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Report On

Limited Emergency Beacons Testing of the
Ocean Signal Limited
EPIRB1 Pro
In accordance with Cospas-Sarsat T.007

Document 75947245 Report 1 Issue 2 **January 2020**

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REPORT ON Limited Emergency Beacons Testing of the Ocean Signal Limited EPIRB1 Pro

Document 75947245 Report 1 Issue 2

January 2020

PREPARED FOR

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DATED 29 January 2020

UKAS TESTING 0141

CONTENTS

SECTION 1

REPORT SUMMARY

Limited Emergency Beacons Testing of the
Ocean Signal Limited EPIRB1 Pro

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ocean Signal Limited EPIRB1 Pro to limited requirements of Cospas-Sarsat T.007.

The scope of testing was agreed between the Manufacturer and C/S Secretariat.

Objective	To perform Emergency Beacon Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Ocean Signal Limited
Model Number(s)	EPIRB1 Pro
Serial Number(s)	Not serialised (0075947245-TSR0001)
Number of Samples Tested	1
Test Specification/Issue/Date	Cospas-Sarsat T.007 Issue 5 - Rev 3 February 2019
Date of Receipt of Test Samples	10 October 2019
Order Number Date	177618 10 October 2019
Start of Test	14 October 2019
Finish of Test	17 October 2019
Name of Engineer(s)	A Uminski
Related Documents	Cospas-Sarsat T.001 Issue 4 Revision 4 February 2019 Cospas-Sarsat T.IP (TCXO) Issue 1 Revision 5 October 2013

1.2 APPLICATION FORM

G.1 - Beacon Manufacturer and Beacon Model	
Beacon Manufacturer	Ocean Signal Ltd
Beacon Manurafturer's Address	Unit 4 Ocivan Way, Margate, Kent, CT9 4NN
Beacon Model Name	EPIRB1
Additional Beacon Model Names	EPIRB1 Pro

G.1 - Beacon Type and Operational Configurations		
Beacon Type	Beacon Used While	Tick Where Appropriate (X)
EPIRB Float Free	Floating in water or on deck or in a safety raft	X
EPIRB Non-Float Free (automatic and manual activation)	Floating in water or on deck or in a safety raft	X
EPIRB Non-Float Free (manual activation only)	Floating in water or on deck or in a safety raft	
EPIRB Float Free with VDR	Floating in water or on deck or in a safety raft	
PLB	On ground and above ground	
	On ground and above ground and floating in water	
ELT Survival	On ground and above ground	
	On ground and above ground and floating in water	
ELT Auto Fixed	Fixed ELT with aircraft external antenna	
ELT(DT)	Distress Tracking ELT with aircraft external antenna	
ELT Auto Portable	In aircraft with an external antenna	
	On ground, above ground, or in a safety raft with an integrated antenna	
ELT Auto Deployable	Deployable ELT with attached antenna	
Other (specify)		

G.1 - Beacon Characteristics		
Characteristic	Declared Value	
Operating frequency (406 MHz operating channel = 406.nnn)	406.040 MHz	
Operating temperature range	Tmin = -20 °C	Tmax= 55 °C
Temperature, at which minimum duration of continuous operation is expected (Submit C/S T.007 Section 5, part s, if applicable)	Tmin ✓	OR Other (nn °C)
Operating lifetime	48	hours
Beacon power supply type (internal non-rechargeable, internal re-chargeable, external, combined, other)	Internal non-rechargeable	
External power supply parameters (AC/DC and nominal voltage)	N/A	
Is external power supply needed to energise the beacon or its ancillary devices in any of operational modes (N/A or Yes or No)	No	
Battery cell chemistry	Lithium Manganese Dioxide	
Battery cell model name, cell size, number of cells in a battery pack, and details of the battery pack electrical configuration	Cell Model Name:	CR123
	Cell Size:	34.5mm x 17mm dia
	Number of Cells in Battery Pack:	6
	Details of the battery pack electrical configuration:	2 x 3 in series
Battery cell manufacturer	Qlite	
Battery pack manufacturer and part number	Battery Pack Manufacturer Name:	Ocean Signal Ltd
	Battery Pack Part Number:	901S-01393
Beacon manufacturers declared maximum allowed cell shelf-life (from date of cell manufacture to date of battery pack installation in the beacon)	2.5	years
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	12.5	years
Oscillator type (e.g. OCXO, MCXO, TCXO)	TCXO	
Oscillator manufacturer	Rakon	
Oscillator model name/ part number	Model Name:	E5344LF
	Part Number:	E5344LF
Oscillator satisfies long-term frequency stability requirements (Yes or No)	Yes	
Antenna type: Integral or Other (e.g. External, Detachable – specify type)	Integreal, manually deployed	
Antenna manufacturer	Ocean Signal Ltd	
Antenna part name and part number (OEM, if applicable, and beacon manufacturer's)	OEM Model Name:	N/A
	OEM Part Number:	N/A
	Beacon Manufacturer's Model Name:	130S-01404 (EPIRB1 only) 130S-03273 (EPIRB1 Pro only)
	Beacon Manufacturer's Part Number:	130S-01404 (EPIRB1 only) 130S-03273 (EPIRB1 Pro only)

