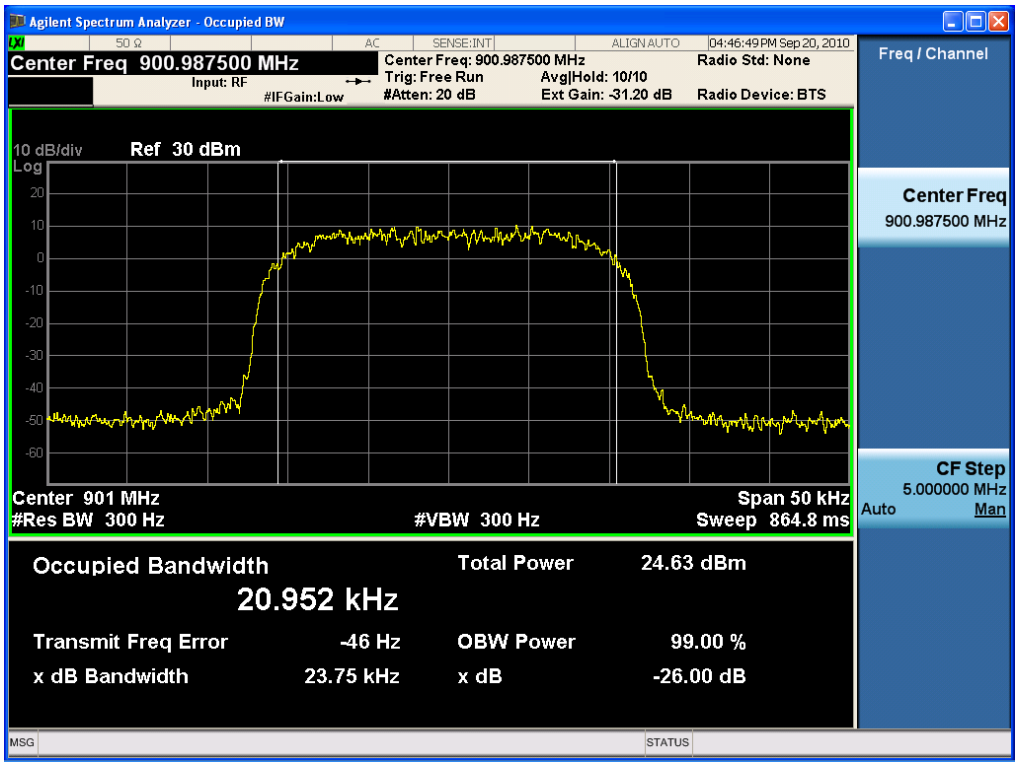
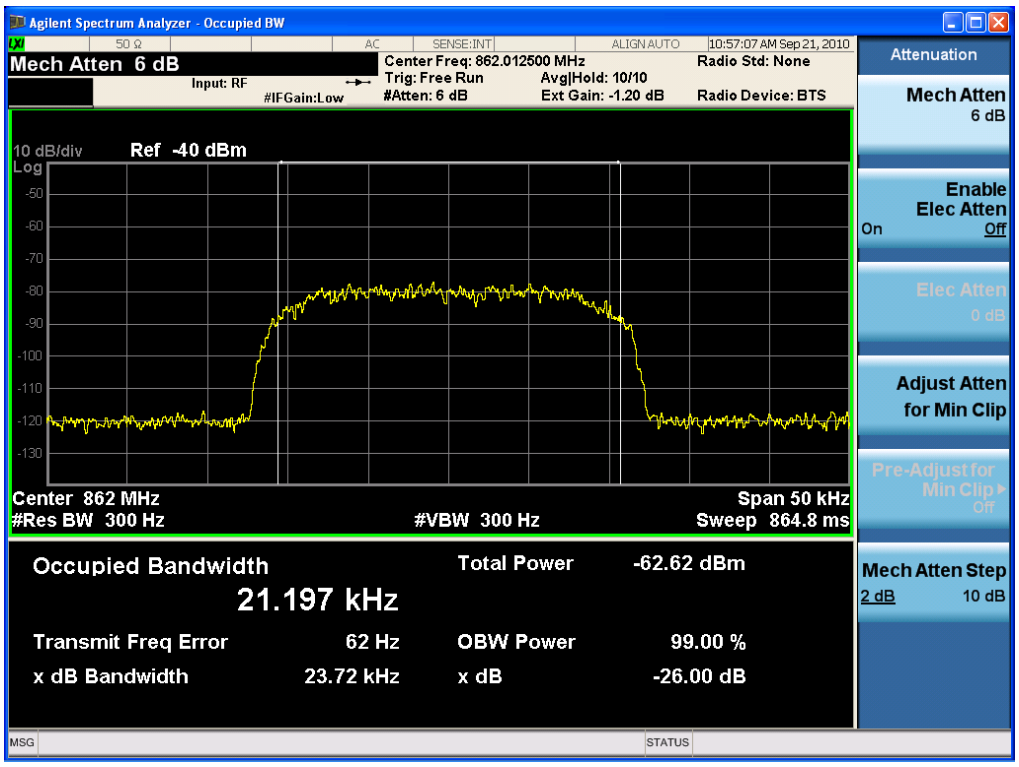
