Engineering and Testing for EMC and Safety Compliance

FCC Certification Report

Harris Corporation
221 Jefferson Ridge Parkway
Lynchburg, VA 24501
Daryl Popowitch
Phone: (434) 455-9527

MODEL: M7300/M5300 Mobile Radio 700/800 MHz

FCC ID: OWDTR-0060-E

June 28, 2010

Standards Referenced for this Report	
Part 2: 2009	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2009	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

Report Prepared By: Dan Baltzell

Document Number: 2010092

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)	Modulation	Mode	Emission Designator
763-775, 793-805	30	0.4	P25 (digitized data)	T/A, Trunked/Conventional	8K4F1D
763-775, 793-805	30	0.4	P25 (digitized voice)	T/A, Trunked/Conventional	8K4F1E
763-775, 793-805	30	0.4	OTP	Trunked	12K1F9W
763-775, 793-805	30	0.4	Analog FM (12.5 kHz spaced)	T/A, Trunked/Conventional	11K0F3E
806-824	35	1.5	P25 (digitized data)	Trunked/Conventional	8K4F1D
806-824	35	1.5	P25 (digitized voice)	Trunked/Conventional	8K4F1E
851-869	35	1.5	P25 (digitized data)	T/A	8K4F1D
851-869	35	1.5	P25 (digitized voice)	T/A	8K4F1E
806-824	35	1.5	OTP	SMR/NPSPAC Trunked	12K1F9W
806-809	35	1.5	Analog FM (NPSPAC)	Trunked/Conventional	14K0F3E
806-821	35	1.5	Analog FM (SMR)	Trunked/Conventional	16K0F3E
821-824	35	1.5	Analog FM (SMR)	Trunked/Conventional	16K0F3E
821-824	35	1.5	Analog FM (NPSPAC)	Trunked/Conventional	14K0F3E
851-854	35	1.5	Analog FM (NPSPAC)	T/A	14K0F3E
851-869	35	1.5	Analog FM (SMR)	T/A	16K0F3E
866-869	35	1.5	Analog FM (NPSPAC)	T/A	14K0F3E
806-809	35	1.5	2-level (digitized data)	NPSPAC Trunked/Conventional	11K9F1D
806-809	35	1.5	2-level (digitized voice)	NPSPAC Trunked/Conventional	11K9F1E
806-809	35	1.5	2-level (digitized data)	SMR Trunked/Conventional	14K2F1D
806-809	35	1.5	2-level (digitized voice)	SMR Trunked/Conventional	14K2F1E
809-824	35	1.5	2-level (digitized data)	SMR Trunked/Conventional	14K2F1D
809-824	35	1.5	2-level (digitized voice)	SMR Trunked/Conventional	14K2F1E
821-824	35	1.5	2-level (digitized data)	NPSPAC Trunked/Conventional	11K9F1D
821-824	35	1.5	2-level (digitized voice)	NPSPAC Trunked/Conventional	11K9F1E
851-854	35	1.5	2-level (digitized data)	NPSPAC T/A	11K9F1D
851-854	35	1.5	2-level (digitized voice)	NPSPAC T/A	11K9F1E
851-854	35	1.5	2-level (digitized data)	SMR T/A	14K2F1D
851-854	35	1.5	2-level (digitized voice)	SMR T/A	14K2F1E
854-866	35	1.5	2-level (digitized data)	SMR T/A	14K2F1D
854-866	35	1.5	2-level (digitized voice)	SMR T/A	14K2F1E
866-869	35	1.5	2-level (digitized data)	SMR T/A	14K2F1D
866-869	35	1.5	2-level (digitized voice)	SMR T/A	14K2F1E
866-869	35	1.5	2-level (digitized data)	NPSPAC T/A	11K9F1D
866-869	35	1.5	2-level (digitized voice)	NPSPAC T/A	11K9F1E

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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	2.1046(a), 90.541(b), 90.542(a)(6)	Complies
Field strength of spurious radiation	2.1053(a), 90.543(f)	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, 90.539	Complies
Modulation Characteristics	2.1047(a)(b)	Complies

2 General Information

The following Type Certification Report is prepared on behalf of **Harris Corporation** in accordance with the Federal Communications Commission Rules and Regulations. The Equipment Under Test (EUT) was the **M7300/M5300 Mobile Radio; FCC ID: OWDTR-0060-E.**

The radio has two models:

Two products are formed from the 700/800 MHz radio hardware platform. All use the same FCC ID.

700 / 800 MHz mobile radio – M7300
800 MHz mobile radio – M5300

The M5300 is a variant of the M7300, with 800 MHz operation only configured for customer use. The hardware is exactly the same as the M7300; the 700 MHz operation is disabled via firmware.

There is also a DeskTop station version of the product, the CS7000. The DeskTop station is a mobile radio mounted inside of an enclosure suitable for a desktop office environment.

The radio can be used with a GPS, remote and front mount control heads, and is subject to FCC DoC. The control heads come in two versions: a scan and system version. The system version provides more functionality than the scan version through additional buttons. Other than the buttons, both control heads are electrically identical. The system control head was used for testing. DoC testing was performed for the aforementioned accessories and the data is contained in a separate DoC report.

The M7300 version of the product was tested.

All measurements contained in this application were conducted in accordance with 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)

N/A

2.3 Grant Notes

Power is continuously variable from:
700 MHz band: 2 - 30 W
800 MHz band: 5 – 35 W

The grant listed power is rated power and the actual measured power is shown in the test report.

The DeskTop station version of the product, the CS7000, considers antenna selection and co-location at the time of site licensing.

3 Tested System Details

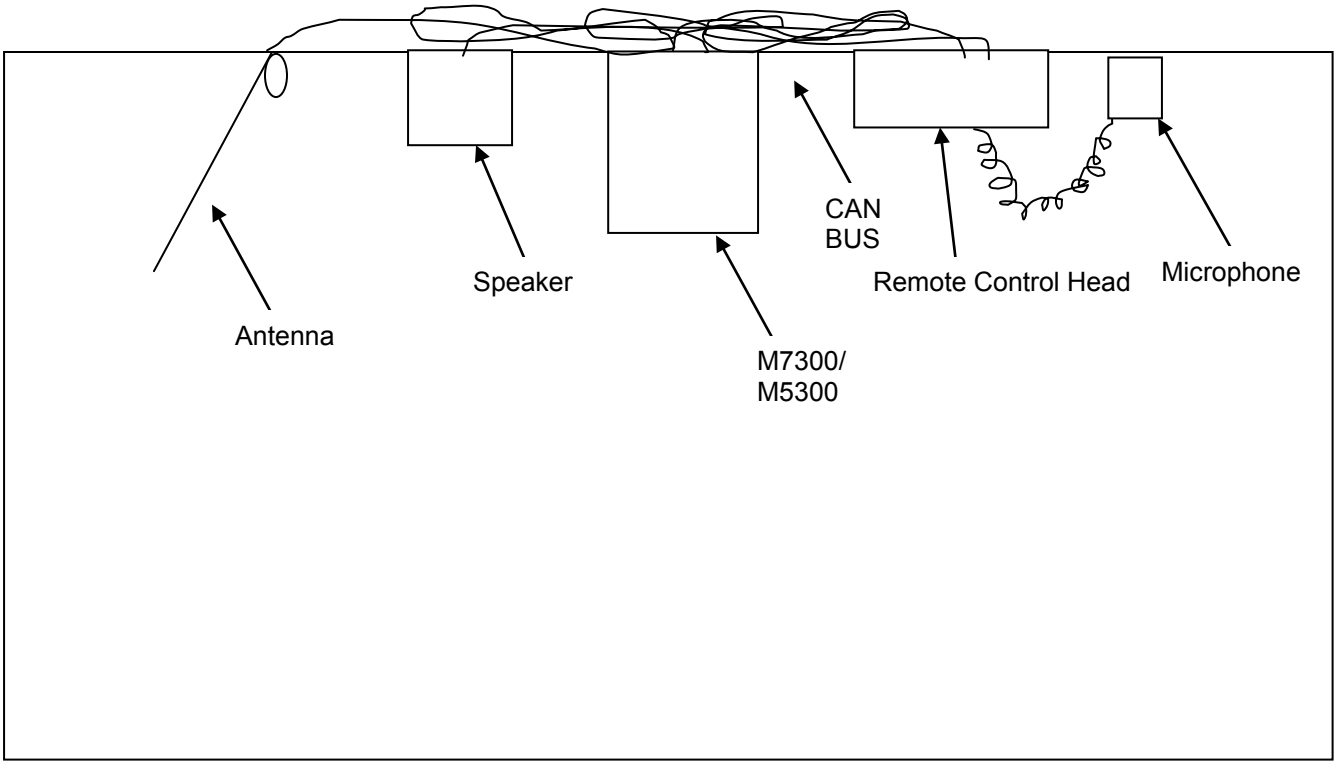
The test sample was received on June 15, 2010. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. The device was programmed for multiple modes of operation and modulation types.

Table 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN	FCC ID	RTL Bar Code
700 / 800 MHz Mobile Radio (remote mount)	Harris Corporation	M7300/M5300	RU144750-061	OWDTR-0060-E	19573
Remote Mount Control Head	Harris Corporation	CH721	CU23218-0004	N/A	19545
700 / 800 MHz Mobile Radio	Harris Corporation	M7300	RU144750-061	OWDTR-0060-E	19546
700 / 800 MHz Mobile Radio	Harris Corporation	M7300	RU144750-061	OWDTR-0060-E	19547
Dual Band 764-870 MHz, 3 dB Gain Element	Harris Corporation	AN-225001-001	N/A	N/A	019544
Speaker	Harris Corporation	LS102824v10	N/A	N/A	019548
Microphone	Harris Corporation	CH721	N/A	N/A	019549
Microphone	Harris Corporation	CH721	N/A	N/A	019550
Microphone	Harris Corporation	MC101616-041-rev	N/A	N/A	019551
Dual Band 764-870 MHz, 5 dBd Gain Element	Harris Corporation	AN-225001-005	N/A	N/A	019552
Standard Roof Mount base low loss coax RF195 with GPS	Harris Corporation	AN-125001-006	N/A	N/A	019553
Dual Band 764-870 MHz, 3 dBd Gain, Elevated Feed Element	Harris Corporation	AN-225001-002	N/A	N/A	N/A
Dual Band 764-870 MHz, 3 dBd Gain, Elevated Feed Element NGP	Harris Corporation	AN-225001-003	N/A	N/A	N/A
Dual Band 764-870 MHz, 2 dBd Gain, Low Profile Element	Harris Corporation	AN-225001-004	N/A	N/A	N/A

Standard Roof Mount base Low Loss coax RF195	Harris Corporation	AN-125001-002	N/A	N/A	N/A
Magnetic Roof Mount base Low Loss coax RF195	Harris Corporation	AN-125001-008	N/A	N/A	N/A
Thick Roof Mount base Low Loss coax RF195	Harris Corporation	AN-125001-004	N/A	N/A	N/A
Cut to Length 132-960 MHZ 0 dBd Gain Roof Mount	Harris Corporation	AN102800V1	N/A	N/A	N/A
Cut to Length 132-960 MHZ 0 dBd Gain Thick Roof Mount	Harris Corporation	AN102800V2	N/A	N/A	N/A
GPS Roof Mount Antenna	Harris Corporation	AN-025187-001	N/A	N/A	N/A
GPS Magnet Mount Antenna	Harris Corporation	AN-025187-003	N/A	N/A	N/A
Hidden Mount Antenna 0 dBi Gain	Harris Corporation	Sti-Co CCAS-SB-700	N/A	N/A	N/A

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

700 MHz band: 13.28 V / 7.0 A
800 MHz band: 13.28 V / 8.5 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

5.1 Test Procedure

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

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

Manufacturer's rated power:
700 MHz band: Conducted power is continuously variable from 1.5 to 30 W
800 MHz band: Conducted power is continuously variable from 5 W to 35 W

5.2 Test Data

Table 5-1: RF Conducted Output Power - Measured

Frequency (MHz)	High Power (dBm)	High Power (W)
767.0000	45	31.6
769.0125	45	31.6
772.0125	45	31.6
773.9875	45	31.6
804.99375	42.7	18.8
816.0125	45.8	38.0
860.0125	44.9	30.9

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	11/18/10
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	11/18/10

Test Personnel:

Dan Baltzell	Daniel W. Baltzell	May 26, 2010
EMC Test Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.543: Emission Limitations

6.1 Test Procedure

ANSI/TIA-603-C-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 – 19,200 bps for OTP and 9,600 bps for P25 modes.

6.2 Test Data

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

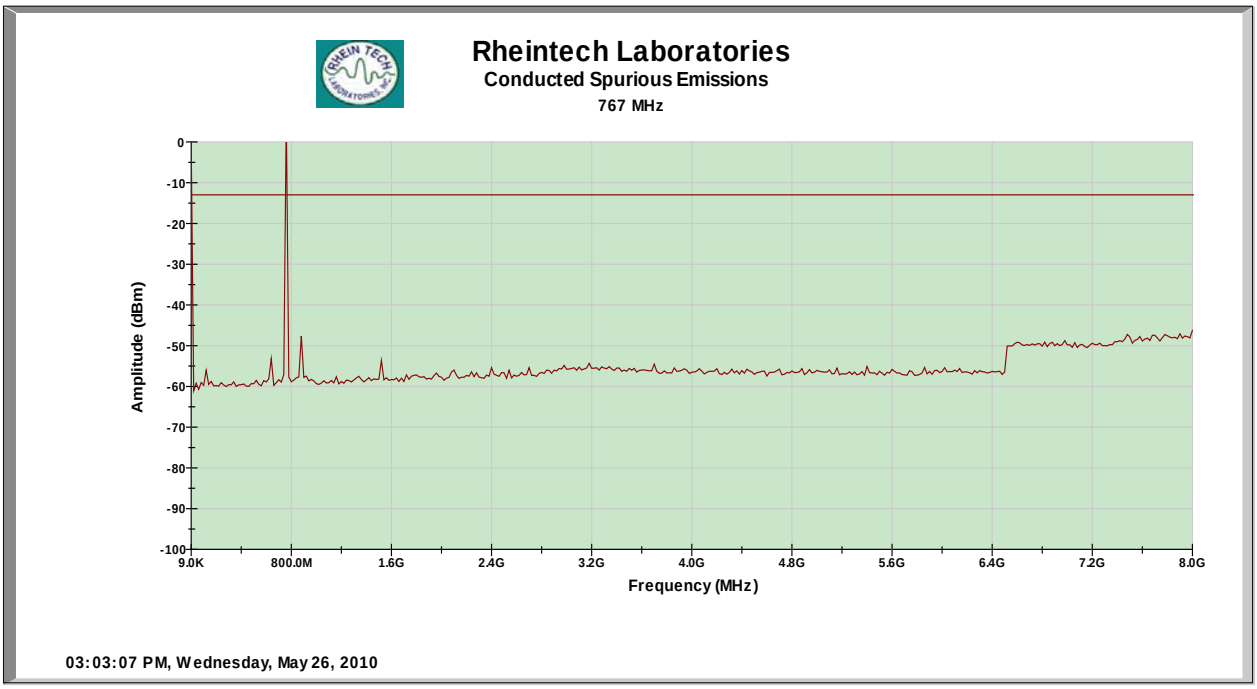
Limits: (43 + 10 LOG P(W))

The following channels (in MHz) were investigated:

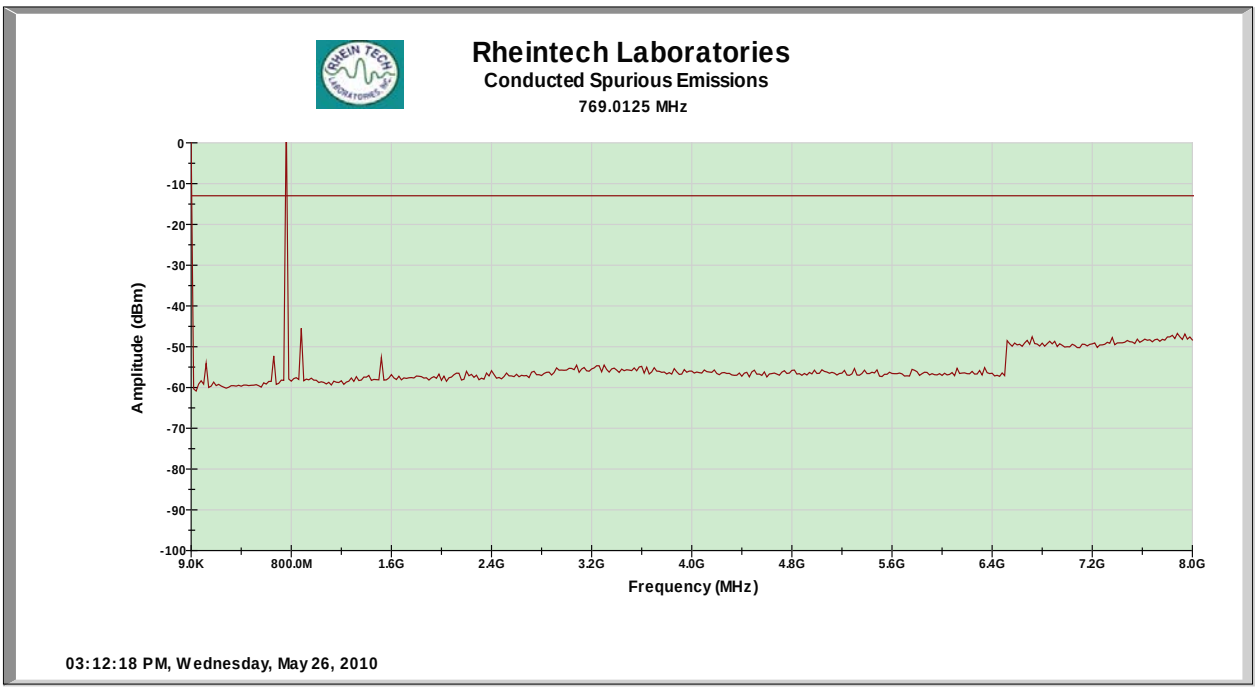
769.00625, 799.00625, 816.0125 and 860.0125

Both high and low power settings were checked; high power was found to be worst case.

