RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

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XG-25M 700/800 MHZ Mobile Radio

FCC ID: OWDTR-0076-E
IC: 3636B-0076

May 14, 2013

Standards Referenced for this Report	
Part 2: 2012	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2012	Private Land Mobile Radio Services
TIA-EIA-603-C August 2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards
ANSI/TIA–102.CAAA-A-2002	Digital C4FM/CQPSK Transceiver Measurement Methods
ANSI/TIA-102.CAAB-A-2002	Land Mobile Radio Transceiver Performance Recommendations – Project 25 – Digital Radio Technology, C4FM/CQPSK Modulation
TIA-102.CCAA August 2011	Two-Slot Time Division Multiple Access Transceiver Measurement Methods
TIA-102.CCAB October 2011	Two - Slot Time Division Multiple Access Transceiver Performance Recommendations
Industry Canada RSS-119 Issue 11	Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41- 960 MHz

Report Prepared By: Dan Baltzell

Document Number: 2012287

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

Frequency Range (MHz)	Rated Output Power (W) Conducted	Frequency Tolerance (ppm)	Mode	Emission Designator
806 – 824	35	0.2	Analog FM (SMR)	16K0F3E
806 – 824	35	0.2	Analog FM (SMR)	16K0F9W
806 – 824	35	0.2	Analog FM (NPSPAC)	14K0F3E
851 – 869	35	0.2	Analog FM (SMR, T/A)	16K0F3E
851 – 869	35	0.2	Analog FM (NPSPAC, T/A)	14K0F3E
809 – 824	35	0.2	2-level FSK, digitized data or voice, EDACS (NPSPAC) TX 9600NP	11K9F1D/E
806 – 824	35	0.2	2-level FSK, digitized data or voice, EDACS (SMR) TX 9600W	14K2F1D/E
851 – 854, 866 – 869	35	0.2	2-level FSK, digitized data or voice, EDACS (NPSPAC, T/A)TX 9600 NP	11K9F1D/E
851 – 869	35	0.2	2-level FSK, digitized data or voice, EDACS (SMR, T/A) TX 9600W	14K2F1D/E
806 – 824	35	0.2	4-level FSK, digitized data or voice, P25 Phase 1 P25 RND	8K40F1D/E
851 – 869	35	0.2	4-level FSK, digitized data or voice, P25 Phase 1 (T/A) P25 RND	8K40F1D/E
821 – 824	35	0.2	4-level FSK, digitized data or voice, NPSPAC OTP	12K1F9W
809 – 824, 854 – 869	35	0.2	4-level FSK, digitized data or voice, wideband OTP SMR	12K1F9W
769 – 775, 799 – 805 (FCC) 768 - 776, 798 - 806 (IC)	35	0.2	4-level FSK, digitized data or voice, P25 Phase 1 P25 RND	8K40F1D/E
799 – 805 (FCC) 798 – 806 (IC)	35	0.2	4-level FSK, digitized data or voice, OTP SMR	12K1F9W
799 – 805 (FCC) 798 – 806 (IC)	35	0.2	4-level FSK, digitized data or voice, OTP (NB)	8K10F9W
769 – 775, 799 – 805 (FCC) 768 - 776, 798 - 806 (IC)	35	0.2	Analog FM (NB, T/A)	11K0F3E
799 – 805 (FCC) 798 – 806 (IC)	35	0.2	H-CPM P25 P2 SYM 0	8K10DXW
806 – 824	35	0.2	H-CPM P25 P2 SYM 0	8K10DXW

700 MHz Band Low Power Channels

Channel No. (6.25 kHz)	Channel No. (12.5 kHz)	12.5 kHz Channel Spaced Tx Center Frequencies
1	1-2	769.006250
2		
3	3-4	769.018750
4		
5	5-6	769.031250
6		
7	7-8	769.043750
8		
9	9-10	769.056250
10		
11	11-12	769.068750
12		
949	949-950	774.931250
950		
951	951-952	774.943750
952		
953	953-954	774.956250
954		
955	955-956	774.968750
956		
957	957-958	774.981250
958		
959	959-960	774.993750
960		
961	961-962	799.006250
962		
963	963-964	799.018750
964		
965	965-966	799.031250
966		
967	967-968	799.043750
968		
969	969-9700	799.056250
970		
971	971-972	799.068750
972		
1909	1909-1910	804.931250
1910		
1911	1911-1912	804.943750
1912		
1913	1913-1914	804.956250
1914		
1915	1915-19166	804.968750
1916		

1917	1917-1918	804.981250
1918		
1919	1919-19200	804.993750
1920		

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1 Test Result Summary

Test	FCC Reference	IC Reference	Result
RF Power Output	2.1046(a), 90.541(b), 90.542(a)(6)	RSS-119 5.4	Complies
Spurious Emissions at Antenna Terminals	2.1046(a), 90.541(b), 90.542(a)(6)	RSS-119 5.4	Complies
Field Strength of Spurious Radiation	2.1053(a), 90.543(f)	RSS-119 5.5, 5.8	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.543(d)	RSS-119 5.5, 5.8	Complies
Adjacent Channel Power	90.543	RSS-119 5.58	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.539	RSS-119 5.3	Complies
Modulation Characteristics	2.1047(a)(b)	N/A	Complies

2 General Information

The following Type Certification Report is prepared on behalf of **Harris Corporation** in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **XG-25M 700/800 MHZ Mobile Radio; FCC ID: OWDTR-0076-E, IC: 3636B-0076.**

The radio can be used with a computer, and is subject to FCC DoC. DoC testing was performed for the aforementioned accessories and the data is contained in a separate DoC report.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 Parts 2 and 90, and Industry Canada RSS-119. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

2.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to, and approved by, the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

2.2 Related Submittal(s)/Grant(s)

N/A

2.3 Grant Notes

Power is continuously variable from: 0.3 to 35 W.

2.4 Tested System Details

The test sample was received on March 26, 2013. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. The device was programmed for multiple modes of operation and modulation types.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN	FCC ID	RTL Bar Code
700 / 800 MHz Mobile Radio with GPS Module	Harris Corporation	XG-25M	A40153000B04	OWDTR-0076-E	21006
700 / 800 MHz Mobile Radio	Harris Corporation	XG-25M	A40153000B03	OWDTR-0076-E	21007

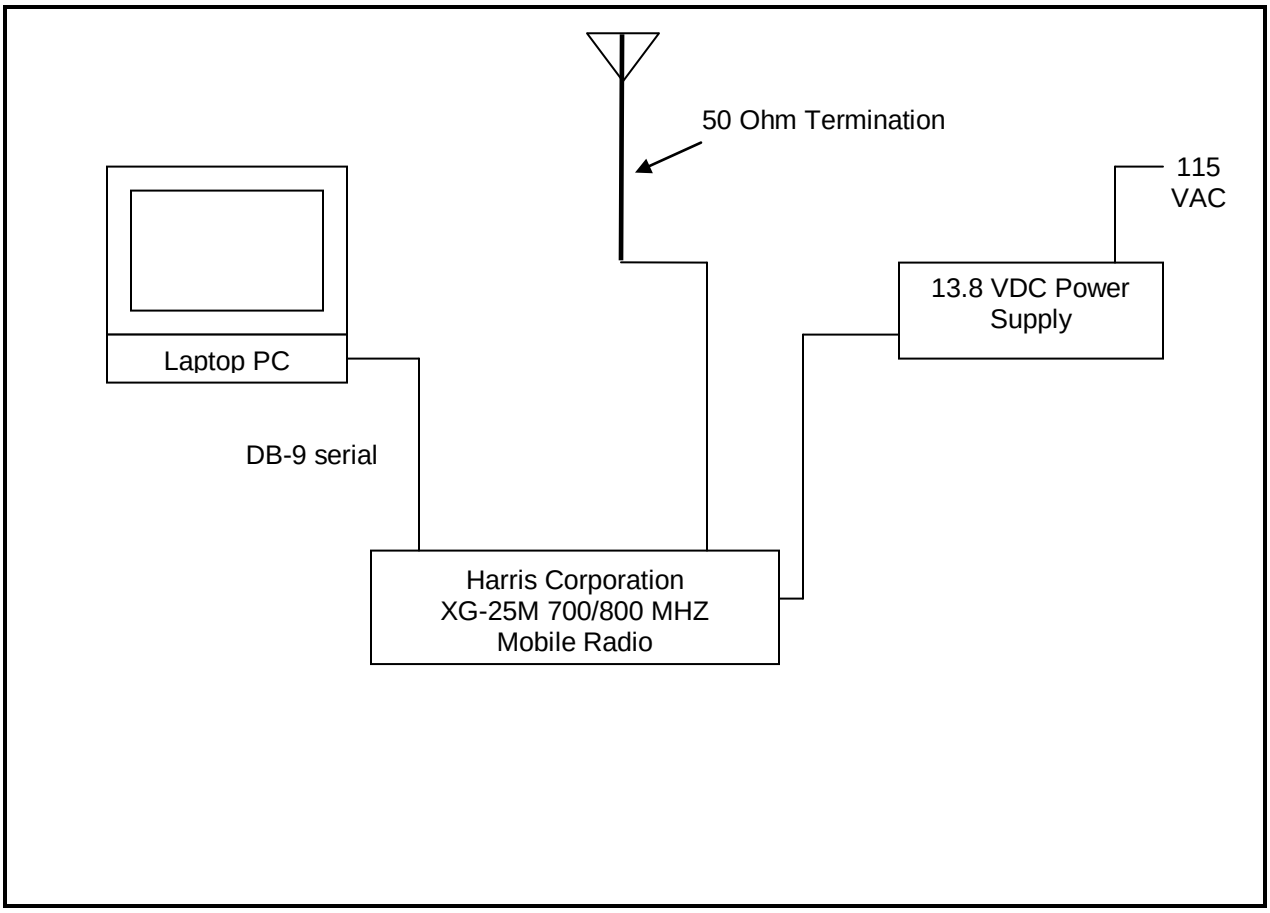


Figure 2-1: Configuration of Tested System

3 FCC Rules and Regulations Part 2.1033(C)(8) Voltages and Currents Through The Final Amplifying Stage

13.6 V / 12.0 A

4 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 90.541(b)/90.542(a)(6): Transmitting Power Limits, RSS-119 5.4: Transmitter Output Power

4.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.1

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

Manufacturer's rated power:

Conducted power is continuously variable from 0.3 to 35 W

4.2 Test Data

Table 4-1: RF Conducted Output Power - Measured

Frequency (MHz)	High Power (dBm)	High Power (W)	Low Power (dBm)	Low Power (W)
769.0125	45.5	35.5	24.6	0.3
775.0125	45.2	33.1	25.0	0.3
794.0125	45.3	33.9	25.4	0.3
799.0125	45.2	33.1	25.6	0.4
805.9875	45.1	32.4	30.0	1.0
806.0125	45.1	32.4	30.2	1.0
815.0000	45.0	31.6	30.1	1.0
823.9875	45.0	31.6	30.1	1.0
851.0125	45.1	32.4	30.0	1.0
860.0000	45.0	31.6	30.1	1.0
868.9875	45.0	31.6	30.0	1.0

Notes:
Data presented is for analog mode. All other modes were investigated and found to have equivalent power within measurement tolerances.

Table 4-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	10/14/13

Test Personnel:

Daniel Baltzell		April 5, 2013
Test Engineer	Signature	Date of Test

5 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.543: Emission Limitations, RSS-119 5.8: Transmitter Unwanted Emissions

5.1 Test Procedure

ANSI/TIA/EIA-603-2004, Section 2.2.13

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence.

5.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc

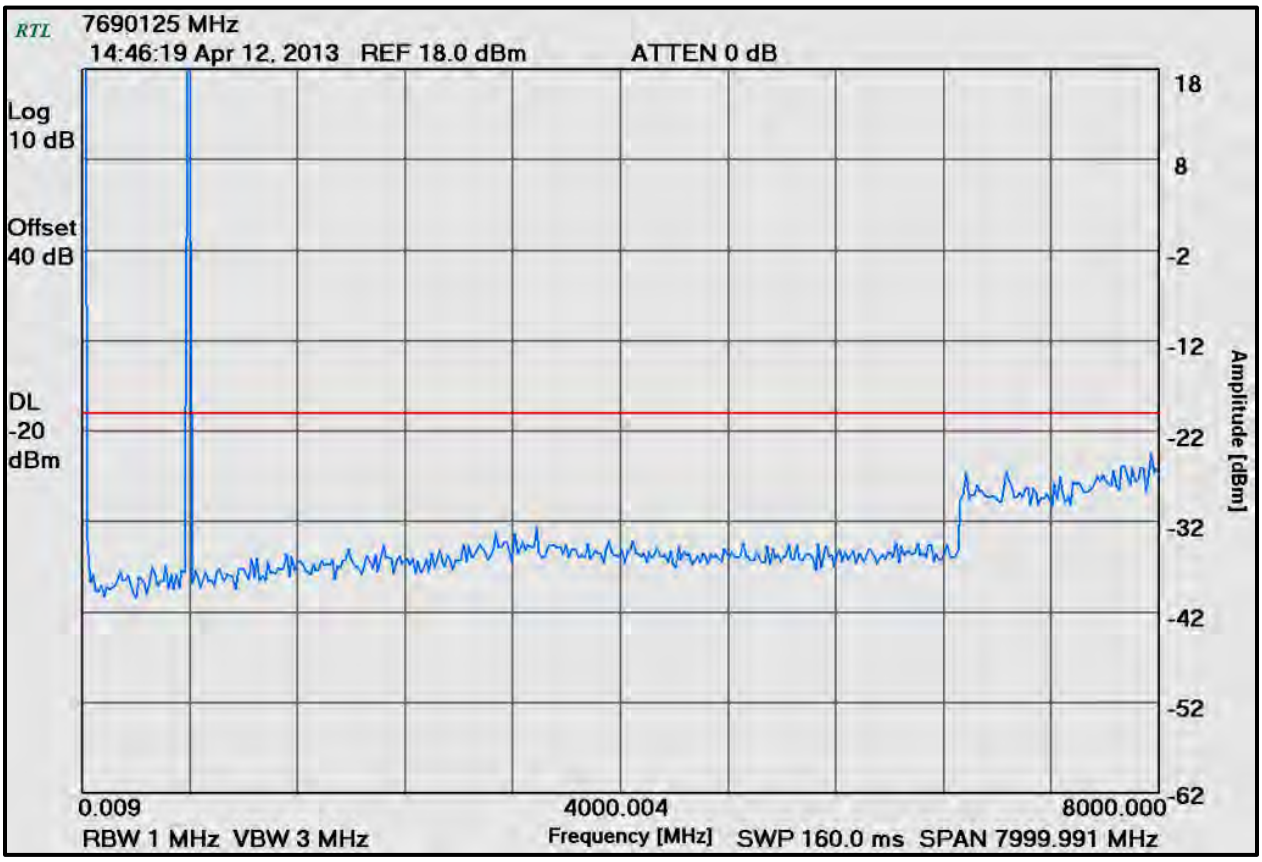
Limits: (43 + 10 LOG P(W))

The following frequencies were investigated:

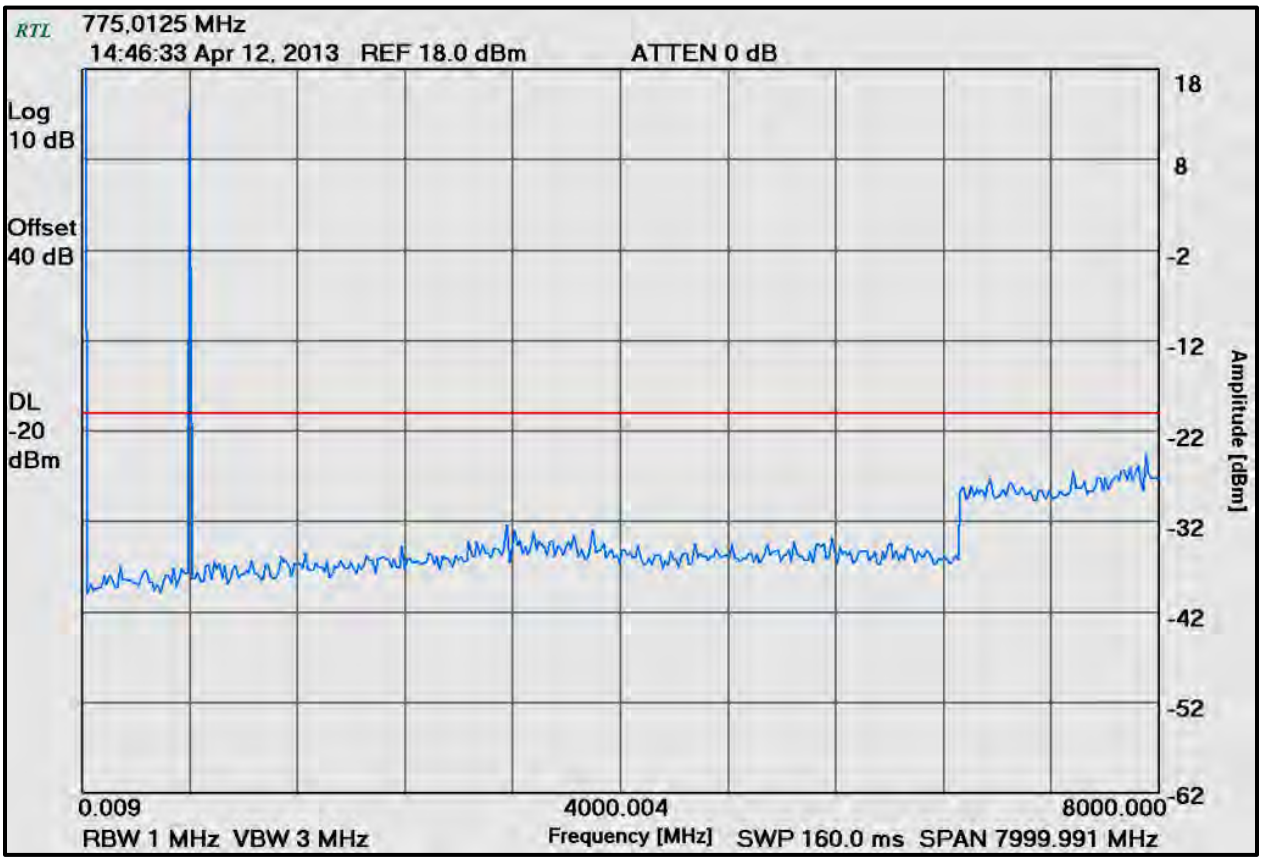
Frequencies (MHz)
769.0125
775.0125
794.0125
799.0125
805.9875
806.0125
815.0000
823.9875
851.0125
860.0000
868.9875

Both high and low power settings were checked; high power was found to be worst case. All modes were investigated and analog is presented as representative data.

