Engineering and Testing for EMC and Safety Compliance

Type Certification Report

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Model: M7100^{IP} UHF-H Mobile Radio, 100 Watt

FCC ID: OWDTR-0042-E

August 15, 2006

Standards Referenced for this Report	
FCC Part 2: 2005	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
FCC Part 15: 2005	§15.109: Radiated Emissions Limits
FCC Part 90: 2005	Private Land Mobile Radio Services
ANSI TIA-603-C-2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA; 2004	Digital C4FM/CQPSK Transceiver Measurement Methods

Frequency Range (MHz)	Rated Output Power (W)	Frequency Tolerance (ppm)	Emission Designator
450-470	100	2.0	16K0F3E
450-470	100	2.0	11K0F3E
450-470	100	2.0	14K2F1D/E
450-470	100	2.0	16K0F1D/E
450-470	100	2.0	8K4F1D/E

Report Prepared by Test Engineer: Daniel Biggs

Document Number: 2006055

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1 General Information

The following Type Certification Report is prepared on behalf of **M/A-COM, Inc**. in accordance with the Federal Communications Commission. The Equipment Under Test (EUT) was the **M7100 UHF-H Mobile Radio, 100 Watt; FCC ID: OWDTR-0042-E**. The test results reported in this document relate only to the item that was tested.

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

1.1 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.

1.2 Related Submittal(s)/Grant(s)

This is an original application report.

2 Tested System Details

The test sample was received on July 21, 2006. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

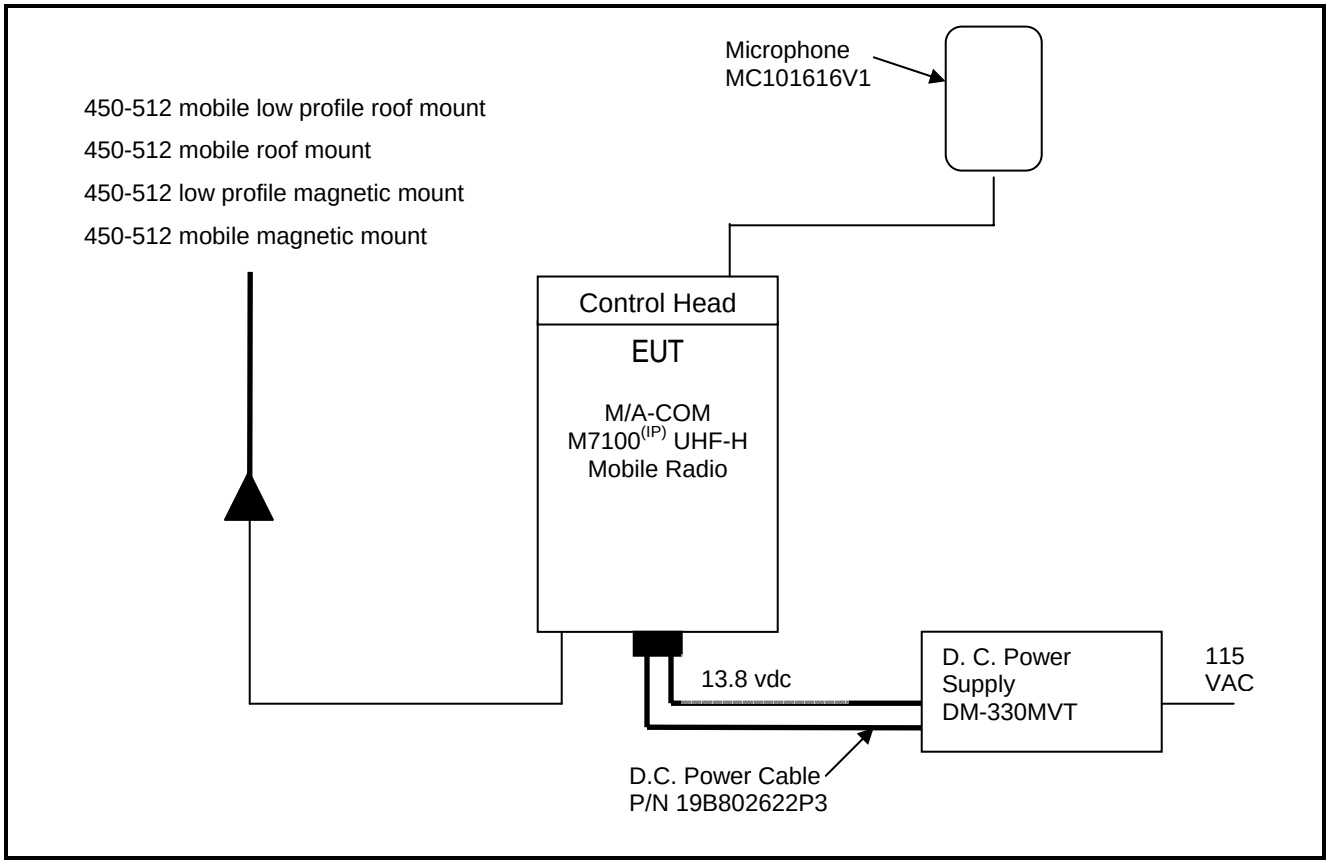
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
M7100 UHF-H, 100 W	M/A-Com, Inc.	M7100	ET2UHP03U	OWDTR-0042-E	17448
Control Head	M/A-Com, Inc.	Scan	344A4581P3	N/A	N/A
Antenna	M/A-Com, Inc.	450-512 mobile low profile roof mount	AN-025158-009	N/A	17444
Antenna	M/A-Com, Inc.	450-512 mobile roof mount	AN-025158-001	N/A	17445
Antenna	M/A-Com, Inc.	450-512 low profile magnetic mount	AN-025158-011	N/A	17446
Antenna	M/A-Com, Inc.	¼ Wave Unity Gain	AN-025158-005	N/A	17447
Antenna	M/A-Com, Inc.	450-512 mobile roof mount	AN-102800V1 (Roof Mount)	N/A	17441
Power Cable	M/A-Com, Inc.	N/A	19B802622P3	N/A	17443
Microphone	M/A-Com, Inc.	N/A	MC101616V1	N/A	N/A

Table 2-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
DC Power Supply	Alinco, Inc.	DM-330MVT	0008662	N/A	901438

Figure 2-1: Configuration of Tested System



3 FCC Rules and Regulations Part 2 §2.1033(C)(8) Voltages and Currents Through The Final Amplifying Stage

Nominal DC Voltage: 13.8 VDC
Current: 18 AMPS

4 FCC Rules and Regulations Part 2 §2.1046(a): RF Power Output: Conducted

4.1 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.

4.2 Test Data

Table 4-1: RF Power Output: Carrier Output Power

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1	450.000	101.6
2	453.275	102.6
3	456.525	103.8
4	459.800	102.1
5	463.050	103.5
6	466.325	104.2
7	469.575	103.5
8	470.000	104.2

* Measurement accuracy: +/-.02 dB (logarithmic mode)

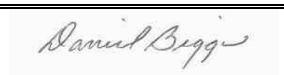
Table 4-2: RF Power Output (Rated Power)

Rated Power
100

Table 4-3: Test Equipment for Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184	Agilent	E4416A	Power Meter	GB41050573	9/21/06
901356	Agilent	E9323A	Power Sensor	31764-264	9/21/06
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08

Test Personnel:

Daniel Biggs		August 7, 2006
Test Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals

5.1 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 – 9600 bps for P25 mode.

Device with analog modulation: The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation at 1,000 Hz.

5.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10xFc.

Limit: P(dBm) – (50 + 10xLOG P(W))

The worst case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

Table 5-1: Conducted Spurious Emissions – 450.000 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.07 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
900	85.87	70.07	-15.80
1350	89.18	70.07	-19.11
1800	90.88	70.07	-20.81
2250	92.31	70.07	-22.24
2700	84.62	70.07	-14.55
3150	94.93	70.07	-24.86
3600	94.77	70.07	-24.70
4050	96.07	70.07	-26.00
4500	96.07	70.07	-26.00

Table 5-2: Conducted Spurious Emissions - 453.275 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.11 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
906.55	86.91	70.11	-16.80
1359.825	93.82	70.11	-23.71
1813.1	95.92	70.11	-25.81
2266.375	94.85	70.11	-24.74
2719.65	89.86	70.11	-19.75
3172.925	93.97	70.11	-23.86
3626.2	95.41	70.11	-25.30
4079.475	93.41	70.11	-23.30
4532.75	95.81	70.11	-25.70

Table 5-3: Conducted Spurious Emissions - 456.525 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.16 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
913.05	88.63	70.16	-18.47
1369.575	97.46	70.16	-27.30
1826.1	96.06	70.16	-25.90
2282.625	96.85	70.16	-26.69
2739.15	90.31	70.16	-20.15
3195.675	92.03	70.16	-21.87
3652.2	95.96	70.16	-25.80
4108.725	94.69	70.16	-24.53
4565.25	95.53	70.16	-25.37

Table 5-4: Conducted Spurious Emissions - 459.800 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.09 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
919.6	88.76	70.09	-18.67
1379.4	97.19	70.09	-27.10
1839.2	94.69	70.09	-24.60
2299	95.08	70.09	-24.99
2758.8	93.04	70.09	-22.95
3218.6	93.46	70.09	-23.37
3678.4	91.39	70.09	-21.30
4138.2	91.42	70.09	-21.33
4598	90.46	70.09	-20.37

Table 5-5: Conducted Spurious Emissions – 463.050 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.15 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
926.1	88.62	70.15	-18.47
1389.15	96.25	70.15	-26.10
1852.2	92.55	70.15	-22.40
2315.25	93.34	70.15	-23.19
2778.3	92.10	70.15	-21.95
3241.35	94.32	70.15	-24.17
3704.4	94.95	70.15	-24.80
4167.45	95.78	70.15	-25.63
4630.5	93.52	70.15	-23.37

