ANAB ACCREDITED
ISO/IEC 17025
TESTING LABORATORY
For Scope of Accreditation Under Certificate Number: AT-2021

TÜV SÜD America

Choose certainty.
Add value.

EMC Technical Report

Prepared For: Johnson Outdoors, INC

Model Covered: SOLIX 10 SI
Model Variants: SOLIX 10

In Accordance with:
Radio Equipment Directive (RED) – 2014/53/EU

Product Standard: EN 301 489-17 V3.2.0, EN 301 489-19 V2.1.0, and EN 60945:2002 with respect to EN 301 489-1 V2.2.0 (Guide EG203367 V1.1.1)

Report Number: AT72132224.3R1
Report Revision: B
Report Issue Date: January 5, 2018

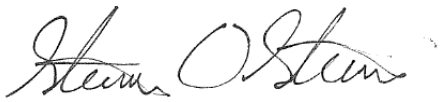
This report contains Page 66 pages

TÜV SÜD America Inc., 5015 B.U. Bowman Drive, Buford, GA 30518
Tel: (770) 831-8048. Website: www.TUVamerica.com

Project Manager:

Arthur Sumner
EMC Technician
TÜV SÜD America Inc.

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: AT72132224.3R1
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	Revised model names	All	Steve O'Steen

Project Information Sheet

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
Unacceptable Degradation (Provided by Mfg.): Not Provided, See Section 1.4.4
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)

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
RFI Site: FAC
Radiated Emissions Equipment Class: Class B
Harmonic Current EMI Class: N/A

Test Methods Applied

(Check all that apply)

☒ CISPR 16-2-1 Ed. 1.1 2005
☒ CISPR 16-2-3 1st Ed. 2003
☒ IEC 61000-4-2 Ed. 2.0
☒ IEC 61000-4-3 Ed. 3.2
☒ IEC 61000-4-4 Ed. 2.0
☐ IEC 61000-4-5 2nd Ed.
☒ IEC 61000-4-6 3rd Ed.
☐ IEC 61000-4-8 2nd Ed.
☐ IEC 61000-4-11 2nd Ed.

Table of Contents

SECTION A: GENERAL INFORMATION

1.0 Introduction

1.1 Scope

This report documents conformance with the requirements set forth in EN 301 489-17 V3.2.0, EN 301 489-19 V2.1.0, and EN 60945:2002 with respect to EN 301 489-1 V2.2.0 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 Purpose

Testing was performed to evaluate the EUT with regard to EMC regulatory requirements in accordance with the European Unions CE Marking arrangements.

1.3 Results Summary

Product Standard or Test Method Applied	Description	Result
	Product Standards	
EN 301 489-1 V2.2.0	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements	Pass
EN 301 489-17 V3.2.0	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems	Pass
EN 301 489-19 V2.1.0	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU	Pass
EN 60945:2002	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results	Pass
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)	N/A
EN 61000-3-3:2013	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection	N/A
	Basic Immunity Standards per EN 301 489-1/-17/-19 and EN60945	
IEC 61000-4-2 Ed. 2.0	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	Pass
IEC 61000-4-3 Ed. 3.2	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	Pass
IEC 61000-4-4 Ed. 2.0	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	Pass
IEC 61000-4-5 2nd Ed.	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	N/A
IEC 61000-4-6 3rd Ed.	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	Pass
IEC 61000-4-8 2nd Ed.	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	N/A
IEC 61000-4-11 2nd Ed.	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	N/A

N/A = Test Not Applicable to this EUT N/P = Not Performed. See Test Justification for Details

1.4 Performance Criteria

1.4.1 Emissions Performance Criteria

For model SOLIX 10 SI the limits which apply are shown in Table 1.4.1-1 below:

Table 1.4.1-1 Emissions Limits per EN 301 489 and EN60945

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 0.50	84 to 74 (V)[1,2] 40 to 30 (I)[1,3]	74 to 64 (V)[1,2] 30 to 20 (I)[1,3]
	0.50 to 30	87 (V)[2] 43 (I)[3]	74 (V)[2] 30 (I)[3]
Radiated at 3 Meters (dBuV/m)	0.01 to 0.15	96 to 50[1]	
	0.15 to 0.35	60 to 50[1]	
	0.35 to 30	50	
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 – Limits above 1GHz are for 3m measurement distance

1.4.2 Harmonic Current Emissions Criteria

Harmonic current emissions for Class A equipment must not exceed the levels as given in table 1.4.2-1 below:

Table 1.4.2-1

Harmonic Order (n)	Maximum Permissible Harmonic Current (A)
Odd Harmonics	
3	**2.30**
5	**1.14**
7	**0.77**
9	**0.40**
11	**0.33**
13	**0.21**
15 ≤ n ≤ 39	**0.15(15/n)**
Even Harmonics	
2	**1.08**
4	**0.43**
6	**0.30**
8 ≤ n ≤ 40	**0.23(8/n)**

1.4.3 Voltage Fluctuations & Flicker Criteria

The following limits apply:

- The value of P_{ST} shall not be greater than 1.0
- The value of P_{LT} shall not be greater than .65
- The relative steady-state voltage change, d_c, shall not exceed 3.3%
- The maximum voltage change, d_{max}, shall not exceed 4%
- The relative voltage change characteristics value of d(t) during a voltage change shall not exceed 3.3% for more that 200mS.

Where:

- P_{ST} is the short term flicker indicator. The flicker severity is evaluated over a short period (in minutes). P_{ST} = 1 is the conventional threshold of irritability.
- P_{LT} is the long term flicker indicator. The flicker severity is evaluated over a long period (in hours) using successive P_{ST} values.
- d(t), d_{max} and d_c are ratios of the absolute magnitudes to the phase-to-neutral values of the nominal voltages.

1.4.4 Immunity Performance Criteria

EN 301 489-17

Each immunity test requires 1 of 3 performance criteria to be met. The performance criteria is given as:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as defined in table 1.4.4-1 below:

Table: 1.4.4-1

Criteria	During test	After test
A	Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions
B	May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions	Functions shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions
C	May be loss of function (one or more)	Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance (see note 2)

NOTE 1:	Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.
NOTE 2:	No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for Continuous phenomena applied to Transmitters (CT)
The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Transmitters (TT)
The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5000ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR)
The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR)
The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5000ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

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 section 1.0

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.

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 climate parameters given below:

- Ambient temperature 15° to 35° C
- Relative Humidity 30% to 60%
- Atmospheric Pressure 860mbar to 1060mbar

All test equipment was operated within climate specifications as defined by the manufacturer.

2.4 Test Equipment Calibration Statement

Test equipment used for each test is specified in the relevant sections of this test report. Unless expressly given, all test equipment is calibrated on an annual basis, where applicable. All test equipment is operated within the climate specifications as defined by the manufacturer.

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 were not required to bring the EUT into compliance with the requirements.** ☐ **Modifications were required to bring the EUT into compliance with the requirements.**

3.3 System Block Diagram and Support Equipment

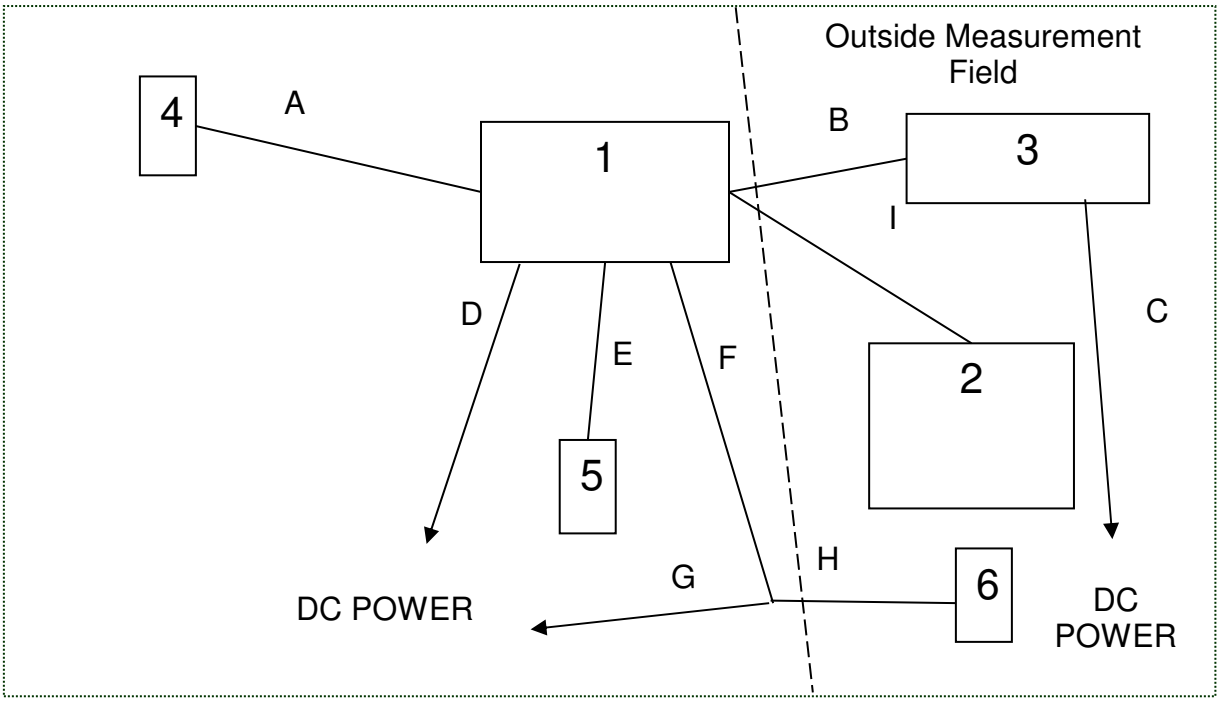


Figure 3.3-1: System Block Diagram

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

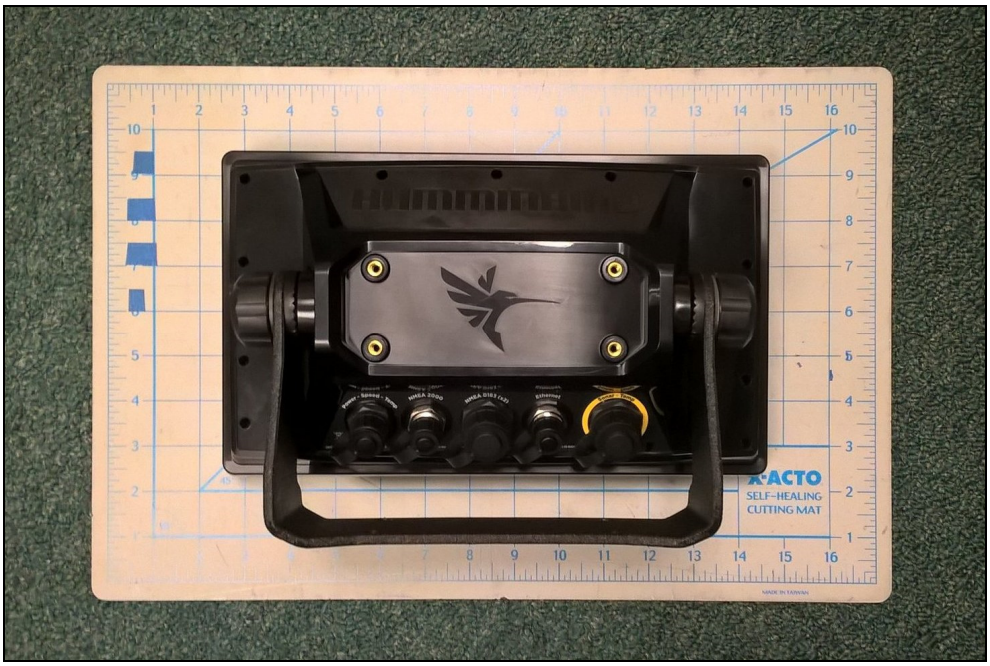


Figure 3.5-2: EUT Photo – Back

SECTION B: EMISSIONS – TEST INFORMATION AND RESULTS

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:

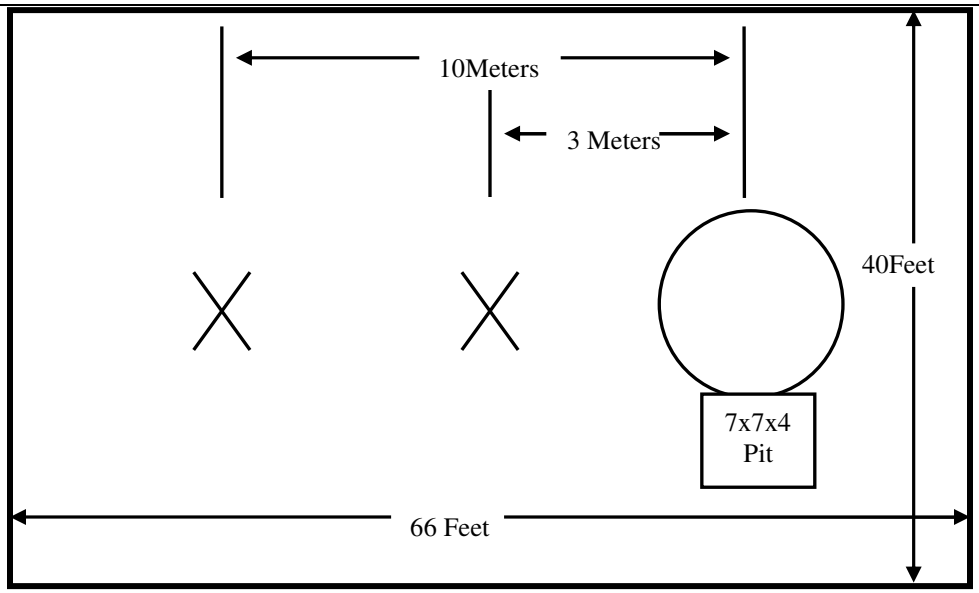


Figure 4.1.1.1-1: Open Area Test Site

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 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 C63.4:2014. 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:

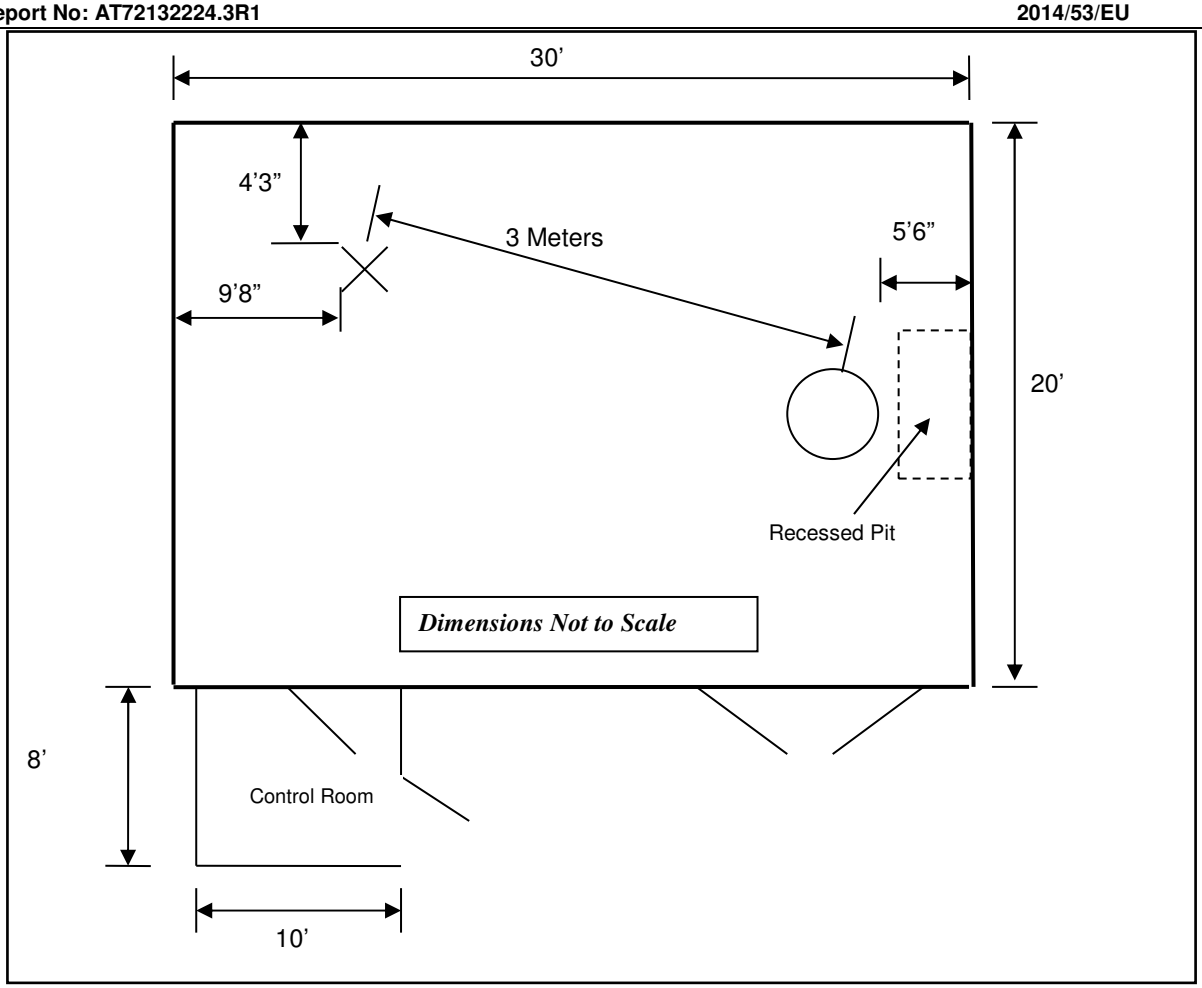


Figure 4.1.1.2-1: Semi-Anechoic Chamber Test Site

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 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:

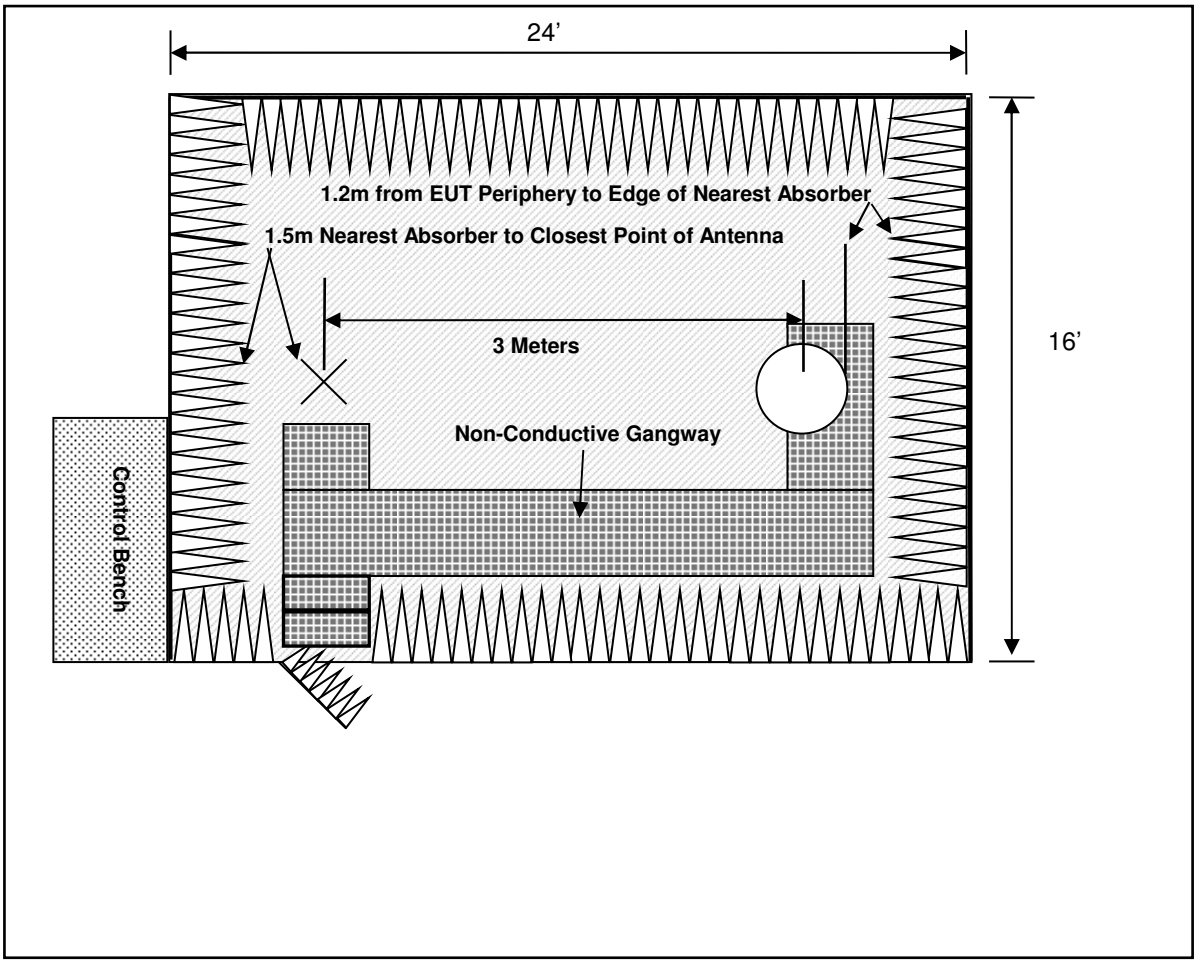


Figure 4.1.1.3-1: Fully Anechoic Chamber Test Site

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	7/24/2017	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 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 at 3m or 10m.

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 150kHz to 2GHz for EN60945 and 30MHz to 5GHz for EN 301 489. 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 between 30MHz and 1000MHz, 9kHz for measurements between 150kHz and 30MHz. 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 Limits as given in section 1.4.1.