Antenna cable assembly min/max RF- losses at 406 MHz, if applicable	Minimum loss (dB):	N/A
	Maximum loss (dB):	N/A
Navigation device type (Internal, External or None)	Internal	
Features in beacon that prevent degradation to 406 MHz signal or beacon lifetime resulting from a failure of navigation device or failure to acquire position data (Yes, No, or N/A)	Yes	
Features in beacon that ensure erroneous position data is not encoded into the beacon message (Yes, No or N/A)	Yes	
Navigation device capable of supporting global coverage (Yes, No or N/A)	Yes	
Encoded position update capability (Yes, No, N/A) ~~and~~	Yes	
Encoded position update interval value (range)	25 to 120	minutes
For Internal Navigation Devices		
Geodetic reference system (WGS 84 or GTRF)	WGS 84	
GNSS receiver cold start forced at every beacon activation (Yes or No)	Yes	
Navigation device manufacturer		
Navigation device model name and part Number	Model Name:	L70
	Part Number:	L70
Internal navigation device antenna type(integrated, internal, external, passive/active) , manufacturer and model	Internal, AEL Crystals Ltd, DAE1575R1820A	
GNSS system supported (e.g. GPS, GLONASS, Galileo)	GPS	
For External Navigation Devices		
Data protocol for GNSS receiver to beacon interface	N/A	
Physical interface for beacon to navigation device	N/A	
Electrical interface for beacon to navigation device	N/A	
Part number of the external navigation interface device (if applicable)	N/A	
Navigation device model and manufacturer (if beacon designed to use specific devices)	N/A	

Self-Test Mode Characteristics:	Self-Test Mode	Optional GNSS Self-test Mode
Activated by a separate switch/ separate switch position (Yes or No)	Yes	Yes
Self-test/GNSS self-test mode switch automatically returns to normal position when released (Yes or No)	Yes	Yes
Self-test/ GNSS self-test activation can cause an operational mode transmission (Yes or No)	No	No
Results in transmission of a single self-test burst only, regardless of how long the self-test activation mechanism is applied (Yes or No)	Yes	No
Results of self-test / GNSS self-test are indicated by (provide details, e.g. Pass / Fail indicator light, strobe light, etc.)	Indicator LED / Strobe	Indicator LED / Strobe
The content of the encoded position data fields of the self-test message has default values	Yes	N/A
Performs an internal check and indicates that RF-power is being emitted at 406 MHz and 121.5 MHz, if beacon includes a 121.5 Hz homer (Yes or No)	Yes	No
Self-test results in transmission of a signal other than at 406 MHz (Yes & details or No)	Yes, 121.5MHz for 1sec	No
Self-test can be activated directly at beacon (Yes or No)	Yes	Yes
List of Items checked by self-test	406 Power, Synth, 121.5 Power, Battery Status	GPS
Self-test/ GNSS self-test 406 MHz burst duration (440 or 520 ms)	520ms	N/A
Self-test message length format flag in bit 25, ("0" or "1")	1	N/A
Maximum duration of a self-test mode, sec	16.5sec	315.5sec
Maximum recommended number of self-tests / GNSS self-tests during battery pack replacement period (as applicable)	150	12
Distinct indication of self-test start (Yes or No)	Yes	Yes
Indication of self-test results (Yes or No)	Yes	Yes
Distinct indication of insufficient battery capacity (Yes or No)	Yes	N/A
Automatic termination of self-test mode immediately after completion of the self-test cycle (Yes or No)	Yes	Yes
GNSS Self-test results in transmission of a single burst, irrespectively of the test result (Yes or No)	N/A	No
Self-test / GNSS self-test can be activated from beacon remote activation points (Yes & details or No)	No	No
List all methods of Self-test mode and GNSS Self-test modes activation. Provide details on a separate sheet to describe	Test key only	Test key only