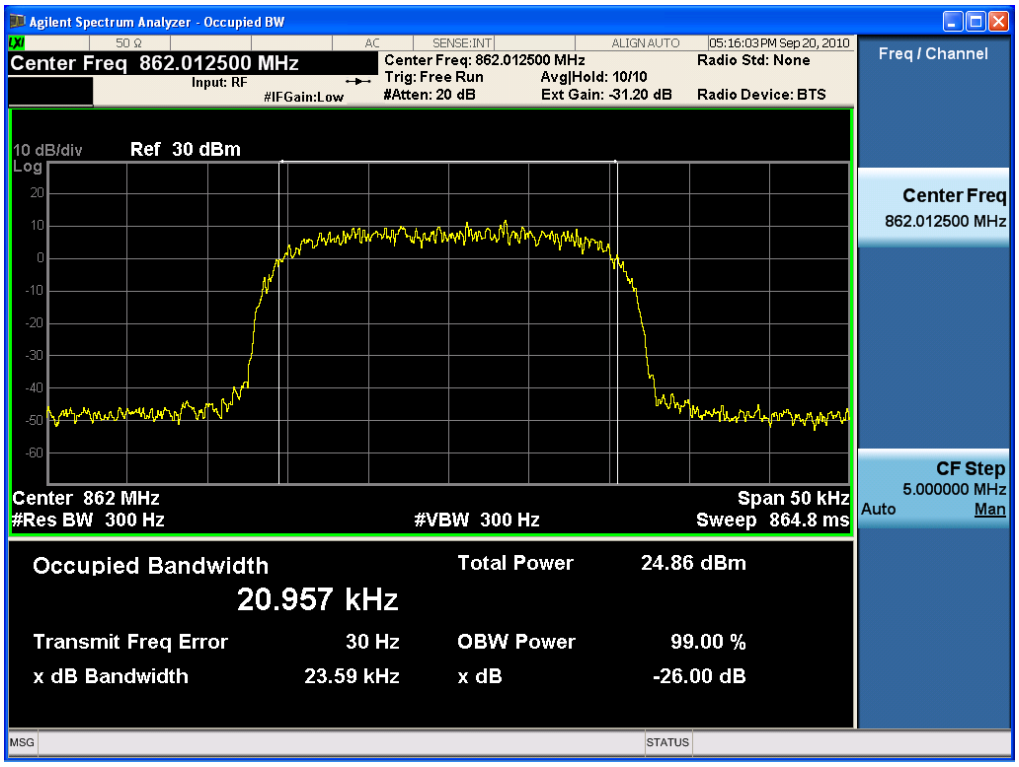


