EMC Test Report

Ocean Signal Limited
EPIRB3 Pro and EPIRB3

In accordance with IEC 61097-2: 2021

Prepared for: Ocean Signal Limited
Ocivan Way
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CT9 4NN
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Document 75952867-04 Issue 02

SIGNATURE			
A.J. Lawson			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Andrew Lawson	Chief Engineer, EMC	Authorised Signatory	30 September 2022

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with IEC 61097-2: Edition 4.0 2021-06 for the tests detailed in section 1.3.

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	27 September 2022
2	Correction of typographical errors	30 September 2022

Table 1

1.2 Introduction

Applicant	Ocean Signal Limited
Manufacturer	Ocean Signal Limited
Model Number(s)	EPIRB3 Pro EPIRB3
Serial Number(s)	EPIRB3 Pro: TA000015 EPIRB3: TA000015*
Hardware Version(s)	Issue 01.00
Software Version(s)	N/A
Firmware Version(s)	500S-03885 Issue 00.03.00
Number of Samples Tested	2
Test Specification/Issue/Date	IEC 61097-2: Edition 4.0 2021-06
Test Plan/Issue/Date	Not applicable
Order Number Date	PO37718 11-April-2022
Date of Receipt of EUT	30-March-2022
Start of Test	10-May-2022
Finish of Test	10-June-2022
Name of Engineer(s)	Matthew Dawkins and Michael Mawby
Related Document(s)	EN 61000-4-3: 1996 EN 61000-4-2: 2009 IEC 60945: 2008 ISO 694: 2000

* EUT serial number TA000015 was used for testing both the EPIRB3 Pro and EPIRB3 models: the same PCB and lower part of the housing was the same for both models. A change in the clear plastic and antenna section of the EPIRB differentiates between the two models, with the EPIRB3 Pro utilising a fixed antenna and the EPIRB3 utilising a ‘wind up’ antenna.

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with IEC 61097-2 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: EPIRB3Pro (fixed antenna) in float free housing - EPIRB idle, RFiD active				
2.1	5.18 - IEC 60945 10.4	Immunity to Radiated Radio Frequencies	Pass	EN 61000-4-3: 1996
2.2	5.18 - IEC 60945 10.9	Immunity To Electrostatic Discharge	Pass	EN 61000-4-2: 2009
2.3	5.20 - IEC 60945 11.2	Compass Safe Distance	Pass	ISO 694: 2000
Configuration and Mode: EPIRB3 (windup antenna) in manual housing - EPIRB idle, RFiD active				
2.1	5.18 - IEC 60945 10.4	Immunity to Radiated Radio Frequencies	Pass	EN 61000-4-3: 1996
2.2	5.18 - IEC 60945 10.9	Immunity To Electrostatic Discharge	Pass	EN 61000-4-2: 2009
2.3	5.20 - IEC 60945 11.2	Compass Safe Distance	Pass	ISO 694: 2000
Configuration and Mode: EPIRB3Pro (fixed antenna) standalone - EPIRB active, RFiD idle				
2.2	5.18 - IEC 60945 10.9	Immunity To Electrostatic Discharge	Pass	EN 61000-4-2: 2009
Configuration and Mode: EPIRB3 (windup antenna) standalone - EPIRB active, RFiD idle				
2.2	5.18 - IEC 60945 10.9	Immunity To Electrostatic Discharge	Pass	EN 61000-4-2: 2009

Table 2

1.4 Declaration of Build Status

MAIN EUT	
MANUFACTURING DESCRIPTION	Emergency Position Indicating Radio Beacon
MANUFACTURER	Ocean Signal Ltd, ACR Electronics Inc.
MODEL	EPIRB3 Pro (SafeSea EPIRB3 Pro), EPIRB3 (rescueME EPIRB3)
PART NUMBER	900S-03887 (EPIRB3 Pro , SafeSea EPIRB3 Pro), 900S-03886 (EPIRB3, rescueME EPIRB3)
HARDWARE VERSION	Issue 01.00 (All models)
SOFTWARE VERSION	Not Applicable
FIRMWARE VERSION	500S-03885 Issue 00.03.00 (All models)
PSU VOLTAGE/FREQUENCY/CURRENT	9V
HIGHEST INTERNALLY GENERATED FREQUENCY	406.031 MHz
FCC ID (if applicable)	XYE EPIRB3
INDUSTRY CANADA ID (if applicable)	9296A-EPIRB3E1E2
TECHNICAL DESCRIPTION (a brief technical description of the intended use and operation)	Emergency Position Indicating Radio Beacon incorporating 162 MHz AIS Man Overboard positioning, 406MHz Cospas Sarsat Satellite rescue and 121.5MHz homing capabilities.
COUNTRY OF ORIGIN	UK and USA
RF CHARACTERISTICS (if applicable)	
TRANSMITTER FREQUENCY OPERATING RANGE (MHz)	121.5MHz, 161.975MHz, 162.025 MHz & 406.031MHz
RECEIVER FREQUENCY OPERATING RANGE (MHz)	N/A
INTERMEDIATE FREQUENCIES	N/A
EMISSION DESIGNATOR(S): https://fccid.io/Emissions-Designator/	3K20A3X, 16K0GXW, 16K0G1D
MODULATION TYPES: (i.e. GMSK, QPSK)	Swept tone AM, GMSK, BPSK
OUTPUT POWER (W or dBm)	16 ±2dBm (121.5MHz), 31.5 ±0.5 dBm (AIS), 37dBm (406MHz)

I hereby declare that the information supplied is correct and complete.

Name: Mark Newton
Position held: Approvals Manager
Date: 15-June-2022

1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was an Ocean Signal Limited EPIRB3 Pro and EPIRB3.

The EPIRB3 Pro and EPIRB3 are 406 MHz Emergency Position Indication Radio Beacons with a 121.5 MHz homing transmitter and AIS signal locating function.

The EUTs are designed to be used to alert emergency services to aide rescue in grave and imminent danger. The devices also contain an RFiD transmitter which can be used when the beacons are not active.

Figure 1 – EPIRB3

Figure 2 – EPIRB3 Pro

1.5.2 Test Configuration

Configuration	Description
EPIRB3 (windup antenna) in manual housing	The EUT was installed into the manual housing
EPIRB3 (windup antenna) standalone	The EUT was tested in isolation
EPIRB3Pro (fixed antenna) in float free housing	The EUT was installed into the float free housing
EPIRB3Pro (fixed antenna) standalone	The EUT was tested in isolation

Table 3

1.5.3 Modes of Operation

Mode	Description
EPIRB idle, RFiD active	The EUT was switched off with RFiD active
EPIRB active, RFiD idle	The EUT was switched on with RFiD idle

Table 4

1.5.4 Monitoring of Performance

Mode	Description
EPIRB idle, RFiD active	A spectrum analyser was connected to an antenna inside the chamber to monitor for unintentional transmissions from the EUT.
EPIRB active, RFiD idle	A GPS simulator used to transmit a fixed position to the EUT. A beacon tester was used to monitor the EUT's 406 MHz transmissions including a check of GPS position. A spectrum analyser was connected to an antenna inside the chamber to confirm presence of the 121 MHz homing transmitter and AIS locating signal from the EUT.

Table 5

1.5.5 Performance Criteria

Performance Criteria A

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

The manufacturers specified performance level is detailed as:

No loss of EUT function or degradation of performance during and after the test is applied.

Performance Criteria B

The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

The manufacturers specified performance level is detailed as:

No loss of EUT function or degradation of performance after the test is applied.

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: EPIRB3, Serial Number: TA000015			
2	AIS True Heading parameter change	Ocean Signal Ltd	07 April 2022
Model: EPIRB3 Pro, Serial Number: TA000015			
2	AIS True Heading parameter change	Ocean Signal Ltd	07 April 2022

Table 6

1.8 Test Location

TÜV SÜD conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: EPIRB3Pro (fixed antenna) in float free housing - EPIRB idle, RFiD active		
Immunity to Radiated Radio Frequencies	Matthew Dawkins	UKAS
Immunity To Electrostatic Discharge	Matthew Dawkins	UKAS
Compass Safe Distance	Michael Mawby	UKAS
Configuration and Mode: EPIRB3 (windup antenna) in manual housing - EPIRB idle, RFiD active		
Immunity to Radiated Radio Frequencies	Matthew Dawkins	UKAS
Immunity To Electrostatic Discharge	Matthew Dawkins	UKAS
Compass Safe Distance	Michael Mawby	UKAS
Configuration and Mode: EPIRB3Pro (fixed antenna) standalone - EPIRB active, RFiD idle		
Immunity To Electrostatic Discharge	Matthew Dawkins	UKAS
Configuration and Mode: EPIRB3 (windup antenna) standalone - EPIRB active, RFiD idle		
Immunity To Electrostatic Discharge	Matthew Dawkins	UKAS

Table 7

Office Address:

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

2 Test Details

2.1 Immunity to Radiated Radio Frequencies

2.1.1 Specification Reference

IEC 61097-2, Clause 5.18
IEC 60945 10.4

2.1.2 Equipment Under Test and Modification State

EPIRB3, S/N: TA000015 - Modification State 2
EPIRB3Pro, S/N: TA000015 - Modification State 2

2.1.3 Date of Test

11-May-2022

2.1.4 Test Method

The equipment under test including associated cabling was configured on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

Three axes of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarisations.