Table 5-6: Conducted Spurious Emissions - 466.325 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.18 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
932.65	89.18	70.18	-19.00
1398.975	93.51	70.18	-23.33
1865.3	94.35	70.18	-24.17
2331.625	93.01	70.18	-22.83
2797.95	92.35	70.18	-22.17
3264.275	92.68	70.18	-22.50
3730.6	93.85	70.18	-23.67
4196.925	91.35	70.18	-21.17
4663.25	94.68	70.18	-24.50

Table 5-7: Conducted Spurious Emissions - 469.575 MHz; Narrow Band; High Power

12.5 kHz channel spacing; Conducted power = 50.15 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
939.15	89.15	70.15	-19.00
1408.725	93.68	70.15	-23.53
1878.3	94.42	70.15	-24.27
2347.875	92.48	70.15	-22.33
2817.45	93.22	70.15	-23.07
3287.025	94.15	70.15	-24.00
3756.6	93.52	70.15	-23.37
4226.175	91.32	70.15	-21.17
4695.75	94.65	70.15	-24.50

Table 5-8: Conducted Spurious Emissions - 470.000 MHz; Narrow Band; High Power

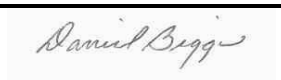
12.5 kHz channel spacing; Conducted power = 50.18 dBm

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
940	89.97	70.15	-19.82
1410	90.72	70.15	-20.57
1880	95.64	70.15	-25.49
2350	94.48	70.15	-24.33
2820	93.66	70.15	-23.51
3290	93.07	70.15	-22.92
3760	87.63	70.15	-17.48
4230	96.02	70.15	-25.87
4700	93.27	70.15	-23.12

Table 5-9: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	09/14/06
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/06

Test Personnel:

Daniel Biggs		August 8, 2006
Test Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1053(a): Field Strength of Spurious Radiation

6.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.12.

Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600 bps for P25 mode.

Device with analog modulation: The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation at 1,000 Hz.

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.

6.2 Test Data

6.2.1 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.

Limit: P(dBm) – (50 + 10xLOG P(W))

Table 6-1: Field Strength of Spurious Radiation - 459.800 MHz; Narrow Band; High Power;

Limit = 50 + 10 Log P = 70.1 dBc
Conducted Power = 50.1 dBm = 102.1 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
919.6	60.0	-53.7	3.0	-1.1	108.6	-38.5
1379.4	57.3	-47.2	3.7	5.9	95.1	-25.0
1839.2	55.2	-45.6	4.8	6.6	93.9	-23.8
2299.0	49.3	-52.0	4.8	6.9	100.0	-29.9
2758.8	34.3	-68.2	4.8	7.4	115.7	-45.6
3218.6	47.0	-50.8	5.3	7.4	98.8	-28.7
3678.4	51.2	-44.1	5.8	7.4	92.6	-22.5
4138.2	30.0	-49.0	6.1	7.9	97.3	-27.2
4598.0	36.2	-53.1	6.0	8.9	100.3	-30.2

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

Table 6-2: Test Equipment for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	11/1/06
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 15 V, 0.1-26 GHz, 28 dB gain, power 5dB	1094152	03/24/07
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	09/14/06
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 – 20 GHz)	3610A00866	11/10/06
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	05/20/07
900321	EMCO	3161-03	Horn Antennas (4 - 8,2 GHz)	9508-1020	05/20/07
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	12/12/06
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	12/12/06
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/06

Test Personnel:

Daniel Biggs		August 11, 2006
Test Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 90 §90.210 Emissions Masks and Part 2 §2.1049(c)(1): Occupied Bandwidth

7.1 Test Procedure

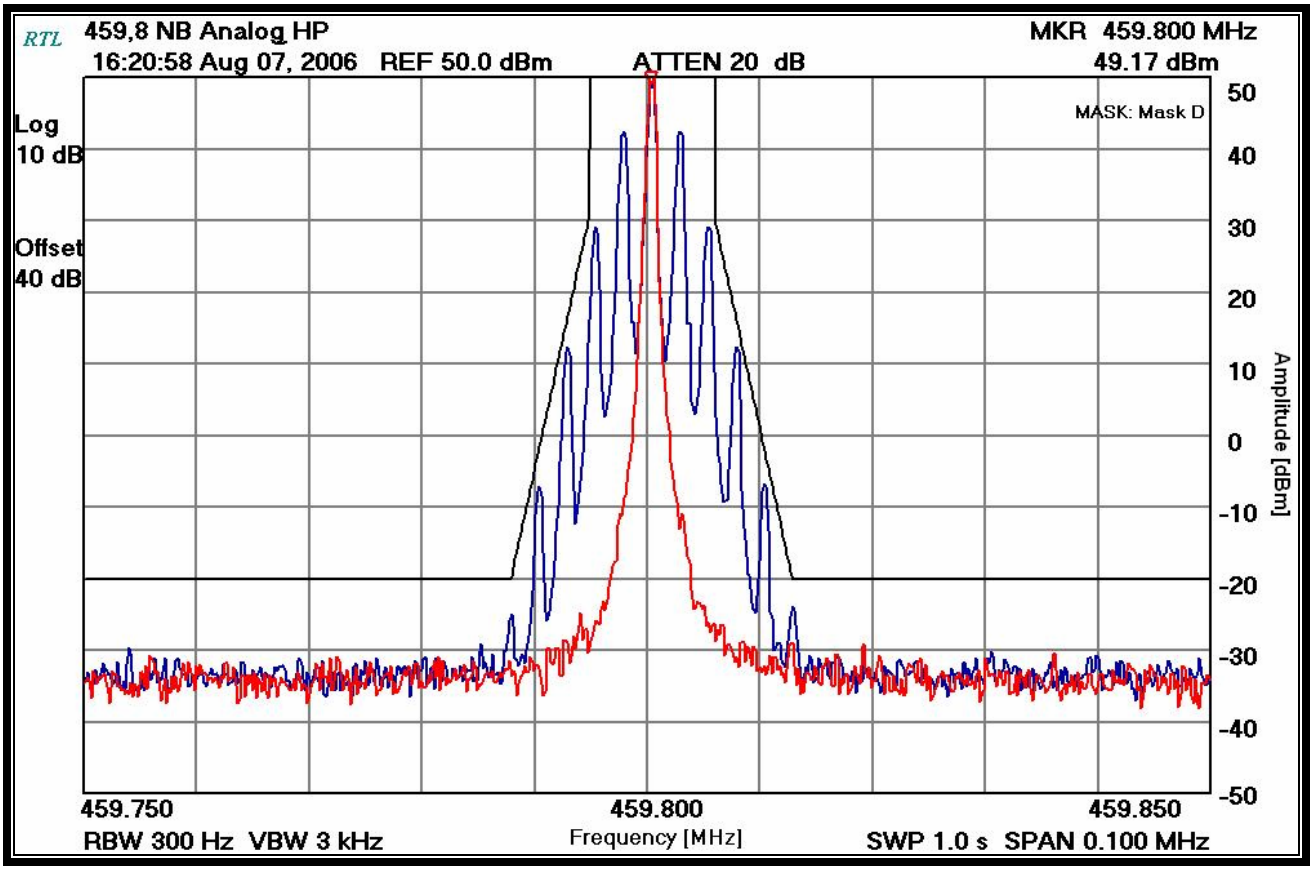
ANSI TIA-603-C-2004, Section 2.2.11.

Device with analog modulation: The transmitter is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation at 1,000 Hz.

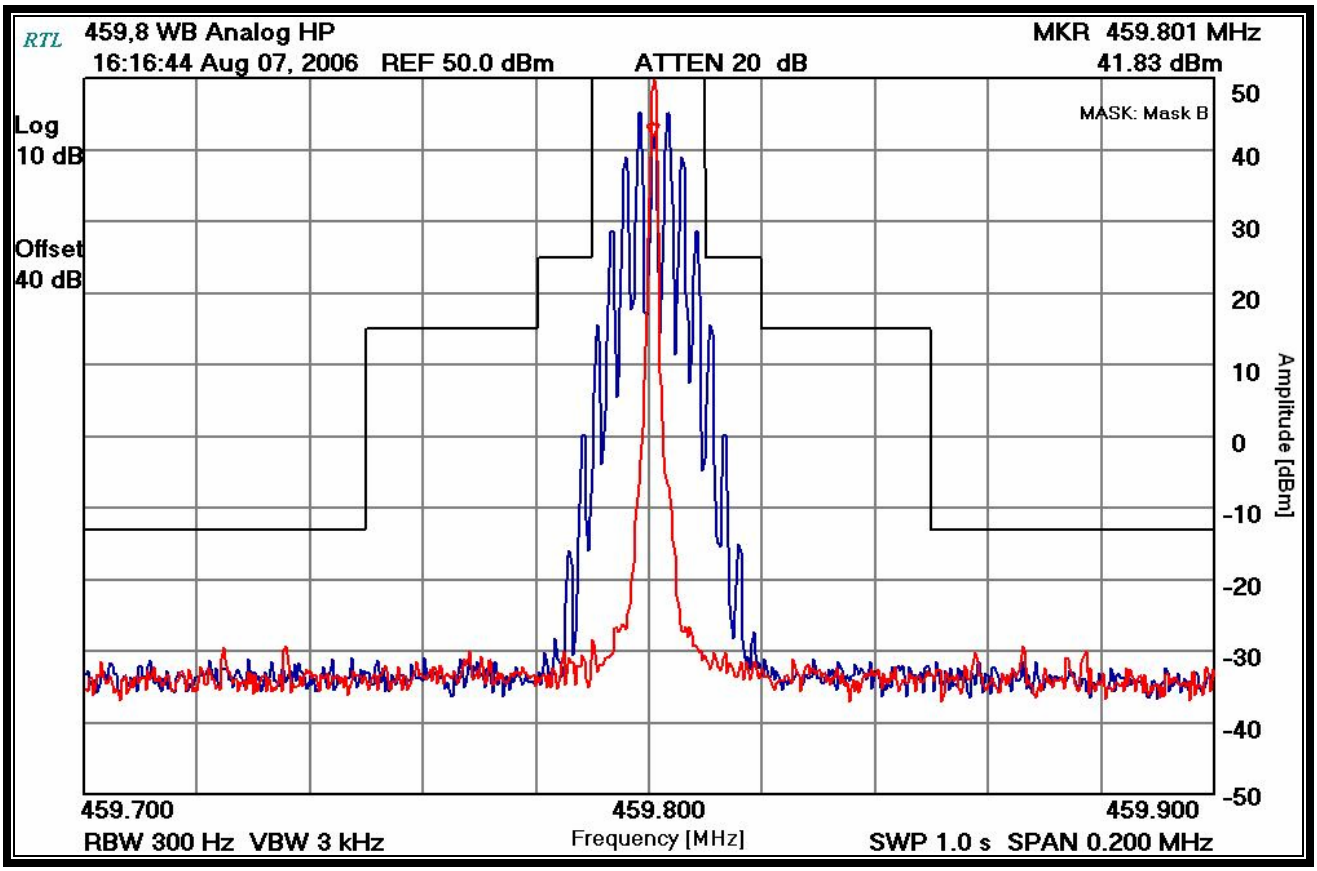
Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600 bps for P25 mode.

