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FCC Certification Report

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MODEL: P7300 UHF Portable Radio 700/800 MHz

FCC ID: OWDTR-0054-E

June 30, 2009

Standards Referenced for this Report	
Part 2: 2008	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2008	Private Land Portable Radio Services
TIA-EIA-603-C August 2004	Land Portable 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: Daniel Baltzell

Document Number: 2009141

Frequency Range (MHz)	Rated Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Transmit Mode/Emission Designator
806-824	3.0	0.18	Analog FM (SMR) 16K0F3E, 16K0F9W
806-824	3.0	0.18	Analog FM (NPSPAC) 14K0F3E
851-869	3.0	0.18	Analog FM (SMR, Talkaround) 16K0F3E
851-869	3.0	0.18	Analog FM (NPSPAC, Talkaround) 14K0F3E
806-824	3.0	0.18	2-level FSK, digitized data or voice, EDACS (NPSPAC) 11K9F1D/E
806-824	3.0	0.18	2-level FSK, digitized data or voice, EDACS (SMR) 14K2F1D/E
851-854, 866-869	3.0	0.18	2-level FSK, digitized data or voice, EDACS (NPSPAC, Talkaround) 11K9F1D/E
851-869	3.0	0.18	2-level FSK, digitized data or voice, EDACS (SMR, Talkaround) 14K2F1D/E
806-824	3.0	0.18	4-level FSK, digitized data or voice, P25 Phase 1 8K4F1D/E
851-869	3.0	0.18	4-level FSK, digitized data or voice, P25 Phase 1 (Talkaround) 8K4F1D/E
806-809, 821-824	3.0	0.18	4-level FSK, digitized data or voice, NPSPAC OTP 12K1F9W
806-824	3.0	0.18	4-level FSK, digitized data or voice, wideband OTP 12K1F9W
769-775	3.0	0.18	4-level FSK, digitized data or voice, P25 Phase 1 (Talkaround) 8K4F1D/E
799-805	3.0	0.18	4-level FSK, digitized data or voice, P25 Phase 1 8K4F1D/E
799-805	3.0	0.18	4-level FSK, digitized data or voice, OTP 12K1F9W
799-805	3.0	0.18	4-level FSK, digitized data or voice, OTP (NB) 8K1F9W
769-775	3.0	0.18	Analog FM (NB, Talkaround) 11K0F3E
799-805	3.0	0.18	Analog FM (NB) 11K0F3E

700 MHz Band Low Power Channels

Channel No. (6.25 kHz)	Channel No. (12.5 kHz)	12.5 kHz Channel Spaced Tx Center Frequencies	
		Original 700 MHz Band Plan (MHz)	Revised 700 MHz Band Plan (MHz)
1	1-2	764.006250	769.006250
2			
3	3-4	764.018750	769.018750
4			
5	5-6	764.031250	769.031250
6			
7	7-8	764.043750	769.043750
8			
9	9-10	764.056250	769.056250
10			
11	11-12	764.068750	769.068750
12			
949	949-950	775.931250	774.931250
950			
951	951-952	775.943750	774.943750
952			
953	953-954	775.956250	774.956250
954			
955	955-956	775.968750	774.968750
956			
957	957-958	775.981250	774.981250
958			
959	959-960	775.993750	774.993750
960			
961	961-962	794.006250	799.006250
962			
963	963-964	794.018750	799.018750
964			
965	965-966	794.031250	799.031250
966			
967	967-968	794.043750	799.043750
968			
969	969-9700	794.056250	799.056250
970			
971	971-972	794.068750	799.068750
972			
1909	1909-1910	805.931250	804.931250
1910			
1911	1911-1912	805.943750	804.943750
1912			

Channel No. (6.25 kHz)	Channel No. (12.5 kHz)	12.5 kHz Channel Spaced Tx Center Frequencies	
		Original 700 MHz Band Plan (MHz)	Revised 700 MHz Band Plan (MHz)
1913	1913-1914	805.956250	804.956250
1914			
1915	1915-19166	805.968750	804.968750
1916			
1917	1917-1918	805.981250	804.981250
1918			
1919	1919-19200	805.993750	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	2.1046(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 and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **P7300 700/800 MHz Portable Radio; FCC ID: OWDTR-0054-E.**

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 0.5 to 3 W.

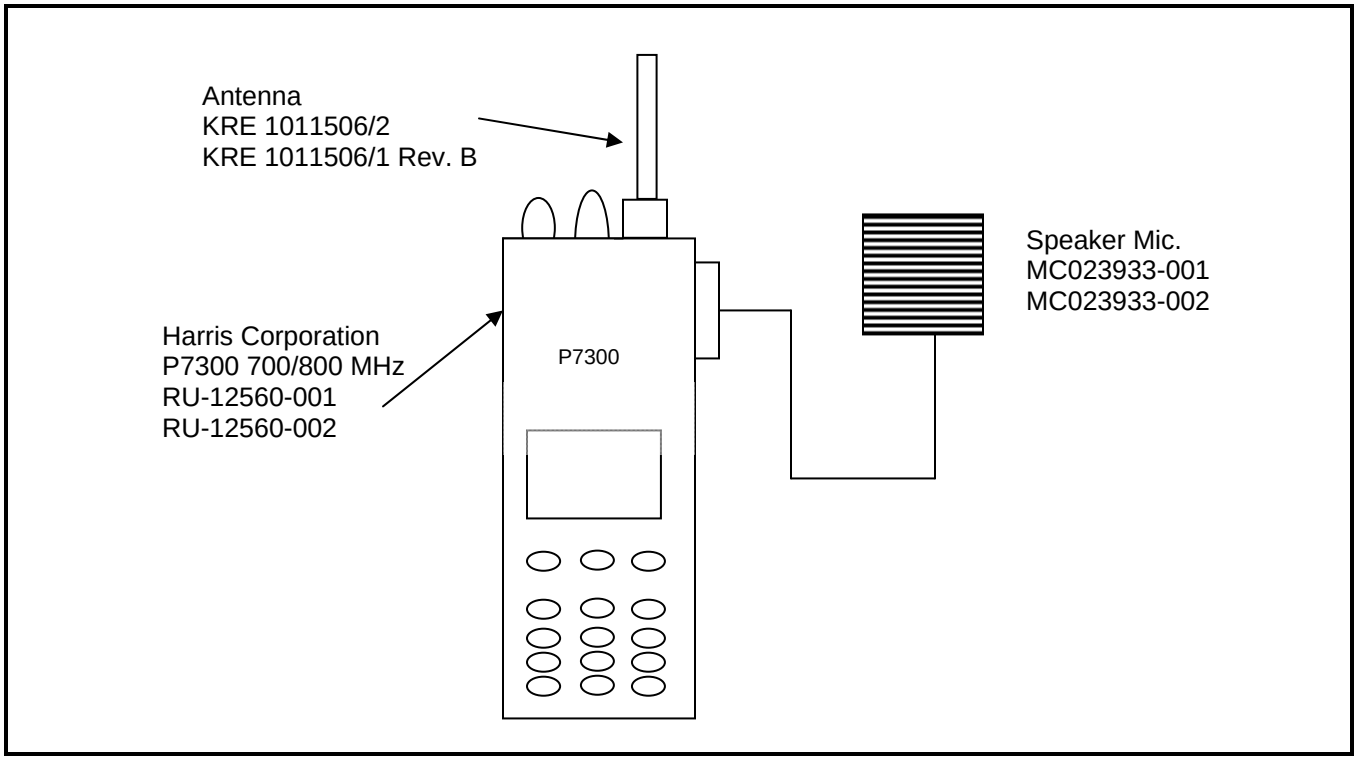
2.4 Tested System Details

The test sample was received on March 11, 2009. 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 was programmed for multiple modes of operation and modulation types. The EUT has two product variants: a Scan and a System version. The System version adds a DTMF keypad; the System version was used in testing, as it was deemed to represent the potential for worst-case emissions.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	P/N	FCC ID	RTL Bar Code
P7300 Portable System Radio	Harris Corporation	P7300	RU-012560-002 (T2-DB-002)	OWDTR-0054-E	18854
7.5V NiCd Battery	Harris Corporation	BT-023406-001	001056LMAS	N/A	18855
P7300 Portable Scan Radio	Harris Corporation	P7300	RU-012560-001 (T2-DB-001)	OWDTR-0054-E	18857
7.5V NiCd Battery	Harris Corporation	BT-023406-001	001056LMAS	N/A	18858

Figure 2-1: Configuration of Tested System



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

7.5 V / 2.5 A

4 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 90.541(b)/ 90.542(a)(6)

4.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.1

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

Manufacturer's rated power:

Conducted power is continuously variable from 0.5 to 3 W.

4.2 Test Data

Table 4-1: RF Conducted Output Power – High Power

Frequency (MHz)	Power Measured (dBm)	Power Measured (Watts)
764	34.4	2.7
767	34.4	2.8
770	34.4	2.8
772.00625	34.4	2.8
794	34.5	2.8
797	34.5	2.8
800	34.5	2.8
802.00625	34.5	2.8
806	35.0	3.2
815	35.0	3.2
820	35.0	3.2
822.5	35.0	3.2
824	35.0	3.2
851	35.0	3.1
860	34.9	3.1
865	34.9	3.1
867.5	34.9	3.1
869	34.9	3.1

Table 4-2: RF Conducted Output Power – Low Powered Channels in 700 MHz Band

Frequency (MHz)	Power Measured (dBm)	Power Measured (Watts)
769.00625	32.7	1.9
769.01875	32.7	1.9
769.03125	32.7	1.9
769.04375	32.7	1.9
769.05625	32.7	1.9
769.06875	32.7	1.9
774.93125	32.7	1.9
774.94375	32.7	1.9
774.95625	32.7	1.9
774.96875	32.7	1.9
774.98125	32.7	1.9
774.99375	32.7	1.9
799.00625	32.8	1.9
799.01875	32.7	1.9
799.03125	32.7	1.9
799.04375	32.7	1.9
799.05625	32.7	1.9
804.93125	32.7	1.9
804.94375	32.7	1.9
804.95625	32.7	1.9
804.96875	32.7	1.9
804.98125	32.7	1.9
804.99375	32.7	1.9

Table 4-3: 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	11/5/09
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	11/5/09
901138	Weinschel Corp.	48-40-34 DC-18GHz	Attenuator, 100W 40dB	BK5883	12/3/09

Test Personnel:

Daniel Baltzell		March 11, 2009
EMC Test Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.543

5.1 Test Procedure

ANSI/TIA/EIA-603-2002, 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.

