RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

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XG-75 700/800 MHz Portable Radio

FCC ID: OWDTR-0074-E
IC: 3636B-0074

September 21, 2011

Standards Referenced for this Report	
Part 2: 2010	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2010	Private Land Mobile Radio Services
TIA-EIA-603-C August 2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards
ANSI/TIA/EIA–102.CAAA; 2002	Digital C4FM/CQPSK Transceiver Measurement Methods
ANSI/TIA/EIA–102.BAAA–1998	Project 25 FDMA Common Air Interface—New Technology Standards Project—Digital Radio Technical Standards
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: Richard B. McMurray, P.E.

Document Number: 2011144

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 Conducted Output Power (W)	Frequency Tolerance (ppm)	Transmit Mode	Emission Designator
764 – 776, 794 – 806 (FCC) 768 – 776, 798 – 806 (IC)	0.5 – 3.0	0.2	Analog FM (NB)	11K0F3E
764 – 776, 794 – 806 (FCC) 768 – 776, 798 – 806 (IC)	0.5 – 3.0	0.2	4-level FSK, digitized data or voice, P25 Phase 1, 9.6 kbps	8K40F1D/E
794 – 806 (FCC) 798-806 (IC)	0.5 – 3.0	0.2	4-level FSK, digitized data or voice, OTP, 19.2 kbps	12K1F9W
794 – 806 (FCC) 798-806 (IC)	0.5 – 3.0	0.2	4-level FSK, digitized data or voice, OTP, 9.6 kbps	8K10F9W
806 – 809, 851 – 854	0.5 – 3.0	0.2	Analog FM (NPSPAC)	14K0F3E
806 – 809, 851 – 854	0.5 – 3.0	0.2	2-level FSK, digitized data or voice, EDACS (NPSPAC), 9.6 kbps	11K9F1D/E
806 – 809, 851 – 854	0.5 – 3.0	0.2	4-level FSK, digitized data or voice, NPSPAC OTP, 19.2 kbps	12K1F9W
809 – 824	0.5 – 3.0	0.2	Analog FM (SMR)	16K0F3E 16K0F9W
809 – 824, 854 – 869	0.5 – 3.0	0.2	2-level FSK, digitized data or voice, EDACS (SMR)	14K2F1D/E
809 – 824, 854 – 869	0.5 – 3.0	0.2	4-level FSK, digitized data or voice, wideband OTP, 19.2 kbps	12K1F9W
806 – 824, 851 – 869	0.5 – 3.0	0.2	4-level FSK, digitized data or voice, P25 Phase 1, 9.6 kbps	8K40F1D/E
854 – 869	0.5 – 3.0	0.2	Analog FM (SMR)	16K0F3E

* the itinerant channels in the table below are limited to 2.0 W ERP per 90.531(b)(4)

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		

Channel No. (6.25 kHz)	Channel No. (12.5 kHz)	12.5 kHz Channel Spaced Tx Center Frequencies
1917	1917-1918	804.981250
1918		
1919	1919-19200	804.993750
1920		

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1 Test Result Summary

Test	FCC Reference	Result
RF Power Output	2.1046(a), 90.541(b), 90.542(a)(6)	Complies
Spurious Emissions at Antenna Terminals	2.1051, 90.210	Complies
Field strength of spurious radiation	2.1053(a), 90.543(c)	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.543(d)	Complies
Adjacent Channel Power	90.543	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.213, 90.539	Complies
Modulation Characteristics	2.1047(a)(b)	Complies

2 General Information

The following Certification Report is prepared on behalf of Harris Corporation in accordance with the Federal Communications Commission rules and regulations and Industry Canada rules and regulations. The Equipment Under Test (EUT) was the XG-75 700/800 MHz portable radio family; FCC ID: OWDTR-0074-E, IC: 3636B-0074.

The radio is subject to FCC DoC. DoC testing was performed and the data is contained in a separate DoC report.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Rules and Regulations CFR 47 Parts 2 and 90. 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)

This is a new family certification application for Industry Canada. The XG-75 700/800 MHz portable radio family members to be certified at this time include the following System model numbers: EVXG-PF78B and EVXG-PF78Y.

2.3 Grant Notes

RF power switchable from 0.5 W to rated power 3 W.

3 Tested System Details

The test sample was received on August 24, 2011. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

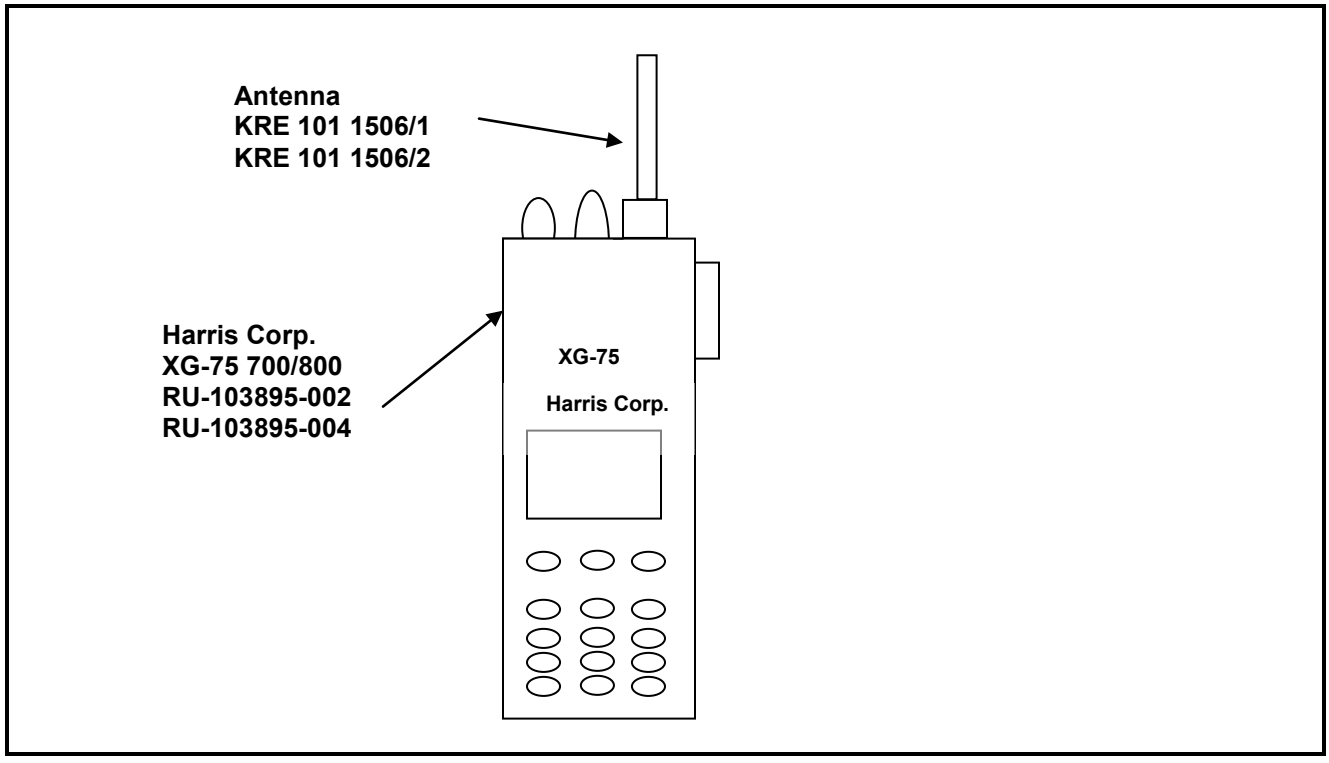
The EUT includes a System model and a Scan model, the difference being that the System model has a DTMF keypad. The System model is considered to have worst case emissions and is considered representative of the radio family, and was used for testing.

The device was programmed for multiple modes of operation and modulation types.

Table 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
XG-75 Radio	Harris Corporation	EVXG-PF78B (System – Black/Gray)	RU-103895-002	OWDTR-0074-E	20263
XG-75 Radio	Harris Corporation	EVXG-PF78Y (System - Yellow/Black)	RU-103895-004	OWDTR-0074-E	20262

Figure 3-1: Configuration of Tested System



4 FCC Rules and Regulations Part 2.1033(C)(8) Voltages and Currents through the Final Amplifying Stage

7.5VDC / 2.25 A

5 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 4.1 Transmitter Output Power

5.1 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: 3 W for 800 band, 3 W for 700 band; for the 2W ERP used in the 700 MHz band on-scene incident channels, a power setting of 1.9 W is used.

5.2 Test Data

Table 5-1: RF Conducted Output Power – Measured

Frequency (MHz)	Power (dBm)	Power (W)
764.0125	34.8	3.0
769.0125	34.8	3.0
771.0000	34.8	3.0
774.9875	34.8	3.0
775.9875	34.8	3.0
794.0125	34.8	3.0
799.0125	34.8	3.0
801.0000	34.8	3.0
804.9875	34.8	3.0
805.9875	35.3	3.4
806.0125	35.3	3.4
815.0000	35.3	3.4
823.9875	35.3	3.4
851.0125	35.3	3.4
860.0000	35.3	3.4
868.9875	35.3	3.4

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

Table 5-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	1/11/13
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	1/20/13
901138	MCE Weinschel	48-40-34	Attenuator, 40 dB	BK5883	2/14/12

Test Personnel:

Daniel Baltzell		August 25, 2011
EMC Test Engineer	Signature	Date of Test

6 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.210: Emission Limitations

6.1 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.

6.2 Test Data

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

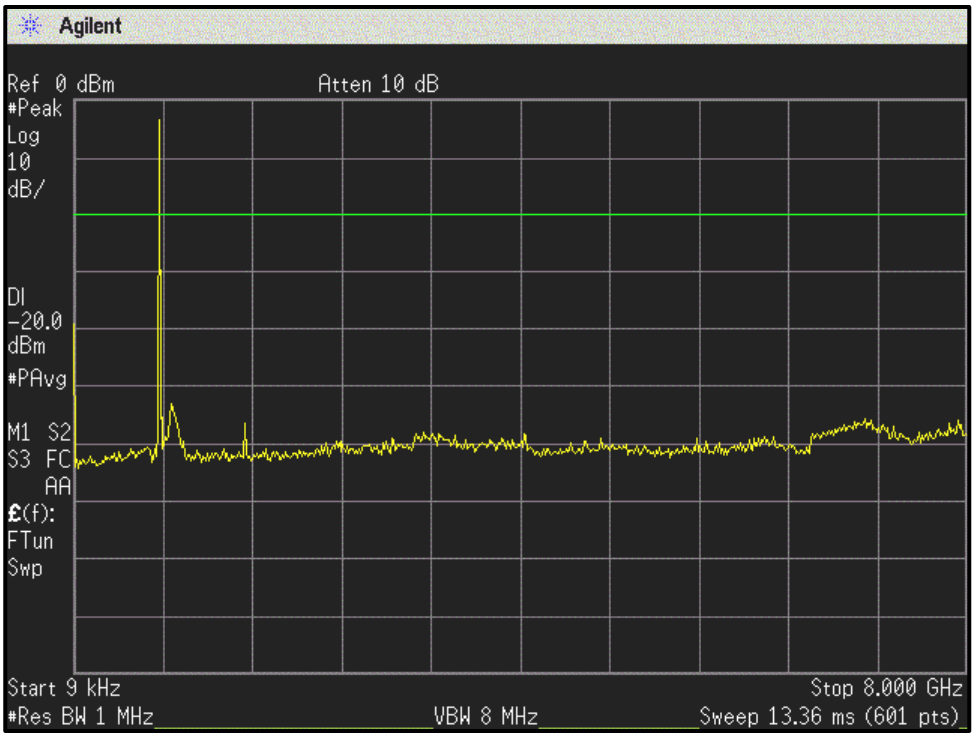
Limits: (43+10LOG P(W)) for wideband and 50 + 10 LOG P(W)) for narrowband

The following channels (in MHz) were investigated:

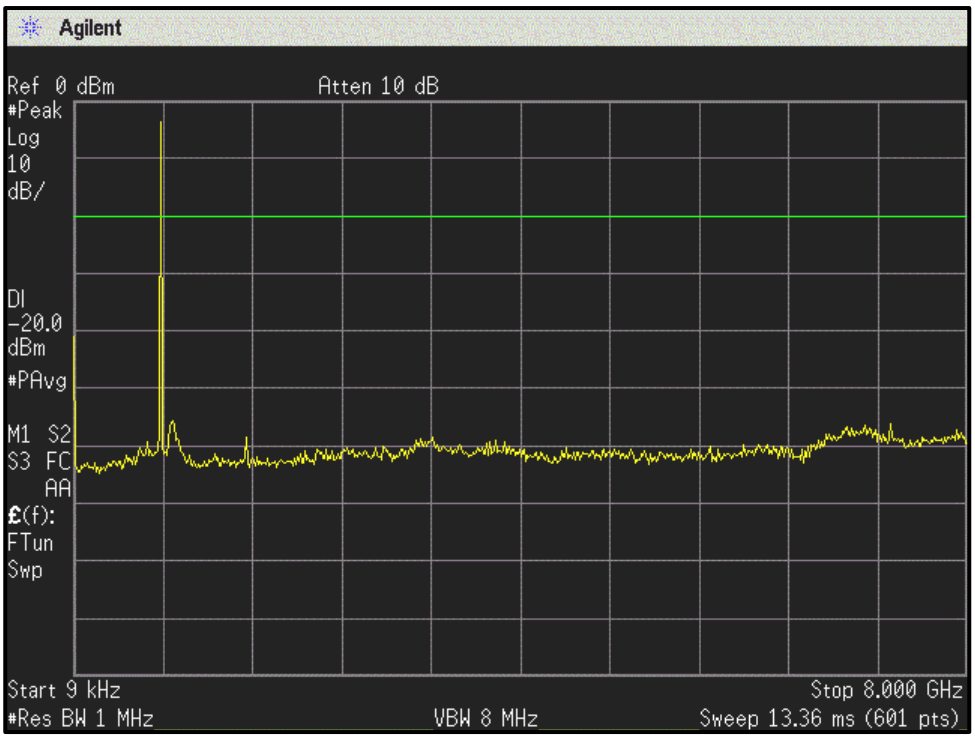
700 MHz	800 MHz
764.0125	806.0125
771.0000	815.0000
775.9875	823.9875
794.0125	851.0125
801.0000	860.0000
805.9875	868.9875

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

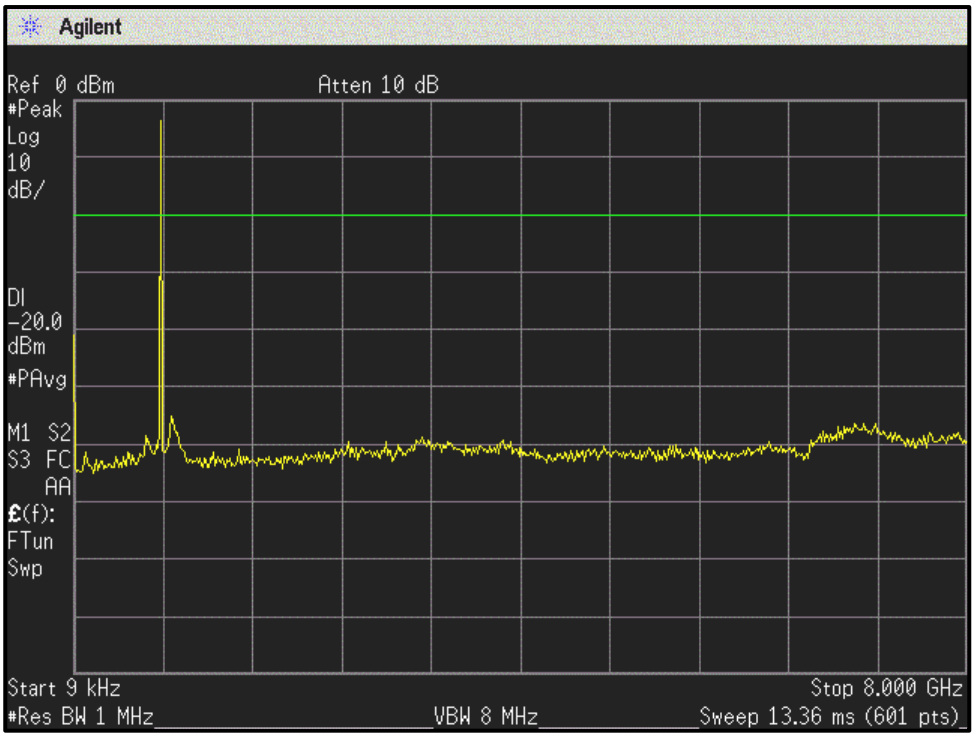
Plot 6-1: Spurious Emissions at Antenna Terminals – 764.0125 MHz



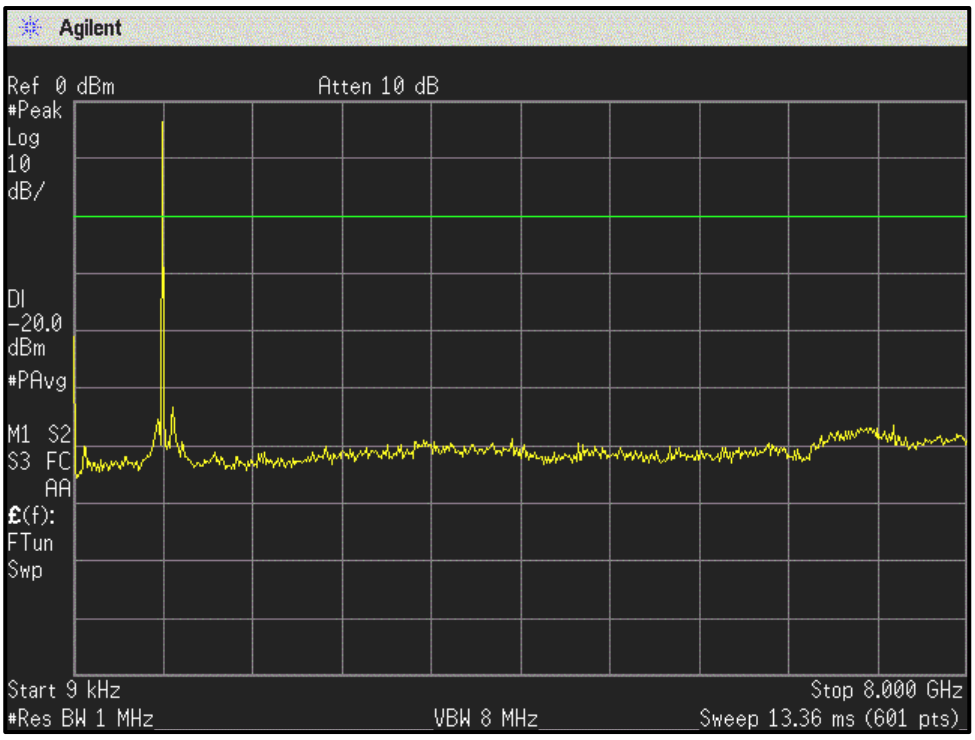
Plot 6-2: Spurious Emissions at Antenna Terminals – 771.0000 MHz



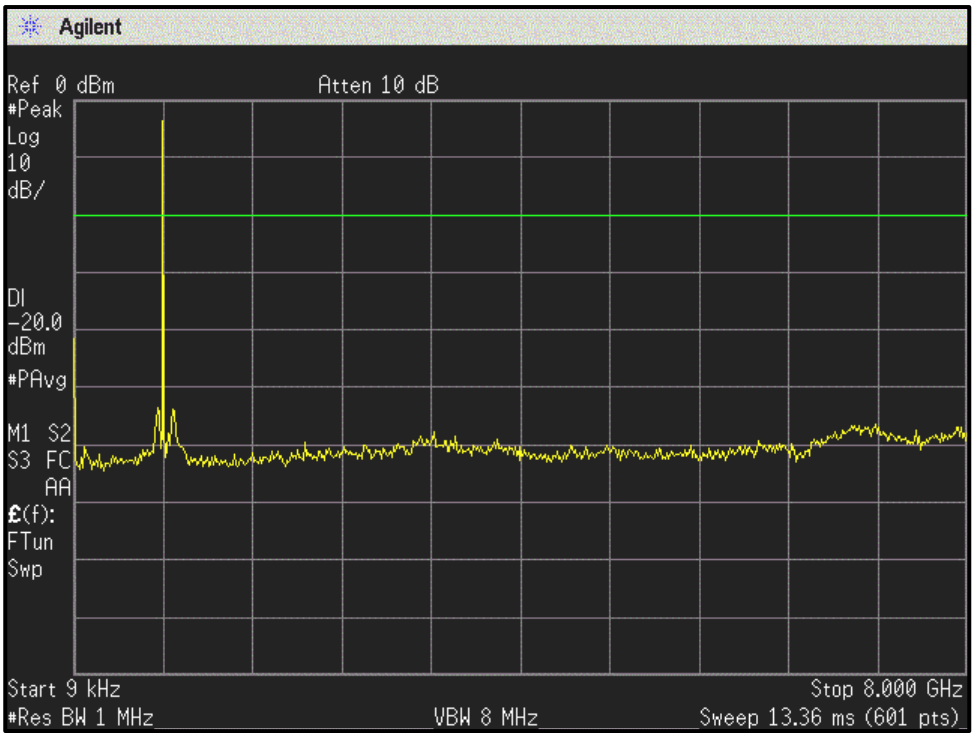
Plot 6-3: Spurious Emissions at Antenna Terminals – 775.9875 MHz



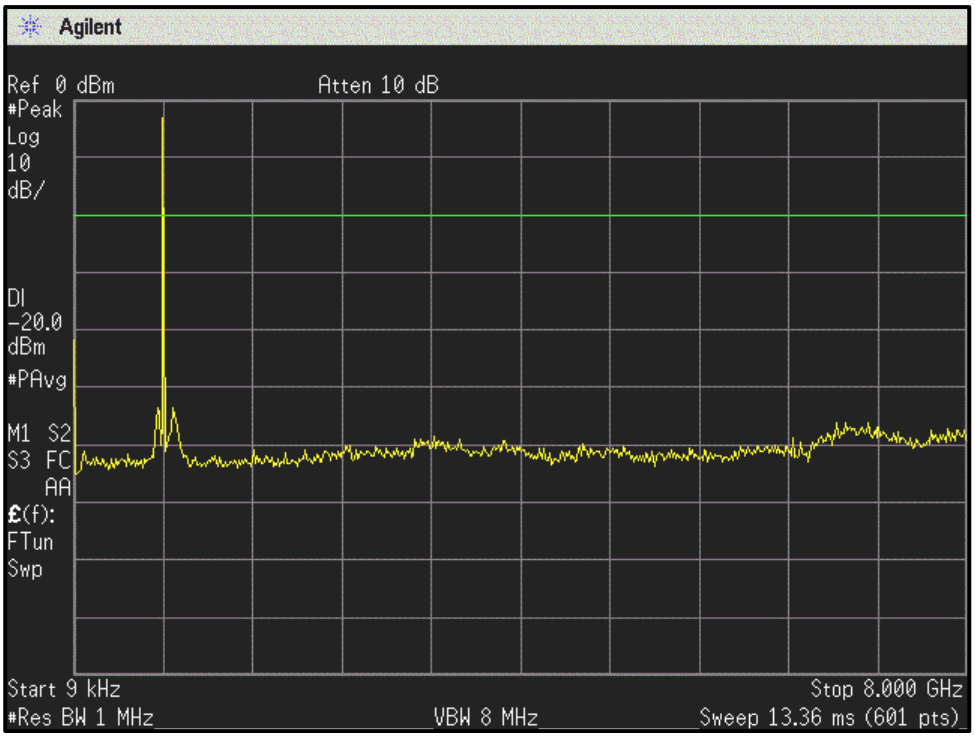
Plot 6-4: Spurious Emissions at Antenna Terminals – 794.0125 MHz



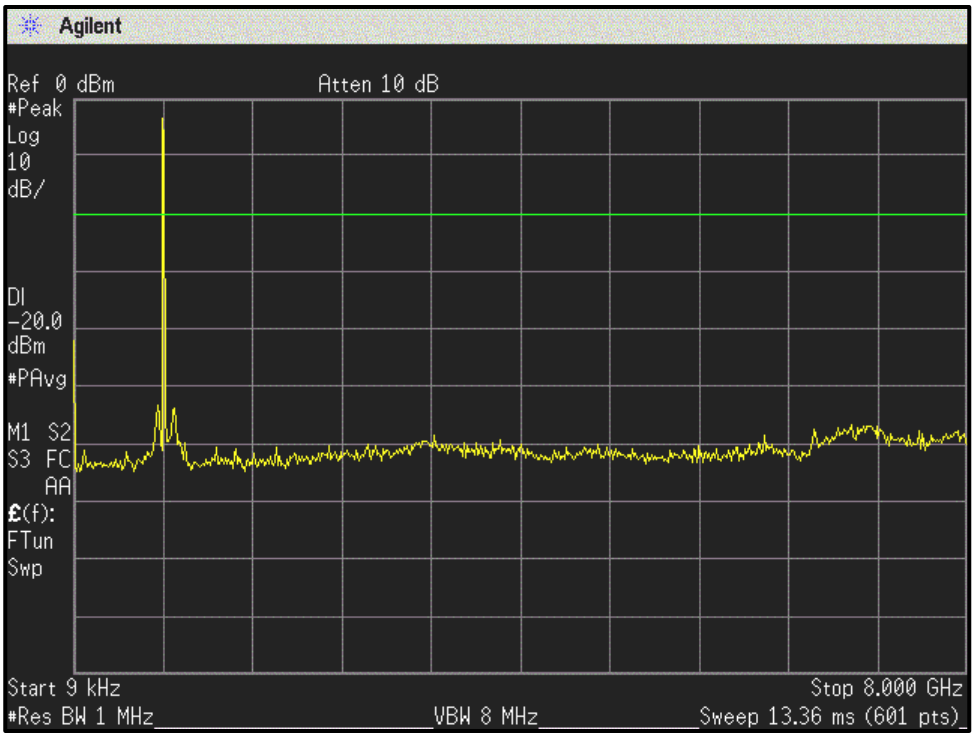
Plot 6-5: Spurious Emissions at Antenna Terminals – 801.0000 MHz



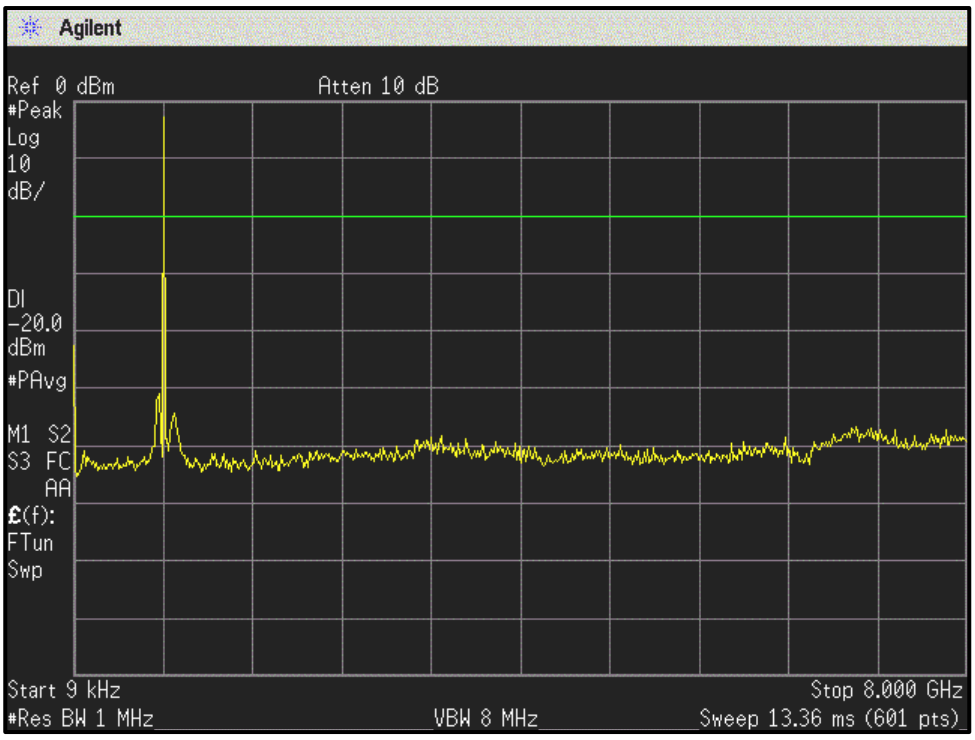
Plot 6-6: Spurious Emissions at Antenna Terminals – 805.9875 MHz



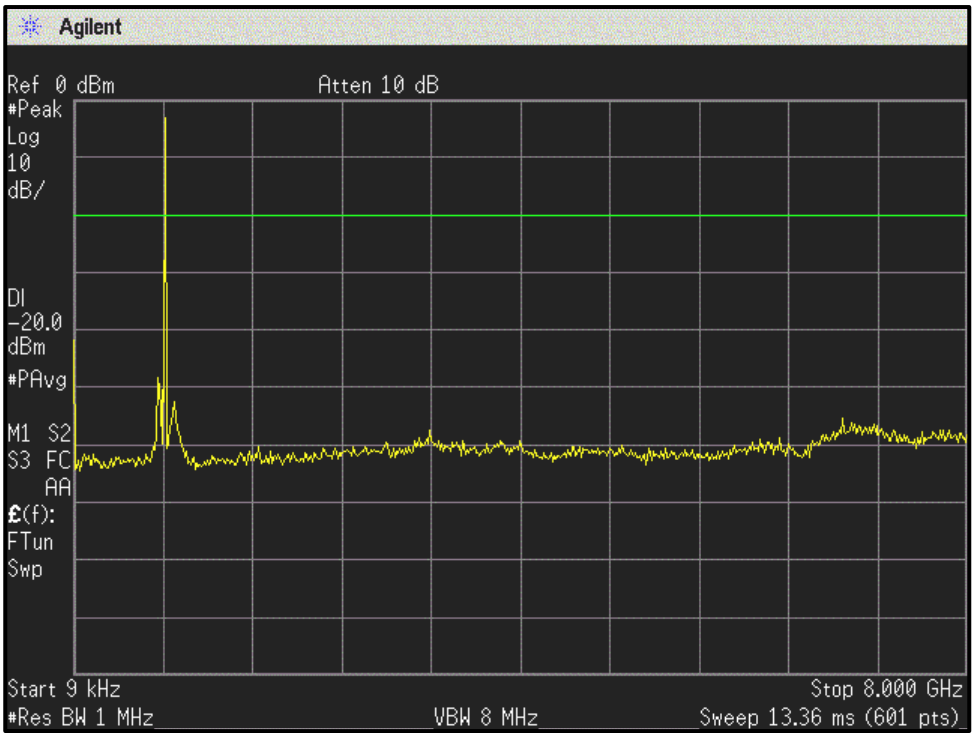
Plot 6-7: Spurious Emissions at Antenna Terminals – 806.0125 MHz



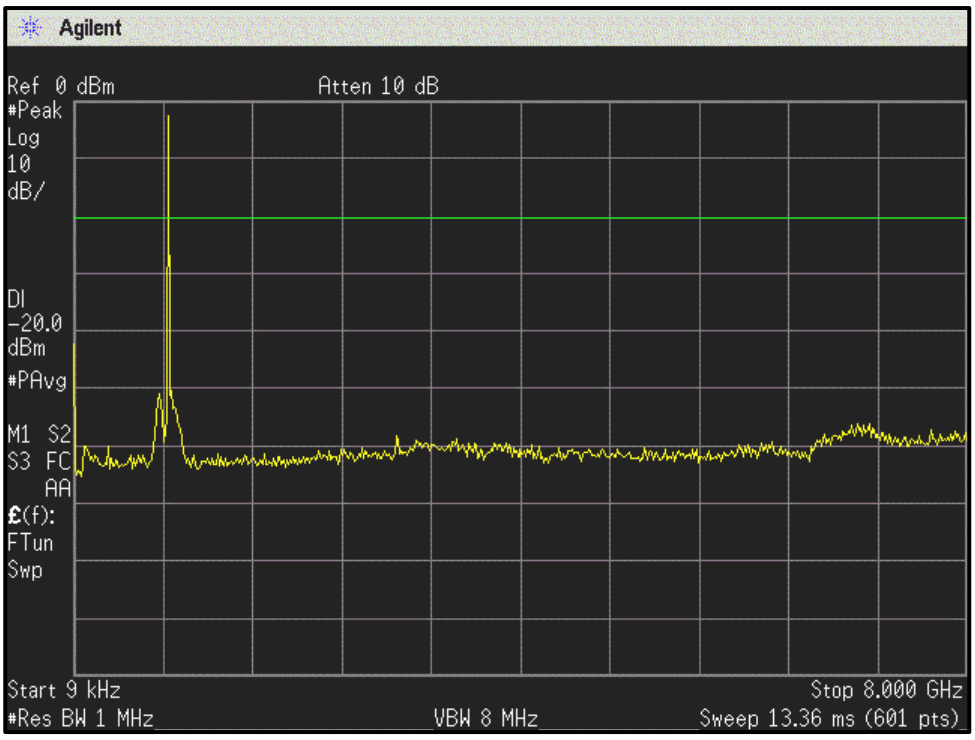
Plot 6-8: Spurious Emissions at Antenna Terminals – 815.0000 MHz



