



Engineering and Testing for EMC and Safety Compliance



Accredited under NVLAP Lab Code 200061-0

Certification Report

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MODEL: MASTR III VHF Base Station (150 – 174 MHz)

FCC ID: OWDTR-0050-E
IC: 3636B-0050

June 8, 2007

Standards Referenced for this Report	
Part 2: 2006	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 15: 2006	Radio Frequency Devices - §15.109: Radiated Emissions Limits
Part 90: 2006	Private Land Portable Radio Services
ANSI TIA-603-C-2004	Land Portable FM or PM Communications Equipment - Measurement and Performance Standards
ANSI TIA/EIA-102.CAAA; 2004	Digital C4FM/CQPSK Transceiver Measurement Methods
RSS-119, Issue 9, June 2007	Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41 to 960 MHz

Frequency Range (MHz)	Rated Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Emission Designator (Calculated)
150-174	10-110	0.93	16K0F3E (WB Voice)
150-174	10-110	0.93	11K0F3E (NB Voice)
150-174	10-110	0.93	14K2F1D (2-level FSK WB)
150-174	10-110	0.93	14K2F1E (2-level FSK WB)
150-174	10-110	0.93	10K5F1D (C4FM)
150-174	10-110	0.93	10K5F1E (C4FM)
150-174	10-110	0.93	9K93F1D (2-level FSK NB)
150-174	10-110	0.93	9K93F1E (2-level FSK NB)

Report Prepared by Test Engineer: Dan Biggs

Document Number: 2007124-002/QRTL07-034

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Test results relate only to the item tested.*

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1 General Information

This 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 **MASTRIII VHF Base Station; FCC ID: OWDTR-0050-E, IC: 3636B-0050**. 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 Part 90 and Industry Canada RSS-119. 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.

1.3 Test System Details

The base station can use one of two receive synthesizer modules/front ends (EA101684V1/19D902782G1 or EA101684V2/19D902782G2), both of which were tested, and is configured with one of the two at the time of customer order. Additionally, the frequency reference shown is an optional item also configured to a system at the time of customer order, and was tested in addition to the internal frequency reference.

1.4 Grant Notes

Conducted power shown is rated power. Actual measured conducted power is shown in the test report.

2 Tested System Details

The test sample was received on March 8, 2007. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this testing, as applicable.

Table 2-1: Equipment under Test (EUT)

The test system contains the following components:

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
MASTRIII VHF Base Station	M/A-COM, Inc.	SXG_ _ _ ⁽¹⁾	N/A	OWDTR-0050-E	N/A
T/R Shelf	M/A-COM, Inc.		19D902839G2	N/A	
Transmit Synthesizer	M/A-COM, Inc.	N/A	EA101685V2	N/A	17799
Receive Synthesizer	M/A-COM, Inc.	N/A	EA101684V2	N/A	17804
RX Front End Module	M/A-COM, Inc.	N/A	19D902782G2	N/A	17801
Receive Synthesizer	M/A-COM, Inc.	N/A	EA101684V1	N/A	17803
RX Front End Module	M/A-COM, Inc.	N/A	19D902782G1	N/A	17800
IF Module	M/A-COM, Inc.	N/A	EA101401V1	N/A	N/A
DSP Module	M/A-COM, Inc.	N/A	EA101800V1	N/A	N/A
System Module	M/A-COM, Inc.	N/A	19D902590G6	N/A	N/A
Power Module	M/A-COM, Inc.	N/A	19D902589G2	N/A	N/A
Power Amplifier	M/A-COM, Inc.	150–174 MHz	EA101292V12	N/A	17795
SitePro Controller and Modem	M/A-COM, Inc.	SXMD6F	EA101209V20	N/A	N/A
Frequency Standard	M/A-COM, Inc.	SXMD6G	CY102784V5	N/A	17917
Power Supply	M/A-COM, Inc.	SXPS9	PS103010V240	N/A	N/A

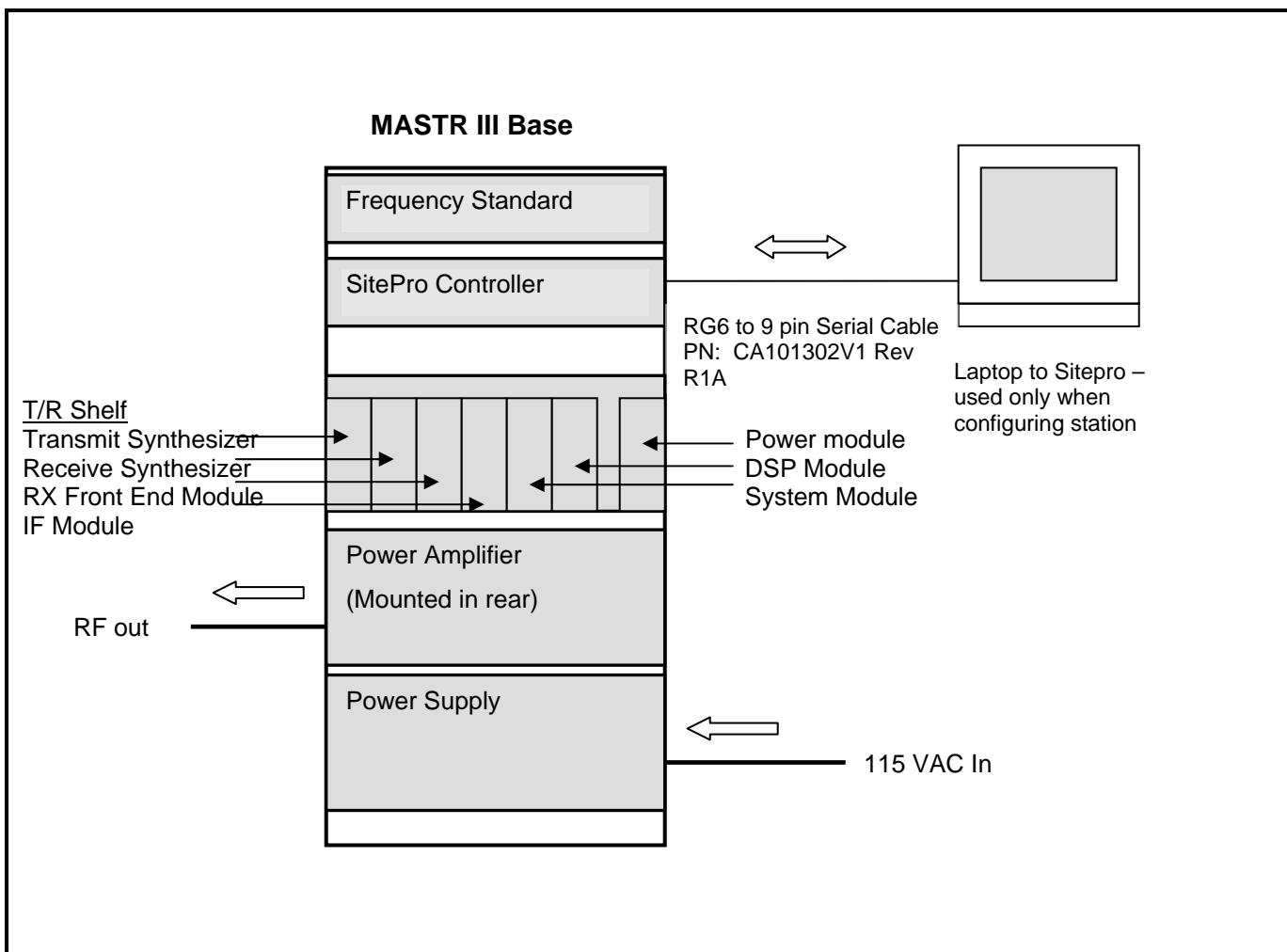
Footnotes:

(1) Model numbers depending upon equipment configuration for specific application, modulation mode.

Table 2-2: Support Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
Notebook Computer	Panasonic	Toughbook	N/A	N/A	N/A
Serial Interface Cable	N/A	DB-9	N/A	N/A	N/A

Figure 2-1: Configuration of Tested System



Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA 20170
<http://www.rheintech.com>

Client: M/A COM, Inc.
Model: MASTRIII VHF Base Station
ID's: OWDTR-0050-E/3636B-0050
Standards: Part 90/RSS-119
Report #: 2007124-002

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

Nominal DC Voltage: 26.2 VDC

Current: 10.5 AMPS

4 FCC Rules and Regulations Part 2 §2.1046(a): RF Power Output: Conducted; RSS-119 §4.1, 5.4: Output Power Test

4.1 Test Procedure

ANSI TIA-603-C-2004, section 2.2.1

The EUT was connected with a power sensor/meter through an appropriate 50 ohm attenuator. Attenuator loss was accounted for.

4.2 Test Data

Table 4-1: RF Power Output (High Power): Carrier Output Power (Unmodulated)

Channel	Frequency (MHz)	RF Power Measured (W)*
2 (High Power)	162.0	111.9

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

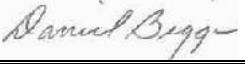
Table 4-2: RF Power Output (Rated Power)

Rated Power (W)
110.0

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

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901184	Agilent Technologies	E4416A	EPM-P Power Meter, Single Channel	GB41050573	10/3/07
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	10/3/07
900819	Weinschel Corporation	BF0830	Attenuator 10 db	N/A	12/2/08

Test Personnel:

Dan Biggs		March 15, 2007
Test Technician/Engineer	Signature	Date Of Test

5 FCC Rules and Regulations Part 2 §2.1051: Spurious Emissions at Antenna Terminals; Part 90 §90.210: Emissions Masks; RSS-119 §4.2: Transmitter Unwanted Emissions

5.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.13.