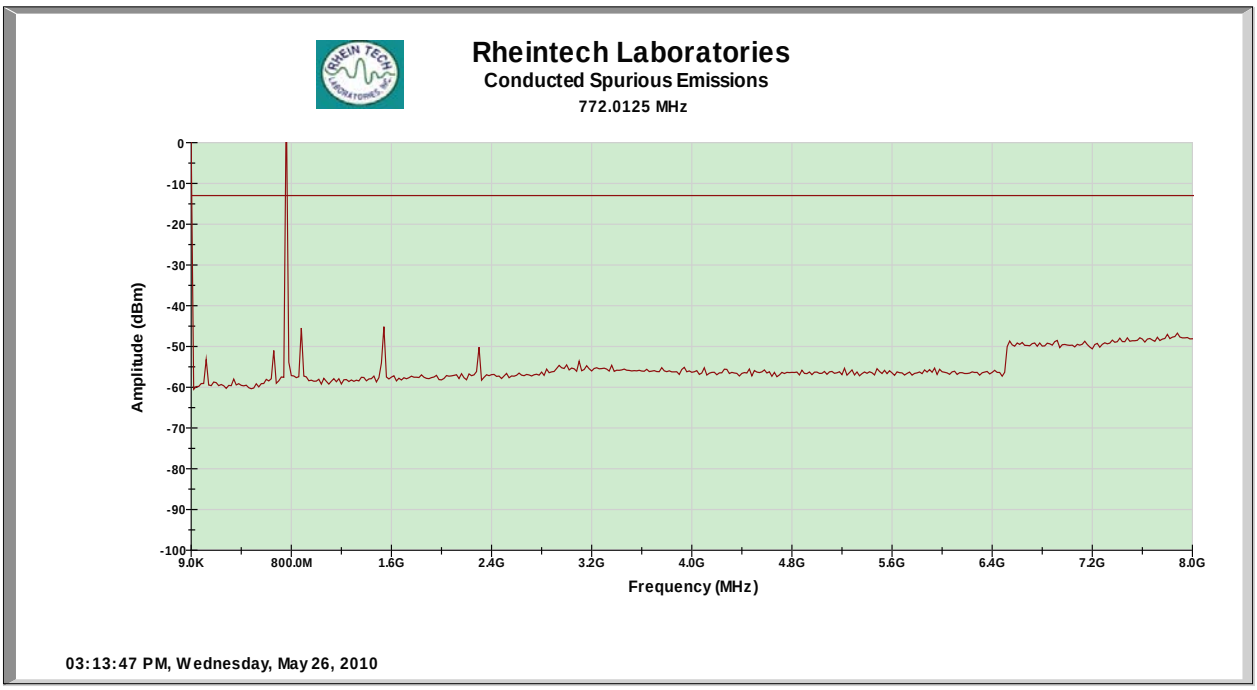
Plot 6-1: Spurious Emissions at Antenna Terminals - 767 MHz



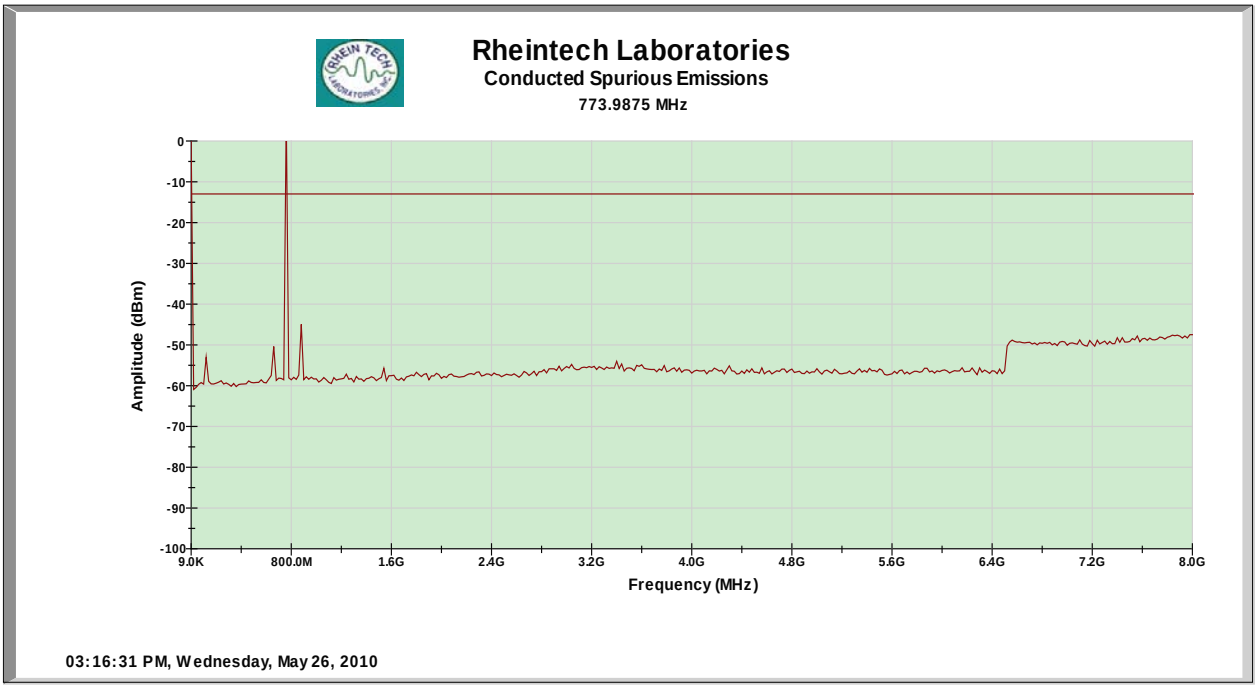
Plot 6-2: Spurious Emissions at Antenna Terminals - 769.0125 MHz



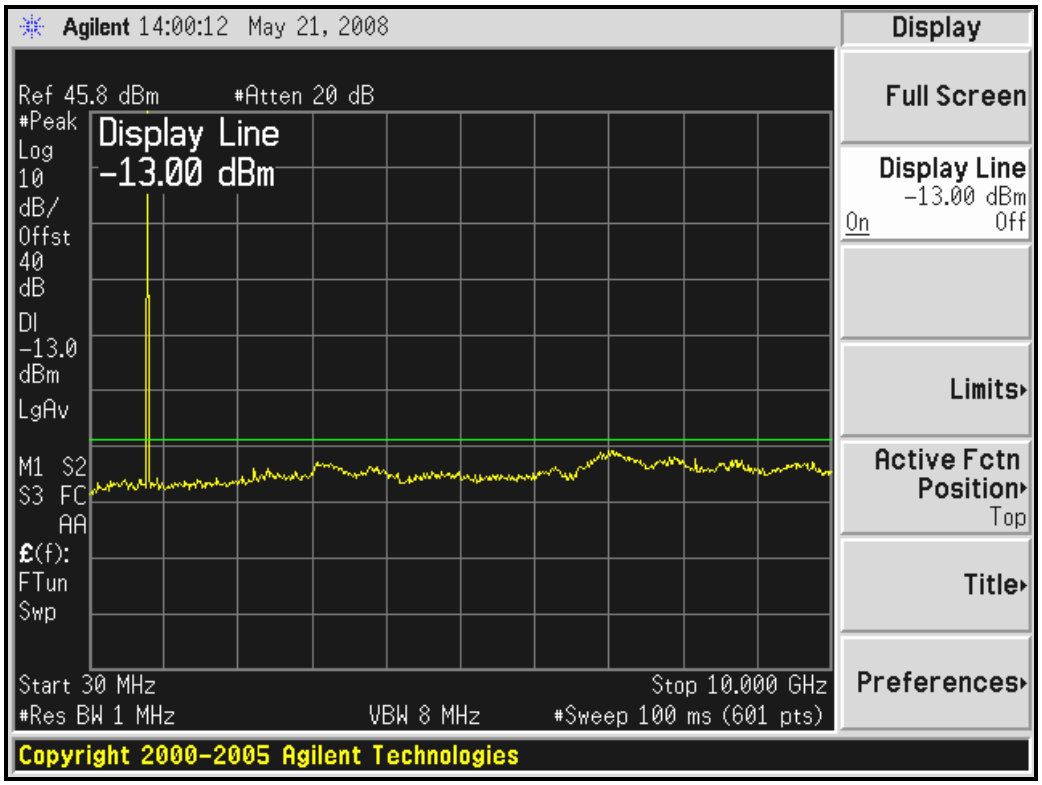
Plot 6-3: Spurious Emissions at Antenna Terminals - 772.0125 MHz



Plot 6-4: Spurious Emissions at Antenna Terminals - 773.9875 MHz



Plot 6-5: Spurious Emissions at Antenna Terminals - 816.0125 MHz – P25 RND



Plot 6-6: Spurious Emissions at Antenna Terminals - 860.0125 MHz – P25 RND

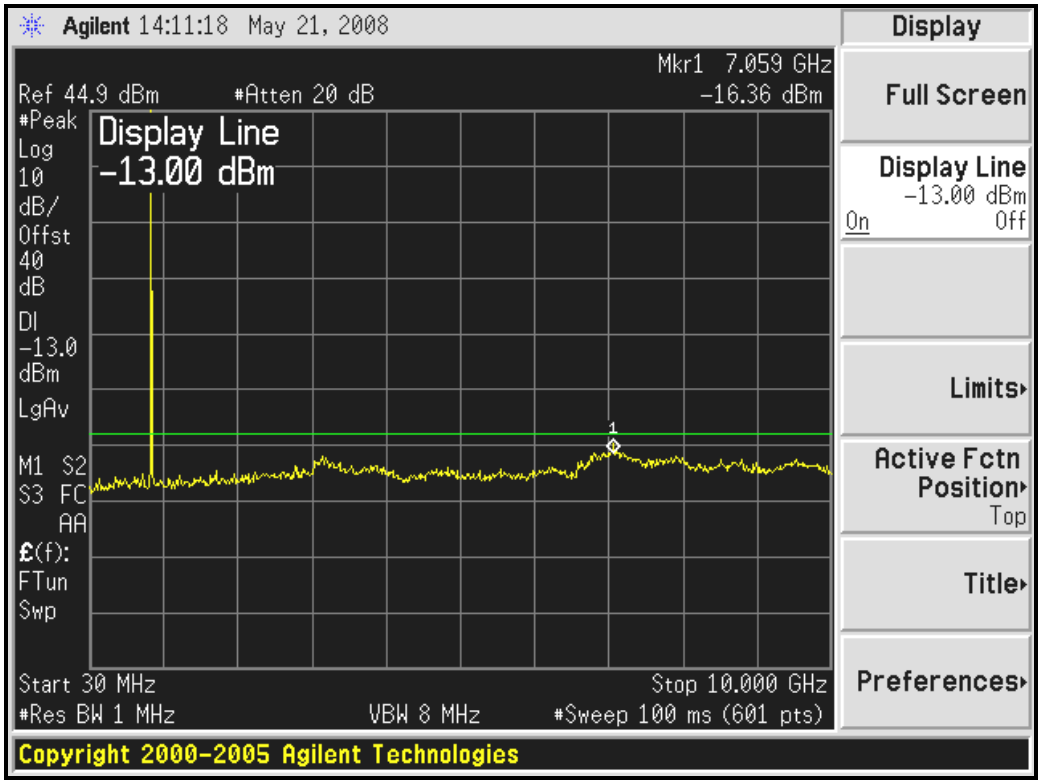


Table 6-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	11/10/10
901215	Hewlett Packard	8596EM	Spectrum Analyzer	3826A00144	11/23/10

Test Personnel:

Dan Baltzell		May 26, 2010
EMC Test Engineer	Signature	Date Of Test

7 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.

7.1 Test Procedure

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 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 the adjacent channel power 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.

FCC Rules and Regulations Part 90 §90.543(e)

(e) For operations in the 763–768 MHz and the 793–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

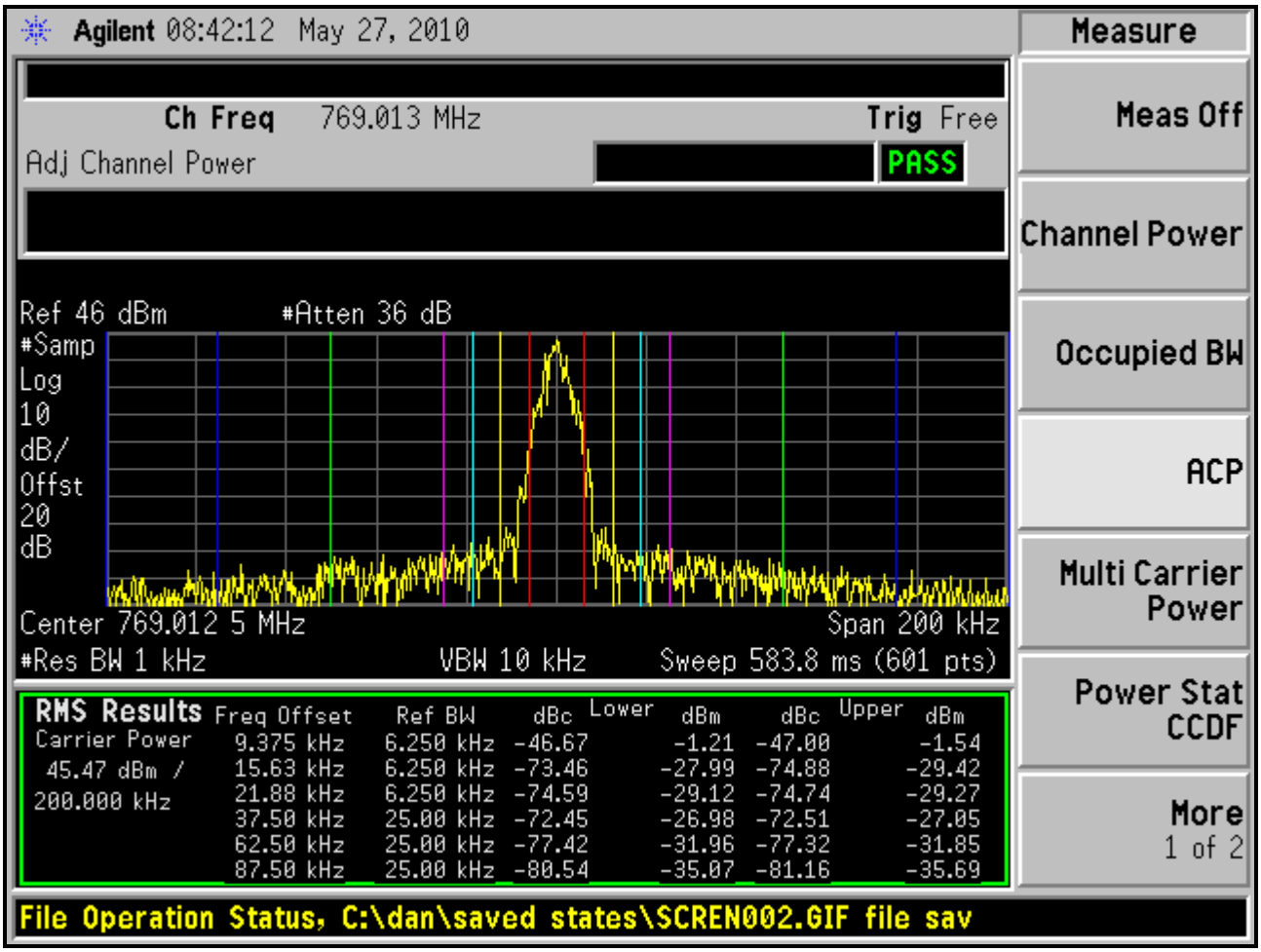
(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

7.2 Test Data

Table 7-1: P25 NB – 767 MHz; 12.5 kHz Channel Spacing; 90.543(e)(2) 769-775 and 799-805 MHz

Band (MHz)	Power Limit 65+10LogP (dBc)	Measured Power (dBc)
769-775	80	133.4
799-805	80	133.3

Plot 7-1: P25 Mode – 769.0125 MHz; 12.5 kHz Channel Spacing - 9.375 kHz to 87.5 kHz



Plot 7-2: P25 Mode – 769.0125 MHz; 12.5 kHz Channel; 150 kHz – 350 kHz

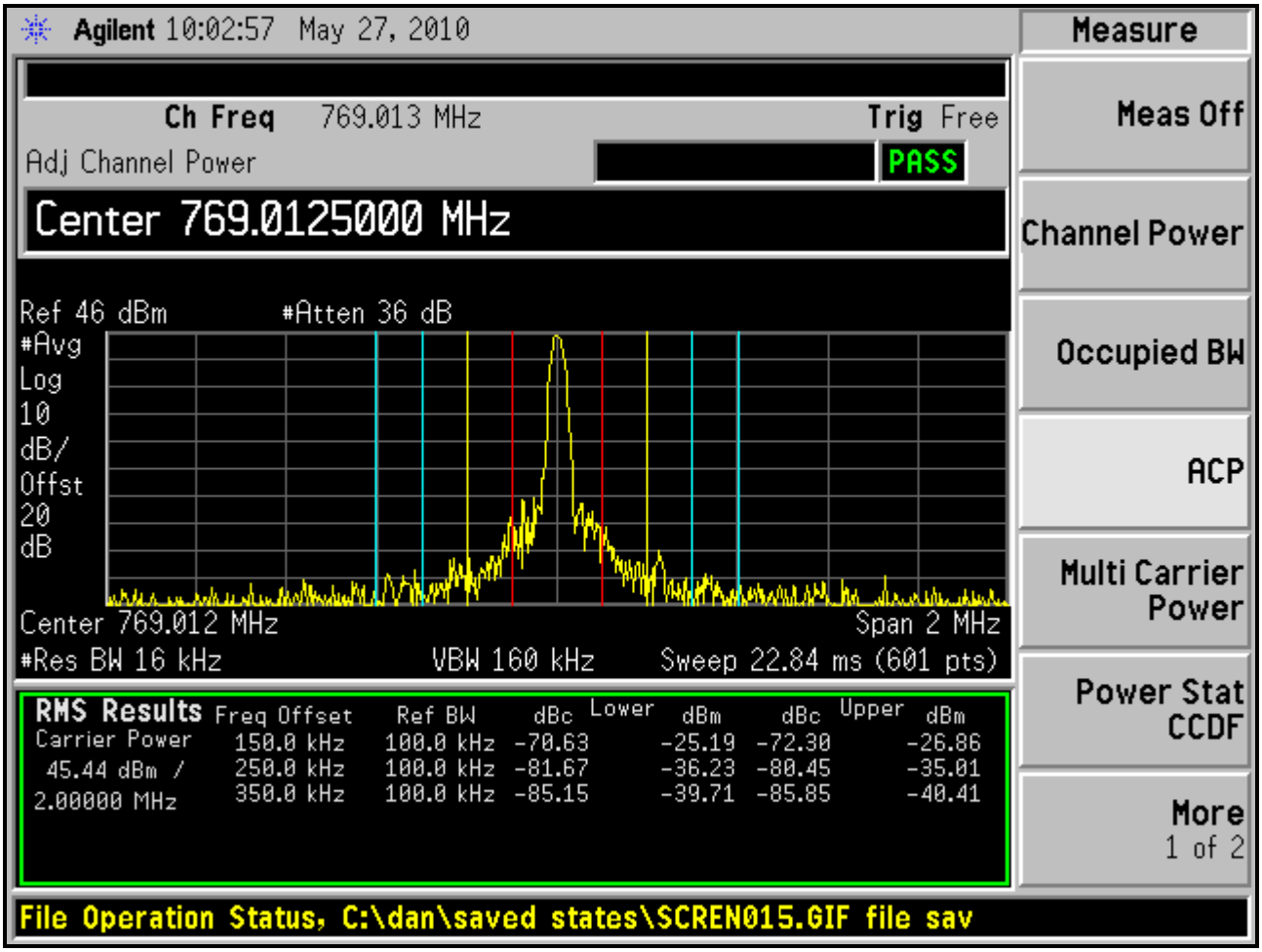
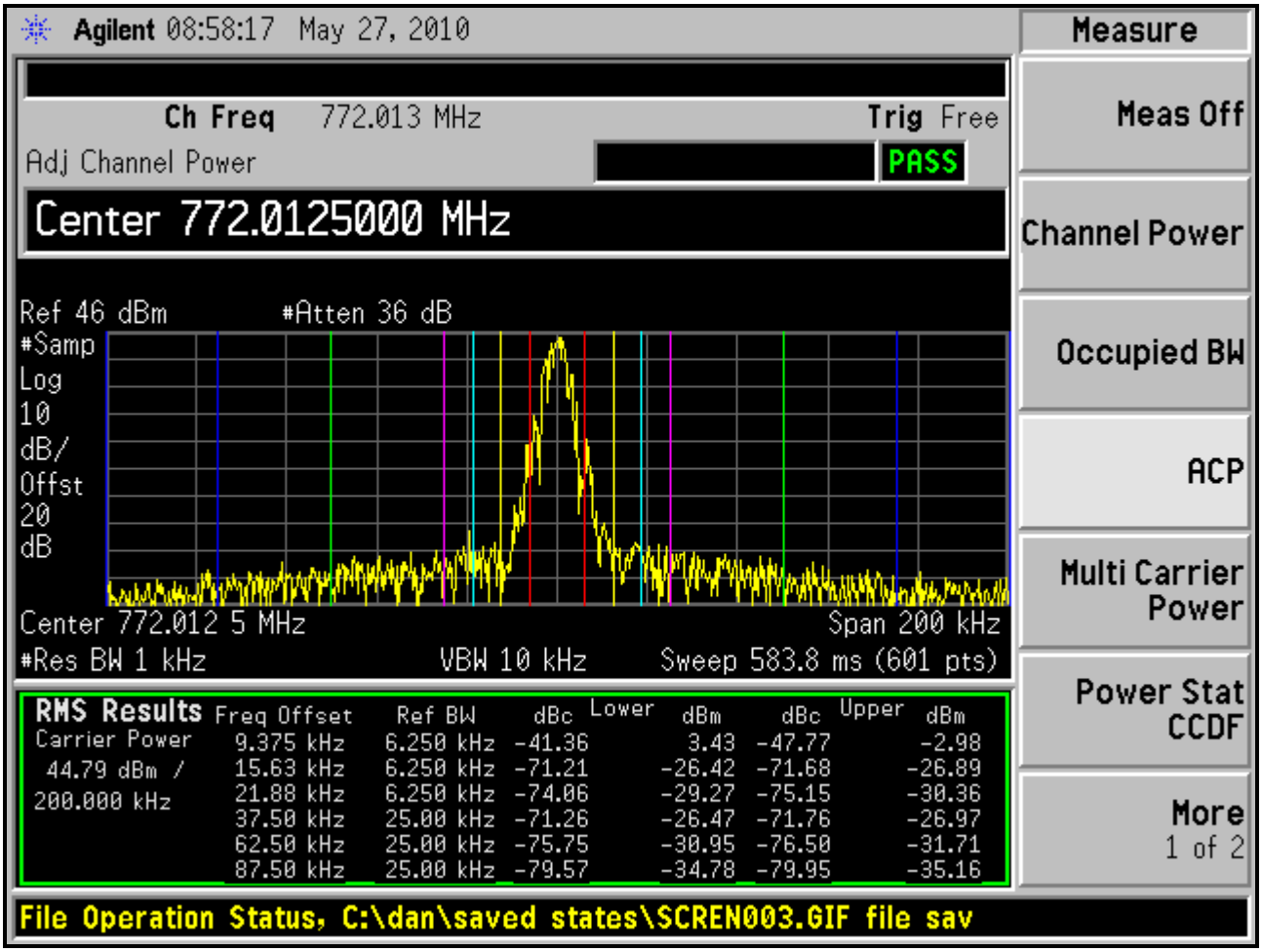


