



Excellence in Compliance Testing

Test Report to EN 300 440-2 V1.4.1

Electromagnetic compatibility and Radio spectrum Matters (ERM);
Short range devices;
Radio equipment to be used in the 1 GHz to 40 GHz frequency range;
Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

ACS Report Number: 16-0526.W09.1A

Manufacturer: Johnson Outdoors Marine Electronics, Inc.

Model(s): SOLIX 12 SI

Test Begin Date: December 6, 2016

Test End Date: December 6, 2016

Report Issue Date: January 10, 2017



FOR THE SCOPE OF ACCREDITATION UNDER Certificate Number: AT-2021

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.

Prepared by:

Ryan McGann
Wireless Program Manager
Advanced Compliance Solutions, Inc.

Reviewed by:

Thierry Jean-Charles
EMC Engineer
Advanced Compliance Solutions, Inc.

This test report shall not be reproduced except in full. This report may be reproduced in part with prior written consent of ACS, Inc. The results contained in this report are representative of the sample(s) submitted for evaluation.

This report contains 23 pages

Table of Contents

1.0 GENERAL	3
1.1 PURPOSE	3
1.2 PRODUCT DESCRIPTION	3
1.3 TEST METHODOLOGY AND CONSIDERATIONS	4
1.4 MODIFICATIONS OF EUT	4
1.5 REFERENCES	4
2.0 TEST FACILITIES	5
2.1 LOCATION	5
2.2 LABORATORY ACCREDITATIONS/RECOGNITIONS/CERTIFICATIONS	5
2.3 RADIATED EMISSIONS TEST SITE DESCRIPTION	6
2.3.1 <i>Semi-Anechoic Chamber Test Site</i>	6
2.3.2 <i>Open Area Tests Site (OATS)</i>	7
3.0 EQUIPMENT UNDER TEST SYSTEM BLOCK DIAGRAM	8
4.0 TEST SETUP BLOCK DIAGRAM(S)	9
5.0 CONCLUSIONS, OBSERVATIONS AND COMMENTS	11
6.0 MEASUREMENT UNCERTAINTY	11
7.0 TEST RESULTS SUMMARY	12
7.1 RESULTS SUMMARY	12
7.1.1 <i>Transmitter</i>	12
7.1.2 <i>Receiver</i>	12
7.1.3 <i>2.45 GHz RFID systems</i>	13
7.1.4 <i>GBSAR systems</i>	13
8.0 TEST RESULTS	14
8.1 TRANSMITTER PARAMETERS	14
8.1.1 <i>Equivalent Isotropically Radiated Power (e.i.r.p)</i>	14
8.1.2 <i>Permitted Range of Operating Frequencies</i>	14
8.1.3 <i>Unwanted Emissions in the Spurious Domain</i>	14
8.1.4 <i>Duty Cycle</i>	14
8.1.5 <i>Additional Requirements for FHSS Equipment</i>	14
8.2 RECEIVER PARAMETERS	15
8.2.1 <i>Adjacent Channel Selectivity</i>	15
8.2.2 <i>Blocking or Desensitization</i>	15
8.2.3 <i>Spurious Emissions</i>	16
8.3 2,45 GHz RFID SYSTEMS PARAMETERS	17
8.4 GBSAR SYSTEMS PARAMETERS	17
8.4.1 <i>Effective radiated power</i>	17
8.4.2 <i>Permitted range of operating frequencies</i>	17
8.4.3 <i>DAA threshold</i>	17
8.4.4 <i>Minimum listen time</i>	17
8.4.5 <i>Minimum listen time after detection</i>	18
8.4.6 <i>Maximum transmit on-time</i>	18
8.4.7 <i>Minimum transmit off-time</i>	18
8.4.8 <i>Antenna pattern</i>	18
8.4.9 <i>Unwanted emissions in the spurious domain</i>	18
9.0 TEST SET-UPS	19
10.0 SCREEN PLOTS / SCREEN CAPTURES	20
11.0 PHOTOGRAPHS OF THE EQUIPMENT (UUT)	21
12.0 TEST EQUIPMENT	23

1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with the essential requirements of EN 300 440-2 V1.4.1 using the test methods and limits as referenced and defined in EN 300 440-1 V1.6.1.

