Engineering and Testing for EMC and Safety Compliance

TYPE CERTIFICATION REPORT

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MODEL: P7100IP/P5100IP 800 MHz Portable Radio
806-870 MHz

FCC ID: OWDTR-0023-E

June 21, 2004

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2003	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2003	RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS
PART 90: 2003	PRIVATE LAND PORTABLE RADIO SERVICES
ANSI C63.4-2001	AMERICAN NATIONAL STANDARD FOR METHODS OF MEASUREMENT OF RADIO NOISE EMISSIONS FROM LOW -VOLTAGE ELECTRICAL AND ELECTRONIC EQUIPMENT IN THE RANGE OF 9 KHZ – 40 GHZ
ANSI/TIA/EIA603- 2002	LAND PORTABLE FM OR PM COMMUNICATIONS EQUIPMENT - MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA –102.CAAA; 2002	DIGITAL C4FM/CQPSK TRANSCEIVER MEASUREMENT METHODS
RSS-119; Issue 6; 2000	LAND PORTABLE AND FIXED RADIO TRANSMITTERS AND RECEIVERS 27.41 TO 960.0 MHZ

Frequency Range	Maximum Measured Output Power (W) Conducted	Measured Frequency Tolerance (ppm)	Emission Designator
806-824, 851-869 MHz	3.3	.32	16K0F3E (WB Voice)
806-824, 851-869 MHz	3.3	.32	12K8F3E (NPSPAC Voice)
806-824, 851-869 MHz	3.3	.32	10K3F1D (2 level WB 9600) measured
806-824, 851-869 MHz	3.3	.32	10K3F1E (2 level WB 9600) measured
806-824, 851-869 MHz	3.3	.32	9K3F1D (2 level NPSPAC 9600) measured
806-824, 851-869 MHz	3.3	.32	9K3F1E (2 level NPSPAC 9600) measured
806-824, 851-869 MHz	3.3	.32	8K1F1D (4 Level) measured
806-824, 851-869 MHz	3.3	.32	8K1F1E (4 Level) measured

REPORT PREPARED BY TEST ENGINEER: DAN BIGGS

Document Number: 2004058/ QRTL04-120

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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 and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **P7100IP 800 MHz Portable Radio; FCC ID: OWDTR-0023-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, Industry Canada RSS-119, and ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 2001. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. 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 dated March 3, 1994, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2001).

1.2 RELATED SUBMITTAL(S)/GRANT(S)

This is an original application report. The P5100IP is a keyless version of the P7100IP; aside from the absence of keys, all other hardware remains the same as the P7100IP. The applicant requests that the grant include both models.

2 CONFORMANCE STATEMENT

STANDARDS REFERENCED FOR THIS REPORT	
PART 2: 2003	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS
PART 15: 2003	RADIO FREQUENCY DEVICES - §15.109: RADIATED EMISSIONS LIMITS
PART 90: 2003	PRIVATE LAND PORTABLE RADIO SERVICES
ANSI C63.4-2001	AMERICAN NATIONAL STANDARD FOR METHODS OF MEASUREMENT OF RADIO NOISE EMISSIONS FROM LOW -VOLTAGE ELECTRICAL AND ELECTRONIC EQUIPMENT IN THE RANGE OF 9 KHZ – 40 GHZ
ANSI/TIA/EIA603- 2002	LAND PORTABLE FM OR PM COMMUNICATIONS EQUIPMENT - MEASUREMENT AND PERFORMANCE STANDARDS
ANSI/TIA/EIA –102.CAAA; 2002	DIGITAL C4FM/CQPSK TRANSCEIVER MEASUREMENT METHODS
RSS-119; Issue 6; 2000	LAND PORTABLE AND FIXED RADIO TRANSMITTERS AND RECEIVERS 27.41 TO 960.0 MHZ
PART 2: 2003	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

Frequency Range	Maximum Measured Output Power (W) Conducted	Measured Frequency Tolerance (ppm)	Emission Designator
806-824, 851-869 MHz	3.3	.32	16K0F3E (WB Voice)
806-824, 851-869 MHz	3.3	.32	12K8F3E (NPSPAC Voice)
806-824, 851-869 MHz	3.3	.32	10K3F1D (2 level WB 9600) measured
806-824, 851-869 MHz	3.3	.32	10K3F1E (2 level WB 9600) measured
806-824, 851-869 MHz	3.3	.32	9K3F1D (2 level NPSPAC 9600) measured
806-824, 851-869 MHz	3.3	.32	9K3F1E (2 level NPSPAC 9600) measured
806-824, 851-869 MHz	3.3	.32	8K1F1D (4 Level) measured
806-824, 851-869 MHz	3.3	.32	8K1F1E (4 Level) measured

We, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made to the equipment during testing in order to achieve compliance with these standards. The test results relate only to the item that was tested.

Furthermore, there was no deviation from, additions to or exclusions from the above standards for Certification methodology.

Signature: Richard B. McMurray Date: June 21, 2004

Typed/Printed Name: Rick McMurray Position: Vice President of Operations

Signature: Daniel Biggs Date: June 21, 2004

Typed/Printed Name: Daniel W. Biggs Position: Test Engineer

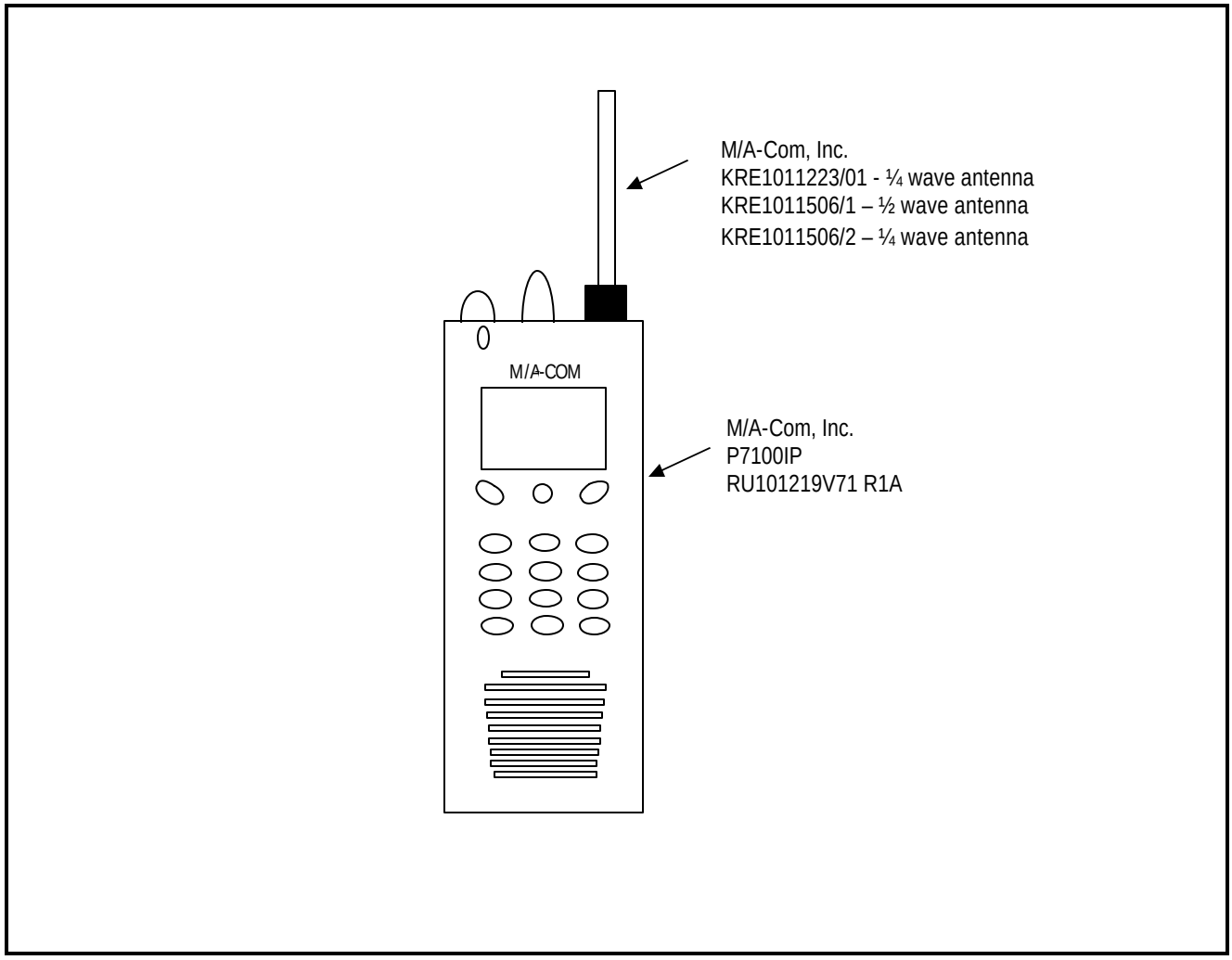
3 TESTED SYSTEM DETAILS

Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

TABLE 3-1: EQUIPMENT UNDER TEST (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
P7100 800 MHz Portable Radio (System)	M/A-COM, INC.	P7100IP	RU101219V71 R1B T1-PP30	OWDTR-0023-E	015809
P7100 800 MHz Portable Radio (Scan)	M/A-COM, INC.	P7100IP	RU101219V71 R1B T1-PP10	OWDTR-0023-E	015810
¼ wave antenna	M/A-COM, INC.	N/A	KRE1011223/01	N/A	N/A
½ wave antenna	M/A-COM, INC.	N/A	KRE1011506/1	N/A	N/A
¼ wave antenna	M/A-COM, INC.	N/A	KRE1011506/2	N/A	N/A

FIGURE 3-1: CONFIGURATION OF TESTED SYSTEM



4 FCC RULES AND REGULATIONS PART 2 §2.1033(C)(8) VOLTAGES AND CURRENTS THROUGH THE FINAL AMPLIFYING STAGE

Nominal DC Voltage: 7.5 VDC
Current: 7.5 AMPS

5 FCC RULES AND REGULATIONS PART 2 §2.1046 (A): RF POWER OUTPUT: CONDUCTED

5.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.1

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

5.2 TEST DATA

The following channels (in MHz) were tested: 806.0125, 815.5, 823.9875, 851.0125, 863.0, and 868.9875.

TABLE 5-1: RF POWER OUTPUT (HIGH POWER): CARRIER OUTPUT POWER (UNMODULATED)

Channel	Frequency (MHz)	RF Power Measured (Watt)*
1 (High Power)	806.0125	3.30
2 (High Power)	815.5	3.25
3 (High Power)	823.9875	3.21
4 (High Power)	851.0125	3.14
5 (High Power)	863.0	3.07
6 (High Power)	868.9875	3.02
1 (Low Power)	806.0125	1.10
2 (Low Power)	815.5	1.11
3 (Low Power)	823.9875	1.10
4 (Low Power)	851.0125	1.06
5 (Low Power)	863.0	1.09
6 (Low Power)	868.9875	1.07

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

TABLE 5-2: RF POWER OUTPUT (RATED POWER)

Rated Power (W)
3

TABLE 5-3: TEST EQUIPMENT USED FOR TESTING RF POWER OUTPUT - CONDUCTED

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184/901186	Agilent	E4416A/E9323A	Power Meter / Sensor	GB41050573/US420.52510380	07/30/04

TEST PERSONNEL:

DANIEL BIGGS	Daniel Biggs	APRIL 8, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

6 FCC RULES AND REGULATIONS PART 2 §2.1051: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

6.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, Section 2.2.13

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

Digital Modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps

6.2 TEST DATA

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

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

The following channels (in MHz) were investigated: 806, 851, and 870. The worse case (unwanted emissions) channels are shown. The magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

TABLE 6-1: CONDUCTED SPURIOUS EMISSIONS CHANNEL 1 – 806.0125 MHZ – HIGH POWER

(806.0125 MHz); 25 kHz channel spacing; Conducted Power = 3.30 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1612.025	77.82	48.19	-29.63
2418.0375	75.33	48.19	-27.14
3224.05	99.98	48.19	-51.79
4030.0625	103.16	48.19	-54.97
4836.075	104.22	48.19	-56.03
5642.0875	109.32	48.19	-61.13
6448.1	112.75	48.19	-64.56
7254.1125	111.29	48.19	-63.10
8060.125	115.39	48.19	-67.20

TABLE 6-2: CONDUCTED SPURIOUS EMISSIONS CHANNEL 1 – 806 MHZ – LOW POWER

(806 MHz); 25 kHz channel spacing; Conducted Power = 1.10 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1612.025	80.00	43.41	-36.59
2418.0375	78.18	43.41	-34.77
3224.05	102.64	43.41	-59.23
4030.0625	103.99	43.41	-60.58
4836.075	120.40	43.41	-76.99
5642.0875	109.28	43.41	-65.87
6448.1	124.31	43.41	-80.90
7254.1125	117.95	43.41	-74.54
8060.125	118.50	43.41	-75.09

TABLE 6-3: CONDUCTED SPURIOUS EMISSIONS CHANNEL 2 – 815.5 MHZ – HIGH POWER

(815.5 MHz); 25 kHz channel spacing; Conducted Power = 3.25 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1631	93.35	48.12	-45.23
2446.5	75.63	48.12	-27.51
3262	101.06	48.12	-52.94
4077.5	100.13	48.12	-52.01
4893	119.31	48.12	-71.19
5708.5	109.04	48.12	-60.92
6524	116.29	48.12	-68.17
7339.5	110.02	48.12	-61.90
8155	114.09	48.12	-65.97

TABLE 6-4: CONDUCTED SPURIOUS EMISSIONS CHANNEL 2 – 815.5 MHZ – LOW POWER

(815.5 MHz); 25 kHz channel spacing; Conducted Power = 1.11 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1631	72.52	43.45	-29.07
2446.5	74.93	43.45	-31.48
3262	100.21	43.45	-56.76
4077.5	97.67	43.45	-54.22
4893	117.05	43.45	-73.60
5708.5	109.16	43.45	-65.71
6524	114.13	43.45	-70.68
7339.5	111.64	43.45	-68.19
8155	114.07	43.45	-70.62