Table 7-2: P25 NB – 769.0125 MHz; 12.5 kHz Channel Spacing; >400 kHz – Receive Band

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-96.7
12 MHz to receive band	30(s)	-75	-92.3
In receive band	30(s)	-100	-106.3

Plot 7-3: P25 Mode – 772.0125 MHz; 12.5 kHz Channel Spacing - 9.375 kHz to 87.5 kHz



Plot 7-4: P25 Mode – 772.0125 MHz; 12.5 kHz Channel Spacing; 150 kHz – 350 kHz

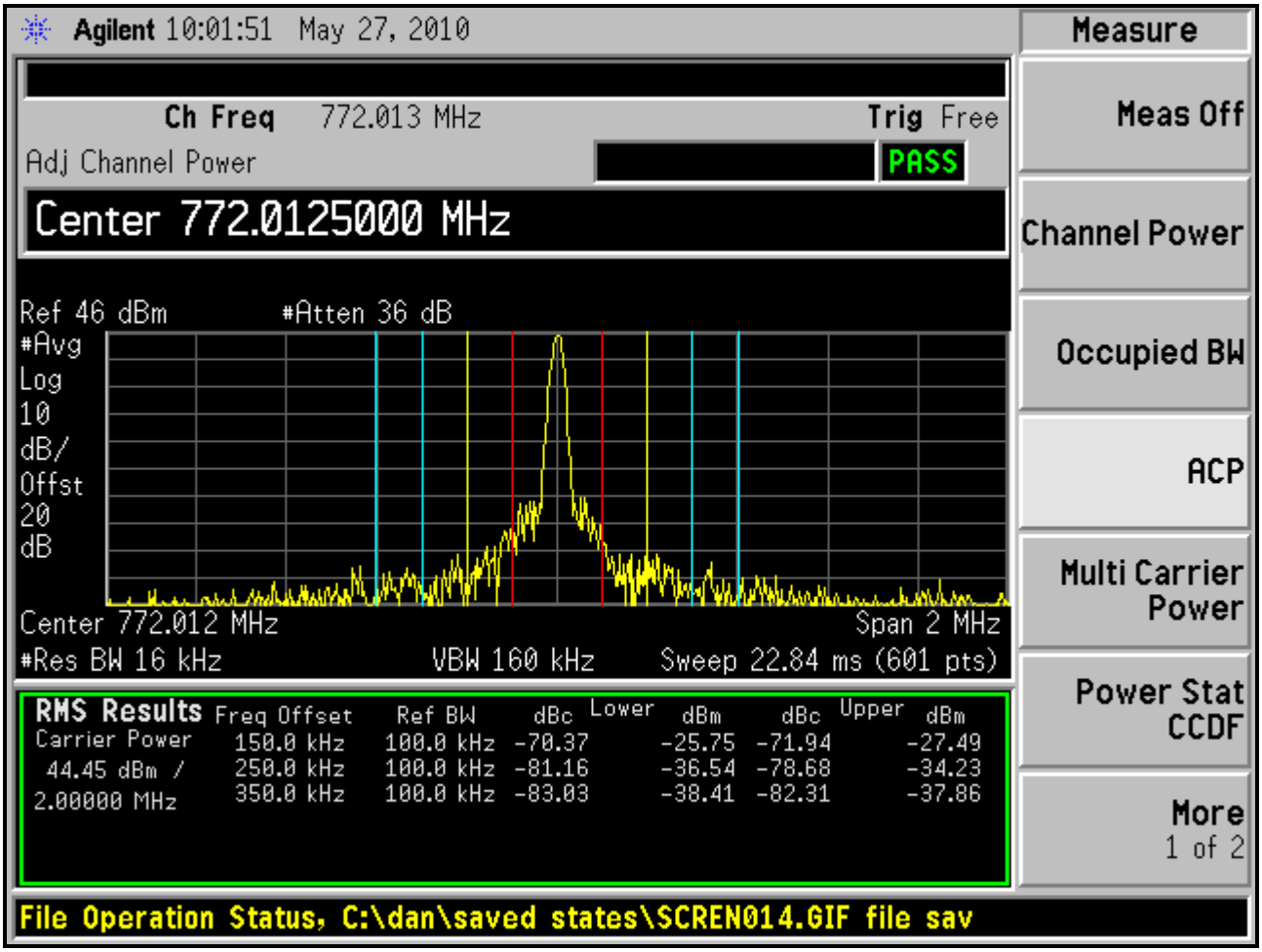
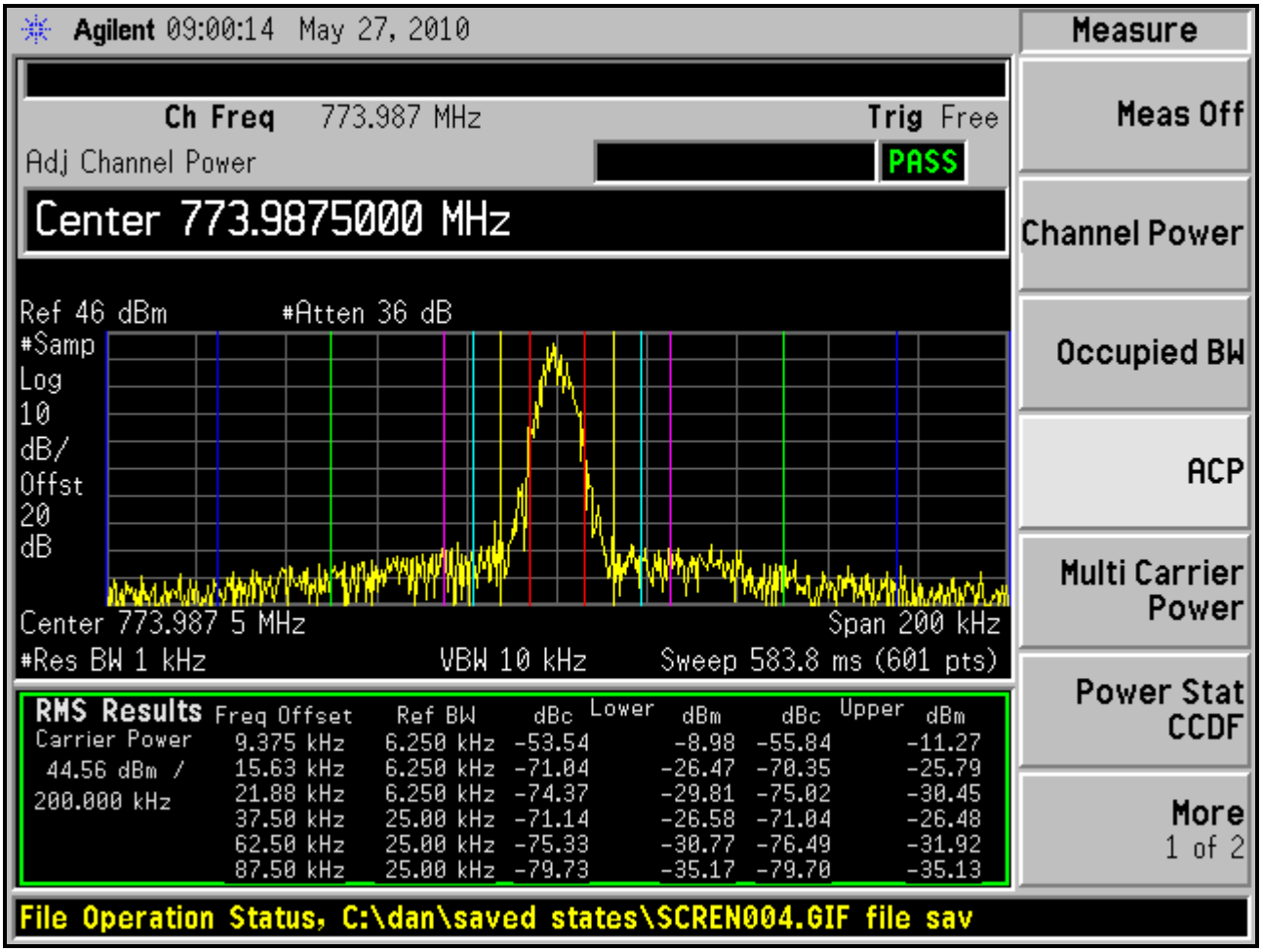


Table 7-3: P25 NB – 772.0125 MHz; 12.5 kHz Channel Spacing; >400 kHz – Receive Band

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-89.1
12 MHz to receive band	30(s)	-75	-87.9
In receive band	30(s)	-100	-112.0

Plot 7-5: P25 Mode – 773.9875 MHz; 12.5 kHz Channel Spacing - 9.375 kHz to 87.5 kHz



Plot 7-6: P25 Mode – 773.9875 MHz; 12.5 kHz Channel Spacing; 150 kHz – 350 kHz

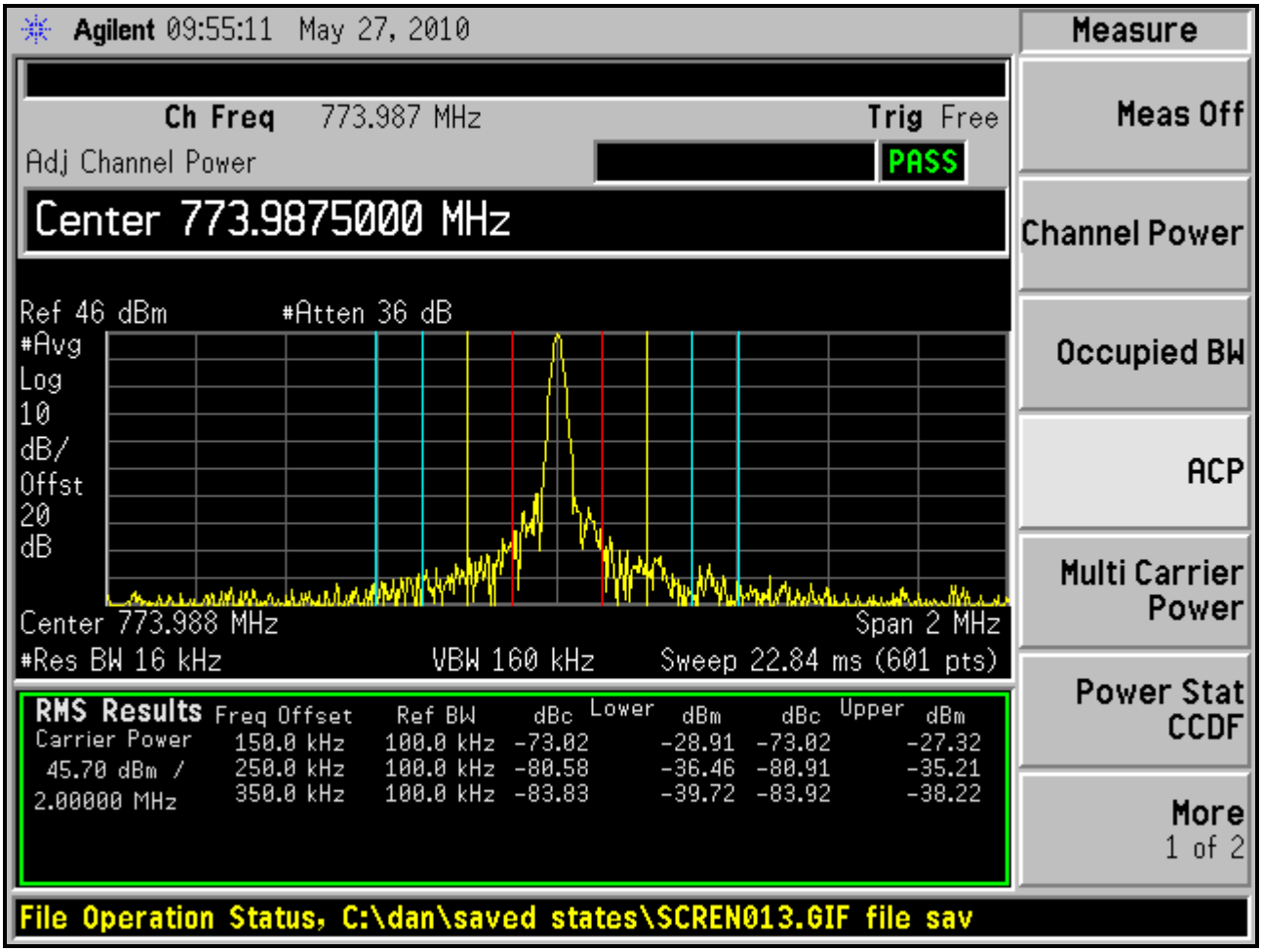


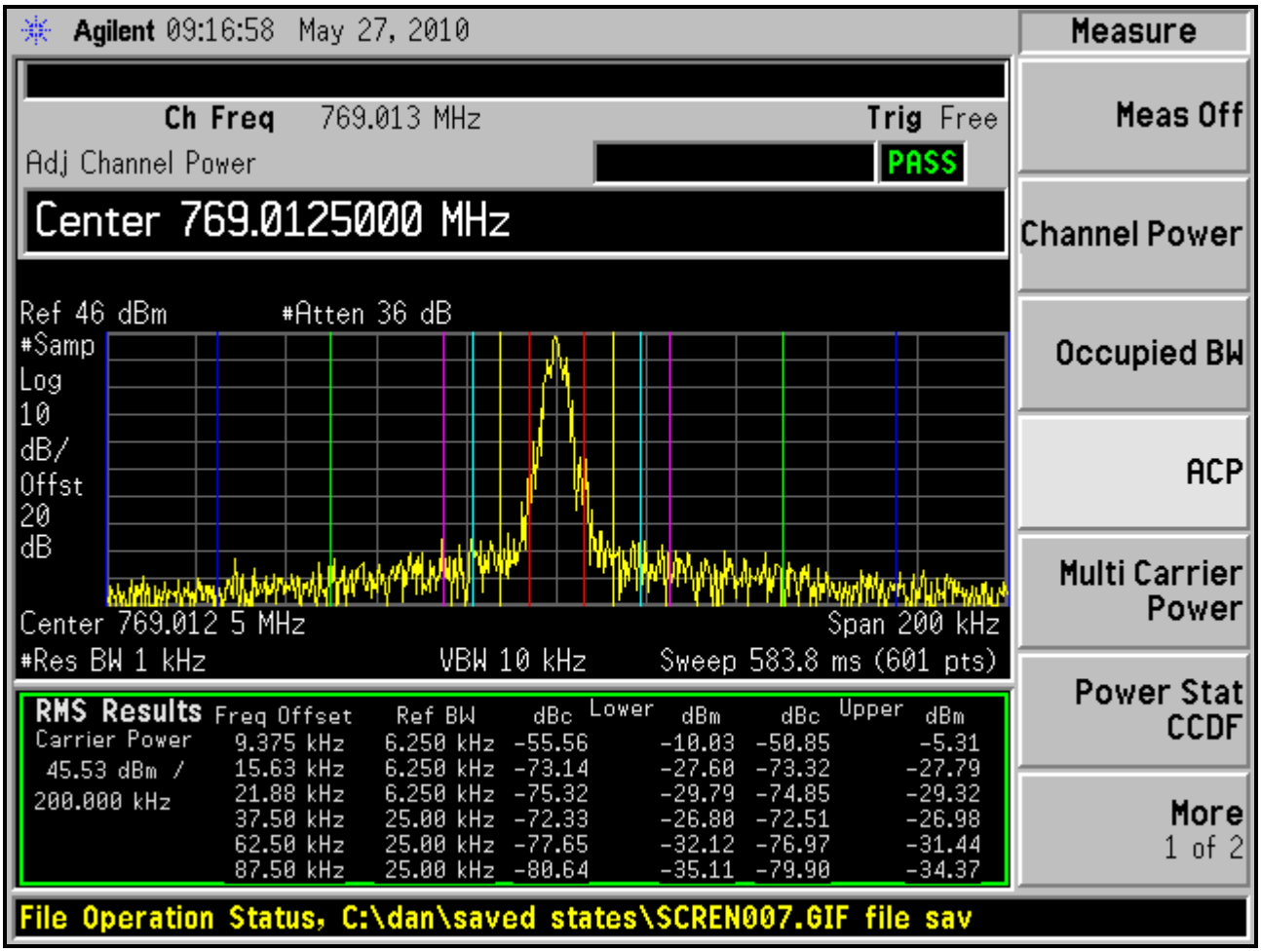
Table 7-4: P25 NB – 773.9875 MHz; 12.5 kHz Channel Spacing; >400 kHz – Receive Band

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-90.0
12 MHz to receive band	30(s)	-75	-89.2
In receive band	30(s)	-100	-114.0

Table 7-5: OTP NB – 767 MHz; 12.5 kHz Channel Spacing; 90.543(e)(2) 769-775 and 799-805 MHz

Band (MHz)	Power Limit 65+10LogP (dBc)	Measured Power (dBc)
769-775	80	132.8
799-805	80	133.7

Plot 7-7: OTP NB – 769.0125 MHz; 12.5 kHz Channel Spacing - 9.375 kHz to 87.5 kHz