Message Coding Protocols	Protocol Option	Tick Where Appropriate (X)
User Protocol	Maritime with MMSI	
	Maritime with Radio Call Sign	
	EPIRB Float Free with Serial Number	
	EPIRB Non Float Free with Serial Number	
	Radio Call Sign	
	Aviation	
	ELT with Serial Number	
	ELT with Aircraft Operator and Serial Number	
	ELT with Aircraft 24-bit Address	
	PLB with Serial Number	
	National (Short Message Format)	
	National (Long Message Format)	
Standard Location Protocol	EPIRB with MMSI	X
	EPIRB with Serial Number	X
	ELT with 24-bit Address	
	ELT with Aircraft Operator Designator	
	ELT with Serial Number	
	PLB with Serial Number	
National Location Protocol	National Location: EPIRB	X
	National Location: ELT	
	National Location: PLB	
ELT(DT) Location Protocol	ELT with Serial Number	
	ELT with Aircraft Operator and Serial Number	
	ELT with Aircraft 24-bit Address	
RLS Location Protocol	EPIRB	
	ELT	
	PLB	
User Location Protocol	Maritime with MMSI	
	Maritime with Radio Call Sign	X
	EPIRB Float Free with Serial Number	
	EPIRB Non Float Free with Serial Number	
	Radio Call Sign	X
	Aviation	
	ELT with Serial Number	
	ELT with Aircraft Operator and Serial Number	
	ELT with Aircraft 24-bit Address	
	PLB with Serial Number	

Other Declarations	Declared Value		
Beacon includes a homer transmitter(s) (Yes or No)	<<Yes / No >>		
- homer transmitter(s) frequency and power	Frequency	Power (dBm)	Yes / No
	121.5 MHz	16dBm ±2dBm	Yes
	243.0 MHz	<< Power >>	No
	AIS	<< Power >>	No
	Other (MHz)		
	<< frequency >>	<< Power >>	<< Yes / No >>
	Description:	<< Description >>	
homer transmitter(s) duty cycle	97	%	
duty cycle of homer swept tone	34	%	
Beacon includes a high intensity flashing light (e.g. Strobe)	Yes		
- light intensity	>1.14	cd	
- flash rate	20-30	flashes per minute	
Beacon transmission repetition period satisfies C/S T.001 requirement that two beacon's repetition periods are not synchronised closer than a few seconds over 5 minute period, and the time intervals between transmissions are randomly distributed on the interval 47.5 to 52.5 seconds (Yes or No)	Yes		
Other ancillary devices (e.g. voice transceiver, remote control, external audio and light indicators, external activation device). List details on a separate sheet if insufficient space to describe.	No		
Beacon includes automatic activation mechanism (Yes or No). Specify type of automatic beacon activation mechanism	Yes / No :	Yes	
	Description:	Water activation	
Beacon includes features and functions not listed above, related or non-related to 406 MHz (Yes or No). List features and use a separate sheet if insufficient space	No		
	Description:		
Beacon model hardware part number (P/N) and version	900S-01448 Issue 01.00 (EPIRB1 only) 900S-03377 Issue 01.00 (EPIRB1 Pro only)		
Beacon model firmware P/N, version, date of issue/releases	500S-01449 Issue 01.00		
Beacon model software P/N, version, date of issue/releases	N/A		
Beacon model printed circuit board P/N and version	101S-01367 Issue 01.00		
Known non-compliances with C/S T.001 requirements (Yes or No). If Yes, provide details (Submit C/S T.007 Section 5, part t, if applicable)	No		
Beacon Manufacturer Point of Contact (POC) for this Type Approval application:			
Name and Job Title:	Wayne Card		
Phone:	+44 1843 282930		
E-mail:	wayne.card@oceansignal.com		

Dated(*)	14/11/2019
Signed(*) 	Wayne Card, Senior Engineer

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was an Ocean Signal Limited EPIRB1 Pro as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.

Equipment Under Test

1.3.2 Physical Test Configuration

The EUT was a fully packaged beacon, similar to the proposed production beacons equipped with its proper antenna. This EUT was used to perform Antenna Characteristics. The test configuration for these tests is a function of the beacon type and the operational environments supported by the beacon, as declared by the manufacturer.