TABLE 6-5: CONDUCTED SPURIOUS EMISSIONS CHANNEL 3 – 823.9875 MHZ – HIGH POWER

(823.9875 MHz); 25 kHz channel spacing; Conducted Power = 3.21 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1647.975	79.31	48.07	-31.24
2471.9625	73.53	48.07	-25.46
3295.95	101.86	48.07	-53.79
4119.9375	95.44	48.07	-47.37
4943.925	119.00	48.07	-70.93
5767.9125	106.65	48.07	-58.58
6591.9	117.96	48.07	-69.89
7415.8875	105.21	48.07	-57.14
8239.875	114.88	48.07	-66.81

TABLE 6-6: CONDUCTED SPURIOUS EMISSIONS CHANNEL 3 – 823.9875 MHZ – LOW POWER

(823.9875 MHz); 25 kHz channel spacing; Conducted Power = 1.10 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1647.975	71.53	43.41	-28.12
2471.9625	73.77	43.41	-30.36
3295.95	101.37	43.41	-57.96
4119.9375	95.63	43.41	-52.22
4943.925	119.09	43.41	-75.68
5767.9125	106.29	43.41	-62.88
6591.9	113.07	43.41	-69.66
7415.8875	110.69	43.41	-67.28
8239.875	111.40	43.41	-67.99

TABLE 6-7: CONDUCTED SPURIOUS EMISSIONS CHANNEL 4– 851.0125 MHZ – HIGH POWER

(851.0125 MHz); 25 kHz channel spacing; Conducted Power = 3.14 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1702.025	66.46	48.07	-18.39
2553.0375	97.64	48.07	-49.57
3404.05	101.67	48.07	-53.60
4255.0625	102.52	48.07	-54.45
5106.075	117.51	48.07	-69.44
5957.0875	101.24	48.07	-53.17
6808.1	109.77	48.07	-61.70
7659.1125	108.61	48.07	-60.54
8510.125	115.42	48.07	-67.35

TABLE 6-8: CONDUCTED SPURIOUS EMISSIONS CHANNEL 4 – 851.0125 MHZ – LOW POWER

(851.0125 MHz); 25 kHz channel spacing; Conducted Power = 1.06 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1702.025	113.10	43.41	-69.69
2553.0375	96.70	43.41	-53.29
3404.05	104.88	43.41	-61.47
4255.0625	102.45	43.41	-59.04
5106.075	118.35	43.41	-74.94
5957.0875	100.44	43.41	-57.03
6808.1	108.15	43.41	-64.74
7659.1125	110.45	43.41	-67.04
8510.125	110.53	43.41	-67.12

TABLE 6-9: CONDUCTED SPURIOUS EMISSIONS CHANNEL 5 – 863.0 MHZ – HIGH POWER

(863.0 MHz); 25 kHz channel spacing; Conducted Power = 3.07 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1726	63.04	47.87	-15.17
2589	81.55	47.87	-33.68
3452	100.83	47.87	-52.96
4315	102.16	47.87	-54.29
5178	118.95	47.87	-71.08
6041	110.07	47.87	-62.20
6904	111.18	47.87	-63.31
7767	115.51	47.87	-67.64
8630	111.10	47.87	-63.23

TABLE 6-10: CONDUCTED SPURIOUS EMISSIONS CHANNEL 5 – 863.0 MHZ – LOW POWER

(863.0 MHz); 25 kHz channel spacing; Conducted Power = 1.09 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1726	101.77	43.37	-58.40
2589	98.48	43.37	-55.11
3452	118.91	43.37	-75.54
4315	101.33	43.37	-57.96
5178	119.34	43.37	-75.97
6041	108.62	43.37	-65.25
6904	110.46	43.37	-67.09
7767	110.94	43.37	-67.57
8630	105. 36	43.37	-61.99

TABLE 6-11: CONDUCTED SPURIOUS EMISSIONS CHANNEL 6 – 868.9875 MHZ – HIGH POWER

(868.9875 MHz); 25 kHz channel spacing; Conducted Power = 3.02 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1737.966	59.94	47.80	-12.14
2606.9535	78.10	47.80	-30.30
3475.941	94.43	47.80	-46.63
4344.9285	94.56	47.80	-46.76
5213.916	115.09	47.80	-67.29
6082.9035	109.83	47.80	-62.03
6951.891	112.78	47.80	-64.98
7820.8785	116.48	47.80	-68.68
8689.866	106.85	47.80	-59.05

TABLE 6-12: CONDUCTED SPURIOUS EMISSIONS CHANNEL 6 – 868.9875 MHZ – LOW POWER

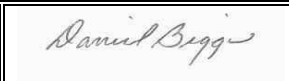
(868.9875MHz); 25 kHz channel spacing; Conducted Power = 1.07 W

Frequency (MHz)	Level (dBc)	Limit (dBc)	Margin(dB)
1737.966	61.83	43.29	-18.54
2606.9535	80.95	43.29	-37.66
3475.941	98.18	43.29	-54.89
4344.9285	97.61	43.29	-54.32
5213.916	115.06	43.29	-71.77
6082.9035	114.15	43.29	-70.86
6951.891	109.12	43.29	-65.83
7820.8785	109.48	43.29	-66.19
8689.866	103.31	43.29	-60.02

TABLE 6-13: TEST EQUIPMENT USED FOR TESTING CONDUCTED SPURIOUS EMISSIONS

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz-12.8 GHz)	3826A00144	08/27/04
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	08/06/04
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	09/09/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 9, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

7 FCC RULES AND REGULATIONS PART 2 §2.1053 (A): FIELD STRENGTH OF SPURIOUS RADIATION

7.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 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.

Digital Modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps

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.

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.

TABLE 7-1: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL 2 – 815.5 MHZ; WIDE BAND; HIGH POWER

Limit = 43 + 10 Log P = 48.12 dBc
Conducted Power = 35.12 dBm = 3.25 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1631	48.39	-39.9	1.6	4.75	48.12	-23.8
2446.5	42.80	-49.4	2.3	6.35	48.12	-32.3
3262	45.12	-47.3	2.2	7.35	48.12	-29.2
4077.5	42.86	-47.2	2.5	6.95	48.12	-29.8
4893	25.59	-59.1	3.0	7.35	48.12	-41.7
5708.5	37.23	-46.8	3.1	8.35	48.12	-28.5
6524	26.87	-59.2	3.3	8.85	48.12	-40.6
7339.5	26.34	-56.8	3.0	8.35	48.12	-38.5
8155	28.89	-51.5	3.4	7.45	48.12	-34.5

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

TABLE 7-2: FIELD STRENGTH OF SPURIOUS RADIATION CHANNEL 5 – 863 MHZ; WIDE BAND; LOW POWER

Limit = 43 + 10 Log P = 47.87 dBc
Conducted Power = 34.87 dBm = 3.07 W

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss* (dB)	Antenna Gain (dBd)	Corrected Signal Generator Level (dBc)	Margin (dB)
1726	44.71	-42.7	1.1	4.85	73.8	-25.9
2589	28.29	-63.4	1.2	6.95	92.5	-44.6
3452	45.16	-47.6	1.5	7.35	76.6	-28.7
4315	36.59	-49.0	1.8	7.45	78.2	-30.3
5178	22.75	-60.7	1.8	7.55	89.9	-42.0
6041	27.10	-58.8	2.3	8.65	87.3	-39.4
6904	26.05	-58.6	2.5	8.05	87.9	-40.0
7767	29.66	-56.1	2.5	7.65	85.8	-37.9
8630	26.79	-53.4	2.5	8.50	82.3	-34.4

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

TABLE 7-3: TEST EQUIPMENT USED FOR TESTING FIELD STRENGTH OF SPURIOUS RADIATION

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901053	Schaffner-Chase	CBL6112	Antenna (25 MHz – 2 GHz)	2648	07/03/04
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	N/A
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	07/15/04
900917	Hewlett Packard	8648C	Synthesized Signal Generator (9 kHz - 3200 MHz)	3537A01741	05/02/04
900928	Hewlett Packard	HP 83752A	Synthesized Sweeper (.01 - 20 GHz)	3610A00866	08/05/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 14, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

8 FCC RULES AND REGULATIONS PART 2 §2.1049 (C) (1): OCCUPIED BANDWIDTH

OCCUPIED BANDWIDTH - COMPLIANCE WITH THE EMISSION MASKS

8.1 TEST PROCEDURE

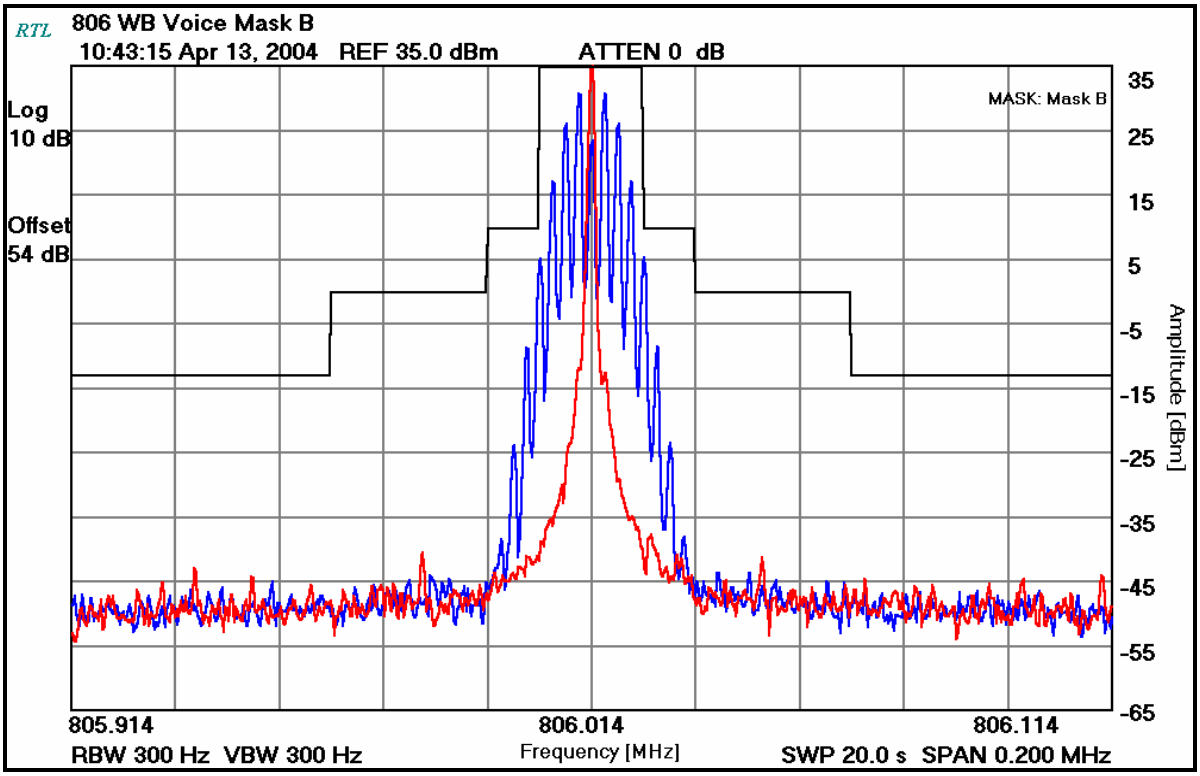
ANSI/TIA/EIA-603-1992, section 2.2.11 and TIA/EIA-102.CAAA-1999 section 2.2.5

Device with audio modulation: Transmitter was modulated with a 2,851 Hz sine wave at an input level of 16 dB greater than that required to produce 50% of rated system deviation at 1,000 Hz.

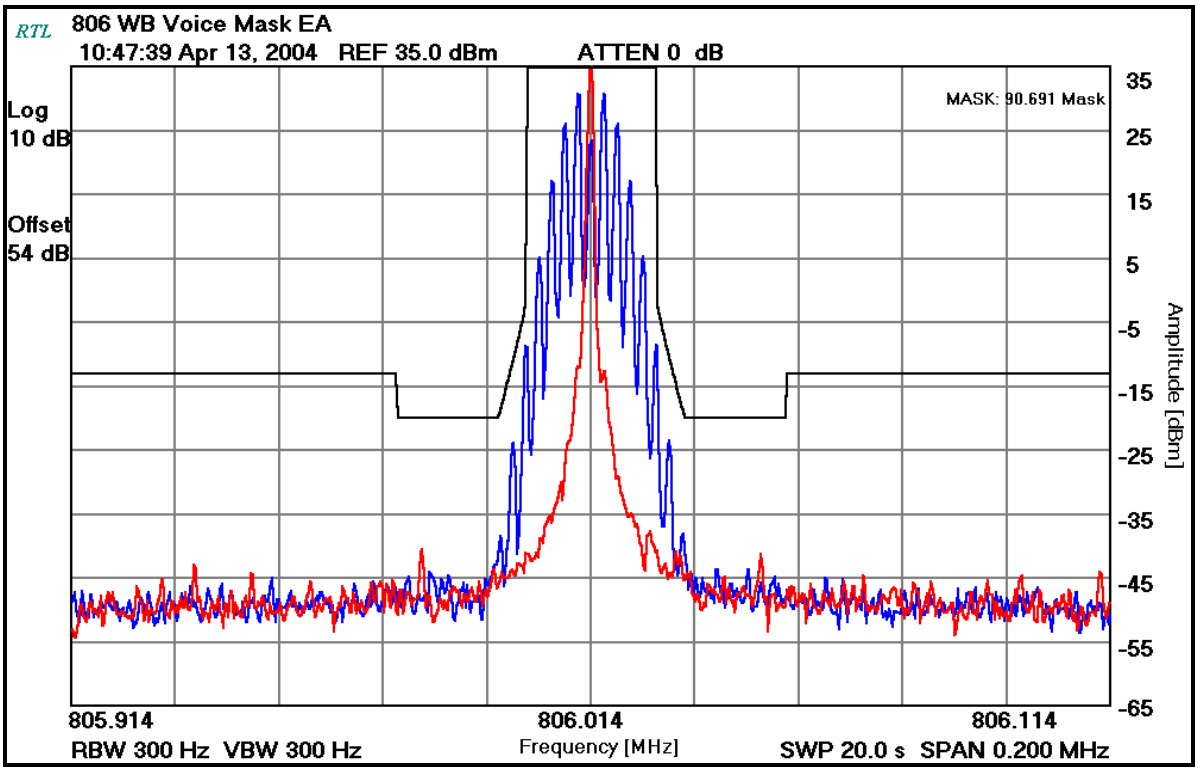
Device with digital modulation: Modulated to its maximum extent using a pseudo random data sequence – 9600-bps