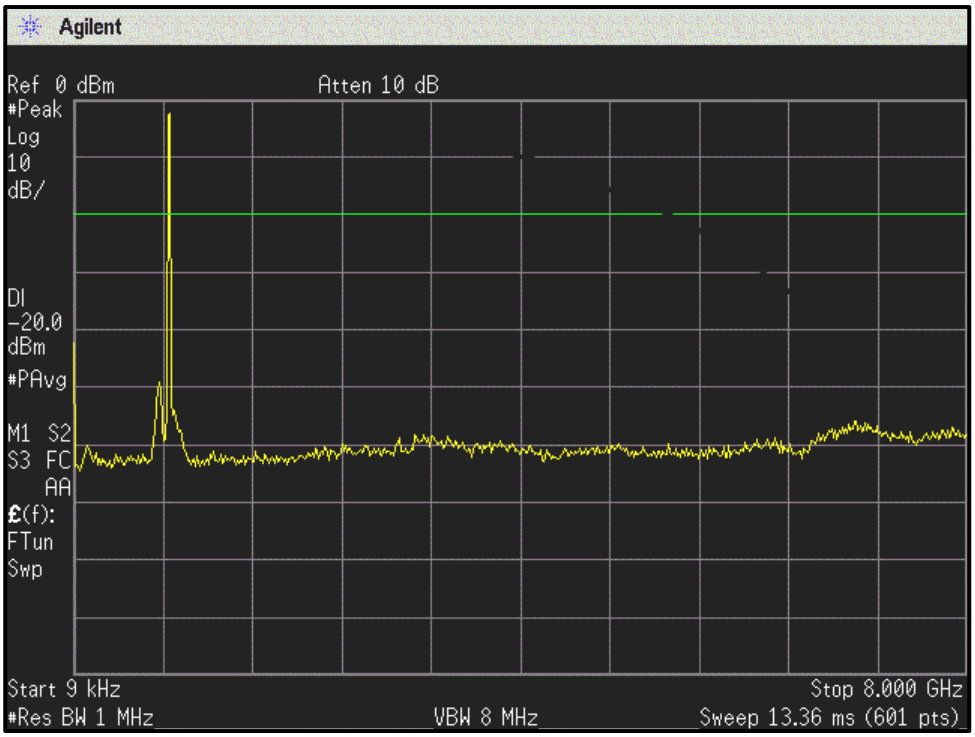
Plot 6-9: Spurious Emissions at Antenna Terminals – 823.9875 MHz



Plot 6-10: Spurious Emissions at Antenna Terminals – 851.0125 MHz



Plot 6-11: Spurious Emissions at Antenna Terminals – 860.0000 MHz



Plot 6-12: Spurious Emissions at Antenna Terminals – 868.9875 MHz

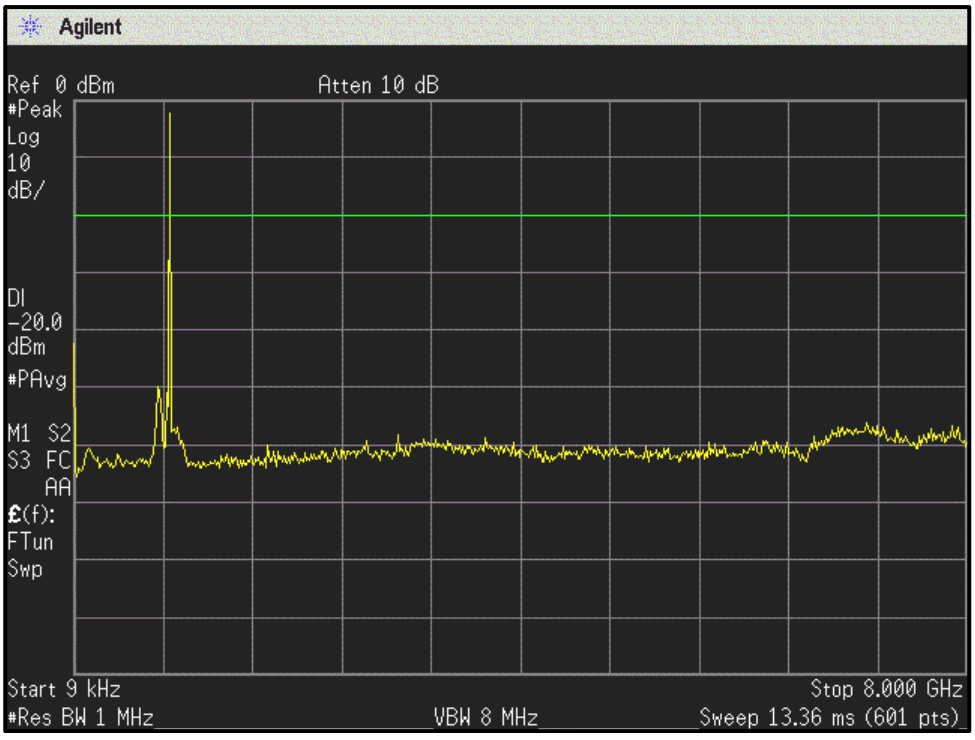


Table 6-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	12/29/12
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	2/14/12
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	3/10/12

Test Personnel:

Daniel Baltzell		August 27, 2011
EMC Test Engineer	Signature	Date of Test

7 FCC Rules and Regulations Part 90.543(a): Emission Limitations: ACP Requirements; RSS-119 4.3 Adjacent Channel Power (ACP) Measurement for Equipment in the Bands 764-776 MHz and 794-806 MHz

Effective October 23, 2007, transmitters designed to operate in the 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 the 763–768 MHz and 793–798 MHz bands must meet the emission limitations in (e) of this section.

7.1 Test Procedure

ANSI/TIA-603-C-2004 2.2.14 Unwanted Emissions: Adjacent Channel Power Ratio

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

For a Portable 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 Portable 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 90.543(b)

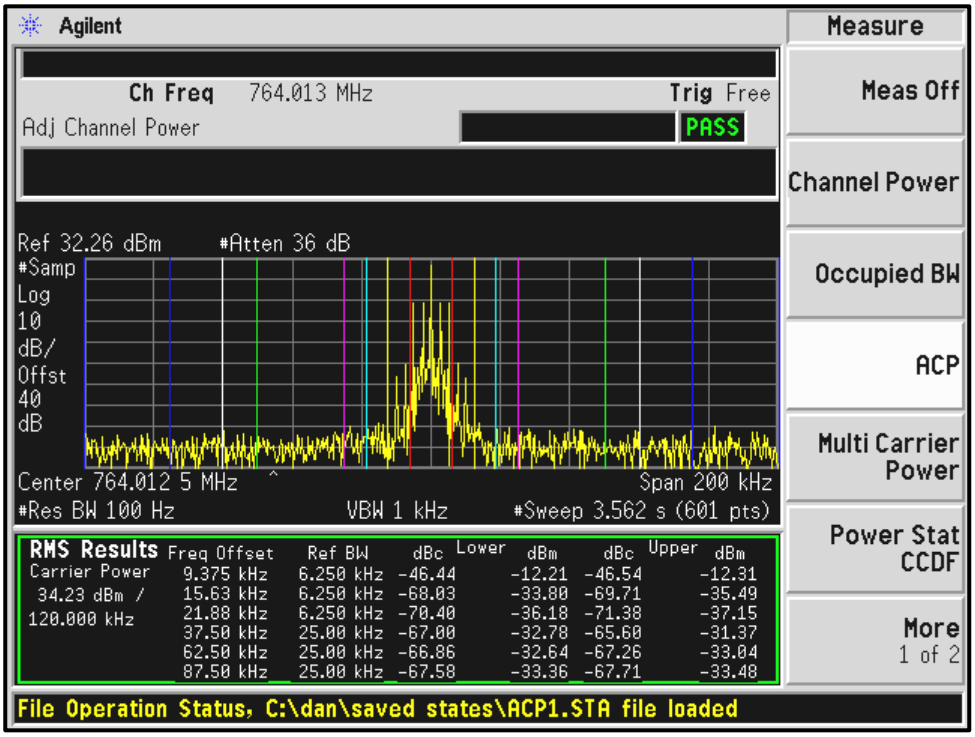
Setting Reference Level - 90.543(b)(1): Using a spectrum analyzer capable of ACP measurements, set the measurement bandwidth to the channel size. Set the frequency offset of the measurement to zero and adjust the center frequency of the spectrum analyzer to give the power level in the measurement bandwidth.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

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

Measuring the power level at the frequency offset >600 kHz - §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.

7.2 Test Data

Plot 7-1: Adjacent Channel Power - 764.0125 MHz; Analog Mode (9.375 kHz - 87.5 kHz)



Plot 7-2: Adjacent Channel Power - 764.0125 MHz; Analog Mode (150 kHz - 350 kHz)

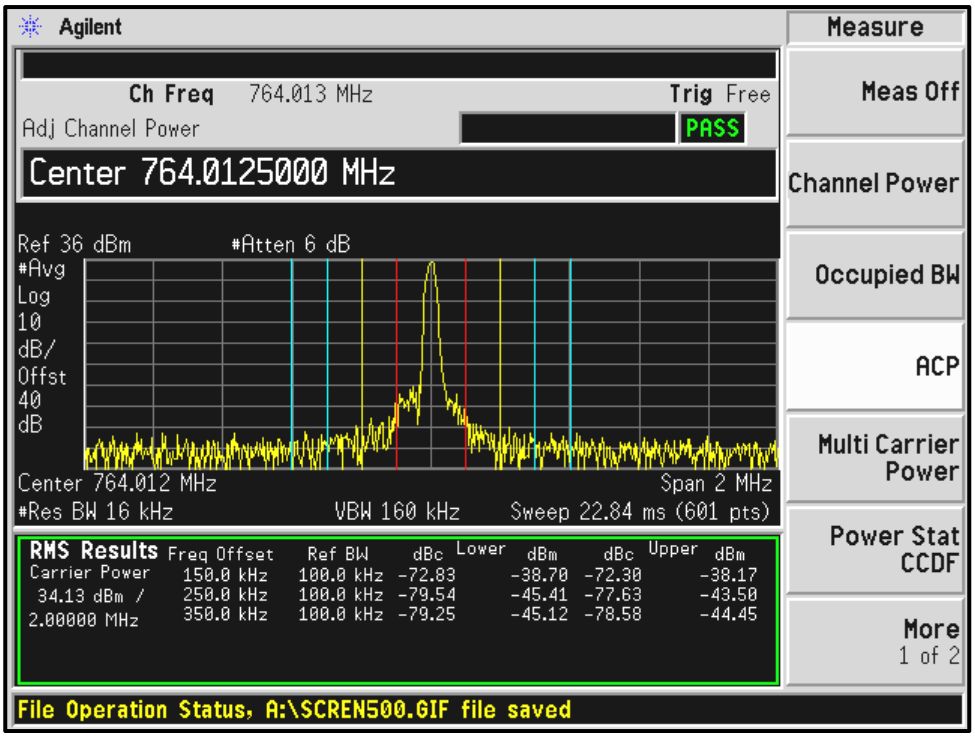
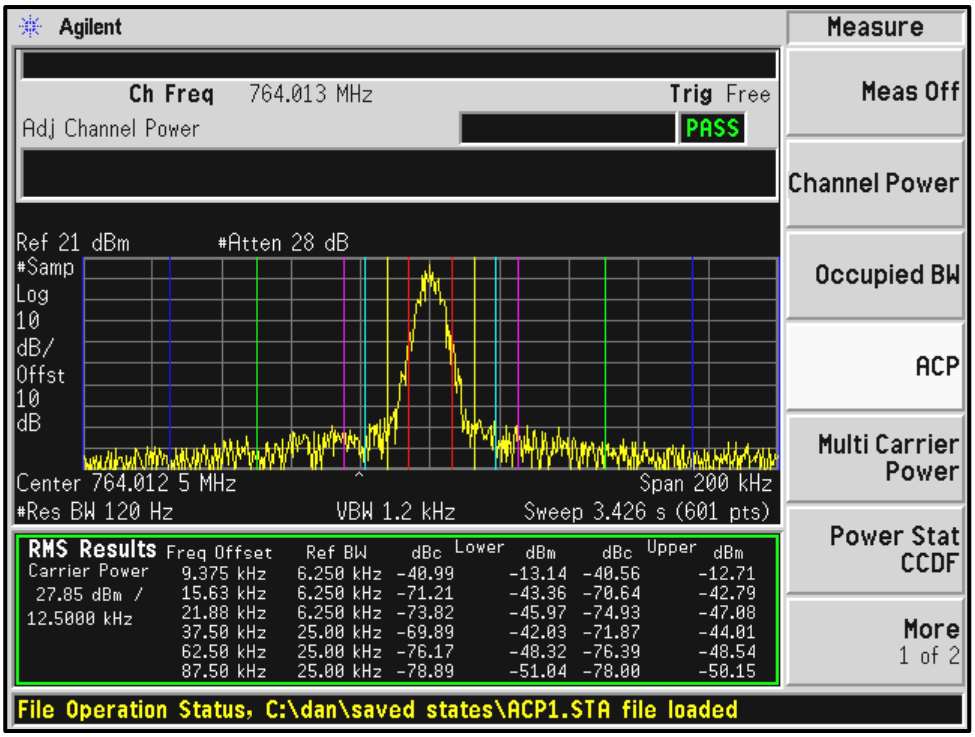


Table 7-1: Adjacent Channel Power - 764.0125 MHz; Analog Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-79.6
12 MHz to receive band	30(s)	-75	-83.9
In receive band	30(s)	-100	-104.0

Plot 7-3: Adjacent Channel Power - 764.0125 MHz; P25 Mode (9.375 kHz - 87.5 kHz)



Plot 7-4: Adjacent Channel Power - 764.0125 MHz; P25 Mode (150 kHz - 350 kHz)

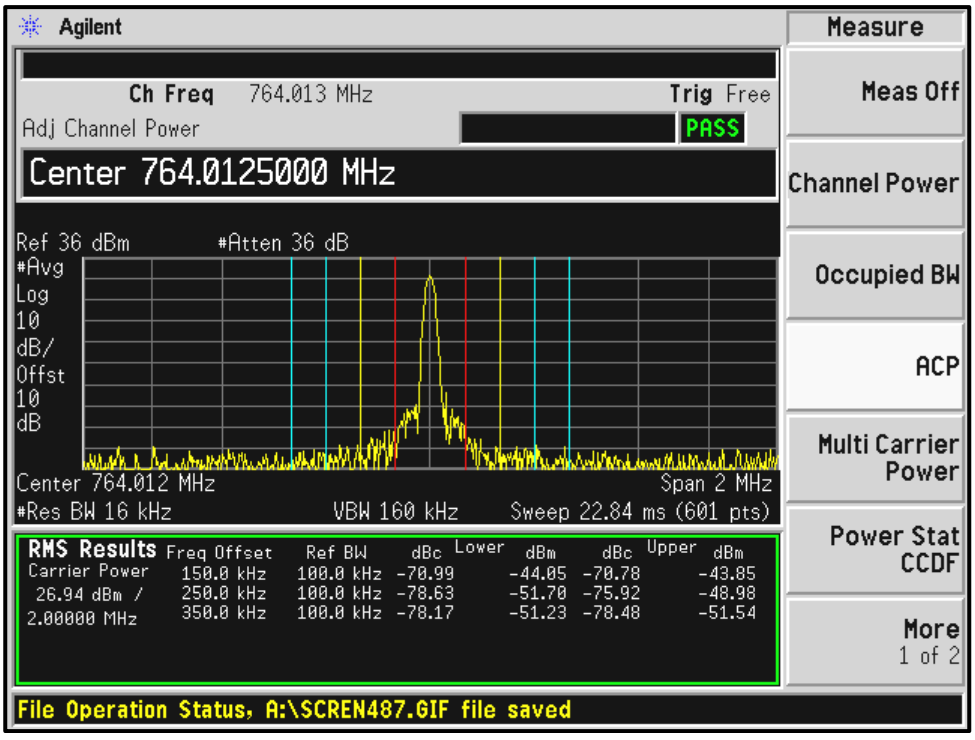
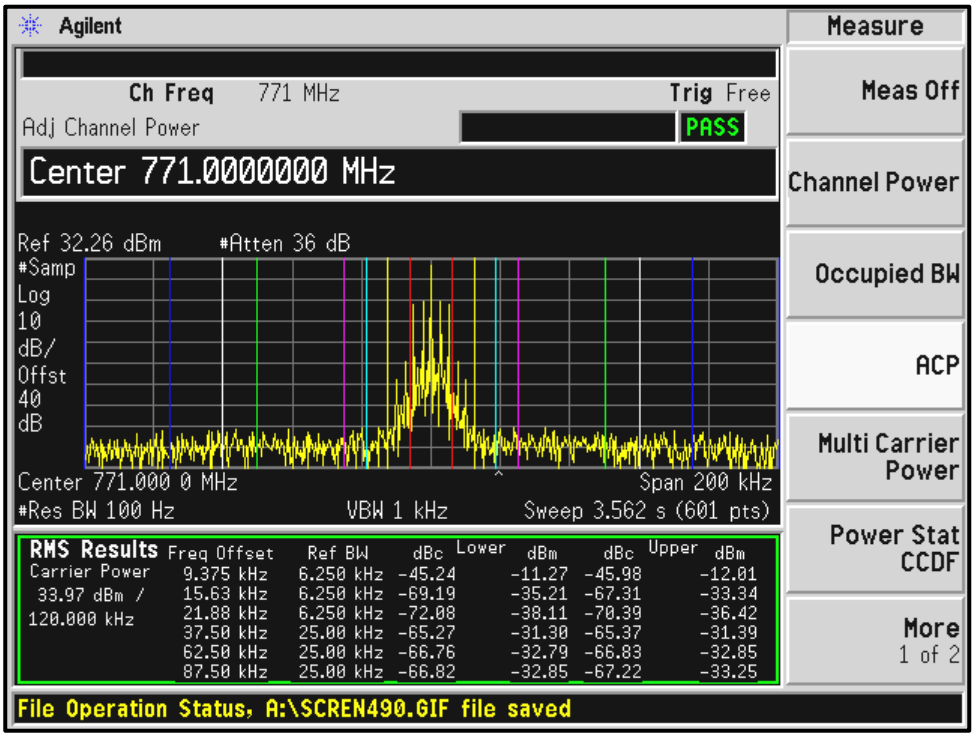


Table 7-2: Adjacent Channel Power - 764.0125 MHz; P25 Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-92.8
12 MHz to receive band	30(s)	-75	-101.8
In receive band	30(s)	-100	-112.4

Plot 7-5: Adjacent Channel Power - 771.0000 MHz; Analog Mode (9.375 kHz - 87.5 kHz)



Plot 7-6: Adjacent Channel Power - 771.0000 MHz; Analog Mode (150 kHz - 350 kHz)

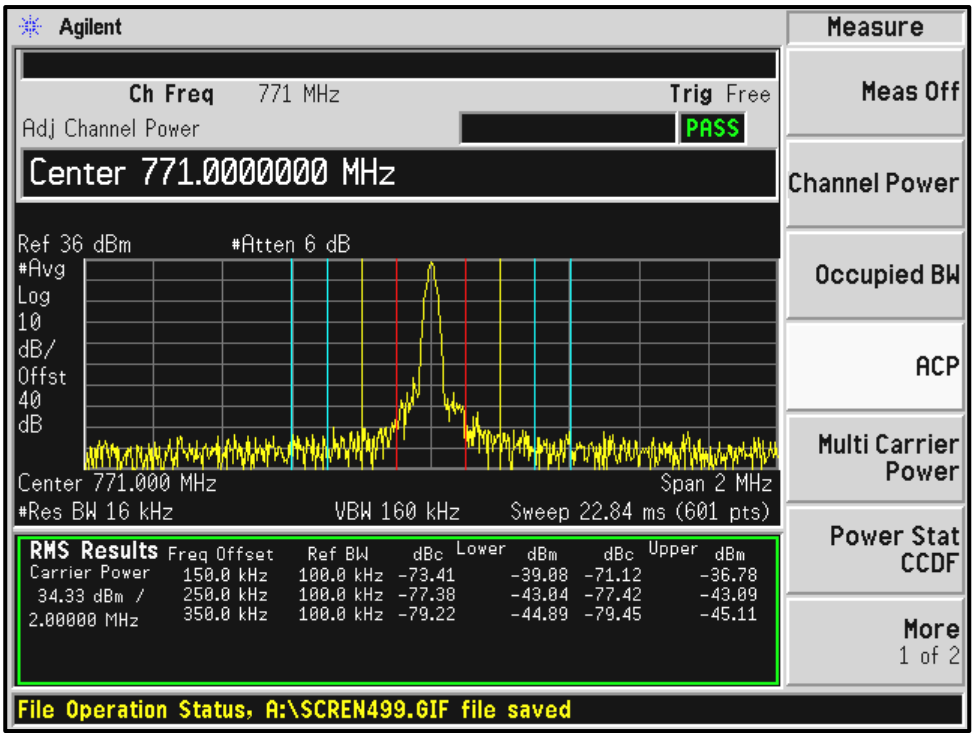
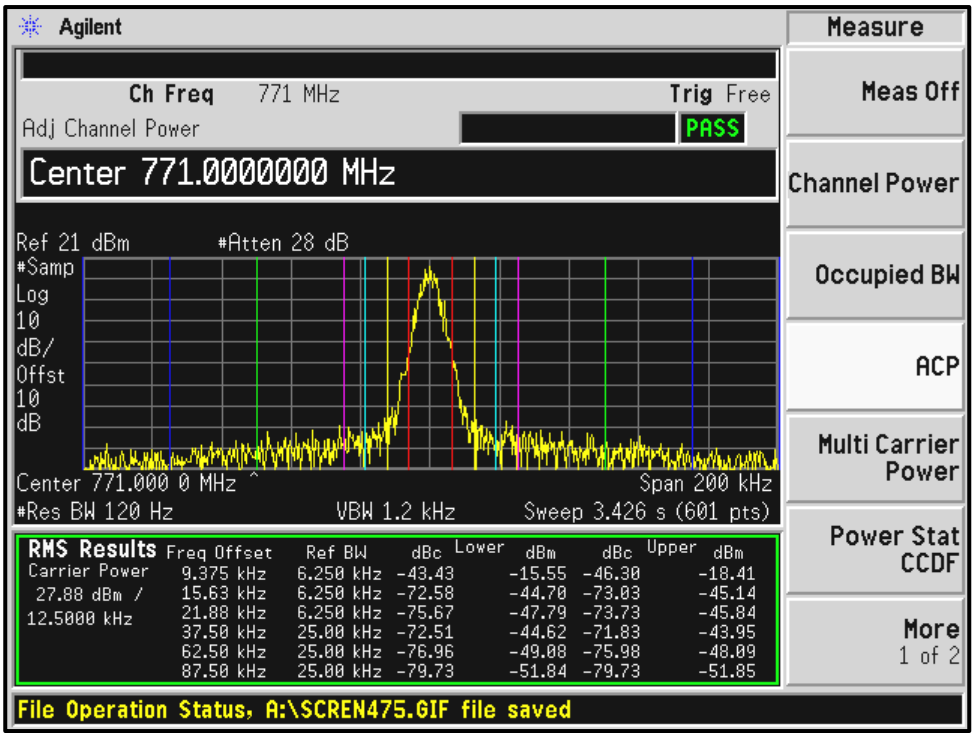


Table 7-3: Adjacent Channel Power – 771.0000 MHz; Analog Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-84.2
12 MHz to receive band	30(s)	-75	-88.8
In receive band	30(s)	-100	-103.7

Plot 7-7: Adjacent Channel Power - 771.0000 MHz; P25 Mode (9.375 kHz - 87.5 kHz)



Plot 7-8: Adjacent Channel Power - 771.0000 MHz; P25 Mode (150 kHz - 350 kHz)

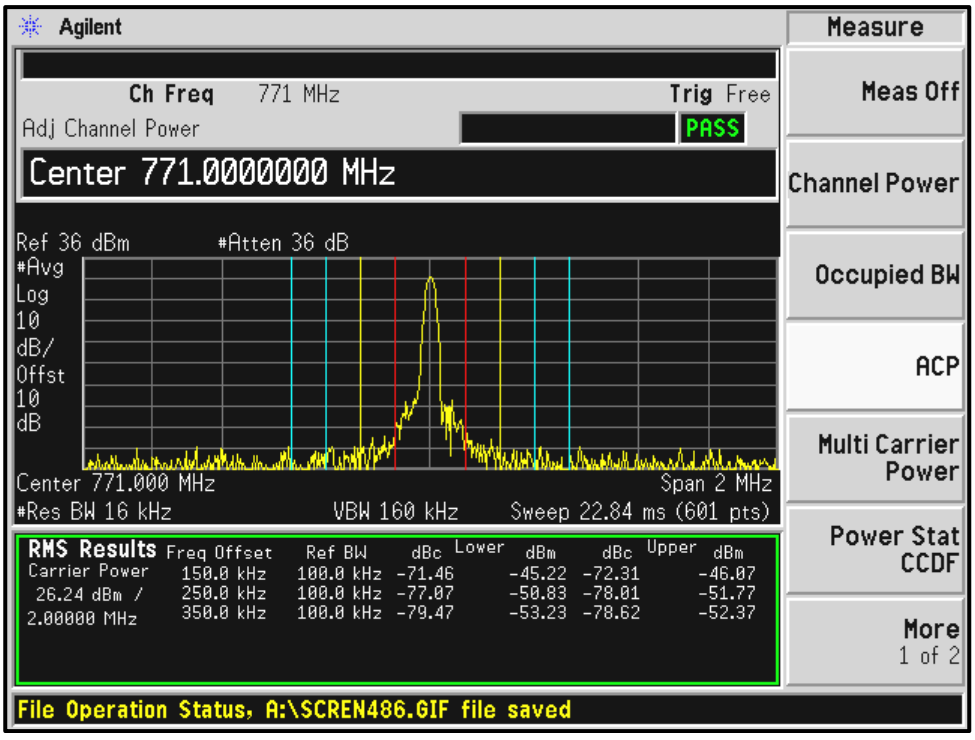
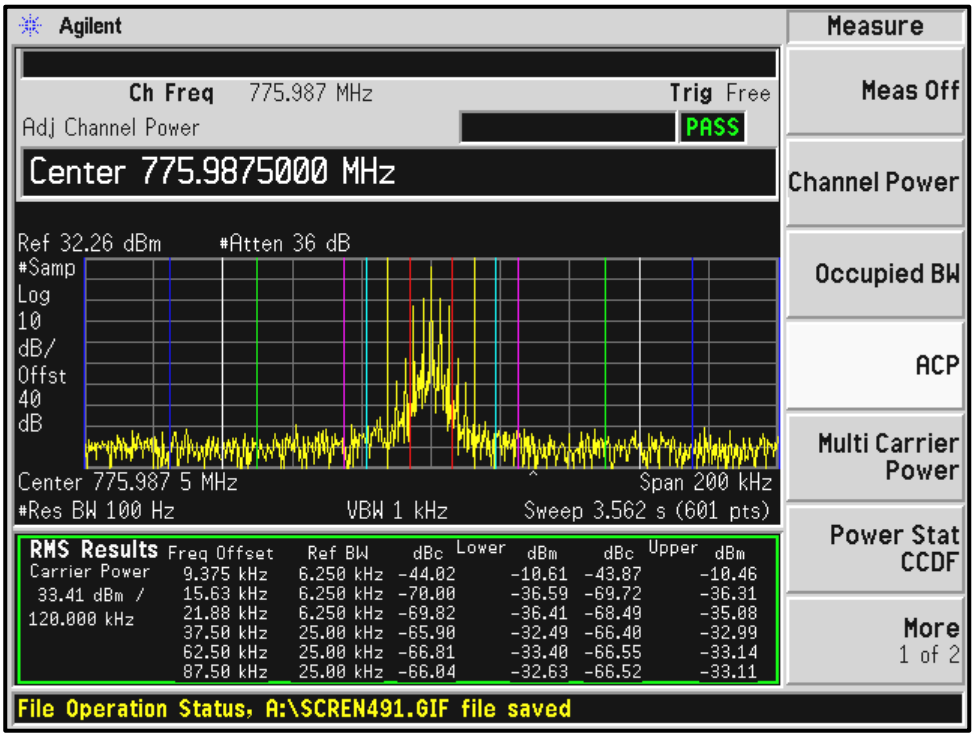


Table 7-4: Adjacent Channel Power – 771.0000 MHz; P25 Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-93.0
12 MHz to receive band	30(s)	-75	-99.3
In receive band	30(s)	-100	-112.7

Plot 7-9: Adjacent Channel Power - 775.9875 MHz; Analog Mode (9.375 kHz - 87.5 kHz)



Plot 7-10: Adjacent Channel Power - 775.9875 MHz; Analog Mode (150 kHz - 350 kHz)

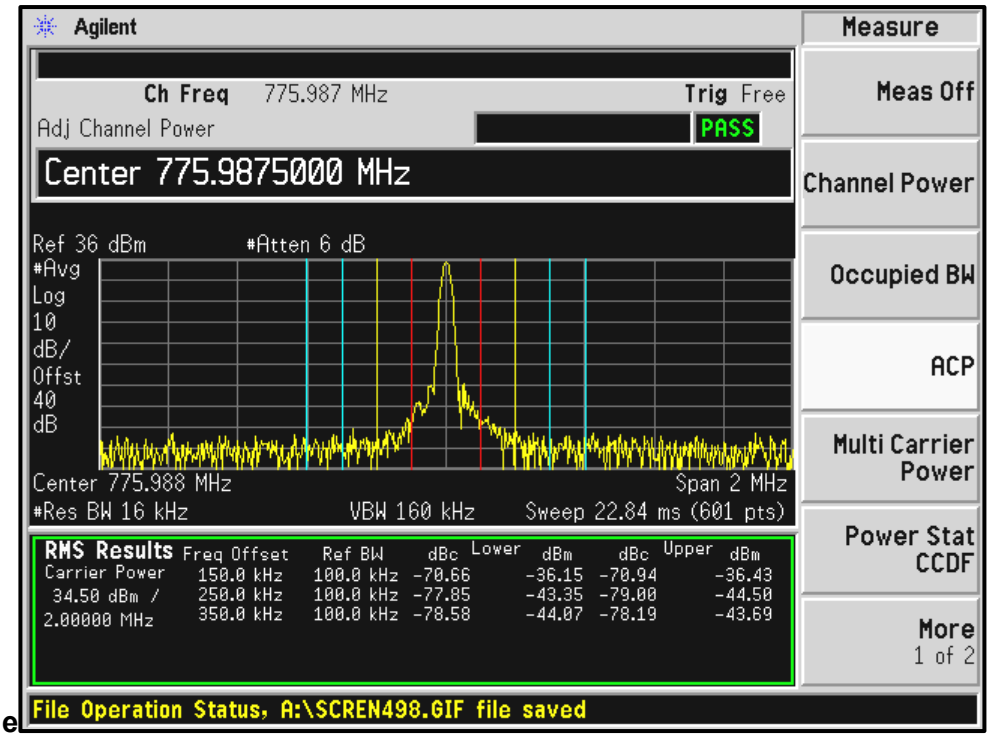
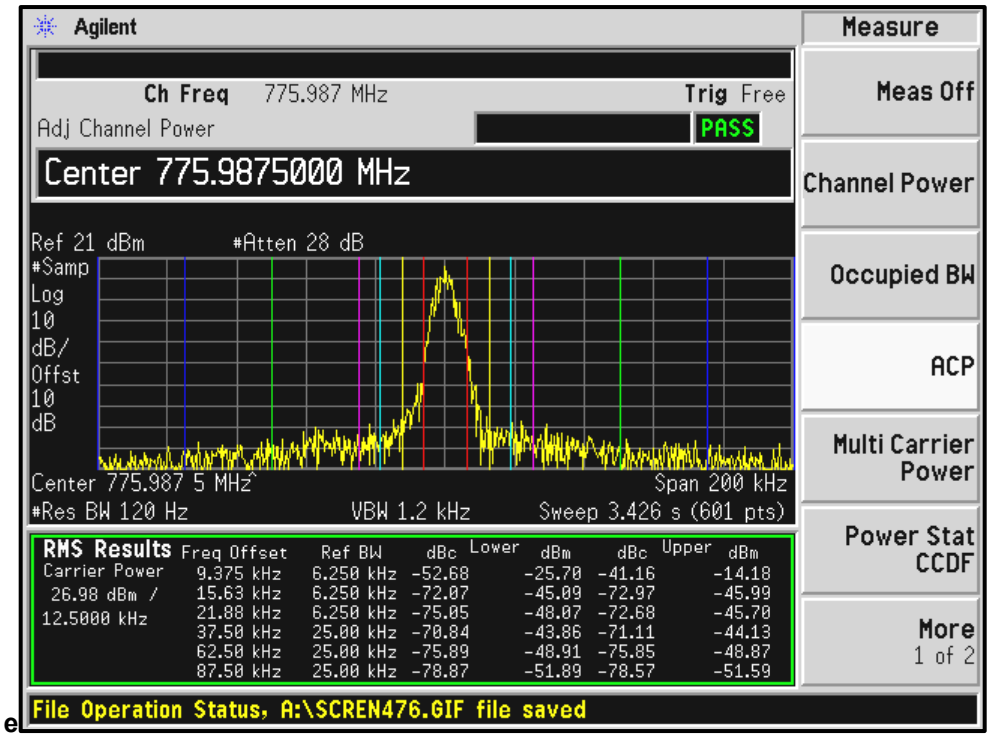


Table 7-5: Adjacent Channel Power – 775.9875 MHz; Analog Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-83.5
12 MHz to receive band	30(s)	-75	-91.2
In receive band	30(s)	-100	-103.8

Plot 7-11: Adjacent Channel Power - 775.9875 MHz; P25 Mode (9.375 kHz - 87.5 kHz)



Plot 7-12: Adjacent Channel Power - 775.9875 MHz; P25 Mode (150 kHz - 350 kHz)