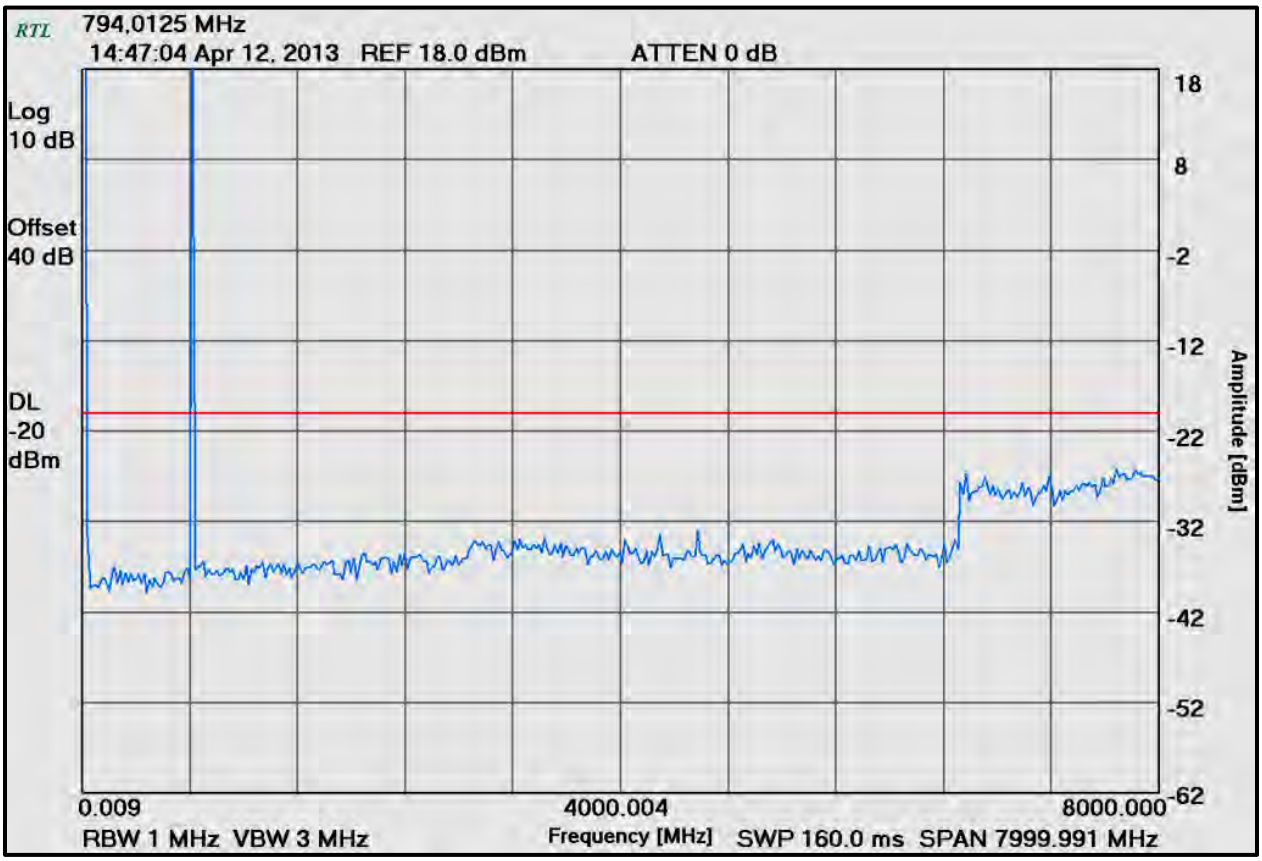
Plot 5-1: 769.0125 MHz; Analog Mode



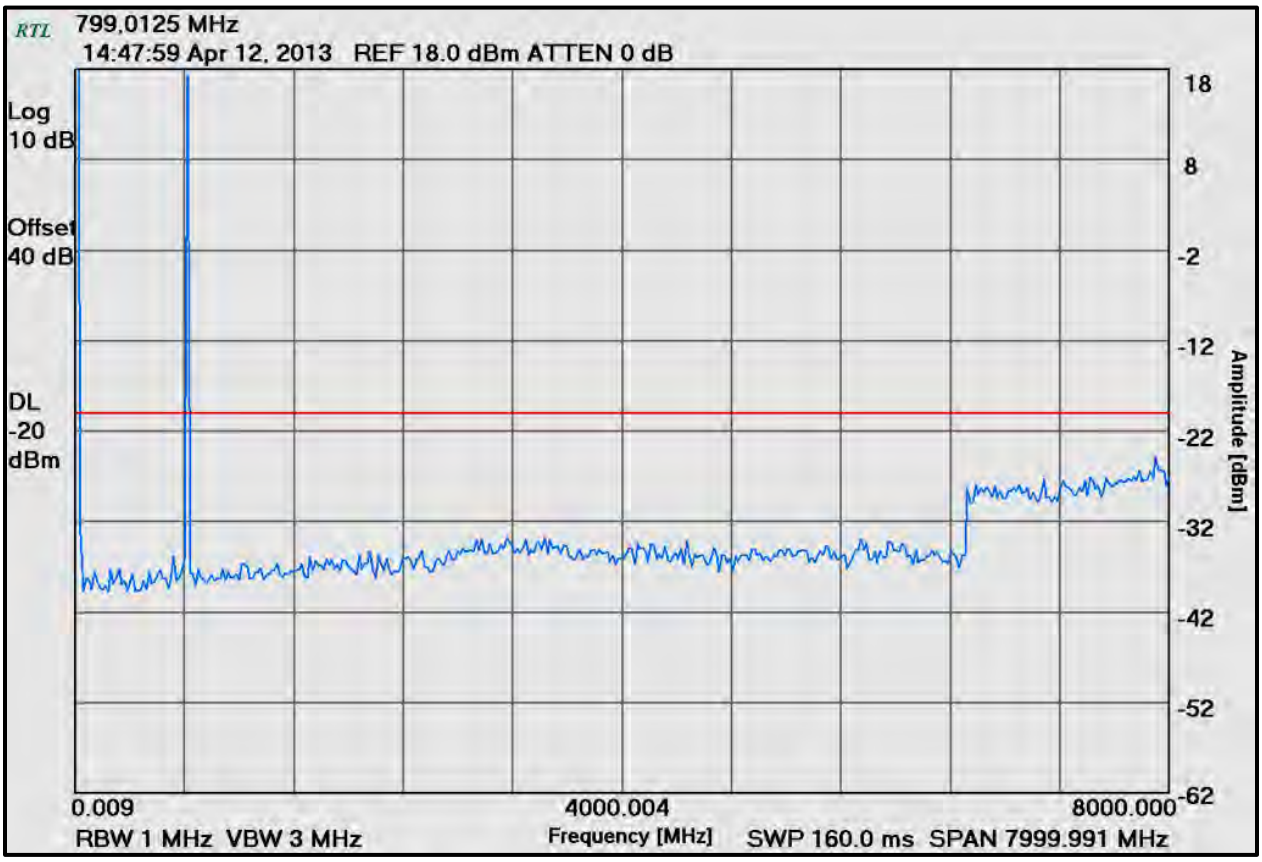
Plot 5-2: 775.0125 MHz; Analog Mode



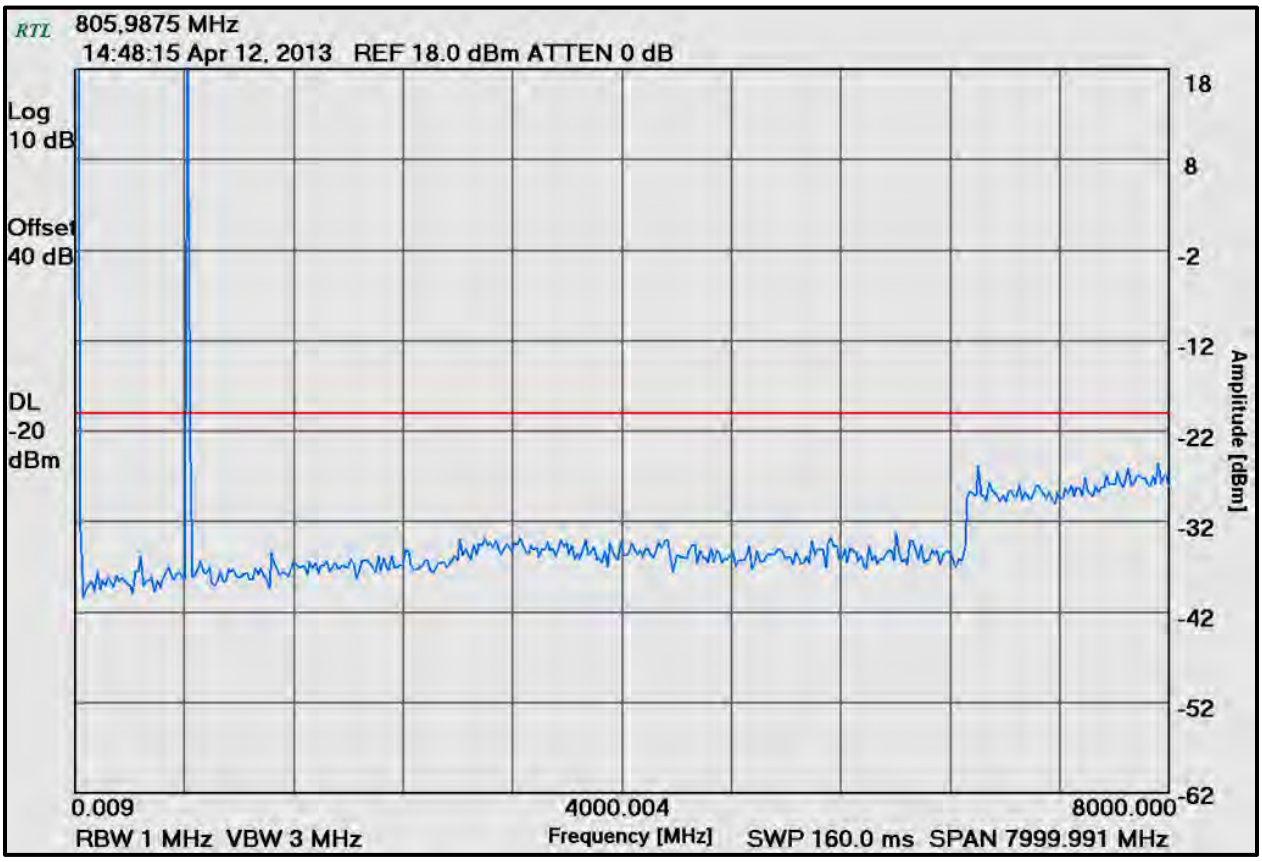
Plot 5-3: 794.0125 MHz; Analog Mode



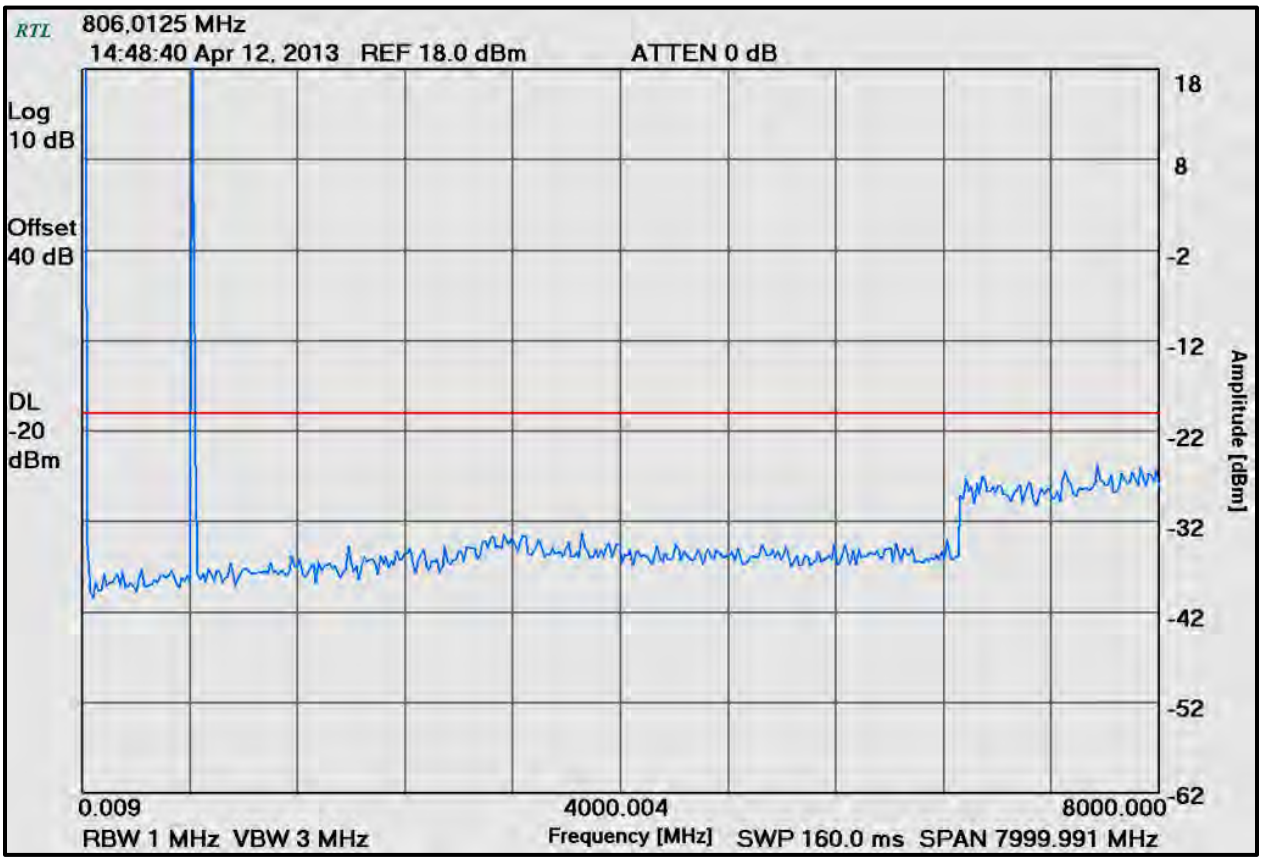
Plot 5-4: 799.0125 MHz; Analog Mode



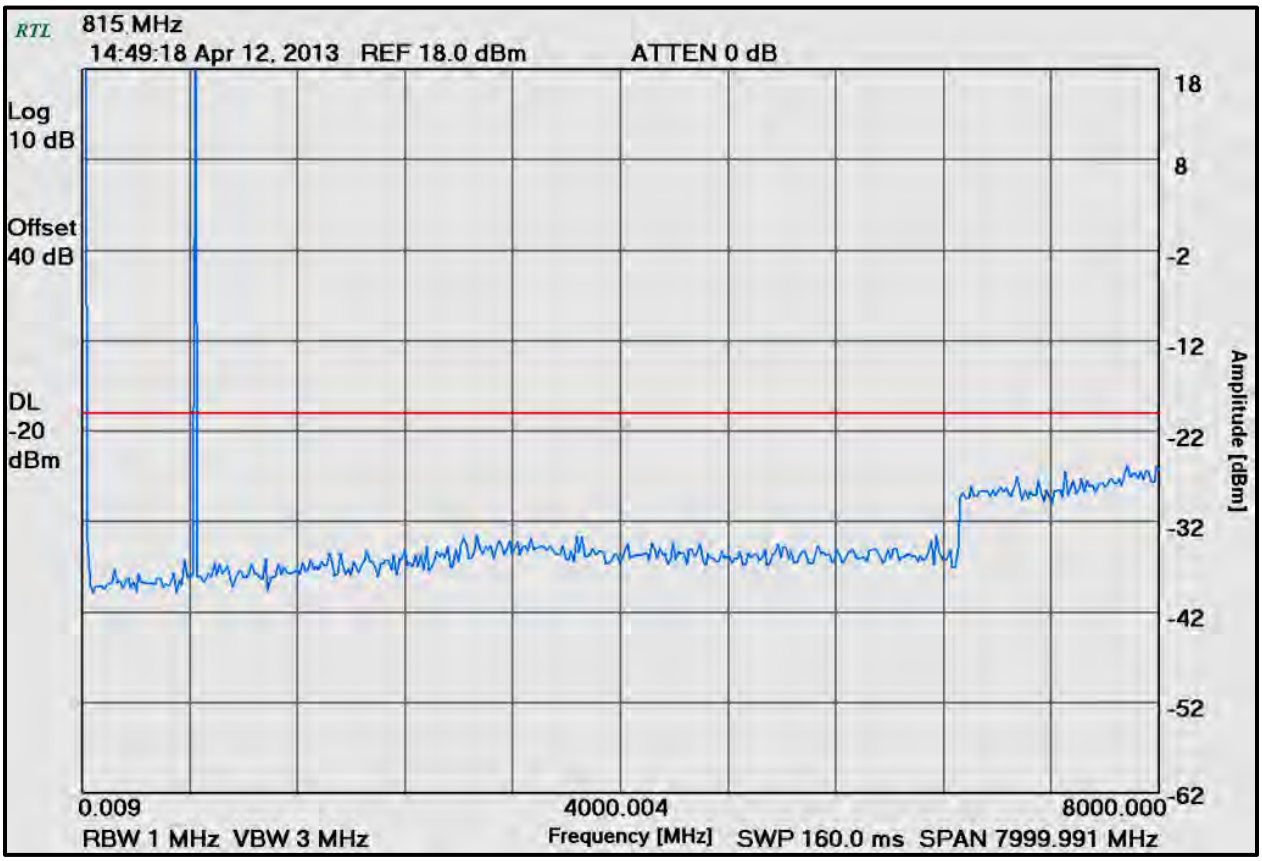
Plot 5-5: 805.9875 MHz; Analog Mode



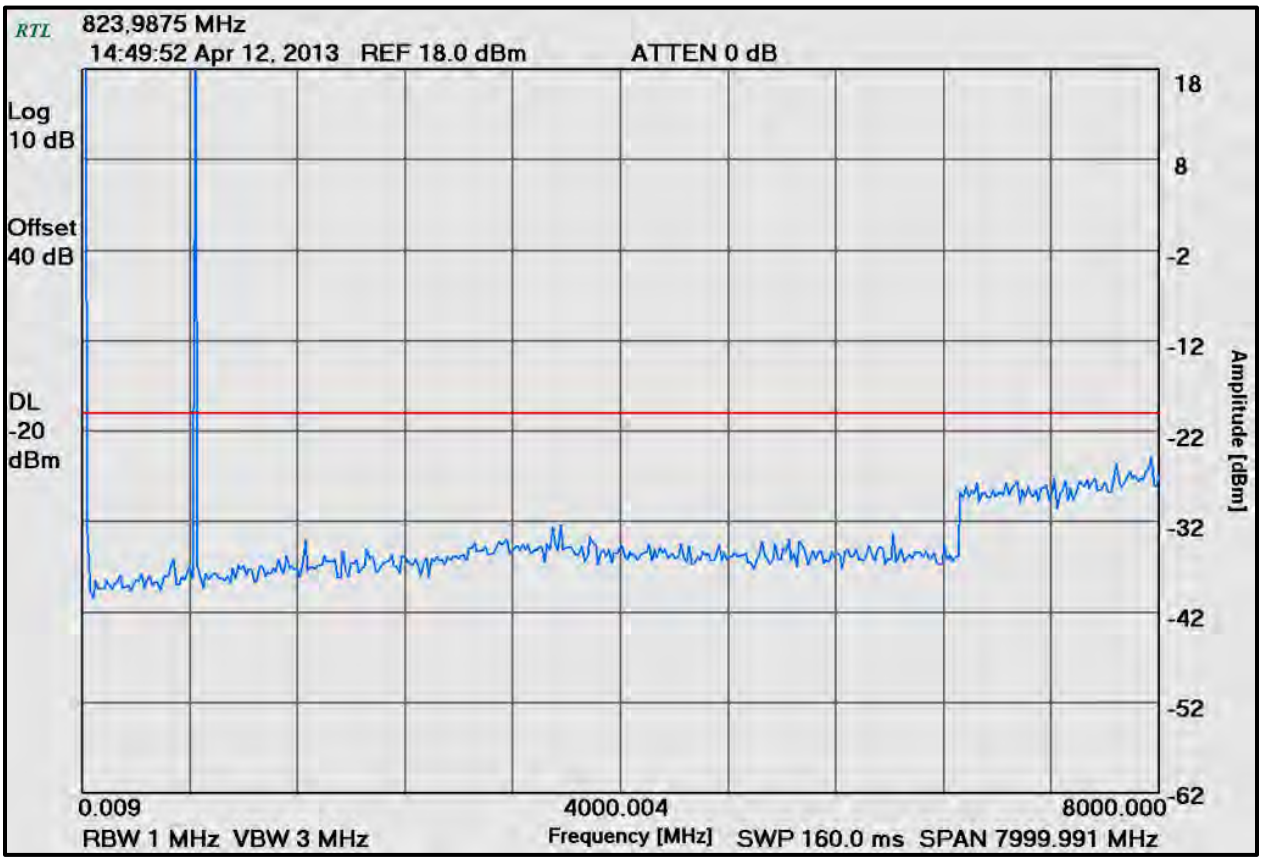
Plot 5-6: 806.0125 MHz; Analog Mode



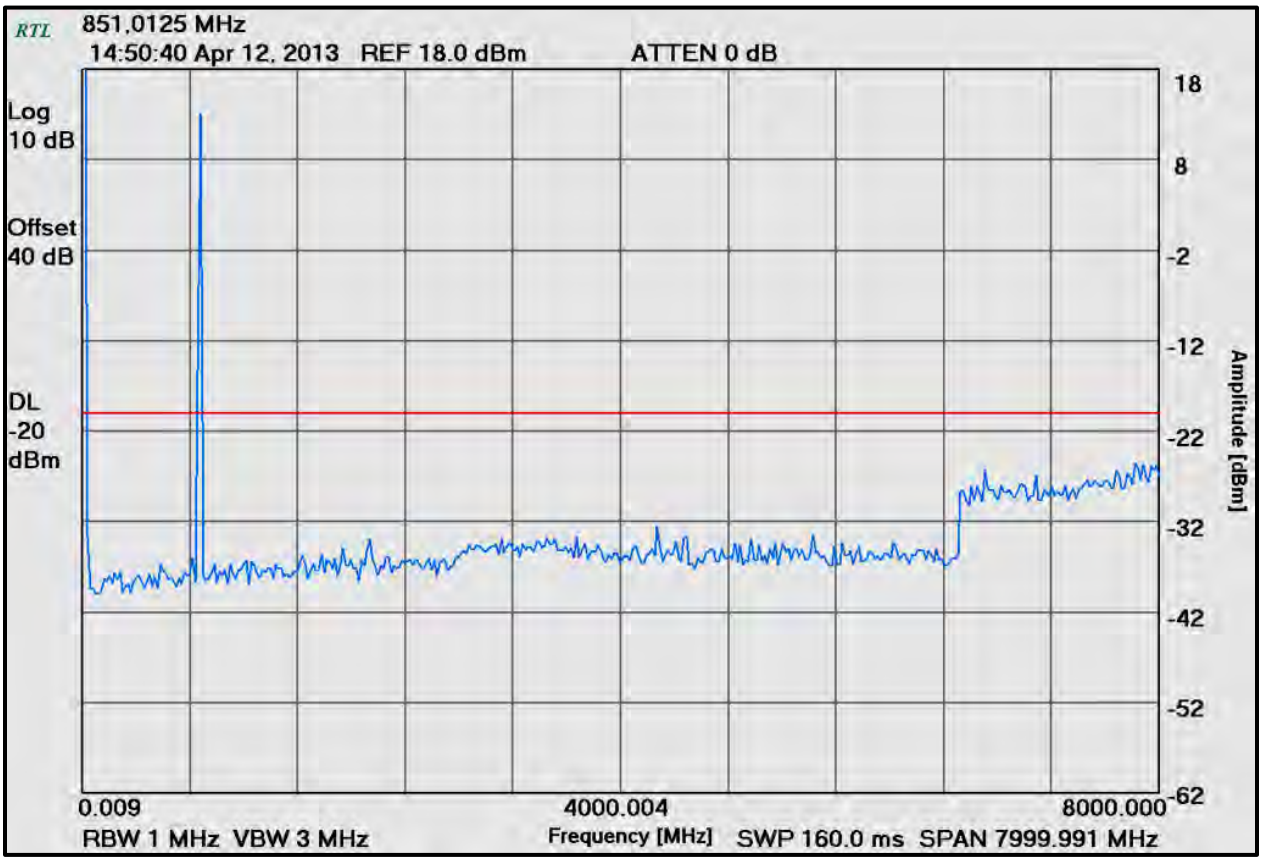
Plot 5-7: 815.0000 MHz; Analog Mode



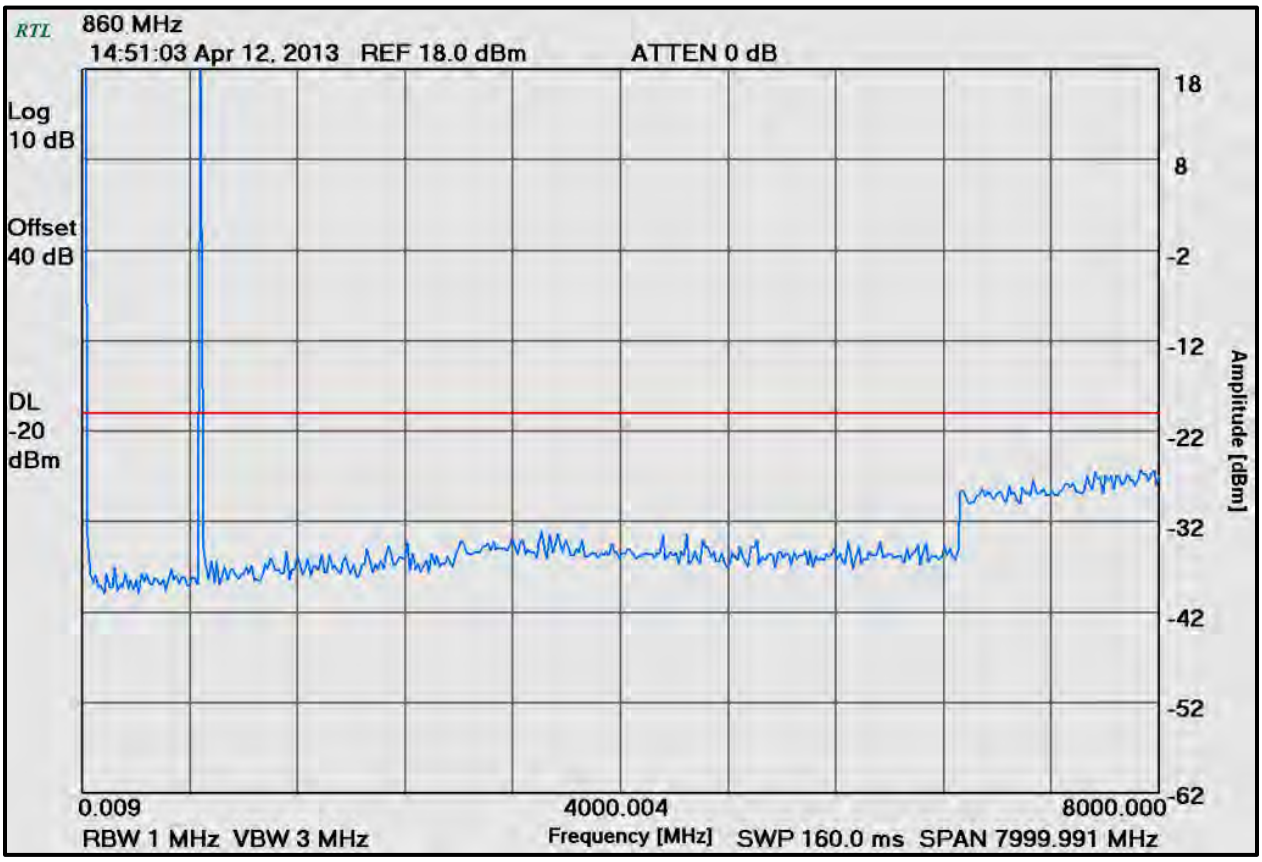
Plot 5-8: 823.9875 MHz; Analog Mode



Plot 5-9: 851.0125 MHz; Analog Mode



Plot 5-10: 860.0000 MHz; Analog Mode



Plot 5-11: 868.9875 MHz; Analog Mode

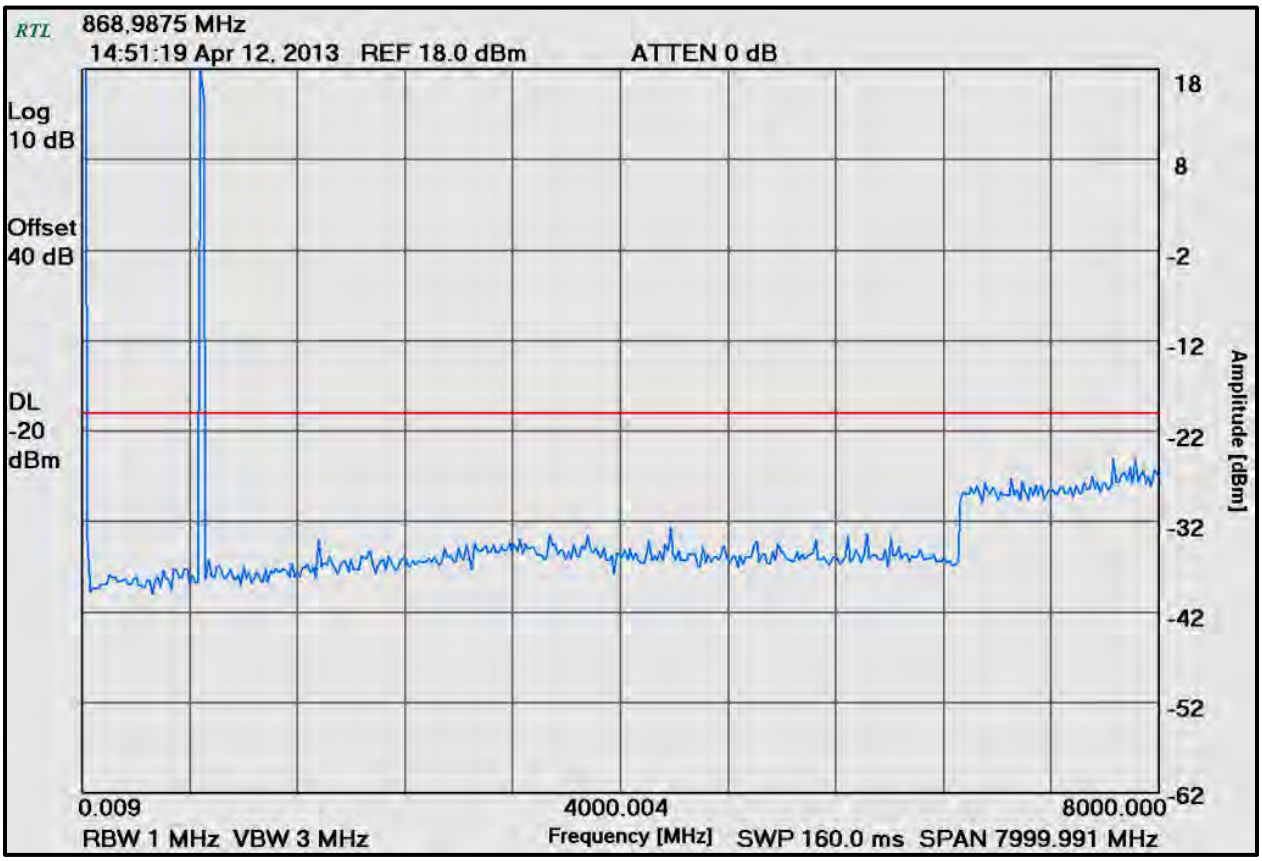


Table 5-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	3/15/14
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	10/14/13

Test Personnel:

Daniel Baltzell		April 12, 2013
Test Engineer	Signature	Date of Test

6 FCC Rules and Regulations Part 90.543(a): Emission Limitations: ACP Requirements

Effective October 23, 2007, transmitters designed to operate in 769–775 MHz and 799–805 MHz frequency bands must meet the emission limitations in paragraphs (a) through (d) of this section. Transmitters operating in 763–768 MHz and 793–798 MHz bands must meet the emission limitations in (e) of this section.

6.1 Test Procedure

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP, 9,600 bps for P25 Phase 1 and EDACS, and 12 kbps for H-CPM P25 Phase 2 modes.

For a mobile transmitter designed to operate with a 12.5 kHz channel bandwidth, the ACP shall be in accordance with the values in the following table:

Offset from Center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACP Relative (dBc)
(+/-)9.375	6.25	-40
(+/-)15.625	6.25	-60
(+/-)21.875	6.25	-60
(+/-)37.5	25	-60
(+/-)62.5	25	-65
(+/-)87.5	25	-65
(+/-)150	100	-65
(+/-)250	100	-65
(+/-)350	100	-65
>400 kHz to 12 MHz	30(s)	-75
12 MHz to paired receive band	30(s)	-75
In the paired receive band	30(s)	-100

For a mobile transmitter designed to operate with a 25 kHz channel bandwidth, the ACP shall be in accordance with the values in the following table:

Offset from Center Frequency (kHz)	Measurement Bandwidth (kHz)	Maximum ACP Relative (dBc)
(+/-)15.625	6.25	-40
(+/-)21.875	6.25	-60
(+/-)37.5	25	-60
(+/-)62.5	25	-65
(+/-)87.5	25	-65
(+/-)150	100	-65
(+/-)250	100	-65
(+/-)350	100	-65
>400 kHz to 12 MHz	30(s)	-75
12 MHz to paired receive band	30(s)	-75
In the paired receive band	30(s)	-100

FCC Rules and Regulations Part 90 §90.543(b)

Setting Reference Level - Part 90 §90.543(b)(1): Using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth to the channel size. Set the frequency offset of the measurement to zero and adjust the center frequency of the spectrum analyzer to give the power level in the measurement bandwidth. Record this power as the reference power level.

Measuring the power level at the frequency offset < 600 kHz - Part 90 §90.543(b)(2): Using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth as shown in table. Measure ACP in dBm. These measurements were made at maximum power. Calculate the coupled power by subtracting the measurements made in this step from the reference power level. The absolute ACCP values must be less than the values given in the table for each condition.

Measuring the power level at the frequency offset >600 kHz - Part 90 §90.543(b)(3): Set the spectrum analyzer to 30 kHz resolution bandwidth, 1 MHz video bandwidth and sample detection mode. Sweep +/- 6 MHz from the carrier frequency. Set the reference level to the RMS value of the transmitter power and note the power. The response at frequencies >600 kHz must be less than the values listed in the table.

6.2 Test Data

Plot 6-1: P25 Mode – 769.0125 MHz - 12.5 kHz Channel Spacing

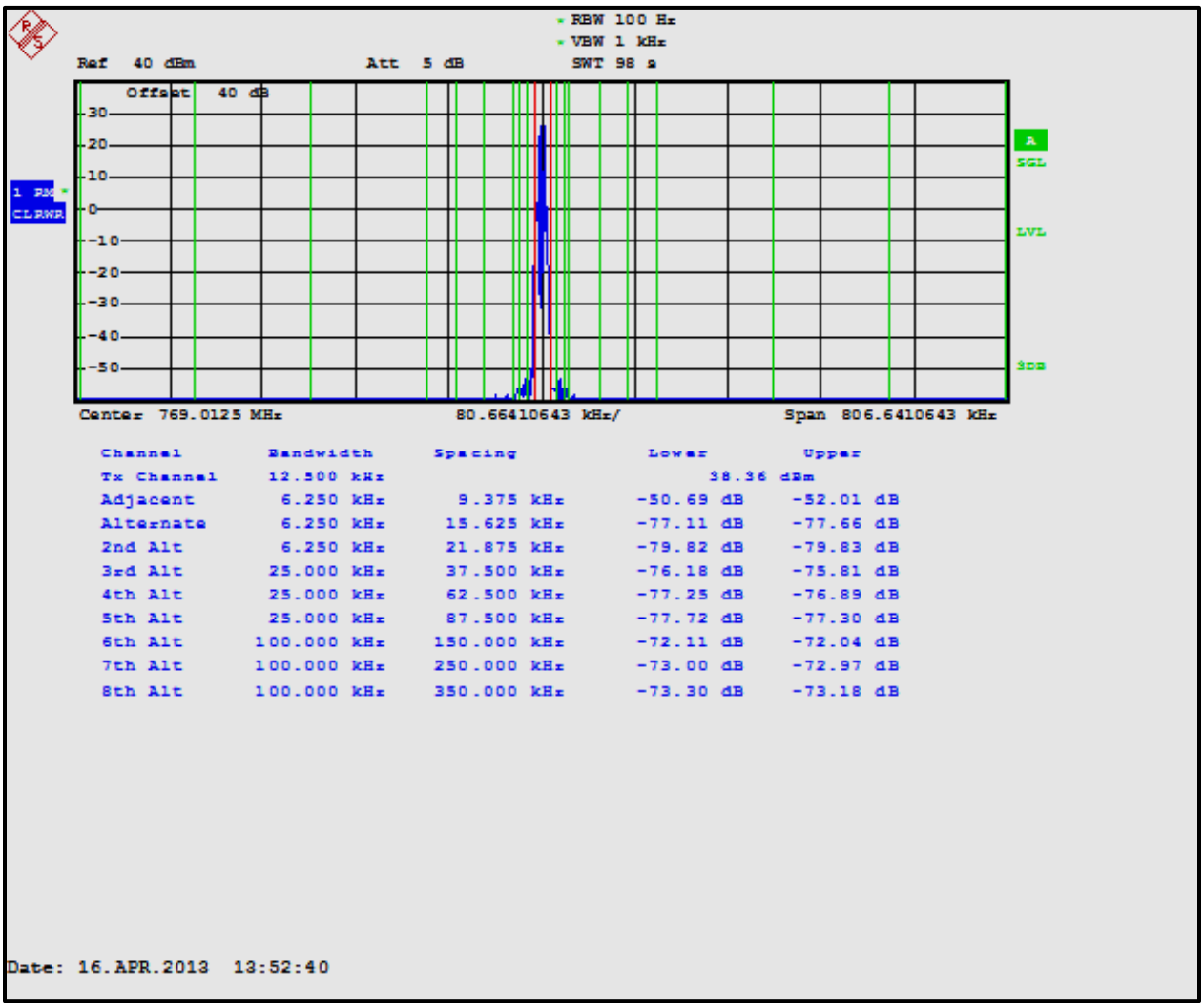


Table 6-1: P25 Mode – 769.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-86.2
12 MHz to receive band	30(s)	-75	-101.0
In receive band	30(s)	-100	-101.4

Plot 6-2: P25 Mode – 775.0125 MHz - 12.5 kHz Channel Spacing

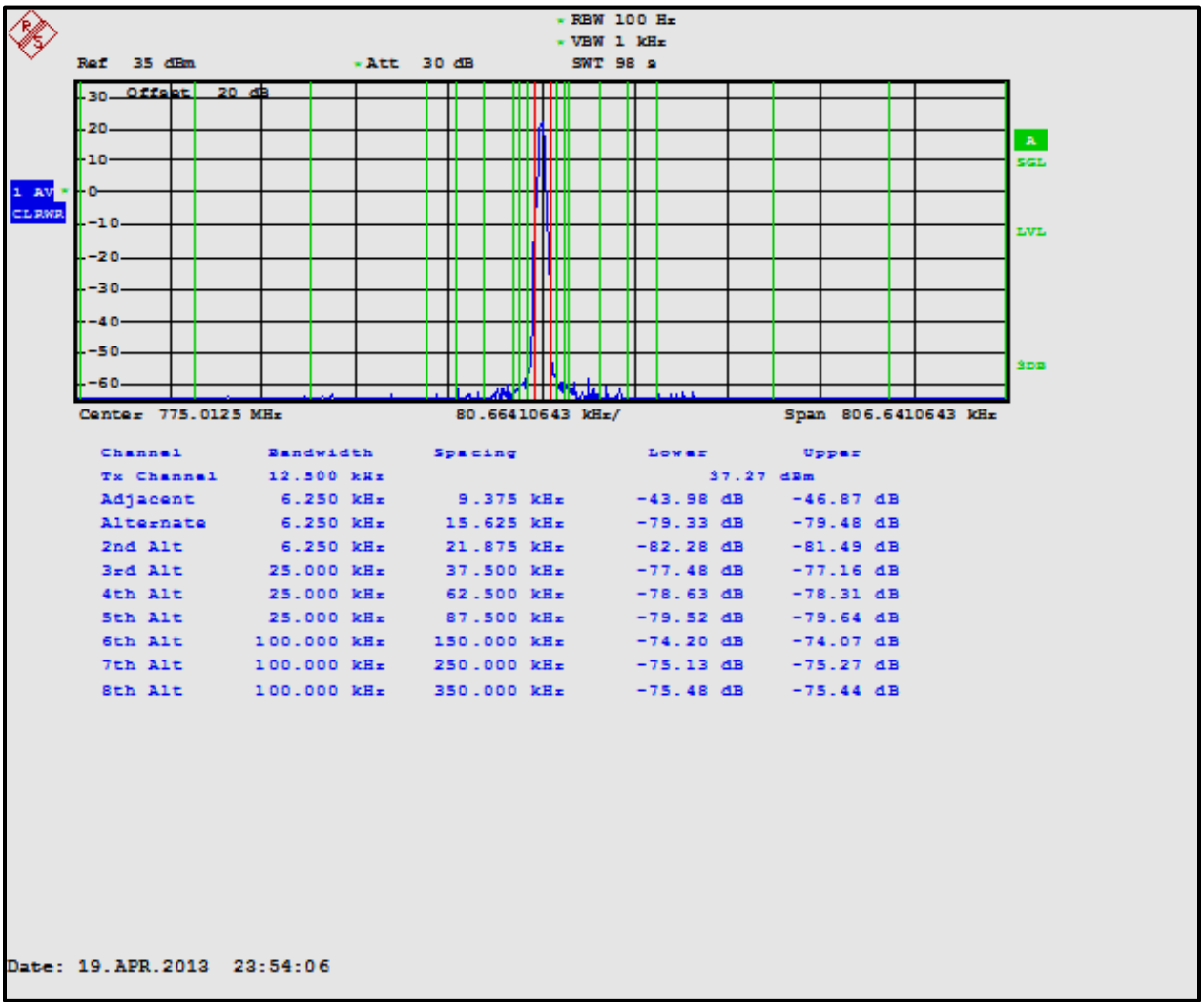


Table 6-2: P25 Mode – 775.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-93.7
12 MHz to receive band	30(s)	-75	-99.0
In receive band	30(s)	-100	-101.9

Plot 6-3: P25 Mode – 794.0125 MHz - 12.5 kHz Channel Spacing

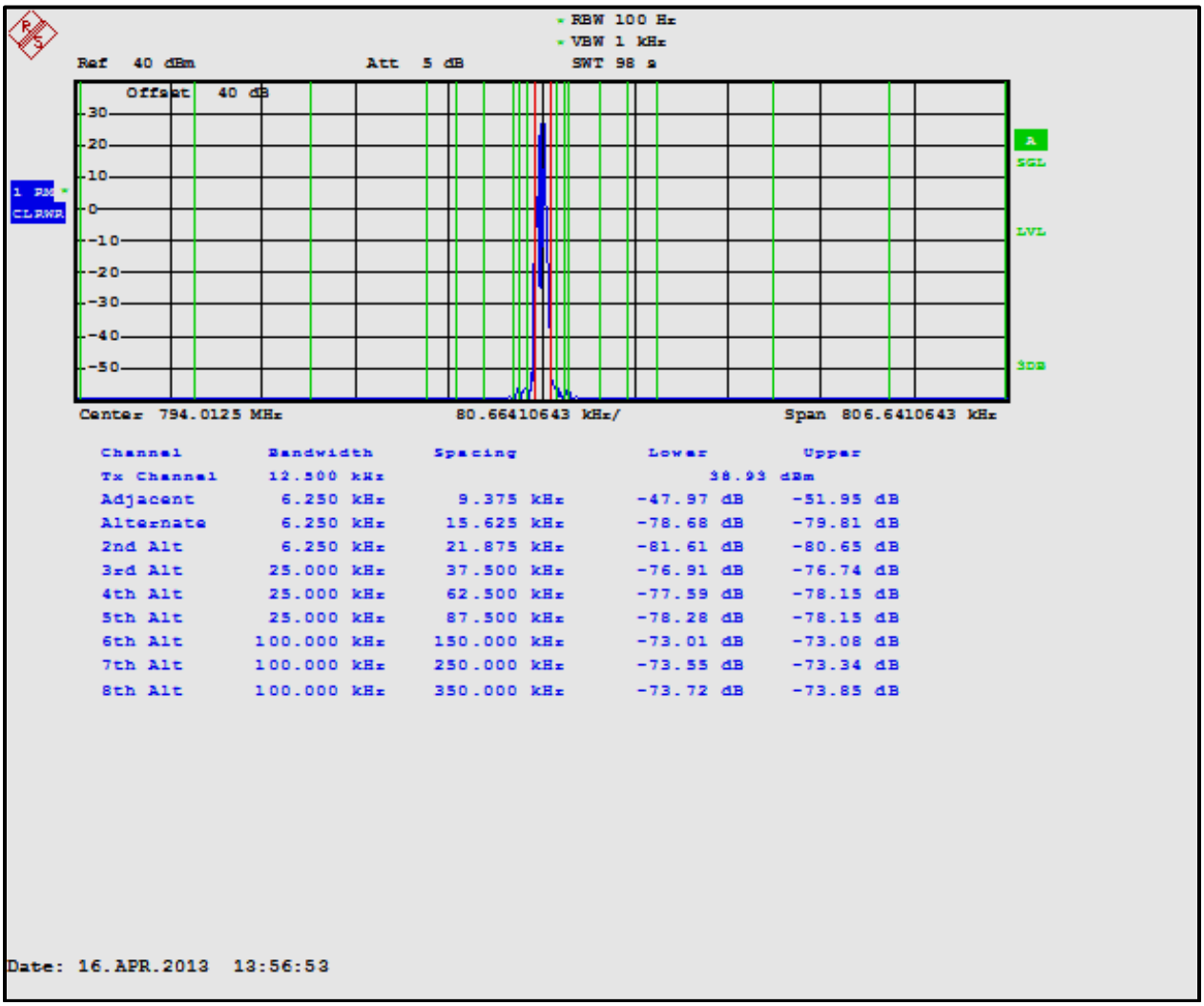


Table 6-3: P25 Mode – 794.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-84.7
12 MHz to receive band	30(s)	-75	-101.8
In receive band	30(s)	-100	-101.8

Plot 6-4: P25 Mode – 799.0125 MHz - 12.5 kHz Channel Spacing

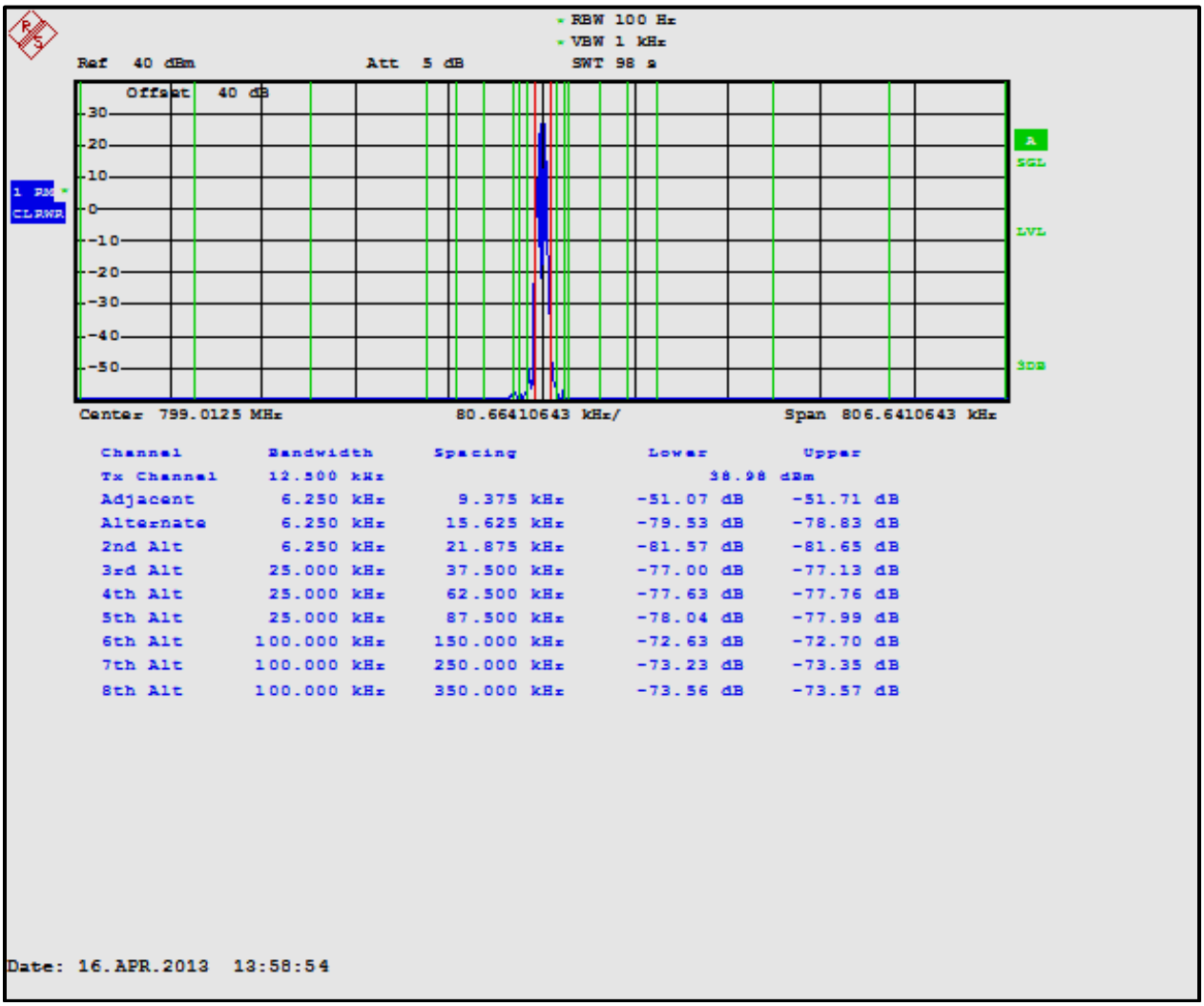


Table 6-4: P25 Mode - 799.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-94.0
12 MHz to receive band	30(s)	-75	-95.6
In receive band	30(s)	-100	-103.2

Plot 6-5: P25 Mode – 805.9875 MHz - 12.5 kHz Channel Spacing

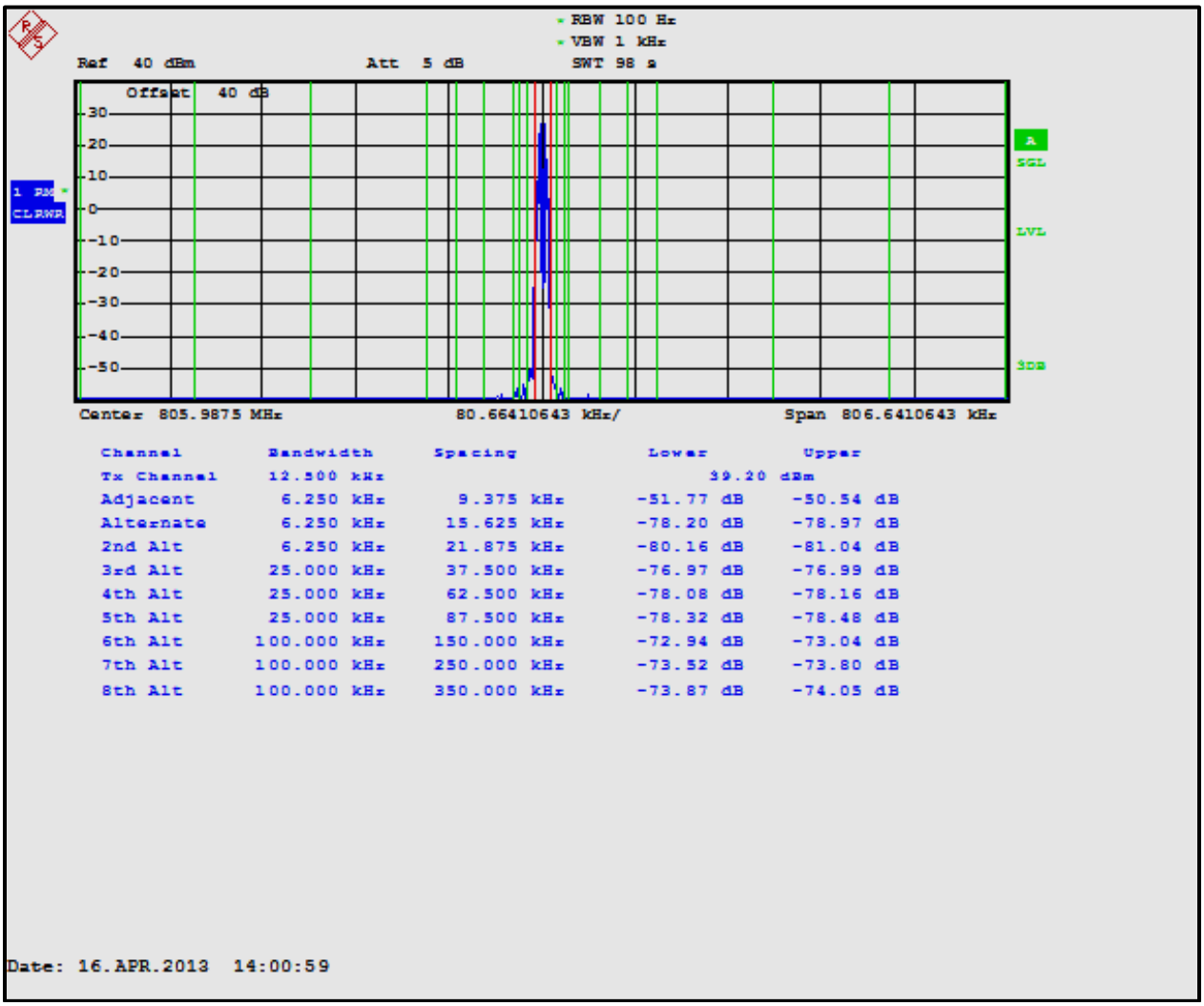
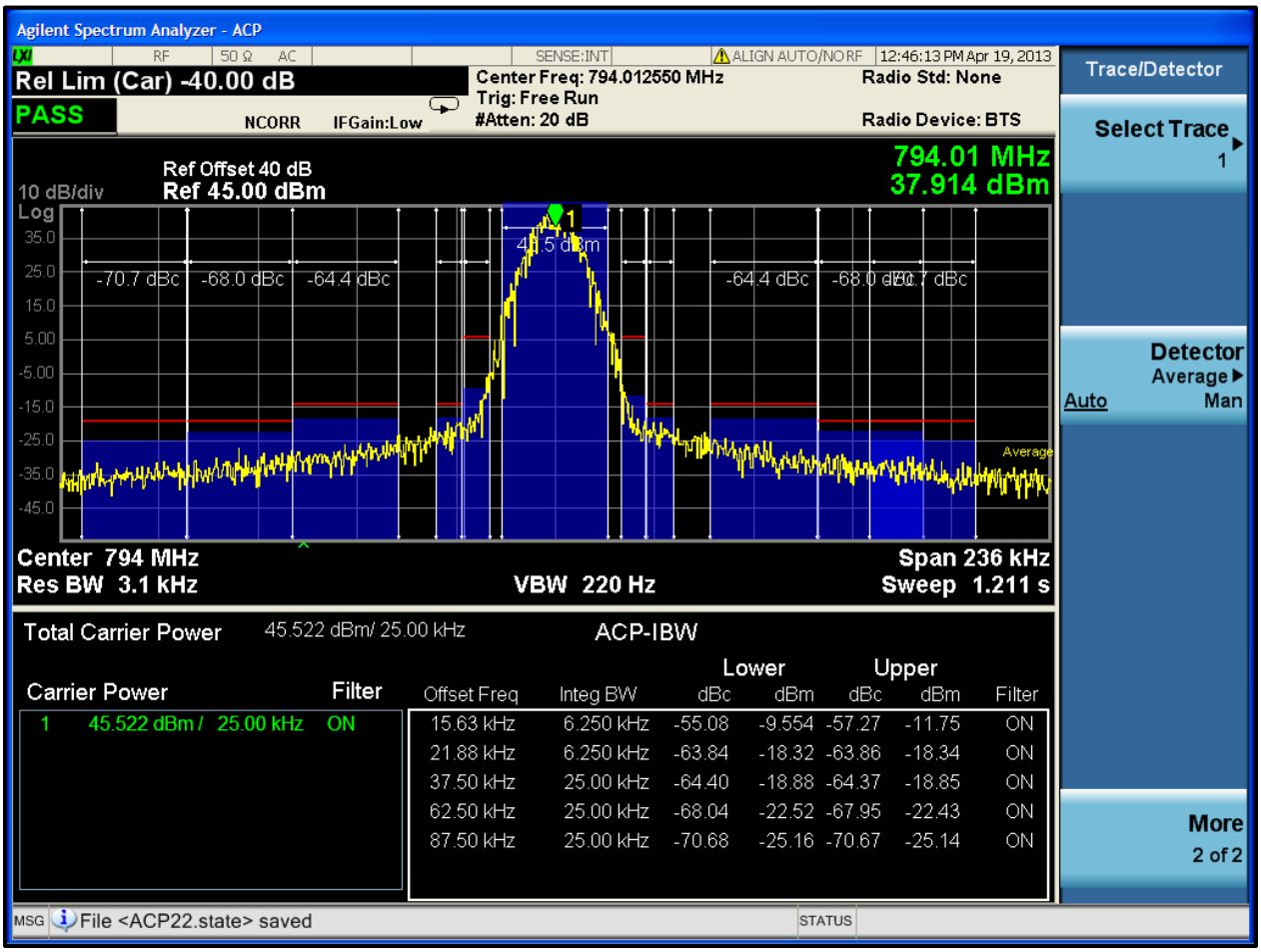


Table 6-5: P25 Mode – 805.9875 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-85.5
12 MHz to receive band	30(s)	-75	-100.8
In receive band	30(s)	-100	-102.2

Plot 6-6: OTP SMR Mode – 794.0125 MHz - 25 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-7: OTP SMR Mode – 794.0125 MHz - 25 kHz Channel Spacing – 150 kHz – 350 kHz

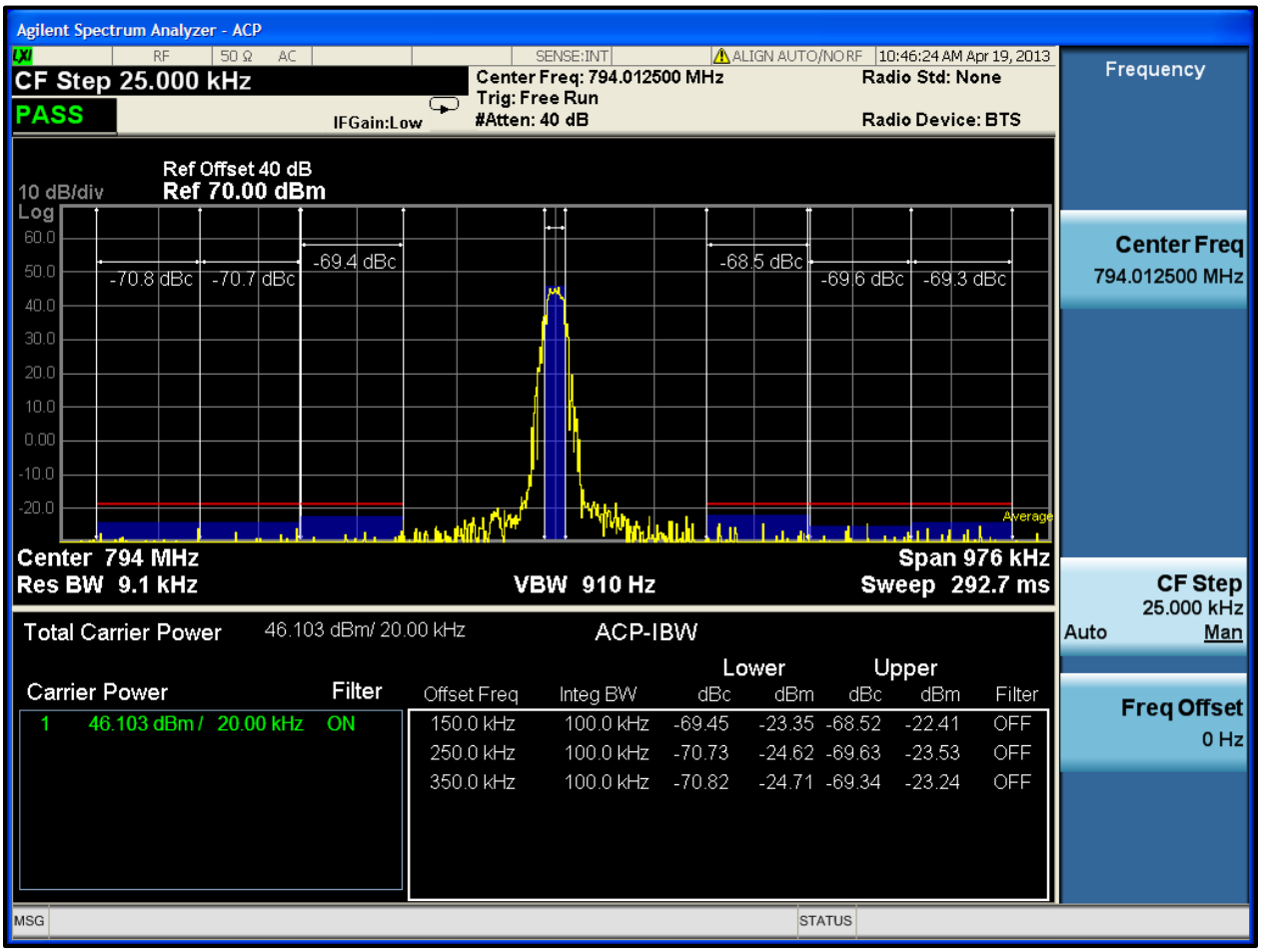
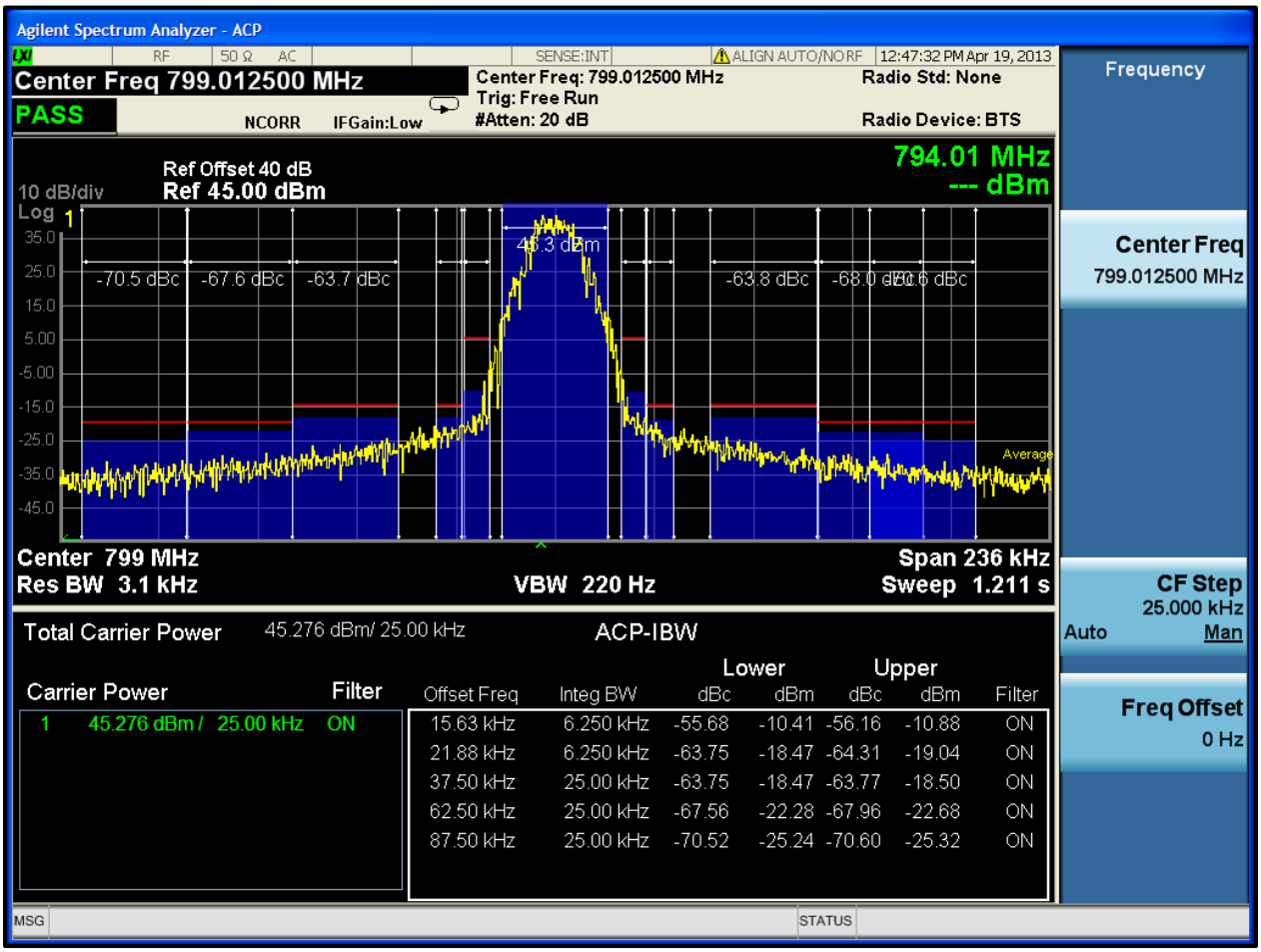


Table 6-6: OTP SMR Mode – 794.0125 MHz - 25 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-86.3
12 MHz to receive band	30(s)	-75	-101.4
In receive band	30(s)	-100	-102.6

Plot 6-8: OTP SMR Mode - 799.0125 MHz - 25 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-9: OTP SMR Mode - 799.0125 MHz - 25 kHz Channel Spacing – 150 kHz – 350 kHz