During this test, any anomalies in the equipment under tests' performance were recorded.

2.1.5 Environmental Conditions

Ambient Temperature	25.5 °C
Relative Humidity	41.9 %

2.1.6 Specification Limits

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Test Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 1000	10[2]	AM (80 %,400 Hz, sine wave)	1	3[1]	A
1000 to 2000	10[2]	AM (80 %,400 Hz, sine wave)	1	9[1]	A
Supplementary information: Note 1. Dwell times <1GHz can be reduced to 2 s and >1GHz to 5 s for samples with fast cycle times. Note 2. As detailed in specification clause 5.3 Test results, the EUT shall pass the test only if the measured performance margin is favourable and greater than the test measurement uncertainty.					

Table 8

2.1.7 Test Results

Results for Configuration and Mode: EPIRB3 Pro (fixed antenna) in float free housing - EPIRB idle, RFiD active.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size	1%			
Dwell Time < 1GHz	3 s			
Dwell Time > 1GHz	9 s			
Modulation	400 Hz Sinewave 80% AM			
Frequency Range	Test Face	Antenna Polarisation	Test Level	Result
80 MHz to 2 GHz	X, Y and Z	Horizontal and Vertical	12.6 V/m (10 + MU)	Pass

Table 9

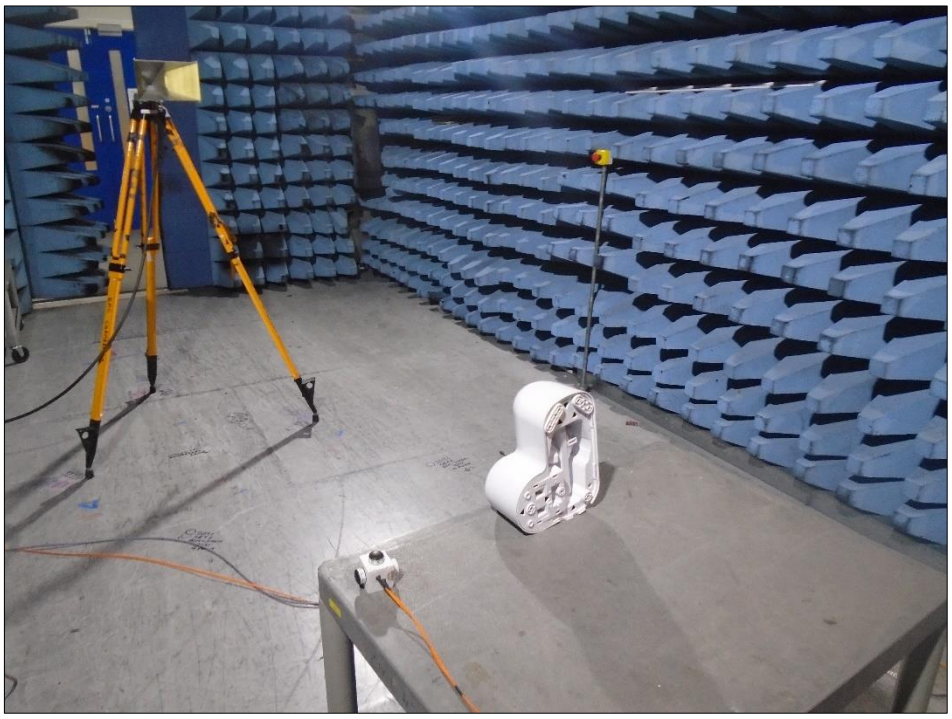

Figure 3 - Test Setup - Above 1 GHz

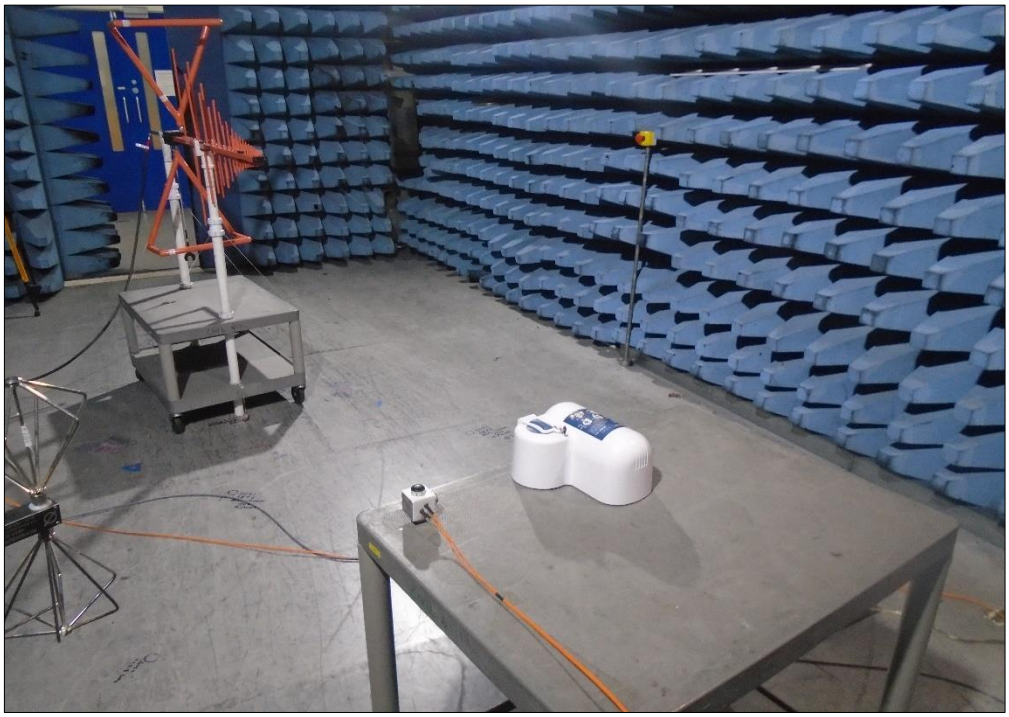

Figure 4 - Test Setup - Below 1 GHz

Results for Configuration and Mode: EPIRB3 (windup antenna) in manual housing - EPIRB idle, RFiD active.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size	1%			
Dwell Time < 1GHz	3 s			
Dwell Time > 1GHz	9 s			
Modulation	400 Hz Sinewave 80% AM			
Frequency Range	Test Face	Antenna Polarisation	Test Level	Result
80 MHz to 2 GHz	X, Y and Z	Horizontal and Vertical	12.6 V/m (10 + MU)	Pass