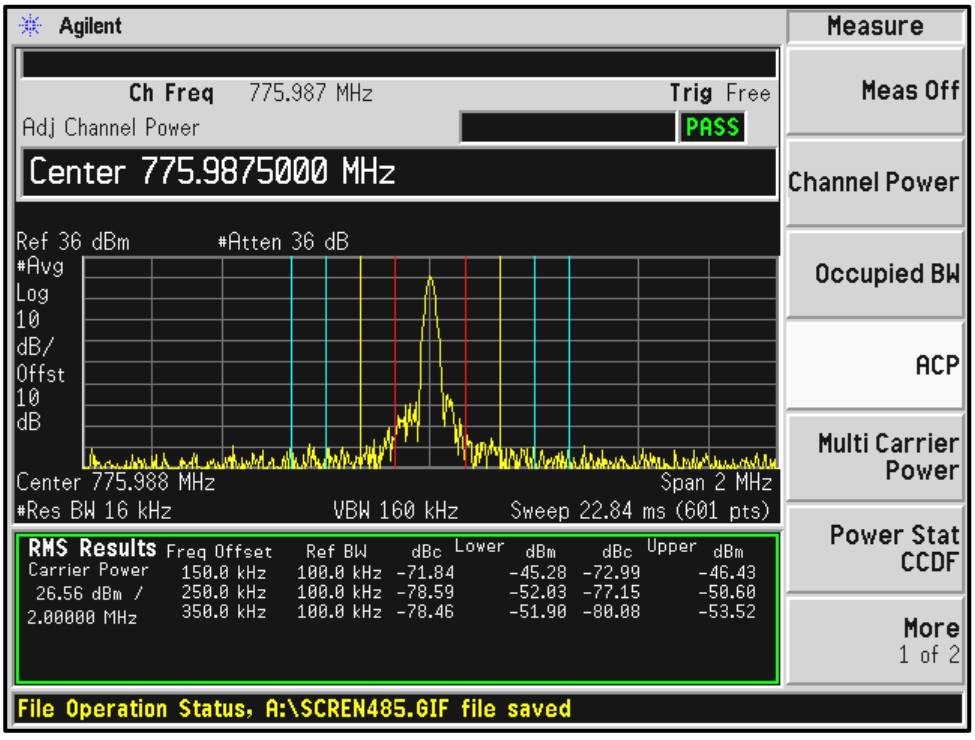
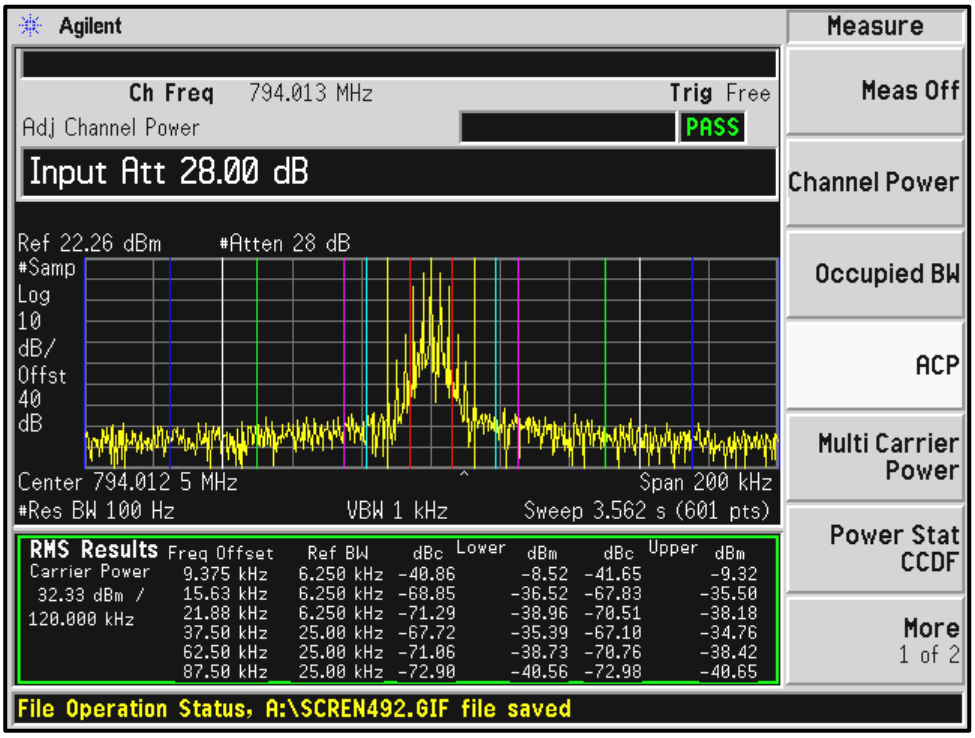


Table 7-6: Adjacent Channel Power - 775.9875 MHz; P25 Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-93.3
12 MHz to receive band	30(s)	-75	-99.5
In receive band	30(s)	-100	-107.6

Plot 7-13: Adjacent Channel Power - 794.0125 MHz; Analog Mode; (9.375 kHz - 87.5 kHz)



Plot 7-14: Adjacent Channel Power - 794.0125 MHz; Analog Mode; (150 kHz - 350 kHz)

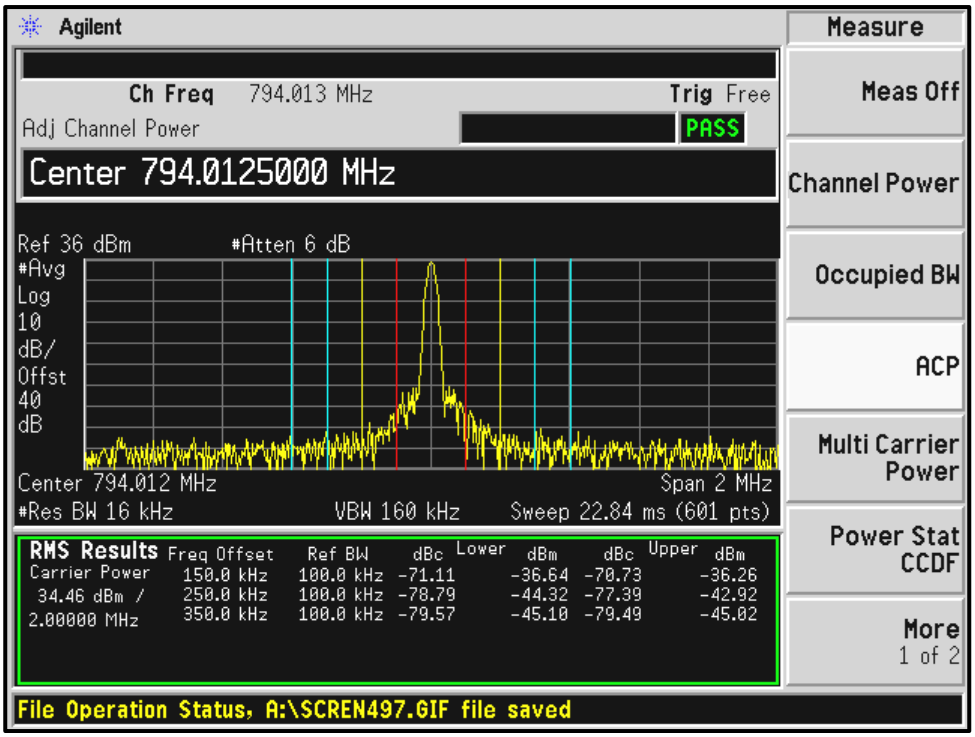
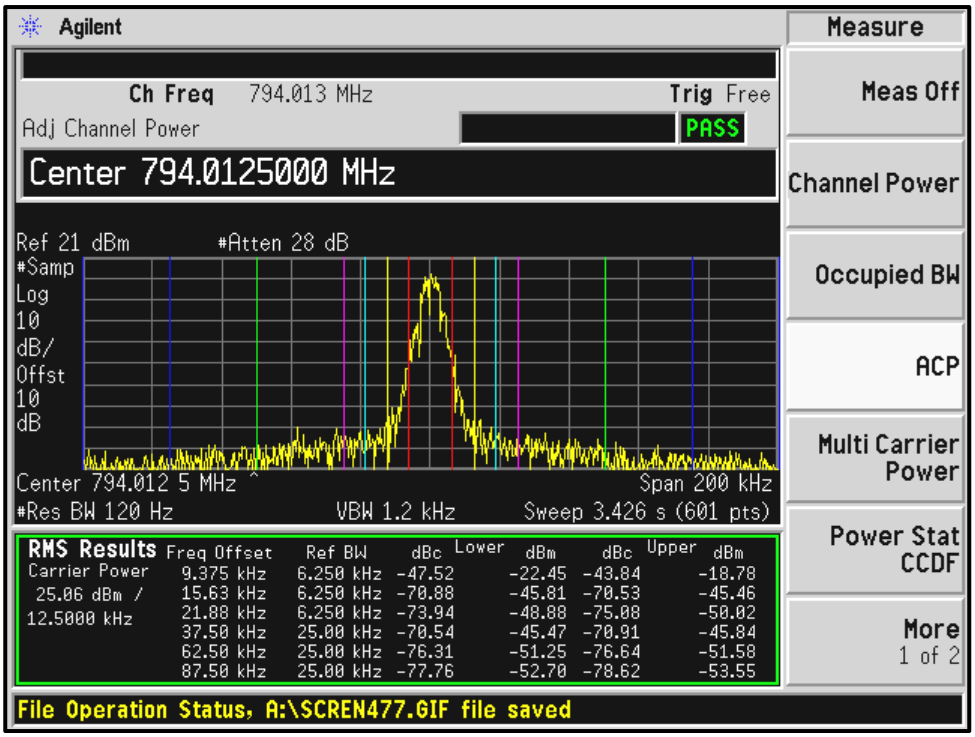


Table 7-7: Adjacent Channel Power - 794.0125 MHz; Analog Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-89.3
12 MHz to receive band	30(s)	-75	-93.0
In receive band	30(s)	-100	-105.2

Plot 7-15: Adjacent Channel Power – 794.0125 MHz; P25 (9.375 kHz - 87.5 kHz)



Plot 7-16: Adjacent Channel Power – 794.0125 MHz; P25 (150 kHz - 350 kHz)

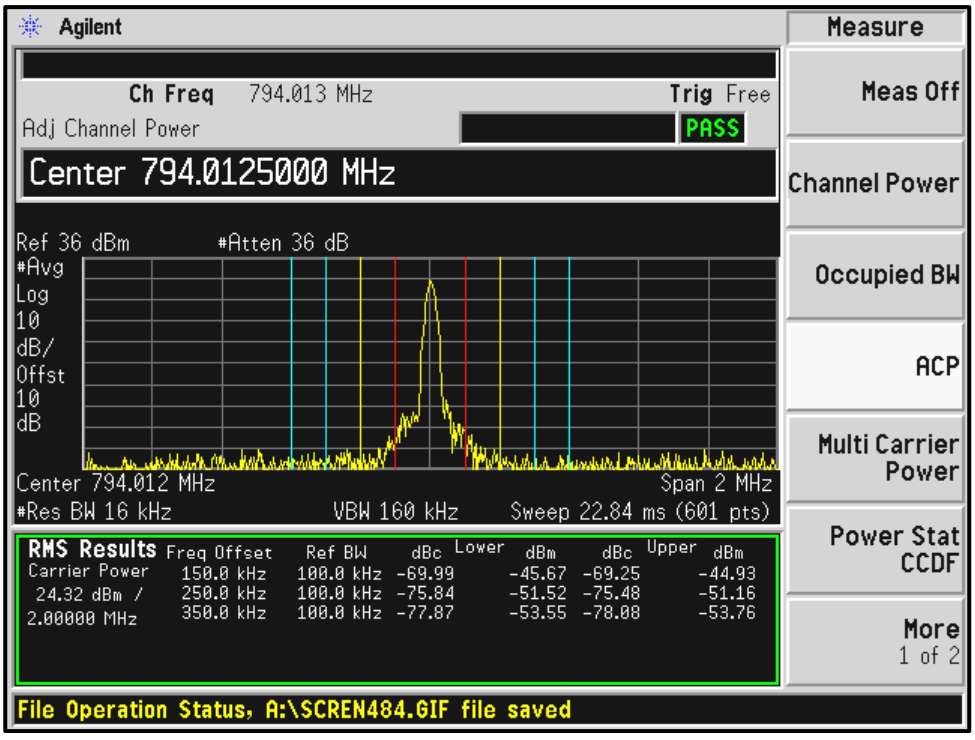
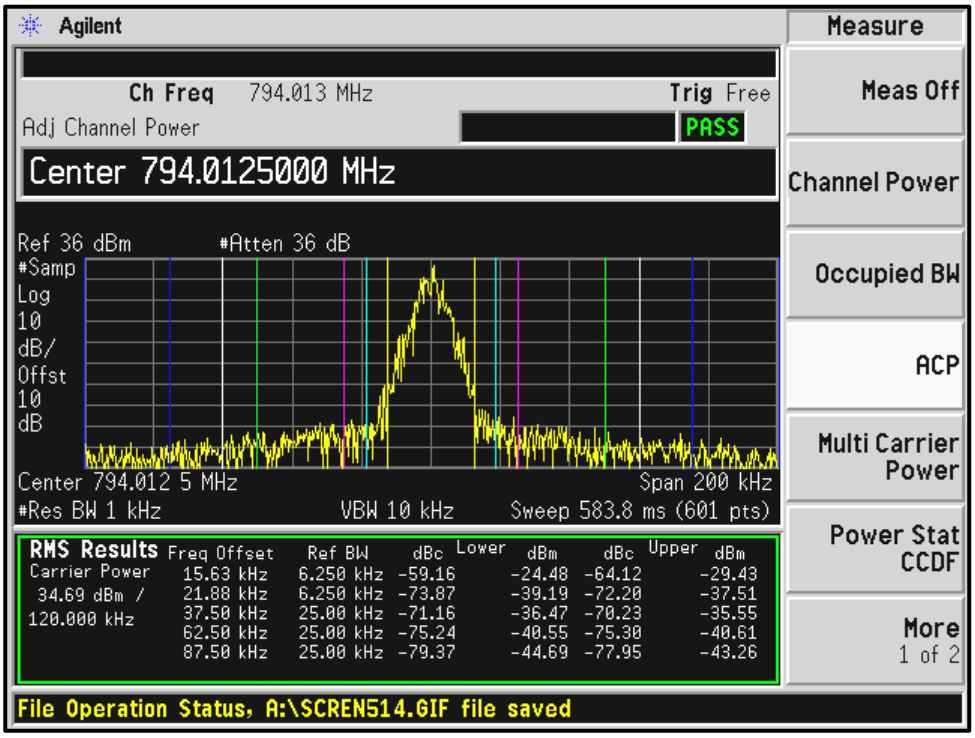


Table 7-8: Adjacent Channel Power – 794.0125 MHz; P25 (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-91.9
12 MHz to receive band	30(s)	-75	-101.1
In receive band	30(s)	-100	-103.7

Plot 7-17: Adjacent Channel Power – 794.0125 MHz; OTP SMR Mode (9.375 kHz - 87.5 kHz)



Plot 7-18: Adjacent Channel Power – 794.0125 MHz; OTP SMR Mode (150 kHz - 350 kHz)

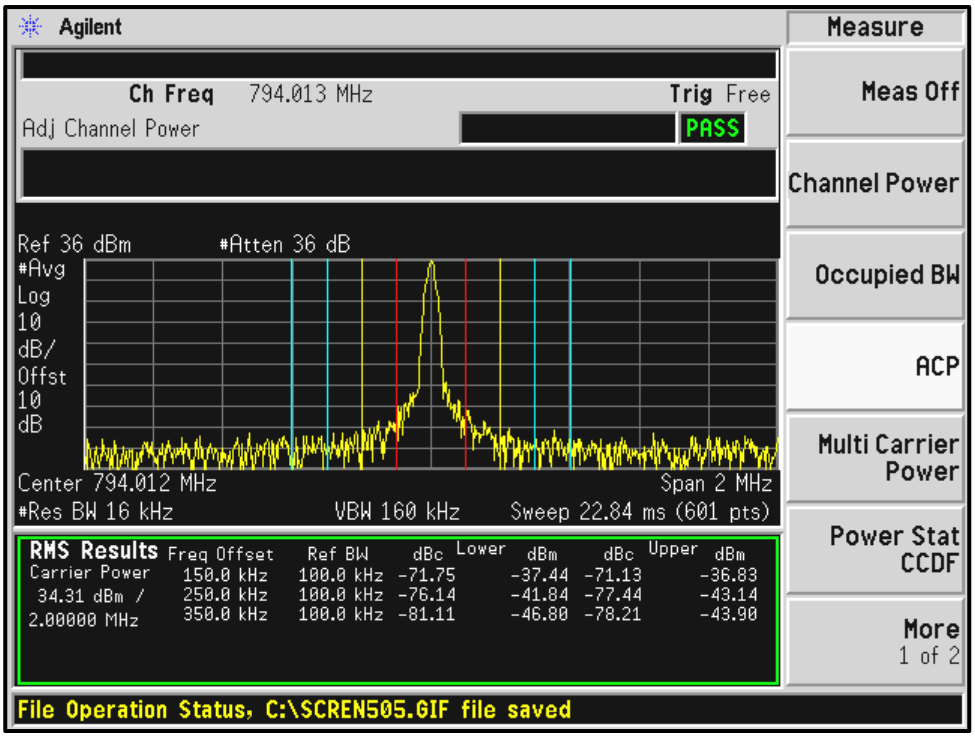
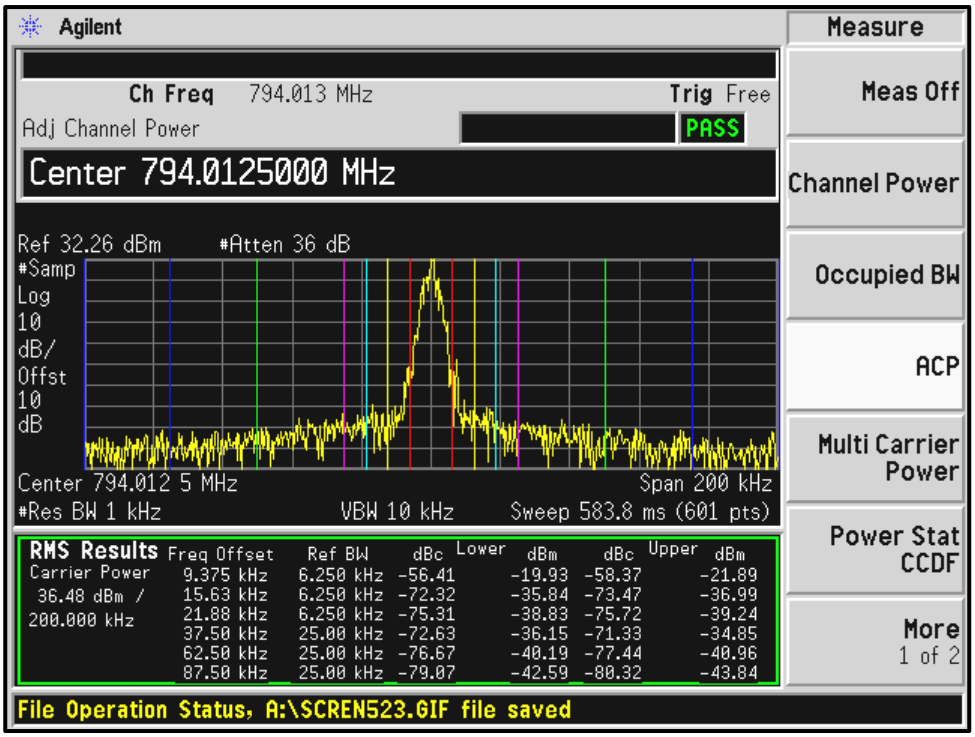


Table 7-9: Adjacent Channel Power – 794.0125 MHz; OTP SMR Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-92.1
12 MHz to receive band	30(s)	-75	-99.0
In receive band	30(s)	-100	-103.6

Plot 7-19: Adjacent Channel Power – 794.0125 MHz; OTP NB Mode; (9.375 kHz - 87.5 kHz)



Plot 7-20: Adjacent Channel Power – 794.0125 MHz; OTP NB Mode (150 kHz - 350 kHz)

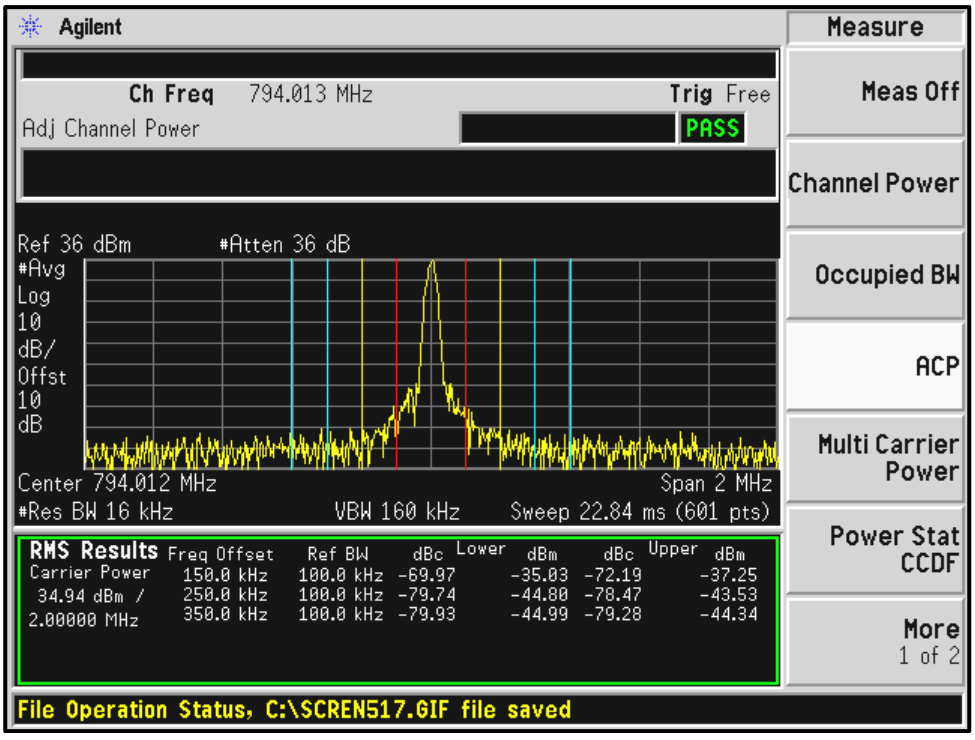
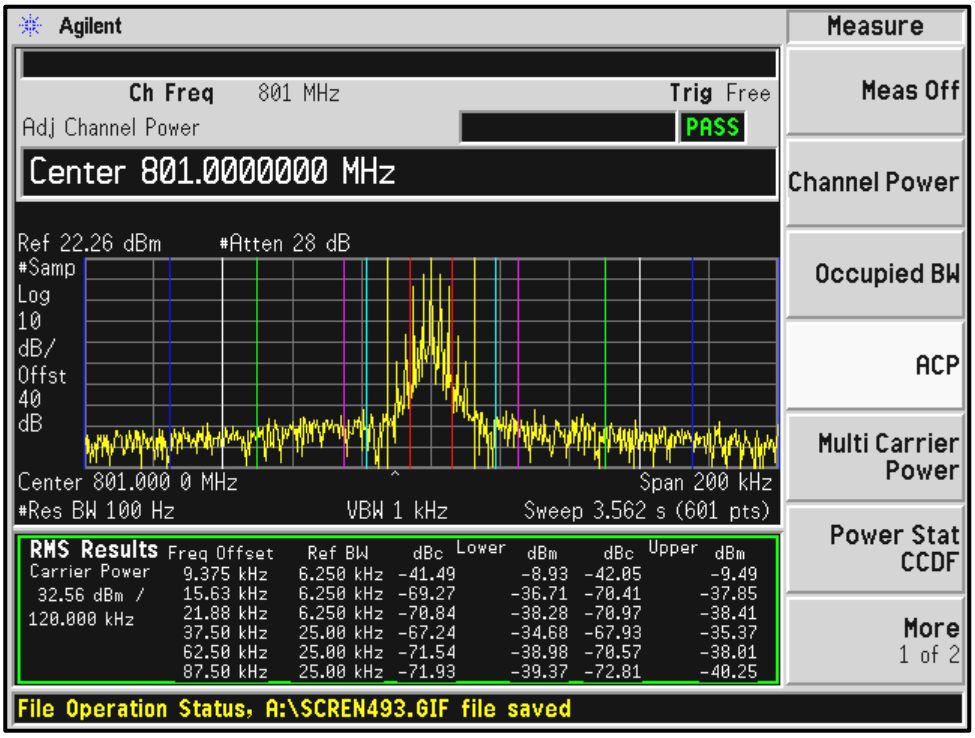


Table 7-10: Adjacent Channel Power – 794.0125 MHz; OTP NB Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-88.0
12 MHz to receive band	30(s)	-75	-97.4
In receive band	30(s)	-100	-102.9

Plot 7-21: Adjacent Channel Power – 801.0000 MHz; Analog Mode; (9.375 kHz - 87.5 kHz)



Plot 7-22: Adjacent Channel Power – 801.0000 MHz; Analog Mode; (150 kHz - 350 kHz)

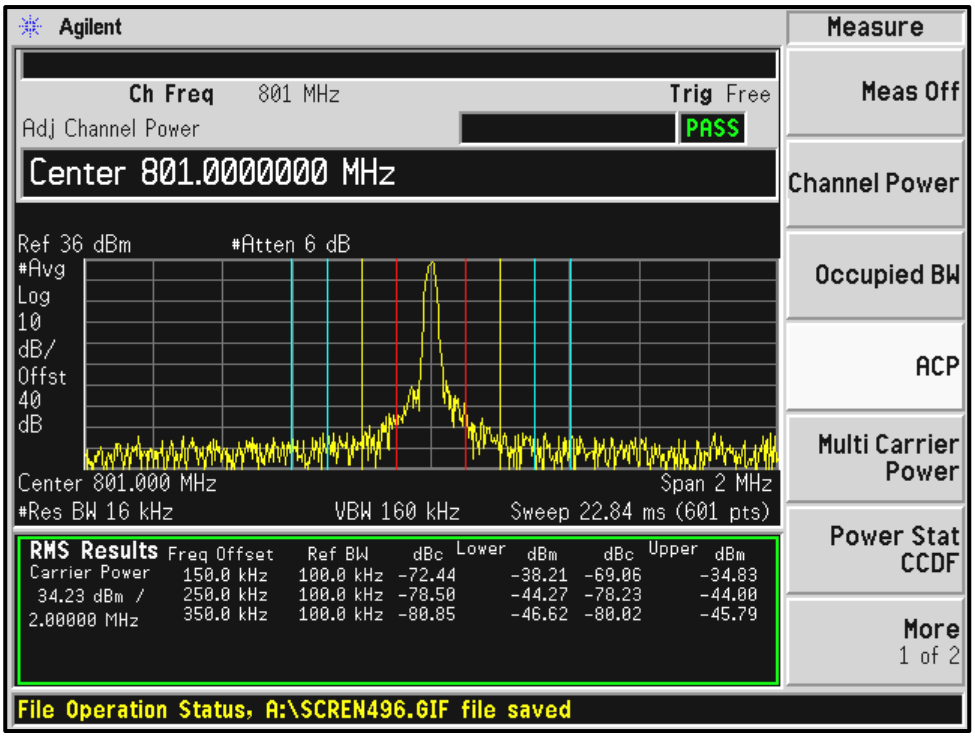
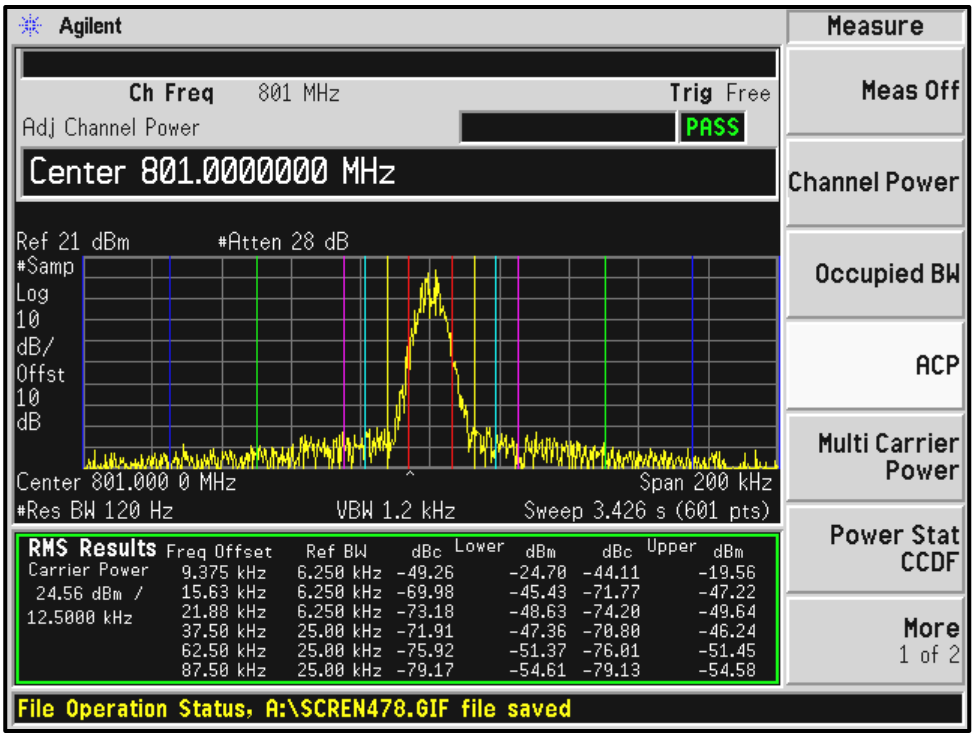


Table 7-11: Adjacent Channel Power – 801.0000 MHz; Analog Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-90.2
12 MHz to receive band	30(s)	-75	-96.9
In receive band	30(s)	-100	-107.5

Plot 7-23: Adjacent Channel Power – 801.0000 MHz; P25 (9.375 kHz - 87.5 kHz)



Plot 7-24: Adjacent Channel Power – 801.0000 MHz; P25 (150 kHz - 350 kHz)

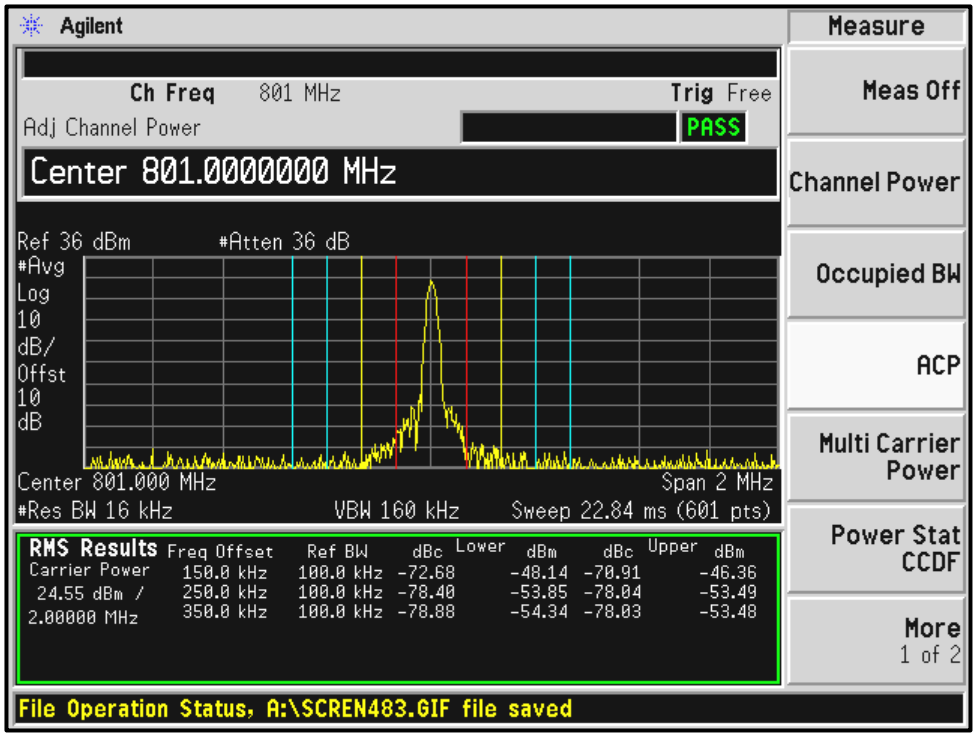
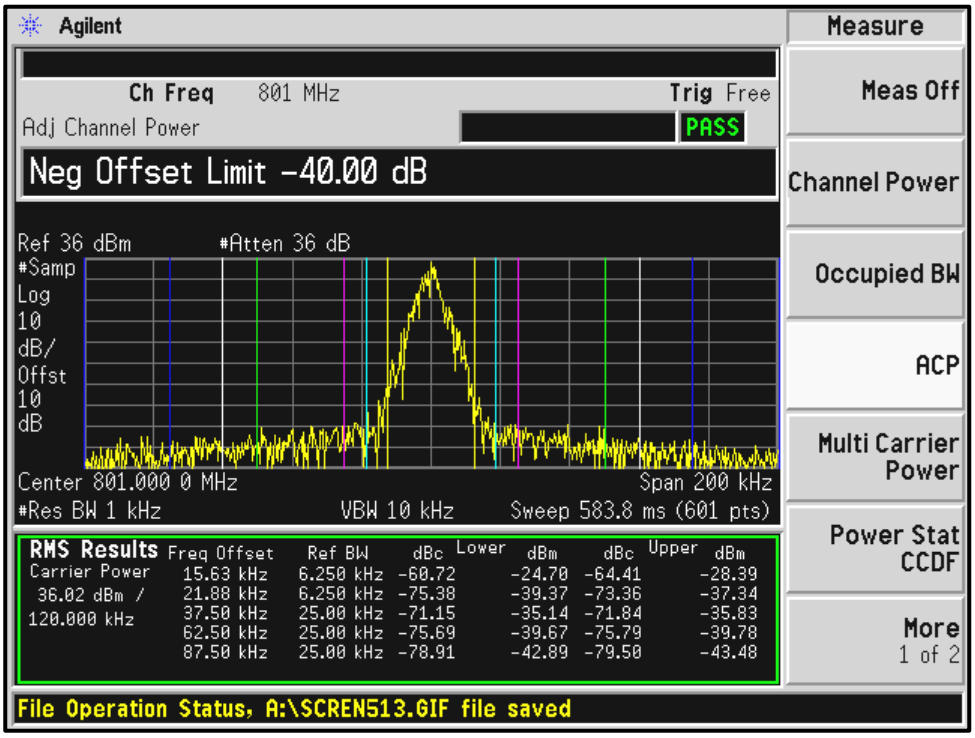