1.2 Product Description

Product Name: SOLIX 12 SI

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

The summary of the model variations are as follows:

SOLIX 12 SI (Tested Variant)

SOLIX 12

All model variants are identical and differ only in software. The SOLIX 12 SI has the most functionality and was submitted for testing to represent all of the SOLIX 12 model variants.

Internal GPS Receiver

72-channel u-blox M8 engine operating at GPS L1 C/A (1575.42 MHz)

Serial number: X4-7

Technical Information:

Detail	Description
Receiver Frequency / Alignment Range	1575.42 MHz
Operating Voltage	3.3Vdc
Internal Antenna Type / Gain:	18.4mm x 18.4mm x 4mm ceramic patch / 1.76dBi
Receiver Category	3
Temperature Category	I (General): -20 °C to +55 °C
Type of equipment:	Mobile
Hardware version:	GPS Receiver: 00080000
Software release:	GPS Engine FW Rev.: 3.01

Manufacturer Information:

Johnson Outdoors Marine Electronics, Inc.

678 Humminbird Lane

Eufaula, AL 36027- USA

Test sample received on: December 6, 2016

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

No deviation from the test methods specified in EN 300 440-1 was applied.

The EUT was configured such that all accessory and support equipment was located outside the test environment to the extent possible. Those components related to the GPS receivers were included in the test environment to facilitate measurement of emissions only related to the GPS receiver.

The GPS receiver was operating throughout the duration of the tests. A GPS repeater was utilized to provide an external GPS signal to the receivers. See section 4.0 for additional details.

1.4 Modifications of EUT

No modifications of the EUT were required.

1.5 References

- ETSI EN 300 440-1 (V1.6.1): " Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and test methods".
- ETSI EN 300 440-2 (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive"

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

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

2.2 Laboratory Accreditations/Recognitions/Certifications

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

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, ISED Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 391271

ISED Canada Lab Code: IC 4175A

VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

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 101 x 101 x 19mm thick and weighs approximately 550 grams. 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 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.

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 chases 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.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

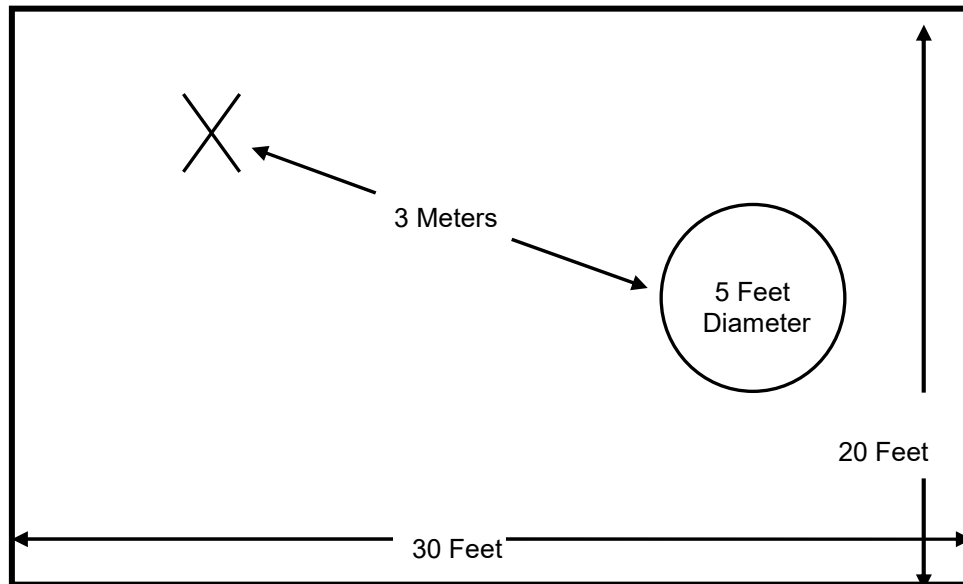


Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

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 2.3-2 below:

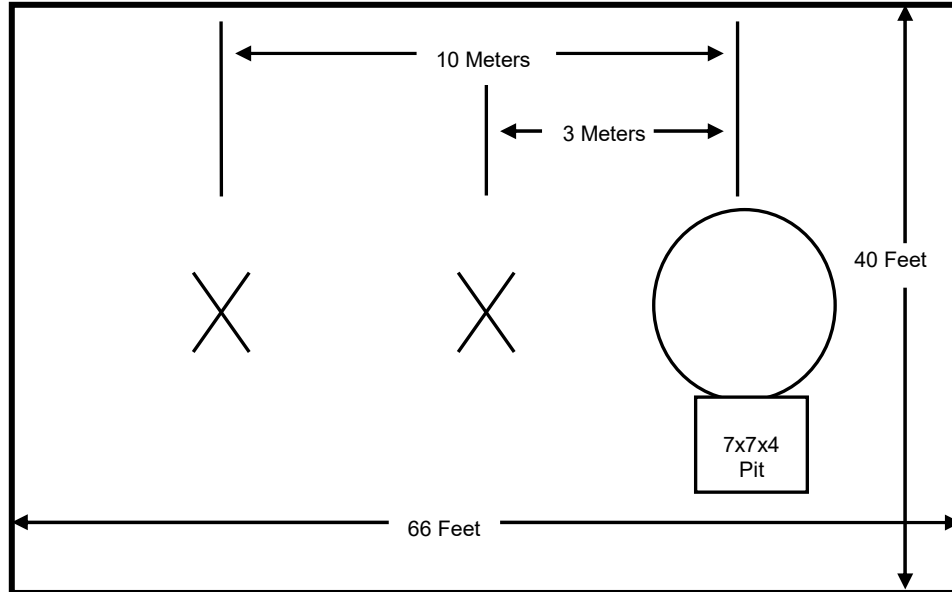


Figure 2.3-2: Open Area Test Site

3.0 EQUIPMENT UNDER TEST SYSTEM BLOCK DIAGRAM

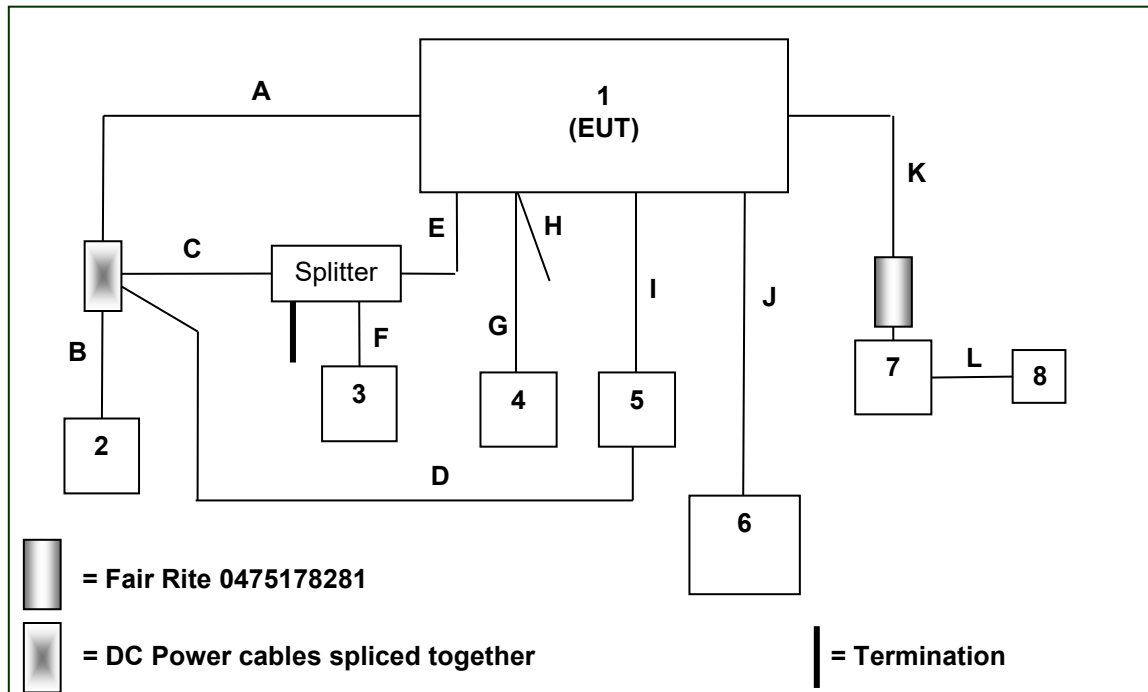


Table 3-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Johnson Outdoors	SOLIX 12 SI	X4-7
2	Battery	AutoCraft	29HM	DCG-31DT
3	Antenna	Maretron	N/A	ACS #7
4	GPS Antenna	Johnson Outdoors	AS GPS HS	12071842-0039
5	AIS System	Techsonic Industries	GTX AIS	46090073
6	Ancillary Display	Johnson Outdoors	SOLIX 12	X4-9
7	Transducer	Johnson Outdoors	N/A	ACS #6
8	Depth Simulator	Johnson Outdoors	N/A	ACS #5

Table 3-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	DC Power Cable	180 cm	No	1 – Splice
B	DC Power Cable	130 cm	No	Splice – 2
C	DC Power Cable	360 cm	No	Splice – Splitter
D	DC Power Cable	260 cm	No	5 – Splice
E	Power/Signal Cable	300 cm	Yes	1 – Splitter
F	Power/Signal Cable	60 cm	Yes	Splitter – 3
G	Signal Cable	630 cm	No	1 – 4
H	DC Power Cable	60 cm	No	1 – Unterminated
I	Signal Cable	310 cm	No	1 – 5
J	Ethernet Cable	920 cm	No	1 – 6
K	Signal Cable	620 cm	No	1 – 7
L	Signal Cable	55 cm	No	7 – 8