Table 10

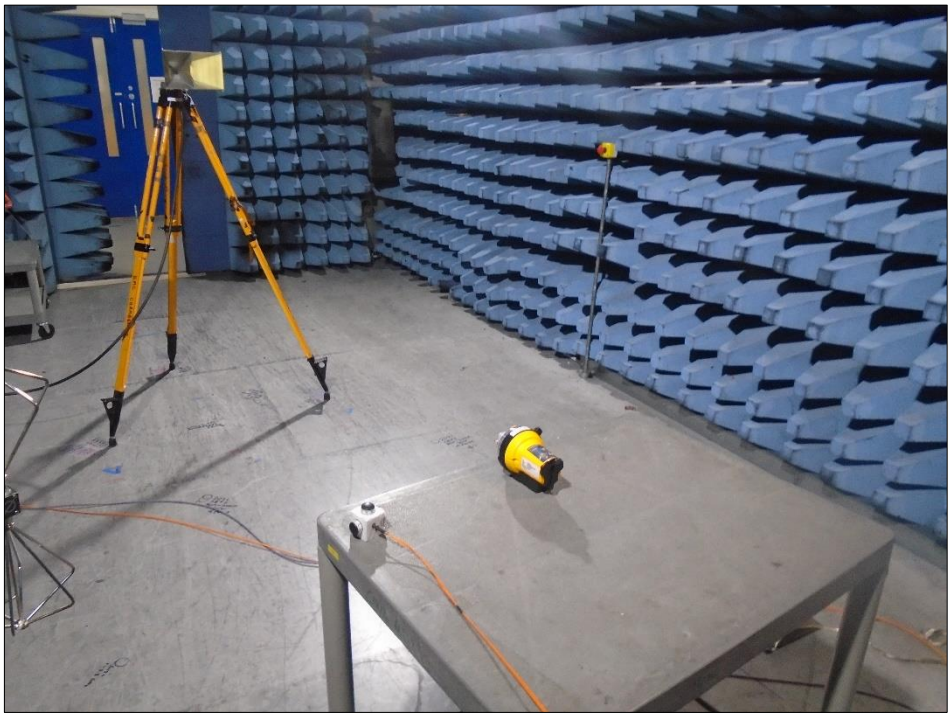

Figure 5 - Test Setup - Above 1 GHz

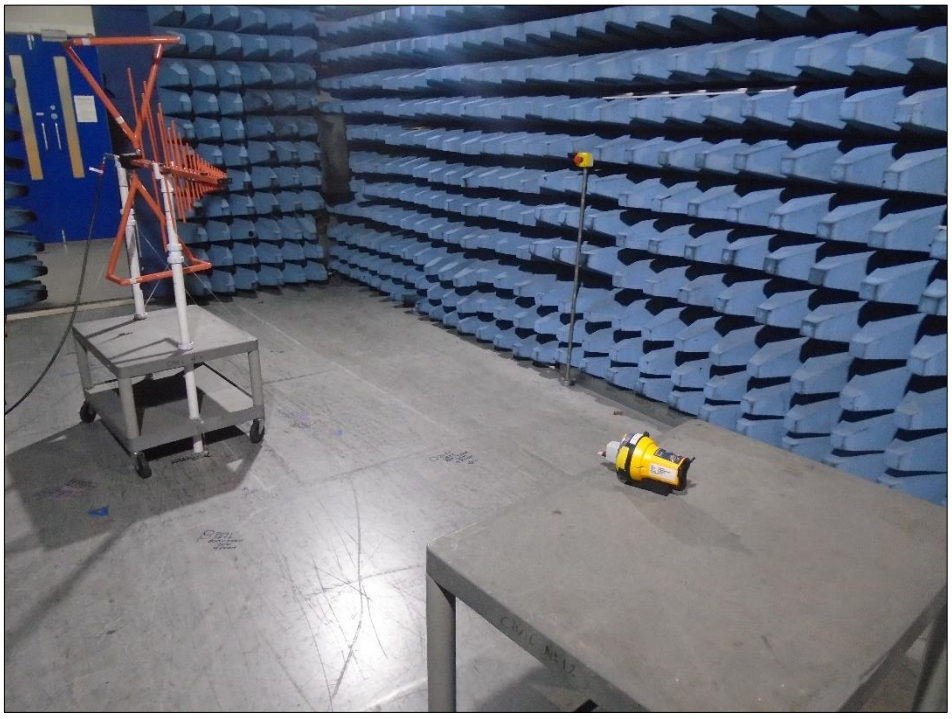

Figure 6 - Test Setup - Below 1 GHz

2.1.8 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Screened Room (2)	Rainford	Rainford	1542	12	23-Mar-2023
Radiated Immunity Test Software	Amp Research	EMCWare V4.0.7	4899	-	Software
Signal Generator (9 kHz to 6 GHz)	Rohde & Schwarz	SMB 100A	3500	12	25-Apr-2023
Amplifier (80 MHz to 1 GHz)	Amp Research	250W1000A	3029	-	TU
Amplifier (1 GHz to 2.5 GHz)	Thorn	PTC6341	2069	-	TU
Amplifier (2.5 GHz to 8 GHz)	Thorn	PTC6343	2068	-	TU
Directional Coupler	Amp Research	DC6180	283	-	TU
Power Sensor (100 kHz to 6 GHz)	Rohde & Schwarz	NRV-Z4	3815	-	TU
Power Meter	Rohde & Schwarz	NRVD	747	-	TU
Power Meter	Rohde & Schwarz	NRVD	748		TU
Antenna (Bilog, 30 MHz to 1 GHz)	Schaffner	CBL6143	322	-	TU
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	-	TU
Laser Powered Electric Field Sensor	Dare Development	RadiSense VI - CTR1001A	3209	-	TU

Table 11

TU - Traceability Unscheduled

2.2 Immunity To Electrostatic Discharge

2.2.1 Specification Reference

IEC 61097-2, Clause 5.18 - IEC 60945 10.9

2.2.2 Equipment Under Test and Modification State

EPIRB3, S/N: TA000015 - Modification State 2
EPIRB3Pro, S/N: TA000015 - Modification State 2

2.2.3 Date of Test

10-May-2022

2.2.4 Test Method

The equipment under test including associated cabling was configured on a horizontal coupling plane fitted with a 0.5mm insulated surface attached to the top of a 0.8m non-conductive table for table-top equipment or on a 0.1m insulated support for floor standing equipment, above a ground reference plane within a test laboratory.

Using the air discharge method for non-metallic parts, the contact discharge method for metallic parts and with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repetition rate.

During this test, any anomalies in the equipment under tests' performance were recorded.

2.2.5 Environmental Conditions

Ambient Temperature	19.6 °C
Relative Humidity	60.0 %

2.2.6 Specification Limits

Required Test Levels			Performance Criteria
Discharge type	Discharge Level (±kV)	Number of discharges per location per polarity	
Air – Direct	2, 4 and 8	10	B
Contact – Direct	6		
Contact – Indirect	6		
Supplementary information: None			

Table 12

2.2.7 Test Results

Results for Configuration and Mode: EPIRB3Pro (fixed antenna) in float free housing - EPIRB idle, RFiD active.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

◯ Contact ☐ Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Air Discharges	Air	✓*	✓*	✓*	✓*	N/A	N/A	✓*	✓*	N/A	N/A

Table 13

Key to Results	
✓	The EUT's performance was not impaired at this test point when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied.
N/A	Not Applicable.