The transmitter was interfaced with a spectrum analyzer through an appropriate 50 ohm attenuator and a notch filter. The transmitter was operated at maximum power. Attenuator, notch filter, and cable losses were accounted for.

Analog Modulation: The transmitter is terminated with a 50Ω 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.

5.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to $10 \times F_c$.

Limit = $50 + 10 \log (P)$ dB or 70 dB, whichever is greater.

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 – 162.0 MHz; Narrow Band; High Power

Freq = 162.0 MHz - Limit = $50 + 10 \log P$ = 70.5 dBc - Conducted Power = 50.5 dBm = 111.9 W

Frequency (MHz)	Notch/Cable Loss (dB)	Level (dBc)	Limit (dBc)	Margin(dB)
324	0.20	96.8	70.5	-26.3
486	0.35	97.8	70.5	-27.4
648	0.06	112.7	70.5	-42.2
810	0.25	110.2	70.5	-39.8
972	1.20	97.6	70.5	-27.1
1134	1.60	110.7	70.5	-40.2
1296	4.60	108.2	70.5	-37.7
1458	7.30	103.7	70.5	-33.2
1620	4.60	107.3	70.5	-36.8

Table 5-2: Test Equipment for Testing Conducted Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz-12.8 GHz)	3826A00144	10/16/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	01/13/09
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/05/07

Test Personnel:

Daniel Biggs	<i>Daniel Biggs</i>	March 16, 2007
Test Technician/Engineer	Signature	Date Of Test

6 FCC Rules and Regulations Part 2 §2.1053(a): Field Strength of Spurious Radiation; RSS-119 §5.11, RSS-Gen: Unwanted Emissions

6.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.12

Analog Modulation: The transmitter is terminated with a 50Ω 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.

$$P_d(\text{dBm}) = P_g(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

where:

P_d is the dipole equivalent power
 P_g is the generator output power into the substitution antenna

6.2 Test Data

6.2.1 CFR 47 Part 90.210 Requirements

Limit = $50 + 10 \log (P)$ dB or 70 dB, whichever is greater. 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.

The EUT transmitting at high power was determined to be the worst case emissions level and is reported in the following tables.

Table 6-1: Field Strength of Spurious Radiation – 162.0 MHz; Narrow Band; High Power

Freq = 162.0 MHz - Limit = 50 + 10 Log P = 70.5 dBc - Conducted Power = 50.5 dBm = 111.9 W

Note: Transmit Synthesizer - EA101685V2

Frequency (MHz)	Measured Level (dB _{UV})		Signal Gen. Level (db)		Cable Loss (dB)	Antenna Gain (dB _D)		Corrected Level (dBc)		Limit (dBc)	Margin (dB)	
	H	V	H	V		H	V	H	V		H	V
162.0												
324.00	38.9	31.2	-78.1	-82.5	2.7	-0.7	-0.6	131.9	136.2	70.5	-61.5	-65.8
486.00	44.3	34.8	-67.6	-75.7	3.3	-1.0	-1.0	122.3	130.4	70.5	-51.9	-60.0
648.00	45.0	44.0	-66.9	-64.3	3.8	-1.2	-1.7	122.3	120.2	70.5	-51.9	-49.8
810.00	30.8	27.0	-78.1	-79.3	4.0	-1.5	-2.1	134.0	135.8	70.5	-63.6	-65.4
972.00	63.6	63.0	-41.4	-40.5	4.3	-1.5	-1.1	97.6	96.3	70.5	-27.2	-25.9
1134.00	41.6	44.1	-66.1	-63.7	4.5	1.4	0.7	119.7	118.0	70.5	-49.3	-47.6
1296.00	38.9	38.9	-64.7	-65.7	4.8	2.9	2.9	117.1	118.1	70.5	-46.7	-47.7
1458.00	30.6	30.6	-70.5	-70.7	5.0	4.0	3.9	122.0	122.3	70.5	-51.5	-51.9
1620.00	23.4	23.4	-77.6	-76.9	5.3	4.9	5.0	128.5	127.7	70.5	-58.1	-57.3

*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
900791	Schaffner-Chase	CBL6112	Antenna (25 MHz–2 GHz)	2099	6/12/07
900154	Compliance Design, Inc.	Roberts Dipole	Adjustable Elements Dipole 30-1000 MHz Antennas	00401	01/07/08
900814	Electro-Metrics	EM-6961 (RGA-60)	Double Ridges Guide Antenna (1-18 GHz)	2310	3/30/09
901020	Hewlett Packard	8564E	Portable Spectrum Analyzer (9 kHz-40 GHz)	3943A01719	10/28/07
901281	Rhein Tech Laboratories	PR-1040 (10-2000 MHz)	Amplifier	1004	01/19/08
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF Cable, 30'	NA	12/05/07
901425	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF Cable, 20'	NA	12/05/07
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF Cable 36"	NA	12/05/07

Test Personnel:

Daniel Biggs		March 22, 2007
Test Technician/Engineer	Signature	Date Of Test

7 FCC Rules and Regulations Part 2 §2.1049: Occupied Bandwidth; Part 90 §90.210(g): Emissions Masks; RSS-119 §4.2: Transmitter Unwanted Emissions

7.1 Test Procedure

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

The transmitter was interfaced with a spectrum analyzer through an appropriate 50 ohm attenuator and a notch filter. The transmitter was operated at maximum power. Attenuator losses were accounted for.

Analog Modulation: The transmitter is terminated with a 50Ω 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.

The device uses digital modulation modulated to its maximum extent using a pseudo-random data sequence of 9600 bps.

Limit Mask B:

- (1) On any frequency removed from the assigned frequency by more than 50%, but not more than 100% of the authorized bandwidth: **at least 25 dB**.
- (2) On any frequency removed from the assigned frequency by more than 100%, but not more than 250% of the authorized bandwidth: **at least 35 dB**.
- (3) On any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth: **at least $43 + 10 \log (P)$ dB**.

Limit Mask C:

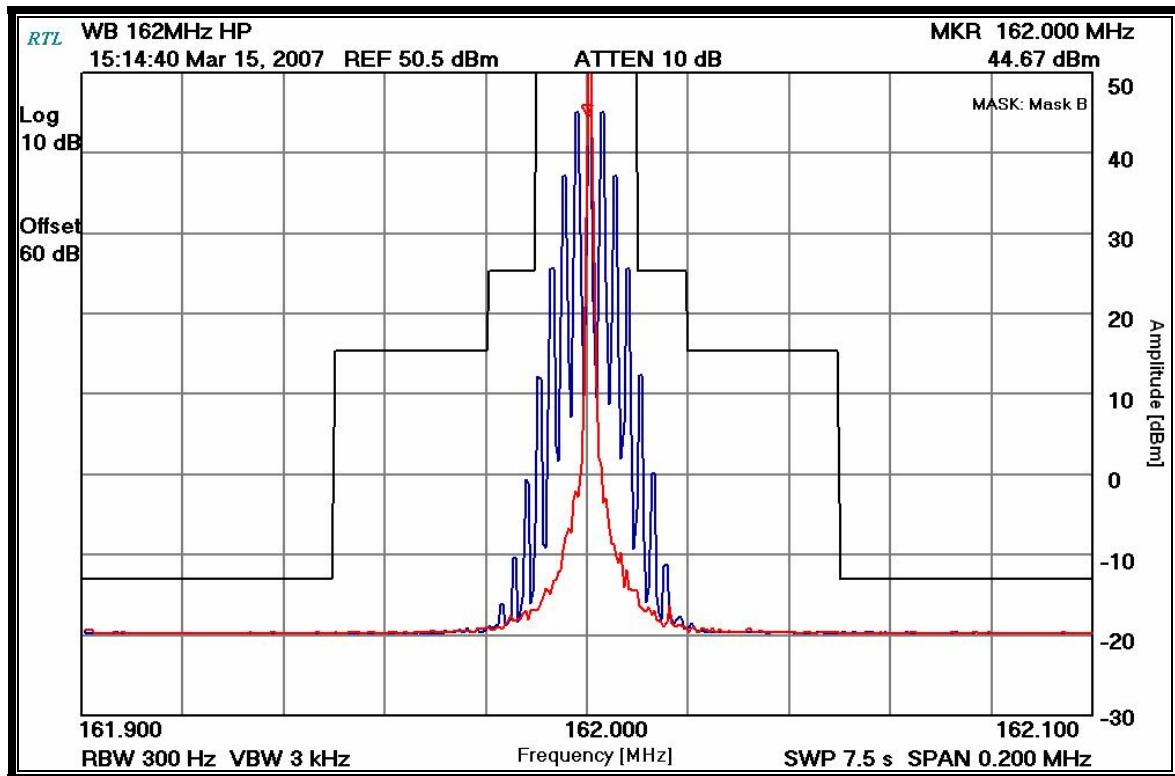
- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5 kHz, but not more than 10 kHz: **at least $83 \log (fd/5)$ dB**;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 10 kHz, but not more than 250% of the authorized bandwidth: **at least $29 \log (fd^2/11)$ dB or 50 dB, whichever is the lesser attenuation**;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250% of the authorized bandwidth: **at least $43 + 10 \log (P)$ dB**.