iDEN900 Uplink High CH Output

Plots of Occupied Bandwidth-7 MHz



iDEN800 Downlink Low CH Input



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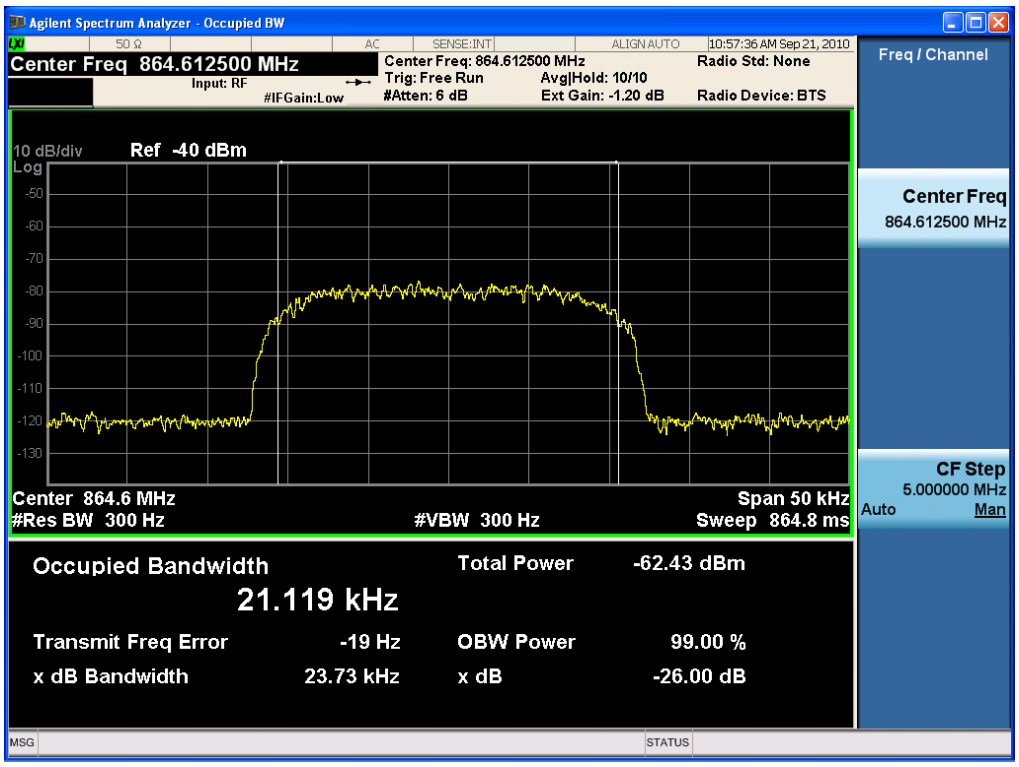

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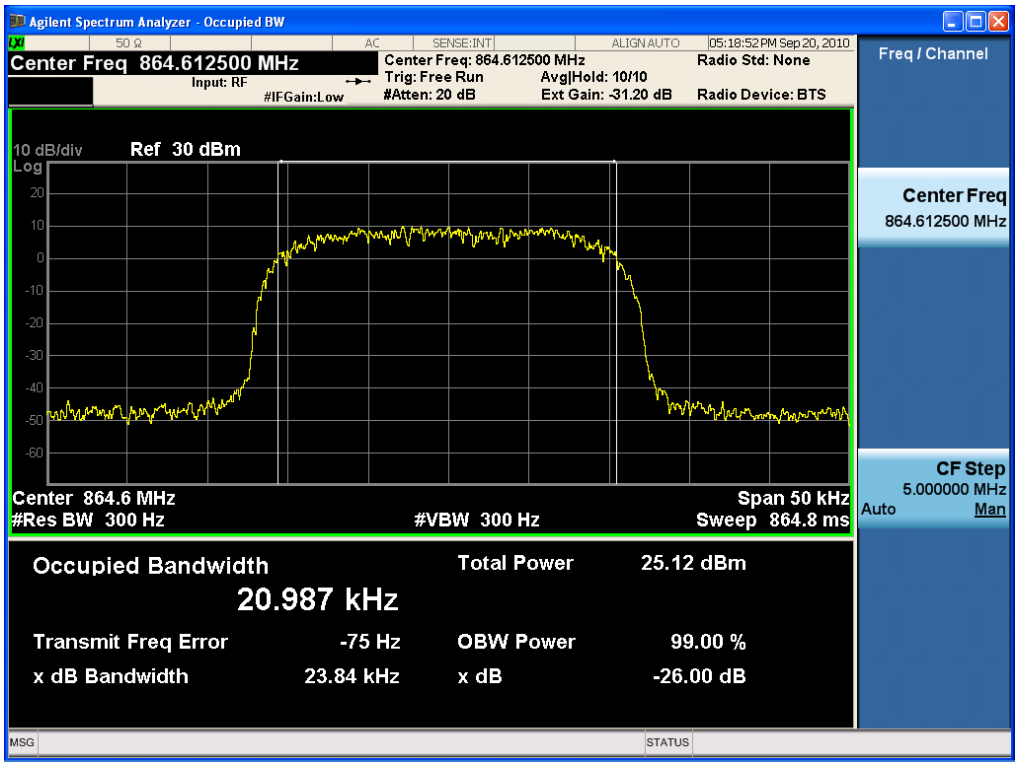