Table 14

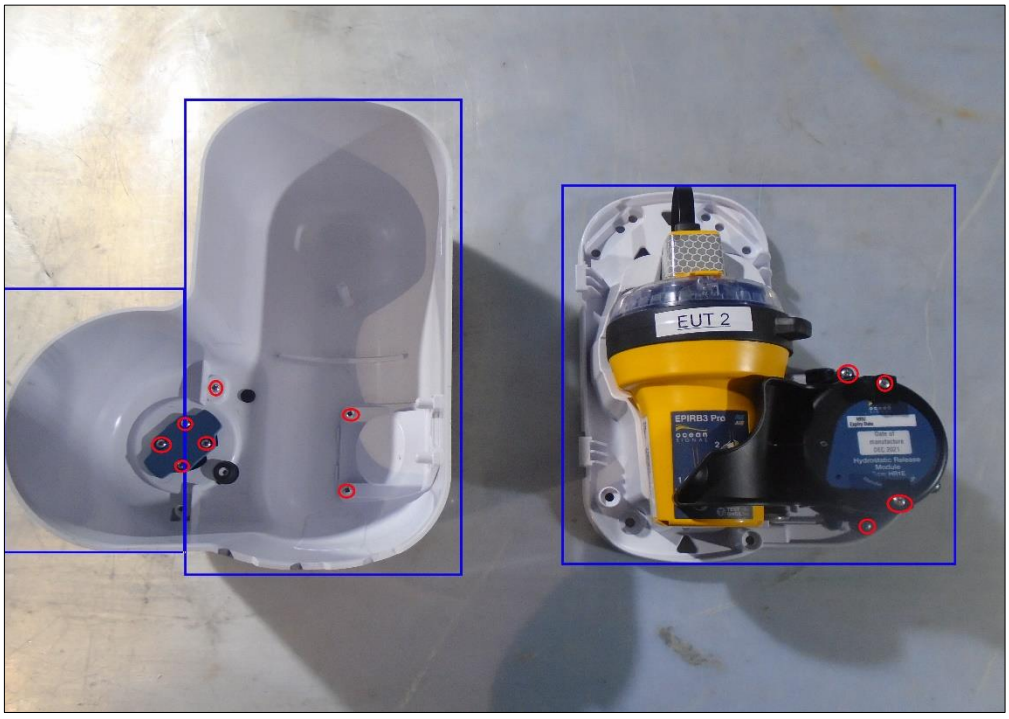

Figure 7 - ESD Test Positions

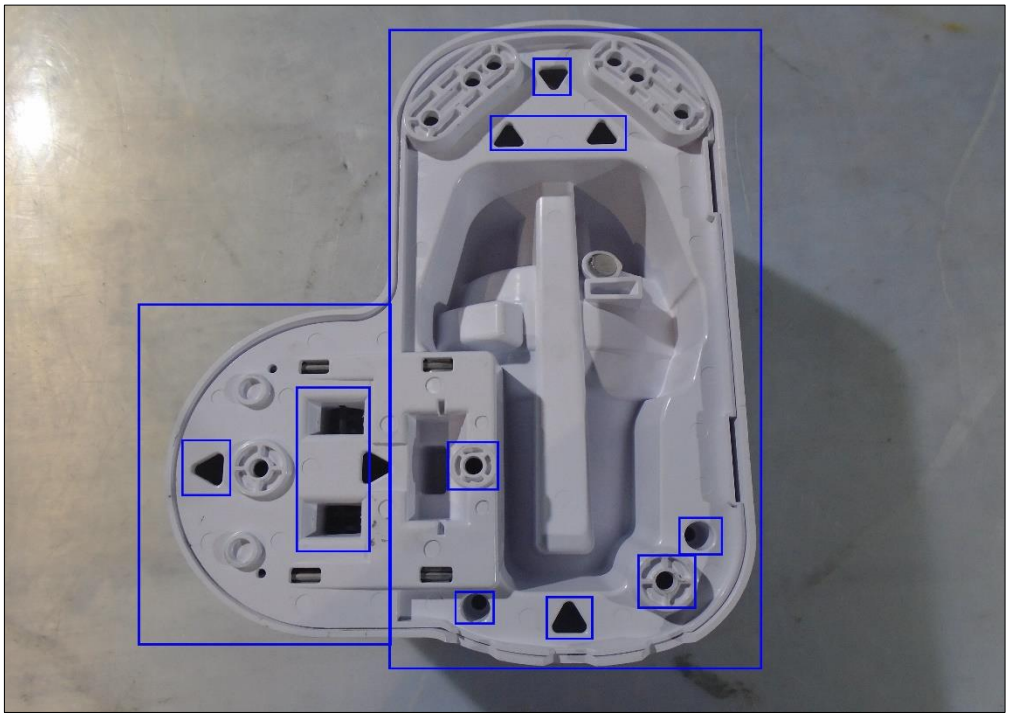

Figure 8 - ESD Test Positions

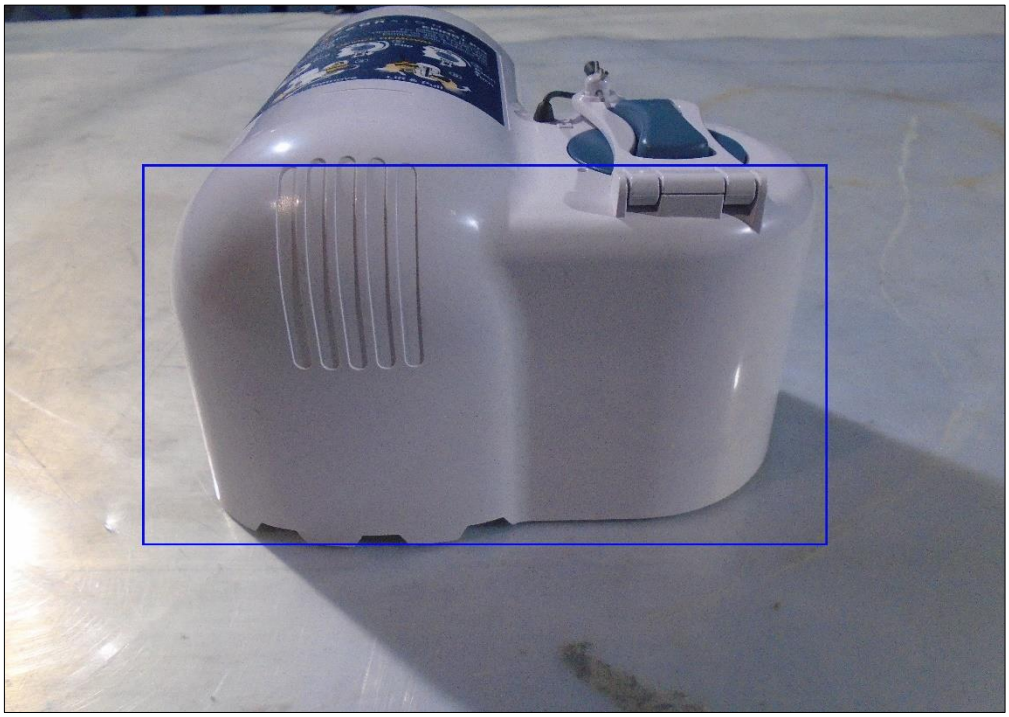

Figure 9 - ESD Test Positions

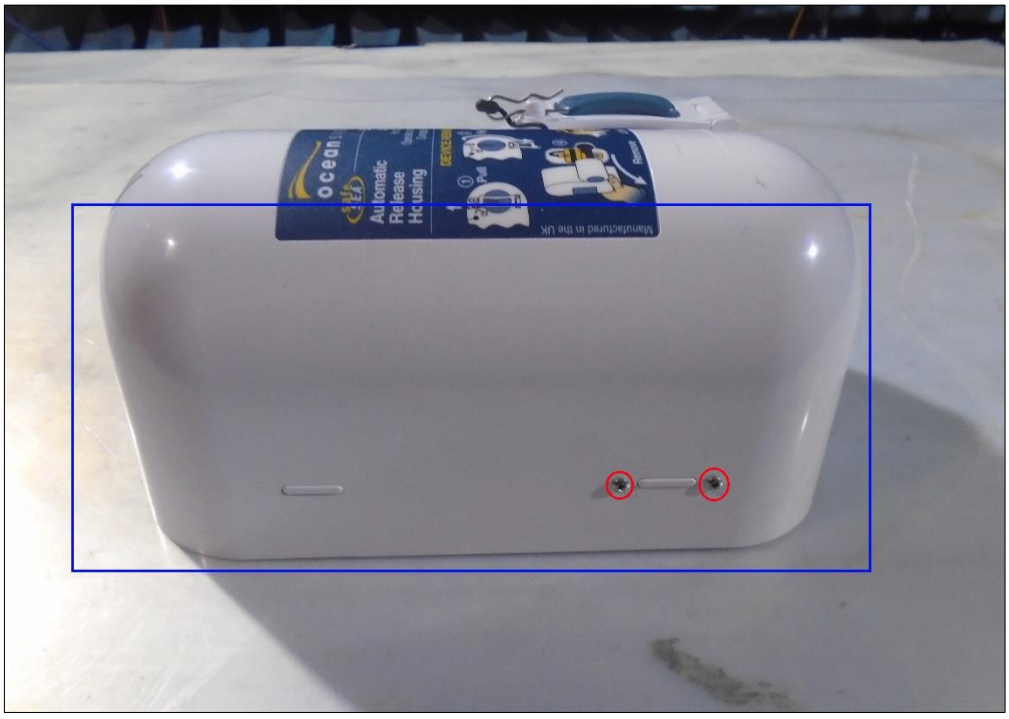

Figure 10 - ESD Test Positions

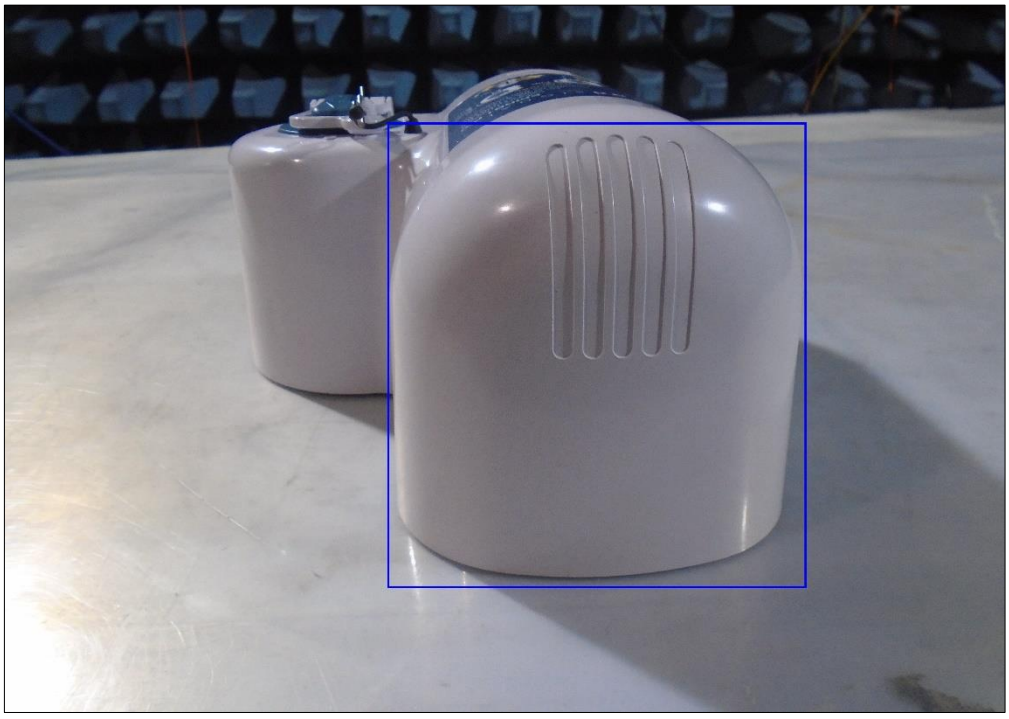

Figure 11 - ESD Test Positions

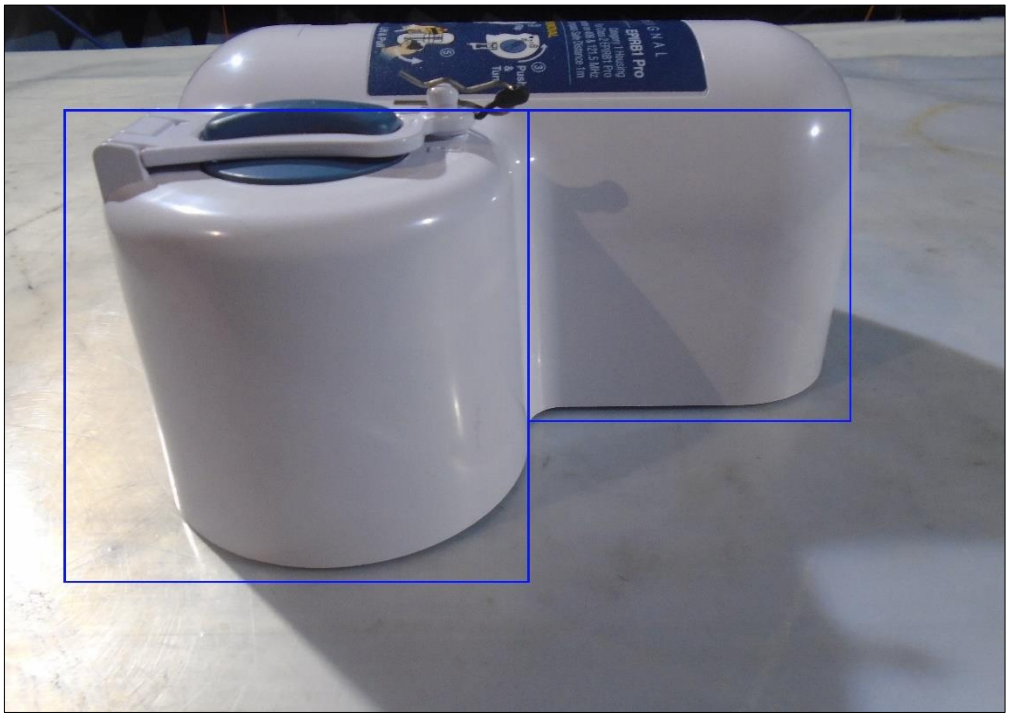

Figure 12 - ESD Test Positions

Figure 13 - ESD Test Positions

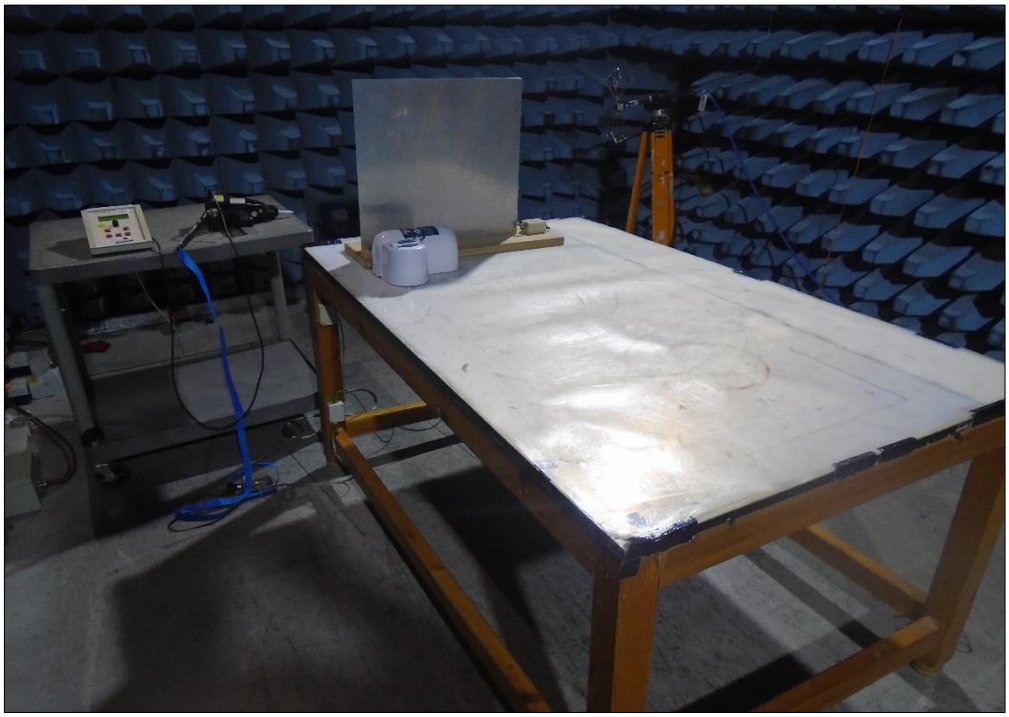

Figure 14 - Test Setup

Results for Configuration and Mode: EPIRB3 (windup antenna) in manual housing - EPIRB idle, RFiD active.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

◯ Contact ☐ Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	N/A	N/A	✓*	✓*	N/A	N/A	N/A	N/A
Air Discharges	Air	✓*	✓*	✓*	✓*	N/A	N/A	✓*	✓*	N/A	N/A

Table 15

Key to Results	
✓	The EUT's performance was not impaired at this test point when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied.
N/A	Not Applicable.