8.2 TEST DATA

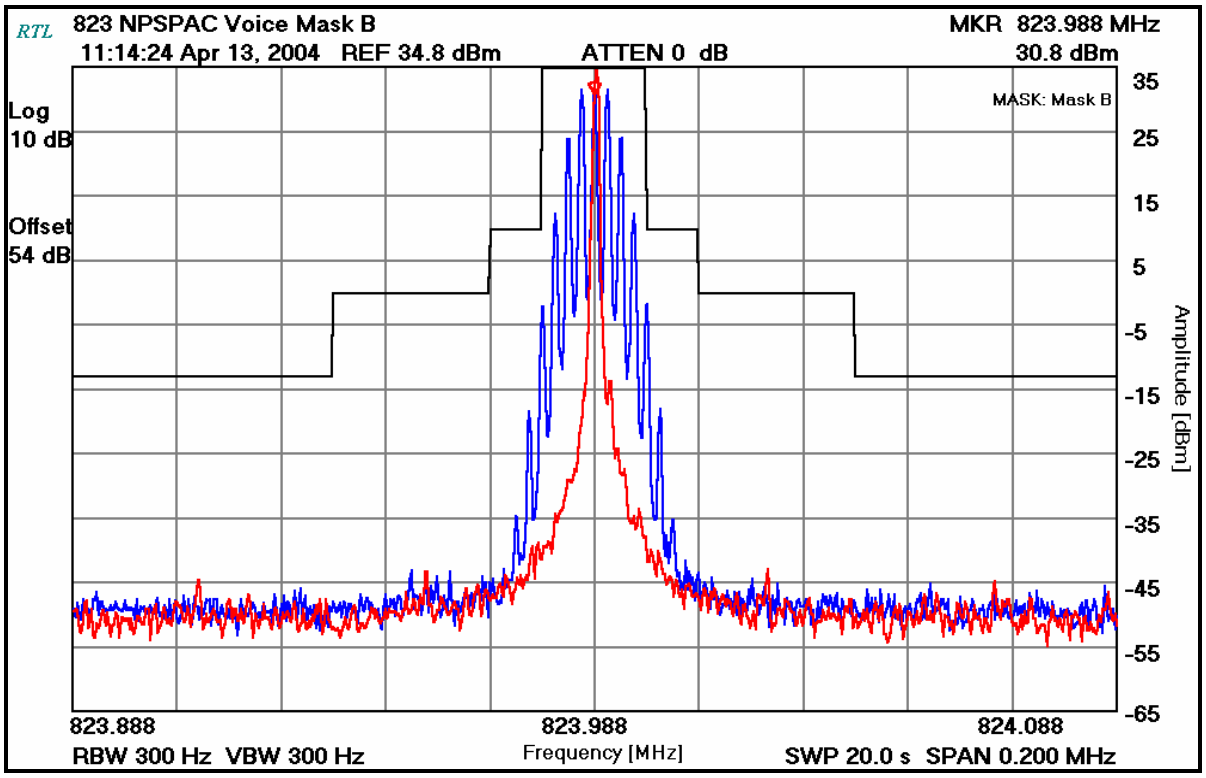
PLOT 8-1: OCCUPIED BANDWIDTH; WIDE BAND; AUDIO MODULATION: 2,500 HZ (MASK B)



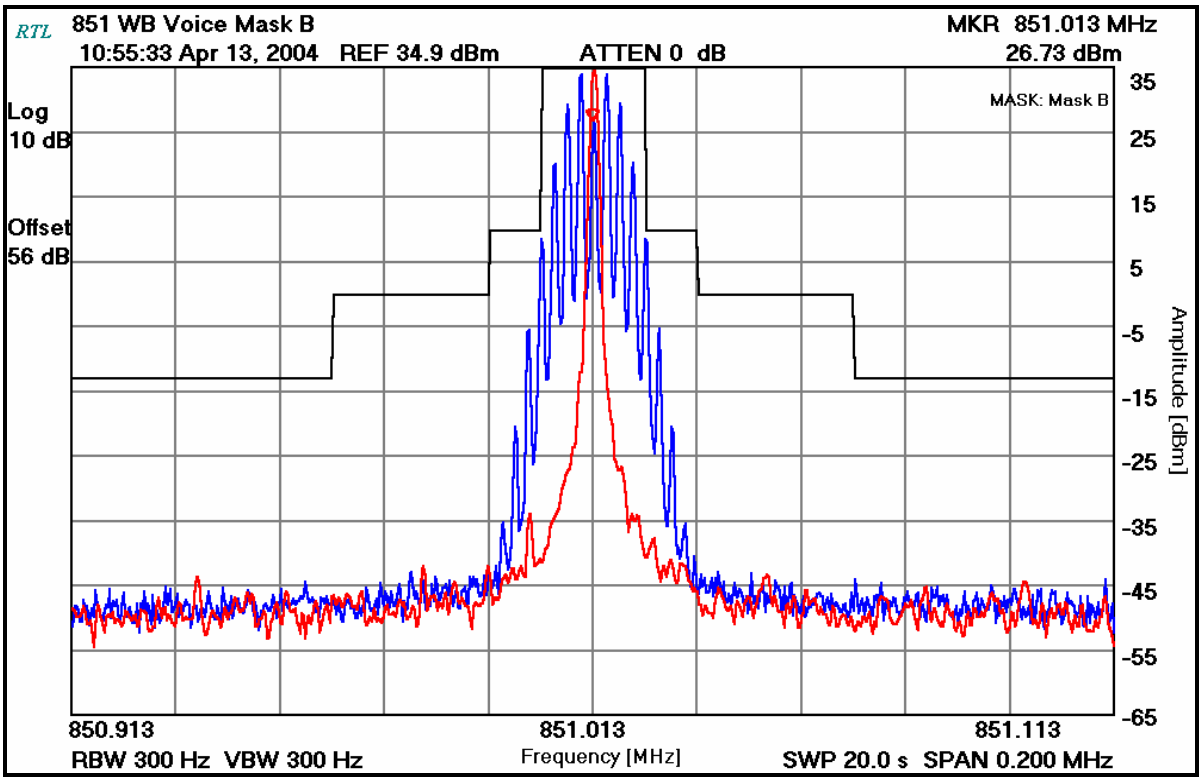
PLOT 8-2: OCCUPIED BANDWIDTH; WIDE BAND; AUDIO MODULATION: 2,500 HZ (MASK EA)



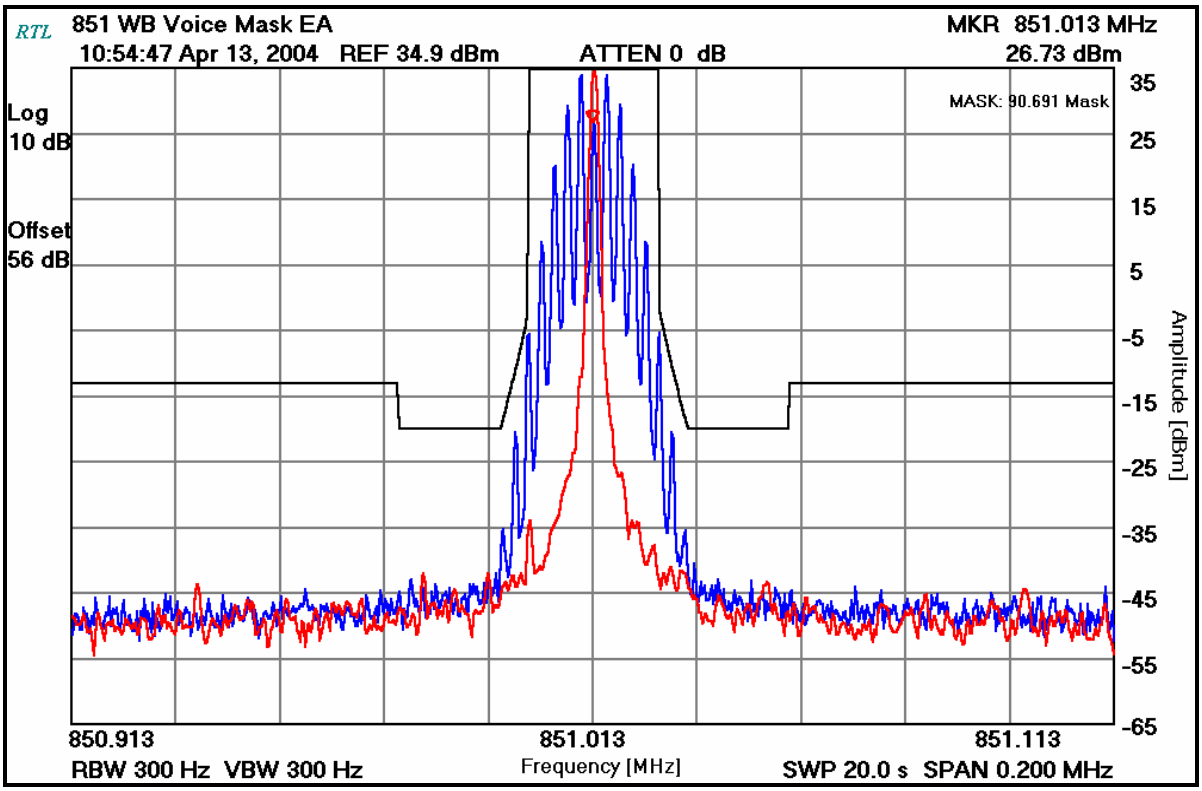
PLOT 8-3: OCCUPIED BANDWIDTH; NPSPAC; AUDIO MODULATION: 2,500 HZ (MASK B)



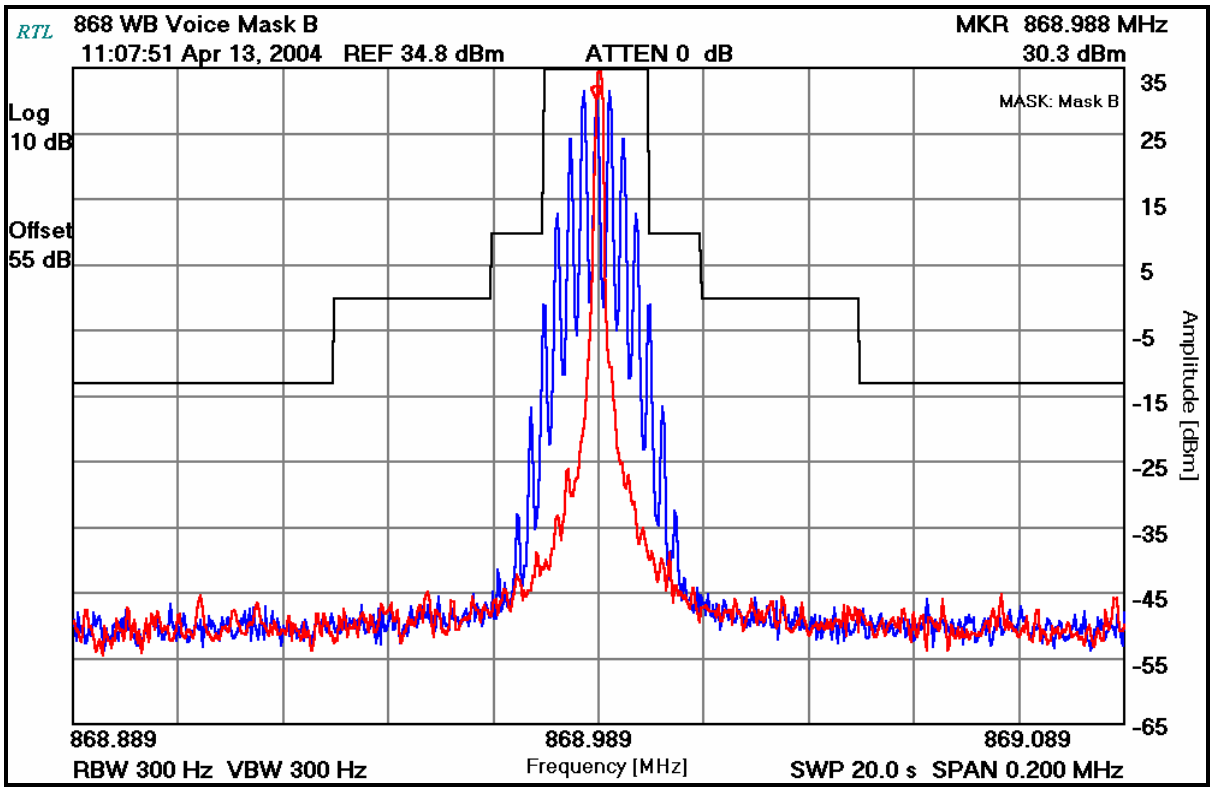
PLOT 8-4: OCCUPIED BANDWIDTH; WIDE BAND; AUDIO MODULATION: 2,500 HZ (MASK B)