5.2 Test Data

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

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

The following channels (in MHz) were investigated: 764, 794, 800, 806, 824, and 869 MHz

Table 5-1: Antenna Terminal Spurious Emissions - 764 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Notch Insertion Loss (dB)	Corrected Analyzer Level (dBc)	Margin (dB)
1528.0	-51.8	0.7	85.5	-38.2
2292.0	-39.0	9.3	64.1	-16.7
3056.0	-82.9	1.1	116.2	-68.9
3820.0	-87.7	0.4	121.7	-74.4
4584.0	-68.9	5.3	98.0	-50.6
5348.0	-86.9	4.3	117.0	-69.7
6112.0	-83.7	2.3	115.8	-68.5
6876.0	-81.9	7.0	109.3	-62.0
7640.0	-82.3	1.0	115.7	-68.3

Table 5-2: Antenna Terminal Spurious Emissions - 794 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Notch Insertion Loss (dB)	Corrected Analyzer Level (dBc)	Margin (dB)
1588.0	-58.2	0.5	92.2	-44.7
2382.0	-42.9	7.0	70.4	-22.9
3176.0	-80.9	0.3	115.1	-67.6
3970.0	-84.1	0.6	118.0	-70.6
4764.0	-75.3	2.4	107.4	-59.9
5558.0	-86.9	28.3	93.1	-45.6
6352.0	-82.3	0.8	116.0	-68.6
7146.0	-83.1	2.6	115.0	-67.5
7940.0	-84.1	0.4	118.2	-70.8

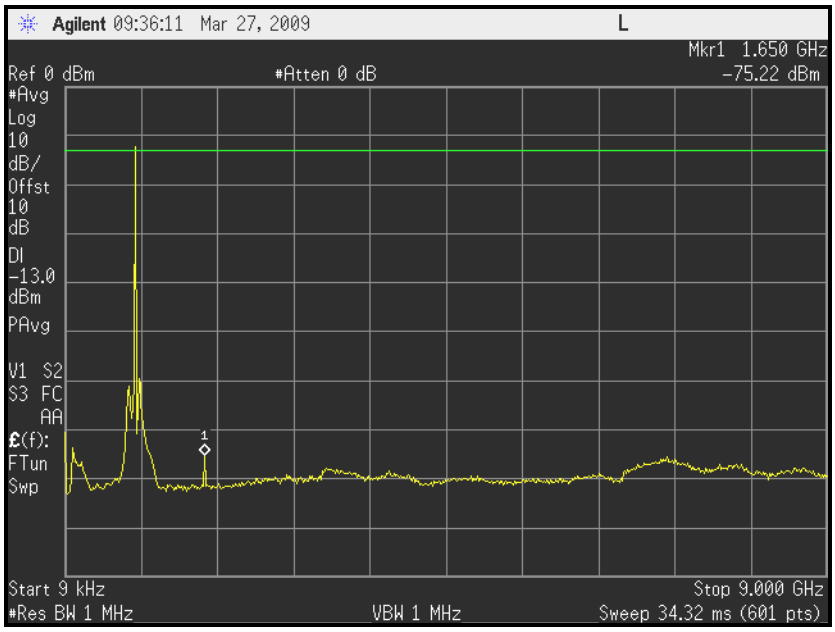
Table 5-3: Antenna Terminal Spurious Emissions - 800 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Notch Insertion Loss (dB)	Corrected Analyzer Level (dBc)	Margin (dB)
1604.0	-49.4	0.7	83.2	-35.7
2406.0	-45.8	6.8	73.5	-26.0
3208.0	-80.1	0.5	114.1	-66.6
4010.0	-84.8	0.7	118.6	-71.1
4812.0	-78.9	1.1	112.3	-64.8
5614.0	-87.0	17.5	104.0	-56.5
6416.1	-83.1	0.7	116.9	-69.4
7218.1	-83.9	1.3	117.1	-69.6
8020.1	-84.9	1.0	118.4	-70.9

Table 5-4: Antenna Terminal Spurious Emissions - 806 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Notch Insertion Loss (dB)	Corrected Analyzer Level (dBc)	Margin (dB)
1612.0	-47.4	0.9	81.5	-34.1
2418.0	-42.7	7.6	70.1	-22.7
3224.0	-79.7	0.8	113.9	-66.5
4030.0	-88.9	0.9	123.0	-75.5
4836.0	-80.5	0.9	114.6	-67.2
5642.0	-94.0	13.2	115.8	-68.3
6448.0	-88.3	0.5	122.8	-75.4
7254.0	-90.1	1.8	123.3	-75.9
8060.0	-90.2	0.4	124.8	-77.4

Plot 5-1: Antenna Conducted Spurious - 824 MHz



Plot 5-2: Antenna Conducted Spurious - 869 MHz

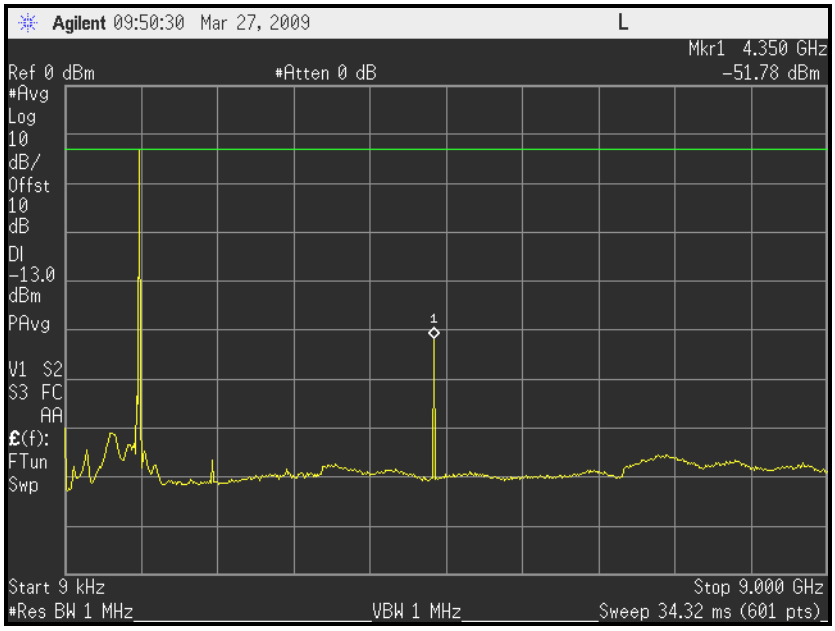


Table 5-5: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
901128	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	3/10/12

Test Personnel:

Daniel Baltzell		March 27, June 1, 2009
EMC Test Engineer	Signature	Dates Of Tests

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

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.

6.1 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 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 Part 90 §90.543(b)

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

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

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

6.2 Test Data

Table 6-1: P25 Mode – 772.00625 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-43.5	-43.4
(+/-)15.625	6.25	-60	-72.5	-71.6
(+/-)21.875	6.25	-60	-70.1	-73.9
(+/-)37.5	25	-60	-71.3	-71.1
(+/-)62.5	25	-65	-75.6	-75.3
(+/-)87.5	25	-65	-78.6	-78.4
(+/-)150	100	-65	-73.4	-71.4
(+/-)250	100	-65	-76.5	-78.4
(+/-)350	100	-65	-78.9	-79.3

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-98.5
12 MHz to receive band	30(s)	-75	-105.0
In receive band	30(s)	-100	-118.5

Table 6-2: Analog – 772.00625 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-50.8	-52.6
(+/-)15.625	6.25	-60	-65.4	-65.2
(+/-)21.875	6.25	-60	-67.0	-69.6
(+/-)37.5	25	-60	-67.9	-68.0
(+/-)62.5	25	-65	-68.7	-68.7
(+/-)87.5	25	-65	-68.5	-68.5
(+/-)150	100	-65	-66.0	-66.0
(+/-)250	100	-65	-66.1	-66.0
(+/-)350	100	-65	-67.1	-67.4

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-98.8
12 MHz to receive band	30(s)	-75	-105.0
In receive band	30(s)	-100	-118.5

Table 6-3: P25 Mode – 802.00625 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-42.6	-42.6
(+/-)15.625	6.25	-60	-72.8	-72.8
(+/-)21.875	6.25	-60	-74.3	-74.7
(+/-)37.5	25	-60	-71.9	-71.4
(+/-)62.5	25	-65	-76.2	-76.1
(+/-)87.5	25	-65	-79.1	-79.0
(+/-)150	100	-65	-73.1	-72.5
(+/-)250	100	-65	-79.5	-78.9
(+/-)350	100	-65	-80.4	-81.1

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-99.3
12 MHz to receive band	30(s)	-75	-106.3
In receive band	30(s)	-100	-115.2

Table 6-4: OTP NB – 802.00625 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-51.6	-61.6
(+/-)15.625	6.25	-60	-72.0	-70.5
(+/-)21.875	6.25	-60	-73.4	-75.6
(+/-)37.5	25	-60	-70.9	-71.9
(+/-)62.5	25	-65	-75.2	-75.6
(+/-)87.5	25	-65	-78.5	-78.7
(+/-)150	100	-65	-71.8	-74.0
(+/-)250	100	-65	-76.9	-78.6
(+/-)350	100	-65	-79.3	-79.4

