Amber Helm Development L.C.
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Sister Lakes, MI 49047

EMC Test Report

#1201582FX
Issued 05/11/12

Regarding the FCC Part 15, SubPart C testing

Vacuum Cleaner 3 Button Transmitter Switch

Model Number: LW1500RS, LW1500CRS, LW1000RF
FCC ID: NZFLW1500
Category: Manual 15.231b Intentional Radiator

Judgments: FCC Part 15 Part 15.231 – Compliant
Industry Canada RSS-210 Issue 7, ICES-003 and RSS-Gen - Compliant

NVLAP LAB CODE 200129-0

Prepared for:

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Test Date(s): 5/3/2012-5/6/2012

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Statements concerning this report

NVLAP Accreditation: NVLAP Lab Code 200129-0
The scope of AHD accreditation are the test methods of:

IEC/CISPR 22:	Limits and methods measurement of radio disturbance characteristics of information technology equipment.
FCC Method – 47 CFT Part 15:	Digital Devices.
AS/NZS 3548:	Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment.
IEC61000-4-2 and Amend.1:	Electrostatic Discharge Immunity
IEC61000-4-5:	Surge Immunity

Test Data:
This test report contains data included in the scope of NVLAP accreditation.

Subcontracted Testing:
This report does not contain data produced under subcontract.

Test Traceability:
The calibration of all measuring and test equipment and the measured data using this equipment are traceable to the National Institute for Standards and Technology (NIST).

Limitations on results:
The test results contained in this report relate only to the Item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require an evaluation to verify continued compliance.

Limitations on copying:
This report shall not be reproduced, except in full, without the written approval of AHD.

Limitations of the report:
This report shall not be used to claim product endorsement by NVLAP, FCC, or any agency of the US Government.

Statement of Test Results Uncertainty:
Following the guidelines of NAMAS publication NIS81 and NIST Technical Note 1297, the Measurement Uncertainty at a 95% confidence level is determined to be: +/-1.4 dB

Retention of Records:
For equipment verified to comply with FCC regulations, the manufacturer is obliged to retain this report with the product records for ten years following the manufacture of the equipment that was tested.

For equipment verified to comply with RSS-210, the manufacturer is obliged to retain this report with the product records for as long as the model is being marketed in Canada.

FCC Required user statements:
Applies to: [Class A or B Digital Devices or Peripheral].

For products satisfying the FCC Part 15 Class A or Class B requirements the following are to be satisfied:

1. The following statement is required to be labeled on the product or, if the device is too small, in the user's manual:

   This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

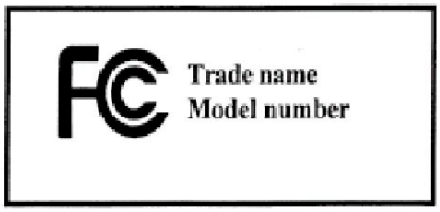
2. A statement is required to be placed in the User's Manual shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Additionally, for products satisfying the FCC Part 15 Class B requirements the following are to be satisfied:

1. The User's Manual shall include this or similar statement:

   NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
   - *i. Reorient or relocate the receiving antenna.*
   - *ii. Increase the separation between the equipment and receiver.*
   - *iii. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
   - *iv. Consult the dealer or an experienced radio/TV technician for help.*

2. For products certified using the Declaration of Conformity approach,
   a. The FCC conformity LOGO is to be placed on the Class B Digital Device.



   b. The FCC requires a Compliance Information statement (Declaration of Conformity) to accompany each product to the end user.

Industry Canada Required user statements:

Applies to: [Category II Equipment]

1. For products satisfying the ICES-003, RSS-Gen and RSS-210 Issue 7 requirements the following are to be satisfied:

   User manuals for license-exempt LPDs shall contain the following or equivalent statements in a conspicuous position:

   "Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

   If the antenna is detachable (i.e. selectable by the user), see the user manual requirement in Section 7.1.4. The following instructions in the user manual are also required:

   "To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that permitted for successful communication."

   The above statements may be placed on the device instead of the manual.

2. User Manual:

   User manual shall also contain text declaring compliance to the limits found in this Standard in both English and French.

3. Equipment Labels:

   Equipment subject to certification under the applicable RSS's, shall be permanently labeled on each item, or as an inseparable combination. The label must contain the following information for full compliance:

   (a) the certification number, prefixed by the term "IC:";
   (b) the manufacturer's name, trade name or brand name; and
   (c) a model name or number.

   Equipment for which a certificate has been issued is not considered certified if it is not properly labeled.

   The information on the Canadian label can be combined with the manufacturer's other labeling requirements.

   If the device size is too small to put a label, the label can be included in the user's manual, upon agreement with Industry Canada.

Summary of Results

1. The device model number LW1500RS was tested for compliance with FCC Regulations, Part 15, SubPart 231, and Industry Canada ICES-003, RSS-Gen, RSS-210 Issue 7 (Annex 1 for momentarily operated devices.) These tests were performed at AHD EMC Laboratory following the procedures outlined in ANSI C63.4.
2. The test results apply to models LW1500RS, LW1500CRS, and LW1000RF.
3. The test report is in support of FCC ID NZFLW1500 submission.
4. The device tested is compliant to the requirements of FCC Part 15 SubPart C for periodic transmission intentional radiators and Industry Canada RSS-210 Issue 7 Annex 1, ICES-003, RSS-Gen.
5. The equipment under test was received on 5/3/2012 and this test series commenced on 5/3/2012.
6. Because the EUT is battery operated, no conducted emissions testing was required.
7. Prescreen of the EUT revealed no detectable spurious radiated emissions.
8. The device meets the requirements of 15.231 section a.1 and IC RSS-210 A1.1.1.a for automatic transmit deactivation within 5 seconds after manual button release. The device releases the transmitter by design within 70 milliseconds after button release.
9. Measurements were taken using peak detector mode. Because all peak detected measurements were below the FCC / IC Average limits, the measurements were not adjusted for duty cycle.
10. The 15.231 fundamental signal limit is measured to be 77.39 dBuV/m using peak detection at a distance of 3 meters. The radiated fundamental transmit emission level nearest the limit occurred at 433.90 MHz, in a vertically polarized end orientation. The signal was measured to be 3.44 dB below the FCC calculated average limit.
11. The 15.231 spurious signal limit is calculated to be 35.2 dBuV/m using peak detection at a distance of 3 meters. The radiated second harmonic transmit emission level nearest the limit occurred at 868 MHz, in a horizontally polarized flat orientation. The signal was measured to be 26.7 dB below the FCC calculated average limit.
12. The 20 dB bandwidth limit is calculated to be 1.085 MHz per 15.231.c. The fundamental signal bandwidth was measured to be 0.520 MHz below the calculated limit.
13. The 99% bandwidth limit is calculated to be 1.085 MHz per RSS-210 A1.1.3. The fundamental signal bandwidth was measured to be 0.977 MHz below the calculated limit.
14. The fundamental signal was found to be 199.98 mW below the IC SAR limit of 200 mW. SAR measurement is not required for IC certification.
15. The fundamental signal was found to be 138.229 mW below the FCC KDB 447948-D01 recommended limit for evaluating SAR performance. SAR measurement is not required for FCC certification.