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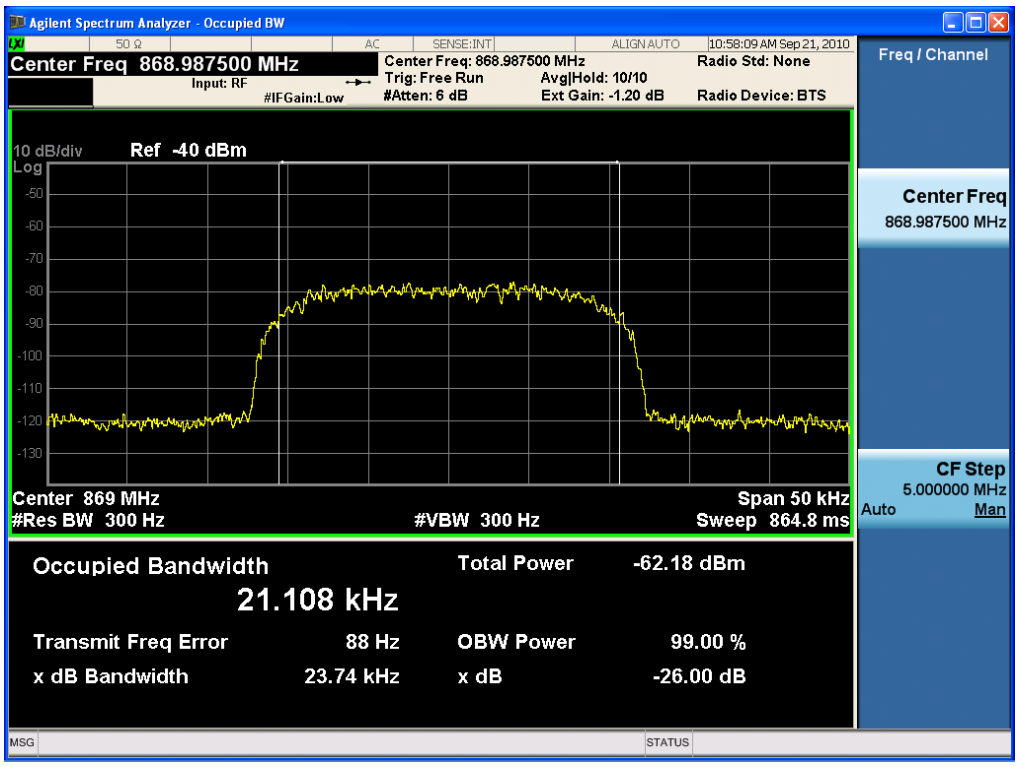

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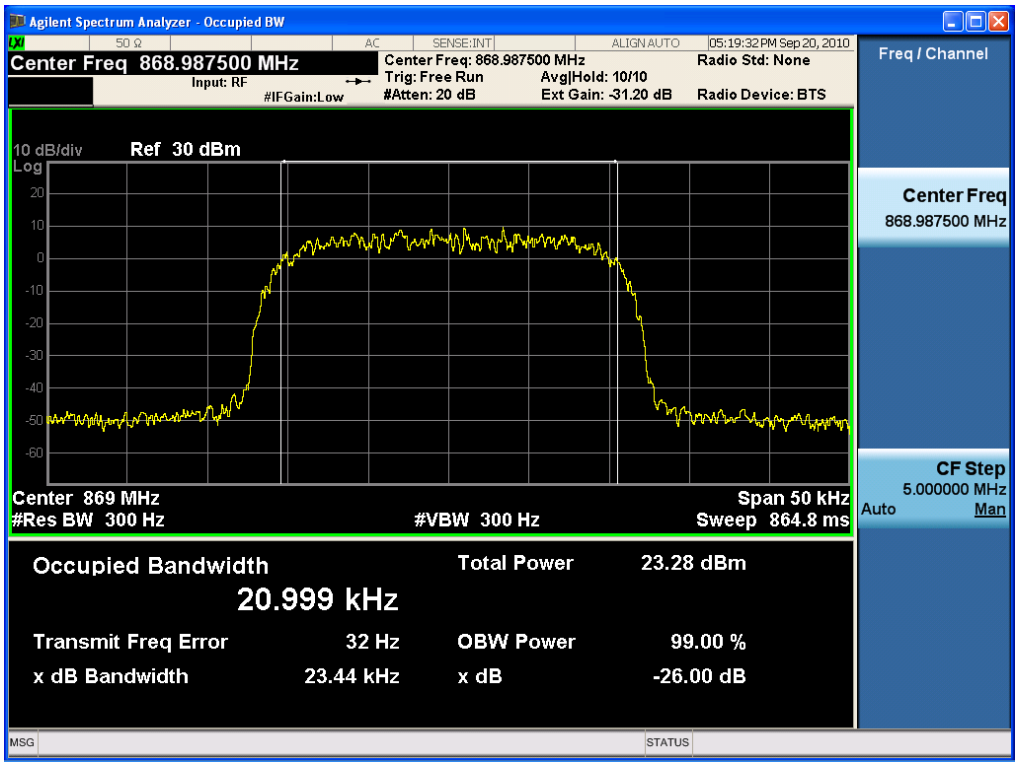

