

Amber Helm Development L.C.

92723 Michigan Hwy-152
Sister Lakes, MI 49047

EMC Test Report

#1301729FXA

Issued 08/03/13

Regarding the FCC Part 15.225 testing



RFID Transceiver Model DP180

FCC ID: RIN-ADP180B

Category: 15.225 RFID Device

Judgments: FCC Part 15.225 / Class B Compliant*

*** when operated according to manufacturer instructions**



NVLAP LAB CODE 200129-0

Prepared for:

*Rick Raber
Northern Apex Corp
14220 Plank St.
Fort Wayne, Ind. 46818*

Test Date(s):

6/25/2013-7/13/2013

Report prepared by:



David J. Miller, NCE

Report reviewed by



Gordon L. Helm, NCE

Data recorded by:



Gordon L. Helm, NCE
Test Engineer, AHD

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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:**FCC Part 18 ISM Devices:**

1. For all industrial, scientific, medical (ISM) devices, the instruction manual or, if no instruction manual is provided, the product packaging, must provide information that addresses the following: (1) interference potential of the device, (2) maintenance of the system and (3) simple measures that can be taken to correct interference. RF lighting devices must add a statement similar to the following: "This product may cause interference to radio equipment and should not be installed near maritime safety communications equipment, ships at sea or other critical navigation or communications equipment operating between 0.45-30 MHz." (Section 18.213)

In addition, Part 18 devices that are authorized under the DoC procedure shall also include in the instruction manual, on a separate sheet, or on the packaging the following: (1) identification of the product (e.g. name and model number), (2) a statement similar to "This device complies with Part 18 of the FCC Rules" (Section 18.212), and (3) the name and address of the responsible party (Section 2.909).

2. For products certified using the Declaration of Conformity approach, this FCC conformity LOGO is to be placed on the ISM Device.

**FCC Part 15 Class A or B Digital Devices or Peripherals:**

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.

For an FCC Part 15 Class A digital device or peripheral, the user instructions shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

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 6 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 Northern Apex DP180 device was tested for compliance with FCC Regulations, Part 15.225.
2. The equipment under test was received on 6/25/13 and this test series commenced on 6/25/13.
3. This device uses a PCB loop antenna which has gain less than 3dB at the transmit frequency.
4. This is a battery operated device which will not operate while connected to a charging unit that is connected to a mains power source. However, it can operate if connected to a charging unit that is disconnected from the mains power source. The manufacturer provides written instructions in their manual and on a device label warning against operating with the device connected to the charging unit.
5. In 120VAC 60Hz disabled "charging" mode, the worst case conducted emission level occurred at 160 KHz. The signal was measured to be 13.69 dB below the class B / C Quasi-Peak limit and 40.17 dB below the Average limit when measuring neutral to ground.
6. Above 30 MHz, when operating as the manufacturer instructs, the worst case spurious radiated emission level nearest the limit occurred at 40.6 MHz vertically polarized. This signal was measured to be 7.94 dB below class B/C Quasipeak limit.
7. Above 30 MHz, when operated contrary to manufacturer instructions with the charger attached but not connected to a mains power source, the worst case spurious radiated emission level nearest the limit occurred at 40.6 MHz vertically polarized. This signal was measured to be 6.16 dB above class B/C the Quasipeak limit.
8. Below 30 MHz, the worst case spurious radiated emission level nearest the limit occurred at 1.69 MHz. This signal was measured to be 13.29 dB below the 15.209 peak limit.
9. The 13.56 MHz Peak intentionally radiated emission level was measured to be 15781 uV/m below the 15.225 limit of 15848 uV/m at 30 meters when corrected for distance.
10. The worst case measurable 15.225 bandwidth template parameter was measured at 13.553 Mhz to be 311.05 uV/M below the 15.225 limit of 334 uV/M at 30 meters when corrected for distance.
11. The worst case frequency drift due to temperature was measured to be 1100 Hz, which is 255.98 Hz within the margin of allowable drift.
12. The worst case frequency drift due to voltage was measured to be 890 Hz, which is 465.9 Hz within the margin of allowable drift.

Changes Made to Achieve Compliance:

Intermark 212-629-3620 Bead on Line Cord near product AC connection.

EUT Descriptions

Model: RFID Transceiver

Model number: DP180

Serial/ID No: 0513398

Description: 13.56 MHz RFID transceiver

Antenna: Internal loop PCB antenna with gain less than 3dB at transmit frequency.

Specifications:

Input Power:

Internal battery pack. NIMH 7.2V Digikey PN P220-F061-ND

External charger – XiCon P/N 112084

(Note that unit will not function when charger is plugged into AC.)

Outputs Signals: 15.225 13.56 MHz RFID device

Input Signals: NA

PCB's:

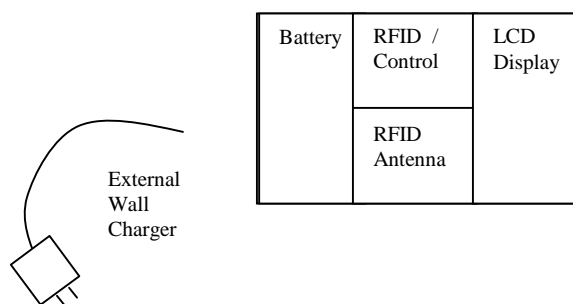
Antenna – v1r1ant1356_REPUSA

Control Board

S002 RFID Board

LCD Display – Lumex PN LCM-S01601DSF

EUT Block Diagram:



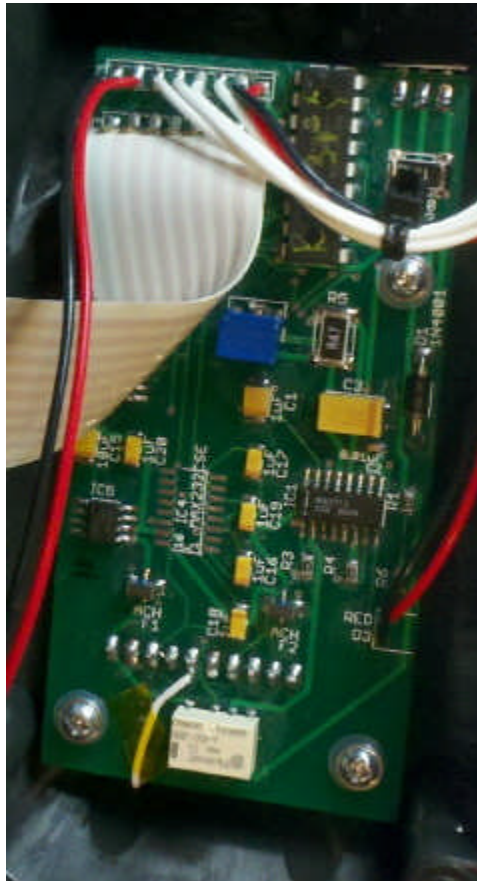
EUT Pictures

• Exterior Overall View	Page 9
• RFID Control PCB Top	Page 10
• RFID Control OCB Bottom	Page 10
• S002 Transmit PCB Top	Page 11
• S002 Transmit PCB Bottom	Page 11
• RFID Antenna PCB Top	Page 12
• RFID Antenna PCB Bottom	Page 12
• LCD PCB Top	Page 13
• LCD PCB Bottom	Page 13
• Internal Battery Pack View	Page 14
• Charger Bead View	Page 14

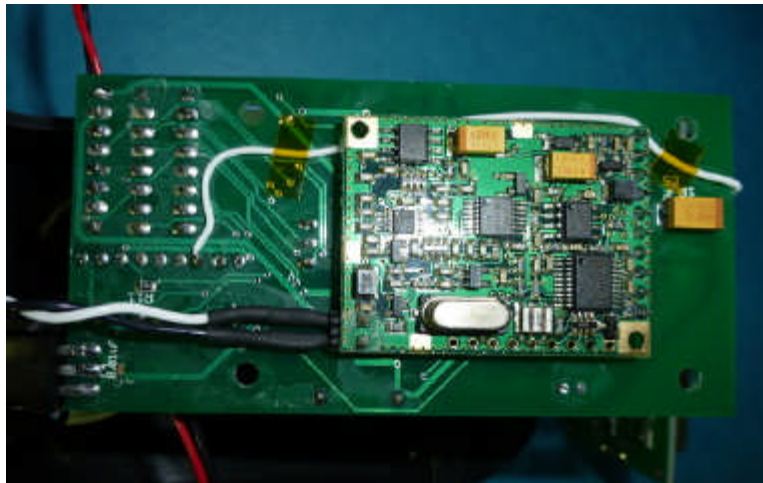
Exterior View



Internal RFID Control PCB Top



Internal RFID Transmit PCB Bottom



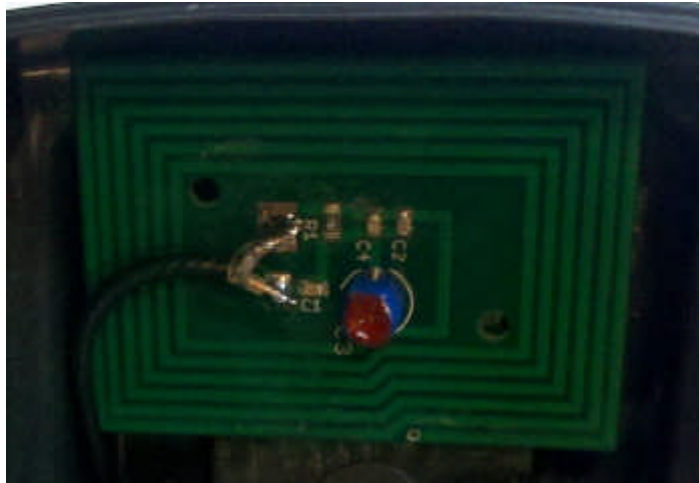
S002 PCB Top



S002 PCB Bottom



RFID Antenna PCB Top



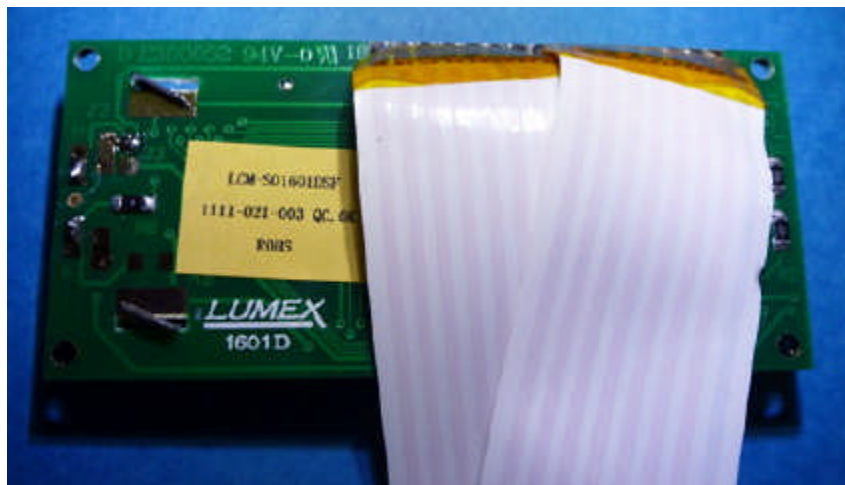
RFID Antenna PCB Bottom



LCD PCB Top



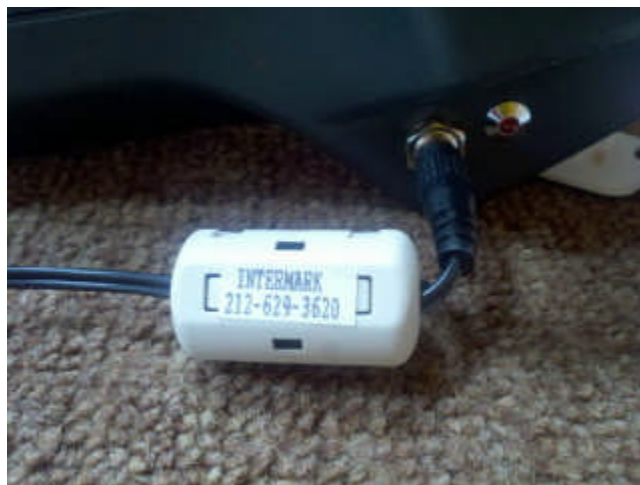
LCD PCB Bottom



Internal Battery Pack

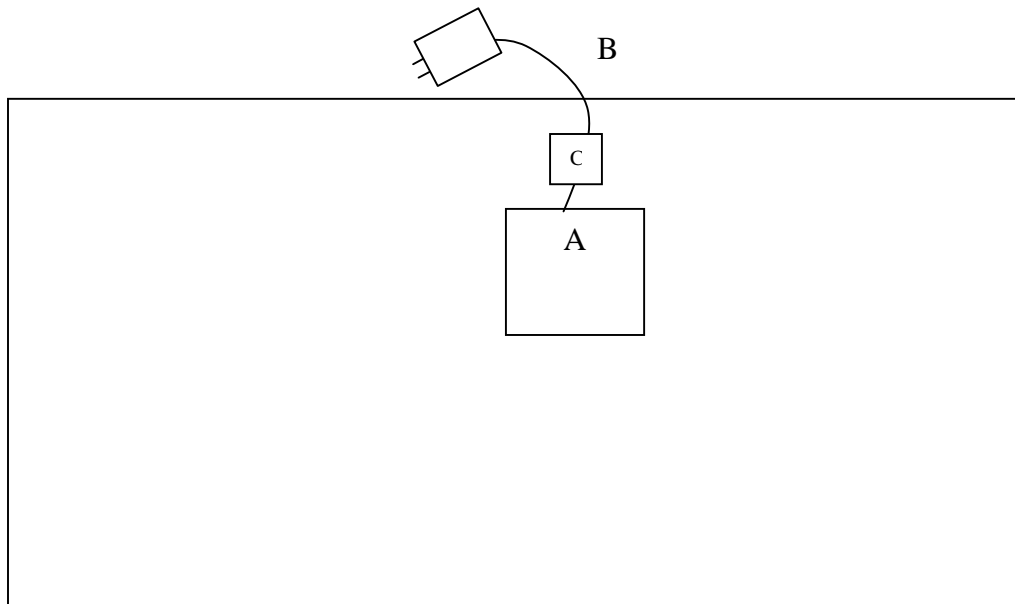


Charger Bead



Equipment Test Setup:**Support Equipment & Cabling**

Setup Diagram Legend	Description	Model	Serial No. / Part No.	EMC Consideration
A	RFID Unit	DP180	0513398	13.56 MHz RFID
B	Wall Charger Unit	XiCon	112084	7.2V
C	Bead	Intermark	212-629-3620	Ferrite Bead

Block Diagram

Setup Pictures

- Radiated Prescreen Setup Page 16
- Conducted Setup Front View Page 17
- Conducted Setup Rear View Page 17
- Radiated Setup Front View Page 18
- Radiated Setup Rear View Page 18
- Low Frequency Loop Antenna Setup Page 19
- Hot / Cold Chamber Test Page 19

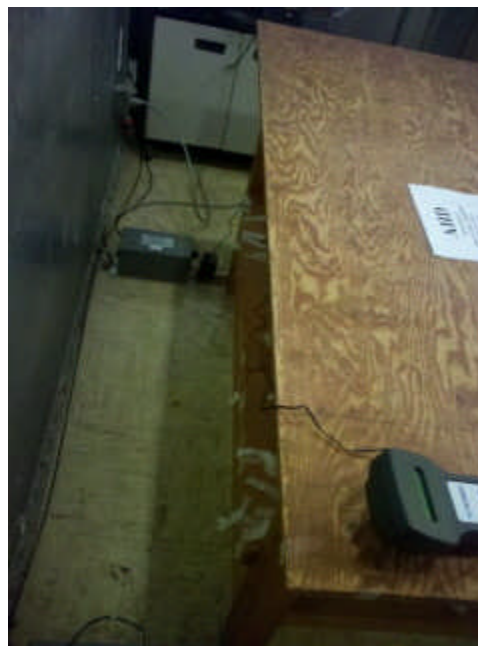
Radiated Prescreen Setup



Conducted Setup Front View



Conducted Setup Rear View



Radiated Setup Front View



Radiated Setup Rear View



Low Frequency Radiated Loop Antenna View



RFID Hot / Cold Chamber Test



Measurement Report

Standards Applied to Test

ANSI C63.4 – Radio Noise Emissions 2003.12
CFR47 FCC Part 15, SubParts B and C, Class B/C limits
AHD/SEI test procedures TP0101LC, TP0102RA
EN55022 ITE Disturbance 2005.11
EN61000-6-3 Generic 2007.2

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

Line Conducted:

Line Conducted test procedures are described in Appendix A.

Line Conducted Testing was performed with charger plugged into unit and AC mains. Unit is not functional when charging batteries.

Radiated:

Spurious radiated testing was performed at a 3 meter open field test site, and completed according to the procedures in FCC 15, SubPart B 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 low level spurious emissions from the unit.

The suspect signals recorded in the shielded room prescan for each module were then measured at distances of 3-meter and 10 meter at the open area test site.

Measurements were scaled for distance using a scaling factor of 40 dB per decade for frequencies under 30 MHz per 15.31.f.2.

RFID transmit data was measured using calibrated loop antenna.

The EUT was scanned for radiated energy up to 1000 MHz to meet FCC part 15 requirements.

The EUT under test was placed per ANSI C63.4

AC Charger was plugged into unit but disconnected from AC mains to demonstrate possible worst case operational configuration.

The EUT was exercised as follows:

1. Device was powered via power switch.
2. A unique RFID tag was placed near unit
3. Evidence of device operation was LCD display of tag data

The device was measured at the fundamental frequency of 13.56 MHz.

Spurious emissions were measured below and above 30 MHz.

The cables were manipulated to produce the highest signal level relative to the limit.

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

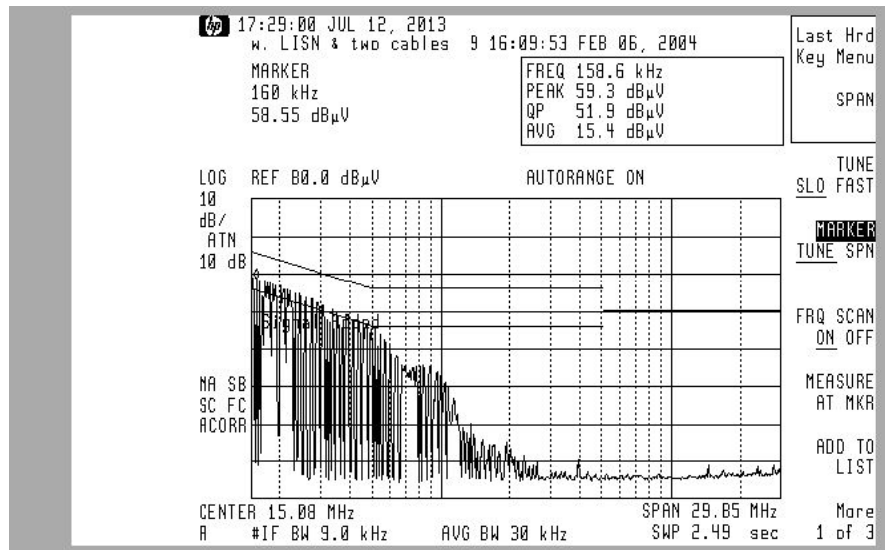
Variance from Test Procedure:

None

Test Data

Line Conducted:

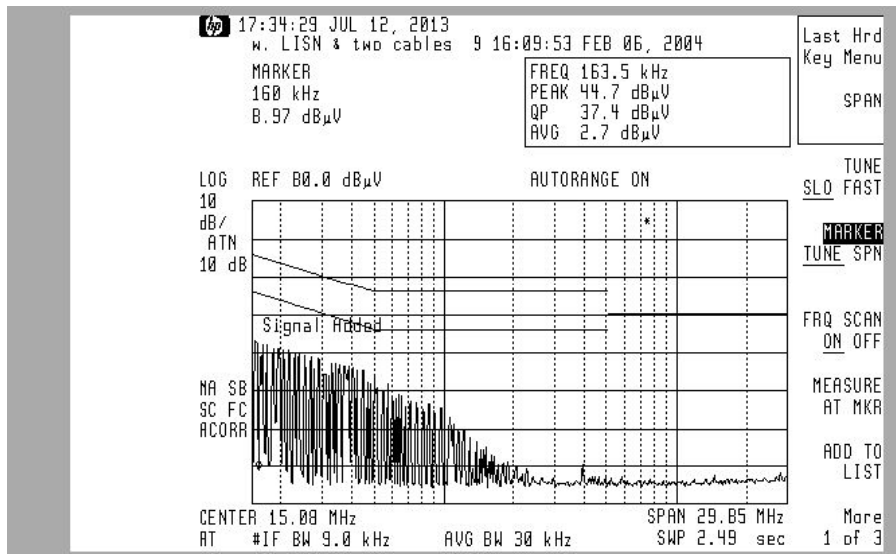
Class B/C NEUTRAL to Ground Measurement. Plot of Peak Values



Class B/C NEUTRAL to Ground Conducted Tabulated Measurements

Frequency MHz	dBuV Reading QP Avg		FCC Class B/C dBuV Limit		dB Margin QP Avg	
			QP	Avg		
0.16	51.85	15.37	65.54	55.54	13.69	40.17
0.21	48.00	12.00	63.21	53.21	15.21	41.21
0.31	45.37	10.03	59.84	49.84	14.47	39.81
0.40	43.27	-59.99	57.76	47.76	14.49	107.75
0.49	23.85	-6.55	56.24	46.24	32.39	52.79
0.56	22.08	-5.75	56.00	46.00	33.92	51.75

Class B/C PHASE to Ground Measurement. Plot of Peak Values



Class B/C PHASE to Ground Conducted Tabulated Measurements

Frequency	dBuV Reading		FCC Class B/C		dB Margin	
			dBuV Limit			
MHz	QP	Avg	QP	Avg	QP	Avg
0.16	37.38	2.67	65.29	55.29	27.91	52.62
0.21	34.98	1.09	63.04	53.04	28.06	51.95
0.32	31.32	-2.36	59.58	49.58	28.26	51.94
0.43	29.62	-3.73	57.28	47.28	27.66	51.01
0.52	27.75	-4.68	56.00	46.00	28.25	50.68
0.60	24.42	-5.87	56.00	46.00	31.58	51.87

Radiated Spurious Emissions**Vertical Polarization Tabulated 10 Meter Spurious Measurements**

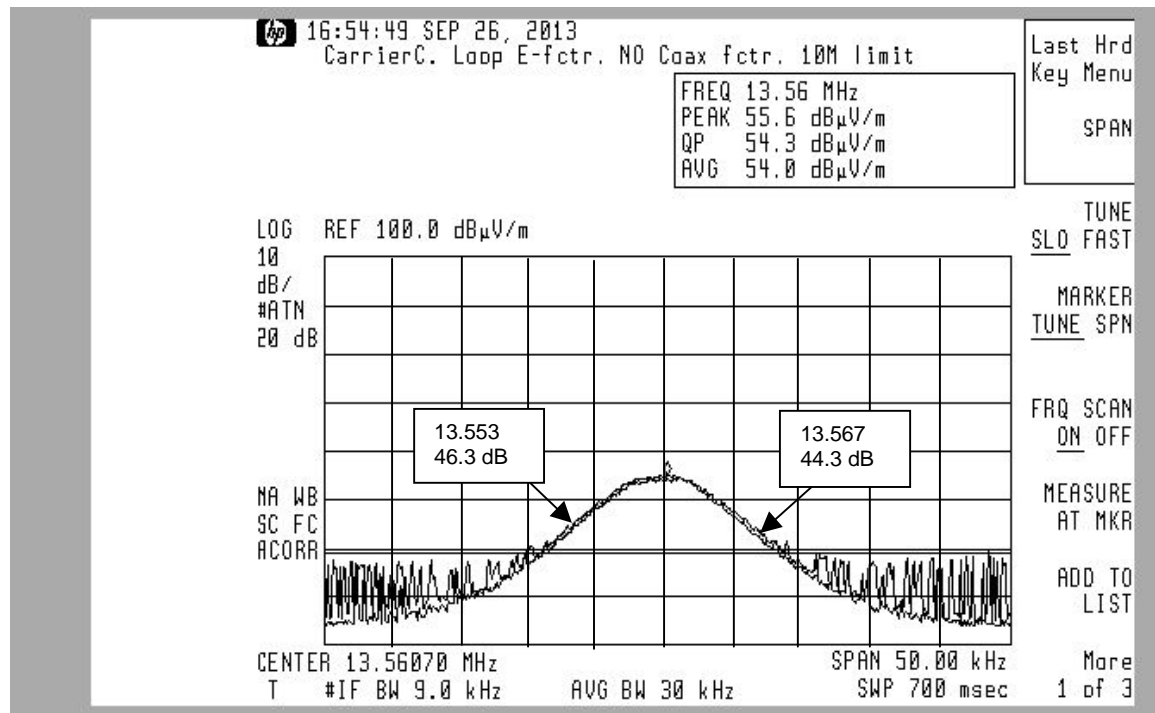
Frequency	10M Corrected Quasipeak Measurement	Distance Correction	Corrected Measurement	Turntable Azimuth	Antenna Height	FCC 3M Class B/C Limit	Margin Class B/C
MHz	dBuV/m	dB	dBuV/m	deg	Mtr	dBuV/m	dBuV/m
40.60	21.60	10.46	32.06	110	1.0	40.00	7.94
217.00	26.70	10.46	37.16	0	1.0	46.00	8.84
40.60	35.70	10.46	46.16	110	1.0	40.00	-6.16

*note: This measurement was taken with device operating in a manner contrary to manufacturer instructions with the charger attached but not connected to a mains power source

Horizontally Polarized Tabulated 10 Meter Spurious Measurements

Frequency	10M Corrected Quasipeak Measurement	Distance Correction	Corrected Measurement	Turntable Azimuth	Antenna Height	FCC 3M Class B/C Limit	Margin Class B/C
MHz	dBuV/m	dB	dBuV/m	deg	Mtr	dBuV/m	dBuV/m
40.60	18.50	10.46	28.96	0	3.0	40.00	11.04
217.00	19.40	10.46	29.86	0	3.0	46.00	16.14

RFID Tx Plotted Test Results – 10 Meters



Tx Tabulated Test Results

Tx Freq.	E Measured Peak	Distance	Distance Scaling Factor	E Corrected	Scale Conversion	15.225 Limit	Margin
MHz	dBuV	Meters	dB	dBuV/m	uV/m	uV/m	uV/m
13.56	55.60	10.00	-19.08	36.52	66.95	15848.00	15781.05
13.11(a)	29.90	10.00	-19.08	10.82	3.47	30.00	26.53
13.41(a)	29.50	10.00	-19.08	10.42	3.32	106.00	102.68
13.553	46.30	10.00	-19.08	27.22	22.95	334.00	311.05
13.567	44.30	10.00	-19.08	25.22	18.23	334.00	315.77
13.71(a)	27.60	10.00	-19.08	8.52	2.67	106.00	103.33
14.01(a)	28.70	10.00	-19.08	9.62	3.03	30.00	26.97

(a: Noise floor only, no signal observed)

Low Frequency Spurious Test Results

Spurious Freq.	Vmeasured Peak	Distance	Distance Scaling Factor	V Corrected	Scale Conversion	15.209 Limit	Margin
kHz	dBuV	Meters	dB	dBuV/m	uV/m	uV/m	uV/m
160.00	47.00	3.00	-80.00	-33.00	0.02	15.00	14.98
1690.00	18.30	10.00	-19.08	-0.78	0.91	14.20	13.29
11900.00	55.10	3.00	-40.00	15.10	5.69	30.00	24.31

RFID Tx Tabulated Frequency Drift Over Temp

Temperature	Frequency	Frequency Delta from Ambient	.01% Freq. Change Limit	Margin
Deg C	MHz	Hz	Hz	Hz
-20.00	13.56009	290	1355.98	1065.98
25.00	13.55980	NA	NA	NA
57.00	13.55870	-1100	1355.98	255.98

RFID Tx Tabulated Frequency Drift Over Voltage

Voltage	Frequency	Frequency Delta from Ambient	.01% Freq. Change Limit	Margin
V	MHz	Hz	Hz	Hz
8.00	13.55989	890	1355.9	465.9
7.20	13.55900	NA	NA	NA
6.00	13.55989	890	1355.9	465.9

Environment

The test was performed with the equipment under test, and measurement equipment inside the all-weather enclosure. Ambient temperature was 78 deg F, the relative humidity 53%.

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 8542E			
RF Filter Section	HP-85420E	3448A00144	4 Sept-12	14 months
RF Receiver Section	HP-85422E	3625A00174	4 Sept-12	14 months
EMCO BiconiLog Antenna	3142	1069	18- Sept-12	14 months
EMCO Double Ridged Horn	3115	7770	22-Sept-12	14 months
Solar LISN	8012-50-R-24-BNC	962137	14 Sept-12	14 months
Solar LISN	8012-50-R-24-BNC	962138	28-Aug-12	14 months
(3-m) LMR-400 Ultra Flex	LMR400	C090804	02-May-13	6 months
(3-m) CS-3227 RG8	CS-3227	C060914	02-May-13	6 months
(10-m) Amelco 50ohm Coax	RG213U	9903-10ab	02-May-13	6 months
(LCI) Double shielded 50ohm Coax	RG58/U	920809	05-Apr-13	14 months
HP Oscilloscope	54100D	2510A00511	08-Apr-13	14 months
Keytek Surge	711B	8511854	10-Apr-13	14 months
Schaffner ESD	NSG432	01027	09-Apr-13	14 months
Schaffner EFT	NSG600/641	0113	11-Apr-13	14 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
EMCO Loop	6205	2164	22-Sept-12	36 months

Cable Loss

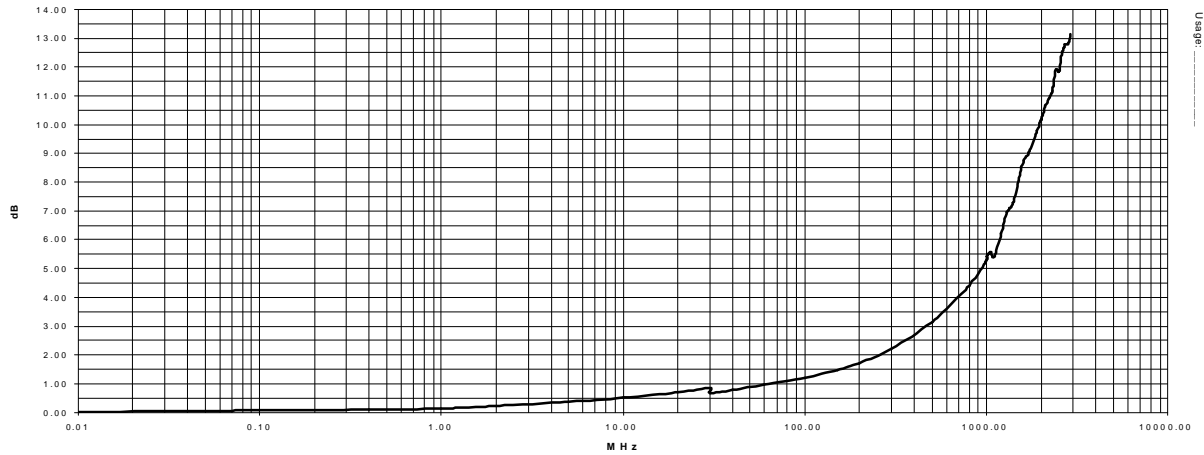
Line Conducted 150KHz through 30MHz, Coax #920809

Last Calibration date: Apr 5, 2013

TEST DATE: -----

COAX #9208091

Tester: -----



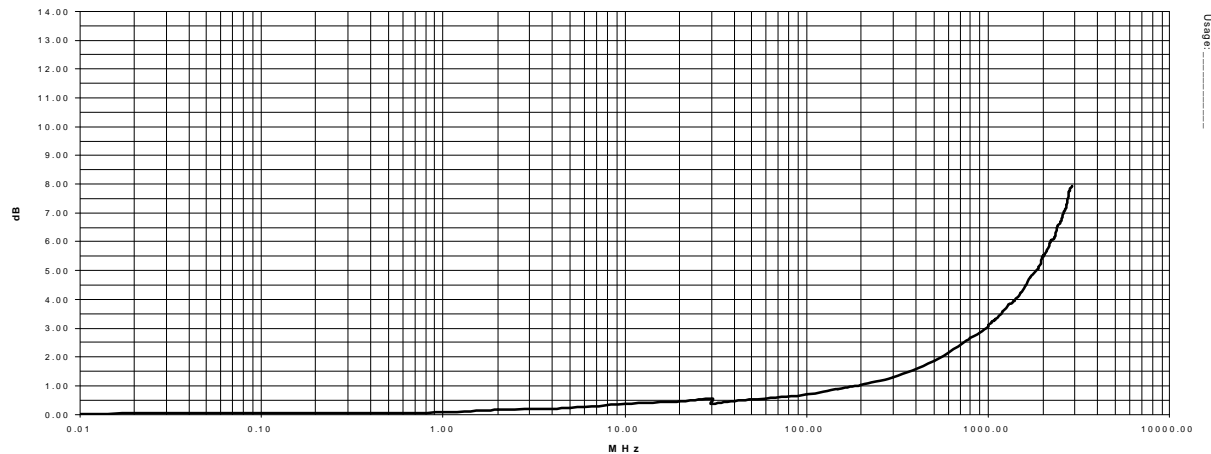
Radiated at 3 meters; 30MHz through 3000MHz, Coax #C090804

Last Calibration date: 02-May-13

TEST DATE: -----

COAX #9812_11

Tester: -----

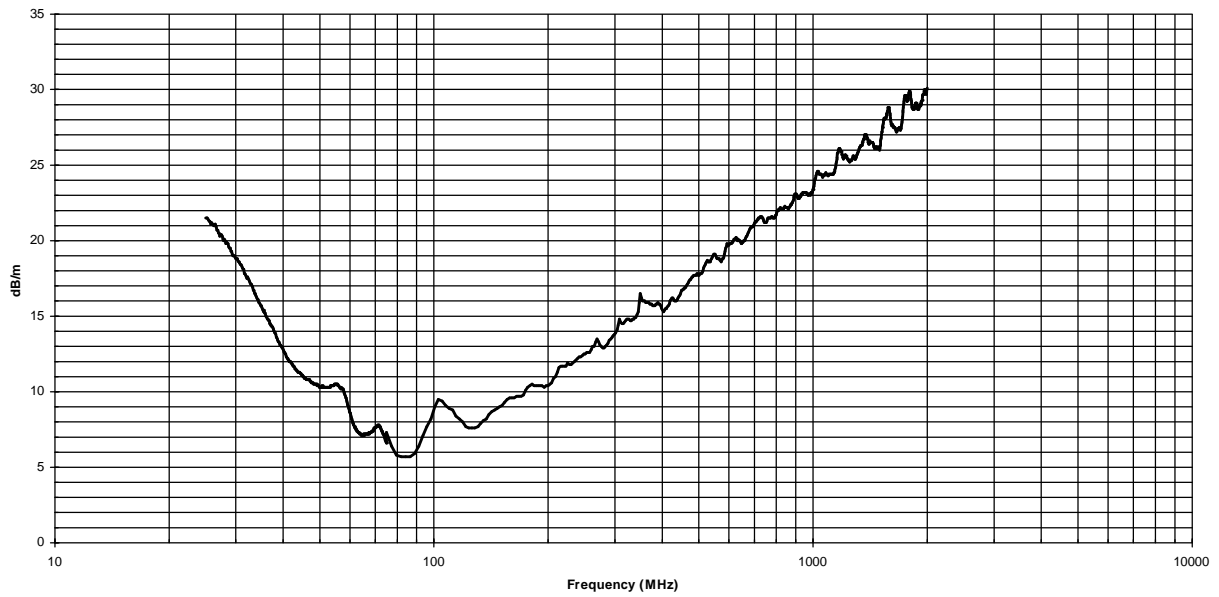


Antenna Factors

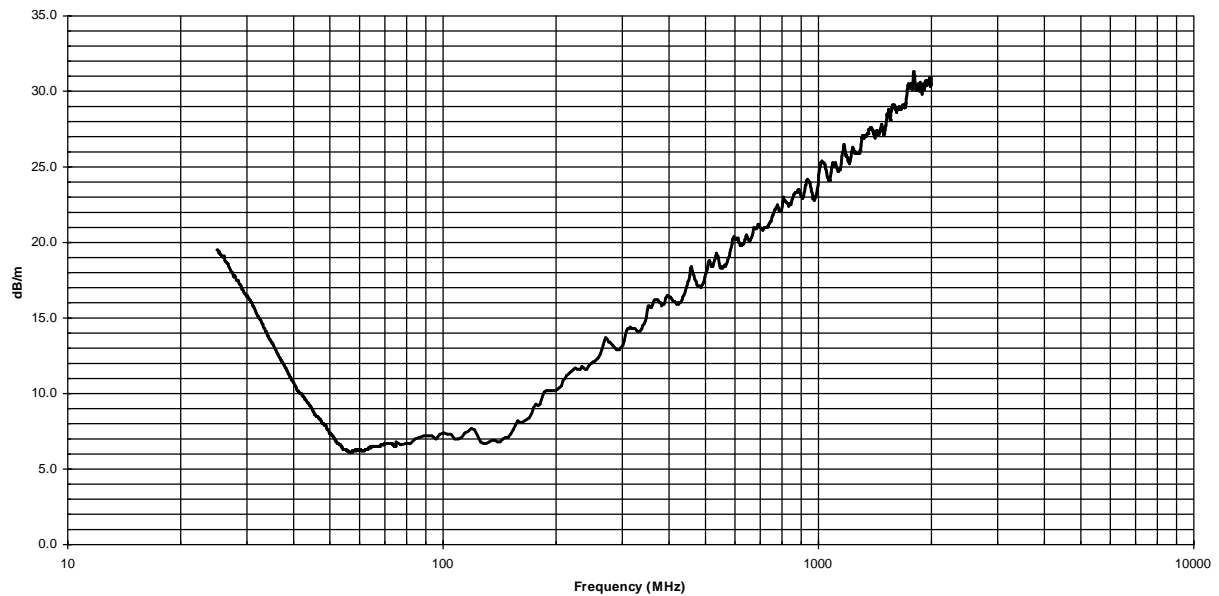
EMCO Model 3142 Antenna #1069

Last Calibration Date; 18- Sept-12


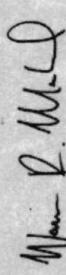
3 Meter Distance Factors



10 Meter Distance Factors



AHD Accreditation

<p>United States Department of Commerce National Institute of Standards and Technology</p> <p>NVLAP[®]</p> <p>Certificate of Accreditation to ISO/IEC 17025:2005</p> <p>NVLAP LAB CODE: 200129-0</p> <p>AHD (Amber Helm Development, L.C.) Sister Lakes, MI</p> <p>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</p> <p>ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS</p> <p>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 Communiqué dated January 2009).</p> <p>2013-07-01 through 2014-06-30 Effective dates</p> <p> For the National Institute of Standards and Technology</p> <p></p> <p>NVLAP-01C (REV. 2009-01-28)</p>

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

June 07, 2013

AHD (Amber Helm Development, Inc.
92723 Michigan Highway 152,
Sister Lakes, MI 49047

Attention: Gordon Helm

Re: Accreditation of AHD (Amber Helm Development, Inc.
Designation Number: US5317
Test Firm Registration #: 955409

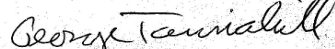
Dear Sir or Madam:

We have been notified by National Voluntary Laboratory Accreditation Program that AHD (Amber Helm Development, Inc. has been accredited as a Conformity Assessment Body (CAB).

At this time AHD (Amber Helm Development, Inc. is hereby designated to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Part 15B of the Commission's Rules.

This designation will expire upon expiration of the accreditation or notification of withdrawal of designation.

Sincerely,



George Tannahill
Electronics Engineer

NARTE Seal