



Engineering Solutions & Electromagnetic Compatibility Services

: 7 7 `7 `Ugg` =DYfa]gg]j Y`7\ Ub[Y`FYdcfh

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

Model: M7300 VHF 110W Mobile Radio

FCC ID: OWDTR-0056-E

July 10, 2012

Standards Referenced for this Report	
Part 2: 2011	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 80: 2011	Stations in the Maritime Services
TIA-EIA-603-C August 2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards

Frequency Range (MHz)	Rated Transmit Power (W) (Conducted)	Measured Frequency Tolerance (ppm)	Emission Designator
156 – 162	50*	0.5	16K0F3E

* coast station use only

Report Prepared By: Daniel Baltzell

Document Number: 2012214

This report may not be reproduced, except in full, without the full written approval of Rhein Tech Laboratories, Inc. and Harris Corporation. Test results relate only to the item tested.

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

Table of Contents

1	Test Result Summary	4
1.1	General Information	4
1.2	Test Facility	4
1.3	Related Submittal(s)/Grant(s)	4
1.4	Grant Notes	4
2	Tested System Details	5
3	FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 80.215 Transmitter Power	6
3.1	Test Procedure	6
3.2	Test Data	6
4	FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Spurious Emissions at Antenna Terminals; Part 80.211 Emission Limitations	7
4.1	Test Procedure	7
4.2	Test Data	7
5	FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 80.211 Emission Limitations	9
5.1	Test Procedure	9
5.2	Test Data	9
6	FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 80.205	11
6.1	Test Procedure	11
6.2	Test Data	11
7	FCC Part 2.1047: Modulation Characteristics; Part 80.213 Modulation Requirements	13
7.1	Test Procedures	13
7.1.1	Audio Frequency Response	13
7.1.2	Audio Low Pass Filter Response	13
7.1.3	Modulation Limiting	13
7.2	Test Data	14
7.2.1	Audio Frequency Response	14
7.2.2	Audio Low Pass Filter Response	15
7.2.3	Modulation Limiting	16
8	Conclusion	18

Table of Figures

Figure 2-1: Configuration of Tested System.....	5
---	---

Table of Tables

Table 2-1: Equipment Under Test (EUT).....	5
Table 3-1: RF Power Output: Carrier Output Power	6
Table 3-2: Test Equipment Used For Testing RF Power Output - Conducted.....	6
Table 4-1: Test Equipment Used For Testing Spurious Emissions	8
Table 5-1: Field Strength of Spurious Radiation – 156.8 MHz.....	9
Table 5-2: Test Equipment Used For Testing Field Strength of Spurious Radiation	10
Table 6-1: Test Equipment Used For Testing Occupied Bandwidth	12
Table 7-1: Test Equipment Used For Testing Field Strength of Spurious Radiation	17

Table of Plots

Plot 4-1: Spurious Emissions at Antenna Terminals – 156.8 MHz (9 kHz – 1 GHz).....	7
Plot 4-2: Spurious Emissions at Antenna Terminals – 156.8 MHz (1 GHz – 1.6 GHz).....	8
Plot 6-1: Occupied Bandwidth – 156.8 MHz.....	11
Plot 7-1: Modulation Characteristics - Audio Frequency Response - 156.8 MHz	14
Plot 7-2: Modulation Characteristics – Audio Low Pass Filter – 156.8 MHz	15
Plot 7-3: Modulation Characteristics – Modulation Limiting – 156.8 MHz; WB; Positive Peak	16
Plot 7-4: Modulation Characteristics – Modulation Limiting – 156.8 MHz; WB; Negative Peak.....	17

Table of Appendixes

Appendix A: Test Configuration Photographs	19
Appendix B: Agency Authorization Letter	21
Appendix C: Change Description Letter	22
Appendix D: Attestation Letter	23

Table of Photographs

Photograph 1: Radiated Emissions (Front View).....	19
Photograph 2: Radiated Emissions (Rear View)	20

1 Test Result Summary

Test	FCC Reference	Result
RF Power Output	2.1046(a), 80.215	Complies
Spurious Emissions at Antenna Terminals	2.1051, 2.1057, 80.211(f)(3)	Complies
Field strength of spurious radiation	2.1053(a), 2.1057, 80.211(f)(3)	Complies
Occupied Bandwidth	2.1049(c)(1), 80.205, 80.211(f)	Complies
Modulation Characteristics	2.1047(a)(b), 80.213	Complies

1.1 General Information

The following Class II Permissive Change Report is prepared on behalf of Harris Corporation in accordance with the Federal Communications Commission rules and regulations. The Equipment Under Test (EUT) was the M7300 VHF 110W Mobile Radio; FCC ID: OWDTR-0056-E.

The purpose of this Class 2 Permissive Change is to certify the maritime services in the 156-162 MHz band under Part 80. The justification for this addition via a Class II Permissive Change is that the original hardware could always support these frequencies, power level and mode of operation.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Rules and Regulations CFR 47 Parts 2 and 80. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

1.2 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.

1.3 Related Submittal(s)/Grant(s)

The original FCC certification was granted on 02/1/2012, and a Class II permissive change was approved on June 27, 2012.

1.4 Grant Notes

Existing grant notes should not be changed; but please note that Part 80 operation is limited to 50 W output power for coast station use only.