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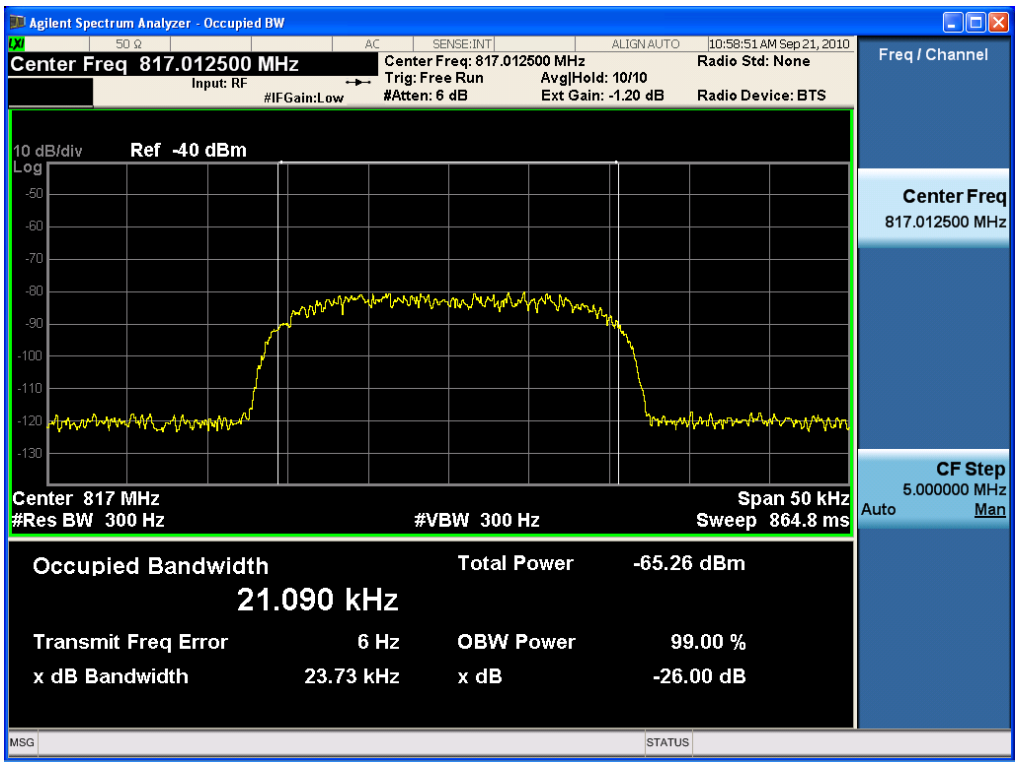