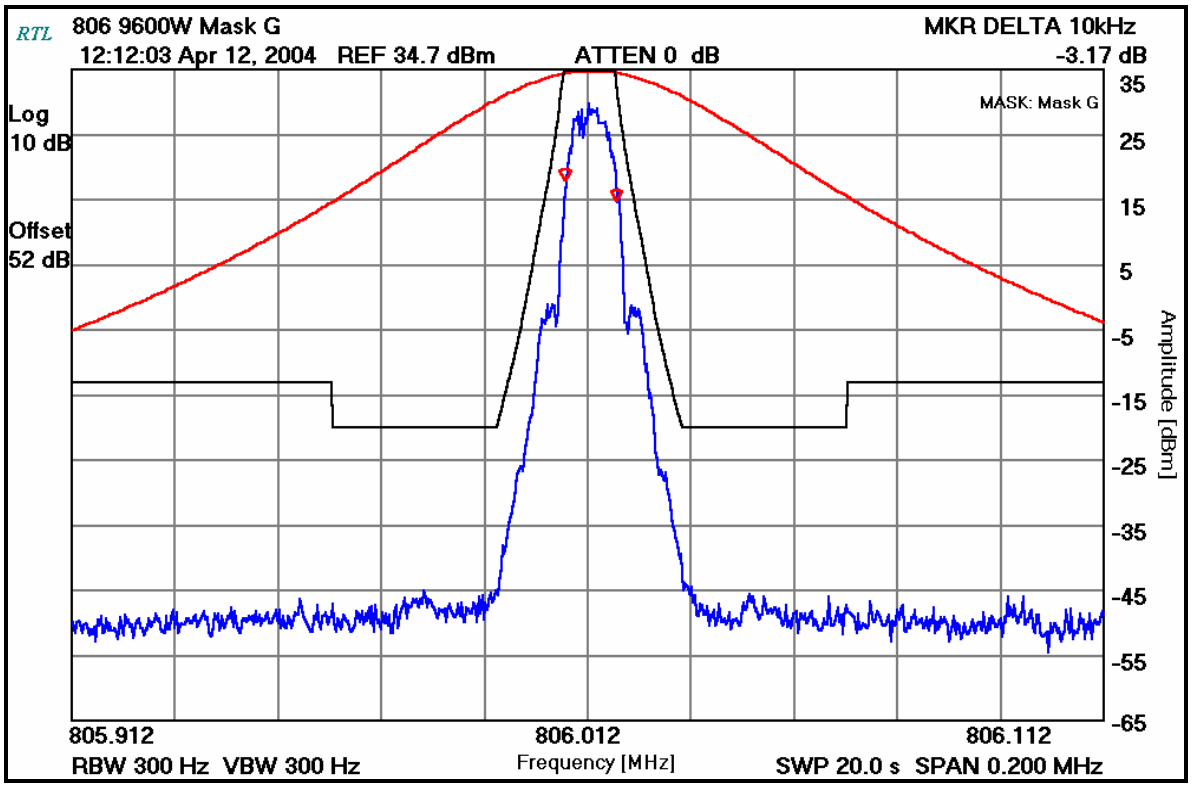
PLOT 8-5: OCCUPIED BANDWIDTH; WIDE BAND; AUDIO MODULATION: 2,500 HZ (MASK EA)



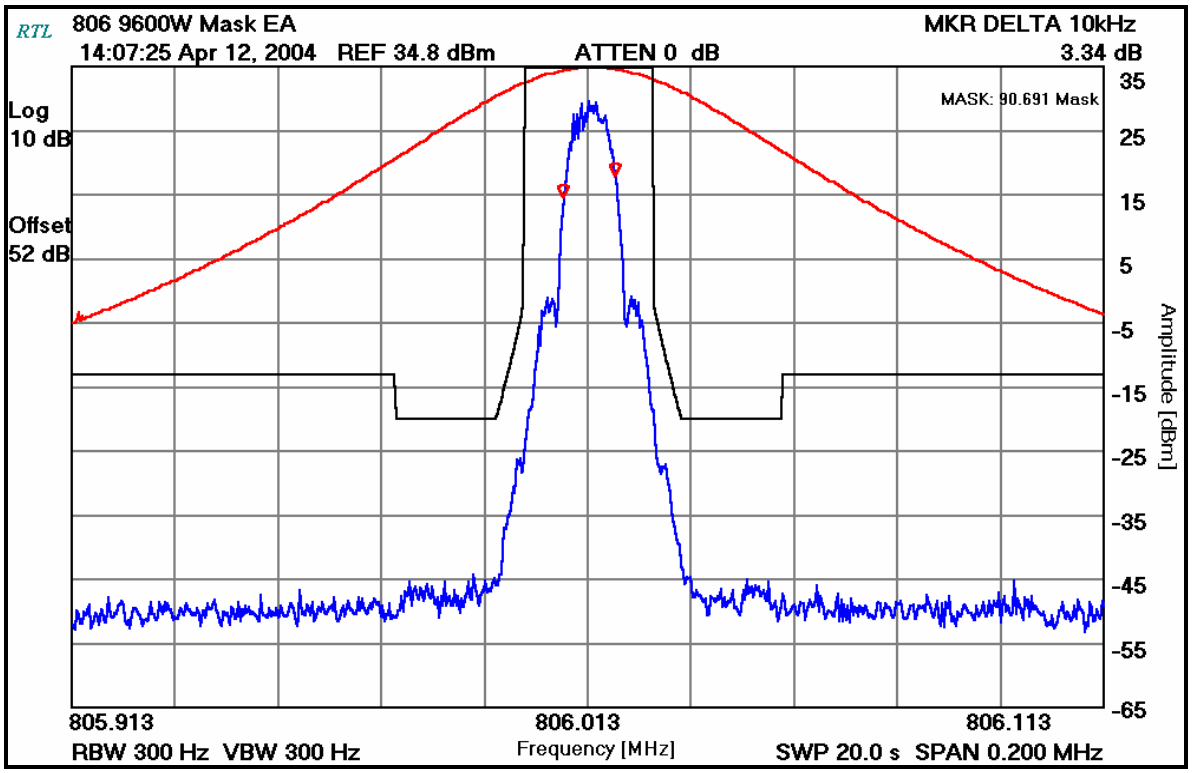
PLOT 8-6: 99% OCCUPIED BANDWIDTH - NPSPAC; AUDIO MODULATION; (MASK B)



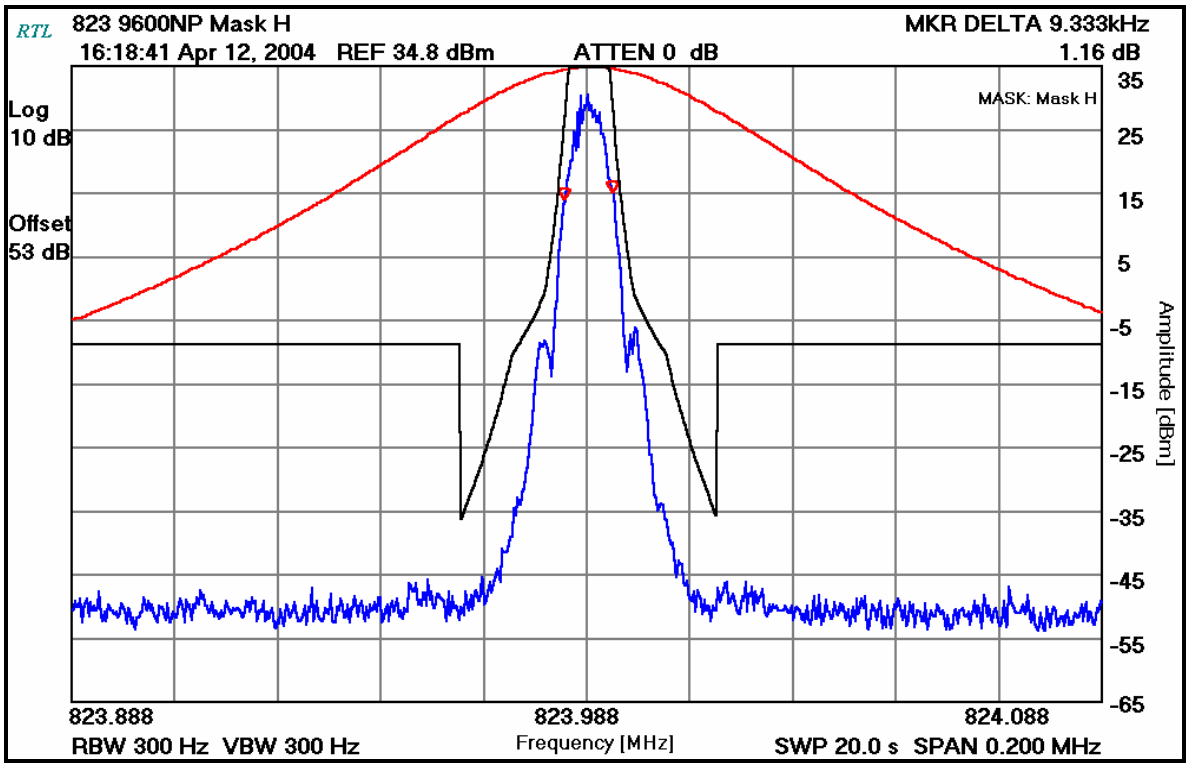
PLOT 8-7: 99% OCCUPIED BANDWIDTH – 2-LEVEL; WIDE BAND; 9600; (MASK G)



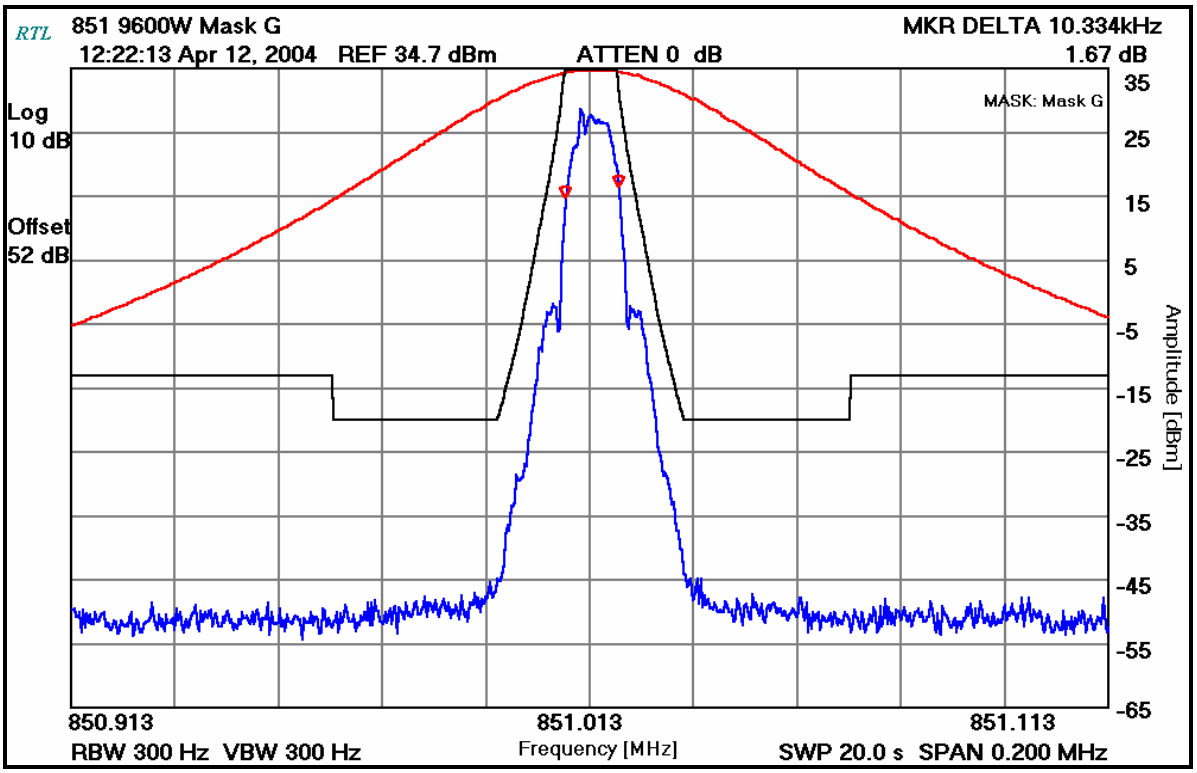
PLOT 8-8: 99% OCCUPIED BANDWIDTH – 2-LEVEL; WIDE BAND; 9600; (MASK EA)



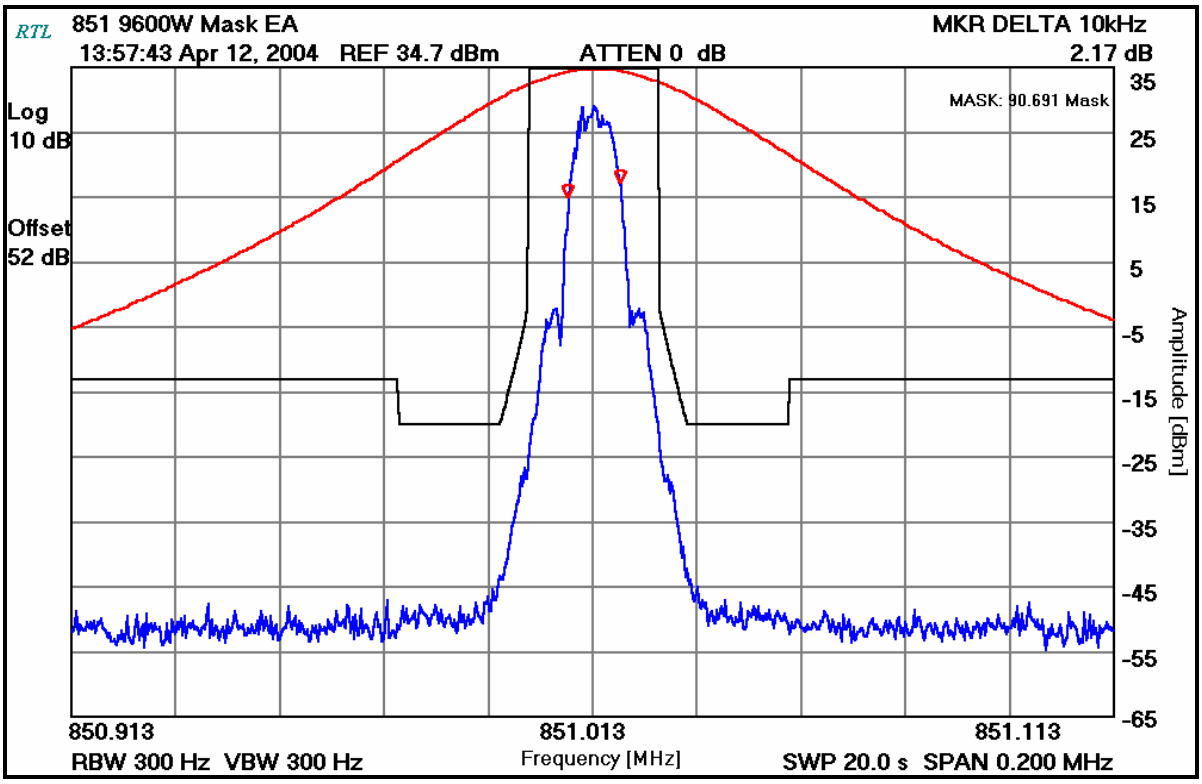
PLOT 8-9: 99% OCCUPIED BANDWIDTH – 2-LEVEL; NPSPAC; 9600; (MASK H)