Table 7-12: Adjacent Channel Power – 801.0000 MHz; P25 (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-93.1
12 MHz to receive band	30(s)	-75	-99.5
In receive band	30(s)	-100	-106.6

Plot 7-25: Adjacent Channel Power – 801.0000 MHz; OTP SMR Mode (9.375 kHz - 87.5 kHz)



Plot 7-26: Adjacent Channel Power – 801.0000 MHz; OTP SMR Mode (150 kHz - 350 kHz)

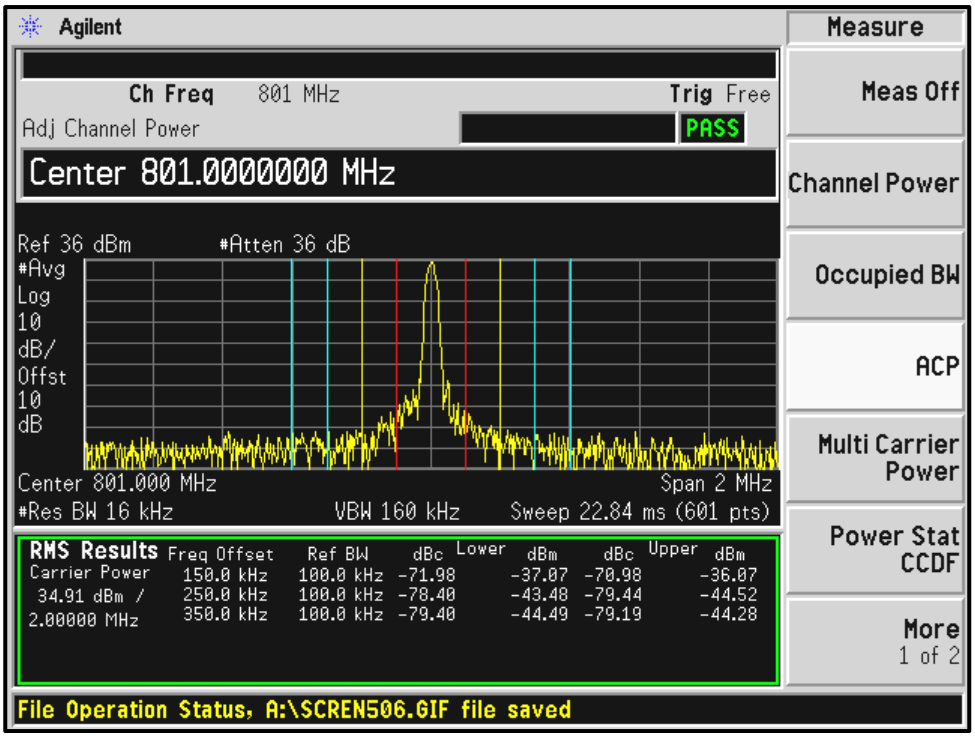
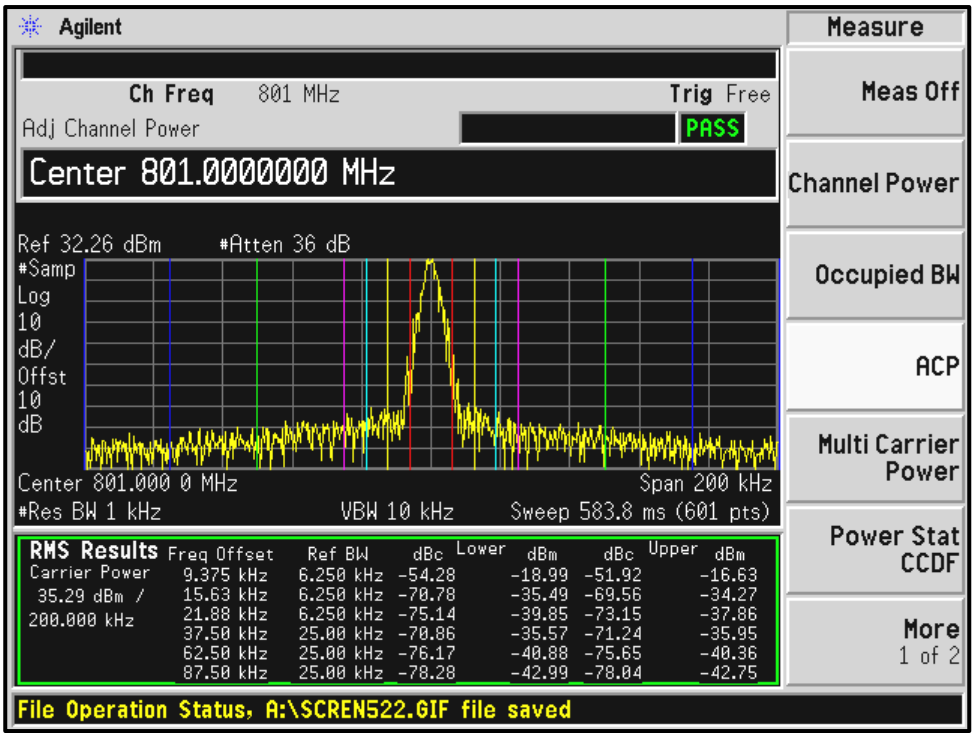


Table 7-13: Adjacent Channel Power – 801.0000 MHz; OTP SMR Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-92.4
12 MHz to receive band	30(s)	-75	-100.0
In receive band	30(s)	-100	-106.2

Plot 7-27: Adjacent Channel Power – 801.0000 MHz; OTP NB Mode (9.375 kHz - 87.5 kHz)



Plot 7-28: Adjacent Channel Power – 801.0000 MHz; OTP NB Mode (150 kHz - 350 kHz)

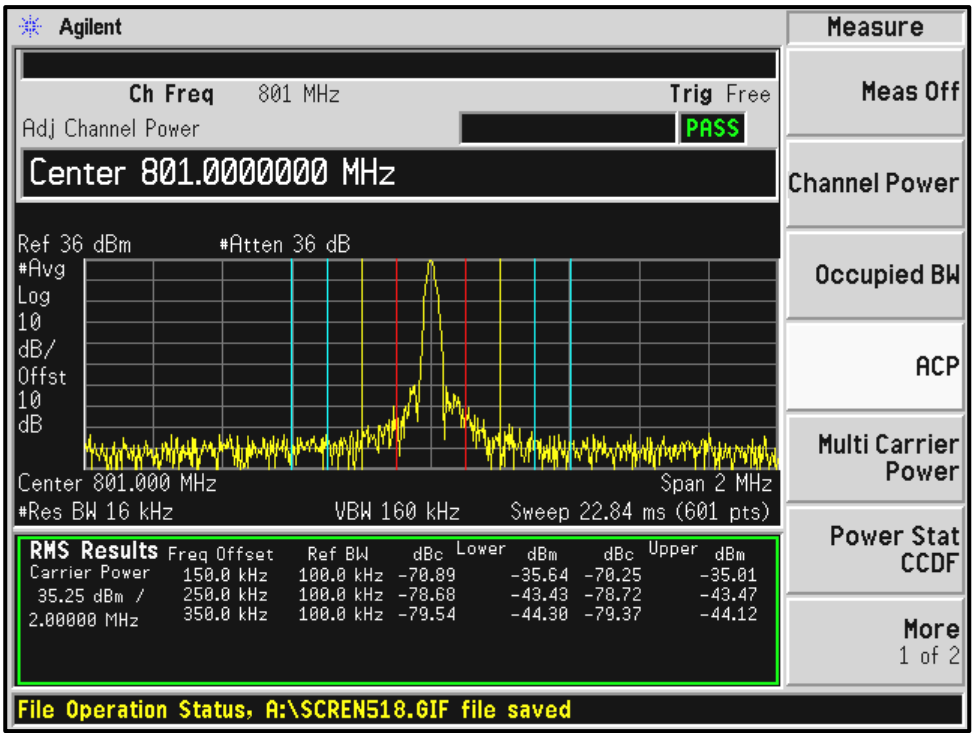
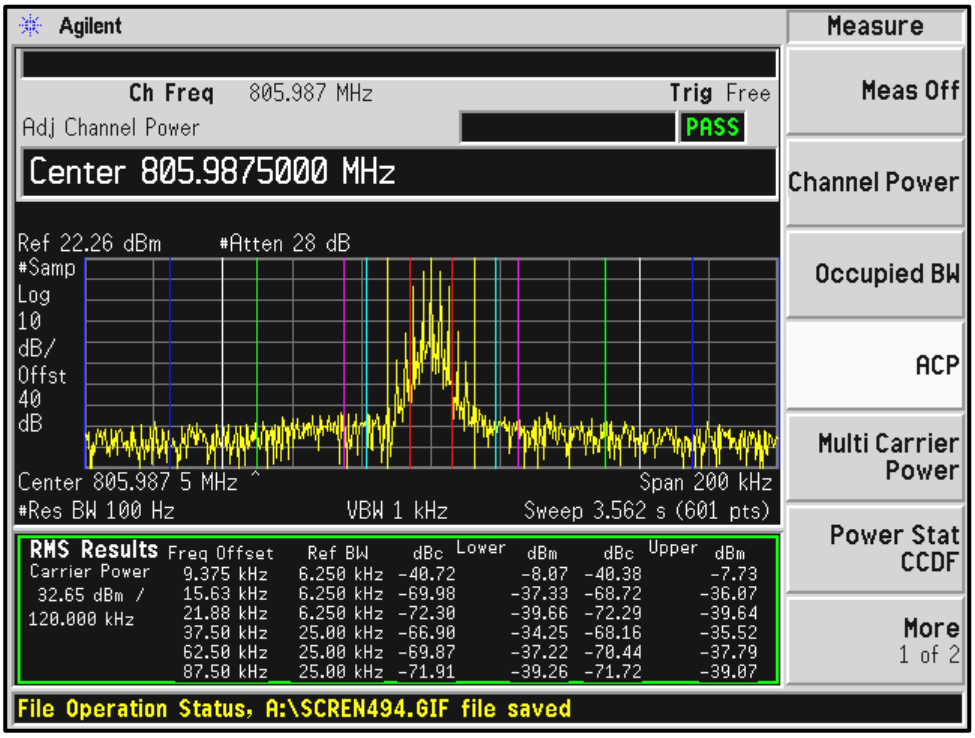


Table 7-14: Adjacent Channel Power – 801.0000 MHz; OTP NB Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-87.0
12 MHz to receive band	30(s)	-75	-96.4
In receive band	30(s)	-100	-104.0

Plot 7-29: Adjacent Channel Power - 805.9875 MHz; Analog Mode; (9.375 kHz - 87.5 kHz)



Plot 7-30: Adjacent Channel Power - 805.9875 MHz; Analog Mode; (150 kHz - 350 kHz)

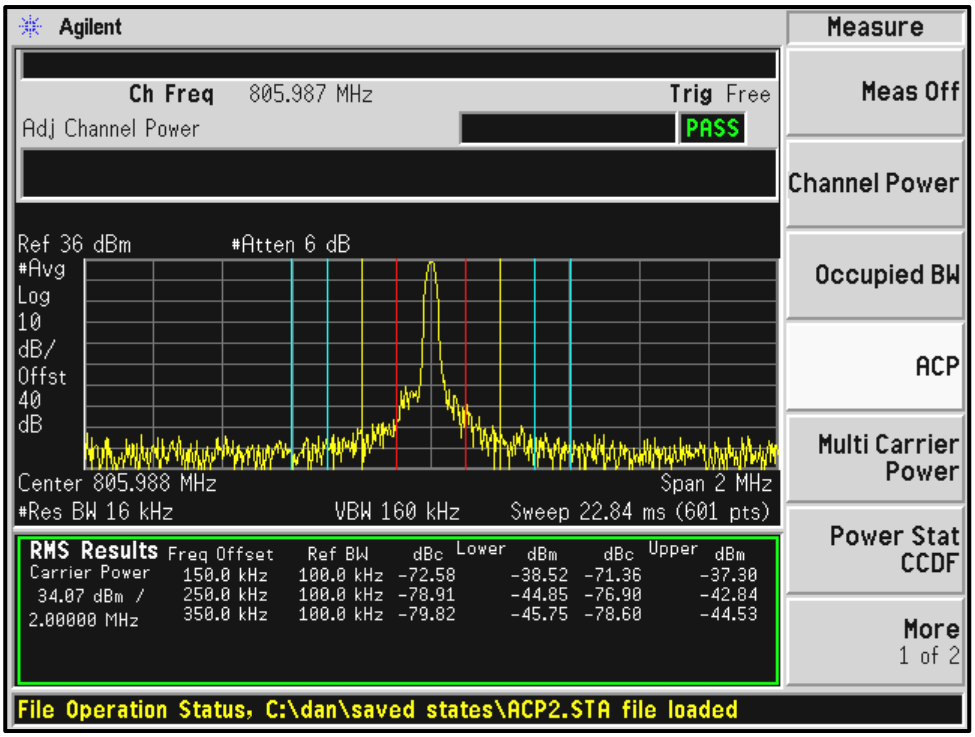
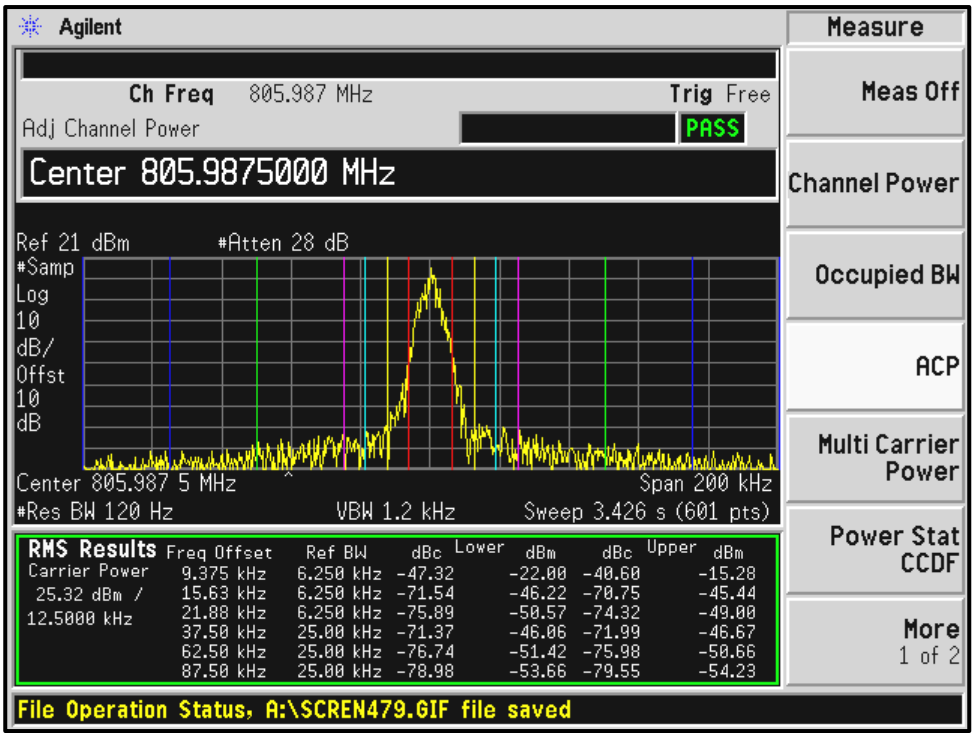


Table 7-15: Adjacent Channel Power – 805.9875 MHz; Analog Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-92.5
12 MHz to receive band	30(s)	-75	-99.7
In receive band	30(s)	-100	-108.1

Plot 7-31: Adjacent Channel Power – 805.9875 MHz; P25 (9.375 kHz - 87.5 kHz)



Plot 7-32: Adjacent Channel Power – 805.9875 MHz; P25 (150 kHz - 350 kHz)

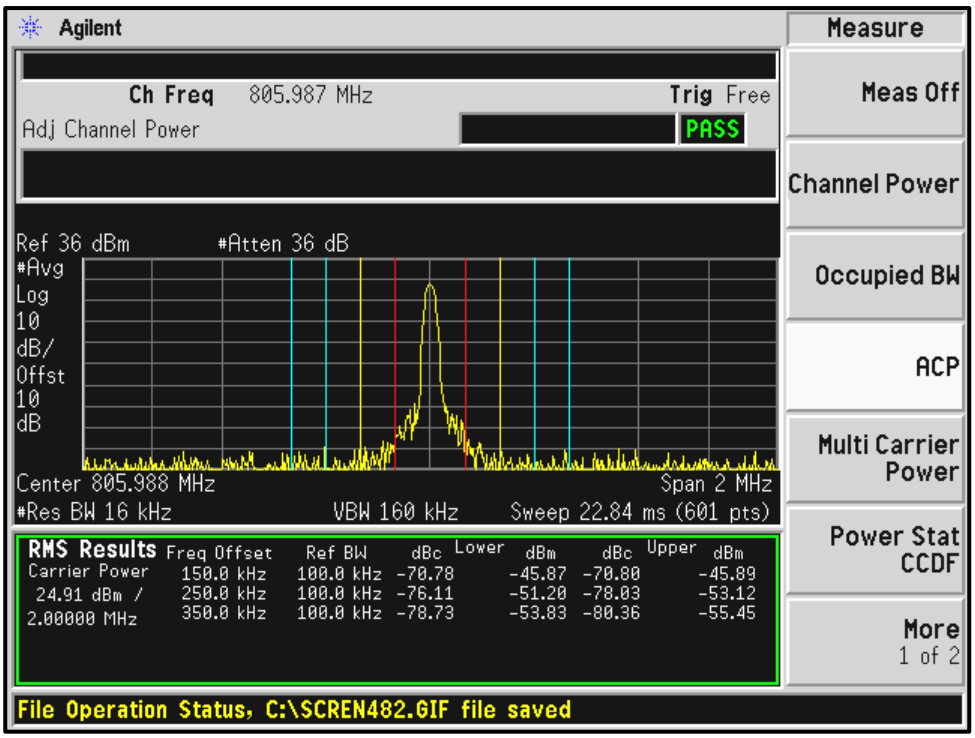
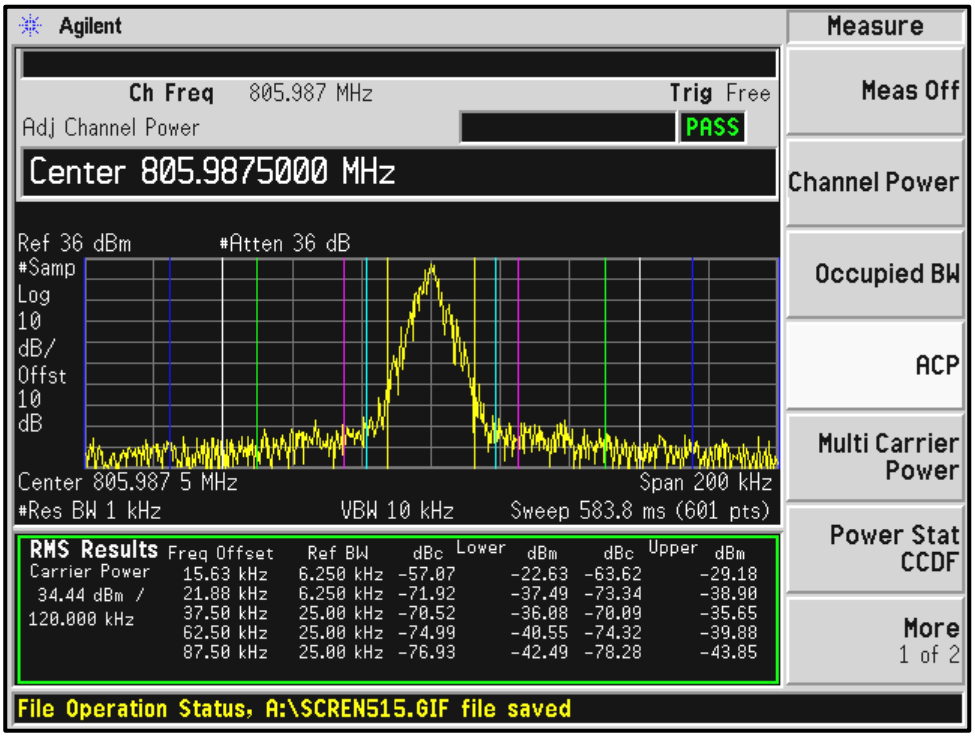


Table 7-16: Adjacent Channel Power – 805.9875 MHz; P25 (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-92.9
12 MHz to receive band	30(s)	-75	-98.4
In receive band	30(s)	-100	-107.4

Plot 7-33: Adjacent Channel Power – 805.9875 MHz; OTP SMR Mode (9.375 kHz - 87.5 kHz)



Plot 7-34: Adjacent Channel Power – 805.9875 MHz; OTP SMR Mode (150 kHz - 350 kHz)

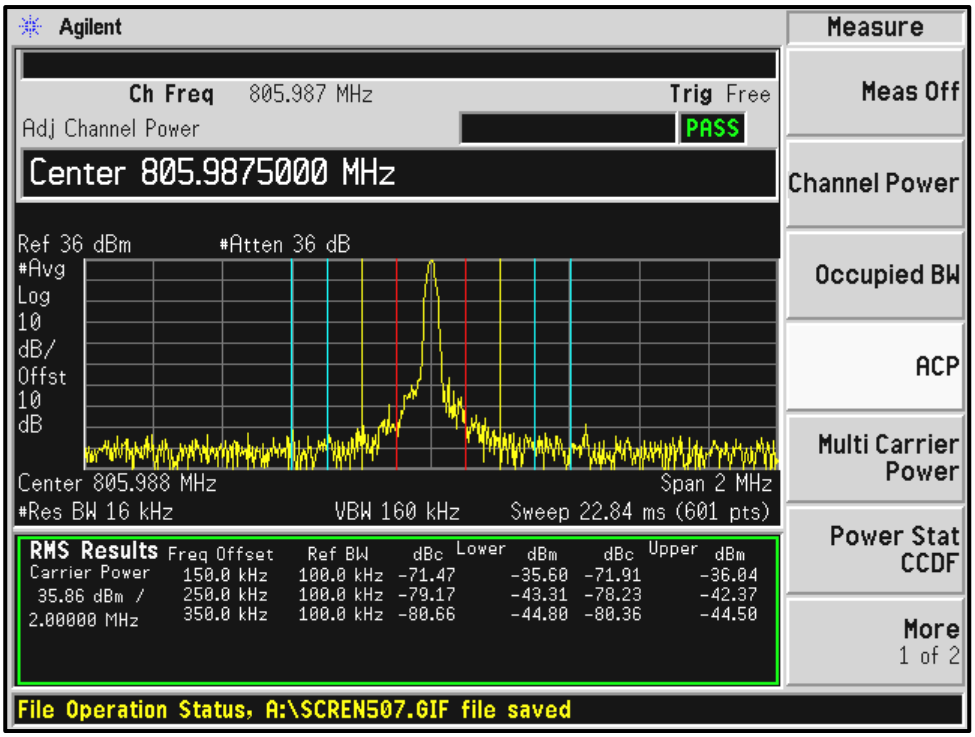
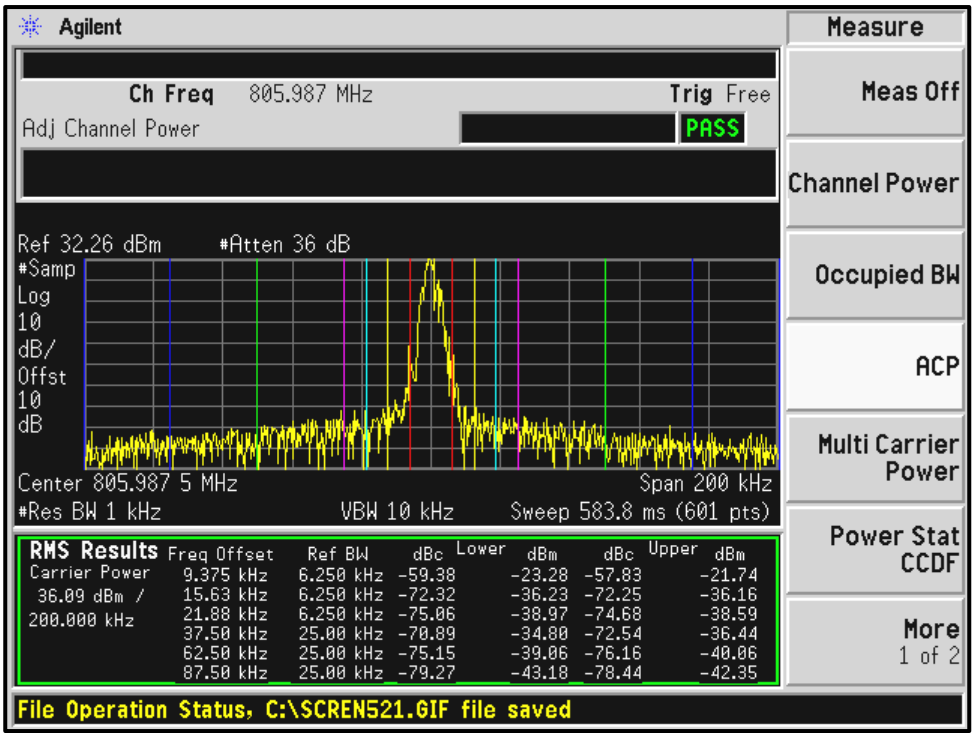


Table 7-17: Adjacent Channel Power – 805.9875 MHz; OTP SMR Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-89.7
12 MHz to receive band	30(s)	-75	-95.6
In receive band	30(s)	-100	-104.2

Plot 7-35: Adjacent Channel Power - 805.9875 MHz; OTP NB Mode (9.375 kHz - 87.5 kHz)



Plot 7-36: Adjacent Channel Power - 805.9875 MHz; OTP NB Mode (150 kHz - 350 kHz)

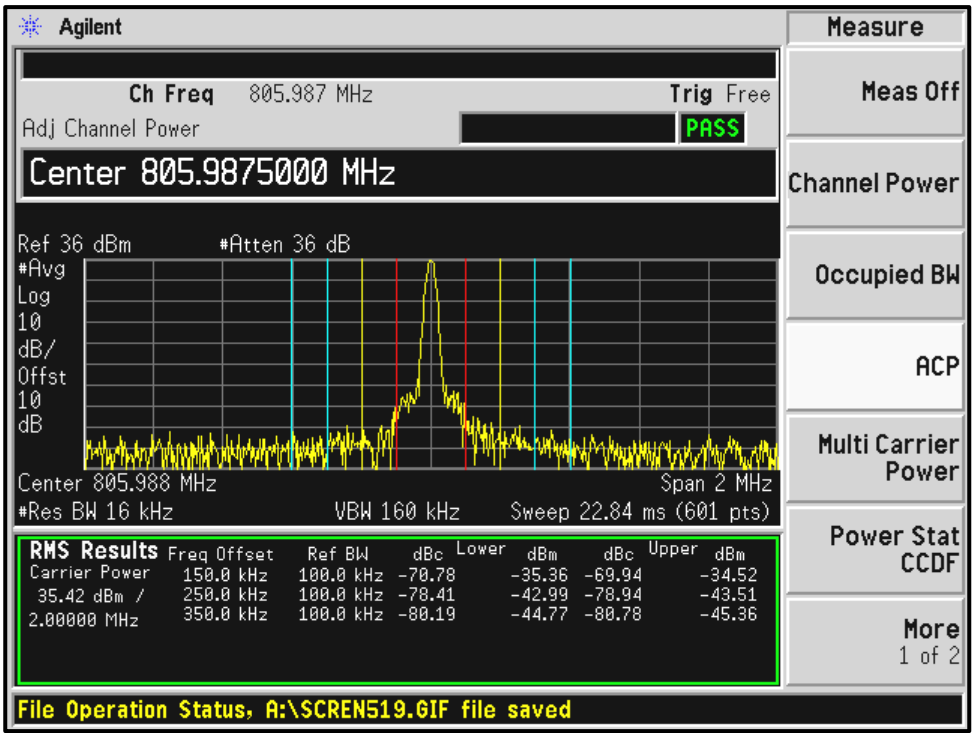


Table 7-18: Adjacent Channel Power – 805.9875 MHz; OTP NB Mode (>400 kHz - RX Band)

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-91.5
12 MHz to receive band	30(s)	-75	-97.2
In receive band	30(s)	-100	-106.2

Table 7-19: Test Equipment Used For Testing ACP Requirements

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	12/29/12
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	2/14/12

Test Personnel:

Daniel Baltzell		August 27-30, 2011
EMC Test Engineer	Signature	Dates of Tests

8 FCC Rules and Regulations Part 90.210(g) and Part 2.1053(a): Field Strength of Spurious Radiation; Part 90.543(f): Out of Band Emissions Limit; RSS-119 5.8.9.2 Out-of-band Emission Limit

8.1 Test Procedure

ANSI/TIA-603-2004, section 2.2.12

The device uses digital modulation modulated to its maximum extent using a pseudo-random data sequence of 9600 bps for NBOTP (Narrow Band OpenSky Trunking Protocol) mode.

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 (dBi) was added to achieve the EIRP level, then converted from the corrected signal generator level (dBm) to dBc, or dBW for 700 MHz band, and compared to the limit.

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."