2 Tested System Details

The test sample was received on June 28, 2012. 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)

Model	Manufacturer	Model #	Part #	FCC ID	RTL Bar Code
M7300 VHF 110W Mobile Radio	Harris Corporation	MAMW-SHMXX	RU144750-051	OWDTR-0056-E	20257
CH721 Control Unit	Harris Corporation	CH721	CU23218-0004	N/A	20270

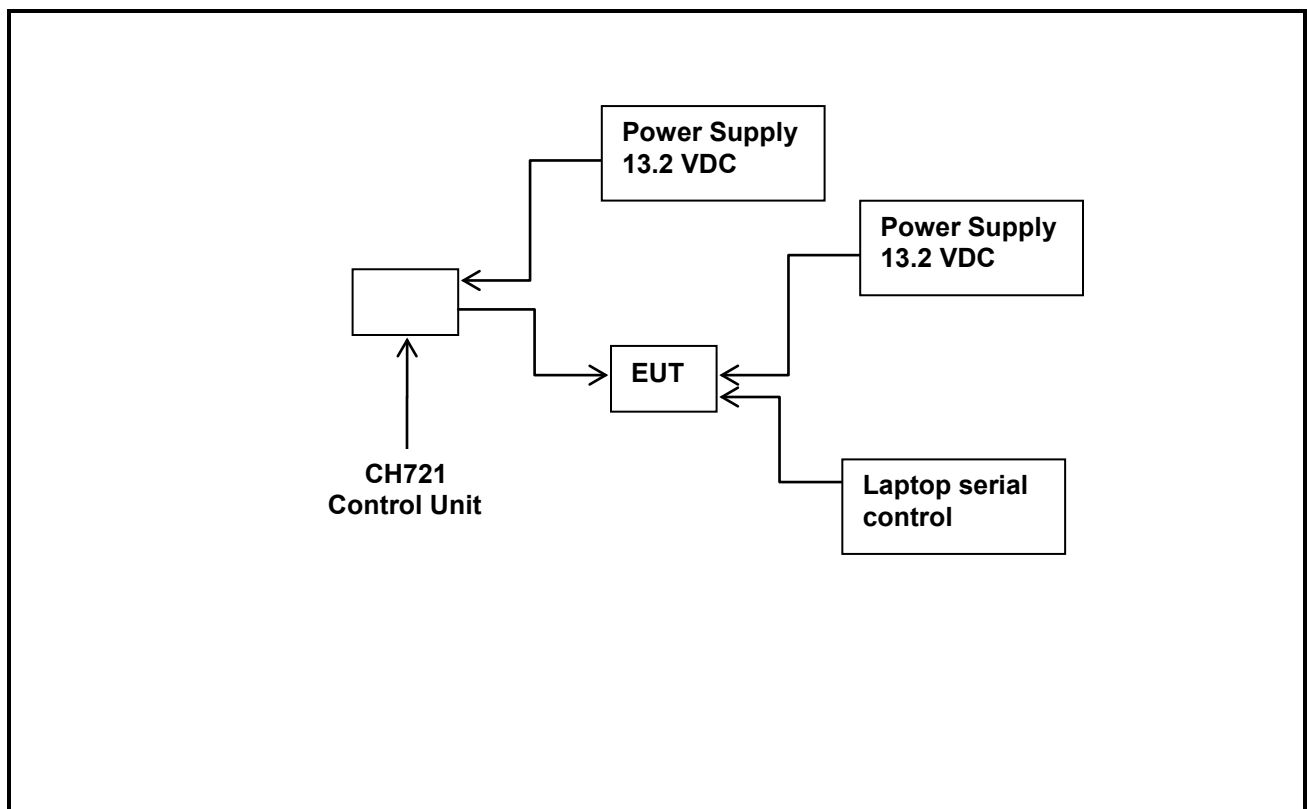


Figure 2-1: Configuration of Tested System

3 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 80.215 Transmitter Power

3.1 Test Procedure

ANSI/TIA-603-2004, section 2.2.1

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

3.2 Test Data

Table 3-1: RF Power Output: Carrier Output Power

Frequency (MHz)	Power (dBm)	Power (W)
156.0	47.7	58.9
156.8	47.6	57.5
162.0	47.6	57.5

Table 3-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	10/14/12

Test Personnel:

Daniel Baltzell
EMC Test Engineer



Signature

July 2, 2012
Date of Test

4 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Spurious Emissions at Antenna Terminals; Part 80.211 Emission Limitations