Table 16

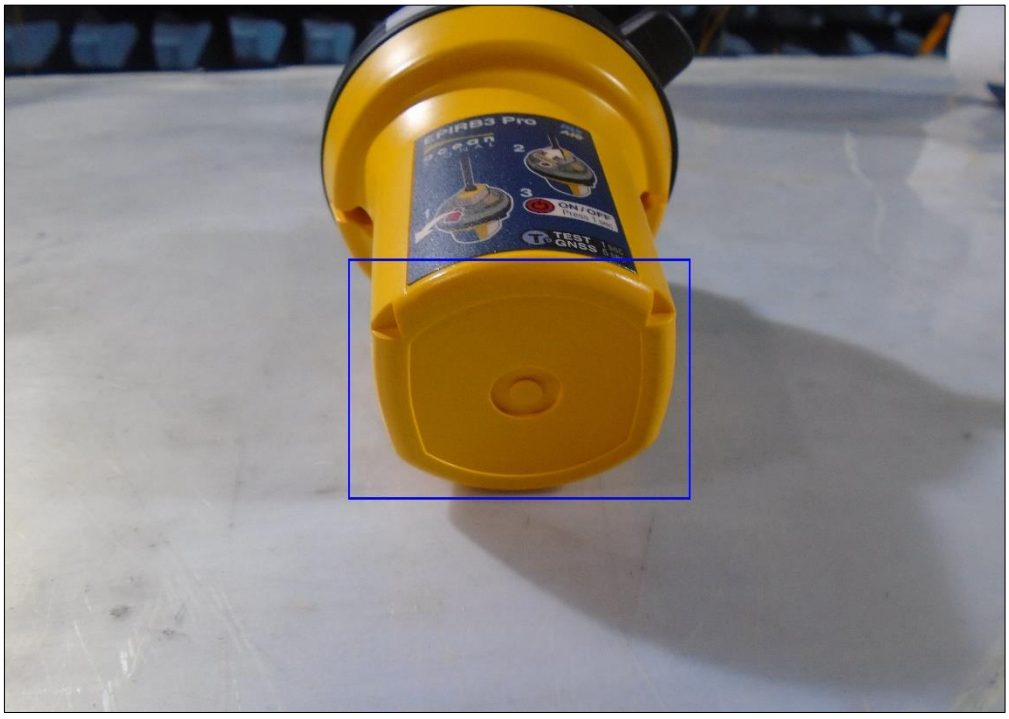

Figure 15 - ESD Test Positions

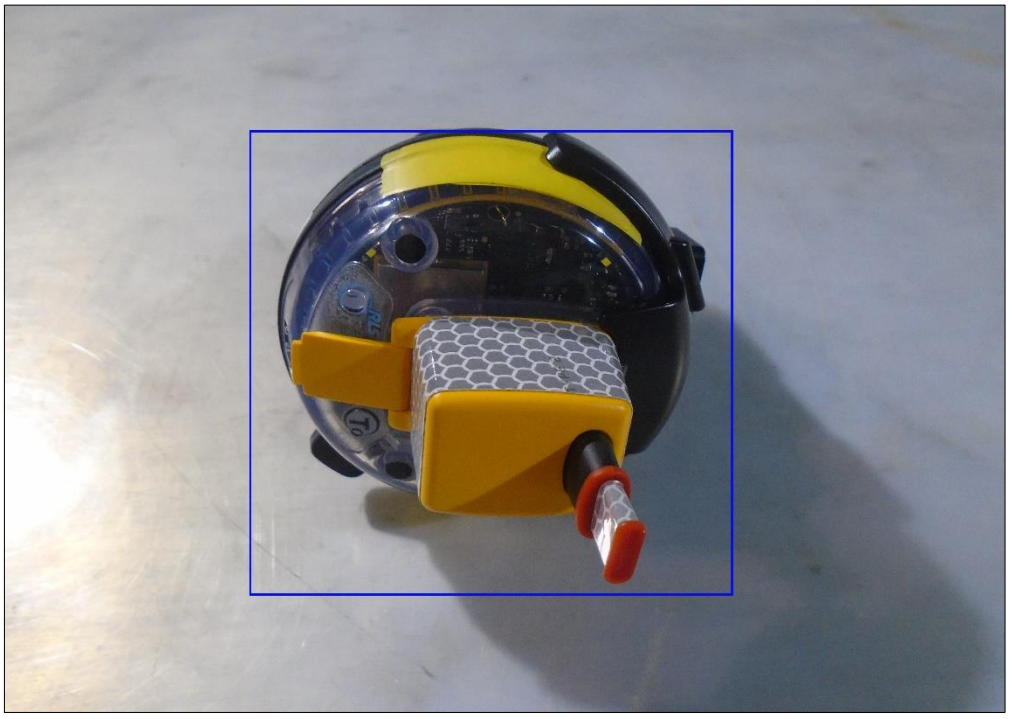

Figure 16 - ESD Test Positions

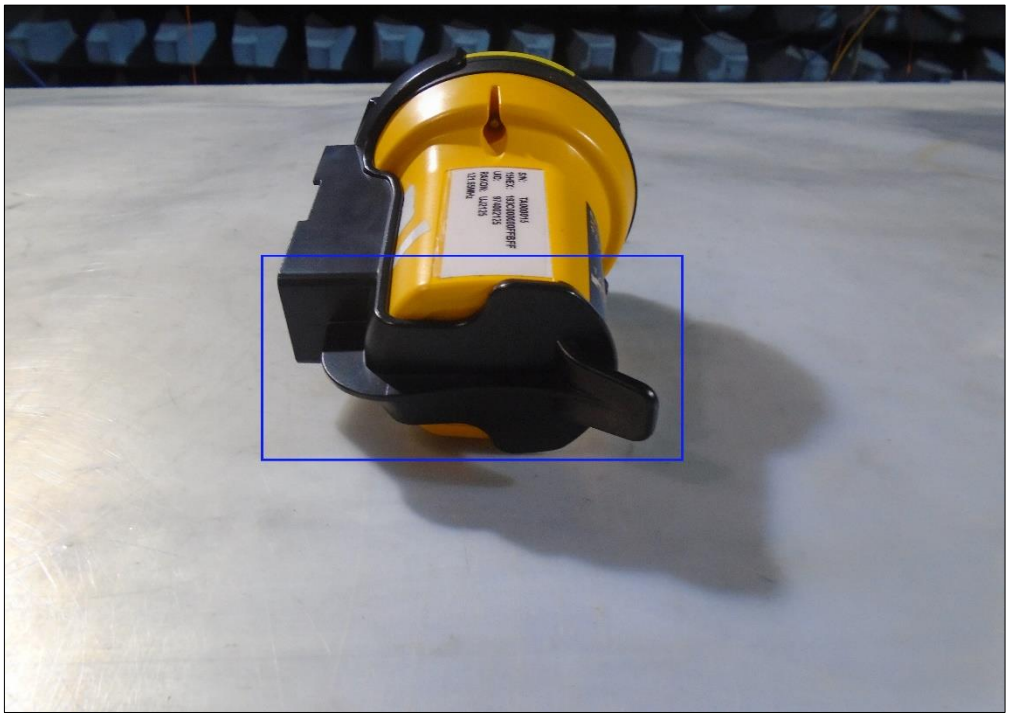

Figure 17 - ESD Test Positions

Figure 18 - ESD Test Positions

Figure 19 - ESD Test Positions

Figure 20 - ESD Test Positions

Figure 21 - ESD Test Positions

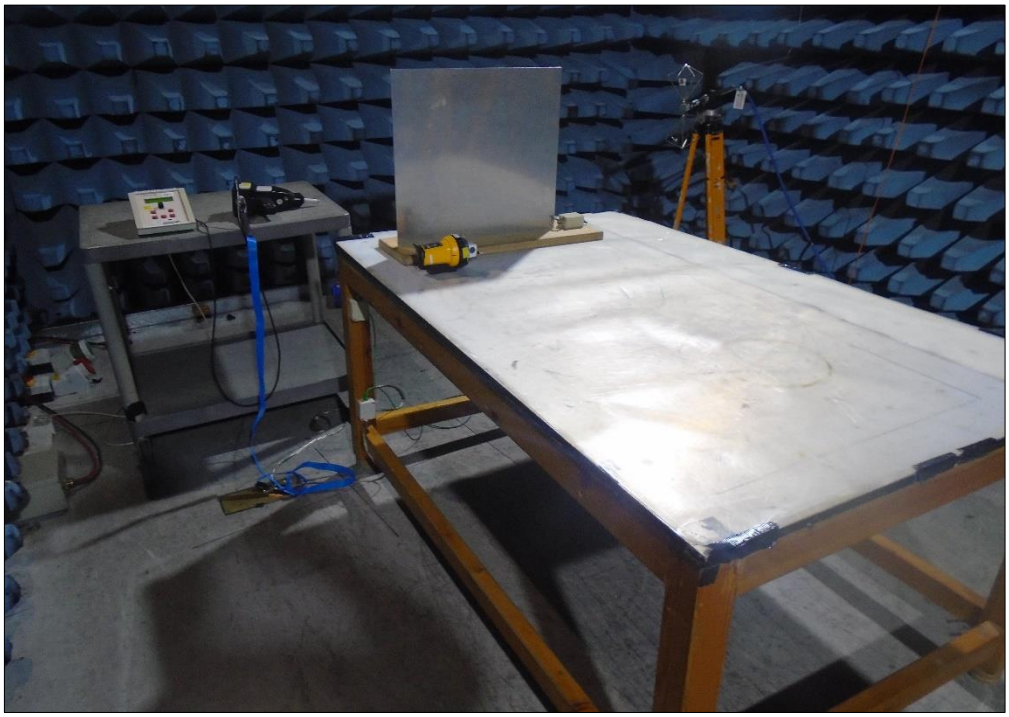

Figure 22 - Test Setup

Results for Configuration and Mode: EPIRB3 Pro (fixed antenna) standalone - EPIRB active, RFiD idle.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

◯ Contact ☐ Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	N/A	N/A	✓*	✓*	N/A	N/A	N/A	N/A
Air Discharges	Air	✓*	✓*	✓*	✓*	N/A	N/A	✓*	✓*	N/A	N/A

Table 17

Key to Results	
✓	The EUT's performance was not impaired at this test point when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied.
N/A	Not Applicable.