8.2 Test Data

Table 8-1: Field Strength of Spurious Radiation – 764.0125 MHz

Conducted Power 34.8 dBm; 3 W; Limit=43+10LogP=47.8 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1528.0250	50.0	-60.4	1.2	6.5	89.8	-42.0
2292.0375	17.1	-84.2	1.6	7.4	113.2	-65.4
3056.0500	18.8	-80.0	1.9	7.2	109.5	-61.7
3820.0625	12.9	-82.7	2.2	7.0	112.7	-64.9
4584.0750	8.7	-82.4	2.4	9.1	110.5	-62.7
5348.0875	4.1	-86.9	2.6	8.5	115.8	-68.0
6112.1000	4.4	-84.8	2.7	9.0	113.3	-65.5
6876.1125	8.1	-79.4	2.8	9.5	107.4	-59.6
7640.1250	8.4	-77.2	2.9	9.3	105.6	-57.8

Table 8-2: Field Strength of Spurious Radiation – 771.0000 MHz

Conducted Power 34.8 dBm; 3 W; Limit=43+10LogP=47.8 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1542.0000	51.4	-59.5	1.2	6.6	88.9	-41.1
2313.0000	20.0	-81.5	1.6	7.3	110.5	-62.7
3084.0000	14.3	-84.0	1.9	7.2	113.6	-65.8
3855.0000	10.2	-85.2	2.2	7.0	115.3	-67.5
4626.0000	3.8	-87.1	2.4	9.1	115.2	-67.4
5397.0000	2.4	-88.5	2.6	8.5	117.4	-69.6
6168.0000	4.3	-84.8	2.7	8.9	113.4	-65.6
6939.0000	6.8	-80.5	2.8	9.6	108.6	-60.8
7710.0000	0.0	-85.3	2.9	9.4	113.7	-65.9
1542.0000	51.4	-59.5	1.2	6.6	88.9	-41.1

Table 8-3: Field Strength of Spurious Radiation – 775.9875 MHz

Conducted Power 34.8 dBm; 3 W; Limit=43+10LogP=47.8 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1551.9750	53.0	-58.3	1.2	6.6	87.6	-39.8
2327.9625	21.5	-80.2	1.6	7.3	109.3	-61.5
3103.9500	11.7	-86.5	1.9	7.2	116.1	-68.3
3879.9375	10.2	-84.3	2.2	7.0	114.3	-66.5
4655.9250	7.4	-83.3	2.4	9.0	111.5	-63.7
5431.9125	6.0	-84.8	2.6	8.5	113.7	-65.9
6207.9000	6.2	-82.8	2.7	8.9	111.4	-63.6
6983.8875	7.8	-79.4	2.8	9.6	107.5	-59.7
7759.8750	10.2	-75.0	2.9	9.4	103.2	-55.4
1551.9750	53.0	-58.3	1.2	6.6	87.6	-39.8

Table 8-4: Field Strength of Spurious Radiation – 794.0125 MHz

Conducted Power 34.8 dBm; 3 W; Limit=43+10LogP=47.8 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1588.0250	52.5	-57.1	1.2	6.7	86.4	-38.6
2382.0375	21.1	-81.0	1.6	7.2	110.2	-62.4
3176.0500	17.7	-80.2	2.0	7.0	109.9	-62.1
3970.0625	12.8	-81.2	2.2	7.3	111.0	-63.2
4764.0750	5.7	-85.9	2.5	8.8	114.3	-66.5
5558.0875	4.7	-85.8	2.6	8.7	114.5	-66.7
6352.1000	5.0	-83.7	2.8	9.4	111.8	-64.0
7146.1125	8.6	-78.6	2.8	9.4	106.8	-59.0
7940.1250	9.9	-74.9	2.9	9.3	103.2	-55.4

Table 8-5: Field Strength of Spurious Radiation – 801.0000 MHz

Conducted Power 34.8 dBm; 3 W; Limit=43+10LogP=47.8 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1602.0000	52.9	-56.8	1.2	6.8	86.0	-38.2
2403.0000	18.4	-83.9	1.6	7.2	113.2	-65.4
3204.0000	18.2	-79.6	2.0	7.0	109.4	-61.6
4005.0000	6.6	-87.3	2.2	7.5	116.8	-69.0
4806.0000	4.7	-85.3	2.5	8.8	113.8	-66.0
5607.0000	4.7	-85.7	2.6	8.9	114.2	-66.4
6408.0000	7.1	-81.4	2.8	9.7	109.3	-61.5
7209.0000	7.4	-79.3	2.8	9.2	107.7	-59.9
8010.0000	8.7	-75.6	2.9	9.3	104.1	-56.3

Table 8-6: Field Strength of Spurious Radiation – 805.9875 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1611.9750	52.5	-57.2	1.2	6.7	87.0	-38.7
2417.9625	19.5	-83.2	1.6	7.2	112.9	-64.6
3223.9500	18.6	-79.5	2.0	7.0	109.8	-61.5
4029.9375	7.7	-86.0	2.3	7.6	116.0	-67.7
4835.9250	5.9	-84.4	2.5	8.8	113.4	-65.1
5641.9125	5.3	-85.0	2.6	9.0	114.0	-65.7
6447.9000	8.0	-80.4	2.8	9.7	108.8	-60.5
7253.8875	8.6	-78.1	2.9	9.0	107.2	-58.9
8059.8750	9.7	-74.5	2.9	9.2	103.5	-55.2

Table 8-7: Field Strength of Spurious Radiation – 806.0125 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1612.0250	52.3	-57.4	1.2	6.7	87.2	-38.9
2418.0375	19.6	-82.9	1.6	7.2	112.7	-64.4
3224.0500	18.0	-79.7	2.0	7.0	109.9	-61.6
4030.0625	7.2	-87.5	2.3	7.6	117.4	-69.1
4836.0750	5.7	-84.6	2.5	8.8	113.6	-65.3
5642.0875	3.9	-86.4	2.6	9.0	115.4	-67.1
6448.1000	6.3	-82.1	2.8	9.7	110.5	-62.2
7254.1125	8.2	-78.5	2.9	9.0	107.6	-59.3
8060.1250	8.9	-75.3	2.9	9.2	104.3	-56.0

Table 8-8: Field Strength of Spurious Radiation – 815.0000 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1630.0000	49.9	-59.9	1.2	6.7	89.7	-41.4
2445.0000	20.1	-82.6	1.6	7.3	112.3	-64.0
3260.0000	17.1	-80.4	2.0	7.0	110.7	-62.4
4075.0000	9.7	-83.8	2.3	7.9	113.5	-65.2
4890.0000	7.9	-83.1	2.5	8.8	112.1	-63.8
5705.0000	6.4	-83.8	2.7	9.2	112.5	-64.2
6520.0000	8.1	-80.2	2.8	9.7	108.5	-60.2
7335.0000	6.5	-80.0	2.9	8.8	109.4	-61.1
8150.0000	8.0	-75.9	2.9	9.2	104.9	-56.6

Table 8-9: Field Strength of Spurious Radiation – 823.9875 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1647.9750	50.3	-59.6	1.2	6.6	89.5	-41.2
2471.9625	20.8	-80.6	1.6	7.3	110.3	-62.0
3295.9500	13.9	-83.4	2.0	7.1	113.7	-65.4
4119.9375	11.1	-82.2	2.3	8.2	111.6	-63.3
4943.9250	5.4	-86.4	2.5	8.8	115.4	-67.1
5767.9125	5.9	-84.1	2.7	9.2	112.9	-64.6
6591.9000	8.1	-80.0	2.8	9.6	108.5	-60.2
7415.8875	7.7	-78.6	2.9	8.8	108.0	-59.7
8239.8750	9.7	-73.9	2.9	9.3	102.8	-54.5

Table 8-10: Field Strength of Spurious Radiation – 851.0125 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1702.0250	52.7	-57.4	1.3	6.5	87.5	-39.2
2553.0375	20.5	-80.4	1.7	7.4	110.0	-61.7
3404.0500	18.2	-78.6	2.0	7.6	108.4	-60.1
4255.0625	13.5	-79.2	2.3	8.6	108.2	-59.9
5106.0750	4.7	-86.8	2.5	8.6	116.0	-67.7
5957.0875	8.5	-81.1	2.7	9.2	109.9	-61.6
6808.1000	8.4	-79.2	2.8	9.5	107.9	-59.6
7659.1125	8.7	-76.8	2.9	9.3	105.7	-57.4
8510.1250	8.5	-74.2	2.9	9.2	103.2	-54.9

Table 8-11: Field Strength of Spurious Radiation – 860.0000 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1720.0000	52.7	-56.8	1.3	6.5	86.9	-38.6
2580.0000	21.2	-79.6	1.7	7.4	109.2	-60.9
3440.0000	17.9	-79.3	2.1	7.6	109.1	-60.8
4300.0000	13.6	-78.8	2.3	8.7	107.8	-59.5
5160.0000	5.9	-85.5	2.5	8.5	114.8	-66.5
6020.0000	5.4	-84.0	2.7	9.1	112.9	-64.6
6880.0000	7.6	-79.8	2.8	9.5	108.4	-60.1
7740.0000	8.8	-76.4	2.9	9.4	105.2	-56.9
8600.0000	9.2	-73.2	2.9	9.3	102.1	-53.8

Table 8-12: Field Strength of Spurious Radiation – 868.9875 MHz

Conducted Power 35.3 dBm; 3.4 W; Limit=43+10LogP=48.3 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
1737.9750	53.4	-56.8	1.3	6.5	86.9	-38.6
2606.9625	21.4	-79.3	1.7	7.4	108.9	-60.6
3475.9500	16.9	-79.5	2.1	7.6	109.3	-61.0
4344.9375	15.0	-77.2	2.3	8.6	106.2	-57.9
5213.9250	5.1	-86.2	2.6	8.5	115.6	-67.3
6082.9125	4.6	-84.7	2.7	9.1	113.6	-65.3
6951.9000	7.2	-80.1	2.8	9.6	108.6	-60.3
7820.8875	9.5	-75.5	2.9	9.4	104.2	-55.9
8689.8750	9.9	-72.2	2.9	9.2	101.2	-52.9

8.2.1 CFR 47 Part 90.543(f) Requirements

The worst-case emissions test data are shown.

Limit: -80 dBW EIRP for discrete emissions

Table 8-13: Field Strength of Spurious Radiation – Worst Case Emissions

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Antenna Gain (dBi)	Corrected Signal Generator Level (dBW)	Margin (dB)
1577.329	33.1	-72.3	1.2	6.7	-96.7	-16.7
1587.329	33.9	-71.0	1.2	6.7	-95.5	-15.5
1588.025	41.9	-63.1	1.2	6.7	-87.5	-7.5
1591.317	32.8	-72.1	1.2	6.7	-96.6	-16.6
1598.025	44.7	-60.3	1.2	6.8	-84.8	-4.8
1599.292	37.1	-68.0	1.2	6.8	-92.4	-12.4
1602.013	44.3	-61.1	1.2	6.8	-85.5	-5.5
1609.988	47.7	-57.6	1.2	6.7	-82.0	-2.0

Table 8-14: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	2/22/12
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901516	Insulated Wire Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/19/11
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/19/11
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	1/31/13
900321	EMCO	3161-03	Horn Antennas (4 – 8 GHz)	9508-1020	6/14/12
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/12
901236	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	7/8/12
900928	Hewlett Packard	83752A	Synthesized Sweeper, 0.01 to 20 GHz	3610A00866	2/17/12
900913	Hewlett Packard	85462A	EMI Receiver RF Section (9 kHz – 6.5 GHz)	3325A00159	8/2/12
900914	Hewlett Packard	8546OA	RF Filter Section, (100 kHz - 6.5 GHz)	3330A00107	8/2/12
900905	Rhein Tech Laboratories	PR-1040	Amplifier (20 MHz - 2 GHz)	900905	7/14/12
901132	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	3/10/12
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	3/10/12

Test Personnel:

Daniel Baltzell		September 6, 2011
Test Engineer	Signature	Date of Tests

9 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 90.210 Authorized Bandwidth; RSS-119 5.5 Channel Spacing, Authorized Bandwidth, Occupied Bandwidth and Spectrum Masks

Occupied Bandwidth - Compliance with the Emission Masks

9.1 Test Procedure

ANSI/TIA/EIA-603-2004, section 2.2.11 and TIA/EIA-102.CAAA-2002 section 2.2.5

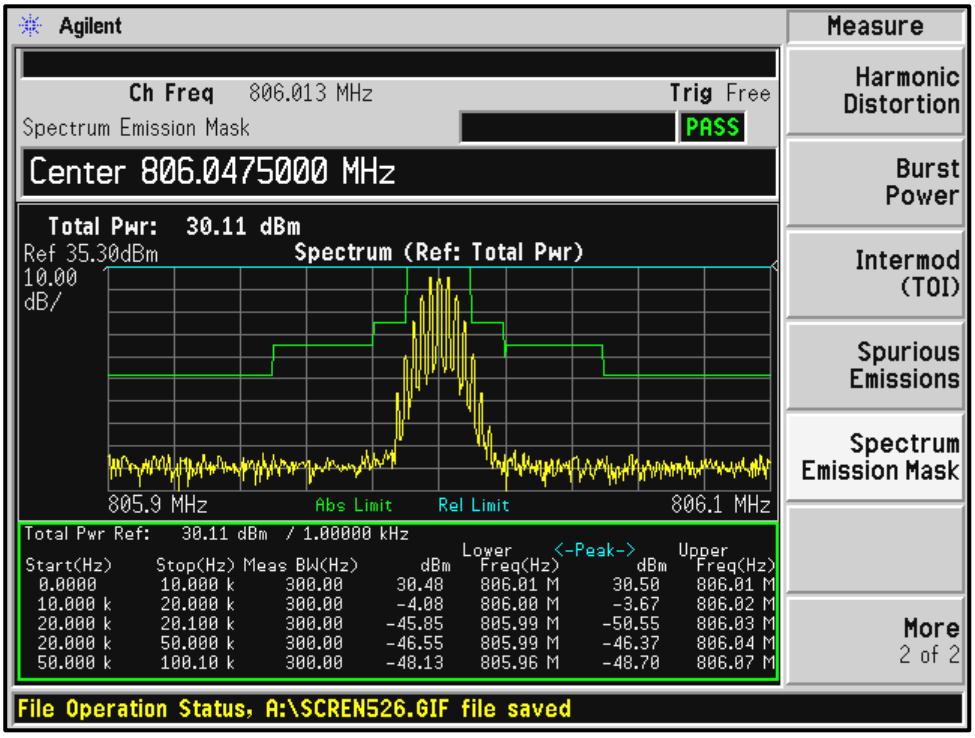
Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence.

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

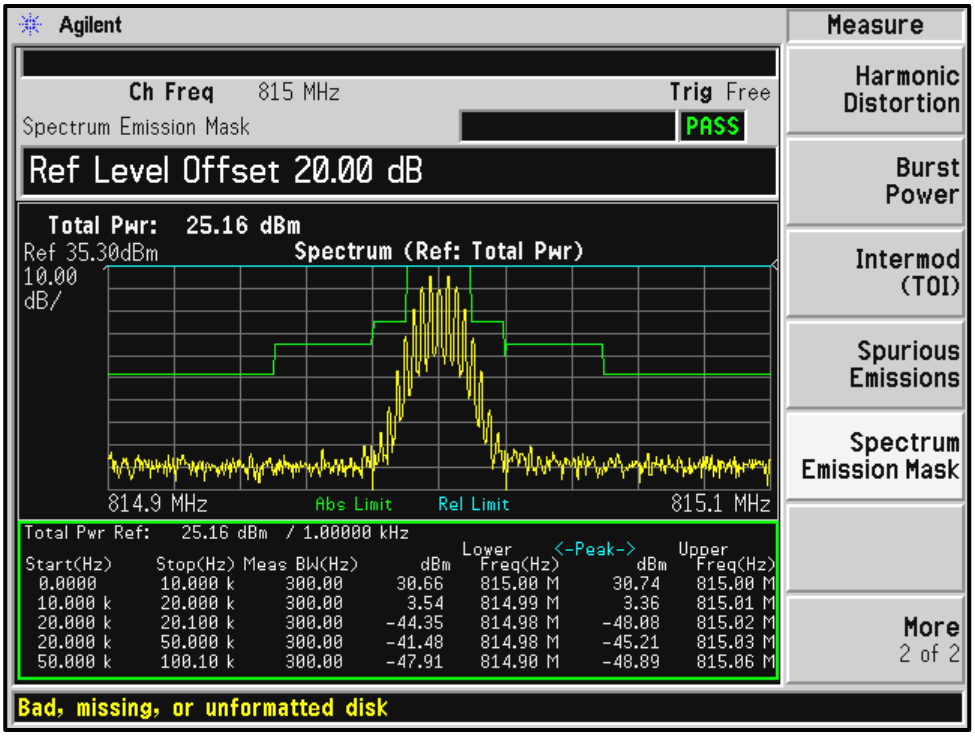
[1] Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
[2] Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask 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.

9.2 Test Data

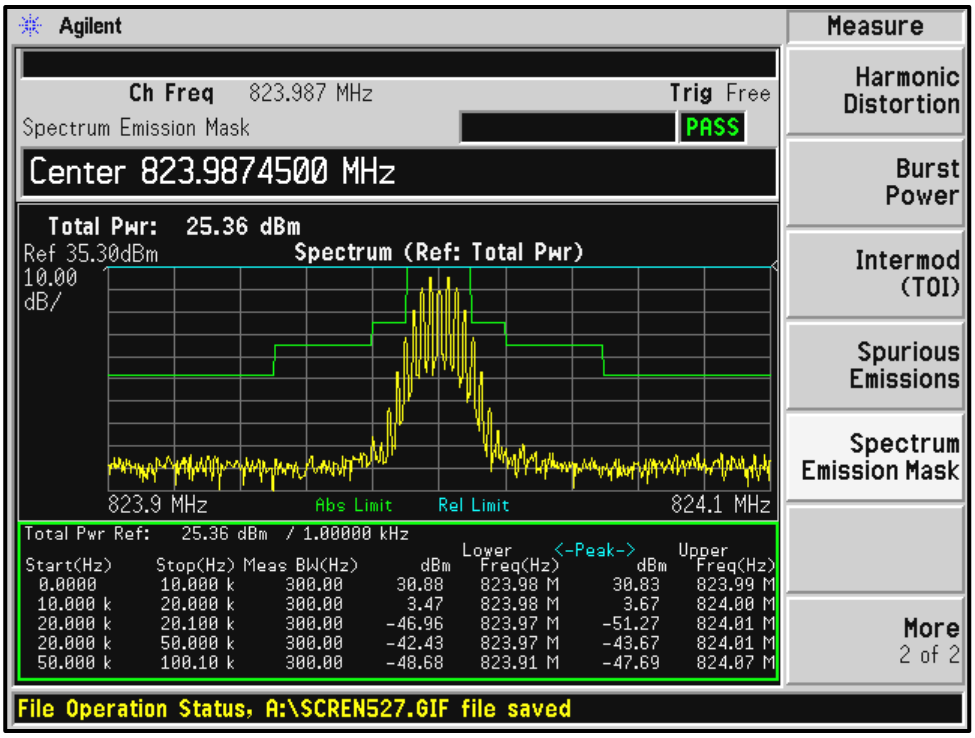
Plot 9-1: Occupied Bandwidth – 806.0125 MHz; Wideband Analog; Mask B



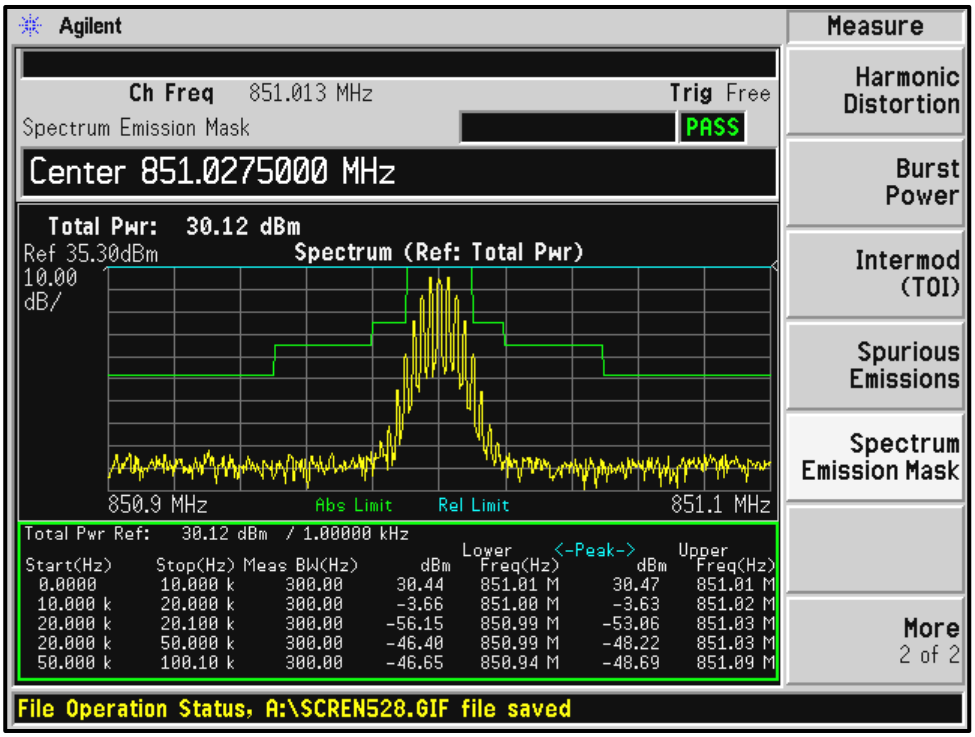
Plot 9-2: Occupied Bandwidth – 815.0000 MHz; Wideband Analog; Mask B



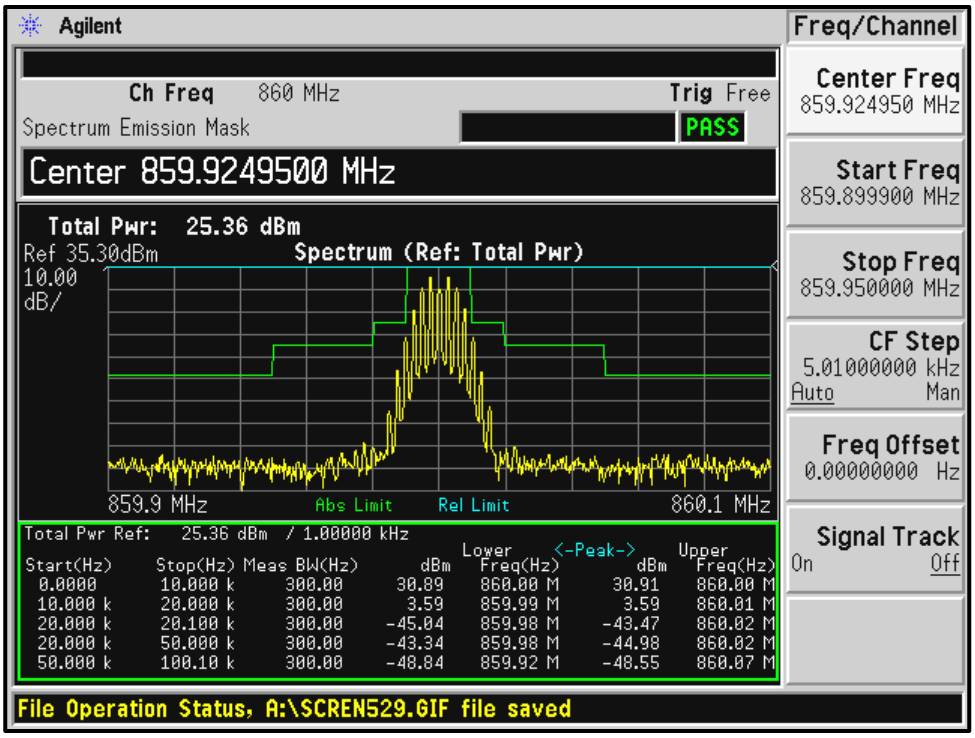
Plot 9-3: Occupied Bandwidth – 823.9875 MHz; Wideband Analog; Mask B



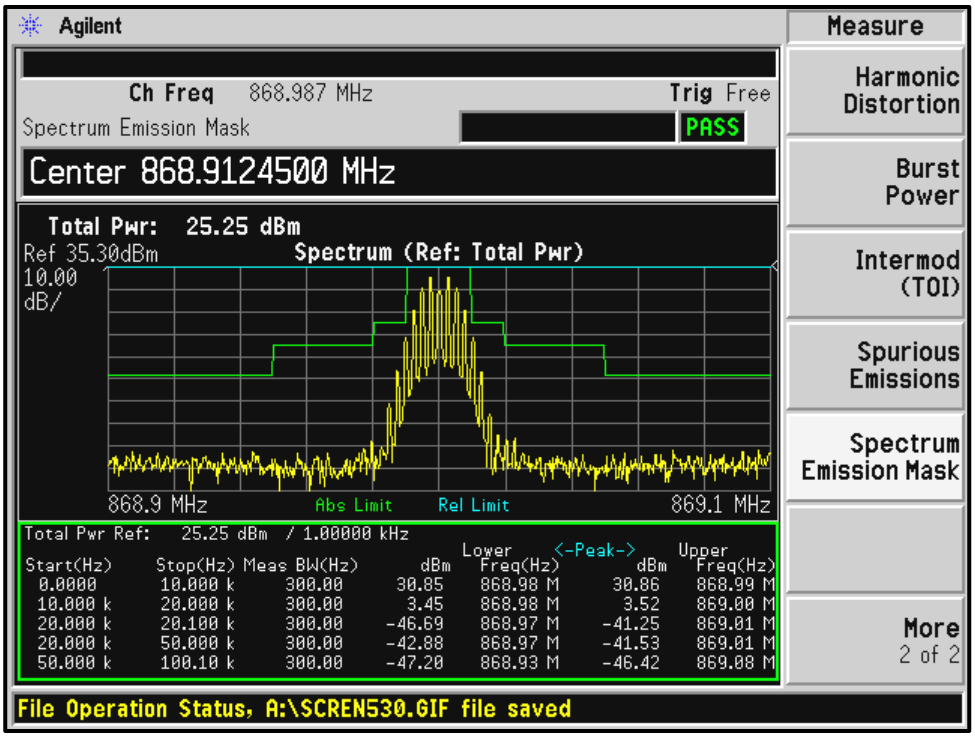
Plot 9-4: Occupied Bandwidth – 851.0125 MHz; Wideband Analog; Mask B



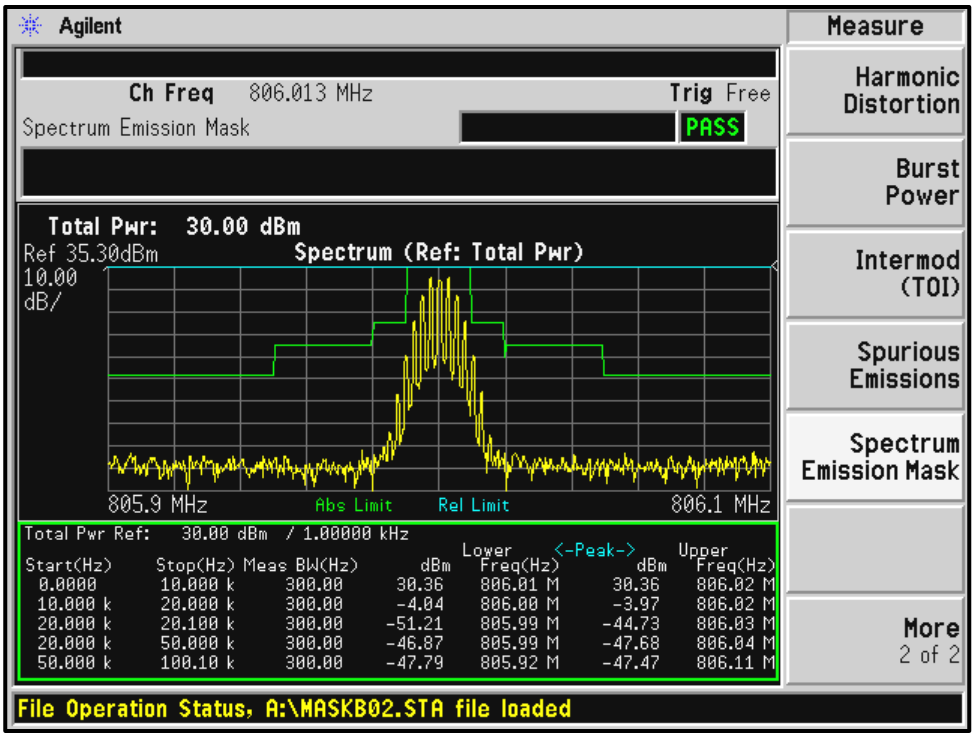
Plot 9-5: Occupied Bandwidth – 860.0000 MHz; Wideband Analog; Mask B



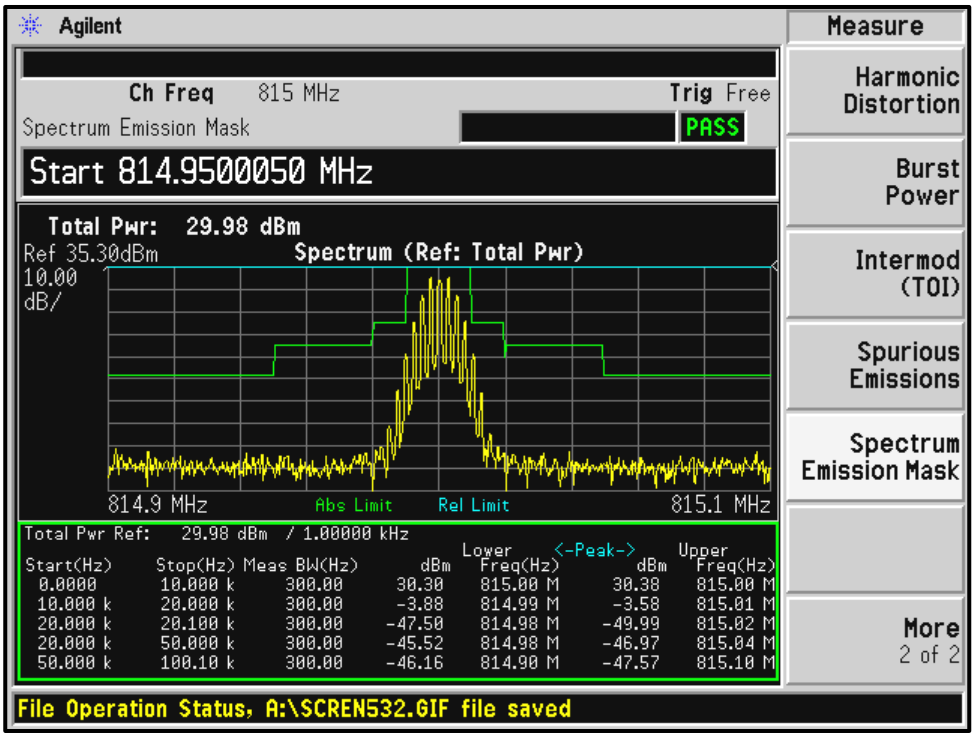
Plot 9-6: Occupied Bandwidth – 868.9875 MHz; Wideband Analog; Mask B



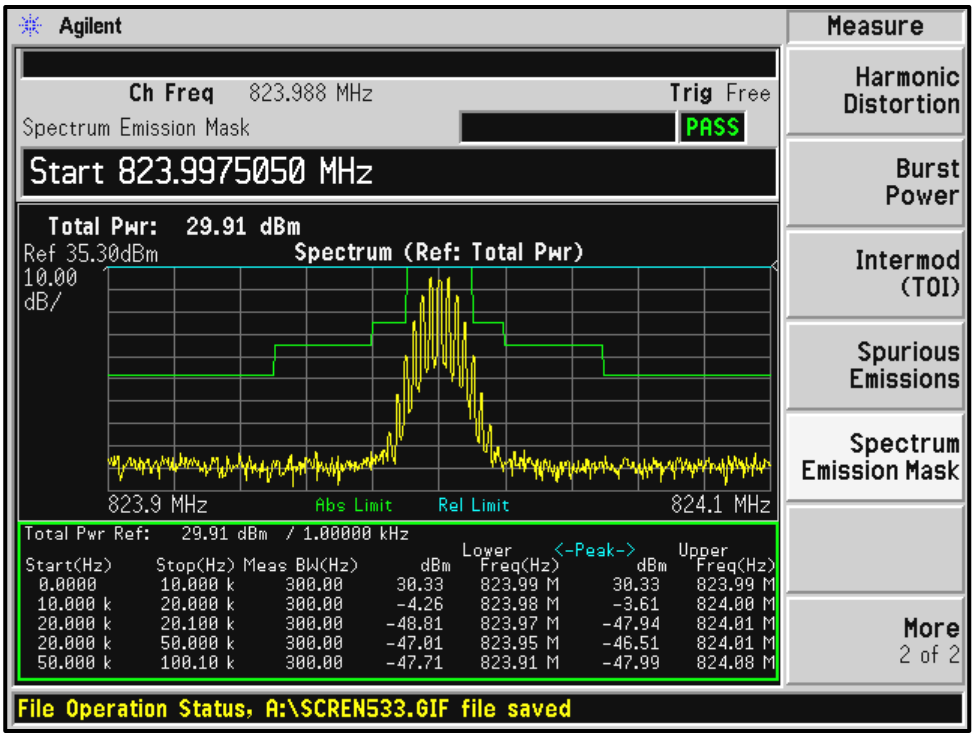
Plot 9-7: Occupied Bandwidth – 806.0125 MHz; Analog NPSPAC; Mask B



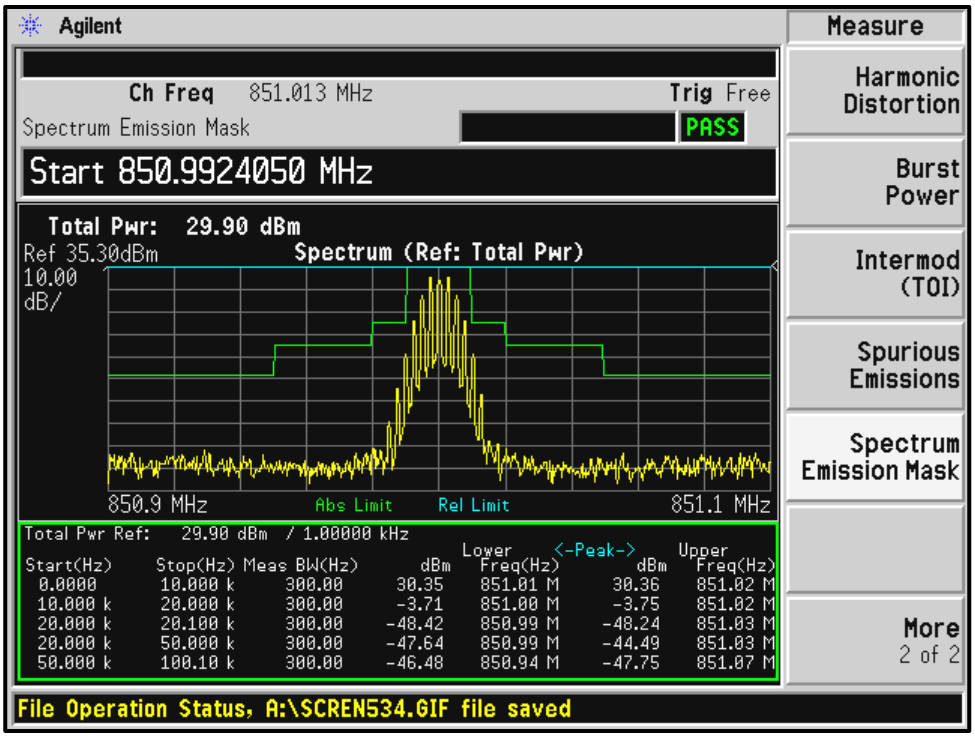
Plot 9-8: Occupied Bandwidth – 815.0000 MHz; Analog NPSPAC; Mask B



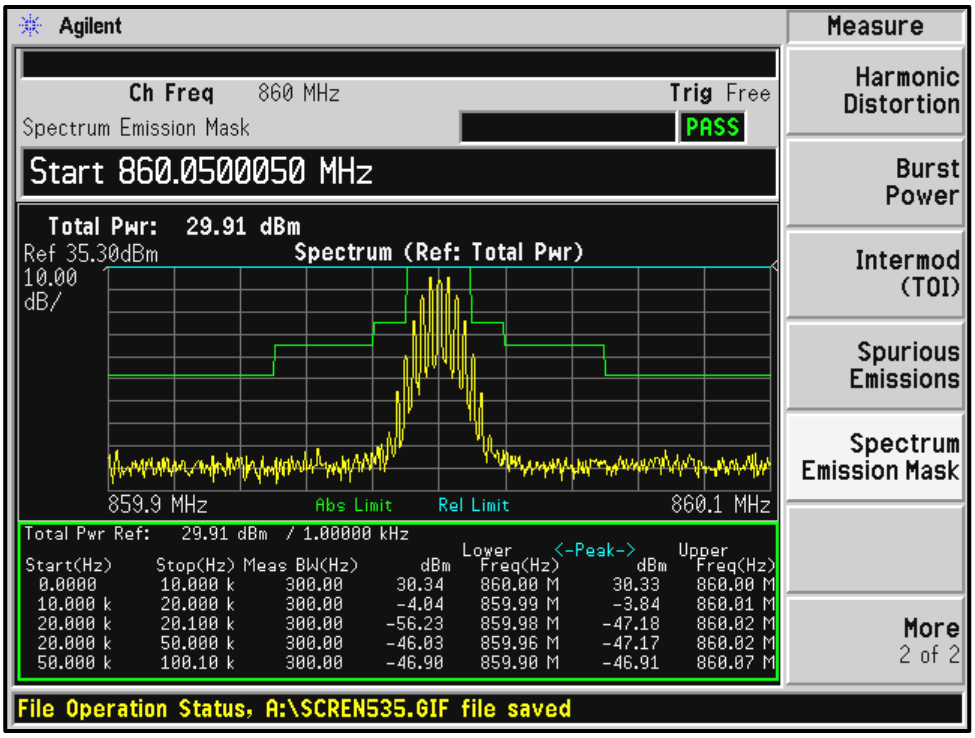
Plot 9-9: Occupied Bandwidth – 823.9875 MHz; Analog NPSPAC; Mask B