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-99.1
12 MHz to receive band	30(s)	-75	-106.1
In receive band	30(s)	-100	-114.5

Table 6-5: Analog – 802.00625 MHz - 12.5 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)9.375	6.25	-40	-67.6	-67.4
(+/-)15.625	6.25	-60	-72.0	-72.2
(+/-)21.875	6.25	-60	-74.5	-74.9
(+/-)37.5	25	-60	-72.5	-71.6
(+/-)62.5	25	-65	-75.7	-76.1
(+/-)87.5	25	-65	-78.8	-78.4
(+/-)150	100	-65	-73.7	-73.2
(+/-)250	100	-65	-77.6	-79.0
(+/-)350	100	-65	-81.7	-81.9

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-98.97
12 MHz to receive band	30(s)	-75	-106.26
In receive band	30(s)	-100	-115.04

Table 6-6: OTP SMR – 802.00625 MHz - 25 kHz Channel Spacing

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP Low Offset (dBc)	Max ACP High Offset (dBc)
(+/-)15.625	6.25	-40	-59.7	-63.8
(+/-)21.875	6.25	-60	-76.0	-74.9
(+/-)37.5	25	-60	-71.4	-71.4
(+/-)62.5	25	-65	-75.6	-75.1
(+/-)87.5	25	-65	-78.1	-77.7
(+/-)150	100	-65	-68.6	-71.9
(+/-)250	100	-65	-78.7	-78.5
(+/-)350	100	-65	-81.2	-79.3

Offset from Center Frequency (kHz)	Measurement BW (kHz)	Max ACP (dBc)	Max ACP (dBc)
>400 to 12 MHz	30(s)	-75	-98.9
12 MHz to receive band	30(s)	-75	-106.1
In receive band	30(s)	-100	-115.4

Table 6-7: 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	7/31/09

Test Personnel:

Daniel Baltzell		March 17, 2009
EMC Test Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 2.1053(a): Field Strength of Spurious Radiation; Part 90 90.543(f)

7.1 Test Procedure

ANSI/TIA/EIA-603-2002, 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 15.543(f) states: "For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation."

7.2 Test Data

7.2.1 CFR 47 Part 90.210 Requirements

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

No emissions for any channels investigated were found to have emissions within 20 dB of the margin, except those shown below.

Table 7-1: Field Strength of Spurious Radiation in the 1559–1610 MHz Band – FCC 15.543(f)

Fundamental/ Harmonic (MHz)	Spectrum Analyzer Level - Horizontal Polarity	Spectrum Analyzer Level - Vertical Polarity	Signal Generator Level - Horizontal Substitution (dBm)	Signal Generator Level - Vertical Substitution (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (worst case) (dBW/MHz)	Limit (dBW/ MHz)	Margin (dB)
800									
1600	25.1	17.5	-48.1	-53.2	15.0	6.8	-91.4	-80.0	-11.4
802.0063									
1604.013	25.2	16.9	-47.8	-52.6	16.7	6.7	-87.8	-80.0	-7.8

Table 7-2: 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
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	3/4/10
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 - 20 GHz)	3610A00866	2/9/10
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	10/17/09
901516	Insulated Wire Inc.	KPS-1503-2400-KPS-09302008	RF cable, 20'	NA	10/17/09
901517	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	10/17/09
901132	Par Electronics	806-902 (25W)	UHF Notch Filter	N/A	3/10/12
900816	Weinschel Corp.	2	3 dB Attenuator; 5 W	BG1273	12/3/09
901375	Weinschel Corp	2	6 dB Attenuator; 5 W	AP5914	12/3/09
901358	Aeroflex/Weinschel	47-3-34	Attenuator, 3 dB0 (1 - 18 GHz)	BS0146	3/12/10
900819	Weinschel Corp	2	10 dB Attenuator; 5 W	BF0830	12/3/09

Test Personnel:

Daniel Baltzell		March 18 and June 2, 2009
Test Engineer	Signature	Dates Of Tests

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

Occupied Bandwidth - Compliance with the Emission Masks

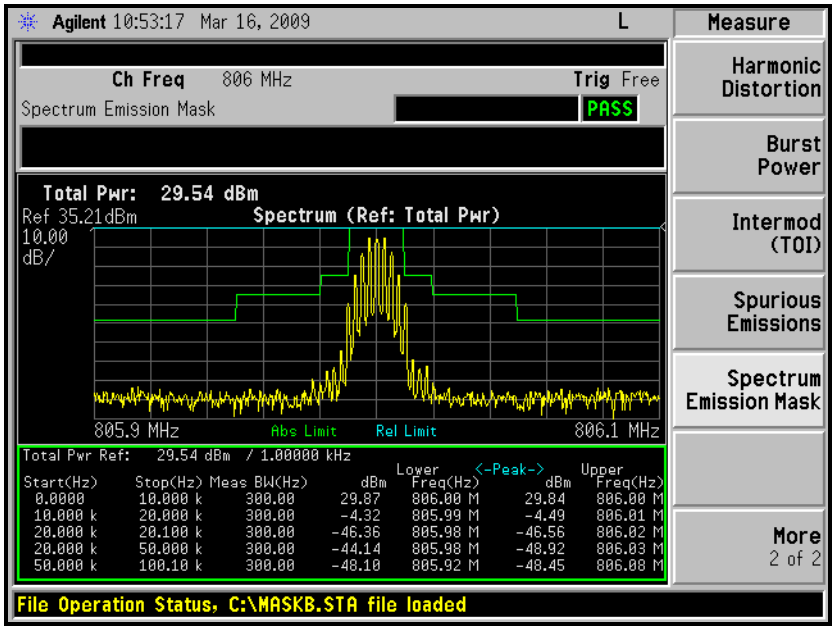
8.1 Test Procedure

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

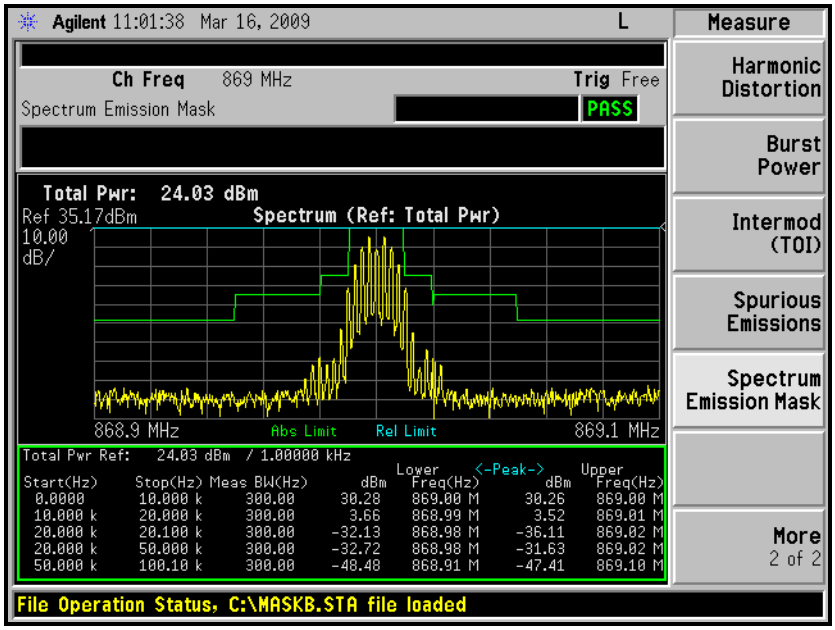
Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

8.2 Test Data

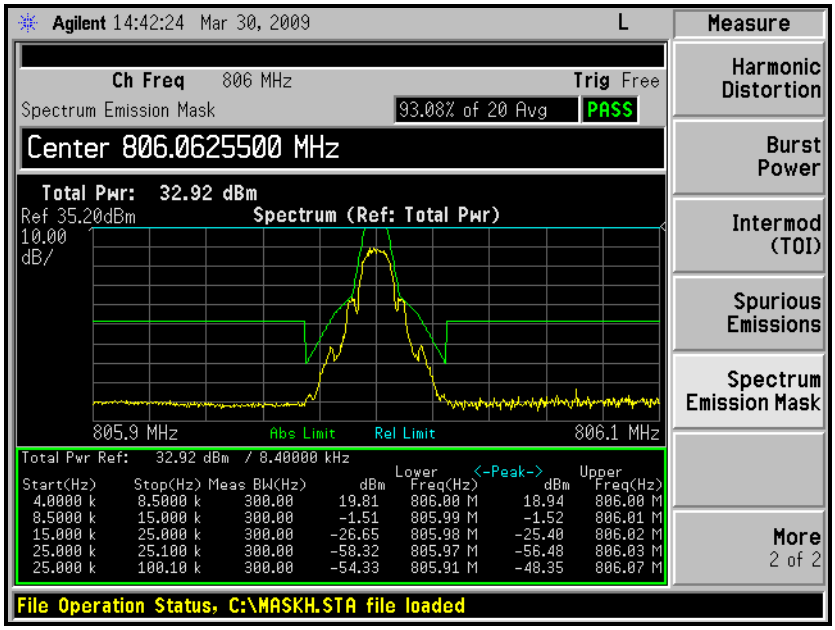
Plot 8-1: Occupied Bandwidth – Analog; 806 MHz; Mask B