Limit Mask D:

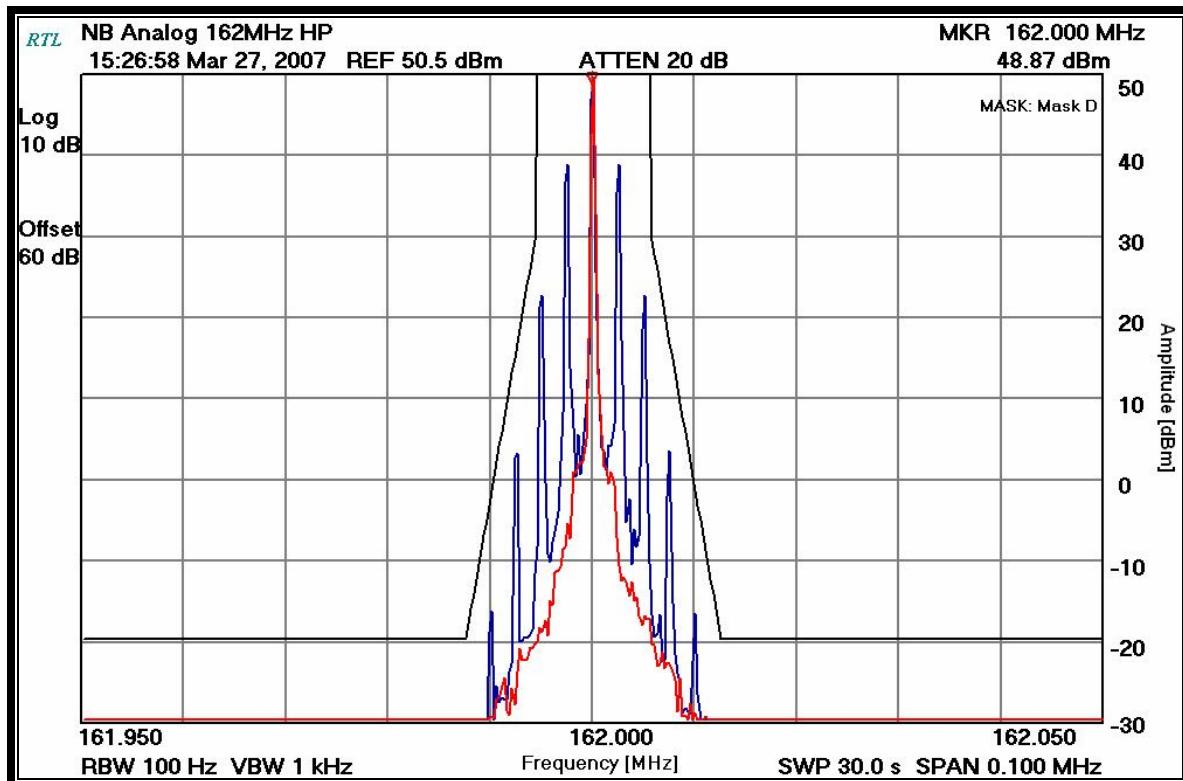
- (1) On any frequency removed from the center of the authorized bandwidth f_0 : **zero dB**;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz, but not more than 12.5 kHz: **at least $7.27(fd-2.88 \text{ kHz})$ dB**;
- (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: **at least $50 + 10 \log (P)$ dB or 70 dB, whichever is the lesser attenuation**.

7.2 Test Data

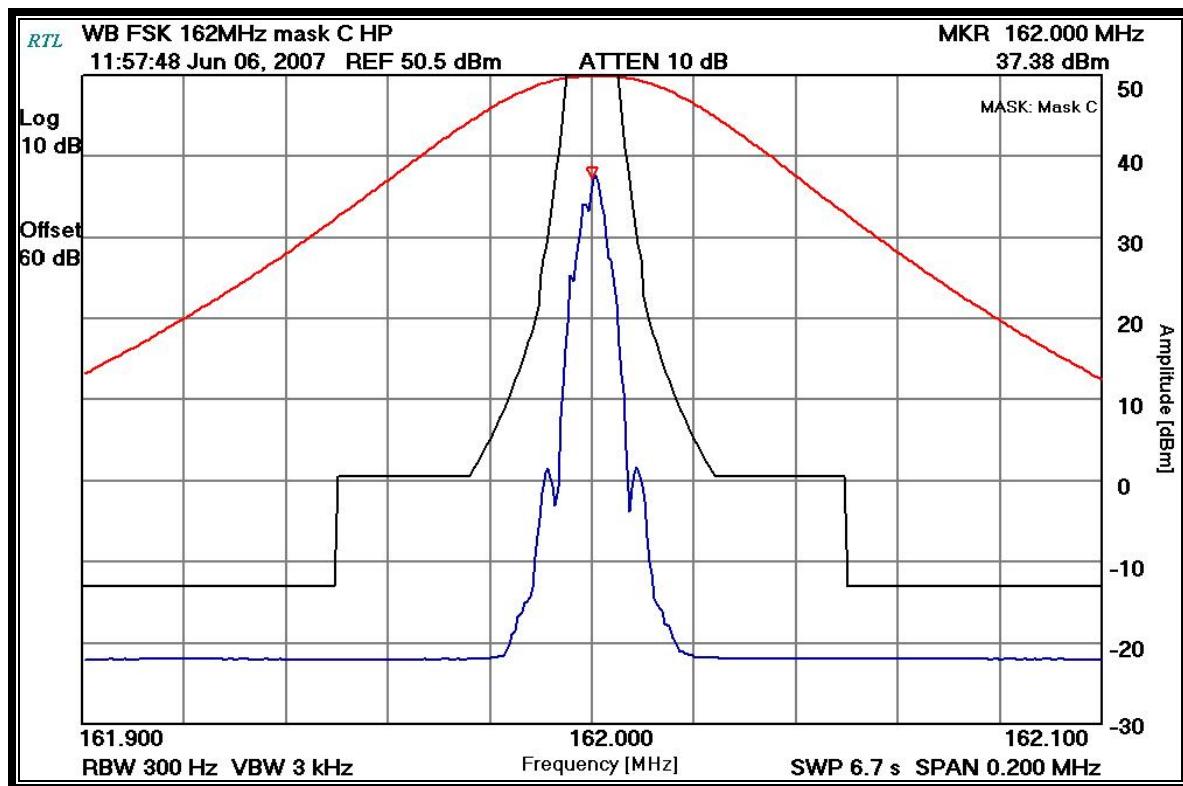
Plot 7-1: Occupied Bandwidth – 162 MHz; Mask B; Wide Band; Analog



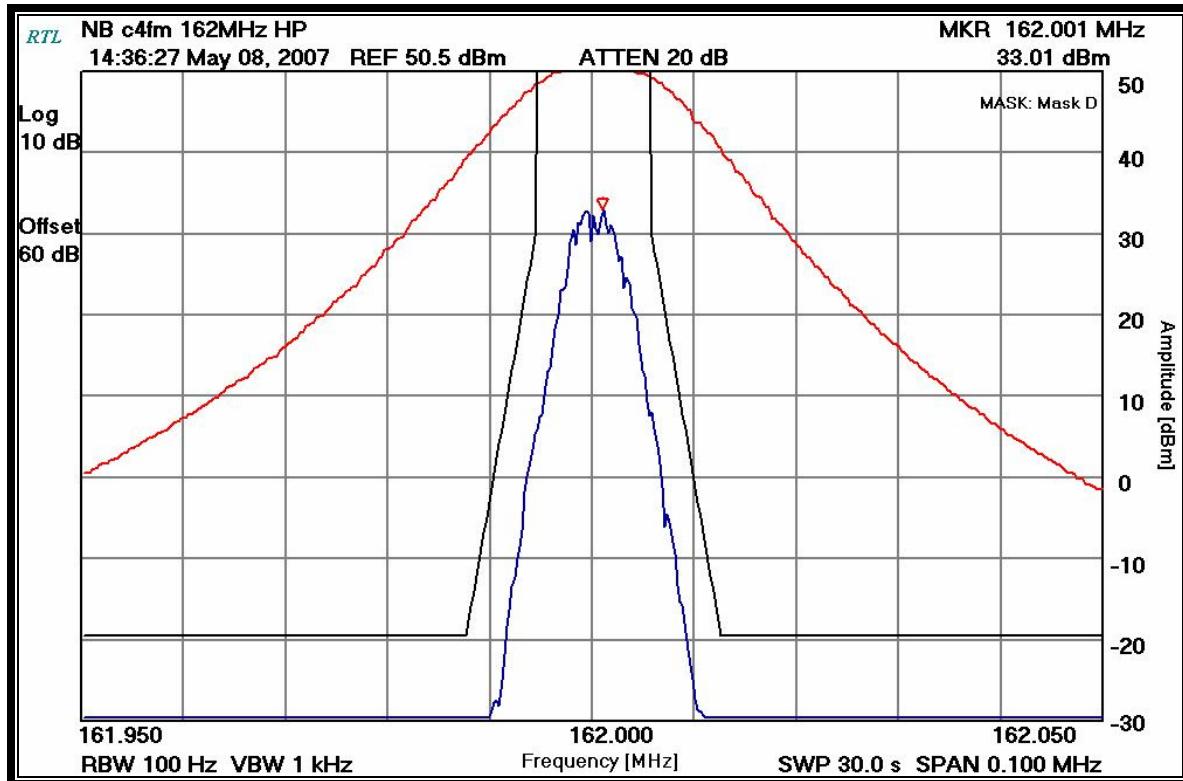
Plot 7-2: Occupied Bandwidth – 162 MHz; Mask D; Narrow Band; Analog



