RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC Class 2 Permissive Change Report

Harris Corporation
221 Jefferson Ridge Parkway
Lynchburg, VA 24501

Model: M7300 VHF Mobile Radio

FCC ID: OWDTR-0056-E

October 23, 2013

Standards Referenced for this Report	
Part 2: 2012	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 80: 2012	Stations in the Maritime Services
TIA-102.CCAA August 2011	Two-Slot Time Division Multiple Access Transceiver Measurement Methods
TIA-102.CCAB October 2011	Two - Slot Time Division Multiple Access Transceiver Performance Recommendations
TIA-EIA-603-C August 2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards

FCC Rule Parts	Frequency Range (MHz)	Rated Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Mode	Emission Designator
22, 90	136 – 174	110	0.18	H-CPM TDMA (Phase II)	8K10DXW
80	136 – 174	50	0.18	H-CPM TDMA (Phase II)	8K10DXW
22	136 – 174	110	0.18	Voice	16K0F3E
80	136 – 174	50	0.18	Voice	16K0F3E
22, 90	136 – 174	110	0.18	Voice	11K0F3E
80	136 – 174	50	0.18	Voice	11K0F3E
22, 90	136 – 174	110	0.18	2 level NB 9600	9K90F1D/E
80	136 – 174	50	0.18	2 level NB 9600	9K90F1D/E
22, 90	136 – 174	110	0.18	2 level NB 4800	7K10F1D/E
80	136 – 174	50	0.18	2 level NB 4800	7K10F1D/E
22, 90	136 – 174	110	0.18	P25 (Phase I)	8K40F1D/E
80	136 – 174	50	0.18	P25 (Phase I)	8K40F1D/E

Report Prepared By: Daniel Baltzell

Document Number: 2013228

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.

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1 Test Result Summary

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

2 General Information

The following Class 2 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 M7300 VHF Radio; FCC ID: OWDTR-0056-E.

The purpose of this Class 2 Permissive Change is to add Part 80 for all emission designators.

All measurements contained in this application were conducted in accordance with the applicable sections of FCC Rules and Regulations CFR 47 Parts 2 and 90. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

2.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to, and approved by, the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

2.2 Related Submittal(s)/Grant(s)

The original FCC certification was granted on February 1, 2012; FCC Class II permissive changes were granted on June 27, 2012, August 1, 2012, and May 16, 2013.

2.3 Grant Notes

Power is continuously variable from 50 - 110 W. The grant listed power is rated power.

2.4 Tested System Details

The test sample was received on September 27, 2013. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable.

The device was programmed for multiple test modulations.

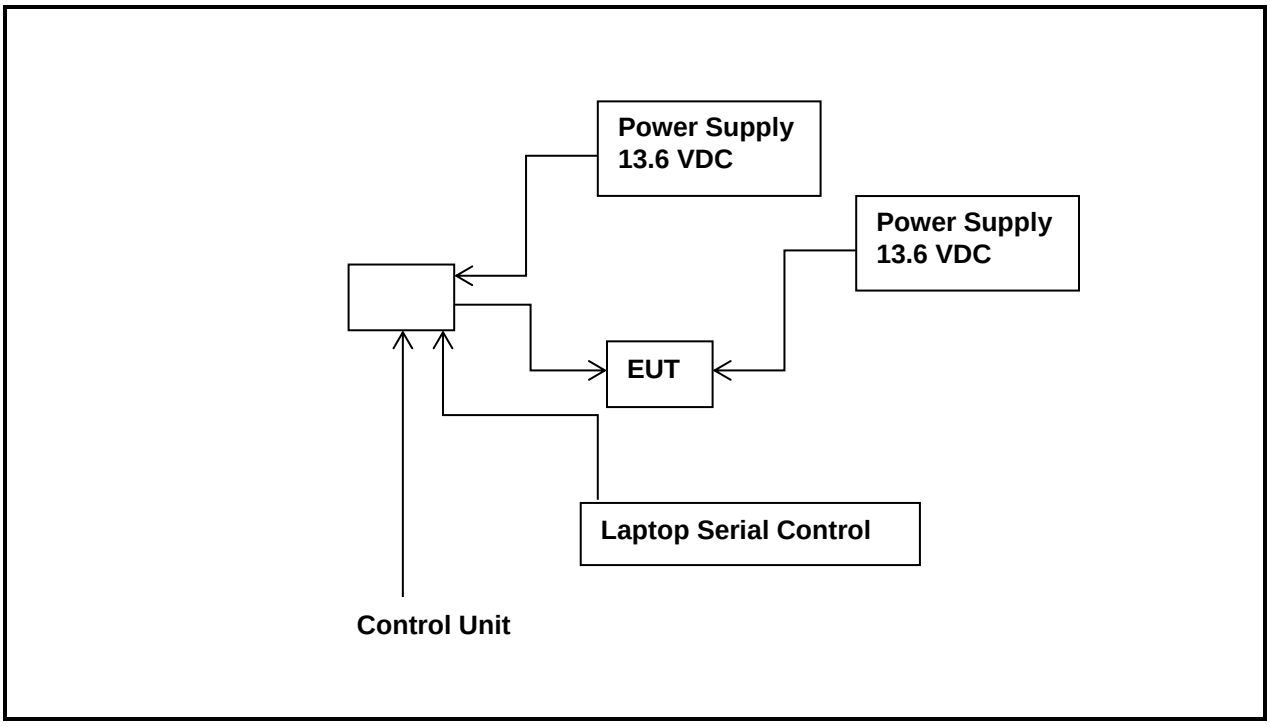
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
M7300 VHF Radio	Harris Corporation	MAMW-SHHXX	RU144750-051	OWDTR-0056-E	20757

Table 2-2: Auxiliary Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
13.8 VDC Power Supply	Alinco	DM-330MV	N/A	DoC	901438
Power Cable	Harris	N/A	N/A	N/A	N/A
Termination	BIRD Electronic Corporation	8141	4005	N/A	900714
Laptop	Sony	PCG-71314L	N/A	N/A	N/A
Control Head	Harris	CH-271	CU-23218	N/A	20952

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. An offset was used to account for any attenuation.