4.1 Test Procedure

ANSI/TIA-603-2004, Section 2.2.13

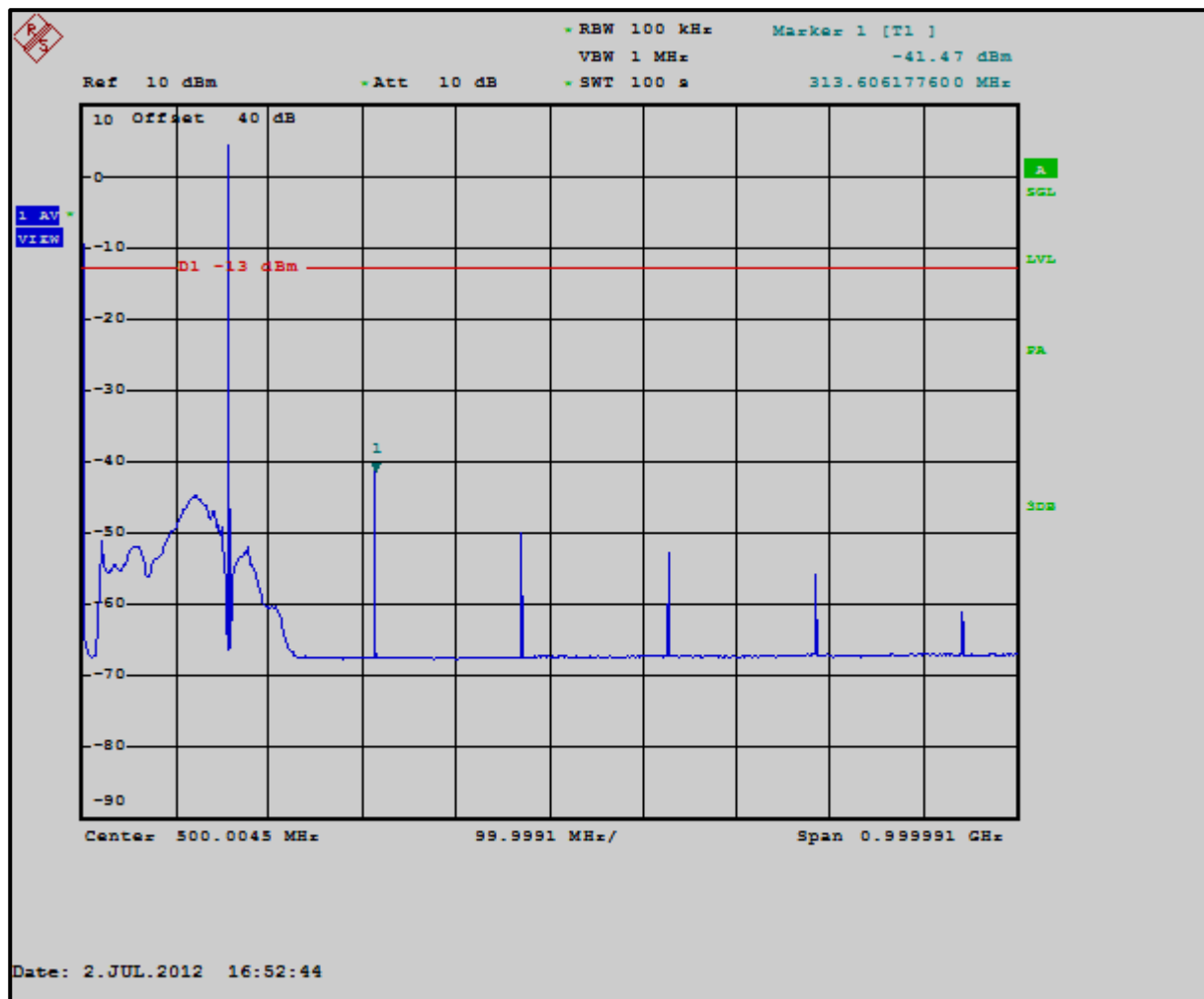
The transmitter is terminated with a $50\ \Omega$ load and interfaced with a spectrum analyzer.

4.2 Test Data

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

Limits: $(43+10\log P(W))$

Plot 4-1: Spurious Emissions at Antenna Terminals – 156.8 MHz (9 kHz – 1 GHz)



Plot 4-2: Spurious Emissions at Antenna Terminals – 156.8 MHz (1 GHz – 1.6 GHz)