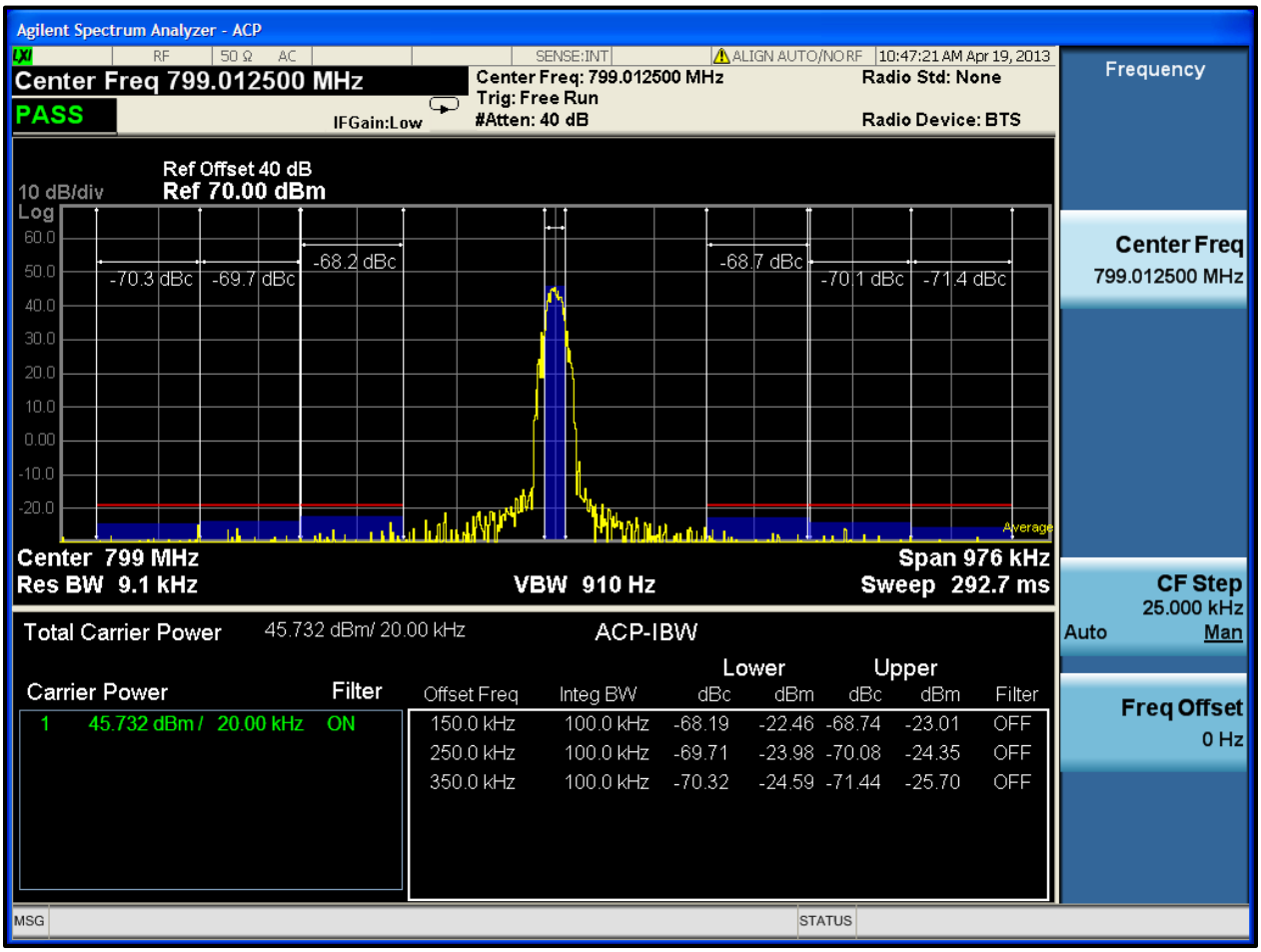
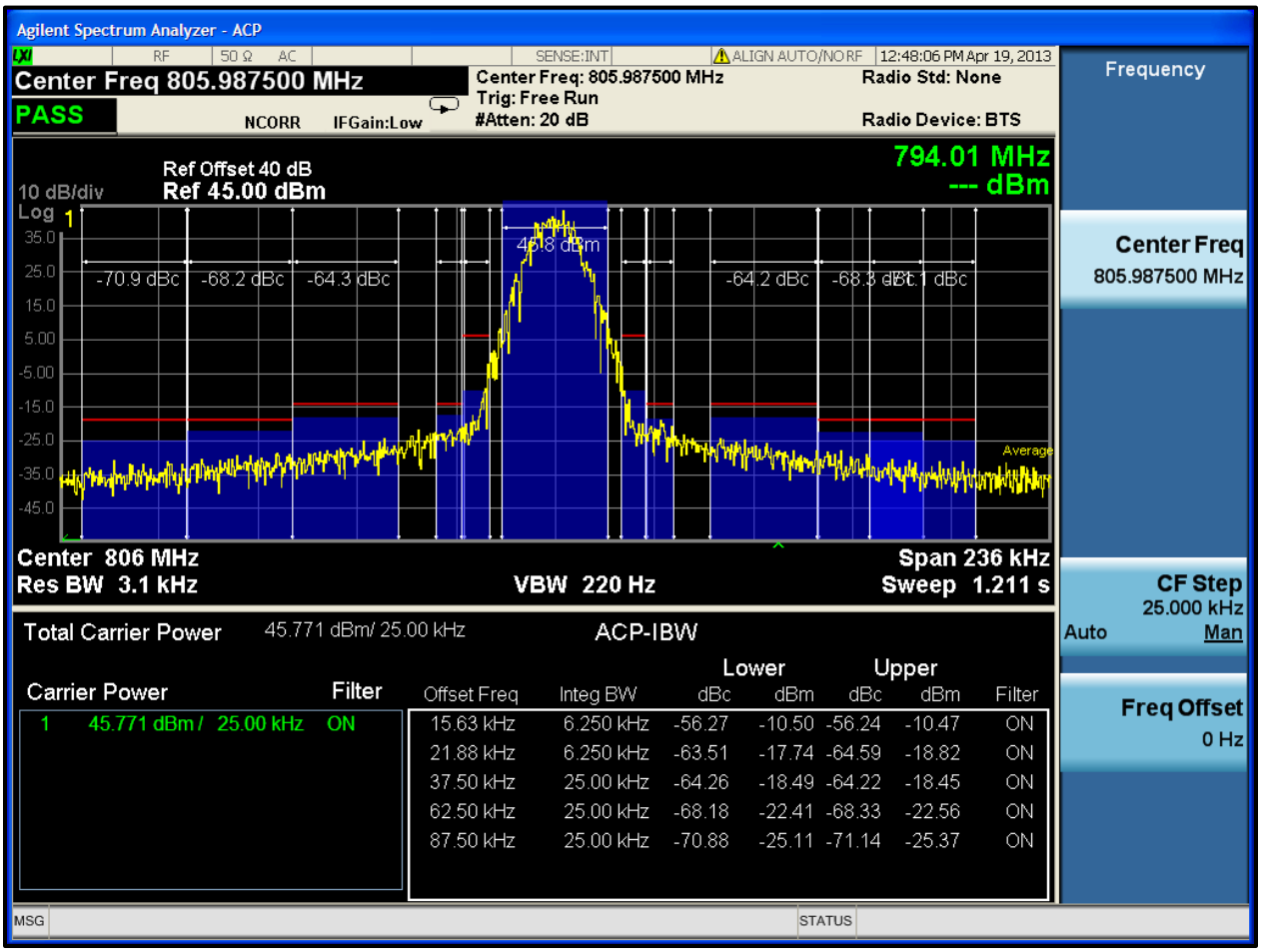


Table 6-7: OTP SMR Mode - 799.0125 MHz - 25 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-94.2
12 MHz to receive band	30(s)	-75	-96.5
In receive band	30(s)	-100	-102.8

Plot 6-10: OTP SMR – 805.9875 MHz - 25 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-11: OTP SMR – 805.9875 MHz - 25 kHz Channel Spacing – 150 kHz – 350 kHz

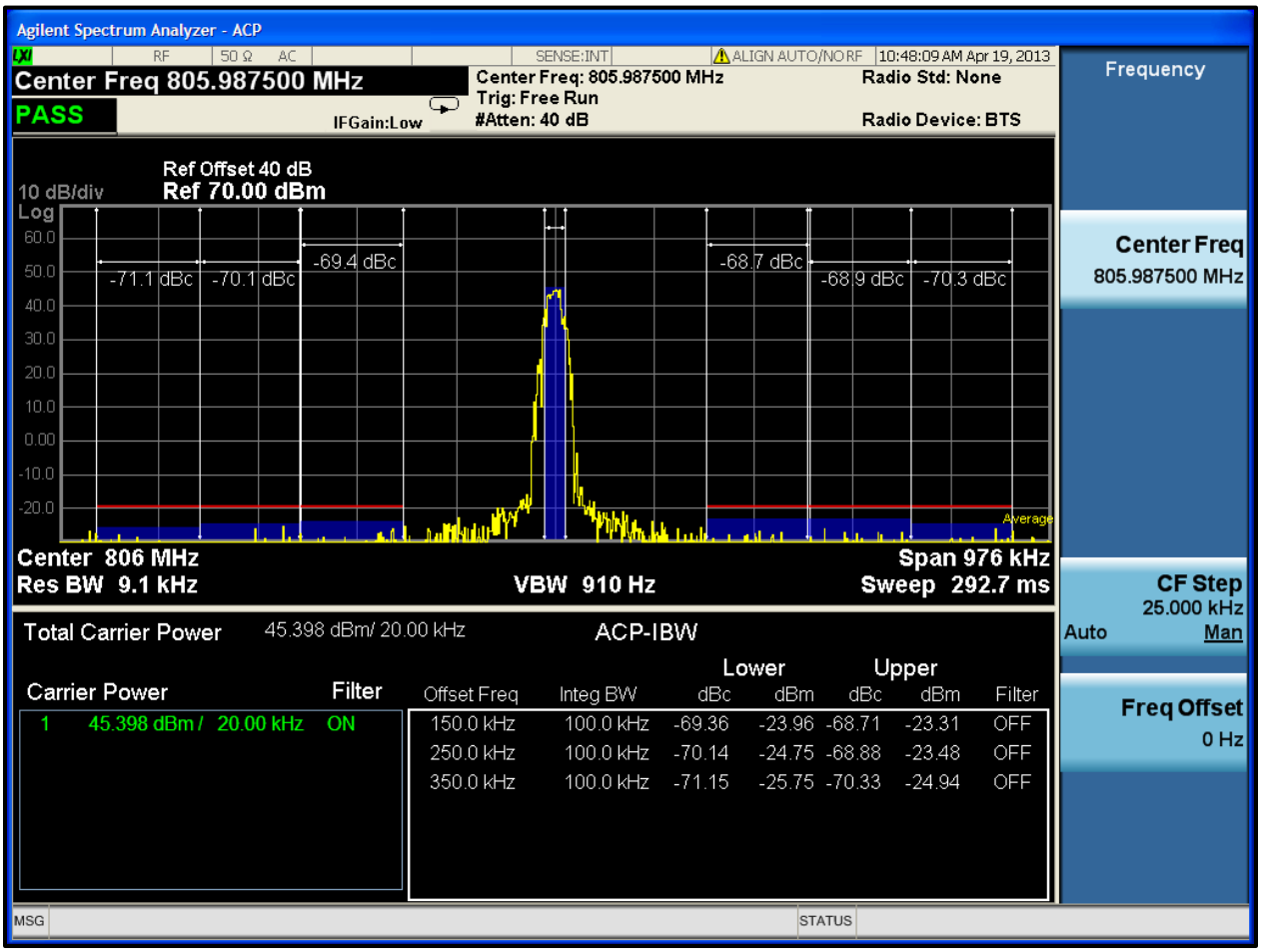


Table 6-8: OTP SMR – 805.9875 MHz - 25 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-86.3
12 MHz to receive band	30(s)	-75	-102.5
In receive band	30(s)	-100	-102.7

Plot 6-12: OTP NB – 794.0125 MHz - 12.5 kHz Channel Spacing

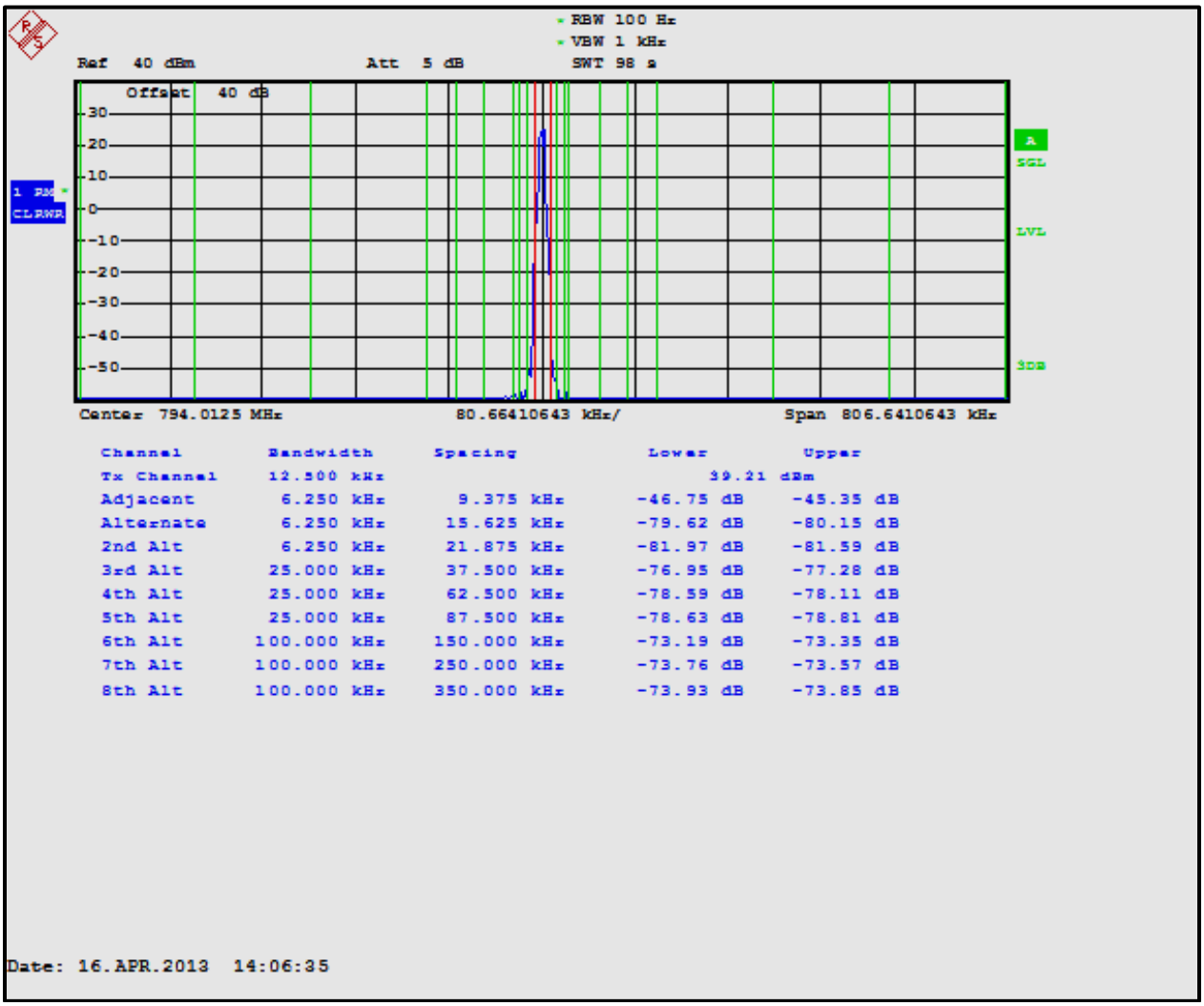


Table 6-9: OTP NB – 794.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-86.2
12 MHz to receive band	30(s)	-75	-100.6
In receive band	30(s)	-100	-101.4

Plot 6-13: OTP NB - 799.0125 MHz - 12.5 kHz Channel Spacing

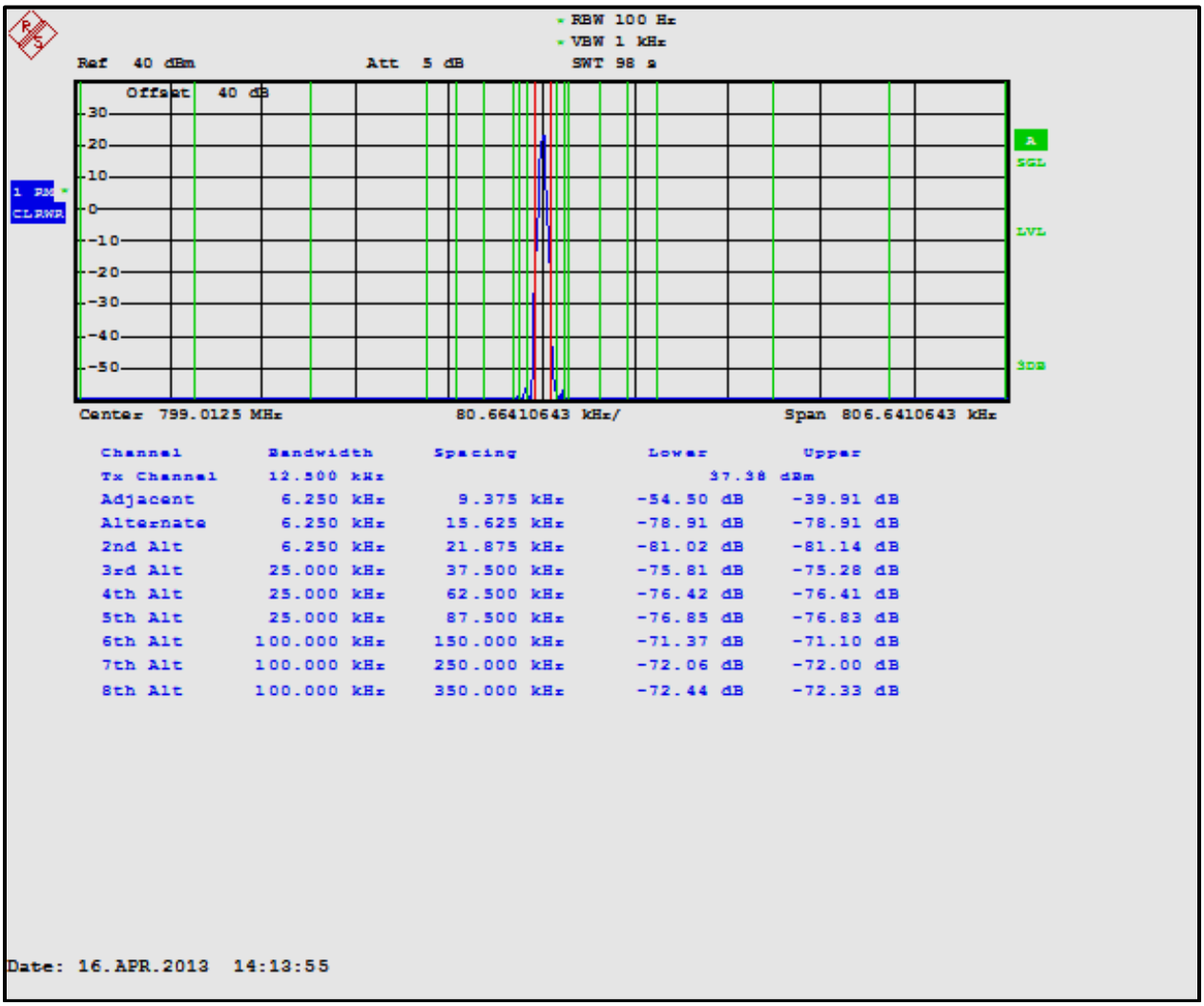


Table 6-10: OTP NB - 799.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-85.3
12 MHz to receive band	30(s)	-75	-97.1
In receive band	30(s)	-100	-102.7

Plot 6-14: OTP NB – 805.9875 MHz - 12.5 kHz Channel Spacing

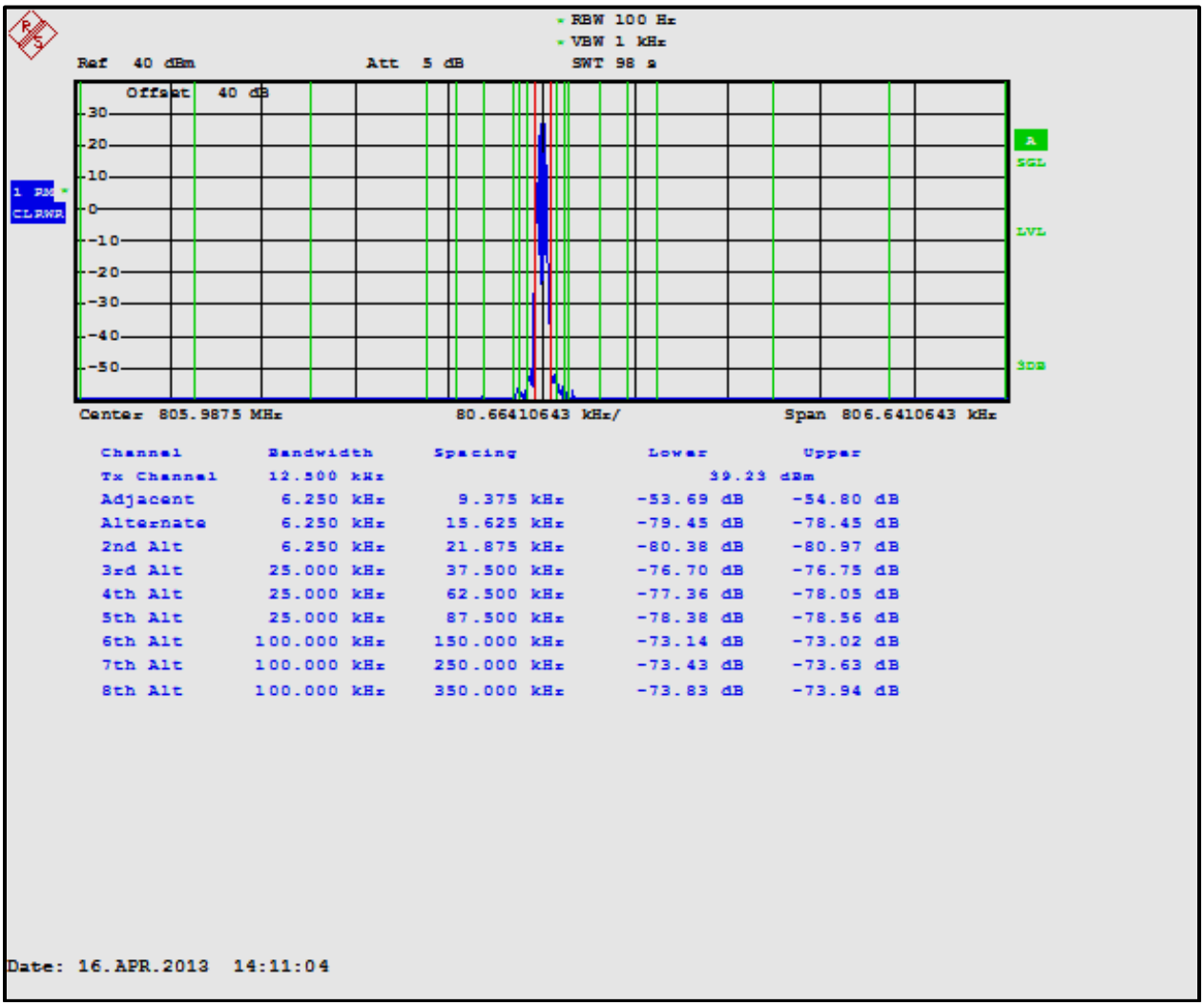
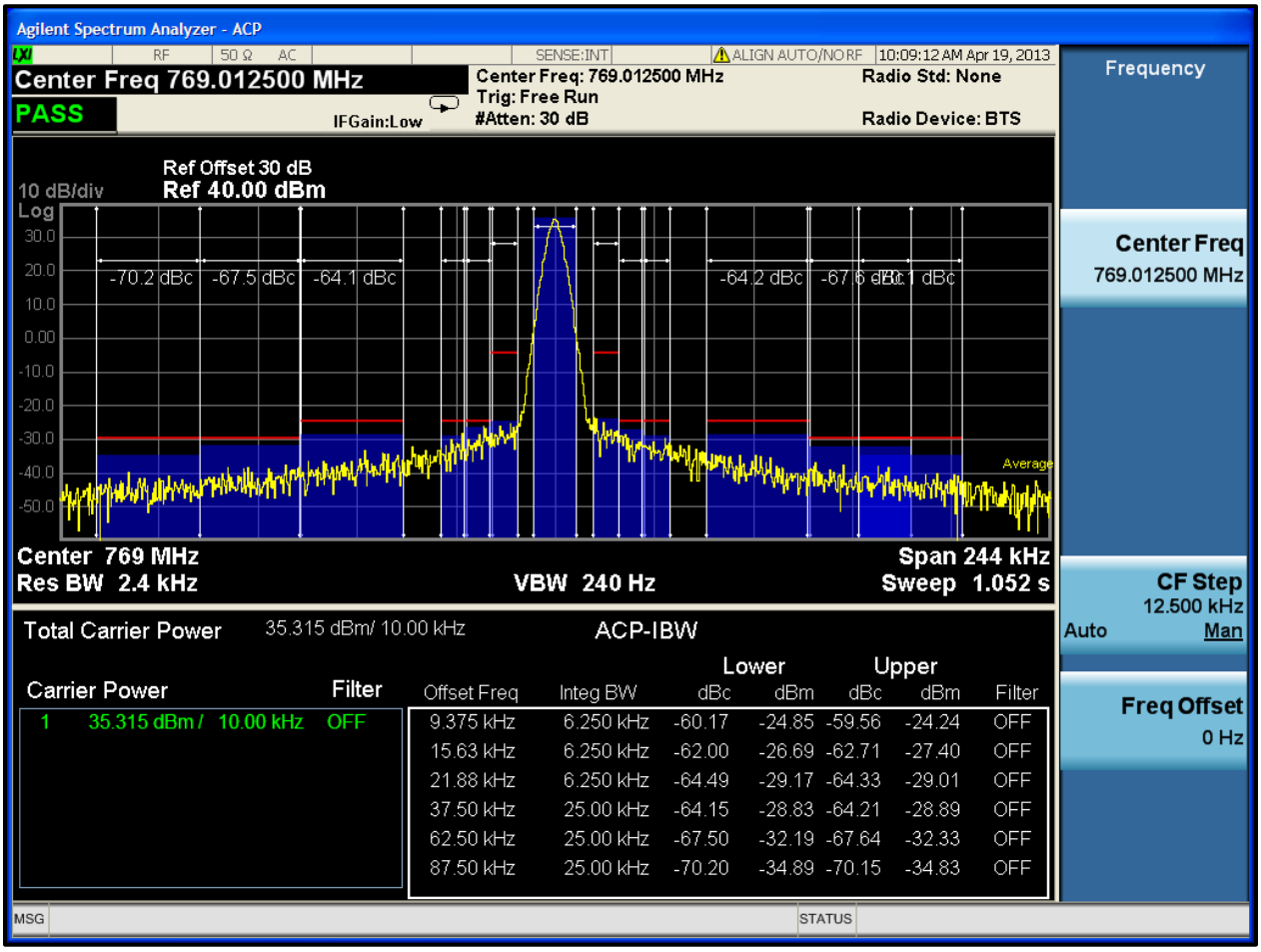


Table 6-11: OTP NB – 805.9875 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-84.6
12 MHz to receive band	30(s)	-75	-101.7
In receive band	30(s)	-100	-103.2

Plot 6-15: Analog NB Talkaround Mode – 769.0125 MHz - 12.5 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-16: Analog NB Talkaround Mode - 769.0125 MHz - 12.5 kHz Channel Spacing - 150 kHz – 350 kHz

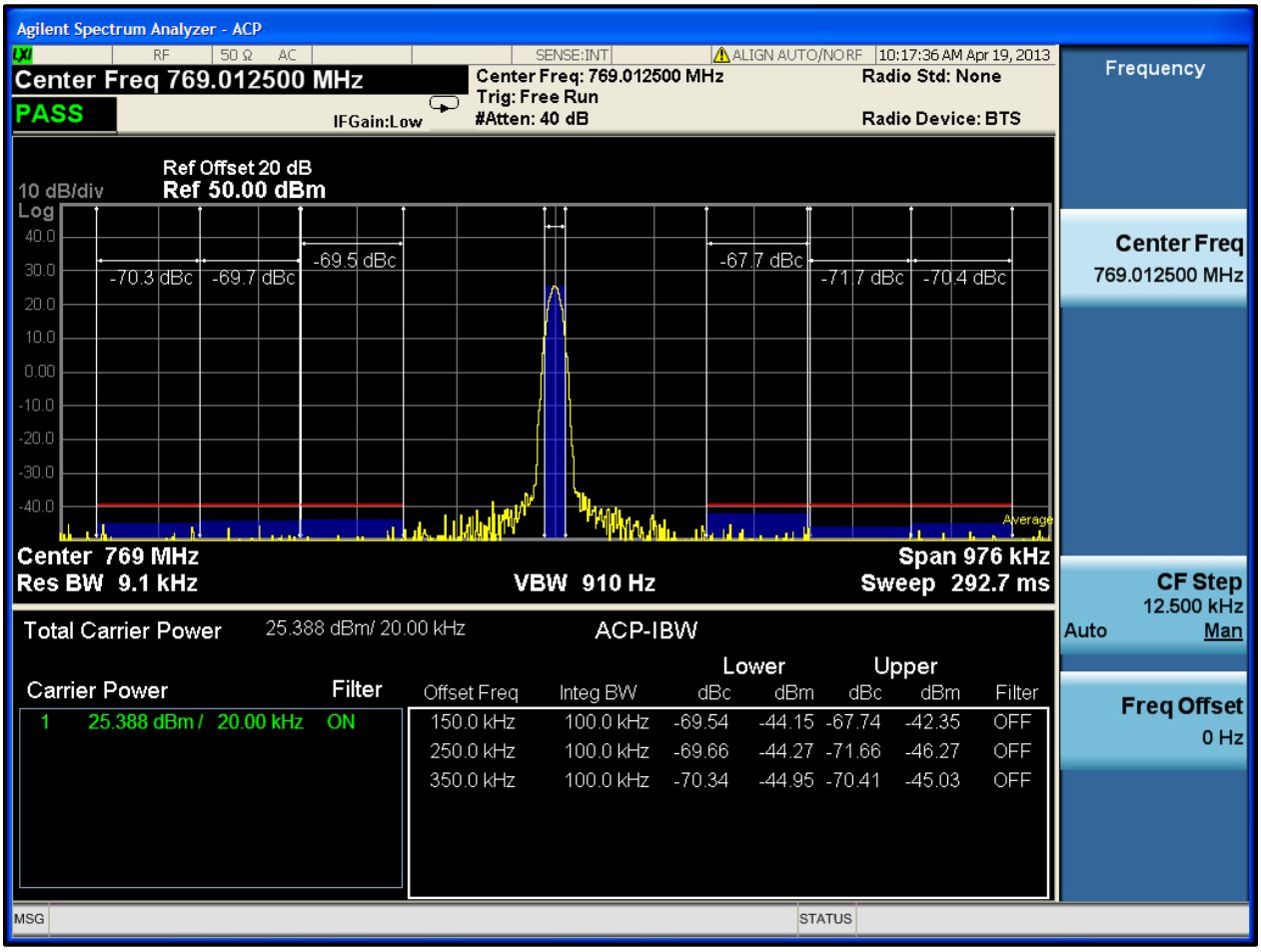
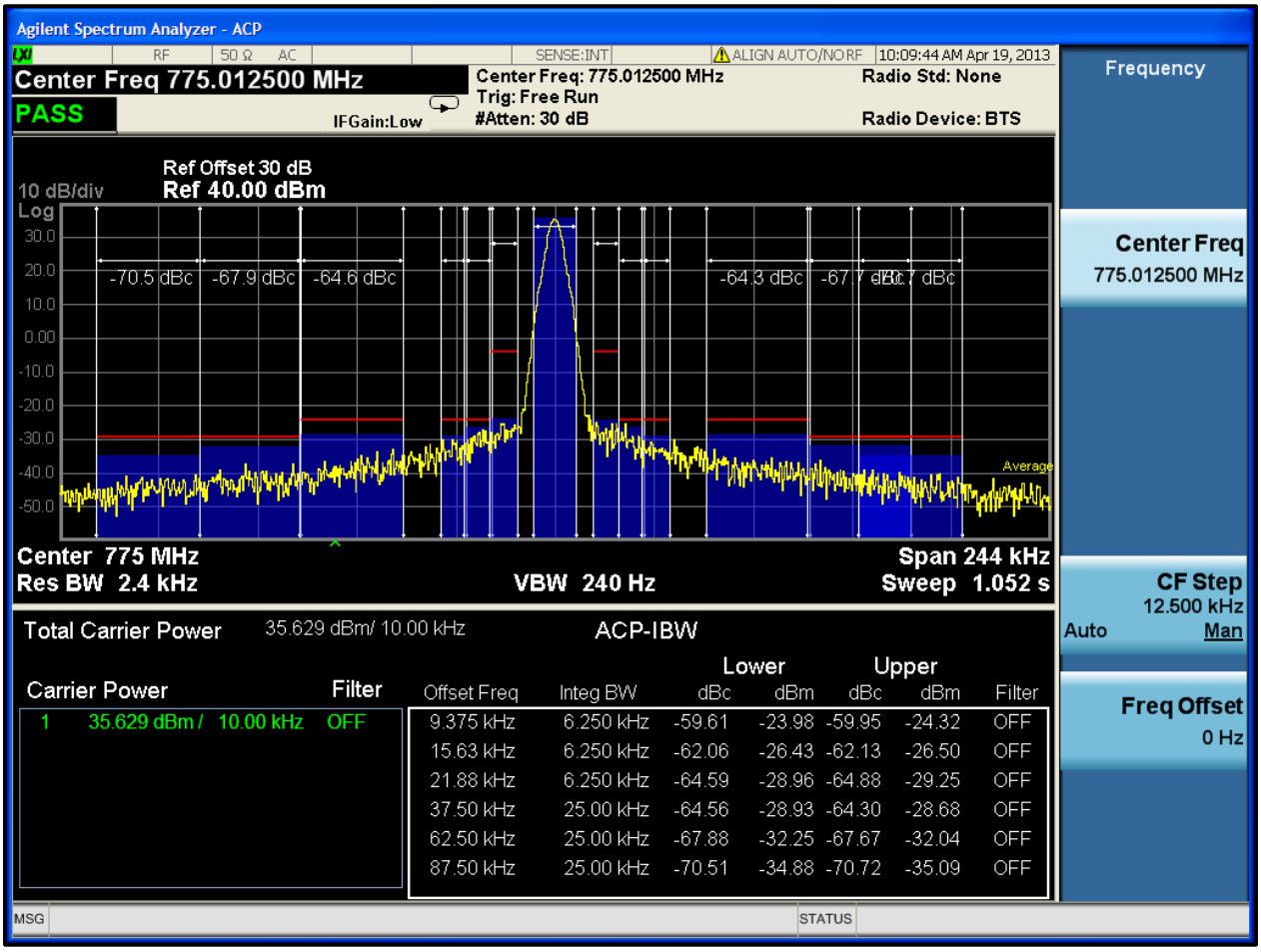


Table 6-12: Analog NB Talkaround Mode – 769.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-82.8
12 MHz to receive band	30(s)	-75	-99.7
In receive band	30(s)	-100	-102.8

Plot 6-17: Analog NB Talkaround Mode – 775.0125 MHz - 12.5 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-18: Analog NB Talkaround Mode - 775.0125 MHz - 12.5 kHz Channel Spacing - 150 kHz – 350 kHz

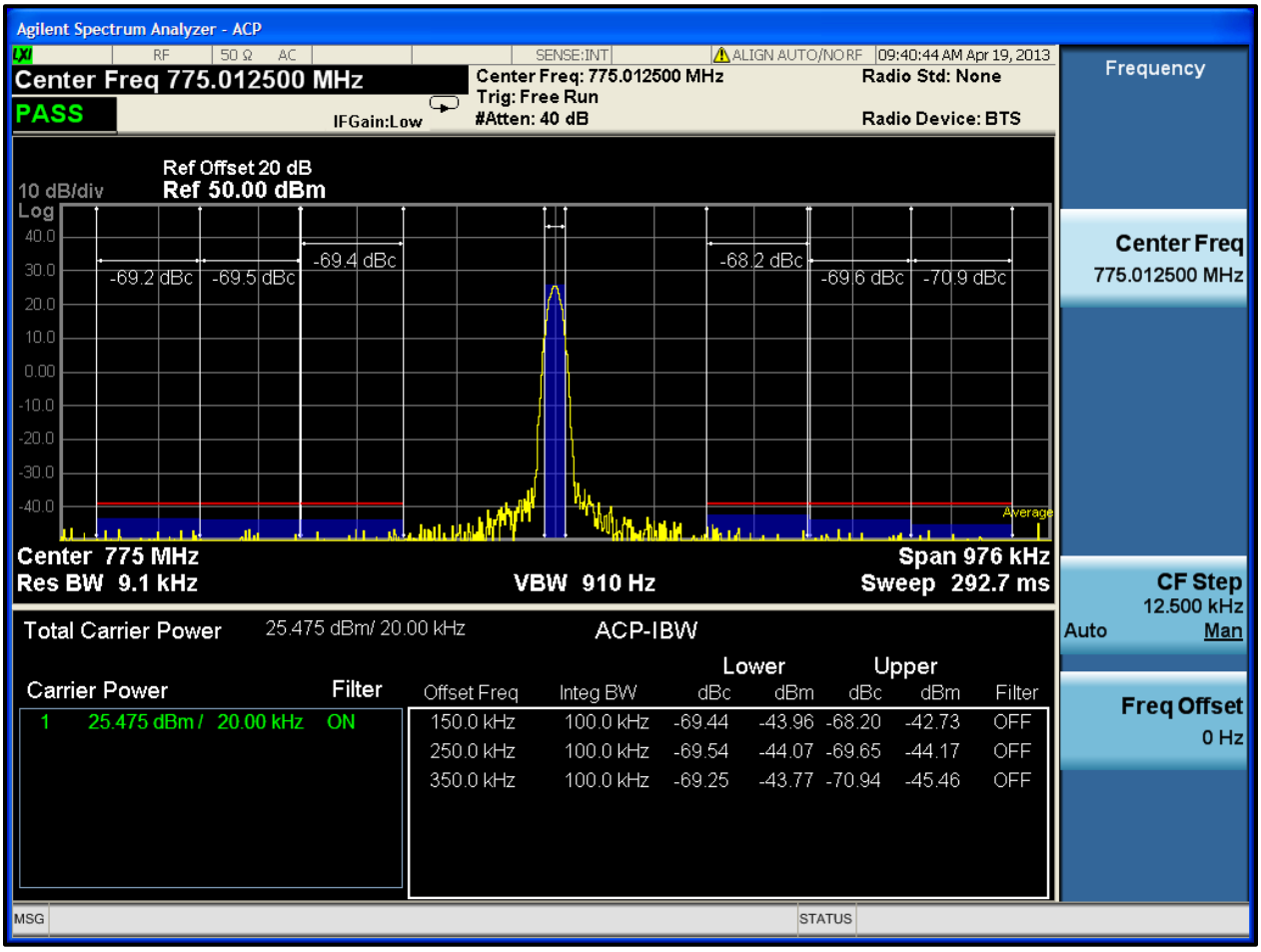
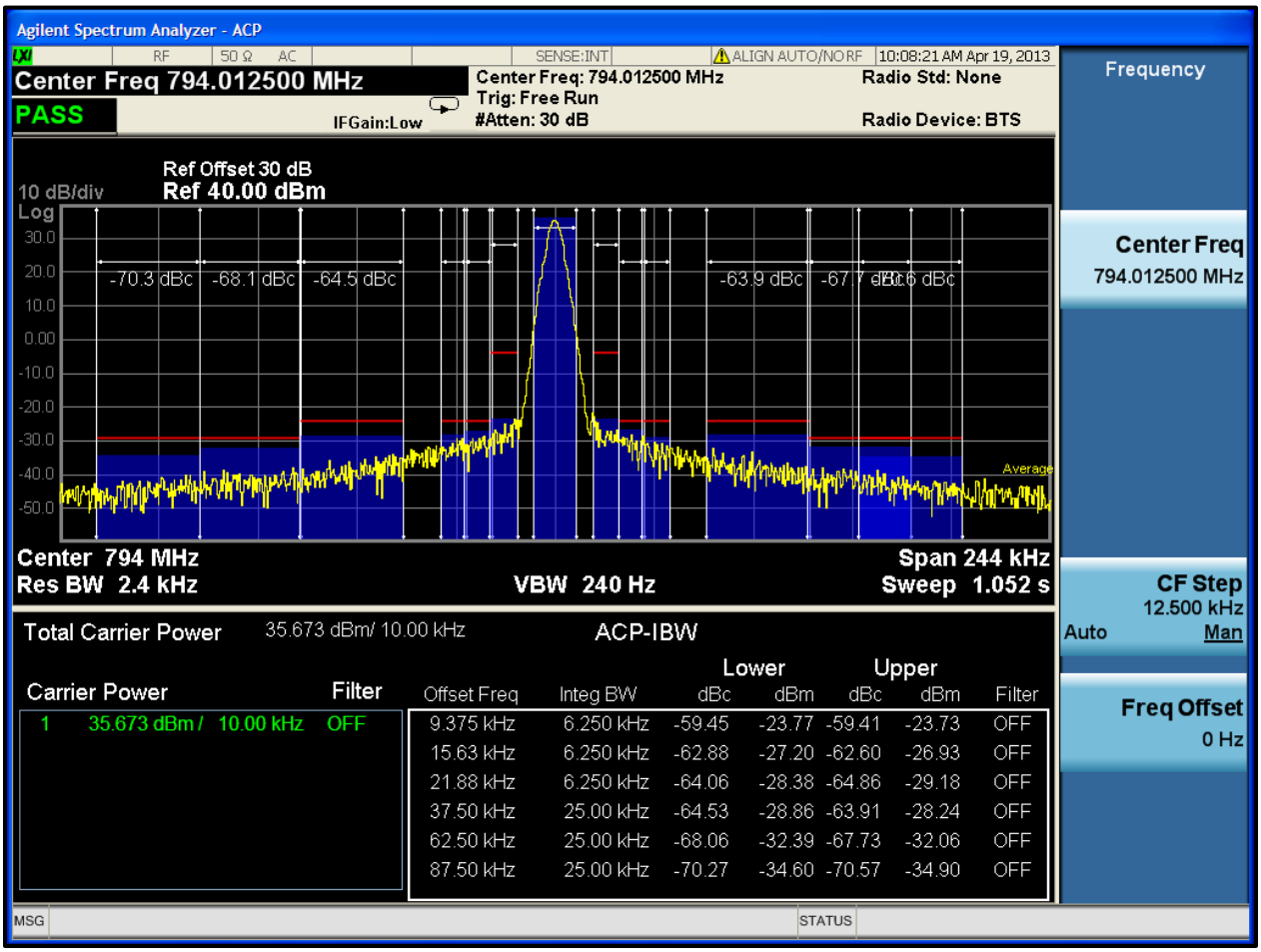