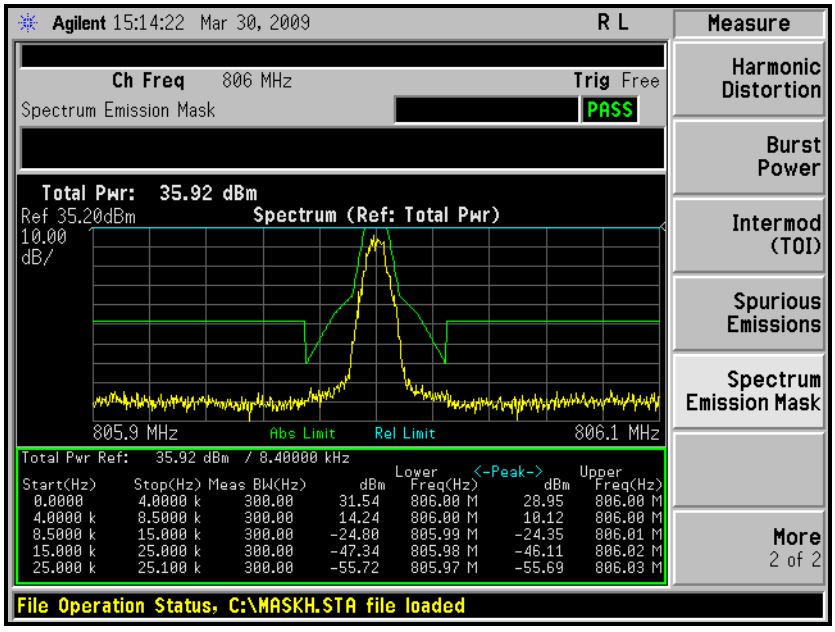
Plot 8-2: Occupied Bandwidth – Analog; 869 MHz; Mask B



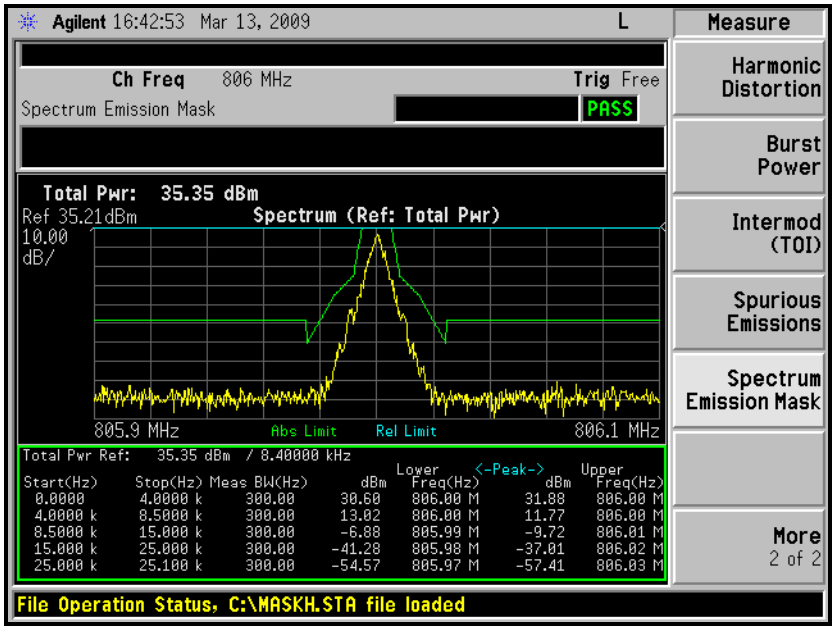
Plot 8-3: Occupied Bandwidth – TX 9600W; 806 MHz; Mask H



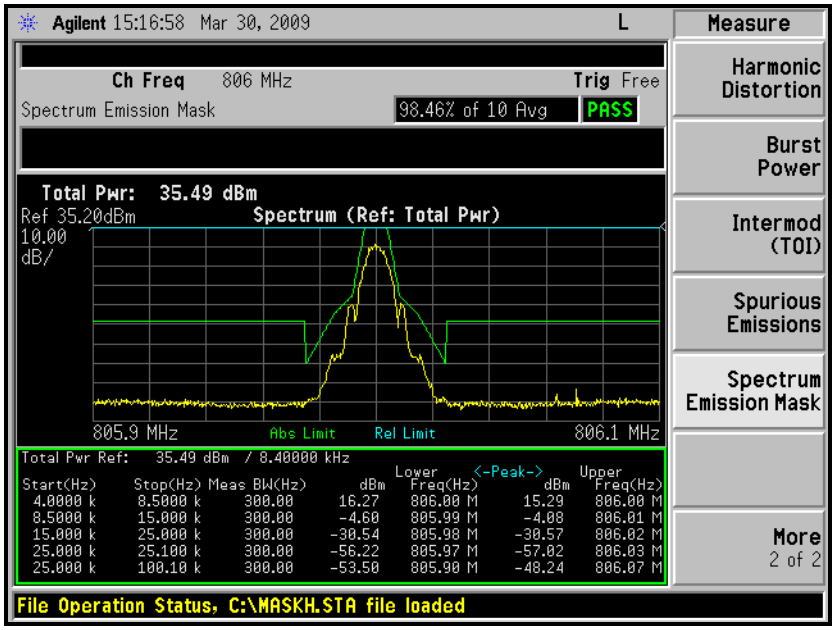
Plot 8-4: Occupied Bandwidth – P25 RND; 806 MHz; Mask H



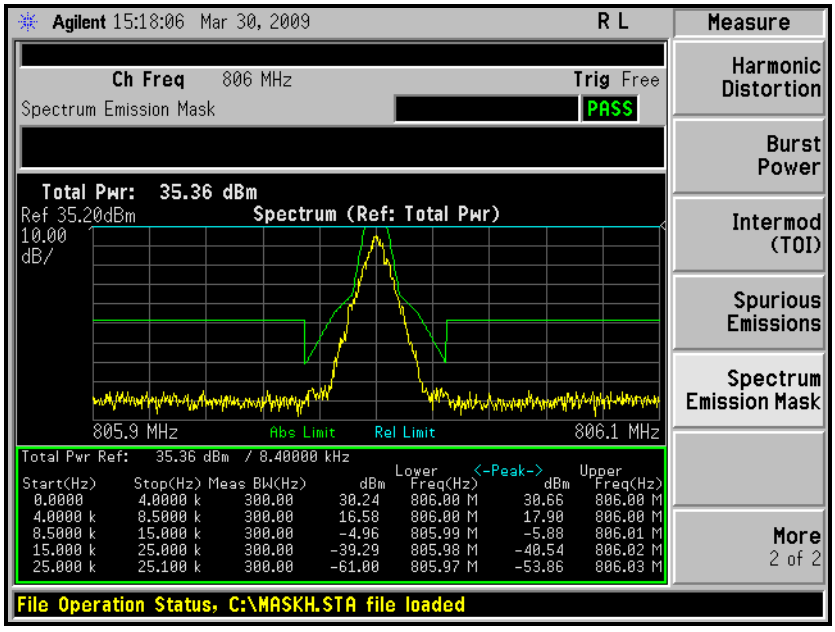
Plot 8-5: Occupied Bandwidth – OTP NPS; 806 MHz; Mask H



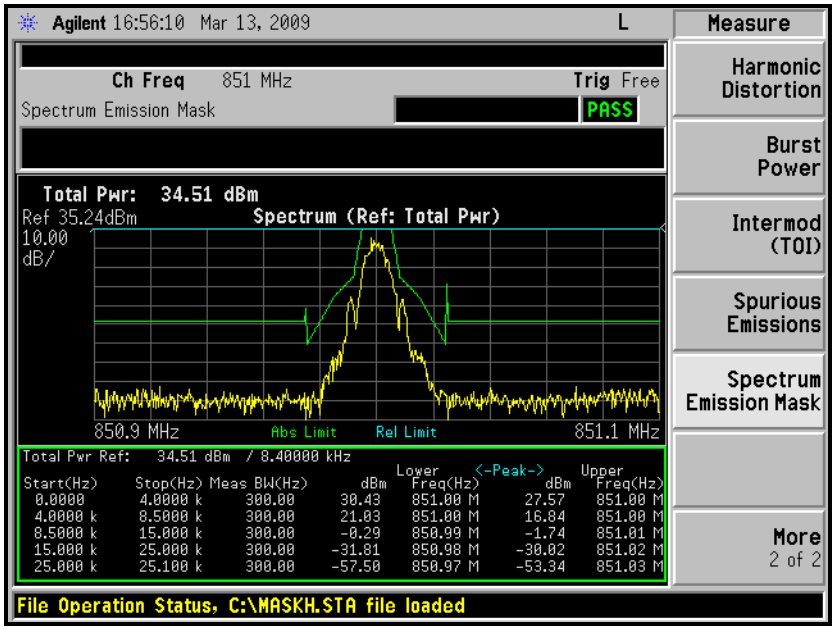
Plot 8-6: Occupied Bandwidth – TX 9600NP; 806 MHz; Mask H



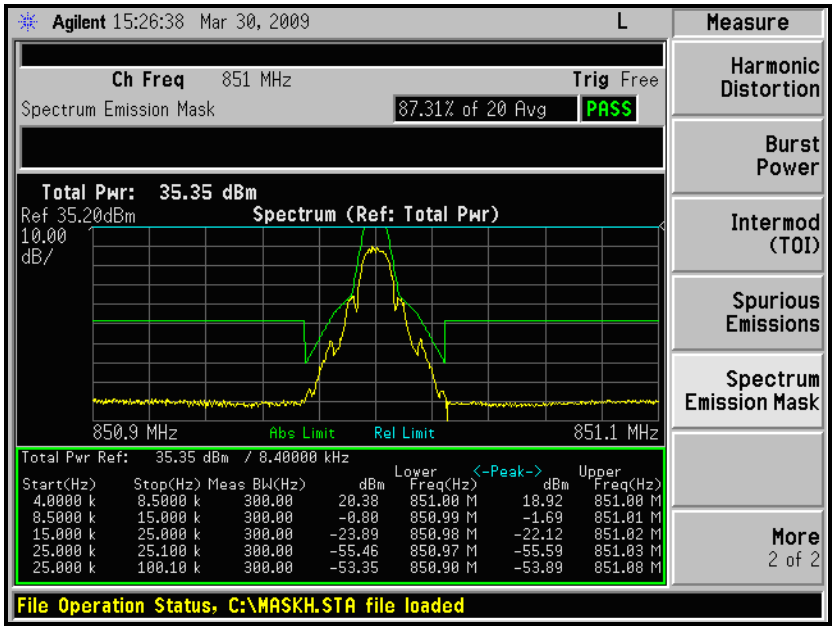
Plot 8-7: Occupied Bandwidth – OTP SMR; 806 MHz; Mask H