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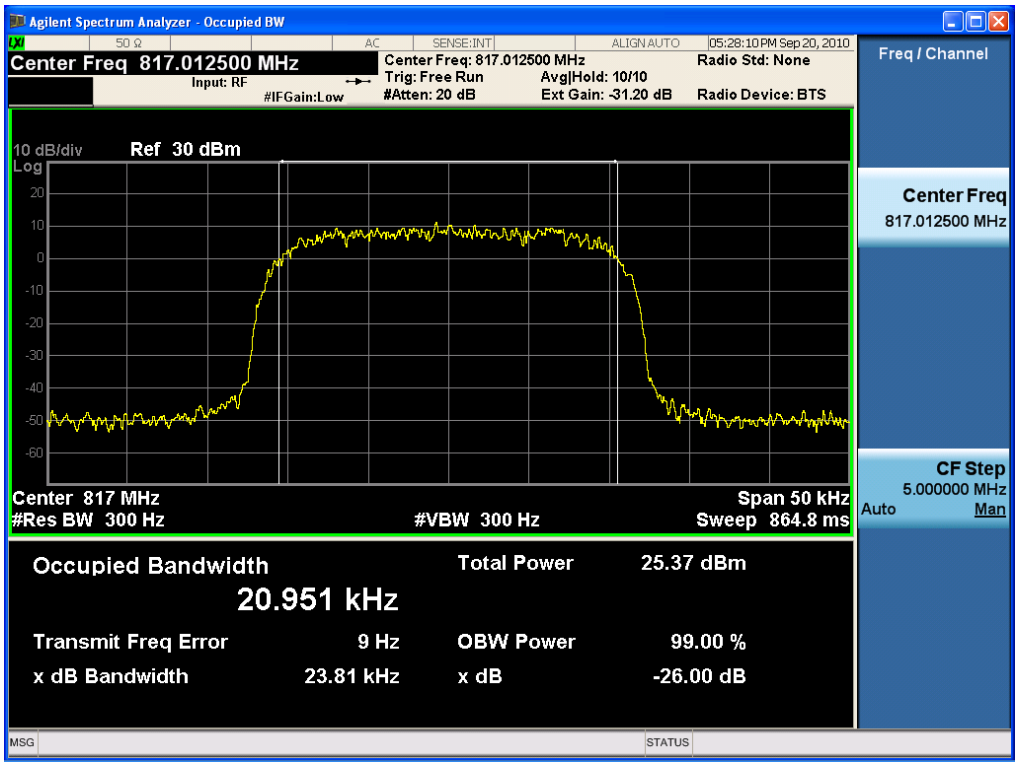

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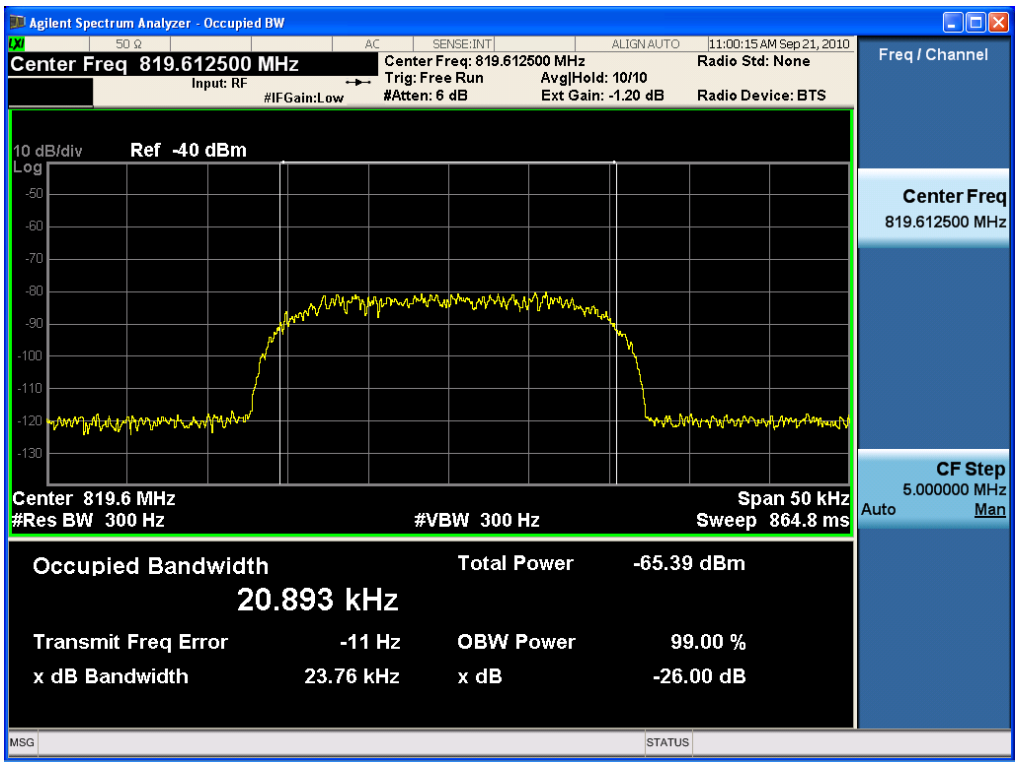