3.2 Test Data

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

Frequency (MHz)	Low Power (dBm)	Low Power (W)
136.0125	47.5	56.2
156.0000	47.4	55.0
156.8000	47.3	53.7
162.0000	47.4	55.0
173.9875	47.3	53.7

Table 3-2: RF Power Output (Rated Power)

Frequency (MHz)	Part 80 Power Rating (W)
136-174	50

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

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
901291	Pasternack	PE7031-20	300W Attenuator, DC - 1 GHz, 20 dB	NA	3/25/16
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	4/16/14
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	12/14/13

Test Personnel:

Daniel Baltzell		October 17, 2013
EMC Test Engineer	Signature	Date of Test

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

4.1 Test Procedure

ANSI/TIA-603-2004, Section 2.2.13

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

Part 80.211(f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:
(1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;
(2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus $10\log_{10}$ (mean power in watts) dB.

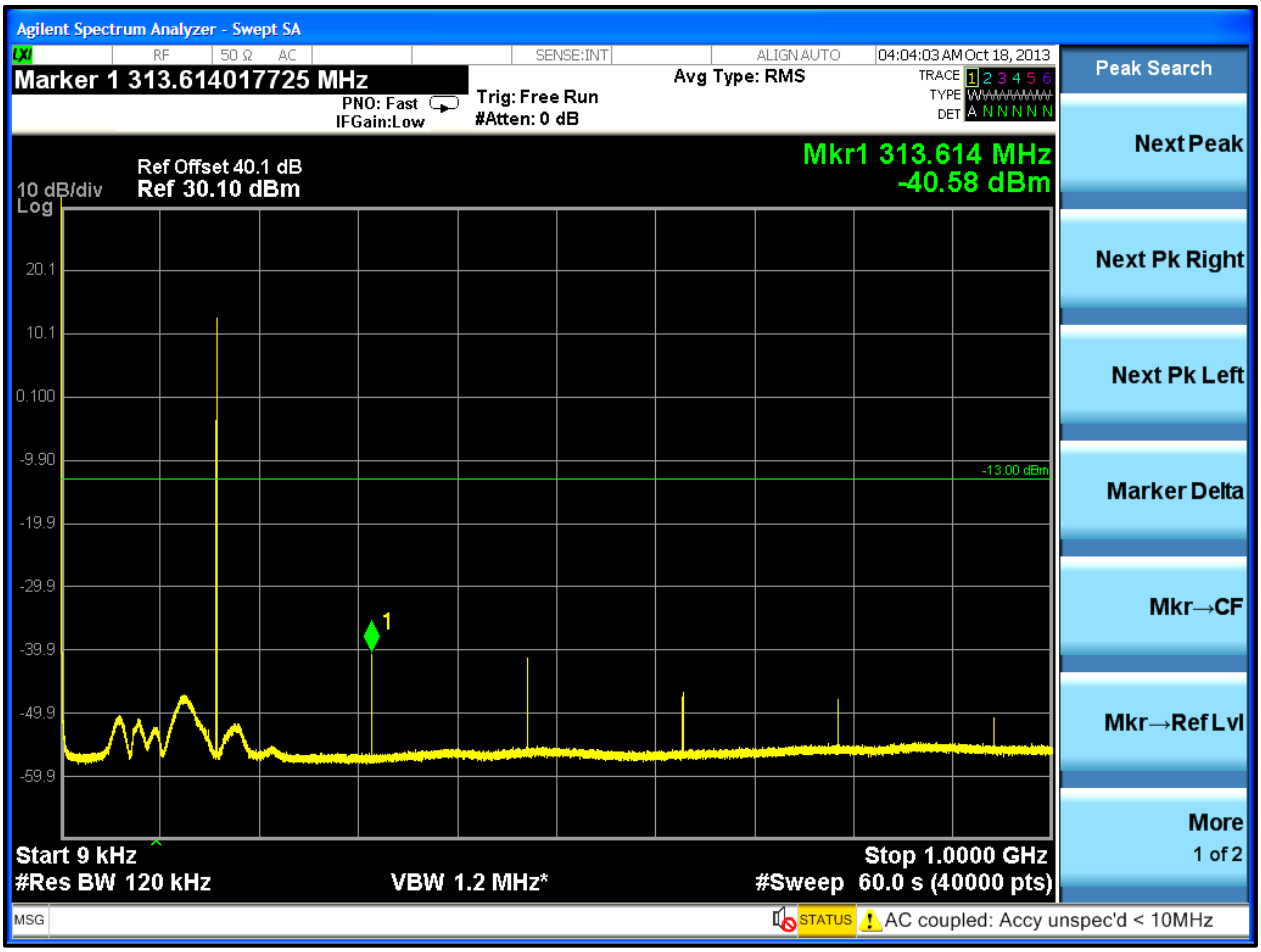
4.2 Test Data

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

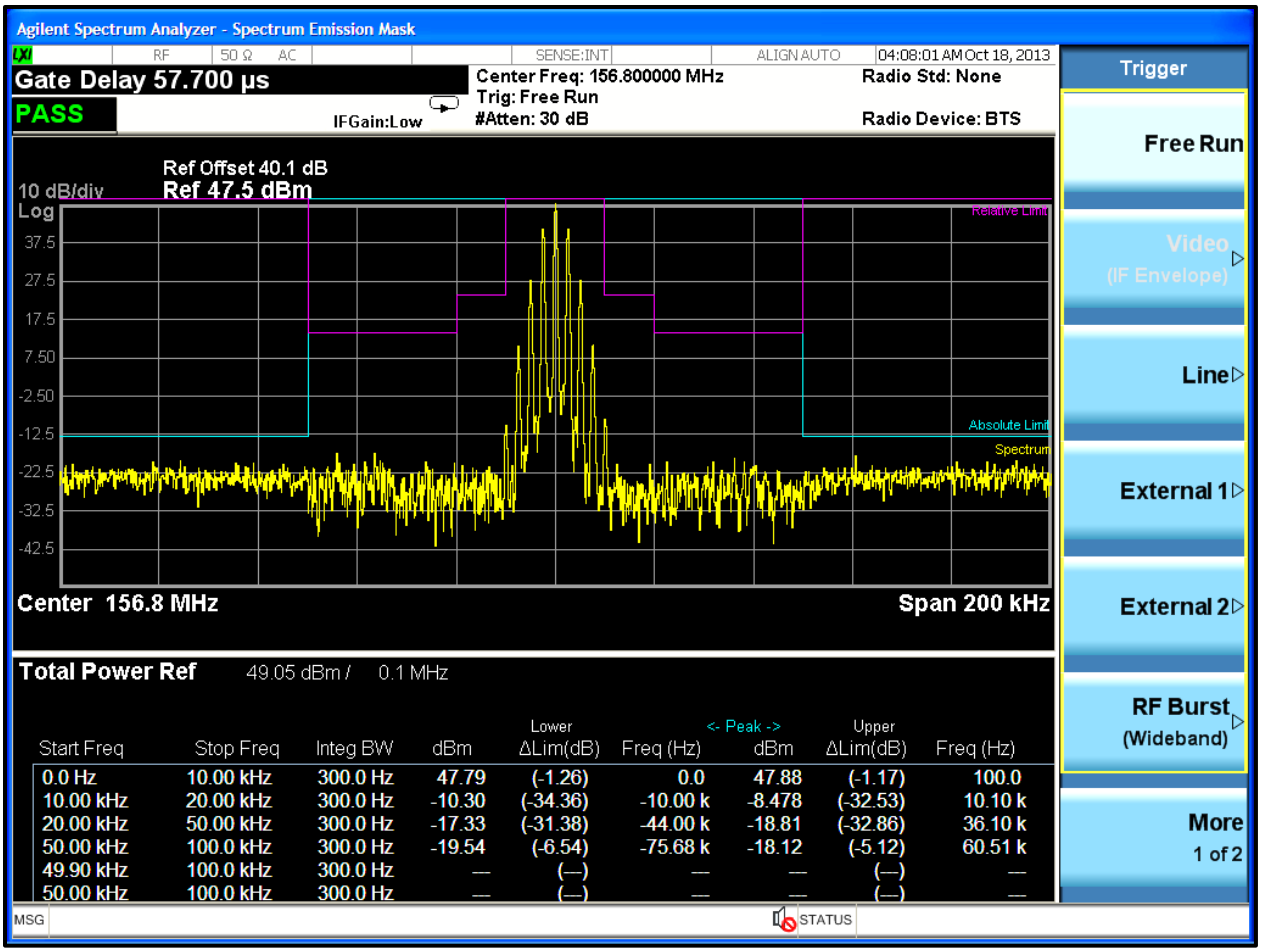
Limits: (43+10LOG P(W))

The worst case (unwanted emissions) channels are shown. Per FCC 2.1051, the magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

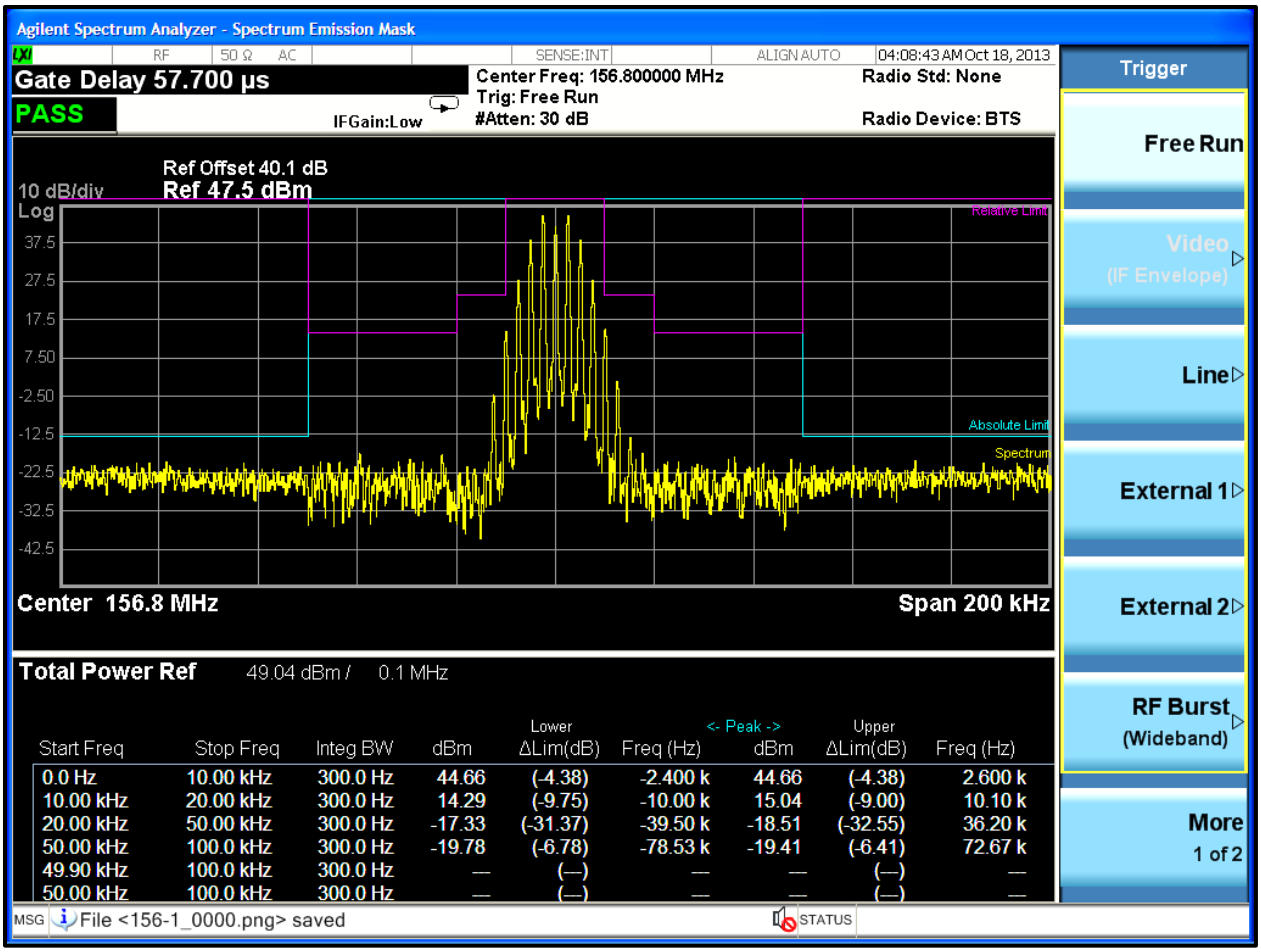
Plot 4-1: Out of Band Spurious Emissions at Antenna Terminals – 156.8 MHz (9 kHz – 1 GHz)



