



## 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: GS Instruments Co., Ltd.**

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

**Date of Issue : May 20,2011**

**Test Report No.: HCTR1105FR11**

**Test Site: HCT CO., LTD.**

**FCC ID:**

**U88-SC-8930AMP**

**APPLICANT:**

**GS Instruments Co., Ltd.**

**EUT Type:**

**In-Building RF Repeater**

**Model:**

**GMS-8930AMP/DFU-SPR**

**Frequency Ranges:**

**Uplink:** 806 MHz – 824 MHz (iDEN800-18 MHz)  
817 MHz – 824 MHz (iDEN800-7 MHz)  
896 MHz – 901 MHz (iDEN900-5 MHz)  
**Downlink:** 851 MHz – 869 MHz (iDEN800-18 MHz)  
862 MHz – 869 MHz (iDEN800-7 MHz)  
935 MHz – 940 MHz (iDEN900-5 MHz)

**RF Output Power:**

**Uplink:** 27.0 dBm (iDEN800 / iDEN900)  
**Downlink:** 27.0 dBm (iDEN800 / iDEN900)

**FCC Rules Part(s):**

**CFR 47 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 90 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

HCT CO., LTD.

◁◁◁

## CONTENTS

1. CLIENT INFORMATION .....	3
2. TEST SPECIFICATIONS .....	4
3. STANDARDS ENVIRONMENTAL TEST CONDITIONS .....	5
4. TEST EQUIPMENT .....	5
5. RF OUTPUT POWER.....	6
6. OCCUPIED BANDWIDTH .....	18
7. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL .....	39
8. FIELD STRENGTH OF SPURIOUS RADIATION.....	83
9. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS.....	86
10. RF EXPOSURE STATEMENT.....	89

## 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: In-Building RF Repeater
- FCC ID: U88-SC-8930AMP
- Frequency Ranges:
- |           |                                    |
|-----------|------------------------------------|
| Uplink:   | 806 MHz – 824 MHz (iDEN800-18 MHz) |
|           | 817 MHz – 824 MHz (iDEN800-7 MHz)  |
|           | 896 MHz – 901 MHz (iDEN900-5 MHz)  |
| Downlink: | 851 MHz – 869 MHz (iDEN800-18 MHz) |
|           | 862 MHz – 869 MHz (iDEN800-7 MHz)  |
|           | 935 MHz – 940 MHz (iDEN900-5 MHz)  |
- RF Output Power:
- |           |                              |
|-----------|------------------------------|
| Uplink:   | 27.0 dBm (iDEN800 / iDEN900) |
| Downlink: | 27.0 dBm (iDEN800 / iDEN900) |
- FCC Rules Part(s): CFR Title 47 Part90
- Emission Designators: 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 90

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

### 3. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15 °C to + 35 °C
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	11/11/2011	MY42082646
Agilent	E4416A /Power Meter	Annual	01/04/2012	GB41291412
Agilent	E9327A/ Power Sensor	Annual	07/23/2011	MY4442009
Korea Eng	KR-1005L/ Temperature and Humidity Chamber	Annual	12/28/2011	KRAC05063-3CH
Agilent	N9020A /Signal Analyzer	Annual	03/03/2012	US46220219
WEINSCHL	67-30-33/ATTENUATOR	Annual	12/29/2011	BR0530
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	05/20/2011	990893
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	04/13/2012	147
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	09/23/2011	296
Schwarzbeck	VULB 9168/TRILOG Antenna	Biennial	02/09/2013	9168-200
Schwarzbeck	VULB 9160/TRILOG Antenna	Biennial	07/15/2012	9160-3150

## 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.

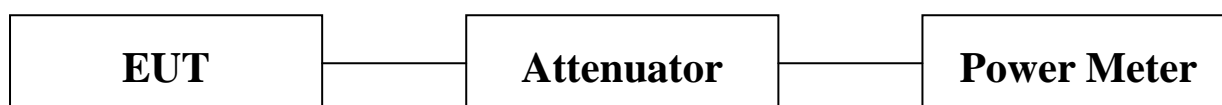
§ 2.1046 (c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output 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.

§ 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	-24.5

**(Downlink)**

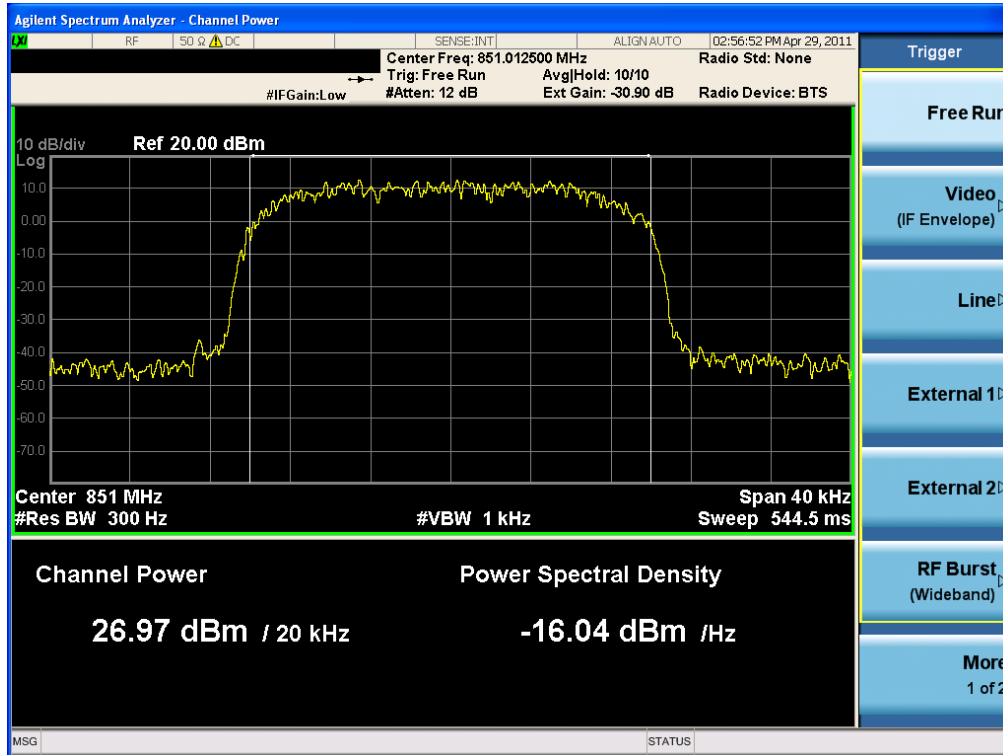
iDEN800 DownLink-18 MHz		
Carrier Channel	Frequency (MHz)	Measured Average Output Power dBm (mW)
Low	851.0125	26.97(497.7371)
Mid	860.0000	26.95(495.4502)
High	868.9875	26.84(483.0588)
iDEN900 DownLink		
Carrier Channel	Frequency (MHz)	Measured Average Output Power dBm (mW)
Low	935.0125	27.02(503.5006)
Mid	937.5000	26.93(493.1738)
High	939.9875	27.07(509.3309)
iDEN800 DownLink-7 MHz		
Carrier Channel	Frequency (MHz)	Measured Average Output Power dBm (mW)
Low	862.0125	26.94(494.3107)
Mid	865.5000	26.94(494.3107)
High	868.9875	26.94(494.3107)

(Uplink)

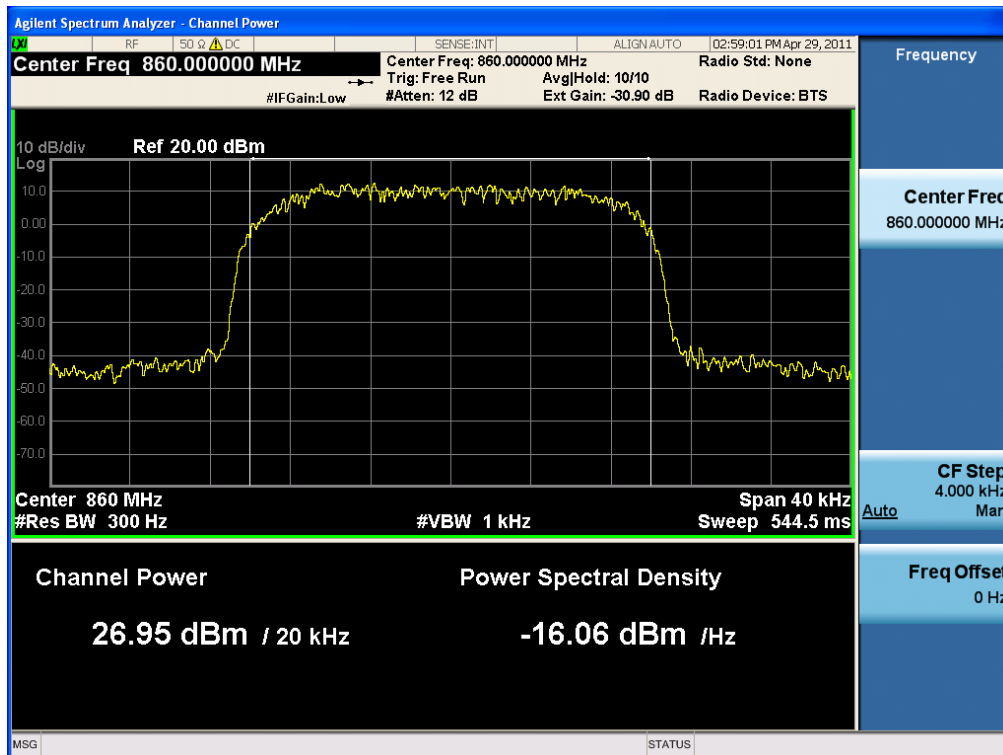
iDEN800 UpLink-18 MHz		
Carrier Channel	Frequency (MHz)	Measured Average Output Power dBm (mW)
Low	806.0125	27.00(501.1872)
Mid	815.0000	26.97(497.7371)
High	823.9875	26.87(486.4072)
iDEN900 UpLink		
Carrier Channel	Frequency (MHz)	Measured Average Output Power dBm (mW)
Low	896.0125	26.85(484.1724)
Mid	898.5000	26.97(497.7371)
High	900.9875	26.92(492.0395)
iDEN800 UpLink-7 MHz		
Carrier Channel	Frequency (MHz)	Measured Average Output Power dBm (mW)
Low	817.0125	26.97(497.7371)
Mid	820.5000	26.87(486.4072)
High	823.9875	26.92(492.0395)