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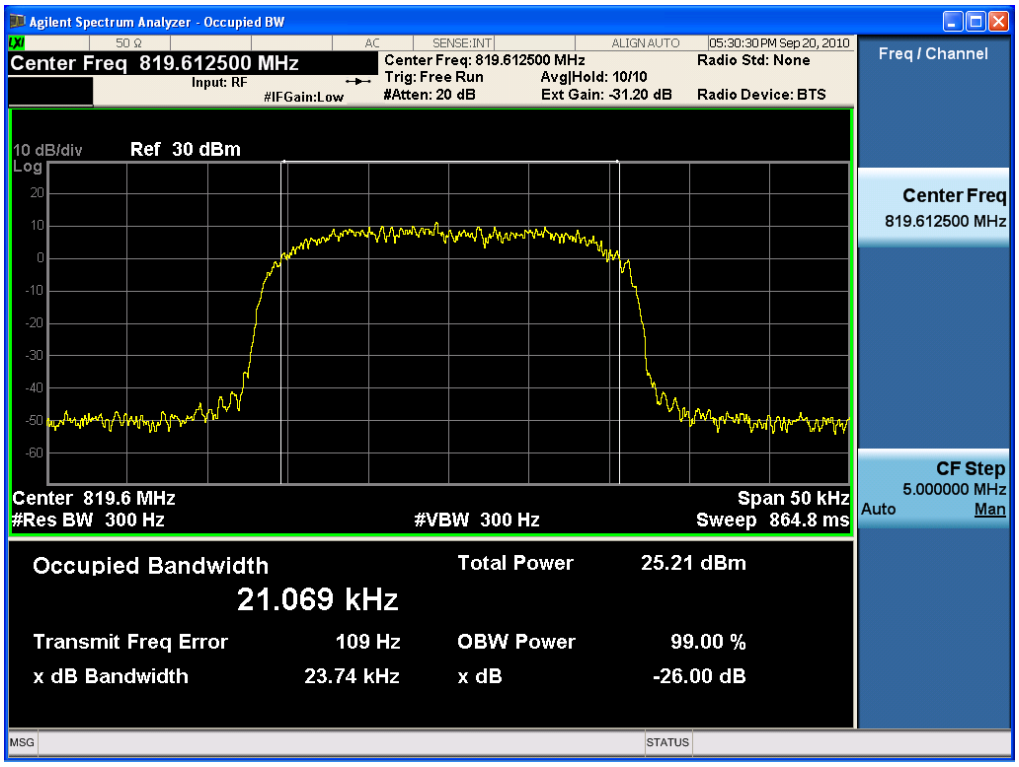