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

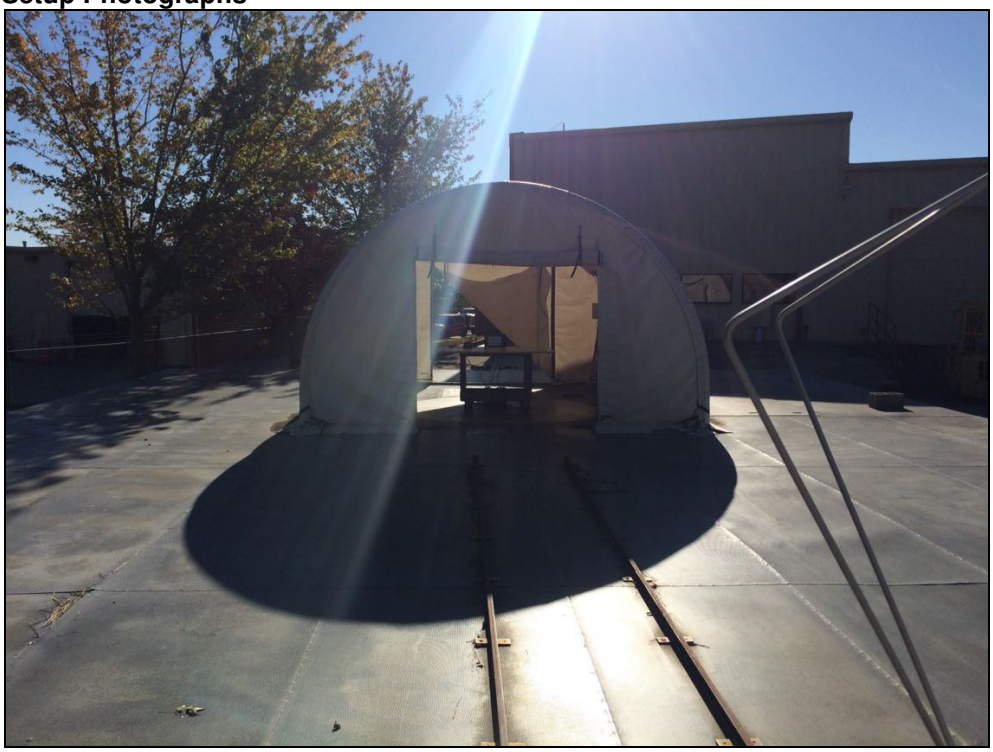


Figure 4.1.4-1: Radiated Emissions - Front View - OATS

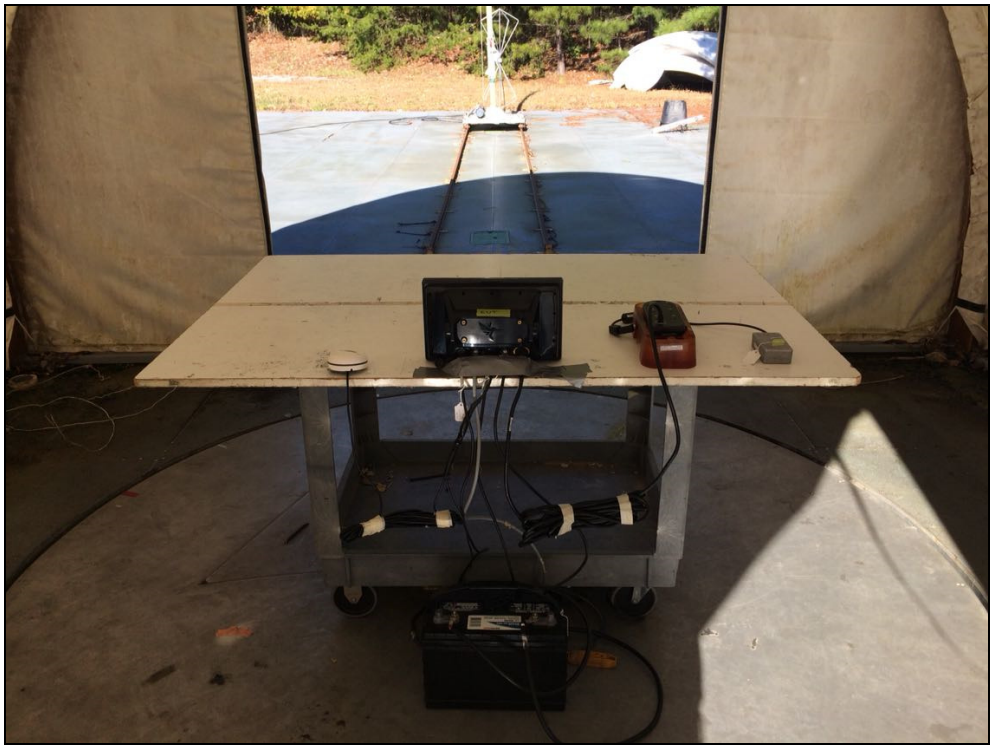


Figure 4.1.4-2: Radiated Emissions - Rear View - OATS

Figure 4.1.4-3: Radiated Emissions - Front View - SAC

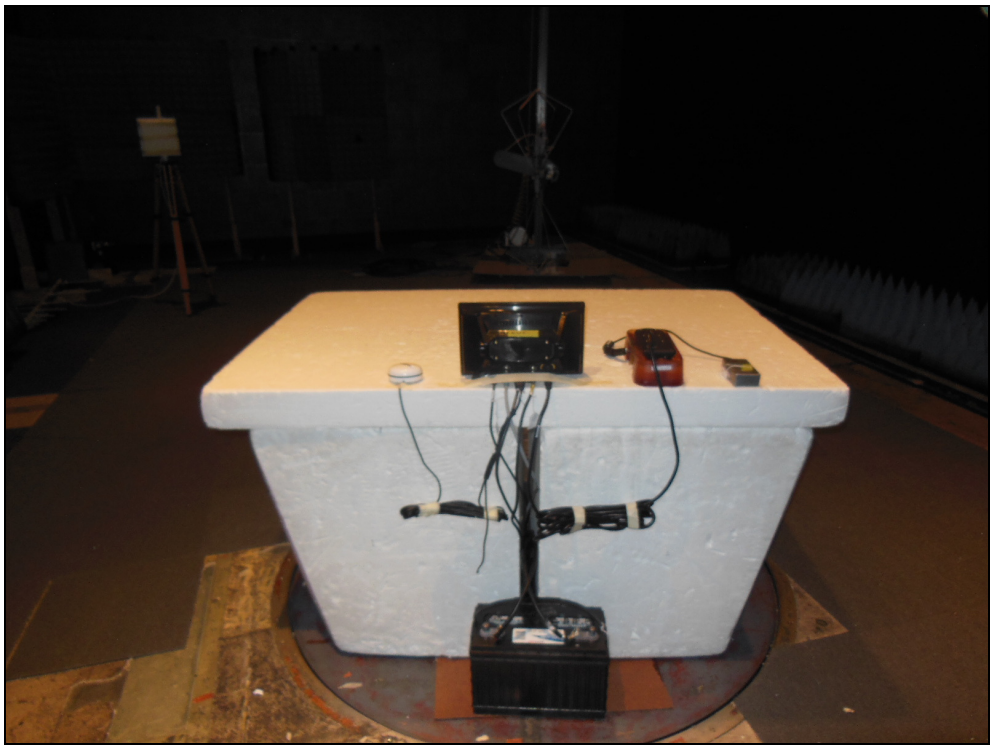


Figure 4.1.4-4: Radiated Emissions - Rear View - SAC

Figure 4.1.4-5: Radiated Emissions - Rear View - SAC

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

EN 301 489

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.

Test Data Table:

Measurement Distance:	EN 60945
☐ 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
1.247	41.50	25.31	n/a	1.5	158	10.72	---------	36.03	--------	51.3	---------	15.2
2.447	26.39	17.20	n/a	1.5	202	10.76	---------	27.96	--------	51.1	---------	23.1
4.868	23.34	14.39	n/a	1.5	234	11.00	---------	25.39	--------	51.0	---------	25.6
5.82	24.62	13.21	n/a	1.5	288	11.00	---------	24.21	--------	50.5	---------	26.3
157.16		13.83	V	300	270	-10.10	---------	3.73	--------	24.0	---------	20.3
160.177		13.93	V	300	270	-9.67	---------	4.26	--------	24.0	---------	19.7
130.937	---	35.36	V	100	90	-13.16	---------	22.20	--------	54.0	---------	31.8
400	---	49.11	H	100	236	-7.50	---------	41.61	--------	54.0	---------	12.4
450	---	47.29	V	146	164	-6.20	---------	41.09	--------	54.0	---------	12.9
600	---	40.89	H	100	348	-2.70	---------	38.19	--------	54.0	---------	15.8
801.95	---	44.14	H	221	296	0.44	---------	44.58	--------	54.0	---------	9.4
853.5	---	38.47	V	100	300	1.41	---------	39.88	--------	54.0	---------	14.1

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

Notes:

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 4.2.1-1:

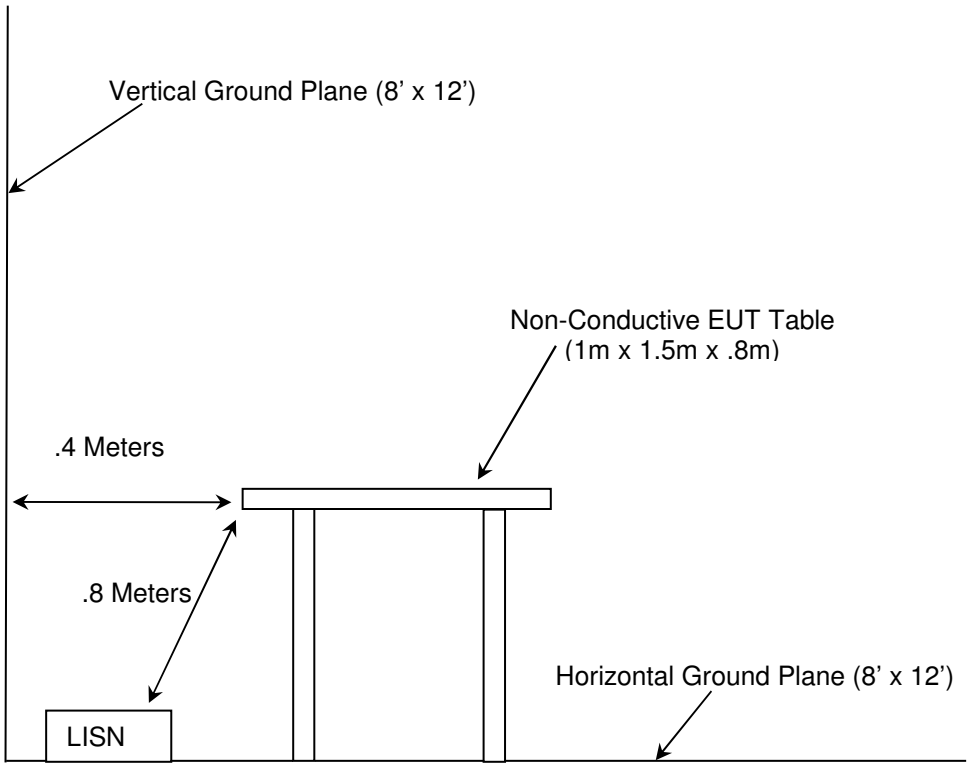


Figure 4.2.1-1: AC Mains Conducted EMI Site

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	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 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz for EN 301 489. Conducted emissions were performed from 10kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 200Hz for measurements between 10kHz and 150kHz and 9kHz for measurements between 150kHz and 30MHz and the video bandwidth set to 30kHz for EN60945. 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 1.2.