1.3.3 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Operating

- Push and hold power button for 3 seconds then release.
- 121 Homer active and offset
- GPS operating in normal duty cycle for the following navigation input conditions
- No navigation data applied

All modes

All mode descriptions are applicable to all tests unless otherwise stated. Additional methods of activation include:

- Water contacts

1.4 TEST LOCATIONS

Antenna Test: Hursley EMC Services Ltd. Hursley, Hants, UK

1.5 MODIFICATIONS

Modification 0 - No modifications were made to the test sample during testing.

1.6 REPORT MODIFICATION RECORD

Issue 1 – First Issue.
Issue 2 – Revised Application form as supplied by Manufacturer.

SECTION 2

TEST DETAILS

Limited Emergency Beacons Testing of the
Ocean Signal Limited EPIRB1 Pro

TEST RESULTS TABLE

Parameters to be Measured	Range of Specification	Units	Test Results				Comments
15. Antenna Characteristics							**Result: Pass**
Model: , S/N: Not serialised (0075947245-TSR), TUV Ref: TSR1 and Modification State 0							
Test Configuration	As per C/S T.007		Configuration				
			1	2	3	4	
Polarisation	linear or RHCP		Linear	-	-	Linear	
VSWR	≤ 1.5		-	-	-	-	Detachable Antennas Only
$EIRP_{LOSS}$		dB	0.67	-	-	0.67	
$EIRP_{maxEOL}$	≤ 43	dBm	43	-	-	42.9	
$EIRP_{minEOL}$	≥ 32	dBm	32.6	-	-	30.1	$EIRP_{minEOL}$ limit decreases to 30 dBm for Configuration 4

2.1 BEACON ANTENNA TEST

2.1.1 Specification

Cospas-Sarsat T.007, Clause A.2.6

2.1.2 Equipment Under Test and Modification State

N/A S/N: Not serialised (0075947245-TSR0001) - Modification State 0

2.1.3 Date of Test

17 October 2019

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Environmental Conditions

Ambient Temperature 13°C
Relative Humidity 83.9%

2.1.6 Test Result

Configuration 1

Legend: ~~**Strikeout**~~ **Under-range** **Over-range** Vv-Vh < 10 dB

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	38.4	1.5	41.3	4.4	42.5	5.6	35.5	-1.3	33.7	-3.2
30	38.8	2.0	41.3	4.4	42.6	5.8	36.1	-0.7	33.7	-3.1
60	39.2	2.3	41.7	4.8	42.7	5.8	36.1	-0.8	33.7	-3.2
90	38.7	1.9	41.7	4.8	~~43.0~~	6.2	36.3	-0.6	33.5	-3.4
120	39.6	2.7	41.9	5.0	~~43.0~~	6.1	36.6	-0.3	34.2	-2.7
150	39.2	2.3	42.0	5.1	43.0	6.1	36.6	-0.3	34.1	-2.7
180	39.1	2.3	41.9	5.1	~~43.2~~	6.4	37.2	0.3	34.0	-2.9
210	39.6	2.7	41.2	4.3	42.9	6.1	37.3	0.4	33.3	-3.6
240	38.9	2.1	41.1	4.3	42.8	6.0	37.5	0.6	33.9	-3.0
270	38.8	1.9	41.2	4.3	42.8	5.9	37.1	0.3	33.9	-2.9
300	38.9	2.0	41.0	4.2	42.2	5.3	35.6	-1.3	33.7	-3.2
330	38.7	1.9	41.1	4.2	42.1	5.2	35.0	-1.9	33.3	-3.6

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh
0	110.4	94.5	113.0	85.3	113.4	90.8	105.4	88.9	102.0	83.9
30	110.9	95.2	113.0	86.9	113.6	90.9	106.0	90.1	102.0	87.7
60	111.2	94.6	113.4	87.5	113.7	88.8	105.9	90.1	101.9	89.6
90	110.7	95.1	113.4	83.7	114.0	86.9	106.1	90.9	101.6	89.7
120	111.6	95.2	113.6	87.2	114.0	90.3	106.4	92.4	102.4	87.6
150	111.2	96.0	113.7	84.5	113.9	94.7	106.3	93.0	102.5	84.2
180	111.1	95.9	113.6	82.2	114.2	95.3	107.0	92.7	102.4	76.9
210	111.6	96.8	112.9	86.9	113.9	96.3	107.1	92.0	101.6	83.0
240	110.9	94.5	112.8	89.6	113.8	95.5	107.3	92.5	102.2	86.8
270	110.9	92.5	112.9	87.8	113.7	95.1	106.9	93.8	102.2	86.8
300	110.9	94.7	112.8	86.6	113.1	95.2	105.2	93.4	102.0	84.5
330	110.8	94.5	112.8	82.4	113.1	93.1	104.8	89.9	101.7	79.9
Min (Vv-Vh)	14.8		23.2		17.6		11.9		11.9	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} =$ 36.86 - 36.19 = 0.67 dB