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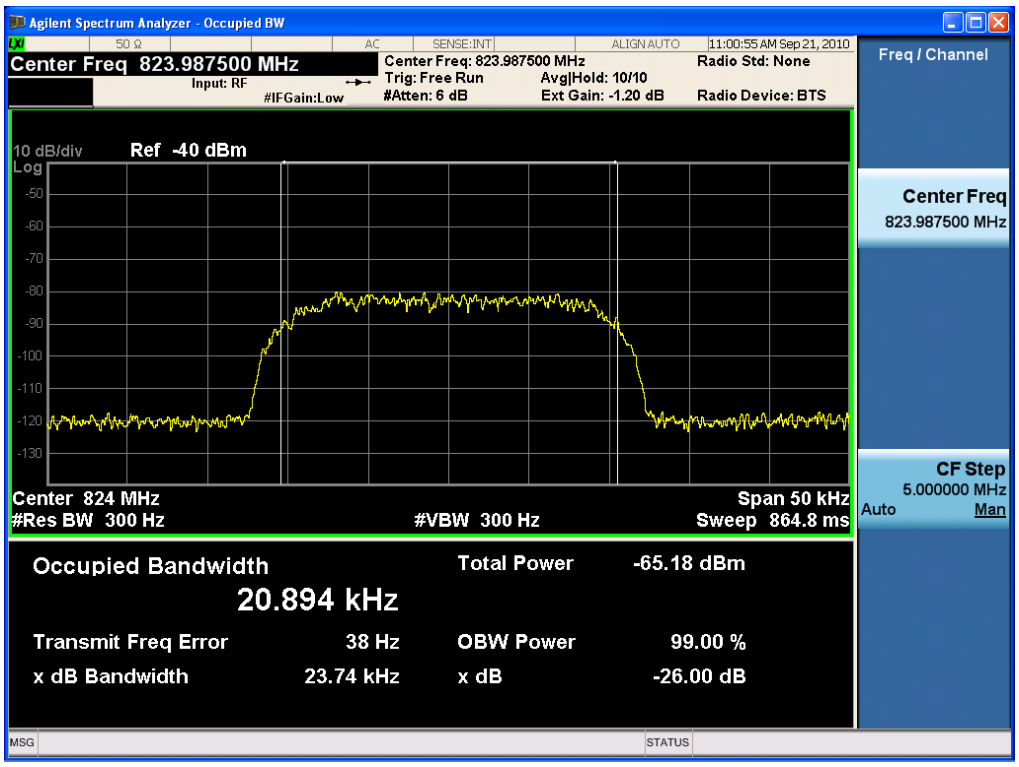

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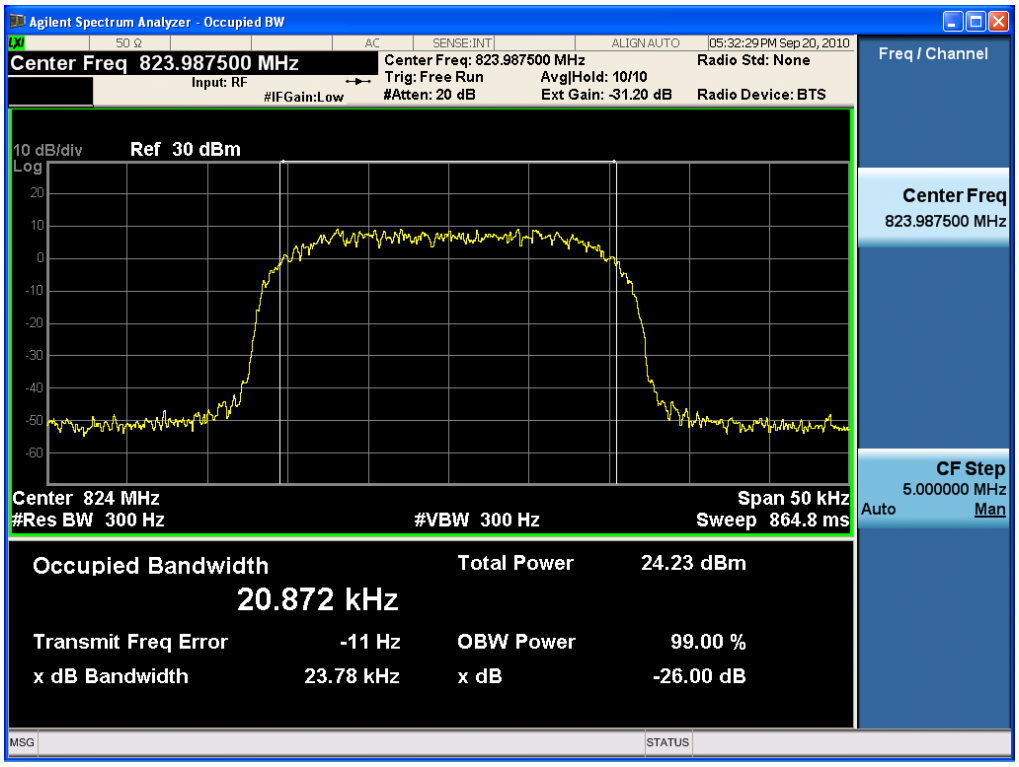

iDEN800 Uplink High CH Output

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.

§ 24.238 Emission limitations for Broadband PCS equipment:

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

§ 24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

§ 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.