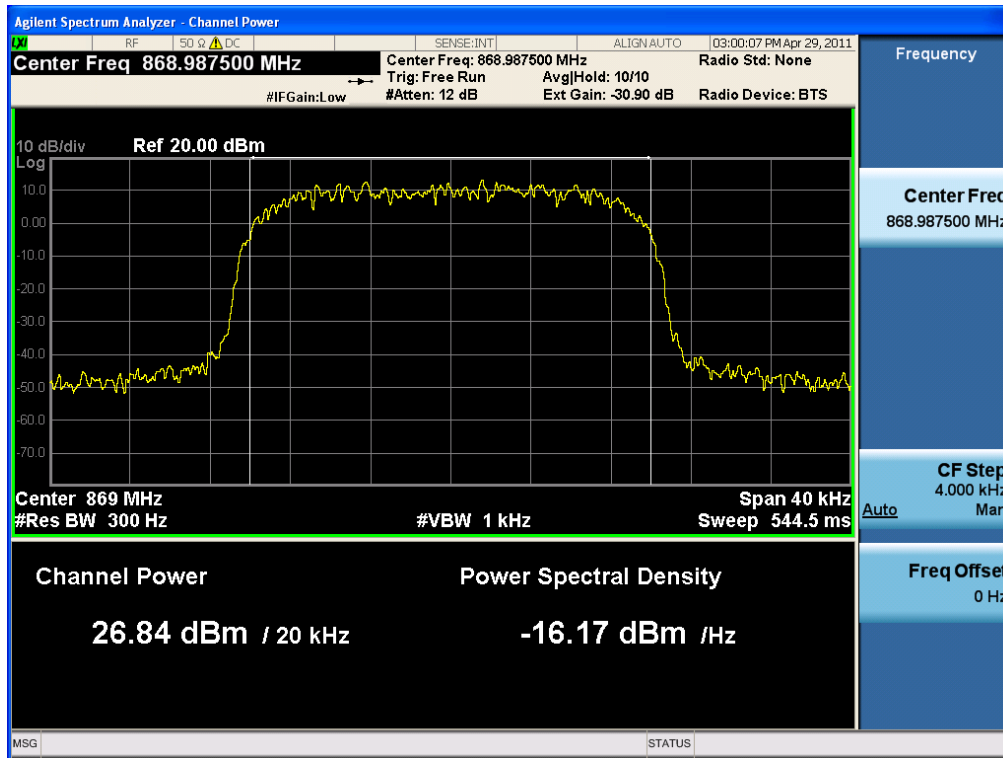
## Plots of RF Output Power-18 MHz



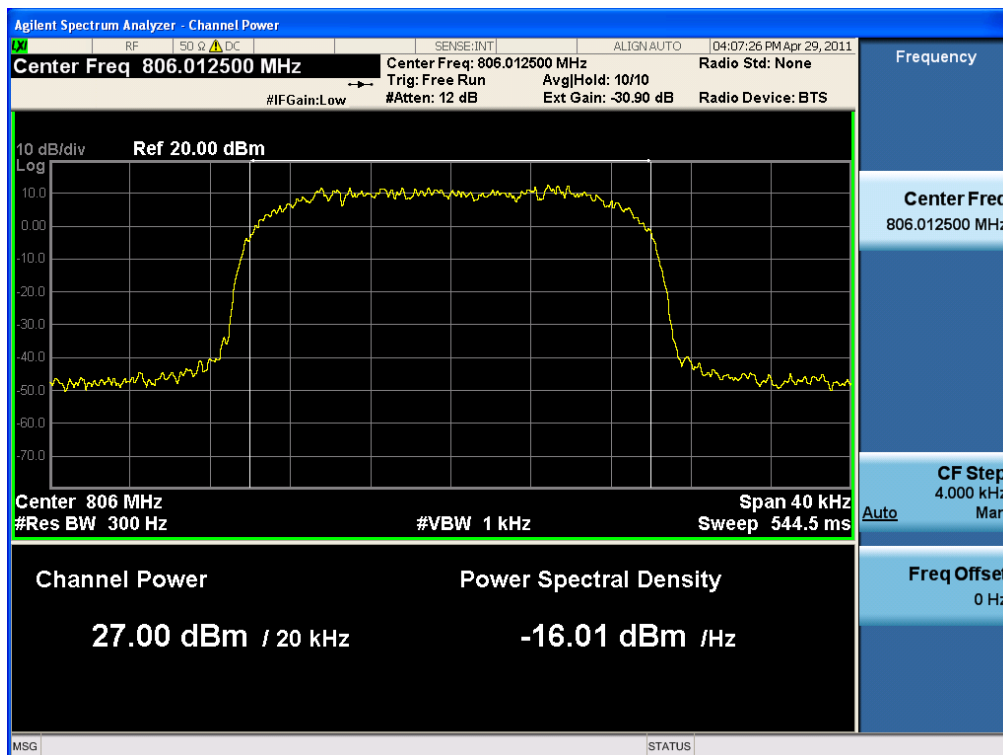
Downlink Low CH (iDEN 800)



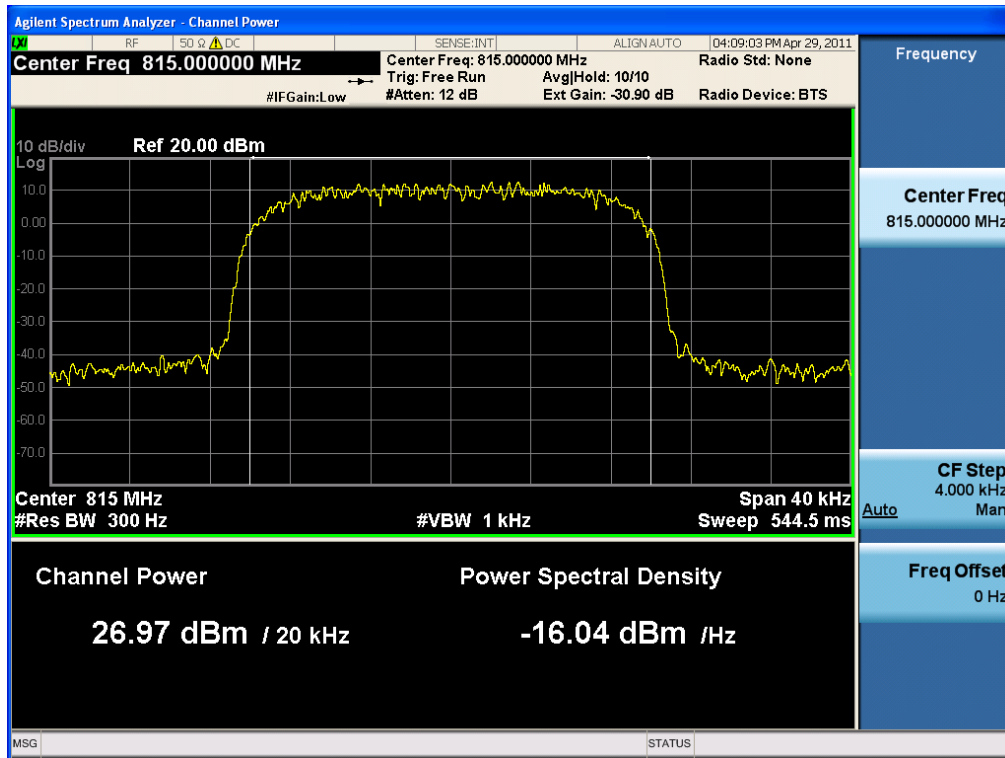
Downlink Middle CH (iDEN 800)



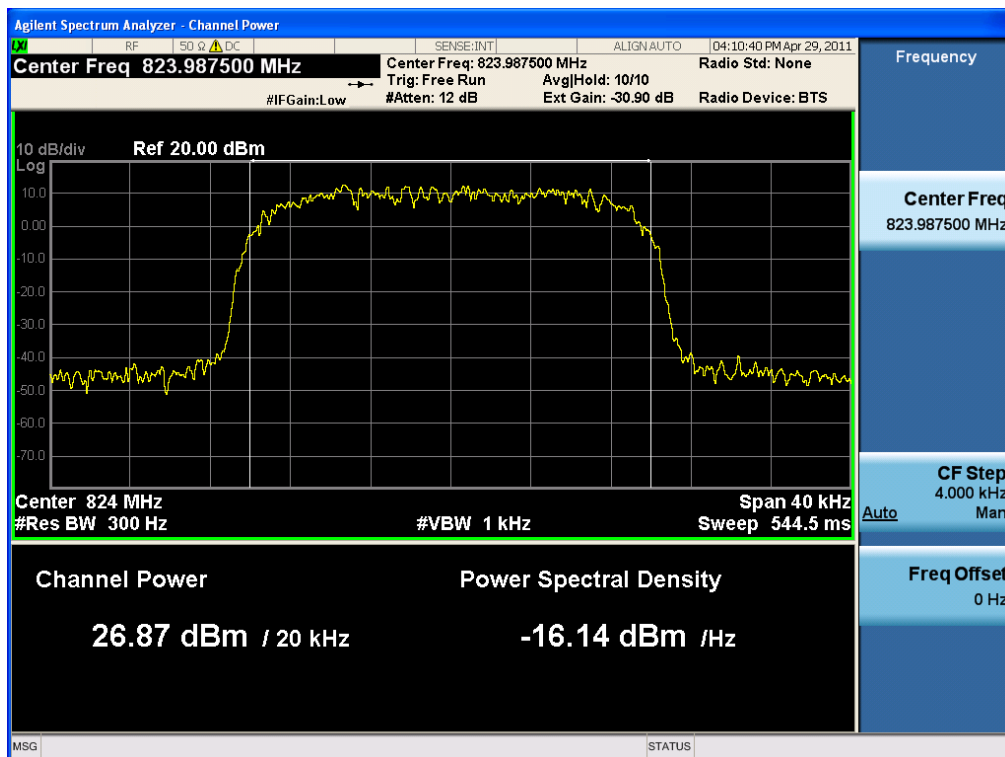
Downlink High CH (iDEN 800)



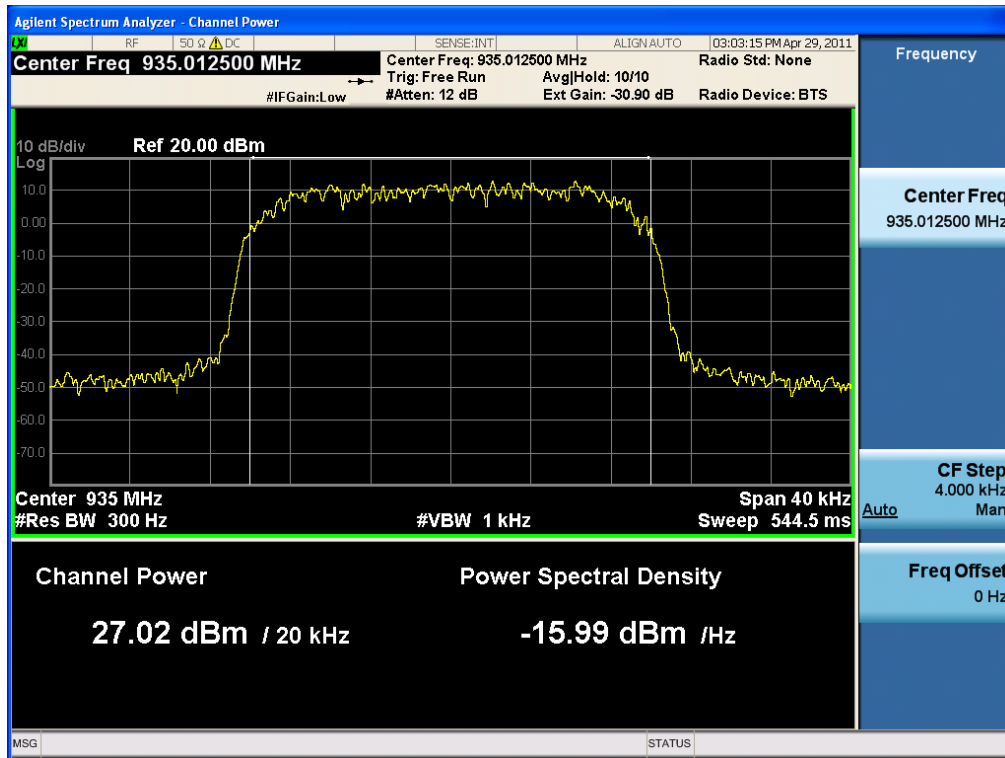
Uplink Low CH (iDEN 800)



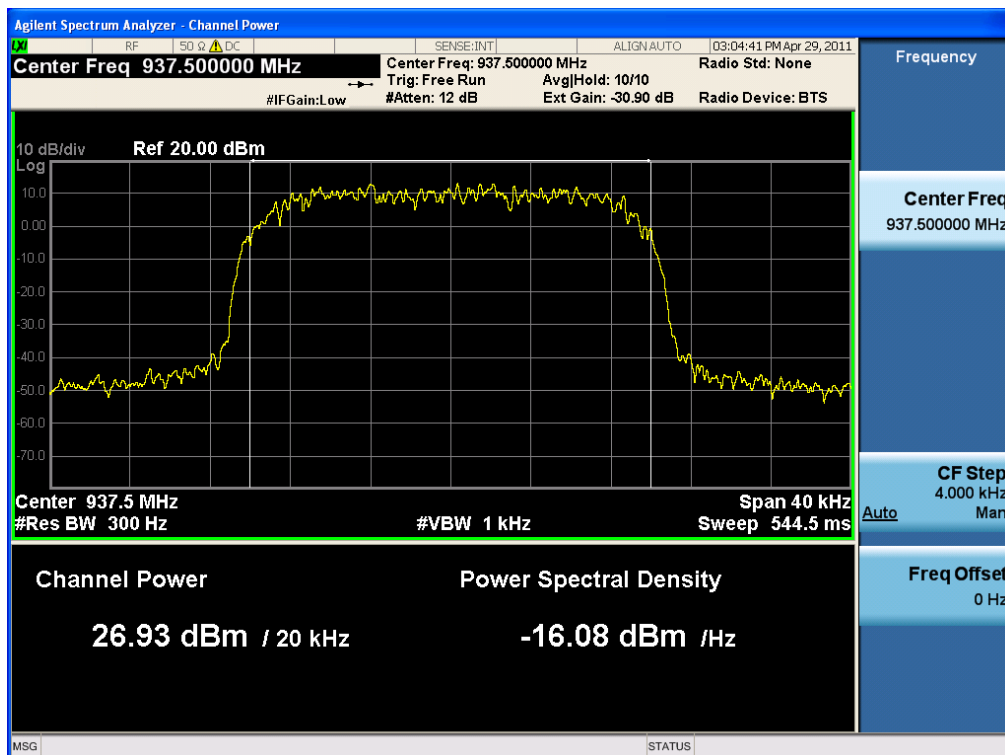
Uplink Middle CH (iDEN 800)