7.2 Test Data

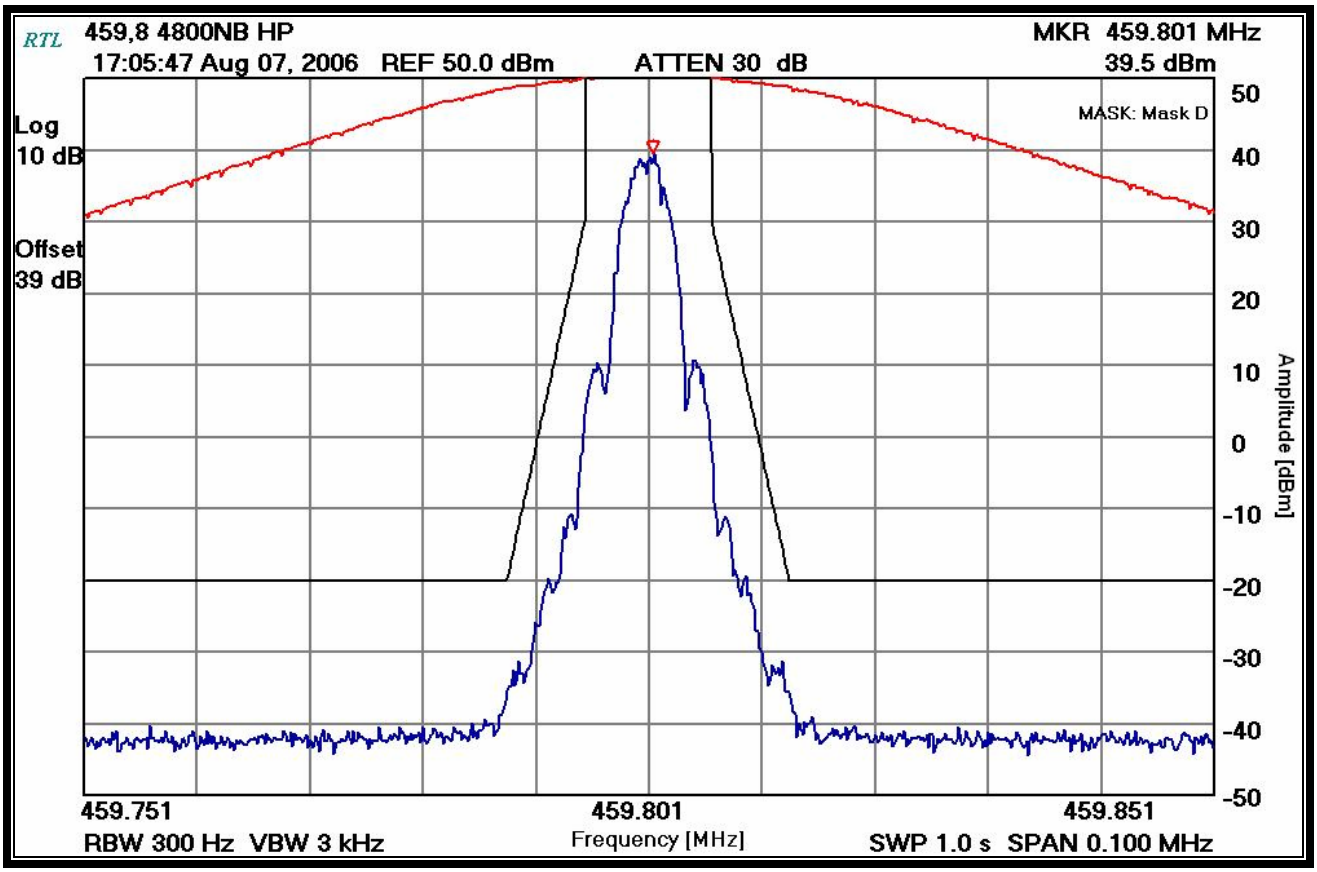
Plot 7-1: Occupied Bandwidth - 459.800 MHz; Analog; Narrow Band; High Power



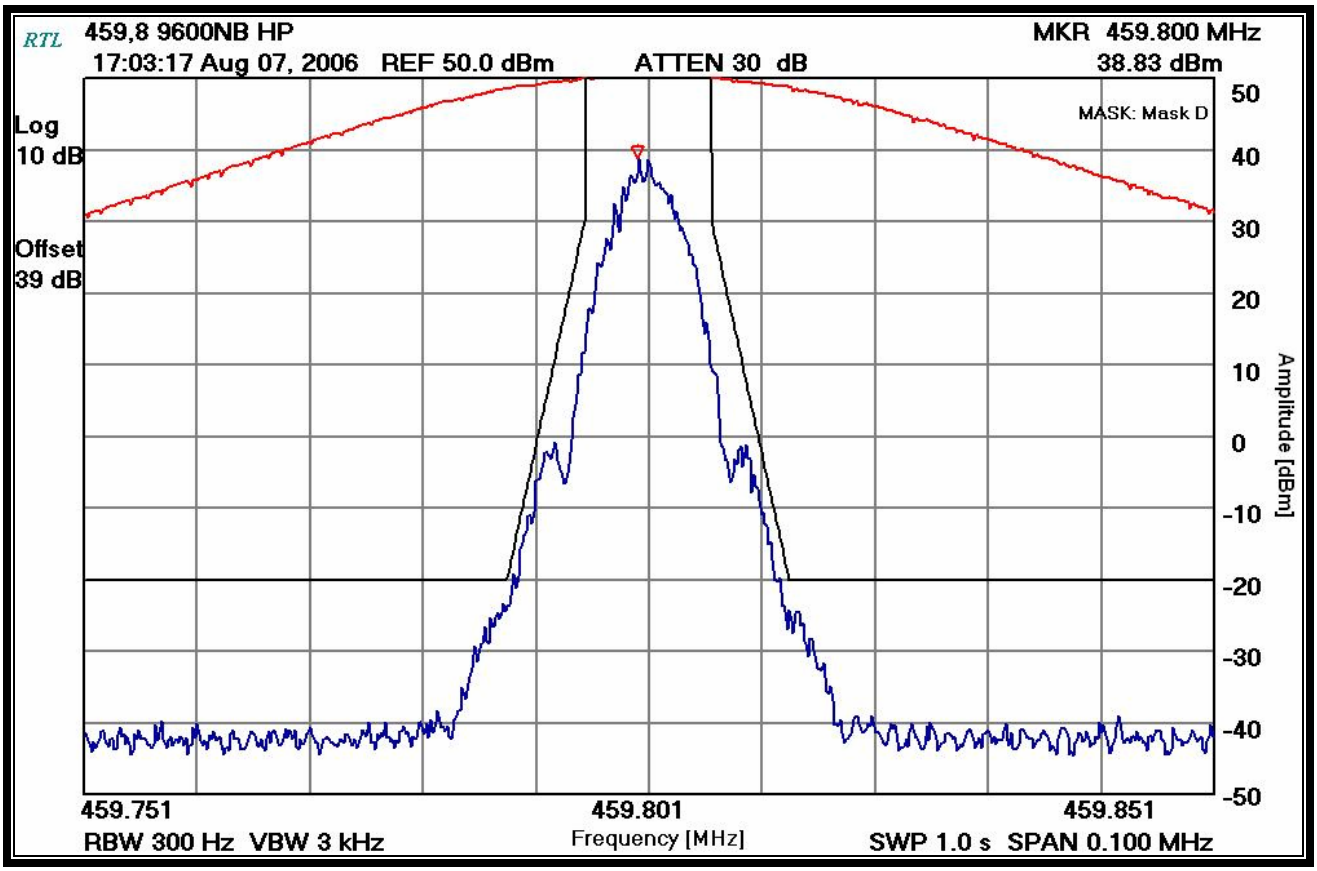
Plot 7-2: Occupied Bandwidth; 459.800 MHz; Analog; Wide Band; High Power