4.0 TEST SETUP BLOCK DIAGRAM(S)

RECEIVER SPURIOUS EMISSIONS

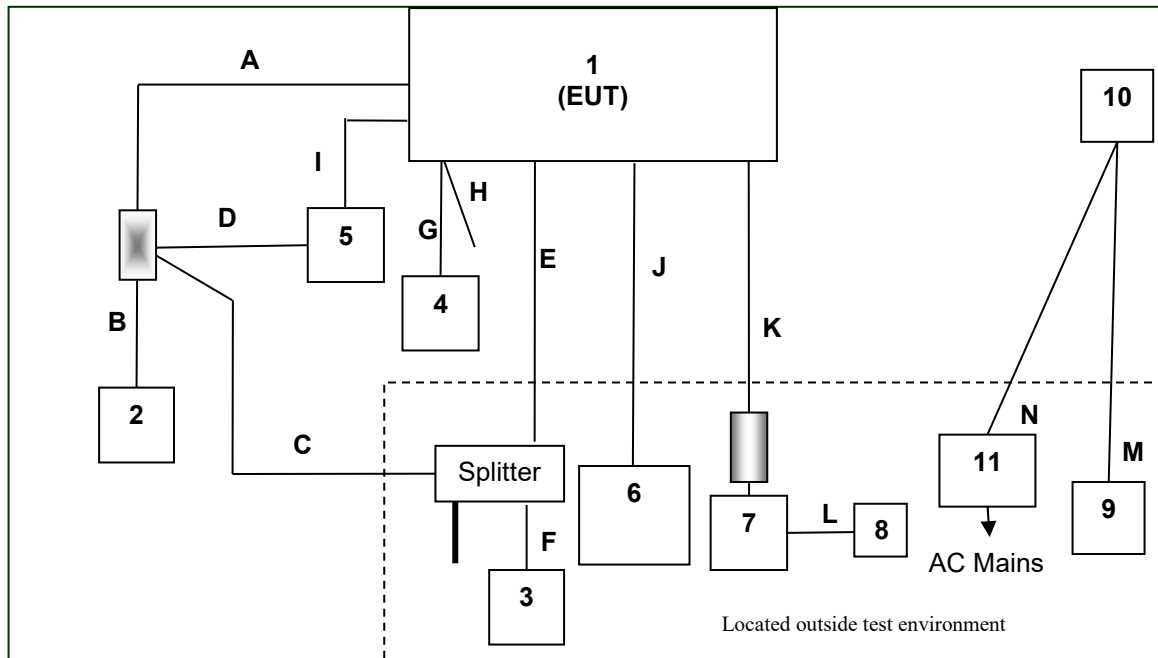


Table 4-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Johnson Outdoors	SOLIX 12 SI	X4-7
2	Battery	AutoCraft	29HM	DCG-31DT
3	Antenna	Maretron	N/A	ACS #7
4	GPS Antenna	Johnson Outdoors	AS GPS HS	12071842-0039
5	AIS System	Techsonic Industries	GTX AIS	46090073
6	Ancillary Display	Johnson Outdoors	SOLIX 12	X4-9
7	Transducer	Johnson Outdoors	N/A	ACS #6
8	Depth Simulator	Johnson Outdoors	N/A	ACS #5
9	GPS Antenna	NavsGo	G-503	N/A
10	GPS Antenna	NavsGo	N/A	N/A
11	Wall Wart Power Supply	TL Courier Charger	TL-803<IC>	N/A

Table 4-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	DC Power Cable	180 cm	No	1 – Splice
B	DC Power Cable	130 cm	No	Splice – 2
C	DC Power Cable	360 cm	No	Splice – Splitter
D	DC Power Cable	260 cm	No	5 – Splice
E	Power/Signal Cable	300 cm	Yes	1 – Splitter
F	Power/Signal Cable	60 cm	Yes	Splitter – 3
G	Signal Cable	630 cm	No	1 – 4
H	DC Power Cable	60 cm	No	1 – Unterminated
I	Signal Cable	310 cm	No	1 – 5
J	Ethernet Cable	920 cm	No	1 – 6
K	Signal Cable	620 cm	No	1 – 7
L	Signal Cable	55 cm	No	7 – 8
M	RF Cable	5.5m	Yes	9 – 10
N	RF Cable	1.15m	Yes	10 – 11

5.0 CONCLUSIONS, OBSERVATIONS AND COMMENTS

The test report will be filed at Advanced Compliance Solutions for a period of 10 years following the issue of this report. It may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval from Advanced Compliance Solutions.

The results of the tests as stated in this report are exclusively applicable to the EUT as identified in this report. Advanced Compliance Solutions cannot be held liable for properties of the EUT that have not been observed during these tests.