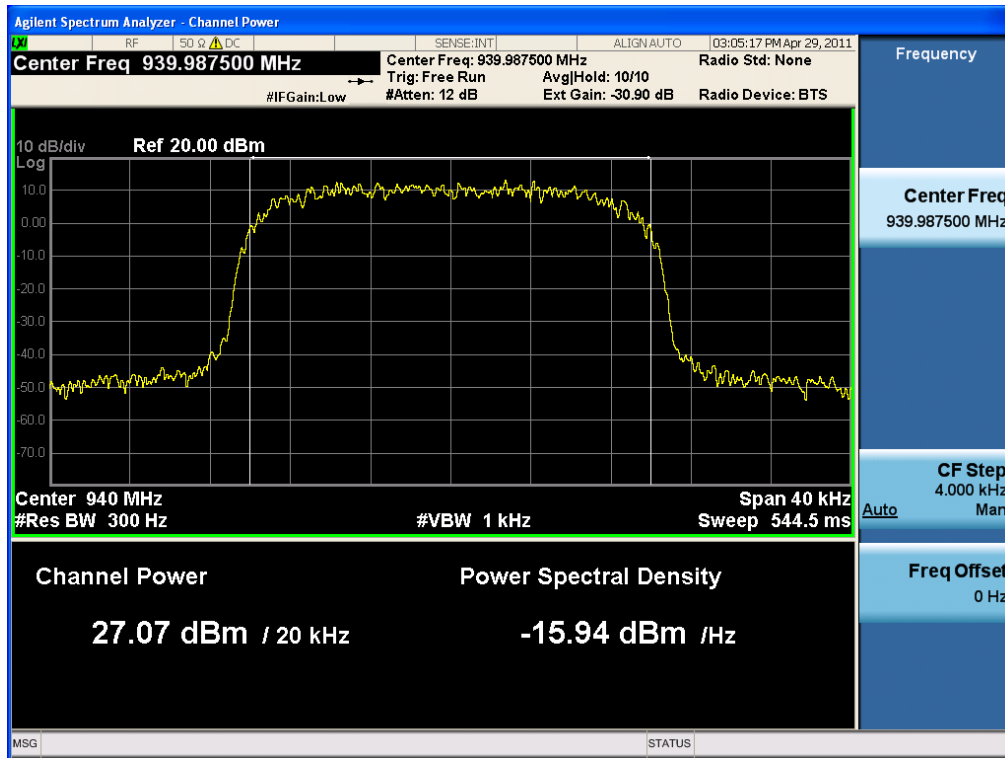
Uplink High CH (iDEN 800)



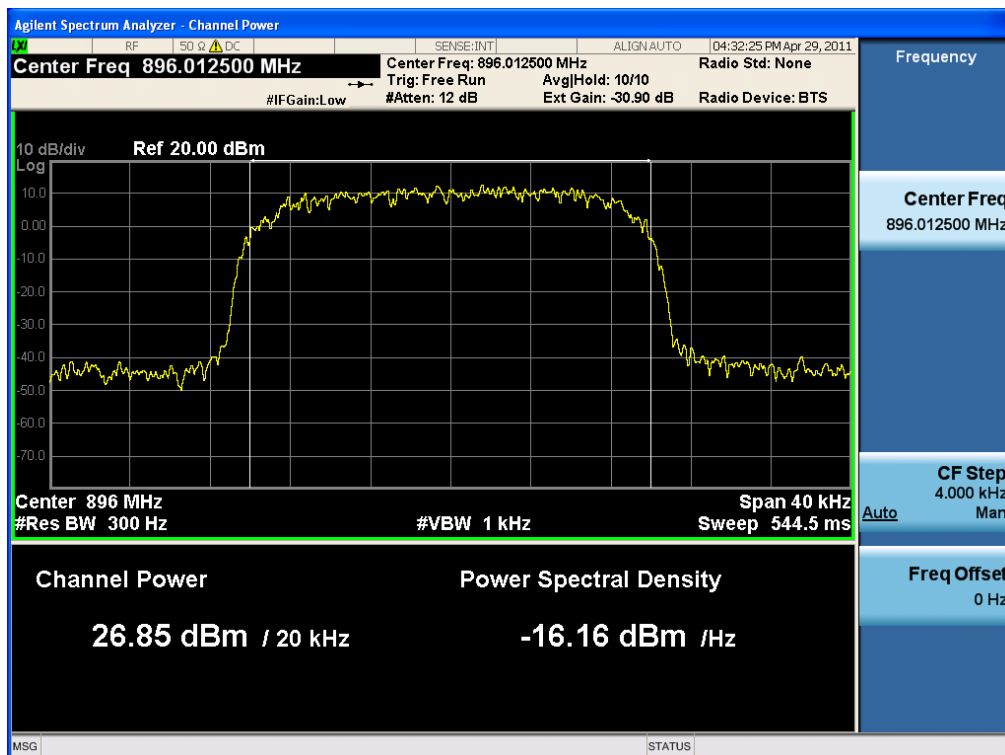
Downlink Low CH (iDEN 900)



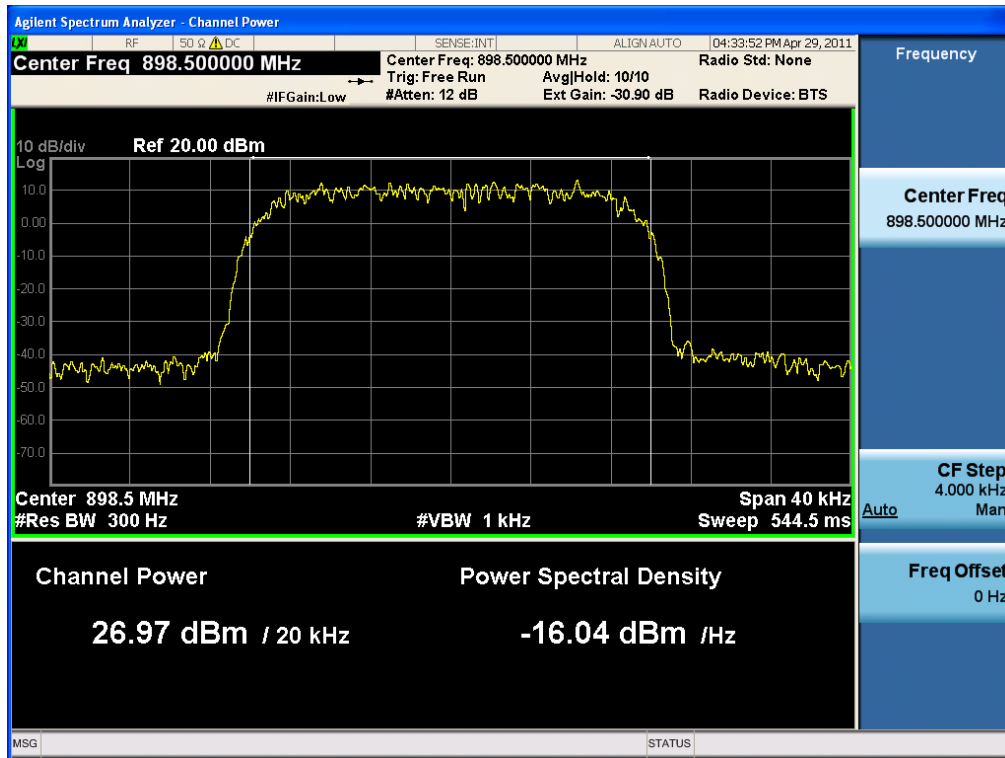
Downlink Middle CH (iDEN 900)



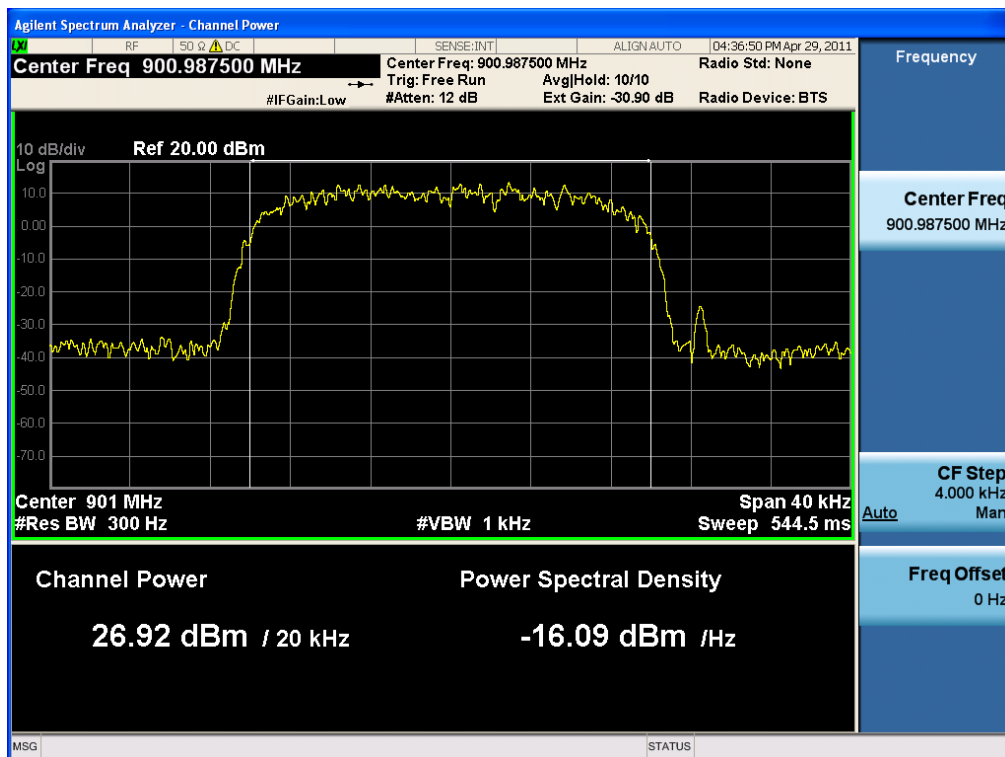
Downlink High CH (iDEN 900)



Uplink Low CH (iDEN 900)

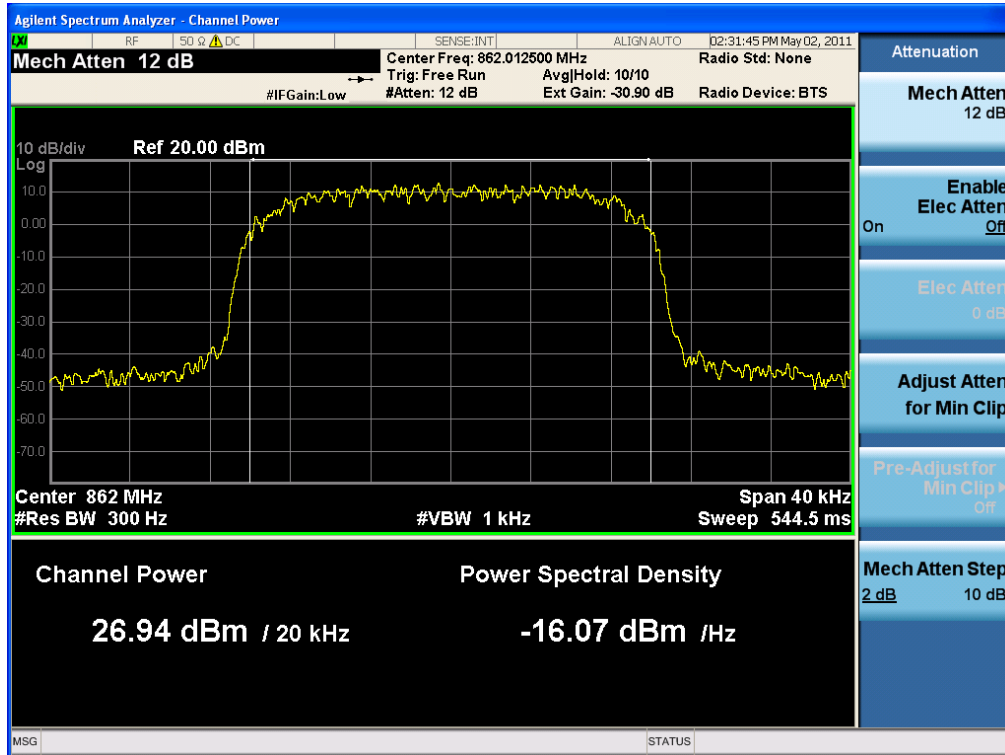


Uplink Middle CH (iDEN 900)