Plot 4-2: In Band Spurious Emissions at Antenna Terminals – 156.8 MHz (NB)



Plot 4-3: In Band Spurious Emissions at Antenna Terminals – 156.8 MHz (WB)



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

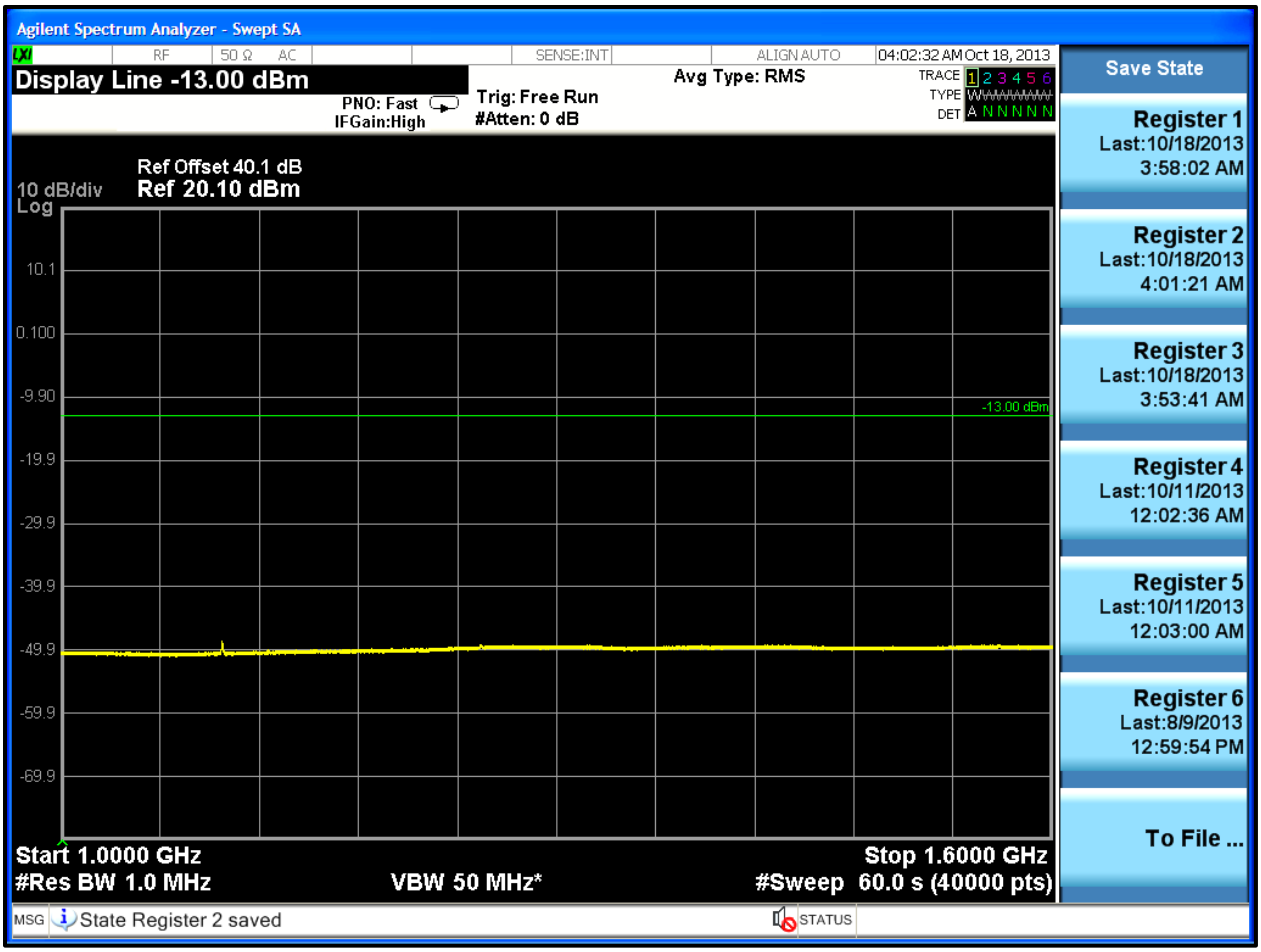


Table 4-1: Test Equipment Used for Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	4/16/14
901537	Weinschel Corp	48-40-34	Attenuator, 40 dB, 100W	CB66628	12/14/13
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	2/28/14
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14

Test Personnel:

Daniel Baltzell		October 18, 2013
EMC Test Engineer	Signature	Date of Test

5 FCC Rules and Regulations Part §2.1051 - Radiated Spurious Emissions; 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; High Power

60.3 dBc = Limit

Frequency (MHz)	Measured Level (dBuv)	Signal Gen. Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Level (dBc)	Margin (dB)
313.6	60.8	-63.7	0.1	1.5	109.6	-49.3
470.4	61.1	-61.0	0.1	1.6	106.8	-46.5
627.2	55.7	-63.0	0.2	1.3	109.2	-48.9
784.0	49.2	-67.5	0.2	0.7	114.3	-54.0
940.8	40.5	-76.2	0.3	1.1	122.7	-62.4
1097.6	44.7	-71.6	0.2	2.9	116.2	-55.9
1254.4	35.5	-80.4	0.2	3.7	124.2	-63.9
1411.2	35.3	-82.7	0.2	4.8	125.4	-65.1
1568.0	31.1	-84.0	0.3	6.3	125.3	-65.0