Plot 7-8: OTP NB – 769.0125 MHz; 12.5 kHz Channel Spacing; 150 kHz – 350 kHz

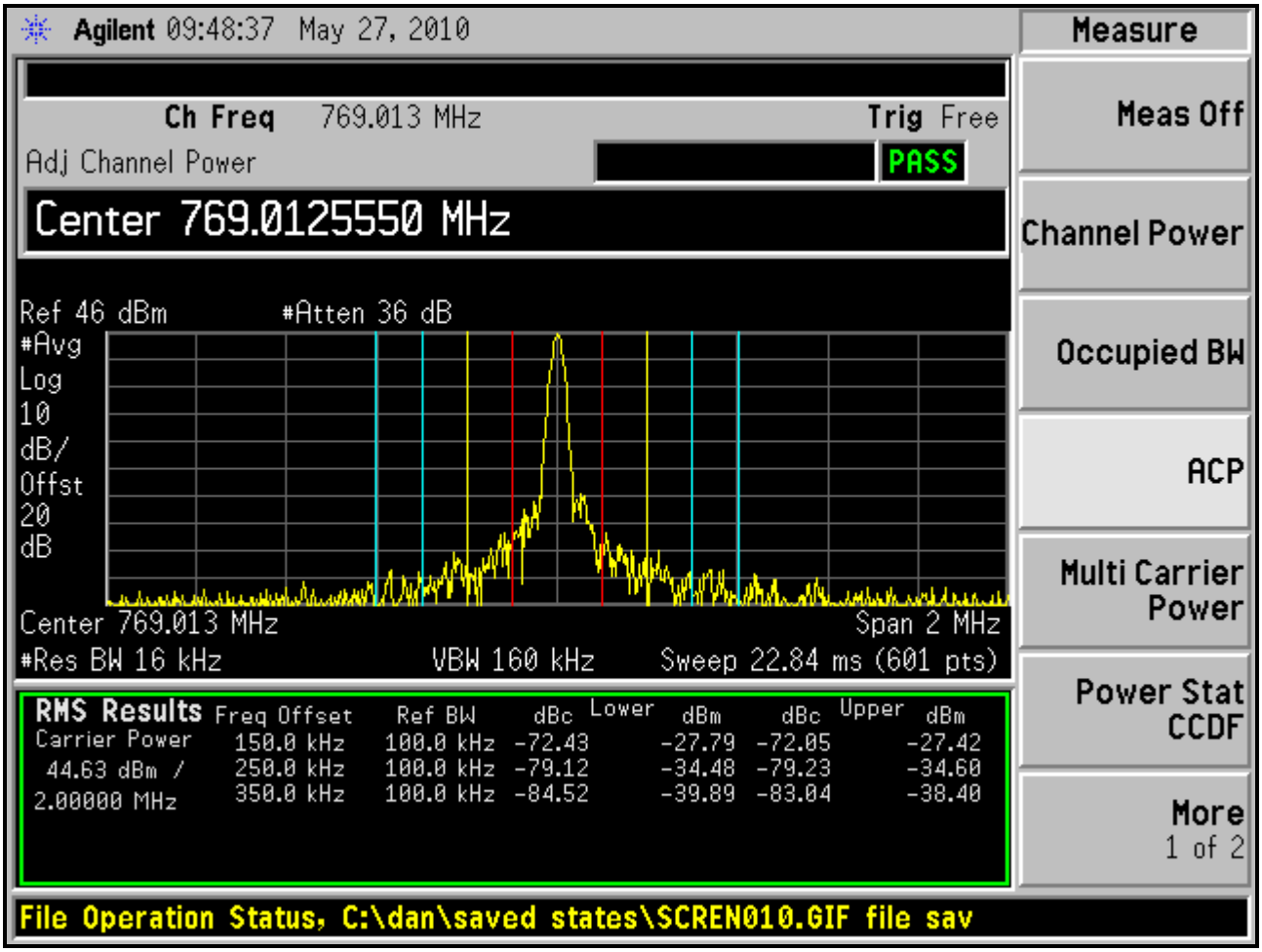
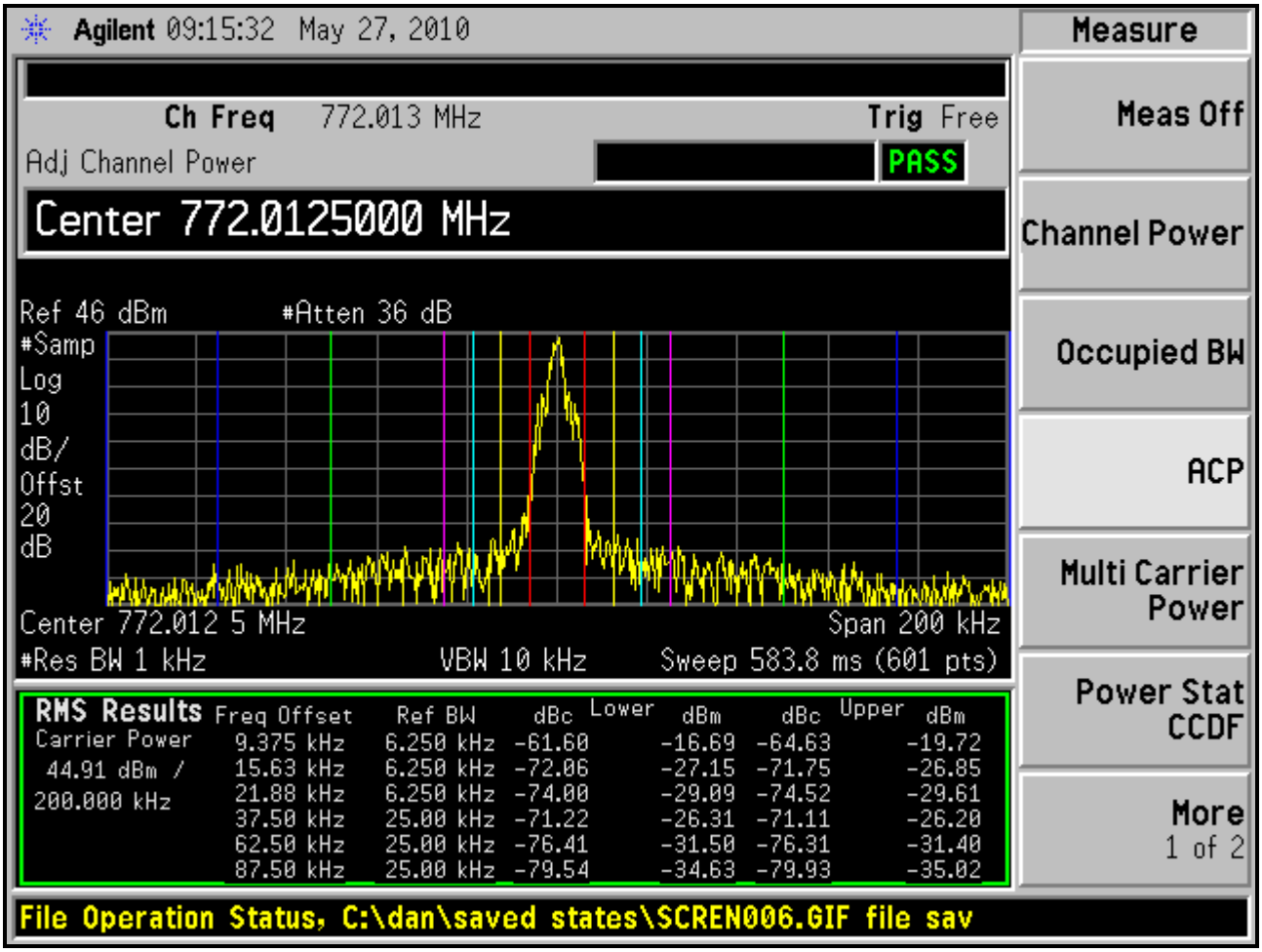


Table 7-6: OTP NB – 769.0125 MHz; 12.5 kHz Channel Spacing; >400 kHz – Receive Band

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-95.3
12 MHz to receive band	30(s)	-75	-92.4
In receive band	30(s)	-100	-106.7

Plot 7-9: OTP NB – 772.0125 MHz; 12.5 kHz Channel Spacing - 9.375 kHz to 87.5 kHz



Plot 7-10: OTP NB – 772.0125 MHz; 12.5 kHz Channel Spacing; 150 kHz – 350 kHz

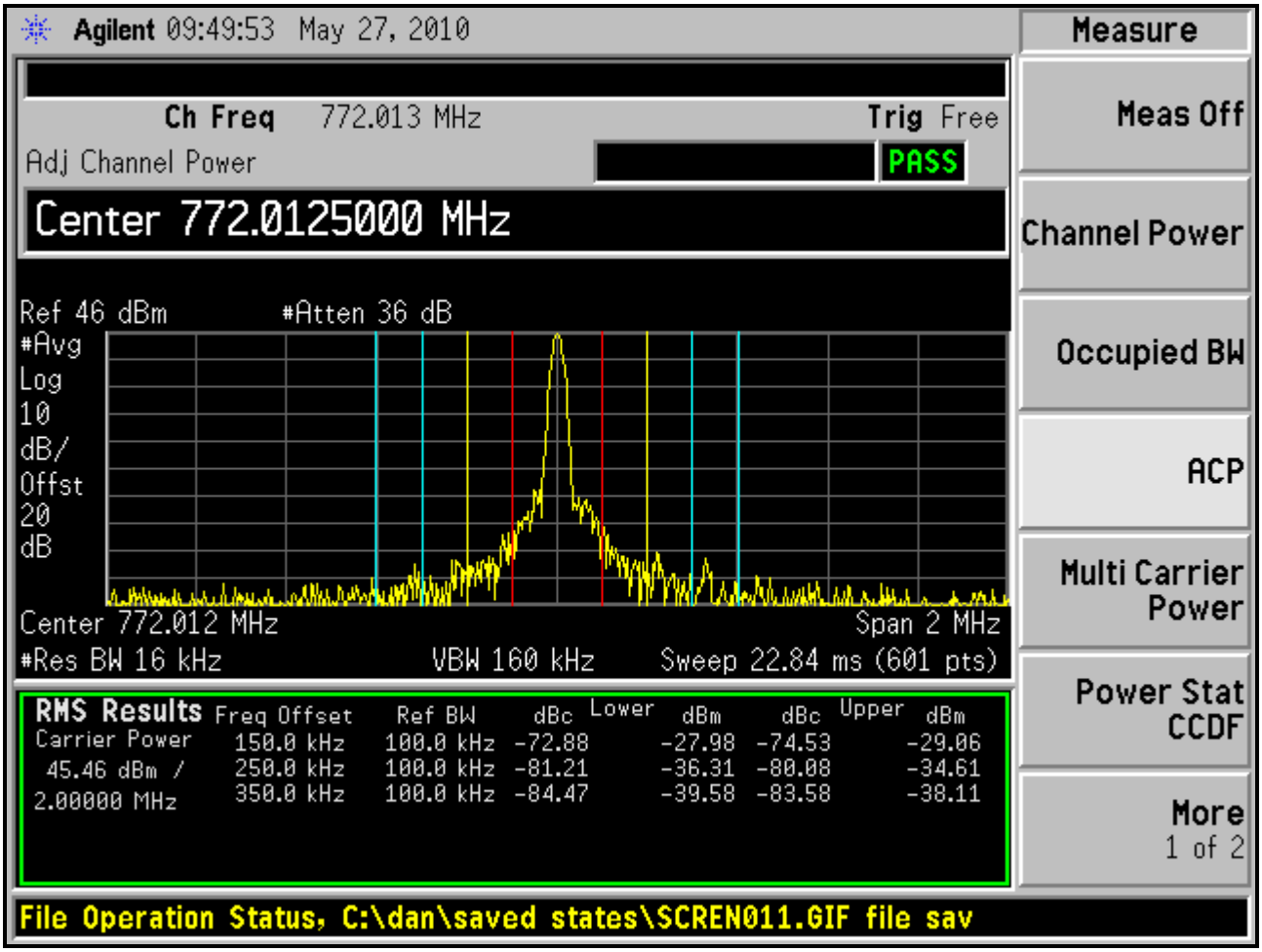
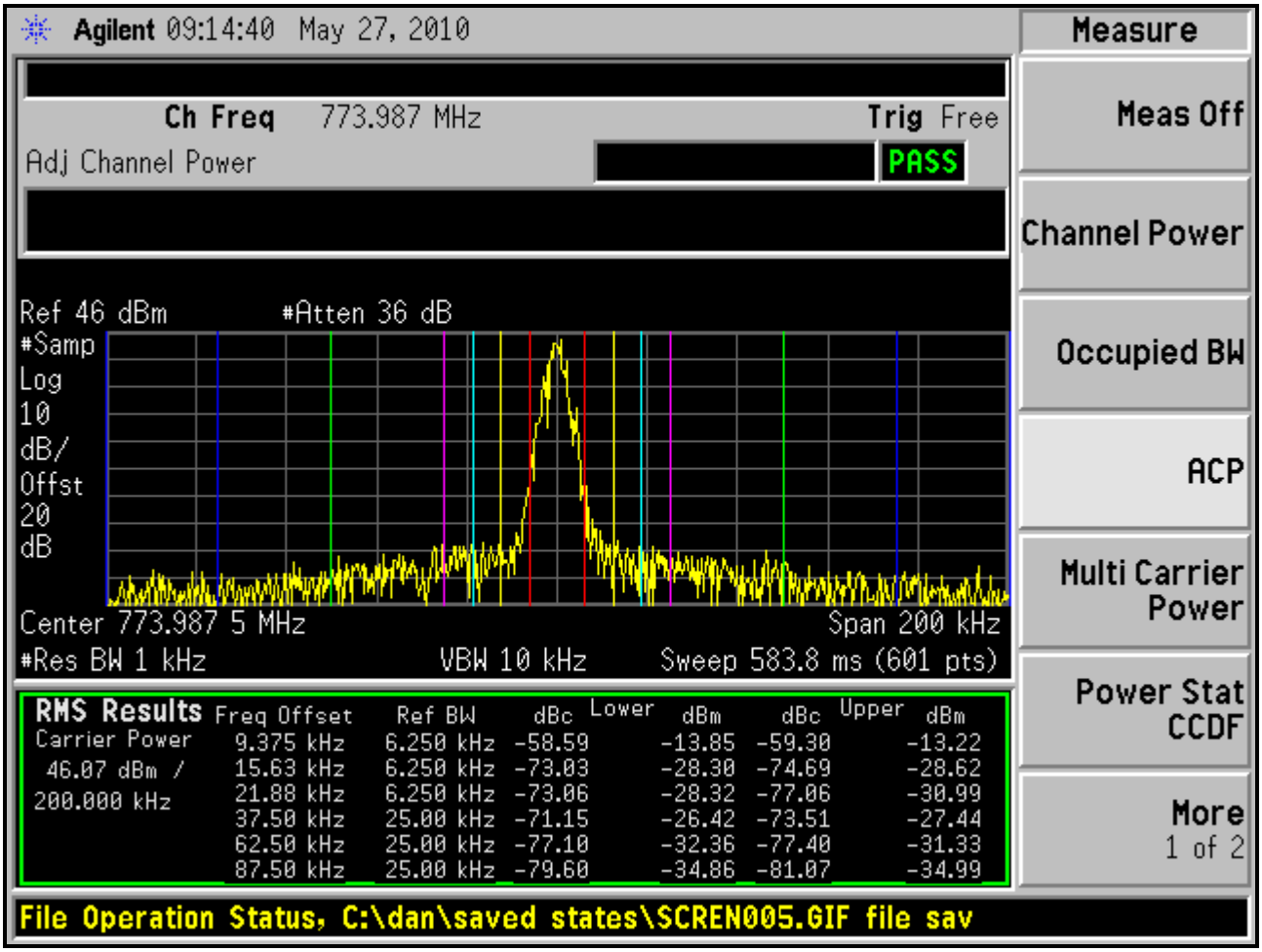


Table 7-7: OTP NB – 772.012 MHz; 12.5 kHz Channel Spacing; >400 kHz – Receive Band

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-97.3
12 MHz to receive band	30(s)	-75	-87.6
In receive band	30(s)	-100	-111.3

Plot 7-11: OTP NB – 773.9875 MHz; 12.5 kHz Channel Spacing; 9.375 kHz to 87.5 kHz



Plot 7-12: OTP NB – 773.9875 MHz; 12.5 kHz Channel Spacing; 150 kHz to 350 kHz

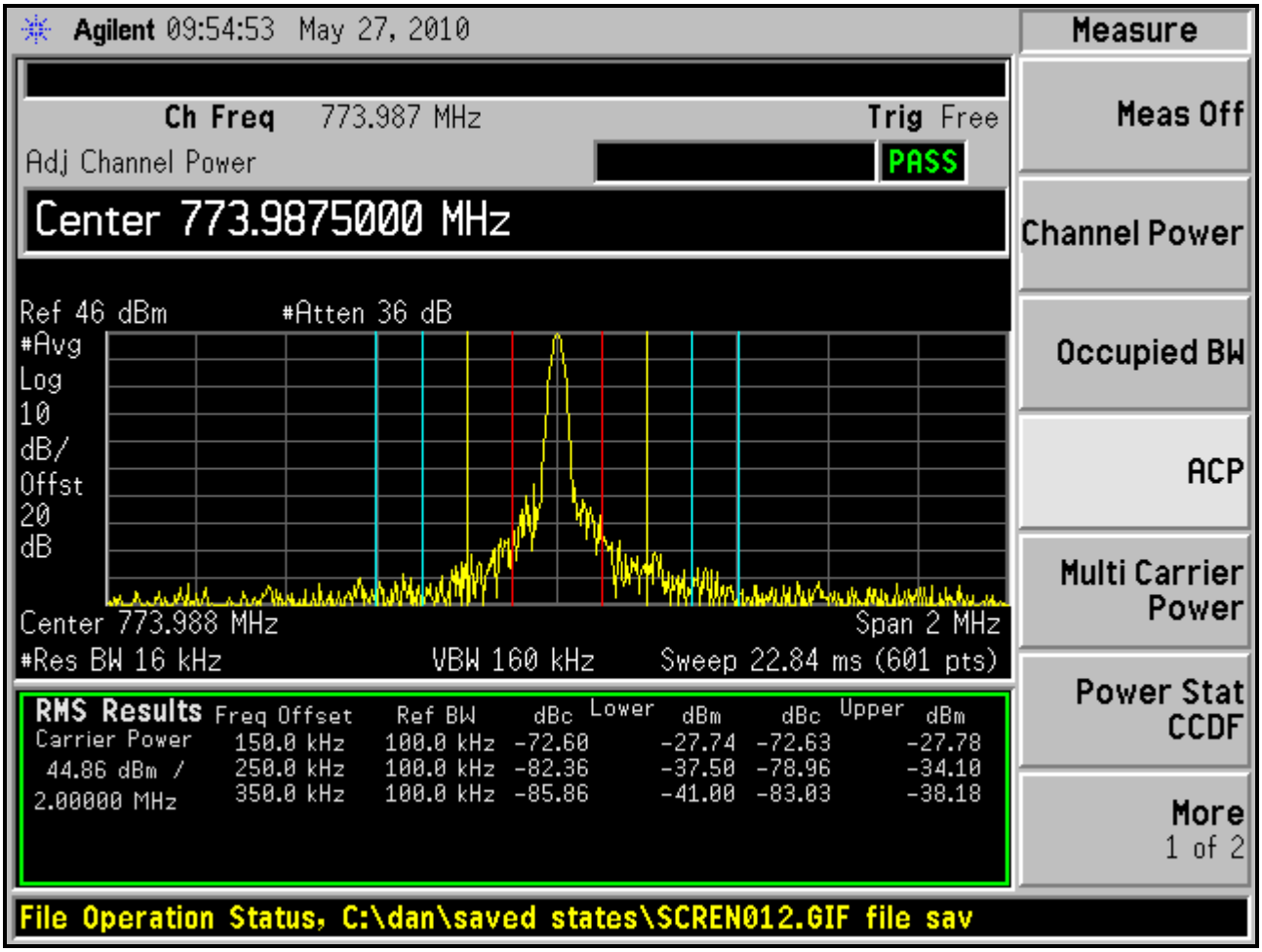


Table 7-8: OTP NB – 773.9875 MHz; 12.5 kHz Channel Spacing; >400 kHz – Receive Band

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Maximum ACP (dBc)	Measured ACP (dBc)
>400 to 12 MHz	30(s)	-75	-90.2
12 MHz to receive band	30(s)	-75	-89.3
In receive band	30(s)	-100	-114.9

Table 7-9: 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	11/10/10

Test Personnel:

Dan Baltzell		May 27, 2010
EMC Test Engineer	Signature	Date Of Test

8 FCC Rules and Regulations Part 2.1053(a): Field Strength of Spurious Radiation; Part 90 90.543(f): Out of Band Emissions Limit

8.1 Test Procedure

ANSI/TIA-603-C-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 and 9,600 bps for P25 and EDACS 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 90.543(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

8.2.1 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 is presented as the worst case channel with only 6,152.054 MHz having an emission 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 8-1: Field Strength of Spurious Radiation – Analog Mode – 769.0125 MHz

Conducted Power = 45 dBm = 31.6 W - Limit = 43 + 10 Log P = 58 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1538.0250	54.6	-62.2	2.3	6.6	102.9	-44.9
2307.0375	37.2	-56.2	2.8	7.3	96.7	-38.7
3076.0500	43.0	-48.0	3.1	7.2	88.9	-30.9
3845.0625	41.5	-47.9	3.2	7.4	88.7	-30.7
4614.0750	35.5	-49.1	5.2	8.8	90.5	-32.5
5383.0875	35.4	-50.5	3.6	8.5	90.6	-32.6
6152.1000	39.8	-48.4	3.8	9.0	88.2	-30.2
6921.1125	31.7	-56.7	4.3	9.6	96.4	-38.4
7690.1250	34.2	-53.3	4.2	9.1	93.4	-35.4

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

Table 8-2: Field Strength of Spurious Radiation in the 1559–1610 MHz Band – FCC 90.543(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)
794.0125							
1588.0250	31.2	-56.3	3.3	6.7	-82.9	-80.0	-2.9
799.0000							
158.0250	30.7	-56.8	3.3	6.8	-83.3	-80.0	-3.3
804.9875							
1609.9750	29.1	-58.4	3.3	6.7	-85.0	-80.0	-5.0

Table 8-3: 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	12/12/10
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	2/22/11
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	11/23/10
900928	Hewlett Packard	83752A	Synthesized Sweeper, (0.01 - 20 GHz)	3610A00866	2/17/11
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/10
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	6/14/10
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	6/14/10
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	10/19/10
901516	Insulated Wire, Inc.	KPS-1503-2400-KPS-09302008	RF cable, 20'	NA	10/19/10
901517	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	10/19/10
901132	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	3/10/12