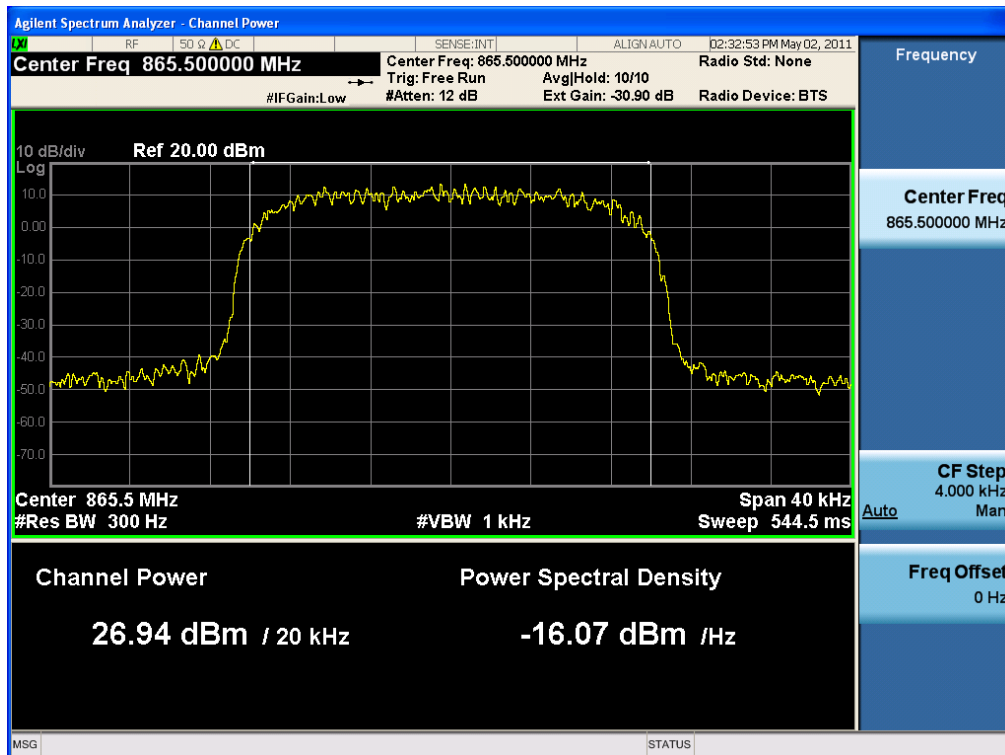


Uplink High CH (iDEN 900)

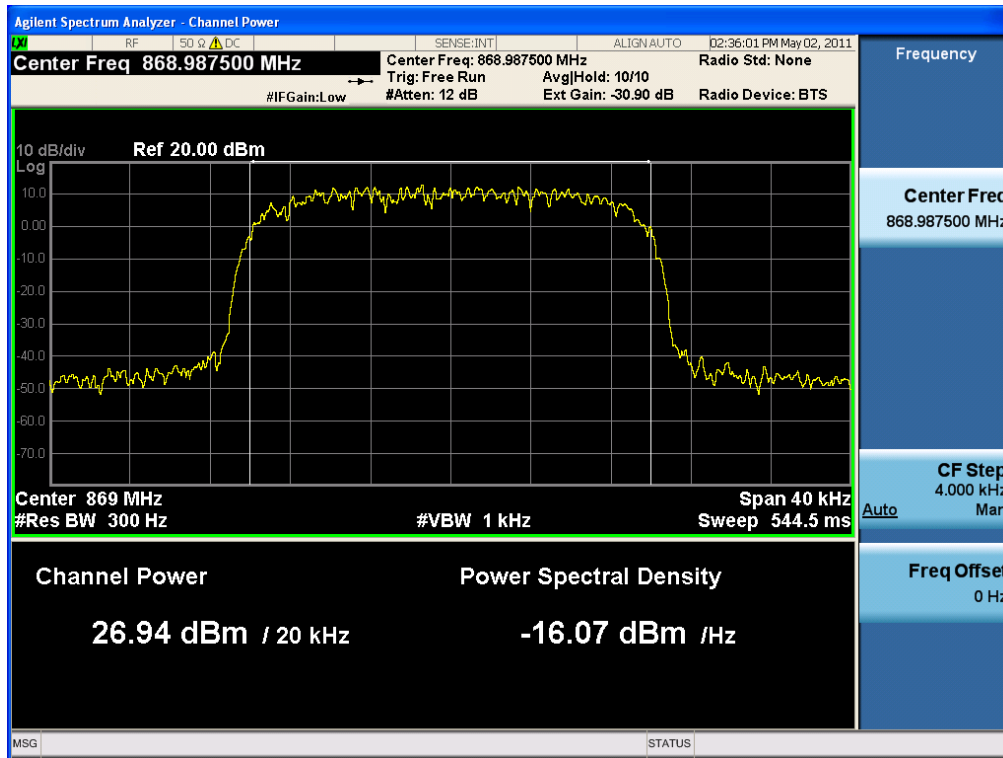
## Plots of RF Output Power-7 MHz



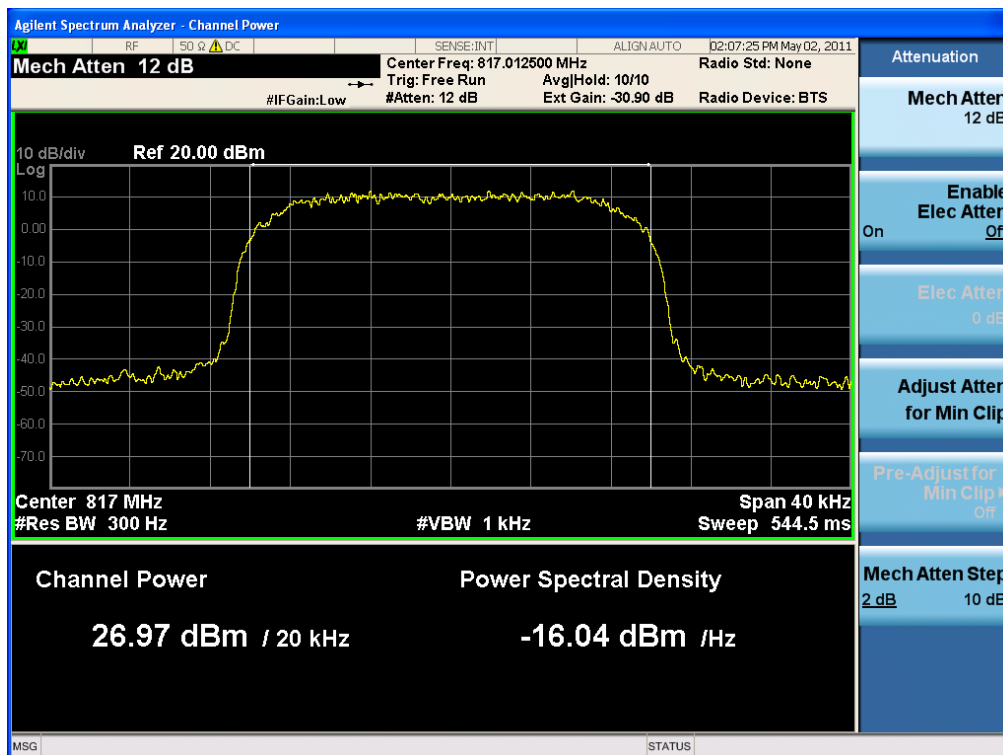
Downlink Low CH (iDEN 800)



Downlink Middle CH (iDEN 800)

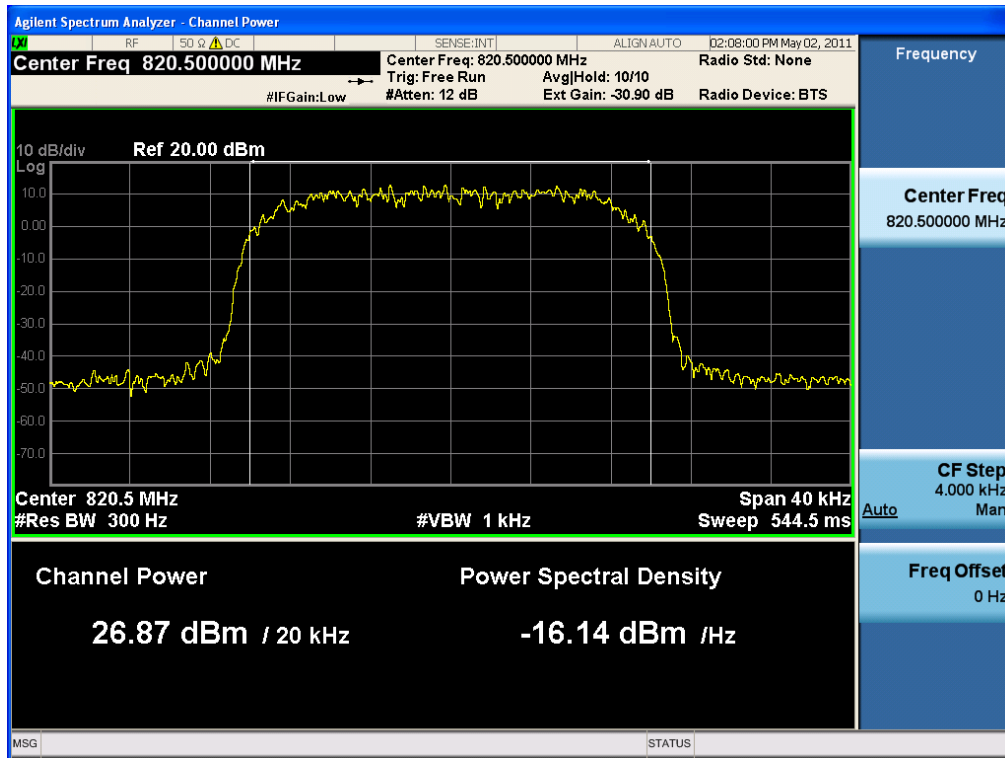


Downlink High CH (iDEN 800)

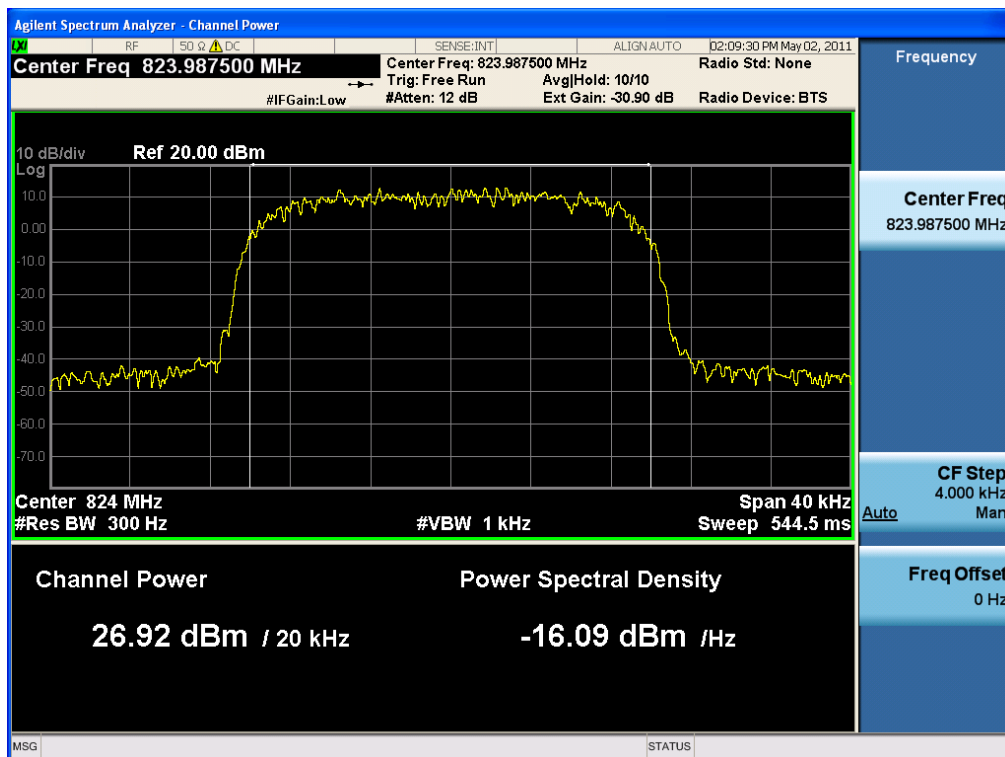


Uplink Low CH (iDEN 800)





Uplink Middle CH (iDEN 800)



Uplink High CH (iDEN 800)