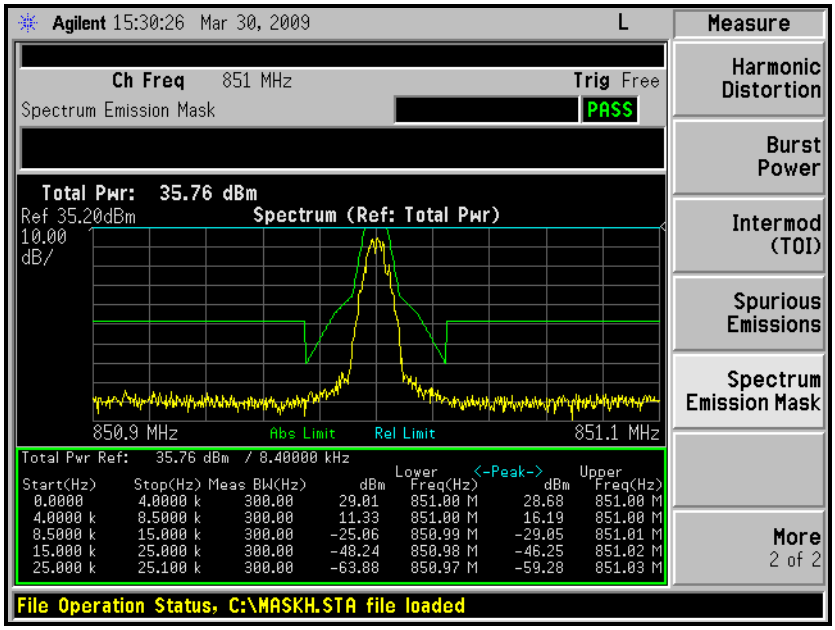
Plot 8-8: Occupied Bandwidth – TX 9600NP; 851 MHz; Mask H



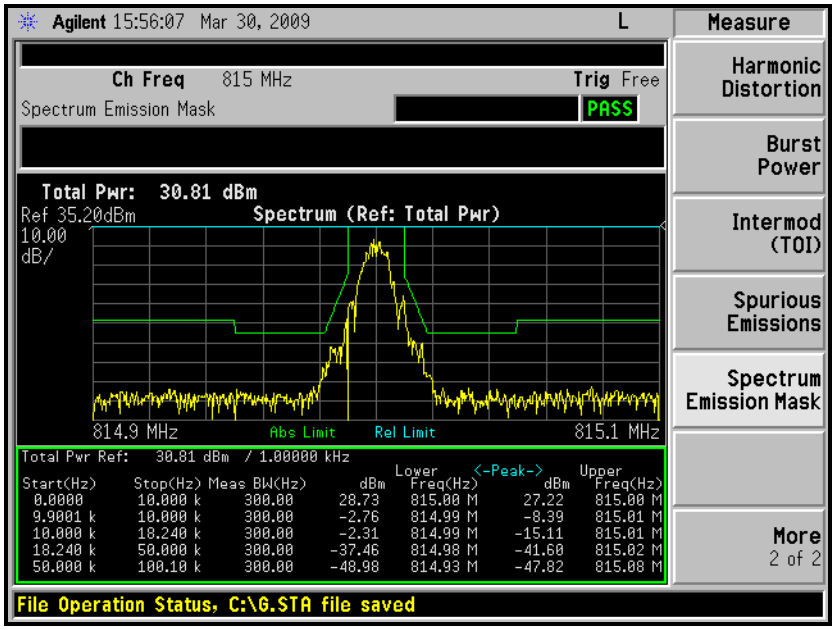
Plot 8-9: Occupied Bandwidth – TX 9600W; 851 MHz; Mask H



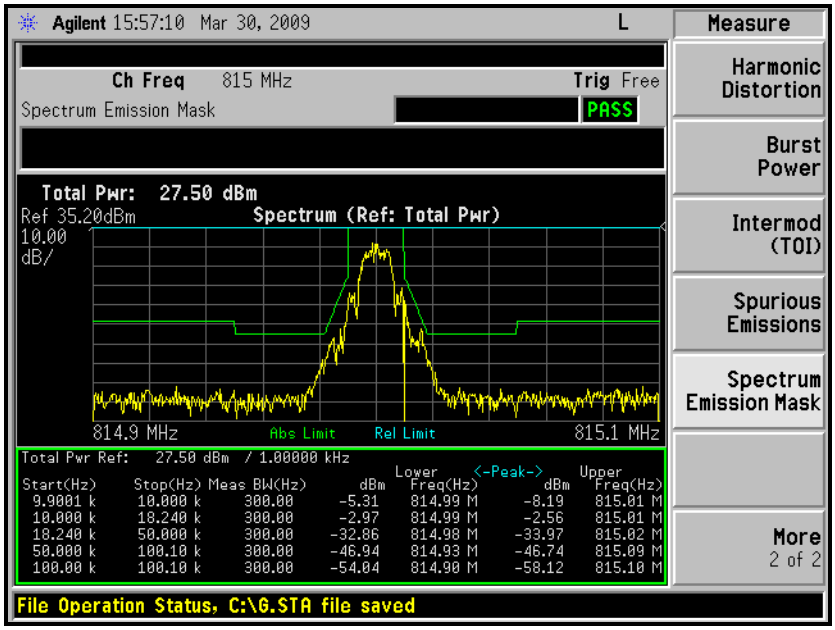
Plot 8-10: Occupied Bandwidth – P25 RND; 851 MHz; Mask H



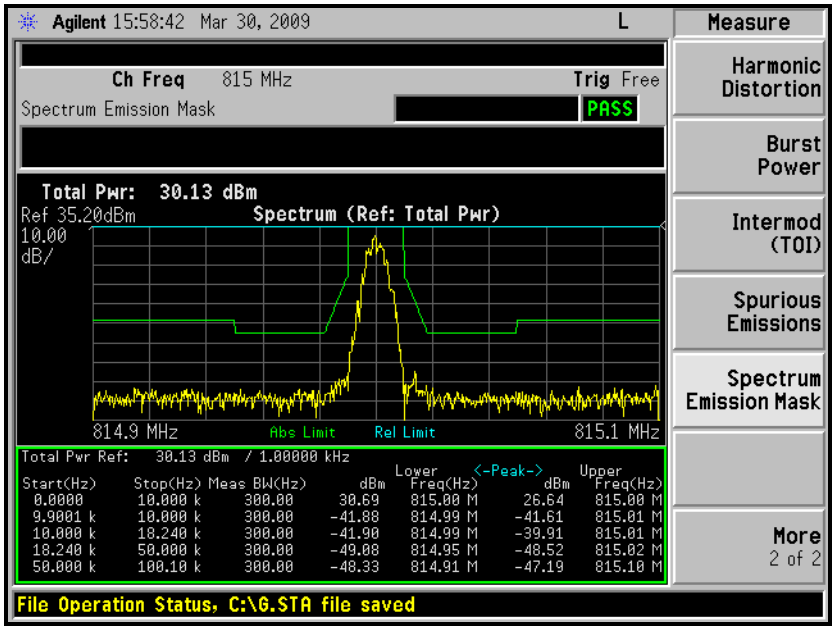
Plot 8-11: Occupied Bandwidth – TX 9600NP; 815 MHz; Mask G



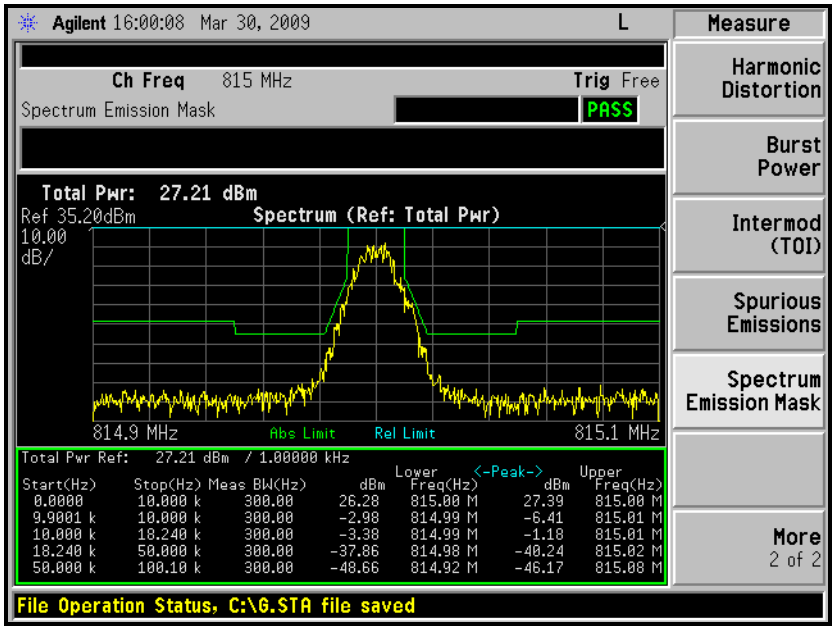
Plot 8-12: Occupied Bandwidth – TX 9600W; 815 MHz; Mask G