Changes Made to Achieve Compliance:

1. None

EUT Descriptions

Model: Three Button Transmitter Switch

Model numbers:

LW1500RS: Swivel and RF handle. This would be in a plain brown box for direct, homecare and specialty.
LW1500CRS: Swivel and RF handle. This would be in a 4-color litho box for specialty and independent.
LW1000RF: RF handle (NO SWIVEL) 4 color litho box.

Serial/ID No: 158

Description: Three Button Periodic Transmitter used to turn on and select the power level of a dirty air – upright vacuum cleaner. The unit is a self-standing, floor-supported, portable vacuum cleaner which has the floor nozzle directly connected to the cleaner and is designed for normal-duty cleaning of household dirt. In use, the cleaner is guided over the floor by means of a handle attached to the cleaner housing. The cleaner contains a driven agitator to assist in dirt removal on floor surfaces. The cleaner may have attachments or provisions, or both, for both floor and above-the-floor cleaning. Note that the transmitter only was activated for this test report, the vacuum cleaner unit was not operating.

Antenna: PCB Integrated

PCB Assembly: KS-01

Description:

The device is a periodic operation transmitter operating at 434 MHz. The transmitter operates as an FCC 15.231 / RSS-210.A1 compatible intentional transmitting device. The transmitter is battery operated and located in the handle of a floor vacuum cleaner appliance.

On/Off Button

When pressed, the button notifies the microprocessor which controls the RF transmitter to send a single burst transmission which carries a code that the On/off button has been pressed. The base receives this transmission and turns the unit on if the unit is off or turns the unit off if the unit is on.

If the button is held for approximately 10 seconds, the microcontroller controls the RF transmitter to send a burst transmission which carries a code to pair the handle and base. This pairing allows the handle and base to communicate. The handle has a unique serial number that is transmitted with each transmission that has to match the serial number saved in the base in order to accept the transmission as valid.

High Button

When pressed, the button notifies the microprocessor which controls the RF transmitter to send a single burst transmission which carries a code that the High button has been pressed. The base receives this transmission and sets the unit in high speed.

If the button is held, the microcontroller will retransmit continuously as long as the button is held the same high code transmit approximately every 250mS for up to 20 times. After 20 consecutive transmissions, the microcontroller will stop and return to a sleep state.

Low Button

When pressed, the button notifies the microprocessor which controls the RF transmitter to send a single burst transmission which carries a code that the Low button has been pressed. The base receives this transmission and sets the unit in low speed.

If the button is held, the microcontroller will retransmit continuously for as long as the button is held the same high code transmit approximately every 250mS for up to 20 times. After 20 consecutive transmissions, the microcontroller will stop and return to a sleep state.

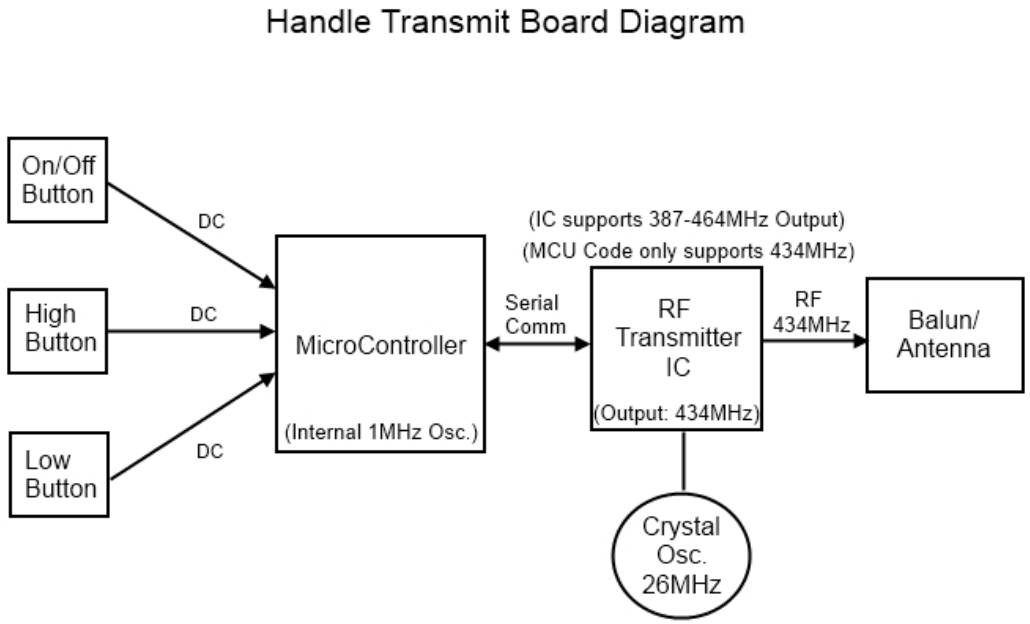
Specifications:

Input Power: CR2025/2032 3V Battery

Outputs Signals: 434 MHz Pulse Modulation

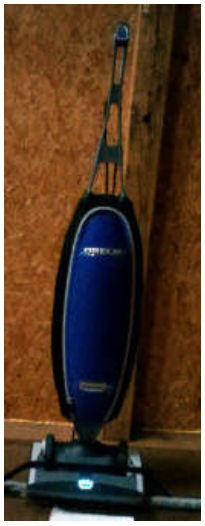
Input Signals: NA

EUT Block Diagram:

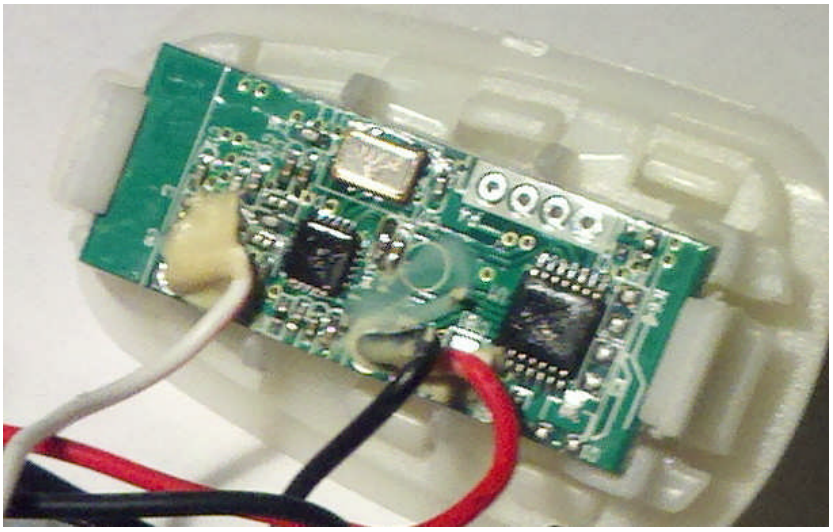


EUT Pictures

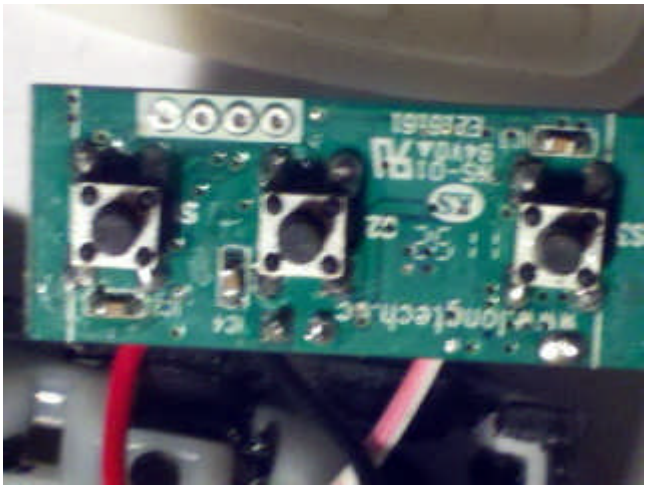
Exterior View



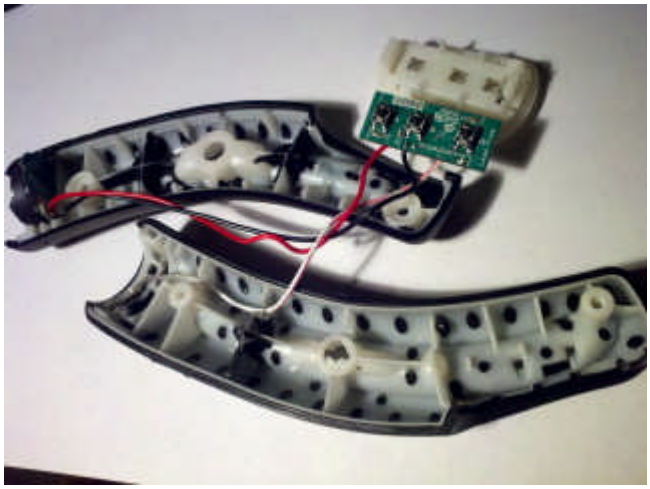
Interior PCB Top View



Interior PCB Bottom View



Handle Assembly View

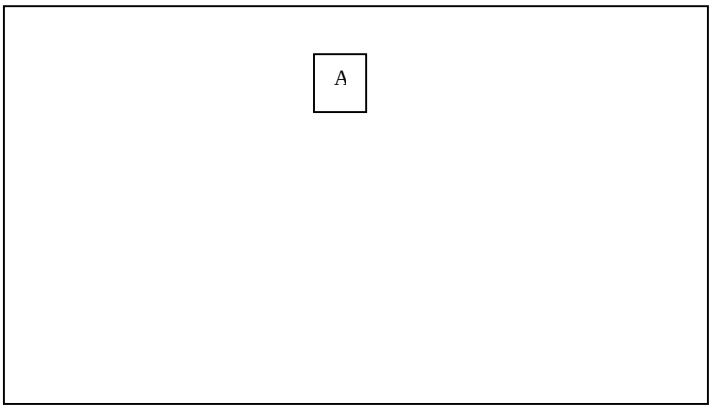


Equipment Test Setup:

Support Equipment & Cabling

Setup Diagram Legend	Description	Model	Serial No. / Part No.	EMC Consideration
A	Three Button Transmitter	LW1500RS	158	434 MHz Intermittent Transmitter

Block Diagram



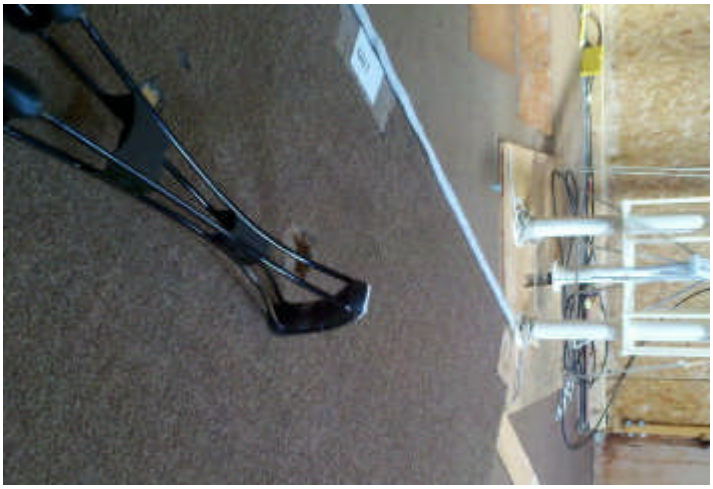
Setup Pictures

Radiated Prescreen Setup

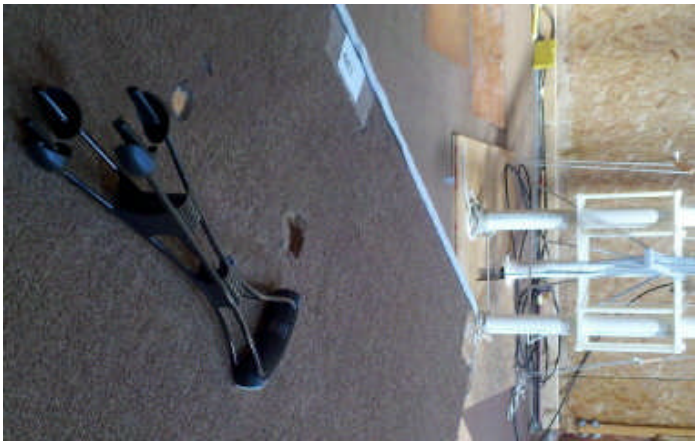
Radiated Setup Front View

Radiated Rear Setup

Transmit Setup End Orientation



Transmit Setup Flat Orientation



Transmit Setup Side Orientation

Measurement Report

Standards Applied to Test

ANSI C63.4 – 2003
CFR47 FCC Part 15, sub-part 231
AHD/SEI test procedures TP0101LC, TP0102RA

Equipment Configuration

For the testing, the placement of the EUT and the support equipment was selected to –

- Be a representation of a configuration typical of user installation, and
- Comply with the minimum system configuration of ANSI C63.4.

Test Methodology

Radiated:

Spurious radiated testing was performed at a 3 meter open field test site, and completed according to the procedures in FCC 15 and IC RSS 210 with supporting instructions from ANSI C63.4. Please reference Appendix A for further details on Test Methodology.

A scan of the EUT was made in a shielded room to study the emission profile of this EUT. This scan indicated no detectable spurious emissions from the unit.

The suspect signals recorded in the shielded room prescan for each module were then measured at the 3-meter open area test site.

The EUT was scanned for radiated energy up to 4.339 GHz to meet FCC 15.33 requirements.

Measurements were taken using peak detector mode. Because all measurement were found to be under FCC and IC Average limits, no duty cycle measurement adjustments were performed. Duty cycle measurements were made for informational purposes.

The EUT under test was placed per ANSI C63.4

All measurements were taken with the transmitter active; the vacuum cleaner unit was not activated.

The EUT was exercised as follows:

1. Device was powered via inserting batteries.
2. The device was programmed for continuous operation, simulating a button push
3. Evidence of operation was demonstrated through the presence of a transmit signal

The pictures, in the preceding pages, show the position of the equipment that produced the maximum signal levels.

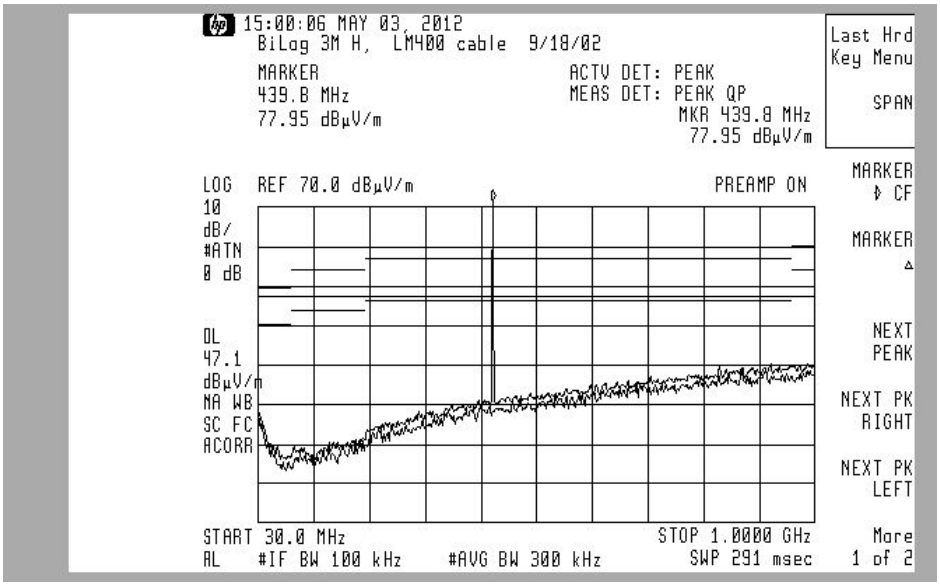
Variance from Test Procedure:

None

Test Data

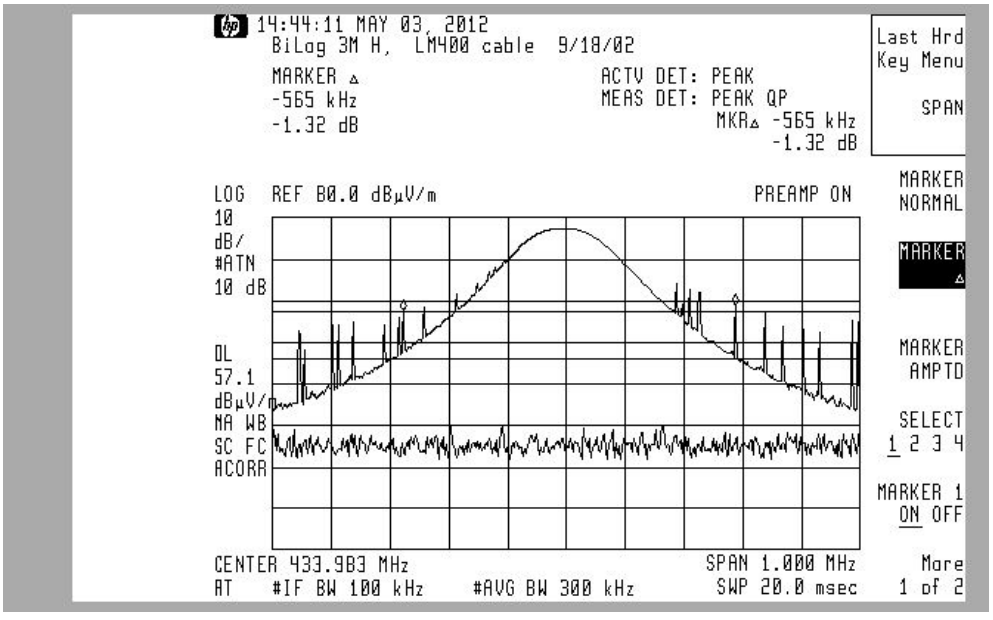
Radiated Spurious Emissions:

Screen Room Spurious Emissions Profile

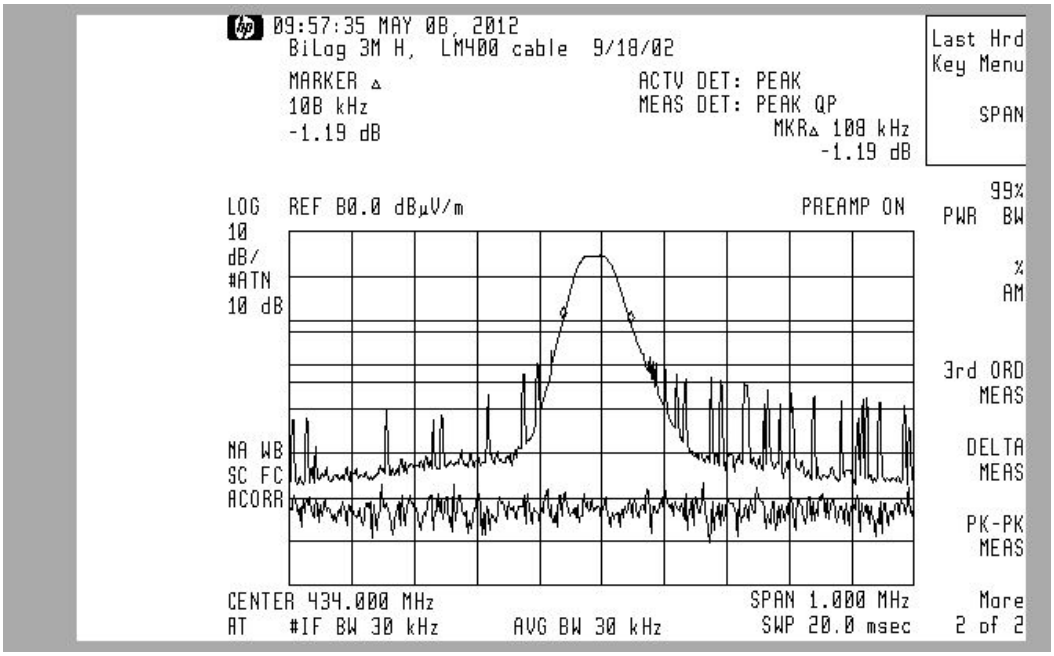


Radiated Transmit Emissions

FCC 20 dB Bandwidth Plot



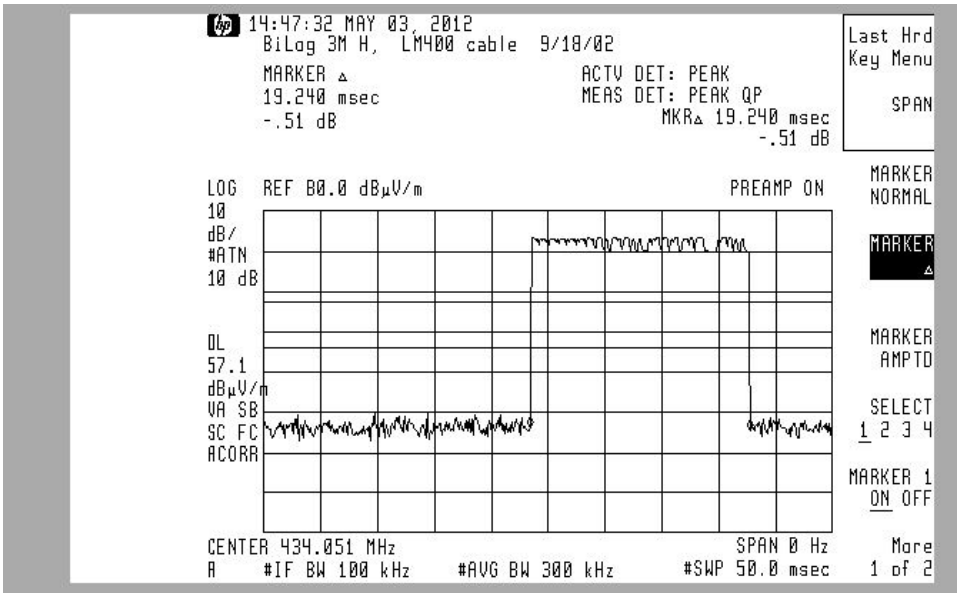
IC 99% Bandwidth Plot



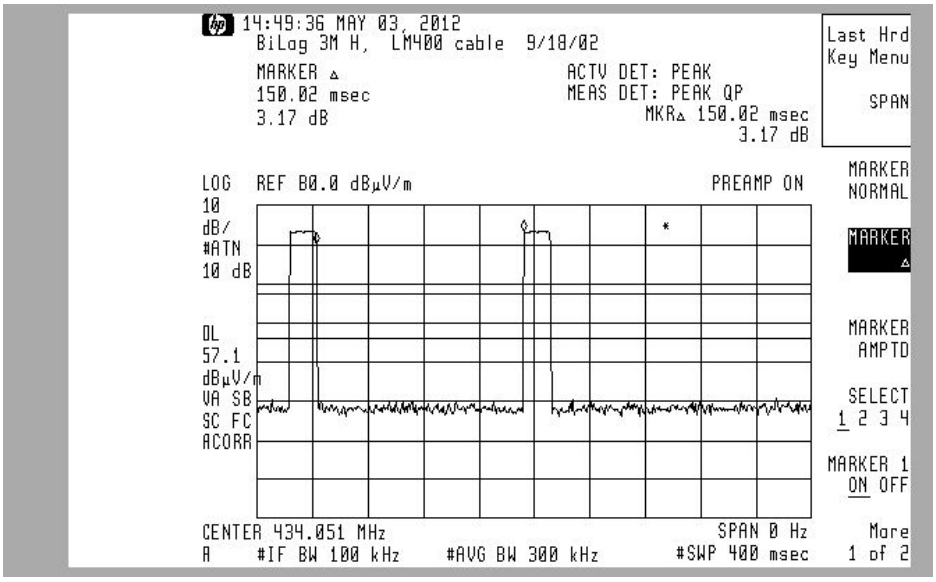
Radiated Transmit 15.231 Calculations

15.231 / RSS-210 Reference	15.231 / RSS 210 Spec	15.231 Limit Calculation	Units	Spec	Measurement	Pass / Margin
a.1 / A1.1.1a	automatic tx deactivation period		seconds	5 seconds	250 mS by design	pass
b / 2.2	Restricted bands		MHz	Nearest 399.9-410 MHz	434 MHz	pass
b.1 / 2.7 Table 4	fund limit	Linear Interpolation between 260 and 470 MHz from 3750 to 12500 uV/m @ 3M	uV/m	11000		
b.1 / 2.7 Table 4	fund limit	20log(spec uV/m)	dBuV/m	80.83	See data	
b.1 / 2.7 Table 4	spur limit	20log(1250uV/m) average	dBuV/m	61.94	See data	
15.231.cc	20 dB bw, 0.25% of frequency	0.25% of center frequency (434 MHz)	MHz	1.085	0.565	0.52
RSS-210 A1.1.3	99% dB bw, 0.25% of frequency	0.25% of center frequency (434 MHz)	MHz	1.085	0.108	0.977

Packet Length Plot



Packet Spacing Plot



Example of Peak to Average Measurement Comparison to Demonstrate Duty Cycle Effect

Frequency	Corrected Peak Measurement	Corrected Average Measurement	EUT orientation	Turntable Azimuth	Antenna Height	Peak to Average Delta
MHz	dBuV/m	dBuV/m				dBuV/m
433.92	**77.39**	**9.93**	**End-v**	**230**	**1**	**67.5**

Vertically Polarized Fundamental and Second Harmonic Tabulated Measurements

Frequency	Corrected Peak Measurement	EUT orientation	Turntable Azimuth	Antenna Height	Average FCC 15.231 limit	Average FCC 15.231 limit	Margin Class B
MHz	dBuV/m		deg	Mtr	uV/m	dBuV/m	dBuV/m
433.90	**62.50**	**flat**	**0**	**1.0**	**11000**	**80.8**	**18.33**
433.90	**63.50**	**side**	**350**	**1.0**	**11000**	**80.8**	**17.33**
433.90	**77.39***	**end**	**230**	**1.0**	**11000**	**80.8**	**3.44**
868.00	**34.00**	**flat**	**0**	**1.0**	**11000**	**61.9**	**27.90**
868.00	**30.30**	**side**	**350**	**1.0**	**11000**	**61.9**	**31.60**
868.00	**35.42**	**end**	**150**	**1.0**	**11000**	**61.9**	**26.48**

*** Note: This represents the peak fundamental measurement**

Horizontally Polarized Fundamental and Second Harmonic Tabulated Measurements

Frequency	Corrected Peak Measurement	EUT orientation	Turntable Azimuth	Antenna Height	Average FCC 15.231 limit	Average FCC 15.231 limit	Margin Class B
MHz	dBuV/m		deg	Mtr	uV/m		dBuV/m
433.92	**75.10**	**flat**	**260**	**1.8**	**11000**	**80.8**	**5.73**
433.92	**74.10**	**side**	**270**	**2.2**	**11000**	**80.8**	**6.73**
433.92	**57.00**	**end**	**190**	**1.0**	**11000**	**80.8**	**23.83**
868.00	**35.20**	**flat**	**80**	**2.3**	**11000**	**61.9**	**26.70**
868.00	**33.60**	**side**	**90**	**2.1**	**11000**	**61.9**	**28.30**
868.00	**27.70**	**end**	**0**	**1.0**	**11000**	**61.9**	**34.20**

Upper Harmonic Tabulated Measurements

Frequency	Peak Measurement	EUT Orientation	Polarization	Average FCC 15.231 limit	Average FCC 15.231 limit	Margin Class B
MHz	dBuV/m			uV/m	dBuV/m	dBuV/m
1301.00	**43.6**	**End**	**V**	**1250**	**54.0**	**10.40**
***1735.00**	**37.4**	**Flat**	**H**	**1250**	**60.8**	**23.40**
2168.00	**44.8**	**Flat**	**H**	**1250**	**60.8**	**16.00**
2603.00	**45.05**	**Flat**	**H**	**1250**	**60.8**	**15.75**
***3036.00**	**49.19**	**End**	**V**	**1250**	**60.8**	**11.61**
***3470.00**	**49.9**	**End**	**V**	**1250**	**60.8**	**10.90**
***3904.00**	**52.8**	**Flat**	**H**	**1250**	**54.0**	**1.20**
***4339.00**	**52.6**	**End**	**V**	**1250**	**54.0**	**1.40**

*** Note: This represents frequencies at which only ambient noise was observed**

IC SAR Calculations

Frequency	Corrected Peak Measurement	EUT orientation	V/m	EIRP	Turntable Azimuth	Antenna Height	IC SAR Limit	Margin
MHz	dBuV/m		V/m	mW	deg	Mtr	mW	mW
433.92	**77.39**	**v-end**	**0.01**	**0.02**	**230**	**1.0**	**200.0**	**199.98**

note: max EIRP mW calculated using P=1000(E*D)^2/30G, with G <= 1

FCC SAR Calculations

FCC Spec Reference	Spec Data	Units	Spec	Data	Margin
KDB 447948 D01	min SAR Evaluation Limit = 60/Freq (GHz)	mW	138.249	0.020	138.229
15.203	Fixed Antenna	NA	Antenna unchangeable by end user	Integrated PCB Antenna	
1.1310	Max Occupational Exposure (assuming distance of 2.5cm) using formula EIRP/(4*(pi)*(d^2))	mW/cm^2	5.000	0.000	5.000
1.1310	General Population Exposure (assuming distance of 2.5cm) using formula EIRP/(4*(pi)*(d^2))	mW/cm^2	1.000	0.000	1.000

Environment

The test was performed with the equipment under test, and measurement equipment inside the all-weather enclosure. Ambient temperature was 82 deg F, the relative humidity 50%.

APPENDIX A

Measurement Procedures

Line Conducted

The system was placed upon a 1 x 1.5 meter non-metallic table 80cm from the ground floor and 40cm from the vertical conducting plane in the prescribed setup per ANSI C63.4. This table is housed in a shielded enclosure to prevent the detection of unwanted ambients.

The EUT, or host unit if applicable, was connected to the LISN being monitored by the EMI Receiver. The remaining support devices requiring mains power were connected to a second LISN.

The EUT was continuously exercised by methods supplied by the manufacturer.

While monitoring the display of the EMI Receiver, via remote video monitor, the cables were manipulated to determine a position that maximized the emissions being observed. Once the highest amplitude relative to the limit was determined for the Phase current carrying line the procedure was repeated for the Neutral current carrying line.

The configuration that created an emission closest to the limit was used during the course of taking final measurements. Pictures of this final configuration are recorded in this report.

The principal settings of the EMI Receiver for line conducted testing include:

Bandwidth = 9KHz

Detector Function: scanning and signal search = Peak Detection Mode
measurements = Quasi Peak Detection and Average Detection

The cable losses of the coax used in line conducted testing are charted in this appendix.

Radiated

The system was placed upon a 1 x 1.5 meter non-metallic table 80cm from the open field site ground plane in the prescribed setup per ANSI C63.4, Figure 9(c).

The table sits upon a remote controlled turntable. The receiving antenna, located at the appropriate standards distance of 3 or 10 meters from the table center, is also remote controlled.

The EUT was continuously exercised by software supplied by the manufacturer.

Preliminary tests were done at the 3 meter open field test site. The final tests are done at the appropriate standards distance of 3 or 10 meters. The "Biconical/Log Periodic" broadband antenna connected to an EMI Receiver, meeting CISPR 16, is used throughout the testing.

During the preliminary scans and while monitoring the display of the EMI Receiver, the turntable was rotated 360 degrees and the receiving antenna height varied from 1 to 4 meters to search out the highest emissions. At the significant emissions, the cables were manipulated to determine a position that maximized the emissions being observed. Once the cable position was determined that presented the highest amplitude relative to the limit for Vertical polarized emissions the procedure was repeated for the Horizontal polarization.

The configuration that created an emission closest to the limit was used during the course of taking final measurements. Pictures of this final configuration are recorded in this report.
The principal settings of the EMI Receiver for radiated testing include:

Bandwidth:	120kHz
Detector Function:	scanning and signal search = Peak Mode
	measurements = Quasi Peak Mode.
Search Range:	30MHz to 1000MHz or to 2GHz as appropriate

The cable loss of the coax used in radiated scanning is charted in this appendix.
The antenna factors, for the test distance used, are charted in this appendix.

The resultant Field Strength (FS) is a summation in decibels (dB) of the Indicated Receiver Level (RF), the Antenna Correction Factor (AF), and the Cable Loss Factor (CF). If a PreAmplifier (PA) is used, its gain (dB) is subtracted from the above sum.

Formula 1: FS(dBuV/m) = RF(dBuV) + AF(dB/m) +CF(dB) - PA(dB)
To convert the Field Strength dBuV/m term to uV/m, the dBuV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in uV/m terms.

Formula 2: FS(uV/m) = AntiLog[(FS(dBuV/m))/20]

Measurement Facilities & Equipment

Test Site

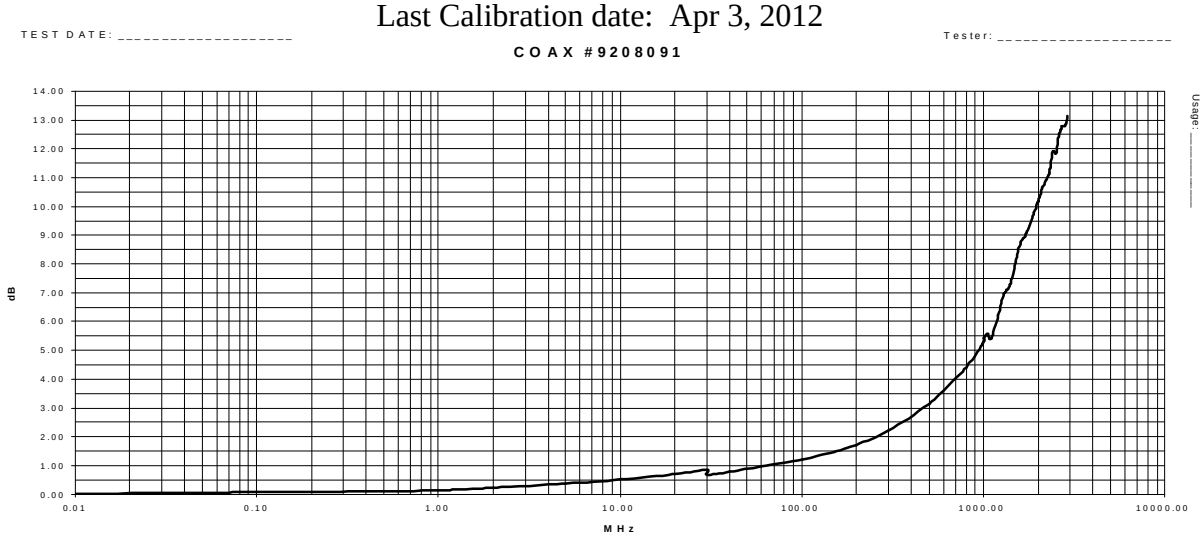
The AHD test facility is centered on 9 acres of rural property near Sister Lakes, Michigan. The mailing address is 92723 Michigan Hwy152, Sister Lakes, 49047. This test facility is NVLAP accredited (LabCode 200129-0). It has been fully described in a report filed with the FCC (No.90413) and Industry Canada (file:IC3161).

Measurement Equipment Used

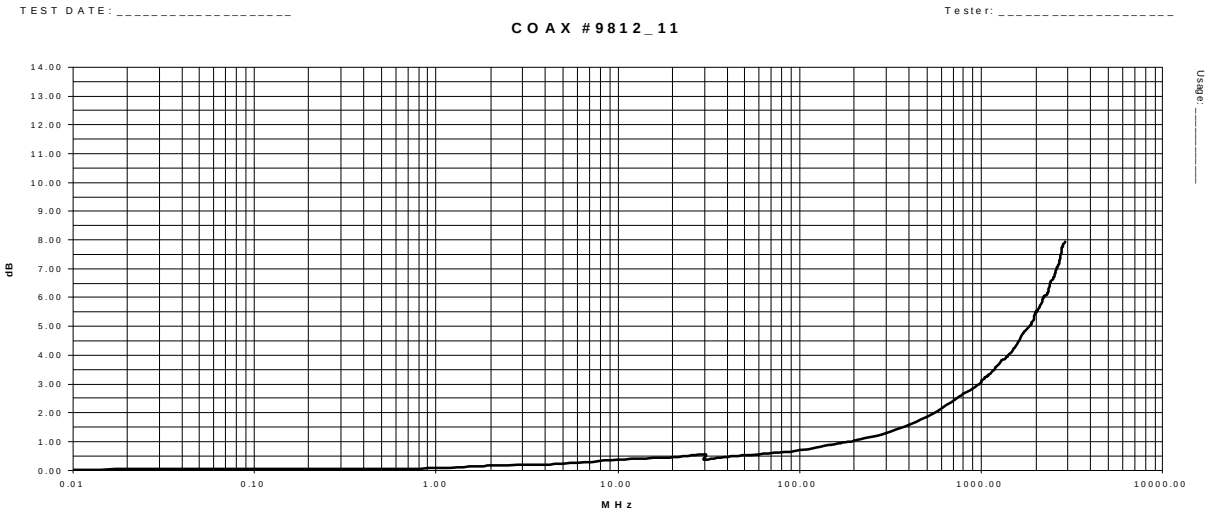
Equipment	Model	S/N	Last Cal Date	Calibration Interval
HP EMI Receiver system	HP 8546A			
RF Filter Section	HP-85460A	3448A00283	30 Aug-11	12 months
RF Receiver Section	HP-85462A	3625A00342	30 Aug-11	12 months
EMCO BiconiLog Antenna	3142	1069	23-Aug-11	12 months
EMCO Double Ridged Horn	3115	7770	20-Sept-11	12 months
Solar LISN	8012-50-R-24-BNC	962137	29-Aug-11	12 months
Solar LISN	8012-50-R-24-BNC	962138	29-July-11	12 months
(LCI) Double shielded 50ohm Coax	RG58/U	920809	3 April-12	12 months
(3-m) LMR-400 Ultra Flex	LMR400	C090804	5- Nov -11	6 months
(3-m) CS-3227 RG8	CS-3227	C060914	5- Nov -11	6 months
(10-m) Amelco 50ohm Coax	RG213U	9903-10ab	5- Nov -11	6 months
Keytek Surge	711B	8511854	22-Oct-11	12 months
Schaffner EFT	NSG600/641	0113	12-Jan-12	12 months
Schaffner ESD	NSG432	01027	22-Nov-11	12 months
Compliance Design Biconical Antenna	B100	016460	29-June-11	36 months
Compliance Design Biconical Antenna	B200	A10102	29-June-11	36 months
Compliance Design Biconical Antenna	B300	A10103	29-June-11	36 months

Cable Loss

Line Conducted 150KHz through 30MHz, Coax #920809
Last Calibration date: Apr 3, 2012

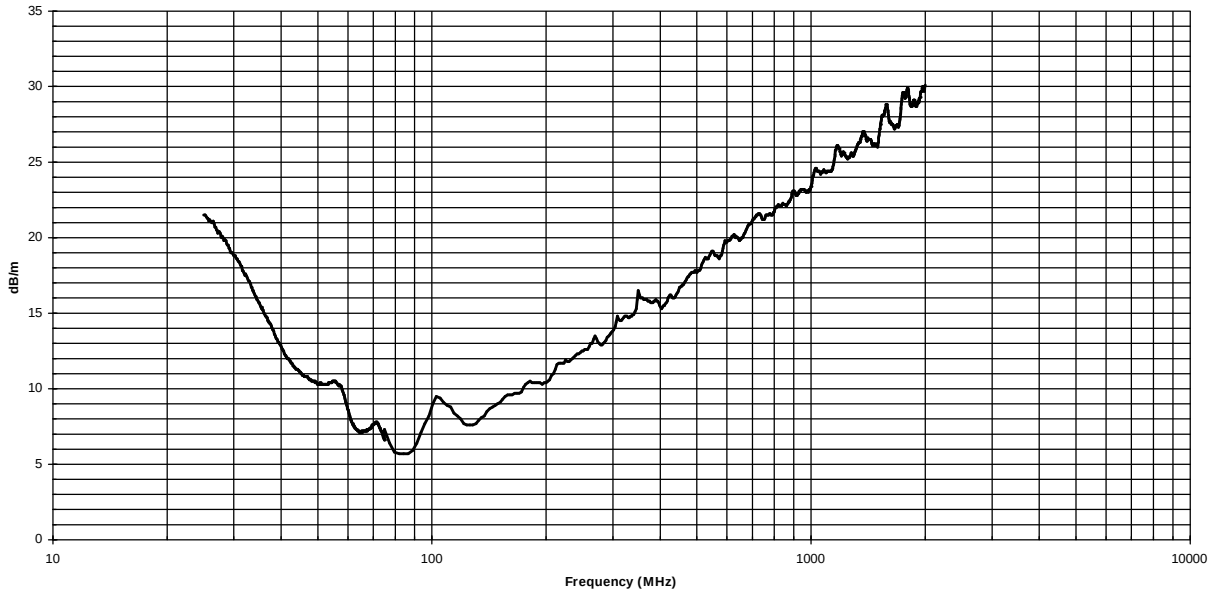


Radiated at 3 meters; 30MHz through 3000MHz, Coax #C090804
Last Calibration date: 5- Nov -11

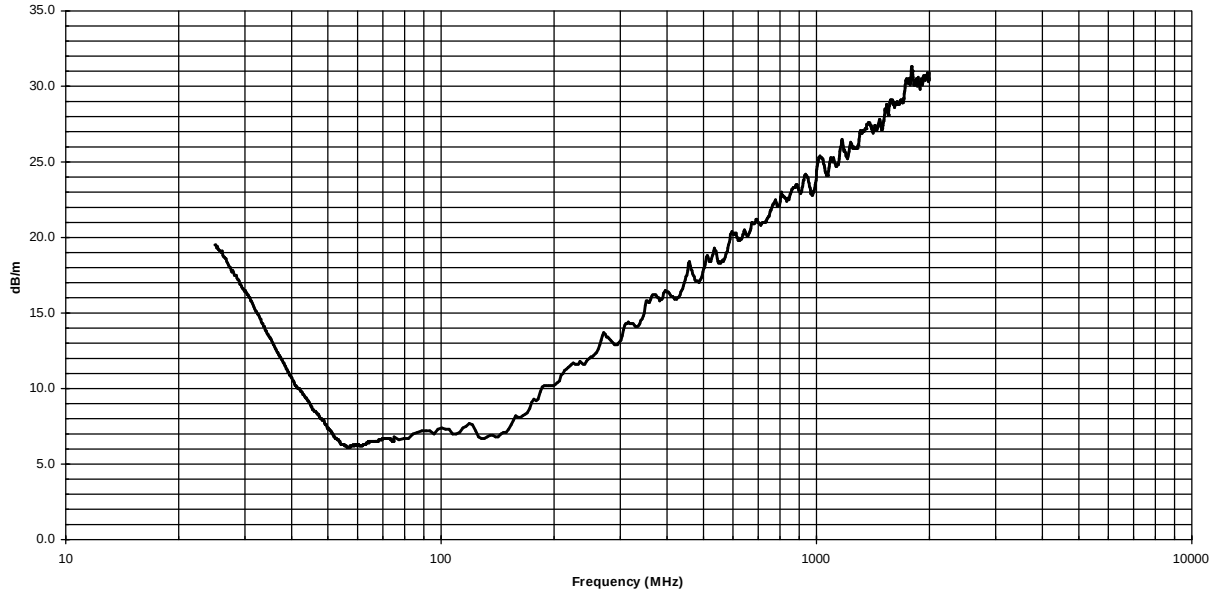


Antenna Factors

EMCO Model 3142 Antenna #1069
Last Calibration Date; 23-Aug-11
3 Meter Distance Factors



10 Meter Distance Factors



AHD Accreditation

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200129-0

AHD (Amber Helm Development, L.C.)

Dowagiac, MI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2011-07-01 through 2012-06-30

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

November 30, 2011

Registration Number: 90413

AHD EMC Laboratory
92723 M-152,
Dowagiac, MI 49047

Attention: Gordon Helm, President

Re: Measurement facility located at Sister Lakes
3 & 10 meter site
Date of Renewal: November 30, 2011

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Phyllis Parrish
Industry Analyst

NARTE Seal