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	May 28/June 25, 2010
EMC Test Engineer	Signature	Dates Of Test

9 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 90.543(d): Authorized Bandwidth

Occupied Bandwidth - Compliance with the Emission Masks

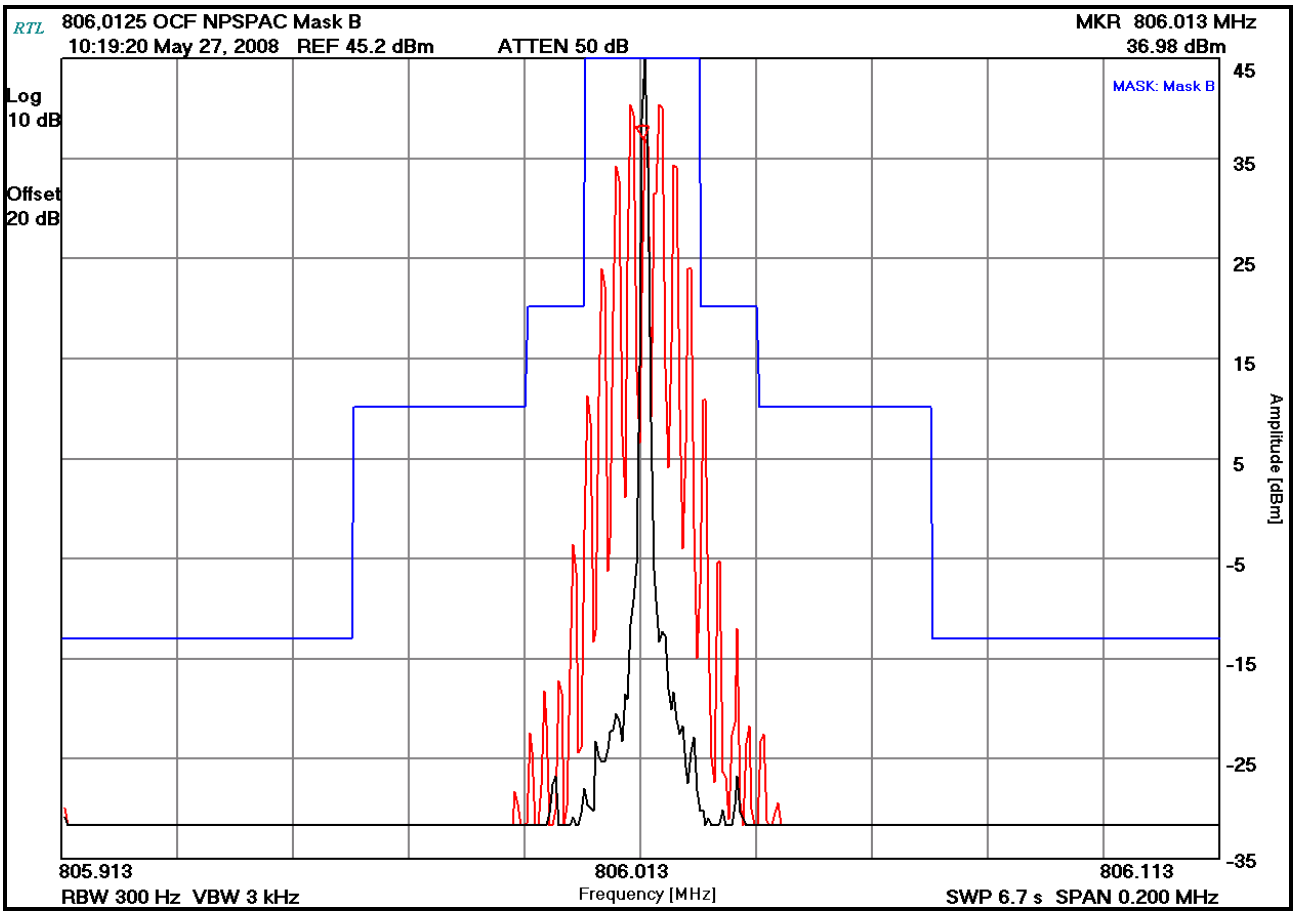
9.1 Test Procedure

ANSI/TIA-603-C-2004, section 2.2.11

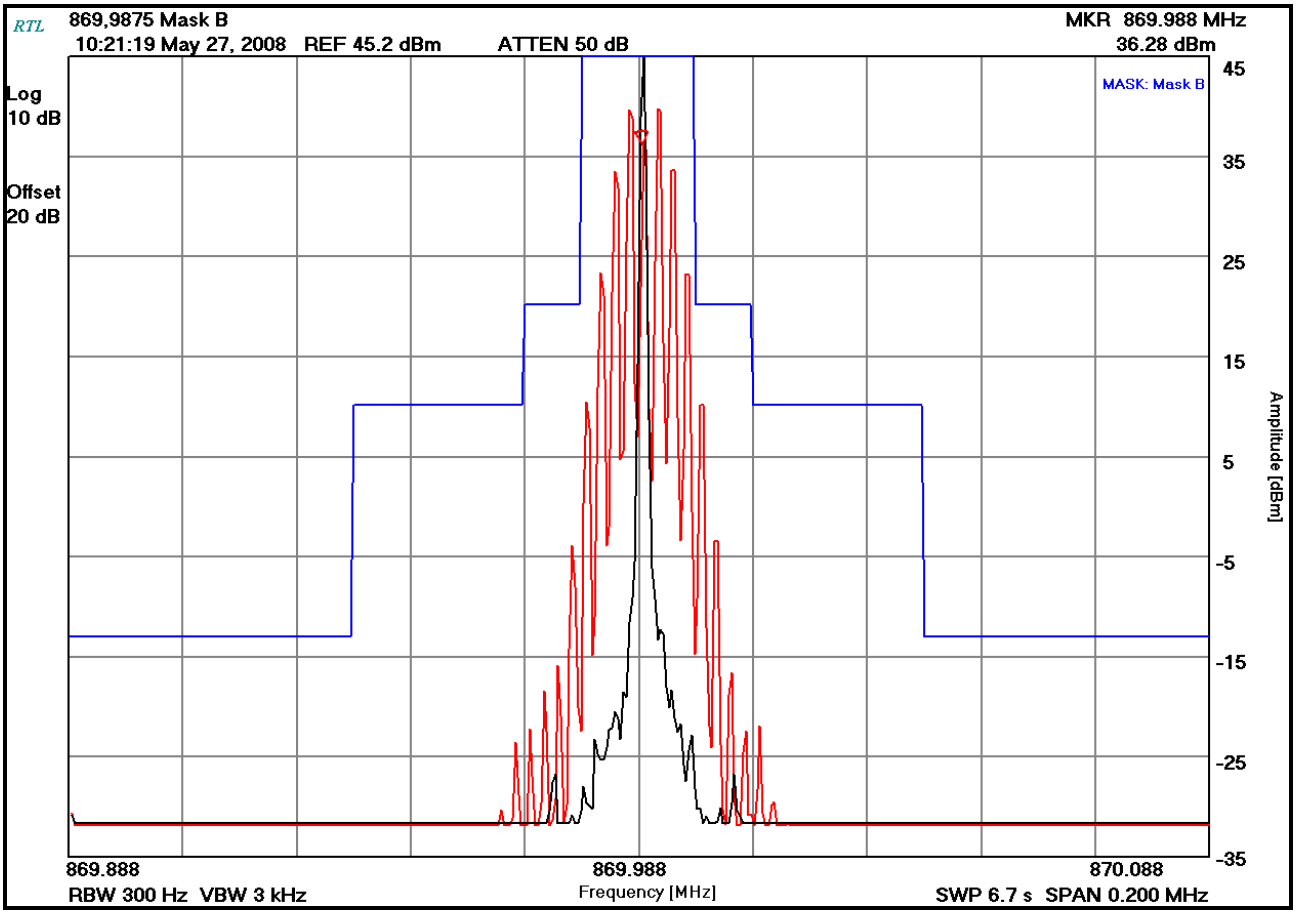
Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

9.2 Test Data

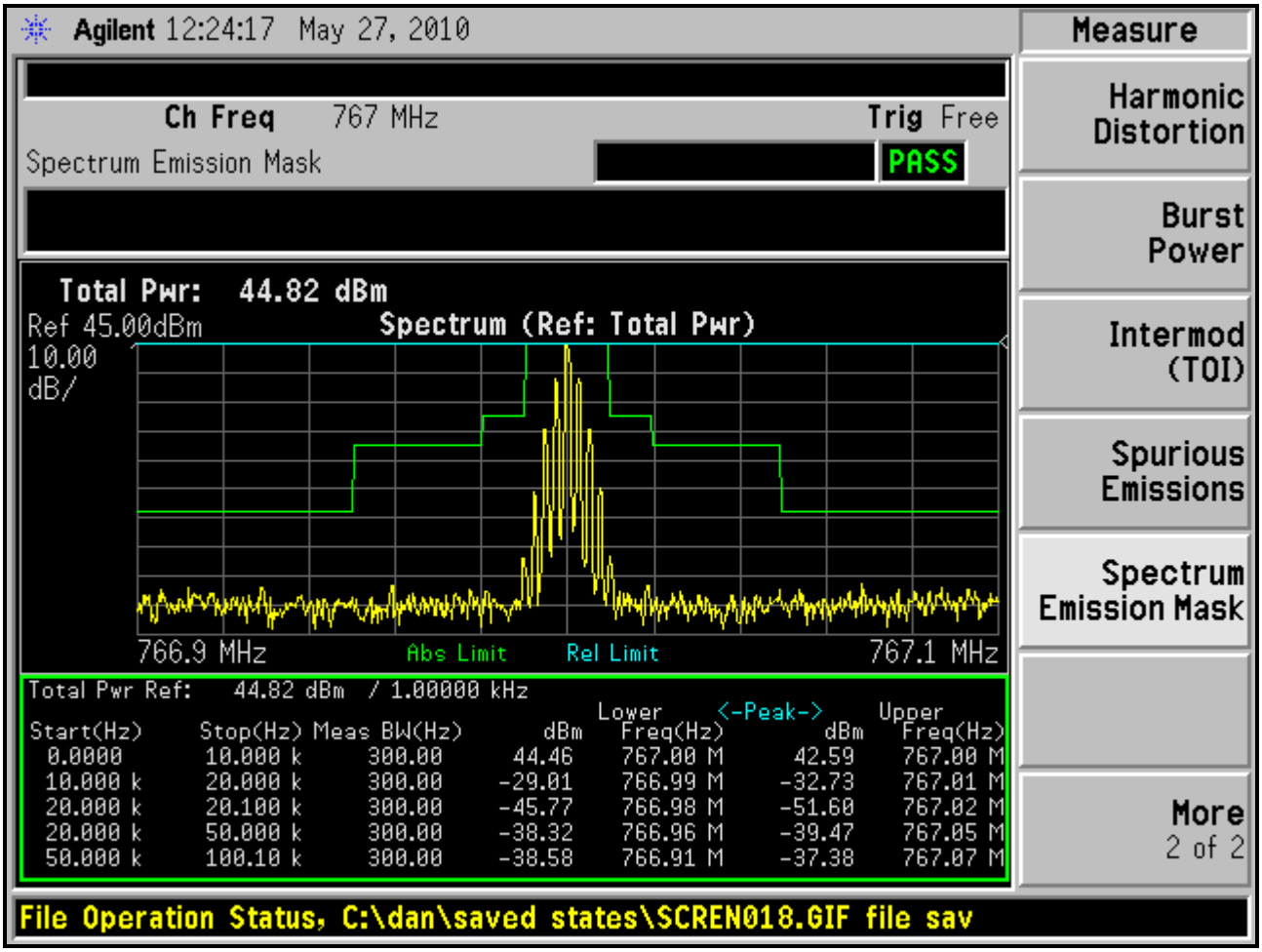
Plot 9-1: Occupied Bandwidth – 806.0125 MHz; Analog (Mask B)



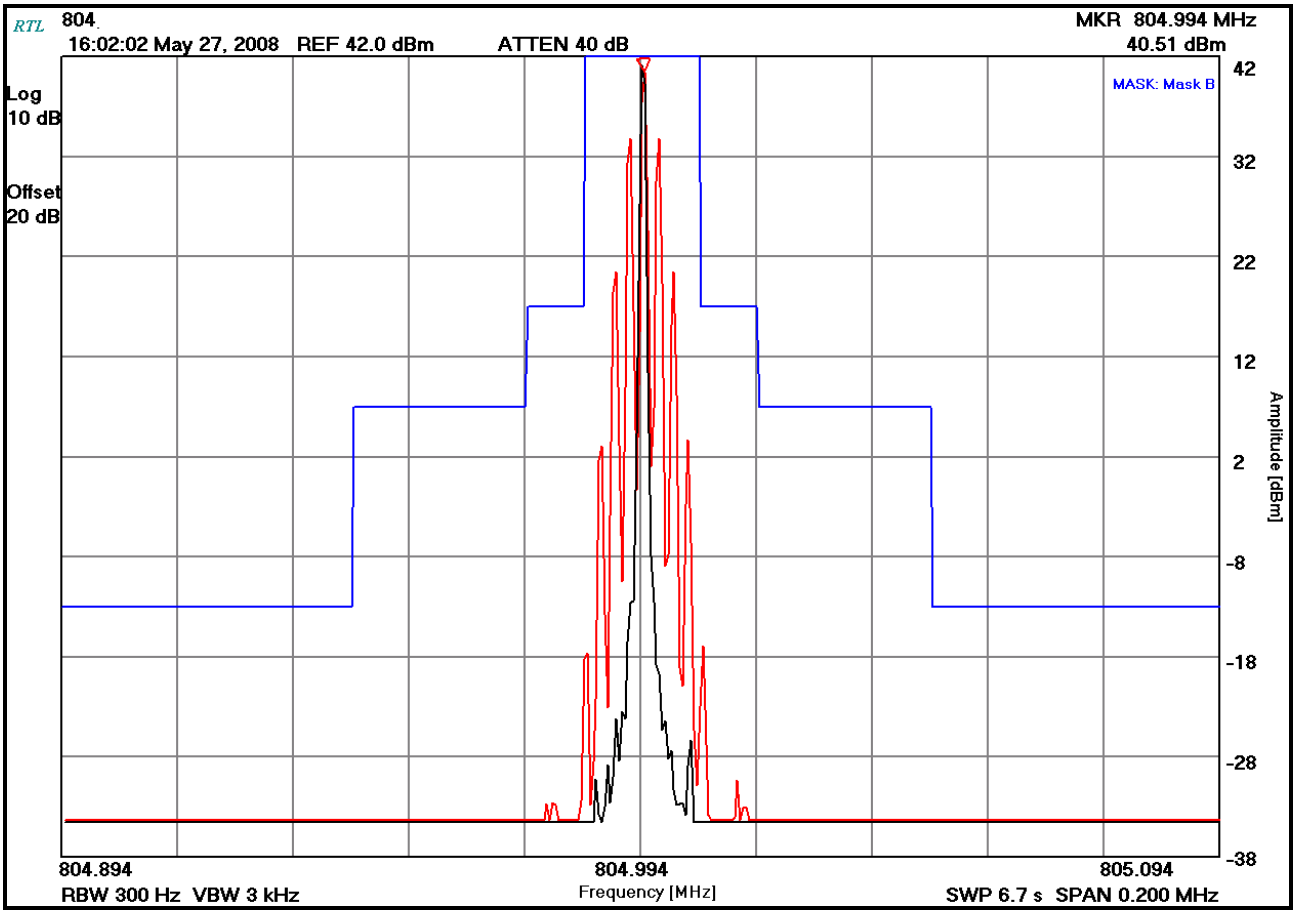
Plot 9-2: Occupied Bandwidth – 869.9875 MHz; Analog (Mask B)



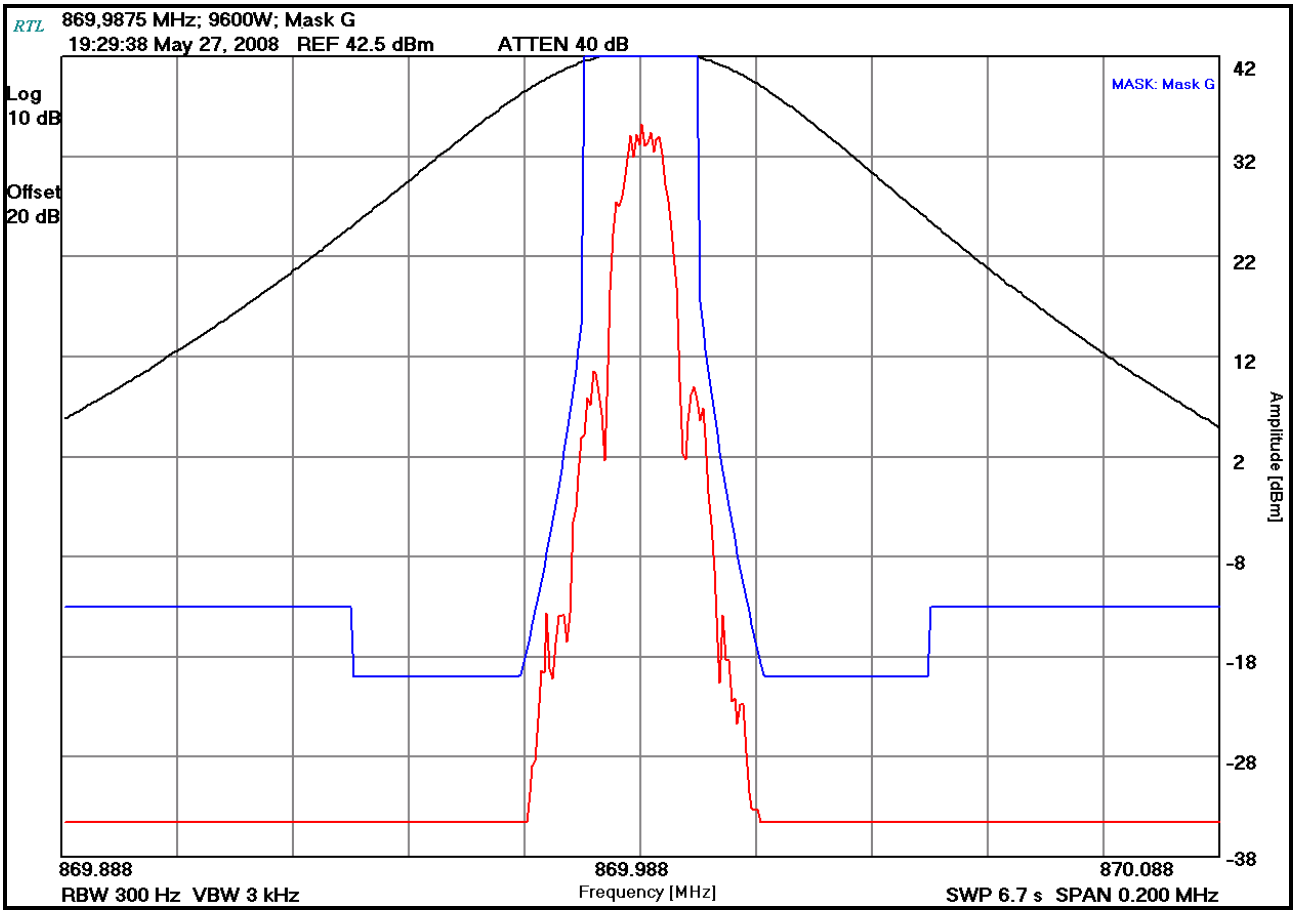
Plot 9-3: Occupied Bandwidth – 767 MHz; Analog (Mask B)