Advanced Compliance Solutions assumes the sample to comply with the requirements of EN 300 440-1,-2 for the respective test sector, if the test results turn out positive.

Comments: The provider was responsible for ensuring the test samples provided were representative of final production units.

6.0 MEASUREMENT UNCERTAINTY

Measurement uncertainties associated with each test have been estimated and expressed in table 6-1 below:

Table 6-1: Measurement Uncertainties

EN300 440 ACS Measurement Uncertainties: Maximum Values		
Parameter	U_{Std}	U_{Lab}
Radio Frequency	$\pm 1 \times 10^{-7}$	$\pm 2.832 \times 10^{-8}$
RF Power, Conducted	$\pm 2,5\text{dB}$	$\pm 0.680 \text{ dB}$
Radiated Emission of Transmitter, valid to 26,5 GHz	$\pm 6 \text{ dB}$	$\pm 5.810 \text{ dB}$
Radiated Emission of Transmitter, valid between 26,5 GHz and 66 GHz ¹	$\pm 8 \text{ dB}$	$\pm 4.318 \text{ dB}$
Radiated Emission of Receiver, valid to 26,5 GHz	$\pm 6 \text{ dB}$	$\pm 5.810 \text{ dB}$
Radiated Emission of Receiver, valid between 26,5 GHz and 66 GHz ¹	$\pm 8 \text{ dB}$	$\pm 4.318 \text{ dB}$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$	$\pm 0.860 \text{ }^{\circ}\text{C}$
Humidity	$\pm 5 \text{ \%}$	$\pm 0.740 \text{ \%}$
Voltage (DC)	$\pm 1 \text{ \%}$	$\pm 0.566 \text{ \%}$
Voltage (AC, <10 kHz)	$\pm 2 \text{ \%}$	$\pm 1.132 \text{ \%}$
¹ ACS does not have measurement equipment capable of measuring radiated emissions above 40GHz. The uncertainty values used for these parameters are only valid to 40GHz.		
Note: For radiated emissions above 26,5 GHz it may not be possible to achieve measurement uncertainties complying with the levels specified in this table. In these cases alone it is acceptable to employ the alternative interpretation procedure specified in clause 10.1.		

The above expanded laboratory measurement uncertainty figures correspond to an expansion factor (coverage factor) $k = 1.96$ which provide confidence levels of 95%.

7.0 TEST RESULTS SUMMARY

7.1 Results summary

The tables 7.1.1-1 and 7.1.1-2 summarize the results for the tested EUT corresponding with the essential requirements defined in EN 300 440-2.

7.1.1 Transmitter

Table 7.1.1-1: Transmitter results summary

Harmonized Standard EN 300 440-2 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive							
Requirement			Test Result			Test Specification	
No	Description	Reference: Clause No	P (Pass)	F (Fail)	N.t. (Not tested)	Reference: Clause No	Test Report Page No.
1	Equivalent isotropically radiated power	4.2.1.1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.3.1	N.t.
2	Permitted range of operating frequencies	4.2.1.2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.3.2	N.t.
3	Unwanted emissions in the spurious domain	4.2.1.3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.3.3	N.t.
4	Duty cycle	4.2.1.4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NA	N.t.

7.1.2 Receiver

Table 7.1.2-1: Receiver results summary

Harmonized Standard EN 300 440-2 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive							
Requirement			Test Result			Test Specification	
No	Description	Reference: Clause No	P (Pass)	F (Fail)	N.t. (Not tested)	Reference: Clause No	Test Report Page No.
5	Adjacent channel selectivity	4.2.2.1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.4.1	N.t.
6	Blocking or desensitization	4.2.2.2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.4.2	N.t.
7	Spurious radiations	4.2.2.3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.4.3	16

7.1.3 2.45 GHz RFID systems

Table 7.1.3-1: 2,45 GHz RFID systems results summary

Harmonized Standard EN 300 440-2 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive							
Requirement			Test Result			Test Specification	
No	Description	Reference: Clause No	P (Pass)	F (Fail)	N.t. (Not tested)	Reference: Clause No	Test Report Page No.
8	2,45 GHz RFID systems	4.2.3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.5	N.t.

7.1.4 GBSAR systems

Table 7.1.4-1: GBSAR systems results summary

Harmonized Standard EN 300 440-2 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive							
Requirement			Test Result			Test Specification	
No	Description	Reference: Clause No	P (Pass)	F (Fail)	N.t. (Not tested)	Reference: Clause No	Test Report Page No.
9	Effective radiated power	4.2.4.1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.1	N.t.
10	Permitted range of operating frequencies	4.2.4.2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.2	N.t.
11	DAA threshold	4.2.4.3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.3	N.t.
12	Minimum listen time	4.2.4.3.1.1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.4.1	N.t.
13	Minimum listen time after detection	4.2.4.3.1.2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.4.2	N.t.
14	Maximum transmit on-time	4.2.4.3.1.3	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.4.3	N.t.
15	Minimum transmit off-time	4.2.4.3.1.4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.4.4	N.t.
16	Antenna pattern	4.2.4.4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.5	N.t.
17	Unwanted emissions in the spurious domain	4.2.4.5	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	5.6.6	N.t.

8.0 TEST RESULTS

8.1 Transmitter Parameters

8.1.1 Equivalent Isotropically Radiated Power (e.i.r.p)

Verdict				Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA			

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.1.2 Permitted Range of Operating Frequencies

Verdict				Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA			

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.1.3 Unwanted Emissions in the Spurious Domain

Verdict				Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA			

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.1.4 Duty Cycle

Verdict				Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA			

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): The UUT does not include RFID in the 2446 MHz to 2454 MHz band.

8.1.5 Additional Requirements for FHSS Equipment

Verdict				Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA			

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.2 Receiver Parameters

8.2.1 Adjacent Channel Selectivity

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): The UUT is a category 3 receiver.

8.2.2 Blocking or Desensitization

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): The UUT is a category 3 receiver.

8.2.3 Spurious Emissions

The power of any spurious emission, radiated or conducted, shall not exceed the values given below.

The limits are applicable to all receiver categories:

- 2 nW below 1 000 MHz;
- 20 nW above 1 000 MHz.

Receiver radiated spurious emissions were performed on the host cabinet with the antenna attached. Therefore conducted spurious emissions are not required.