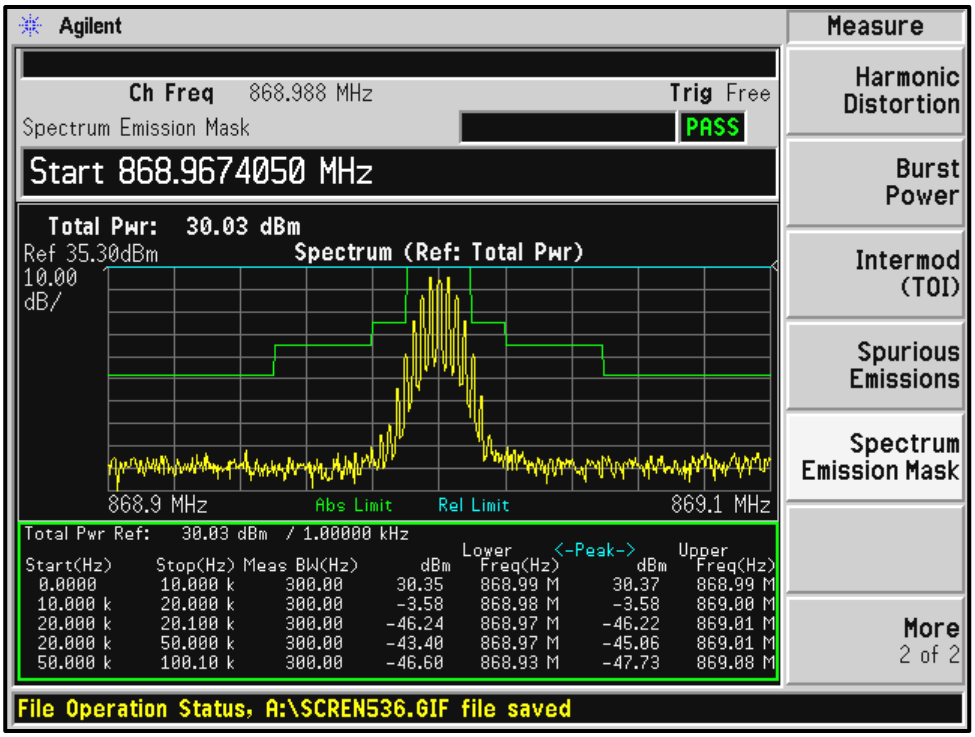
Plot 9-10: Occupied Bandwidth – 851.0125 MHz; Analog NPSPAC; Mask B



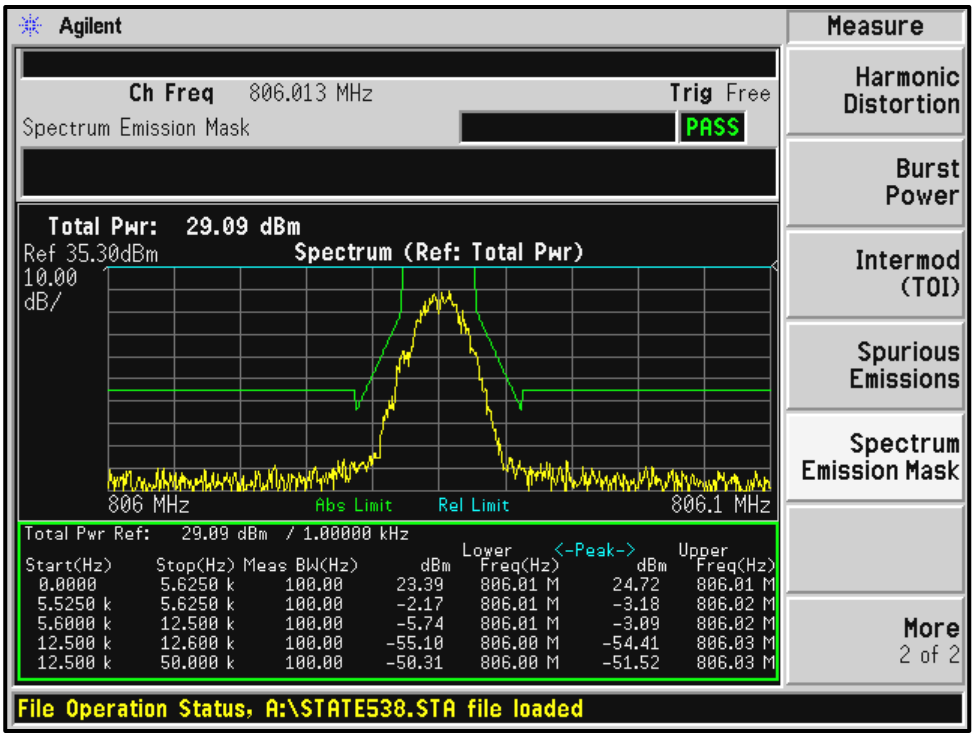
Plot 9-11: Occupied Bandwidth – 860.0000 MHz; Analog NPSPAC; Mask B



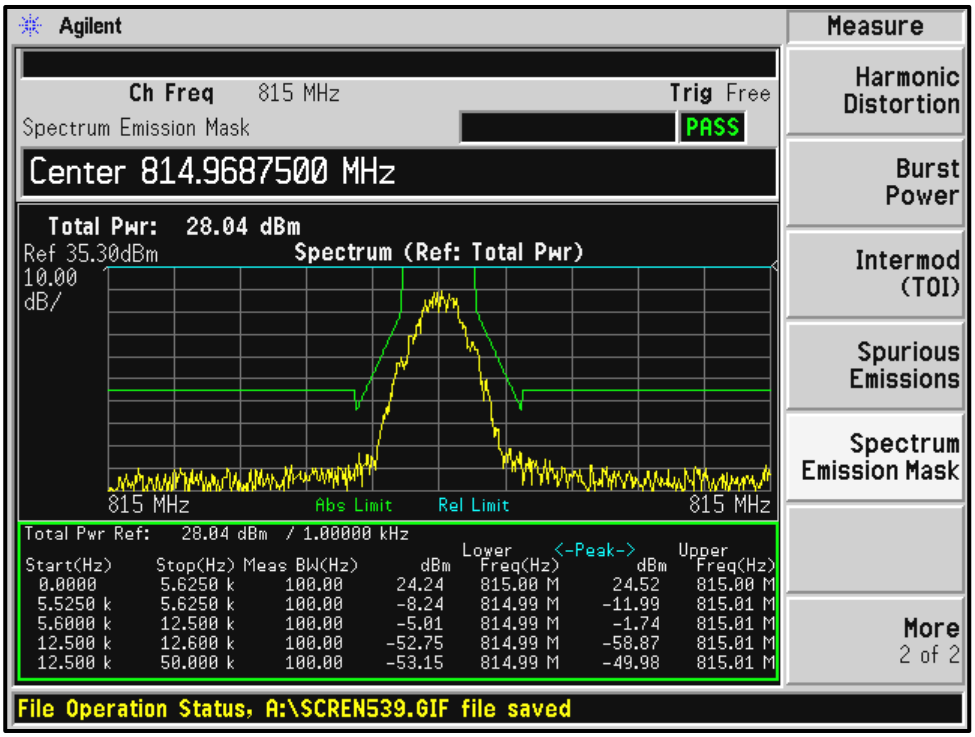
Plot 9-12: Occupied Bandwidth – 868.9875 MHz; Analog NPSPAC; Mask B



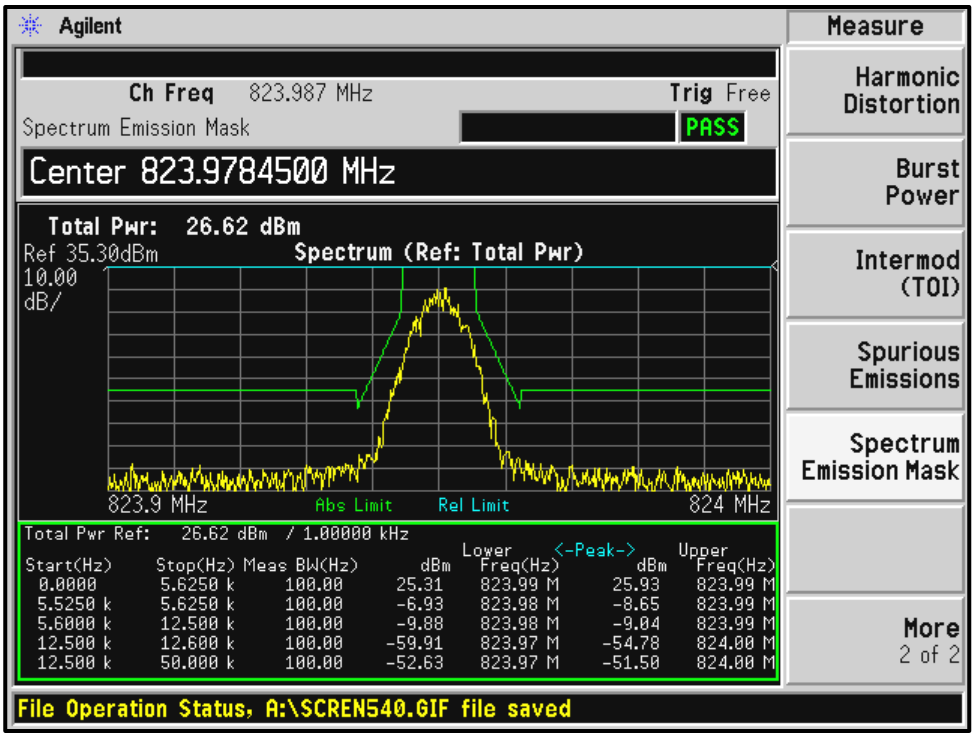
Plot 9-13: Occupied Bandwidth – 806.0125 MHz; P25; Mask D



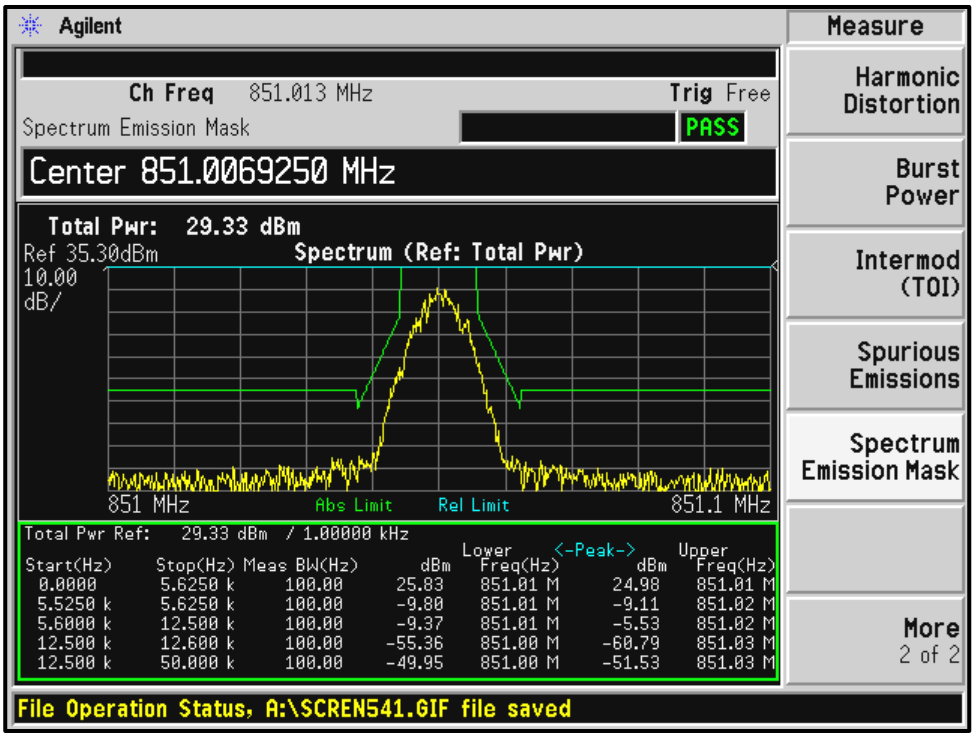
Plot 9-14: Occupied Bandwidth – 815.0000 MHz; P25; Mask D



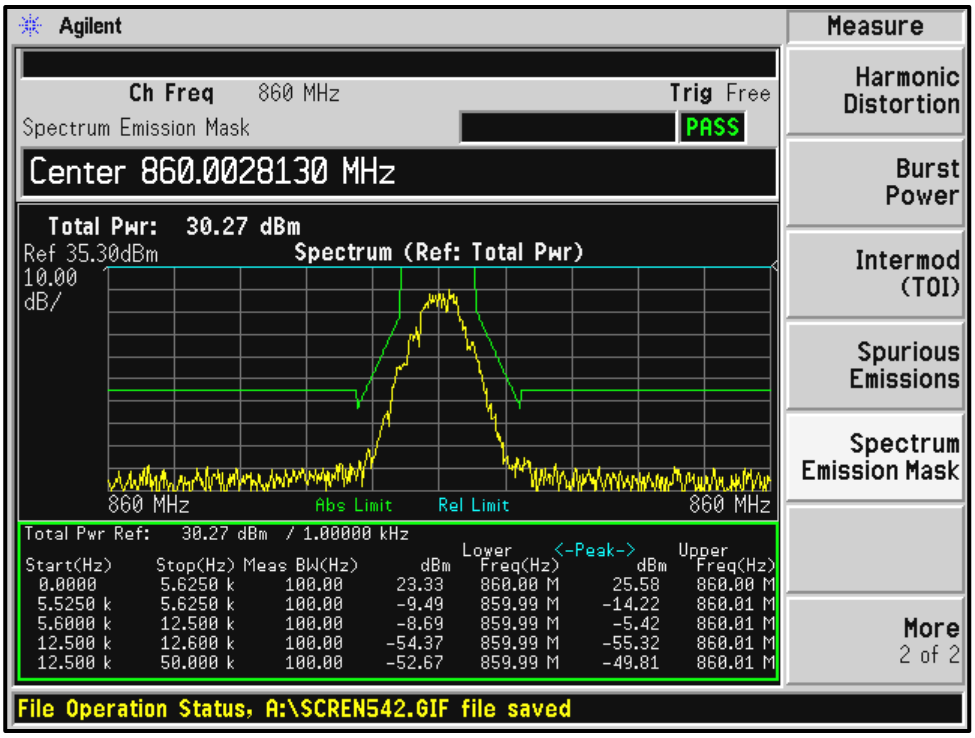
Plot 9-15: Occupied Bandwidth – 823.9875 MHz; P25; Mask D



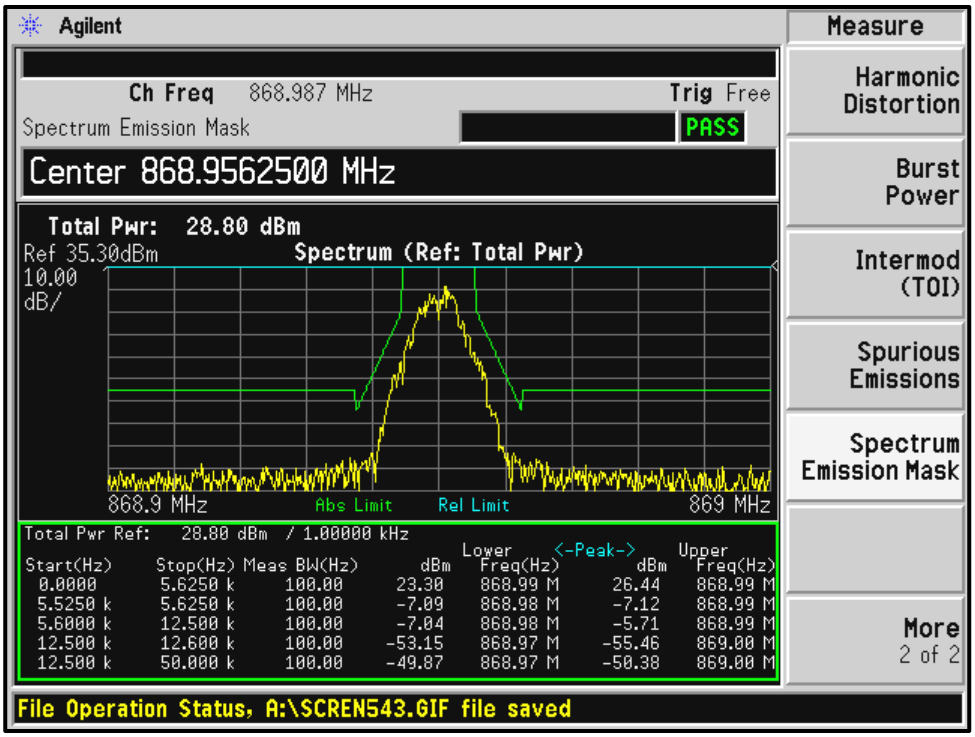
Plot 9-16: Occupied Bandwidth – 851.0125 MHz; P25 RND; Mask D



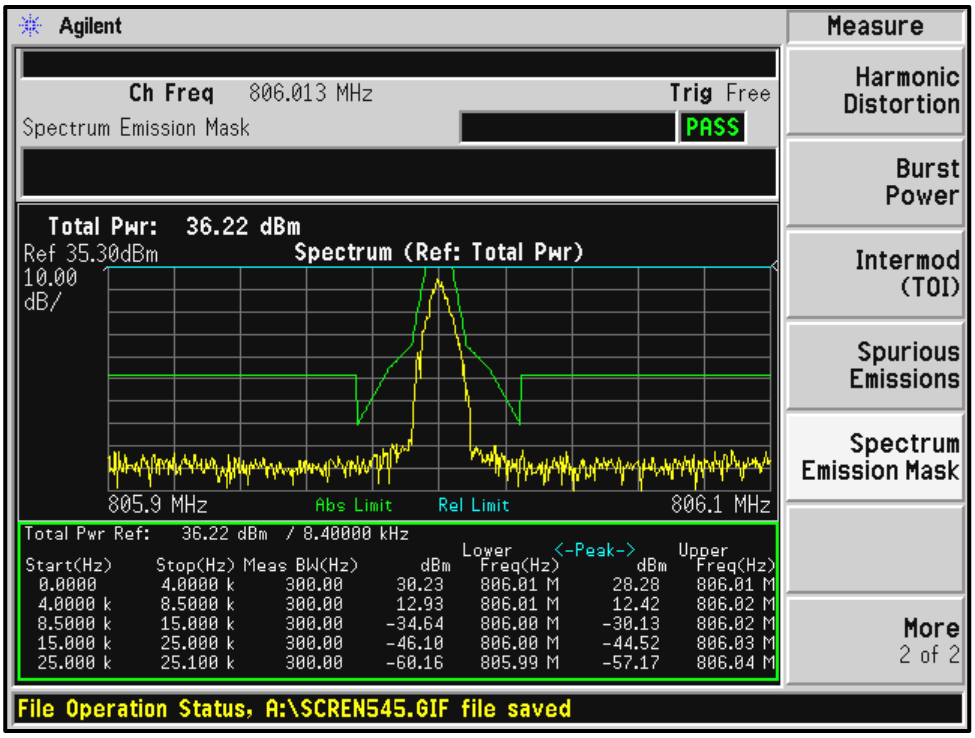
Plot 9-17: Occupied Bandwidth – 860.0000 MHz; P25; Mask D



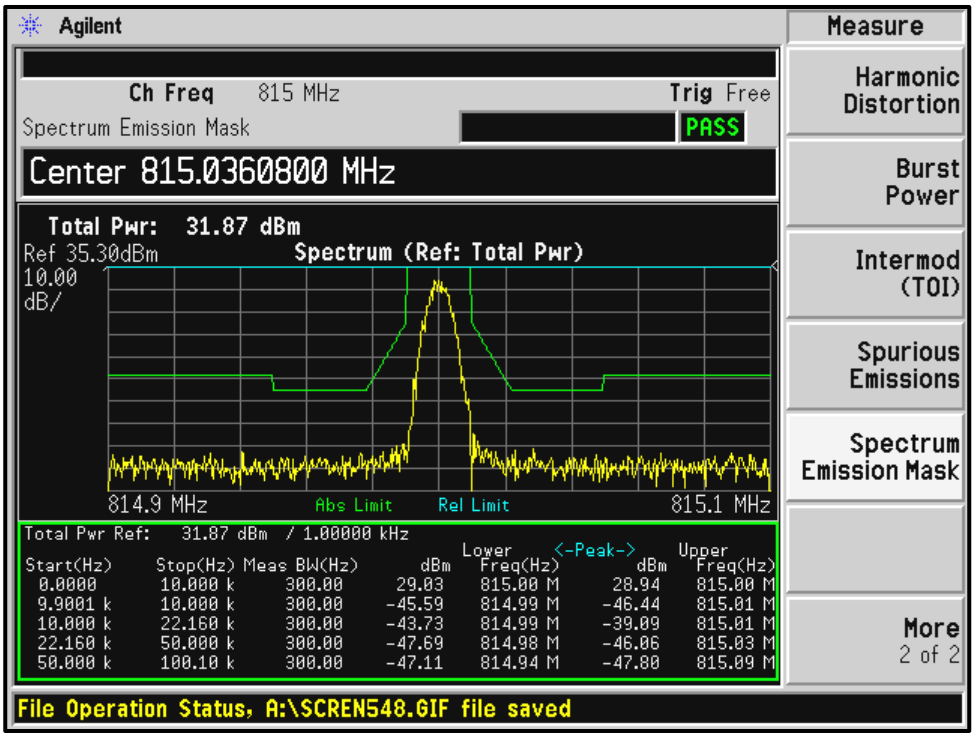
Plot 9-18: Occupied Bandwidth – 868.9875 MHz; P25 RND; Mask D



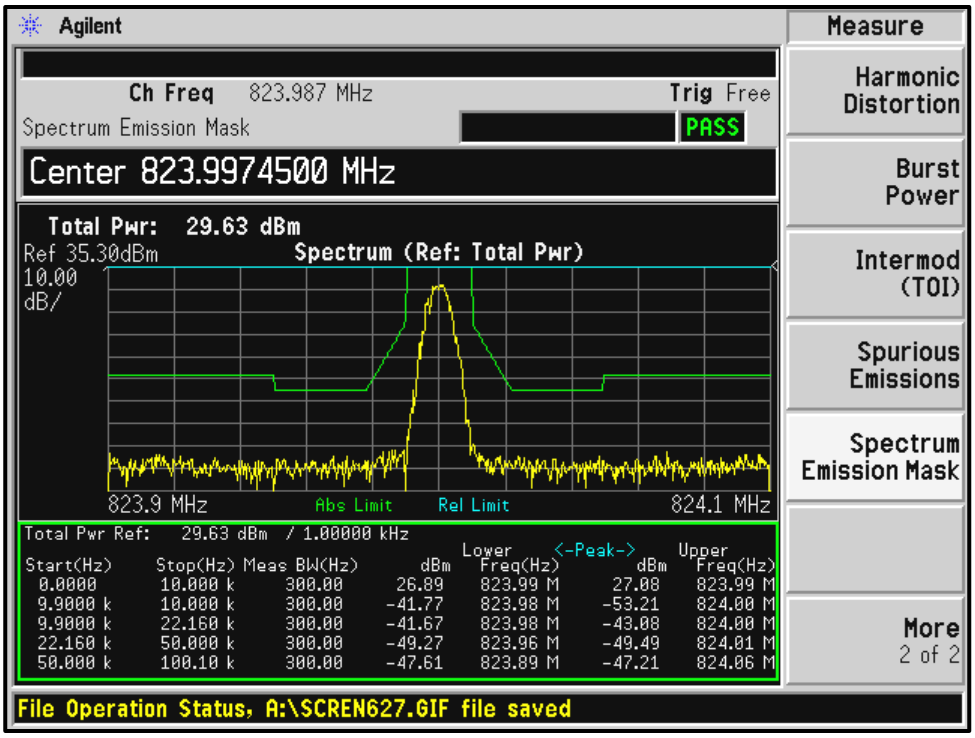
Plot 9-19: Occupied Bandwidth – 806.0125 MHz; P25; Mask H



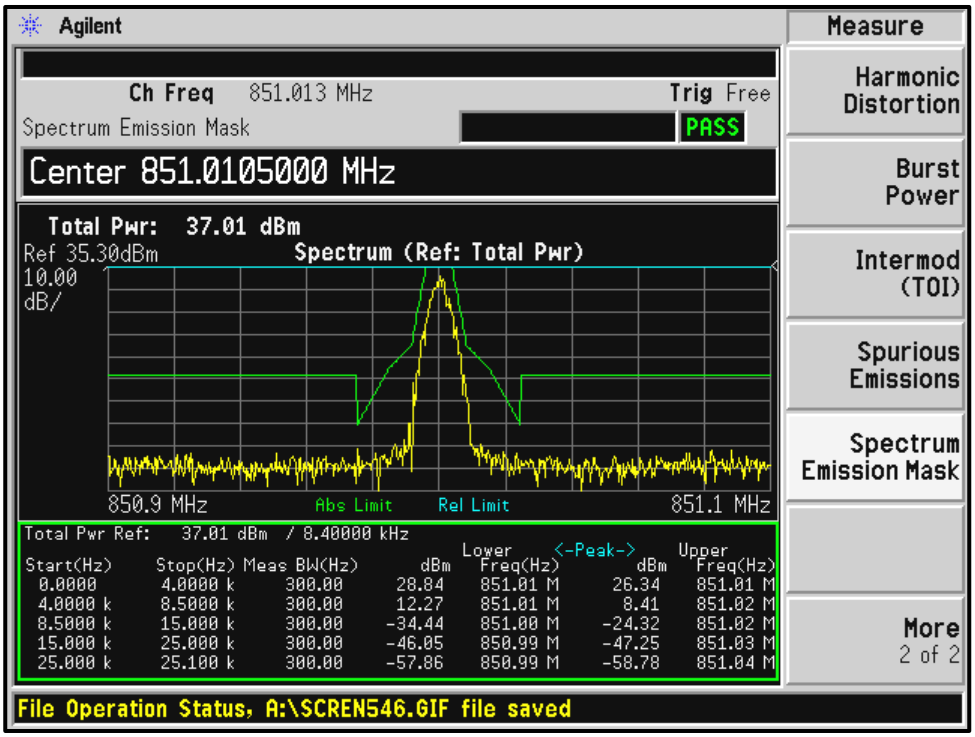
Plot 9-20: Occupied Bandwidth – 815.0000 MHz; P25; Mask G



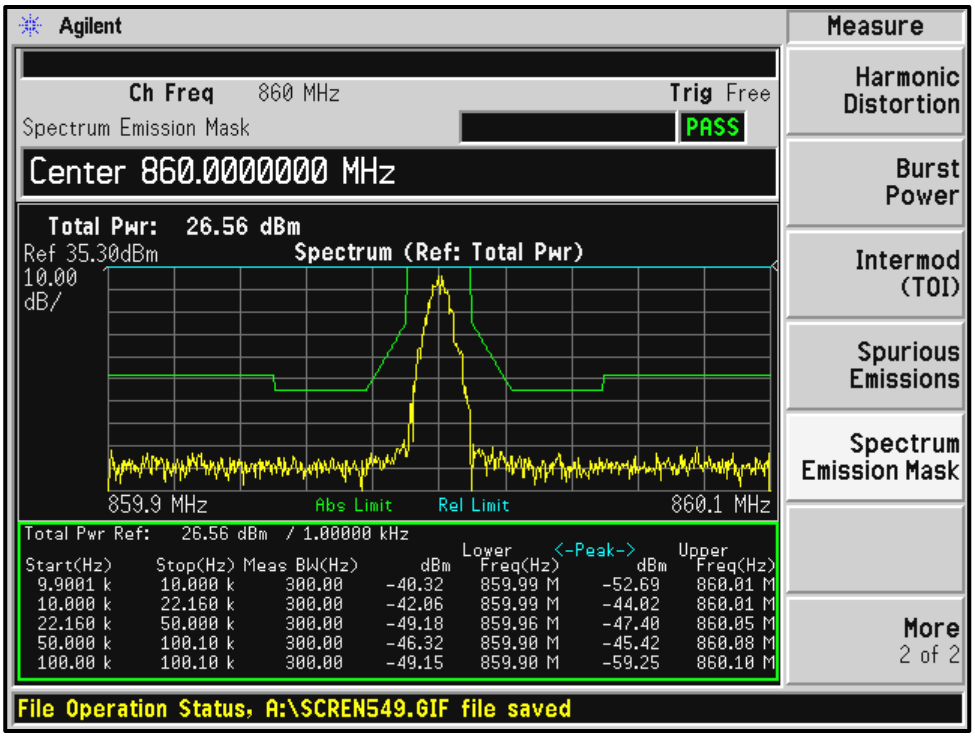
Plot 9-21: Occupied Bandwidth – 823.9875 MHz; P25; Mask G



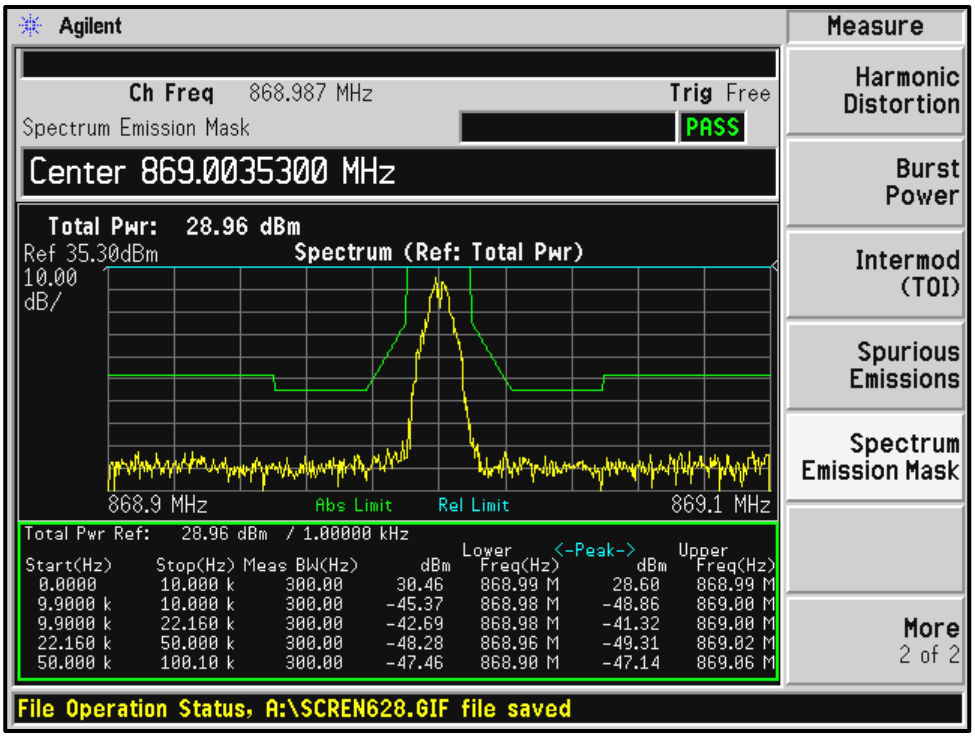
Plot 9-22: Occupied Bandwidth – 851.0125 MHz; P25; Mask H



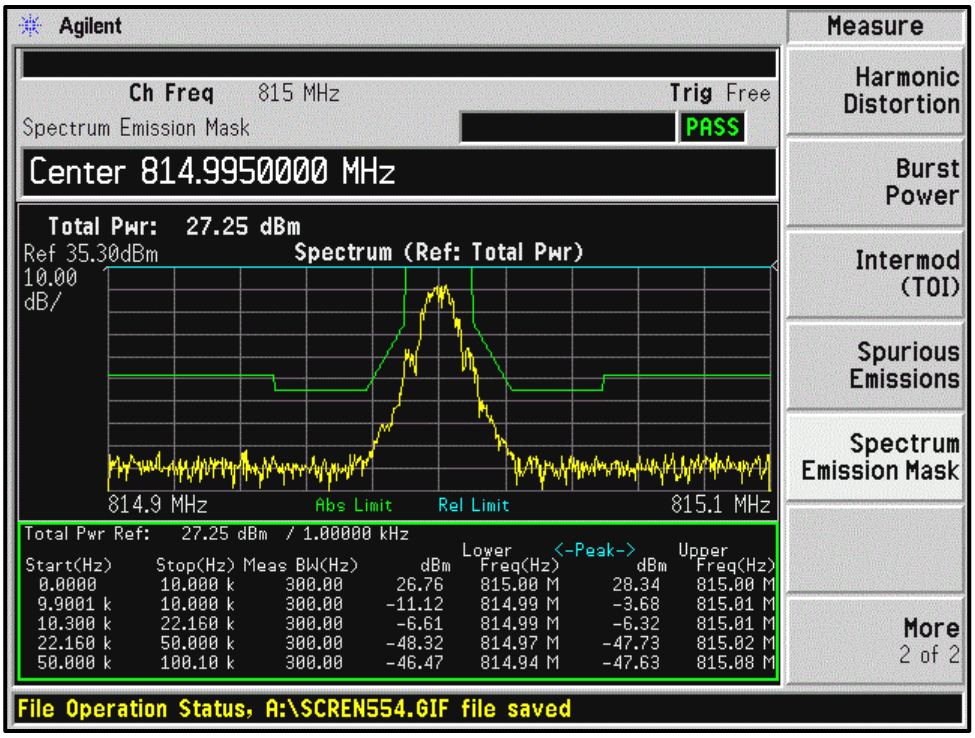
Plot 9-23: Occupied Bandwidth – 860.0000 MHz; P25 RND; Mask G