Table 18

Figure 23 - ESD Test Positions

Figure 24 - ESD Test Positions

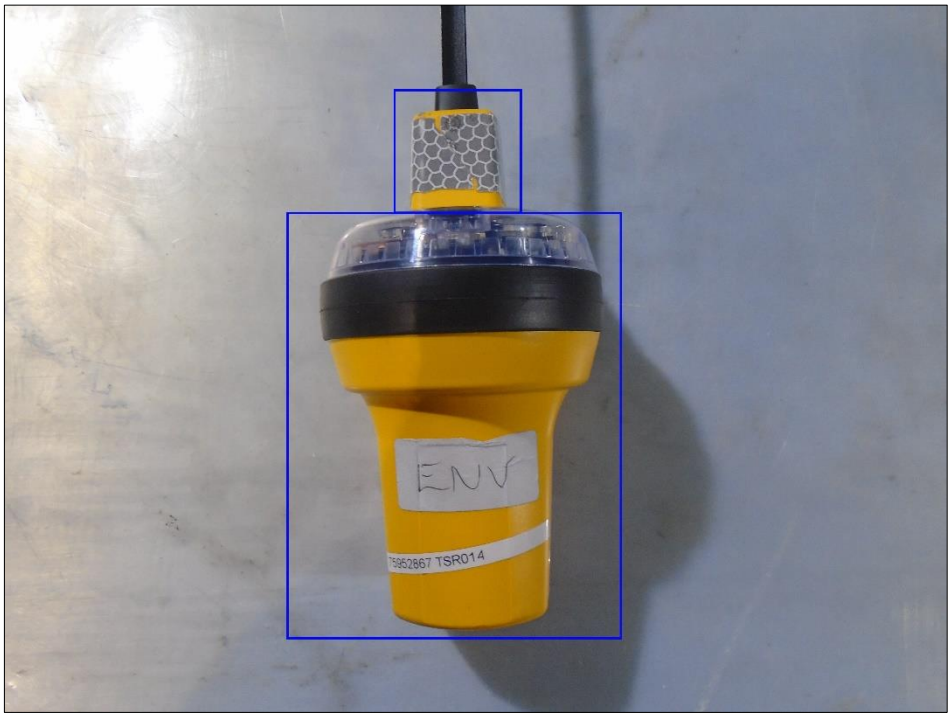

Figure 25 - ESD Test Positions

Figure 26 - ESD Test Positions

Figure 27 - ESD Test Positions

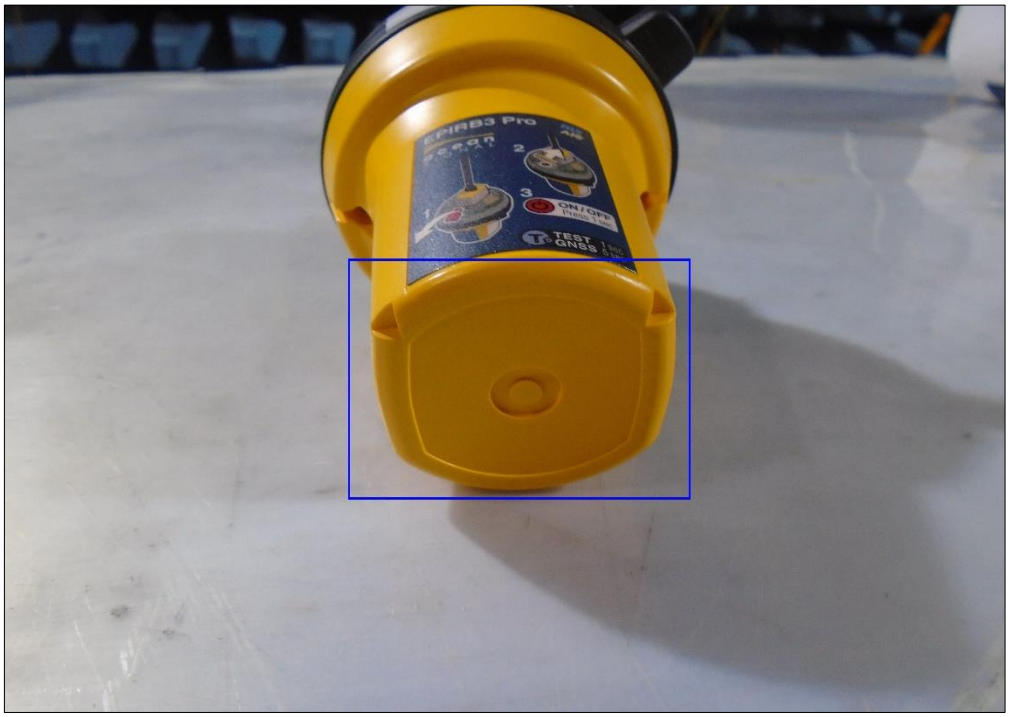

Figure 28 - ESD Test Positions

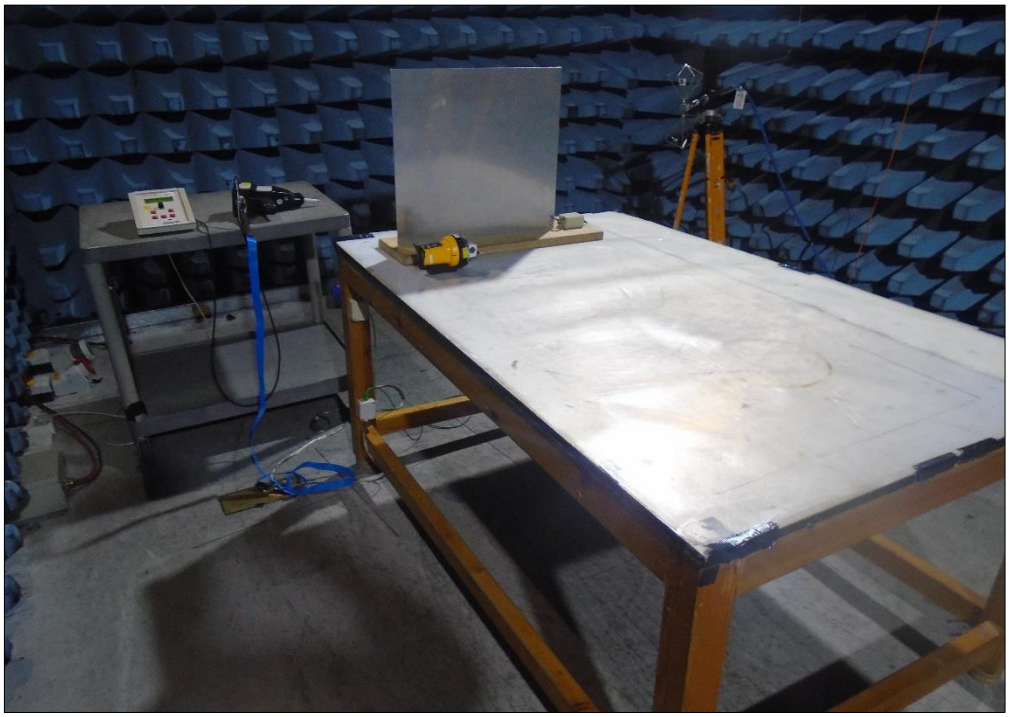

Figure 29 - Test Setup

Results for Configuration and Mode: EPIRB3 (windup antenna) standalone - EPIRB active, RFiD idle.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

◯ Contact ☐ Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	N/A	N/A	✓*	✓*	N/A	N/A	N/A	N/A
Air Discharges	Air	✓*	✓*	✓*	✓*	N/A	N/A	✓*	✓*	N/A	N/A

Table 19

Key to Results	
✓	The EUT's performance was not impaired at this test point when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied.
N/A	Not Applicable.

Table 20

Figure 30 - ESD Test Positions

Figure 31 - ESD Test Positions

Figure 32 - ESD Test Positions

Figure 33 - ESD Test Positions

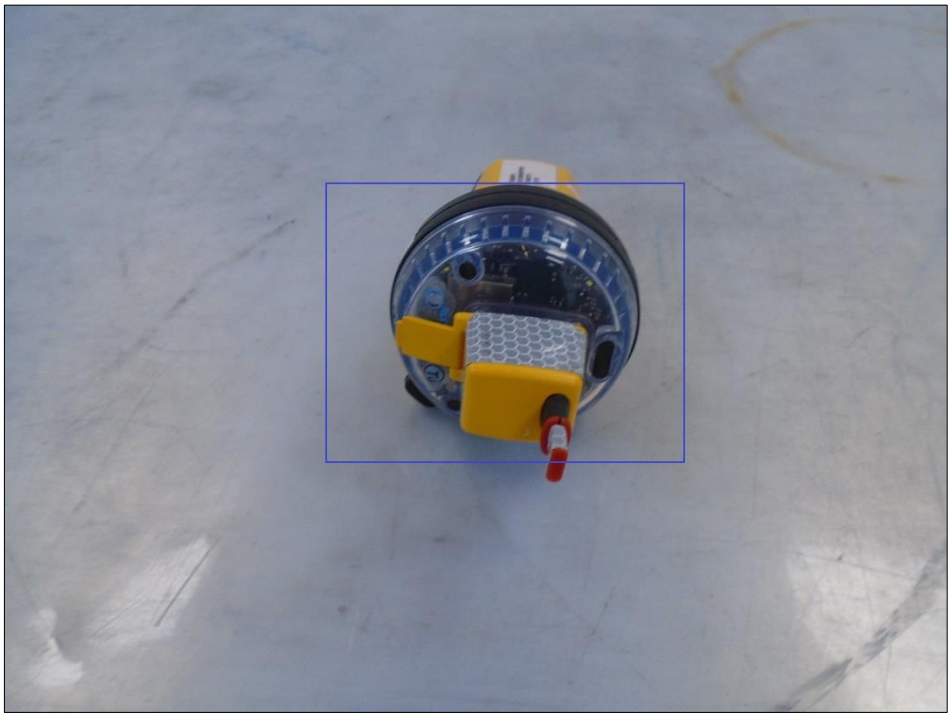

Figure 34 - ESD Test Positions

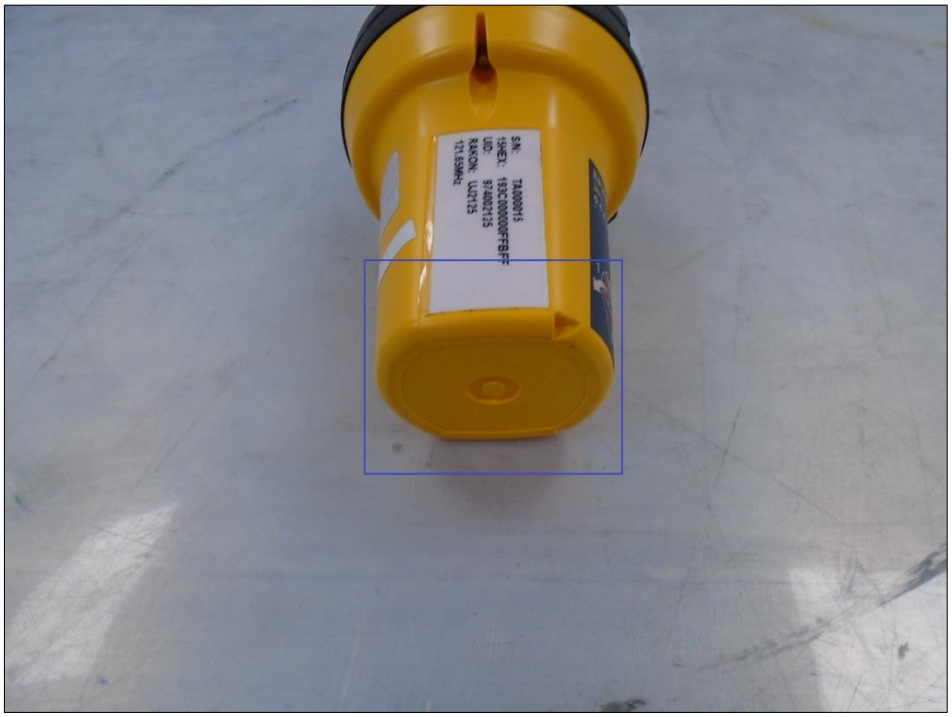

Figure 35 - ESD Test Positions

2.2.8 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Multimeter	Fluke	79 Series III	498	12	14-Jan-2023
ESD Gun	Schloder	SESD 30000	4319	12	02-Nov-2022
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	20-Aug-2022
ESD Generator	Schloder	SESD 30000	4724	12	23-Aug-2022
Tester (Beacon)	WS Technologies	BT200-1100Y	5394	-	TU
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5478	12	25-Mar-2023

Table 21

TU - Traceability Unscheduled

2.3 Compass Safe Distance

2.3.1 Specification Reference

IEC 61097-2, Clause 5.20 - IEC 60945 11.2

2.3.2 Equipment Under Test and Modification State

EPIRB3, S/N: TA000015 - Modification State 0
EPIRB3Pro, S/N: TA000015 - Modification State 0

2.3.3 Date of Test

07-June-2022 and 10-June-2022

2.3.4 Test Method

The EUT was setup on an East to West oriented level non-magnetic surface.