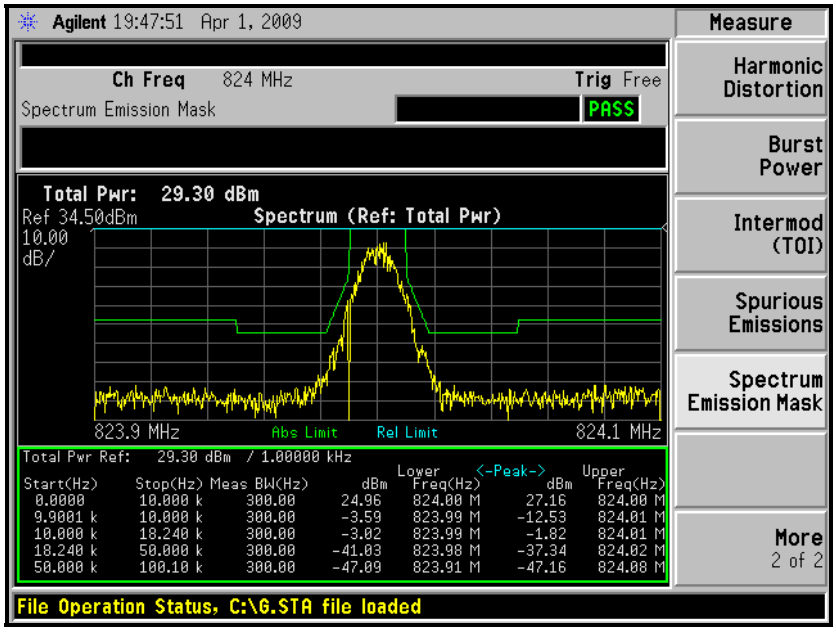
Plot 8-13: Occupied Bandwidth – P25 RND; 815 MHz; Mask G



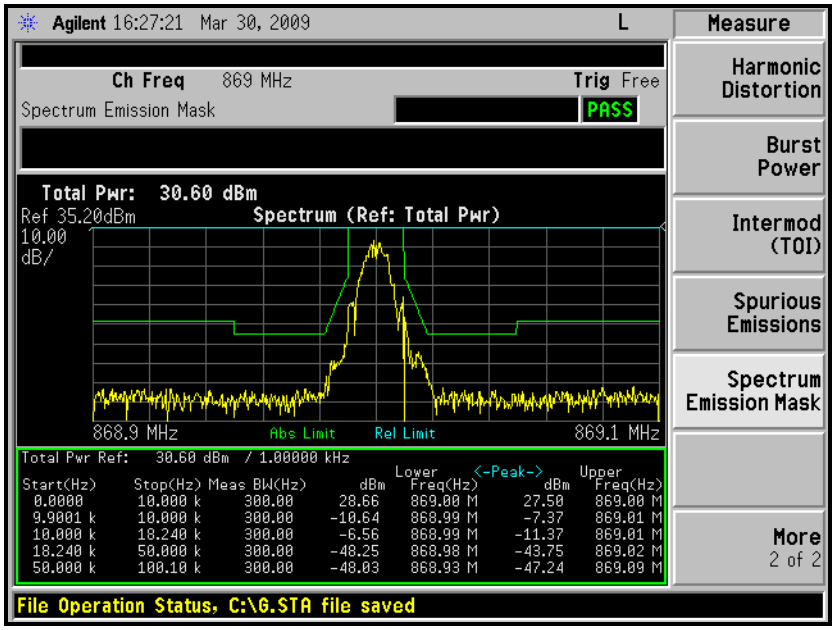
Plot 8-14: Occupied Bandwidth – OTP SMR; 815 MHz; Mask G



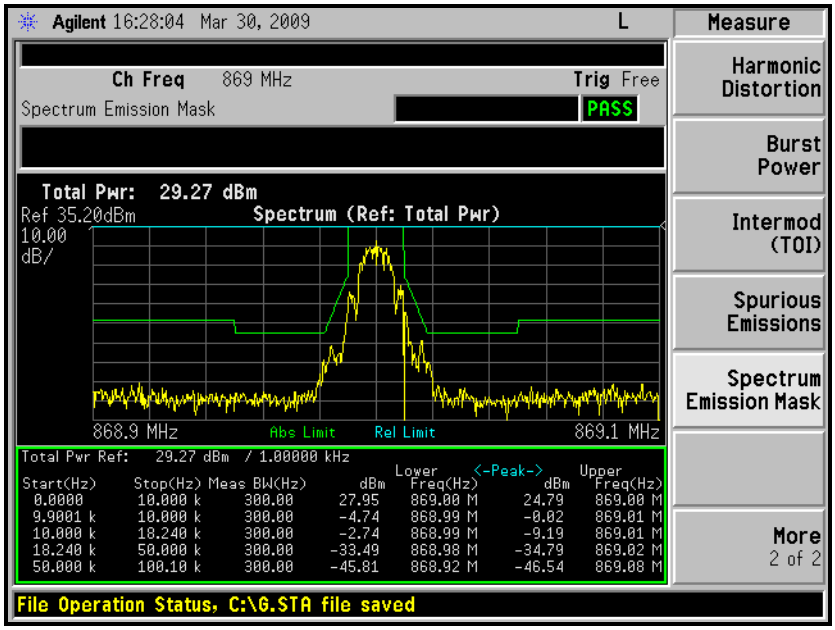
Plot 8-15: Occupied Bandwidth – OTP NPS; 824 MHz; Mask G



Plot 8-16: Occupied Bandwidth – TX 9600NP; 869 MHz; Mask G



Plot 8-17: Occupied Bandwidth – TX 9600W; 869 MHz; Mask G



Plot 8-18: Occupied Bandwidth – P25 RND; 869 MHz; Mask G

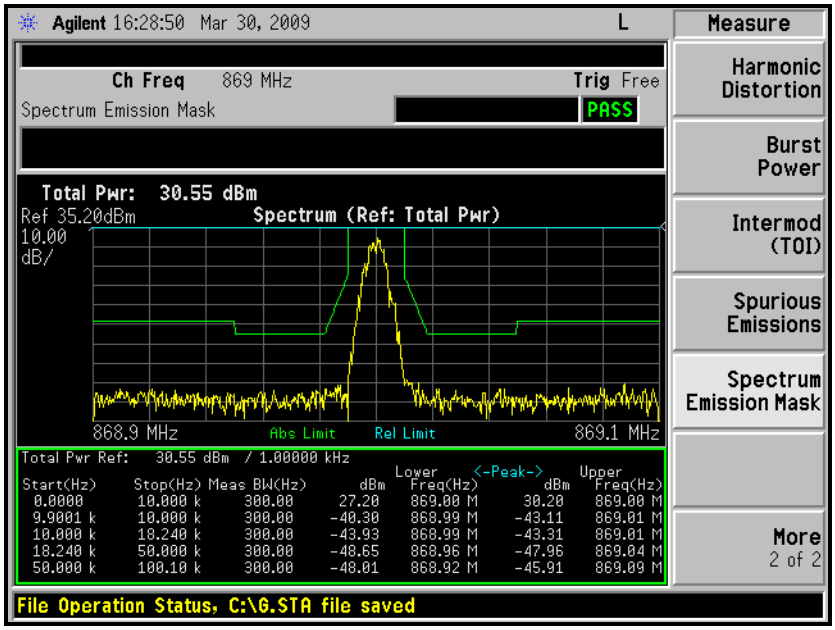


Table 8-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/09
900948	Weinschel Corporation	47-10-43	Attenuator DC-18 GHz 10dB 50W	BH1487	12/3/09
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	1/15/10

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	March 13, 16 & 30, April 1, 2009
Test Engineer	Signature	Dates Of Tests

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

9.1 Test Procedure

ANSI/TIA/EIA-603-2002, 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 +50°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 the 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: Portable stations over 2 W operating power - 1.5 ppm.

9.2 Test Data

Table 9-1: Temperature Frequency Stability – 802.00625 MHz

Temperature (°C)	Measured Frequency (MHz)	ppm
-30	802.006279	0.04
-20	802.006254	0.00
-10	802.006190	-0.07
0	802.006112	-0.17
10	802.006160	-0.11
20 (reference)	802.006250	0.00
30	802.006391	0.18
40	802.006388	0.17
50	802.006362	0.14
60	802.006315	0.08

The worst-case deviation was found to be 0.18 ppm. The requirement for this band at 12.5 kHz channel spacing is 0.4 ppm.

Result: The EUT is compliant.

9.2.1 Frequency Stability/Voltage Variation

Table 9-2: Frequency Stability/Voltage Variation – 802.00625 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
5.878(Battery End-Point)	802.006242	-0.01
6.375	802.006344	0.12
7.5	802.006250	0.00
8.625	802.006252	0.00

Table 9-3: 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	07/08/09
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	07/13/09
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 20dB	BK5859	12/3/09
901350	Meterman	33XR	Multimeter	040402802	12/5/09
N/A	GW Instek	PSS-3203	Programmable Power Supply	N/A	N/A

Test Personnel:

Daniel Baltzell		March 17, 2009
Test Engineer	Signature	Date Of Test

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

10.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.6

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

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

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

10.2 Test Data

Plot 10-1: Modulation Characteristics - Audio Frequency Response

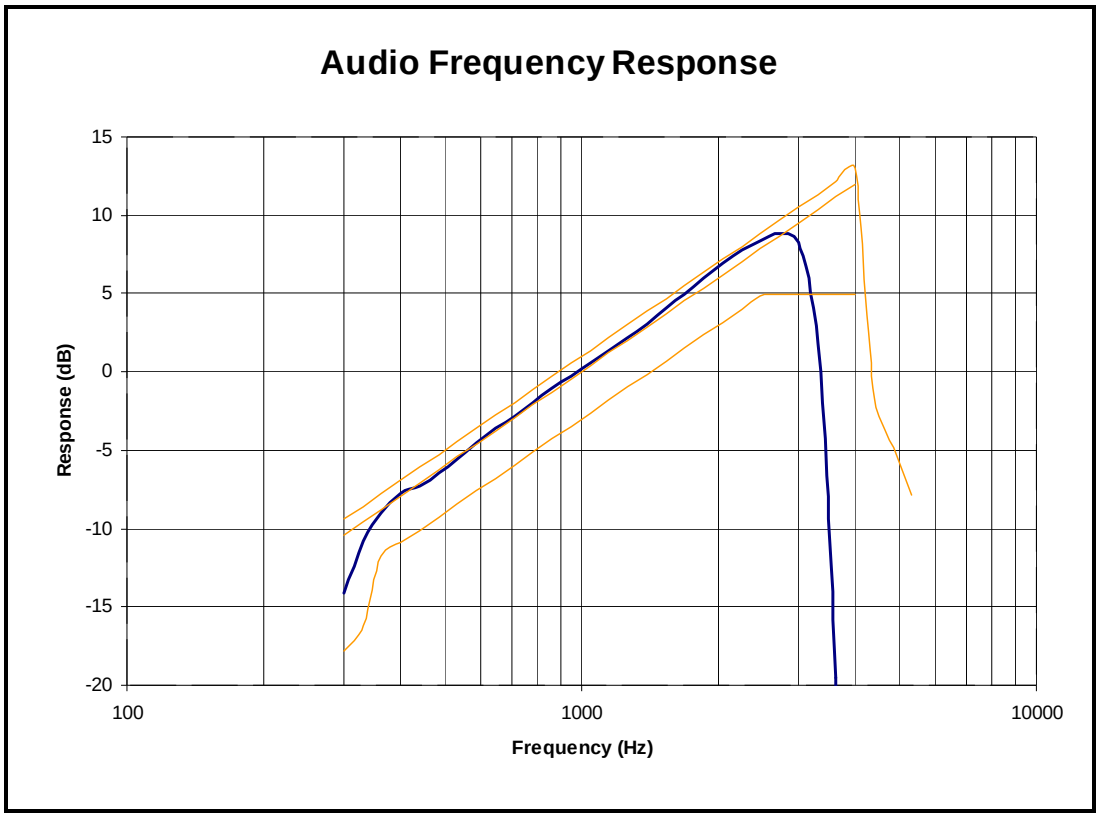


Table 10-1: Test Equipment Used For Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	1/15/10
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	9/09/09

Test Personnel:

Daniel Baltzell		March 16, 2009
Test Engineer	Signature	Date Of Test

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

11.1 Test Procedure

ANSI/TIA/EIA-603-2002, 2.2.15

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

11.2 Test Data

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

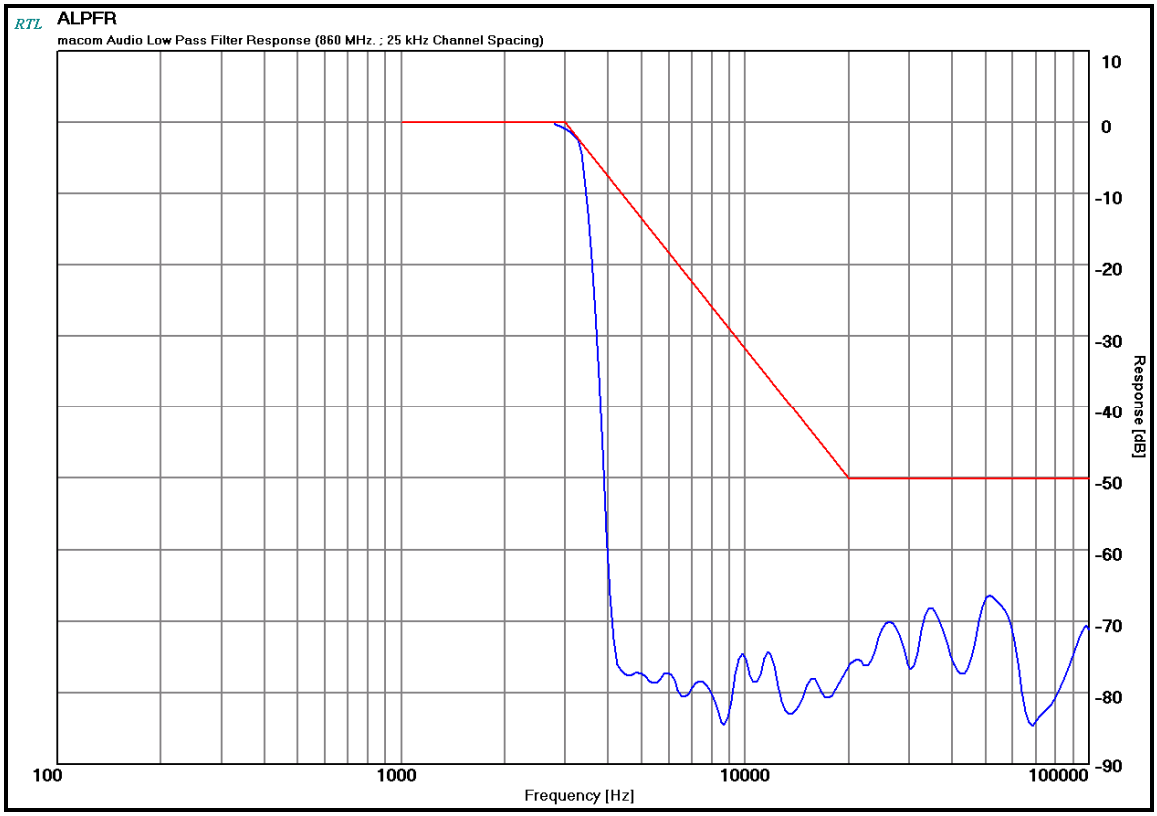


Table 11-1: Test Equipment Used For Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	1/15/10
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	9/09/09
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	11/10/09

Test Personnel:

Daniel Baltzell		March 16, 2009
Test Engineer	Signature	Date Of Test

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

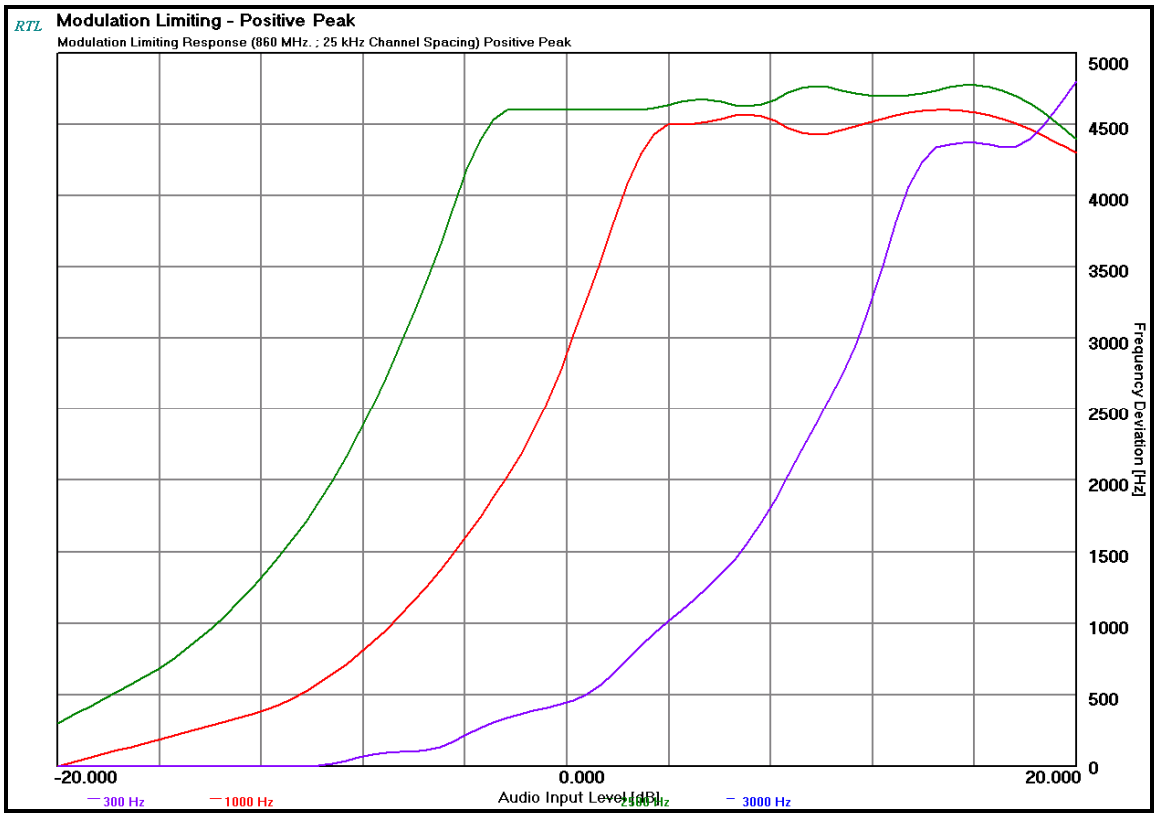
12.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.3