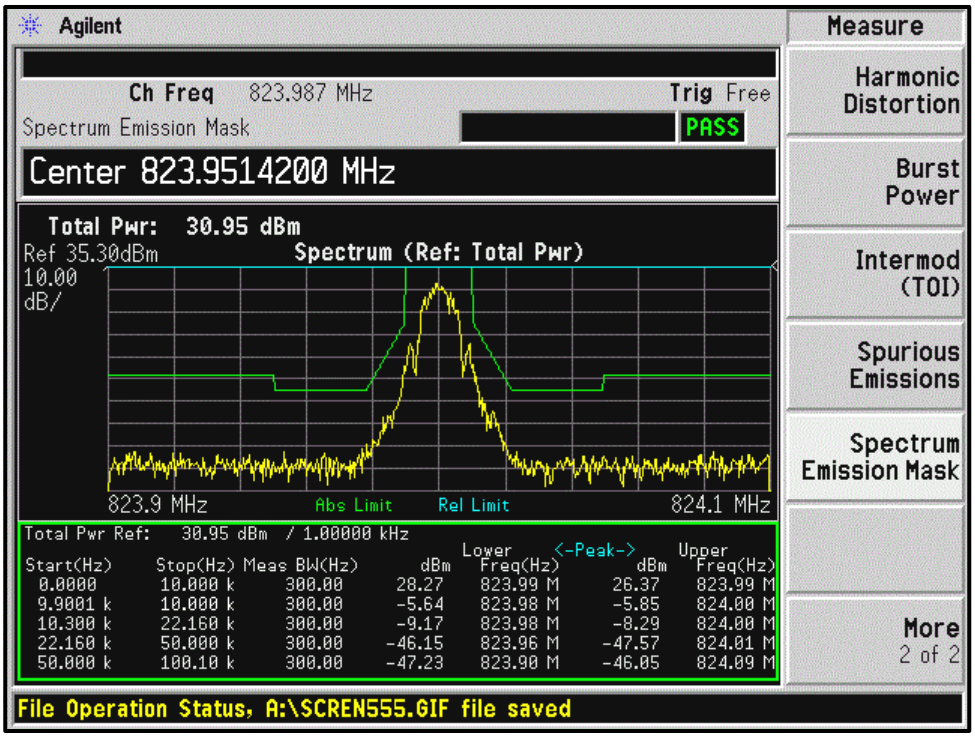
Plot 9-24: Occupied Bandwidth – 868.9875 MHz; P25; Mask G



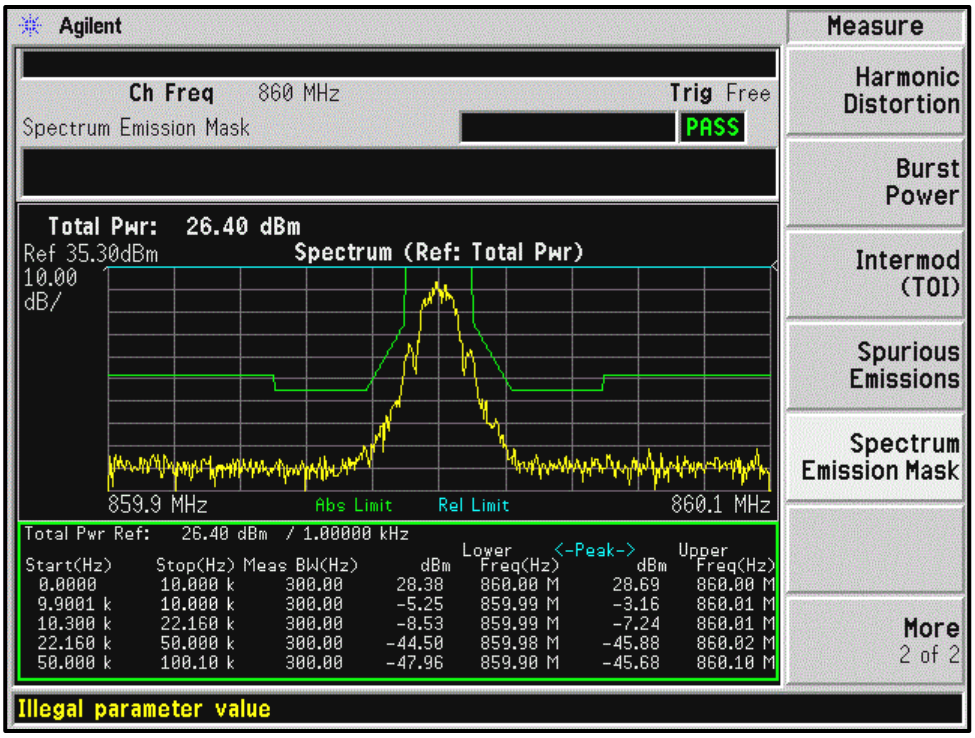
Plot 9-25: Occupied Bandwidth – 815.0000 MHz; 2-Level FSK (9600W); Mask G



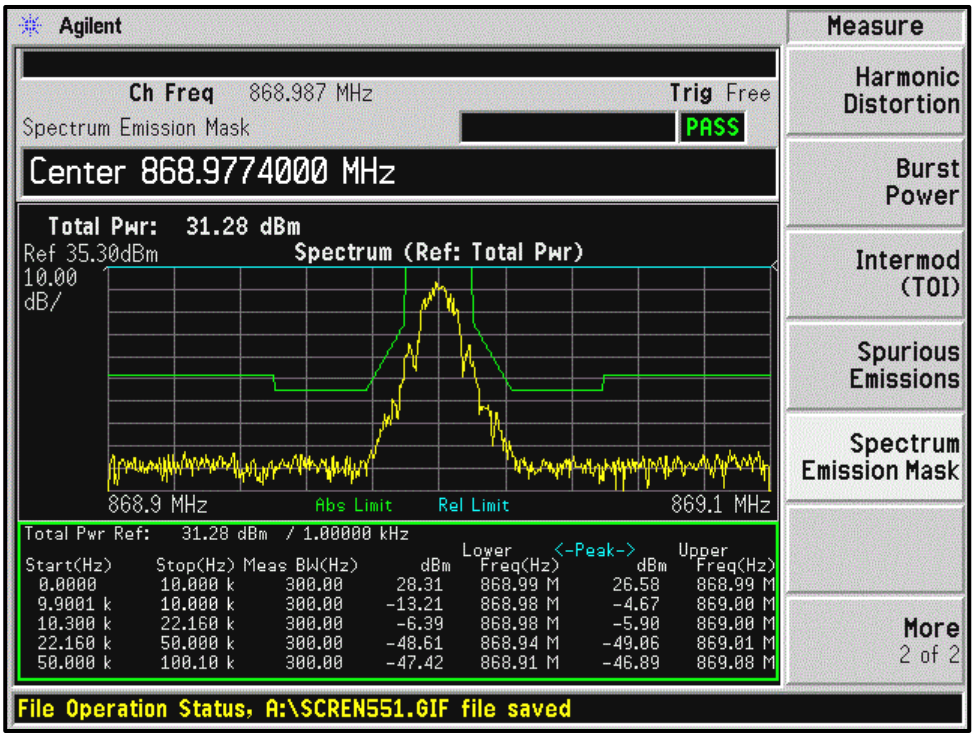
Plot 9-26: Occupied Bandwidth – 823.9875 MHz; 2-Level FSK (9600W); Mask G



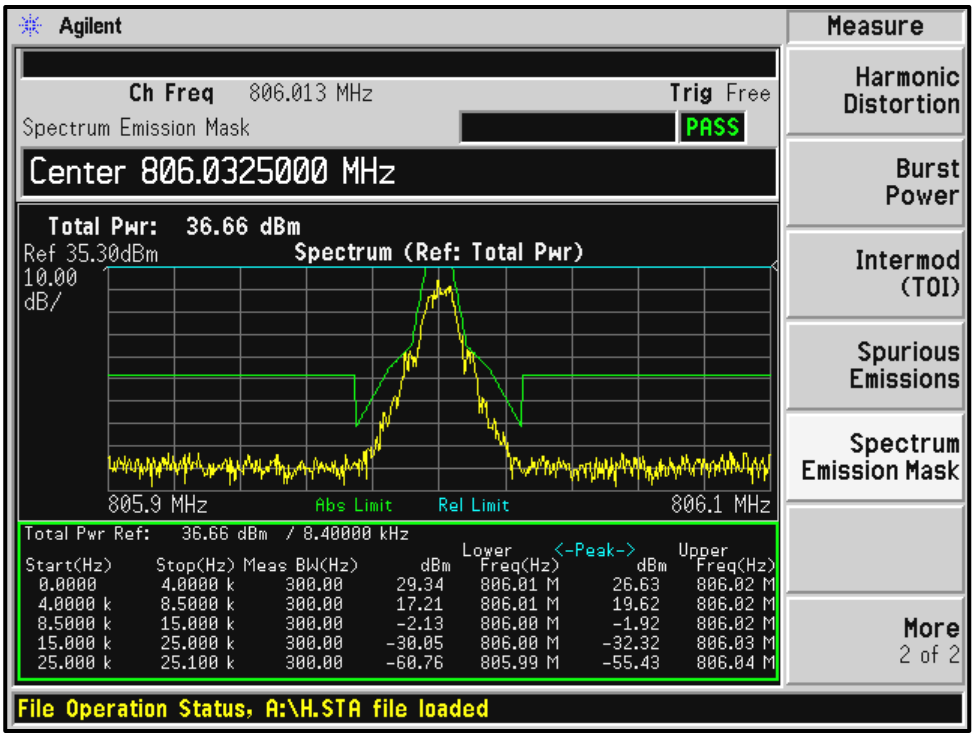
Plot 9-27: Occupied Bandwidth – 860.0000 MHz; 2-Level FSK (9600W); Mask G



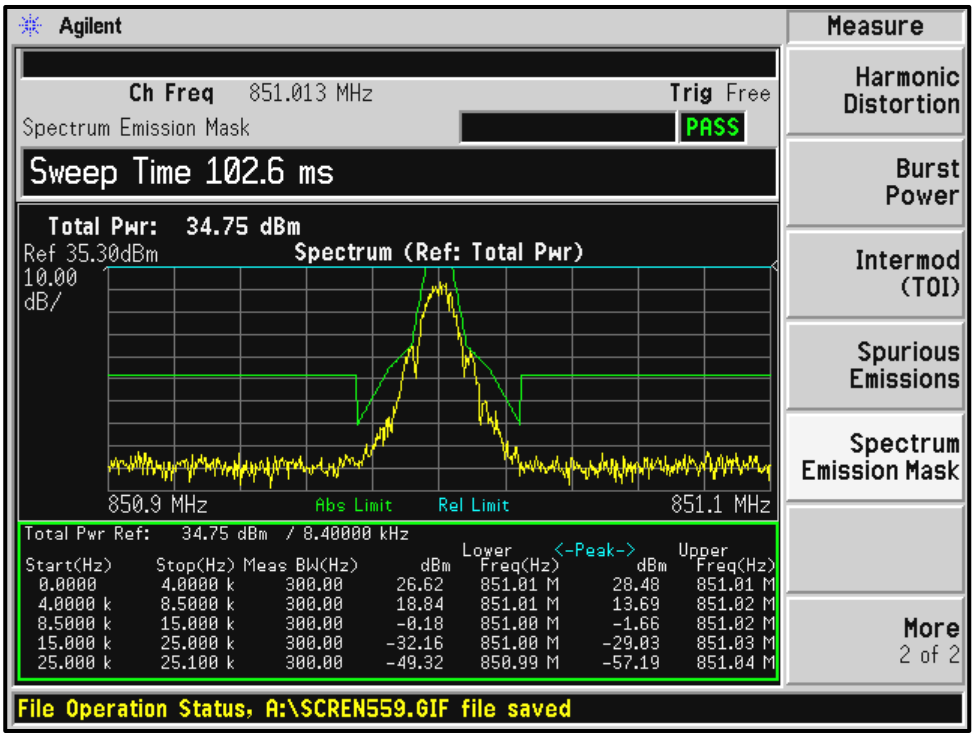
Plot 9-28: Occupied Bandwidth – 868.9875 MHz; 2-Level FSK (9600W); Mask G



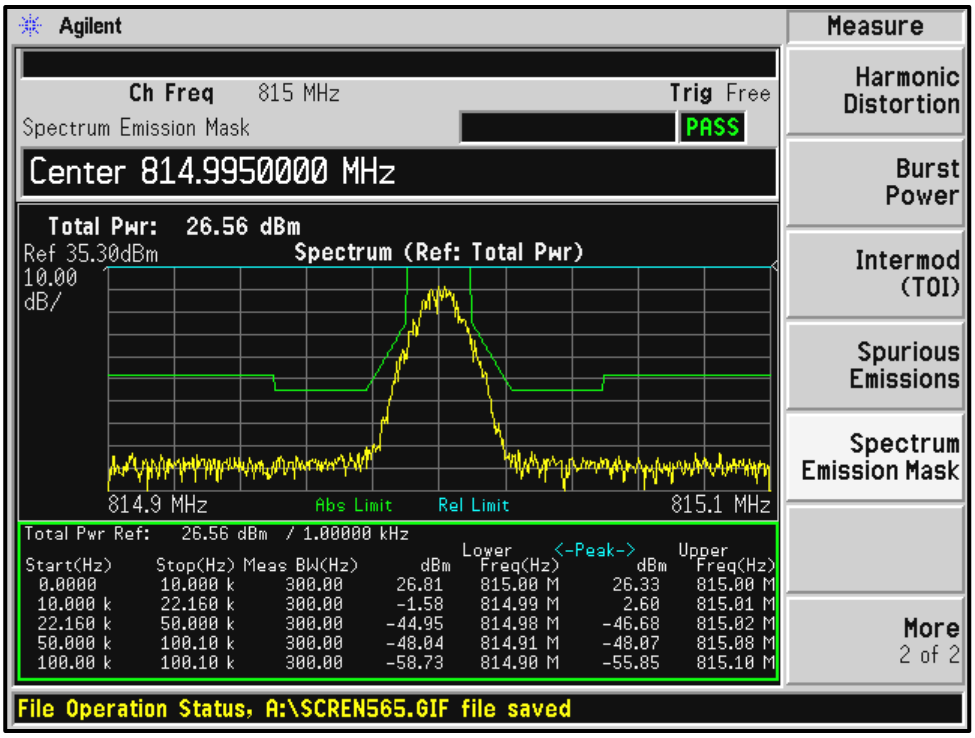
Plot 9-29: Occupied Bandwidth – 806.0125 MHz; 2-Level FSK (9600W); Mask H



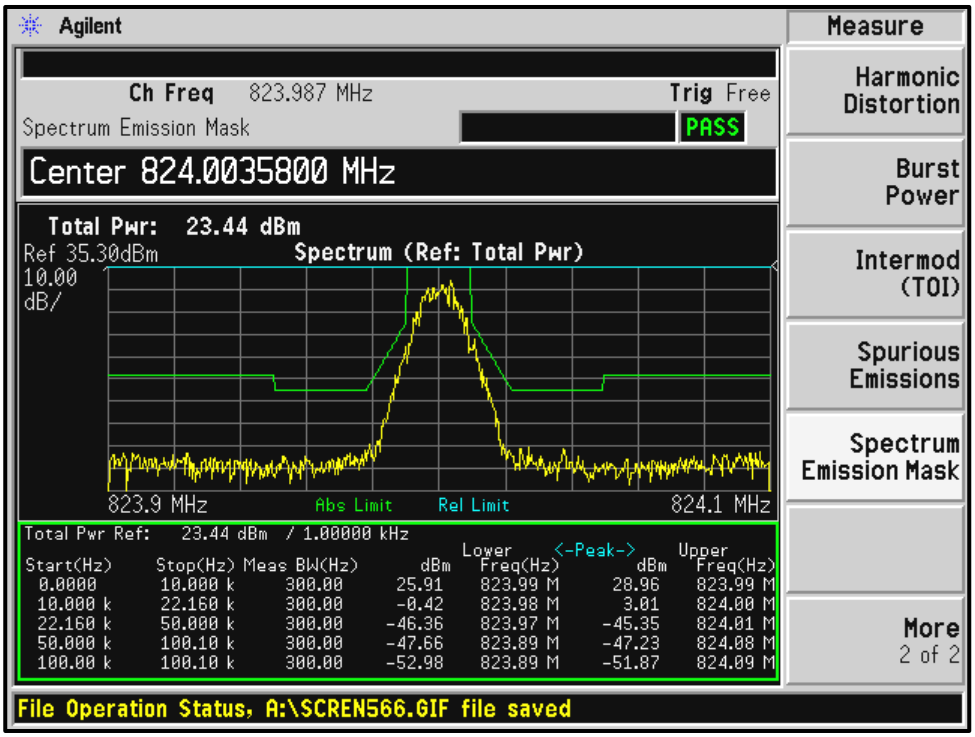
Plot 9-30: Occupied Bandwidth – 851.0125 MHz; 2-Level FSK (9600W); Mask H



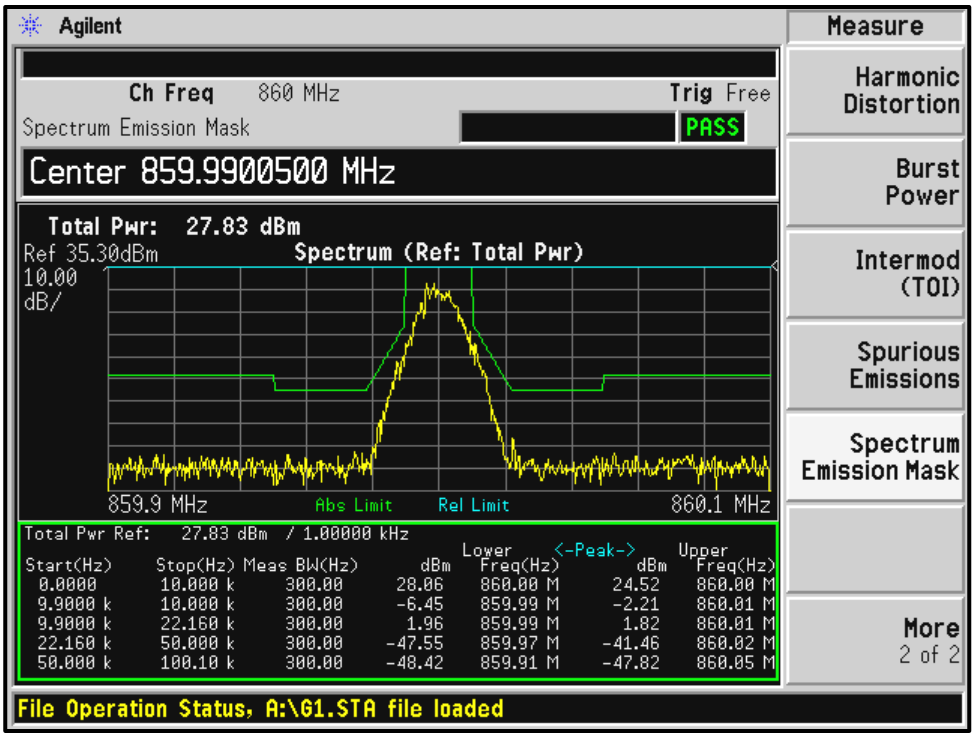
Plot 9-31: Occupied Bandwidth – 815.0000 MHz; 4 Level FSK (OTP SMR); Mask G



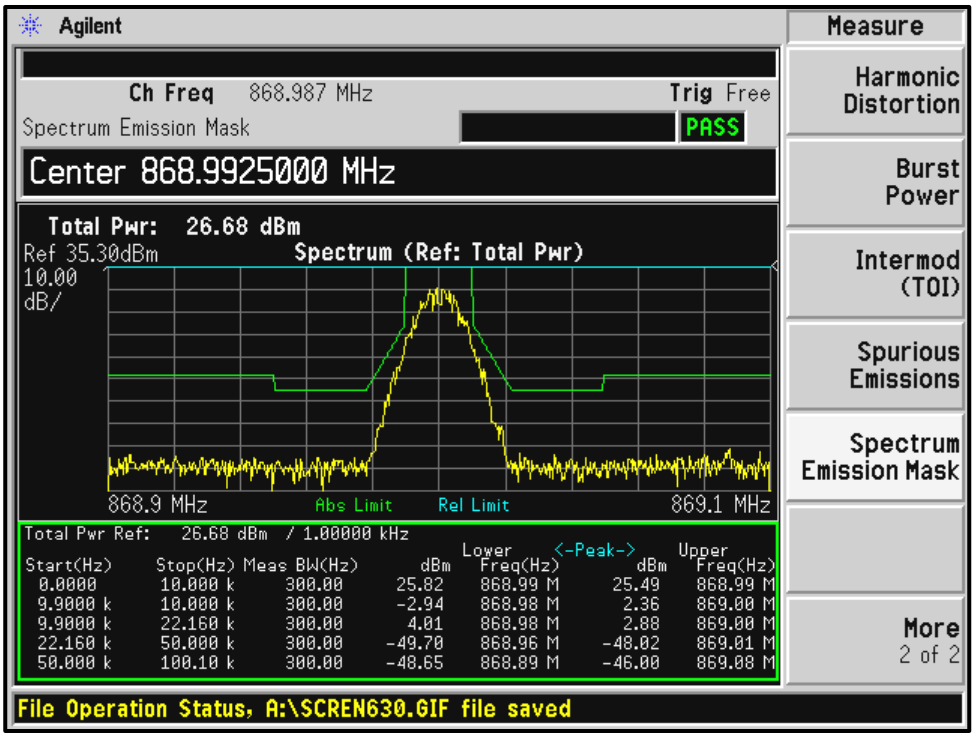
Plot 9-32: Occupied Bandwidth – 823.9875 MHz; 4 Level FSK (OTP SMR); Mask G



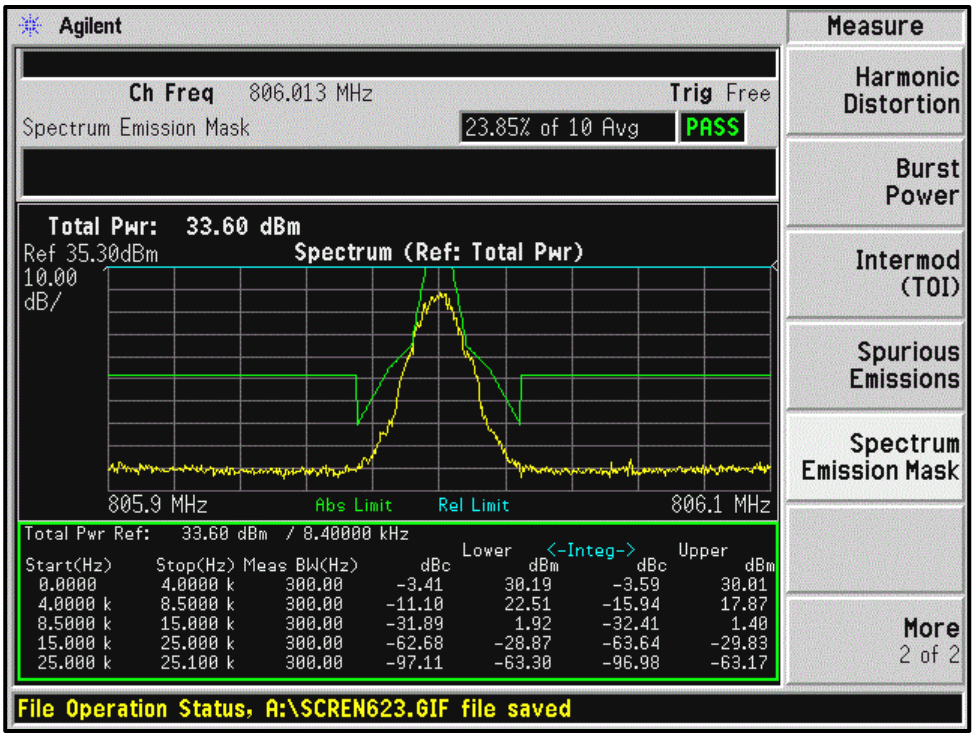
Plot 9-33: Occupied Bandwidth – 860.0000 MHz; 4 Level FSK (OTP SMR); Mask G



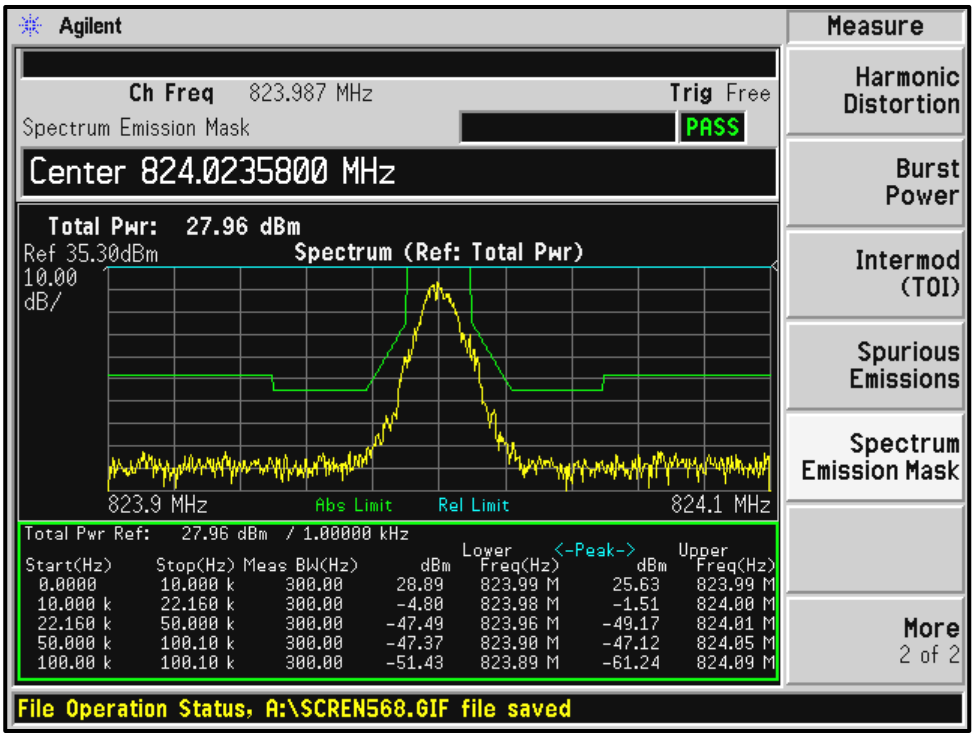
Plot 9-34: Occupied Bandwidth – 868.9875 MHz; 4 Level FSK (OTP SMR); Mask G



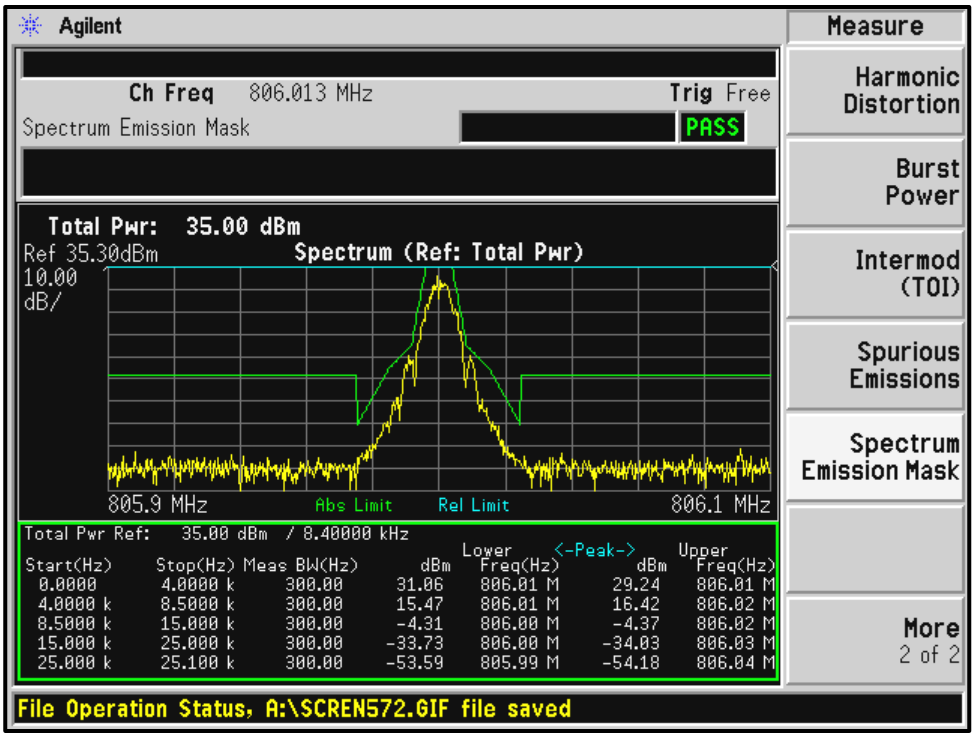
Plot 9-35: Occupied Bandwidth – 806.0125 MHz; 4 Level FSK (OTP NPSPAC); Mask H



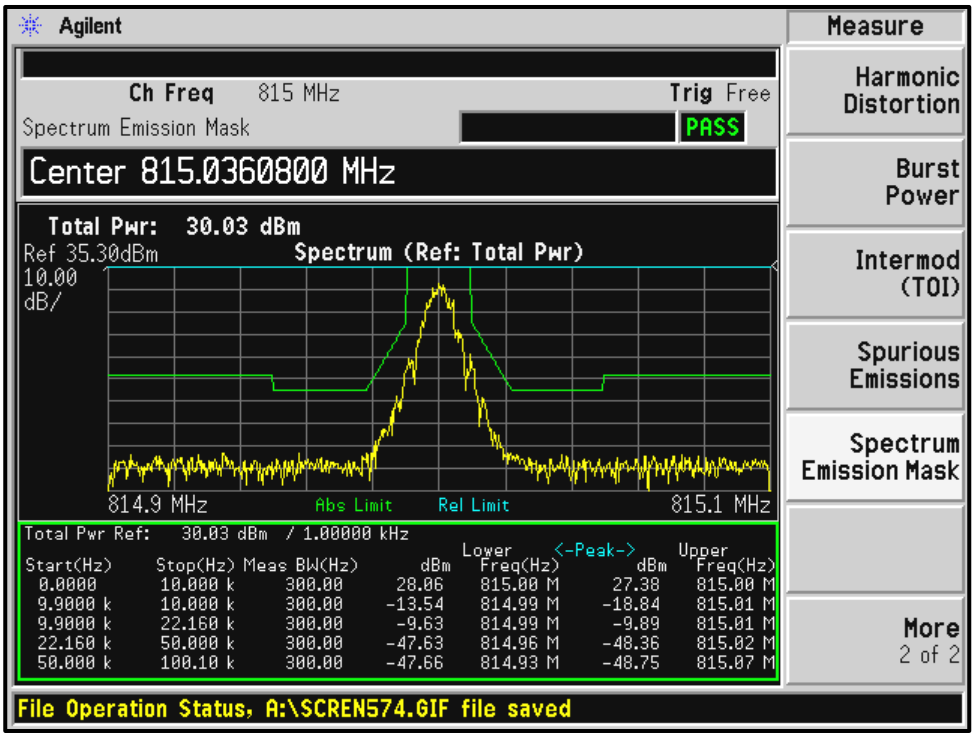
Plot 9-36: Occupied Bandwidth – 823.9875 MHz; 4 Level FSK (OTP NPSPAC); Mask G



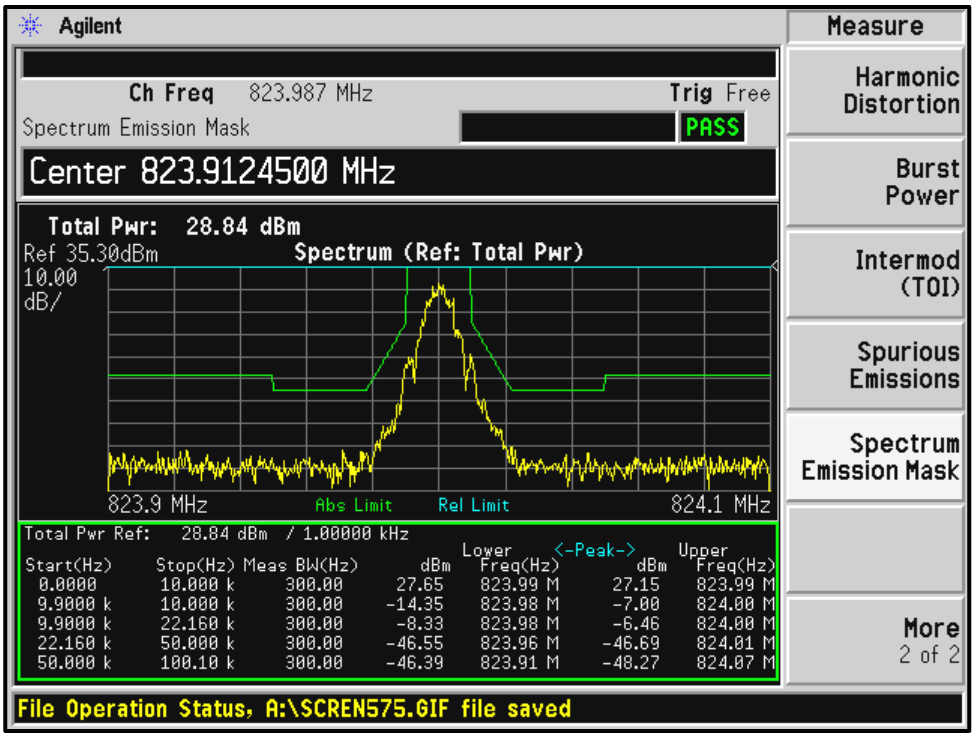
Plot 9-37: Occupied Bandwidth – 806.0125 MHz; 2 Level FSK (NPSPAC); Mask H