Plot 7-3: Occupied Bandwidth – 162 MHz; Mask C; Wide Band FSK 9600 BPS



Plot 7-4: Occupied Bandwidth – 162 MHz; Mask D; Narrow Band C4FM 9600 BPS



Plot 7-5: Occupied Bandwidth – 162 MHz; Mask D; Narrow Band FSK 9600 BPS

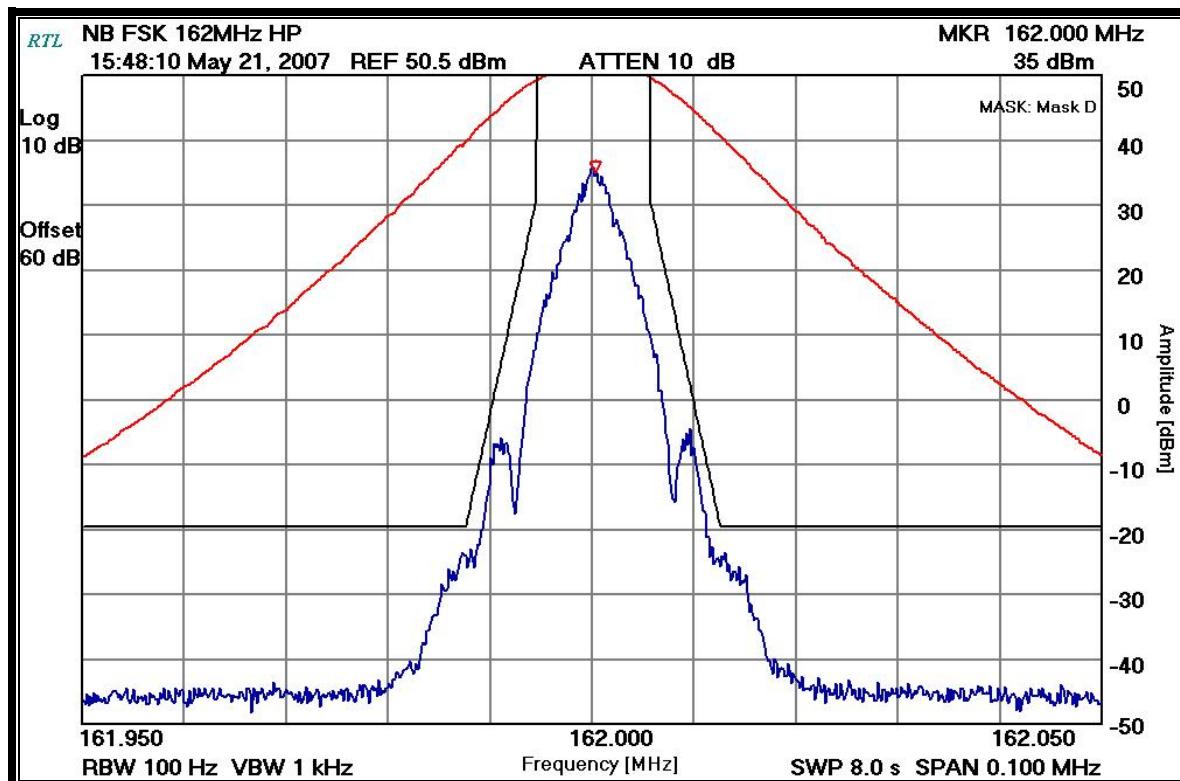


Table 7-1: Test Equipment for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901215	Hewlett Packard	8596EM	EMC Analyzer (9 kHz – 12.8 GHz)	3826A00144	10/16/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/02/08

Test Personnel:

Daniel Biggs	<i>Daniel Biggs</i>	March 15, 26, 27, May 8, 21 & June 6, 2007
Test Technician/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 CFR 47 Part 90.213 Requirements

In the 150–174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm.

8.2.2 Frequency Stability/Temperature Variation

Plot 8-1: Temperature Frequency Stability – 162 MHz – Internal Frequency Reference

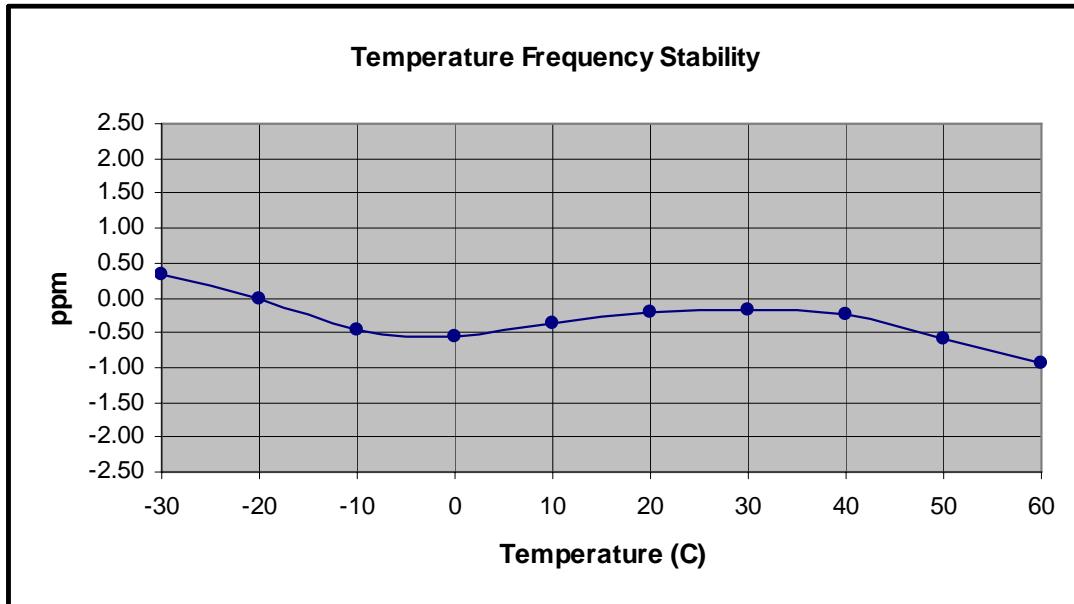


Table 8-1: Frequency Stability/Temperature Variation – 162 MHz – Internal Frequency Reference

Temperature °C	Measured Frequency (MHz)	ppm
-30	162.000053	0.33
-20	161.999998	-0.01
-10	161.999925	-0.46
0	161.999909	-0.56
10	161.999940	-0.37
20	161.999968	-0.20
30	161.999973	-0.17
40	161.999962	-0.24
50	161.999907	-0.58
60	161.999849	-0.93

Plot 8-2: Temperature Frequency Stability – 162 MHz – External Frequency Reference

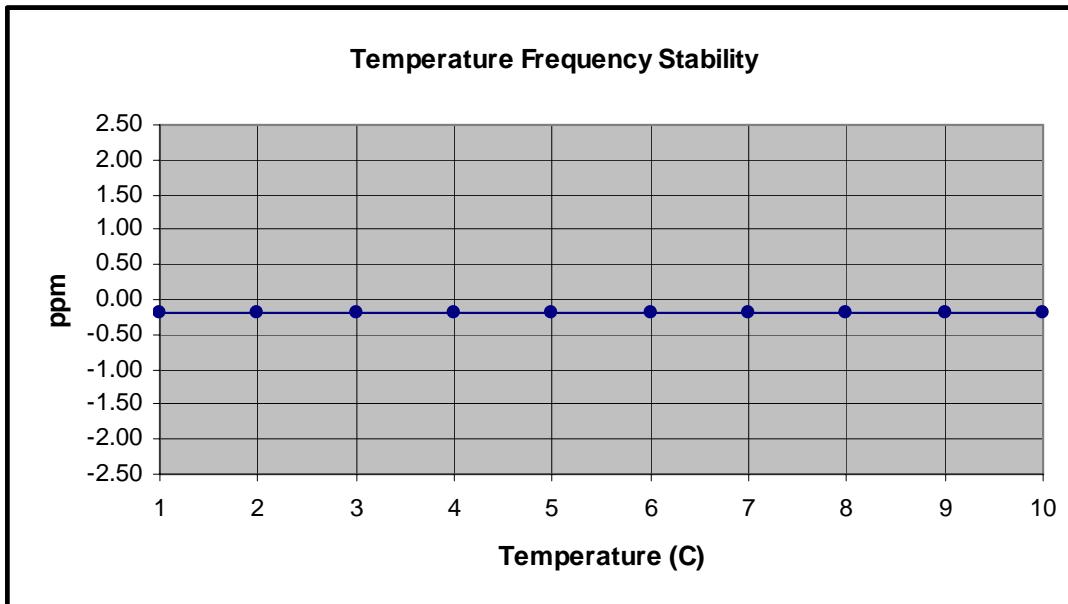


Table 8-2: Frequency Stability/Temperature Variation – 162 MHz – External Frequency Reference

Temperature °C	Measured Frequency (MHz)	ppm
-30	161.999971	-0.18
-20	161.999971	-0.18
-10	161.999971	-0.18
0	161.999971	-0.18
10	161.999971	-0.18
20	161.999971	-0.18
30	161.999971	-0.18
40	161.999971	-0.18
50	161.999971	-0.18
60	161.999971	-0.18

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 Model: MASTRIII VHF Base Station
 ID's: OWDTR-0050-E/3636B-0050
 Standards: Part 90/RSS-119
 Report #: 2007124-002

Table 8-3: 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	01/20/08
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/02/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	12/12/07
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	12/15/07

Test Personnel:

Daniel Biggs	<i>Daniel Biggs</i>	March 23 & May 24, 2007
Test Technician/Engineer	Signature	Dates Of Tests