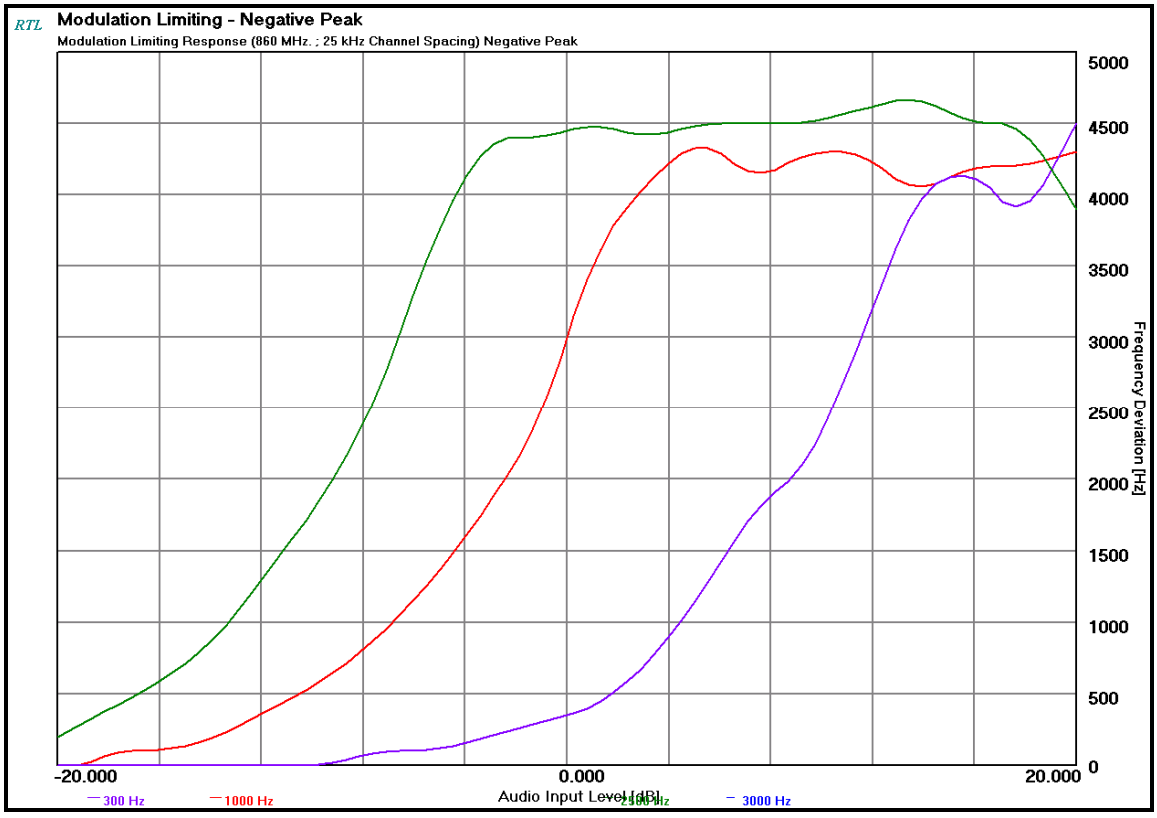
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500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

12.2 Test Data

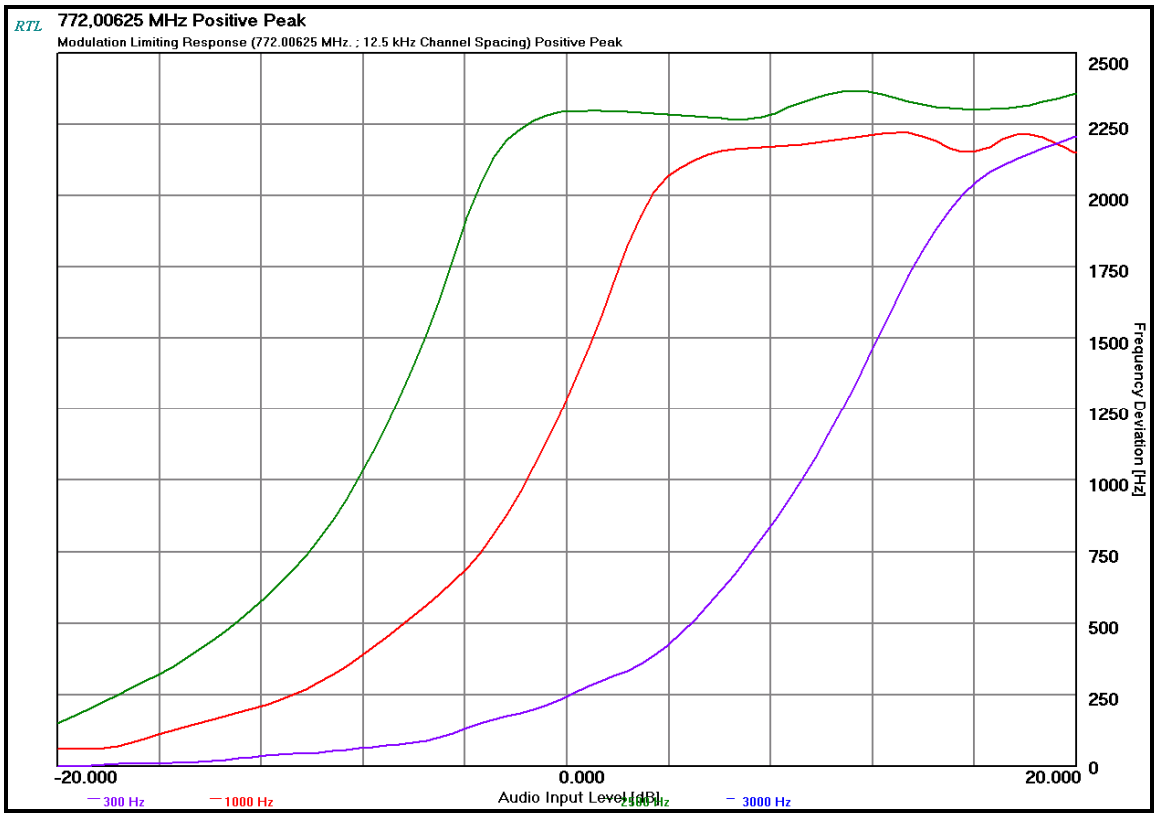
Plot 12-1: Modulation Characteristics – Modulation Limiting; Positive Peak; Wideband



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



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



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

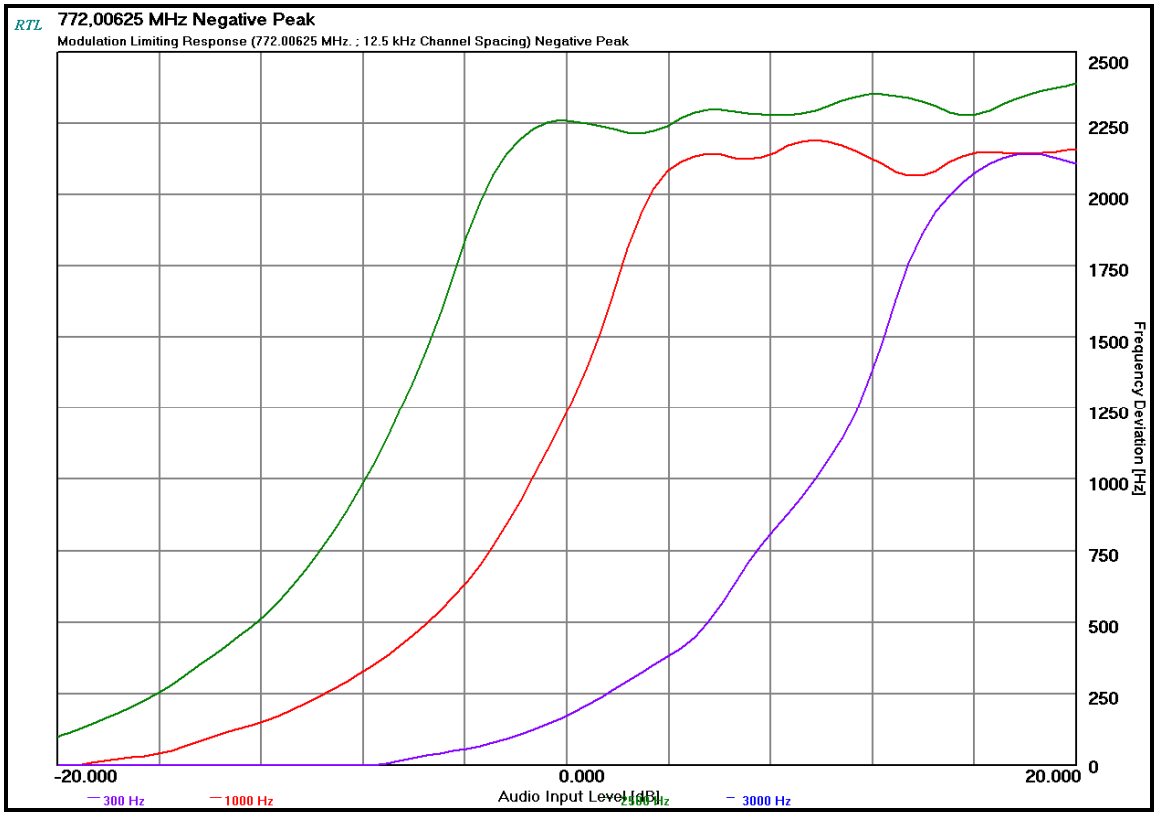


Table 12-1: Test Equipment Used For Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	1/15/10
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	9/09/09

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	March 16 and April 7, 2009
Test Engineer	Signature	Dates Of Test

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

Analog FM

799-805 MHz Trunked/Conventional; 769-775 Talkaround/
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (default)
Bn = 2(M)+2DK = 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

799-805/806-824 MHz SMR 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 = 0.335
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 12.1 kHz
Emission designator: 12K1F9W

806-809, 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 = 0.335
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 12.1 kHz
Emission designator: 12K1F9W

2-Level Voice/Data

806-824 NPSPAC Trunked/Conventional; 851-854, 866-869 MHz NPSPAC Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 2,400 Hz
K = 1
Bn = (3.86*D)+(0.027*RK) = 11,856 kHz
Emission designator: 11K9F1D, 11K9F1E

806-824 MHz SMR Trunked/Conventional; 851-869 MHz SMR Talkaround
Calculation:
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 3,000 Hz
K = 1
Bn = (3.86*D)+(0.027*RK) = 14,172 kHz
Emission designator: 14K2F1D, 14K2F1E

P25 Voice/Data

799-805 MHz Trunked/Conventional; 769-775 MHzTalkaround
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

14 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **P7300 700/800 MHz UHF Portable Radio, FCC ID: OWDTR-0054-E,** complies with all the applicable requirements of Parts 90 and 2 of the FCC Rules.