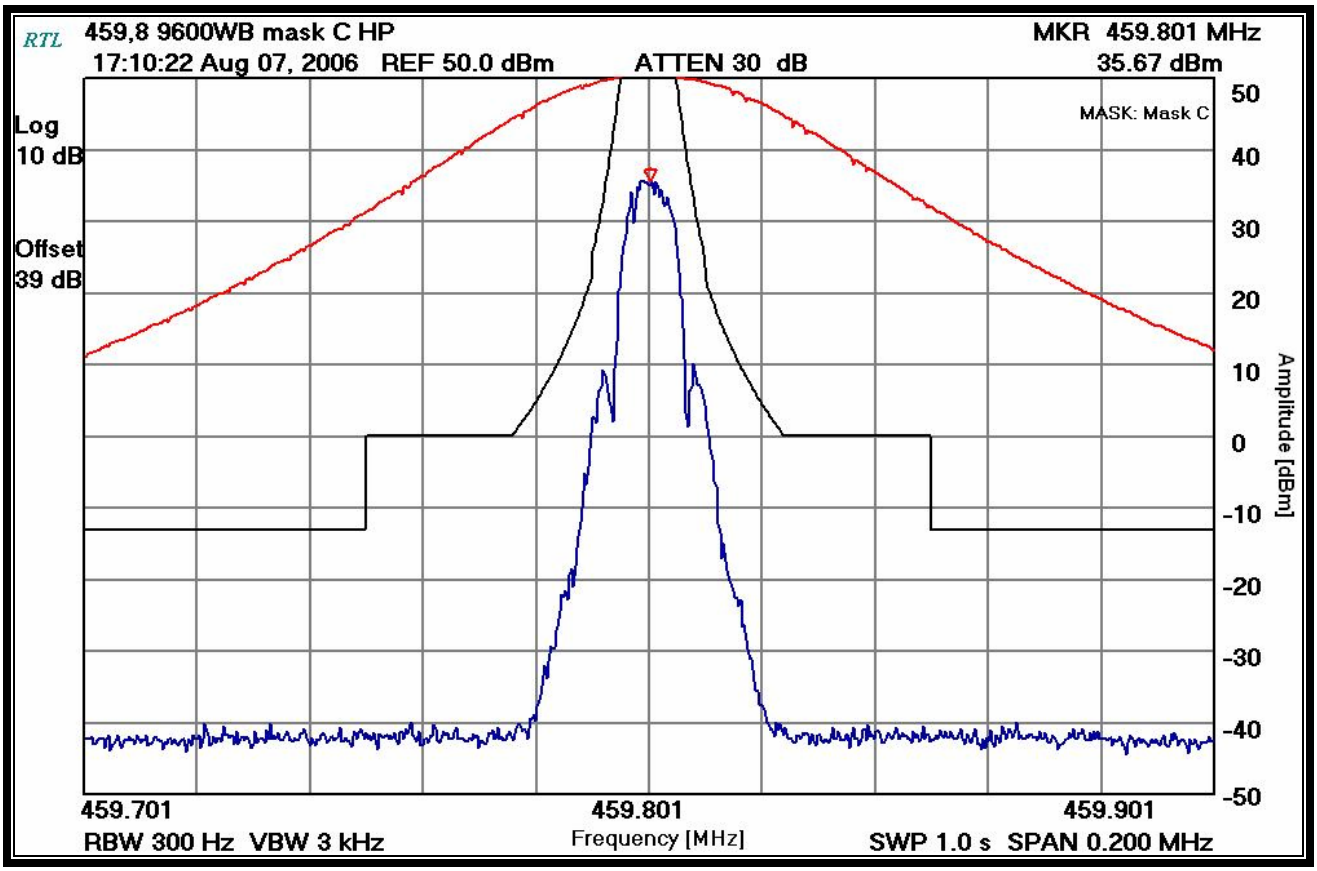
Plot 7-3: Occupied Bandwidth - 459.800 MHz; 4800 Narrow Band; High Power



Plot 7-4: Occupied Bandwidth - 459.800 MHz; 9600 Narrow Band; High Power



Plot 7-5: Occupied Bandwidth - 459.800 MHz; 9600 Wide Band; High Power



Plot 7-6: Occupied Bandwidth - 459.800 MHz; P25; High Power

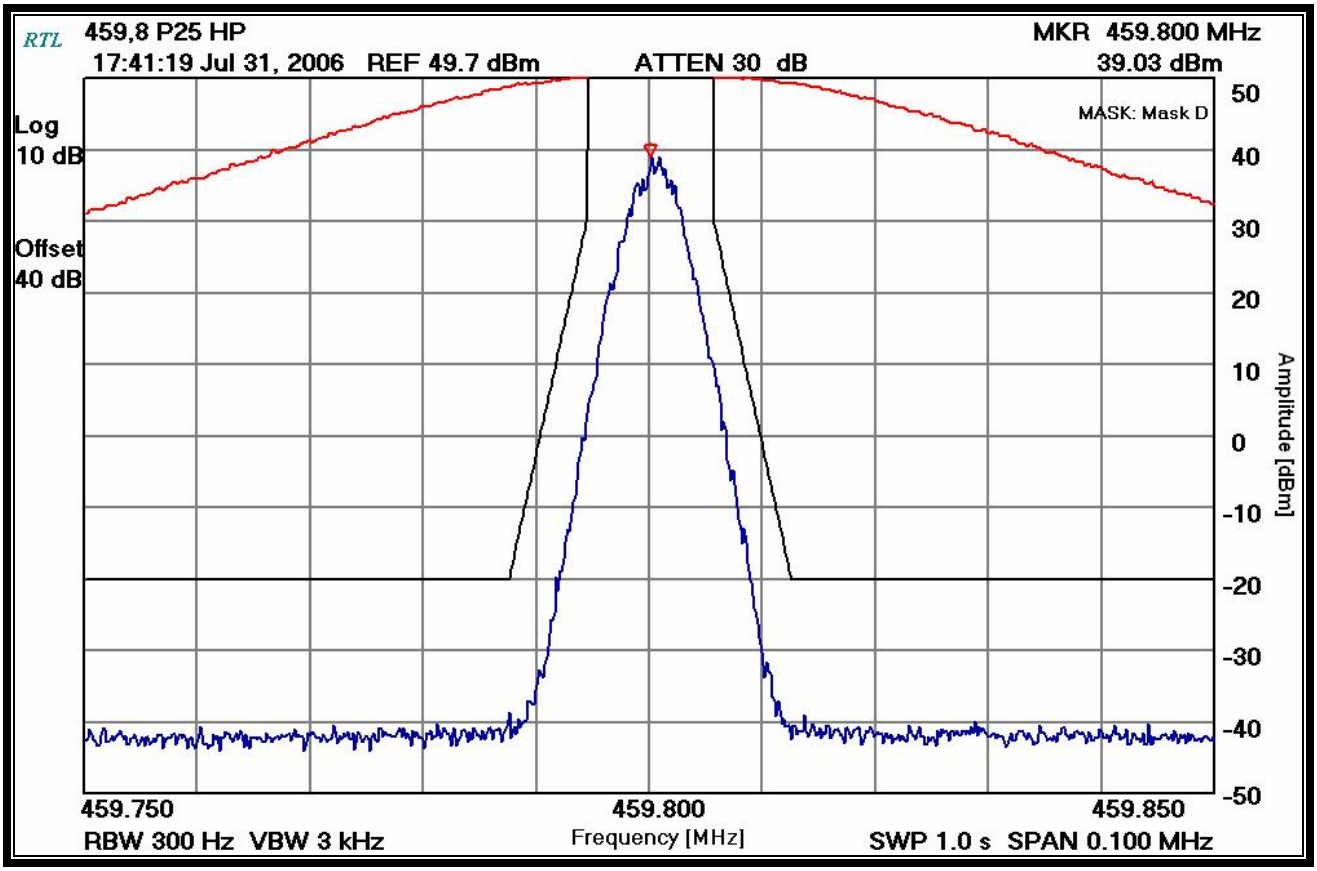


Table 7-1: Test Equipment for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	9/14/06
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08

Test Personnel:

Daniel Biggs		July 31 & August 7, 2006
Test Engineer	Signature	Dates Of Tests

8 FCC Rules and Regulations Part 90 §90.213 and Part 2 §2.1055: Frequency Stability

8.1 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°C 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.

The worst-case test data are shown below in Table 8-1 and Table 8-3.

