ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

For Scope of Accreditation Under Certificate Number: AT-2021

ACS Excellence in Compliance Solutions

EMI Test Report

In Accordance with:

AS/NZS CISPR 22:2009 w/A1:2010

Authorization Type: Verification

Manufacturer: Johnson Outdoors Marine Electronics, Inc.
Model Covered: SOLIX 12 SI (410400-1)
Model Variants: SOLIX 12 (410390-1)

ACS Report: 16-0526.C07.10A
Report Revision: A
Report Issue Date: February 6, 2017

Project Manager:

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Reviewed by:

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Advanced Compliance Solutions, Inc.

This report must not be used by the client to claim product certification, approval, or endorsement by ANAB, NIST, or any agency of the Federal Government.

This report contains 20 pages

REVISION HISTORY
Report Number: 16-0526.C07.10A
Manufacturer: Johnson Outdoors Marine Electronics, Inc.
Model: SOLIX 12 SI (410400-1)

DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
February 6, 2017	---	A	Initial Release	All	Forrest Duncan

Project Information

ACS Project: 16-0526.C07.10A

Applicant Details

Manufacturer: Johnson Outdoors Marine Electronics, Inc.
Street Address: 678 Humminbird Lane
City, State/Province and Postal Code: Eufaula, AL 36027
Country: USA
Contact: Chris Bennett

Phone: 334-687-6613 ext 1290
Fax:
Email: cbennett@johnsonoutdoors.com

Sample Information

Model: SOLIX 12 SI (410400-1)
Model Variant(s): SOLIX 12 (410390-1)
Environment of Use: Residential
Sample Receive Date: December 7, 2016
Sample Receive Condition: Good
Test Mode Description: Powered on; GPS and BT active; Monitoring depth

Highest Frequency Generated or Used: 1GHz

Source: Main processor

Product Description

The Humminbird SOLIX 12 SI is a fishfinder/GPS product with Side/Down imaging sonar capability to be used in the marine environment. It is comprised of a keypad, LCD display, Internal GPS, Ethernet, and capable of supporting external GPS, Ethernet, and both external NMEA 0183 and NMEA2K devices.

The SOLIX 12 is identical to the SOLIX 12 SI with the exception of the SW load that limits sonar to traditional 2D only.

Test Information

Test Start Date: December 7, 2016
Test End Date: December 18, 2016
Emissions Pre-scan Site: SAC
Final Emissions Site: SAC
EMI Freq. Band: 150kHz - 6GHz
Radiated Emissions Equipment Class: Class B

Test Methods/Standards Applied

AS/NZS CISPR 22:2009 w/A1:2010: Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

Table of Contents

1.0 Introduction

1.1 Scope

This report documents conformance with the Electromagnetic Interference requirements outlined in the product information sheet and details the results of testing performed on December 7, 2016 through December 18, 2016 on the model SOLIX 12 SI (410400-1) manufactured by Johnson Outdoors Marine Electronics, Inc..

1.2 Performance Criteria

For model SOLIX 12 SI (410400-1) the limits which apply are Class B. These limits are found in Table 1.2-1 below:

Table 1.2-1 Emissions Limits Class B

Emission Type	Frequency Range (MHz)	Quasi-Peak/Peak[4] Limits	Average Limits
Conducted Class B (Mains Port) (dBµV)	0.15 to 0.50	66 to 56[1]	56 to 46[1]
	0.50 to 5.00	56	46
	5.00 to 30.0	60	50
Conducted Class B (Telecom Ports)	0.15 to 0.5	84 to 74 (V)[1,2] 40 to 30 (I)[1,3]	74 to 64 (V)[1,2] 30 to 20 (I)[1,3]
	0.5 to 30	87 (V)[2] 43 (I)[3]	74 (V)[2] 30 (I)[3]
Radiated Class B at 3 Meters (dBµV/m)	30.0 to 230.0	40.5	
	230.0 to 1000.0	47.5	
	1000 to 3000	70	50
	3000 to 6000	74	54

1 - Decreases Linearly with Logarithm of Frequency **Note: Lower Limit Applies at Transition Frequency**
2 – (V) Indicates voltage limits in dBµV
3 – (I) Indicates current limits in dBµA
4 – Limits <1GHz are Quasi-Peak and Peak >1GHz

2.0 Test Facilities & Environment

2.1 Test Facilities

All testing was performed at the following address:

Advanced Compliance Solutions, Inc.
5015 B.U. Bowman Drive
Buford GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598
www.acstestlab.com

The laboratory is fully equipped to carry out the tests outlined in the project information section on page 3.

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by the ANSI-ASQ National Accreditation Board/ANAB accreditation program, and has been issued certificate number AT-2021 in recognition of this accreditation. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

ACS has been designated through NIST (US Identification Number: US0156) as a Phase I CAB under the APECTel MRA to perform testing for:

- Chinese Taipei's (Taiwan) Bureau of Standards, Metrology and Inspection: BSMI Number SL2-IN-E-1127R
- Hong Kong's Office of the Telecommunications Authority (OFTA)
- Singapore's Infocomm Development Authority of Singapore (IDA)
- Australia's Australian Communication and Media Authority (ACMA)

ACS test sites are also designated by Japan's Voluntary Control Council for Interference (VCCI) to perform testing in accordance with VCCI technical regulations. The VCCI has issued the following designation code in recognition of these test sites: A-0152.

2.3 Test Environment

Unless otherwise specified by the generic or product standard, the EUT was evaluated within the climate conditions of the EUT as specified by the manufacturer.

Where the manufacturer does not specify climate parameters for the EUT, all test are performed within the ambient temperature range of 40°F to 104°F.

3.0 Equipment Under Test (EUT)

3.1 Manufacturer

Johnson Outdoors Marine Electronics, Inc.
678 Humminbird Lane
Eufaula, AL 36027
Chris Bennett
334-687-6613 ext 1290
cbennett@johnsonoutdoors.com

3.2 Modifications

Table 3.2-1 below describes any modification required to bring the EUT into compliance with the test standard. Photographs of the modifications, if any, are contained in appendix a.

Table 3.2-1: EUT Modifications

☒ **Modifications <u>were not</u> required to bring the EUT into compliance with the requirements.**
☐ **Modifications <u>were</u> required to bring the EUT into compliance with the requirements.**

3.3 System Block Diagram and Support Equipment

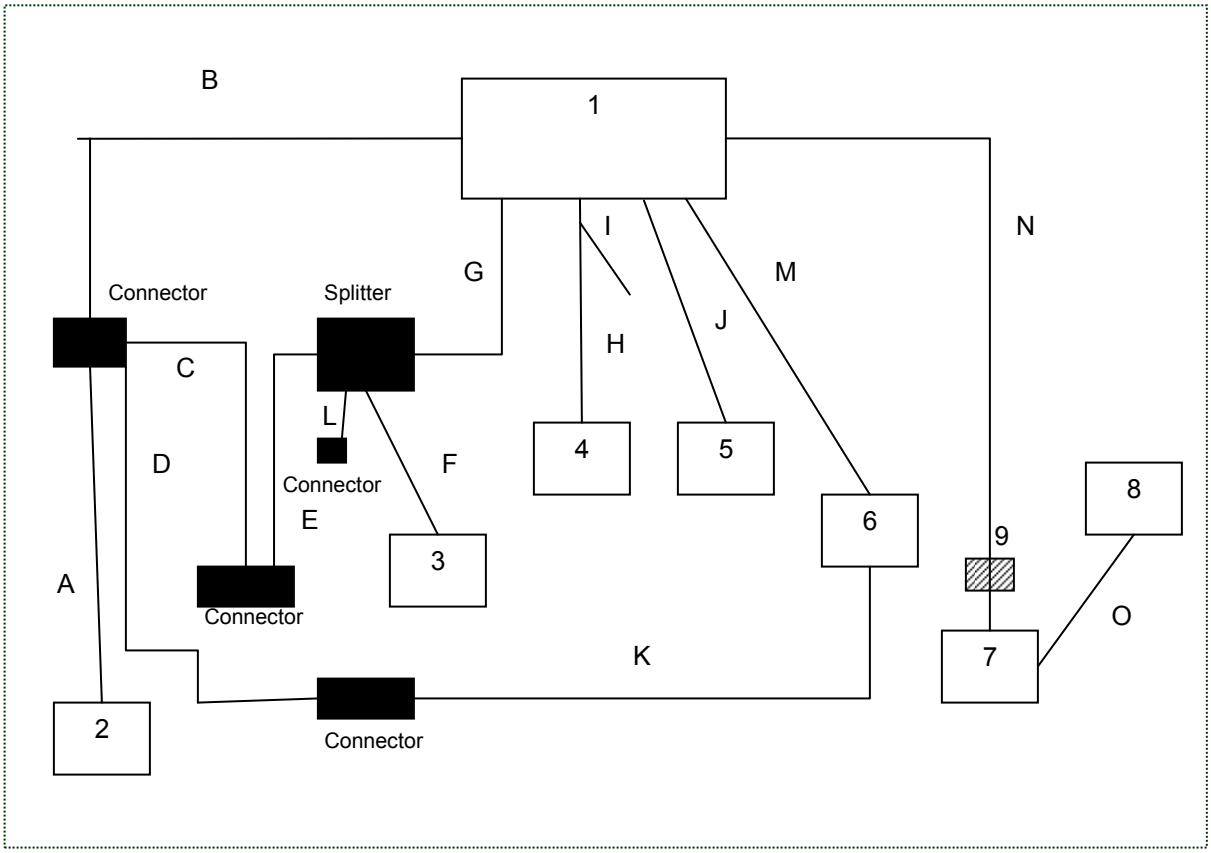

Figure 3.3-1: System Block Diagram

Table 3.3-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Johnson Outdoors	SOLIX 12 SI	X4-7
2	Battery	N/A	N/A	N/A
3	Antenna	Maretron	N/A	Acs#7
4	GPS Antenna	Johnson Outdoors	AS GPS HS	12071842-0039
5	PIS System	Techsonic Industries	G7X AIS	46090073
6	Ancillary Display	Johnson Outdoors	SOLIX 15	X4-1
7	Transducer	Johnson Outdoors	N/A	Acs#6
8	Depth Simulator	Johnson Outdoors	N/A	Acs#5
9	Ferrite bead	Fair-Rite	0475178281	N/A

Table 3.3-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	DC Leads	130cm	No	2 - connector
B	DC Leads	180cm	No	1 - connector
C	DC Leads	160cm	No	Connector - connector
D	DC Leads	160cm	No	Connector - connector
E	DC Leads	700cm	No	Splitter - connector
F	Antenna coax cable	60cm	No	3 - splitter
G	DC Leads	300cm	No	1 - splitter
H	Antenna Coax cable	630cm	No	1 – 4
I	DC leads	60cm	No	1 – GND
K	DC Leads	100cm	No	6 – connector
L	DC Leads	160	No	Connector - splitter
M	Signal cable	900cm	No	1 – 6
N	Transducer cable	620cm	No	1 – 7
O	Coax cable	55ccm	No	7 – 8

3.4 Observations

Any general observations regarding any part of the evaluation are given in table 3.4-1.

Table 3.4-1: Observations

Observation No.	Description

4.0 Radiated and Conducted Emissions

4.1 Radiated Emissions

4.1.1 Radiated Emissions Test Site

4.1.1.1 Open Area Test Site

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 4.1.1.1-1 below:

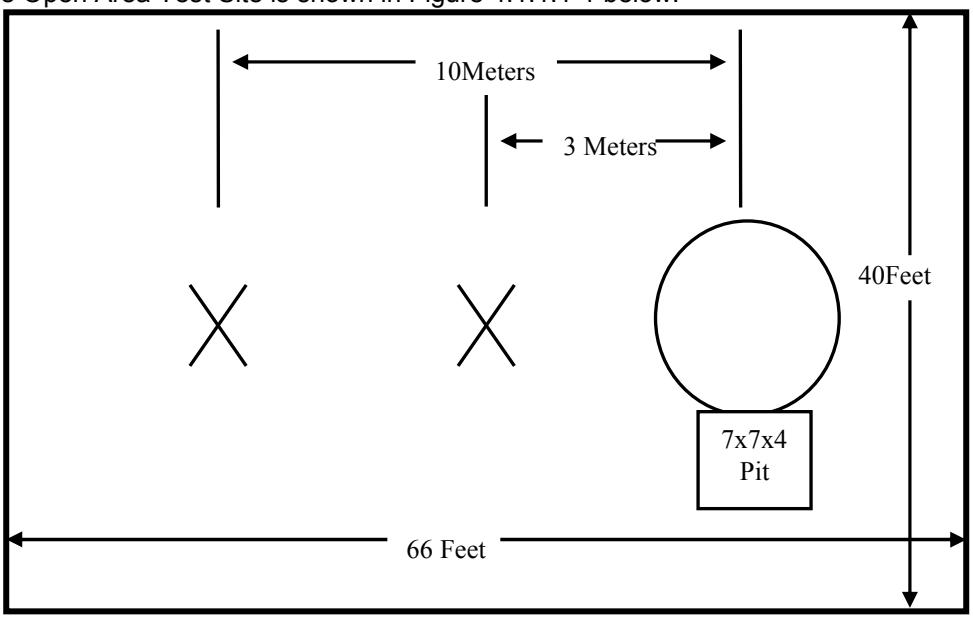

Figure 4.1.1.1-1: Open Area Test Site

4.1.1.2 Semi-Anechoic Chamber

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 4" x 4" x ¾" thick and weighs approximately 1.4lbs. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable. The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the turntable. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chase from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

To comply with the requirements of the test methods given on page 3, RF absorbing foam was placed inside the chamber in a configuration that provided the best results. First, an 8 ft. patch of 12" tall absorber was placed on the floor between the turntable and the receiving antenna. This absorber meets the absorption requirements specified in ANSI C63.4:2009. Next, three vertical structures (Fences) were created and covered with 8" pyramidal RF absorbing foam, two 4 ft. x 4 ft. and one 6 ft. x 4 ft. These fences were placed at locations to prevent high energy signals from reaching the back chamber wall and reflecting back to the receive antenna.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 4.1.1.2-1 below:

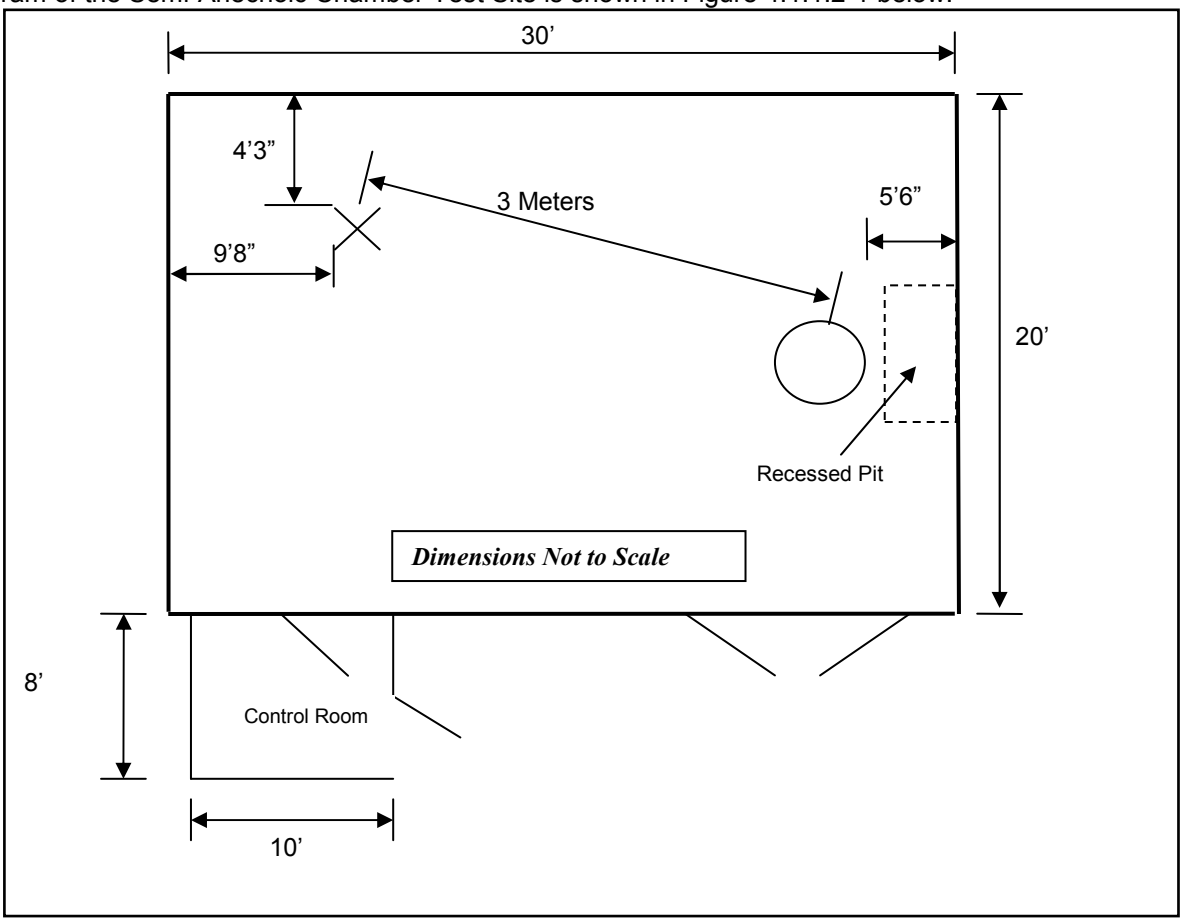

Figure 4.1.1.2-1: Semi-Anechoic Chamber Test Site

4.1.1.3 Fully Anechoic Chamber

The 3m fully anechoic chamber is used for pre-screening the EUT for emissions only. Final screening is performed on the OATS or in case of Class B EUT's, in the 3m semi-anechoic chamber. The Fully Anechoic Chamber has been characterized for field uniformity in accordance with IEC 61000-4-3 and can be used for final radiated fields immunity testing.

The Fully-Anechoic Chamber Test Site consists of a 24'L x 16'W x 12'H shielded enclosure. The chamber is fully lined with RF absorbing foam. The foam ranges in type from 8-24" conventional pyramidal cones, 8-12" conventional wedges and 6" and 16" Hybrid Foam over ferrite tile. The Hybrid material is placed in the 6 specular regions of the chamber for better low-frequency performance. The specular regions are 1) directly behind the receiving antenna, 2) on the floor between the receiving antenna and the EUT table, 3) the wall directly behind the EUT, 4&5) the side walls between the receiving antenna and the EUT table and 6) the ceiling between the receiving antenna and the EUT. The specular regions are 6' x 4' in size.

The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the shield using 3/4" stainless steel braided cable.

The turntable is a remotely controlled EMCO Model 1060 and is 150cm in diameter and is located 1m from the absorber on the back wall of the chamber.

A diagram of the Fully Anechoic Chamber Test Site is shown in Figure 4.1.1.3-1 below:

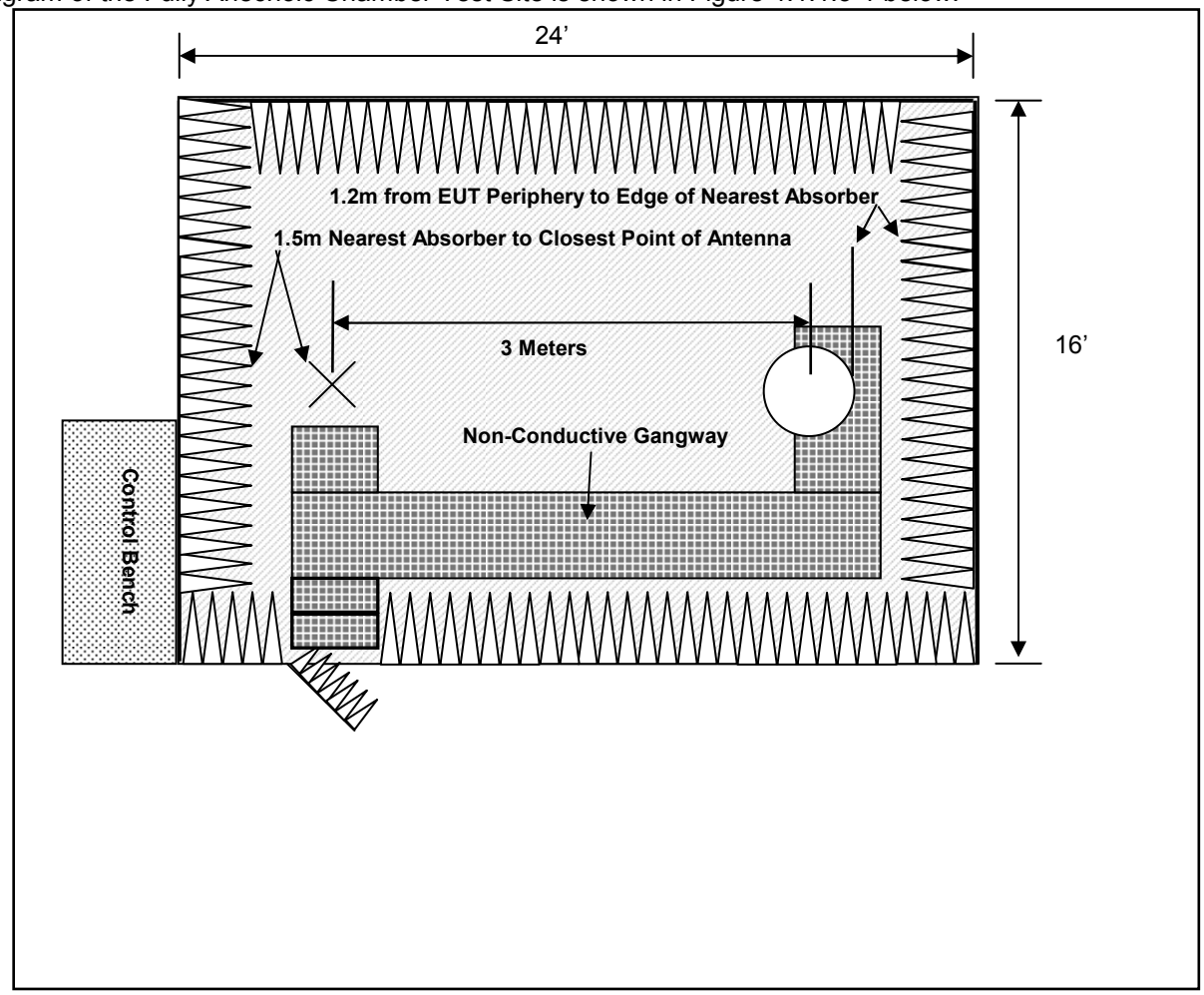

Figure 4.1.1.3-1: Fully Anechoic Chamber Test Site

4.1.2 Test Equipment

Table 4.1.2-1 identifies all equipment used for radiated emissions respectively.

Table 4.1.2-1 Test Equipment – Radiated Emissions

Semi-Anechoic Chamber

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
40	EMCO	3104	Antennas	3211	6/8/2016	6/8/2018
73	Agilent	8447D	Amplifiers	2727A05624	7/21/2016	7/21/2017
167	ACS	Chamber EMI Cable Set	Cable Set	167	9/30/2016	9/30/2017
412	Electro Metrics	LPA-25	Antennas	1241	8/8/2016	8/8/2018
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
RE619	Rohde & Schwarz	ESU26	Spectrum Analyzers	100190	11/5/2014	11/5/2017

Semi-Anechoic Chamber High Frequency

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/30/2015	4/30/2017
338	Hewlett Packard	8449B	Amplifiers	3008A01111	8/21/2015	8/21/2017
422	Florida RF	SMS-200AW-72.0-SMR	Cables	0805	10/27/2016	10/27/2017
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
616	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	N/A	9/2/2016	9/2/2017
676	Florida RF Labs	SMS-290AW-480.0-SMS	Cables	MFR2Y194	11/4/2016	11/4/2017
RE619	Rohde & Schwarz	ESU26	Spectrum Analyzers	1302.6005K26 Ser. 100190	11/5/2014	11/5/2017

Fully Anechoic Chamber

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
321	Hewlett Packard	HPC 8447D	Amplifiers	1937A02809	7/21/2016	7/21/2017
326	ACS	EMI Cable Set-FAC	Cables	326	7/21/2016	7/21/2017
354	ETS Lindgren	3142C	Antennas	00078838	NCR	NCR
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
RE112	Rohde & Schwarz	ESIB26	Receiver	836119/012	7/13/2016	7/13/2017

Open Area Test Site

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
90	Electro-Metrics	LPA25	Antennas	1476	12/10/2015	12/10/2017
193	ACS	OATS Cable Set	Cable Set	0193	7/21/2016	7/21/2017
211	Eagle	C7RFM3NFNM	Filters	HLC-700	10/13/2016	10/13/2017
213	TEC	PA 102	Amplifiers	44927	8/8/2016	8/8/2017
486	Hewlett Packard	8591E	Analyzers	3543A04709	7/12/2016	7/12/2017
544	ETS Lindgren	3110B	Antennas	3361	12/7/2015	12/7/2017

NCR = No Calibration Required

4.1.3 Test Methodology

4.1.3.1 Pre-Scans

Radiated pre-scans are performed on all EUT's in either the 3m Semi-Anechoic or the 3m Fully-Anechoic Chamber. Final emission testing for Class A equipment is performed on the 3/10m Open Area Test Site (OATS) as described in section 4.1.1.1. Final emission testing on Class B equipment can be performed either in the 3m Semi-Anechoic chamber described in section 4.1.1.2 or on the OATS.

Pre-scans are a method by which the 10 highest emissions can be identified for final evaluation. This is achieved by taking automated emission snapshots of the EUT at various azimuths and antenna heights. The software is programmed to perform a peak sweep of the band using the maxhold function. This sweep is performed every 90º in both horizontal and vertical polarities and at antenna heights of 100cm and 300cm. Although not a fully maximized scan, the pre-scan gives a good indication of pass or fail.

4.1.3.2 Final Scans

Radiated emissions measurements were made over the frequency range of 30MHz – 6GHz. Quasi-Peak measurements are taken with the Spectrum Analyzer's resolution bandwidth was set to 120KHz and video bandwidth set to 300 kHz for measurements below 1000MHz. Average measurements are taken above 1000MHz with the RBW set to 1MHz and VBW set to 10Hz. The calculation for the radiated emissions field strength is as follows:

Corrected Reading = Analyzer Reading + Cable Loss + Antenna Factor – Amplifier Gain
Margin(dB) = Applicable Limit - Corrected Reading

4.1.3.3 Test Criteria

The EUT must meet the Class B Limits as given in section 1.2.

4.1.3.4 Test Justification

☒ **No justification - The EUT was tested per the appropriate test methods and test plan.**
☐ **The test method, standard, and/or test plan was deviated from for the following reason:**

4.1.4 Test Setup Photographs

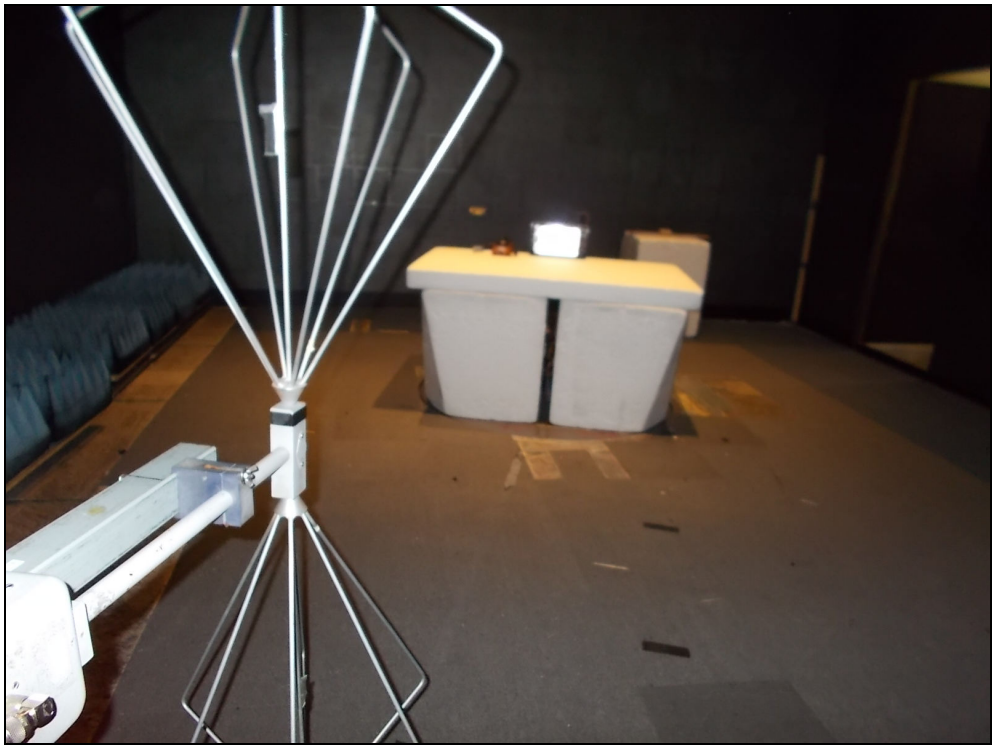

Figure 4.1.4-1: Radiated Emissions - Front View

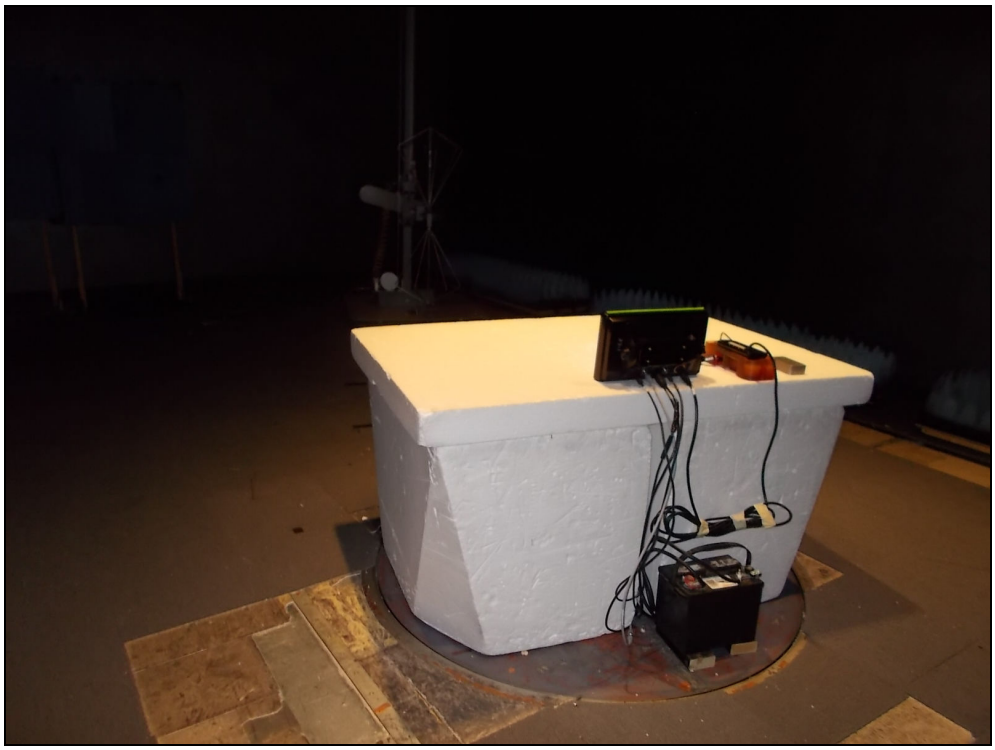

Figure 4.1.4-2: Radiated Emissions - Rear View

4.1.5 Test Data

Final tabulated radiated emissions data are reported in the Test Data Table below:

Test Parameters:

Test Date:	**12/6/2016**	**Temperature (ºC)**	**22**
Technician:	**Art Sumner**	**Humidity (%)**	**44**
Equipment Class:	**Class B**	**Barometric Pressure (mBar)**	**1010**
Tested Modes:	**Powered ON, GPS active, monitoring depth**		
AC Input Power:	**N/A**		
DC Input Power:	**12Vdc**		

Test Data Table:

Measurement Distance:

☐ **FAC** ☒ **SAC** ☐ **OATS**
☐ **1 Meter** ☒ **3 Meter** ☐ **10 Meter**

Frequency (MHz)	Measured Level (dBuV)		Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (o)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	Pk	Qpk/Av					Pk	Qpk/Av	Pk	Qpk/Av	Pk	Qpk/Av
32.1	59.00	43.90	v	100	354	-12.85	---------	31.05	--------	40.5	---------	9.4
60.6	56.40	43.70	v	100	92	-13.97	---------	29.73	--------	40.5	---------	10.7
75.1	68.10	55.10	v	131	241	-17.51	---------	37.59	--------	40.5	---------	2.9
77.2	67.70	54.20	V	100	272	-17.68	---------	36.52	--------	40.5	---------	3.9
136.5	58.70	43.00	H	100	155	-12.68	---------	30.32	--------	40.5	---------	10.1
135.9	59.90	47.00	V	100	154	-12.73	---------	34.27	--------	40.5	---------	6.2
208.5	52.80	38.80	H	100	90	-12.63	---------	26.18	--------	40.5	---------	14.3

Qpk = Quasi-Peak Measurement or Limit (< 1GHz)
AV = Average Measurement or Limit (>1GHz)

Notes:
There were no significant emissions found above 1GHz.

4.2 Conducted Emissions

4.2.1 Conducted Emissions Test Site

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

A diagram of the room is shown below in figure 4.2.1-1:

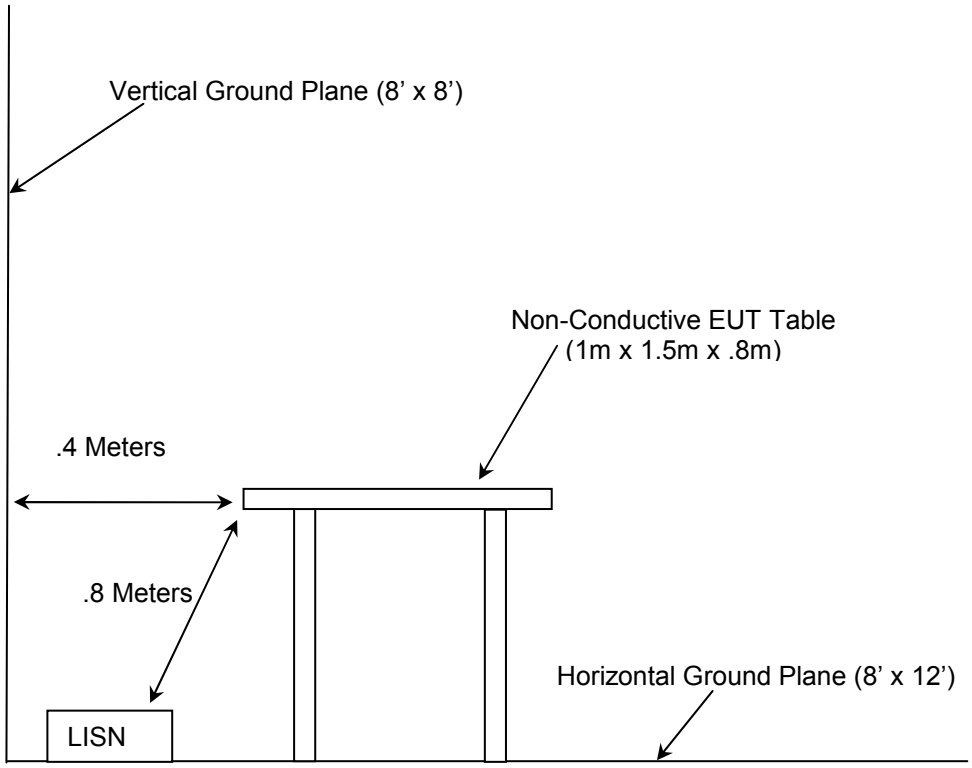

Figure 4.2.1-1: AC Mains Conducted EMI Site

4.2.2 Test Equipment

Table 4.2.2-1 Test Equipment – Conducted Emissions

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
324	ACS	Belden	Cables	8214	5/2/2016	5/2/2017
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
3010	Rohde & Schwarz	ENV216	LISN	3010	7/11/2016	7/11/2017
RE112	Rohde & Schwarz	ESIB26	Receiver	836119/012	7/13/2016	7/13/2017

Conducted Emissions Telecom

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
168	Hewlett Packard	11947A	Attenuators	44829	1/8/2016	1/8/2017
324	ACS	Belden	Cables	8214	5/2/2016	5/2/2017
419	Teseq	ISN T800	LISN	25203	8/4/2016	8/4/2017
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
561	Teseq	ISN ST08	Coupler	31286	7/11/2016	7/11/2017

NCR = No Calibration Required

4.2.3 Test Methodology

Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

4.2.3.1 Test Criteria

The EUT must meet the Class B Limits as given in section 1.4.1.

4.2.3.2 Test Justification

☒ **No justification - The EUT was tested per the appropriate test methods and test plan.**
☐ **The test method, standard, and/or test plan was deviated from for the following reason:**

4.2.4 Test Setup Photographs

Figure 4.2.4-1: Conducted Emissions Test Setup – Front View

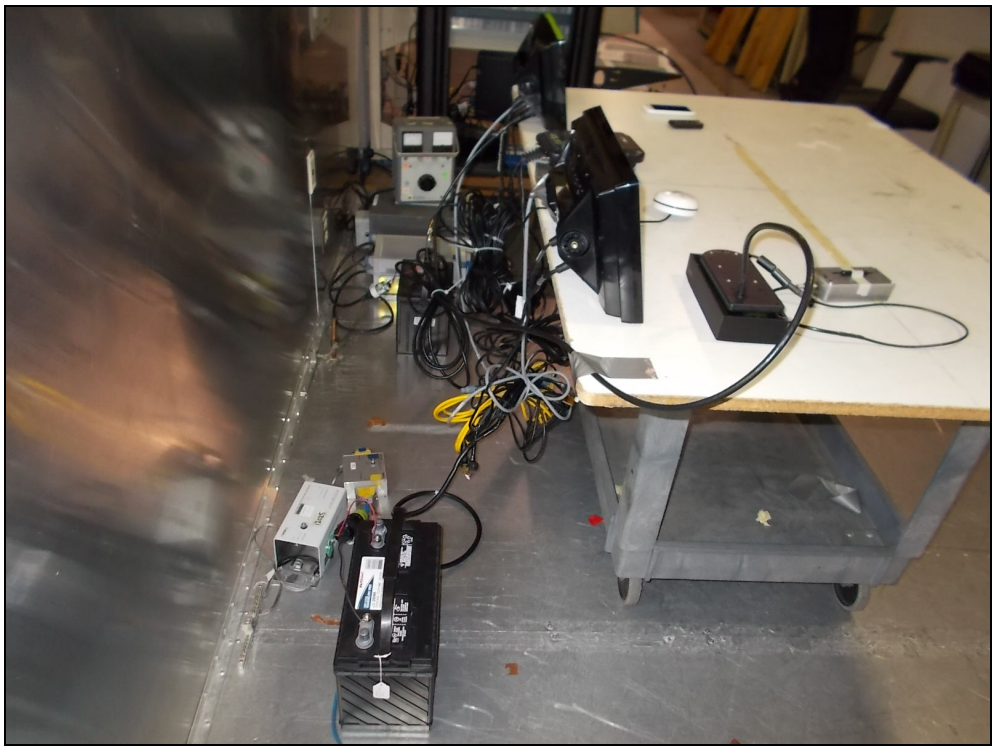

Figure 4.2.4-2: Conducted Emissions Test Setup – Side View

4.2.5 Test Data

Tabulated data is given in the Test Data Tables below.

Test Parameters:

Test Date:	**12/7/2016**	**Temperature (ºC)**	**21**
Technician:	**Art Sumner**	**Humidity (%)**	**44**
Equipment Class:	**B**	**Barometric Pressure (mBar)**	**1011**
Tested Modes:	**Powered ON; GPS and BT active, monitoring depth**		
AC Input Power:	**N/A**		
DC Input Power:	**12Vdc**		

Tested Leads:

☐ **AC Mains – Number of Lines:**
☐ **DC Mains – Number of Lines:**
☒ **Telecom Port – Quantity: 1**

Test Data Tables:

Check All That Apply to This Data
☐ **Line 1** ☐ **Line 2** ☐ **Line 3** ☐ **Line 4**
☐ **To Ground** ☐ **Floating**
☒ **Telecom Port Ethernet**
☒ **dBµV** ☐ **dBµA**

Power Supply Description: 12Vdc

Frequency (MHz)	Corrected Reading		Limit (dBuV)	Margin (dB)	Line	Correction (dB)
	Quasi-Peak (dBuV)	Average (dBuV)				
5.785771	---	46.77	64.00	17.23	Ethernet	19.2
5.785771	54.64	---	74.00	19.36	Ethernet	19.2
5.883228	---	29.32	64.00	34.68	Ethernet	19.2
5.883228	52.43	---	74.00	21.57	Ethernet	19.2
6.122648	---	28.12	64.00	35.88	Ethernet	19.2
6.122648	46.21	---	74.00	27.79	Ethernet	19.2
6.182164	---	34.90	64.00	29.10	Ethernet	19.2
6.182164	44.45	---	74.00	29.55	Ethernet	19.2
18.241884	---	60.53	64.00	3.47	Ethernet	19.5
18.241884	63.74	---	74.00	10.26	Ethernet	19.5
23.127255	---	59.44	64.00	4.56	Ethernet	19.7
23.127255	62.86	---	74.00	11.14	Ethernet	19.7

Notes:

5.0 Measurement Uncertainty

General

Measurement Uncertainty is based on the following publications:

- CISPR 16-4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements
- The Guide to the Expression of Uncertainty in Measurement(GUM): 1995
- ANSI / NCSL Z540.2-1997 (R2002) U.S. Guide to Expression of Uncertainty in Measurement

Calculations for measurement uncertainty are available upon request.

Emissions:

Table 5.0-1: Values of U_{cispr} and U_{Lab}

Measurement	U_{cispr}	U_{Lab}
Conducted disturbance (mains port) (9 kHz – 150 kHz) (150 kHz – 30 MHz)	 4,0 dB 3,6 dB	2.54 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1 000 MHz)	 5,2 dB	3.93 dB

NOTE U_{cispr} resembles a value of measurement uncertainty for a specific test, which was determined by considering uncertainties associated with the quantities listed in CISPR 16-4-2:2003 Section 4.2.

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

If U_{Lab} is less than or equal to U_{cispr} in Table 5.0-1, then:

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If U_{Lab} is greater than U_{cispr}, then:

- compliance is deemed to occur if no measured disturbance, increased by ($U_{Lab} – U_{cispr}$), exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by ($U_{Lab} – U_{cispr}$), exceeds the disturbance limit.

The ACS calculated MU is much less than the internationally accepted MU, therefore an adjustment to the measured result as mentioned above is not necessary.

6.0 Conclusion

The EUT is determined to meet the requirements as defined in the applicable regulations.