Table 6-13: Analog NB Talkaround Mode – 775.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-82.3
12 MHz to receive band	30(s)	-75	-98.5
In receive band	30(s)	-100	-101.3

Plot 6-19: Analog NB – 794.0125 MHz - 12.5 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-20: Analog NB Talkaround Mode - 794.0125 MHz - 12.5 kHz Channel Spacing - 150 kHz – 350 kHz

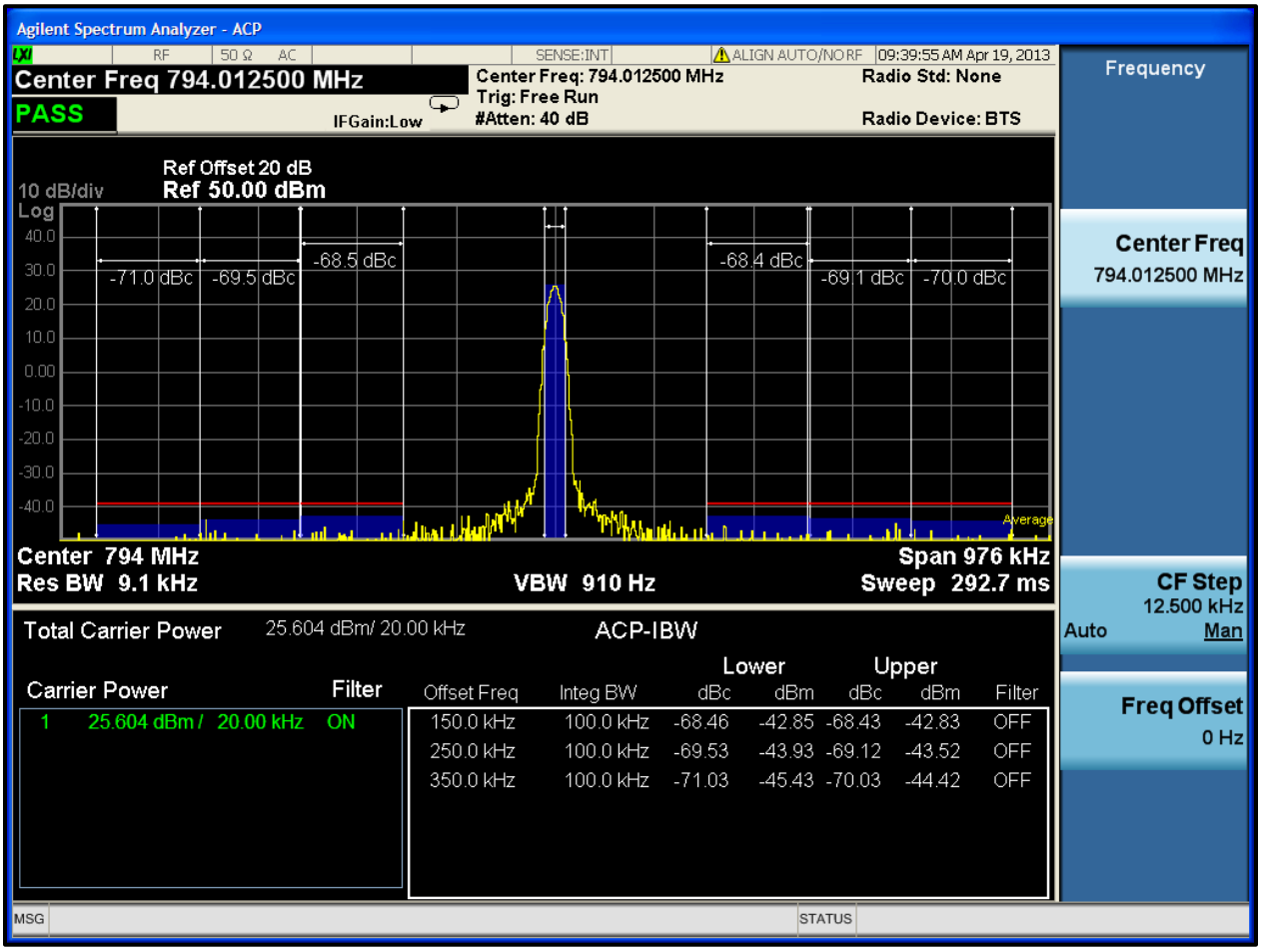
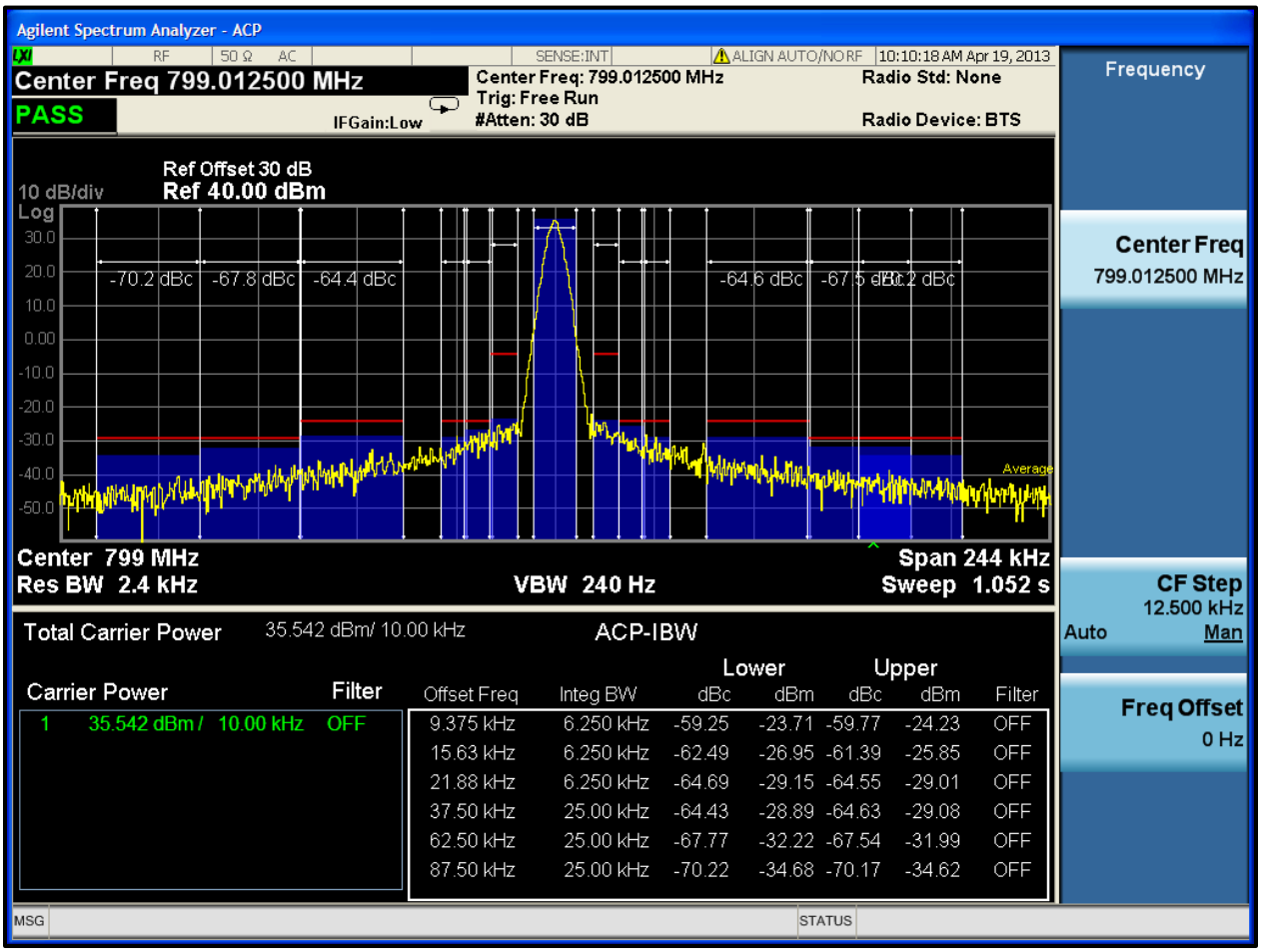


Table 6-14: Analog NB – 794.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-83.3
12 MHz to receive band	30(s)	-75	-100.0
In receive band	30(s)	-100	-101.4

Plot 6-21: Analog NB – 799.0125 MHz - 12.5 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-22: Analog NB Talkaround Mode - 799.0125 MHz - 12.5 kHz Channel Spacing - 150 kHz – 350 kHz

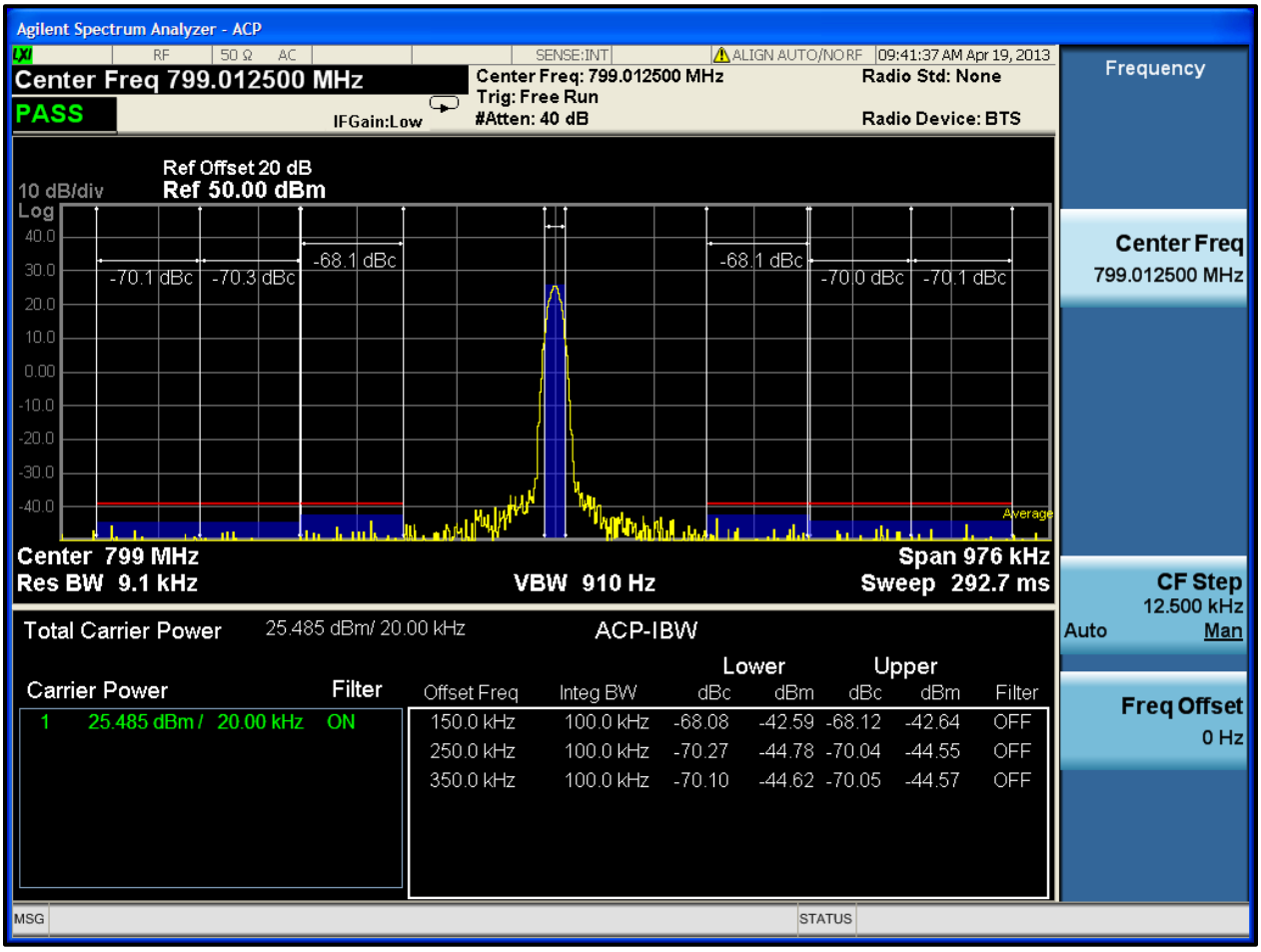
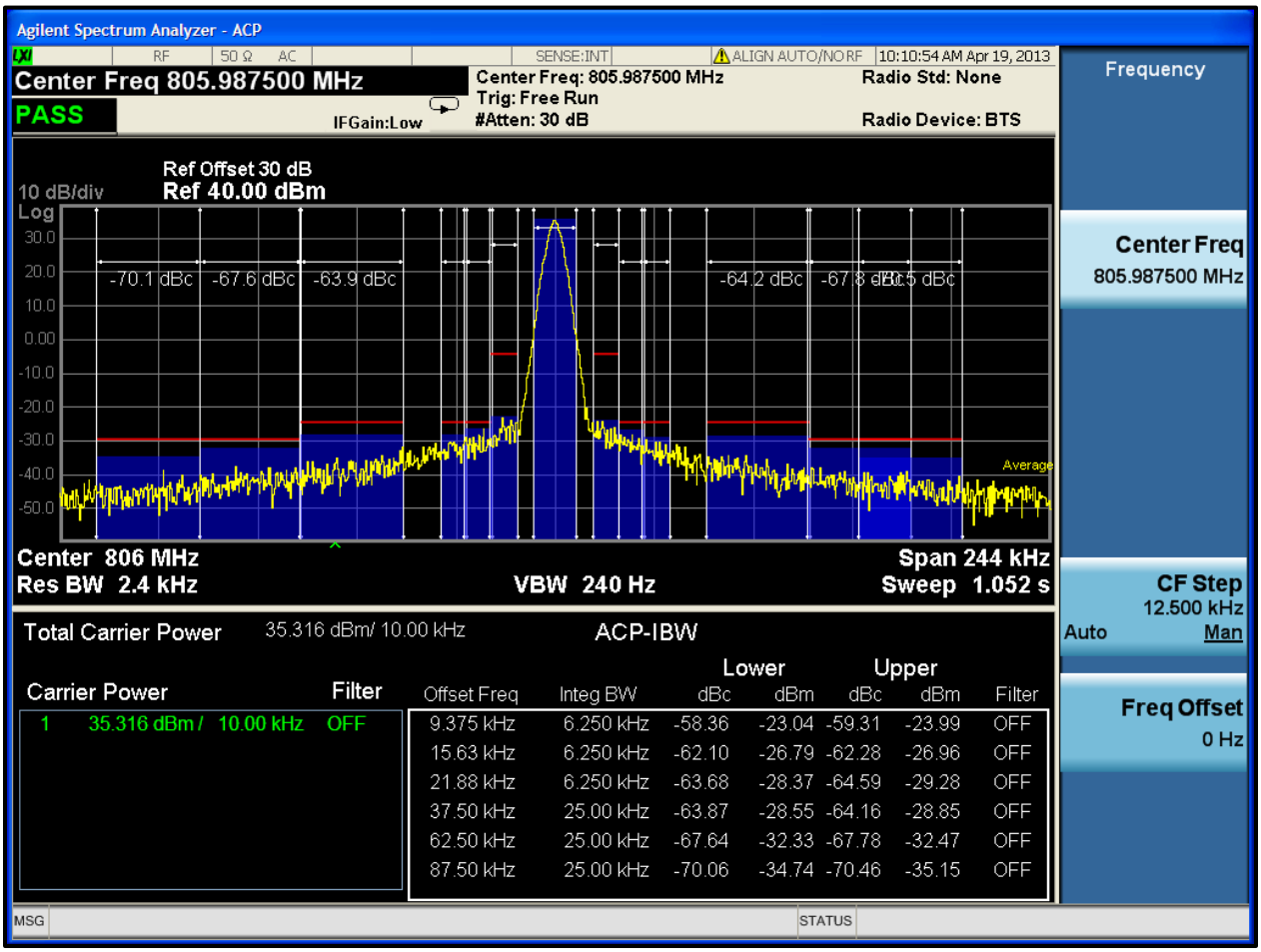


Table 6-15: Analog NB – 799.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-83.3
12 MHz to receive band	30(s)	-75	-99.7
In receive band	30(s)	-100	-101.4

Plot 6-23: Analog NB – 805.9875 MHz - 12.5 kHz Channel Spacing - 9.375 kHz – 87.5 kHz



Plot 6-24: Analog NB Talkaround Mode – 805.9875 MHz - 12.5 kHz Channel Spacing - 150 kHz – 350 kHz

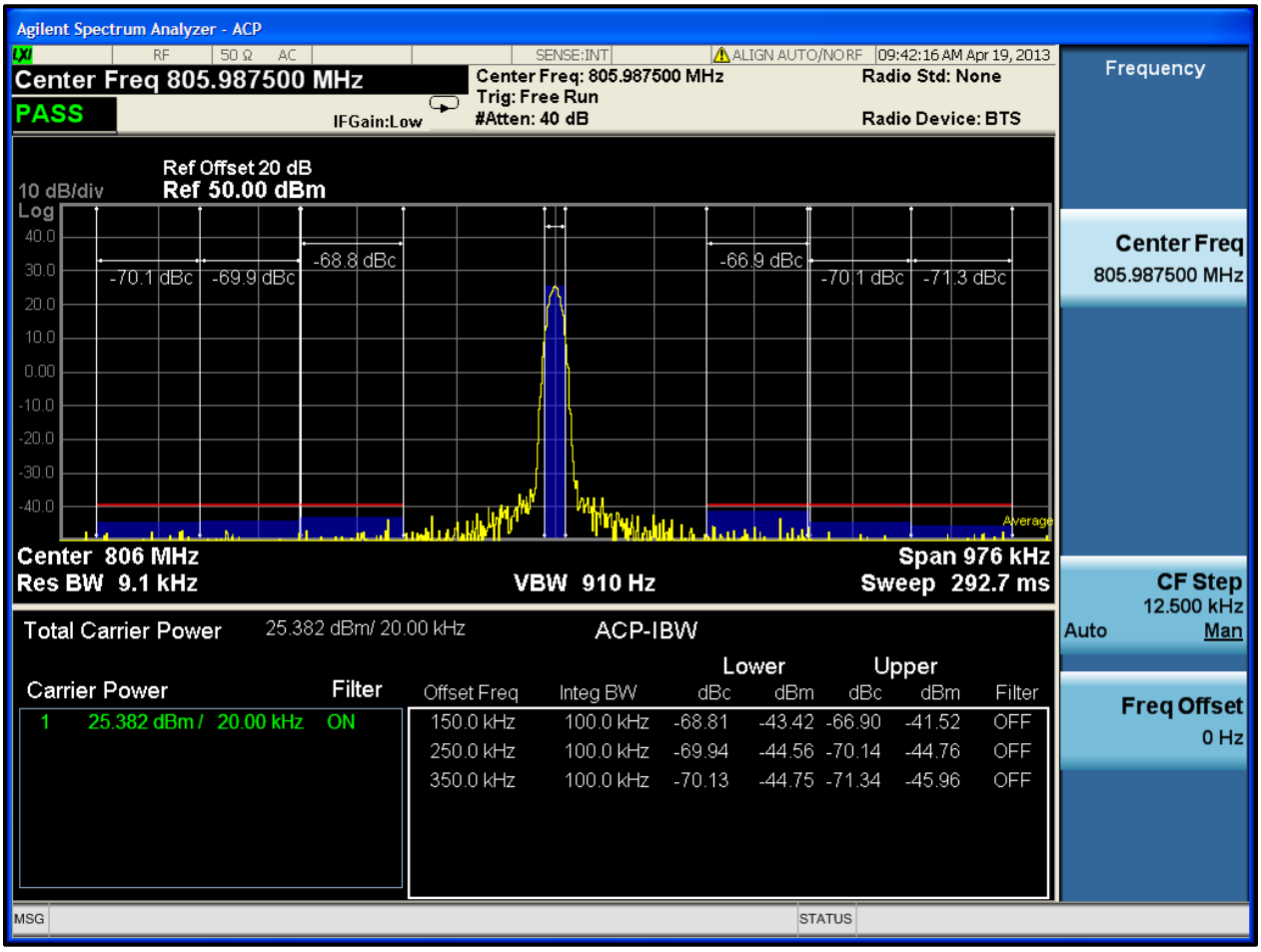


Table 6-16: Analog NB – 805.9875 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-83.0
12 MHz to receive band	30(s)	-75	-100.3
In receive band	30(s)	-100	-101.9

Plot 6-25: H-CPM P25 Mode – 794.0125 MHz - 12.5 kHz Channel Spacing

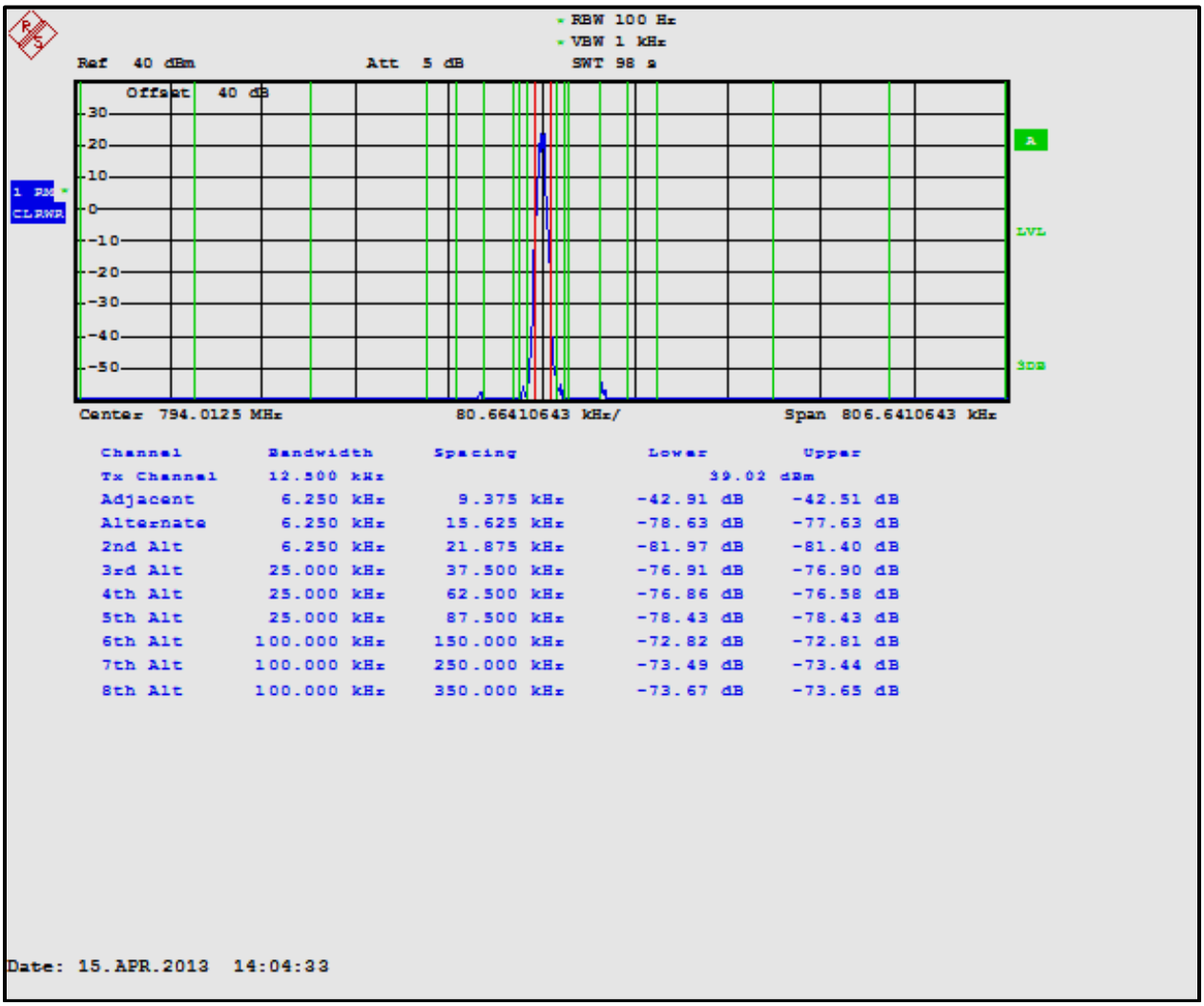


Table 6-17: H-CPM P25 Mode – 794.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-84.7
12 MHz to receive band	30(s)	-75	-101.8
In receive band	30(s)	-100	-101.8

Plot 6-26: H-CPM P25 Mode – 799.0125 MHz - 12.5 kHz Channel Spacing

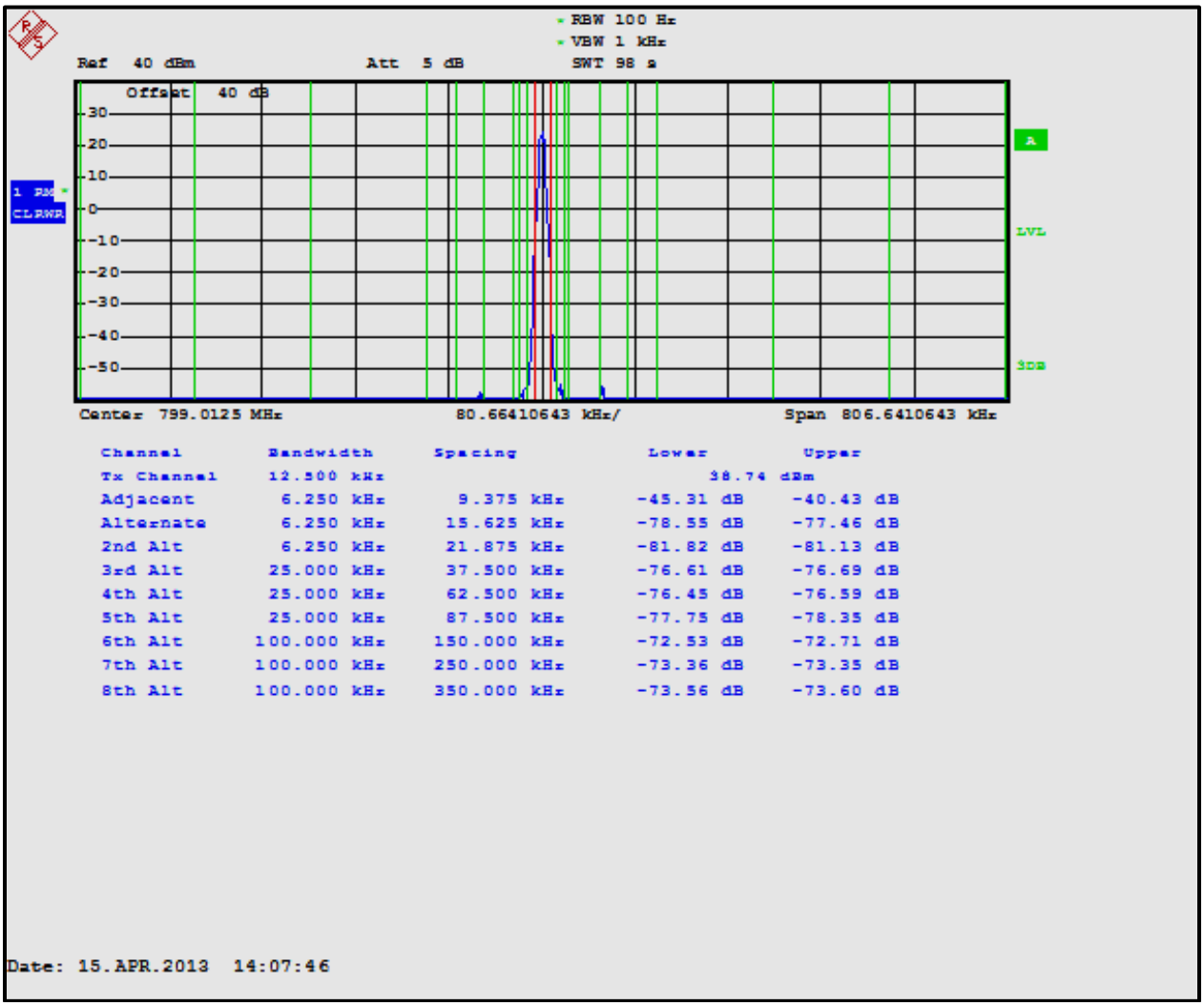


Table 6-18: H-CPM P25 Mode - 799.0125 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-94.0
12 MHz to receive band	30(s)	-75	-95.6
In receive band	30(s)	-100	-103.2

Plot 6-27: H-CPM P25 Mode – 805.9875 MHz - 12.5 kHz Channel Spacing

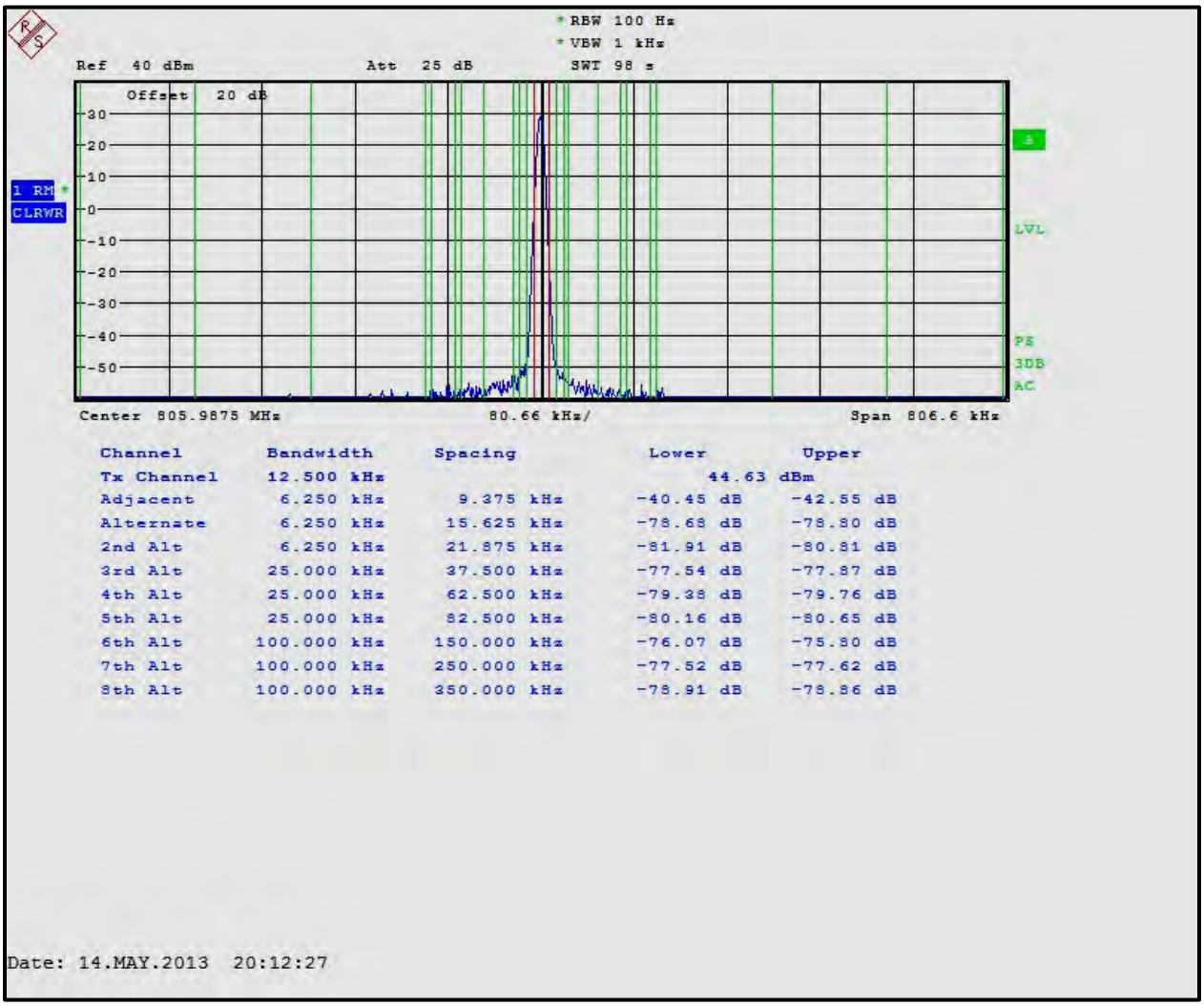


Table 6-19: H-CPM P25 Mode – 805.9875 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Limit (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-85.5
12 MHz to receive band	30(s)	-75	-100.8
In receive band	30(s)	-100	-102.2

Table 6-20: Test Equipment Used For Testing ACP Requirements

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901536	Aeroflex	48-40-34	40 dB Attenuator	CB6627	10/14/13

Daniel Baltzell		April 15, 16 & 19, 2013
Test Engineer	Signature	Dates of Test

7 FCC Rules and Regulations Part 2.1053(a): Field Strength of Spurious Radiation; Part 90 90.543(f): Out of Band Emissions Limit; RSS-119 5.8: Unwanted Emissions

7.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz. Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP, 9,600 bps for P25 Phase 1 and EDACS, and 12 kbps for H-CPM P25 Phase 2 modes.

The spurious emissions levels were measured, and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole.

For emissions in the 1559-1610 band, Part 15.543(f) states: "For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to-70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation."

7.2 Test Data

7.2.1 CFR 47 Part 90.210 Requirements

The worst-case emissions test data are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Both high and low power settings were checked; high power was reported as worst case. The following are presented as the worst case channels having emissions within a 20 dB margin of the limit; no other emissions for any other channels investigated were found to have emissions within this 20 dB margin.

Table 7-1: Field Strength of Spurious Radiation – Analog Mode – 794.0125 MHz

Conducted Power = 45.3 dBm = 33.9 W - Limit = 43 + 10 Log P = 65.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1588.0250	72.8	-41.1	0.4	6.6	80.2	-14.9

Table 7-2: Field Strength of Spurious Radiation – Analog Mode – 799.0125 MHz

Conducted Power = 45.2 dBm = 33.1 W - Limit = 43 + 10 Log P = 65.2 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1598.0250	75.1	-38.8	0.4	6.7	77.6	-12.4

Table 7-3: Field Strength of Spurious Radiation – Analog Mode – 805.9875 MHz

Conducted Power = 45.1 dBm = 32.4 W - Limit = 43 + 10 Log P = 65.1 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1611.9750	74.9	-38.8	0.4	6.8	77.4	-12.3

Table 7-4: Field Strength of Spurious Radiation – Analog Mode – 806.0125 MHz

Conducted Power = 45.1 dBm = 32.4 W - Limit = 43 + 10 Log P = 65.1 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1612.0250	76.8	-36.7	0.4	6.8	75.3	-10.2

Table 7-5: Field Strength of Spurious Radiation – Analog Mode – 815.0000 MHz

Conducted Power = 45 dBm = 31.6 W - Limit = 43 + 10 Log P = 65 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1630.0000	73.0	-40.7	0.4	7.0	79.1	-14.1

Table 7-6: Field Strength of Spurious Radiation – Analog Mode – 823.9875 MHz

Conducted Power = 45 dBm = 31.6 W - Limit = 43 + 10 Log P = 65 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1647.9750	73.6	-40.2	0.4	7.1	78.5	-13.5

Table 7-7: Field Strength of Spurious Radiation – Analog Mode – 851.0125 MHz

Conducted Power = 45.1 dBm = 32.4 W - Limit = 43 + 10 Log P = 65.1 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1702.0250	73.7	-40.0	0.4	7.4	78.1	-13.0

Table 7-8: Field Strength of Spurious Radiation – Analog Mode – 860.0000 MHz

Conducted Power = 45 dBm = 31.6 W - Limit = 43 + 10 Log P = 65 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1720.0000	75.4	-36.7	0.4	7.4	74.6	-9.6

Table 7-9: Field Strength of Spurious Radiation – Analog Mode – 868.9875MHz

Conducted Power = 45 dBm = 31.6 W - Limit = 43 + 10 Log P = 65 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1737.9750	76.9	-34.8	0.4	7.5	72.7	-7.7

Table 7-10: Field Strength of Spurious Radiation in the 1559–1610 MHz Band – FCC 15.543(f)

Fundamental/ Harmonic (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss (dB)*	Antenna Gain (dBd)	Corrected Signal Generator (worst case) (dBW/MHz)	Limit (dBW/ MHz)	Margin (dB)
794.000							
1588.000	13.2	-67.3	0.4	6.6	-91.1	-80.0	-11.1
796.007							
1592.013	18.1	-62.4	0.4	6.6	-86.2	-80.0	-6.2
799.007							
1598.014	16.4	-64.1	0.4	6.7	-87.8	-80.0	-7.8
801.407							
1602.813	15.6	-64.9	0.4	6.8	-88.5	-80.0	-8.5
803.007							
1606.014	15.3	-65.2	0.4	6.8	-88.8	-80.0	-8.8
804.994							
1609.989	21.0	-59.5	0.4	6.8	-83.1	-80.0	-3.1

*This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½-wave dipole antenna.

Table 7-11: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	2/2/14
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	8/10/13
901215	Hewlett Packard	8596EM	Portable Spectrum Analyzer (9 kHz – 12.8 GHz)	3826A00144	3/15/14
900928	Hewlett Packard	83752A	Synthesized Sweeper (0.01 - 20 GHz)	3610A00866	2/18/14
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	4/19/14
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	4/19/14
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	4/19/14
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20’	NA	8/16/13
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/16/13
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/16/13
901132	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	2/29/14
900816	Weinschel Corp.	2	3 dB Attenuator; 5 W	BG1273	8/17/13
901375	Weinschel Corp	2	6 dB Attenuator; 5 W	AP5914	8/17/13
901358	Aeroflex/Weinschel	47-3-34	Attenuator, 3 dB0. (1 - 18 GHz)	BS0146	2/29/14
900819	Weinschel Corp	2	10 dB Attenuator; 5 W	BF0830	3/5/14

Test Personnel:

Daniel Baltzell		April 26, 2013
Test Engineer	Signature	Date of Test

8 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 90.543(d): Authorized Bandwidth; RSS-119 5.8: Transmitter Unwanted Emissions

Occupied Bandwidth - Compliance with the Emission Masks

8.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.11, TIA-102.CCAA August 2011, section 2.2.7, and TIA-102.CCAB October 2011, section 3.2.7, ANSI/TIA–102.CAAA-A-2002, section 2.2.5, ANSI/TIA-102.CAAB-A-2002, section 3.2.5

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP, 9,600 bps for P25 Phase 1 and EDACS, and 12 kbps for H-CPM P25 Phase 2 modes.

FCC §90.210

Applicable Emission Masks		
Frequency Band (MHz)	**Mask for Equipment with Audio Low Pass Filter**	**Mask for Equipment without Audio Low Pass Filter**
Below 25 [1]	A or B	A or C
25–50	B	C
72–76	B	C
150–174 [2]	B, D, or E	C, D, or E
150 Paging-only	B	C
220–222	F	F
421–512 [2]	B, D, or E	C, D, or E
450 Paging-only	B	G
806–809/851–854	B	H
809–824/854–869 [3]	B	G
896–901/935–940	I	J
902–928	K	K
929–930	B	G
4940–4990 MHz	L or M	L or M
5850–5925 [4]		
All other bands	B	C

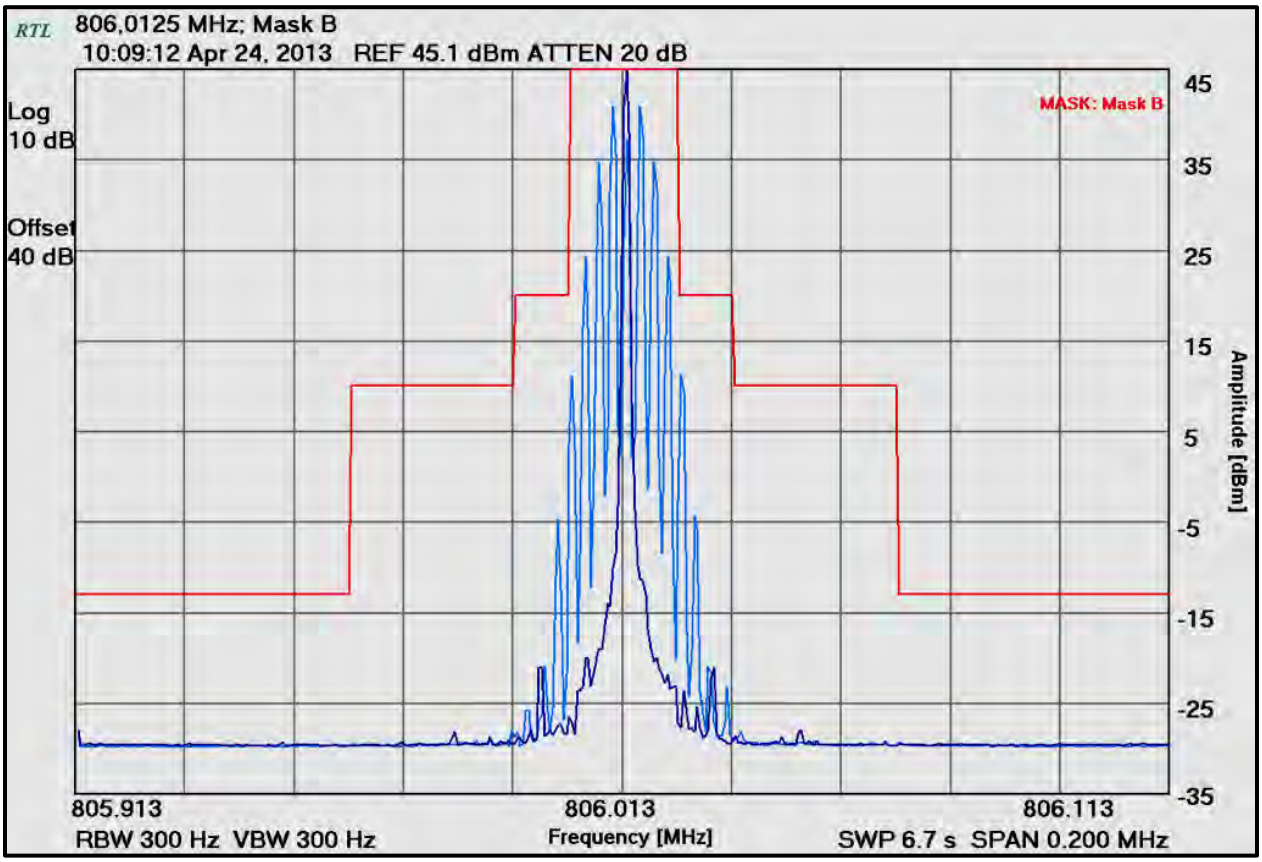
[1] Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
[2] Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.
[3] Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691.
[4] DSRCS Roadside Unit equipment in the 5850–5925 MHz band is governed under subpart M of this part.

RSS-119 Table 3 - Channel Spacing, Authorized Bandwidths and Applicable Spectrum Masks

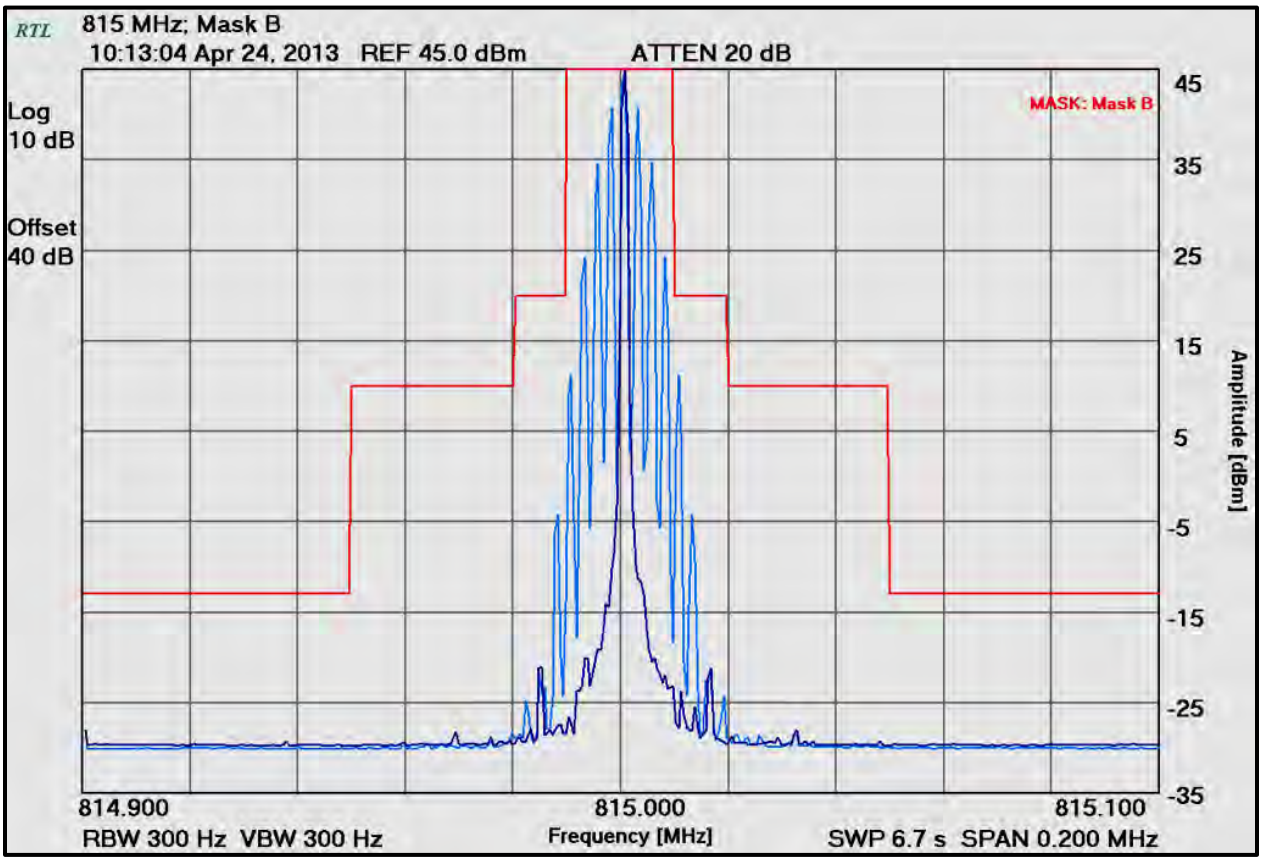
Frequency Band (MHz)	Related SRSP for Channeling Plan and e.r.p.	Channel Spacing (kHz)	Authorized Bandwidth (kHz)	Spectrum Masks with Audio Filter	Spectrum Masks without Audio Filter
764-776 794-806	SRSP-511	6.25 12.5 25 50	Note 2	Section 5.8.9	Section 5.8.9
806-821-/851-866 821-824/866-869	SRSP-502	25	20 22	B Y	G Y
		12.5	11.25	D	D

8.2 Test Data

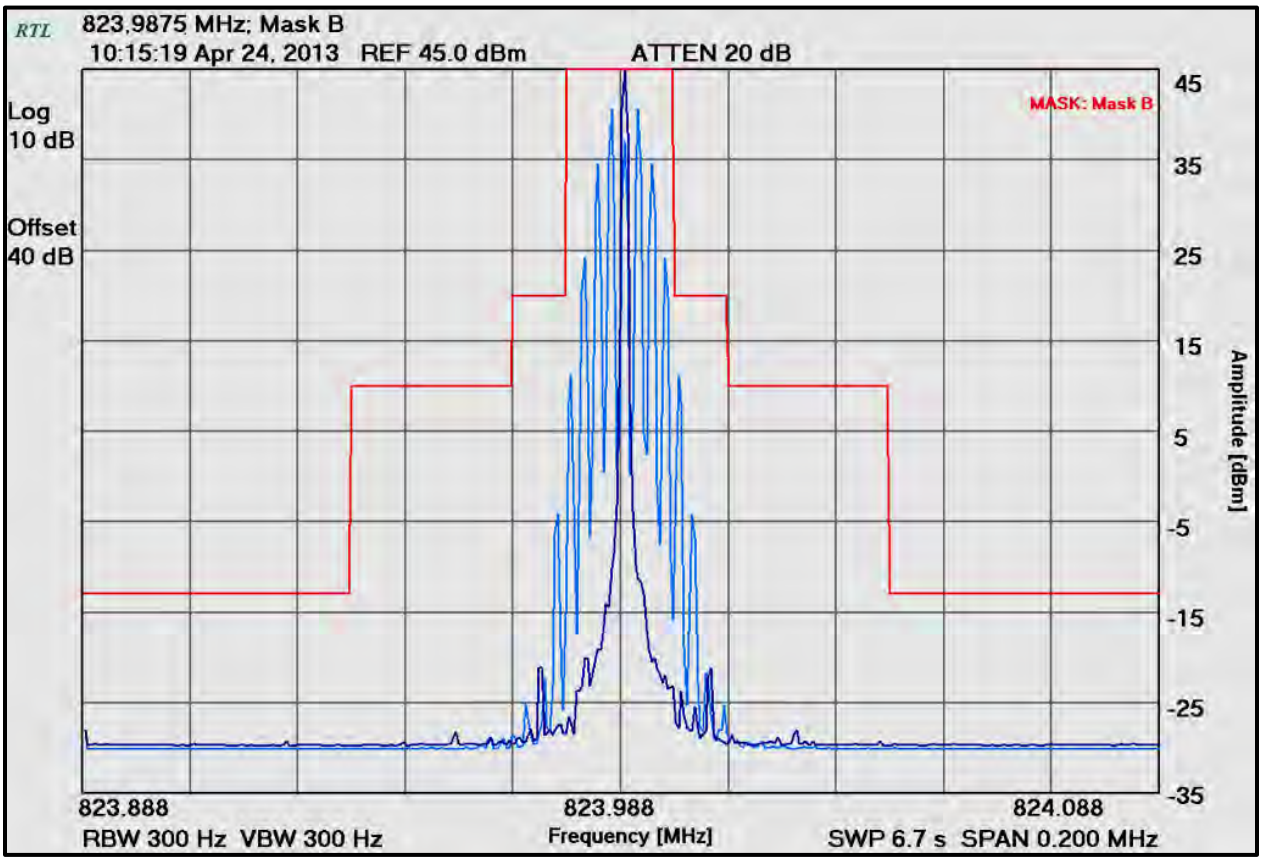
Plot 8-1: Occupied Bandwidth – 806.0125 MHz; Analog (Mask B)



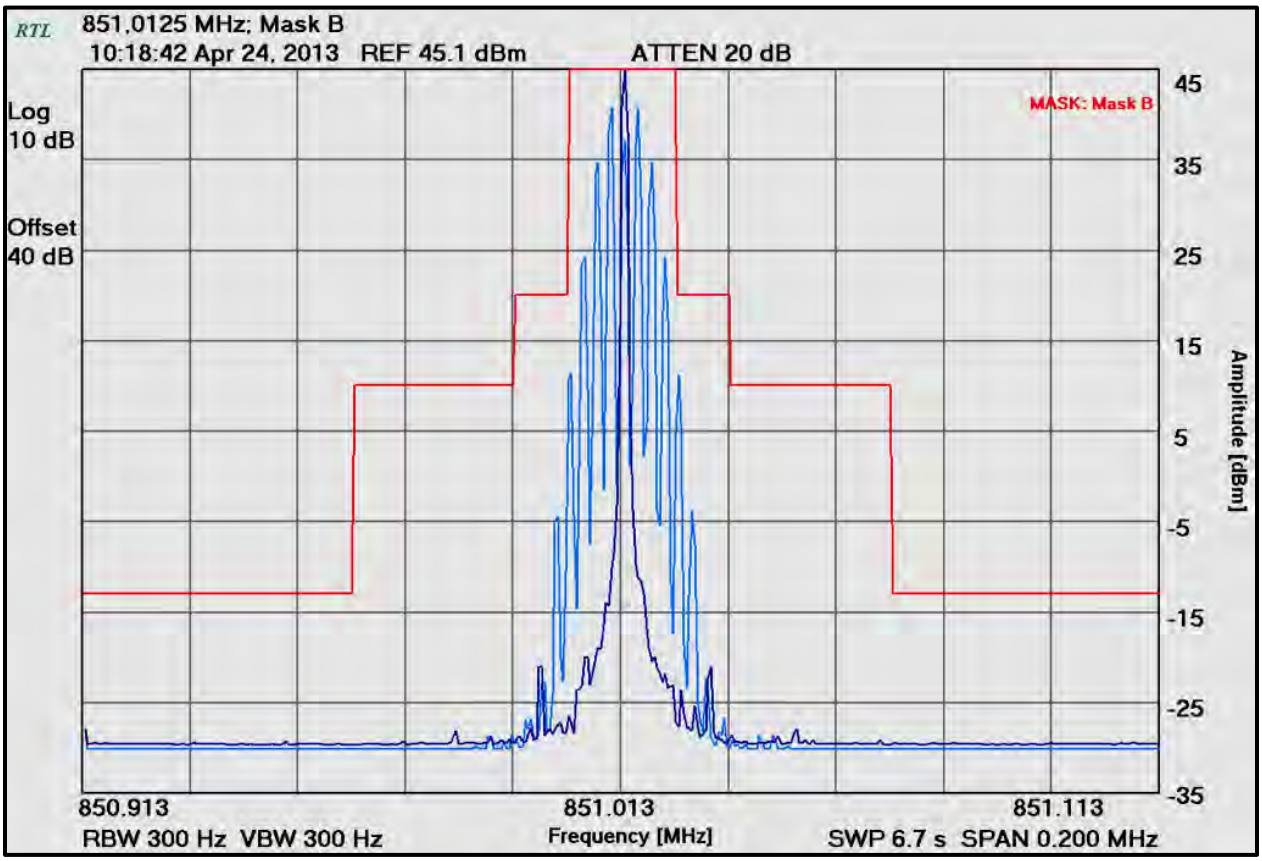
Plot 8-2: Occupied Bandwidth – 815 MHz; Analog (Mask B)



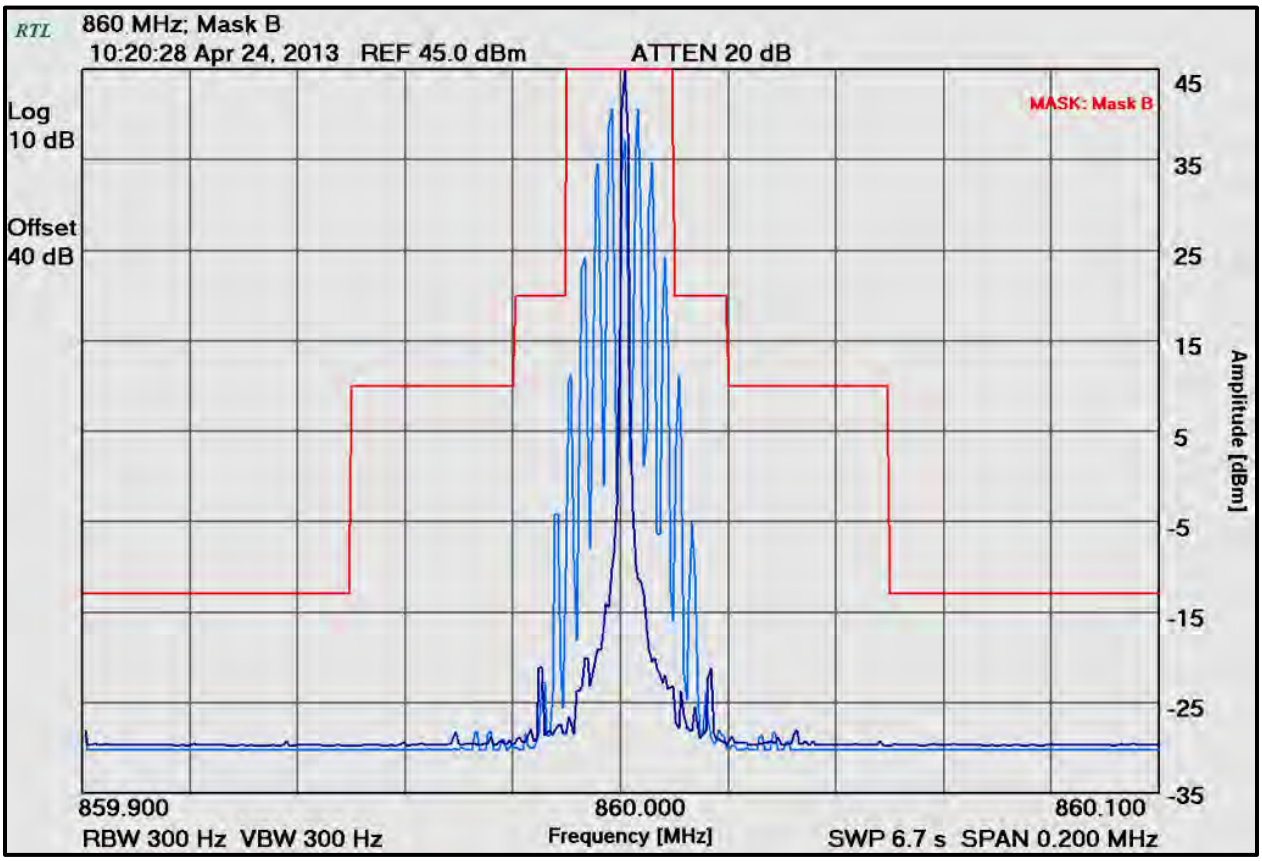
Plot 8-3: Occupied Bandwidth – 823.9875 MHz; Analog (Mask B)



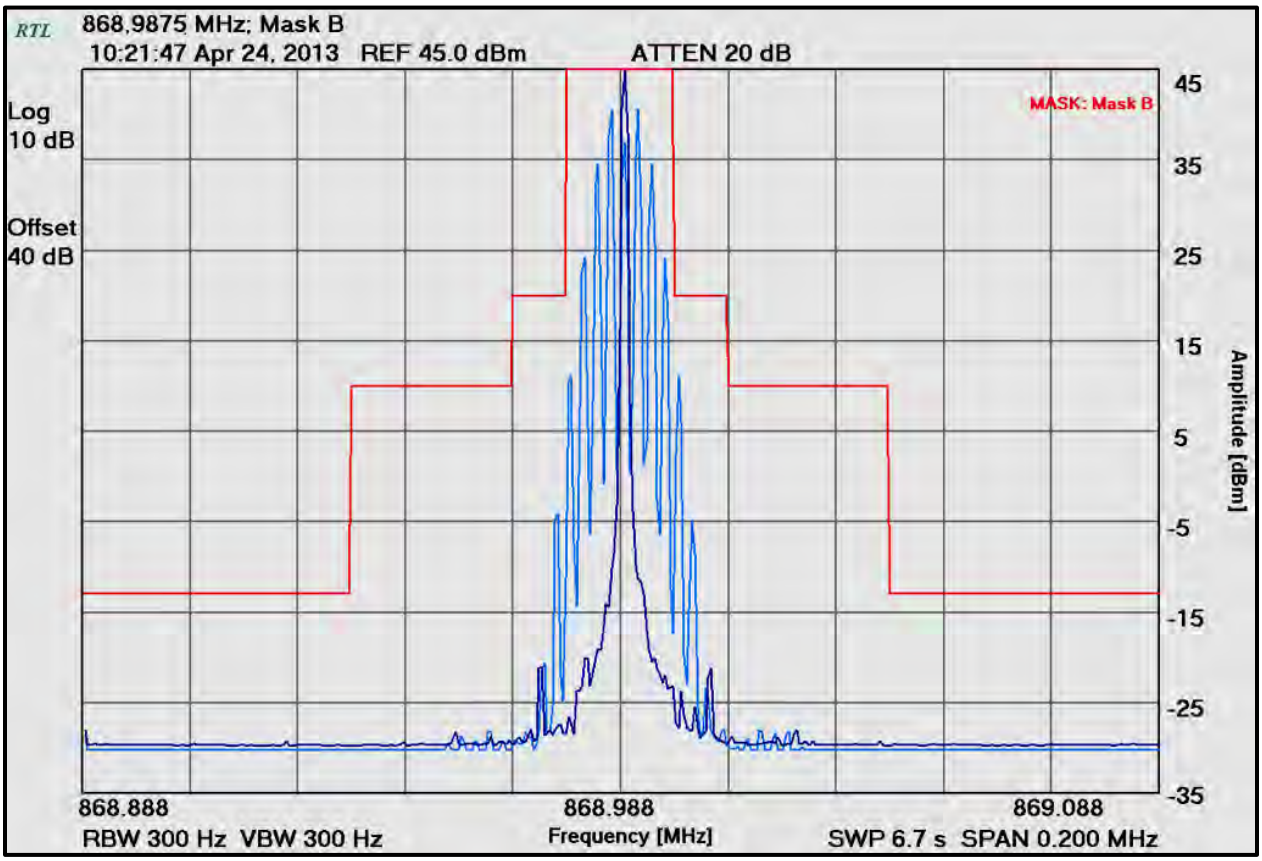
Plot 8-4: Occupied Bandwidth – 851.0125 MHz; Analog (Mask B)



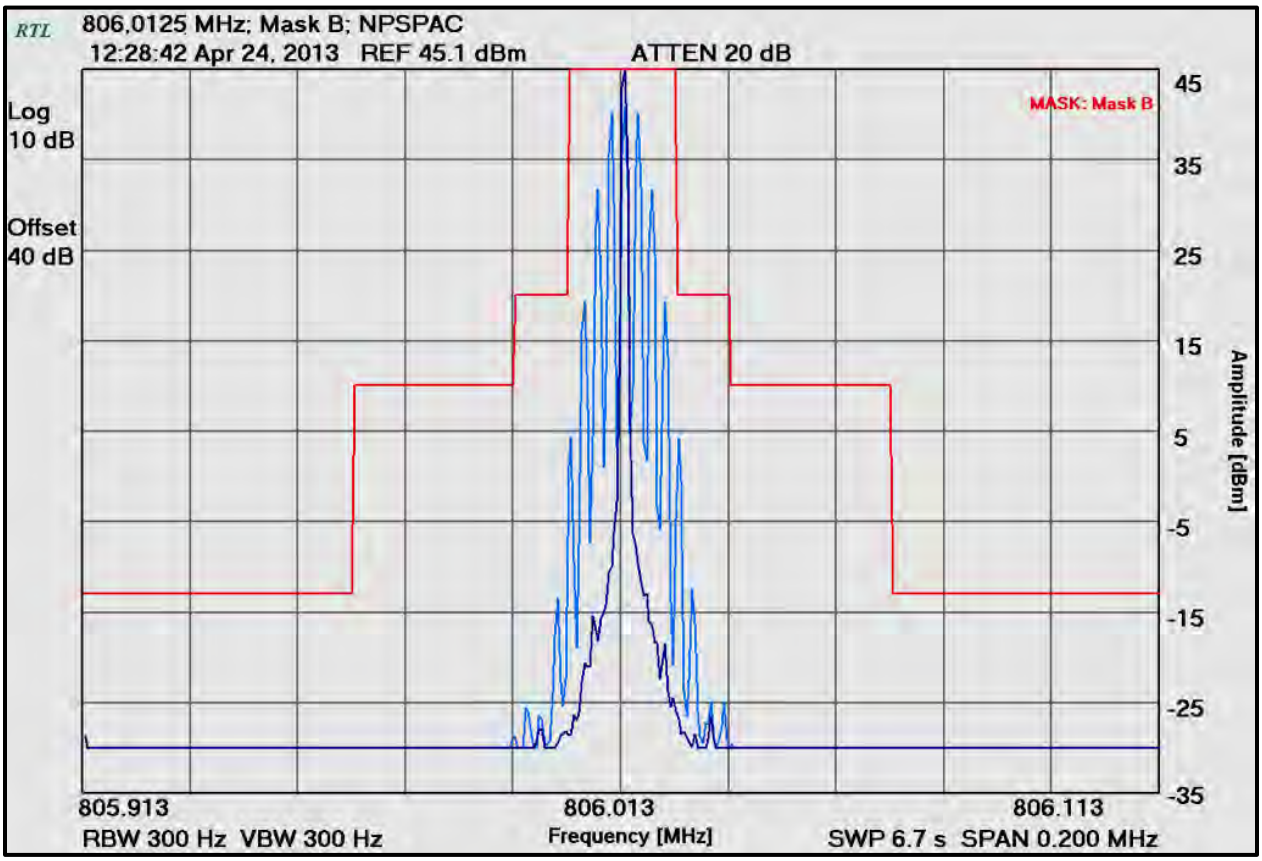
Plot 8-5: Occupied Bandwidth – 860 MHz; Analog (Mask B)



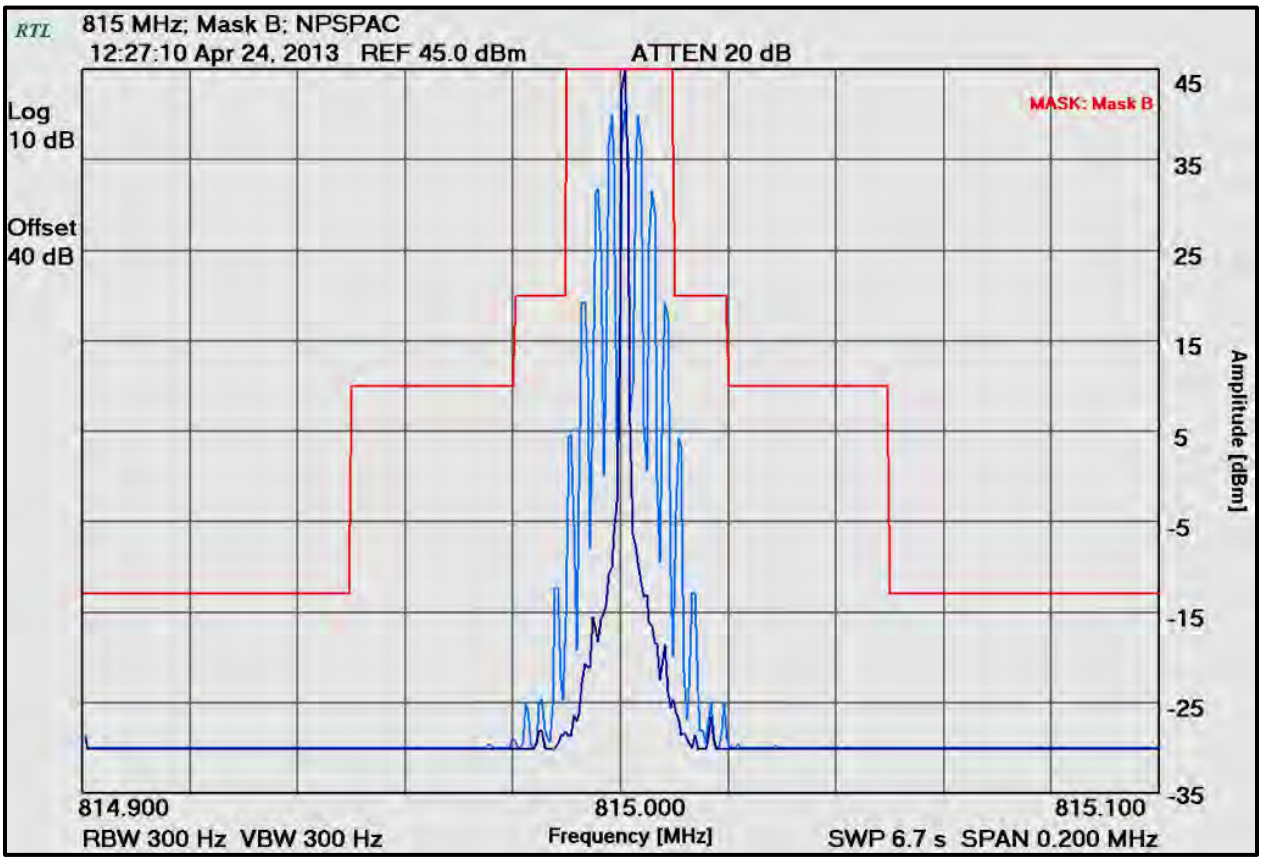
Plot 8-6: Occupied Bandwidth – 868.9875 MHz; Analog (Mask B)



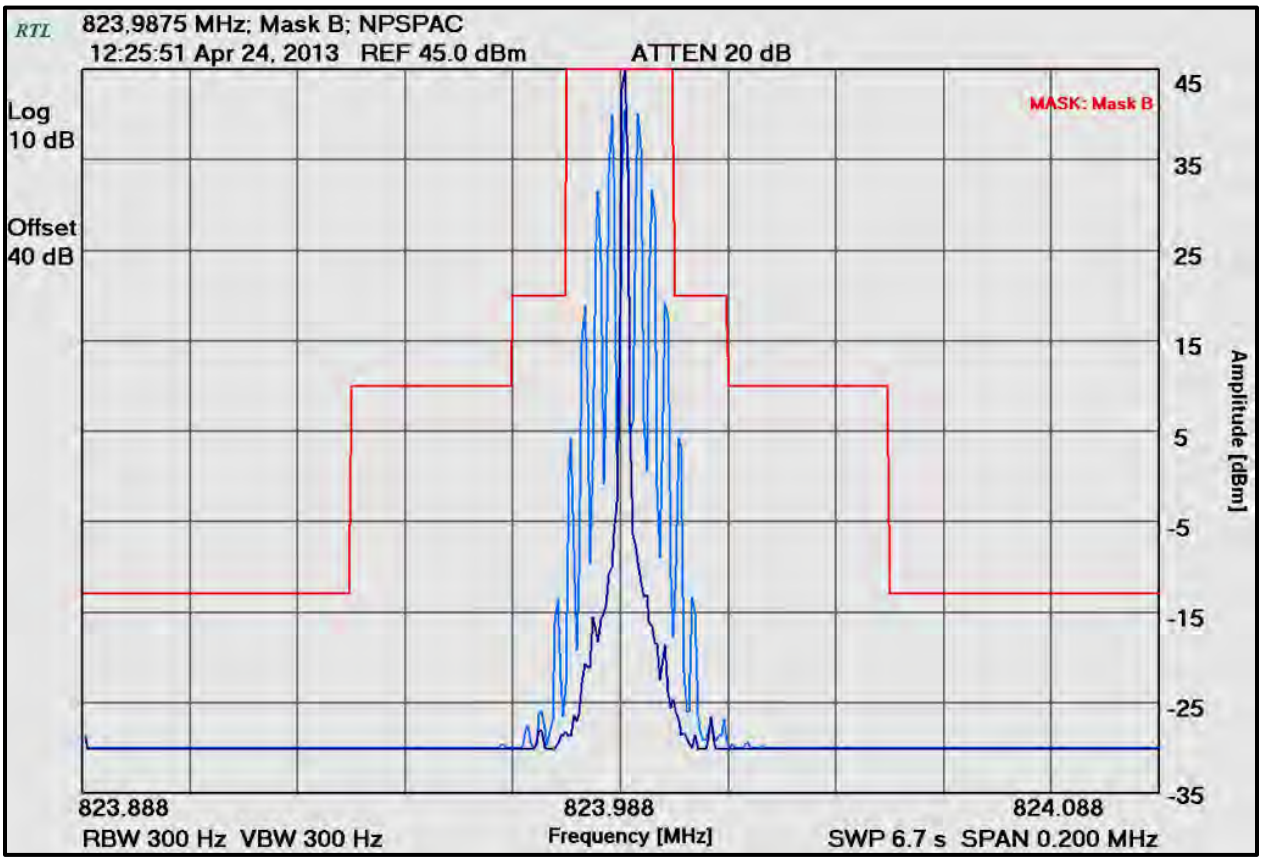
Plot 8-7: Occupied Bandwidth – 806.0125 MHz; Analog (Mask B); NPSPAC



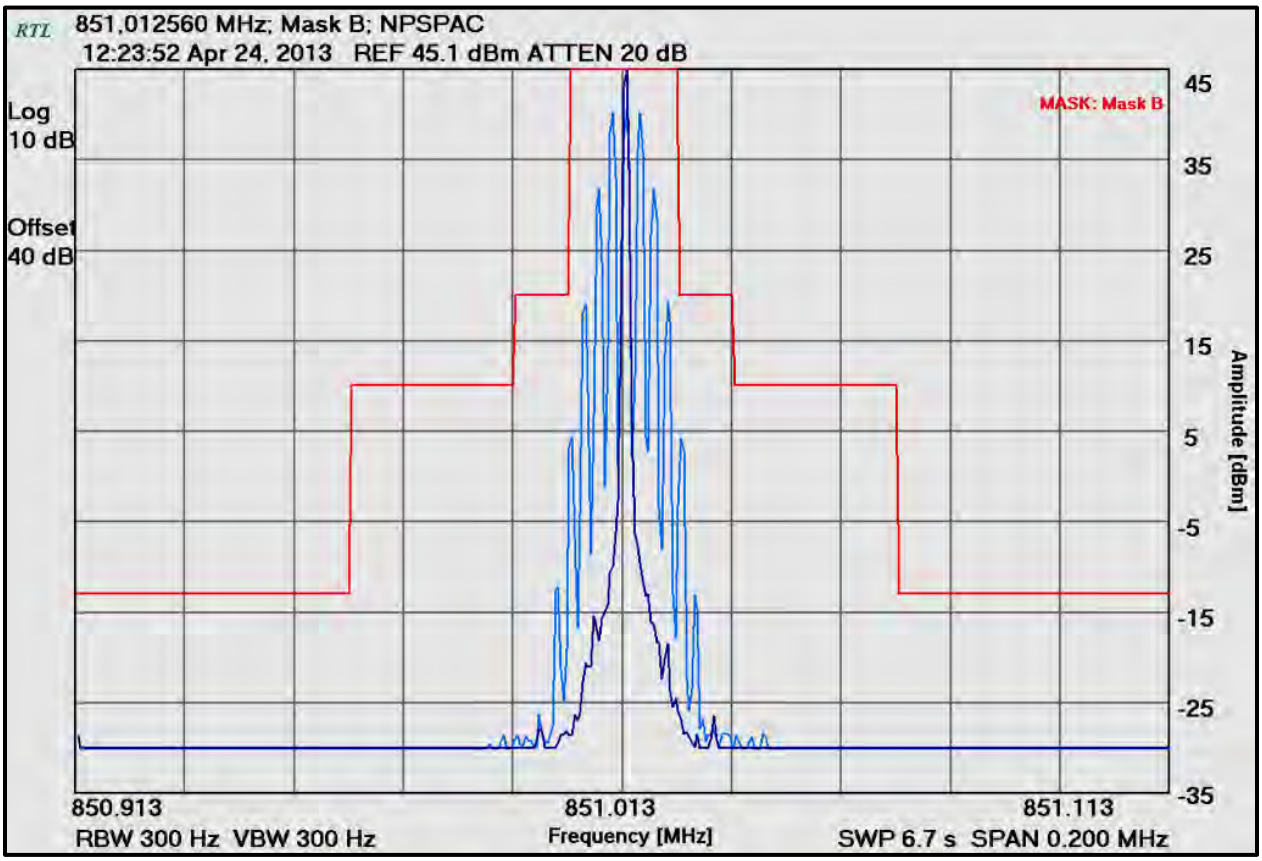
Plot 8-8: Occupied Bandwidth – 815 MHz; Analog (Mask B); NPSPAC



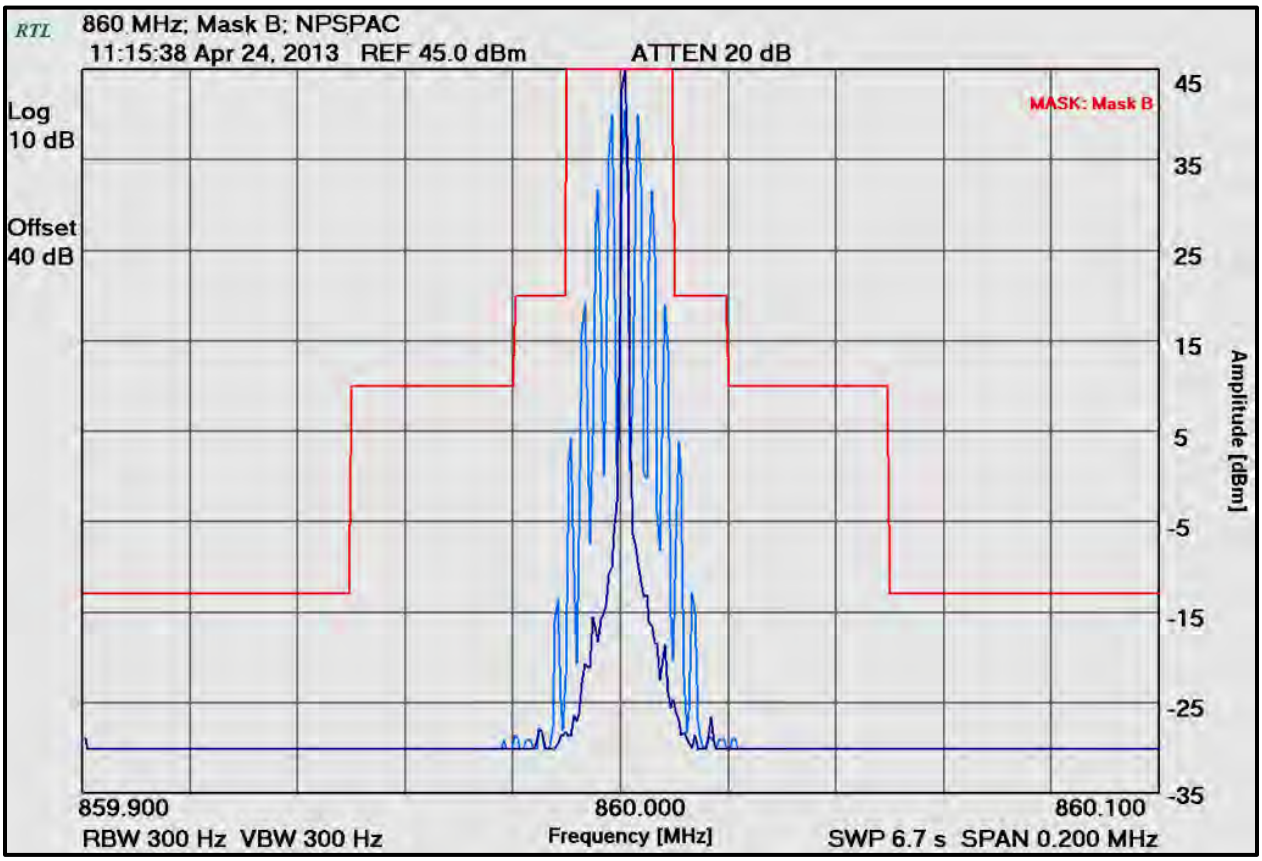
Plot 8-9: Occupied Bandwidth – 823.9875 MHz; Analog (Mask B); NPSPAC



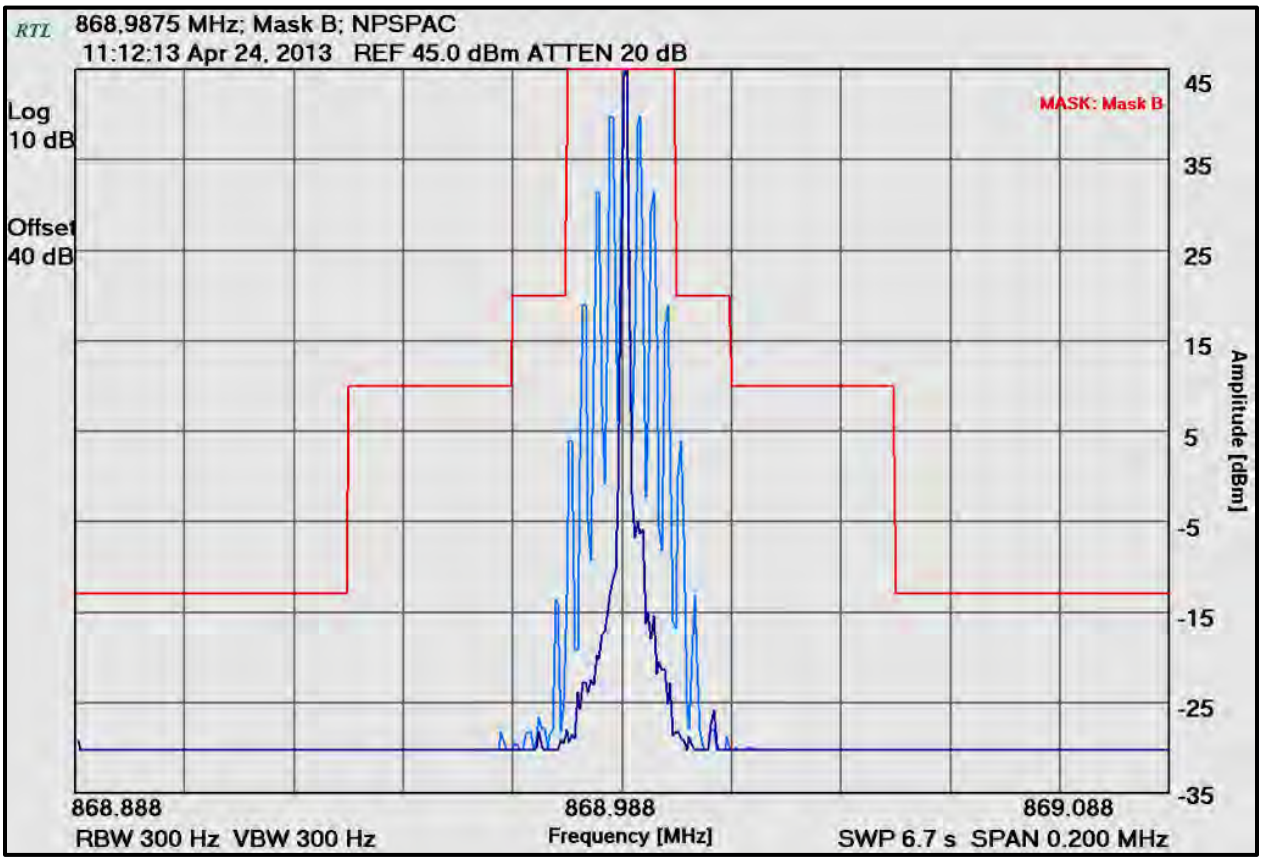
Plot 8-10: Occupied Bandwidth – 851.0125 MHz; Analog (Mask B); NPSPAC



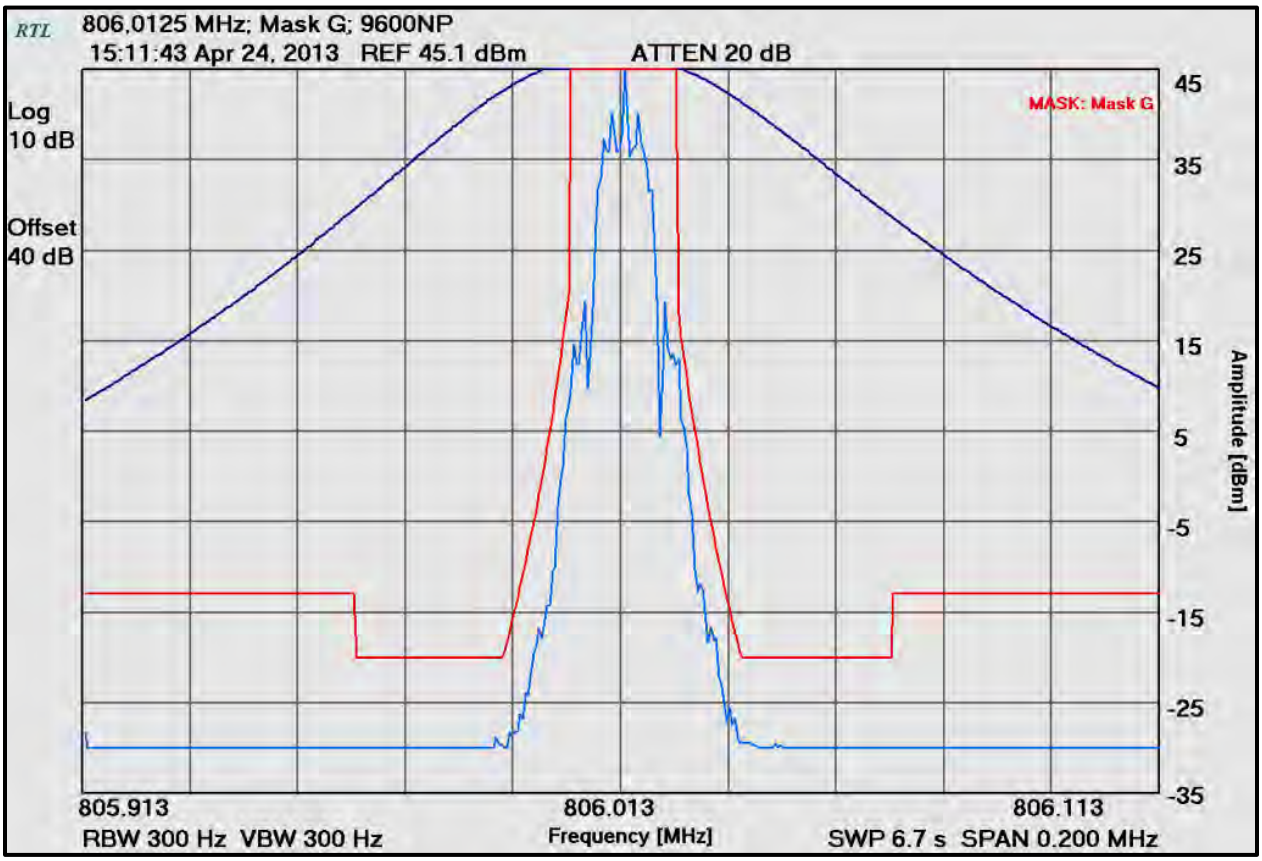
Plot 8-11: Occupied Bandwidth – 860 MHz; Analog (Mask B); NPSPAC