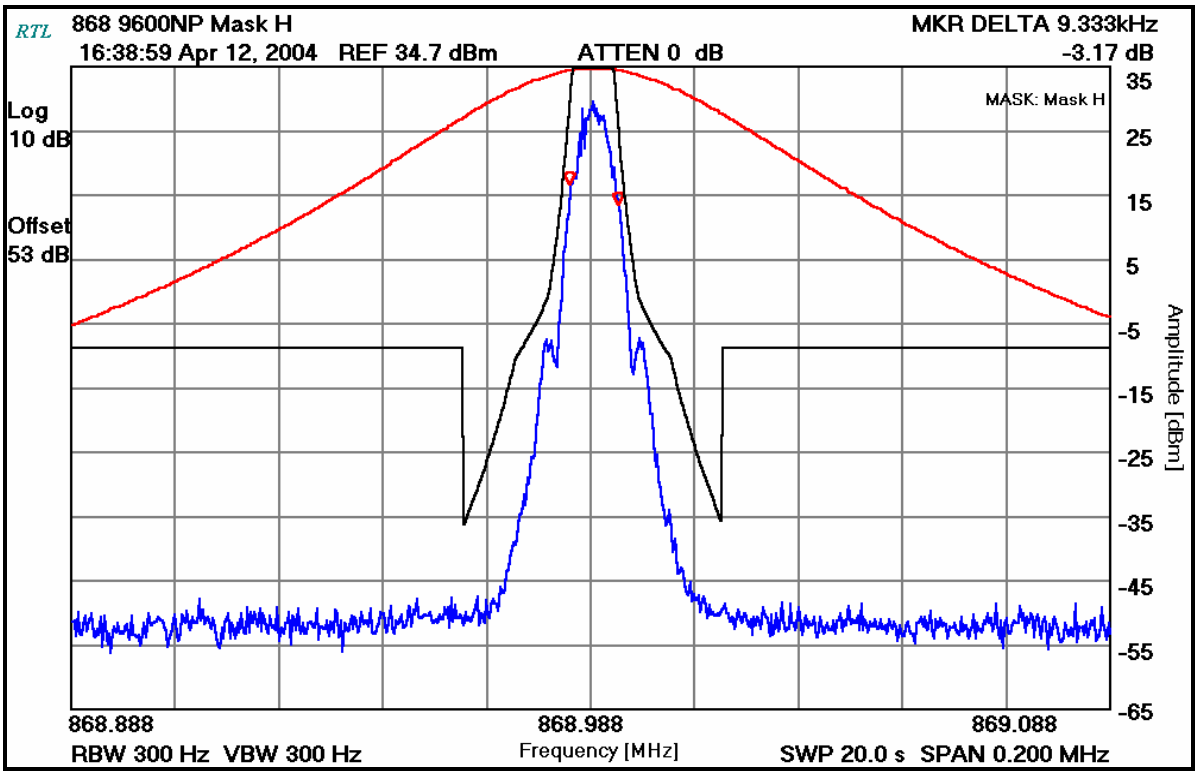
PLOT 8-10: 99% OCCUPIED BANDWIDTH – 2-LEVEL; WIDE BAND; 9600; (MASK G)



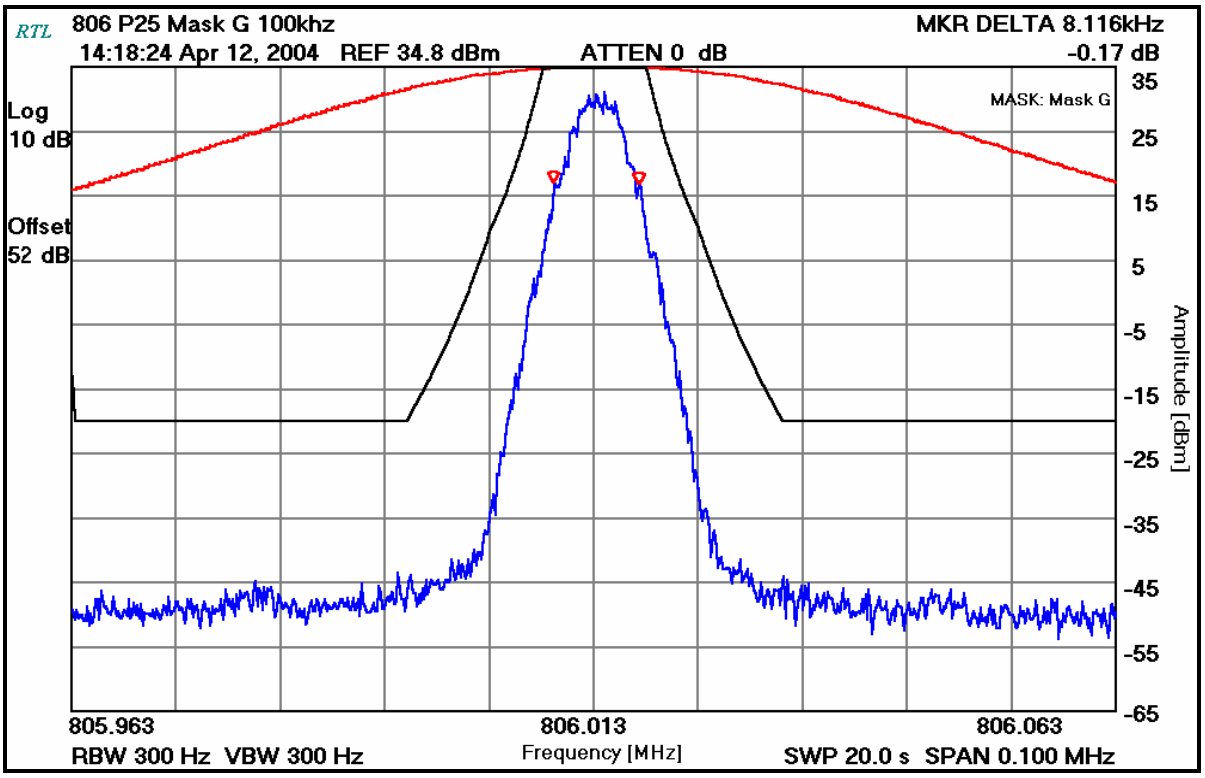
PLOT 8-11: 99% OCCUPIED BANDWIDTH – 2-LEVEL; WIDE BAND; 9600; (MASK EA)



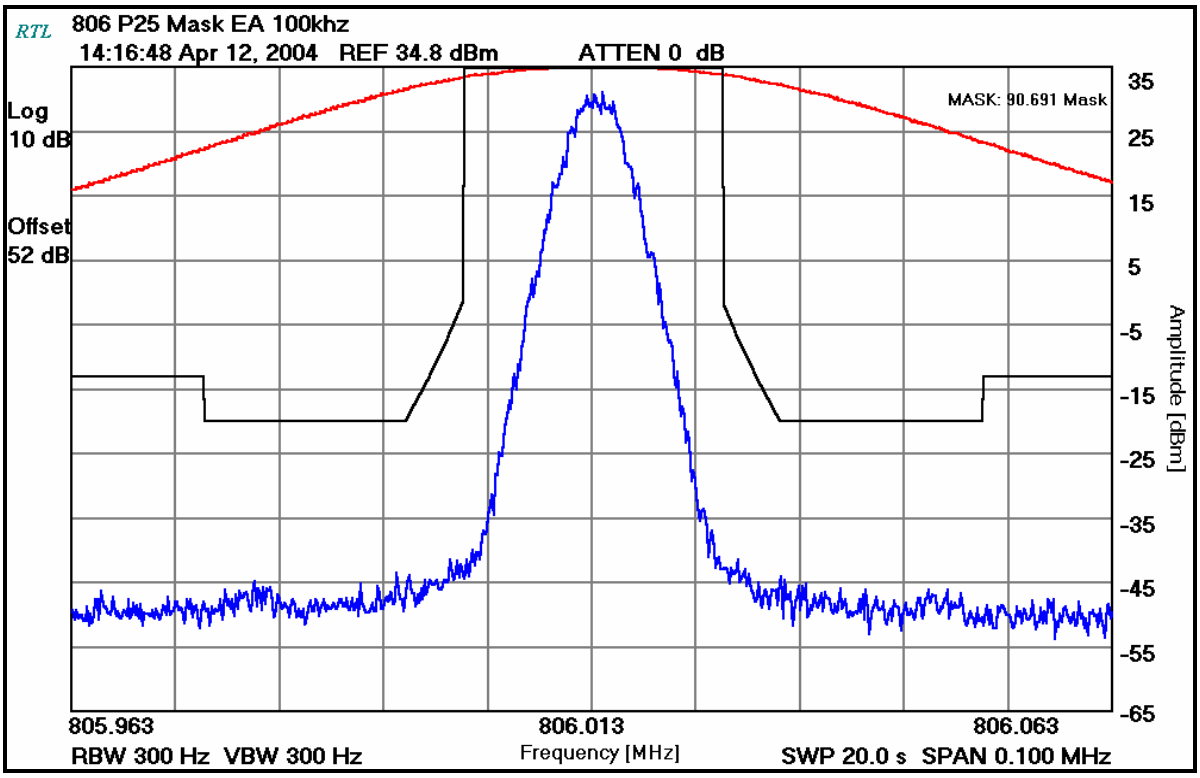
PLOT 8-12: 99% OCCUPIED BANDWIDTH – 2-LEVEL; NPSPAC; 9600; (MASK H)



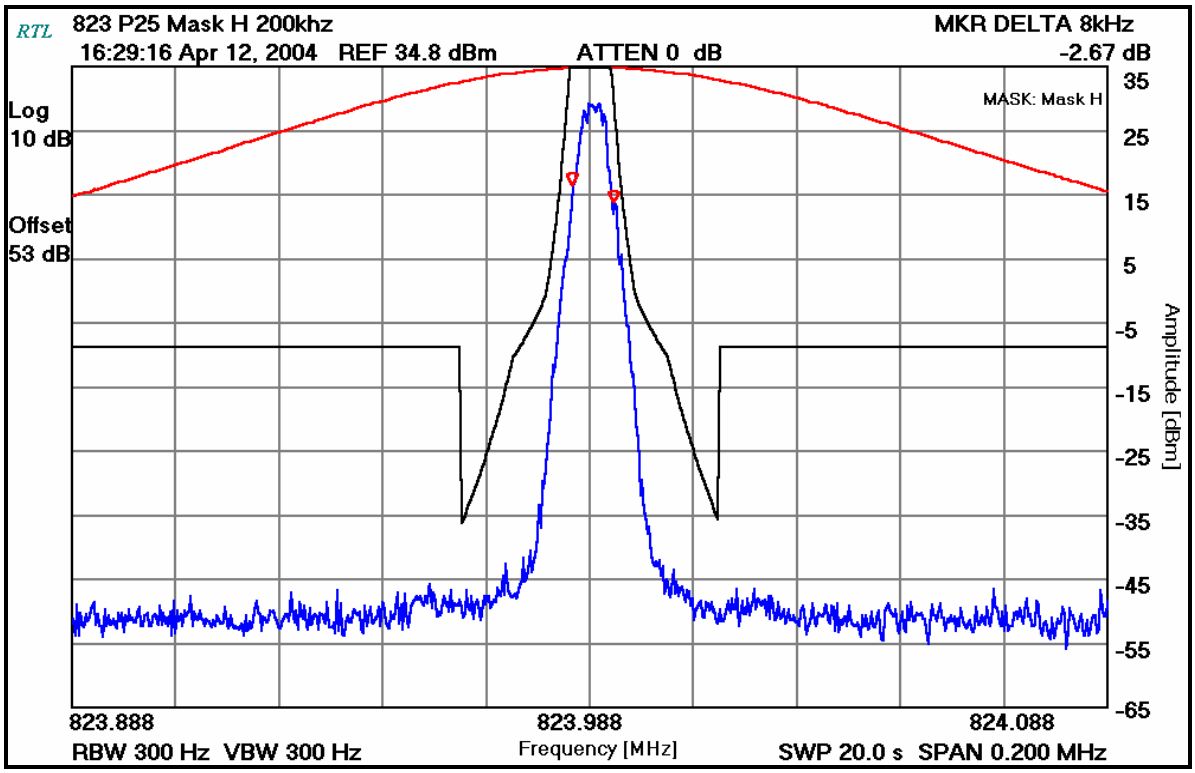
PLOT 8-13: 99% OCCUPIED BANDWIDTH – 4-LEVEL; (MASK G)