Table 8.2.3-1: Receiver spurious emissions

Measurement Method (see EN 300 440-1, clause 8.3):				
Frequency: 1575.42 MHz		Receiver spurious radiation		
Rel. humidity: 44.8%				
Ambient temp.: 20.5°C				
Air pressure: 1007mb				
Frequency Range	Test frequency (MHz)	Maximum emission observed (dBm)	Limit (dBm)	Margin (dBm)
25 MHz to 1 GHz	710.36	-60.46	-57	3.46
1 GHz to 18 GHz	Noise Floor	Noise Floor	-47	Noise Floor

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
80.52	-64.00	-72.30	H	-3.79	-76.09	-57.00	19.09
80.52	-53.2	-58.6	V	-3.79	-62.39	-57.00	5.39
710.36	-67.5	-64.5	H	2.84	-61.66	-57.00	4.66
710.36	-67.4	-63.3	V	2.84	-60.46	-57.00	3.46

Note: The measuring receiver was tuned over the frequency range 25 MHz to 18 GHz (> 10x the receive frequency).

The bandwidth of the measuring receiver was adjusted until the sensitivity of the measuring receiver was at least 6 dB below the spurious emission limit. The RBW was set to 120 kHz for measurements < 1000 MHz and 1 MHz for measurements ≥ 1000 MHz.

Some of the emissions detected are results of emanations from the digital device or peripheral circuitry and components. Those emissions determined to be directly related to the digital device or peripheral circuitry and components are not included.

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: 30, 40, 73, 90, 167, 329, 338, 412, 422, 544, 609, 616, 676, 701, RE619

8.3 2,45 GHz RFID systems parameters

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4 GBSAR systems parameters

8.4.1 Effective radiated power

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.2 Permitted range of operating frequencies

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.3 DAA threshold

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.4 Minimum listen time

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.5 Minimum listen time after detection

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.6 Maximum transmit on-time

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.7 Minimum transmit off-time

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.8 Antenna pattern

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

8.4.9 Unwanted emissions in the spurious domain

Verdict			Pass	Fail	N.t.
Further test results are attached	Yes	No	Page no.: NA		

Test equipment used with equipment no.: NA

N.t. (NOT TESTED): This evaluation addresses the GPS/GNSS receiver only.

9.0 TEST SET-UPS



Figure 9-1: Test Setup (Radiated Emissions)



Figure 9-2: Test Setup (Radiated Emissions)

10.0 SCREEN PLOTS / SCREEN CAPTURES

There are no plots or screen captures applicable to the test performed during this evaluation.

11.0 PHOTOGRAPHS OF THE EQUIPMENT (UUT)



Figure 11-1: External View



Figure 11-2: External View



Figure 11-3: External View



Figure 11-4: External View

12.0 TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 12-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/30/2015	4/30/2017
40	EMCO	3104	Antennas	3211	2/10/2015	2/10/2017
73	Agilent	8447D	Amplifiers	2727A05624	7/21/2016	7/21/2017
90	Electro-Metrics	LPA25	Antennas	1476	12/10/2015	12/10/2017
167	ACS	Chamber EMI Cable Set	Cable Set	167	9/30/2016	9/30/2017
329	A.H.Systems	SAS-571	Antennas	721	7/22/2015	7/22/2017
338	Hewlett Packard	8449B	Amplifiers	3008A01111	8/21/2015	8/21/2017
412	Electro Metrics	LPA-25	Antennas	1241	8/8/2016	8/8/2018
422	Florida RF	SMR	Cables	805	10/27/2016	10/27/2017
544	ETS Lindgren	3110B	Antennas	3361	12/7/2015	12/7/2017
609	Rohde & Schwarz	SMB100A	Signal Generators	175334	8/16/2016	8/16/2018
616	Florida RF Cables	RE-200W-12.0-SM	Cables	N/A	9/2/2016	9/2/2017
676	Florida RF Labs	SMS-290AW-480.0-SMS	Cables	MFR2Y194	9/2/2016	9/2/2017
701	United Microwave Products, Inc.	AA-190-20.00.0	Cables	N/A	6/17/2016	6/17/2017
RE619	Rhode & Schwarz	ESU26	Spectrum Analyzers	1302.6005K26 Ser. 100190	11/5/2014	1/5/2017

END REPORT