## 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)
iDEN	16QAM	-30.5

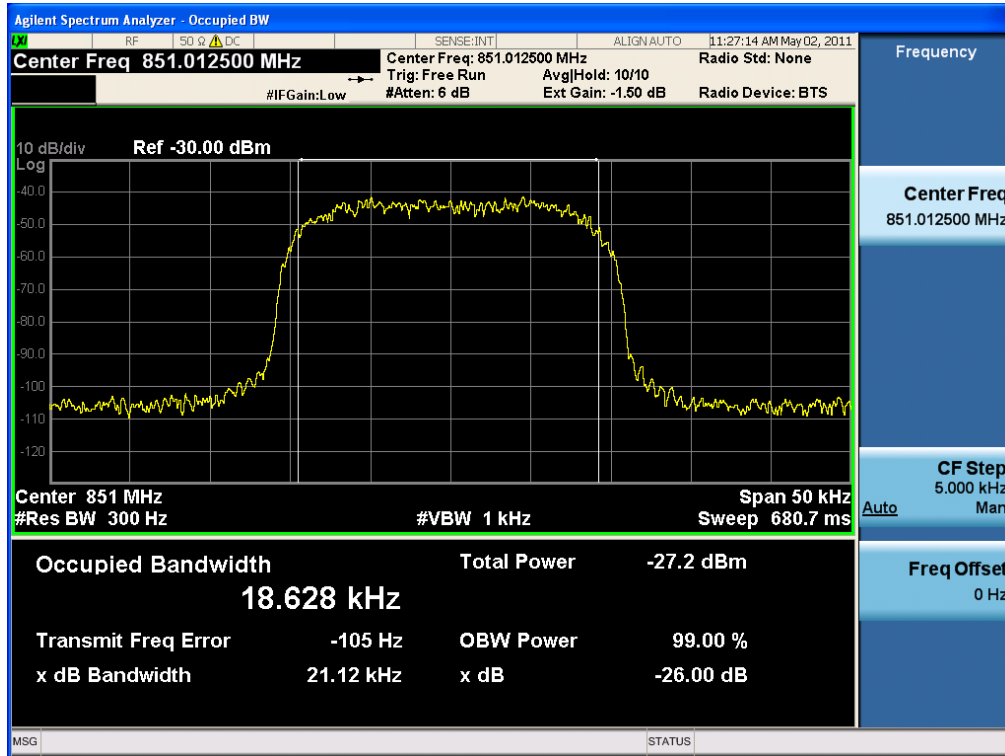
## (Downlink)

iDEN800 DownLink-18 MHz		
Carrier Channel	Frequency (MHz)	26dB Bandwidth(kHz)
Low	851.0125	21.20
Mid	860.0000	21.08
High	868.9875	21.07
iDEN900 DownLink		
Carrier Channel	Frequency (MHz)	26dB Bandwidth(kHz)
Low	935.0125	21.27
Mid	937.5000	21.22
High	939.9875	21.20
iDEN800 DownLink-7 MHz		
Carrier Channel	Frequency (MHz)	26dB Bandwidth(kHz)
Low	862.0125	21.13
Mid	865.5000	21.16
High	868.9875	21.08

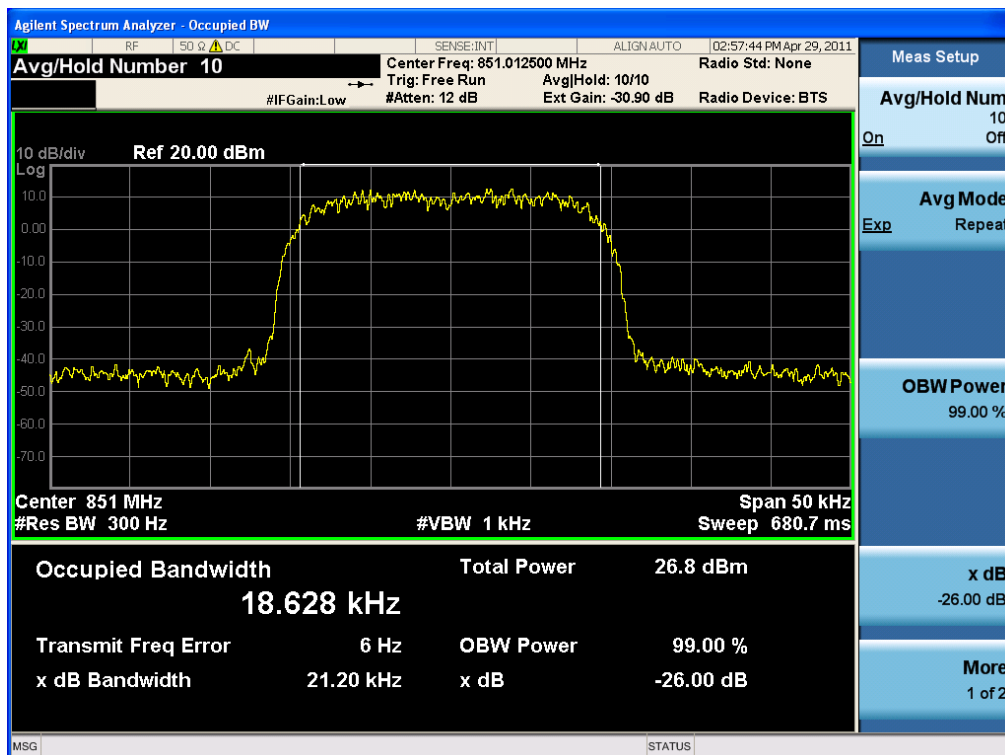
**(Uplink)**

<b>iDEN800 UpLink-18 MHz</b>		
<b>Carrier Channel</b>	<b>Frequency (MHz)</b>	<b>26dB Bandwidth(kHz)</b>
Low	806.0125	21.19
Mid	815.0000	21.23
High	823.9875	21.16
<b>iDEN900 UpLink</b>		
<b>Carrier Channel</b>	<b>Frequency (MHz)</b>	<b>26dB Bandwidth(kHz)</b>
Low	896.0125	21.10
Mid	898.5000	21.02
High	900.9875	21.12
<b>iDEN800 UpLink-7 MHz</b>		
<b>Carrier Channel</b>	<b>Frequency (MHz)</b>	<b>26dB Bandwidth(kHz)</b>
Low	817.0125	21.13
Mid	820.5000	21.08
High	823.9875	21.04

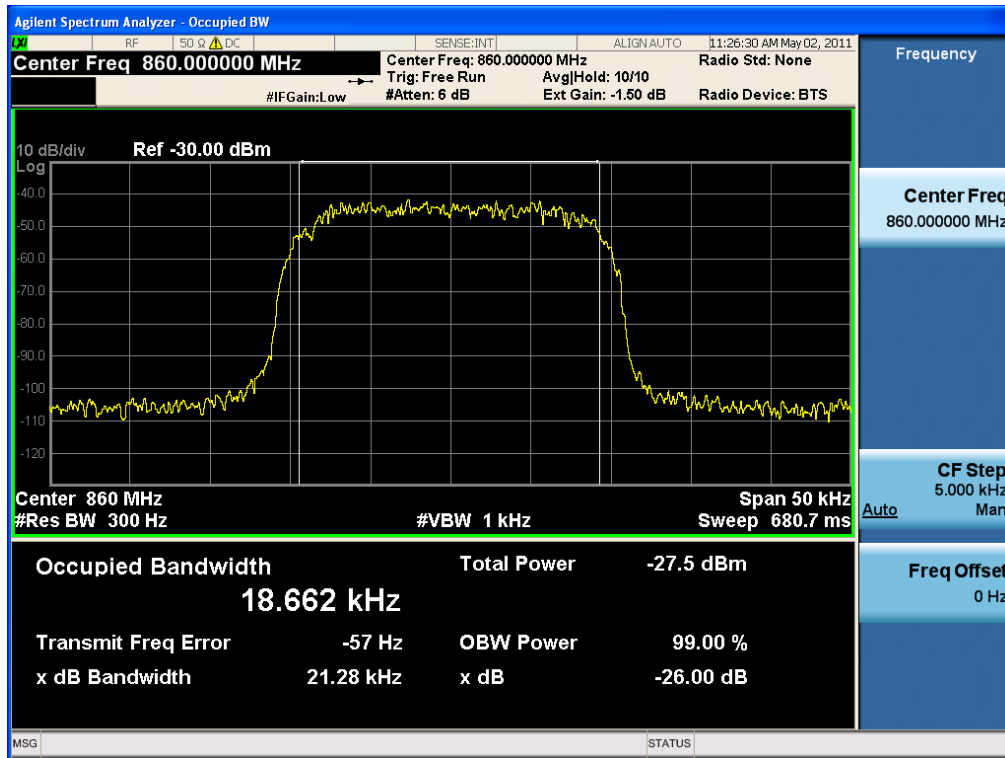
## Plots of Occupied Bandwidth-18 MHz



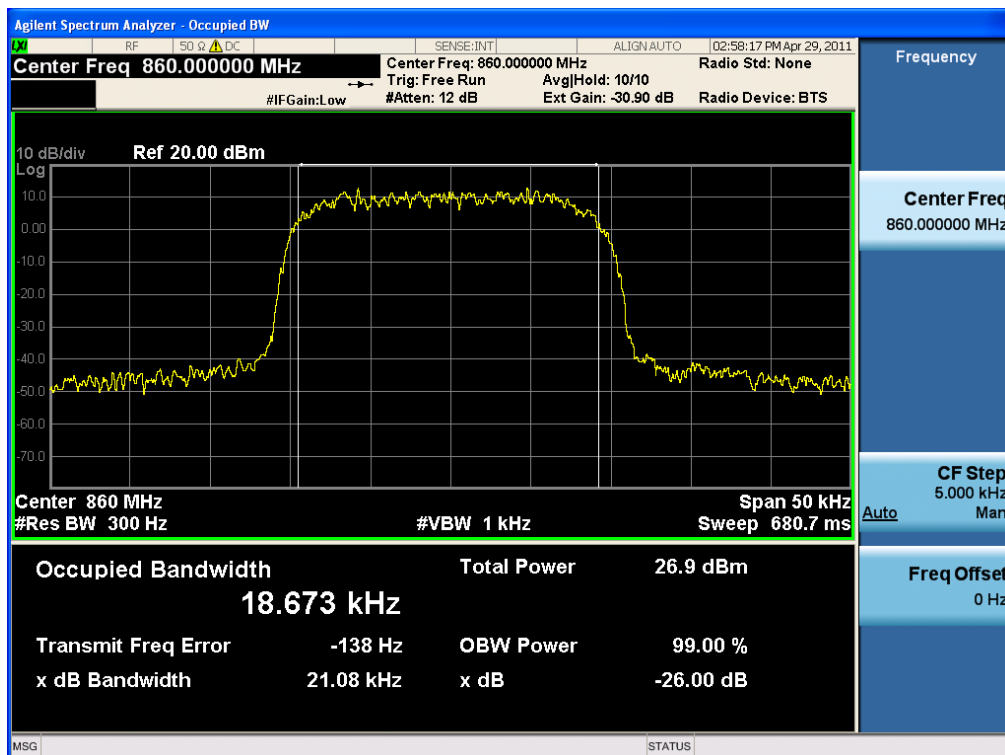
iDEN800 Downlink Low CH Input



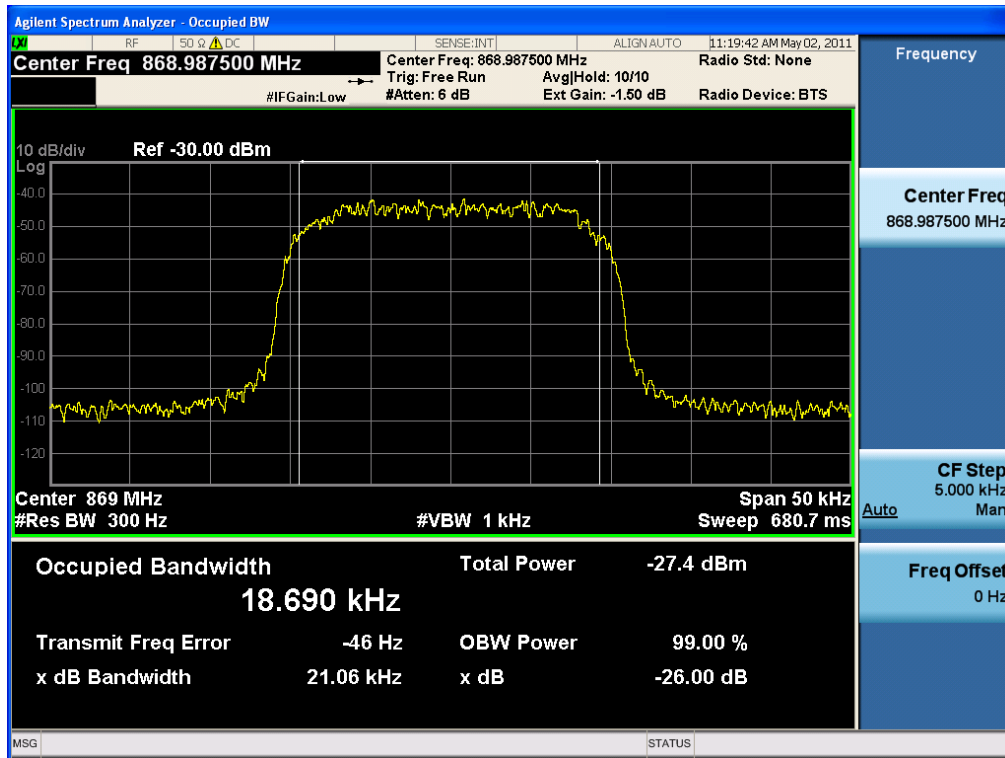
iDEN800 Downlink Low CH Output



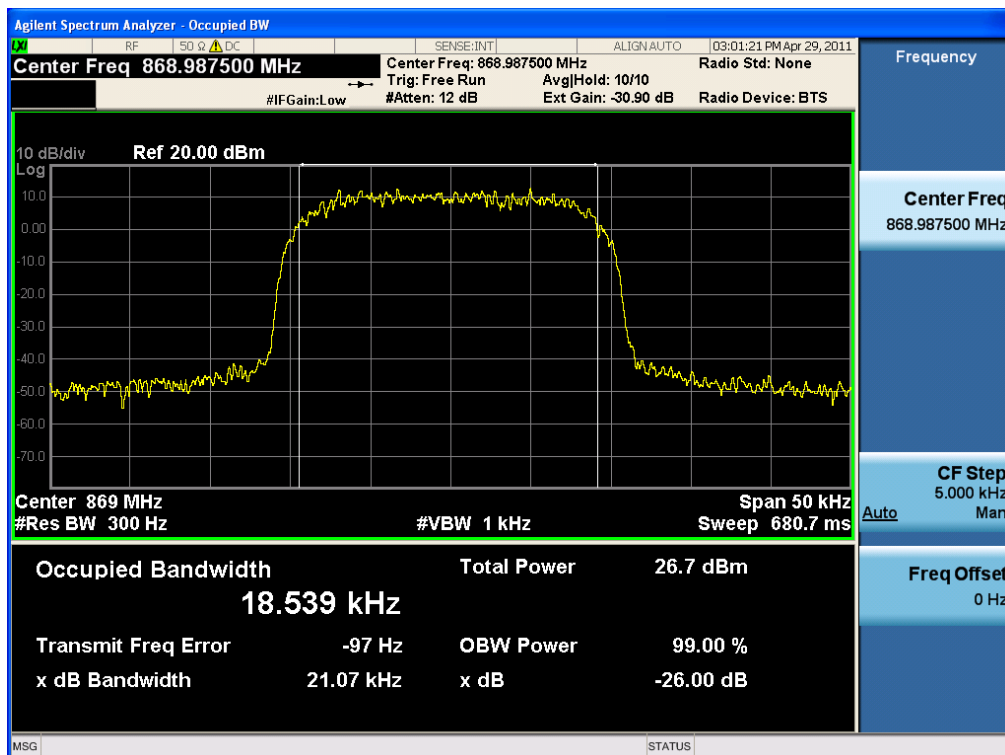
iDEN800 Downlink Mid CH Input



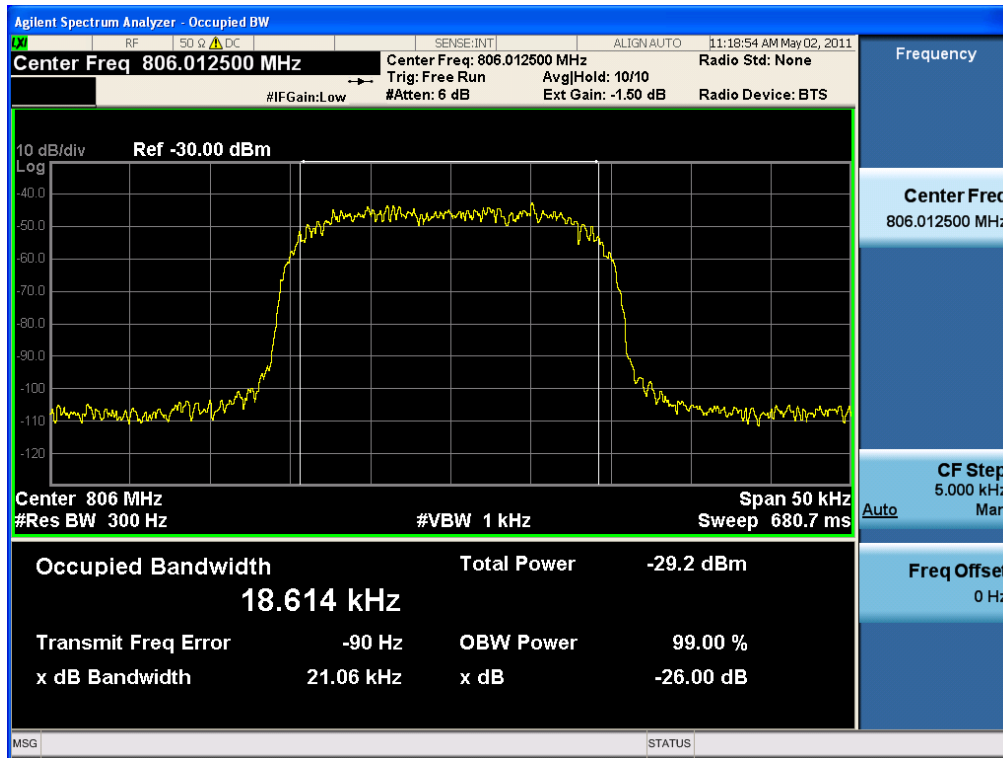
iDEN800 Downlink Mid CH Output



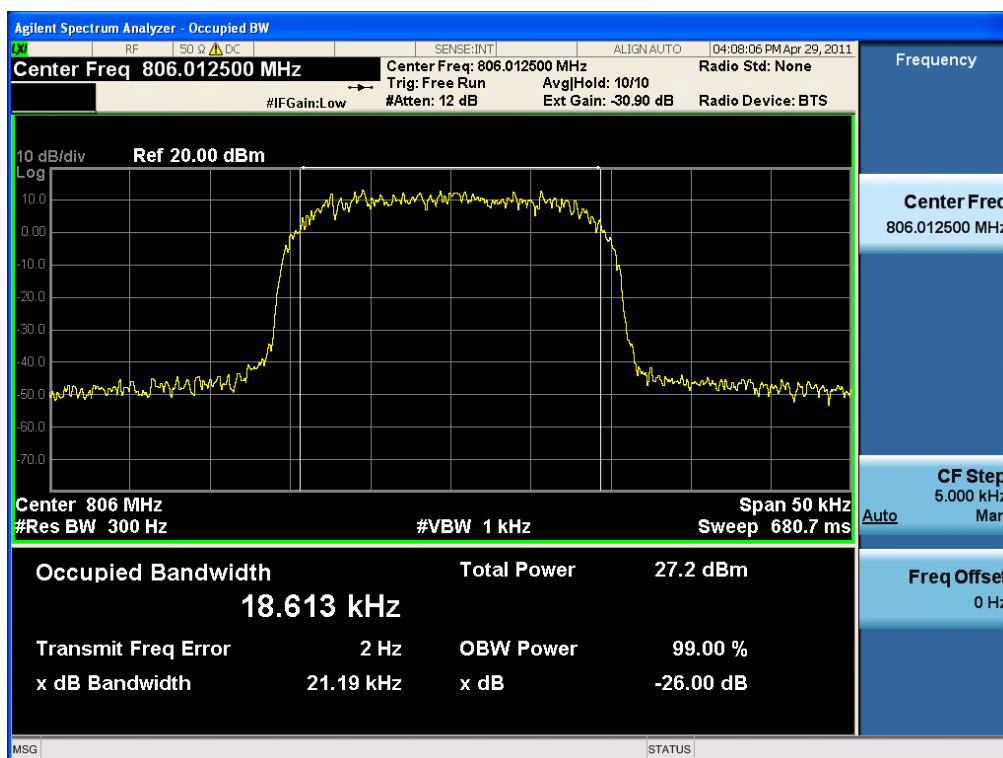
iDEN800 Downlink High CH Input



iDEN800 Downlink High CH Output