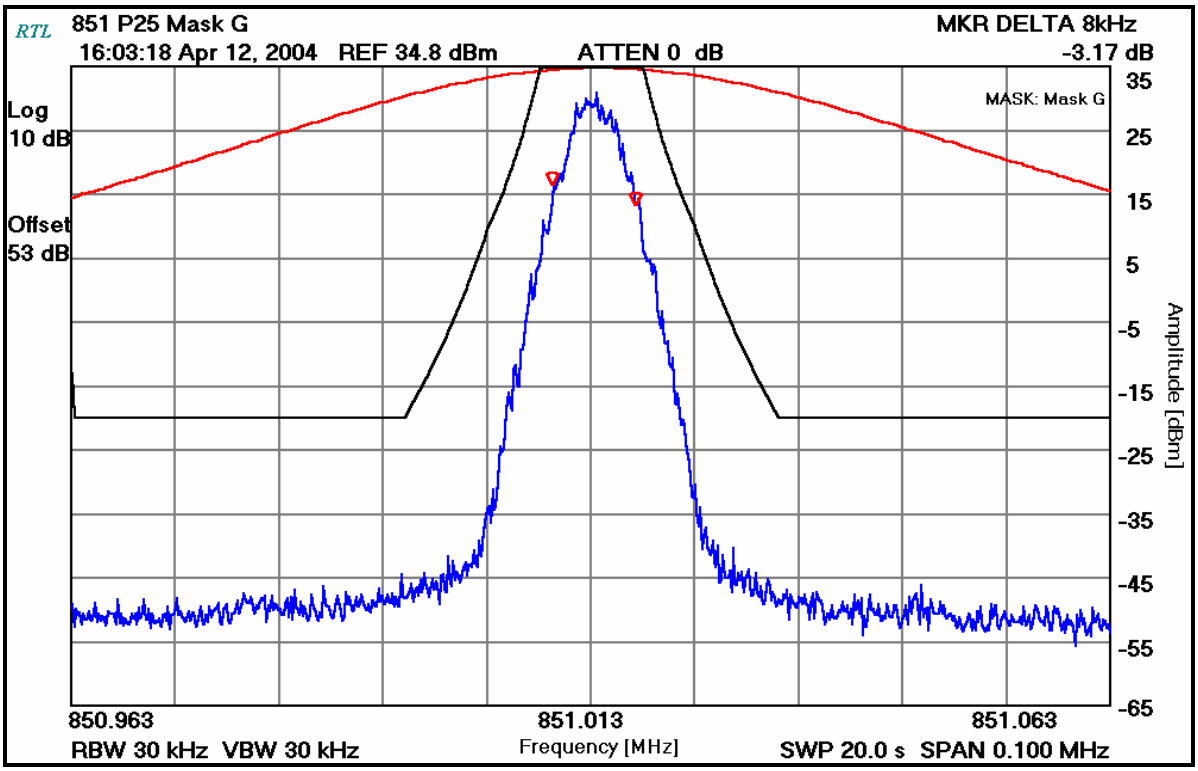
PLOT 8-14: 99% OCCUPIED BANDWIDTH – 4-LEVEL; (MASK EA)



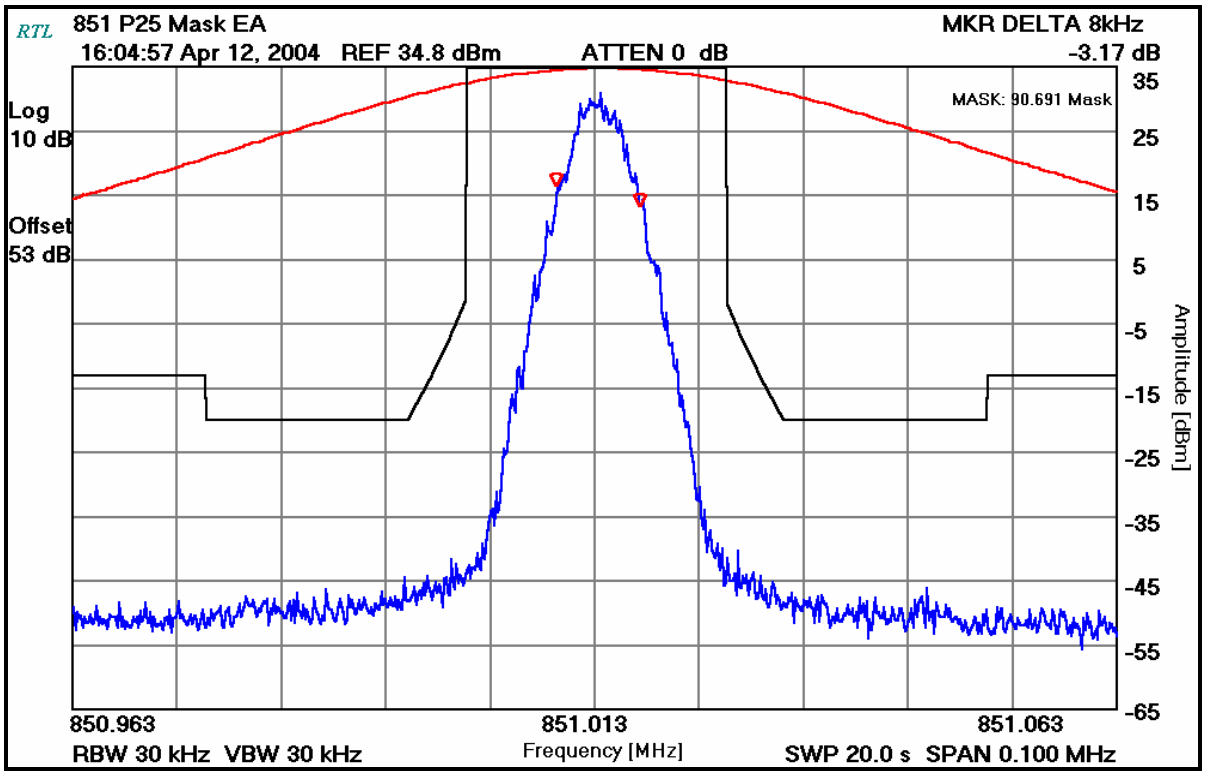
PLOT 8-15: 99% OCCUPIED BANDWIDTH – 4-LEVEL; (MASK H)



PLOT 8-16: 99% OCCUPIED BANDWIDTH – 4-LEVEL; (MASK G)



PLOT 8-17: 99% OCCUPIED BANDWIDTH – 4-LEVEL; (MASK EA)



PLOT 8-18: 99% OCCUPIED BANDWIDTH – 4-LEVEL; (MASK H)

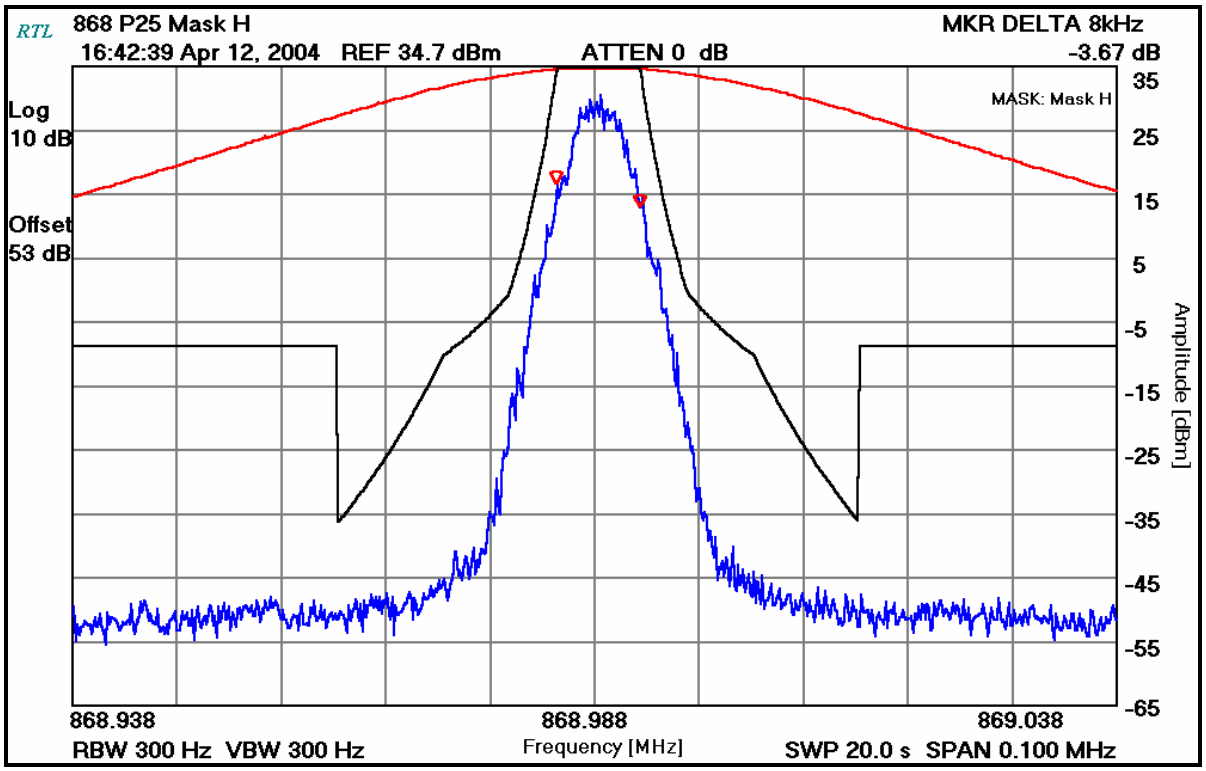


TABLE 8-1: TEST EQUIPMENT USED FOR TESTING OCCUPIED BANDWIDTH

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	07/15/04
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 12, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

9 FCC RULES AND REGULATION PART 2 §2.1055: FREQUENCY STABILITY

9.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 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.

The worst-case test data are shown below in Table 9-1 and Table 9-3.

9.2 TEST DATA

9.2.1 FREQUENCY STABILITY/TEMPERATURE VARIATION

Limit is 1.5 ppm for a Portable device from 806-870 MHz. Worst-case deviation was found to be -.32 ppm at -50°C.

PLOT 9-1: TEMPERATURE FREQUENCY STABILITY

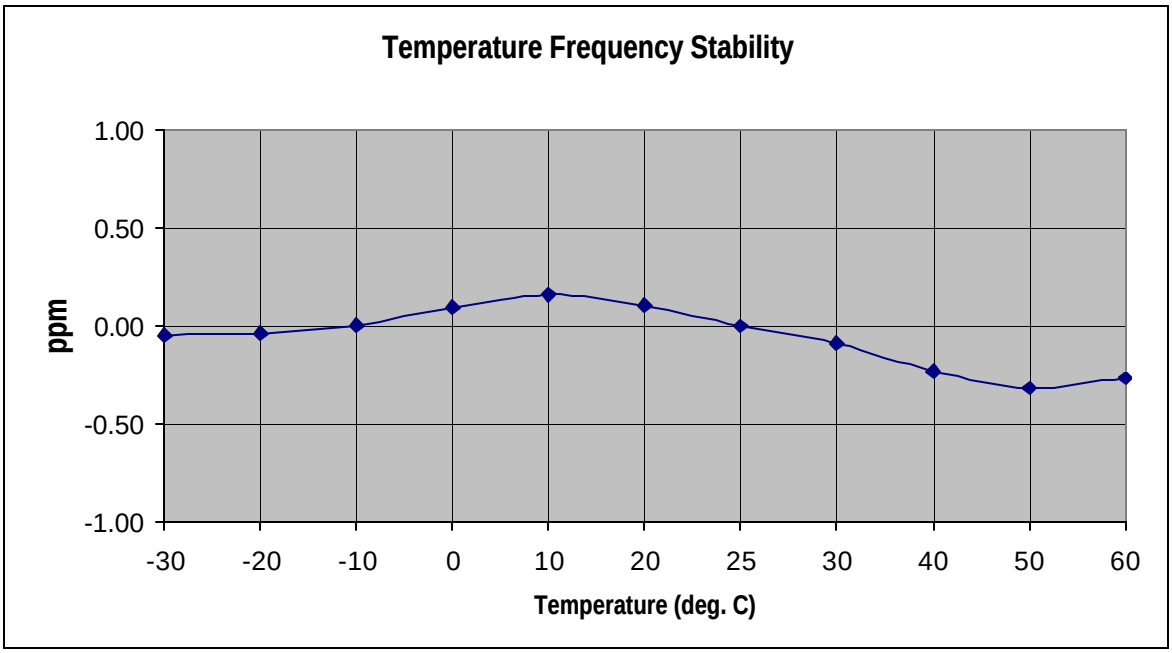


TABLE 9-1: TEMPERATURE FREQUENCY STABILITY CHANNEL 3, 823.9875 MHZ

Temperature C	Measured Frequency (MHz)	ppm
-30	823.987580	-0.05
-20	823.987587	-0.04
-10	823.987622	0.00
0	823.987697	0.09
10	823.987750	0.16
20	823.987705	0.10
25	823.987620	0.00
30	823.987545	-0.09
40	823.987430	-0.23
50	823.987358	-0.32
60	823.987402	-0.26

TABLE 9-2: TEST EQUIPMENT USED FOR TESTING FREQUENCY STABILITY/TEMPERATURE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	02/03/05
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 12, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

9.2.2 FREQUENCY STABILITY/VOLTAGE VARIATION

Worst-case variation is .03 ppm.