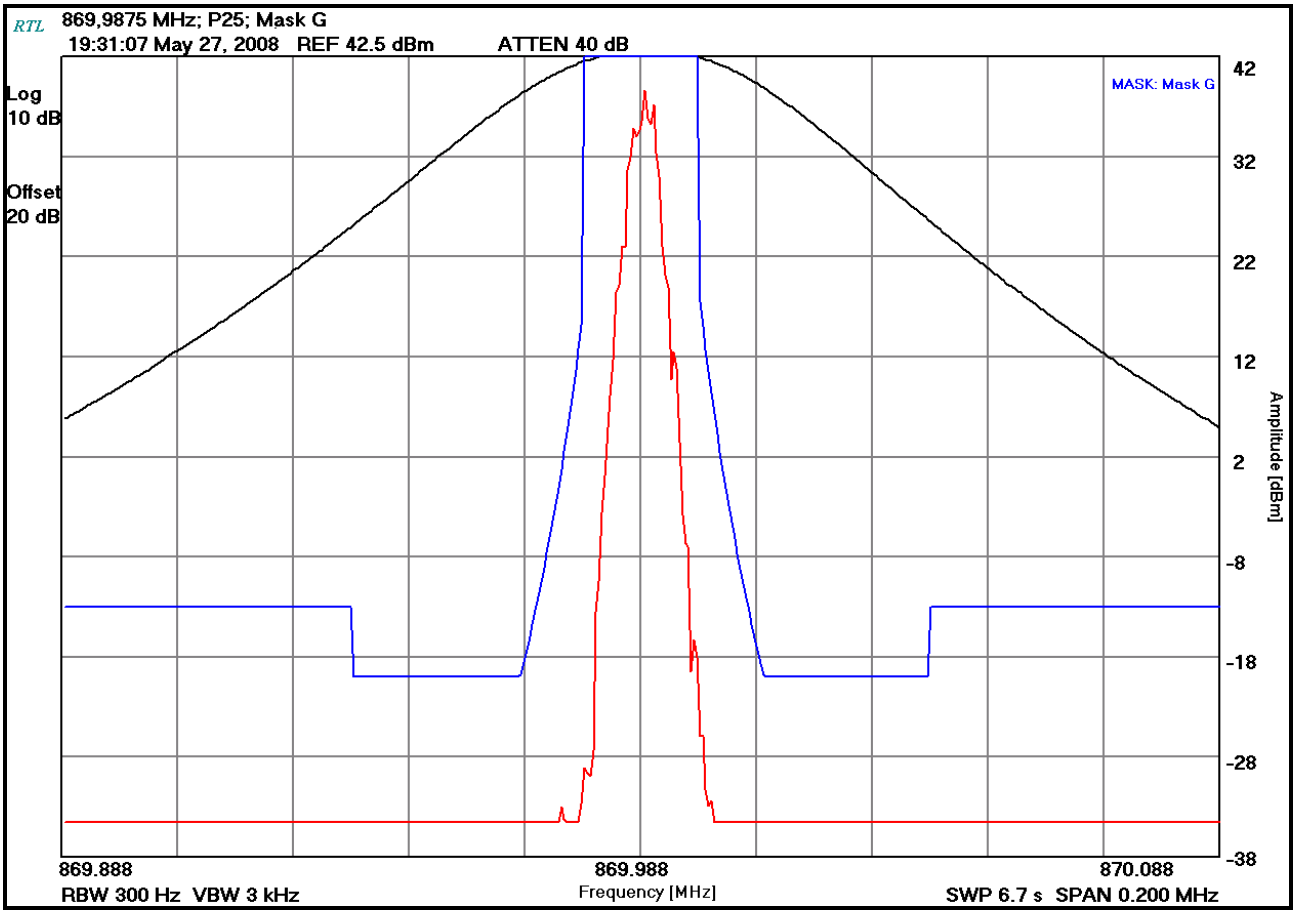
Plot 9-4: Occupied Bandwidth – 804.99375 MHz; Analog (Mask B)



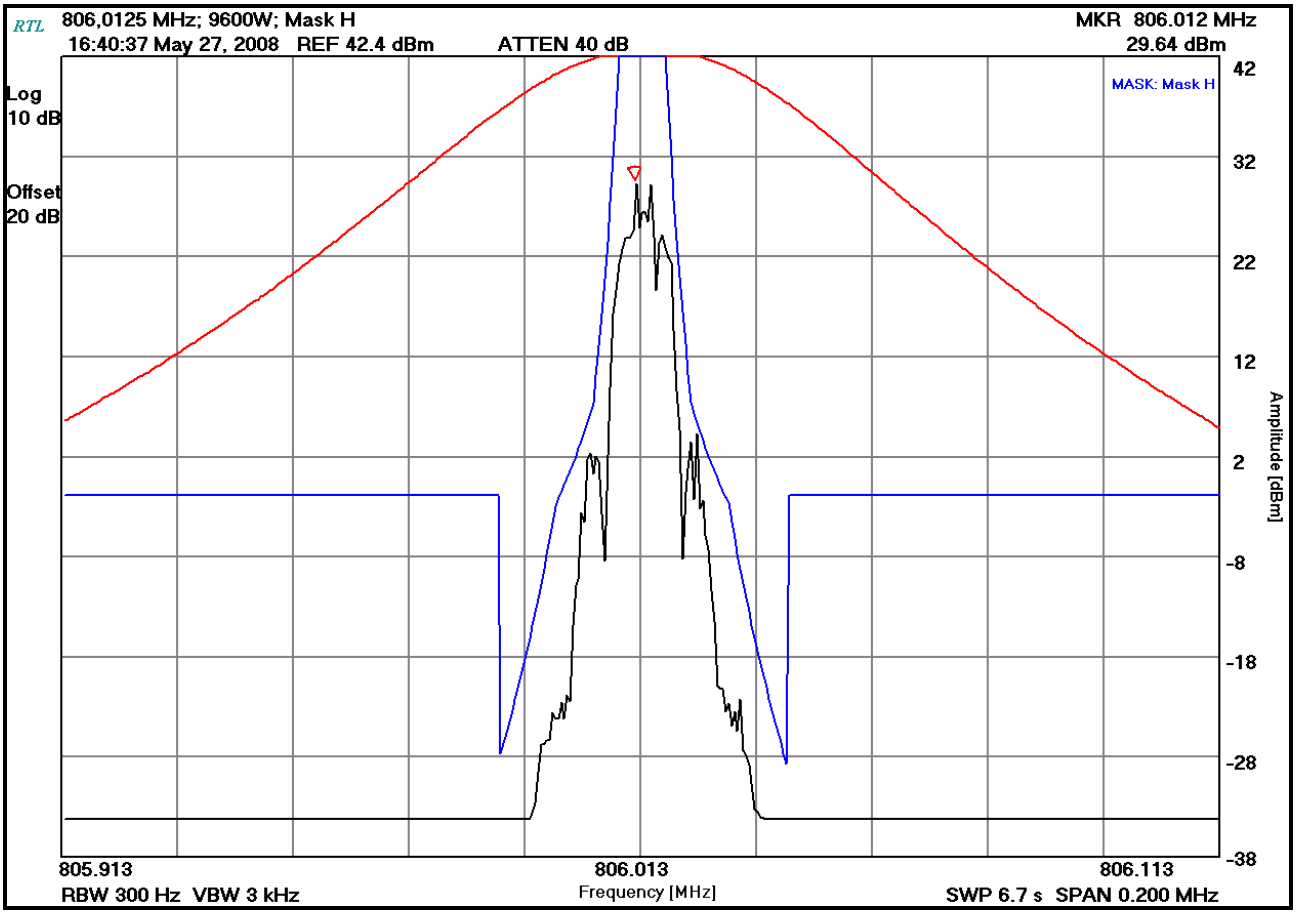
Plot 9-5: Occupied Bandwidth – 869.9875 MHz; 9600 WB (Mask G)



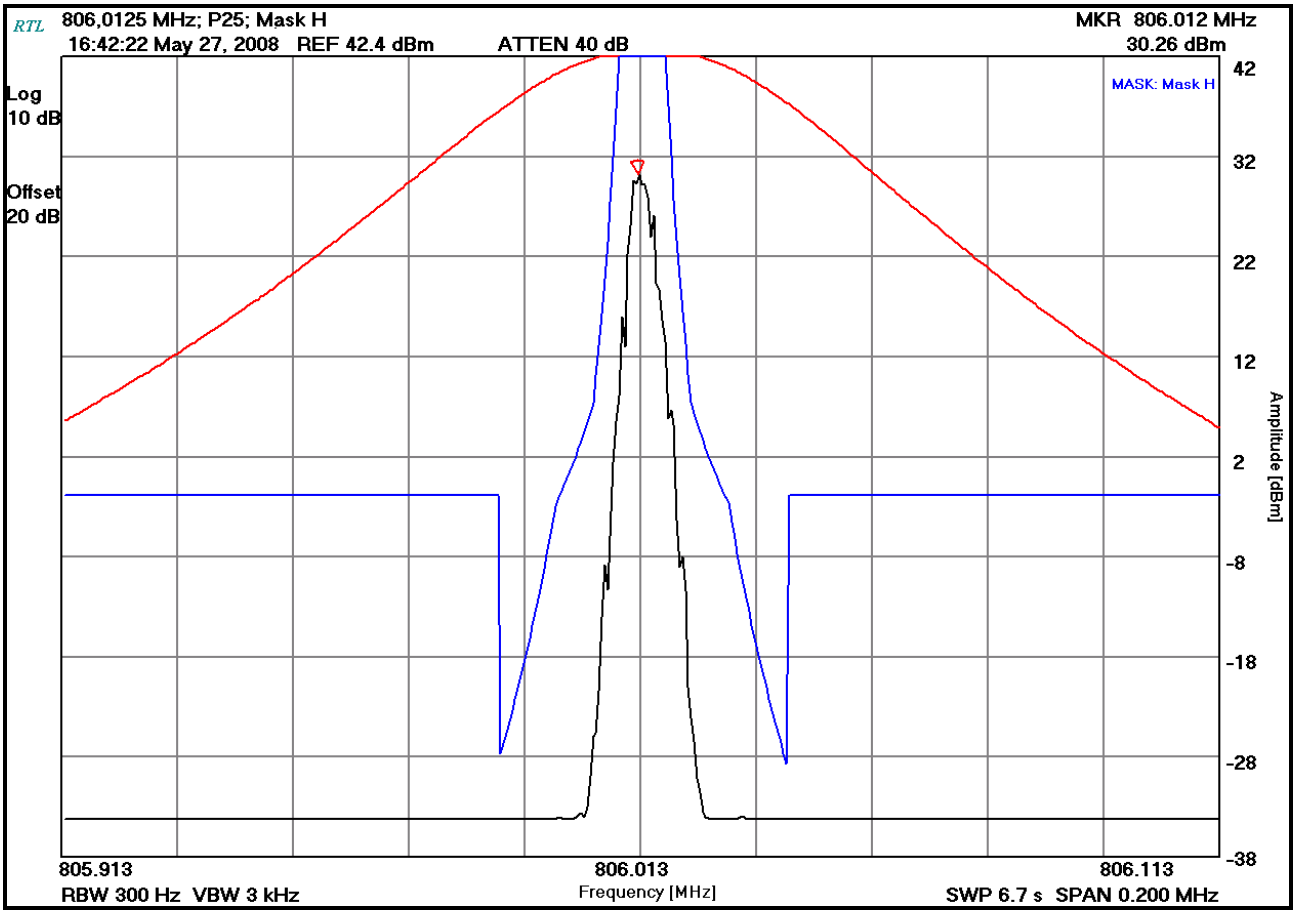
Plot 9-6: Occupied Bandwidth – 869.9875 MHz; P25 (Mask G)



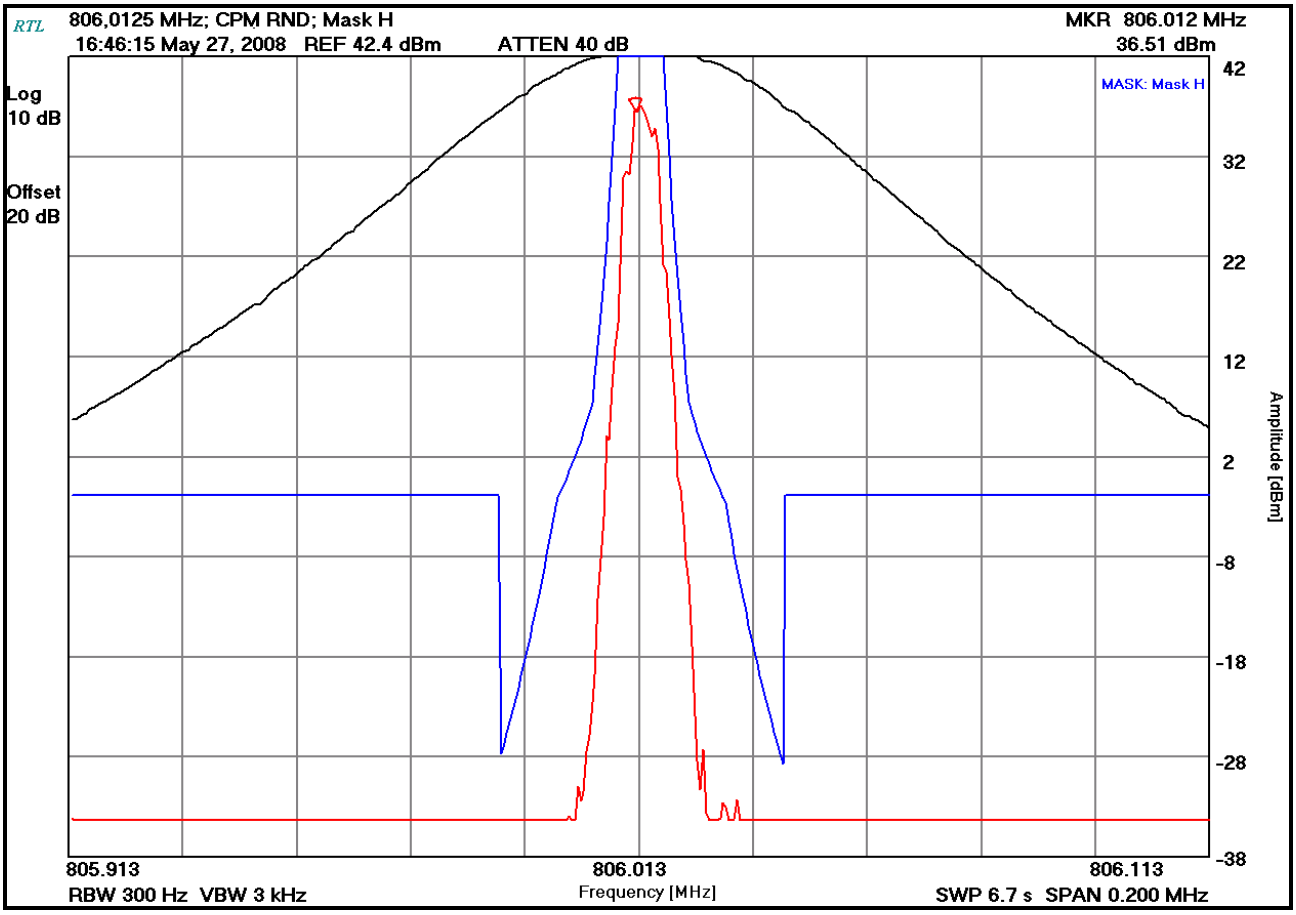
Plot 9-7: Occupied Bandwidth – 806.0125 MHz; 9600 WB; (Mask H)



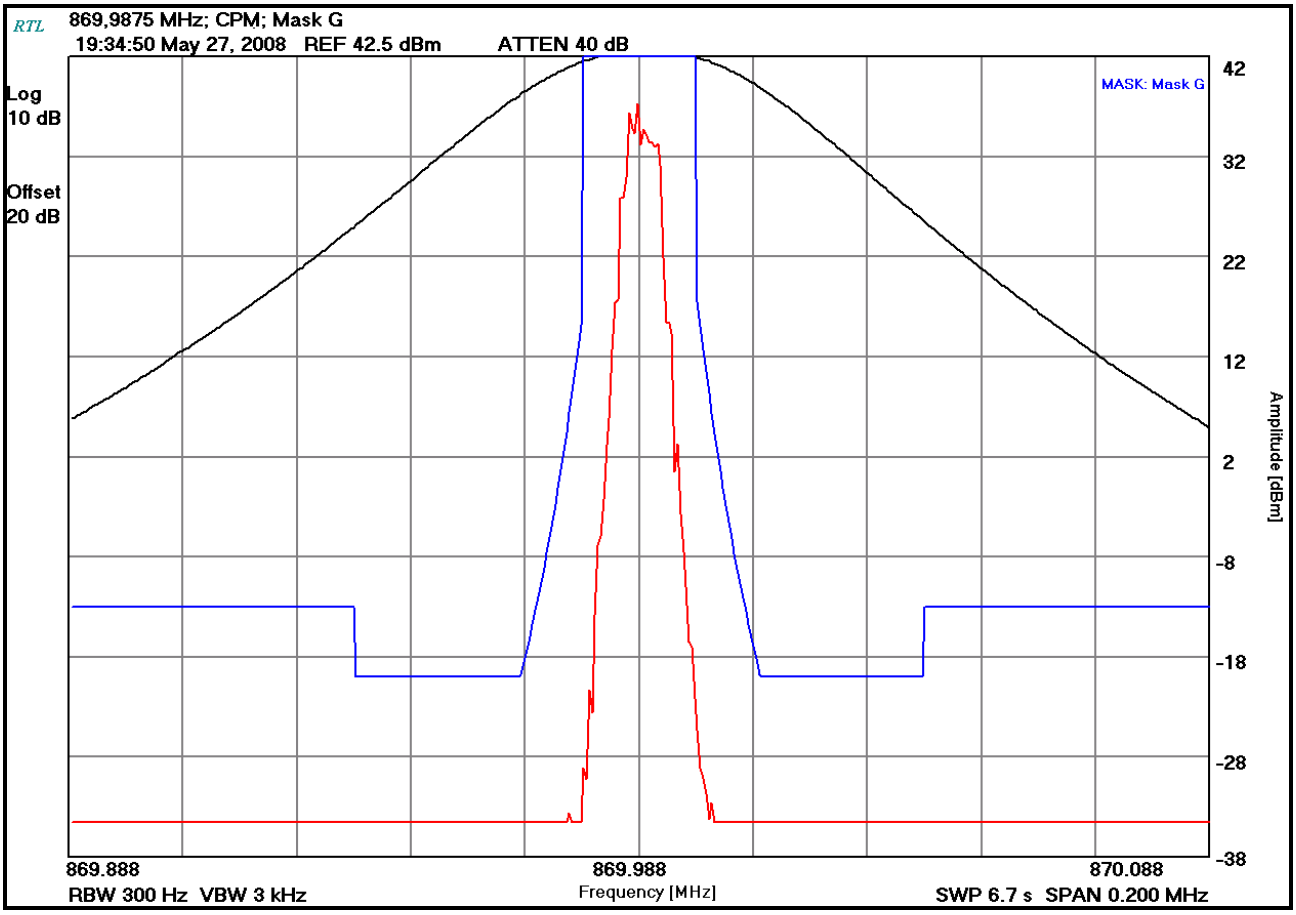
Plot 9-8: Occupied Bandwidth – 806.0125 MHz; P25; (Mask H)