Plot 8-12: Occupied Bandwidth – 868.9875 MHz; Analog (Mask B); NPSPAC

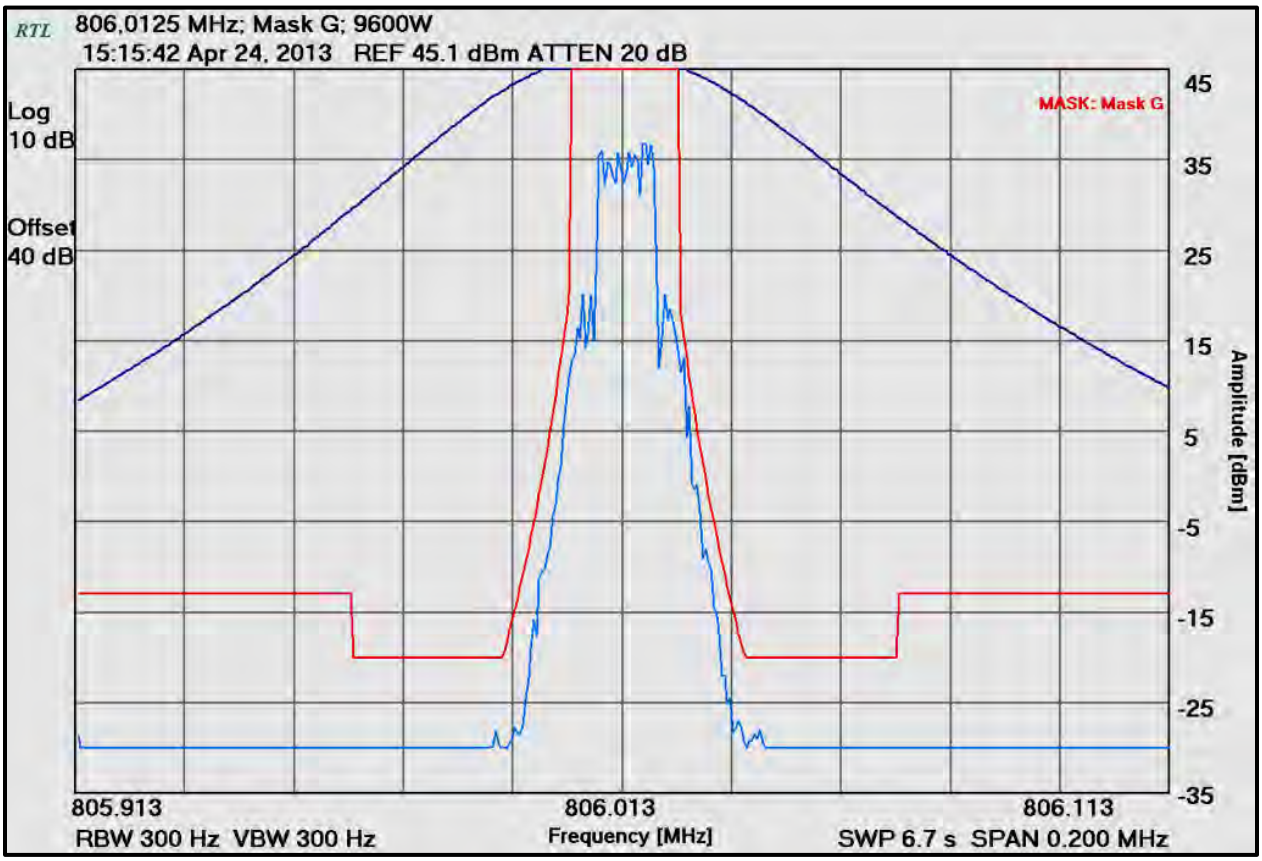


Plot 8-13: Occupied Bandwidth – 806.0125 MHz; 2- Level FSK, EDACS, NPSPAC (9600NP, Mask G)

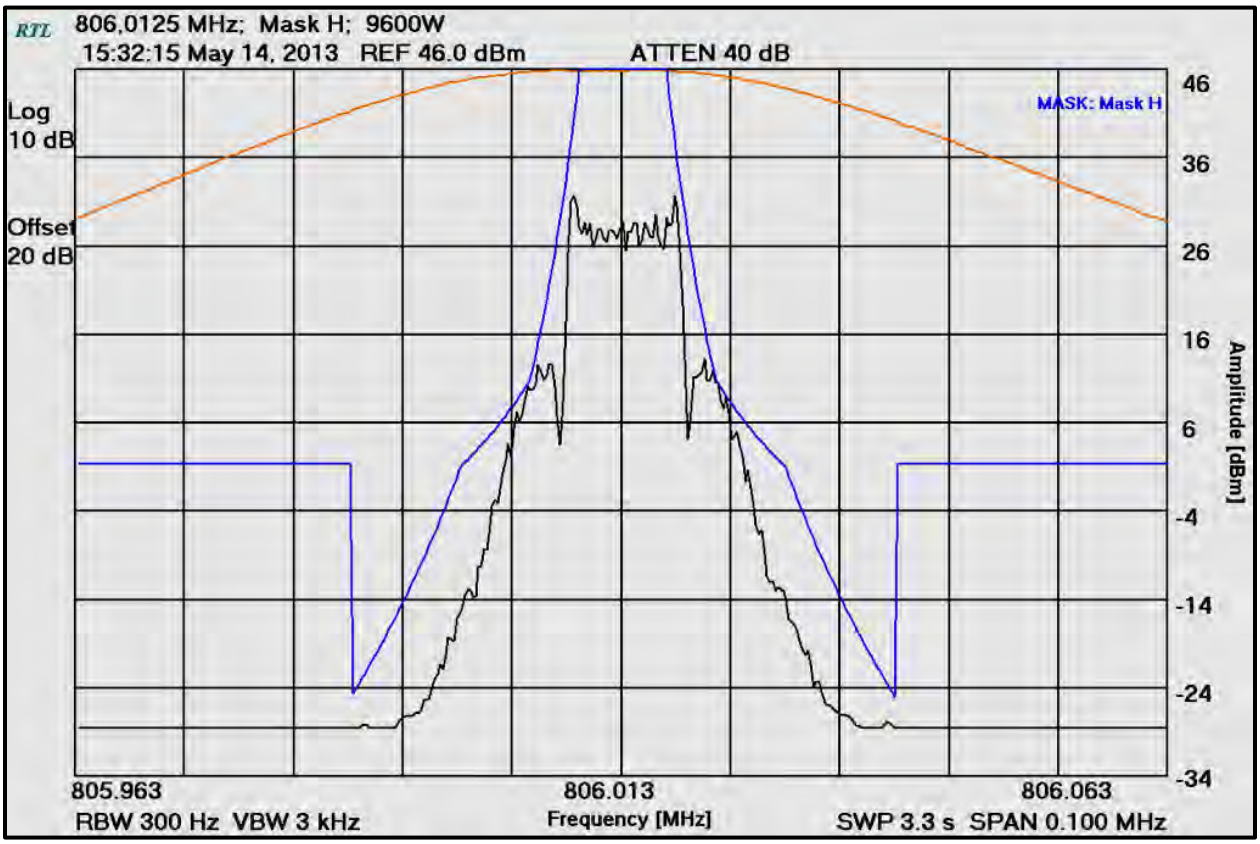


Plot 8-14: Occupied Bandwidth – 806.0125 MHz; 2- Level FSK, EDACS, NPSPAC (9600NP, Mask H)

Plot 8-15: Occupied Bandwidth – 806.0125 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask G)

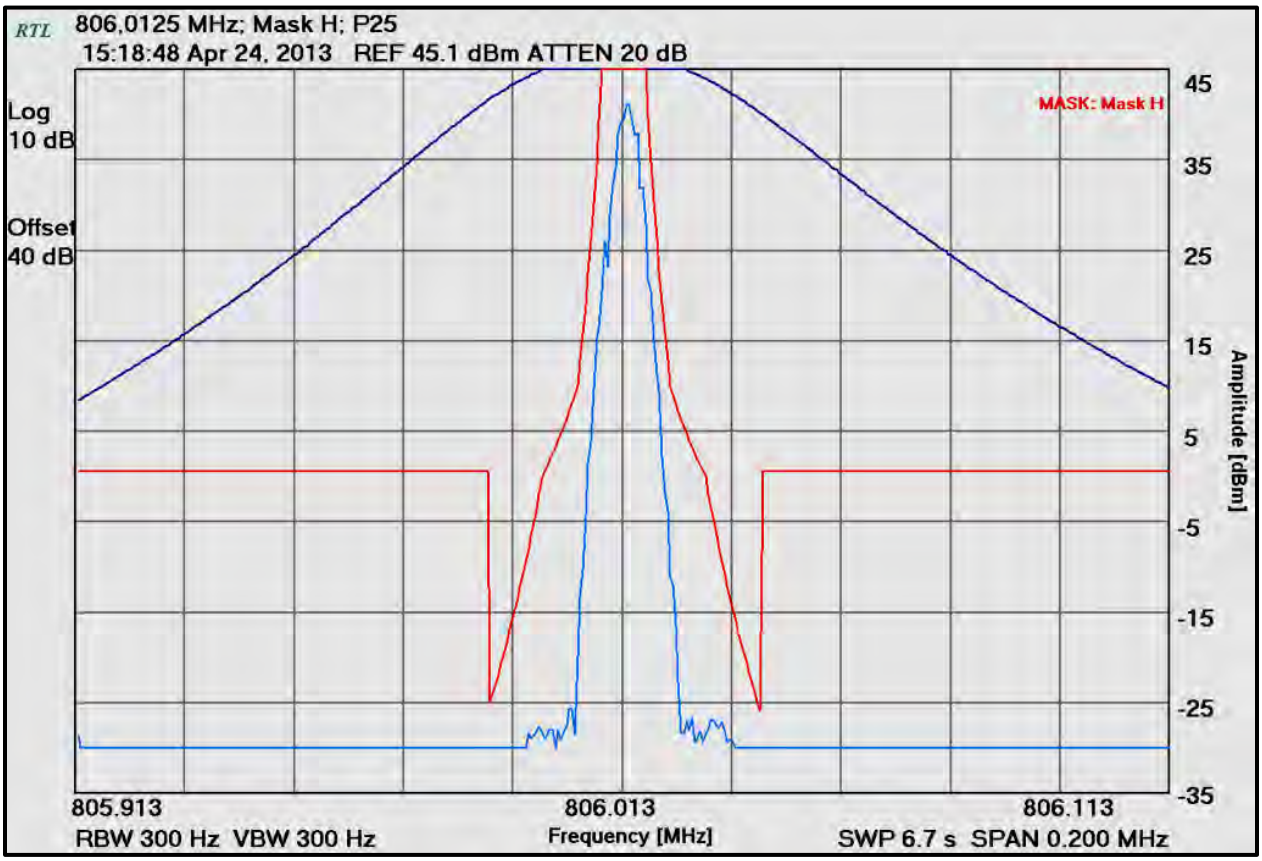


Plot 8-16: Occupied Bandwidth – 806.0125 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask H)

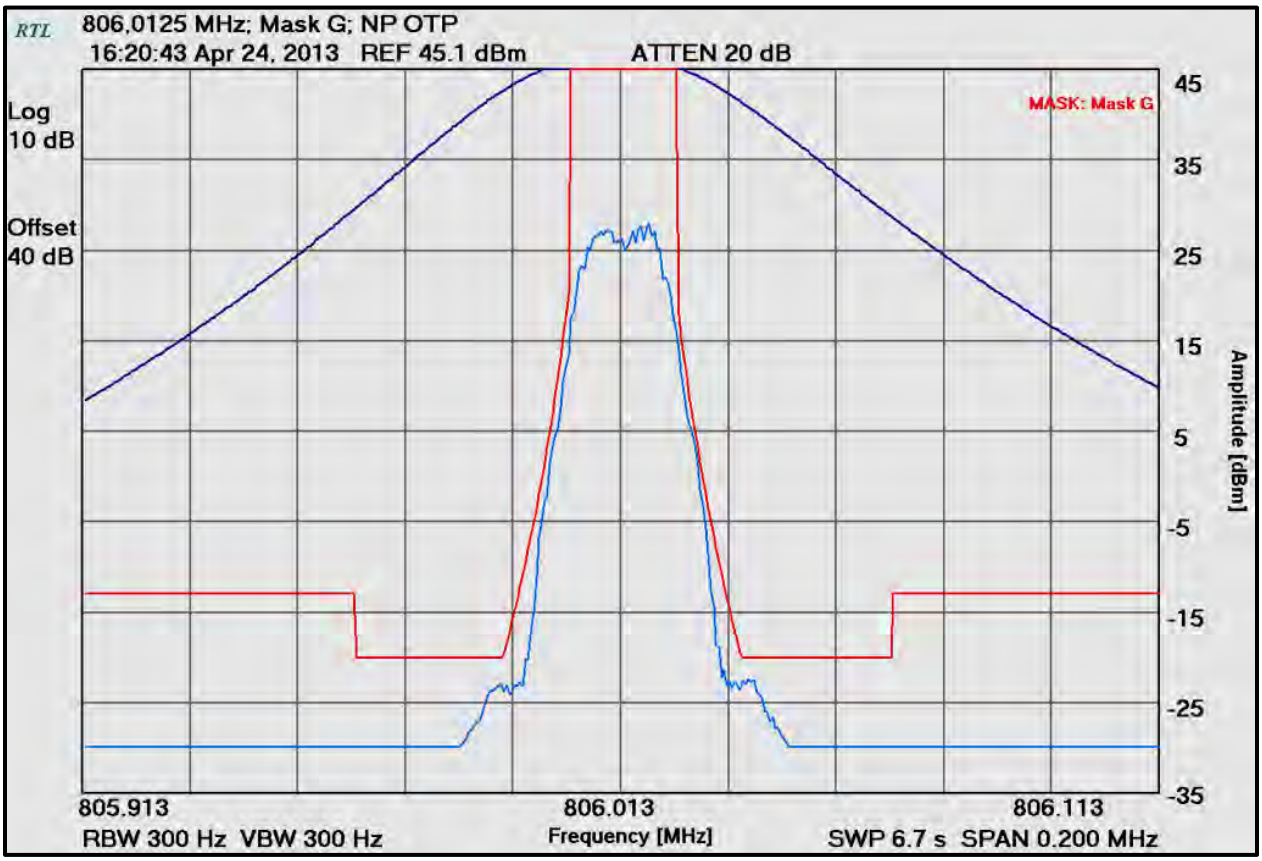


Plot 8-17: Occupied Bandwidth – 806.0125 MHz; 4- Level FSK, P25 Phase 1 (Mask D)

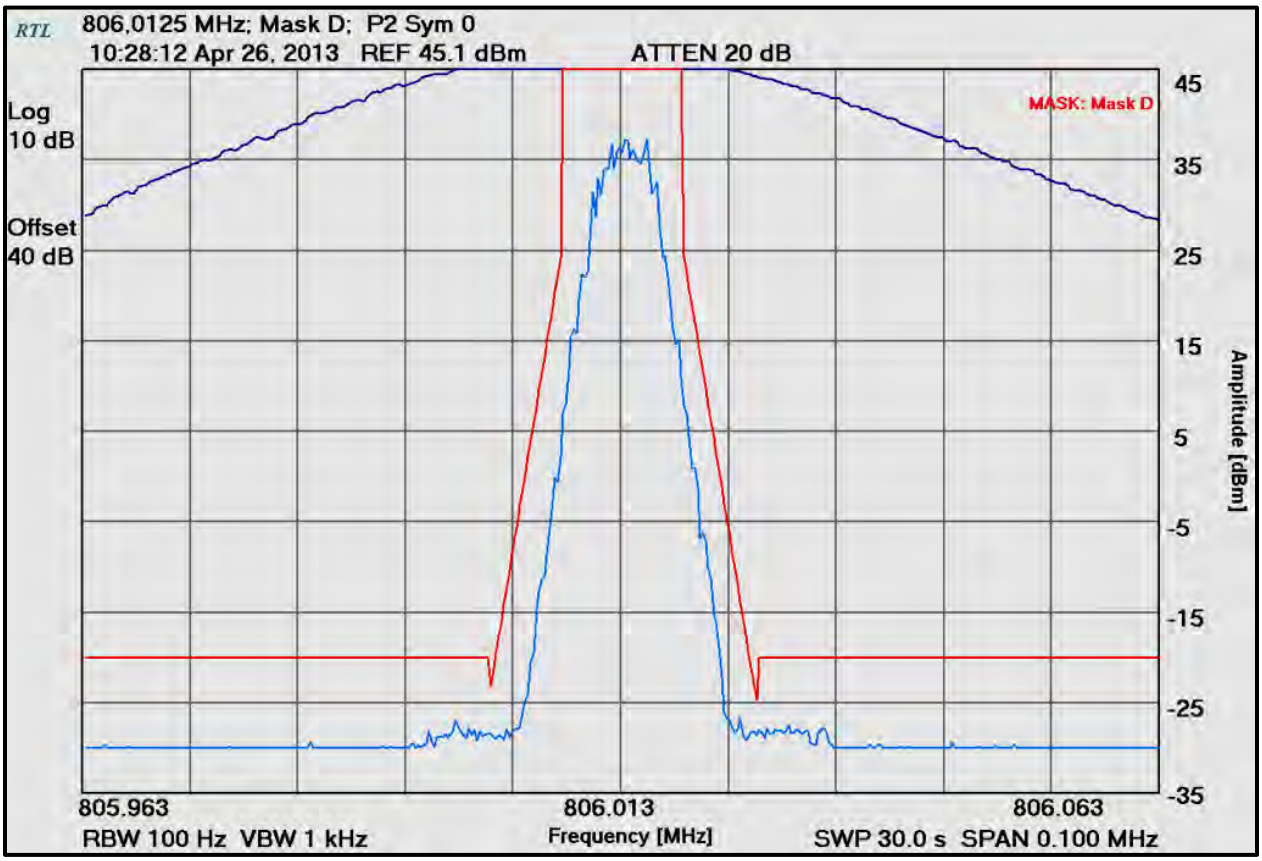
Plot 8-18: Occupied Bandwidth – 806.0125 MHz; 4- Level FSK, P25 Phase 1 (Mask H)



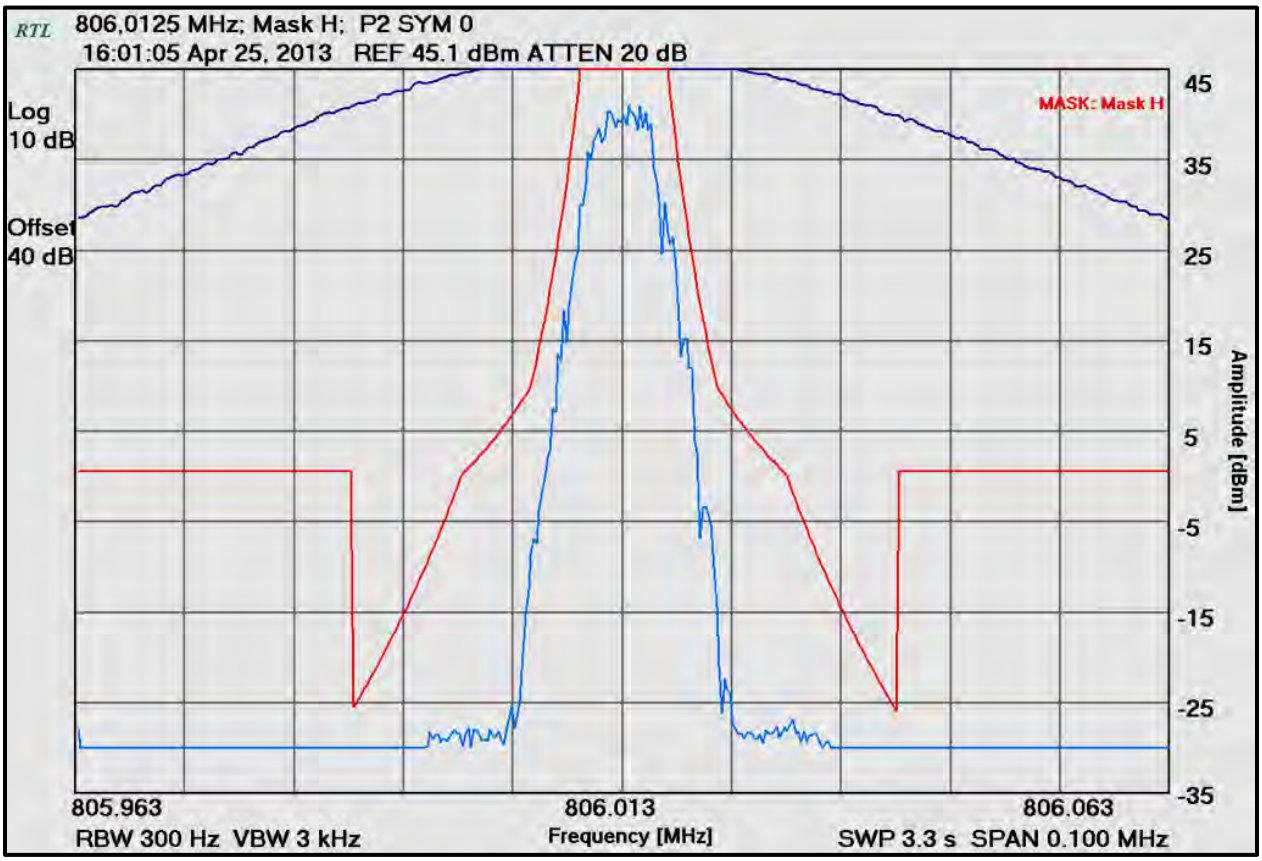
Plot 8-19: Occupied Bandwidth – 806.0125 MHz; 4-Level FSK, NPSPAC OTP (Mask G)



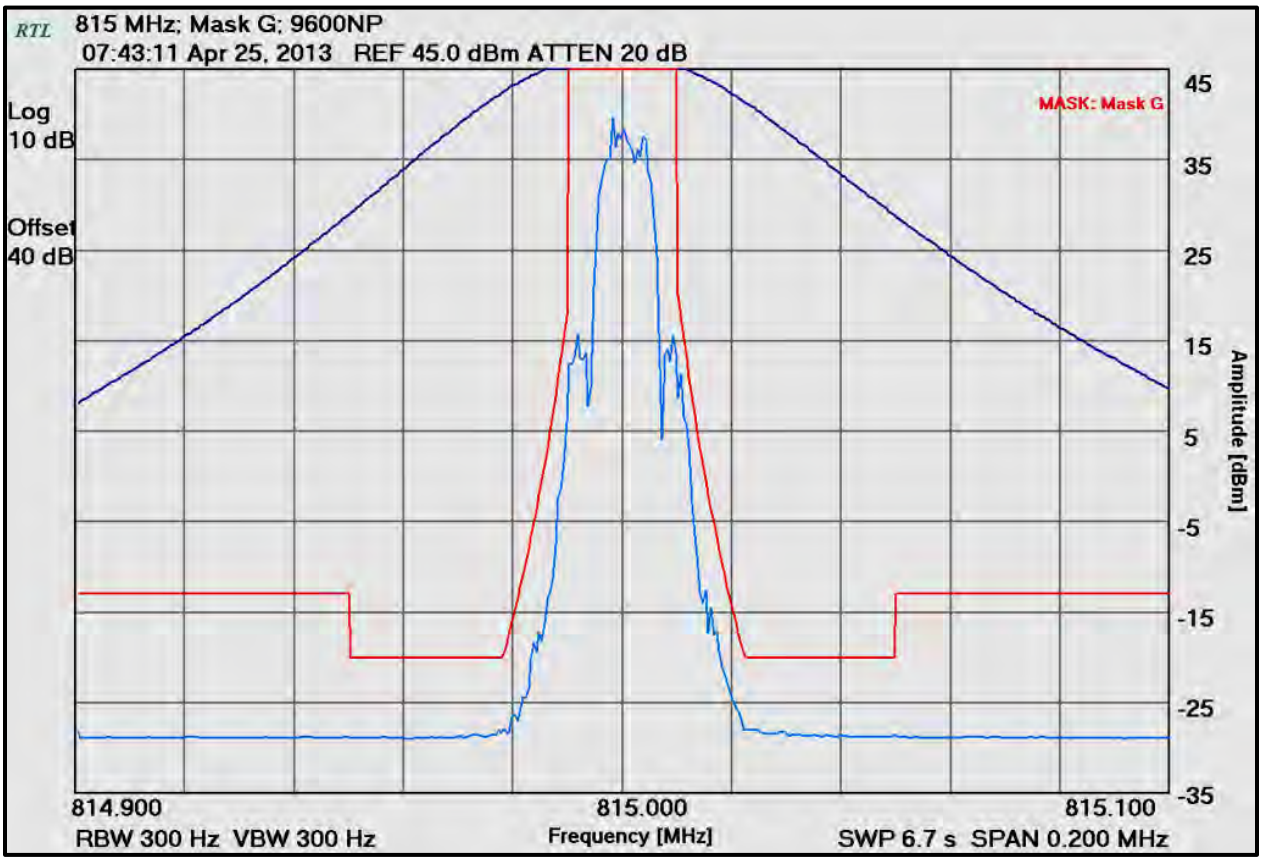
Plot 8-20: Occupied Bandwidth – 806.0125 MHz; H-CPM P25 P2 SYM 0 (Mask D)



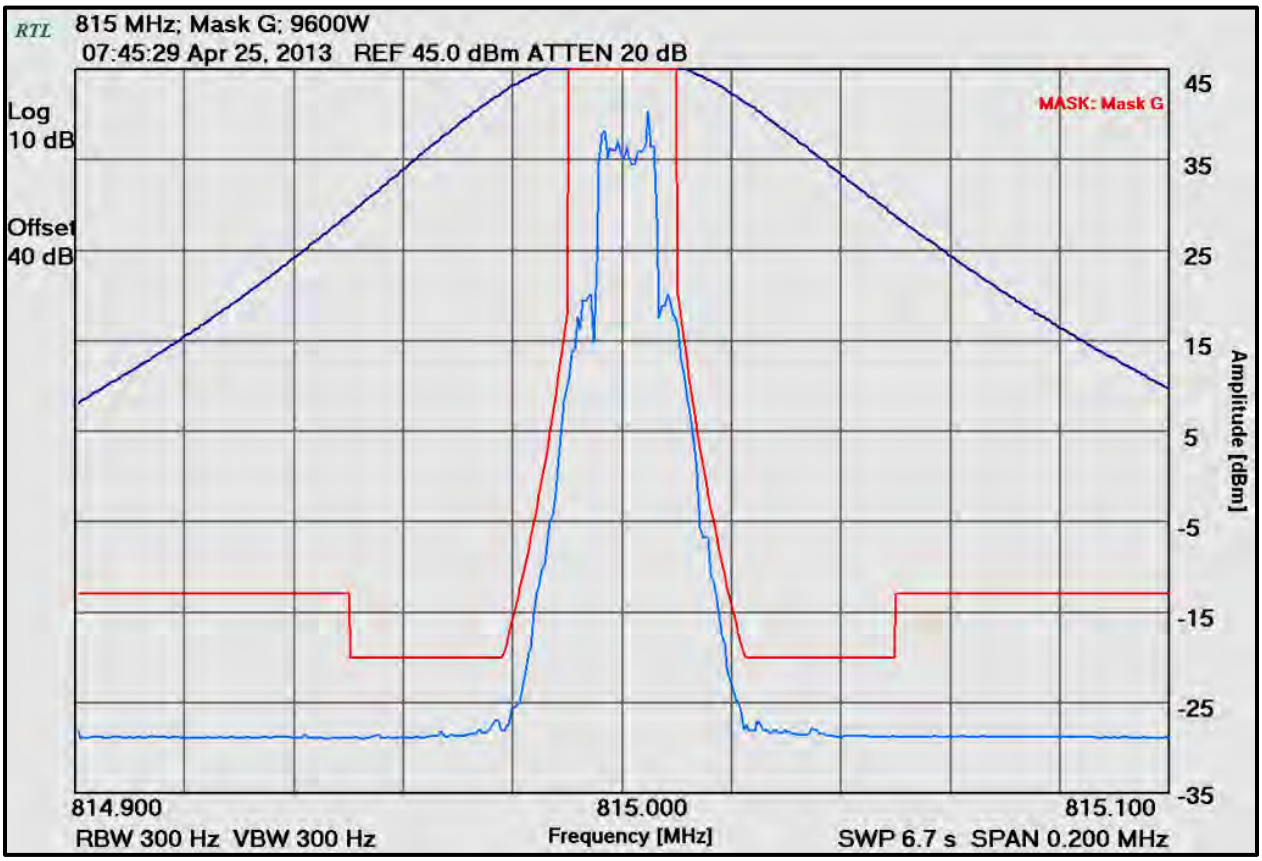
Plot 8-21: Occupied Bandwidth – 806.0125 MHz; H-CPM P25 P2 SYM 0 (Mask H)



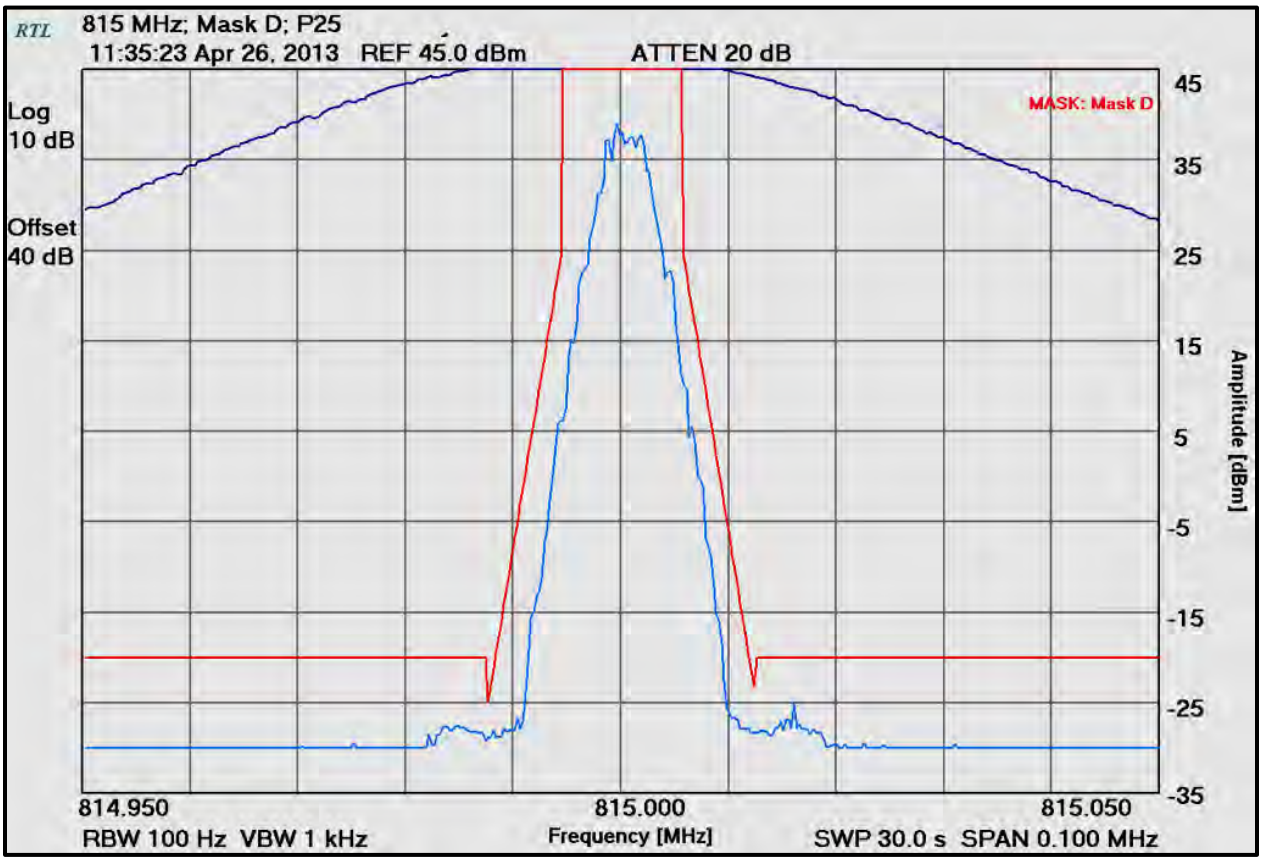
Plot 8-22: Occupied Bandwidth – 815 MHz; 2- Level FSK, EDACS, NPSPAC (9600NP, Mask G)



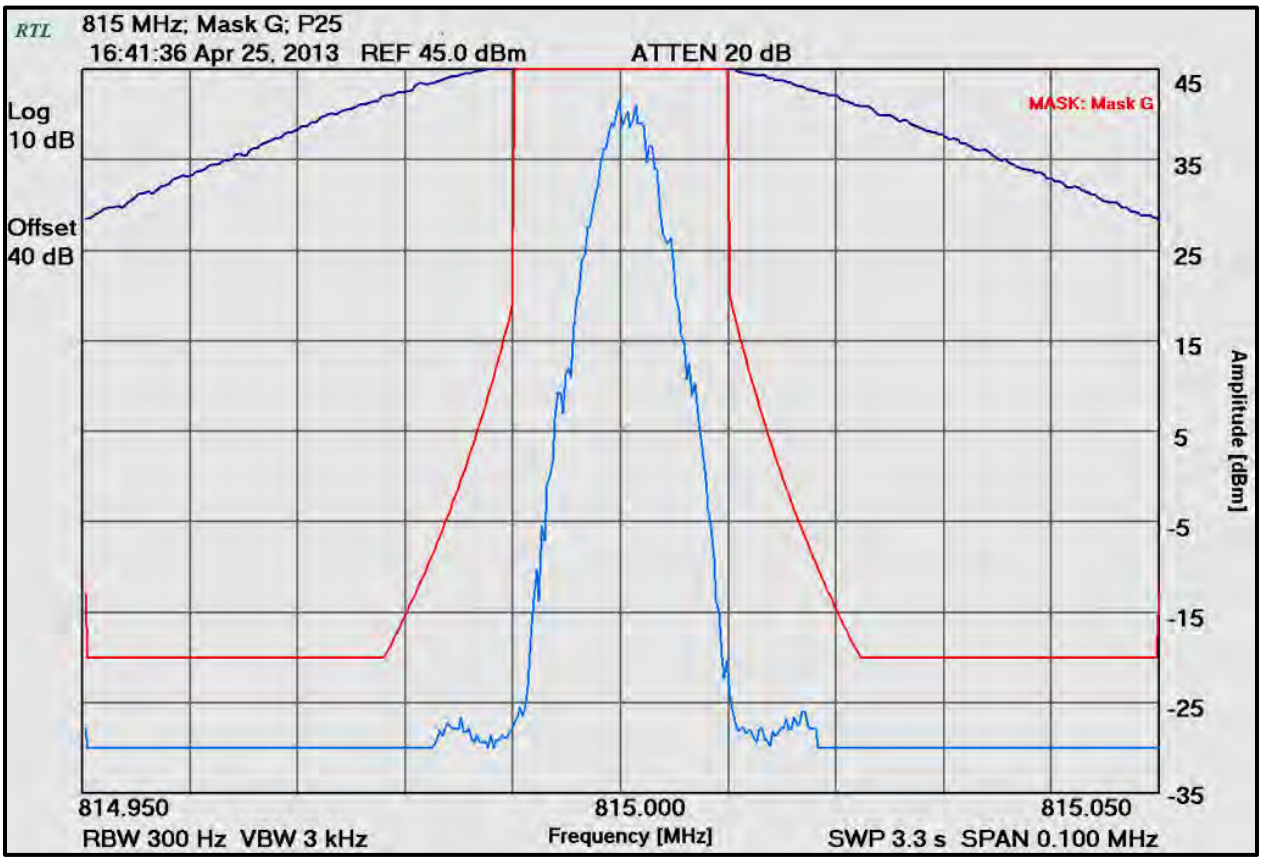
Plot 8-23: Occupied Bandwidth – 815 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask G)



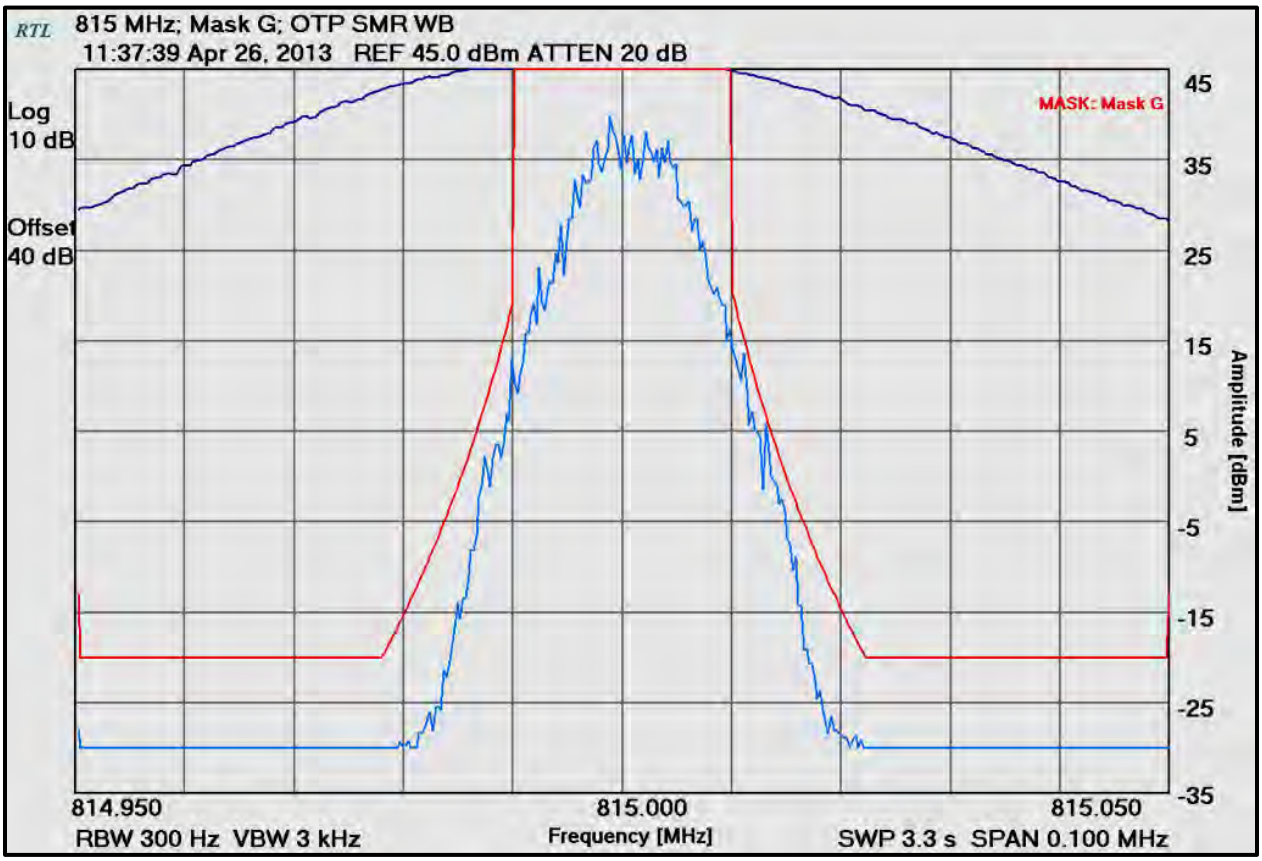
Plot 8-24: Occupied Bandwidth – 815 MHz; 4- Level FSK, P25 Phase 1 (Mask D)



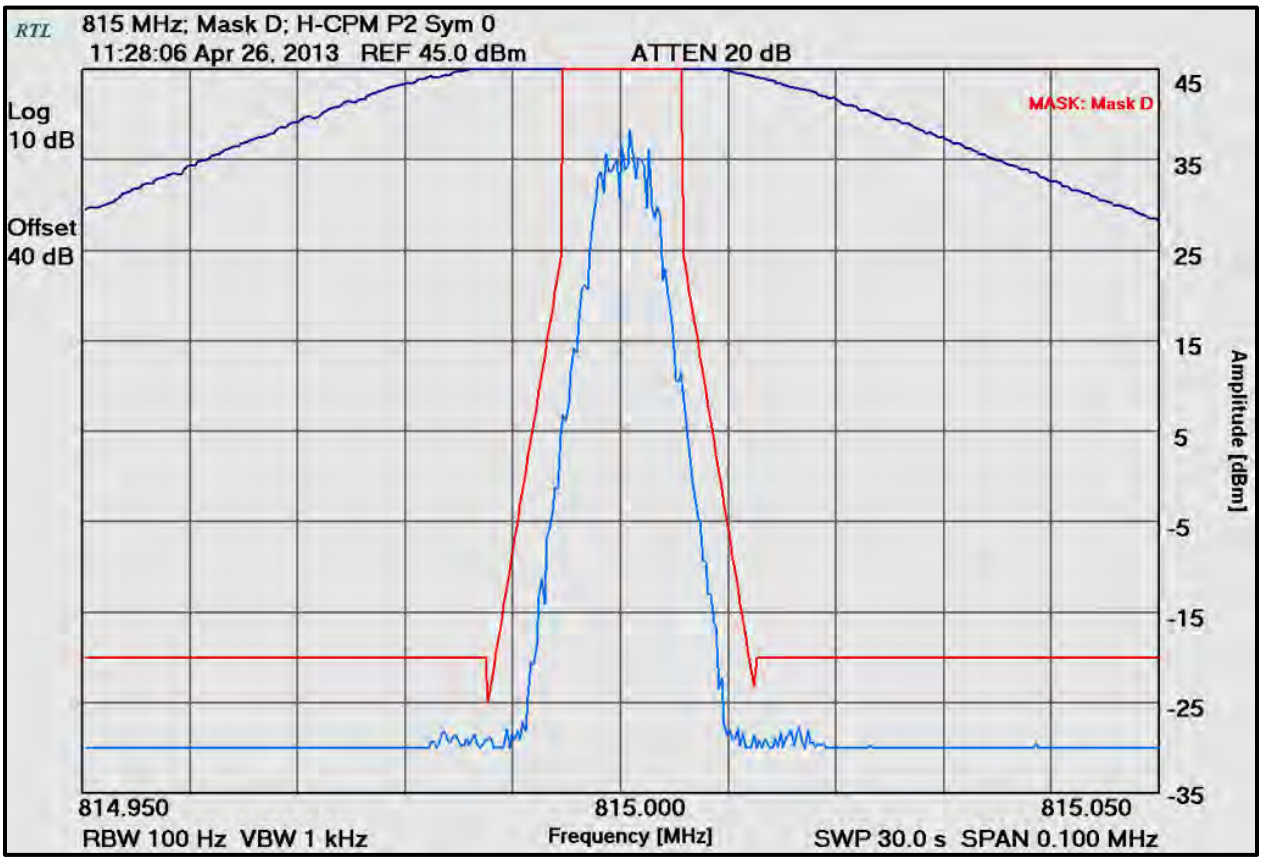
Plot 8-25: Occupied Bandwidth – 815 MHz; 4- Level FSK, P25 Phase 1 (Mask G)



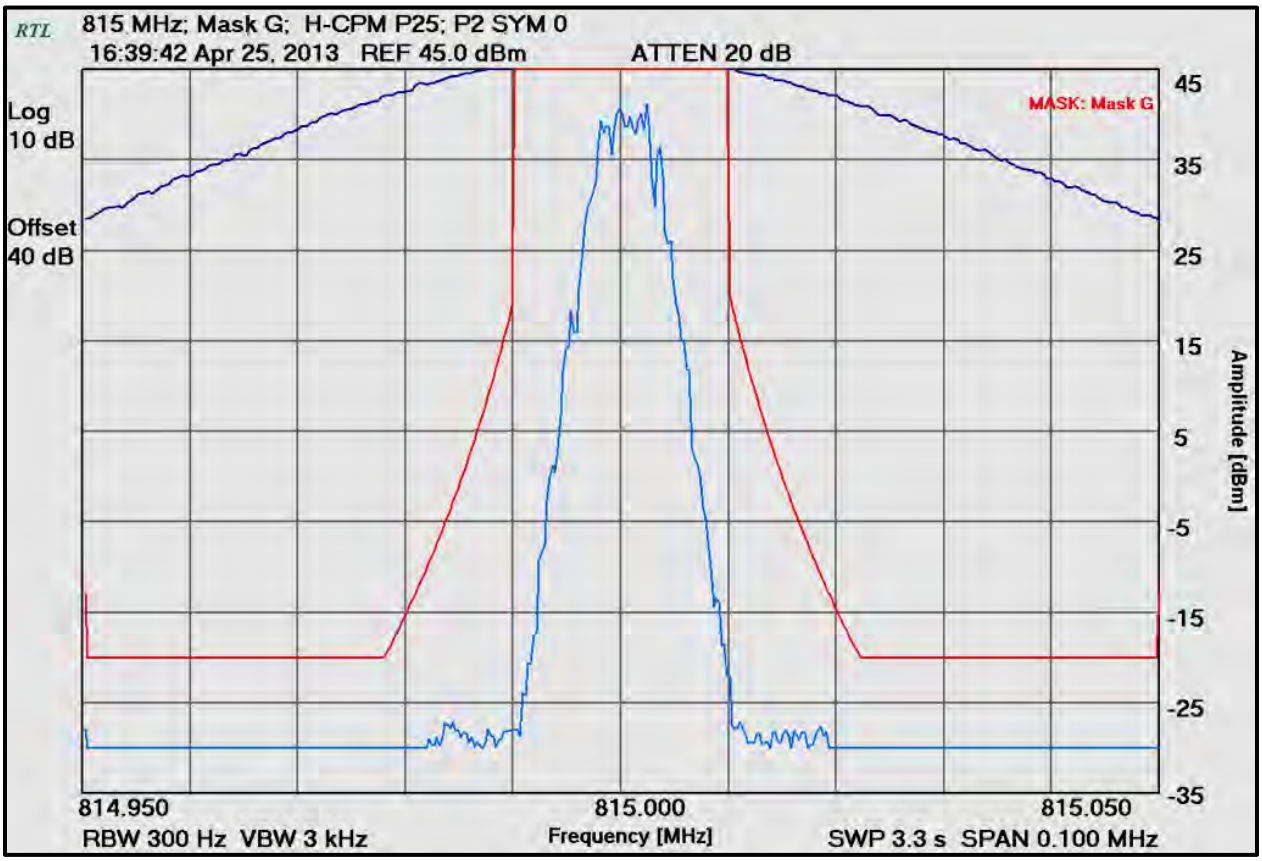
Plot 8-26: Occupied Bandwidth – 815 MHz; 4-Level FSK, Wideband OTP (Mask G)



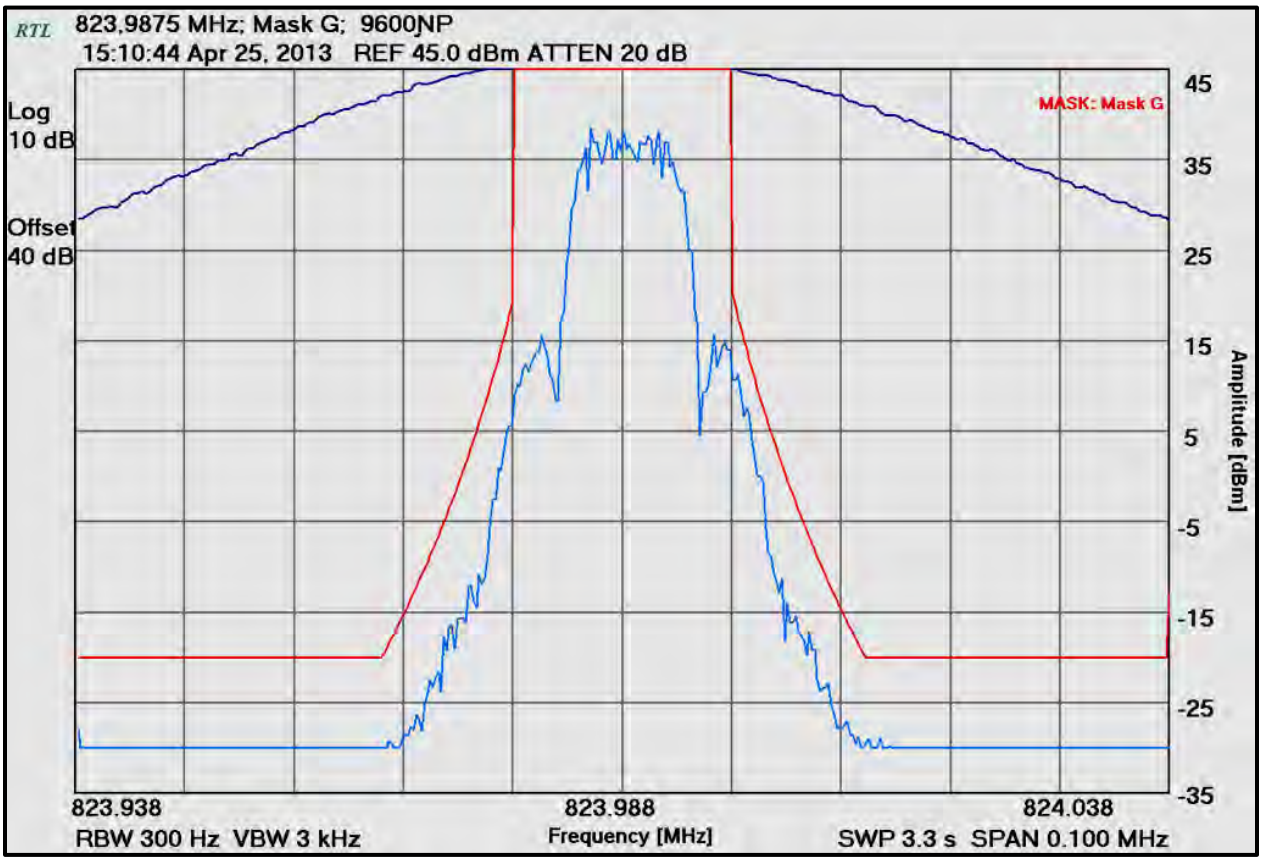
Plot 8-27: Occupied Bandwidth – 815 MHz; H-CPM P25 P2 SYM 0 (Mask D)



Plot 8-28: Occupied Bandwidth – 815 MHz; H-CPM P25 P2 SYM 0 (Mask G)

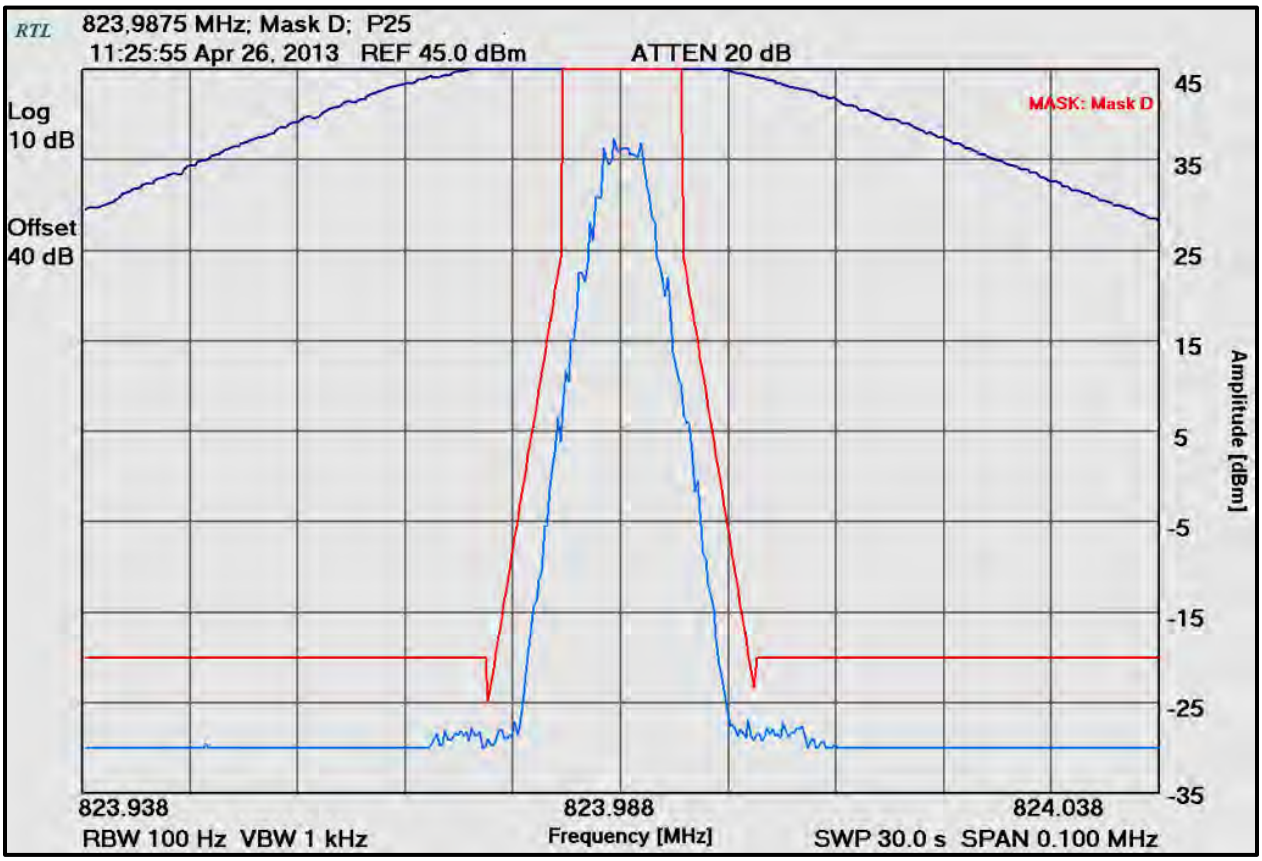


Plot 8-29: Occupied Bandwidth – 823.9875 MHz; 2- Level FSK, EDACS, NPSPAC (9600NP, Mask G)

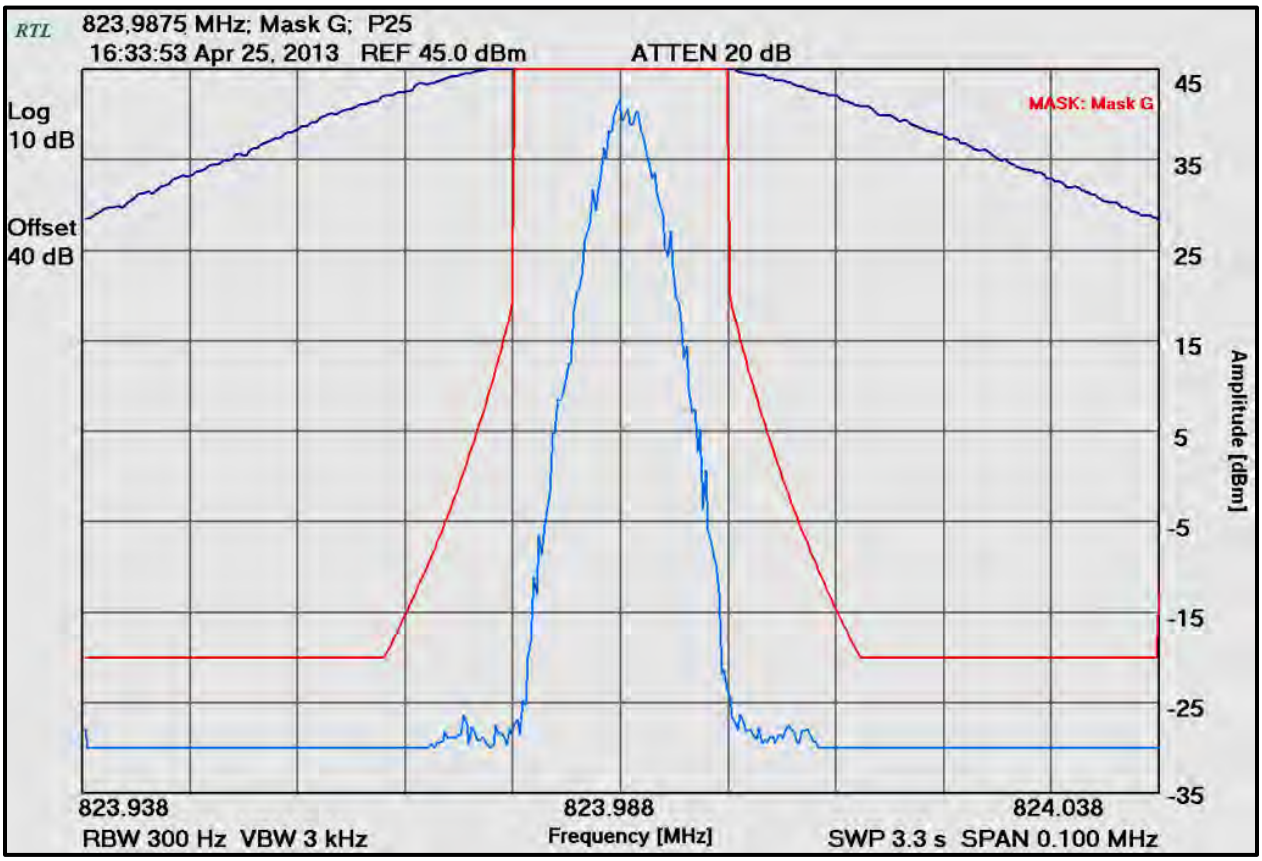


Plot 8-30: Occupied Bandwidth – 823.9875 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask G)

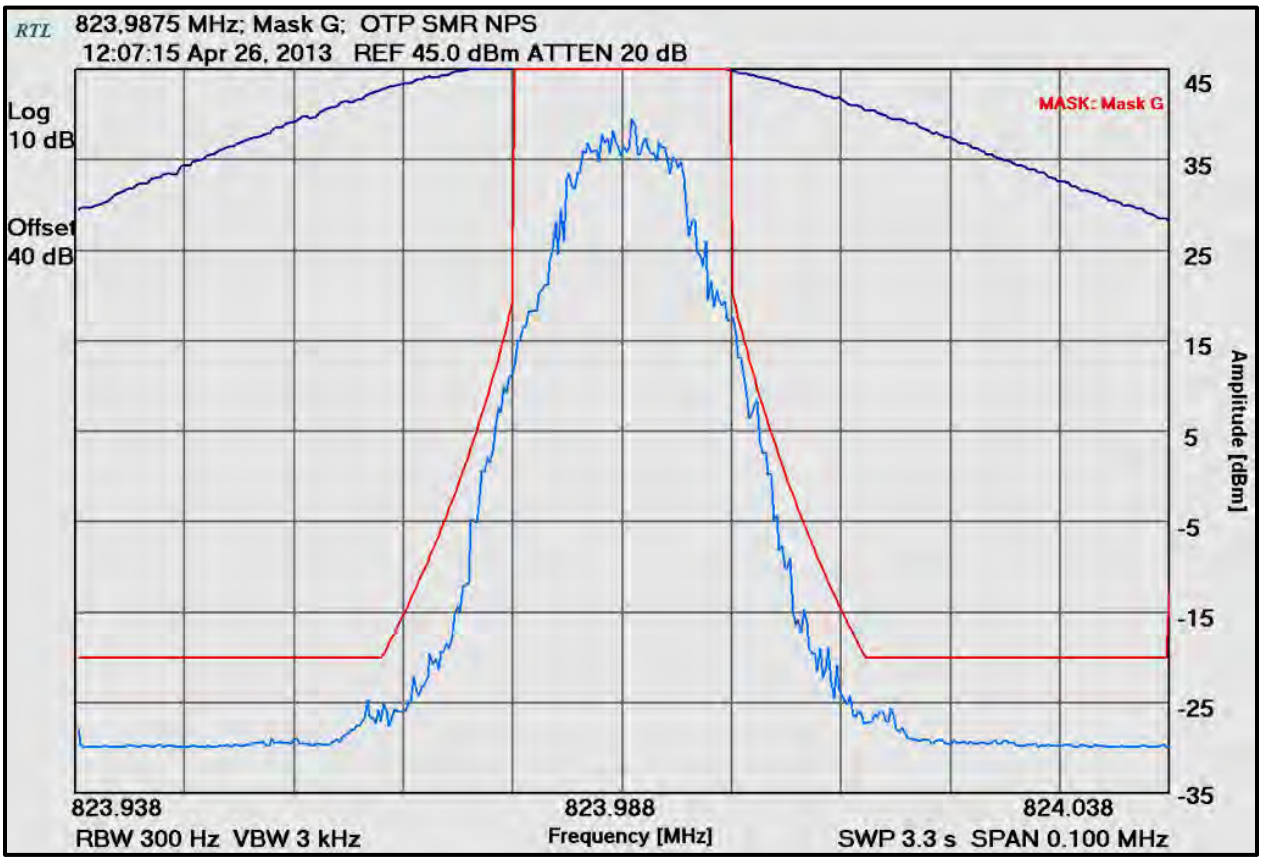
Plot 8-31: Occupied Bandwidth – 823.9875 MHz; 4- Level FSK, P25 Phase 1 (Mask D)



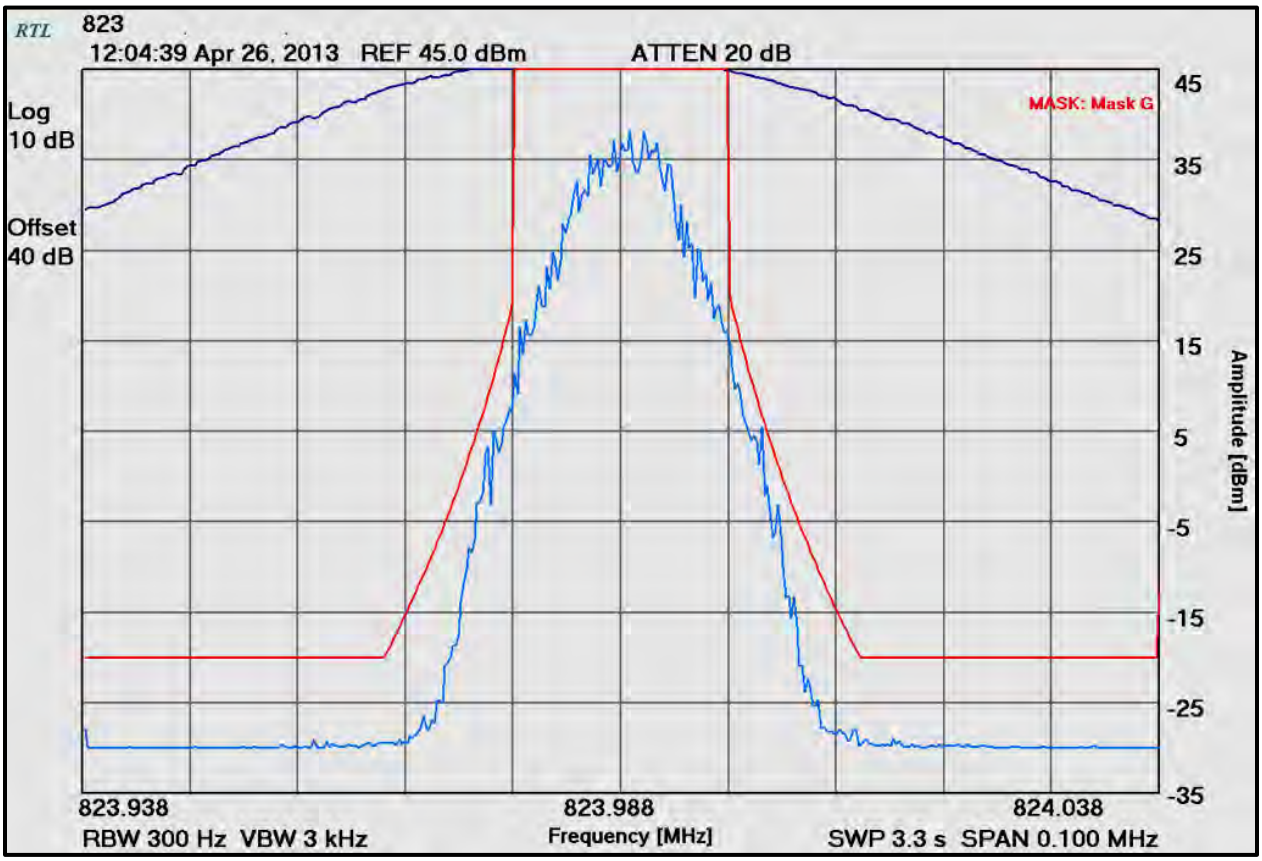
Plot 8-32: Occupied Bandwidth – 823.9875 MHz; 4- Level FSK, P25 Phase 1 (Mask G)



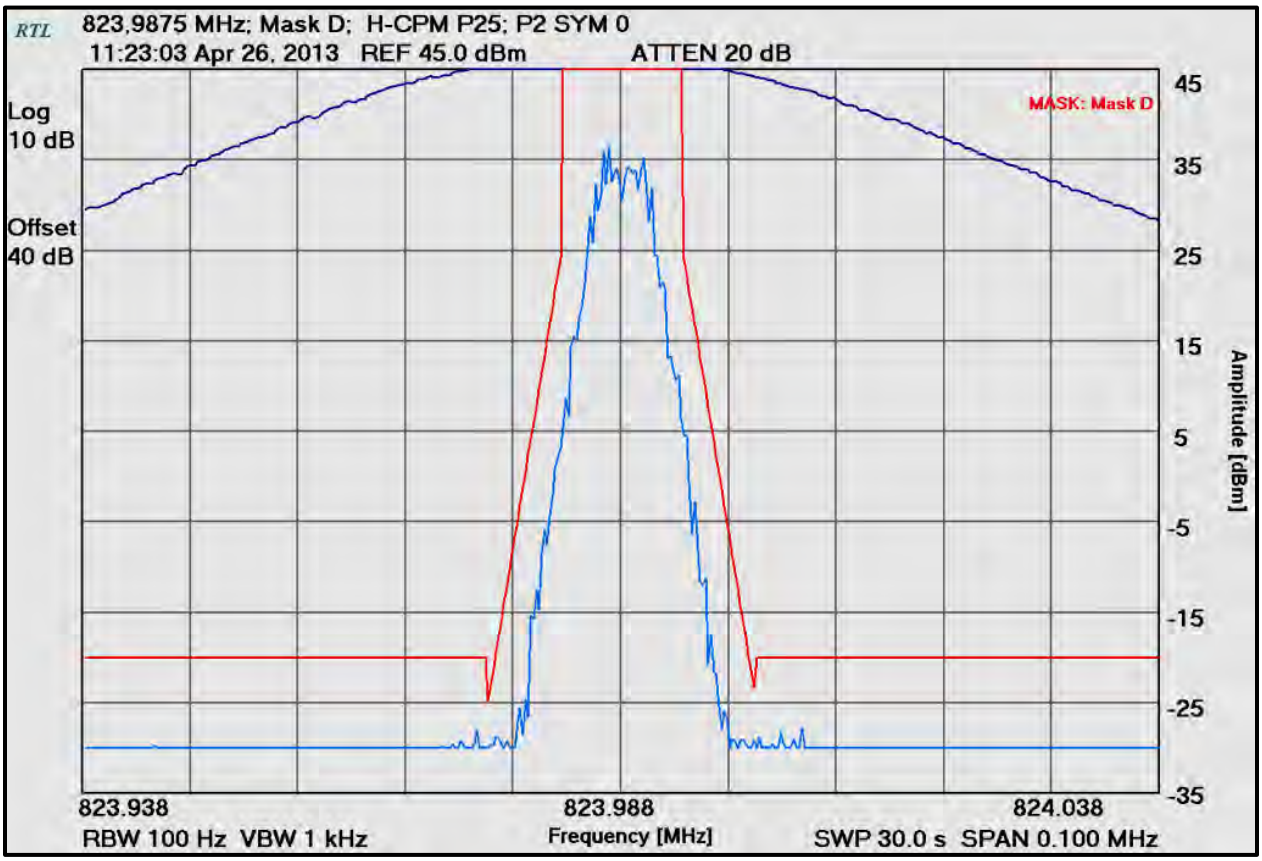
Plot 8-33: Occupied Bandwidth – 823.9875 MHz; 4-Level FSK, NPSPAC OTP (Mask G)



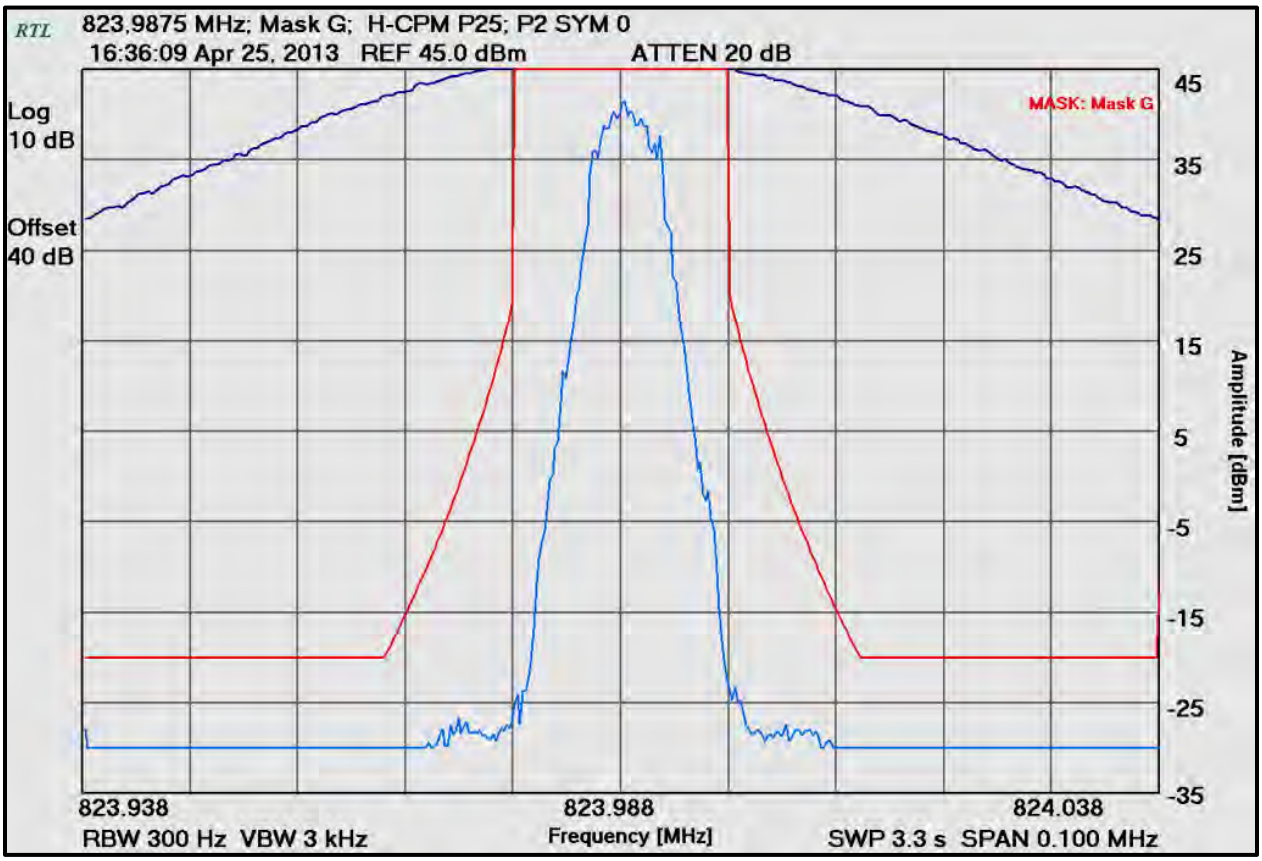
Plot 8-34: Occupied Bandwidth – 823.9875 MHz; 4-Level FSK, Wideband OTP (Mask G)



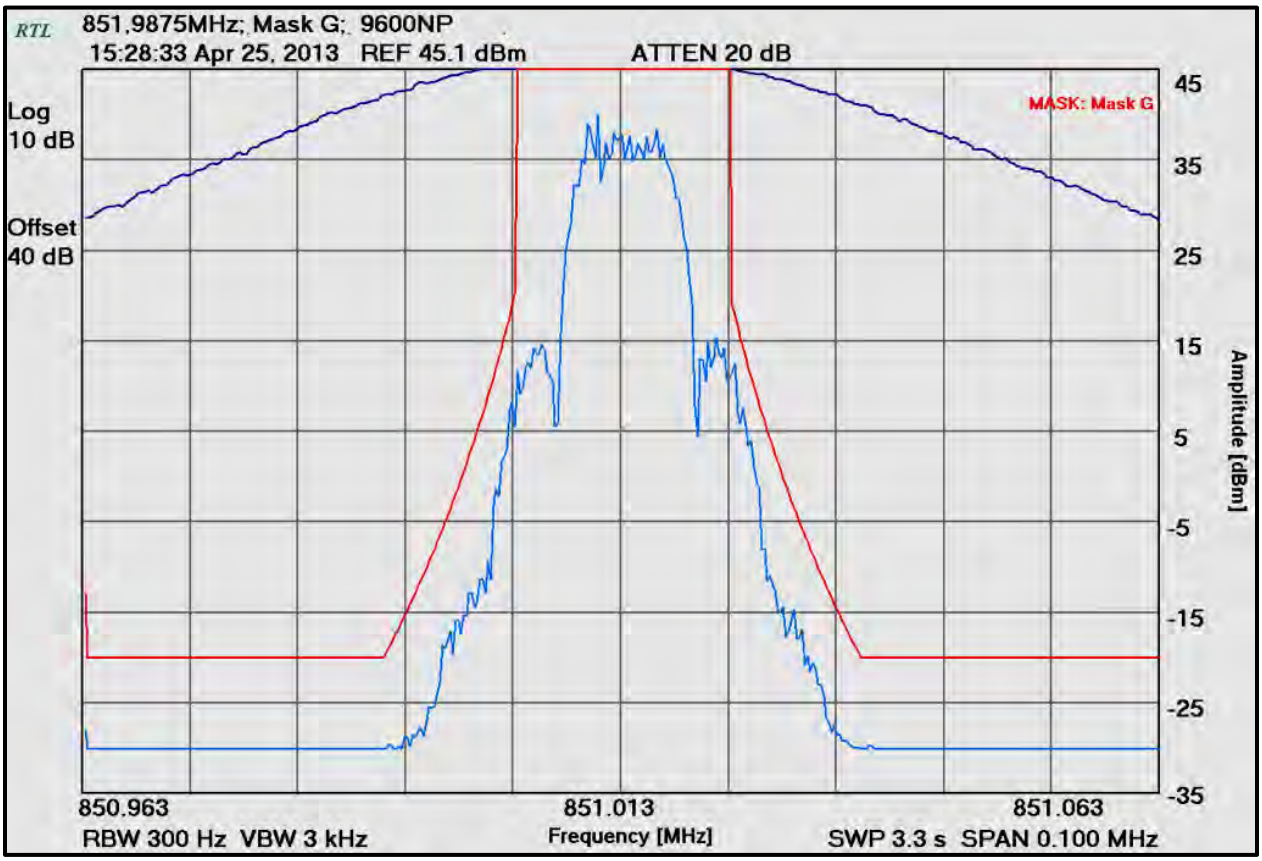
Plot 8-35: Occupied Bandwidth – 823.9875 MHz; H-CPM P25 P2 SYM 0 (Mask D)



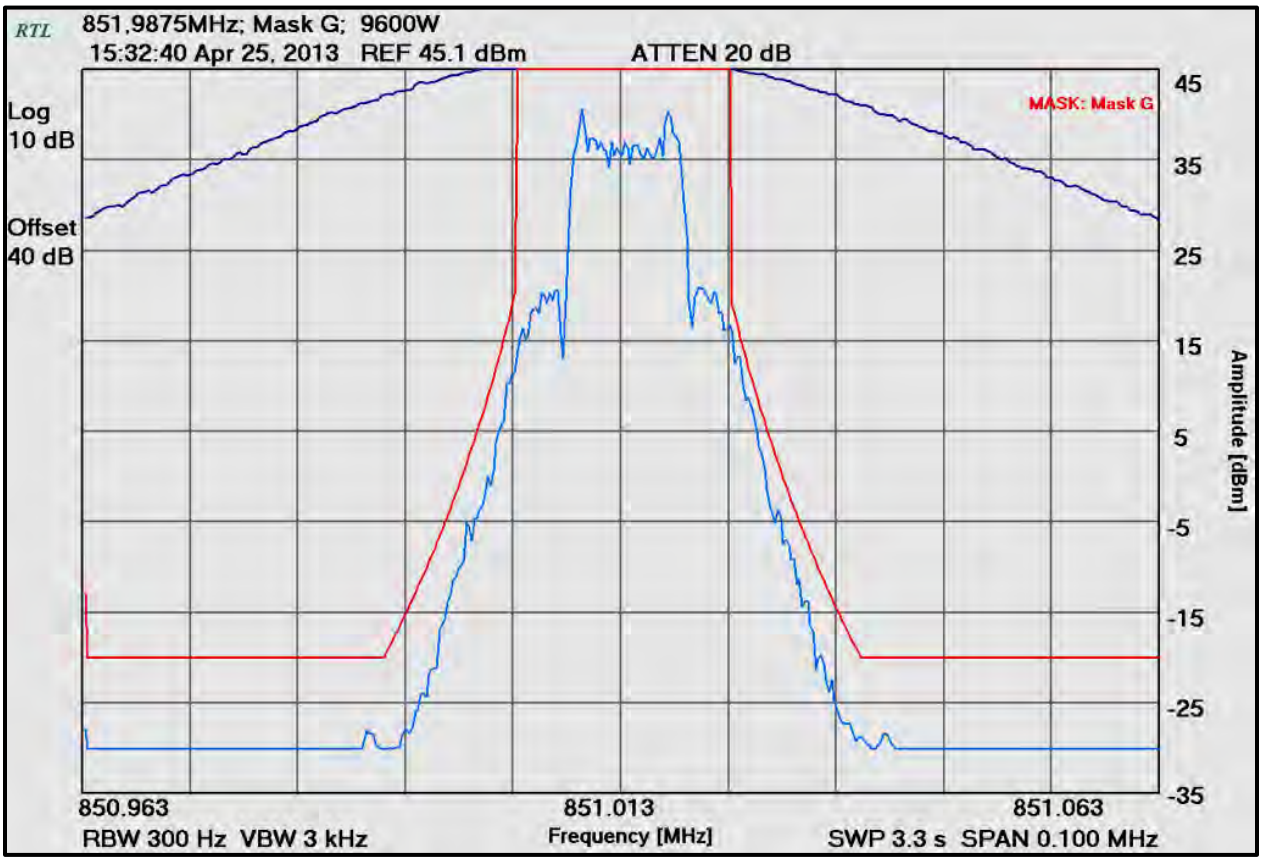
Plot 8-36: Occupied Bandwidth – 823.9875 MHz; H-CPM P25 P2 SYM 0 (Mask G)



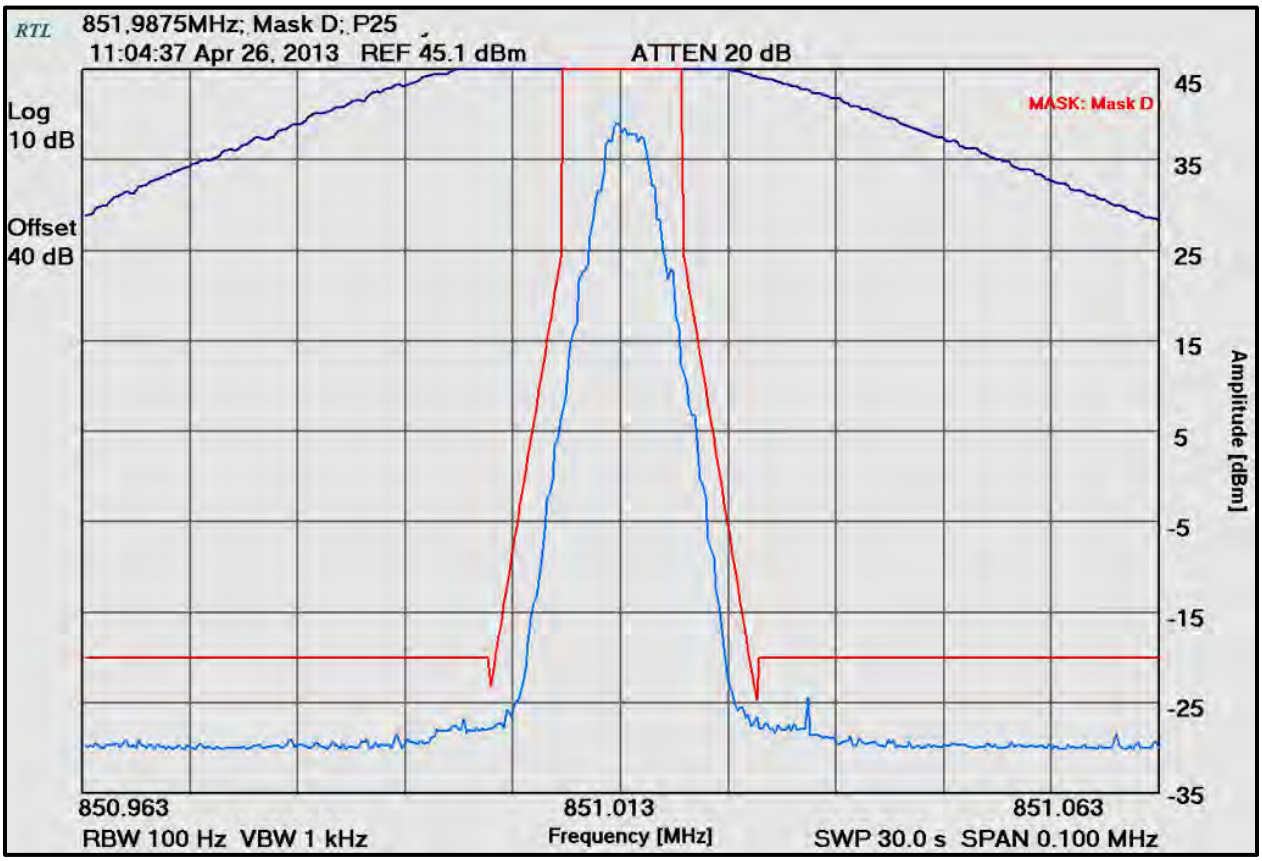
Plot 8-37: Occupied Bandwidth – 851.0125 MHz; 2- Level FSK, EDACS, NPSPAC (9600NP, Mask G)