8.2.3 Frequency Stability/Voltage Variation

Plot 8-3: Temperature Frequency Stability – 162 MHz – Internal Frequency Reference

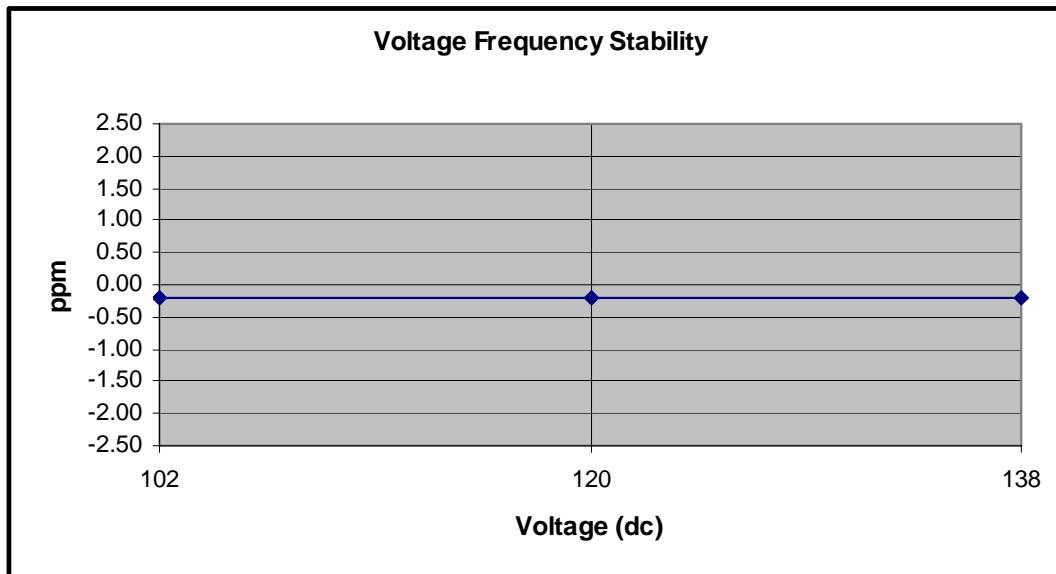


Table 8-4: Frequency Stability/Voltage Variation – 162 MHz – Internal Frequency Reference

Voltage (VAC)	Measured Frequency (MHz)	ppm
102	161.999965	-0.22
120	161.999966	-0.21
138	161.999966	-0.21

Plot 8-4: Temperature Frequency Stability – 162 MHz – External Frequency Reference

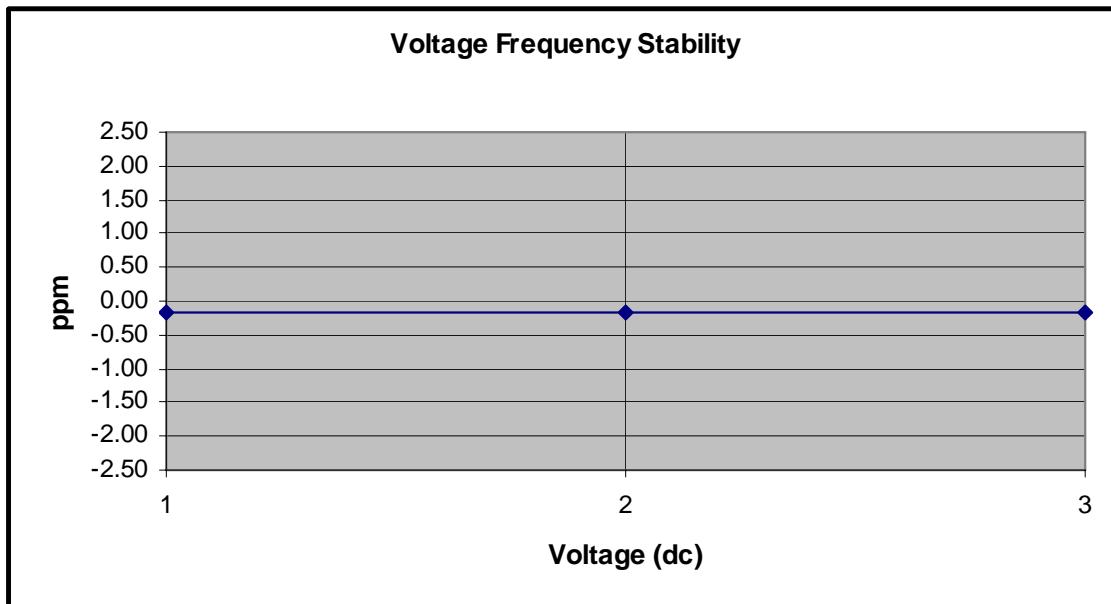


Table 8-5: Frequency Stability/Voltage Variation – 162 MHz – External Frequency Reference

Voltage (VAC)	Measured Frequency (MHz)	ppm
102	161.999971	-0.18
120	161.999971	-0.18
138	161.999971	-0.18

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Table 8-6: Test Equipment for Testing Frequency Stability/Voltage

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	12/15/07
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	12/02/08
901424	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	N/A	12/12/07
901247	Wavetek	DM25XT	Digital Multimeter	40804098	12/07/07

Test Personnel:

Daniel Biggs		March 23 & May 24, 2007
Test Technician/Engineer	Signature	Dates Of Tests

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.

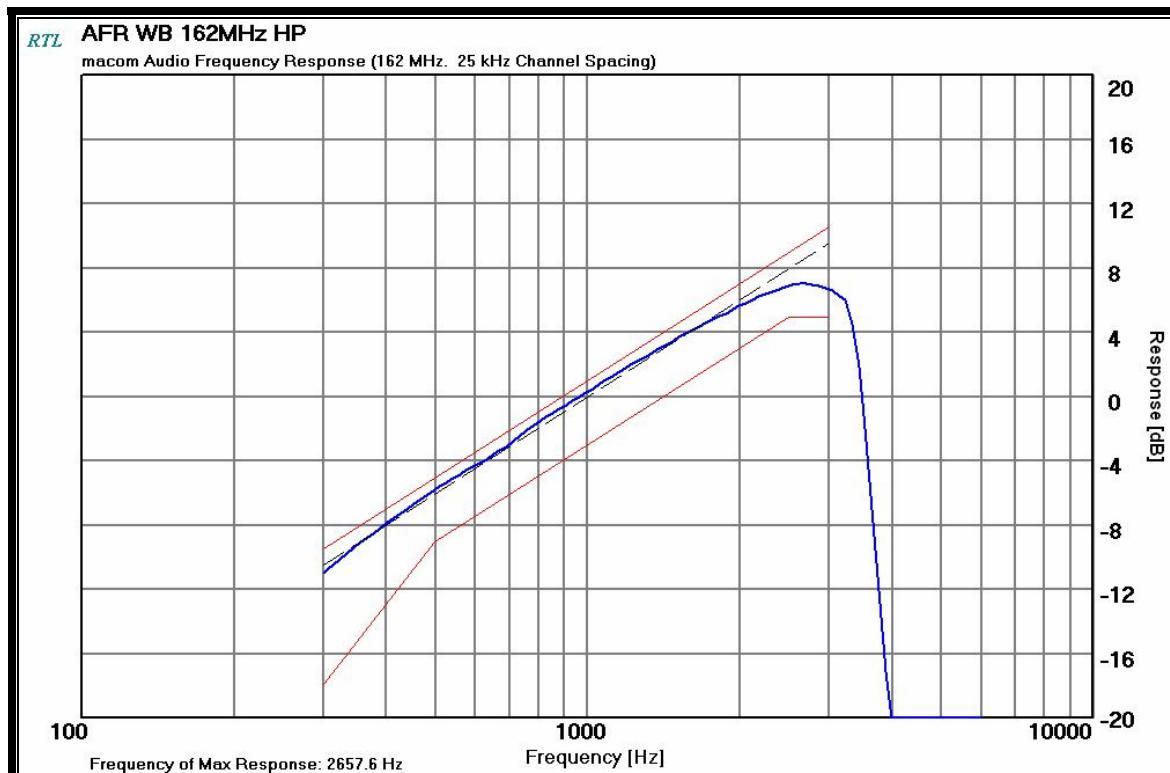
The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

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:

$$\text{Audio Frequency Response} = 20 \text{ LOG} (\text{DEVfreq}/\text{DEVref})$$

9.2 Test Data

Plot 9-1: Modulation Characteristics - Audio Frequency Response – 162 MHz



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

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	12/19/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	10/19/07

Test Personnel:

Daniel Biggs		March 15, 2007
Test Technician/Engineer	Signature	Date Of Test

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

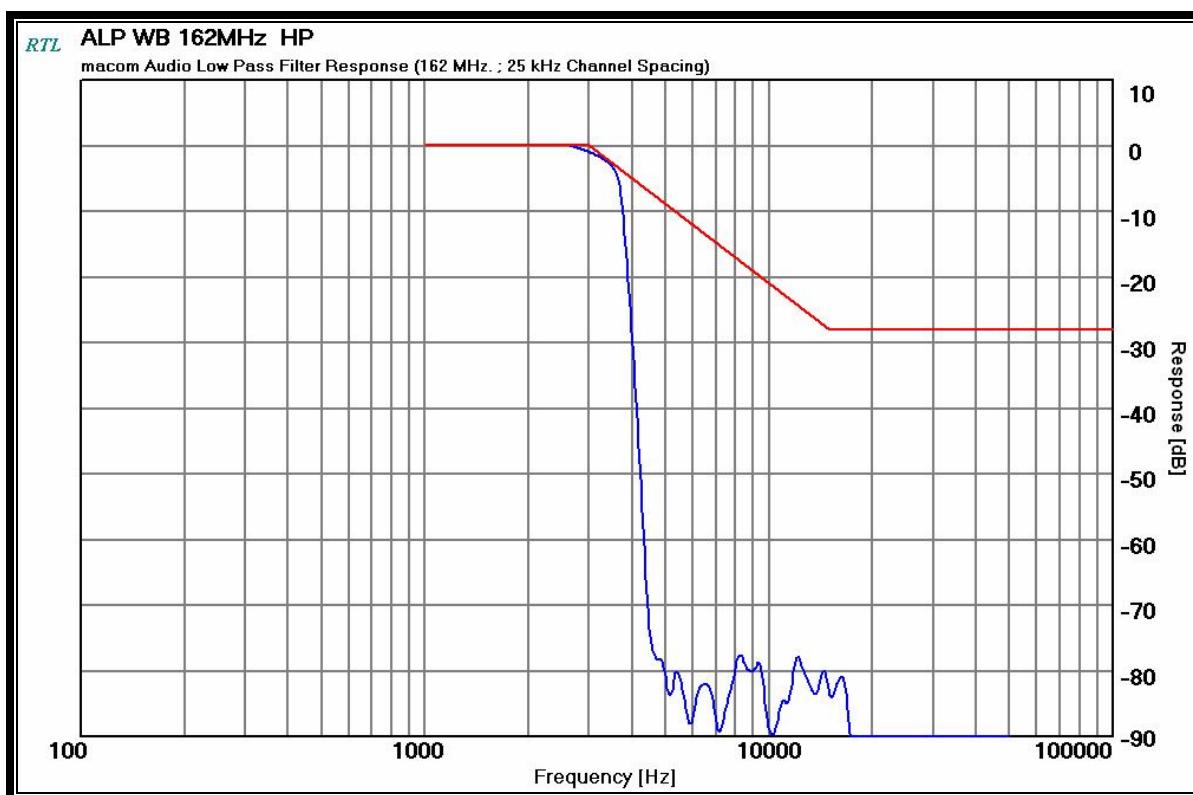
10.1 Test Procedure

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 – 162 MHz



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Standards: Part 90/RSS-119
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Table 10-1: Test Equipment for Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	12/19/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	10/19/07

Test Personnel:

Daniel Biggs		March 15, 2007
Test Technician/Engineer	Signature	Date Of Test

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

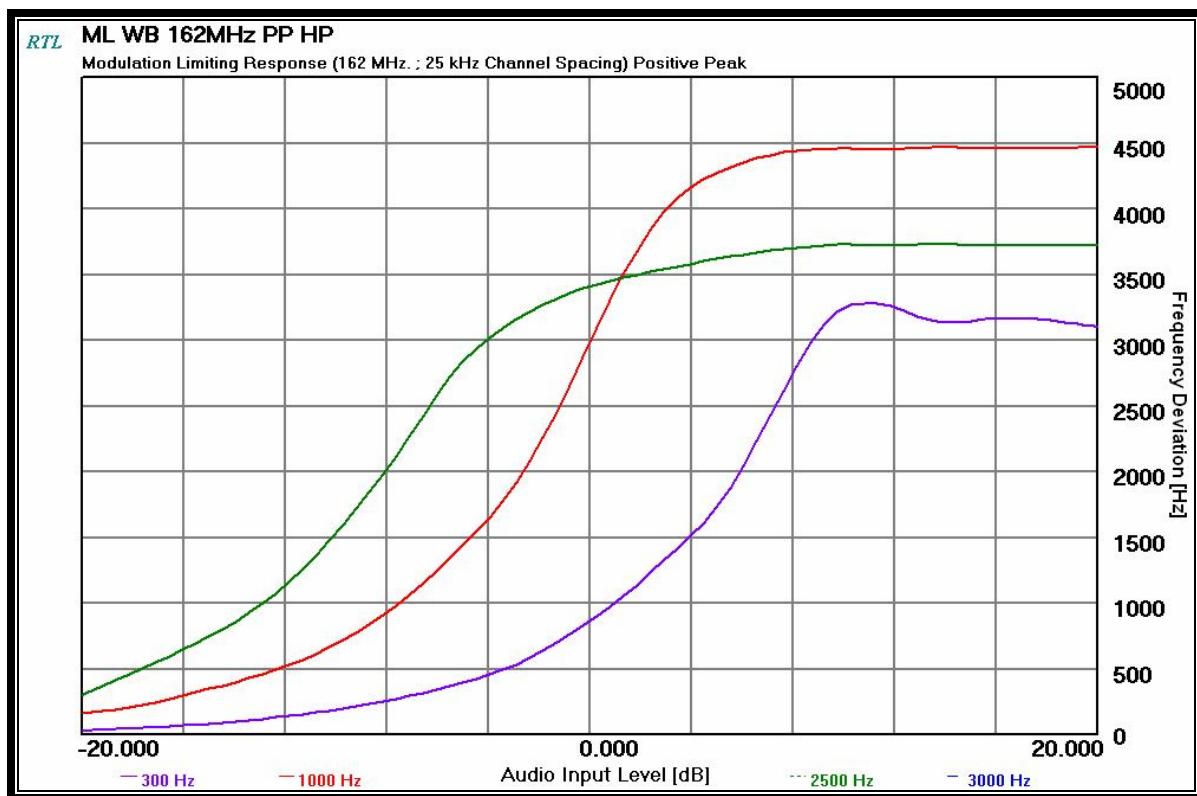
11.1 Test Procedure

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

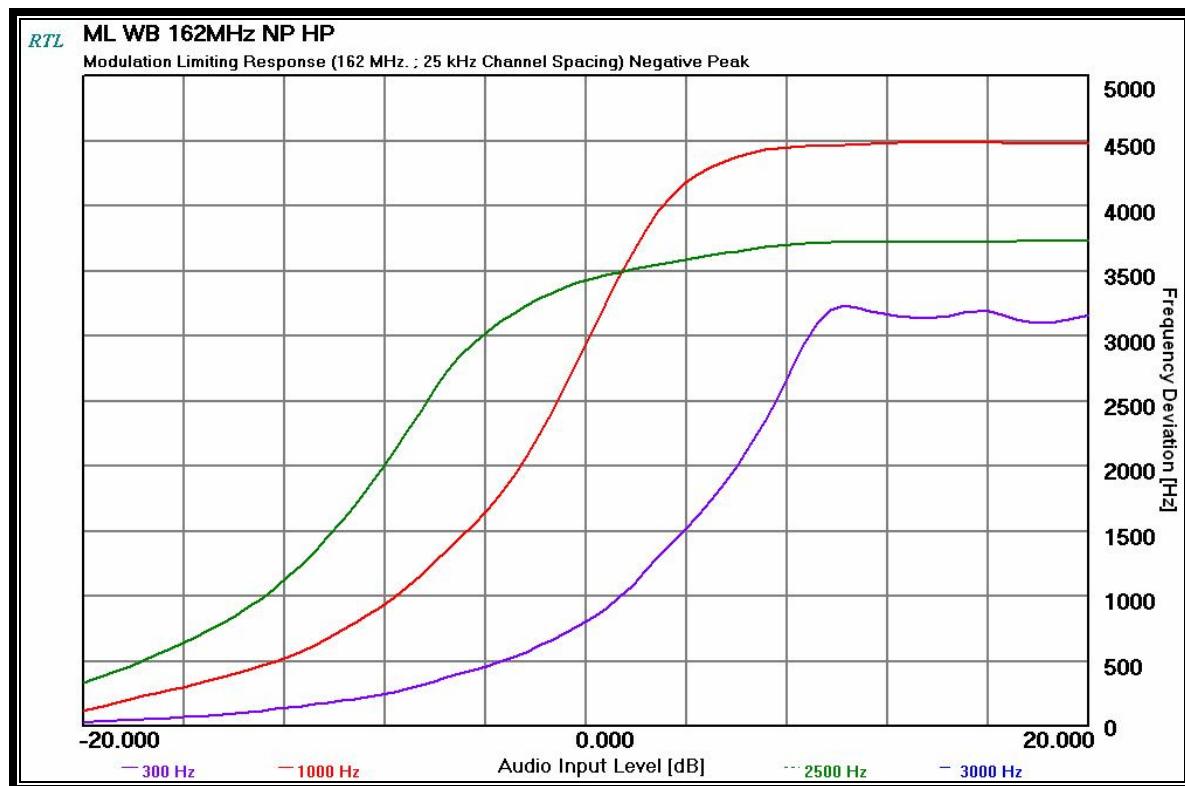
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level as a reference (0 dB), the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500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

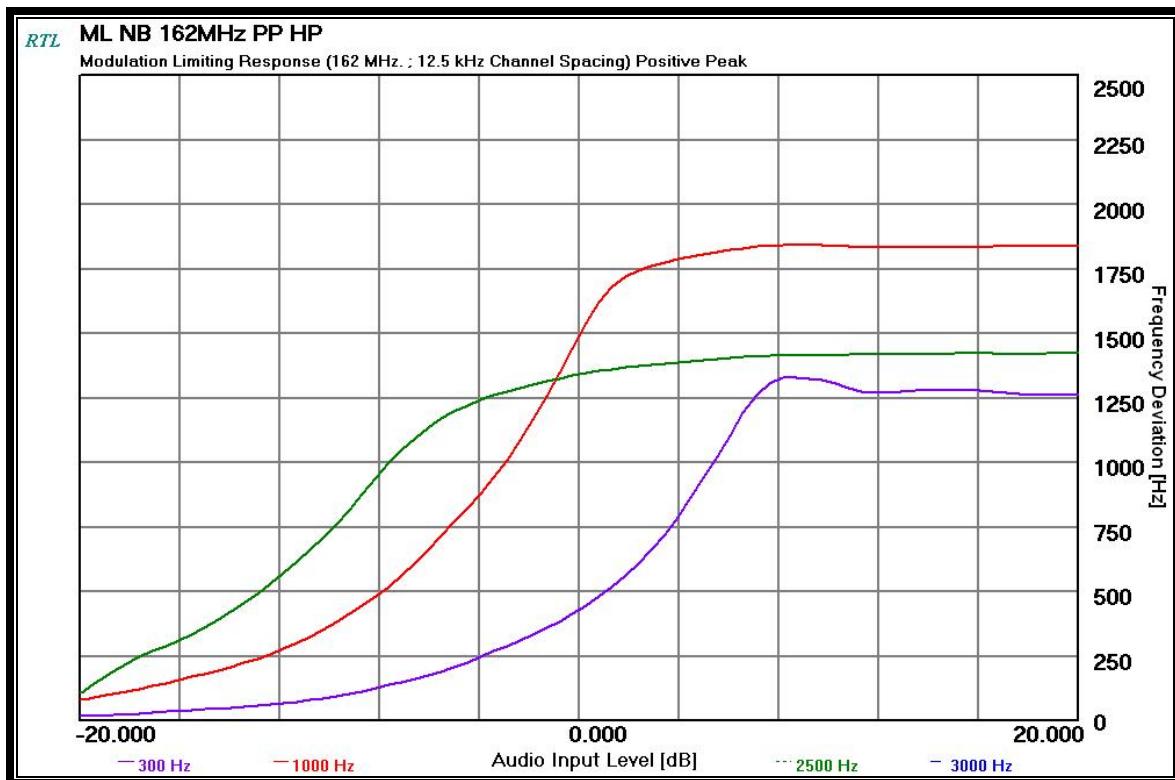
Plot 11-1: Modulation Characteristics – Modulation Limiting: 162 MHz; Wide Band; Positive Peak



Plot 11-2: Modulation Characteristics – Modulation Limiting: 162 MHz; Wide Band; Negative Peak



Plot 11-3: Modulation Characteristics – Modulation Limiting: 162 MHz; Narrow Band; Positive Peak



Plot 11-4: Modulation Characteristics – Modulation Limiting: 162 MHz; Narrow Band; Negative Peak

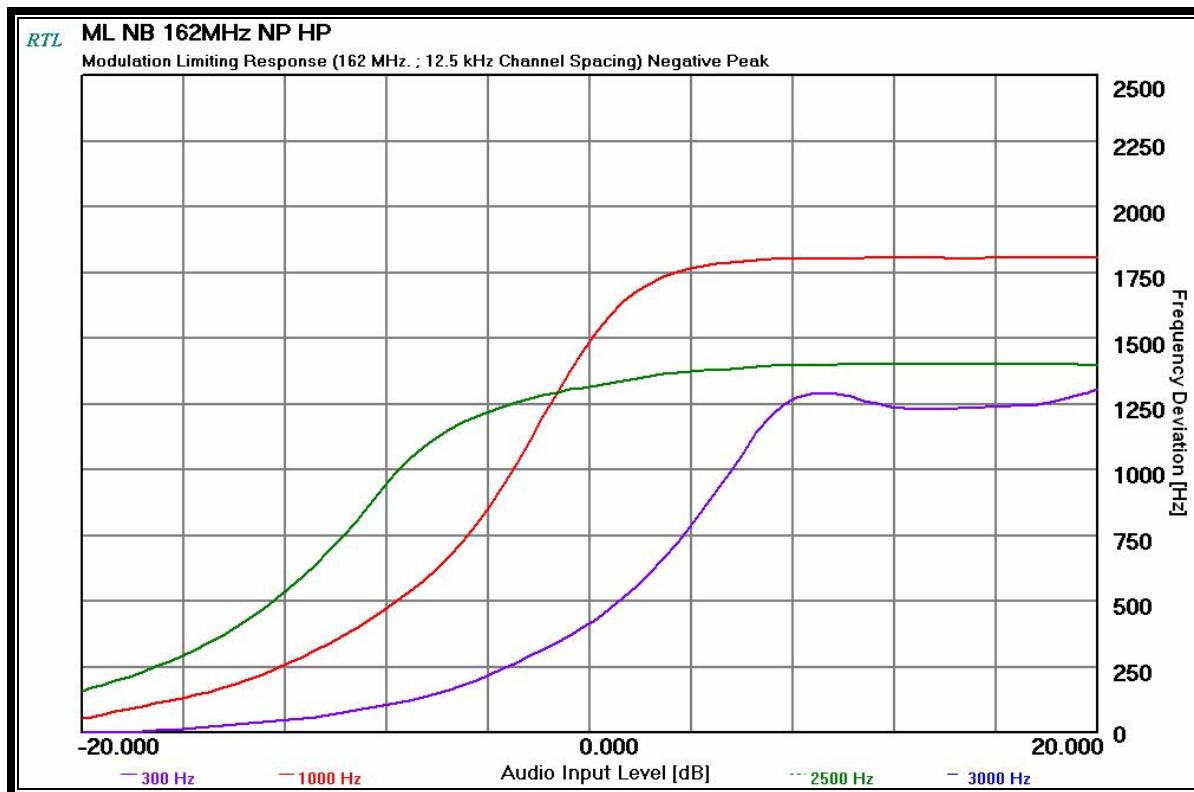


Table 11-1: Test Equipment for Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	12/19/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/21/07
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	10/19/07

Test Personnel:

Daniel Biggs	<i>Daniel Biggs</i>	March 15, 2007
Test Technician/Engineer	Signature	Date Of Test

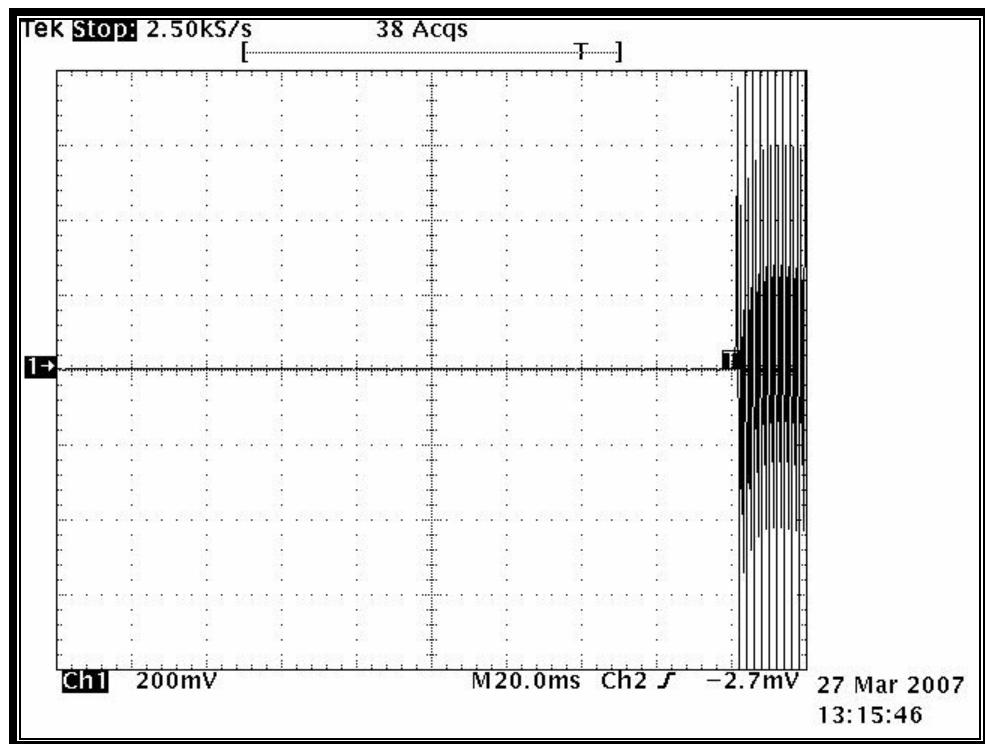
12 FCC Rules and Regulations Part 90 §90.214: Transient Frequency Behavior

12.1 Test Procedure

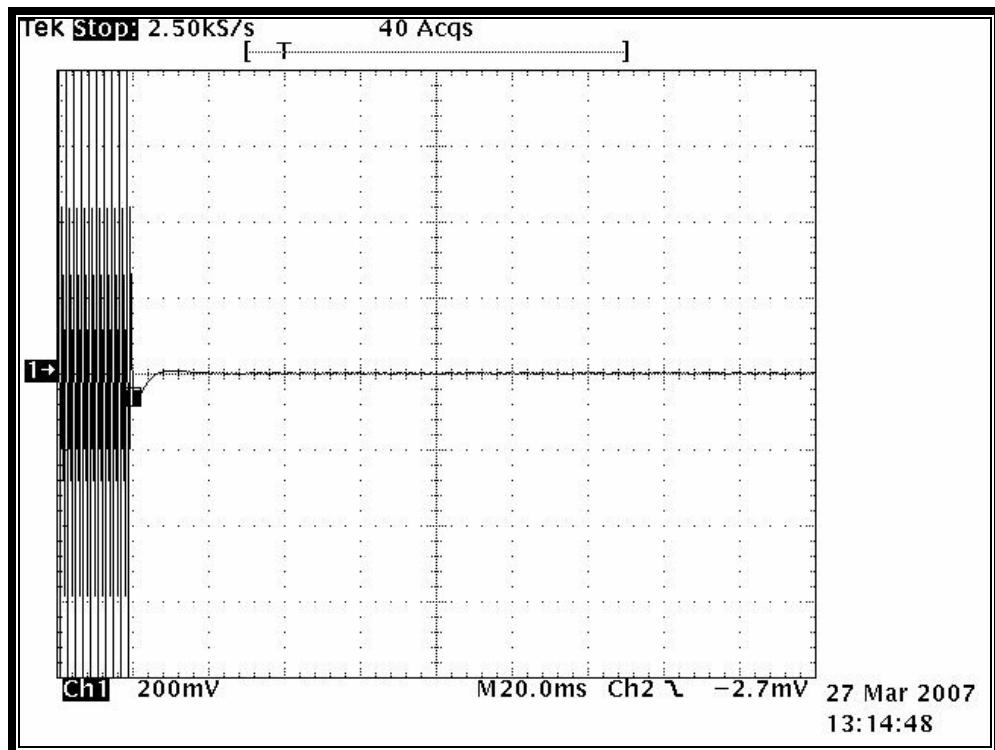
ANSI TIA-603-C-2004, section 2.2.3.

12.2 Test Data

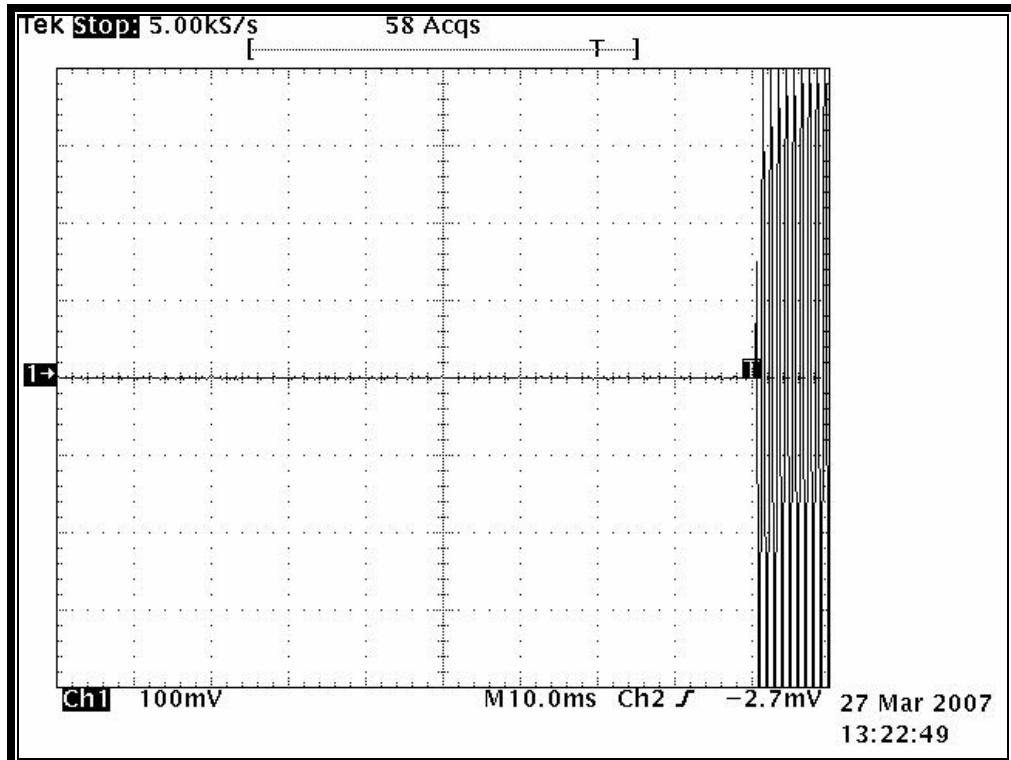
Plot 12-1: Transient Frequency Behavior – 162 MHz; Wide Band; High Power; Carrier ON Time



Plot 12-2: Transient Frequency Behavior – 162 MHz; Wide Band; High Power; Carrier OFF Time



Plot 12-3: Transient Frequency Behavior – 162 MHz; Narrow Band; High Power; Carrier ON Time



Plot 12-4: Transient Frequency Behavior – 162 MHz; Narrow Band; High Power; Carrier OFF Time

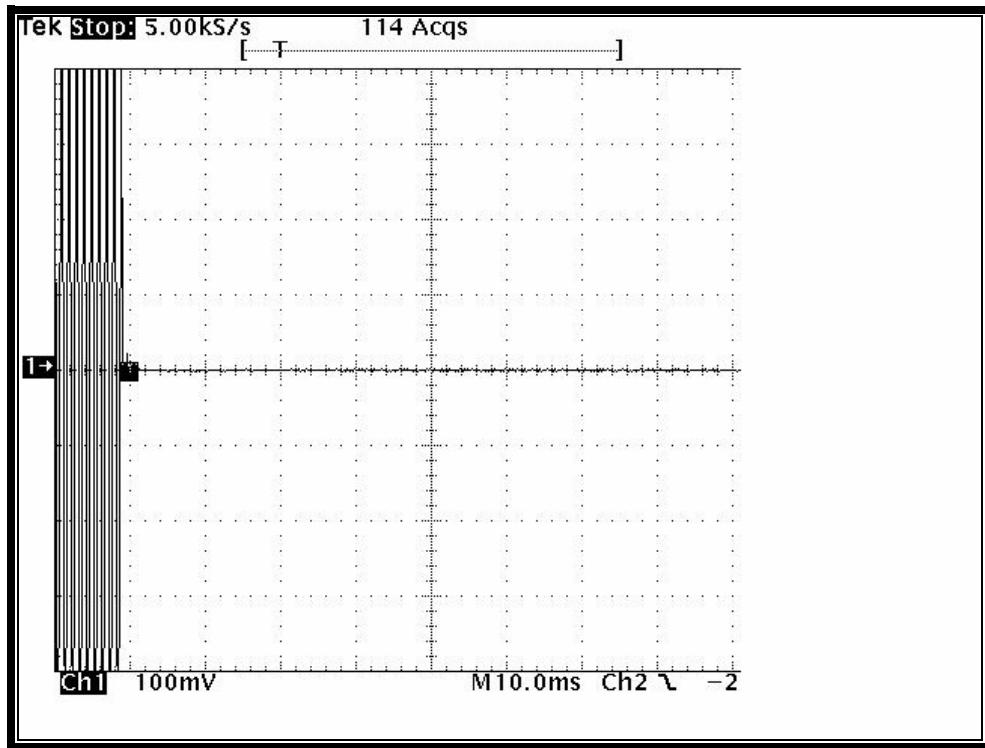


Table 12-1: Test Equipment for Testing Transient Frequency Behavior

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due
900917	Hewlett Packard	8648C	Signal Generator (100 kHz-3200 MHz)	3537A01741	08/29/07
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	07/24/07
900561	Tektronix	TDS540B	Oscilloscope	B020129	03/20/08
900352	Werlatone	C1795	Directional Coupler	4989	06/06/08

Test Personnel:

Daniel Biggs	<i>Daniel Biggs</i>	March 27 & May 8, 2007
Test Technician/Engineer	Signature	Dates Of Tests

13 FCC Rules and Regulations Part 2 §90.202: Necessary Bandwidth and Emission Bandwidth

FCC Mask 90.210(b, c, d.):

Type of Emission: F3E, F1D, F1E

Voice – 25 kHz Channel Separation

Calculation:

Max modulation (M) in kHz: 3.0

Max deviation (D) in kHz: 5

Constant factor (K): 1 (assumed)

$B_n = 2xM+2xDK = 16.0$ kHz

Emission designator: 16K0F3E

Voice – 12.5 kHz Channel Separation

Calculation:

Max modulation (M) in kHz: 3.0

Max deviation (D) in kHz: 2.5

Constant factor (K): 1 (assumed)

$B_n = 2xM+2xDK = 11.0$ kHz

Emission designator: 11K0F3E

Digital Voice and Data 2-level FSK WB

Calculation:

Data rate in bps (R) = 9600

Peak deviation of carrier (D) = 3000

$2D/R = 0.625$

$B_n = 3.86D + 0.27R = 3.86(3000) + 0.27(9600) = 14.17$ kHz

Emission designator: 14K2F1D, 14K2F1E

Digital Voice and Data 2-level FSK NB

Calculation:

Data rate in bps (R) = 9600

Peak deviation of carrier (D) = 1900

$2D/R = 0.625$

$B_n = 3.86D + 0.27R = 3.86(1900) + 0.27(9600) = 9.92$ kHz

Emission designator: 9K9F1D, 9K9F1E

P25 – C4FM (9600 bps):

Calculation:

Data rate in bps (R) = 9600

Peak deviation of carrier (D) = 2826

K = 1

$B_n = [9600/\log_2(4) + 2 (2826) (1)] = 10.452$ kHz

Emission designator: 10K5F1D, 10K5F1E

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14 Conclusion

The data in this measurement report shows that the **M/A-COM, Inc.** Model **MASTR III VHF Base Station, FCC ID: OWDTR-0050-E, IC: 3636B-0050**, complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 9, June 2007.