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

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	2/2/14
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole Antennas (25 - 1000 MHz)	00401	3/6/14
901262	ETS	3160-9	Double ridged Guide Antenna (1 - 18 GHz)	6748	5/11/14
900917	Hewlett Packard	8648C	Synthesized. Signal Generator (9 kHz - 3200 MHz)	3537A01741	2/2/14
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20’	NA	8/27/14
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	4/16/14
901629	Teledyne Cougar	A4C2123	Amplifier	003-003	9/4/14

Test Personnel:

Daniel Baltzell		October 18, 2013
Test Engineer	Signature	Date of Test

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; Narrowband Analog

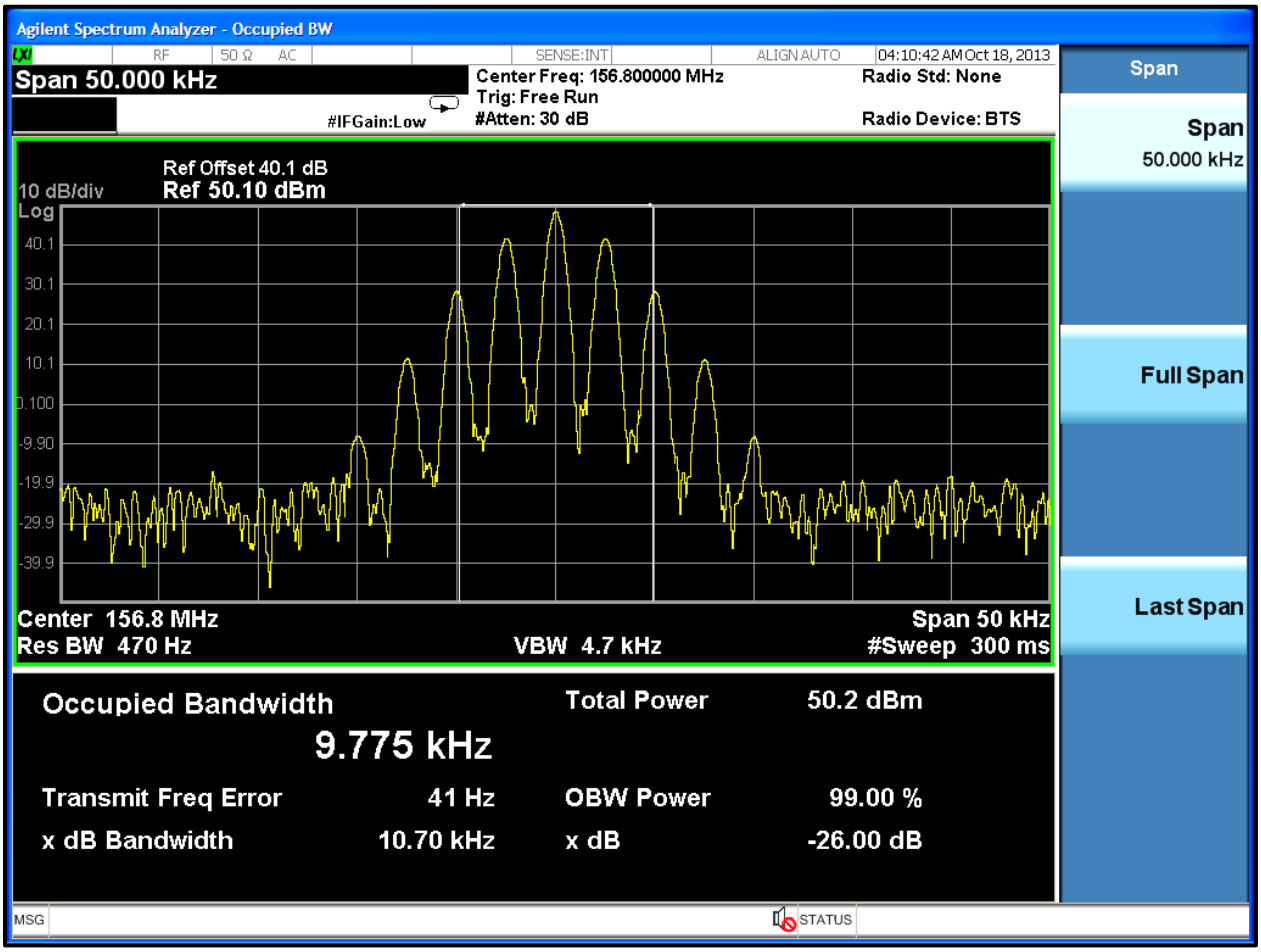


Table 6-1: Test Equipment Used for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	4/16/14
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	12/14/13
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36”	NA	8/27/14

Test Personnel:

Daniel Baltzell		October 17, 2013
Test Engineer	Signature	Date of Test

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

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 60log10(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.

7.1 Test Procedures

7.1.1 Audio Frequency Response

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)

7.1.2 Audio Low Pass Filter Response

ANSI/TIA-603-C-2004 Section 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