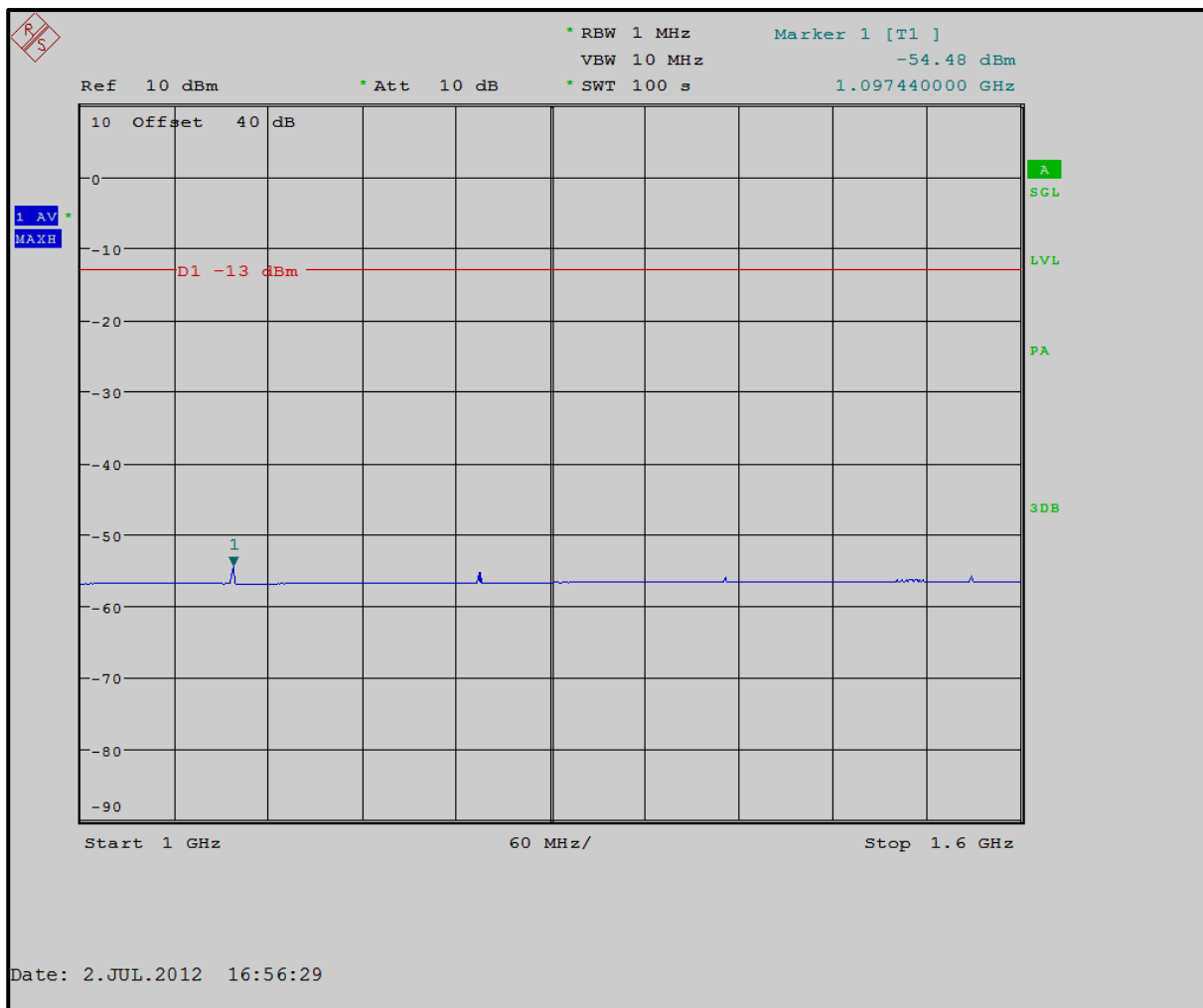


Table 4-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	12/29/12
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	10/14/12
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	2/28/13

Test Personnel:

Daniel Baltzell
 EMC Test Engineer


 Signature

July 2, 2012
 Date of Test

5 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 80.211 Emission Limitations

5.1 Test Procedure

ANSI/TIA-603-2004, section 2.2.12

The spurious emissions levels were measured (analog), 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 (dBi) was added to achieve the EIRP level, then converted from the corrected signal generator level (dBm) to dBc, and compared to the limit.

5.2 Test Data

Table 5-1: Field Strength of Spurious Radiation – 156.8 MHz


Conducted Power 47.6 dBm; 57.5W; Limit=43+10LogP=60.6 dBc

Frequency (MHz)	Spectrum Analyzer Level (dBuV)	Signal Generator Level (dBm)	Cable Loss to Transmit Antenna (dB)	Substitution Antenna Gain (dBi)	Corrected Signal Generator Level (dBc)	Margin (dB)
313.6	62.0	-59.1	0.6	1.5	105.8	-45.2
470.4	60.7	-53.4	0.6	1.6	100.0	-39.4
627.2	66.8	-46.8	0.7	1.2	93.9	-33.3
784.0	42.7	-70.4	0.8	1.1	117.7	-57.1
940.8	44.8	-68.1	0.8	1.5	115.0	-54.4
1097.6	38.8	-74.5	0.9	4.3	118.7	-58.1
1254.4	31.4	-80.6	1.0	5.0	124.2	-63.6
1411.2	31.1	-79.4	1.1	5.9	122.2	-61.6
1568.0	30.4	-79.1	1.2	6.7	121.2	-60.6

Table 5-2: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901516	Insulated Wire Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/14/12
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	1/31/13
900928	Hewlett Packard	83752A	Synthesized Sweeper, (0.01 - 20 GHz)	3610A00866	2/18/13
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole (25 – 1000 MHz Antennas)	00401	3/6/14
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901590	Sucoflex	104	6.5' SMA Cable	145883/4	5/15/13
901591	Sucoflex	104	6.5' SMA Cable	145880/4	5/15/13

Test Personnel:

Daniel Baltzell Test Engineer	 Signature	July 2, 2012 Date of Tests
----------------------------------	---	-------------------------------

6 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 80.205

Occupied Bandwidth

6.1 Test Procedure

ANSI/TIA-603-2004, section 2.2.11 and TIA/EIA-102.CAAA-2002 section 2.2.5

6.2 Test Data

Plot 6-1: Occupied Bandwidth – 156.8 MHz

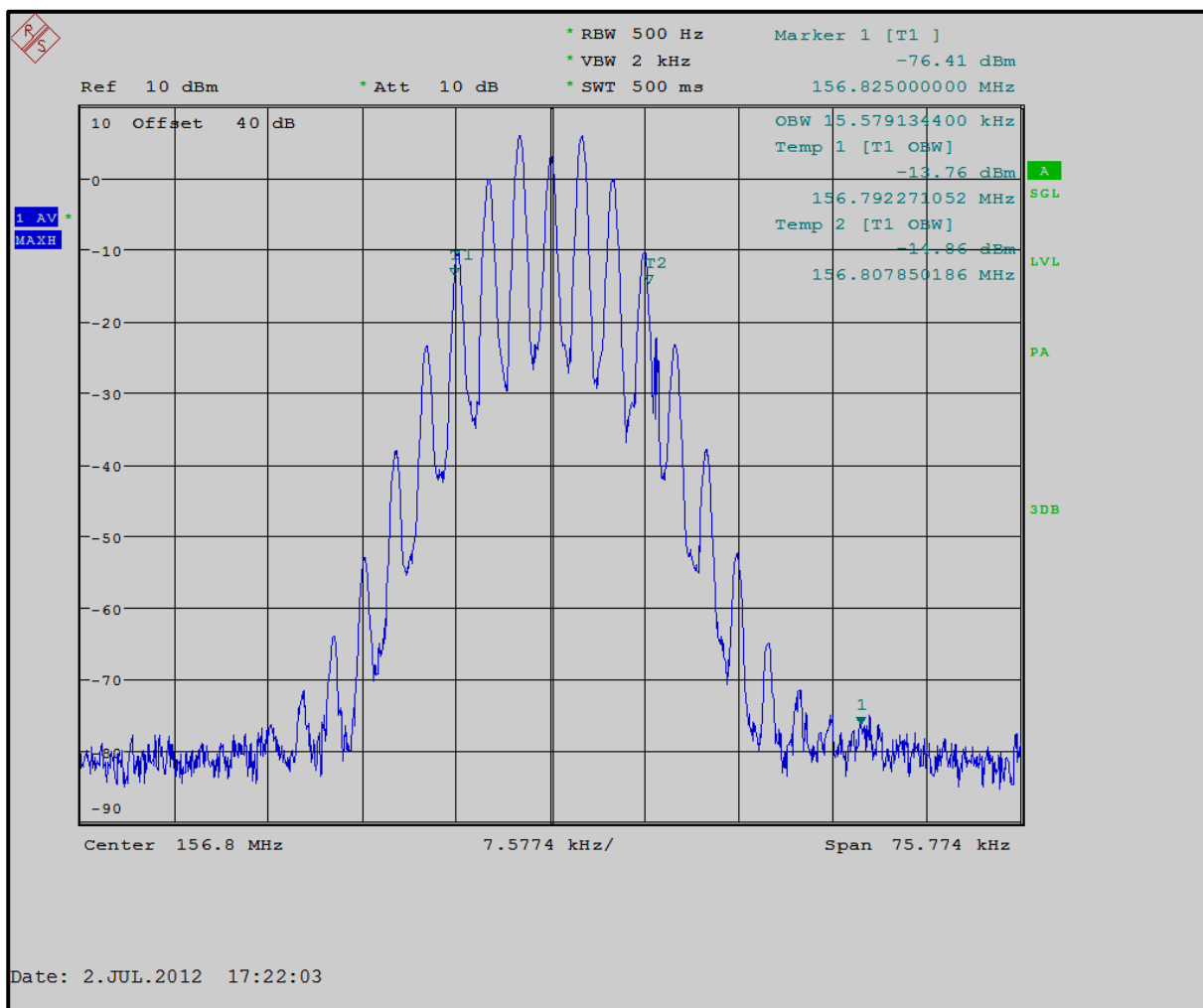



Table 6-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	10/14/12

Test Personnel:

Daniel Baltzell		July 2, 2012
Test Engineer	Signature	Date of Tests

7 FCC Part 2.1047: Modulation Characteristics; Part 80.213 Modulation Requirements

7.1 Test Procedures

7.1.1 Audio Frequency Response

ANSI/TIA/EIA-603-2004, 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)

7.1.2 Audio Low Pass Filter Response

ANSI/TIA/EIA-603-2004, 2.2.15

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

7.1.3 Modulation Limiting

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

The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1000 Hz, and 2500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

Part 80.213 Modulation requirements

(a)(2) When phase or frequency modulation is used in the 156–162 MHz band, the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ± 5 kHz is defined as 100 percent peak modulation.

(b) Radiotelephone transmitters using A3E, F3E and G3E emission must have a modulation limiter to prevent any modulation over 100 percent. This requirement does not apply to survival craft transmitters, to transmitters that do not require a license, or to transmitters whose output power does not exceed 3 watts.

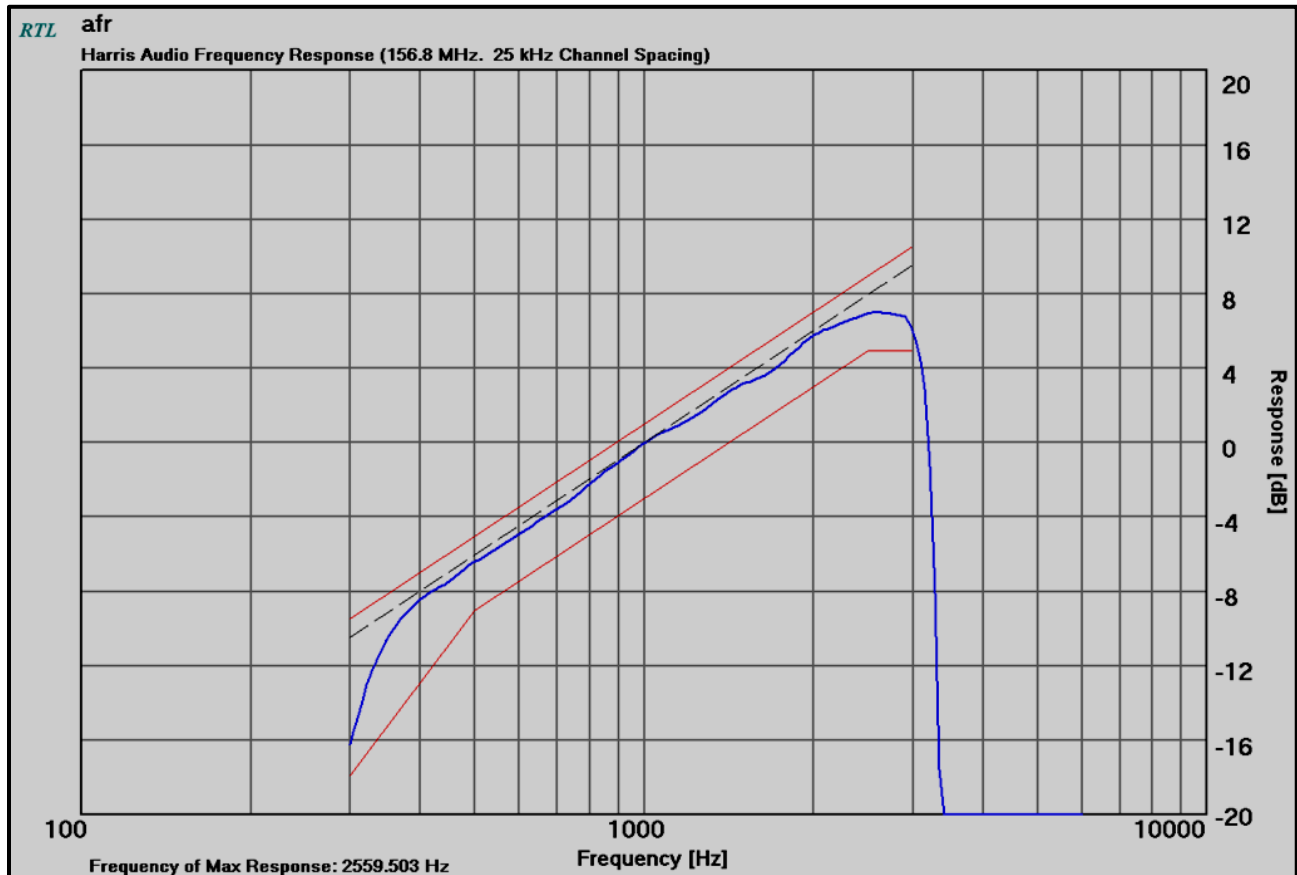
(d) Ship and coast station transmitters operating in the 156–162 MHz and 216–220 MHz bands must be capable of proper operation with a frequency deviation that does not exceed ± 5 kHz when using any emission authorized by §80.207.

(e) Coast station transmitters operating in the 156–162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20 kHz, it must have an attenuation greater than at 1 kHz by at least $60\log_{10}(f/3)$ dB where “f” is the audio frequency in kilohertz. At frequencies above 20 kHz, the attenuation must be at least 50 dB greater than at 1 kHz.

7.2 Test Data

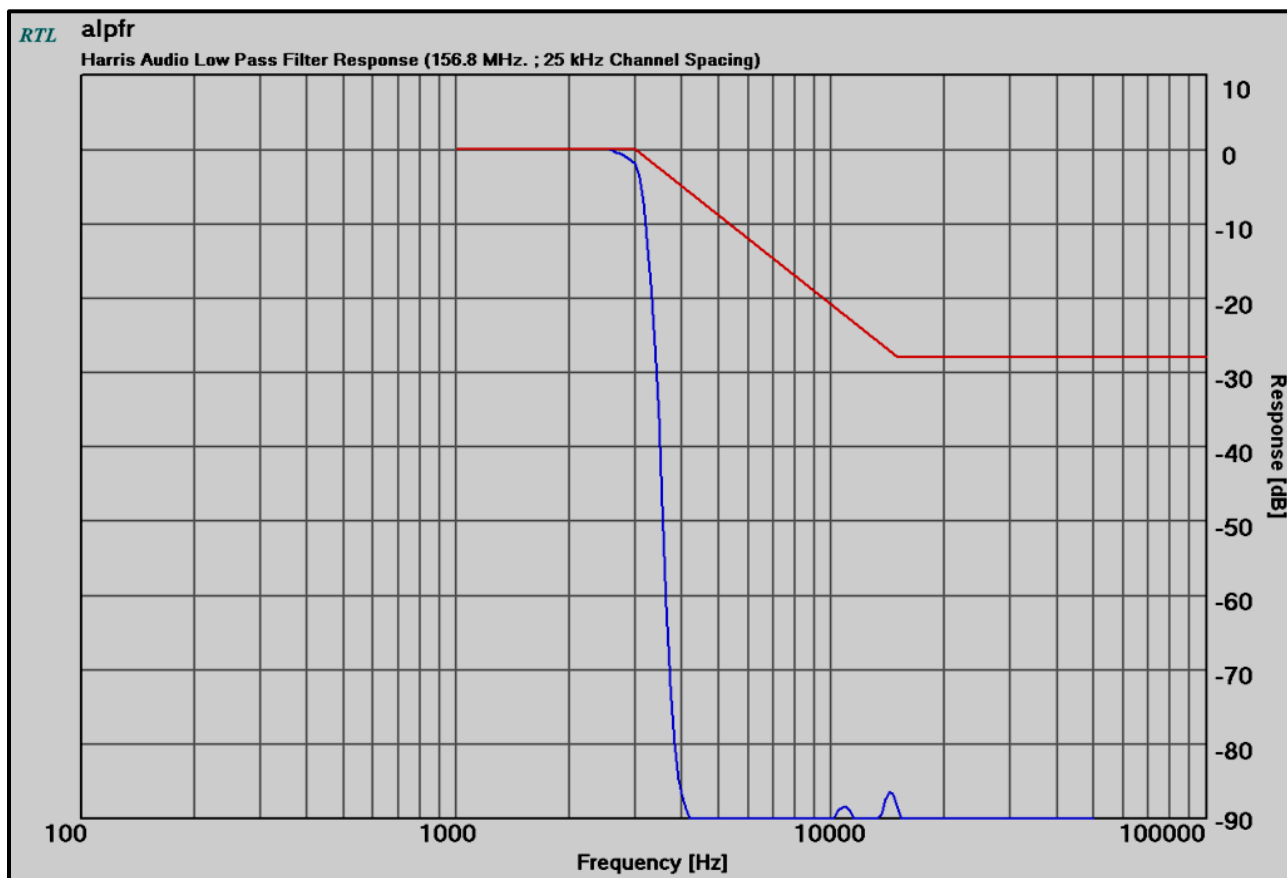
7.2.1 Audio Frequency Response

Plot 7-1: Modulation Characteristics - Audio Frequency Response - 156.8 MHz



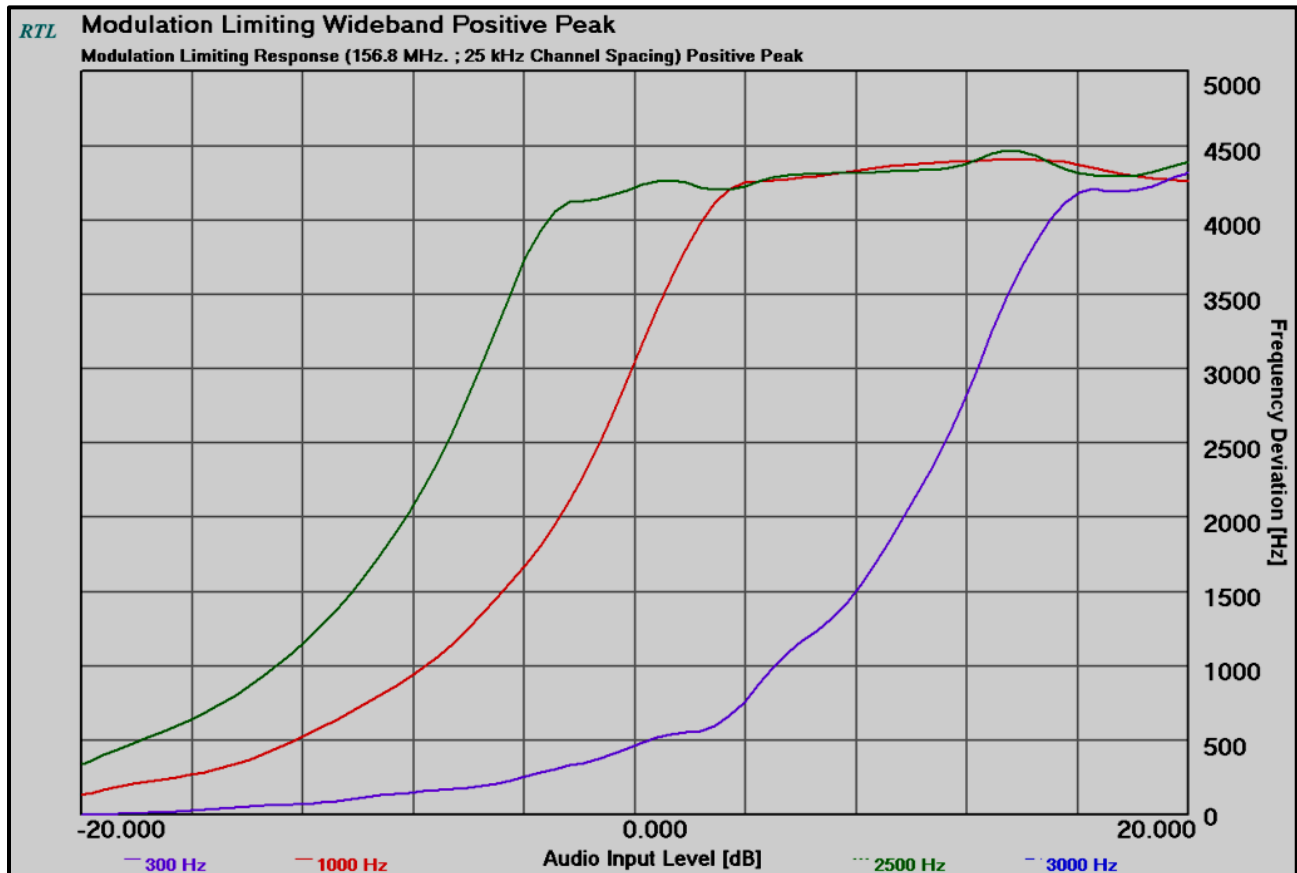
7.2.2 Audio Low Pass Filter Response

Plot 7-2: Modulation Characteristics – Audio Low Pass Filter – 156.8 MHz



7.2.3 Modulation Limiting

Plot 7-3: Modulation Characteristics – Modulation Limiting – 156.8 MHz; WB; Positive Peak



Plot 7-4: Modulation Characteristics – Modulation Limiting – 156.8 MHz; WB; Negative Peak

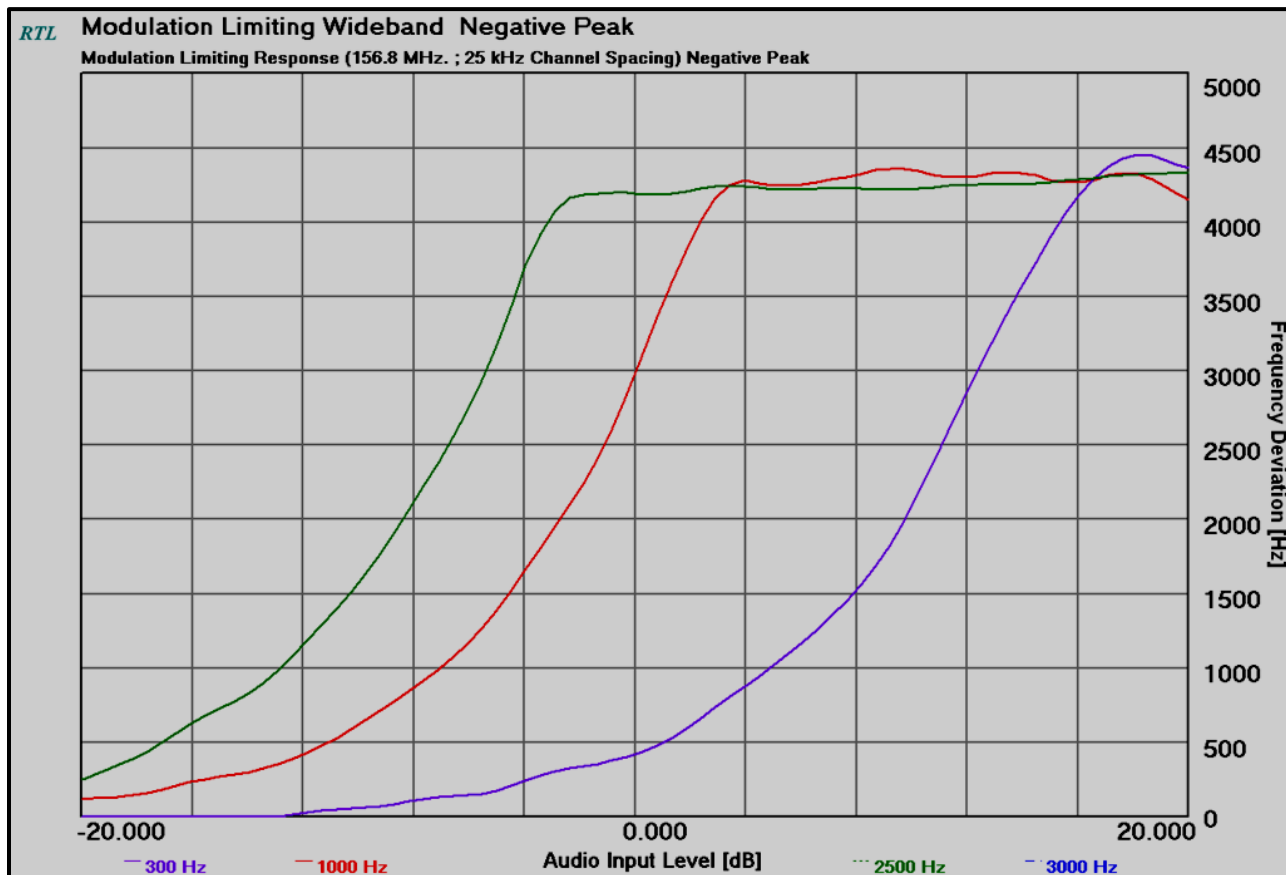


Table 7-1: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	10/20/12
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz – 1300 MHz)	2406A00178	2/14/13
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	3/26/13
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	10/14/12

Test Personnel:

Daniel Baltzell
Test Engineer

Signature

July 2, 2012
Date of Tests

Rhein Tech Laboratories, Inc.
360 Herndon Parkway
Suite 1400
Herndon, VA20170
<http://www.rheintech.com>

Client: Harris Corporation
Model: M7300 VHF 110W
ID: OWDTR-0056-E
Standards: FCC Part 80
Report #: 2012214

8 Conclusion

The data in this measurement report shows that the Harris Corporation Model M7300 VHF 110W Mobile Radio, FCC ID: OWDTR-0056-E, complies with all the applicable requirements for a Class II permissive change for FCC Parts 80 and 2.