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

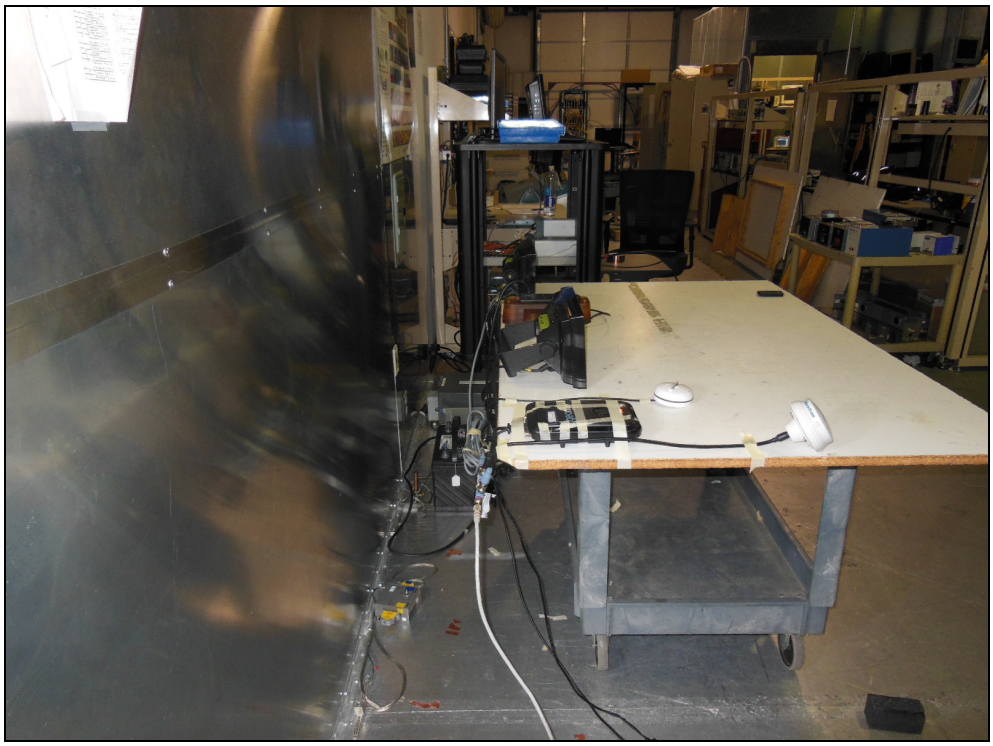


Figure 4.2.4-2: Conducted Emissions Test Setup – Side View

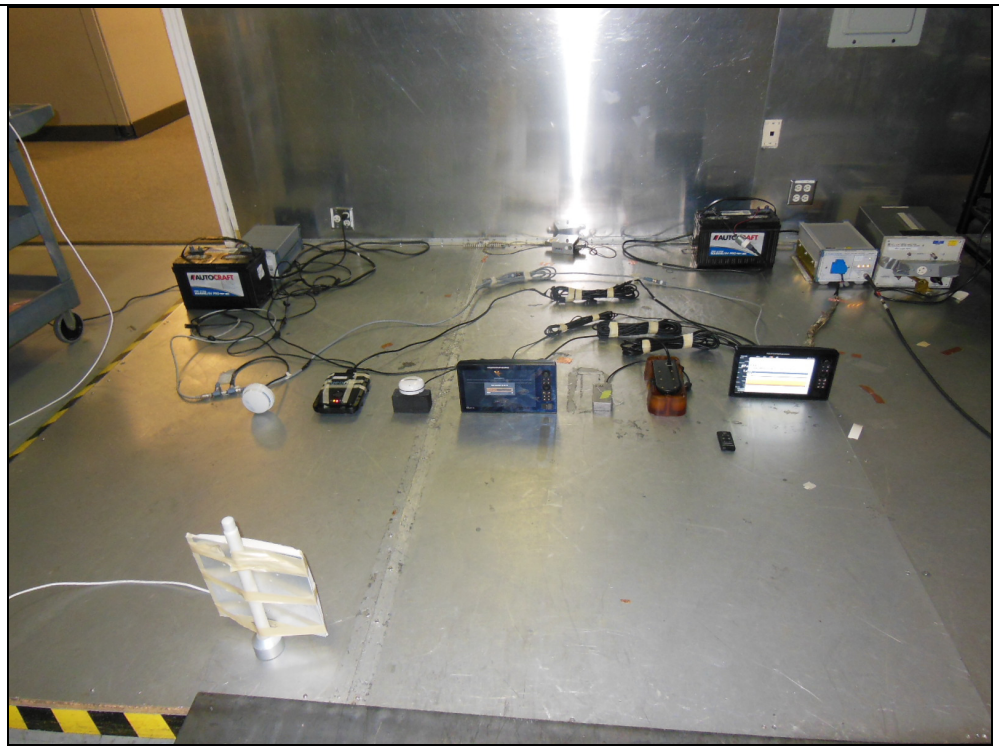


Figure 4.2.4-3: Conducted Emissions Test Setup – Front View - 60945

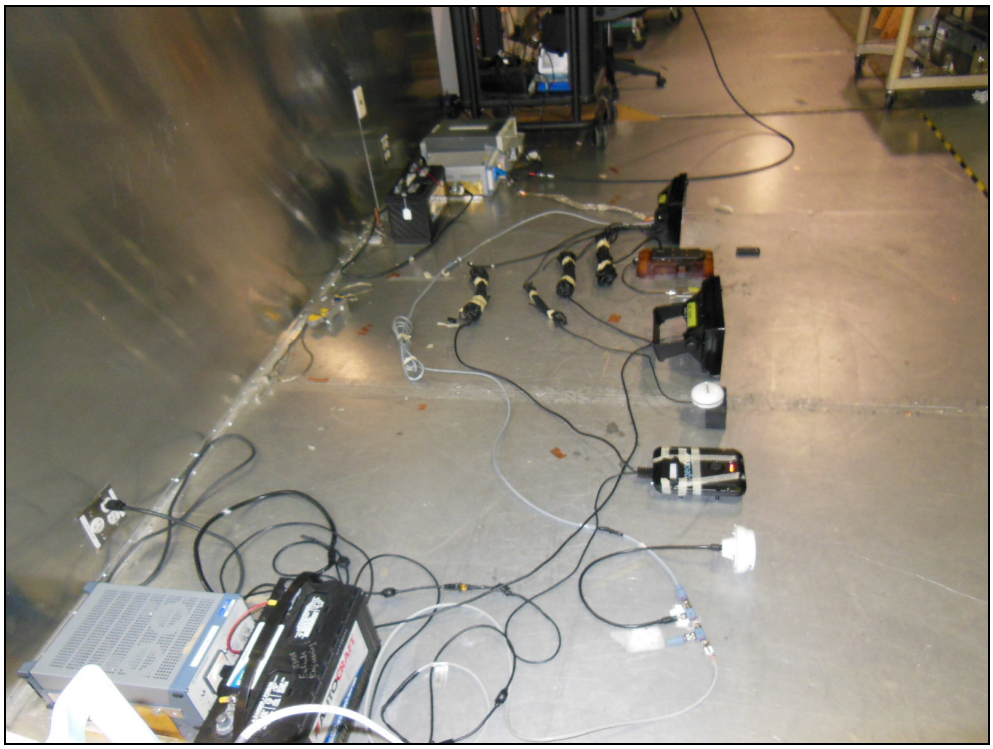


Figure 4.2.4-4: Conducted Emissions Test Setup – Side View - 60945

4.2.5 Test Data – External GPS, EN 301 489

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, EN 301 489

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:

4.2.7 Test Data – External GPS, EN 60945

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; 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: 4**
☐ **Telecom Port – Quantity:**

Power Line, L1
10kHz – 150kHz

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.0753	27.95		61.71		-33.76		9.59
0.0903	27.83		58.62		-30.79		9.59
0.1054	33.56		55.99		-22.43		9.59
0.1114	30.72		55.05		-24.33		9.59
0.1204	30.75		53.73		-22.98		9.59
0.1264	24.75		52.91		-28.16		9.59
0.1344	25.06		51.87		-26.81		9.59
0.1354	38.9		51.74		-12.84		9.59
0.1412	24.79		51.03		-26.24		9.59
0.1459	24.74		50.47		-25.73		9.59

Notes:

Power Line, N
10kHz – 150kHz

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.0903	27.99		58.62		-30.63		9.59
0.1054	33.5		55.99		-22.49		9.59
0.1113	30.72		55.07		-24.35		9.59
0.1204	30.75		53.73		-22.98		9.59
0.1324	25.02		52.12		-27.1		9.59
0.1354	38.66		51.74		-13.08		9.59
0.1373	24.78		51.5		-26.72		9.59
0.1406	24.72		51.1		-26.38		9.59
0.1423	24.72		50.9		-26.18		9.59
0.1439	24.73		50.71		-25.98		9.59

Notes:

Power Line, L1
150kHz – 30MHz

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	44.05		58.8		-14.75		9.58
4.682	40.22		50		-9.78		9.64
4.714	40.17		50		-9.83		9.64
4.778	40.59		50		-9.41		9.64
4.814	40.35		50		-9.65		9.64
4.882	41.32		50		-8.68		9.64
8.886	41.16		50		-8.84		9.68
9.326	34.72		50		-15.28		9.68
9.842	32.95		50		-17.05		9.69
10.142	33.94		50		-16.06		9.69

Notes:

Power Line, N
150kHz – 30MHz

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.162	37.7		59.09		-21.39		9.58
1.19	41.11		50		-8.89		9.6
4.79	40.62		50		-9.38		9.64
4.854	40.45		50		-9.55		9.64
4.958	40.17		50		-9.83		9.64
5.042	40.36		50		-9.64		9.64
8.854	40.34		50		-9.66		9.68
9.402	35.04		50		-14.96		9.68
9.802	32.8		50		-17.2		9.69
9.95	32.76		50		-17.24		9.69

Notes:

4.2.8 Test Data – Internal GPS, EN 60945

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: 4**
☐ **Telecom Port – Quantity:**

Power Line, L1
10kHz – 150kHz

Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.0903	27.69		58.68		-30.99		9.59
0.1054	33.5		55.99		-22.49		9.59
0.1113	30.72		55.07		-24.35		9.59
0.1204	30.75		53.73		-22.98		9.59
0.1342	24.77		51.89		-27.12		9.59
0.1354	38.94		51.74		-12.8		9.59
0.1393	24.78		51.26		-26.48		9.59
0.1401	22.65		51.16		-28.51		9.59
0.1415	24.72		50.99		-26.27		9.59
0.1421	25.12		50.92		-25.8		9.59

Notes:

Power Line, N 10kHz – 150kHz							
Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.0903	27.93		58.62		-30.69		9.59
0.1054	33.54		55.99		-22.45		9.59
0.1113	30.72		55.07		-24.35		9.59
0.1204	30.75		53.73		-22.98		9.59
0.1324	25.02		52.12		-27.1		9.59
0.1354	38.84		51.74		-12.9		9.59
0.1373	24.78		51.5		-26.72		9.59
0.1406	24.72		51.1		-26.38		9.59
0.1423	22.65		50.9		-28.25		9.59
0.1439	24.73		50.71		-25.98		9.59

Notes:

Power Line, L1 150kHz – 30MHz							
Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.162	37.23		59.09		-21.86		9.58
0.222	45.49		55.37		-9.88		9.58
3.79	36		50		-14		9.63
4.882	40.39		50		-9.61		9.64
4.914	41.04		50		-8.96		9.64
5.05	40.98		50		-9.02		9.64
8.894	40.79		50		-9.21		9.68
9.654	34.22		50		-15.78		9.69
9.85	34.37		50		-15.63		9.69
10.134	33.56		50		-16.44		9.69

Notes:

Power Line, N 150kHz – 30MHz							
Frequency (MHz)	Corrected Reading		Limit		Margin		
	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dBuV)	Average (dBuV)	Quasi-Peak (dB)	Average (dB)	Correction (dB)
0.162	38.61		59.09		-20.48		9.58
0.222	45.03		55.37		-10.34		9.58
3.694	32.78		50		-17.22		9.63
4.694	40.2		50		-9.8		9.64
4.754	40.2		50		-9.8		9.64
4.786	40.53		50		-9.47		9.64
4.894	40.42		50		-9.58		9.64
5.062	40.57		50		-9.43		9.64
8.886	40.4		50		-9.6		9.68
9.898	34.72		50		-15.28		9.69

Notes:

5.0 Harmonic Current Emissions

5.1 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:

The EUT is DC powered; therefore, this test is not applicable and was not performed because the EUT is not directly connected to the AC power lines during operation.