$EIRP_{maxEOL} = Max[EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] =$ Max[43.0, 42.3]= 43.0 dBm

$EIRP_{minEOL} = Min[EIRP_{min}, (EIRP_{min} - EIRP_{LOSS})] =$ Min[33.3, 32.6]= 32.6 dBm

Configuration 4

Legend: ~~**Strikeout**~~ **Under-range** **Over-range** Vv-Vh < 10 dB

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	40.9	4.1	42.7	5.8	40.2	3.3	34.2	-2.7	31.6	-5.3
90	40.9	4.1	42.8	6.0	40.3	3.5	33.5	-3.4	~~**30.6**~~	-6.3
180	41.1	4.2	42.9	6.1	40.4	3.5	33.8	-3.1	30.8	-6.1
270	40.8	4.0	42.7	5.9	40.2	3.3	33.9	-2.9	31.9	-4.9

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} =$ 36.86 - 36.19 = 0.67 dB

$EIRP_{maxEOL} = Max[EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] =$ Max[42.9, 42.3]= 42.9dBm

$EIRP_{minEOL} = Min[EIRP_{min}, (EIRP_{min} - EIRP_{LOSS})] =$ Min[30.8, 30.1]= 30.1dBm

Note:

The values of $Pt_{ambient}$ and Pt_{EOL} were provided by the Manufacturer from a previous type approval campaign at test lab other than TUV SUD: PE TC “Omega” Report 14/171 – Issue 4. The relevant pages of this report can be found in Annex A.

Summary

The EUT complies with clause A.2.6 of Cospas-Sarsat T.007.

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 Beacons - Antenna Characteristics					
Antenna, (Tuned Dipole Set)	Roberts Antenna	A-100	569	12	01-Feb-2020
Roberts Antenna 406MHz	Compliance Design		1860	24	06-Apr-2020
ESA-E Series Spectrum Analyser	Agilent Technologies	E4402B	3348	12	04-Nov-2019
Inclinometer, Digital	Radio Spares	01-900-020003 (RS 667-3916)	4125	12	10-Apr-2020
Hygrometer	Rotronic	HP21	4740	12	17-Jan-2020

Note: some tests took place over one or more days and consequently it may appear that some of the test equipment could have been outside of the valid calibration period at the time of testing. However, we confirm that all equipment held a valid and in-date calibration when used, and we hold this information on record.

3.2 MEASUREMENT UNCERTAINTY

Measurement Uncertainty Decision Rule

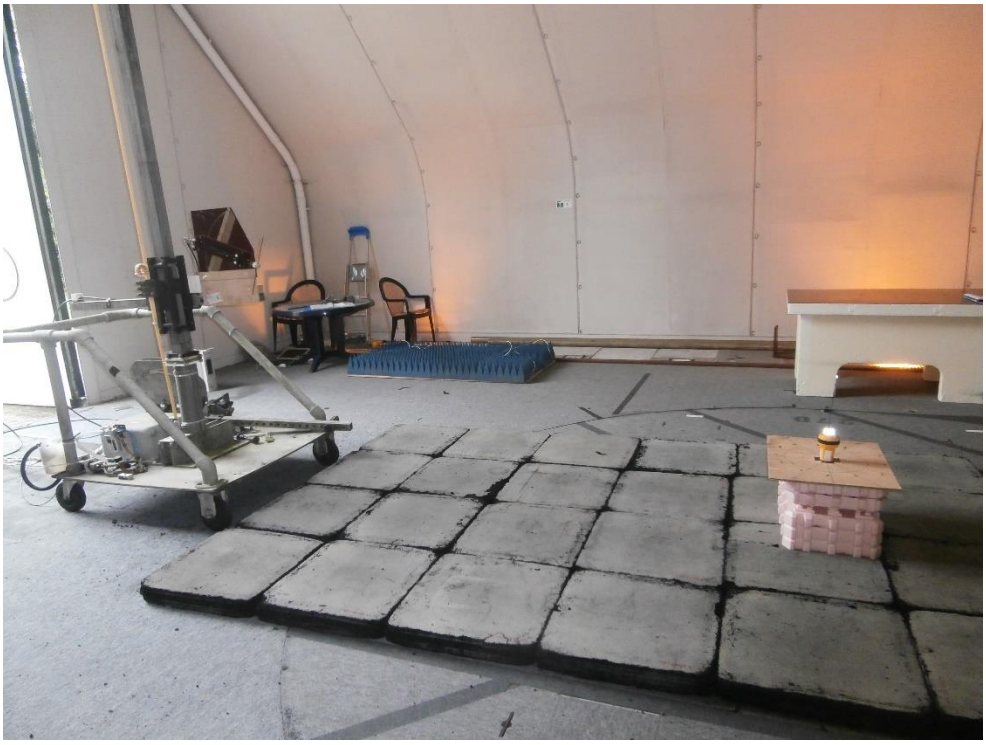
Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Configuration 1 – Test Setup



Configuration 4 – Test Setup

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

ANNEX A

LEGACY ANTENNA CHARACTERISTICS RESULTS

5.7 Antenna Characteristics

Date of tests	30.04.2014 (configuration 1) and 05.05.2014(configuration 4)
Specification	C/S T.007 – section A.2.6
Beacon Model	EPIRB1
Serial number	006
EUT Mod State	0
EUT system configuration, including antenna, external ancillary devices and modes of their operation	The EUT was operated using its own power source (internal battery). The EUT was a fully packaged beacon, similar to the proposed production beacons equipped with its proper antenna
Beacon antenna model (P/N)	130S-01404
Measurement antenna type and model	Tuned dipole, FCC-4
Environmental conditions	Open area test site temperature: 17.0-21.2°C Relative air humidity: 44-48 %
Deviations from standard test procedures	There were no deviations from standard test procedures
Non-compliances noticed	There were not non-compliances

5.7.1 Test Configuration 1: "Water" Ground Plane (C/S T.007, Figure B.4)

Test site:
The measurement was performed in accordance with Figures B.4 and B.8 C/S T.007.

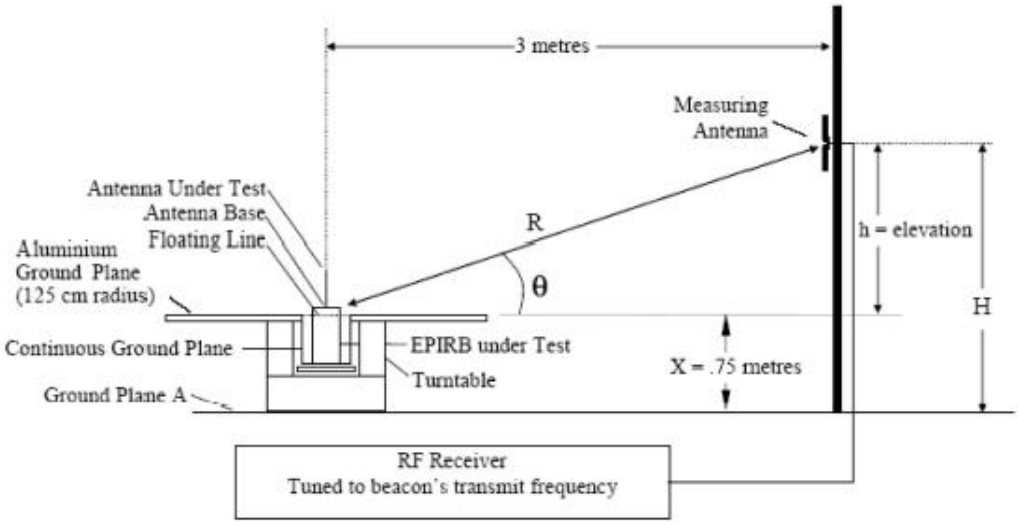


Table F-B.2: Induced Voltage Measurements Vv / Vh (dBuV)

Azimuth Angle (degrees)	Elevation Angle (degrees)				
	10	**20**	**30**	**40**	**50**
0	111.4/88.2	113.0/83.4	111.0/84.0	105.9/77.5	97.3/78.1
30	111.5/85.8	113.0/85.5	110.9/86.5	105.9/83.2	96.8/88.0
60	111.8/82.0	113.1/89.1	111.1/90.6	105.7/87.2	97.5/90.3
90	111.6/79.7	113.0/90.2	111.0/91.5	105.8/91.4	98.0/91.6
120	111.9/80.8	113.1/89.5	111.1/90.7	105.5/88.7	97.6/90.2
150	111.7/83.0	113.1/87.0	111.2/87.7	105.5/90.0	98.3/87.0
180	111.6/86.0	113.1/81.4	111.3/78.4	105.6/78.9	98.4/84.8
210	111.4/87.5	113.1/85.1	111.2/78.8	105.6/81.2	98.1/73.6
240	111.9/89.3	113.1/84.7	111.1/78.4	105.6/86.0	98.0/82.2
270	111.7/90.9	113.0/82.8	111.0/78.7	105.6/88.3	98.1/85.2
300	111.8/87.4	113.1/85.2	111.1/77.0	105.4/83.5	97.4/85.4
330	111.7/90.6	112.9/84.3	111.0/82.9	105.7/83.7	97.7/82.0
Min(Vv-Vh)	20.8	22.8	19.5	14.4	6.4

406 MHz BEACON ANTENNA TEST RESULTS

Table F-B.1: Effective isotropically radiated power (dBm) / antenna gain (dBi)

Azimuth Angle (degrees)	Elevation Angle (degrees)				
	10	20	30	40	50
0	39.21 / 2.35	41.78 / 4.93	41.48 / 4.62	38.84 / 1.99	33.67 / -3.19
30	39.30 / 2.44	41.79 / 4.93	41.38 / 4.52	38.85 / 1.99	33.33 / -3.53
60	39.59 / 2.74	41.89 / 5.04	41.60 / 4.74	38.67 / 1.81	34.10 / -2.75
90	39.39 / 2.53	41.80 / 4.94	41.50 / 4.65	38.82 / 1.96	34.65 / -2.20
120	39.69 / 2.83	41.90 / 5.04	41.60 / 4.74	38.48 / 1.63	34.19 / -2.66
150	39.49 / 2.64	41.89 / 5.03	41.68 / 4.83	38.50 / 1.64	34.75 / -2.11
180	39.40 / 2.54	41.88 / 5.03	41.77 / 4.92	38.55 / 1.69	34.81 / -2.05
210	39.21 / 2.35	41.89 / 5.03	41.67 / 4.82	38.55 / 1.69	34.46 / -2.40
240	39.71 / 2.85	41.89 / 5.03	41.57 / 4.72	38.56 / 1.71	34.39 / -2.47
270	39.52 / 2.67	41.78 / 4.93	41.47 / 4.62	38.58 / 1.72	34.52 / -2.34
300	39.60 / 2.75	41.89 / 5.03	41.57 / 4.72	38.35 / 1.50	33.84 / -3.02
330	39.52 / 2.66	41.69 / 4.83	41.48 / 4.62	38.65 / 1.80	34.09 / -2.77
	0.51	0.21	0.39	0.50	1.14

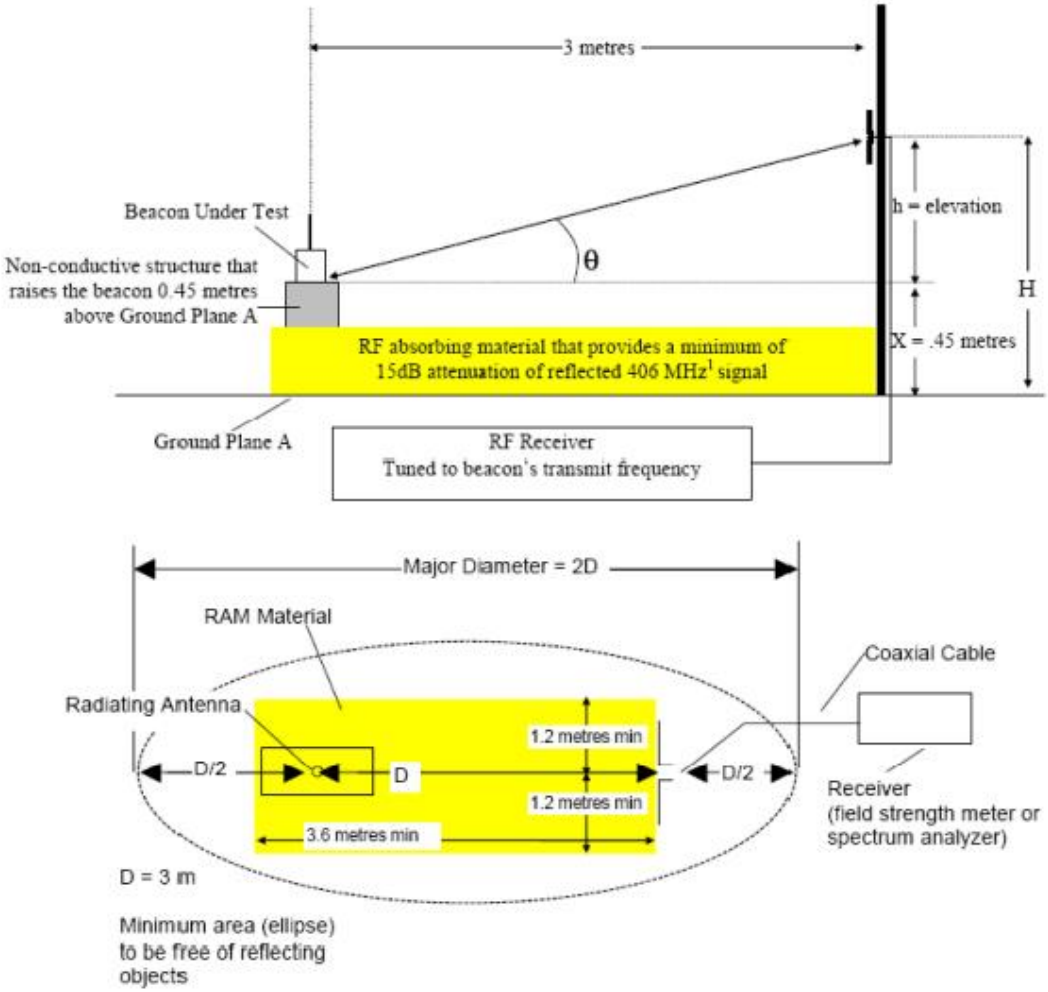
$EIRP_{LOSS} = P_{t\ ambient} - P_{t\ EOL} = 36.86 - 36.19 = 0.67$ dB

$EIRP_{max\ EOL} = MAX [EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] = MAX (41.90, 41.23) = 41.90$ dBm (<= 43 dBm)

$EIRP_{min\ EOL} = MIN [EIRP_{min}, (EIRP_{min} - EIRP_{LOSS})] = MIN (33.33, 32.66) = 32.66$ dBm (>= 32 dBm)

5.7.2 Test Configuration 4: Beacon Above Ground Plane

Test site.
The measurement was performed in accordance with Figures B.2 and B.8 C/S T.007.



406 MHz BEACON ANTENNA TEST RESULTS

Table F-B.2: Induced Voltage Measurements Vv / Vh (dBuV)

Azimuth Angle (degrees)	Elevation Angle (degrees)				
	10	**20**	**30**	**40**	**50**
0	113.9/80.1	112.2/74.7	107.8/84.4	101.6/80.3	97.3/78.3
90	113.9/89.8	112.1/80.4	107.3/88.3	101.5/87.7	96.9/86.0
180	113.6/84.3	112.0/76.4	107.4/84.1	101.9/84.2	97.0/82.8
270	113.9/85.9	112.1/79.3	107.3/87.7	101.8/80.5	97.4/86.7
Min(Vv-Vh)	15.1	31.7	19.0	13.6	10.7

Table F-B.3: Equivalent Isotropically Radiated Power (dBm) / Antenna Gain (dBi)

Azimuth Angle (degrees)	**Elevation Angle (degrees)**				
	10	**20**	**30**	**40**	**50**
0	41.50 / 4.64	40.98 / 4.12	38.28 / 1.43	34.56 / -2.30	33.67 / -3.19
90	41.63 / 4.77	40.88 / 4.03	37.81 / 0.95	34.53 / -2.33	33.36 / -3.50
180	41.20 / 4.34	40.78 / 3.92	37.89 / 1.03	34.88 / -1.98	33.40 / -3.45
270	41.50 / 4.64	40.88 / 4.02	37.80 / 0.95	34.76 / -2.10	33.87 / -2.99

$EIRP_{LOSS} = P_{t\,ambient} - P_{t\,EOL} = 36.86 - 36.19 = 0.67$ dB

$EIRP_{max\,EOL} = MAX [EIRP_{max} , (EIRP_{max} - EIRP_{LOSS})] = MAX (41.63, 40.96) = 40.96$ dBm (<= 43 dBm)

$EIRP_{min\,EOL} = MIN [EIRP_{min} , (EIRP_{min} - EIRP_{LOSS})] = MIN (33.36, 32.69) = 32.69$ dBm (>= 30 dBm)