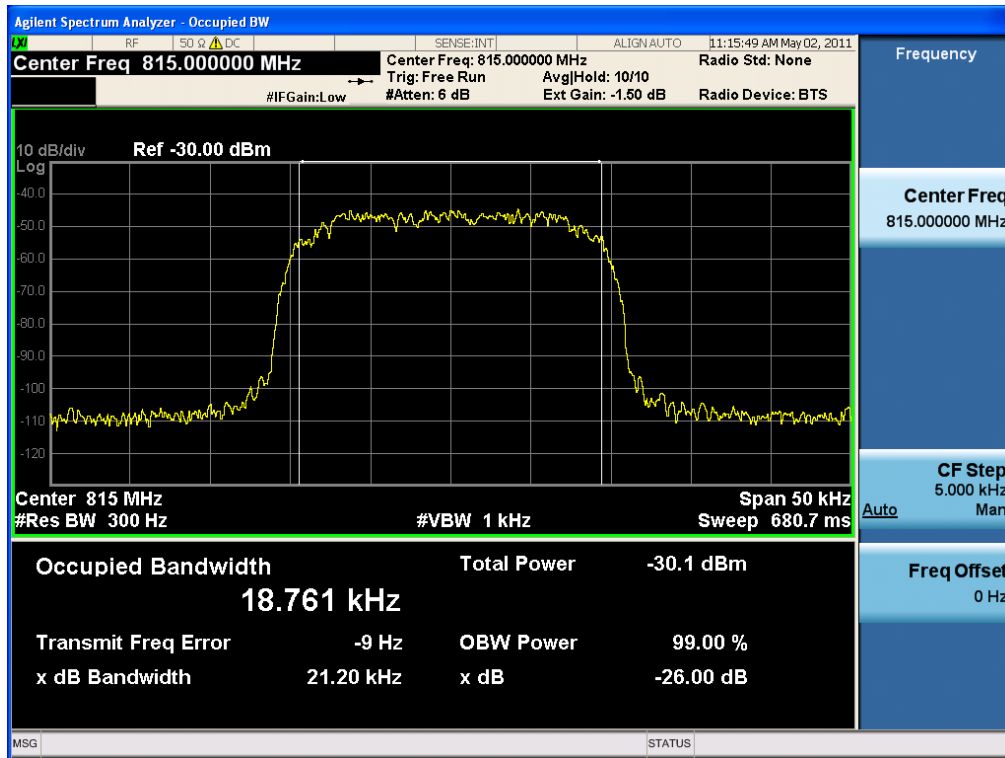


iDEN800 Uplink Low CH Input

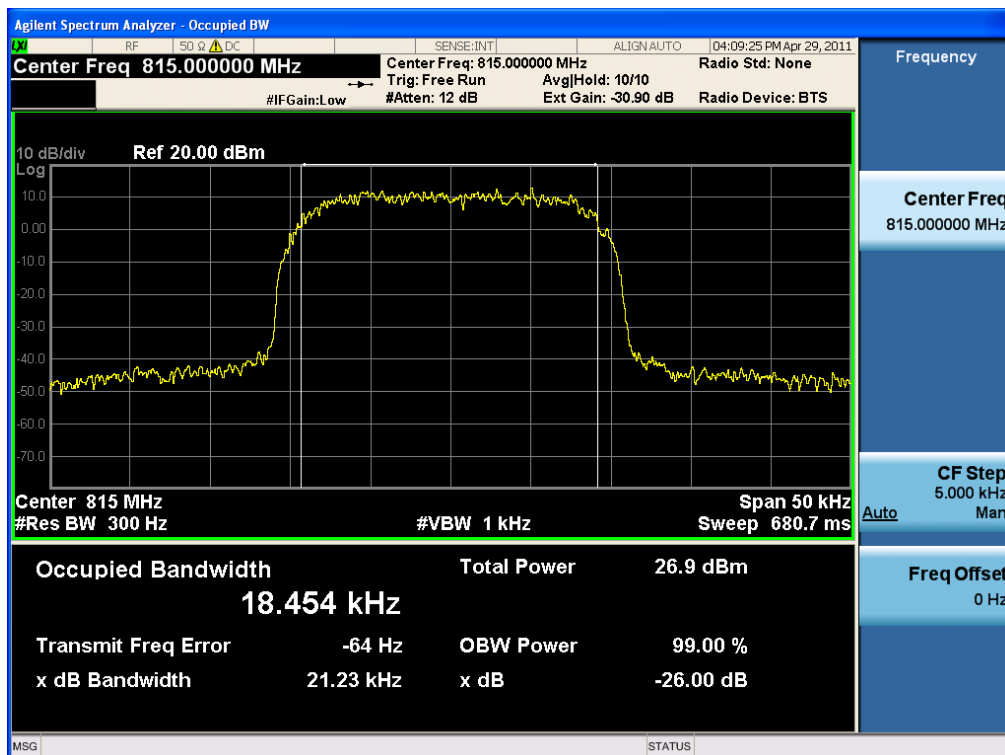


iDEN800 Uplink Low CH Output

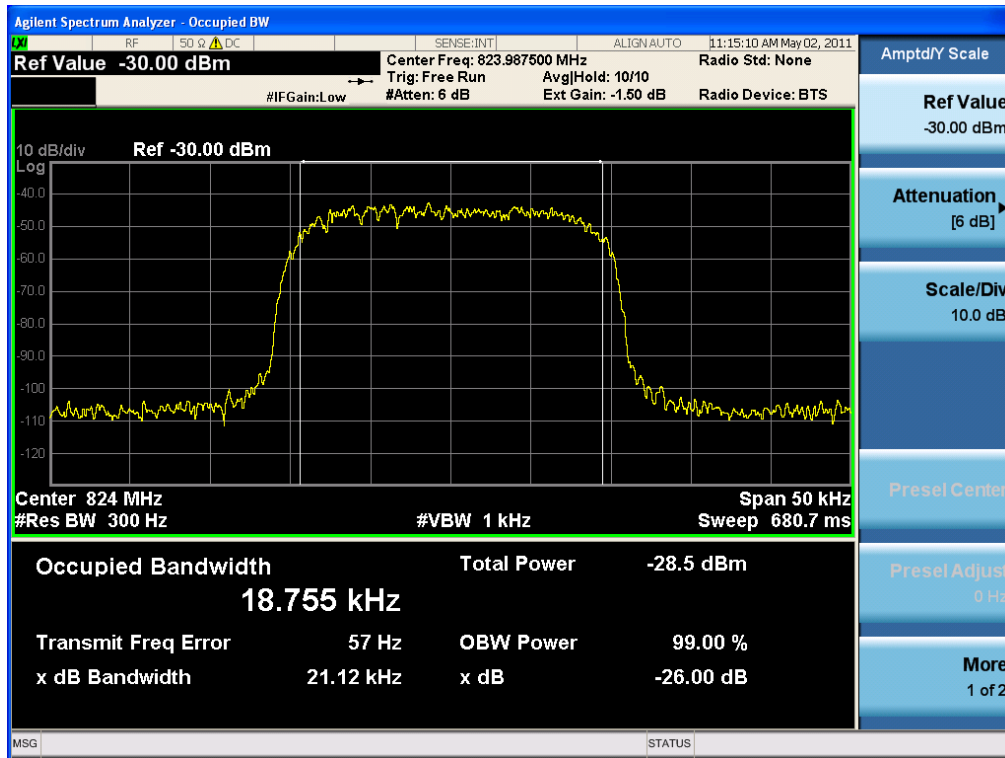




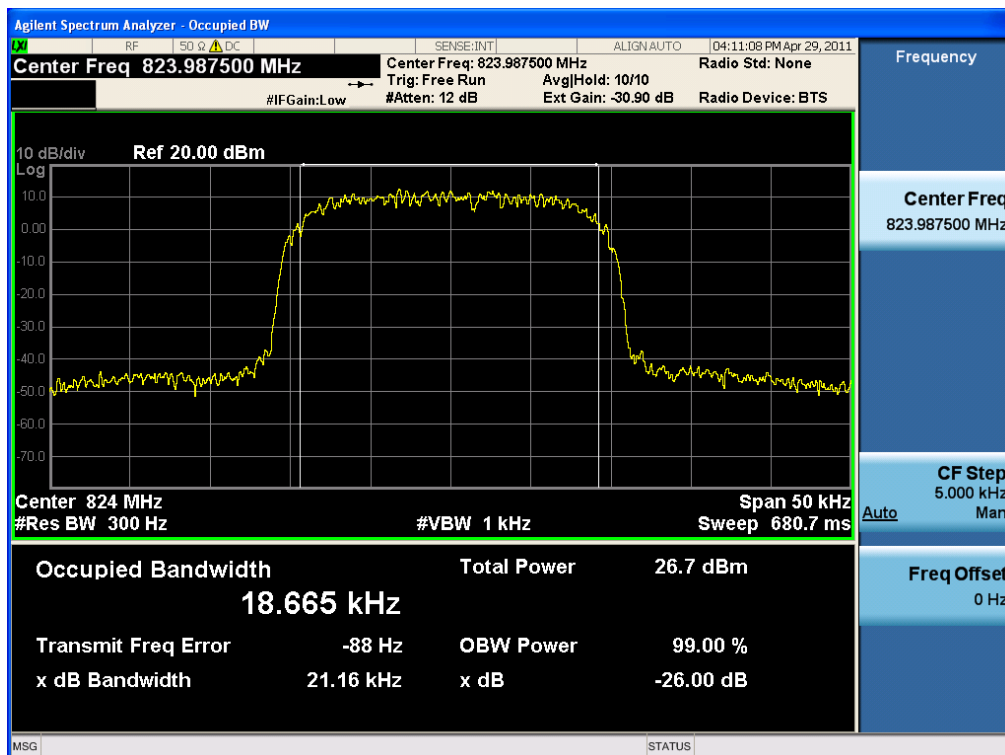
iDEN800 Uplink Mid CH Input



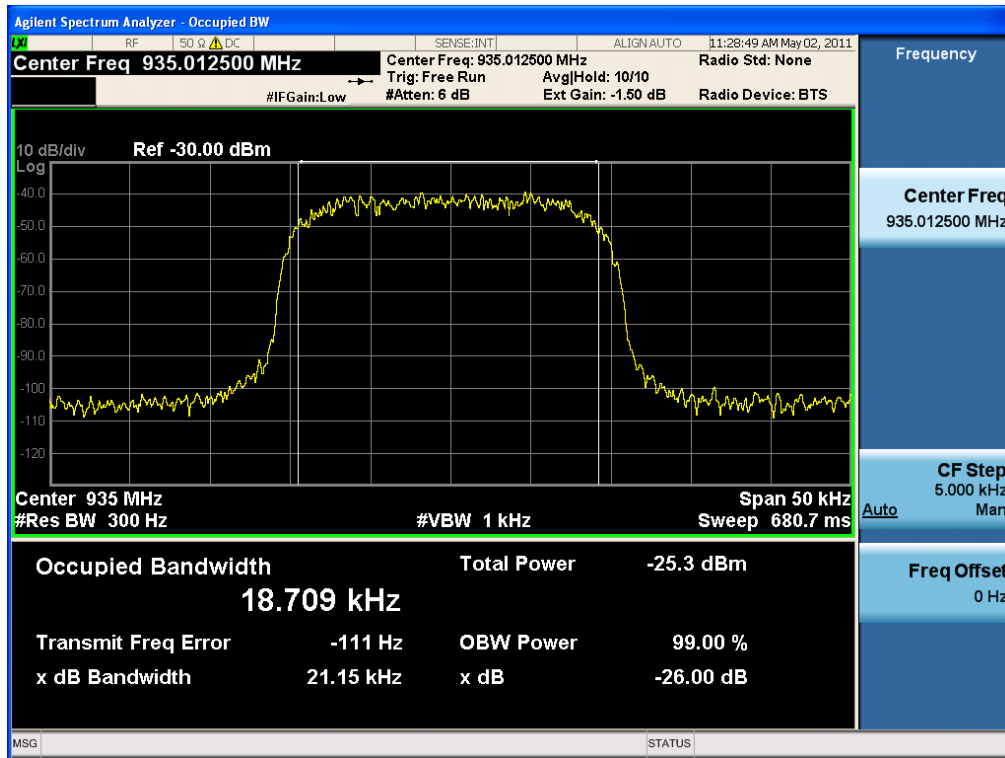
iDEN800 Uplink Mid CH Output



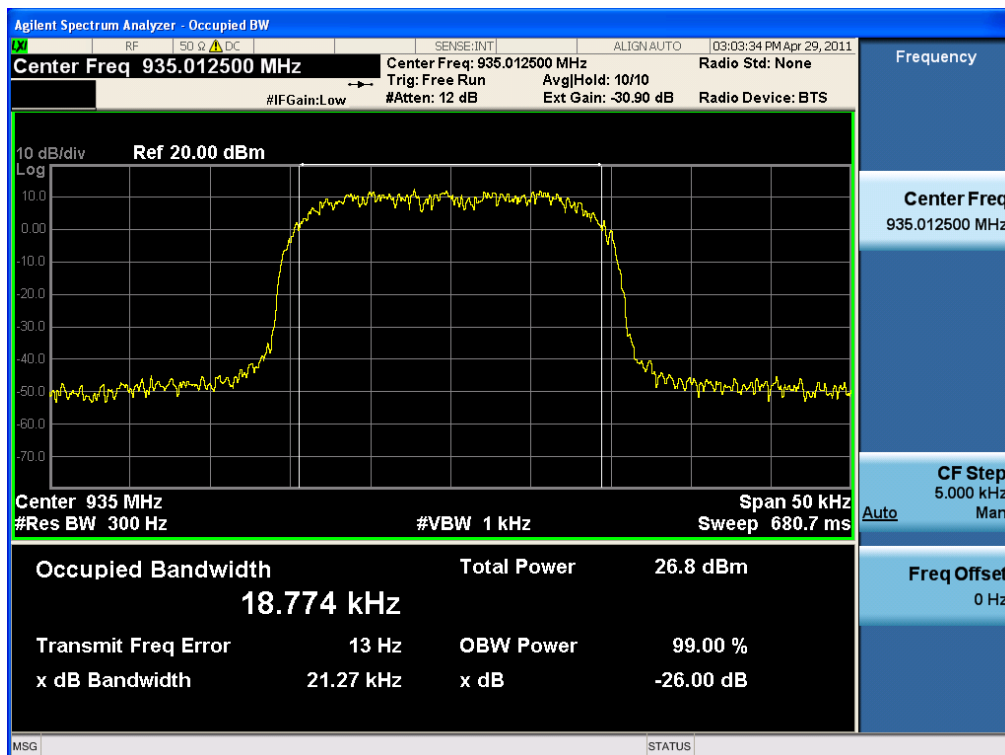
iDEN800 Uplink High CH Input



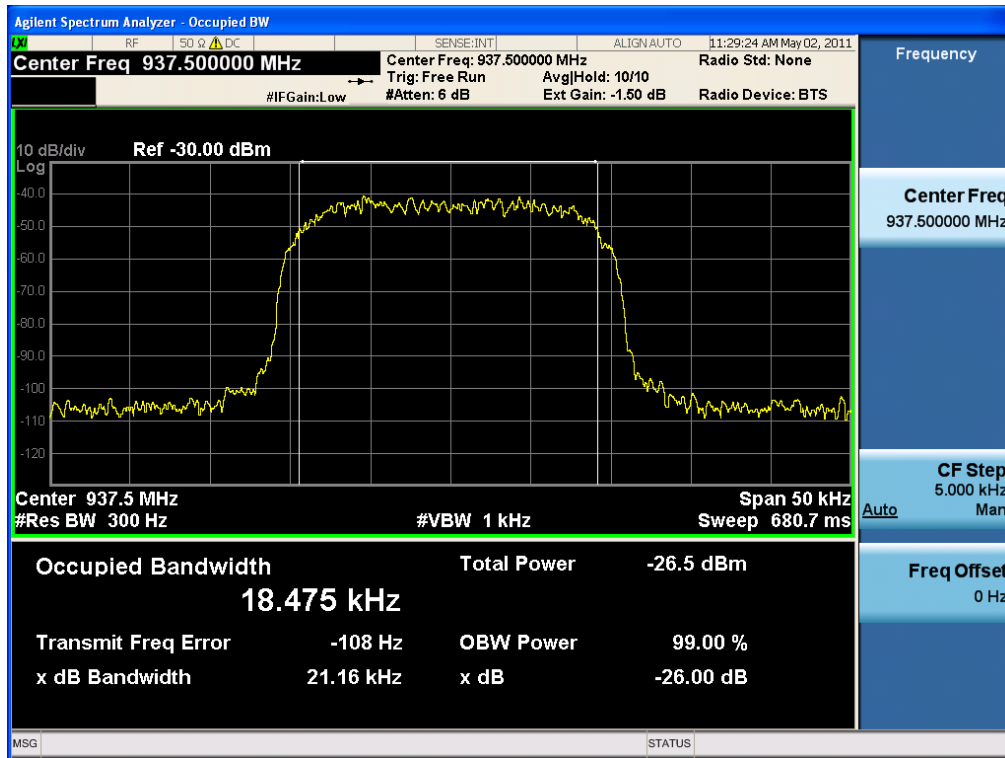
iDEN800 Uplink High CH Output



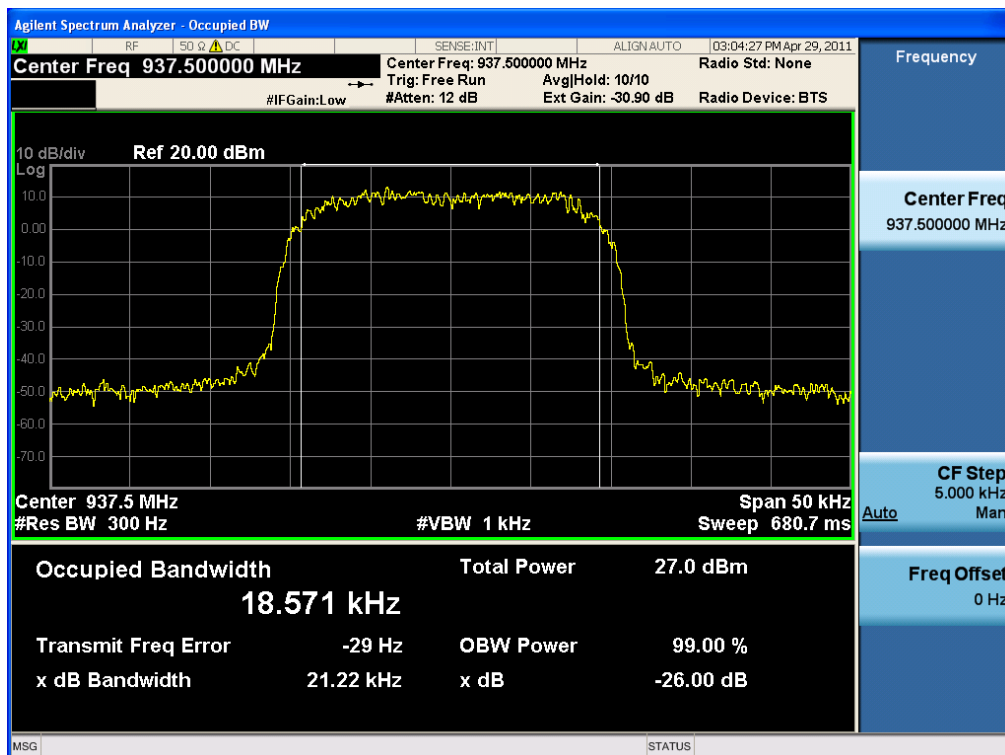
iDEN900 Downlink Low CH Input



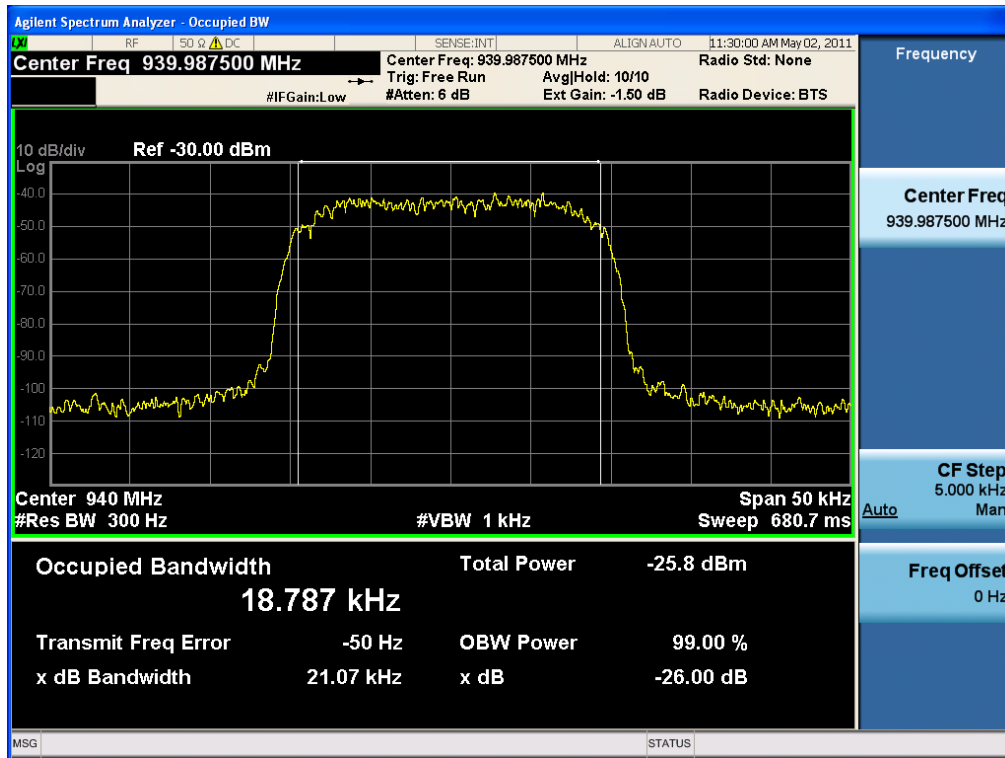
iDEN900 Downlink Low CH Output



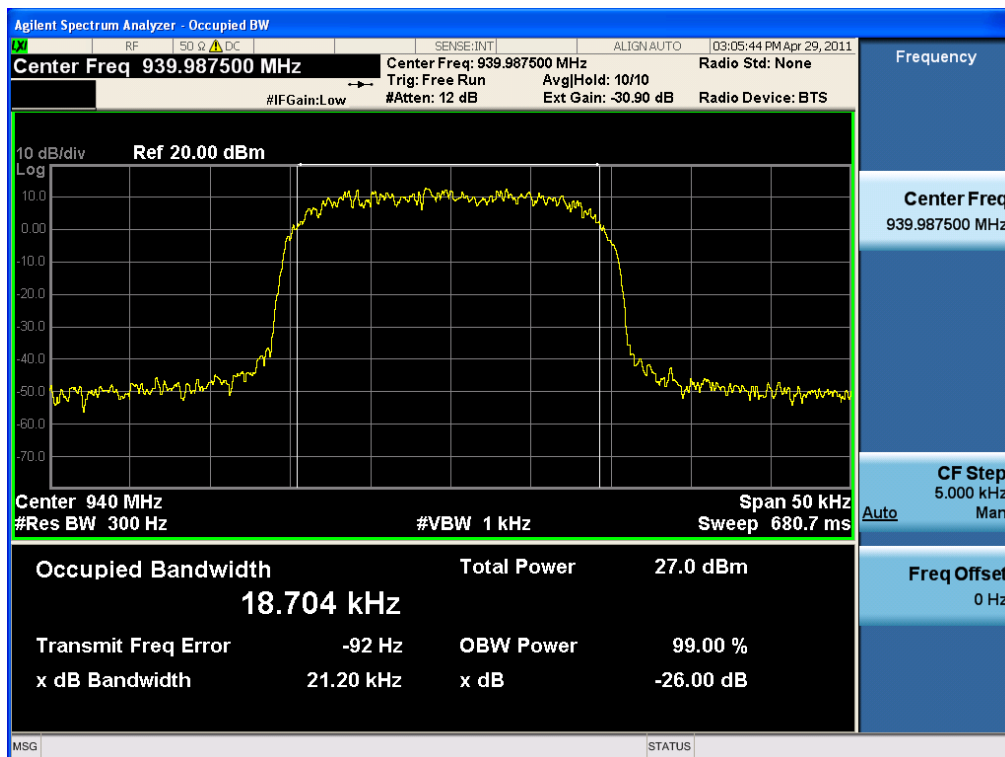
iDEN900 Downlink Mid CH Input



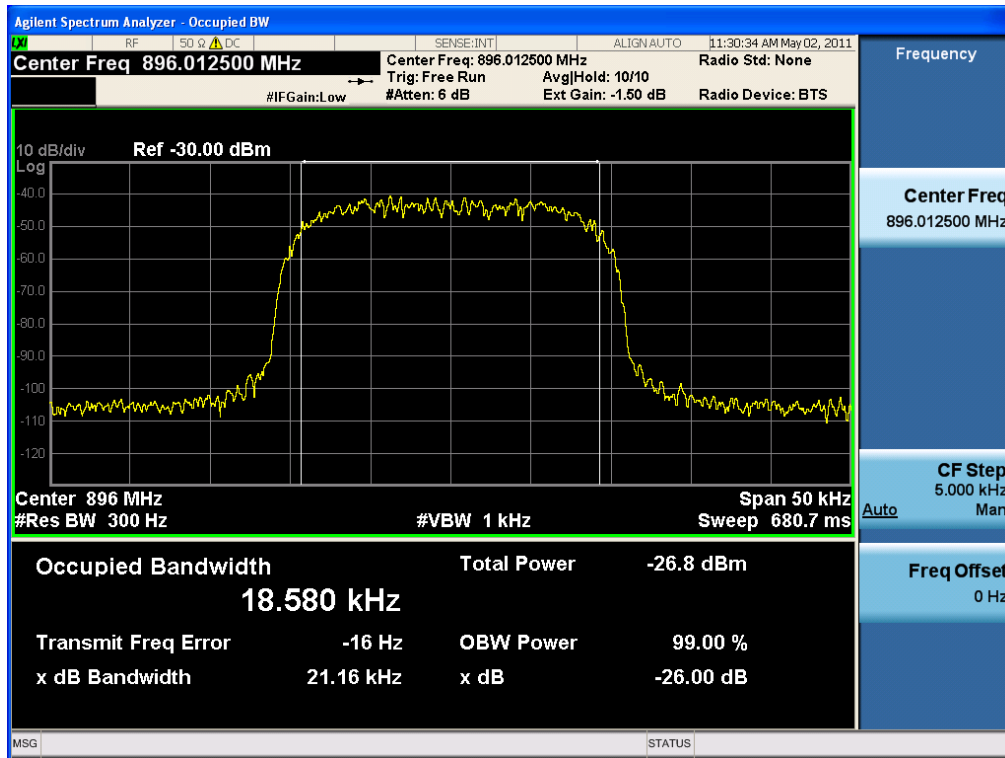
iDEN900 Downlink Mid CH Output



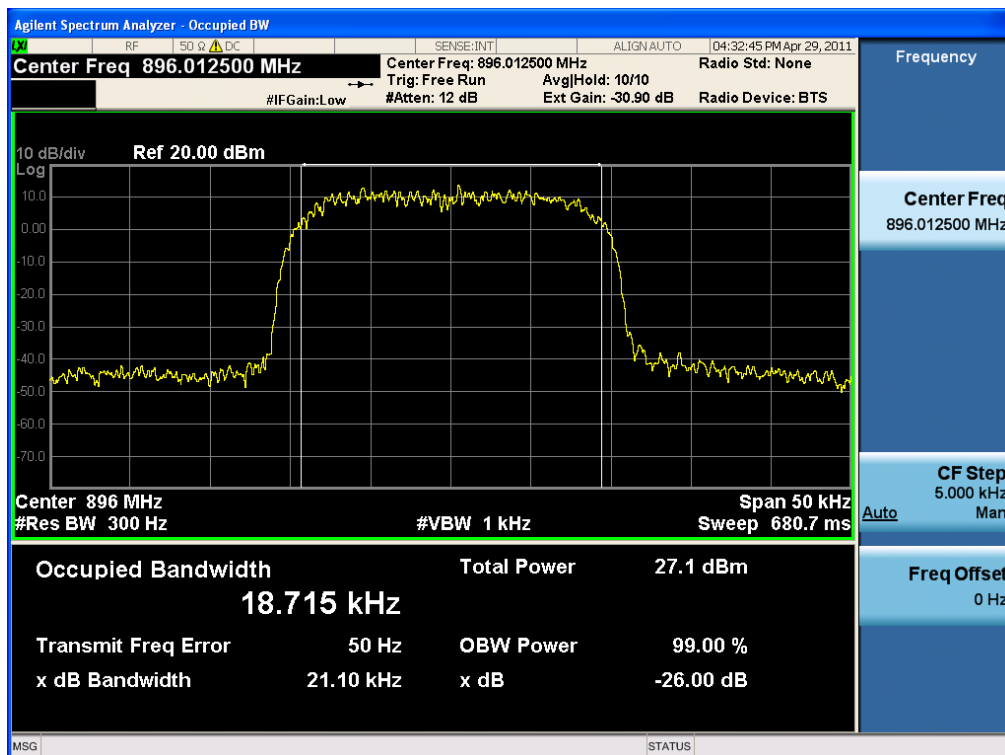
iDEN900 Downlink High CH Input



iDEN900 Downlink High CH Output



iDEN900 Uplink Low CH Input



iDEN900 Uplink Low CH Output