6.0 Voltage Fluctuations & Flicker

6.1 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:

The EUT is DC powered; therefore, this test is not applicable and was not performed because the EUT is not directly connected to the AC power lines during operation.

SECTION C: IMMUNITY – TEST INFORMATION AND RESULTS

7.0 Electrostatic Discharge Immunity

7.1 Test Site Description

The EUT was configured and connected to satisfy its functional requirements.

For a table top configuration, the EUT was placed on an insulating support of 0.5mm in the center of the Horizontal Coupling Plane (HCP). The HCP laid flat on a non-conductive table measuring 1.6 meters x 0.8 meters x 0.8 meters. The non-conductive table was placed on a 16 feet x 8 feet Ground Reference Plane (GRP). The Vertical Coupling Plane was placed 10cm from the EUT and insulated from the HCP.

For a floor standing configuration the EUT was placed on a 10cm insulated support. The non-conductive spacer was placed on a 16 feet x 8 feet Ground Reference Plane (GRP). The Vertical Coupling Plane was placed 10cm from the EUT.

Both the HCP and the VCP were connected to the GRP via cables with 470kΩ resistors located at each end. The ground lead of the ESD generator was also connected to the GRP.

7.2 Test Equipment

Table 7.2-1: Test Equipment List

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
144	Omega	RH411	Climate Monitoring Equipment	H0103373	9/1/2016	9/1/2018
371	Fluke	Fluke 115	Meters	93872717	7/14/2016	7/14/2018
582	Kikusui	KES4021A	ESD Gun	SA003046	5/12/2017	5/12/2018

NCR = No Calibration Required

7.3 Test Methodology

IEC 61000-4-2 - Electromagnetic compatibility (EMC) - Part 4. Testing and measurement techniques - Section 4.2 Electrostatic discharge immunity test - Basic EMC Publication, was the guiding document for this test. The purpose of this test is to verify the immunity of single devices or systems against electrostatic discharges (ESD) generated by an operator or object touching the equipment, or by objects or persons coming into contact in the vicinity of the equipment.

Only areas of the EUT that are accessible to the user are considered for the evaluation.

Direct Contact Discharge

Devices with accessible conductive surfaces are subject to direct contact discharges. Each test point identified was subjected to 10 discharges of both positive and negatives impulses.

Indirect Contact Discharge

The EUT was subjected to indirect contact discharges to a horizontal coupling plane (HCP). At least 10 single discharges in both polarities were applied to the EUT via the HCP on all sides and at a separation distance of 10cm. In addition the EUT was subjected indirect discharges to a vertical coupling plane (VCP). At least 10 single discharges in both polarities were applied to the EUT via the VCP on all sides and at a separation distance of 10cm.

Air Discharge

Insulated surfaces of the EUT that are accessible were subjected to air discharges. Each test point is subjected to 10 discharges of each polarity.

7.3.1 Test Criteria

EN 301 489-17 V3.2.0 and EN60945 requires performance criterion B to be met as described in section 1.4.4

7.3.2 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:**

7.4 Test Setup Photograph

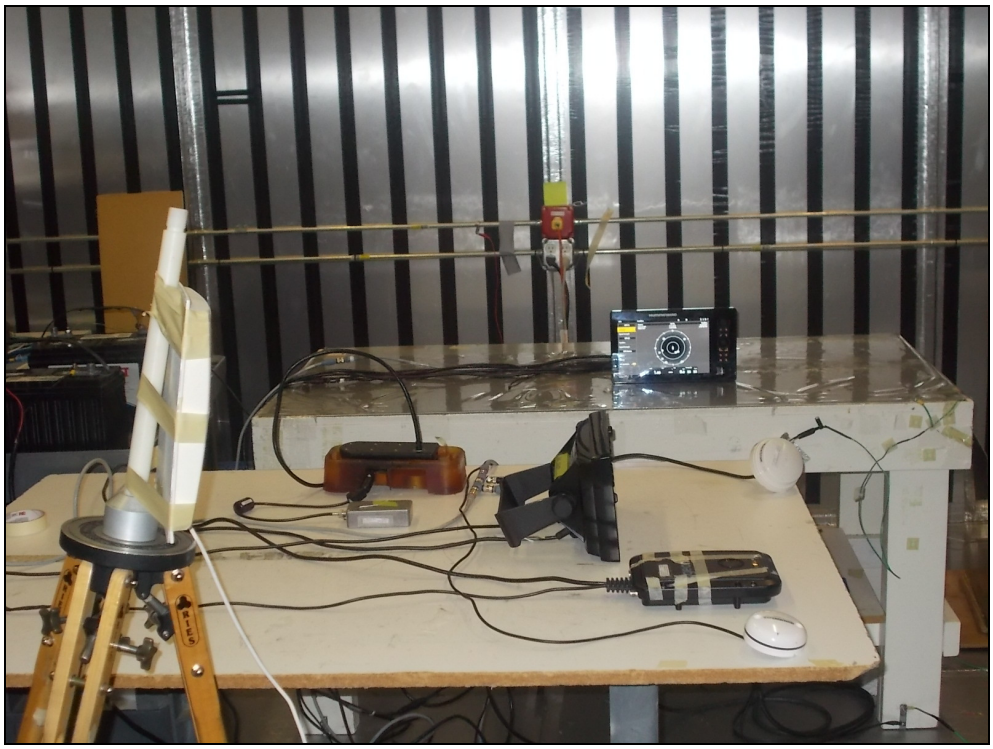
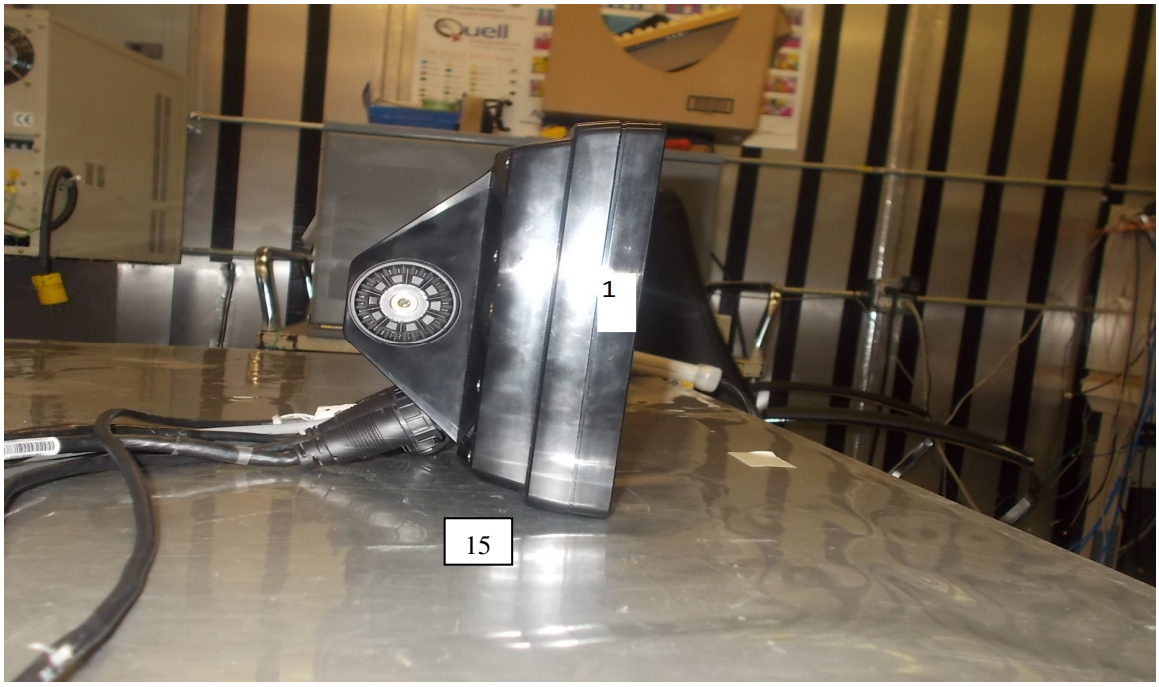
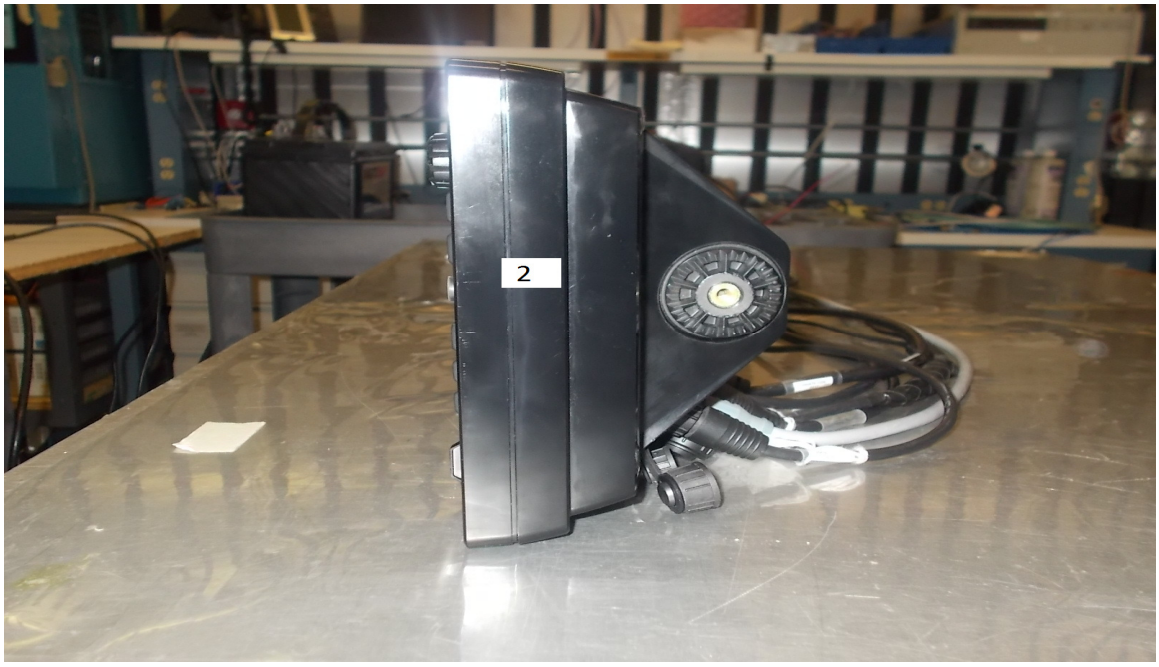


Figure 7.4-1: Test Setup Photograph

7.5 ESD Data Sheet

Test Point Photograph:






3


4
5
6
7
8

Test Point Selection:

TEST POINT#	DESCRIPTION	TYPE (C/A)	TEST POINT#	DESCRIPTION	TYPE (C/A)
1	Right side seam	**Air**	11	Top Screen Seam	**Air**
2	Left side seam	**Air**	12	Bottom Screen seam	**Air**
3	Top seam	**Air**	13	Left Screen seam	**Air**
4	Power Cable port	**Air**	14	Right Screen seam	**Air**
5	NMEA 2000 Port	**Contact**	15	Bottom Seam	**Air**
6	NMEA 0183 Port	**Air**			
7	Ethernet Port	**Contact**			
8	Sonar Temp Port	**Air**			
9	Twist Knob/Button Pad	**Air**			
10	Joystick/Button pad	**Air**			

7.6 Test Data

Test Parameters:

Test Date:	11/09/17	Temperature (ºC)	22.4
Technician:	Eugene Sello	Humidity (%)	40.2
Equipment Class:	N/A	Barometric Pressure (mBar)	1019.6
		☒ Pre-test Verification Complete	
Tested Modes:	Eut on, GPS and Bluetooth Connected		
AC Input Power:	N/A	VCP Resistor Value Check:	.976M (Ohms)
DC Input Power:	24VDC	HCP Resistor Value Check:	.985M (Ohms)

Indirect Contact Discharge:

Check All That Apply to This Data

Plane:	Polarity:	Tested Levels:	
☐ Vertical Coupling Plane	☐ Positive	☒ 2kV	☐ 8kV
☐ Horizontal Coupling Plane	☐ Negative	☒ 4kV	☐ 15kV
☒ Both	☒ Both	☒ 6kV	☐ Enter Other Level Here

Side	Result	Observation (Describe any detectable event)
Front	Pass	
Rear	Pass	
Left	Pass	
Right	Pass	
Bottom	Pass	

Notes:

Air and Direct Contact Discharge:

Check All That Apply to This Data

Polarity:	Tested Levels:	
☐ Positive	☒ 2kV	☒ 8kV
☐ Negative	☒ 4kV	☐ 15kV
☒ Both	☒ 6kV	☐ Enter Other Level Here

Test Point	Discharge Type	Result	Observation (Describe any detectable event)
1	Air	Pass	
2	Air	Pass	
3	Air	Pass	
4	Air	Pass	
5	Contact	Pass	
6	Air	Pass	
7	Contact	Pass	
8	Air	Pass	
9	Air	Pass	
10	Air	Pass	

11	Air	Pass	
12	Air	Pass	
13	Air	Pass	
14	Air	Pass	
15	Air	Pass	

Notes:
Air discharge testing performed up to 8KV, contact discharge testing performed up to 6KV.

8.0 Radio-Frequency Electromagnetic Fields

8.1 Test Site Description

The radiated fields test was performed in the semi or fully-anechoic chamber described in section 4.1.1.2 or 4.1.1.3 respectively.

8.2 Test Equipment

Table 8.2-1: Test Equipment List

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
197	Amplifier Research	DC6080	Coupler	307006	NCR	NCR
354	ETS Lindgren	3142C	Antennas	00078838	NCR	NCR
370	IFI	CMX5002	Amplifier	L364-0407	NCR	NCR
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
565	United Microwave Products, Inc.	OO-190-15.00.0	Cables	565	NCR	NCR
566	United Microwave Products, Inc.	OO-190-00-120.0	Cables	566	NCR	NCR
642	Fairview Microwave	FMC0101951-200CM	Cables	N/A	NCR	NCR
711	Hewlett Packard	8648B	Signal Generators	3623A01926	7/10/2017	7/10/2018
1112	Wandel & Goltermann	BN2244/21	Probes	H0006	12/9/2016	12/9/2017

High Frequency

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
329	A.H. Systems	SAS-571	Antennas	721	8/3/2017	8/3/2019
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
564	United Microwave Products, Inc.	AO-190-00.36.0	Cables	564	NCR	NCR
565	United Microwave Products, Inc.	OO-190-15.00.0	Cables	565	NCR	NCR
566	United Microwave Products, Inc.	OO-190-00-120.0	Cables	566	NCR	NCR
684	Rohde & Schwarz	SML03	Signal Generators	103503	9/8/2017	9/8/2018
1112	Wandel & Goltermann	BN2244/21	Probes	H0006	12/9/2016	12/9/2017
1115	Varian	VZC6961G1	Amplifier	884	NCR	NCR
1116	Varian	VZM6991G5	Amplifier	1147	NCR	NCR
RE89	Amplifier Research	25S1G4A	Amplifier	0324609	NCR	NCR

NCR = No Calibration Required

8.3 Test Methodology

IEC 61000-4-3 Ed. 3.- Electromagnetic compatibility (EMC) - Part 4. Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic field immunity test, was the guiding document for this test. The purpose of this test is to verify the immunity of single devices or systems when subjected to radio-frequency electromagnetic field.

The EUT was configured and connected to satisfy its functional requirements. One representative sample was placed on the table and rotated 90° to expose all side of the EUT to the radiofrequency electromagnetic field. The table is non-conductive measuring 1.5 meters x 1.0 meters x 0.8 meters. The non-conductive table was placed 3 meters from the radiating antenna.

The frequency ranges to be considered are swept with the signal 80% amplitude modulated with a 1kHz AM sine wave for EN 301 489 and 400Hz for EN60945, pausing to adjust the RF signal level or to switch oscillators and antennas as necessary. Where the frequency range is swept incrementally, the step size shall not exceed 1% of fundamental with linear interpolation between calibrated points.

The test shall normally be performed with the generating antenna facing each of the four sides of the EUT, however if the equipment can be used in different orientations, the test shall be performed on all sides, 6 total.

The polarization of the field generated by each antenna necessitates testing each side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.

8.3.1 Test Criteria

EN 301 489-17 V3.2.0 and EN60945 requires criterion A to be met as described in section 1.4.4.

8.3.2 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:**

8.4 Test Setup Photographs

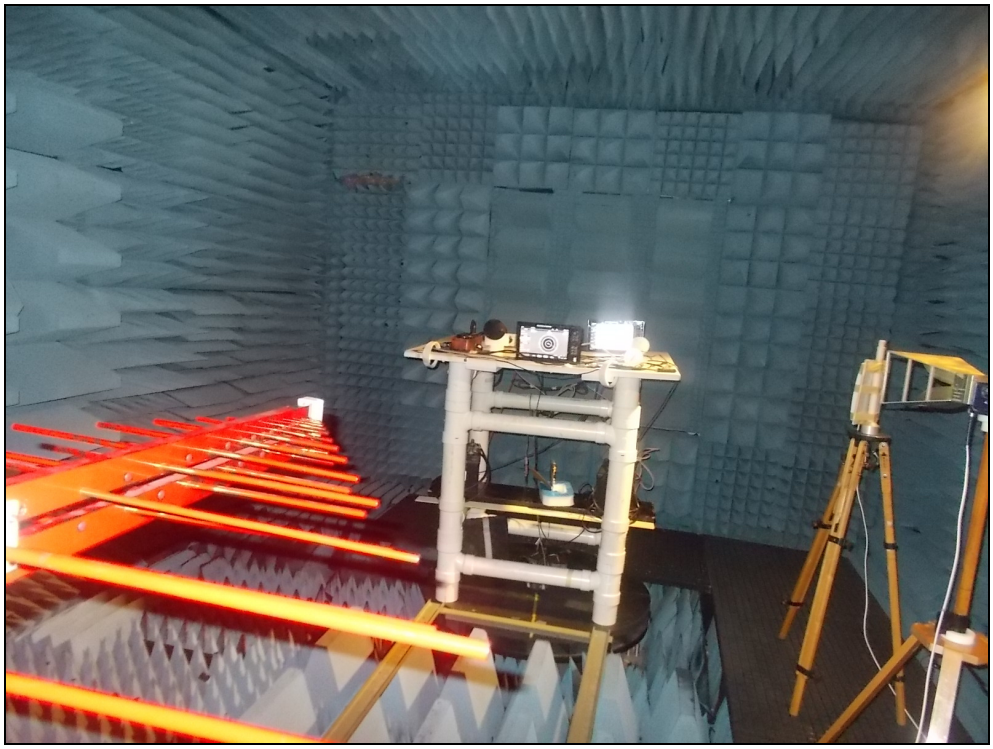


Figure 8.4-1: Test Setup Photograph

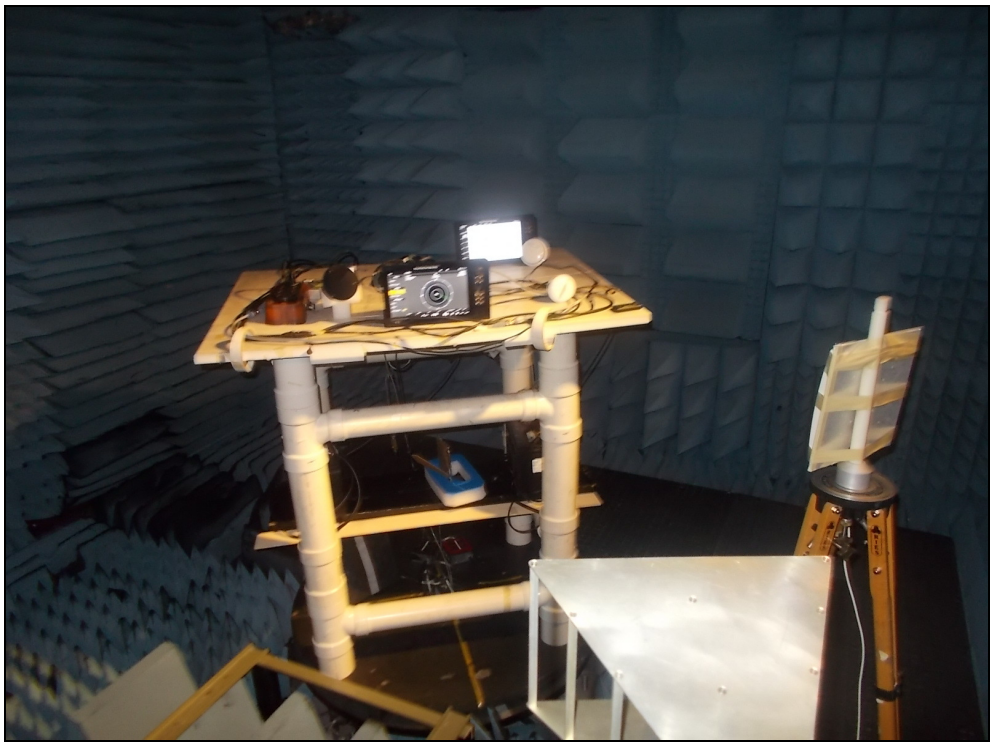


Figure 8.4-2: Test Setup Photograph

8.5 Test Results

Test Parameters: EN 301 489

Test Date:	**11/7/2017**	**Temperature (ºC)**	**23**
Technician:	**Art Sumner**	**Humidity (%)**	**41**
Equipment Class:	**N/A**	**Barometric Pressure (mBar)**	**1019**
Tested Modes:	**Monitoring GPS and Bluetooth**		
AC Input Power:	**N/A**	☒ **Pre-test Verification Complete**	
DC Input Power:	**12Vdc**		

Test Data:

Check All That Apply to This Data

Polarity	Field Strength:	Freq. Band:	Dwell Time
☐ Horizontal	☒ 3V/m	☐ 80-1000MHz	☒ 1 Second
☐ Vertical	☐ 10V/m	☒ 80-6000MHz	☐ 3 Seconds
☒ Both	☐ 8V/m	☐ Enter Other Band Here	☐ Enter Other
	☐ Enter Other Level Here		

Azimuth	Result	Observation (Describe any detectable event)
0	Pass	
90	Pass	
180	Pass	
270	Pass	

Notes:

8.6 Test Results

Test Parameters: EN60945

Test Date:	**11/7/2017**	**Temperature (ºC)**	**23**
Technician:	**Art Sumner**	**Humidity (%)**	**41**
Equipment Class:	**N/A**	**Barometric Pressure (mBar)**	**1019**
Tested Modes:	**Monitoring GPS and Bluetooth**		
AC Input Power:	**N/A**	☒ **Pre-test Verification Complete**	
DC Input Power:	**12Vdc**		

Test Data:

Check All That Apply to This Data

Polarity	Field Strength:	Freq. Band:	Dwell Time
☐ Horizontal	☐ 3V/m	☒ 80-1000MHz	☒ 2.86 Seconds
☐ Vertical	☒ 10V/m	☐ 80-6000MHz	☐ 3 Seconds
☒ Both	☐ 8V/m	☐ Enter Other Band Here	☐ Enter Other
	☒ 400Hz A.M.		

Azimuth	Result	Observation (Describe any detectable event)
0	Pass	
90	Pass	
180	Pass	
270	Pass	

Test Data:

Check All That Apply to This Data

Polarity	Field Strength:	Freq. Band:	Dwell Time
☐ Horizontal	☐ 3V/m	☐ 80-1000MHz	☐ 2.86 Seconds
☐ Vertical	☒ 10V/m	☒ 1000-2000MHz	☐ 3 Seconds
☒ Both	☐ 8V/m	☐ Enter Other Band Here	☒ 8.6 Seconds
	☒ 400Hz A.M.		

Azimuth	Result	Observation (Describe any detectable event)
0	Pass	
90	Pass	
180	Pass	
270	Pass	

Notes:
Spot frequencies also tested.
Frequencies of key interest also tested:

Source/Device	Frequency	Notes
5V Buck Converter	3MHz	
3.3V Buck Converter	3MHz	
Boost Switcher	2MHz	Synced
Power Manager	3MHz	Need to verify

AM3874 Reference Clock	20MHz	
AM3874 Internal Clock	1000MHz	
DSP Reference Clock	25MHz	
DSP Internal Clock	400MHz	
Display Clock	~71-72 MHZ	
Display Backlight	1MHz	Synced
Keyboard Backlight		
Ethernet Reference Clock	25MHz	
Ethernet Clock	50MHz	
DDR3 Memory PWR Supply	400kHz	Not Fixed, Adaptive Need to verify
DDR3 Memory	400MHz	
STM32F4 Reference Clock	8MHz	
STM32F4 Internal Clock	72MHz	
NMEA0183 UART Clock	14.31818MHz	
External A/D Conv. (CHIRP)	???	
GPS TCXO	26MHz	
GPS Receiver (GPS/GALILEO)	1575.42MHz	
GPS Receiver (GLONASS)	1602MHz	
GPS Receiver (BeiDou)	1561.098MHz	
Bluetooth Radio	2400MHz	
External A/D Conv. (Temp)	99.6Khz	

9.0 Electrical Fast Transient/Bursts

9.1 Test Site Description

The EUT was configured and connected to satisfy its functional requirements. The EUT was placed in the center of a non-conductive support measuring 125cm x 96cm x 10 cm. The non-conductive support is placed on a 8 feet x 8 feet Ground Reference Plane (GRP). A minimum distance of 50 cm between the EUT and all other conductive structures was maintained. A minimum distance of 50 cm between the coupling clamp and all other conductive structures, except the GRP, was maintained. A 10 cm insulated support was placed between the capacitive coupling clamp and the GRP. The GRP was bonded to the EFT/B generator.

The input power port of the EUT was tested using the coupling/decoupling network. The +/-1kV bursts were applied to all lines individually as well as simultaneously.

The bursts were applied to the signal/control line ports, if present, using the capacitive coupling clamp.

9.2 Test Equipment

Table 9.2-1: Test Equipment List

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
62	Haefely Trench	EFT Clamp	Immunity Equipment	N/A	7/12/2017	7/12/2018
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
474	Keytek	EMC PRO	General Lab Equipment	9808246	3/13/2017	3/13/2018

NCR = No Calibration Required

9.3 Test Methodology

IEC 61000-4-4 - Electromagnetic compatibility (EMC) - Part 4. Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test - Basic EMC Publication., was the guiding document for this test. The purpose of this test is to verify the immunity of single devices or systems when subjected to types of transient disturbances such as those originating from switching transients such as interruption of inductive loads or relay contact bounce.

9.3.1 Test Criteria

EN 301 489-17 V3.2.0 and EN60945 requires criterion B to be met as described in section 1.4.4.

9.3.2 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:**

9.4 Test Setup Photographs

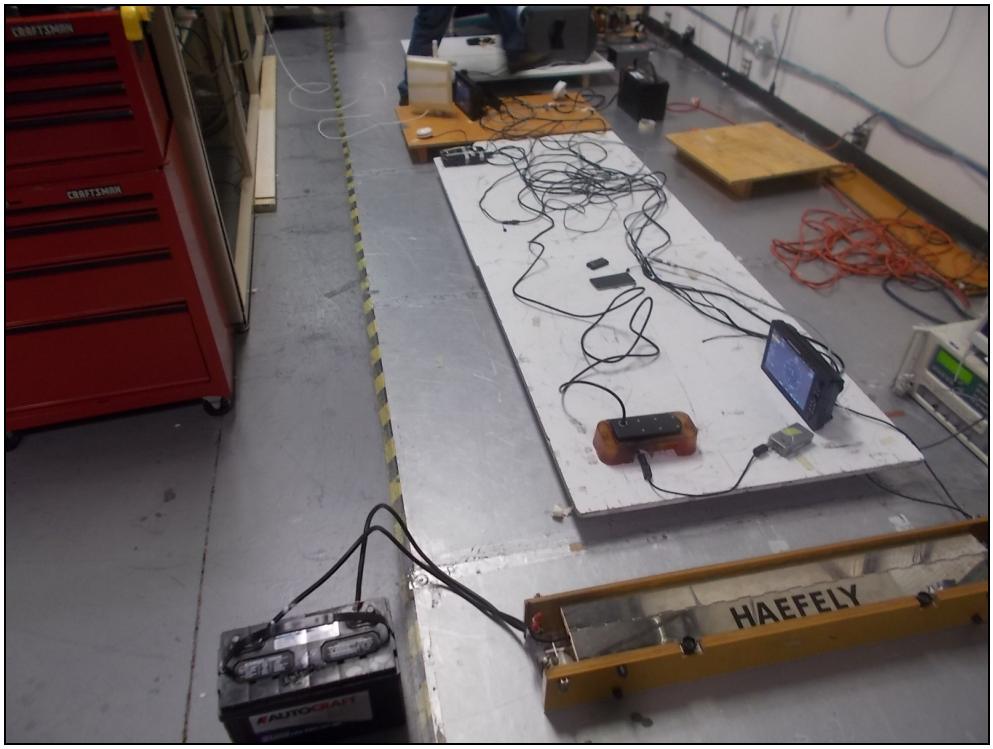


Figure 9.4-1: Test Setup Photograph

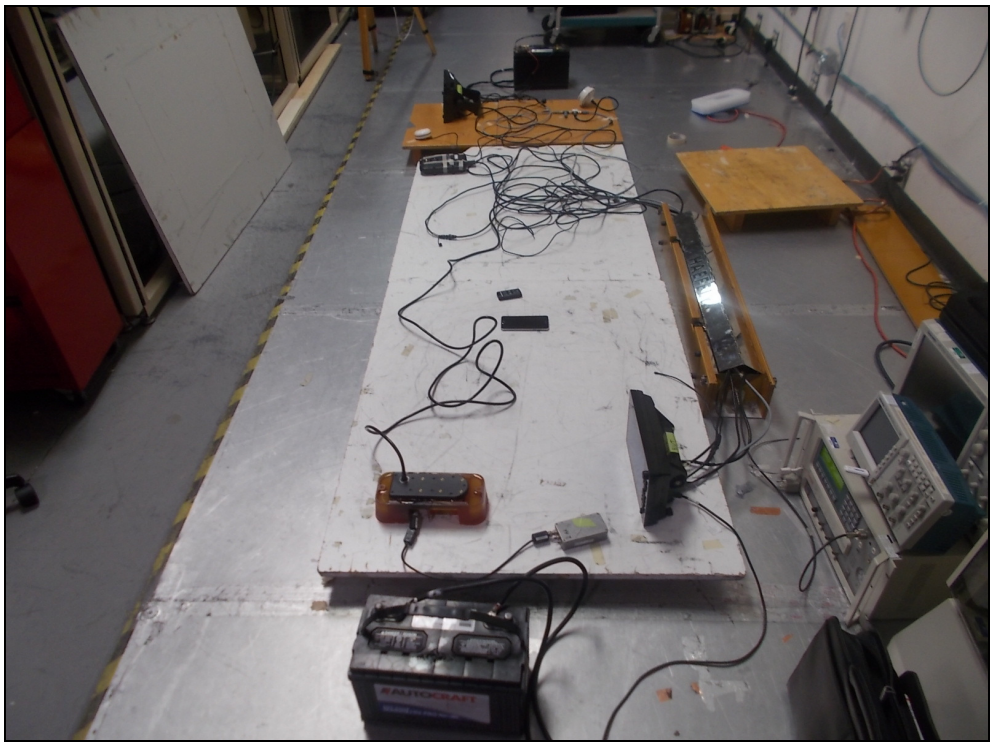


Figure 9.4-2: Test Setup Photograph

Figure 9.4-3: Test Setup Photograph

9.5 Test Results

Test Parameters:

Test Date:	**11/2/17**	**Temperature (ºC)**	**21**
Technician:	**Eugene Sello**	**Humidity (%)**	**40.3**
Equipment Class:	**N/A**	**Barometric Pressure (mBar)**	**1018.6**
Tested Modes:	**GPS/GLONASS/Bluetooth Connected**		
AC Input Power:	**N/A**	☒ **Pre-test Verification Complete**	
DC Input Power:	**12VDC**		

Mains Test Data: Per EN 301 489

Check All That Apply to This Data

Polarity:	Tested Levels:	Interface Type:
☐ Positive	☒ .5kV	☒ Input
☐ Negative	☐ 1kV	☐ Output
☒ Both	☐ 2kV	☐ Both
	☐	

Coupling Mode	Result	Observation (Describe any detectable event)
Clamp	Pass	

Notes:
12VDC Battery Input Power tested through Clamp

Signal Line Test Data: Per EN 301 489 and EN60945

Check All That Apply to This Data

Polarity:	Tested Levels:
☐ Positive	☐ .25kV
☐ Negative	☒ .5kV
☒ Both	☒ 1kV
	☐ 2kV
	☐ Enter Other Level Here

Signal Line	Result	Observation (Describe any detectable event)
NMEA 2000	Pass	
NMEA 0183	Pass	
Ethernet	Pass	
Sonar Temp	Pass	

Notes:
3 minute dwell on all testing

10.0 Surge Immunity

10.1 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:

The EUT is DC powered; therefore, this test is not applicable and was not performed because the EUT is not directly connected to the AC power lines during operation.

11.0 Radio-Frequency Common-Mode Immunity

11.1 Test Site Description

The EUT was configured and connected to satisfy its functional requirements. The EUT was placed on an insulating support of 0.1m height above a ground reference plane. All relevant cables were provided with the appropriate coupling and decoupling devices at a distance between 0.1m and 0.3m from the projected geometry of the EUT on the Ground Reference Plane (GRP).

11.2 Test Equipment

Table 11.2-1: Test Equipment List

AssetID	Manufacturer	Model#	Equipment Type	Serial#	Calibration Performed Date	Calibration Due Date
5	Chase	CSP-8441	Probes	19	6/5/2017	6/5/2018
93	Chase	8101	Clamp	65	5/25/2017	5/25/2018
96	Chase	1000-M3-25	CDN	9806	4/10/2017	4/10/2018
364	Amplifier Research	DC2600A	Coupler	0322466	NCR	NCR
370	IFI	CMX5002	Amplifier	L364-0407	NCR	NCR
418	Teseq	ISN-S501	LISN	24543	3/27/2017	3/27/2018
425	ACS	EMC Cable Set	Cable Set	425	NCR	NCR
457	Com Power	CDN-M2-25	Coupler	511023	7/11/2017	7/11/2018
471	Bird Technologies Group	150-A-FFN-06	Attenuators	0914	NCR	NCR
494	Omega	iBTHX-W	Climate Monitoring Equipment	9460211	8/1/2016	8/1/2018
634	Fischer Custom Communications Inc.	FCC-801-M3-16	CDN	9730	5/10/2017	5/10/2018
711	Hewlett Packard	8648B	Signal Generators	3623A01926	7/10/2017	7/10/2018

NCR = No Calibration Required

11.3 Test Methodology

IEC 61000-4-6 3rd Ed. - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio- frequency fields, was the guiding document for this test. The purpose of this test is to verify the immunity of single devices or systems when subjected to radio-frequency electromagnetic field.

The EUT was caused to operate as intended and monitored for changes in performance. The frequency range is swept from 150 kHz to 80MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz AM sine wave for EN 301 489 and 400Hz AM for EN60945, pausing to adjust the RF signal level or to switch coupling devices as necessary. The rate of sweep shall not exceed 1.5 x 10^{-3} decades. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

11.3.1 Test Criteria

EN 301 489-17 V3.2.0 and EN60945 requires criterion A to be met as described in section 1.4.4.

11.3.2 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:**

11.4 Test Setup Photographs

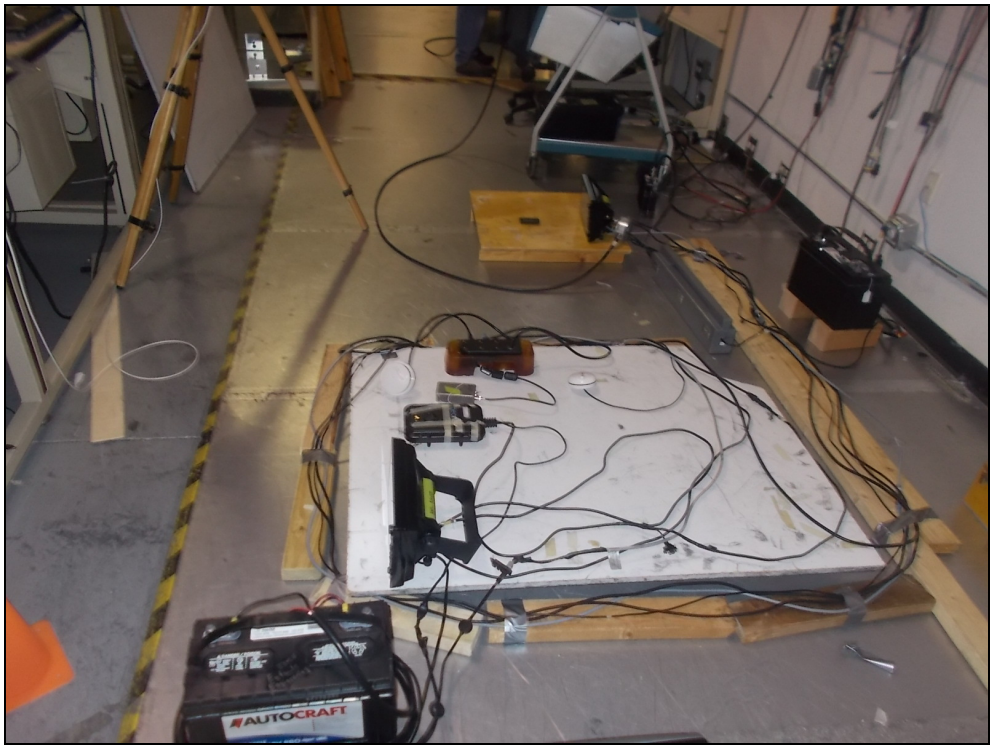


Figure 11.4-1: Test Setup Photograph

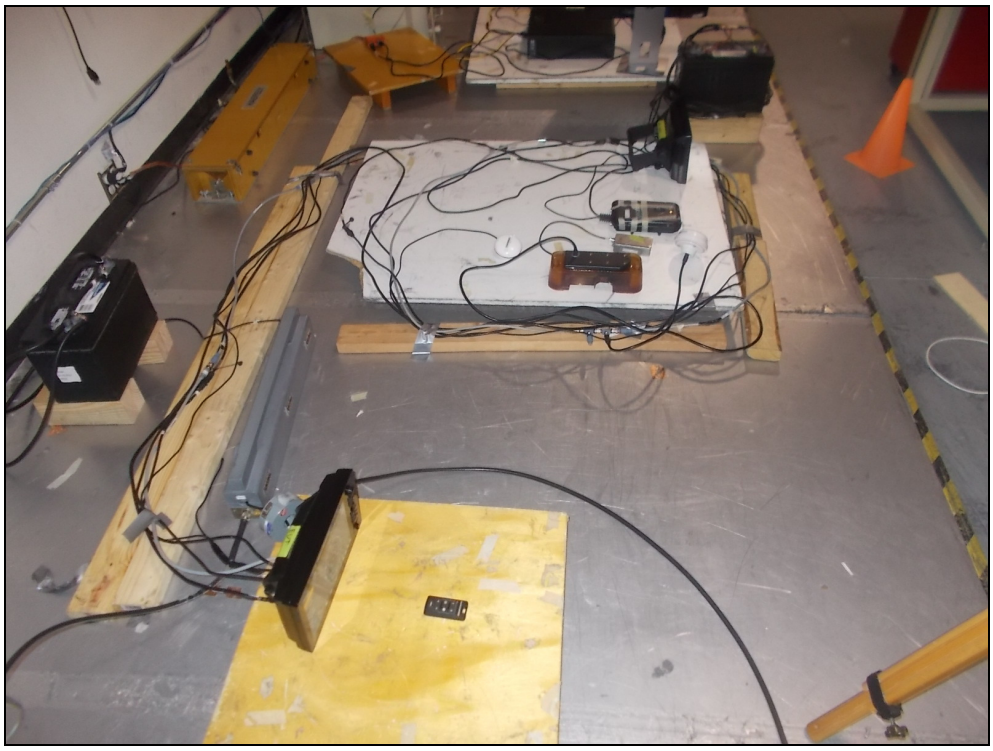


Figure 11.4-2: Test Setup Photograph

Figure 11.4-3: Test Setup Photograph

11.5 Test Results

Test Parameters:

Test Date:	11/8/17	Temperature (ºC)	20.3
Technician:	Eugene Sello	Humidity (%)	40.1
Equipment Class:	N/A	Barometric Pressure (mBar)	1021
Tested Modes:	GPS/GLONASS, Bluetooth Connected		
AC Input Power:	N/A	☒ Pre-Test Verification	
DC Input Power:	12VDC		

Mains Test Data:

Check All That Apply to This Data

Test Level:
☒ 3Vrms
☒ 10Vrms
☐ 15Vrms
☐ Enter Other Level Here

Freq. Band:
☒ .150-80MHz
☐ Enter Other Band Here

Coupling Mode	Result	Observation (Describe any detectable event)
Clamp	Pass	

Notes:
Spot frequency test at 10Vrms at 2.0, 3.0, 4.0, 6.2, 8.2, 12.6, 16.5, 18.8, 22 and 25 (MHz) for both DC input and I/O Cables

Signal Line Test Data:

Check All That Apply to This Data

Test Level:
☒ 3Vrms
☒ 10Vrms
☐ 15Vrms
☐ Enter Other Level Here

Freq. Band:
☒ .150-80MHz
☐ Enter Other Band Here

Signal Line	Result	Observation (Describe any detectable event)
NMEA 2000	Pass	
NMEA 0183	Pass	
Ethernet	Pass	
Sonar Temp	Pass	

Notes:
Spot frequency test at 10Vrms at 2.0, 3.0, 4.0, 6.2, 8.2, 12.6, 16.5, 18.8, 22 and 25 (MHz) for both DC input and I/O Cables

12.0 Power Frequency Magnetic Fields Immunity

12.1 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:

This test is not required per EN 301 489 or EN60945; therefore, it was not performed.

13.0 Voltage Dips and Interruptions

13.1 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:

The EUT is DC powered; therefore, this test is not applicable and was not performed because the EUT is not directly connected to the AC power lines during operation.

SECTION D: 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:

Test Method	U_{Lab}	U_{CISPR}	Uncertainty Units
Radiated Emissions 30MHz-1000MHz	3.68	5.2	dB
Radiated Emissions 30MHz to 200MHz	3.79	5.2	dB
Radiated Emissions 200 to 1000MHz	3.62	5.2	dB
Radiated Emissions 1-18GHz	3.65	---	dB
Conducted Emissions .150k-30MHz	1.52	3.6	dB
Radiated Disturbances 5MHz to 30MHz	2.81	4.5	dB
Radiated Disturbances 30MHz to 950MHz	2.21	4.5	dB
Harmonic Current Emissions	1.7	---	%
Voltage Fluctuations & Flicker	1.7	---	%
Insertion Loss/Internal Calibrations	.65	---	dB
Radiated Immunity 80-1000MHz	1.21	---	dB
Conducted Immunity .150-80MHz	1.64	---	dB
Frequency Interpolations	.81 (ave)	---	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. Where no value is given for U_{cispr} the procedure below does not apply.

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.

Immunity
The EUT was subjected to the appropriate test levels required by the standard with a confidence level of 95%(k=2).

SECTION E: CONCLUSION

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