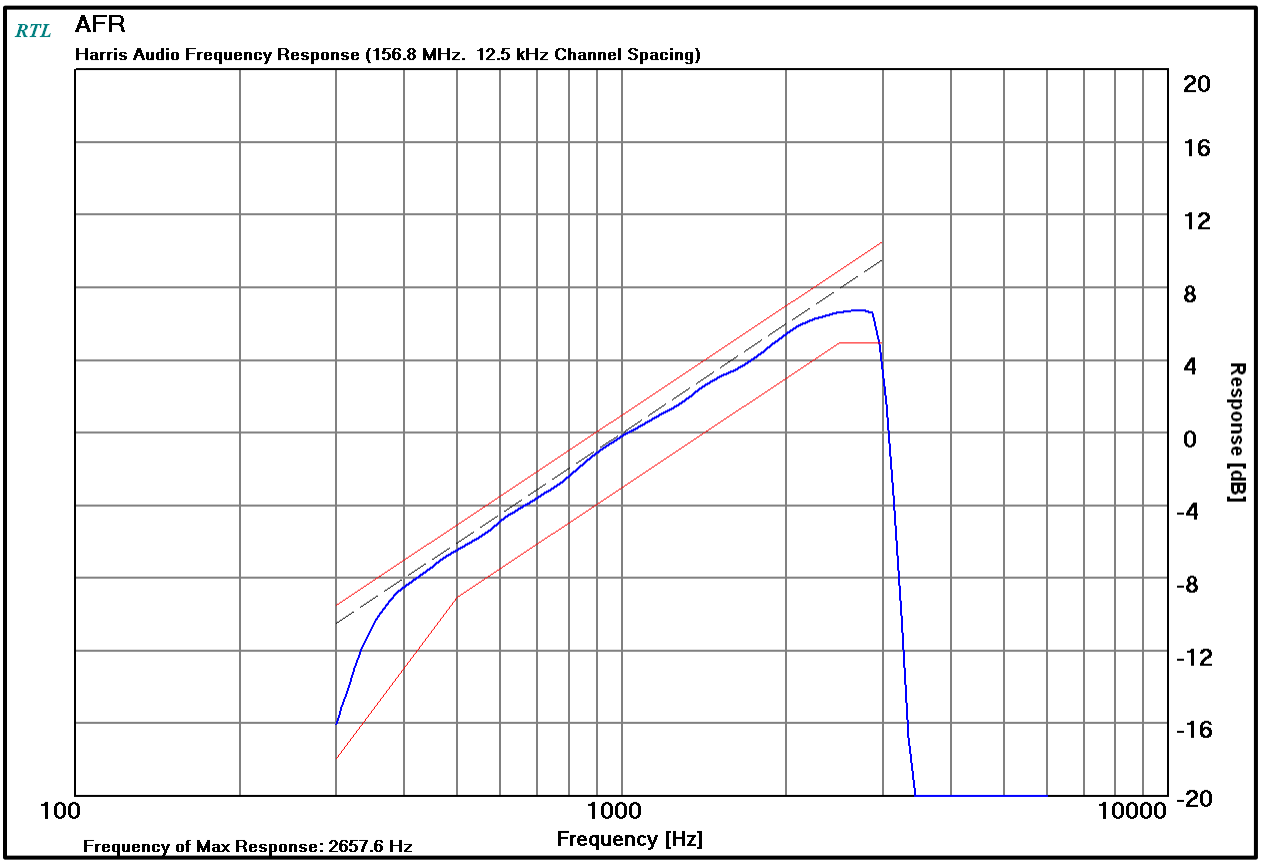
ANSI/TIA-603-C-2004 Section 2.2.3

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

7.2 Test Data

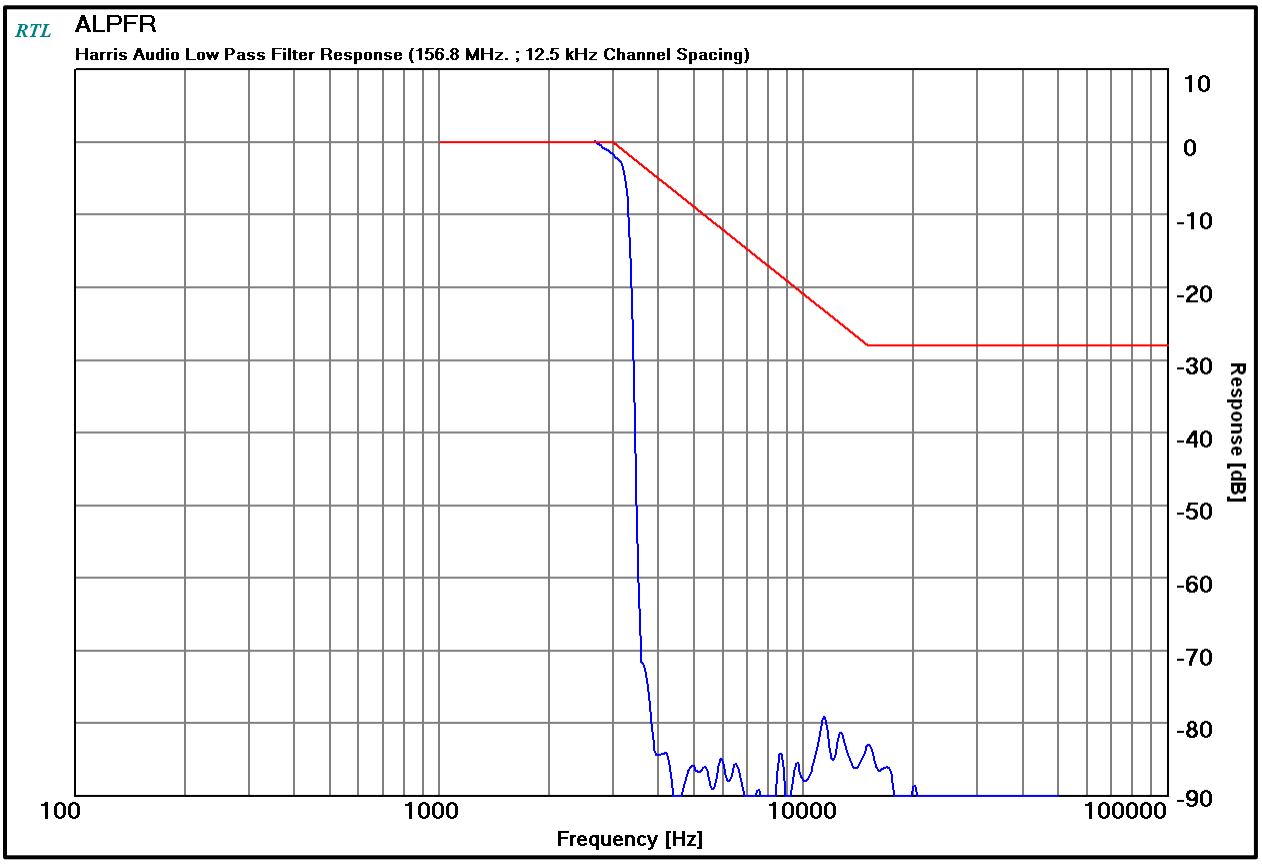
7.2.1 Audio Frequency Response

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



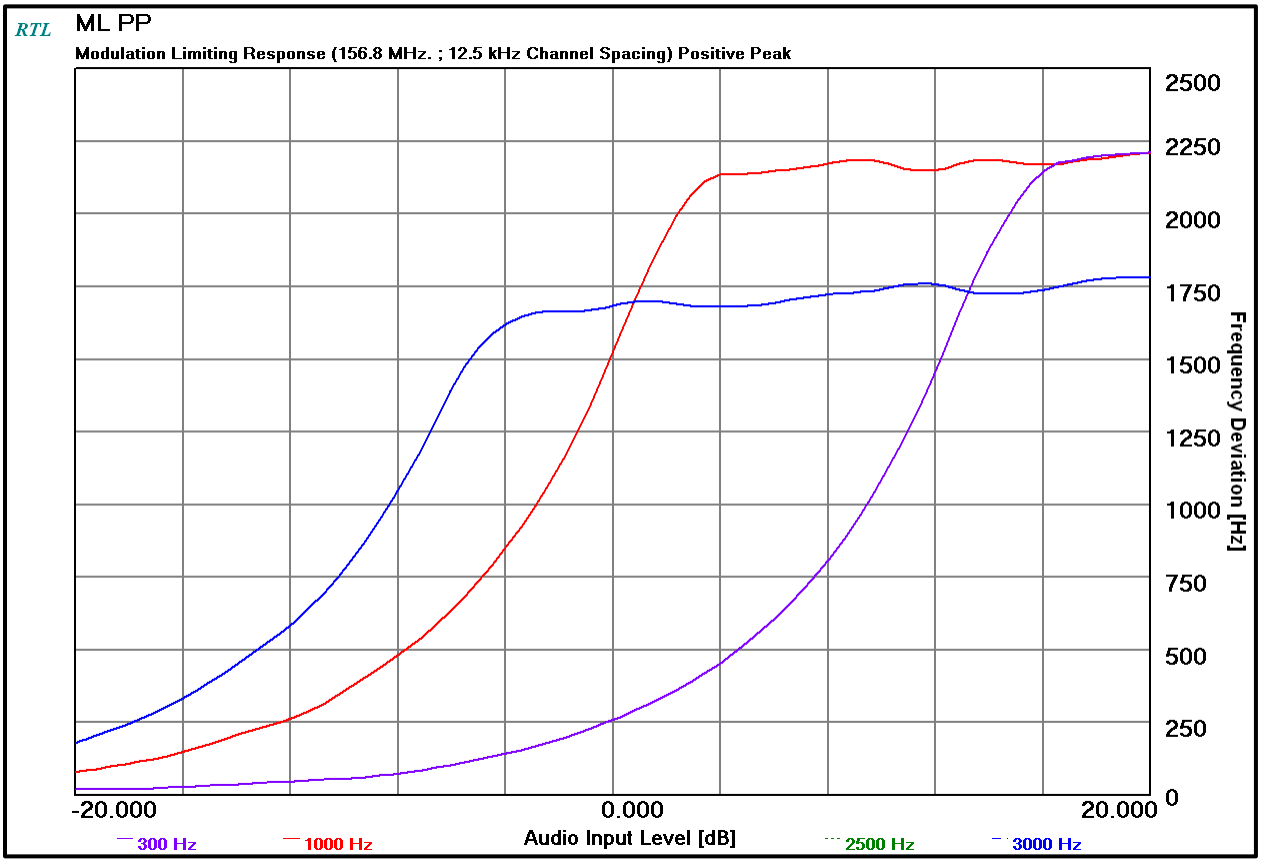
7.2.2 Audio Low Pass Filter Response

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; NB; Positive Peak



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

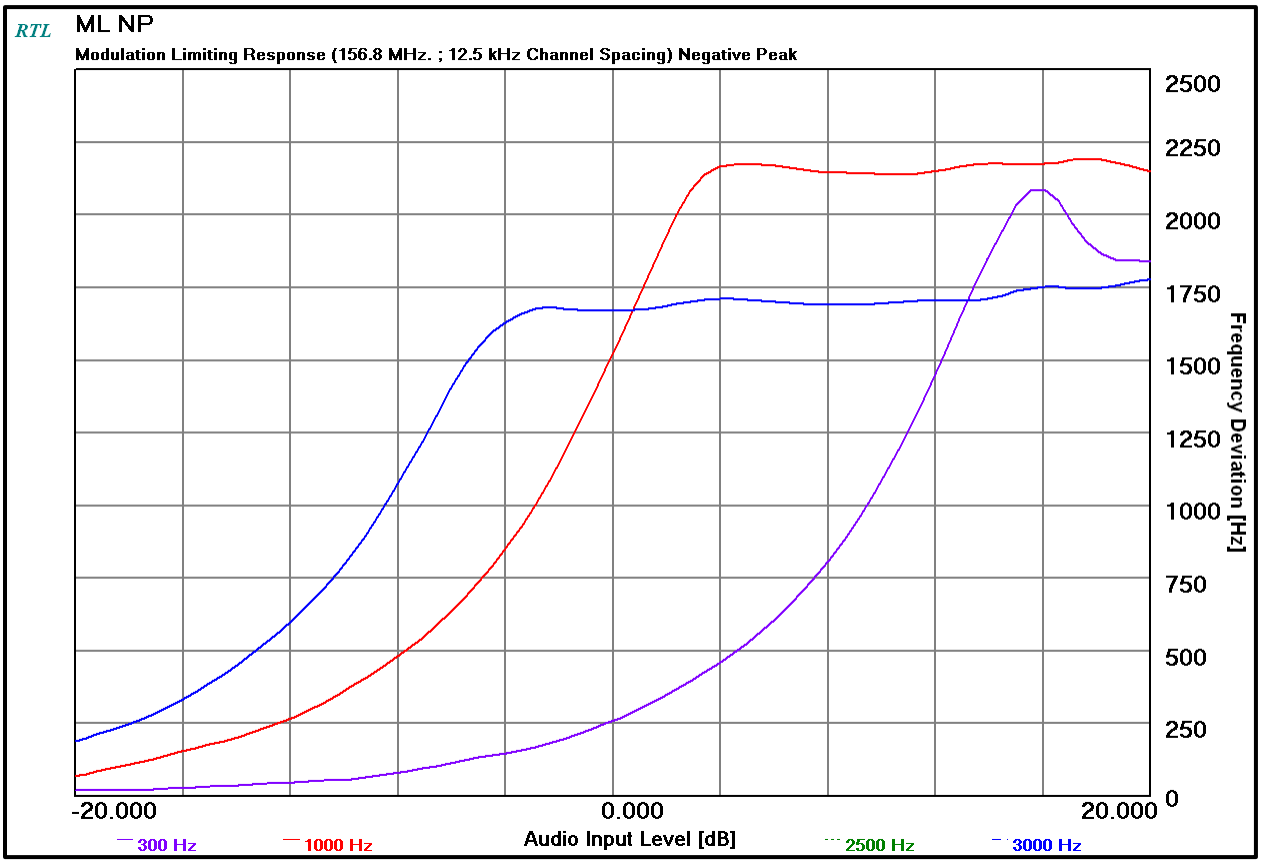


Table 7-1: Test Equipment Used for Testing Modulation Characteristics

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	4/17/15
901118	Hewlett Packard	HP8901B	Modulation Analyzer (150 kHz – 1300 MHz)	2406A00178	4/1/15
901054	Hewlett Packard	HP 3586B	Selective Level Meter	1928A01892	4/9/15
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	12/14/13

Test Personnel:

Daniel Baltzell		October 17, 2013
Test Engineer	Signature	Date of Tests

8 Conclusion

The data in this Class 2 report shows that the Harris Corporation Model M7300 VHF 110W; FCC ID: OWDTR-0056-E, complies with all the applicable requirements of FCC Parts 2 and 80.

Appendix A: Description of Change

Please refer to the separate document submitted with this application.

Appendix B: Agency Authorization Letter

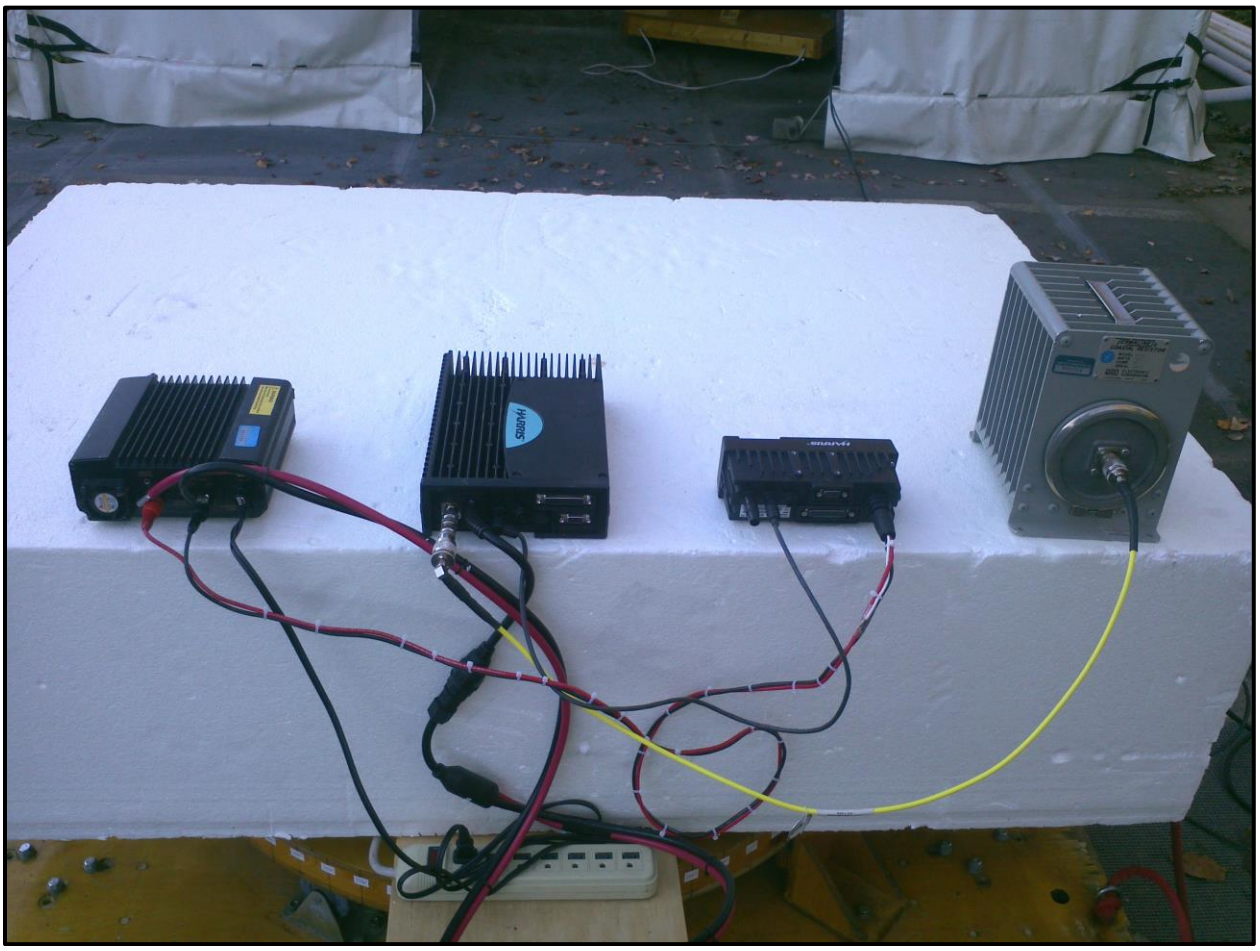
Please refer to the separate document submitted with this application.

Appendix C: Frequency Attestation Letter

Please refer to the separate document submitted with this application.

Appendix D: Test Configuration Photographs

Photograph 1: Radiated TX Spurious Emissions – Front View



Photograph 2: Radiated TX Spurious Emissions – Rear View