A magnetometer was used to take a horizontal magnetic flux density measurement and from this measurement a standard and an emergency compass deflection was calculated.

A ships magnetic compass was located at the west end of the non-magnetic surface.

The compass was zeroed and the EUT was gradually moved from the east to the west end of the non-magnetic surface towards the compass centre in all 6 of its orthogonal planes and in 3 different states until the calculated compass deflection was achieved, or the EUT had reached the boundary of the ships magnetic compass.

Once all raw readings had been obtained, the worst case reading for each state was rounded up to the nearest 50 mm or 100 mm.

2.3.5 Environmental Conditions

Ambient Temperature	20.2 - 21.2 °C
Relative Humidity	46.5 - 46.6 %

2.3.6 Specification Limits

For the steering compass, the standby steering compass and the emergency compass, the permitted deviation is 18°/H, H being defined as the horizontal component of the magnetic flux density in μT's (micro-tesla's) at the location that testing takes place.

2.3.7 Test Results

Results for Configuration and Mode: EPIRB3Pro (fixed antenna) in float free housing - EPIRB idle, RFiD active.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Deflection Calculation Table:

Horizontal Maximum Flux Density, Magnetic North (H)	Standard Compass Deviation Limit (5.4/H in Degrees)	Emergency Compass Deviation Limit (18/H in Degrees)
19.25	0.3	0.9

Table 22

Test Results

Equipment Under Test	EUT Face Under Test	Un-Powered State		Normalised		Powered State	
		Distance from Compass Centre (mm) at A° deflection	Distance from Compass Centre (mm) at B° deflection	Distance from Compass Centre (mm) at A° deflection	Distance from Compass Centre (mm) at B° deflection	Distance from Compass Centre (mm) at A° deflection	Distance from Compass Centre (mm) at B° deflection
EPIRB3Pro	Front Face	650	460	690	480	610	495
EPIRB3Pro	Top Face	830	495	625	475	770	50
EPIRB3Pro	Left Face	355	290	445	280	300	255
EPIRB3Pro	Right Face	480	340	470	350	540	385
EPIRB3Pro	Bottom Face	234	205	230	180	225	180
EPIRB3Pro	Rear Face	610	360	705	325	520	360

Table 23

Final Results

Unit Under Test	Standard Compass Safe Distance (mm)	Emergency Compass Safe Distance (mm)
EPIRB3Pro	850	500

Table 24

Figure 36 - Test Setup

Figure 37 - EPIRB3Pro - Front Face

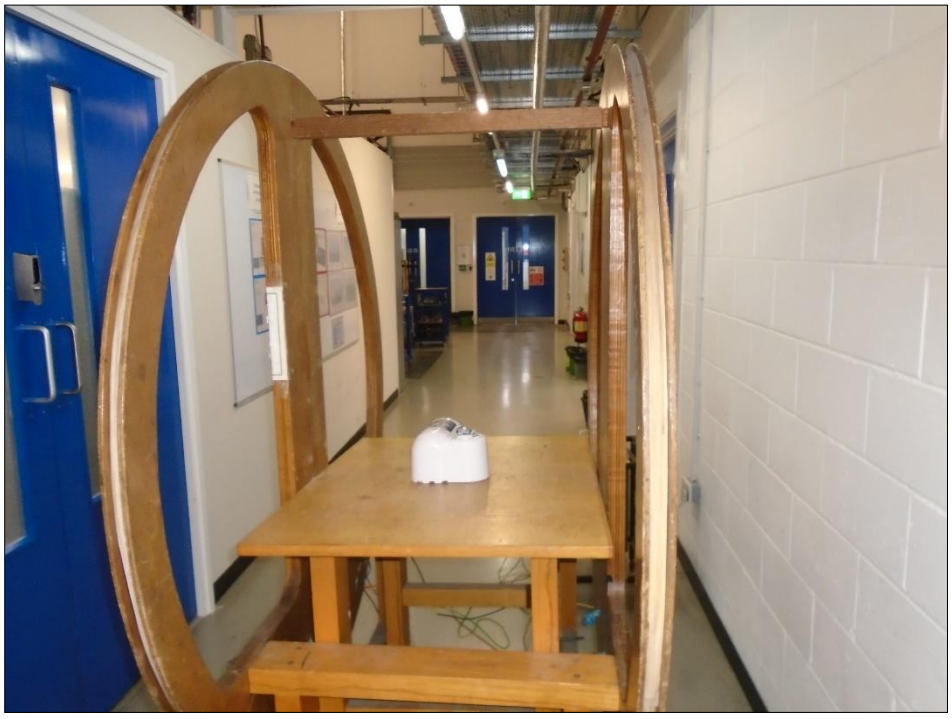

Figure 38 – EPIRB3Pro – Normalising

Results for Configuration and Mode: EPIRB3 (windup antenna) in manual housing - EPIRB idle, RFiD active.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Deflection Calculation Table:

Horizontal Maximum Flux Density, Magnetic North (H)	Standard Compass Deviation Limit (5.4/H in Degrees)	Emergency Compass Deviation Limit (18/H in Degrees)
19.25	0.3	0.9

Table 25

Test Results

Equipment Under Test	EUT Face Under Test	Un-Powered State		Normalised		Powered State	
		Distance from Compass Centre (mm) at A° deflection	Distance from Compass Centre (mm) at B° deflection	Distance from Compass Centre (mm) at A° deflection	Distance from Compass Centre (mm) at B° deflection	Distance from Compass Centre (mm) at A° deflection	Distance from Compass Centre (mm) at B° deflection
EPIRB3	Front Face	280	190	310	210	310	180
EPIRB3	Top Face	240	180	260	*	240	*
EPIRB3	Left Face	520	410	510	380	510	390
EPIRB3	Right Face	520	335	490	340	510	315
EPIRB3	Bottom Face	180	*	180	*	*	*
EPIRB3	Rear Face	420	270	410	310	420	290

Table 26

*Deflection not achieved when EUT reached the compass outer casing.

Final Results

Unit Under Test	Standard Compass Safe Distance (mm)	Emergency Compass Safe Distance (mm)
EPIRB3	550	450

Table 27

Figure 39 - Test Setup

Figure 40 – EPIRB3 - Front Face

Figure 41 – EPIRB3 - Normalising

2.3.1 Test Location and Test Equipment Used

This test was carried out in EMC Open Area Test Site.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Sussex Helmholtz Coil	Various	88771	327	-	TU
Magnetometer	Bartington	MAG01	671	36	05-Jul-2024
Power Supply Unit	Farnell	TSV-70	2043	12	O/P Mon
Multimeter	Iso-tech	IDM101	2417	12	08-Nov-2022
Marine Binnacle Compass with Repeater Display	Cassens & Plath	Compass: Type 11	3834	-	TU

Table 28

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Spectrum Analyser	Hewlett Packard	8562A	14	12	25-Mar-2023
Spectrum Analyser	Agilent Technologies	E7405A	1410	12	29-Oct-2022
Antenna (Bicon)	Schwarzbeck	UBAA 9115	1414	24	13-Aug-2023
Multi-GNSS Simulator (GPS)	Spirent	GSS6700	4596	12	20-Aug-2022
Beacon Tester	WS Technologies	BT100S	4790	-	TU
Tester (Beacon)	WS Technologies	BT200-1100Y	5395	-	TU
Thermo-Hygro-Barometer	PCE Instruments	PCE-THB-40	5473	12	07-Apr-2023
Cable (N-Type to N-Type, 2 m)	Junkosha	MWX221-02000AMSAMS/B	5726	6	11-Aug-2022
Antenna 400-404 MHz	Cobham	MHA3-402L/1207	5916	12	04-Apr-2023

Table 29

TU - Traceability Unscheduled

4 Incident Reports

No incident reports were raised.

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Immunity to Radiated Radio Frequencies	80 MHz to 2 GHz Test Amplitude ±2.0 dB
Immunity To Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2
Compass Safe Distance	± 0.1 °

Table 30

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2007, Clause 4.4.3 and 4.5.1. (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.