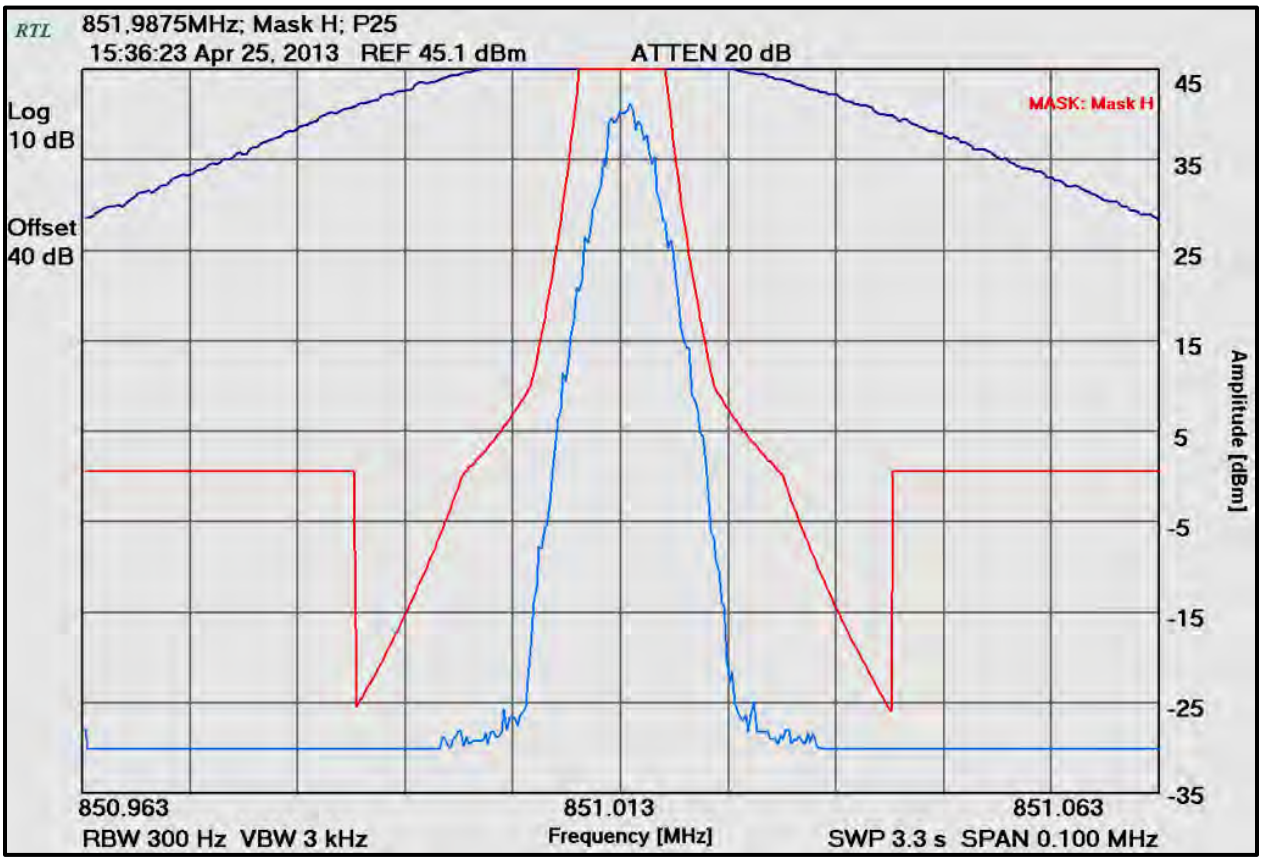
Plot 8-38: Occupied Bandwidth – 851.0125 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask G)



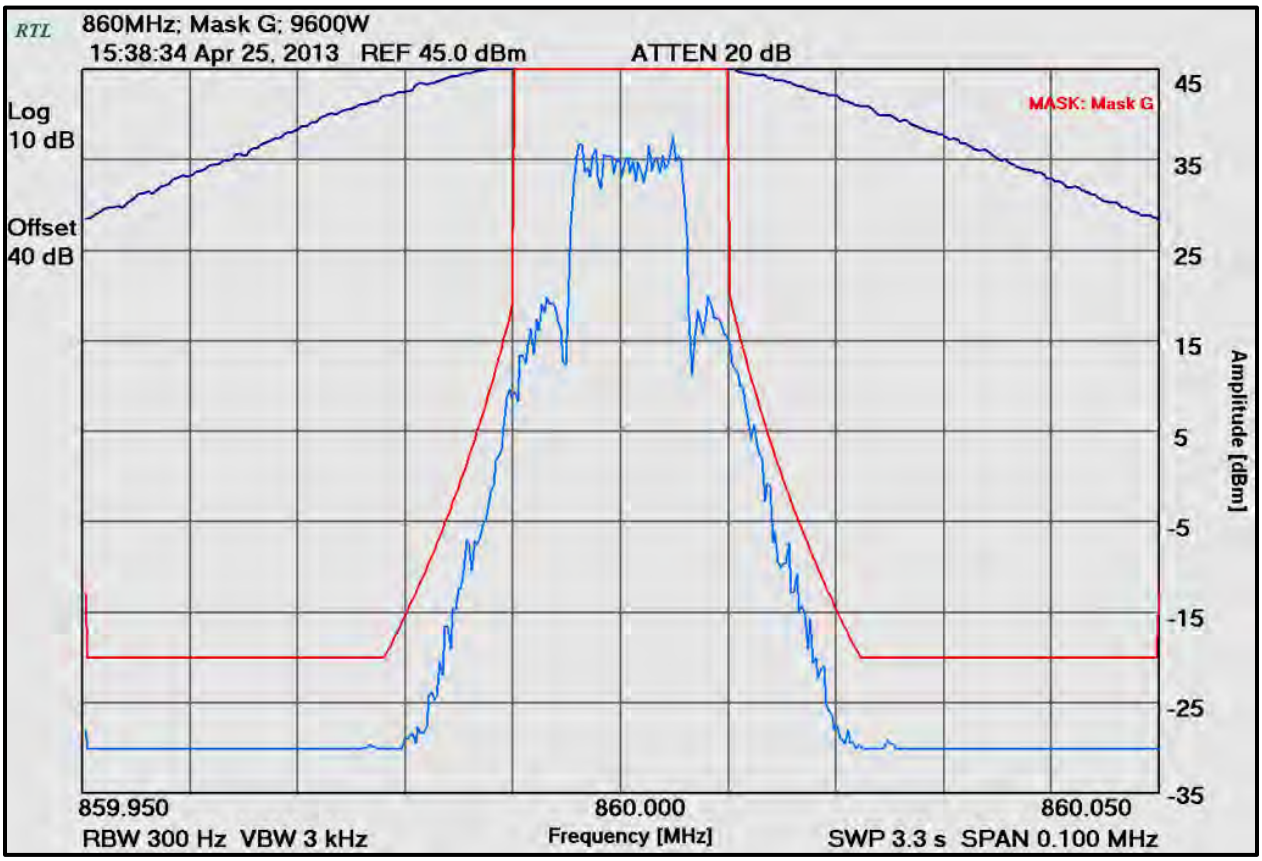
Plot 8-39: Occupied Bandwidth – 851.0125 MHz; 4- Level FSK, P25 Phase 1 (Mask D)



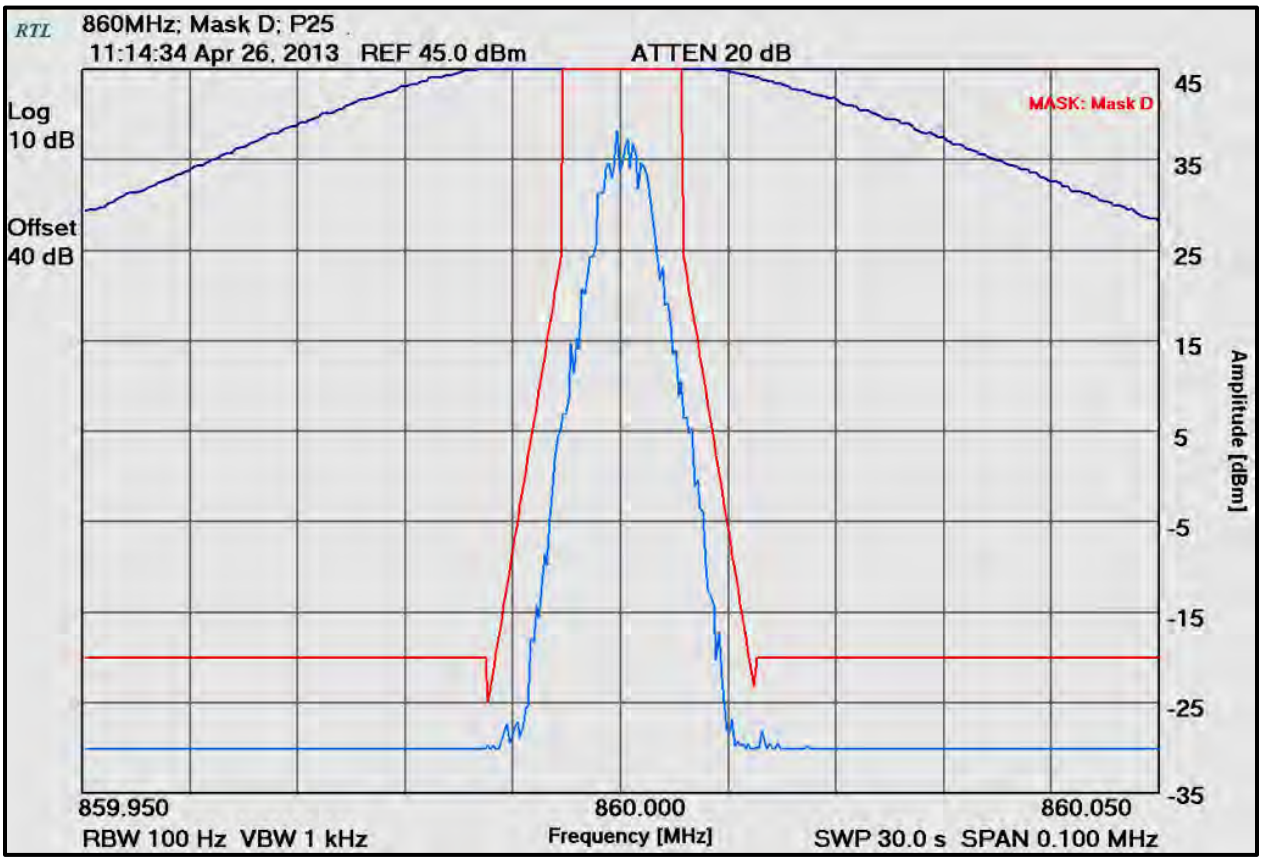
Plot 8-40: Occupied Bandwidth – 851.0125 MHz; 4- Level FSK, P25 Phase 1 (Mask H)



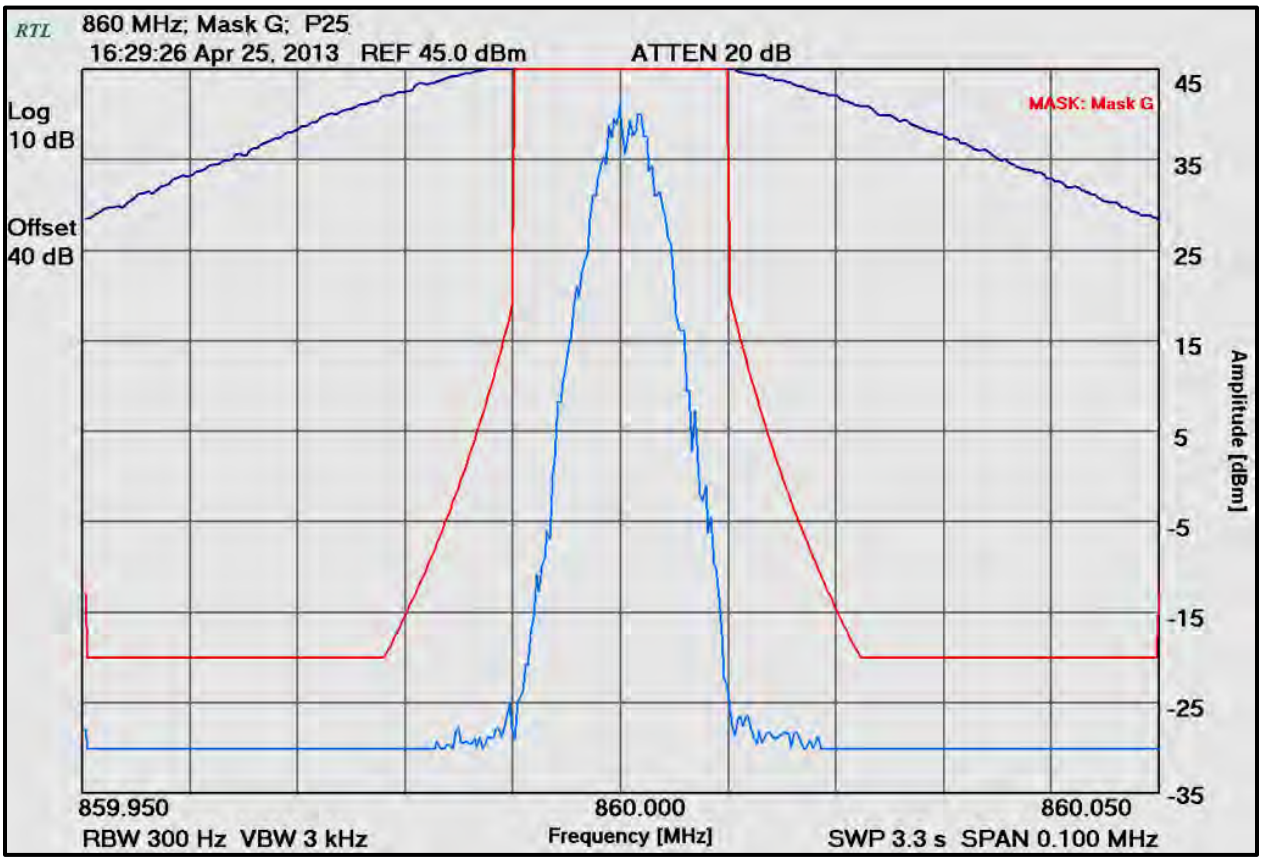
Plot 8-41: Occupied Bandwidth – 860 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask G)



Plot 8-42: Occupied Bandwidth – 860 MHz; 4- Level FSK, P25 Phase 1 (Mask D)



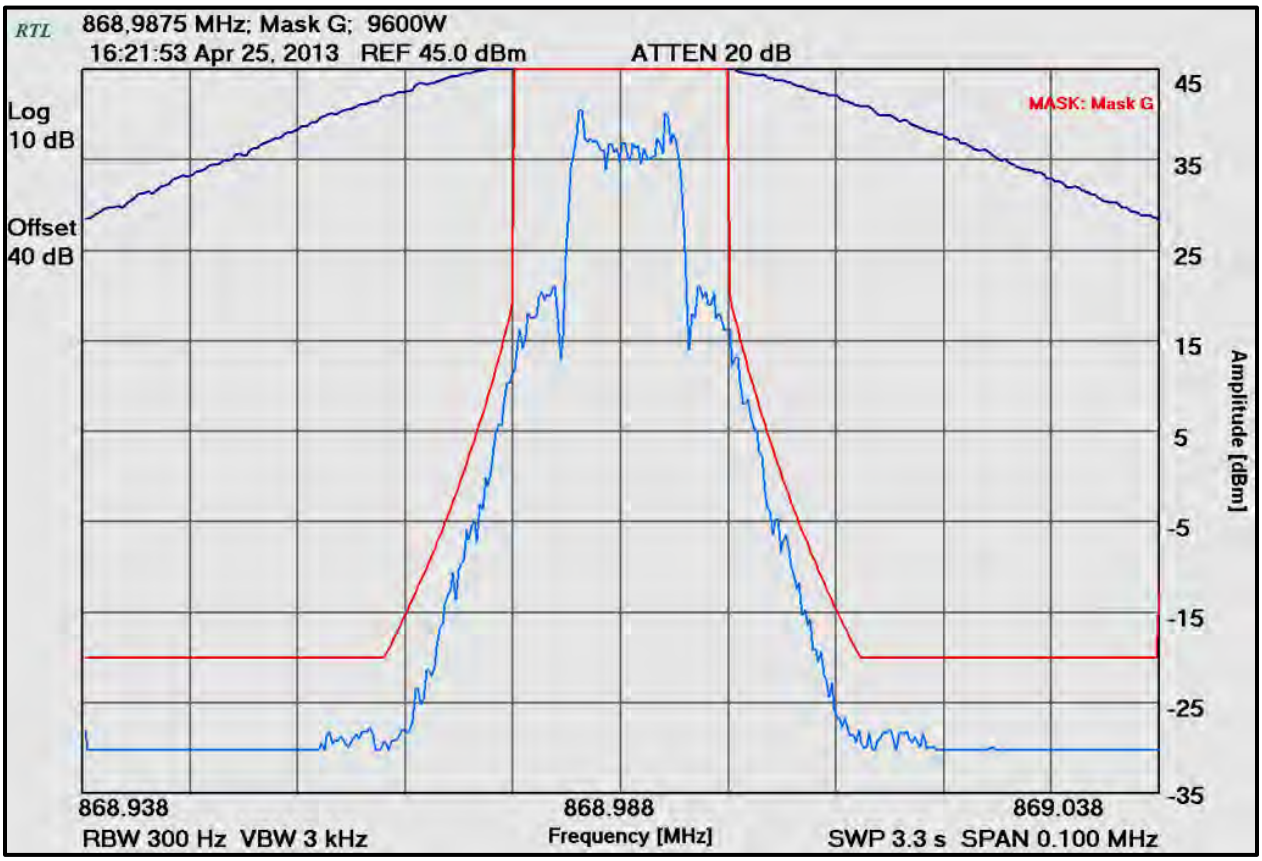
Plot 8-43: Occupied Bandwidth – 860 MHz; 4- Level FSK, P25 Phase 1 (Mask G)



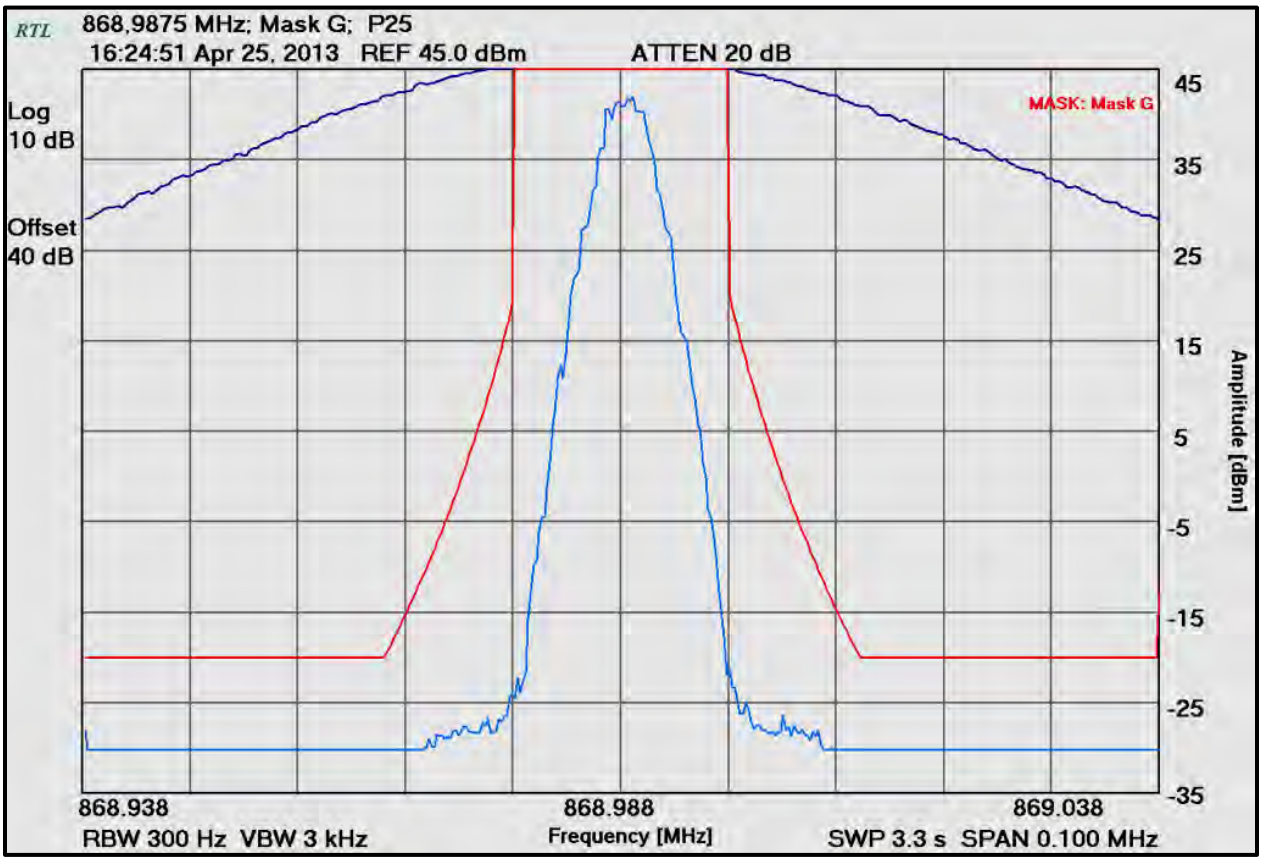
Plot 8-44: Occupied Bandwidth – 860 MHz; 4-Level FSK, Wideband OTP (Mask G)

Plot 8-45: Occupied Bandwidth – 868.9875 MHz; 2- Level FSK, EDACS, NPSPAC (9600NP, Mask G)

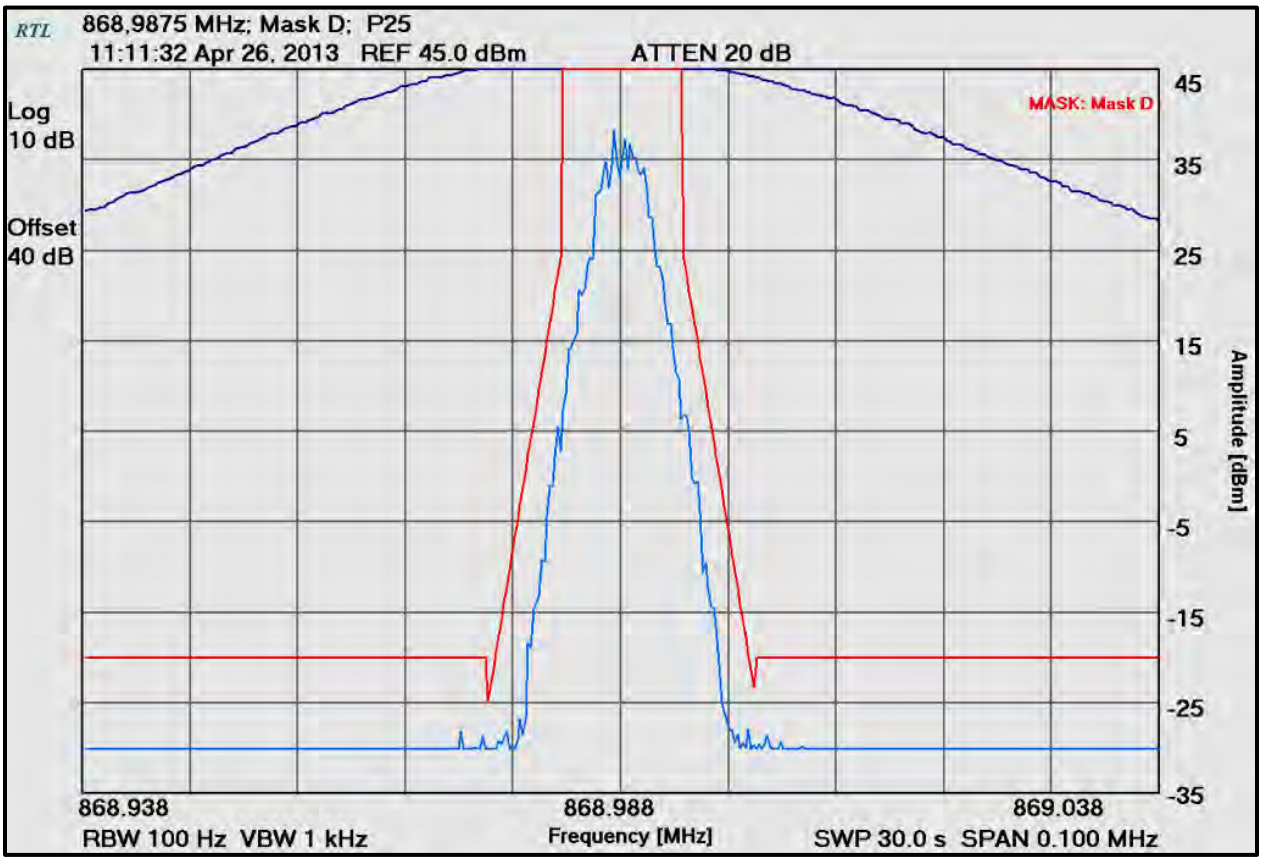
Plot 8-46: Occupied Bandwidth – 868.9875 MHz; 2- Level FSK, EDACS, SMR (9600W, Mask G)



Plot 8-47: Occupied Bandwidth – 868.9875 MHz; 4- Level FSK, P25 Phase 1 (Mask G)



Plot 8-48: Occupied Bandwidth – 868.9875 MHz; 4- Level FSK, P25 Phase 1 (Mask D)



Plot 8-49: Occupied Bandwidth – 868.9875 MHz; OTP SMR (Mask G)

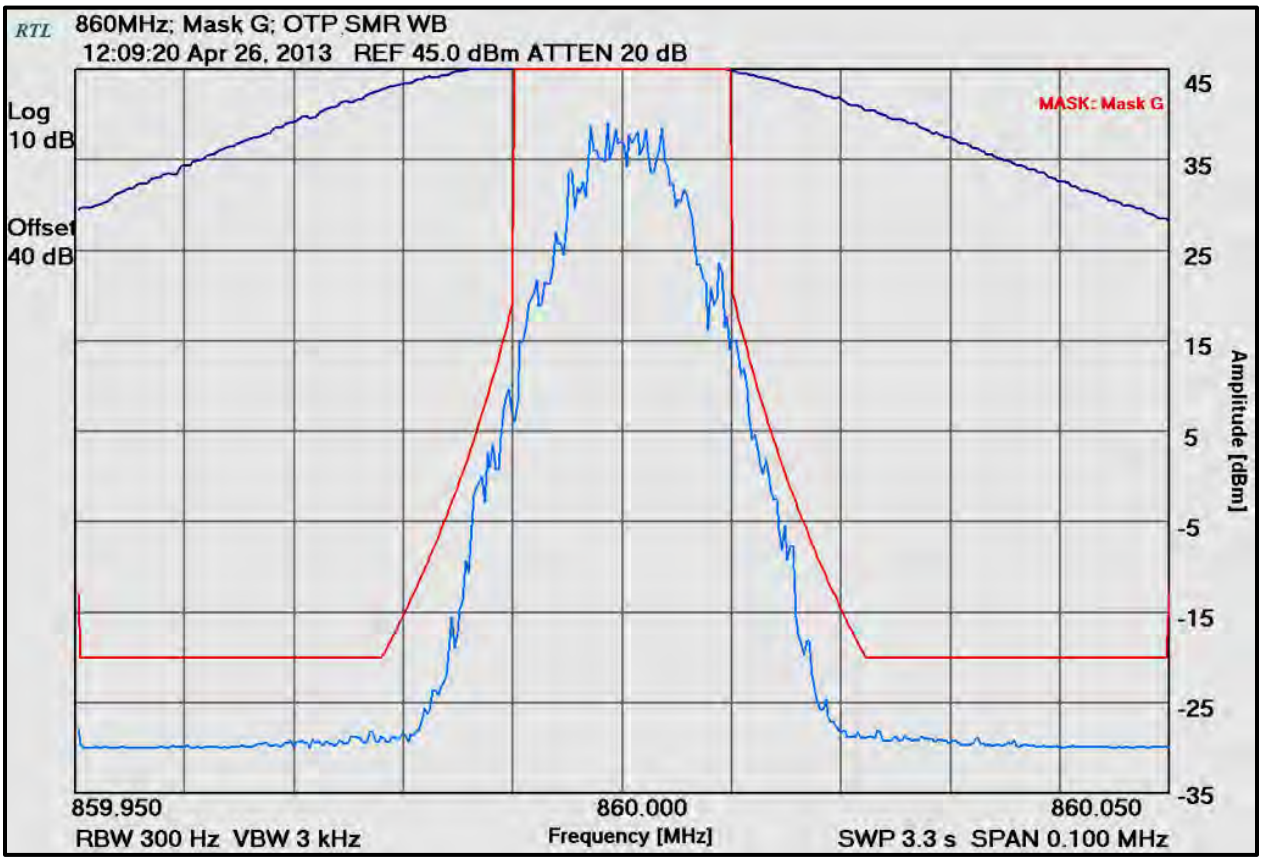


Table 8-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	3/15/14
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	10/14/13

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	April 24-26, 2013
Test Engineer	Signature	Dates of Test

9 FCC Rules and Regulation Part 2.1055: Frequency Stability; Part 90.539: Frequency Stability; RSS-119 5.3: Transmitter Frequency Stability

9.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

The EUT was evaluated over the temperature range -30°C to +60°C.

The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. Additionally, the power supply voltage of the EUT was varied +/-15% nominal input voltage.

Limit for 700 band:

§90.539: Transmitters designed to operate in 769-775 MHz and 799-805 MHz frequency bands must meet the frequency stability requirements in this section.

(a) Mobile, portable and control transmitters must normally use automatic frequency control (AFC) to lock on to the base station signal.
(b) The frequency stability of base transmitters operating in the narrowband segment must be 100 parts per billion or better.
(c) The frequency stability of mobile, portable, and control transmitters operating in the narrowband segment must be 400 parts per billion or better when AFC is locked to the base station.

Note: When AFC is not locked to the base station, the frequency stability must be at least 1.0 ppm for 6.25 kHz, 1.5 ppm for 12.5 kHz (2 channel aggregate), and 2.5 ppm for 25 kHz (4 channel aggregate).

Limit for 800 band:

§90.213: Mobile stations over 2 W operating power - 1.5 ppm.

9.2 Test Data

Table 9-1: Temperature Frequency Stability – 794.0125 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	794.0123794	-0.2
-20	794.0124033	-0.1
-10	794.0124811	0.0
0	794.0125071	0.0
10	794.0124537	-0.1
20 (reference)	794.0125000	0.0
30	794.0125430	0.1
40	794.0125739	0.1
50	794.0125271	0.0
60	794.0125273	0.0

The worst-case deviation was found to be -0.2 ppm. The requirement for this band at 12.5 kHz channel spacing is 1.5 ppm.

Result: The EUT is compliant.

9.2.1 Frequency Stability/Temperature Variation

Table 9-2: Temperature Frequency Stability – 851.0125 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	851.0123464	-0.2
-20	851.0124218	-0.1
-10	851.0124761	0.0
0	851.0125141	0.0
10	851.0124626	0.0
20 (reference)	851.0125000	0.0
30	851.0125451	0.1
40	851.0125903	0.1
50	851.0125326	0.0
60	851.0125455	0.1

The worst-case deviation was found to be -0.2 ppm. The requirement for this band at 12.5 kHz channel spacing is 1.5 ppm.

Result: The EUT is compliant.

9.2.2 Frequency Stability/Voltage Variation

Table 9-3: Frequency Stability/Voltage Variation – 794.0125 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
11.73	794.0125	-0.1
13.8 (reference)	794.0125	0.0
15.87	794.0125	0.0

Table 9-4: Frequency Stability/Voltage Variation – 851.0125 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
11.73	851.0125	0.0
13.8 (reference)	851.0125	0.0
15.87	851.0125	0.0

Table 9-5: Test Equipment Used For Testing Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	1/13/14
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	7/18/13
901350	Meterman	33XR	DMM	N/A	3/20/15

Test Personnel:

Daniel Baltzell		April 16, 2013
Test Engineer	Signature	Date of Test

10 FCC Part 2.1047(a): Modulation Characteristics - Audio Frequency Response

10.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.6

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref. The audio signal generator was varied from 100 Hz to 5 kHz with the input level held constant. The deviation in kHz was recorded using a modulation analyzer as DEVfreq. The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

10.2 Test Data

Plot 10-1: Modulation Characteristics - Audio Frequency Response

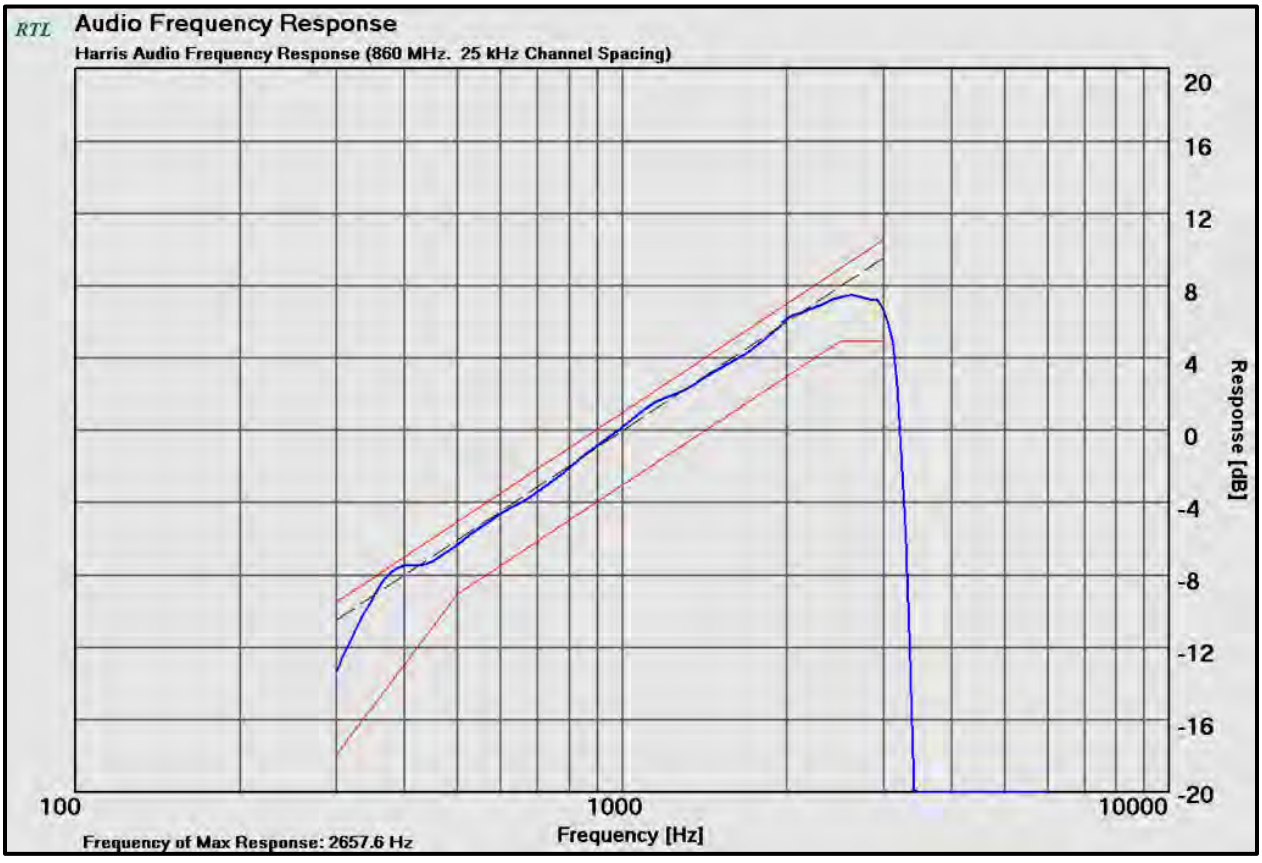


Table 10-1: Test Equipment Used For Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	4/17/15
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	4/1/15
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	4/6/14

Test Personnel:

Daniel Baltzell		April 23, 2013
Test Engineer	Signature	Date of Test

11 FCC Part 2.1047(a): Modulation Characteristics – Audio Low Pass Filter

11.1 Test Procedure

ANSI/TIA/EIA-603-2004, 2.2.15

The Audio Low Pass Filter Response is the frequency response of the post limiter low pass filter circuit above 3000 Hz.

11.2 Test Data

Plot 11-1: Modulation Characteristics – Audio Low Pass Filter

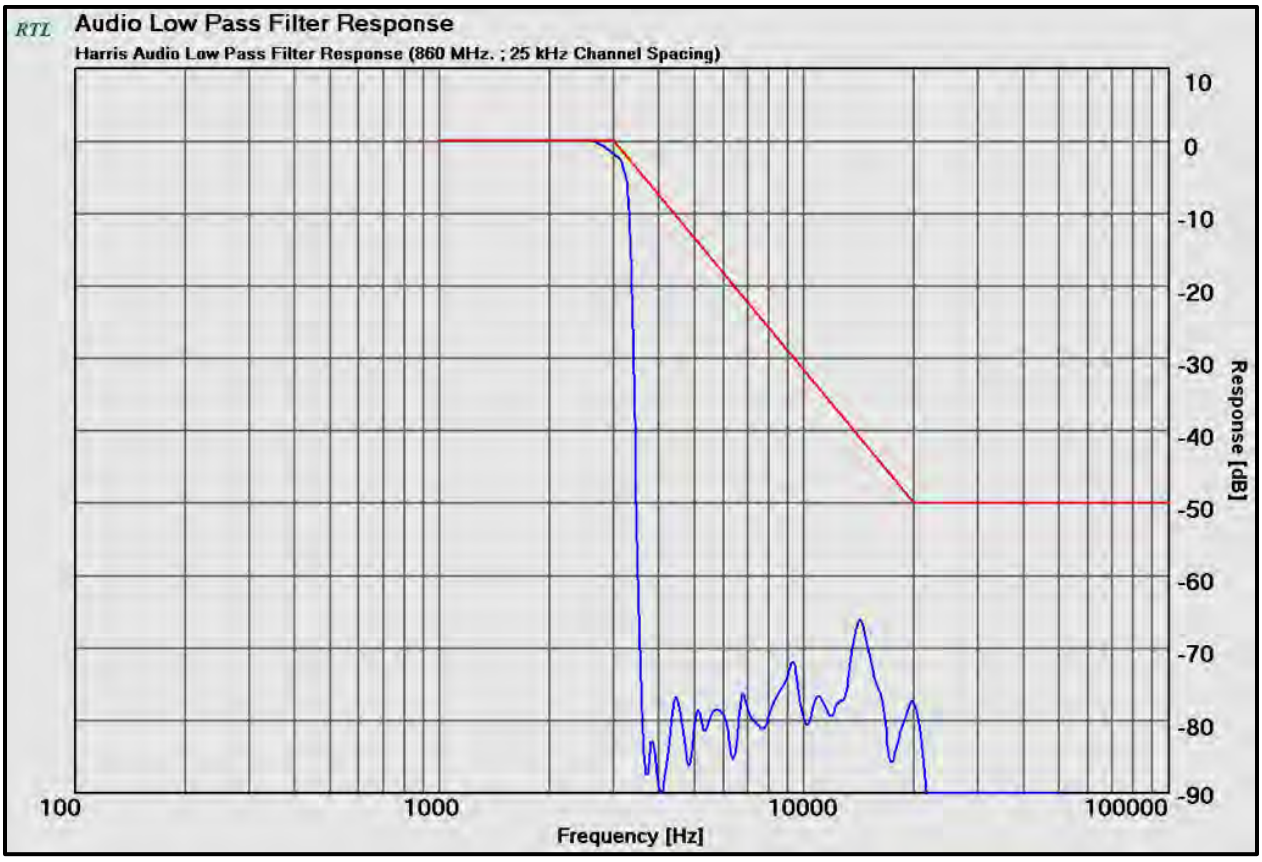


Table 11-1: Test Equipment Used For Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	4/17/15
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	4/1/15
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	4/9/15

Test Personnel:

Daniel Baltzell		April 23, 2013
Test Engineer	Signature	Date of Test

12 FCC Rules and Regulations Part 2.1047(b): Modulation Characteristics - Modulation Limiting

12.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.3

The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

12.2 Test Data

Plot 12-1: Modulation Characteristics – Modulation Limiting; Positive Peak; Wideband

Plot 12-2: Modulation Characteristics – Modulation Limiting; Negative Peak; Wideband

Plot 12-3: Modulation Characteristics – Modulation Limiting; Positive Peak; NPSPAC

Plot 12-4: Modulation Characteristics – Modulation Limiting; Negative Peak; NPSPAC

Table 12-1: Test Equipment Used For Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	4/17/15
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	4/1/15

Test Personnel:

Daniel Baltzell		April 23, 2013
Test Engineer	Signature	Date of Test

13 FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Bandwidth

Analog FM

768-776 MHz Talkaround; 798-806 MHz Trunked/Conventional

Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 11.0 kHz
Emission designator: 11K0F3E

806-824 MHz Trunked/Conventional; 851-870 MHz Talkaround

Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

806-824 MHz Trunked/Conventional; 851-870 MHz TalkAround on NPSPAC Channels

Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 14K0F3E

OTP Modulation

798-806 OTP NB

Calculation:
Data rate in bps (R) =9600
Deviation Peak deviation of carrier (D) = 1800
Number of states in each symbol (S) = 4
K=0.965
Bn = $R/\log_2 S + 2DK = 9600/\log_2(4)+2(1800)(0.965)$ = 8.1 kHz
Emission designator: 8K10F9W

798-806, 806-824, 854-869 MHz Trunked

Calculation:
Data rate in bps (R) = 19,200
Peak deviation of carrier (D) = 3,750 Hz
Number of state in each symbol (S) = 4
K = 0.334
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 12.1 kHz
Emission designator: 12K1F9W

806-809, 821-824, 851-854 MHz SMR/NPSPAC Trunked
Calculation:
Data rate in bps (R) = 19,200
Peak deviation of carrier (D) = 3750 Hz
Number of state in each symbol (S) = 4
K = 0.334
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 12.1 kHz
Emission designator: 12K1F9W

2-Level Voice/Data

806-824 NPSPAC Trunked/Conventional; 851-854, 866-869 MHz NPSPAC Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 2,400 Hz
2D/R = 0.5
Bn = (3.86*D)+(0.027*R) = 11.856 kHz
Emission designator: 11K9F1D, 11K9F1E

806-824, 851-869 SMR Trunked/Conventional; 851-854, 854-866, 866-869 MHz SMR Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 3,000 Hz
2D/R = 0.625
Bn = (3.86*D)+(0.027*R) = 14.172 kHz
Emission designator: 14K2F1D, 14K2F1E

P25 Voice/Data

768-776 Talkaround; 798-806MHz Trunked/Conventional
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = $[R/\log_2(4) + 2(D)(1)]$ = 8.400 kHz
Emission designator: 8K40F1D, 8K40F1E

806-824, 851-869 MHz Trunked or Conventional, Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = $[R/\log_2(4) + 2(D)(1)]$ = 8.400 kHz
Emission designator: 8K40F1D, 8K40F1E

798-806, 806-824 MHz H-CPM P25
Calculation:
Data rate in bps (R) = 12,000
Peak deviation of carrier (D) = 3310 Hz
Number of state in each symbol (S) = 4
Bn = $[R/\log_2(S) + 2(D)(1.079)]$ = 8.100 kHz
Emission designator: 8K10DXW

14 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **XG-25M 700/800 MHz Mobile Radio, FCC ID: OWDTR-0076-E, IC: 3636B-0076 ,** complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 11.