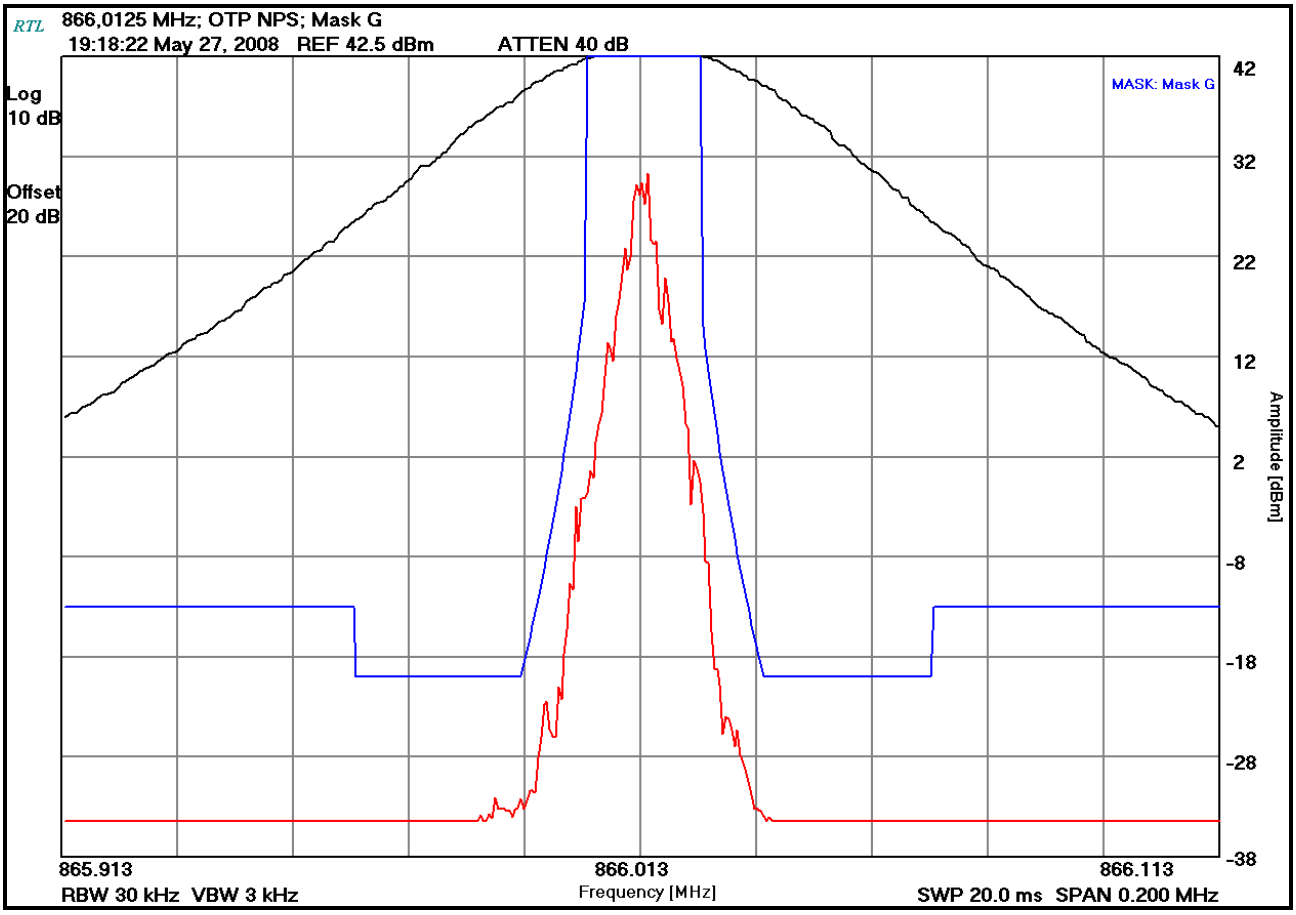
Plot 9-9: Occupied Bandwidth – 806.0125 MHz; CPM; (Mask H)



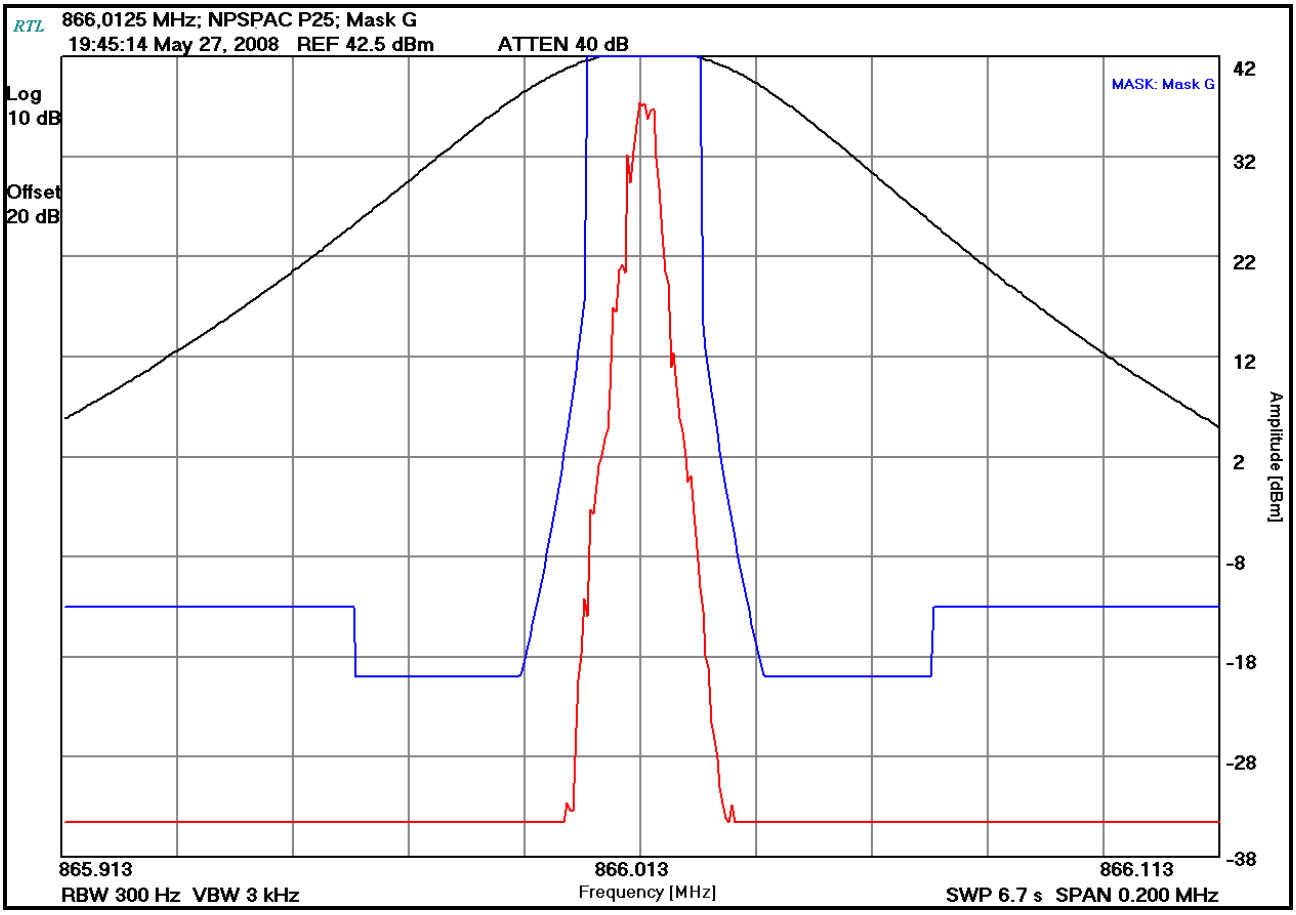
Plot 9-10: Occupied Bandwidth – 869.9875 MHz; CPM; (Mask G)



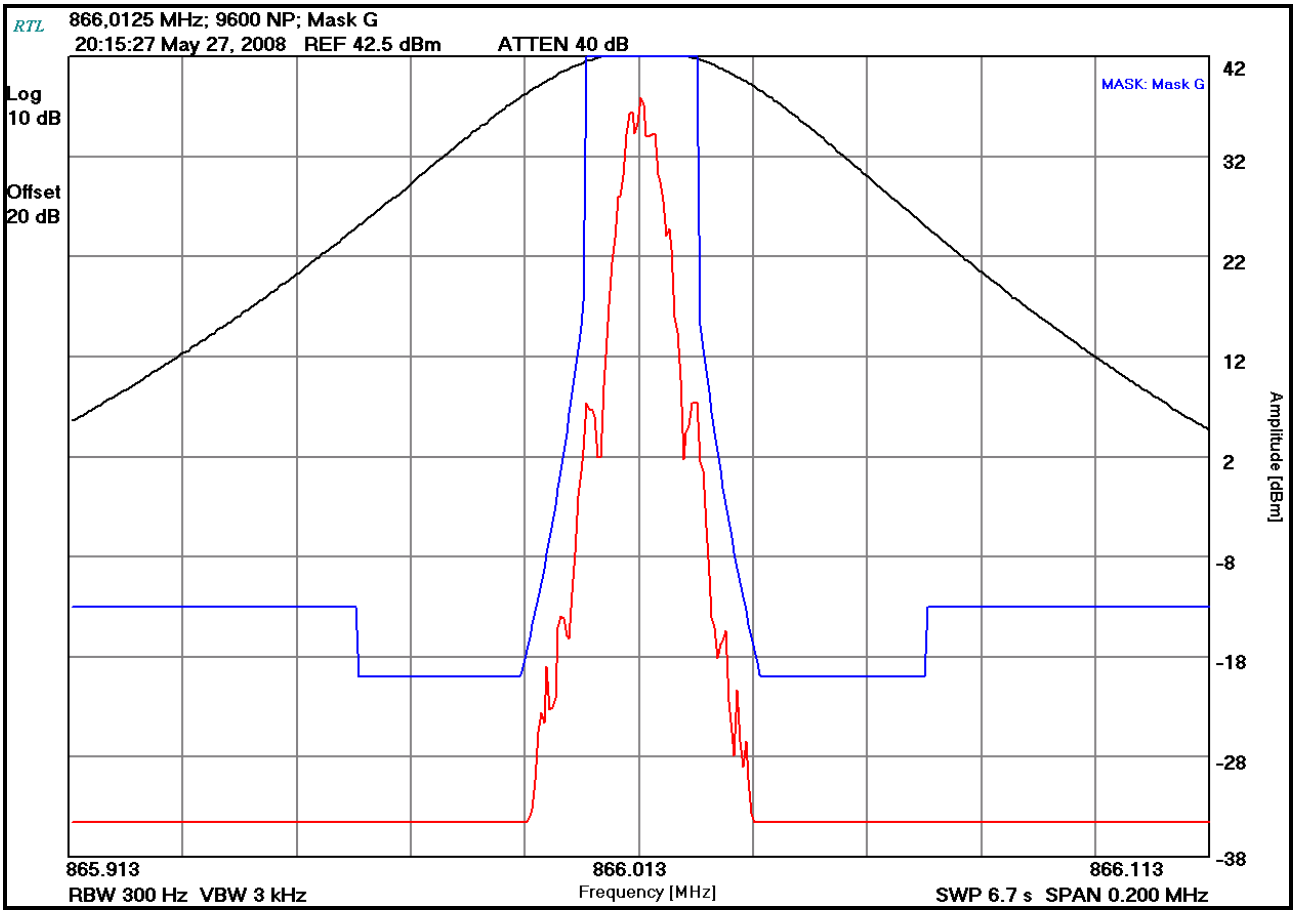
Plot 9-11: Occupied Bandwidth – 866.0125 MHz; OTP NPS; (Mask G)



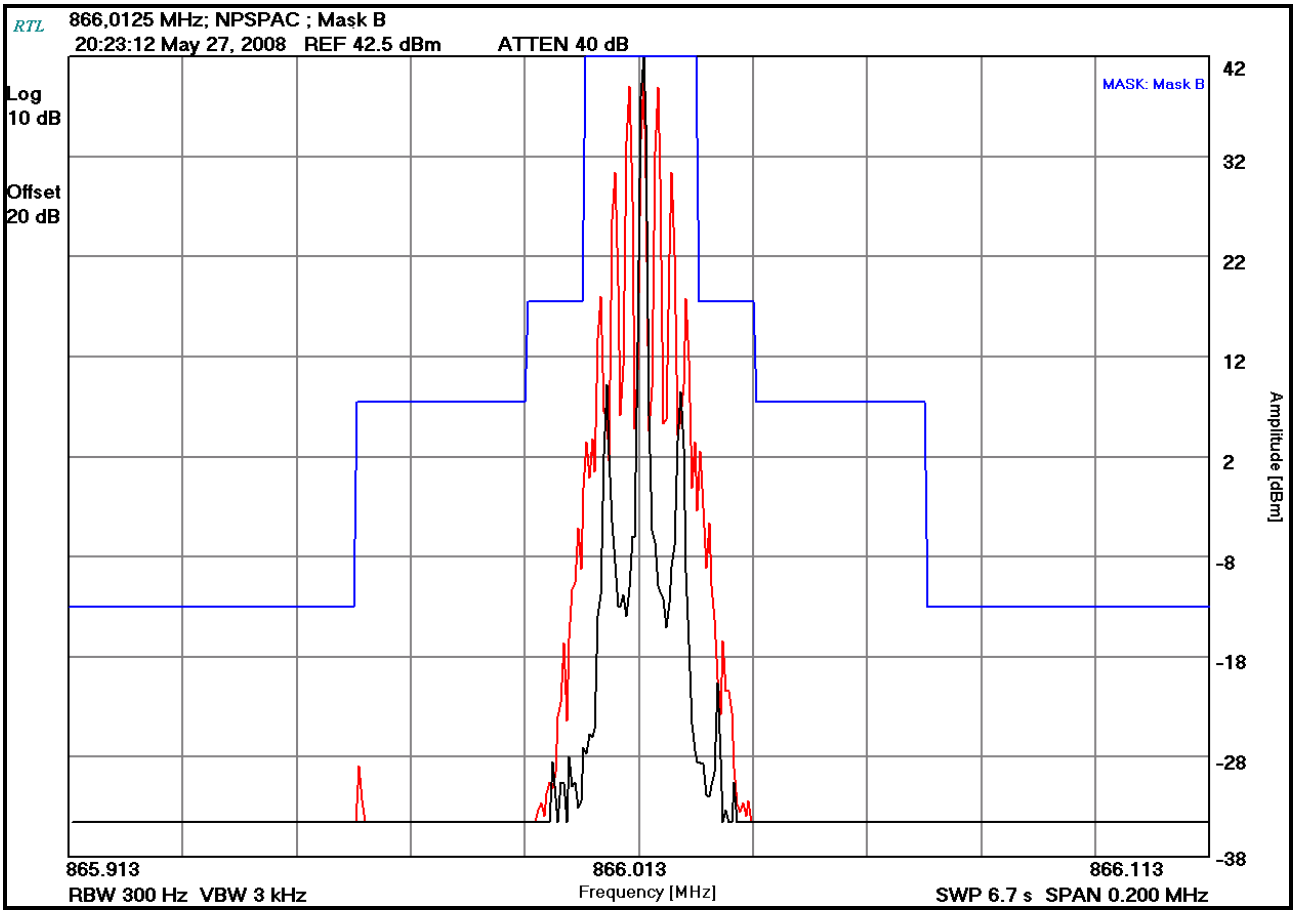
Plot 9-12: Occupied Bandwidth – 866.0125 MHz; NPSPAC P25; (Mask G)



Plot 9-13: Occupied Bandwidth – 866.0125 MHz; 9600 NP; (Mask G)



Plot 9-14: Occupied Bandwidth – 866.0125 MHz; NPSPAC; (Mask B)



Plot 9-15: Occupied Bandwidth – 866.0125 MHz; NPSPAC CPM; (Mask G)

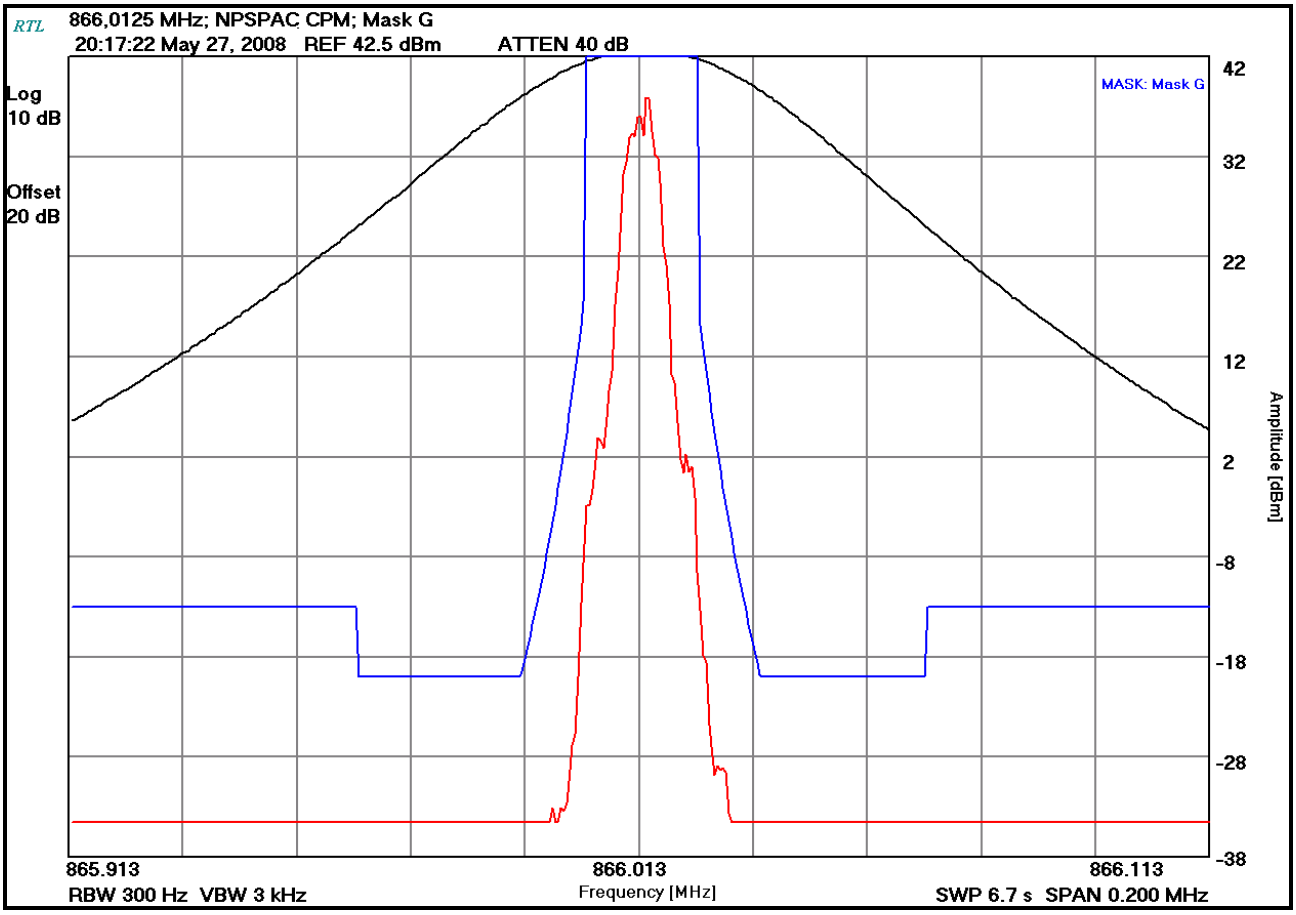


Table 9-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz - 12.8 GHz)	3826A00144	11/23/10
901307	Inmet	6N-10dB	Attenuator 10 dB	64671	2/17/11
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10dB 50W	BH1487	2/17/11
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	11/10/10

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	May 27, 2008 & May 27, 2010
EMC Test Engineer	Signature	Dates Of Tests

10 FCC Rules and Regulation Part 2.1055: Frequency Stability; Part 90.539: Frequency Stability

10.1 Test Procedure

ANSI/TIA-603-C-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.

10.2 Test Data

Table 10-1: Temperature Frequency Stability – 769.0125 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	769.012441	0.39
-20	769.012502	0.47
-10	769.012328	0.24
0	769.012331	0.25
10	769.012250	0.14
20 (reference)	769.012142	0.00
30	769.012078	-0.08
40	769.012045	-0.13
50	769.012122	-0.03
60	769.012069	-0.09

The worst-case deviation was found to be 0.5 ppm. The requirement for this band at 12.5 kHz channel spacing is 1.5 ppm when not locked to a base station.

Result: The EUT is compliant.

Note: Please see manufacturer's attestation exhibit regarding frequency stability when locked to a base station.

10.2.1 Frequency Stability/Temperature Variation

Table 10-2: Temperature Frequency Stability – 816.0125 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	816012189	-0.18
-20	816012138	-0.12
-10	816012079	-0.04
0	816012103	-0.07
10	816012011	0.04
20 (reference)	816012043	0.00
30	816012080	-0.05
40	816012161	-0.14
50	816012386	-0.42
60	816012438	-0.48

The worst-case deviation was found to be -0.48 ppm. The requirement for this band at 12.5 kHz channel spacing when not locked to a base station is 1.5 ppm.

Result: The EUT is compliant.

10.2.2 Frequency Stability/Voltage Variation

Table 10-3: Frequency Stability/Voltage Variation – 769.0125 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
11.7	769012155	0.02
13.8 (reference)	769012142	0.00
15.9	769012143	0.00

Table 10-4: Frequency Stability/Voltage Variation – 816.0125 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
11.7	816012298	0.01
13.8 (reference)	816012305	0.00
15.9	816012282	0.03

Table 10-5: 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	7/23/10
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	6/18/11

Test Personnel:

Dan Baltzell		May 28, 2010
EMC Test Engineer	Signature	Date Of Test

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

11.1 Test Procedure

ANSI/TIA-603-C-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)

11.2 Test Data

Plot 11-1: Modulation Characteristics - Audio Frequency Response

Table 11-1: 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	03/04/11
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	09/29/10

Test Personnel:

Daniel Baltzell		May 27, 2008
EMC Test Engineer	Signature	Date Of Test

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

12.1 Test Procedure

ANSI/TIA-603-C-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.

12.2 Test Data

Plot 12-1: Modulation Characteristics – Audio Low Pass Filter

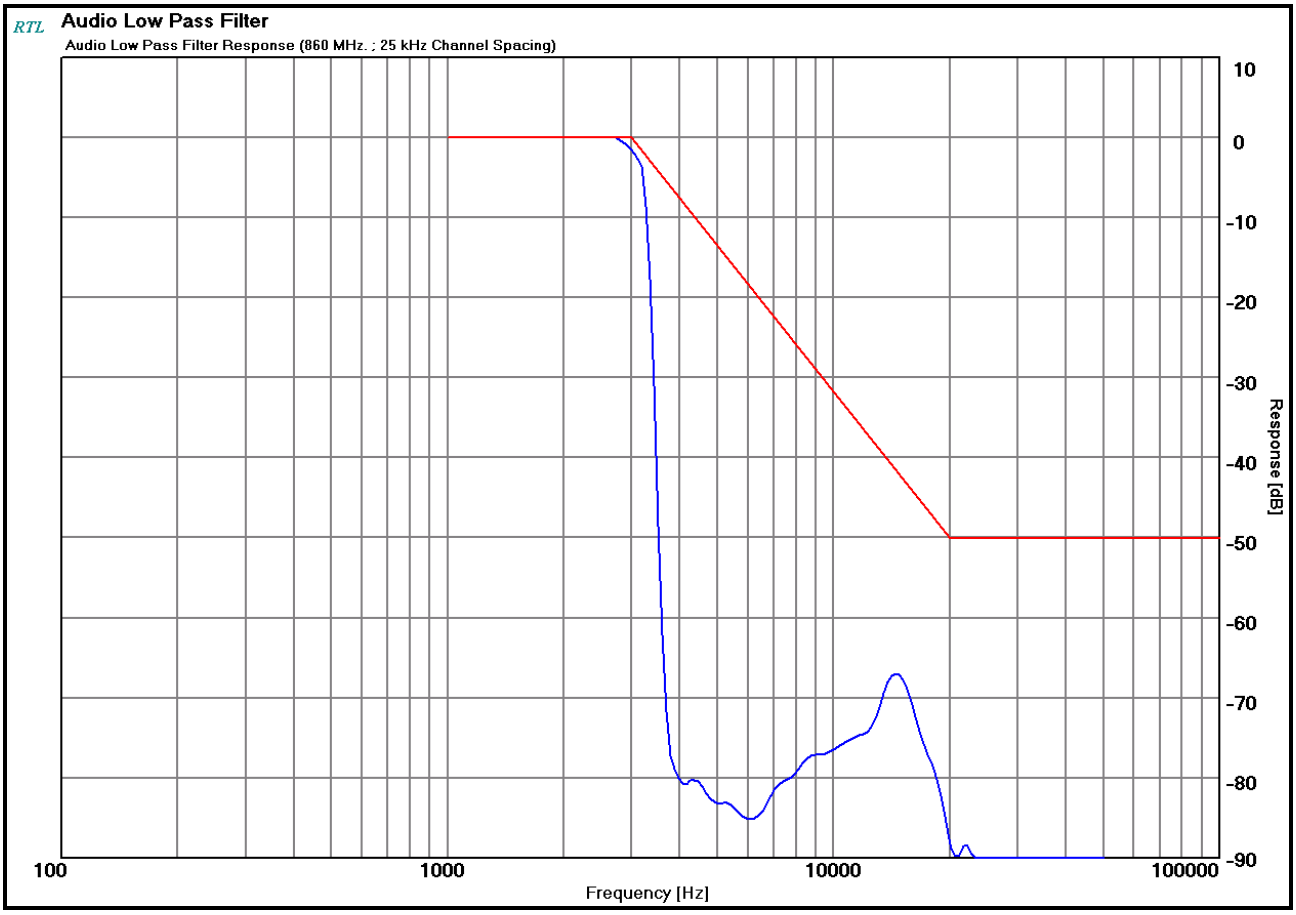


Table 12-1: Test Equipment Used For Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	03/04/11
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	09/29/10
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	12/05/10

Test Personnel:

Daniel Baltzell		May 27, 2008
EMC Test Engineer	Signature	Date Of Test

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

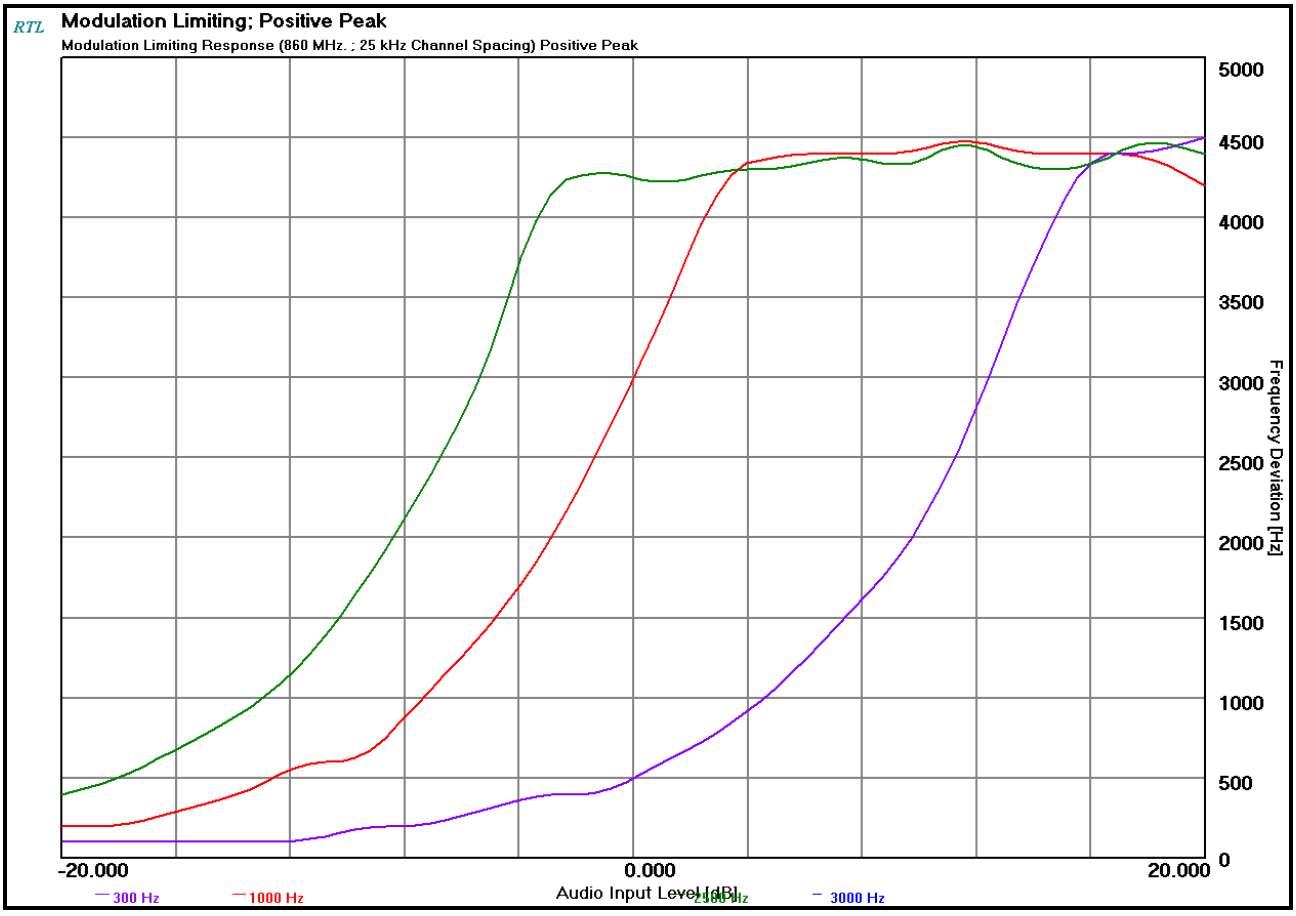
13.1 Test Procedure

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

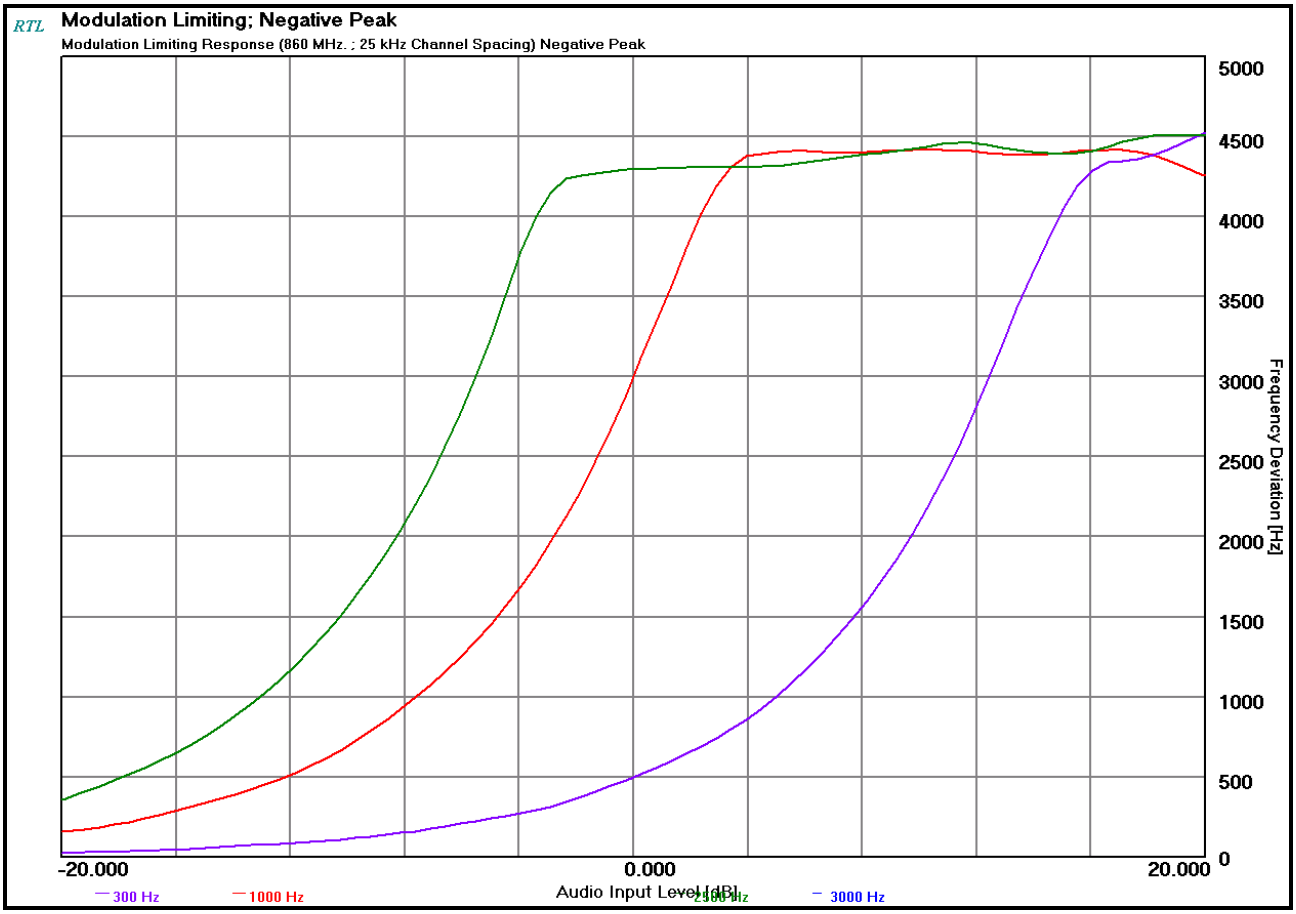
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500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

13.2 Test Data

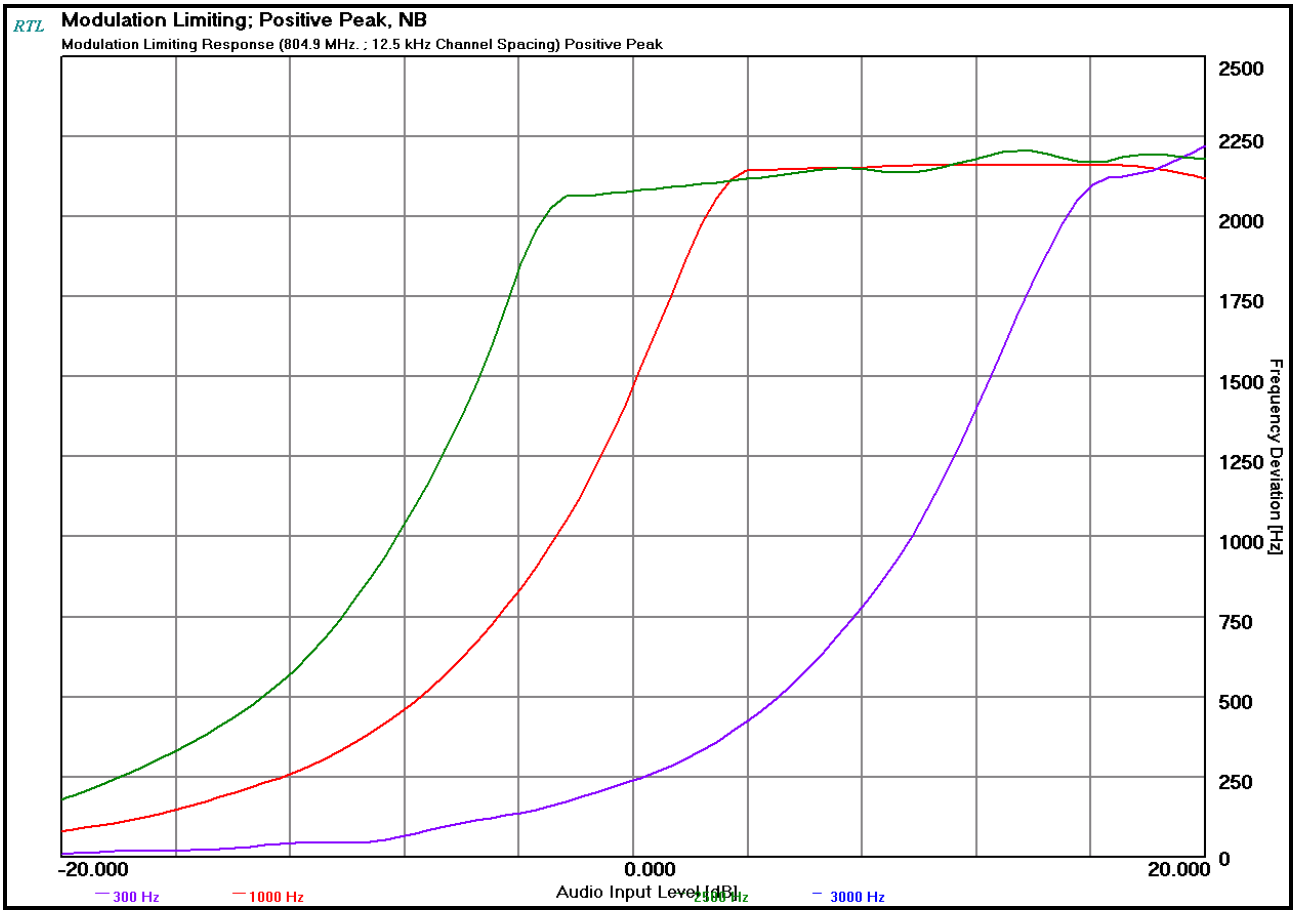
Plot 13-1: Modulation Characteristics – Modulation Limiting; Positive Peak; Wideband



Plot 13-2: Modulation Characteristics – Modulation Limiting; Negative Peak; Wideband



Plot 13-3: Modulation Characteristics – Modulation Limiting; Positive Peak; Narrowband



Plot 13-4: Modulation Characteristics – Modulation Limiting; Negative Peak; Narrowband

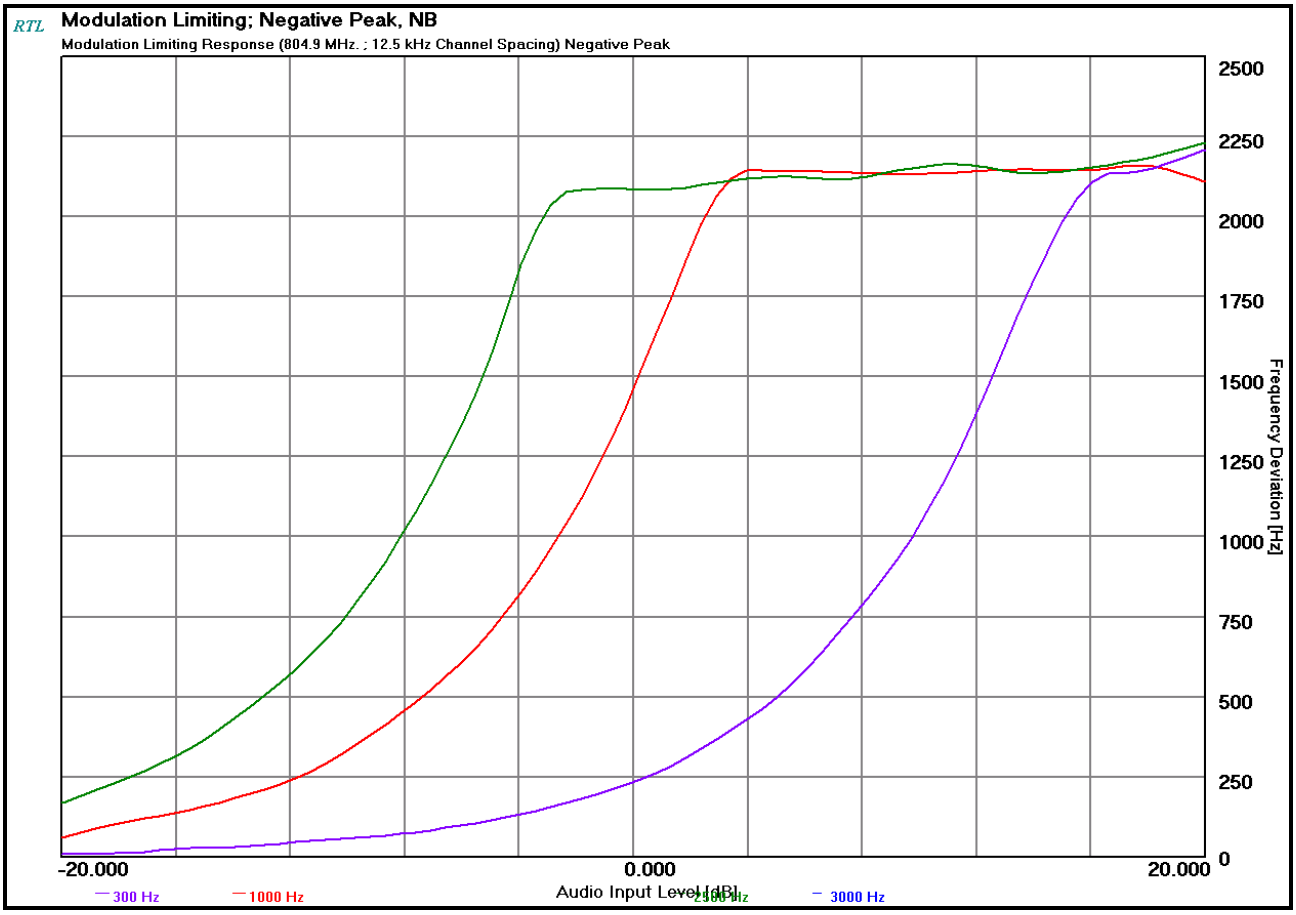


Table 13-1: Test Equipment Used For Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	03/04/11
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	09/29/10

Test Personnel:

Daniel Baltzell		May 27, 2008
EMC Test Engineer	Signature	Date Of Test

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

Analog FM

764-767/773-775 MHz Talkaround; 794-797/803-805 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; 851-869 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; 851-869 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

794-797/803-805 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, 809-821, 821-824 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

806-809, 821-824 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

806-809, 809-821, 821-824 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

763-767/773-776 Talkaround; 794-797/803-805 MHz 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: 8K4F1D, 8K4F1E

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: 8K4F1D, 8K4F1E

15 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **M7300 700/800 MHz Mobile Radio, FCC ID: OWDTR-0060-E,** complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules.