

**PUBLIC ENTERPRISE TESTING CENTER «OMEGA»**

Approved by  
acting director

**PE TC «OMEGA»**

**Bogach S.V.**

**November 10, 2010**



**TEST REPORT No. 10/293**

**Issue 1**

**Emergency Position Indicating Radio Beacon (EPIRB)**

**SafeSea models E100 & E100G class 1, class 2**

**for compliance with RTCM Standard 11000.2 (RTCM Paper 77-2002/SC110-STD,  
version 2.1)**

**Manufacturer Ocean Signal Ltd., Great Britain**

**Sevastopol  
2010**

<b>PUBLIC ENTERPRISE TESTING CENTER «OMEGA»</b> <b>COSPAS-SARSAT Secretariat</b> <b>reference No. CS497/F530 21/09/1994</b> <b>US CG Letter Acceptance of Laborarory for testing EPIRB per RTCM standard 11000.2 for approvals of EPIRBs under 46 CFR 161.011 valid since February 7, 2008</b> <b>National Accreditation Agency of Ukraine. Certificate of accreditation for compliance DSTU ISO 17025:2006 No. 2H339 valid until 17.05.2011</b>	<b>P.O.B. No.37, Sevastopol, 99053, Ukraine</b> <b>Phone: +380 692 240 373</b> <b>Fax: +380 692 469 679</b> <b>E-mail: : stcomega@stel.sebastopol.ua</b>
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<b>Basis</b>	Contract No. 10–512/20–195	
<b>Equipment under test</b>	Emergency Position Indicating Radio Beacon (EPIRB) 406 MHz COSPAS–SARSAT	
<b>Manufacturer</b>	Ocean Signal limited, Uit 4, Ocivan way, Margate, Kent, CT9 4NN, Great Britain	
<b>Applicant</b>	Ocean Signal limited, Uit 4, Ocivan way, Margate, Kent, CT9 4NN, Great Britain	
<b>Test commencement date</b>	07.05.10	
<b>Test completion date</b>	29.10.10	
<b>Test reports shall be delivered to:</b>	Ocean Signal Ltd.	copy 1
	PE TC “Omega”	copy 2

*The results of this report shall be applied only to the tested samples*

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“Omega”*

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Introduction
<p>This test report EPIRB model SAFESEA E100 E100G CLASS 2 consists of one volume and has references on the next test reports:</p> <ol style="list-style-type: none"> <li>1. Test report No.10/26 Issue 3 on type approval of COSPAS-SARSAT Emergency Position Indicating Radio beacon (EPIRB) SafeSea model E100G class 2, manufacturer Ocean Signal Ltd., Great Britain Volume 1;</li> <li>2. Test report No.10/26 Issue 3 of EPIRB model SafeSea E100G class 2. Volume 2 The technical documentation submitted by the manufacturer for testing;</li> <li>3. Test report No.10/27 Issue 3 on type approval of COSPAS-SARSAT Emergency Position Indicating Radio beacon (EPIRB) SafeSea model E100 class 2, manufacturer Ocean Signal Ltd., Great Britain Volume 1;</li> </ol>

Report Issue History		
No	Data of issue	Report reissue reason
1	10.11.2010	The initial issue.

## 1. EQUIPMENT UNDER TEST

<b>1.1 Equipment type name</b>	Emergency Position Indicating Radio Beacon (EPIRB) 406 MHz COSPAS-SARSAT
<b>1.2 Equipment trade mark</b>	SafeSea
<b>1.3 Equipment models</b>	- E100G (with GPS) - E100 (without GPS)
<b>1.4 Equipment class</b>	Class 1 (operating temperature range minus 40°C to +55°C)  Class 2 (operating temperature range minus 20°C to +55°C)
<b>1.5 Equipment category</b>	- EPIRB Float-free and manual (Category 1) with Automatic Release Housing model ARH100;  - EPIRB for manual activation (Category 2); with Manual Release Housing model MRH100  - EPIRB for manual activation (Category 2); with Manual bracket
<b>1.6 Equipment serial numbers</b>	No. 0001200011I (E100 class 2 including ARH100), No. 0001200012I (E100 class 2 with Manual bracket), No. 0001200013I (E100G class 2 including ARH100), No. 0001200014I (E100G class 2 with Manual bracket)  No. 0001200001I (E100 class 1 including ARH100), No. 0001200002I (E100 class 1 with Manual bracket), No. 0001200003I (E100G class 1 including ARH100), No. 0001200004I (E100G class 1 with Manual bracket)
<b>1.7 Equipment destination</b>	Alarm message transmission of distressed accident vessels, aircrafts and other objects via COSPAS- SARSAT satellites system
<b>1.8 Firmware</b>	Issue 00.00.28 (CSConfig 14.01.10)  This firmware used for tests during 07.05.10 – 29.10.10

**1.10 Submitted Documentation**

item	Documentation
1.	APPLICATION FOR A COSPAS-SARSAT 406 MHZ BEACON TYPE APPROVAL CERTIFICATE SIGNED BY THE MANUFACTURER TO CONFIRM THE TECHNICAL DETAILS OF THE BEACON
2.	ANALYSIS AND CALCULATIONS PRE-TEST BATTERY DISCHARGE AT AMBIENT TEMPERATURE BEFORE THE OPERATING LIFETIME AT MINIMUM TEMPERATURE TEST
3.	THE MANUFACTURER'S DECLARATION ABOUT OPERATOR SELECTABLE MODE OF OPERATION (THAT DRAWS THE MAXIMUM BATTERY ENERGY AND THE MAXIMUM PULSE CURRENT)
4.	BEACON OPERATING INSTRUCTIONS AND A TECHNICAL DATA SHEET. DECLARATION ABOUT FIRMWARE VERSION
5.	THE MANUFACTURER'S DECLARATION ABOUT ALL OPERATION CONFIGURATIONS
6.	THE TECHNICAL DATA SHEET FOR THE BATTERY CELLS USED IN THE BEACON AND THE ELECTRIC DIAGRAM OF THE BEACON'S BATTERY PACK
7.	A COPY OF THE BEACON LABEL
8.	THE TECHNICAL DATA SHEET OF THE REFERENCE OSCILLATOR
9.	DESCRIPTIONS TO DEMONSTRATE THAT THE DESIGN PROVIDES PROTECTION AGAINST CONTINUOUS TRANSMISSION
10.	DESCRIPTIONS TO DEMONSTRATE THAT THE DESIGN MEETS THE FREQUENCY STABILITY REQUIREMENTS OVER 5 YEARS
11.	DESCRIPTIONS TO DEMONSTRATE THAT THE DESIGN PROVIDES PROTECTION FROM REPETITIVE SELF-TEST MODE TRANSMISSIONS
12.	A TECHNICAL DESCRIPTION THAT CONFIRMS THE NOMINAL OUTPUT IMPEDANCE OF THE BEACON POWER AMPLIFIER IS 50 OHMS AND THE BEACON ANTENNA INPUT IMPEDANCE IS 50 OHMS
13.	THE BEACON QUALITY ASSURANCE PLAN
14.	DECLARATION OF ALL MANUALLY SELECTABLE OPERATION MODES

See these documents in Report No.10/26 Volume 2.

## 2. TEST PURPOSE

Test purpose is to confirm compliance of EPIRB SafeSea models E100 & E100G class 1, class 2 with RTCM Standard 11000.2 (RTCM Paper 77-2002/SC110-STD, version 2.1) FOR 406 MHZ SATELLITE EMERGENCY POSITION-INDICATING RADIOBEACONS (EPIRBs).

## 3. TEST CONDITIONS AND METHODS

Procedure, conditions and methods of testing correspond to requirements and methods of RTCM Standard 11000.2.

Note:

The following test data contains results of both class 1 and Class 2 variants of the Ocean Signal SafeSea E100/E100G EPIRB. The Class 1 differs from the Class 2 product in the TCXO and battery only. The Class 1 model uses a variant of the TXCO capable of operation down to -40 degrees C and a battery that will meet the 48 hour lifetime at -40 degrees C. In all other respects the two variants are identical in construction and performance; hence some tests were carried out on the class 1 model only.

## 4. TEST PROGRAM

item	Test name	Requirements item of RTCM standard	Methods item of RTCM standard
1.	Initial aliveness test	A1.0	A1.0
2.	Dry heat cycle	Table 2-1 page 2-3	A3.0
3.	Damp heat cycle	2.3.2.1.1, 2.4.1	A4.0
4.	Vibration test	2.3.2.1.2	A5.0
5.	Bump test	2.3.2.1.2	A6.0
6.	Salt fog test	2.3.2.1.5	A7.0
7.	Drop test (on hard surface)	A8.1	A8.1
8.	Drop test (in water)	A8.2	A8.2
9.	Leakage and immersion test	2.4.1 paragraphs 1, 2	A9.0
10.	Spurious emissions test	2.2.3, 2.2.10	A10.0
11.	Thermal shock test	2.3.1.1, Table 2-1 page 2-4	A11.0
12.	COSPAS-SARSAT type approval tests	2.2.1, 2.2.2, 2.2.4.6 2.2.5	A12.0
13.	Operational life test	Table 2-1 page 2-4	A13.1
14.	Strobe light self test	2.2.8	A13.2
15.	Self test	2.3.1.3, 2.2.6.2.1	A13.3
16.	Automatic release mechanism test	2.3.2.1	A14.0
17.	Stability and buoyancy test	2.3.1.6	A15.0
18.	Inadvertent activation test	2.3.2.1.6	A16.0
19.	Auxiliary radio-locating device transmitter test	2.2.9, 2.2.10	A17.0
20.	Humidity test	2.2.1.5, 2.4.1 paragraph 5	A18.0
21.	Orientation test	2.3.1.1 paragraph 2	A19.0

## 5. TEST SCHEDULE

item	Test name	Dates of test
1.	Initial aliveness test	07.05.2010
2.	Dry heat cycle	12.05.2010
3.	Damp heat cycle	13.05.2010
4.	Vibration test	14.05.2010, 18.10.10
5.	Bump test	17.05.2010
6.	Salt fog test	21.05.2010
7.	Drop test (on hard surface)	21.05.2010, 20.10.2010* <sup>1)</sup>
8.	Drop test (in water)	20.10.2010
9.	Leakage and immersion test	21.10.2010-23.10.2010, 25.10.2010
10.	Spurious emissions test	08.06.2010
11.	Thermal shock test	25.10.2010, 26.10.2010* <sup>2)</sup>
12.	COSPAS-SARSAT type approval tests	18.01.2010- 28.07.2010
13.	Operational life test	04.02.2010 - 06.02.2010 <sup>1)</sup>
14.	Strobe light self test	26.05.2010
15.	Self test	07.08.2010
16.	Automatic release mechanism test	09.08.2010, 25.10.2010* <sup>3)</sup>
17.	Stability and buoyancy test	09.09.2010
18.	Inadvertent activation test	02.07.2010
19.	Auxiliary radio-locating device transmitter test	06.08.2010
20.	Humidity test	07.10.2010-08.10.2010
21.	Orientation test	26.08.2010

Notes \*1), \*2), \*3):

All testing after the following modifications was carried out with the modifications in place.

\*1) Modification to the material of the HRU Jaws. The HRU Jaw material was changed to a material with lower creep under static load.

\*2) A rubber bumper was added to the battery to improve performance under impact. The case plastic material was changed to one with improved performance over temperature.

\*3) The gain of the water contact activation circuit was increased by addition of another transistor to ensure activation when the contacts are covered in Ice.

Notes 1):

This test was combined with COSPAS-SARSAT Type Approval operating lifetime test performed at minimum temperature.

## 6. TEST RESULT

item	Test name	Pass/No
1.	Initial aliveness test	Pass
2.	Dry heat cycle	Pass
3.	Damp heat cycle	Pass
4.	Vibration test	Pass
5.	Bump test	Pass
6.	Salt fog test	Pass
7.	Drop test (on hard surface)	Pass* <sup>1)</sup>
8.	Drop test (in water)	Pass
9.	Leakage and immersion test	Pass
10.	Spurious emissions test	Pass
11.	Thermal shock test	Pass* <sup>2)</sup>
12.	COSPAS-SARSAT type approval tests	Pass
13.	Operational life test	Pass
14.	Strobe light self test	Pass
15.	Self test	Pass
16.	Automatic release mechanism test	Pass* <sup>3)</sup>
17.	Stability and buoyancy test	Pass
18.	Inadvertent activation test	Pass
19.	Auxiliary radio-locating device transmitter test	Pass
20.	Humidity test	Pass
21.	Orientation test	Pass

### Notes

All testing after the following modifications was carried out with the modifications in place.

\*1) Modification to the material of the HRU Jaws. The HRU Jaw material was changed to a material with lower creep under static load.

\*2) A rubber bumper was added to the battery to improve performance under impact. The case plastic material was changed to one with improved performance over temperature.

\*3) The gain of the water contact activation circuit was increased by addition of another transistor to ensure activation when the contacts are covered in Ice.

Tests pass with design modification applied.



## 7. CONCLUSION

**Name and Location of Beacon Test Facility:** **PUBLIC ENTERPRISE TESTING CENTER «OMEGA»,  
ul. Vakulenchuka, 29, Sevastopol, 99053, Ukraine**

**Date of Submission for Testing:** **7 May 2010**

**Applicable C/S Standards:**

Document	Version
RTCM Standard 11000.2 (RTCM Paper 77-2002/SC110-STD)	2.1

I hereby confirm that the 406 MHz beacon described above has been successfully tested in accordance with the RTCM Standard 11000.2 and complies with the RTCM Standard 11000.2 FOR 406 MHZ SATELLITE EMERGENCY POSITION-INDICATING RADIOBEACONS (EPIRBs) as demonstrated in the attached report.

Department manager



E. Yurasov

(Name, Position and Signature of US CG Accepted Laboratory Representative)

## 8. SUMMARY OF TEST RESULTS

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C / -40°C)	Tamb (+20°C)	Tmax (+55°C)	
1. INITIAL ALIVENESS TEST (A1.0)						
• Carrier Frequency	406.037 ± 0,001	MHz		406.0369 406.0369 406.0369 406.0369 38.19 – 38.26 38.26 – 38.31		Annex 1 E100 class 1 E100G class 1 E100 class 2 E100G class 2 E100 class 1  E100G class 1
• Power Output	35 – 39	dBm		38.04 – 38.16 37.93 – 38.04		E100 class 2  E100G class 2
2. DRY HEAT CYCLE (A3.0)						
• Aliveness Test (during 2 hour period)						Annex 2
- Carrier Frequency	406.037 ± 0.001	MHz			406.0368 406.0369	E100G Class 1 E100G Class 2
- Power Output	35 – 39	dBm			37.89 37.86	E100G Class 1 E100G Class 2
• Aliveness test (at end of 2 hour period)						
- Carrier Frequency	406.037 ± 0.001	MHz			406.0368 406.0369	E100G Class 1 E100G Class 2
- Power Output	35 – 39	dBm			37.87 37.81	E100G Class 1 E100G Class 2
3. DAMP HEAT CYCLE (A4.0)						
• Aliveness Test (during 2 hour period)						Annex 3
- Carrier Frequency	406.037 ± 0.001	MHz			406.0369 406.0369	E100G Class 1 E100G Class 2
- Power Output	35 – 39	dBm			38.28 38.44	E100G Class 1 E100G Class 2
• Aliveness Test (at end of 2 hour period)						
- Carrier Frequency	406.037 ± 0.001	MHz			406.0369 406.0369	E100G Class 1 E100G Class 2
- Power Output	35 – 39	dBm			38.36 38.37	E100G Class 1 E100G Class 2
4. VIBRATION TEST (A5.0)						
• Exterior Mechanical Inspection	No damage	√		√		Annex 4
• Aliveness Test:						
- Carrier Frequency	406.037 ± 0.001	MHz		406.0370 406.0370 406.0370 406.0370 38.22 37.99 37.97 38.10		E100G Class 2
- Power Output	35 – 39	dBm				E100G Class 2
• Activation	No activation during test	√		√		

\* Note EPIRB has frequency 406.037 MHz opened for type approval testing since January, 1 2004 (C/S T.012 page H-2 Table H.2).  
Frequency 406.025 closed for type approval testing since January, 1 2002 (C/S T.012 page H-2 Table H.2).  
Frequency 406.028 closed for type approval testing since January, 1 2007 (C/S T.012 page H-2 Table H.2).  
These notes extend for frequency requirement on following protocol pages.



PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C / -40°C)	Tamb (+20°C)	Tmax (+55°C)	
<ul style="list-style-type: none"> <li>• Aliveness Test: <ul style="list-style-type: none"> <li>- Carrier Frequency</li> <li>- Power Output</li> </ul> </li> <li>• Frequency Stability <ul style="list-style-type: none"> <li>- short term stability</li> <li>- medium term stability</li> </ul> </li> <li>mean slope</li> <li>residual frequency variation</li> </ul>	406.037 ± 0.001 35 - 39  ≤0.002  ≤0.001  ≤0.003	MHz dBm  parts/ million in 100 ms  parts/ million/ minute parts/ million	406.0368 37.91 – 38.03  0.000058 – 0.000066  0.000268  0.000891 – 0.001445		406.0368 37.92 – 38.03  0.000113 – 0.000121  -0.000731 to -0.000429 0.000312 – 0.000752	E100G class 2 E100G class 2  E100G class 2  E100G class 2 E100G class 2
11. COSPAS-SARSAT TYPE APPROVAL TESTS (A12.0)	C-S Certificate (attached test reports 10/26, 10/27)	√	√	√	√	COSPAS-SARSAT Certificate No.211 submitted
12. OPERATIONAL LIFE, STROBE LIGHT AND SELF TESTS (A13.0)						
Operational Life (A13.1)						Annex 12
<ul style="list-style-type: none"> <li>• Frequency <ul style="list-style-type: none"> <li>- Nominal Carrier</li> </ul> </li> <li>- Short term stability</li> <li>• Medium-term stability <ul style="list-style-type: none"> <li>- Mean slope</li> <li>- Residual variation</li> </ul> </li> <li>• RF output power</li> <li>• Strobe flash rate</li> <li>• Auxiliary radio-locating Peak envelope output power</li> </ul>	406.037 ± 0,001  ≤0.002  ≤0.001  ≤0.003  35 - 39 20 - 30 14 - 20	MHz parts/ million in 100 ms  parts/ million/ minute parts/ Million  dBm /min dBm	406.0369  0.000049- 0.000119  -0. 000654 to 0.000079 0. 000302- 0.002878 36.95- 37.82 25-26 19.54- 19.68			E100G class 2 E100G class 2  E100G class 2 E100G class 2 E100G class 2 E100G class 2 E100G class 2
13. STROBE LIGHT TEST (A13.2)						Annex 13
<ul style="list-style-type: none"> <li>• Flash rate</li> <li>• Effective intensity</li> <li>• Pulse duration</li> </ul>	20 - 30  0.75  10 <sup>-6</sup> to 10 <sup>-2</sup>	/min  Cd  s	25 25 min. value =1.44 max. value =1.79 min. value =1.42 max. value =2.23 9.94x10 <sup>-3</sup> 9.98x10 <sup>-3</sup>	25 25 min. value =1.14 max. value =1.77 min. value =1.93 max. value =1.28 9.95x10 <sup>-3</sup> 9.97x10 <sup>-3</sup>	25 25 min. value =1.21 max. value =1.51 min. value =1.16 max. value =1.81 9.96x10 <sup>-3</sup> 9.96x10 <sup>-3</sup>	E100 class 1 E100 class 2 E100 class 1  E100 class 2  E100 class 1 E100 class 2
14. SELF TEST (A13.3)						Annex 14
<ul style="list-style-type: none"> <li>• RF pulse duration</li> <li>• Frame synchronization pattern</li> </ul>	0.444 sec or 0.525 sec  011010000	√  √	√  √	√  √	√  √	E100G class 1 E100 class 2  E100G class 1 E100 class 2

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C / -40°C)	Tamb (+20°C)	Tmax (+55°C)	
• Number of RF bursts	1-burst	√	√	√	√	E100G class 1 E100 class 2
15. AUTOMATIC RELEASE MECHANISM TEST (A14.0)						Annex 15
• Normal mounted orientation	Release and float free before 4 meters;	√		√		
• Rolling 90° starboard	automatic activation	√		√		
• Rolling 90° port		√		√		
• Rolling 90° bow down		√		√		
• Rolling 90° stern down		√		√		
• Upside down		√		√		
16. STABILITY AND BUOYANCY TEST (A15.0)						Annex 16
• Time to upright	2	s		1.9		
• Reserve Buoyancy	5	%		35		
• Float upright; Antenna base	> 4	cm		6.5		
17. INADVERTENT ACTIVATION TEST (A16.0)						Annex 17
• Activation/Release	EUT should not release from bracket or automatically activate	√		√		E100 class 1 E100 class 2
18. AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0)						Annex 18
• Carrier Frequency	121.5 ± 0.006	MHz	121.4974	121.4978	121.4974	E100G class 1
• PERP	14 - 20	dBm		15		E100G class 1
• Modulation						
- Frequency	700 Hz within range of 300 – 1600 Hz	Hz	348 – 1100	349 – 1120	349 – 1110	E100G class 1
- Direction	Upward	√	√	√	√	E100G class 1
- Duty cycle	33 - 55	%	36.5 – 39.2	36.9 – 40.3	36.9 – 40.8	E100G class 1
- Factor	0.85 – 1.0	#	0.97	0.98	0.97	E100G class 1
- Sweep repetition rate	2 - 4	Hz	3.03	3.03	3.04	E100G class 1
• Antenna						
- Pattern	Omnidirectional	√		√		E100G class 1
- Polarization	Vertical	√		√		E100G class 1
- VSWR	1.5:1	√		√		E100G class 1
19. HUMIDITY TEST (A18.0)						Annex 19
• Aliveness Test:	Successful					
- Carrier Frequency	406.037 ± 0,001	MHz			406.0369	E100G class 2
- Power Output	35 - 39	dBm			37.88 – 37.97	E100G class 2
20. ORIENTATION TEST (A19.0)						Annex 20
• Aliveness Test:						
- Carrier Frequency	406.037 ± 0,001	MHz		406.0369		E100G class 2
- Power Output	35 - 39	dBm		37.76		E100G class 2

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C / -40°C)	Tamb (+20°C)	Tmax (+55°C)	
UPSIDE DOWN						
• Aliveness Test:						
- Carrier Frequency	406.037 ± 0,001	MHz		406.0369		E100G class 2
- Power Output	35 - 39	dBm		37.72		E100G class 2
HORIZONTAL						
• Aliveness Test:						
- Carrier Frequency	406.037 ± 0,001	MHz		406.0369		E100G class 2
- Power Output	35 - 39	dBm		37.68		E100G class 2

Senior Engineer



A.V.Baydachniy

**Annex 1****INITIAL ALIVENESS TEST (A1.0 RTCM 11000.2 Version 2.1)**

**Equipment Under Test (EUT):** 1) No.1 EPIRB SafeSea E100 class 1  
2) No.2 EPIRB SafeSea E100G class 1  
3) No.3 EPIRB SafeSea E100 class 2  
4) No.4 EPIRB SafeSea E100G class 2

**EUT Software Release:** issue 00.00.28

**Sample No.1** Serial No 0001200002 I

**Sample No.2** Serial No 0001200004 I

**Sample No.3** Serial No 0001200012 I

**Sample No.4** Serial No 0001200014 I

**Test Date:** 10.05.2010

**Test Conditions:**

– Atmospheric pressure: 748 mm/Hg

– Relative air humidity: 71 %

– EUT were included	the satellite EPIRB with release mechanism (Category 1):	NO
	the satellite EPIRB with mounting device (Category 2):	YES
– EUT were included	the temperature Class 1 device:	YES
	the temperature Class 2 device:	YES

– EPIRB is ON during the test

Test equipment:

- Beacon tester BT-611 No 1005



Figure 1.1 - View of the EUT (EPIRB E100 class 1)



Figure 1.2 - View of the EUT (EPIRB E100 class 1)





Figure 1.3 - View of the EUT (EPIRB E100 class 1)



Figure 1.4 - View of the EUT (EPIRB E100 class 1)



Figure 1.5 - View of the EUT (EPIRB E100 class 1)



Figure 1.6 - View of the EUT (EPIRB E100 class 1)



Figure 1.7 - View of the EUT (EPIRB E100G class 1)



Figure 1.8 - View of the EUT (EPIRB E100G class 1)





Figure 1.9 - View of the EUT (EPIRB E100G class 1)



Figure 1.10 - View of the EUT (EPIRB E100G class 1)



Figure 1.11 - View of the EUT (EPIRB E100G class 1)



Figure 1.12 - View of the EUT (EPIRB E100G class 1)



Figure 1.13 - View of the EUT (EPIRB E100 class 2)



Figure 1.14 - View of the EUT (EPIRB E100 class 2)



Figure 1.15 - View of the EUT (EPIRB E100 class 2)



Figure 1.16 - View of the EUT (EPIRB E100 class 2)



Figure 1.17 - View of the EUT (EPIRB E100 class 2)



Figure 1.18 - View of the EUT (EPIRB E100 class 2)



Figure 1.19 - View of the EUT (EPIRB E100G class 2)



Figure 1.20 - View of the EUT (EPIRB E100G class 2)





Figure 1.21 - View of the EUT (EPIRB E100G class 2)



Figure 1.22 - View of the EUT (EPIRB E100G class 2)



Figure 1.23 - View of the EUT (EPIRB E100G class 2)



Figure 1.24 - View of the EUT (EPIRB E100G class 2)



Figure 1.25 - View of the EUT (EPIRB), sticker's place 51x26 mm



Figure 1.26 - View of the EUT (EPIRB), sticker's place 51x26 mm

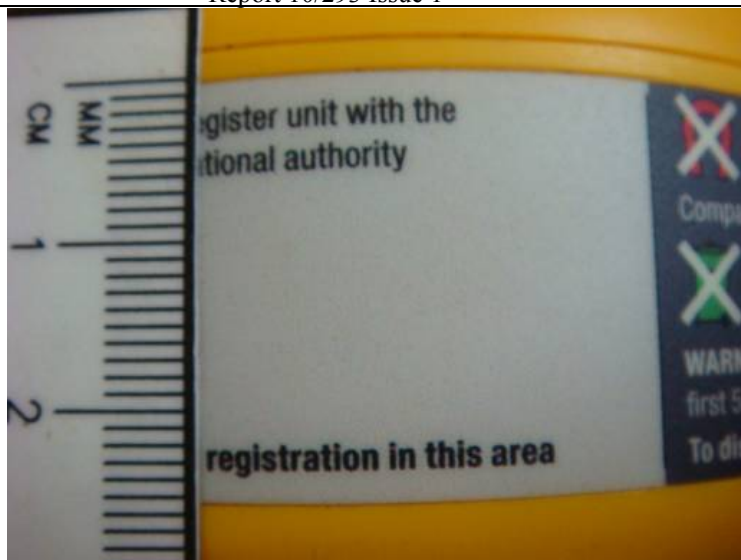


Figure 1.27 - View of the EUT (EPIRB), sticker's place 51x26 mm



Figure 1.28 - View of the test setup for the Initial Aliveness Test

## FINAL RESULTS OF INITIAL ALIVENESS TEST (A1.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	No.1 406.036916 No.2 406.036955-406.036957 No.3 406.036958-406.036962 No.4 406.036930-406.036938	PASS PASS PASS PASS
- Power Output	35 - 39	dBm	No.1 38.19 – 38.26 No.2 38.26 – 38.31 No.3 38.04 – 38.16 No.4 37.93 – 38.04	PASS PASS PASS PASS

Test duration 0 h 15 m	Bursts received 20	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.916	406036.916	406036.916
+Phase deviation, rad	1.00	1.20	1.08	1.08	1.09
-Phase deviation, rad	-1.00	-1.20	-1.11	-1.12	-1.12
Phase time rise, mcs	50.00	250.00	144.19	144.30	145.98
Phase time fall, mcs	50.00	250.00	158.66	158.85	159.95
Power, Wt	3.16	7.94	6.59	6.59	6.70
Power rise, ms	0.00	0.00	0.00	0.40	0.00
Bit Rate, bps	396.00	404.00	399.86	399.86	399.99
Asymmetry, %	0.00	5.00	0.31	0.34	0.40
CW Preamble, ms	158.40	161.60	160.11	160.12	160.12
Total burst duration, ms	514.80	525.20	439.20	439.20	439.25
Repetition period, s	47.50	52.50	47.90	47.90	52.41
Delta Rep. period, s	>4.00		4.50	4.50	4.50
Slope(E-9)	-1.00	1.00	0.036	0.036	0.036
Residual variations (E-9)	0.00	3.00	0.097	0.097	0.097
Short term variations (E-9)	0.00	2.00	0.064	0.064	0.064
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499057	Low Sweep Frequency, Hz			351
Power, mW	96.1	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			825
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 4C972000C6007CE887125 0				

Figure 1.29 - E100 class 1

Test duration 0 h 15 m	Bursts received 20	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.955	406036.955	406036.957
+Phase deviation, rad	1.00	1.20	1.10	1.11	1.13
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.12	-1.13
Phase time rise, mcs	50.00	250.00	148.44	150.84	152.03
Phase time fall, mcs	50.00	250.00	163.49	166.07	169.66
Power, Wt	3.16	7.94	6.70	6.70	6.77
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.93	399.94	400.06
Asymmetry, %	0.00	5.00	0.38	0.48	0.55
CW Preamble, ms	158.40	161.60	160.11	160.12	160.12
Total burst duration, ms	514.80	525.20	519.05	519.05	519.10
Repetition period, s	47.50	52.50	47.61	47.61	52.51
Delta Rep. period, s	>4.00		4.90	4.90	4.90
Slope(E-9)	-1.00	-0.367	-0.367	-0.367	-0.367
Residual variations (E-9)	0.00	0.141	0.141	0.141	0.149
Short term variations (E-9)	0.00	0.096	0.096	0.096	0.096
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500270	Low Sweep Frequency, Hz			345
Power, mW	97.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C96F9C0637FDFF992EF3 783E0F66C				

Figure 1.30 - E100G class 1

Test duration 0 h 15 m	Bursts received 20	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.958	406036.958	406036.962
+Phase deviation, rad	1.00	1.20	1.09	1.09	1.10
-Phase deviation, rad	-1.00	-1.20	-1.09	-1.10	-1.11
Phase time rise, mcs	50.00	250.00	146.56	146.56	147.80
Phase time fall, mcs	50.00	250.00	161.21	161.66	162.68
Power, Wt	3.16	7.94	6.37	6.41	6.55
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	399.91	399.93	400.06
Asymmetry, %	0.00	5.00	0.41	0.42	0.50
CW Preamble, ms	158.40	161.60	160.10	160.10	160.12
Total burst duration, ms	514.80	525.20	439.05	439.05	439.15
Repetition period, s	47.50	52.50	47.80	47.90	52.51
Delta Rep. period, s	>4.00		4.70	4.70	4.70
Slope(E-9)	-1.00	1.00	-0.800	-0.762	-0.762
Residual variations (E-9)	0.00	3.00	0.325	0.325	0.344
Short term variations (E-9)	0.00	2.00	0.047	0.047	0.047
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500674	Low Sweep Frequency, Hz			345
Power, mW	93.1	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 4C972000C6007CE887125 0				

Figure 1.31 - E100 class 2

h 15 m	Test duration 0	Bursts received 20	BCH error 0	Self-Test 0		
	Limits		Measured			
406 MHz Transmitter Parameters		min	max	min	current	max
Frequency, kHz		406036.000	406038.000	406036.930	406036.930	406036.938
+Phase deviation, rad		1.00	1.20	1.06	1.08	1.12
-Phase deviation, rad		-1.00	-1.20	-1.04	-1.09	-1.11
Phase time rise, mcs		50.00	250.00	140.97	142.89	146.07
Phase time fall, mcs		50.00	250.00	156.46	159.06	159.87
Power, Wt		3.16	7.94	6.21	6.25	6.37
Power rise, ms		0.00	0.00	0.00	0.60	0.00
Bit Rate, bps		396.00	404.00	399.89	400.06	400.06
Asymmetry, %		0.00	5.00	0.27	0.42	0.73
CW Preamble, ms		158.40	161.60	160.10	160.11	160.12
Total burst duration, ms		514.80	525.20	519.00	519.05	519.15
Repetition period, s		47.50	52.50	47.50	48.01	52.51
Delta Rep. period, s		>4.00		5.00	5.00	5.00
Slope(E-9)		-1.00	1.00	0.008	0.008	0.008
Residual variations (E-9)		0.00	3.00	0.480	0.480	0.480
Short term variations (E-9)		0.00	2.00	0.055	0.055	0.055
121.5 MHz Transmitter Parameters						
Carrier Frequency, Hz		121499846	Low Sweep Frequency, Hz			345
Power, mW		91.0	High Sweep Frequency, Hz			1176
Sweep Period, sec		0.3	Sweep Range, Hz			831
Modulation Index, %		100				
Message						
Contents (full)		:FFFE2F 8C96F9C0632C84337695B 79500A39A				

Figure 1.32 - E100G



DRY HEAT CYCLE (A3.0 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): 1) No.1 EPIRB SafeSea E100G class 1  
2) No.2 EPIRB SafeSea E100G class 2

Software release for EUT: issue 00.00.28

Sample No.1 Serial No 0001200004 I

Sample No.2 Serial No 0001200014 I

Test Date: 11.05.2010

Test Conditions:

- Atmospheric pressure: 751 mm/Hg.
- Relative air humidity: 67 %.
- Maximum temperature in the chamber +70 °C
- Operating temperature in the chamber +55 °C
- EUT is included the satellite EPIRB without its release mechanism (Category 1): NO  
stowage bracket (Category 2): YES

Test equipment:

- Climatic chamber KPK-400V No 15
- Beacon tester BT-611 No 1005
- Test duration is 13 hours.
- Measurement duration is 3x15 minutes.
  - No. 1 Detailed measurements are of EUT (EPIRB) before of dry heat cycle
  - No. 2 Condition: EPIRB is OFF; ambient temperature is +70 °C in the chamber with EUT duration 10 hours;
  - No. 3 Climatic control devices in EUT are OFF ----- YES  
ON ----- NO
  - Step No. 4 The chamber cooling to +55 °C within 30 minutes;
  - No. 5 Condition: EPIRB is ON; ambient temperature is +55 °C in the chamber with EUT duration 2 hours;
  - No. 6 Detailed measurements are of EUT (EPIRB) during of the 2 hour period in the +55 °C chamber;
  - No. 7 Detailed measurements are of EUT (EPIRB) at the end of the 2 hour period in the +55 °C chamber



Figure 2.1 - View of the EUT (EPIRB E100G class 1) before dry heat cycle



Figure 2.2 - View of the EUT (EPIRB E100G class 1) before dry heat cycle



Figure 2.3 - View of the EUT (EPIRB E100G class 1)  
before dry heat cycle



Figure 2.4 - View of the EUT (EPIRB E100G class 2)  
before dry heat cycle



Figure 2.5 - View of the EUT (EPIRB E100G class 2)  
before dry heat cycle



Figure 2.6 - View of the EUT (EPIRB E100G class 2)  
before dry heat cycle



Test duration 0 h 24 m	Bursts received 30	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.872	406036.872	406036.874
+Phase deviation, rad	1.00	1.20	1.08	1.10	1.11
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.11	-1.13
Phase time rise, mcs	50.00	250.00	143.09	147.68	147.68
Phase time fall, mcs	50.00	250.00	157.65	160.84	163.25
Power, Wt	3.16	7.94	6.13	6.15	6.15
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	399.92	399.93	400.06
Asymmetry, %	0.00	5.00	0.30	0.40	0.48
CW Preamble, ms	158.40	161.60	160.11	160.11	160.12
Total burst duration, ms	514.80	525.20	519.20	519.20	519.25
Repetition period, s	47.50	52.50	47.61	49.11	52.51
Delta Rep. period, s	>4.00		4.90	4.90	4.90
Slope(E-9)	-1.00	1.00	-0.277	-0.277	-0.277
Residual variations (E-9)	0.00	3.00	0.884	0.884	0.894
Short term variations (E-9)	0.00	2.00	0.067	0.067	0.067
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499736	Low Sweep Frequency, Hz			345
Power, mW	89.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 2.7 - Detailed measurement results of EUT (EPIRB E100G class 1) before dry heat cycle

Test duration 0 h 23 m	Bursts received 30	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.896	406036.898	406036.898
+Phase deviation, rad	1.00	1.20	1.08	1.10	1.10
-Phase deviation, rad	-1.00	-1.20	-1.09	-1.10	-1.11
Phase time rise, mcs	50.00	250.00	138.25	140.79	141.27
Phase time fall, mcs	50.00	250.00	148.75	153.51	156.09
Power, Wt	3.16	7.94	6.15	6.15	6.22
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.94	399.94	400.08
Asymmetry, %	0.00	5.00	0.33	0.39	0.43
CW Preamble, ms	158.40	161.60	160.11	160.12	160.12
Total burst duration, ms	514.80	525.20	519.15	519.20	519.20
Repetition period, s	47.50	52.50	47.51	49.61	52.51
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	-0.004	0.264	0.264
Residual variations (E-9)	0.00	3.00	0.743	0.743	0.786
Short term variations (E-9)	0.00	2.00	0.059	0.059	0.059
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499166	Low Sweep Frequency, Hz			345
Power, mW	90.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C9A0018DFC0FF02AD447 79F3C0010				

Figure 2.8 - Detailed measurement results of EUT (EPIRB E100G class 2) before dry heat cycle

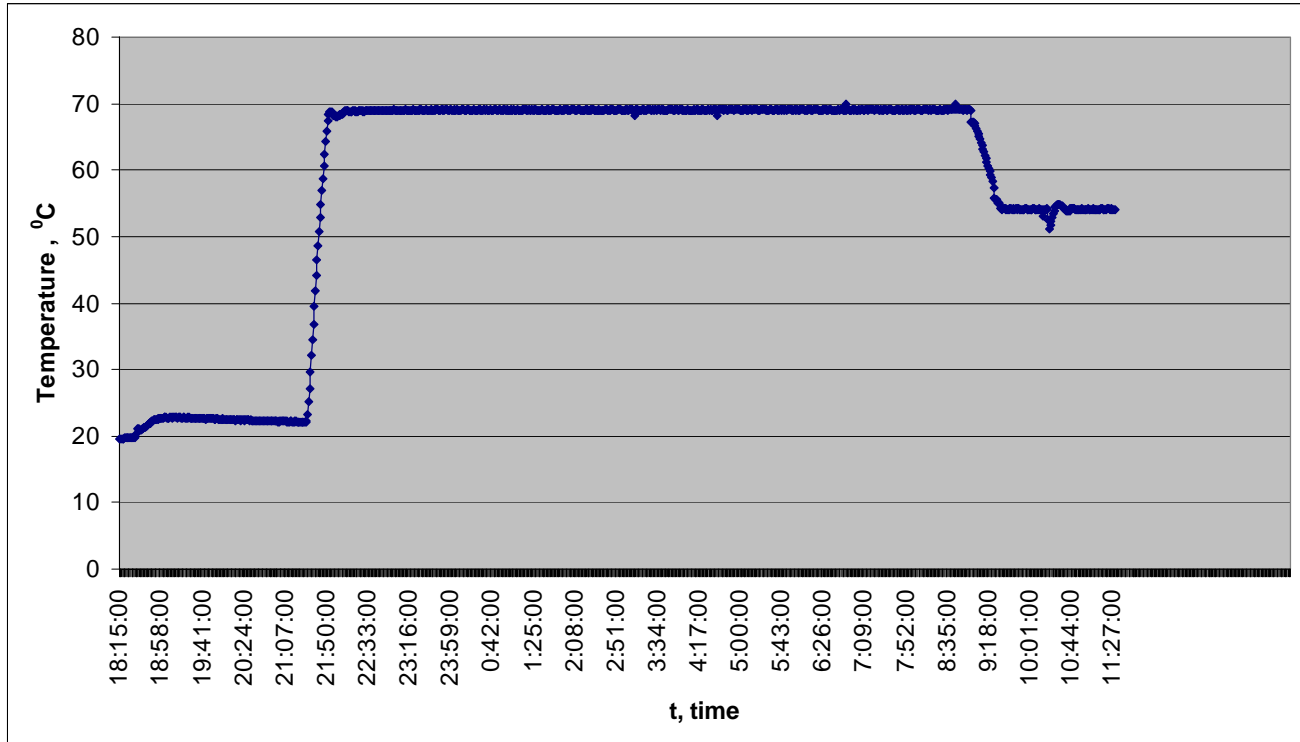


Figure 2.9 Schedule of chamber temperature

Test duration 0 h 15 m	Bursts received 20	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.873	406036.874	406036.874
+Phase deviation, rad	1.00	1.20	1.09	1.10	1.11
-Phase deviation, rad	-1.00	-1.20	-1.11	-1.11	-1.12
Phase time rise, mcs	50.00	250.00	145.19	145.73	147.45
Phase time fall, mcs	50.00	250.00	158.94	159.99	163.25
Power, Wt	3.16	7.94	6.13	6.15	6.15
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	399.92	399.93	400.06
Asymmetry, %	0.00	5.00	0.35	0.41	0.46
CW Preamble, ms	158.40	161.60	160.11	160.11	160.12
Total burst duration, ms	514.80	525.20	519.20	519.20	519.25
Repetition period, s	47.50	52.50	47.61	49.91	52.51
Delta Rep. period, s		>4.00	4.90	4.90	4.90
Slope(E-9)	-1.00	1.00	-0.097	-0.097	-0.097
Residual variations (E-9)	0.00	3.00	0.301	0.301	0.301
Short term variations (E-9)	0.00	2.00	0.052	0.052	0.052
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499708	Low Sweep Frequency, Hz			345
Power, mW	90.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 2.10 – Detailed measurement results of EUT (EPIRB E100G class 1) during the 2 hour period in the +55 °C chamber

Test duration 2 h 43 m	Bursts received 200	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.896	406036.900	406036.900
+Phase deviation, rad	1.00	1.20	1.06	1.09	1.10
-Phase deviation, rad	-1.00	-1.20	-1.09	-1.10	-1.14
Phase time rise, mcs	50.00	250.00	137.22	138.95	143.93
Phase time fall, mcs	50.00	250.00	148.75	152.83	156.37
Power, Wt	3.16	7.94	6.14	6.15	6.22
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.93	399.94	400.08
Asymmetry, %	0.00	5.00	0.15	0.40	0.46
CW Preamble, ms	158.40	161.60	160.10	160.11	160.12
Total burst duration, ms	514.80	525.20	519.10	519.15	519.20
Repetition period, s	47.50	52.50	47.51	47.71	52.51
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	-0.037	-0.037	0.342
Residual variations (E-9)	0.00	3.00	0.058	0.058	1.242
Short term variations (E-9)	0.00	2.00	0.047	0.047	0.066
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499163	Low Sweep Frequency, Hz			351
Power, mW	90.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			825
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C9A0018DFC0FF02AD447 79F3C0010				

Figure 2.11 – Detailed measurement results of EUT (EPIRB E100G class 2) during the 2 hour period in the +55 °C chamber

Test duration 9 h 58 m	Bursts received 727	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.896	406036.902	406036.902
+Phase deviation, rad	1.00	1.20	1.06	1.10	1.11
-Phase deviation, rad	-1.00	-1.20	-1.09	-1.10	-1.14
Phase time rise, mcs	50.00	250.00	136.84	138.21	146.42
Phase time fall, mcs	50.00	250.00	148.60	152.93	156.37
Power, Wt	3.16	7.94	6.04	6.04	6.22
Power rise, ms	0.00	0.00	0.00	0.60	0.00
Bit Rate, bps	396.00	404.00	399.93	399.93	400.08
Asymmetry, %	0.00	5.00	0.15	0.41	0.48
CW Preamble, ms	158.40	161.60	160.10	160.12	160.13
Total burst duration, ms	514.80	525.20	519.10	519.10	519.20
Repetition period, s	47.50	52.50	47.51	47.51	52.51
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	-0.003	-0.003	0.342
Residual variations (E-9)	0.00	3.00	0.615	0.615	1.242
Short term variations (E-9)	0.00	2.00	0.053	0.053	0.073
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499156	Low Sweep Frequency, Hz			351
Power, mW	92.5	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			825
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C9A0018DFC0FF02AD447 79F3C0010				

Figure 2.13 – Detailed measurement results of EUT (EPIRB E100G class 2) at the end of the 2 hour period in the +55 °C chamber

## FINAL RESULTS OF DRY HEAT CYCLE (A3.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
- Carrier Frequency	406.037 ± 0.001	MHz	No.1 406.036873 No.2 406.036900	PASS PASS
- Power Output	35 - 39	dBm	No.1 37.89 No.2 37.86	PASS PASS
• Aliveness Test (at end of 2 hour period):				
- Carrier Frequency	406.037 ± 0.001	MHz	No.1 406.036872 No.2 406.036902	PASS PASS
- Power Output	35 - 39	dBm	No.1 37.87 No.2 37.81	PASS PASS

## CRITERIA OF COMPLIANCE DRY HEAT CYCLE (A3.0 RTCM 11000.2 Version 2.1):

- 1) successful aliveness test conducted during 2 hour period in the +55 °C chamber.
- 2) successful aliveness test conducted at end of 2 hour period in the +55 °C chamber.

### Annex 3

#### DAMP HEAT CYCLE (A4.0 RTCM 11000.2 Version 2.1)

**Equipment Under Test (EUT):** 1) No.1 EPIRB SafeSea E100G class 1  
2) No.2 EPIRB SafeSea E100G class 2

**Software release for EUT:** issue 00.00.28

**Sample No.1** Serial No 0001200004 I

**Sample No.2** Serial No 0001200014 I

**Test Date:** 12.05.2010

**Test Conditions:**

- Atmospheric pressure: 752 mm/Hg.
- Operating relative air humidity in the chamber: 93 %.
- Operating temperature in the chamber: +40 °C

– EUT is included the satellite EPIRB without its release mechanism (Category 1): YES  
stowage bracket (Category 2): YES

– Test equipment:

- Climatic chamber KPK-400V No 15
- Temperature meter Center-309 No 100074/1
- Beacon tester BT-611 No 1005

– Test duration is 20 hours.

– Measurement duration is 3x15 minutes.

No. 1 Detailed measurements are of EUT (EPIRB) before of damp heat cycle

No. 2 Condition: EPIRB is OFF; ambient temperature is +40 °C and 93 % relative humidity (no condensation) in the chamber with EUT duration 10 hours;

No. 3 Climatic control devices in EUT are OFF YES  
ON NO

– Step No. 4 Condition: EPIRB is ON; ambient temperature is +40 °C and 93 % relative humidity in the chamber with EUT duration 2 hours;

No. 4.1 Detailed measurements are of EUT (EPIRB) during of the 2 hour period in the +40 °C and 93 % relative humidity chamber;

No. 4.2 Detailed measurements are of EUT (EPIRB) at the end of the 2 hour period in the +40 °C and 93 % relative humidity chamber



Figure 3.1 - View of the EUT (EPIRB E100G class 1) before damp heat cycle



Figure 3.2 - View of the EUT (EPIRB SafeSea E100G class 2) before damp heat cycle



Figure 3.3 - View of the EUT (EPIRB E100G class 1) before damp heat cycle





Figure 3.4 - View of the EUT (EPIRB E100G class 2) before damp heat cycle



Figure 3.5 - View of the EUT (EPIRB E100G class 2) before damp heat cycle



Figure 3.6 - View of the EUT (EPIRB E100G class 2) before damp heat cycle



Figure 3.7 - View of the EUT (EPIRB E100G with release mechanism) before damp heat cycle in chamber



Test duration 0 h 24 m	Bursts received 20	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.872	406036.872	406036.874
+Phase deviation, rad	1.00	1.20	1.08	1.10	1.11
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.11	-1.13
Phase time rise, mcs	50.00	250.00	143.09	147.68	147.68
Phase time fall, mcs	50.00	250.00	157.65	160.84	163.25
Power, Wt	3.16	7.94	6.13	6.15	6.15
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	399.92	399.93	400.06
Asymmetry, %	0.00	5.00	0.30	0.40	0.48
CW Preamble, ms	158.40	161.60	160.11	160.11	160.12
Total burst duration, ms	514.80	525.20	519.20	519.20	519.25
Repetition period, s	47.50	52.50	47.61	49.11	52.51
Delta Rep. period, s	>4.00		4.90	4.90	4.90
Slope(E-9)	-1.00	1.00	-0.277	-0.277	-0.277
Residual variations (E-9)	0.00	3.00	0.884	0.884	0.894
Short term variations (E-9)	0.00	2.00	0.067	0.067	0.067
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499736	Low Sweep Frequency, Hz			345
Power, mW	91.4	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 3.8 - Detailed measurement results of EUT (EPIRB E100G class 1) before damp heat cycle

Test duration 0 h 23 m	Bursts received 30	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406036.896	406036.898	406036.898
+Phase deviation, rad	1.00	1.20	1.08	1.10	1.10
-Phase deviation, rad	-1.00	-1.20	-1.09	-1.10	-1.11
Phase time rise, mcs	50.00	250.00	138.25	140.79	141.27
Phase time fall, mcs	50.00	250.00	148.75	153.51	156.09
Power, Wt	3.16	7.94	6.15	6.15	6.22
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.94	399.94	400.08
Asymmetry, %	0.00	5.00	0.33	0.39	0.43
CW Preamble, ms	158.40	161.60	160.11	160.12	160.12
Total burst duration, ms	514.80	525.20	519.15	519.20	519.20
Repetition period, s	47.50	52.50	47.51	49.61	52.51
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	-0.004	0.264	0.264
Residual variations (E-9)	0.00	3.00	0.743	0.743	0.786
Short term variations (E-9)	0.00	2.00	0.059	0.059	0.059
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499166	Low Sweep Frequency, Hz			345
Power, mW	92.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C9A0018DFC0FF02AD447 79F3C0010				

Figure 3.9 - Detailed measurement results of EUT (EPIRB E100G class 2) before damp heat cycle

Test duration 0 h 30 m	Bursts received 36	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	406036.909	406036.916	406036.917
+Phase deviation, rad	1.00	1.20	1.08	1.09	1.12
-Phase deviation, rad	-1.00	-1.20	-1.08	-1.11	-1.12
Phase time rise, mcs	50.00	250.00	143.49	145.63	147.02
Phase time fall, mcs	50.00	250.00	156.37	160.64	164.17
Power, Wt	3.16	7.94	6.58	6.73	6.79
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.78	399.79	399.96
Asymmetry, %	0.00	5.00	0.34	0.46	0.65
CW Preamble, ms	158.40	161.60	160.10	160.10	160.11
Total burst duration, ms	514.80	525.20	519.00	519.05	519.10
Repetition period, s	47.50	52.50	47.61	49.11	52.51
Delta Rep. period, s	>4.00		4.90	4.90	4.90
Slope(E-9)	-1.00	1.00	-0.225	-0.225	-0.225
Residual variations (E-9)	0.00	3.00	0.323	0.323	0.323
Short term variations (E-9)	0.00	2.00	0.058	0.058	0.058
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499636	Low Sweep Frequency, Hz			345
Power, mW	90.5	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 3.10 - Detailed measurement results of EUT (EPIRB E100G class 1) during the 2 hour period in the +40°C and 93 % relative humidity chamber

Test duration 0 h 30 m	Bursts received 138	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	406036.910	406036.914	406036.918
+Phase deviation, rad	1.00	1.20	1.08	1.09	1.12
-Phase deviation, rad	-1.00	-1.20	-1.08	-1.11	-1.12
Phase time rise, mcs	50.00	250.00	143.49	145.63	147.02
Phase time fall, mcs	50.00	250.00	156.37	160.64	164.17
Power, Wt	3.16	7.94	6.61	6.83	6.89
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.85	399.86	399.99
Asymmetry, %	0.00	5.00	0.34	0.46	0.65
CW Preamble, ms	158.40	161.60	160.10	160.10	160.11
Total burst duration, ms	514.80	525.20	519.00	519.05	519.10
Repetition period, s	47.50	52.50	47.61	49.11	52.51
Delta Rep. period, s		>4.00	4.90	4.90	4.90
Slope(E-9)	-1.00	1.00	-0.225	-0.225	-0.225
Residual variations (E-9)	0.00	3.00	0.323	0.323	0.323
Short term variations (E-9)	0.00	2.00	0.058	0.058	0.058
21.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499636	Low Sweep Frequency, Hz			345
Power, mW	2050.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 3.11 - Detailed measurement results of EUT (EPIRB E100G class 2) during the 2 hour period in the +40°C and 93 % relative humidity chamber

Test duration 0 h 36 m	Bursts received 45	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	406036.931	406036.940	406036.952
+Phase deviation, rad	1.00	1.20	1.08	1.08	1.10
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.11	-1.11
Phase time rise, mcs	50.00	250.00	136.68	138.89	139.47
Phase time fall, mcs	50.00	250.00	149.82	152.99	154.03
Power, Wt	3.16	7.94	6.79	6.80	6.82
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.83	400.01	400.01
Asymmetry, %	0.00	5.00	0.36	0.38	0.48
CW Preamble, ms	158.40	161.60	160.09	160.10	160.11
Total burst duration, ms	514.80	525.20	519.00	519.00	519.10
Repetition period, s	47.50	52.50	47.51	52.51	52.51
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	-0.603	-0.603	-0.603
Residual variations (E-9)	0.00	3.00	0.200	0.200	0.200
Short term variations (E-9)	0.00	2.00	0.049	0.049	0.049
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499191	Low Sweep Frequency, Hz			345
Power, mW	93.5	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C9A0018DFC0FF02AD447 79F3C0010				

Figure 3.12 - Detailed measurement results of EUT (EPIRB E100G class 1) at the end the 2 hour period in the +40 °C and 93 % relative humidity chamber

Test duration 1 h 50 m	Bursts received 135	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	406036.930	406036.932	406036.961
+Phase deviation, rad	1.00	1.20	1.08	1.10	1.11
-Phase deviation, rad	-1.00	-1.20	-1.08	-1.10	-1.11
Phase time rise, mcs	50.00	250.00	136.28	138.66	141.09
Phase time fall, mcs	50.00	250.00	149.01	153.09	155.23
Power, Wt	3.16	7.94	6.62	6.87	6.88
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	399.83	400.05	400.05
Asymmetry, %	0.00	5.00	0.36	0.45	0.56
CW Preamble, ms	158.40	161.60	160.09	160.10	160.11
Total burst duration, ms	514.80	525.20	519.00	519.00	519.10
Repetition period, s	47.50	52.50	47.51	52.51	52.51
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	-0.168	-0.168	-0.168
Residual variations (E-9)	0.00	3.00	0.335	0.335	0.335
Short term variations (E-9)	0.00	2.00	0.048	0.048	0.048
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499132	Low Sweep Frequency, Hz			345
Power, mW	92.7	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C9A0018DFC0FF02AD447 79F3C0010				

Figure 3.13 – Detailed measurement results of EUT (EPIRB E100G class 2) at the end of the 2 hour period in the +40 °C and 93 % relative humidity chamber



Figure 3.14 – Results of EUT (EPIRB E100G class 2) at the end of the 2 hour period in the +40 °C and 93 % relative humidity chamber



Figure 3.15 – Results of EUT (EPIRB E100G class 1) at the end of the 2 hour period in the +40 °C and 93 % relative humidity chamber

## FINAL RESULTS OF DAMP HEAT CYCLE (A4.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Aliveness Test (during of the 2 hour period)				
- Carrier Frequency	406.037 ± 0.001	MHz	No.1 406.036916 No.2 406.036914	PASS PASS
- Power Output	35 - 39	dBm	No.1 38.28 No.2 38.44	PASS PASS
• Aliveness Test (at end of 2 hour period):				
- Carrier Frequency	406.037 ± 0.001	MHz	No.1 406.036940 No.2 406.036932	PASS PASS
- Power Output	35 - 39	dBm	No.1 38.36 No.2 38.37	PASS PASS

## CRITERIA OF COMPLIANCE DAMP HEAT CYCLE (A4.0 RTCM 11000.2 Version 2.1):

- 1) successful aliveness test conducted during 2 hour period in the +40 °C and 93 % relative humidity chamber.
- 2) successful aliveness test conducted at end of 2 hour period in the +40 °C and 93 % relative humidity chamber.

**Annex 4****VIBRATION TEST (A 5.0 RTCM 11000.2 Version 2.1)****Equipment Under Test (EUT):** 1) No.1 EPIRB SafeSea E100G class 2**Software release for EUT:** issue 00.00.28**Sample No.1** Serial No 00012000131**Test Date:** 18.10.2010**Test Conditions:**

– Atmospheric pressure: 753 mm/Hg.

– Relative air humidity: 56 %.

– EUT were included the satellite EPIRB class 2 with ARH100 (Category 1): YES

the satellite EPIRB class 2 with Manual bracket (Category 2): YES

– EPIRB set up in stand-by mode during the test.

**Test equipment:**

– Vibration table G0227 , Japan, Shinken, Man.No1013

– TIRAvib 5242 ROBOTRON No 26/88

– Beacon tester BT-611 No 1005

– The EUT was secured to the vibration table through its normal attachments for use in service conditions. The EUT was mounted in the same position (with respect to the direction of gravity) for all vibration tests and was subjected to sinusoidal motion in each of its three orthogonal axes according to the following profile:

1. <b>Frequency (Hz)</b>	<b>Peak Amplitude (mm)</b>
4-10	2.5
10-15	0.8
15-25	0.4
25-33	0.2

2. The frequency changed linearly with time between 4 Hz and 33 Hz such that a complete cycle (4 Hz - 33 Hz - 4 Hz) took approximately 5 minutes.

3. The EUT was vibrated in each direction for a period of at least 30 minutes.

4. Upon completion of the vibration test, an exterior mechanical inspection was performed and the aliveness test was conducted.

5. Activation of the EUT during the vibration tests was checked.

– Test duration: 180 minutes.

– Measurement duration: 4 x 15 minutes.

	No. 1	Results of the EUT (EPIRB) Aliveness Test (before the Vibration Test)
	No. 2	Condition: vertical axis vibration of the EUT; duration 30 minutes
	No. 3	Aliveness Test: Carrier Frequency
	No. 4	Aliveness Test: Power Output
	No. 5	Aliveness Test: Data message
	No. 6	Exterior Mechanical Inspection: corrosion, peeling paint, and other signs of deterioration
	No. 7	Condition: lateral axis vibration of the EUT; duration 30 minutes
– Step	No. 8	Aliveness Test: Carrier Frequency
	No. 9	Aliveness Test: Power Output
	No. 10	Aliveness Test: Data message
	No. 11	Exterior Mechanical Inspection: corrosion, peeling paint, and other signs of deterioration
	No.12	Condition: longitudinal axis vibration of the EUT; duration 30 minutes
	No.13	Aliveness Test: Carrier Frequency
	No.14	Aliveness Test: Power Output
	No. 15	Aliveness Test: Data message
	No.16	Exterior Mechanical Inspection: corrosion, peeling paint, and other signs of deterioration



Figure 4.1 - View of the EUT (EPIRB E100G class 2) before the vibration test

Test duration 0 h 1 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406037.053	406037.053	406037.053
+Phase deviation, rad	1.00	1.20	1.09	1.09	1.09
-Phase deviation, rad	-1.00	-1.20	-1.12	-1.12	-1.12
Phase time rise, mcs	50.00	250.00	150.90	150.90	150.90
Phase time fall, mcs	50.00	250.00	166.02	166.02	166.02
Power, Wt	3.16	7.94	6.64	6.64	6.64
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	400.02	400.02	400.02
Asymmetry, %	0.00	5.00	0.42	0.42	0.42
CW Preamble, ms	158.40	161.60	160.11	160.11	160.11
Total burst duration, ms	514.80	525.20	519.00	519.00	519.00
Repetition period, s	47.50	52.50	47.61	47.61	47.61
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499057	Low Sweep Frequency, Hz			351
Power, mW	90.1	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			825
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 4.2 - Results of the EUT (EPIRB E100G class 2) Aliveness Test (before the Vibration Test)





Figure 4.3 – Test Set-up Vibration table G0227. Vertical vibration.



Figure 4.4 – Test Set-up TIRAvib 5142. Horizontal vibration.



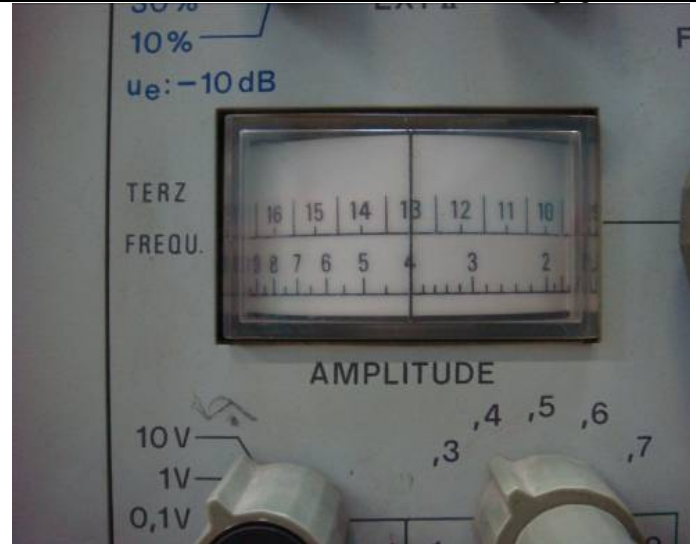


Figure 4.5 –Control panels. Frequency 4 Hz, amplitude 2.52 mm.

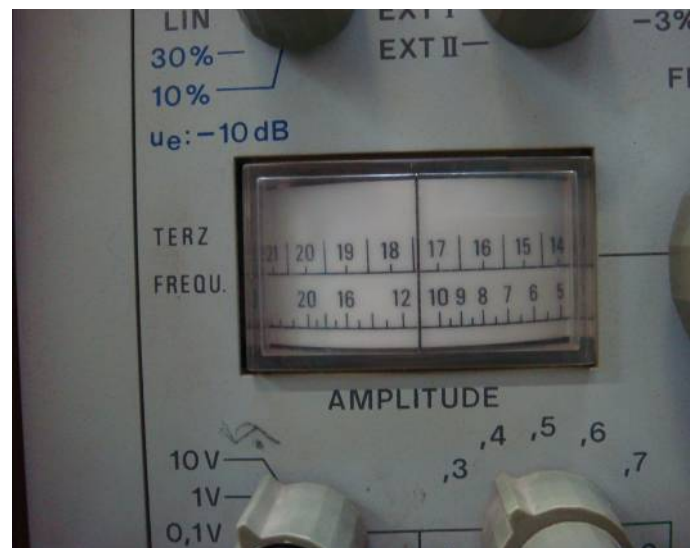


Figure 4.6 –Control panels. Frequency 11 Hz, amplitude 0.81 mm.

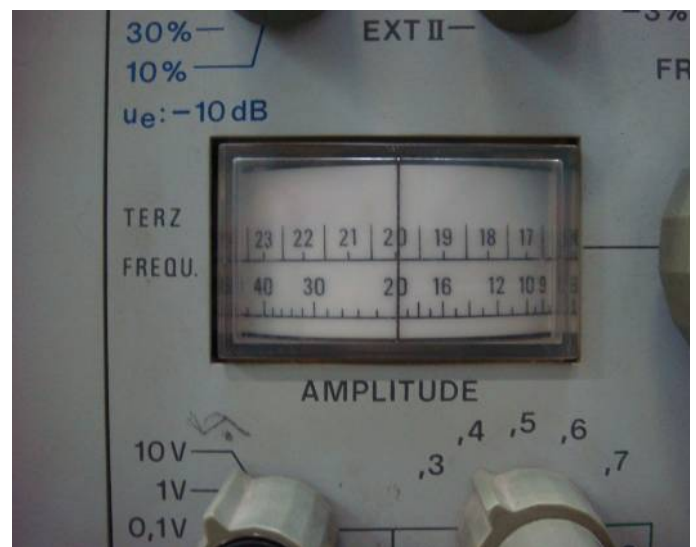


Figure 4.7 –Control panels. Frequency 20 Hz, amplitude 0.4 mm.

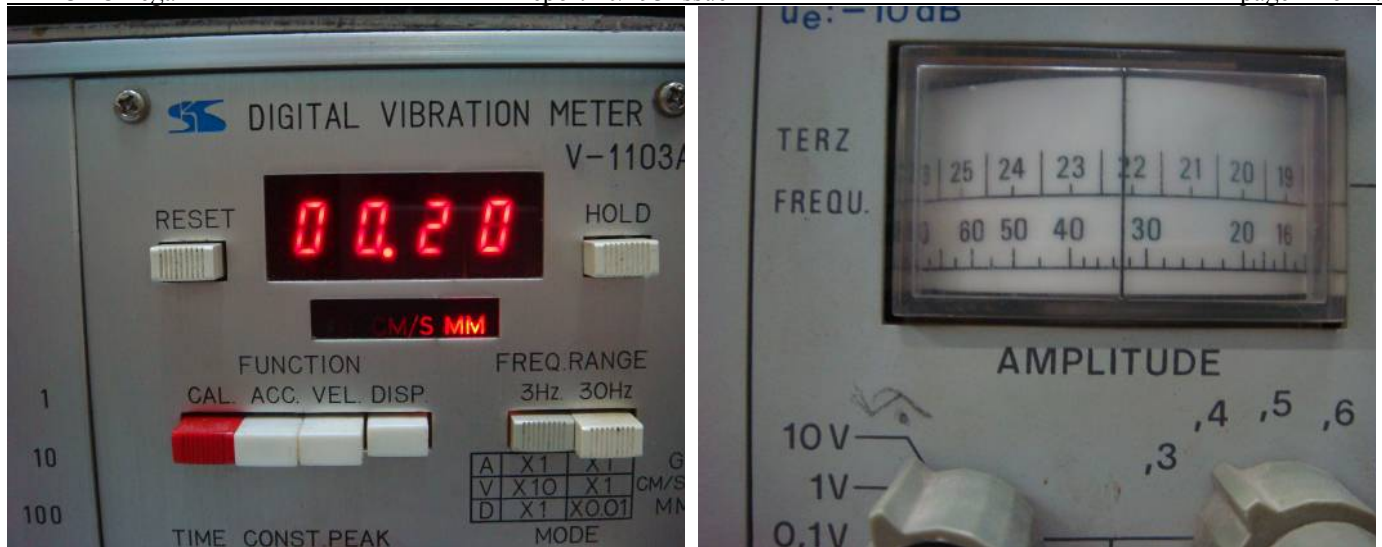


Figure 4.8 –Control panels. Frequency 33 Hz, amplitude 0.2 mm.



Figure 4.9 EUT (EPIRB class 2 with ARH100 (Category 1)) vertical vibration



Figure 4.10 – View of the EUT (EPIRB) upon completion of the vertical axis vibration test

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	0.000	406037.084	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.09	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.12	0.00
Phase time rise, mcs	50.00	250.00	0.00	152.58	0.00
Phase time fall, mcs	50.00	250.00	0.00	163.48	0.00
Power, Wt	3.16	7.94	0.00	6.30	0.00
Power rise, ms	0.00	0.00	0.00	0.48	0.00
Bit Rate, bps	396.00	404.00	0.00	399.88	0.00
Asymmetry, %	0.00	5.00	0.00	0.38	0.00
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00
Total burst duration, ms	514.80	525.20	0.00	518.95	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500719	Low Sweep Frequency, Hz			351
Power, mW	89.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			825
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 4.11 – Aliveness Test: Carrier Frequency & Power Output (upon completion of the vertical axis vibration test)



Figure 4.12 EUT (EPIRB class 2 with ARH100 (Category 1)) lateral axis vibration test.



Test duration 0 h 0 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	0.000	406037.054	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.09	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.12	0.00
Phase time rise, mcs	50.00	250.00	0.00	154.96	0.00
Phase time fall, mcs	50.00	250.00	0.00	162.36	0.00
Power, Wt	3.16	7.94	0.00	6.27	0.00
Power rise, ms	0.00	0.00	0.00	0.97	0.00
Bit Rate, bps	396.00	404.00	0.00	399.89	0.00
Asymmetry, %	0.00	5.00	0.00	0.45	0.00
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00
Total burst duration, ms	514.80	525.20	0.00	517.75	0.00
Repetition period, s	47.50	52.50	0.00	50.51	0.00
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500596	Low Sweep Frequency, Hz			351
Power, mW	88.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			825
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 4.13 - Aliveness Test: Carrier Frequency & Power Output (upon completion of the lateral axis vibration test)



Figure 4.14 - View of the EUT (EPIRB) upon completion of the lateral axis vibration test



Figure 4.15 EUT (EPIRB class 2 with ARH100 (Category 1)) of the longitudinal axis vibration test.

Test duration 0 h 0 m		Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured			
	min	max	min	current	max	
Frequency, kHz	406036.000	406038.000	0.000	406037.058	0.000	
+Phase deviation, rad	1.00	1.20	0.00	1.10	0.00	
-Phase deviation, rad	-1.00	-1.20	0.00	-1.12	0.00	
Phase time rise, mcs	50.00	250.00	0.00	152.24	0.00	
Phase time fall, mcs	50.00	250.00	0.00	160.28	0.00	
Power, Wt	3.16	7.94	0.00	6.46	0.00	
Power rise, ms	0.00	0.00	0.00	0.00	0.00	
Bit Rate, bps	396.00	404.00	0.00	400.00	0.00	
Asymmetry, %	0.00	5.00	0.00	0.46	0.00	
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00	
Total burst duration, ms	514.80	525.20	0.00	519.69	0.00	
Repetition period, s	47.50	52.50	0.00	50.48	0.00	
Delta Rep. period, s	>4.00		0.00	0.00	0.00	
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000	
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000	
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000	
121.5 MHz Transmitter Parameters						
Carrier Frequency, Hz	121500543		Low Sweep Frequency, Hz			351
Power, mW	90.0		High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3		Sweep Range, Hz			825
Modulation Index, %	100					
Message						
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C					

Figure 4.16 – Aliveness Test: Carrier Frequency &amp; Power Output (upon completion of the longitudinal axis vibration test)



Figure 4.17 - View of the EUT (EPIRB E100G class 2) upon completion of the longitudinal axis vibration test

FINAL RESULTS OF VIBRATION TEST (A5.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Exterior Mechanical Inspection	No damage	√	No damage	PASS
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.037053 406.037084 406.037054 406.037058	PASS
- Power Output	35 - 39	dBm	38.22 37.99 37.97 38.10	PASS
• Activation	No activation during test	√	No activation during test	PASS

CRITERIA OF COMPLIANCE VIBRATION TEST (A5.0 RTCM 11000.2 Version 2.1):

- 1) no corrosion, peeling paint, and other signs of deterioration.
- 2) successful aliveness test conducted.
- 3) no activation during test

**Annex 5****BUMP TEST (A 6.0 RTCM 11000.2 Version 2.1)**

**Equipment Under Test (EUT):** No.1: EPIRB SafeSea E100G class1  
No.2: EPIRB SafeSea E100G class2

**Software release for EUT:** issue 00.00.28

**Sample No.1** Serial No 0001200003 I

**Sample No.2** Serial No 0001200013 I

**Test Date:** 13.05.2010 – 14.05.2010

**Test Conditions:**

- Atmospheric pressure: 759 mm/Hg.
- Relative air humidity: 57 %.
- EUT were included the satellite EPIRB with ARH100 (Category 1): YES
- the satellite EPIRB with Manual bracket (Category 2): YES
- EPIRB is READY during the test.
- EUT set up in normal operating position.
- Test equipment:
  - Shock table: TIRA-chock 4110, Man. No 41/88;
  - Fixture for shock tests: Ug7875-0068, PC “Musson” USSR Man.No 1
  - Beacon tester BT-611 No 1005

- The EUT was secured to the bump testing equipment through its normal attachments for use in service conditions, using no additional straps or other holding means.

The EUT was subjected to the bump test according to the following profile:

Peak Acceleration: 98 m/s<sup>2</sup>  
 Pulse Duration: 16 ms  
 Waveshape: Half-cycle Sinewave  
 Test Axis: Vertical  
 Number of Bumps: 4000

- Upon completion of the bump test, an exterior mechanical inspection was performed and the aliveness test was conducted.
- Activation of the EUT during the bump tests was checked.

– Test duration: 150 minutes.

– Measurement duration: 2 x 15 minutes.

- |        |       |  |
|--------|-------|--|
|        | No. 1 | Results of the EUT (EPIRB) Aliveness Test (before the Bump Test)                           |
|        | No. 2 | Condition: vertical axis acceleration of the EUT; 4000 bumps                               |
| – Step | No. 3 | Aliveness Test: Carrier Frequency  |
|        | No. 4 | Aliveness Test: Power Output   |
|        | No. 5 | Exterior Mechanical Inspection: corrosion, peeling paint, and other signs of deterioration |



No1: EPIRB SafeSea E100G class1 with ARH100 (Category 1)



Figure 5.1 - View of the EUT before the Bump Test



Figure 5.2 - View of the EUT before the Bump Test



Figure 5.3 - View of the EUT before the Bump Test



Figure 5.4 - View of the EUT before the Bump Test



Figure 5.5 - Views of the EUT before the Bump Test

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	0.000	406036.928	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.10	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.13	0.00
Phase time rise, mcs	50.00	250.00	0.00	140.37	0.00
Phase time fall, mcs	50.00	250.00	0.00	151.22	0.00
Power, Wt	3.16	7.94	0.00	6.60	0.00
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	0.00	400.04	0.00
Asymmetry, %	0.00	5.00	0.00	0.30	0.00
CW Preamble, ms	158.40	161.60	0.00	160.02	0.00
Total burst duration, ms	514.80	525.20	0.00	519.10	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499995	Low Sweep Frequency, Hz			345
Power, mW	93.4	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFED0 971E0000017FDFFE527FF 683E0F00E				

Figure 5.6 - Results of the EUT Aliveness Test (before the Bump Test)



Figure 5.7 – Test Set-up



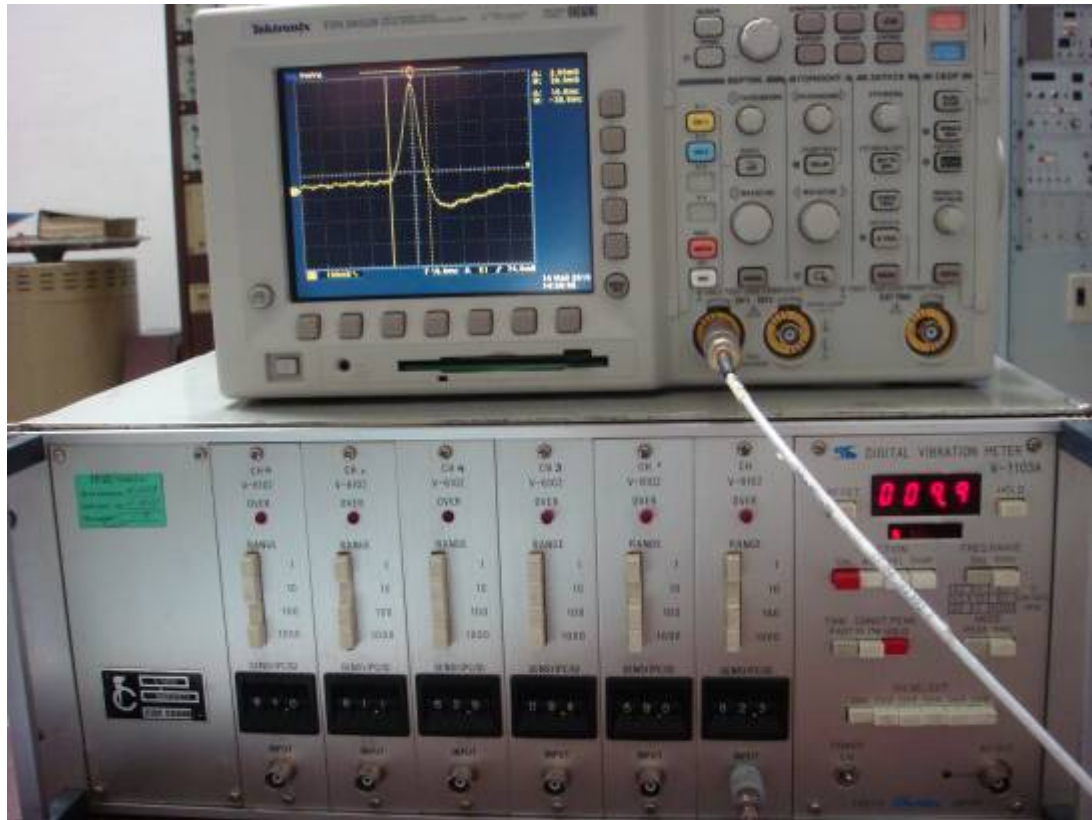


Figure 5.8 – Diagram of the bump testing equipment control channel.

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	0.000	406036.934	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.08	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.13	0.00
Phase time rise, mcs	50.00	250.00	0.00	144.69	0.00
Phase time fall, mcs	50.00	250.00	0.00	152.08	0.00
Power, Wt	3.16	7.94	0.00	6.40	0.00
Power rise, ms	0.00	0.00	0.00	0.57	0.00
Bit Rate, bps	396.00	404.00	0.00	400.04	0.00
Asymmetry, %	0.00	5.00	0.00	0.29	0.00
CW Preamble, ms	158.40	161.60	0.00	160.08	0.00
Total burst duration, ms	514.80	525.20	0.00	518.80	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500195	Low Sweep Frequency, Hz			345
Power, mW	92.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFED0 971E0000017FDFFE527FF 683E0F00E				

Figure 5.9 – Aliveness Test: Carrier Frequency &amp; Power Output (upon completion of the Bump Test)



Figure 5.10 – View of the EUT upon completion of the Bump Test



Figure 5.11 – View of the EUT upon completion of the Bump Test



Figure 5.12 – View of the EUT upon completion of the Bump Test



Figure 5.13 – View of the EUT upon completion of the Bump Test



Figure 5.14 – View of the EUT upon completion of the Bump Test



Figure 5.15 – View of the EUT upon completion of the Bump Test



Figure 5.16 – View of the EUT upon completion of the Bump Test







Figure 5.17 - View of the EUT before the Bump Test



Figure 5.18 - View of the EUT before the Bump Test



Figure 5.19 – Test Set-up



Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	0.000	406037.022	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.11	0.00
Phase time rise, mcs	50.00	250.00	0.00	143.54	0.00
Phase time fall, mcs	50.00	250.00	0.00	157.49	0.00
Power, Wt	3.16	7.94	0.00	6.34	0.00
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	0.00	399.96	0.00
Asymmetry, %	0.00	5.00	0.00	0.52	0.00
CW Preamble, ms	158.40	161.60	0.00	160.00	0.00
Total burst duration, ms	514.80	525.20	0.00	519.20	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499963	Low Sweep Frequency, Hz			345
Power, mW	92.2	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE0 8C92F423F07FDFFB2BF03 683E0F00E				

Figure 5.20 - Results of the EUT Aliveness Test (before the Bump Test)

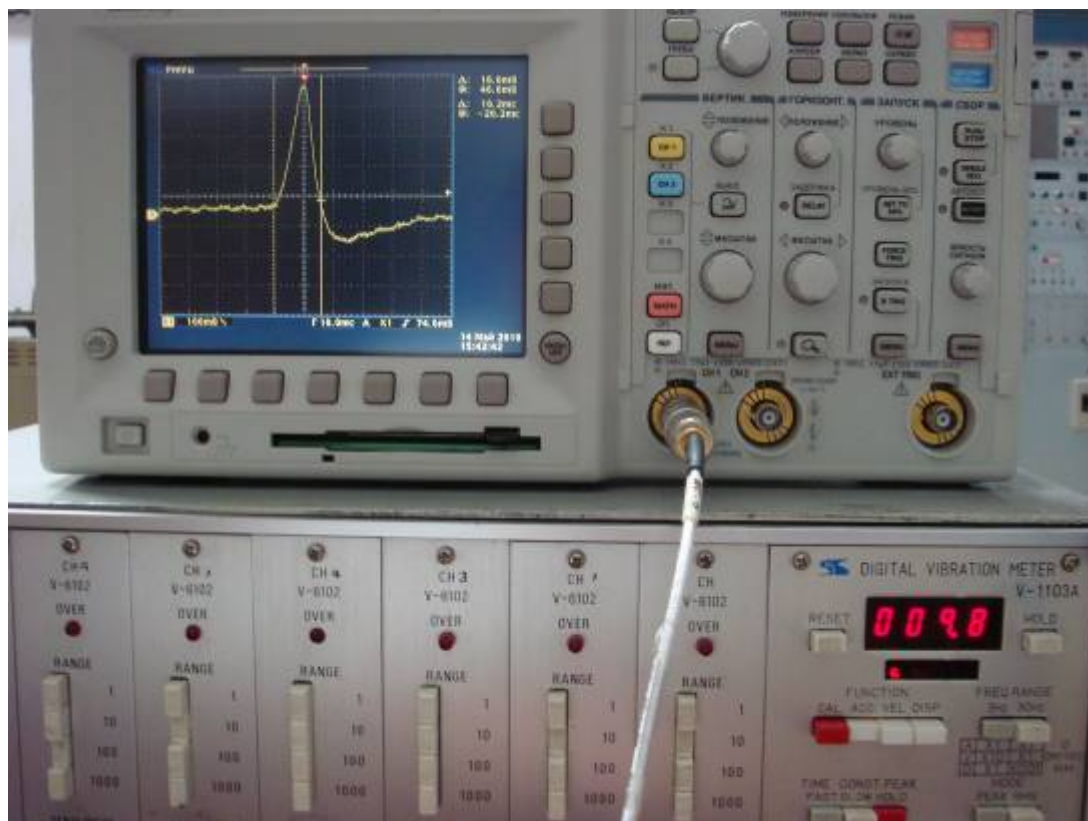


Figure 5.21 – Diagram of the bump testing equipment control channel.

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	40600.000	40600.000	0.000	406037.020	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.12	0.00
Phase time rise, mcs	50.00	250.00	0.00	146.75	0.00
Phase time fall, mcs	50.00	250.00	0.00	155.85	0.00
Power, Wt	3.16	7.94	0.00	6.34	0.00
Power rise, ms	0.00	0.00	0.00	0.30	0.00
Bit Rate, bps	396.00	404.00	0.00	399.91	0.00
Asymmetry, %	0.00	5.00	0.00	0.46	0.00
CW Preamble, ms	158.40	161.60	0.00	160.09	0.00
Total burst duration, ms	514.80	525.20	0.00	519.74	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499878	Low Sweep Frequency, Hz			345
Power, mW	92.2	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FF FED0 8C92F423F07FDFFB2BF03 683E0F00E				

Figure 5.22 – Aliveness Test: Carrier Frequency &amp; Power Output (upon completion of the Bump Test)



Figure 5.23 – Views of the EUT upon completion of the Bump Test



Figure 5.24 – Views of the EUT upon completion of the Bump Test



Figure 5.25 – View of the EUT upon completion of the Bump Test

## FINAL RESULTS OF THE BUMP TEST (A6.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Exterior Mechanical Inspection	No damage	√	√	PASS
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0,001	MHz	No.3 406.036934 No.4 406.037020	PASS
- Power Output	35 - 39	dBm	No.3 38.06 No.4 38.02	PASS
• Activation	No activation during test	√	√	PASS

## BUMP TEST CRITERIA OF COMPLIANCE (A6.0 RTCM 11000.2 Version 2.1):

- 1) an exterior mechanical inspection should be performed
- 2) successful aliveness test conducted.
- 3) no activation during test

**Annex 6****SALT FOG TEST (A7.0 RTCM 11000.2 Version 2.1)****Equipment Under Test (EUT):** No.1: EPIRB SafeSea E100G class2

No.2: EPIRB SafeSea E100G class1

**Software release for EUT:** Issue 00.00.28**Sample No.1** Serial No 000120000131**Sample No.2** Serial No 000120000031**Test Date:** 17.05.2010**Test Conditions:**

- Relative air humidity: 69 %.
- