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TÜV SÜD America

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EMI Technical Report

Prepared For: Johnson Outdoors, INC

Model Covered: SOLIX 10 SI
Model Variants: SOLIX 10

In Accordance with the Conformity Assessment Procedure for Electromagnetic Interference (RRA Announce 2016-79, Dec 19, 2016)

EMI Product Standard: Annex 8-1 (KN 301 489-1), Annex 8-8 (KN 301 489-3), and Annex 8-3 (KN 301 489-17)

Report Number: AT72132224.4N2
Report Revision: C
Report Issue Date: February 14, 2018

This report contains Page 25 pages

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Project Manager:

Arthur Sumner
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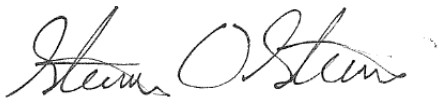
Reviewed by:



Steve O'Steen
Service Line Manager, EMC
TÜV SÜD America 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.

REVISION HISTORY
Report Number: AT72132224.4N2
Manufacturer: Johnson Outdoors, INC
Model: SOLIX 10 SI

DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
January 2, 2018	---	A	Initial Release	All	Steve O'Steen
January 5, 2018	A	B	Added KC ID and Product Type and revised model names	All	Steve O'Steen
February 14, 2018	B	C	Removed KC ID; Added Panasonic Module Information	1, 4, header	Steve O'Steen

Project Information

Applicant Details

Manufacturer: Johnson Outdoors, INC
Street Address: 1220 Old Alpharetta Rd, Ste 340
City, State/Province and Postal Code: Alpharetta, GA 30005
Country: USA
Contact: Nancy Rimedio

Phone: 770-888-6292 (1049)
Fax:
Email: nrimedio@johnsonoutdoors.com

Sample Information

Model: SOLIX 10 SI
Model Variant(s): SOLIX 10
Environment of Use: Residential
Sample Receive Date: October 30, 2017
Sample Receive Condition: Good
Test Mode Description: EUT on; Internal and External Antenna; External GPS connected; BT Connected; Accessories under floor
Highest Data Rate: 1GHz
Source: Main Internal Processor

Product Description

The Humminbird SOLIX Series is a Sonar/Fishfinder/GPS product to be used in the marine environment. The SOLIX 10 has a 10” display with a PCAP touchscreen, 10 keypad buttons, encoder and joystick, 2 SD card slots and displays sonar return information on the display. The differences between the SOLIX 10 and the SOLIX 10 SI are as follows:

- SOLIX 10 - 10" display, pcap touchscreen, 2D sonar, internal GPS, NMEA 2K, bluetooth (BLE and Classic)
- SOLIX 10 SI (EUT) - 10" display, pcap touchscreen, 2D, down imaging and side imaging sonar, internal GPS, NMEA 2K, bluetooth (BLE and Classic)

Panasonic Module model name ENW89823A3KF, Report No MOV-16-RF-K134, KC approval No MSIP-CRM-Pid-ENW89823A3KF.

Test Information

Test Start Date: October 30, 2017
Test End Date: November 15, 2017
Emissions Pre-scan Site: SAC
Final Emissions Site: OATS
EMI Freq. Band: 150kHz - 5GHz
Radiated Emissions Equipment Class: Class B

Test Methods/Standards Applied

(Check all that apply):

☒ RRA Public Notification 2016-26 Dec 19, 2016**:** Korea Technical Requirements for Electromagnetic Compatibility

☒ KN 301 489-1 (Annex 8-1), KN 301 489-3 (Annex 8-8), and KN 301 489-17 (Annex 8-3) Test Methods for Electromagnetic Compatibility with RRA Announce 2016-79 (Dec 19, 2016)

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 October 30, 2017 through November 15, 2017 on the model SOLIX 10 SI manufactured by Johnson Outdoors, INC.

1.2 Performance Criteria

For model SOLIX 10 SI the limits which apply are Class A. 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, 5] Limits	Average Limits[5]
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 5.00	84 to 74 (V)[1,2] 40 to 30 (I)[1,3]	74 to 64 (V)[1,2] 30 to 20 (I)[1,3]
	5.00 to 30	87 (V)[2] 43 (I)[3]	74 (V)[2] 30 (I)[3]
Radiated Class B at 10 Meters (dBµV/m)	30.0 to 230.0	30.0	
	230.0 to 1000.0	37.0	
	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
5 – Measurements above 1GHz made at 3m test distance

2.0 Test Facilities & Environment

2.1 Test Facilities
All testing was performed at the following address:

TÜV SÜD America Inc.
5015 B.U. Bowman Drive
Buford GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598
www.TUVamerica.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
TÜV SÜD America Inc. 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.

TÜV SÜD America Inc. 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)

TÜV SÜD America Inc. has been recognized by the Radio Research Agency (RRA) Korea Communications Commission (KCC) under the Asian Pacific Economic Cooperation Mutual Recognition Arrangement (APEC Tel MRA). TÜV SÜD America Inc. is designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase 1 procedures of the aforementioned MRA.

TÜV SÜD America Inc. 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℉ to 104℉.

3.0 Equipment Under Test (EUT)

3.1 Manufacturer
Johnson Outdoors, INC
1220 Old Alpharetta Rd, Ste 340
Alpharetta, GA 30005
Nancy Rimedio
770-888-6292 (1049)
nrimedio@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

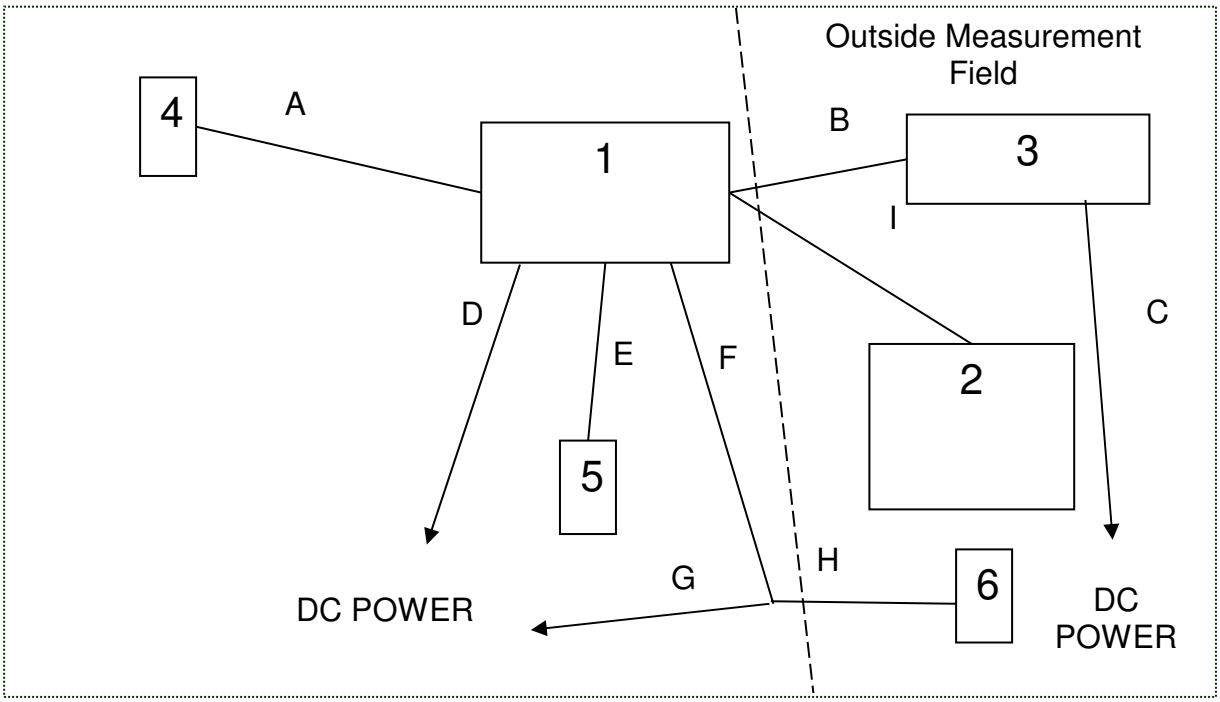


Figure 3.3-1: System Block Diagram

Table 3.3-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Johnson Outdoors	Solix 10 SI	N/A
2	Auxiliary Equipment	Johnson Outdoors	Solix 10 SI	N/A
3	GEO NAV	Techsonic Industries	GTX AIS	46090073
4	GPS antenna	Humminbird	AS*GPS HS	12071842-0039
5	Transducer	Johnson Outdoors	N/A	N/A
6	NMEA2000 antenna	Maretron	N/A	N/A

Table 3.3-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	GPS	20’	No	1 - 4
B	Signal cable	25’	No	1 - 3
C	DC leads	4’	No	3 – DC power
D	DC leads	5’	No	1 – DC power
E	Transducer cable	20’	No	1 - 5
F	NMEA2000 cable	16’	No	1 - H
G	DC leads	6’	No	H – DC power
H	NMEA2000 cable	6’	No	F - 6
I	Ethernet	30’	No	1 - 2

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

3.5 EUT Photographs

Figure 3.5-1: EUT Photo – Front

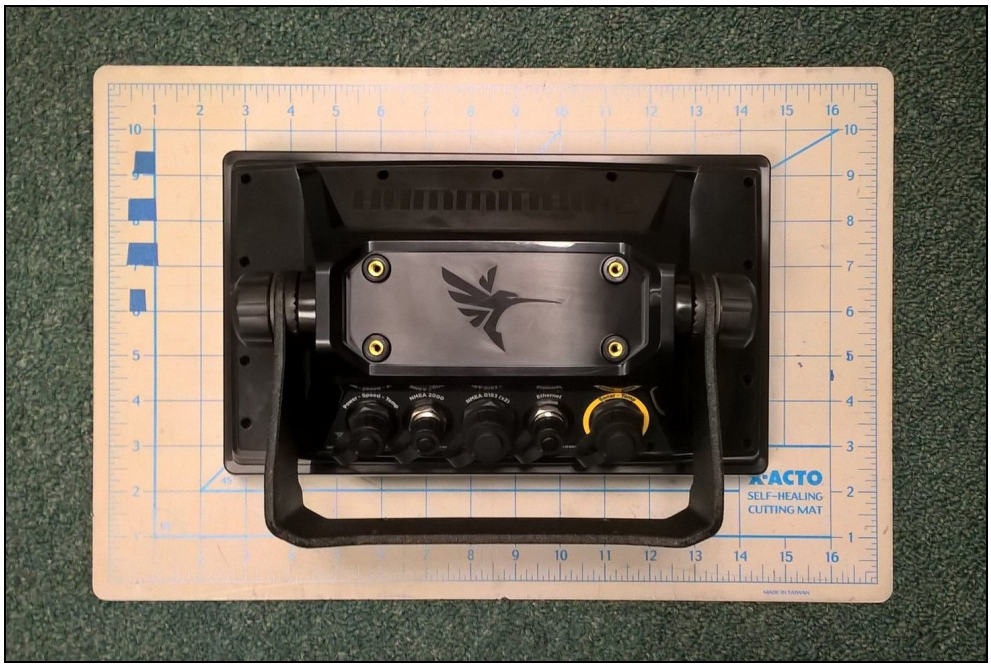


Figure 3.5-2: EUT Photo – Back

4.0 Radiated and Conducted Emissions

4.1 Radiated Emissions

4.1.1 Test Site Description

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:

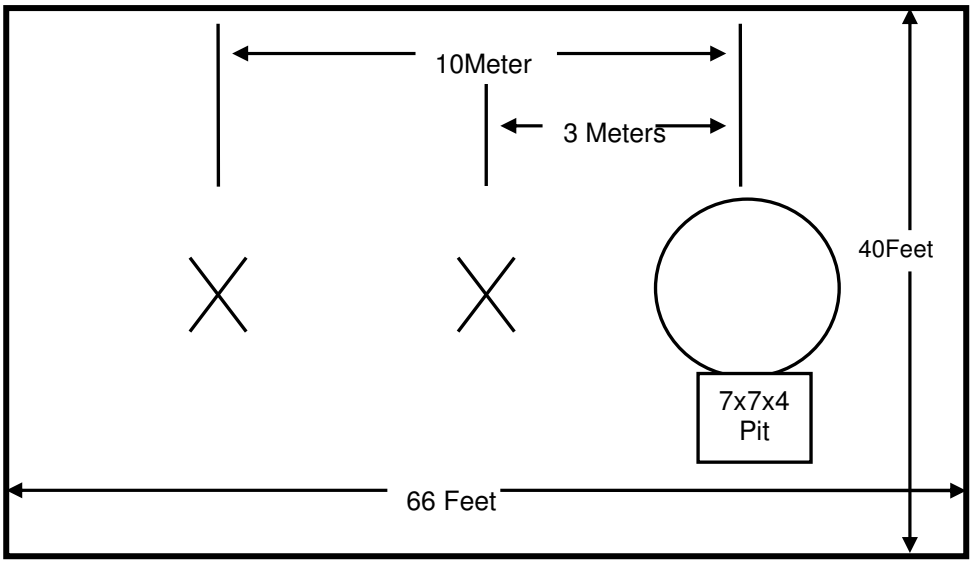


Figure 4.1.1.1-1: Open Area Test Site

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 4, 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 C63.4:2014. 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:

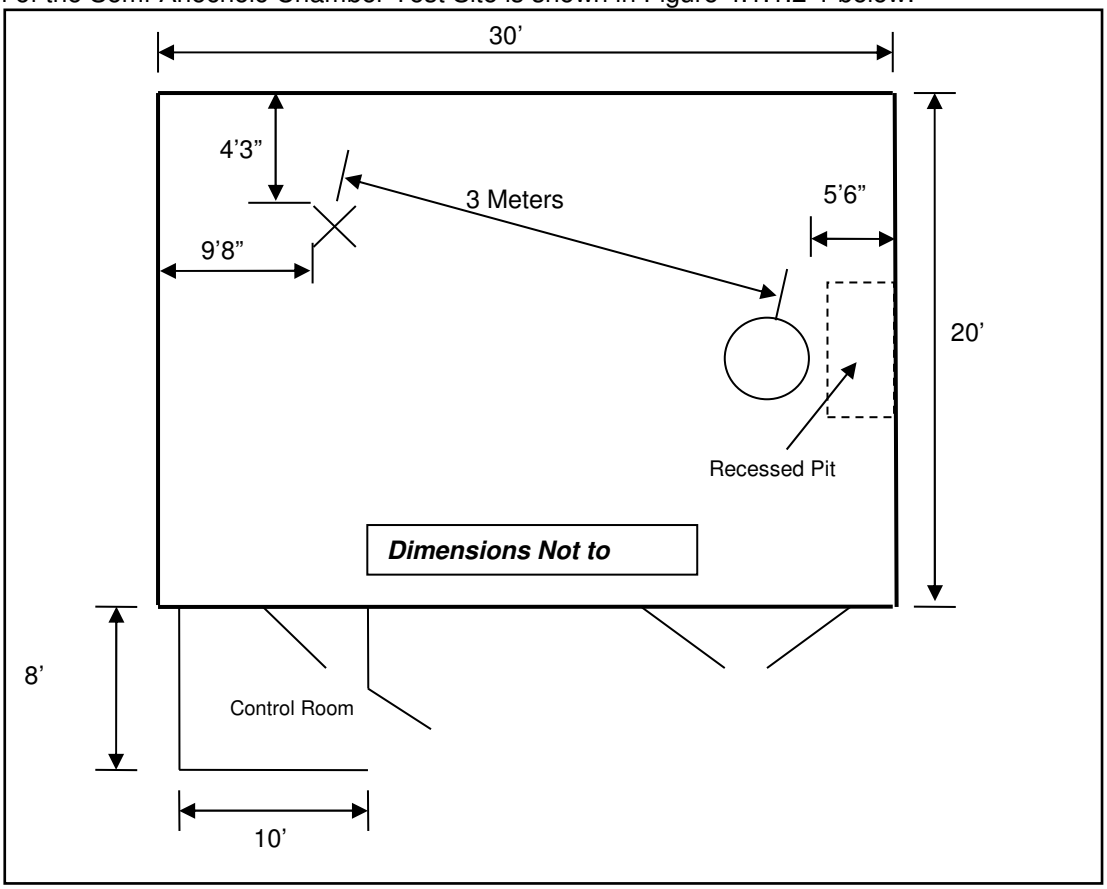


Figure 4.1.1.2-1: Semi-Anechoic Chamber Test Site

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 EUTs, 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:

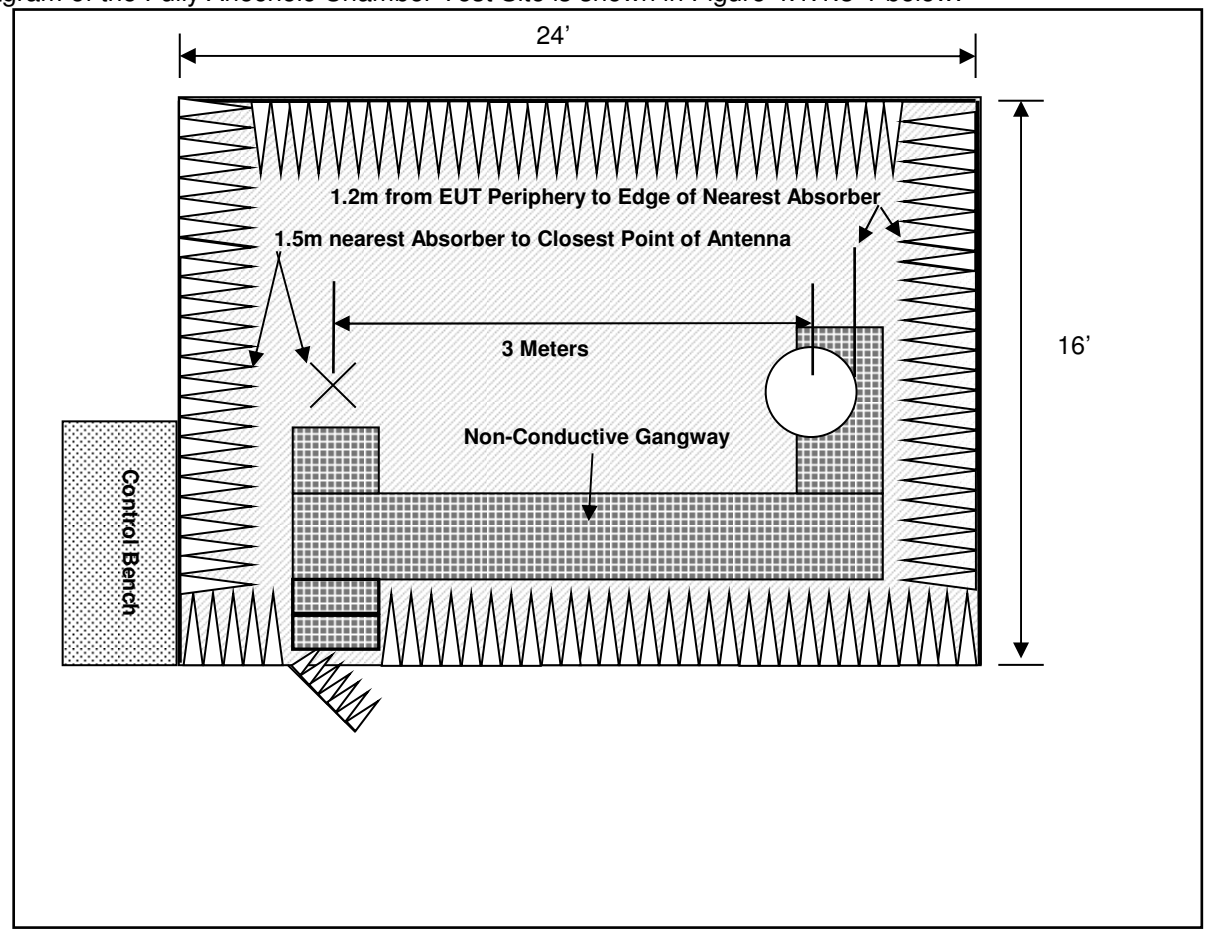


Figure 4.1.1.3-1: Fully Anechoic Chamber Test Site

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	7/24/2017	7/24/2018
167	ACS	Chamber EMI Cable Set	Cable Set	167	9/29/2017	9/29/2018
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
819	Rohde & Schwarz	ESR26	EMI Test Receiver	101345	10/31/2017	10/31/2018

Semi-Anechoic Chamber High Frequency

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
30	Spectrum Technologies	DRH-0118	Antennas	970102	5/9/2017	5/9/2019
338	Hewlett Packard	8449B	Amplifiers	3008A01111	7/11/2017	7/11/2019
422	Florida RF	SMS-200AW-72.0-SMR	Cables	0805	10/27/2016	11/27/2017
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	10/7/2017	10/7/2018
676	Florida RF Labs	SMS-290AW-480.0-SMS	Cables	MFR2Y194	11/4/2016	12/4/2017
819	Rohde & Schwarz	ESR26	EMI Test Receiver	101345	10/31/2017	10/31/2018

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	7/25/2017	7/25/2018
211	Eagle	C7RFM3NFNM	Filters	HLC-700	10/15/2017	10/15/2018
213	TEC	PA 102	Amplifiers	44927	7/24/2017	7/24/2018
486	Hewlett Packard	8591E	Analyzers	3543A04709	7/11/2017	7/11/2018
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 EUTs 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 to 5GHz. 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 above 1000MHz are taken using measurement instruments average detector. The calculation for the radiated emissions field strength is as follows:

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

4.1.3.3 Test Criteria

The EUT must meet the Class A Limits as given in table 1.2-1.

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

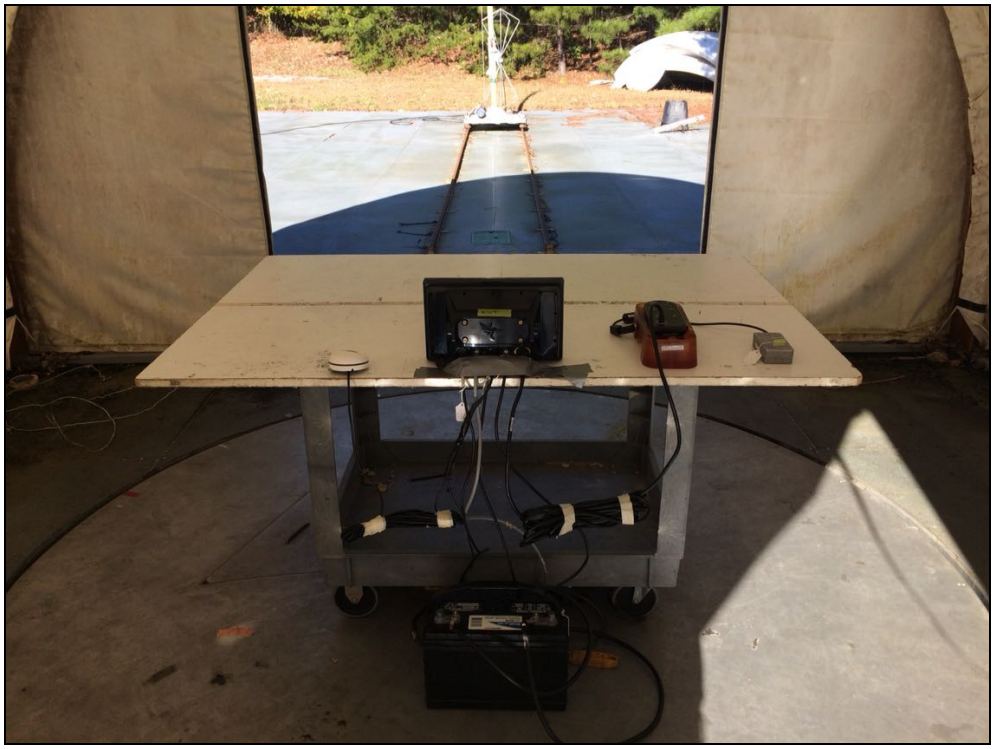


Figure 4.1.4-2: Radiated Emissions - Rear View

4.1.5 Test Data

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

Test Parameters:

Test Date:	**October 31, 2017**	**Temperature (ºC)**	**10.5**
Technician:	**Al Smith**	**Humidity (%)**	**80**
Equipment Class:	**B**	**Barometric Pressure (mBar)**	**1021.3**
Tested Modes:	**EUT on; External antenna; GPS connected; Accessories under floor.**		
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
40.24	37.81	33.12	V	100	128	-12.73	---------	20.39	--------	30.0	---------	9.6
143.39	32.69	26.84	V	100	103	-11.50	---------	15.34	--------	30.0	---------	14.7
145.81	37.95	32.76	V	100	210	-11.37	---------	21.39	--------	30.0	---------	8.6
234.2	34.67	29.78	H	100	0	-11.92	---------	17.86	--------	37.0	---------	19.1
400	40.26	39.04	H	200	231	-5.70	---------	33.34	--------	37.0	---------	3.7
802.1	35.73	32.56	H	140	296	0.88	---------	33.44	--------	37.0	---------	3.6

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 12' solid aluminum horizontal ground reference plane (GRP) bonded every 3" to an 8' X 12' vertical ground plane.

A diagram of the room is shown below in figure 4.1.4-1:

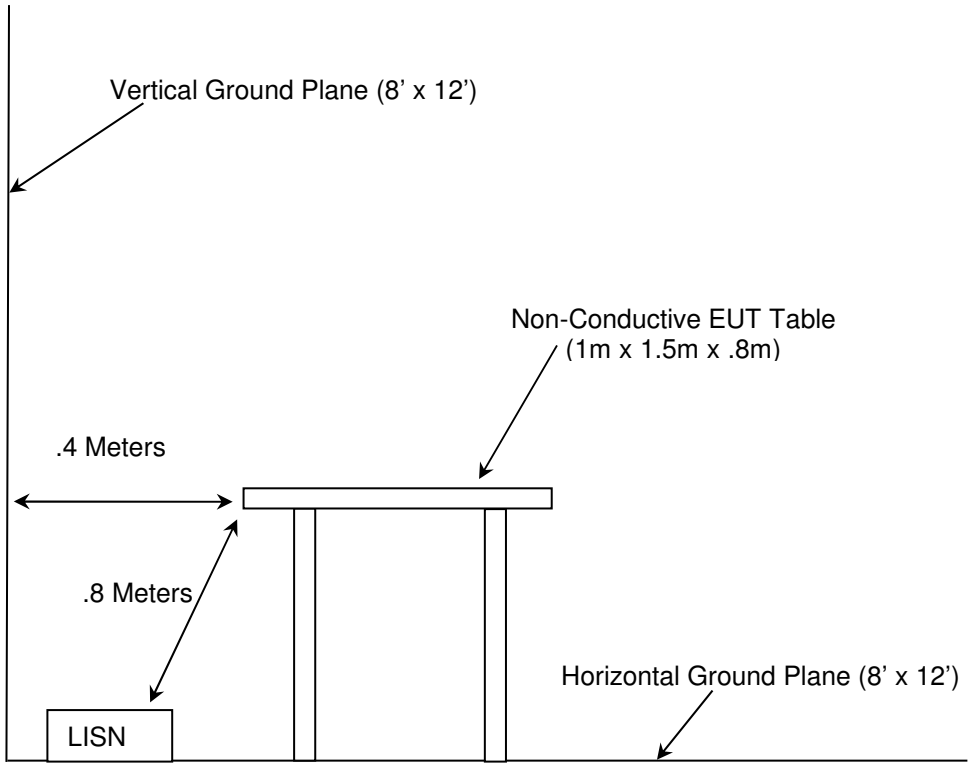


Figure 4.2-1: AC Mains Conducted EMI Site

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	3/21/2017	3/21/2018
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
3010	Rohde & Schwarz	ENV216	LISN	3010	7/11/2017	7/11/2018
813	PMM	9010	Receiver	697WW30606	2/6/2017	2/6/2018

Conducted Emissions Telecom

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
168	Hewlett Packard	11947A	Attenuators	44829	1/12/2017	1/12/2018
324	ACS	Belden	Cables	8214	3/21/2017	3/21/2018
419	Teseq	ISN T800	LISN	25203	8/9/2017	8/9/2018
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
561	Teseq	ISN ST08	Coupler	31286	7/11/2017	7/11/2018
813	PMM	9010	Receiver	697WW30606	2/6/2017	2/6/2018

NCR = No Calibration Required

4.2.3 Test Methodology

Conducted emissions were performed from 150 kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. 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 A Limits as given in section 1.2-1.

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

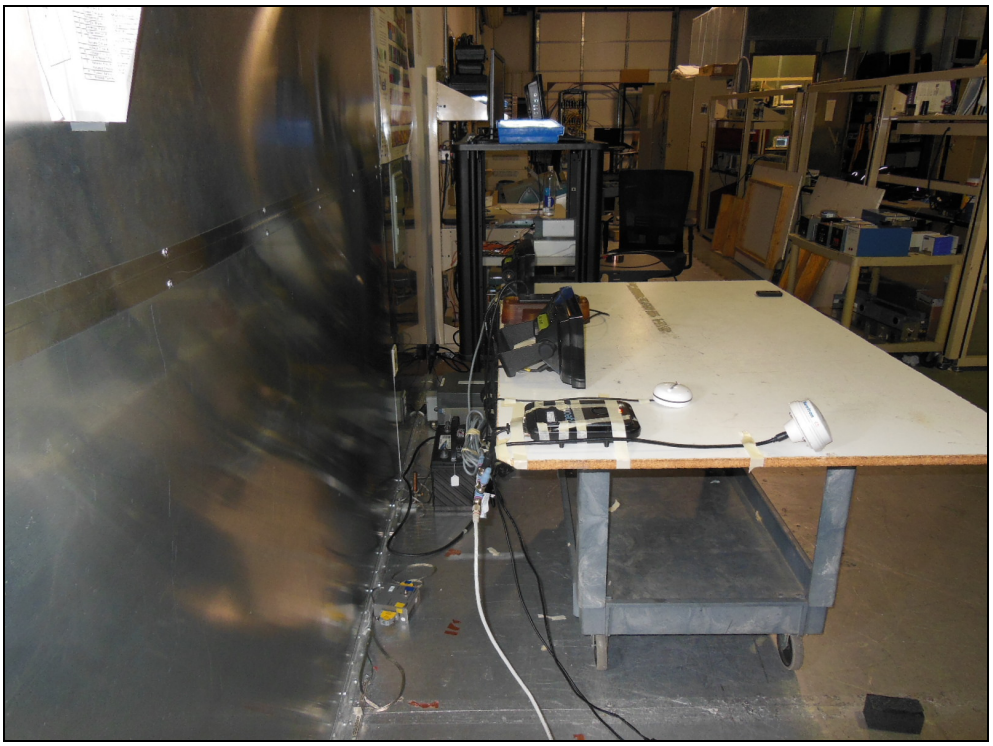


Figure 4.2.4-2: Conducted Emissions Test Setup – Side View

4.2.5 Test Data – External GPS

Tabulated data is given in the Test Data Tables below.

Test Parameters:

Test Date:	**November 8, 2017**	**Temperature (ºC)**	**20.2**
Technician:	**Sean Vick**	**Humidity (%)**	**47.4**
Equipment Class:	**Class B**	**Barometric Pressure (mBar)**	**1018.9**
Tested Modes:	**EUT on; External GPS connected; BT connected**		
AC Input Power:	**N/A**		
DC Input Power:	**12Vdc**		

Tested Leads:

☐ **AC Mains – Number of Lines:**
☒ **DC Mains – Number of Lines: 2**
☐ **Telecom Port – Quantity:**

Power Line, L1

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.286	42.8	42.76	60.64	50.64	-17.84	-7.88	9.58
4.67	30.88	22.39	56	46	-25.12	-23.61	9.74
4.722	30.88	22.39	56	46	-25.12	-23.61	9.74
4.834	32.74	22.36	56	46	-23.26	-23.64	9.74
4.934	37.13	22.36	56	46	-18.87	-23.64	9.74
4.966	37.56	22.36	56	46	-18.44	-23.64	9.74
5.07	37.85	22.37	60	50	-22.15	-27.63	9.74
9.846	37.24	22.84	60	50	-22.76	-27.16	9.79
10.03	32.44	23.16	60	50	-27.56	-26.84	9.79
10.13	31.44	23.19	60	50	-28.56	-26.81	9.79

Notes:

Power Line, N

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.166	38.68	35.91	65.16	55.16	-26.48	-19.25	9.58
0.222	37.12	28.58	62.74	52.74	-25.62	-24.16	9.58
4.734	34.67	16.05	56	46	-21.33	-29.95	9.74
4.846	35.36	17.21	56	46	-20.64	-28.79	9.74
4.922	36.5	17.56	56	46	-19.5	-28.44	9.74
5.002	37.06	24.41	60	50	-22.94	-25.59	9.74
9.826	37.03	14.5	60	50	-22.97	-35.5	9.79
9.926	31.74	12.71	60	50	-28.26	-37.29	9.79
10.026	31.86	19.43	60	50	-28.14	-30.57	9.79
10.114	31.61	13.34	60	50	-28.39	-36.66	9.79

Notes:

4.2.6 Test Data – Internal GPS

Tabulated data is given in the Test Data Tables below.

Test Parameters:

Test Date:	**November 8, 2017**	**Temperature (ºC)**	**20.2**
Technician:	**Sean Vick**	**Humidity (%)**	**47.4**
Equipment Class:	**B**	**Barometric Pressure (mBar)**	**1018.9**
Tested Modes:	**EUT on; Internal GPS connected; BT connected**		
AC Input Power:	**N/A**		
DC Input Power:	**12Vdc**		

Tested Leads:

☐ **AC Mains – Number of Lines:**
☒ **DC Mains – Number of Lines: 2**
☐ **Telecom Port – Quantity:**

Power Line, L1

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.17	41.34	38.54	64.96	54.96	-23.62	-16.42	9.58
4.71	34.49	16.29	56	46	-21.51	-29.71	9.74
4.818	35.48	16.68	56	46	-20.52	-29.32	9.74
4.886	36.63	18.07	56	46	-19.37	-27.93	9.74
5.066	38.23	19.33	60	50	-21.77	-30.67	9.74
8.858	37.97	11.82	60	50	-22.03	-38.18	9.78
9.61	30.87	12.44	60	50	-29.13	-37.56	9.79
9.738	31.14	13	60	50	-28.86	-37	9.79
9.93	31.19	12.75	60	50	-28.81	-37.25	9.79
10.038	32.43	17.88	60	50	-27.57	-32.12	9.79

Notes:

Power Line, N

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.166	42.38	38.83	65.16	55.16	-22.78	-16.33	9.58
4.654	34.98	17.99	56	46	-21.02	-28.01	9.74
4.694	35.12	16.35	56	46	-20.88	-29.65	9.74
4.802	35.14	16.39	56	46	-20.86	-29.61	9.74
4.866	36.21	19.28	56	46	-19.79	-26.72	9.74
4.942	37.08	17.8	56	46	-18.92	-28.2	9.74
5.01	38.06	21.91	60	50	-21.94	-28.09	9.74
5.074	37.92	19.84	60	50	-22.08	-30.16	9.74
10.034	31.74	13.46	60	50	-28.26	-36.54	9.79
10.134	32.39	15.7	60	50	-27.61	-34.3	9.79

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.