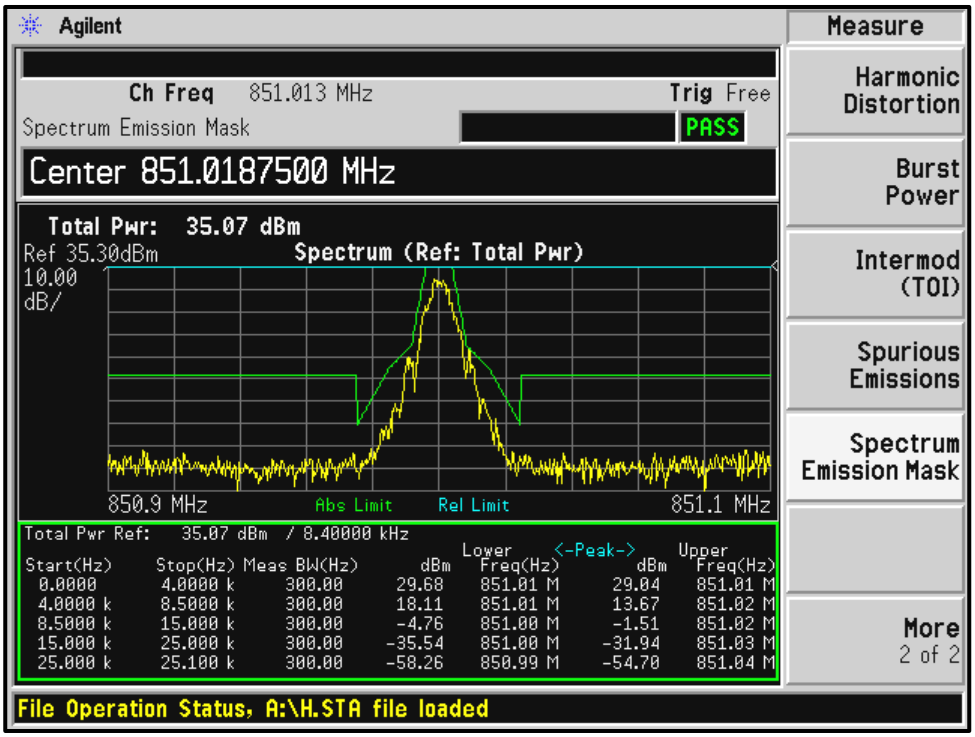
Plot 9-38: Occupied Bandwidth – 815.0000 MHz; 2 Level FSK (NPSPAC); Mask G



Plot 9-39: Occupied Bandwidth – 823.9875 MHz; 2 Level FSK (NPSPAC); Mask G



Plot 9-40: Occupied Bandwidth – 851.0125 MHz; 2 Level FSK (NPSPAC); Mask H



Plot 9-41: Occupied Bandwidth – 868.9875 MHz; 2 Level FSK (NPSPAC); Mask G

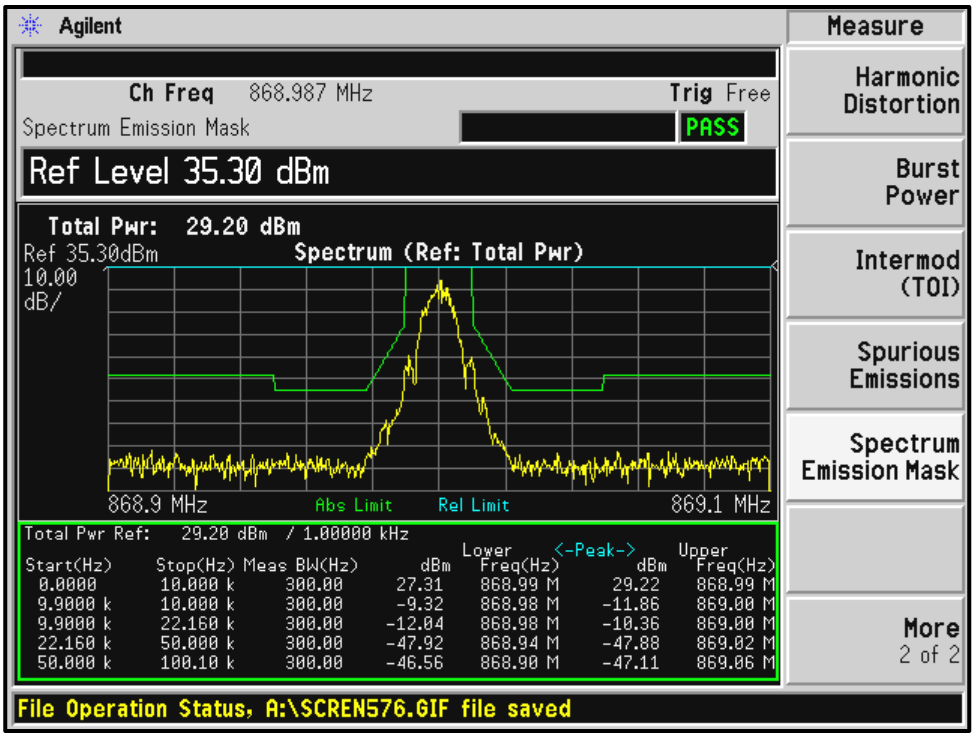


Table 9-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	1/13/12
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	2/14/12
900819	Weinschel Corp	2	10 dB Attenuator; 5 W	BF0830	2/15/12
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/12

Test Personnel:

Daniel Baltzell		August 31-September 2, 2011
Test Engineer	Signature	Dates of Tests

10 FCC Rules and Regulation Part 2.1055: Frequency Stability; Part 90.213, 90.539: Frequency Stability; RSS-119 5.3 Transmitter Frequency Stability

10.1 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 AFC was not locked to the base station.

The temperature was initially set to -30°C and a 1-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.

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

Part 90.213 Frequency Stability

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

MINIMUM FREQUENCY STABILITY
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
Below 25	[1,2,3] 100	100	200
25–50	20	20	50
72–76	5	.....	50
150–174	[5,11] 5	[6] 5	[4,6] 50
216–220	1.0	.....	1.0
220–222 [12]	0.1	1.5	1.5
421–512	[7,11,14] 2.5	[8] 5	[8] 5
806–809	[14] 1.0	1.5	1.5
809–824	[14] 1.5	2.5	2.5
851–854	1.0	1.5	1.5
854–869	1.5	2.5	2.5
896–901	[14] 0.1	1.5	1.5
902–928	2.5	2.5	2.5
902–928 [13]	2.5	2.5	2.5
929–930	1.5	.....	.....
935–940	0.1	1.5	1.5
1427–1435	[9] 300	300	300
Above 2450 [10]	.....	.....	.....

Part 90.539 Frequency Stability

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. 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).
(d) The frequency stability of base transmitters operating in the wideband segment must be 1 part per million or better.
(e) The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked.

The EUT was tested while the AFC was not locked, therefore, the limit is 1.5 ppm. The worst-case deviation was found to be 0.5 ppm.

10.2 Test Data

Table 10-1: Temperature Frequency Stability – 769.00625 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	769.006492	0.31
-20	769.006571	0.42
-10	769.006577	0.43
0	769.006486	0.31
10	769.006395	0.19
20 (reference)	769.006250	0.00
30	769.006172	-0.10
40	769.006035	-0.28
50	769.005998	-0.33
60	769.006029	-0.29

Table 10-2: Temperature Frequency Stability – 860.0000 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	859.999944	-0.07
-20	859.999930	-0.08
-10	859.999889	-0.13
0	859.999855	-0.17
10	859.999936	-0.07
20 (reference)	860.000000	0.00
30	860.000067	0.08
40	860.000082	0.10
50	860.000112	0.13
60	860.000149	0.17

Results: The EUT is compliant.

Table 10-3: 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	1/13/12
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	7/18/12
900957	Weinschel Corp	68-20-43	100W Attenuator 20 dB	LT394	2/14/12

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	August 24, 2011
Test Engineer	Signature	Date of Test

10.2.1 Frequency Stability/Voltage Variation

Table 10-4: Frequency Stability/Voltage Variation – 769.00625 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
5.545 (end of battery)	769.006245	-0.01
6.375	769.006252	0.00
7.5	769.006250	0.00
8.625	769.006249	0.00

Table 10-5: Frequency Stability/Voltage Variation – 860.0000 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
5.31 (end of battery)	860.000002	0.00
6.375	860.000008	0.01
7.5	860.000000	0.00
8.625	860.000003	0.00

Table 10-6: Test Equipment Used For Testing Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901350	Meterman	33XR	Multimeter	040402802	12/28/11
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	7/18/12
900957	Weinschel Corp	68-20-43	100W Attenuator 20 dB	LT394	2/14/12

Test Personnel:

Daniel Baltzell		August 27, 2011
EMC Test Engineer	Signature	Date of Test

11 FCC Part 2.1047: Modulation Characteristics; RSS-119 5.8 Types of Modulation

11.1 Test Procedures

11.1.1 Audio Frequency Response

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)

11.1.2 Audio Low Pass Filter Response

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.

11.1.3 Modulation Limiting

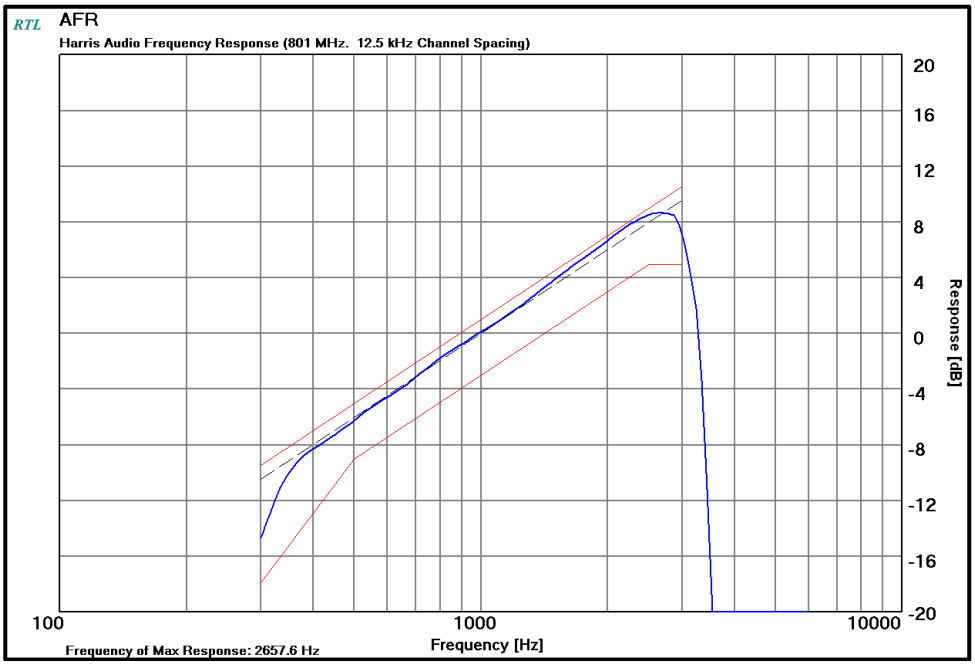
ANSI/TIA/EIA-603-2004, section 2.2.3

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.

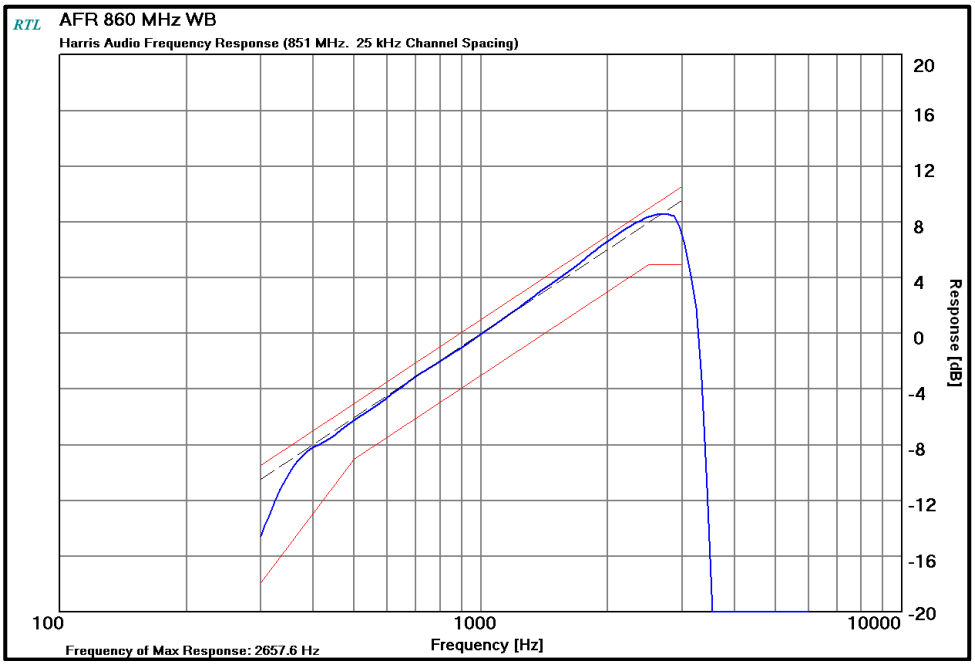
11.2 Test Data

11.2.1 Audio Frequency Response

Plot 11-1: Modulation Characteristics - Audio Frequency Response – 801.0000 MHz (NB)

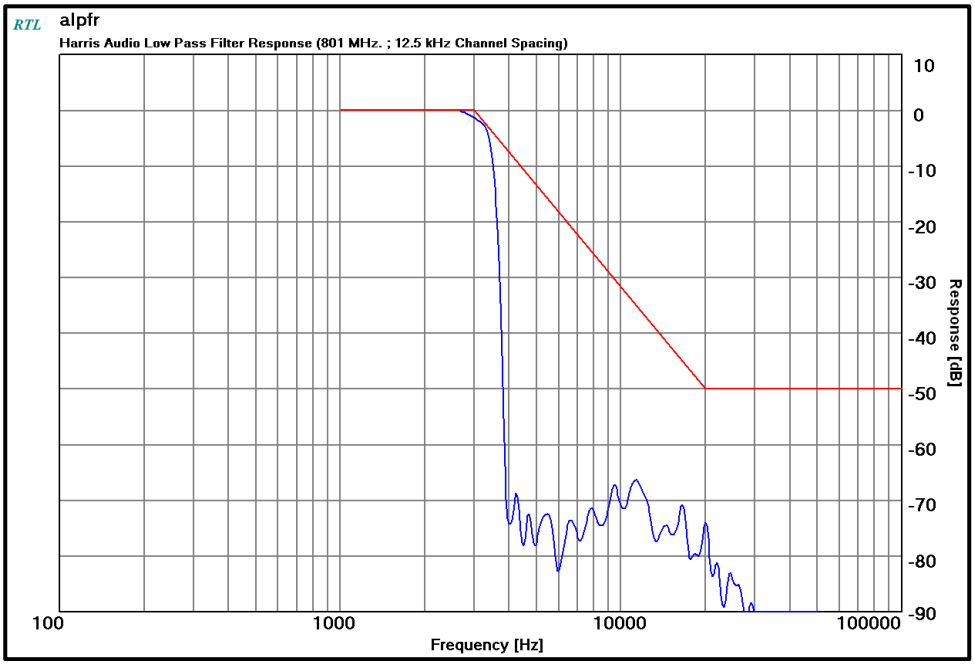


Plot 11-2: Modulation Characteristics - Audio Frequency Response – 860.0000 MHz (WB)

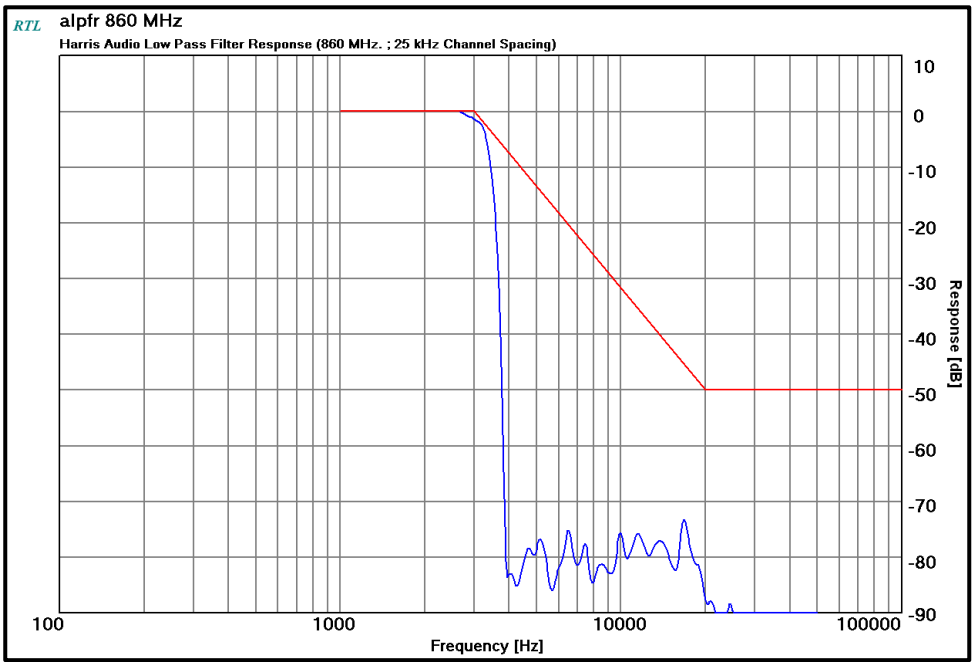


11.2.2 Audio Low Pass Filter Response

Plot 11-3: Modulation Characteristics – Audio Low Pass Filter – 801.0000 MHz (NB)

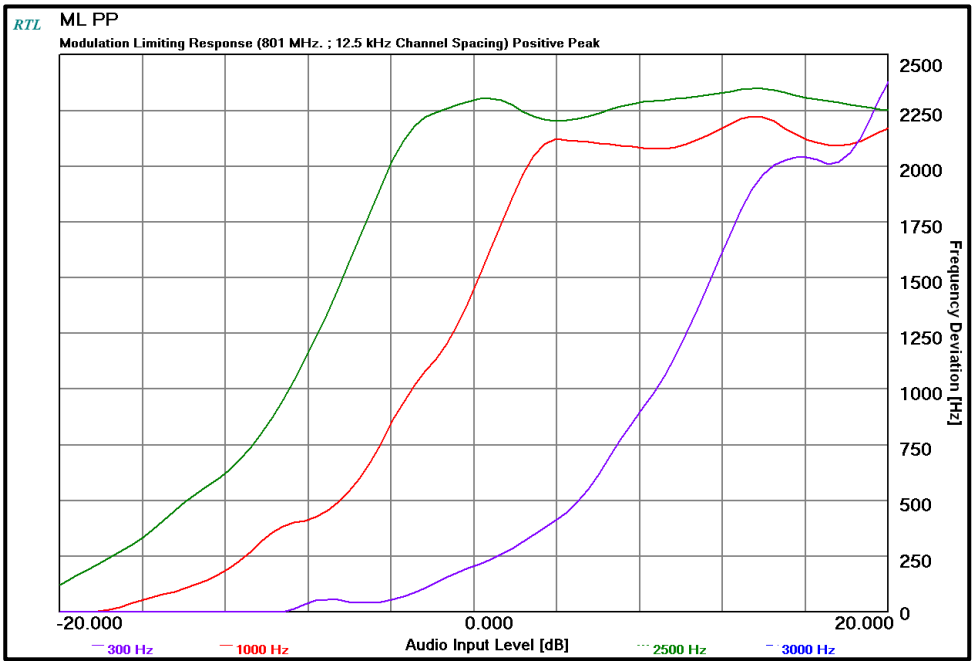


Plot 11-4: Modulation Characteristics – Audio Low Pass Filter – 860.0000 MHz (WB)

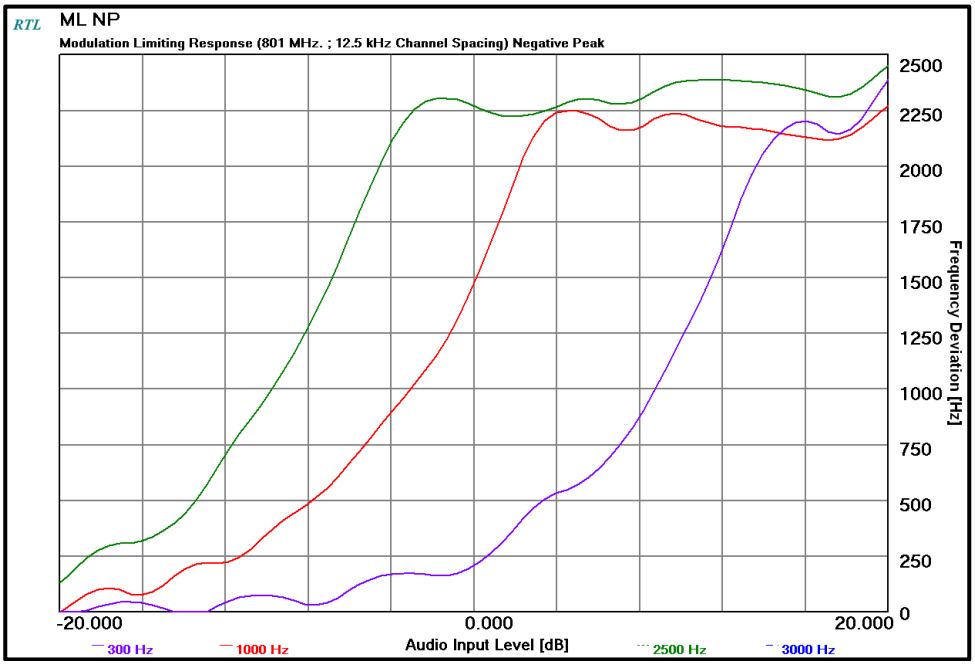


11.2.3 Modulation Limiting

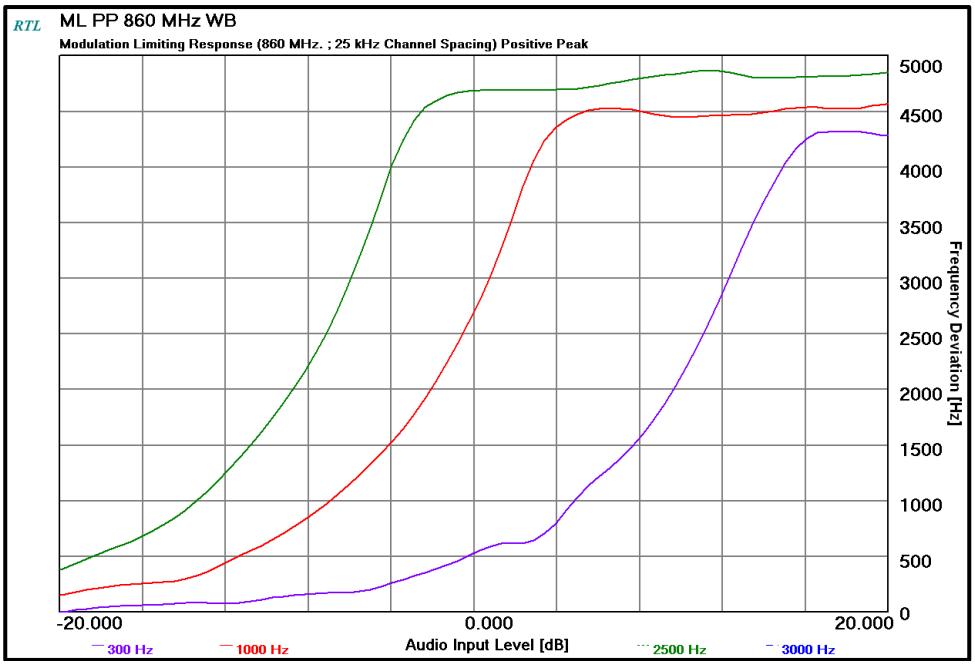
Plot 11-5: Modulation Characteristics – Modulation Limiting – 801.0000 MHz; NB; Positive Peak



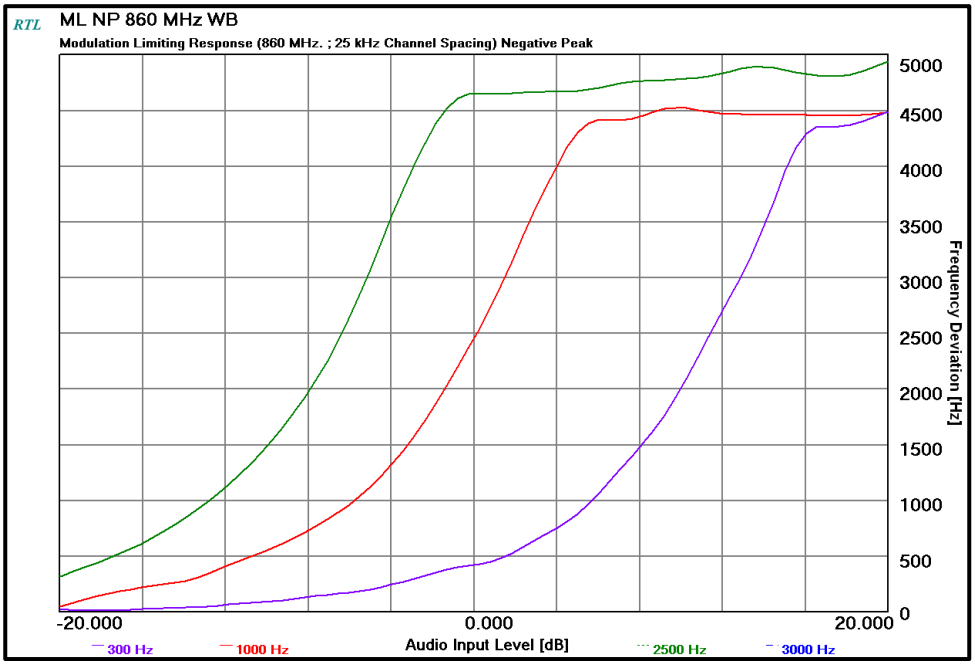
Plot 11-6: Modulation Characteristics – Modulation Limiting - 801.0000 MHz; (NB) Negative Peak



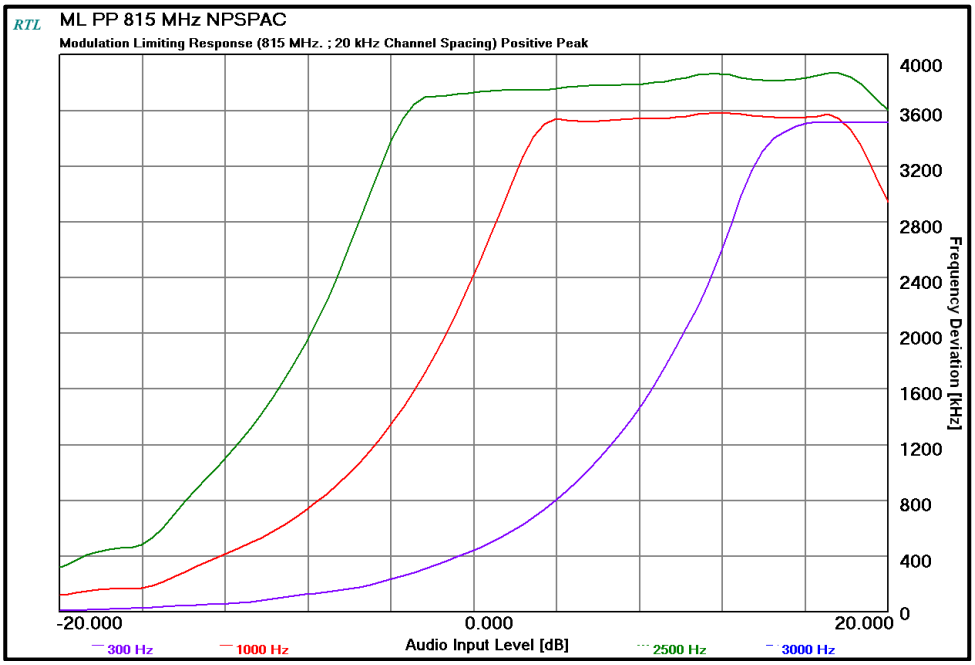
Plot 11-7: Modulation Characteristics – Modulation Limiting – 860.0000 MHz, WB, Positive Peak



Plot 11-8: Modulation Characteristics – Modulation Limiting – 860.0000 MHz, WB, Negative Peak



Plot 11-9: Modulation Characteristics – Modulation Limiting – 815.0000 MHz, WB (NPSPAC), Positive Peak



Plot 11-10: Modulation Characteristics – Modulation Limiting – 815.0000 MHz, WB (NPSPAC), Negative Peak

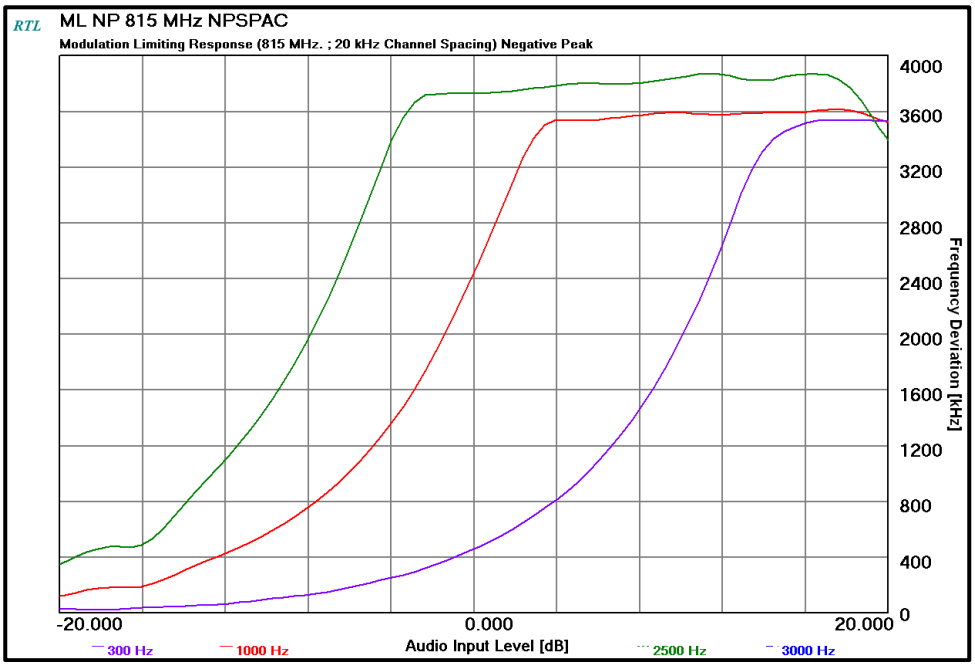


Table 11-1: Test Equipment Used For Testing Modulation Requirements

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/7/11
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	2/14/12

Test Personnel:

Daniel Baltzell		August 31, 2011
Test Engineer	Signature	Date of Tests

12 FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth

Type of Emissions: F3E, F1D, F1E, F9W

Voice – 12.5 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 11.0 kHz
Emission designator: 11K0F3E

Voice – 25 kHz channel separation (NPSPAC)
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 14K0F3E

Voice – 25 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5
Constant factor (K): 1 (assumed)
Bn = 2M+2DK = 16.0 kHz
Emission designator: 16K0F3E

P25 – 9600 bps
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1800
Bn = $[9600/\log_2(4) + 2\ (1800)\ (1) = 8.400$ kHz
Emission designator: 8K40F1D, 8K40F1E

NPSPAC, SMR OTP
Calculation:
Data rate in bps (R) =19200
Deviation Peak deviation of carrier (D) = 3750
Number of states in each symbol (S) = 4
K=0.335
Bn = $R/\log_2 S + 2DK = 19200/\log_2(4)+2(3750)(0.335) = 12.1$ kHz
Emission designator: 12K1F9W

2-level FSK (SMR)
Calculation:
Data rate in bps (R) =9600
Deviation Peak deviation of carrier (D) = 3000
Constant factor (K): 1 (default)
Bn = 3.86D+0.27RK = 3.86(3000) + 0.27(9600)(1) =14.2 kHz
Emission designator: 14K2F1D/E

2-level FSK (NPSPAC)
Calculation:
Data rate in bps (R) =9600
Deviation Peak deviation of carrier (D) = 2400
Constant factor (K): 1 (default)
Bn = 3.86D+0.27RK = 3.86(2400) + 0.27(9600)(1) =11.9 kHz
Emission designator: 11K9F1D/E

13 Conclusion

The data in this measurement report shows that the Harris Corporation Model XG-75 7/800 MHz Portable Radio family, System Models EVXG-PF78B and EVXG-PF78Y, FCC ID: OWDTR-0074-E, IC: 3636B-0074, comply with all the applicable requirements of Parts 90 and 2 of the FCC Rules and Industry Canada RSS-119.