PLOT 9-2: VOLTAGE FREQUENCY STABILITY

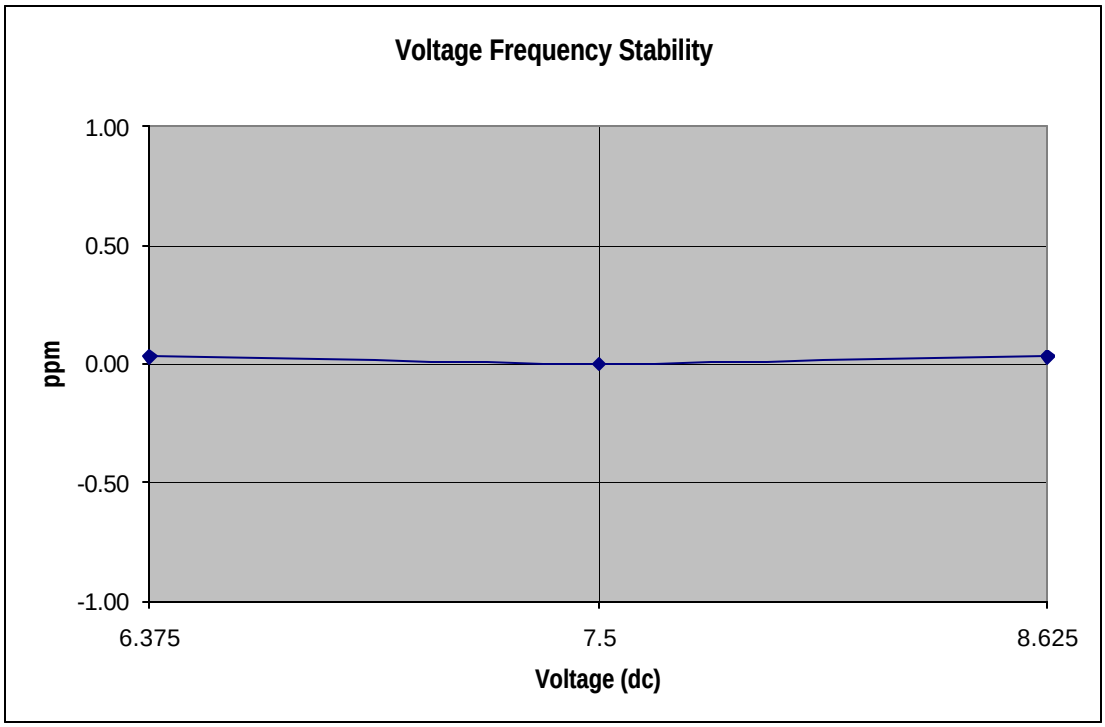


TABLE 9-3: FREQUENCY STABILITY/VOLTAGE VARIATION CHANNEL 3, 823.9875 MHZ

Voltage (VDC)	Measured Frequency (MHz)	ppm
6.375	823.987900	0.03
7.5	823.987875	0.00
8.625	823.987900	0.03

TABLE 9-4: TEST EQUIPMENT USED FOR TESTING FREQUENCY STABILITY/VOLTAGE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz - 40 GHz)	3943A01719	07/15/04
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 12, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

10 FCC PART 2 §2.1047 (A): MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

10.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 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 300 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 - {25 KHZ CHANNEL BANDWIDTH}

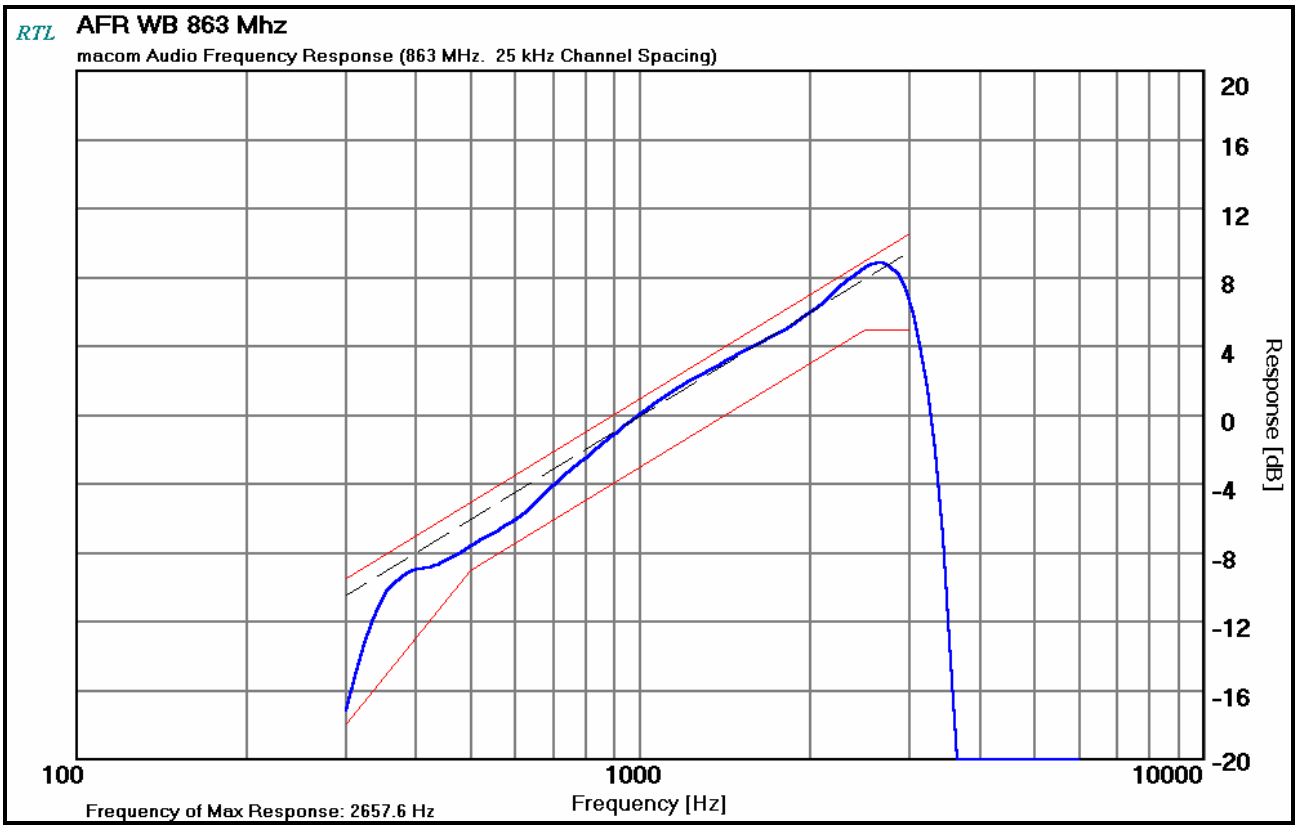


TABLE 10-1: TEST EQUIPMENT USED FOR TESTING AUDIO FREQUENCY RESPONSE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	08/06/04
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	09/09/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 9, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

11 FCC PART 2 §2.1047 (A): MODULATION CHAR ACTERISTICS – AUDIO LOW PASS FILTER

11.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 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

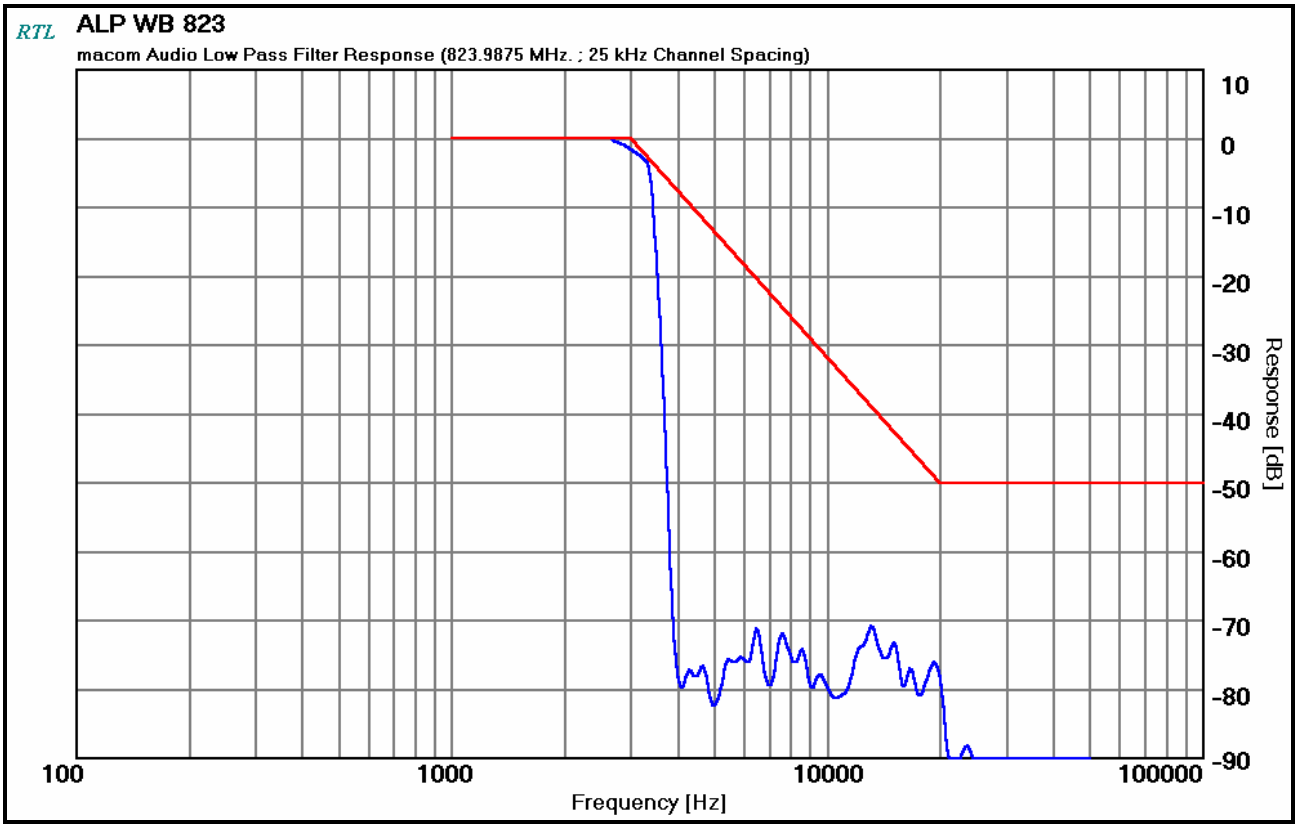


TABLE 11-1: TEST EQUIPMENT USED FOR TESTING AUDIO LOW PASS FILTER RESPONSE

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	08/06/04
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	09/09/04

TEST PERSONNEL:

DANIEL BIGGS		APRIL 9, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

12 FCC RULES AND REGULATIONS PART 2 §2.1047 (B): MODULATION CHARACTERISTICS - MODULATION LIMITING

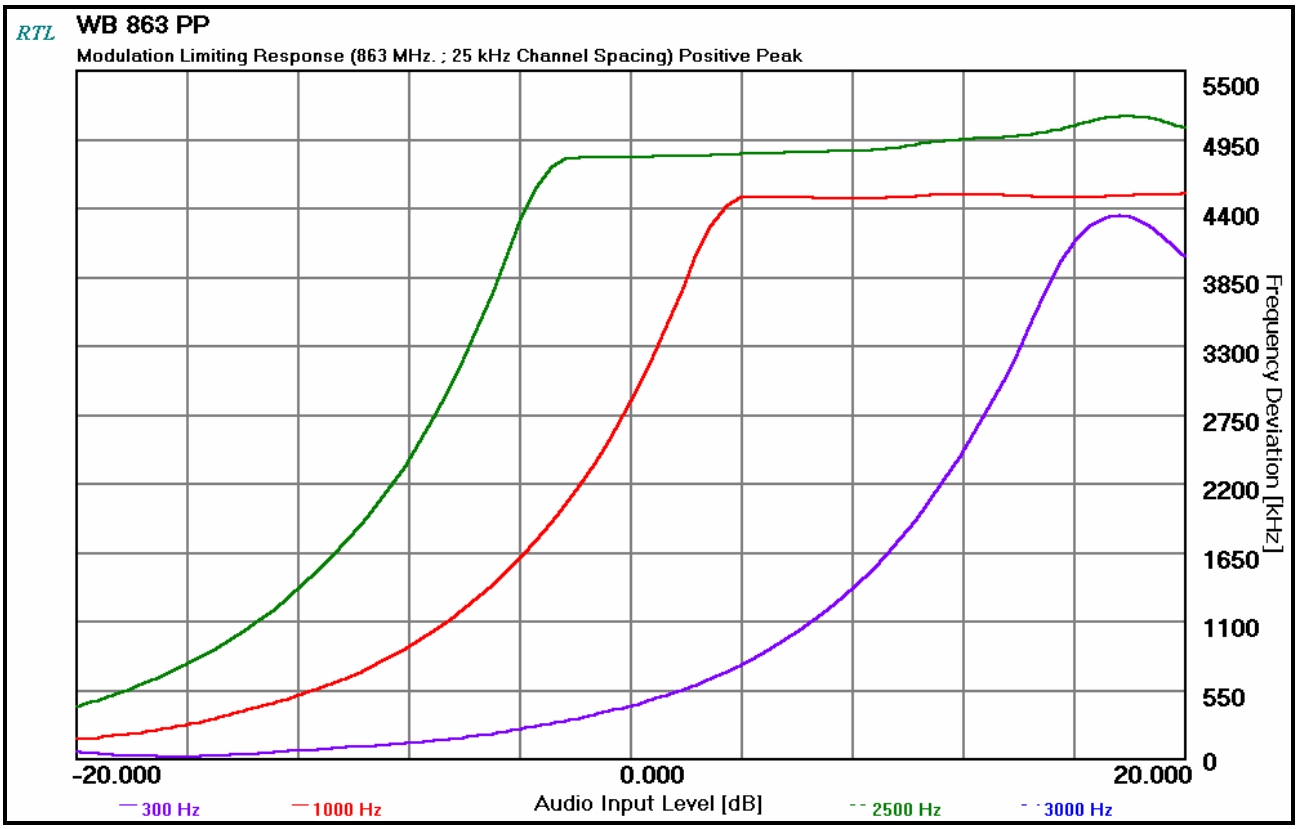
12.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, 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 (0dB) 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: WIDE BAND; POSITIVE PEAK



PLOT 12-2: MODULATION CHARACTERISTICS – MODULATION LIMITING: WIDE BAND; NEGATIVE PEAK

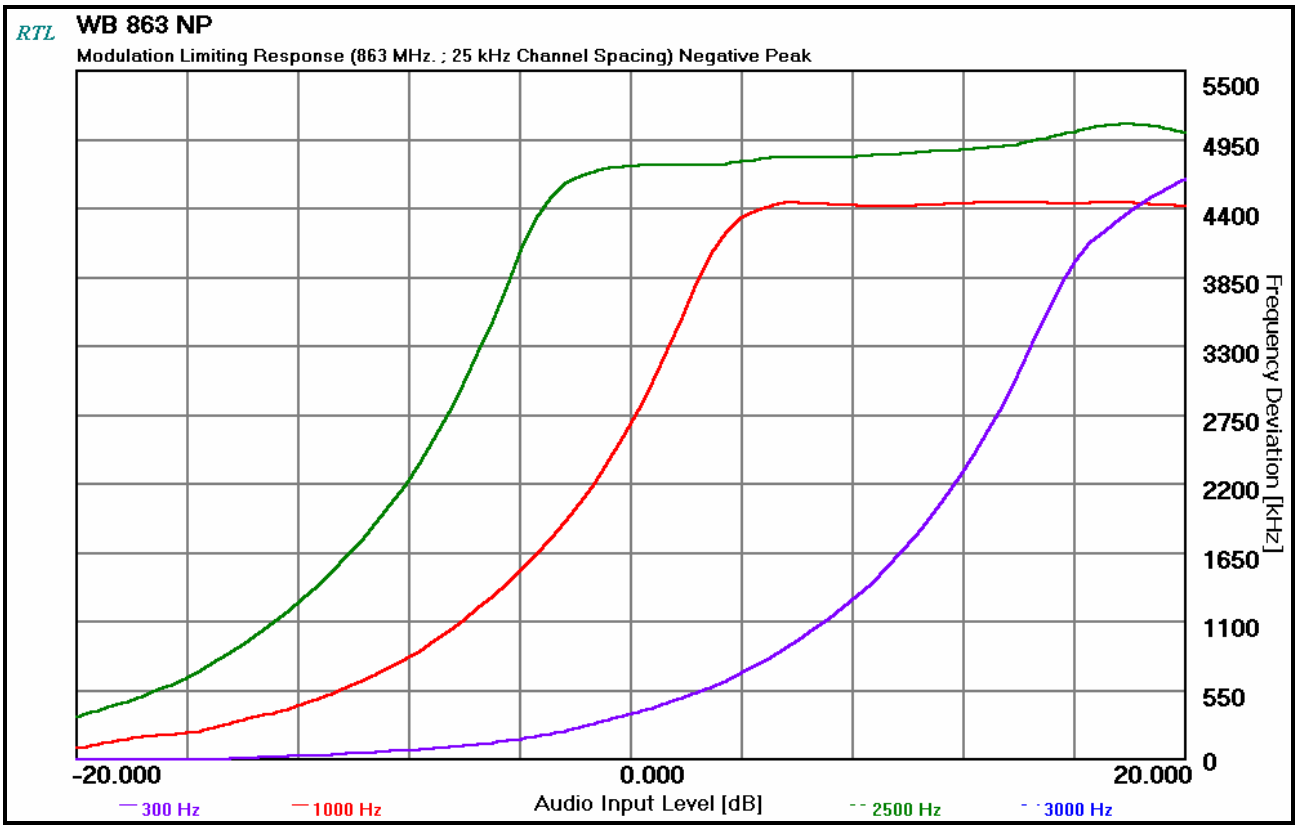


TABLE 12-1: TEST EQUIPMENT USED FOR TESTING MODULATION LIMITING

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	08/06/04
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	09/09/04

TEST PERSONNEL:

DANIEL BIGGS	Daniel Biggs	APRIL 15, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

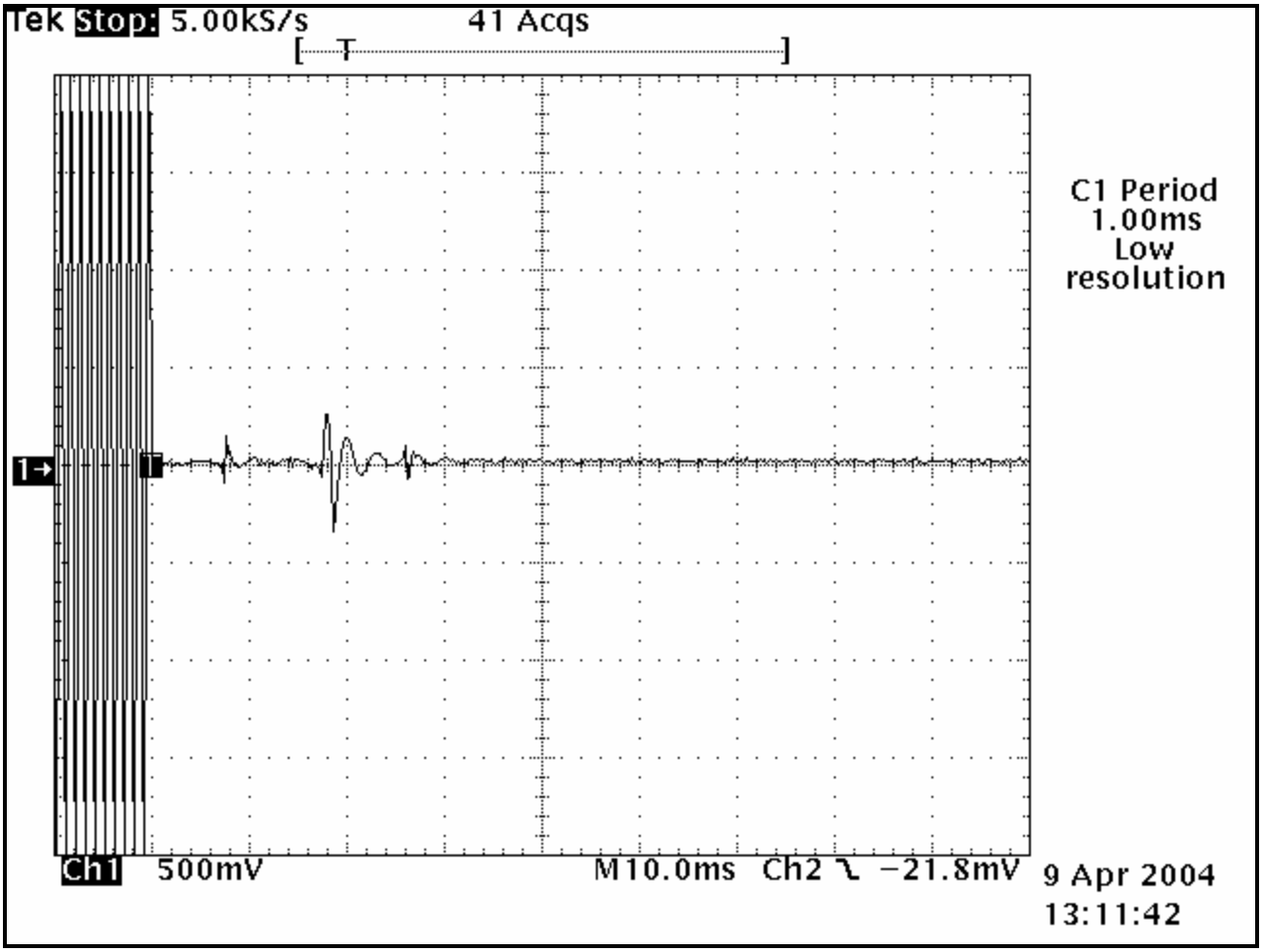
13 FCC RULES AND REGULATIONS PART 90 §90.214: TRANSIENT FREQUENCY BEHAVIOR

13.1 TEST PROCEDURE

ANSI/TIA/EIA-603-1992, section 2.2.3

13.2 TEST DATA

PLOT 13-1: TRANSIENT FREQUENCY BEHAVIOR – 863 MHZ; HIGH POWER; WIDE BAND; CARRIER ON TIME



PLOT 13-2: TRANSIENT FREQUENCY BEHAVIOR – 863 MHZ; HIGH POWER; WIDE BAND; CARRIER OFF TIME

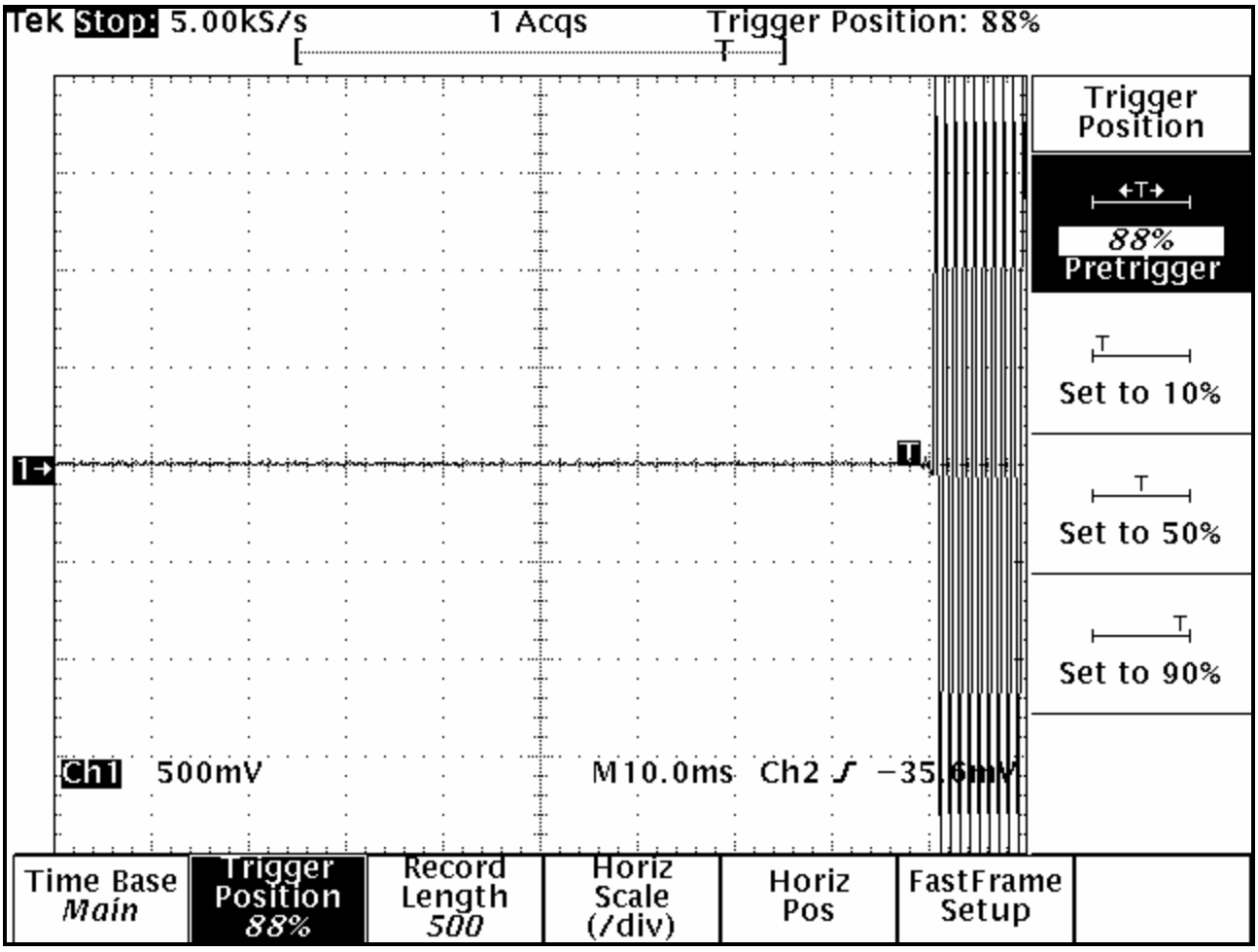


TABLE 13-1: TEST EQUIPMENT USED FOR TESTING TRANSIENT FREQUENCY BEHAVIOR

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900917	Hewlett Packard	8648C	Signal Generator	3537A01741	05/02/04
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	06/18/04
900561	Tektronix	TDS540B	Oscilloscope	B020129	03/02/05
900352	Werlatone	C1795	Directional Coupler	4989	N/A

TEST PERSONNEL:

DANIEL BIGGS	Daniel Biggs	APRIL 9, 2004
TEST TECHNICIAN/ENGINEER	SIGNATURE	DATE OF TEST

14 FCC RULES AND REGULATIONS PART 2 §2.202: NECESSARY BANDWIDTH AND EMISSION BANDWIDTH

Type of Emission: F3E, F1D, F1E

Necessary Bandwidth and Emission Bandwidth:

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

Voice – NPSPAC
Calculation:
Max modulation(M) in kHz: 2.4
Max deviation (D) in kHz: 4
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 12.8 kHz
Emission designator: 12K8F3E

Digital voice and data – 25 kHz separation
9600 Baud
Measurement: 99.0% Occupied Bandwidth
Bn = 10.33 kHz
Emission designator: 10K3F1D, 10K3F1E

Digital voice and data – NPSPAC
9600 Baud
Measurement: 99.0% Occupied Bandwidth
Bn = 9.33 kHz
Emission designator: 9K3F1D, 9K3F1E

C4FM –
Measurement: 99.0% Occupied Bandwidth
Bn = 8.1 kHz
Emission designator: 8K1F1D, 8K1F1E

15 CONCLUSION

The data in this measurement report shows that the **M/A-COM, Inc**. Model **P7100IP 800 MHz Portable Radio; FCC ID: OWDTR-0023-E,** complies with all the requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 6, 2000.