8.2 Test Data

8.2.1 Frequency Stability/Temperature Variation

Table 8-1: Frequency Stability/Temperature Variation – 459.800 MHz

Temperature °C	Measured Frequency (MHz)	ppm
-30	459.799780	-0.48
-20	459.799768	-0.50
-10	459.799746	-0.55
0	459.799703	-0.65
10	459.799685	-0.69
20	459.799668	-0.72
30	459.799636	-0.79
40	459.799605	-0.86
50	459.799420	-1.26
60	459.799305	-1.51

Table 8-2: Test Equipment for Testing Frequency Stability/Temperature

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	01/20/07
901413	Agilent	E4448A	Spectrum Analyzer	US44020346	11/2/06
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/06

Test Personnel:

Daniel Biggs		August 9, 2006
Test Engineer	Signature	Date Of Test

8.2.2 Frequency Stability/Voltage Variation

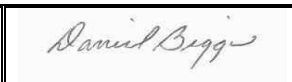
Table 8-3: Frequency Stability/Voltage Variation – 459.800 MHz

Voltage (VDC)	Measured Frequency (MHz)	ppm
11.73	459.799627	-0.81
13.8	459.799617	-0.83
15.87	459.799612	-0.84

Table 8-4: Test Equipment for Testing Frequency Stability/Voltage

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901300	Agilent	53131A	Frequency Counter	MY40001345	11/23/06
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/2/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	N/A	12/12/06
901354	Meterman	37XR	Digital Multimeter	N/A	8/31/06

Test Personnel:

Daniel Biggs		August 9, 2006
Test Engineer	Signature	Date Of Test

9 FCC Rules and Regulations Part 2 §2.1047(a): Modulation Characteristics - Audio Frequency Response

9.1 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)

9.2 Test Data

Plot 9-1: Modulation Characteristics - Audio Frequency Response

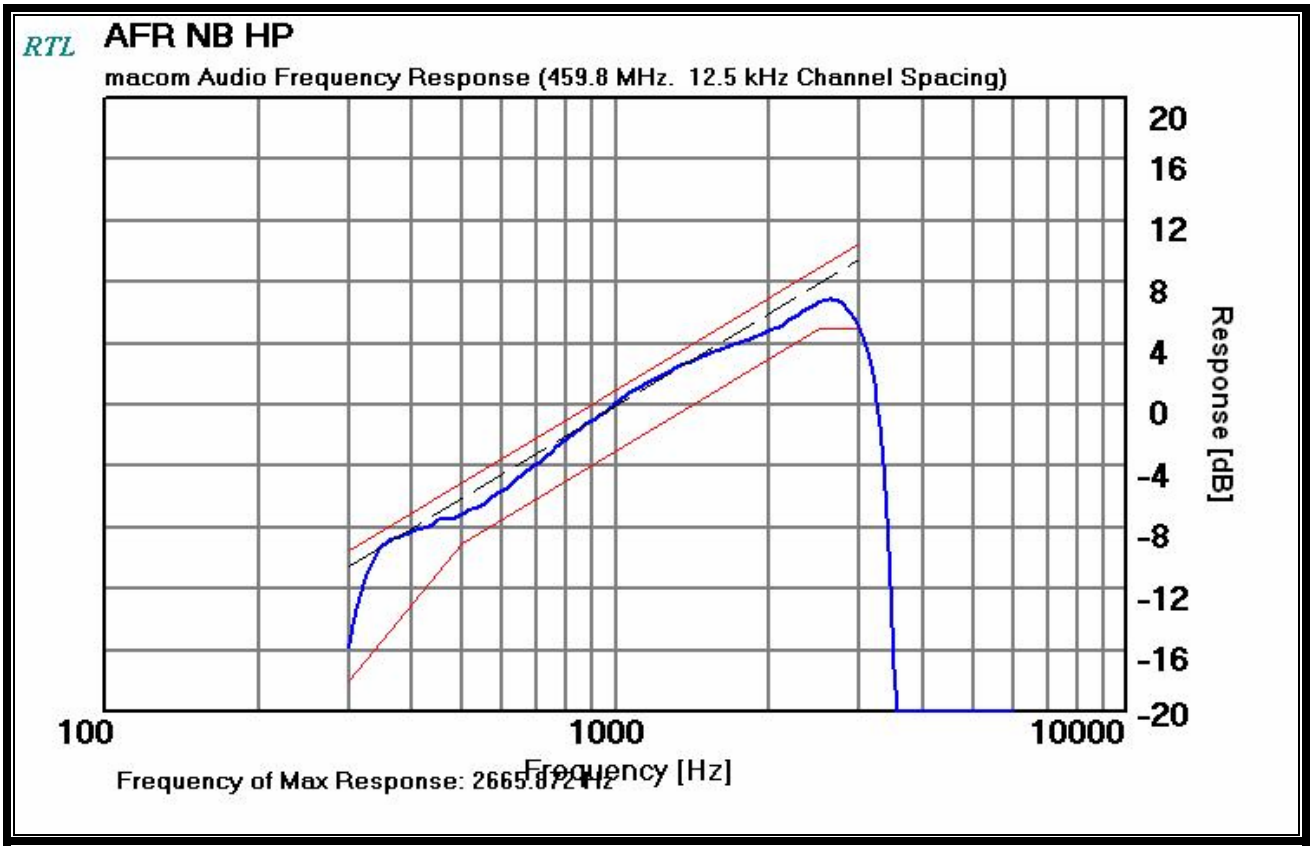


Table 9-1: Test Equipment for Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/14/06
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/14/06

Test Personnel:

Daniel Biggs		August 9, 2006
Test Technician/Engineer	Signature	Date Of Test

10 FCC Rules and Regulations Part 2 §2.1047(a): Modulation Characteristics – Audio Low Pass Filter

10.1 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.

10.2 Test Data

Plot 10-1: Modulation Characteristics – Audio Low Pass Filter

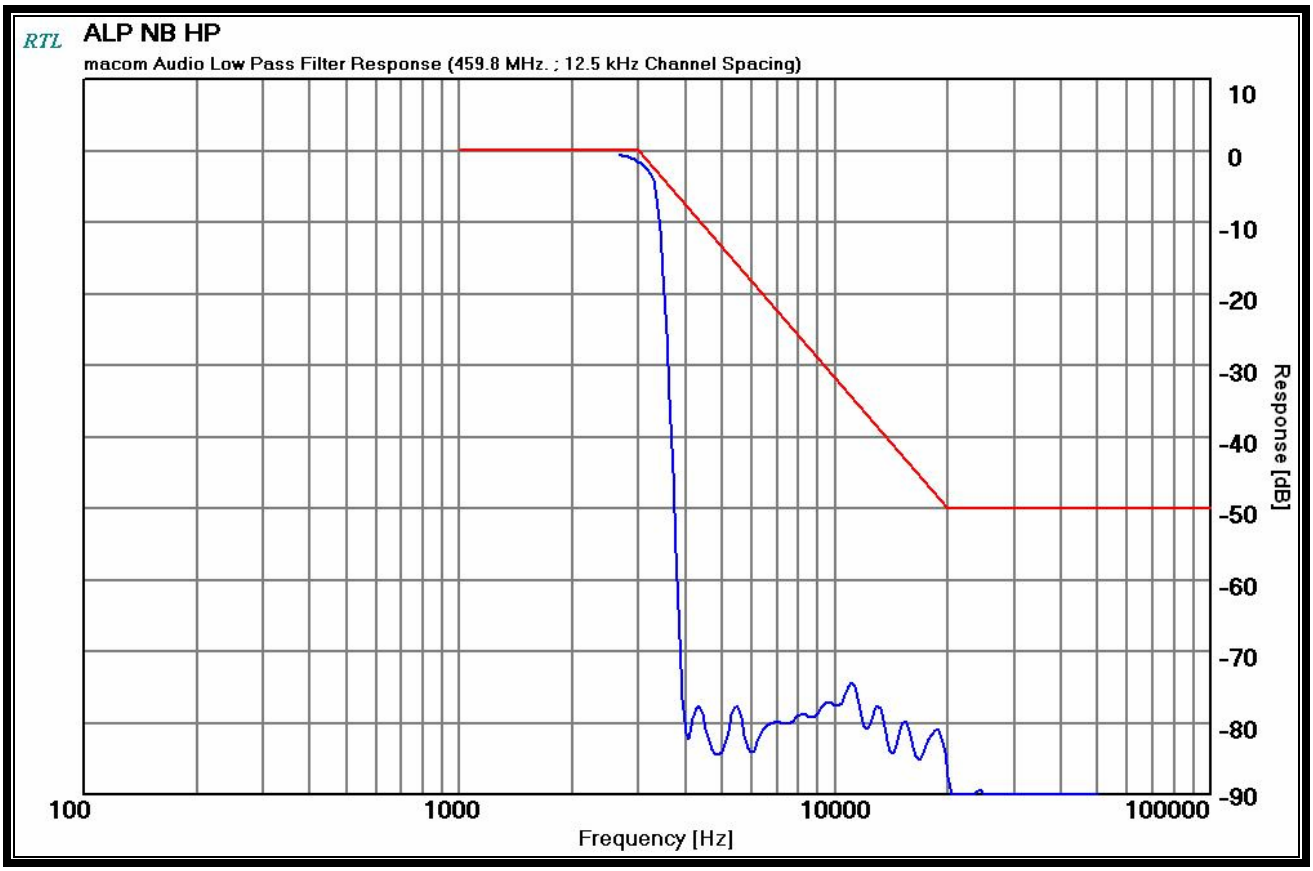


Table 10-1: Test Equipment for Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/14/06
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/14/06

Test Personnel:

Daniel Biggs		August 9, 2006
Test Technician/Engineer	Signature	Date Of Test

11 FCC Rules and Regulations Part 2 §2.1047(b): Modulation Characteristics - Modulation Limiting

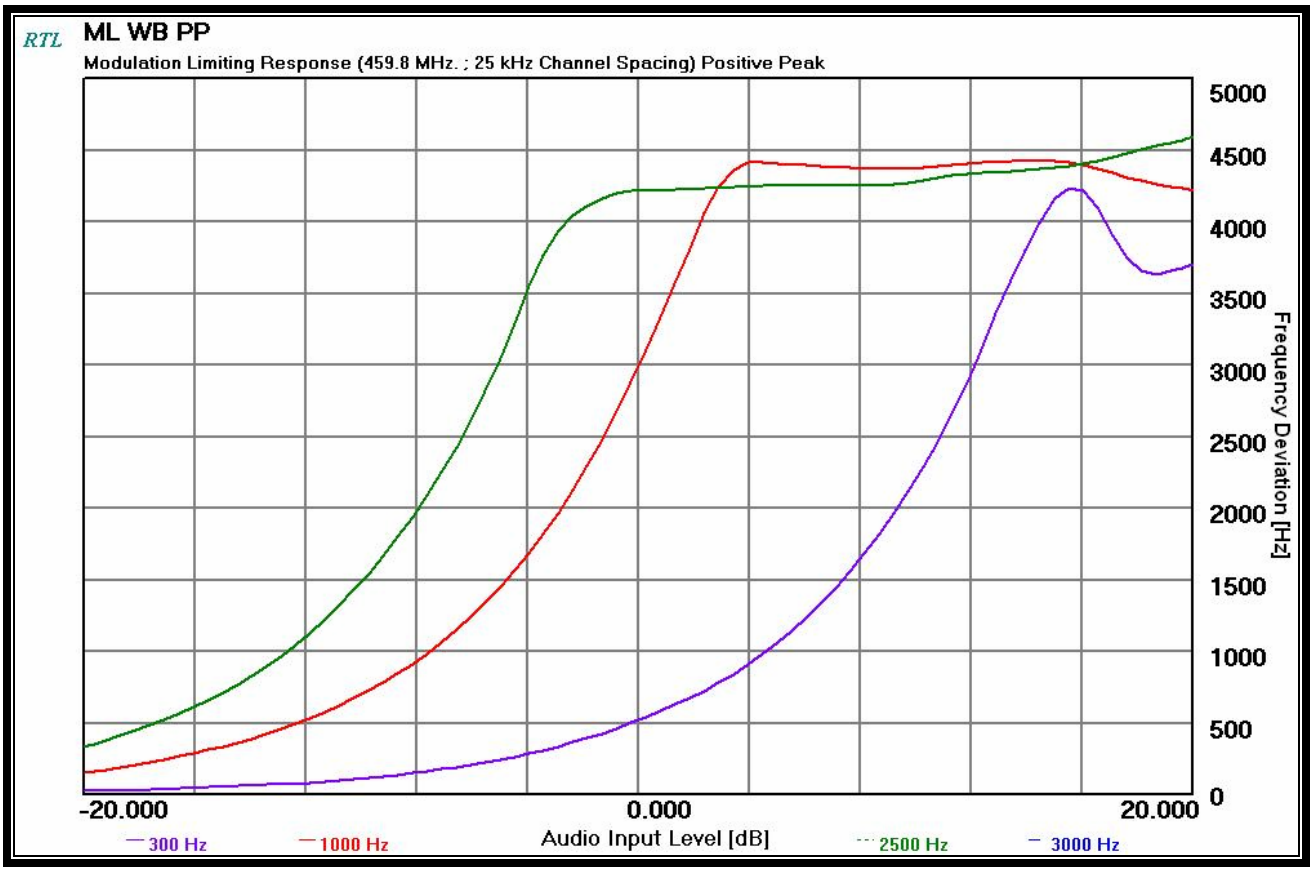
11.1 Test Procedure

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

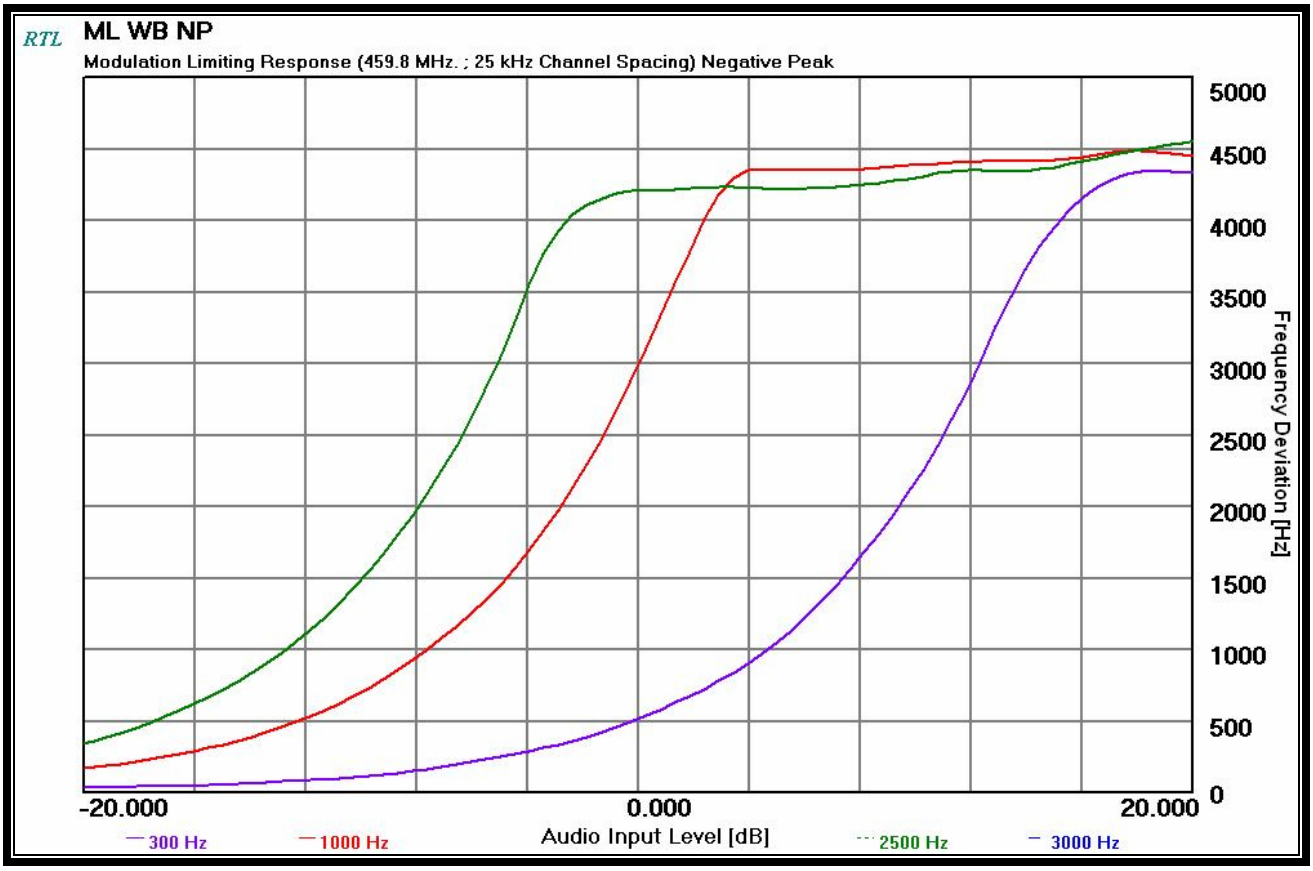
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0 dB), the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500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

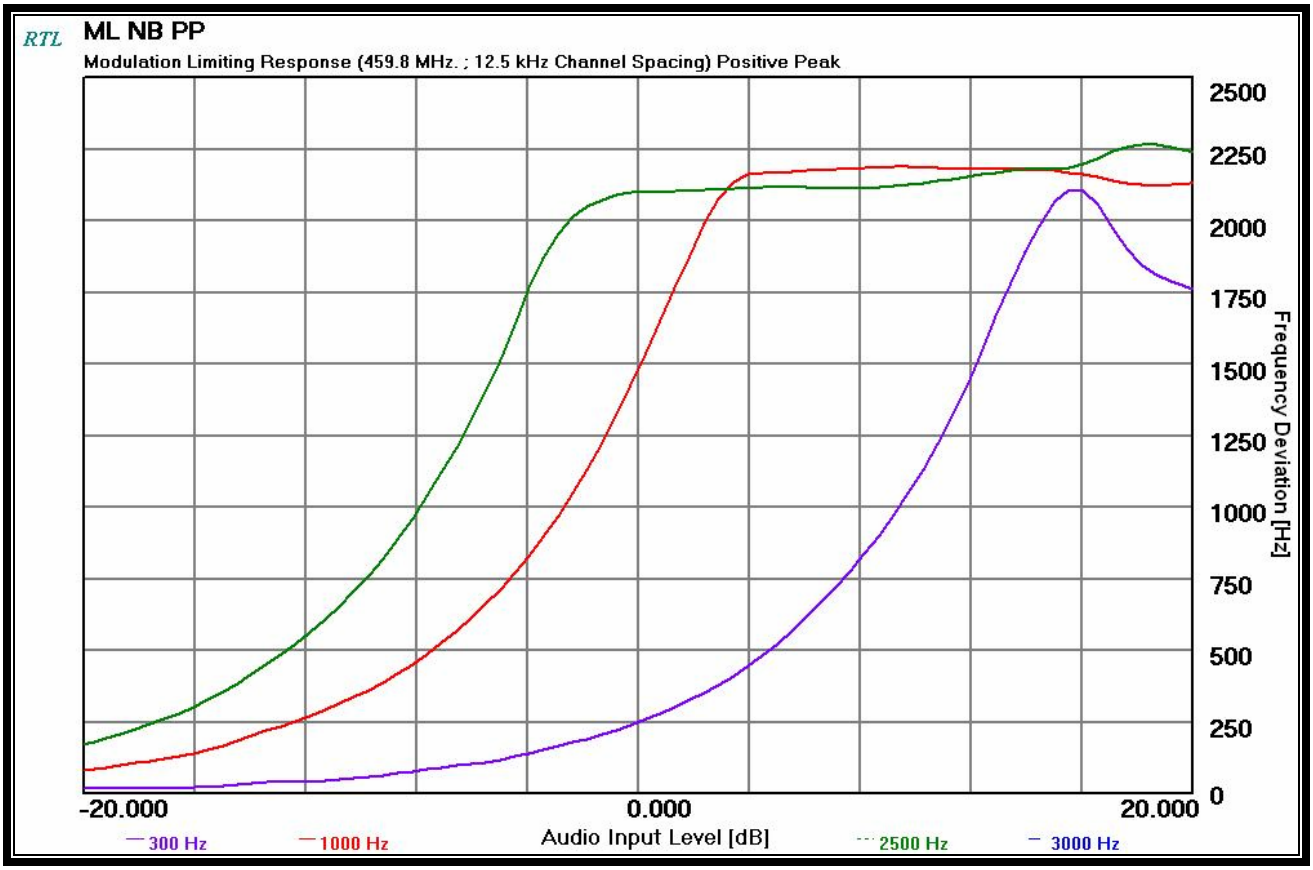
Plot 11-1: Modulation Characteristics – Modulation Limiting: Wide Band; Positive Peak



Plot 11-2: Modulation Characteristics – Modulation Limiting: Wide Band; Negative Peak



Plot 11-3: Modulation Characteristics – Modulation Limiting: Narrow Band; Positive Peak



Plot 11-4: Modulation Characteristics – Modulation Limiting: Narrow Band; Negative Peak

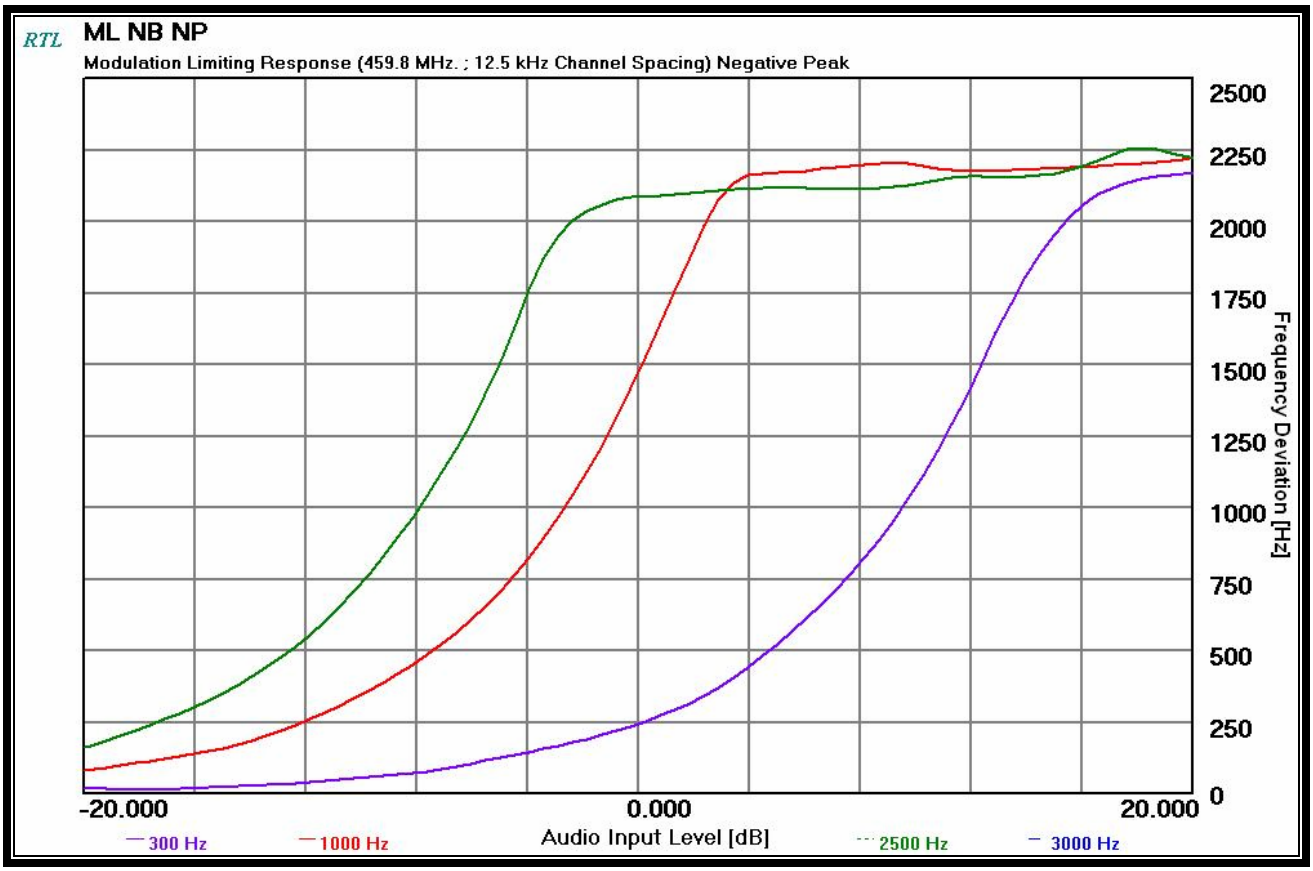


Table 11-1: Test Equipment for Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	09/14/06
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	09/14/06

Test Personnel:

Daniel Biggs	Daniel Biggs	August 9, 2006
Test Technician/Engineer	Signature	Date Of Test

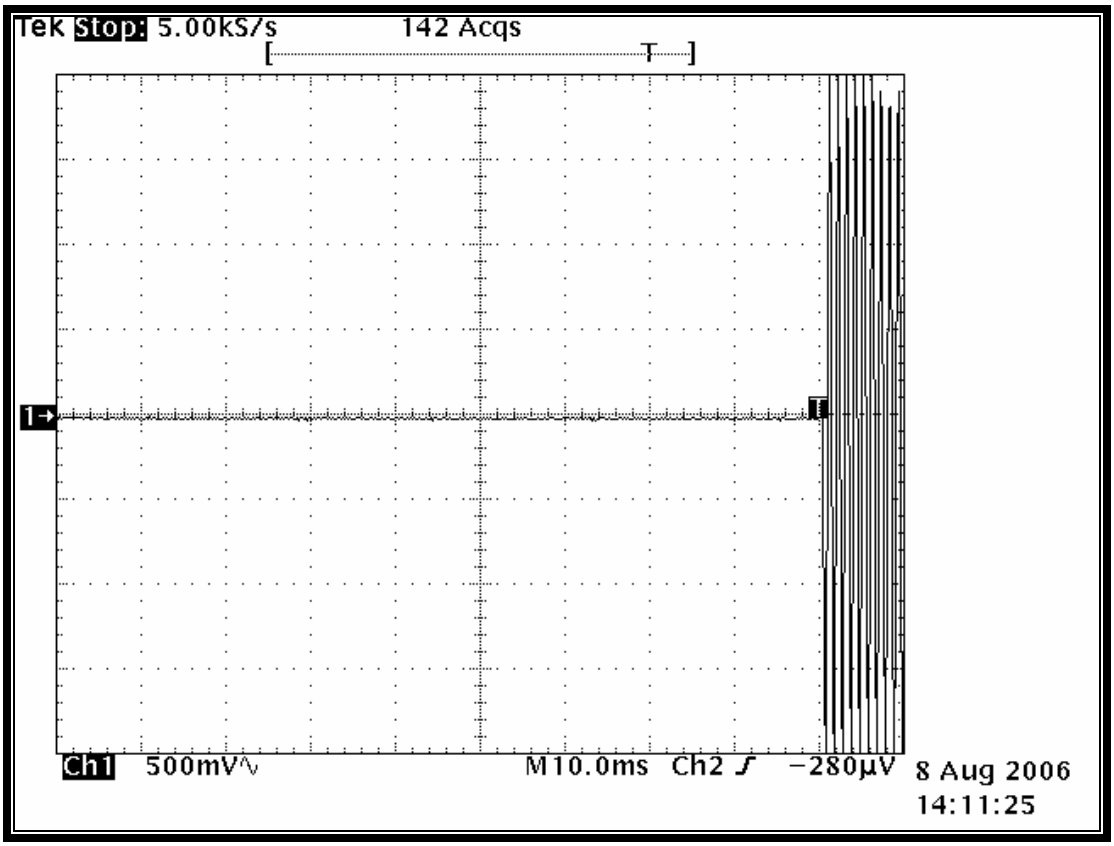
12 FCC Rules and Regulations Part 90 §90.214: Transient Frequency Behavior

12.1 Test Procedure

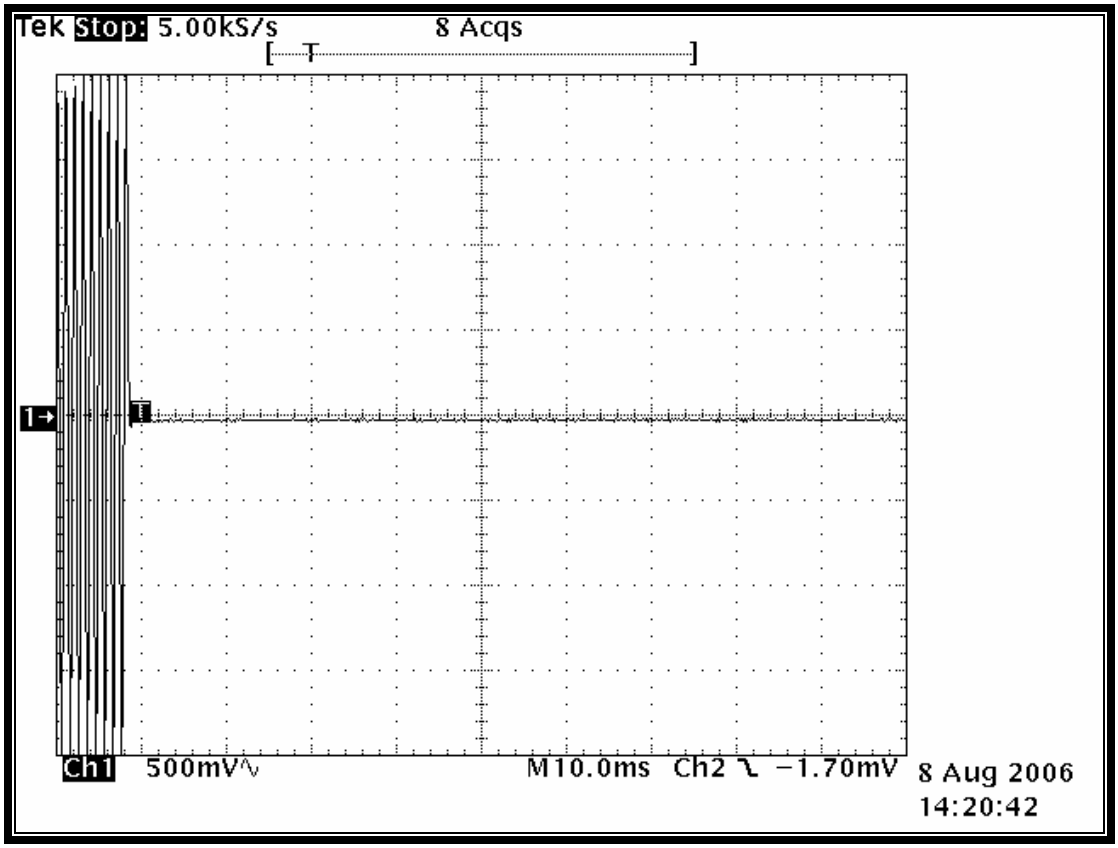
ANSI TIA-603-C-2004, section 2.2.3.

12.2 Test Data

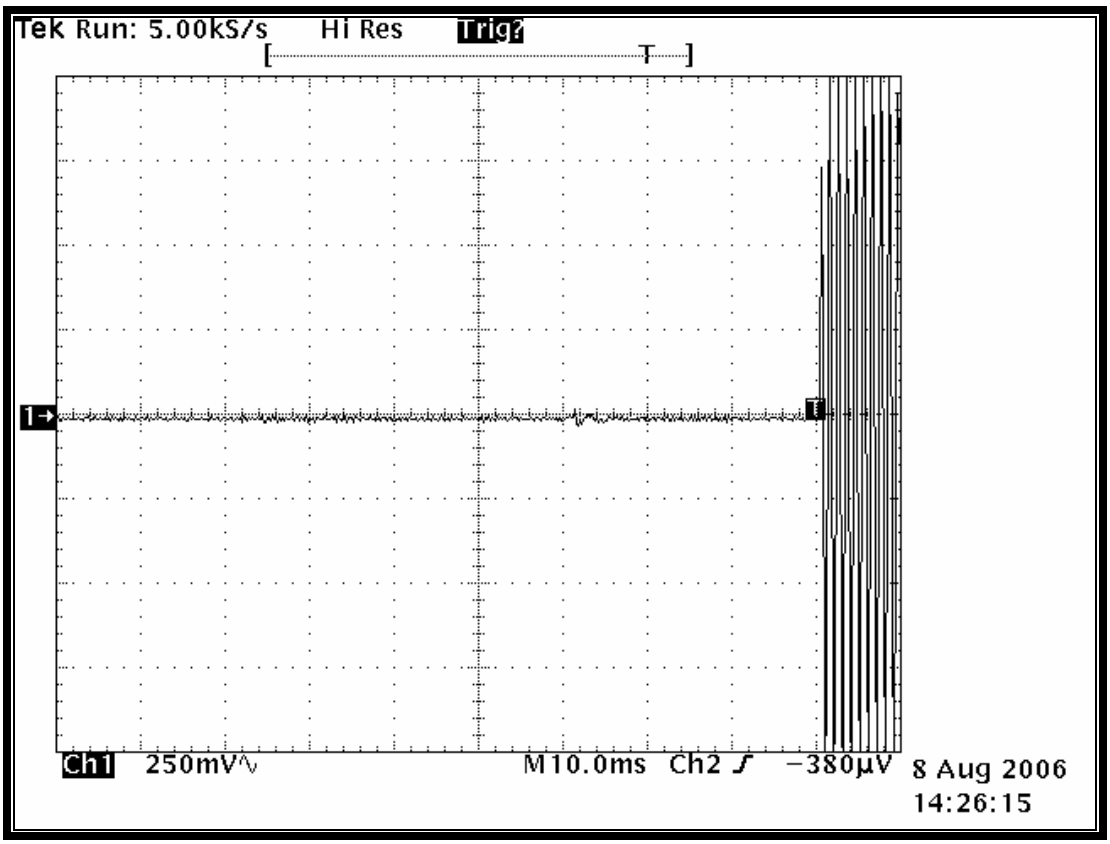
Plot 12-1: Transient Frequency Behavior – 459.800 MHz; Wide Band; High Power; Carrier ON Time



Plot 12-2: Transient Frequency Behavior – 459.800 MHz; Wide Band; High Power; Carrier OFF Time



Plot 12-3: Transient Frequency Behavior – 459.800 MHz; Narrow Band; High Power; Carrier ON Time



Plot 12-4: Transient Frequency Behavior – 459.800 MHz; Narrow Band; High Power; Carrier OFF Time

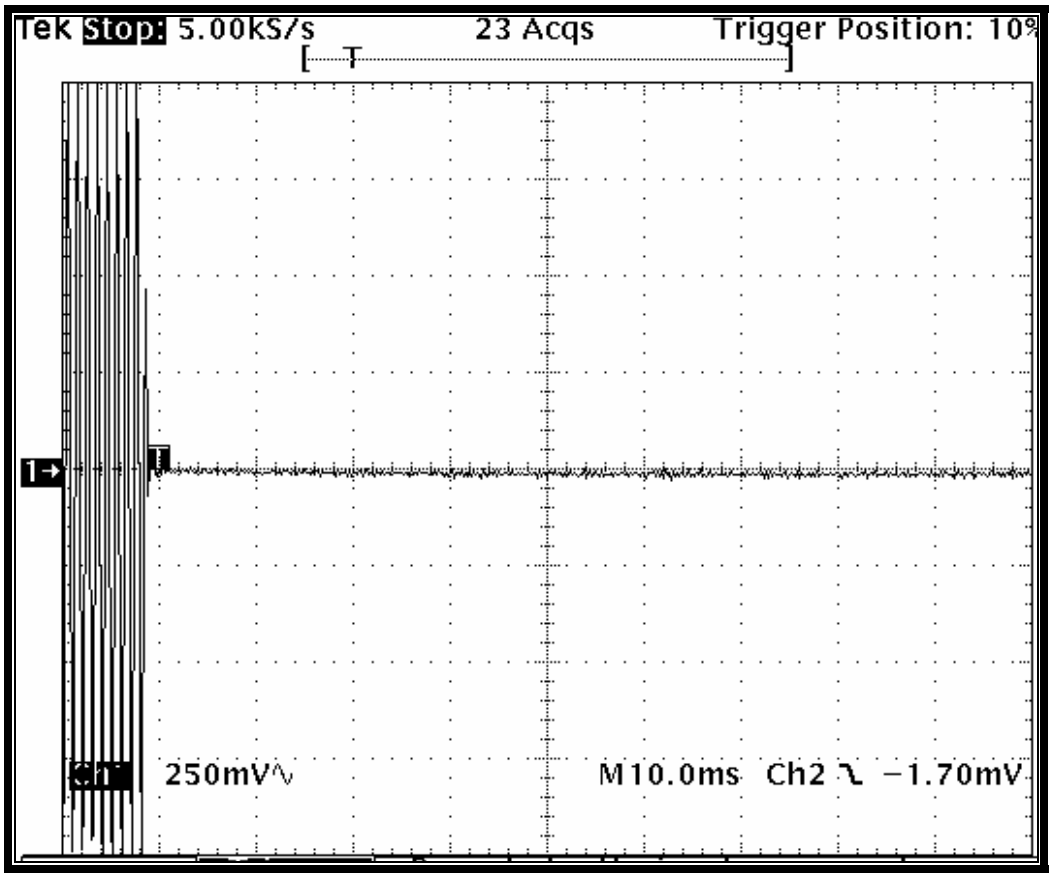


Table 12-1: Test Equipment for Testing Transient Frequency Behavior

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900917	Marconi	52022-910E	Signal Generator	119044-189	03/07/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
900561	Tektronix	TDS540B	Oscilloscope	B020129	03/08/07
900352	Werlatone	C1795	Directional Coupler	4989	06/06/08

Test Personnel:

Daniel Biggs	Daniel Biggs	August 8, 2006
Test Technician/Engineer	Signature	Date Of Test

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

Type of Emission: F3E, F1D, F1E

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

Voice – 12.5 kHz channel spacing
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

Digital Voice and Data (9600W) – 25 kHz channel spacing
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 3000
2D/R = 0.625
Bn = 3.86D + 0.27R = 3.86(3000) + 0.27(9600) = 14.172 kHz
Emission designator: 14K2F1D, 14K2F1E

Digital Voice and Data (9600N) – 12.5 kHz channel spacing
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 2350
2D/R = 0.245
Bn = 3.86D + 0.27R = 3.86(2350) + 0.27(9600) = 11.086 kHz
Emission designator: 11K1F1D, 11K1F1E

Digital Voice and Data (4800N) – 12.5 kHz channel spacing
Calculation:
Data rate in bps (R) = 4800
Peak deviation of carrier (D) = 1500
2D/R = 0.625
Bn = 3.86D + 0.27R = 3.86(1500) + 0.27(4800) = 7.086 kHz
Emission designator: 7K1F1D, 7K1F1E

C4FM – 9600 bps 12.5 kHz channel spacing: (P25 Standard)
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = +/-1.8 kHz
Number of states in each symbol (S) = 4
Bn = $[9600/\log_2(4) + 2(1800)(1)]$ = 8.400 kHz
Emission designator: 8K4F1D, 8K4F1E

14 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc**. Model **M7100 UHF-H Mobile Radio, FCC ID: OWDTR-0042-E,** complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules.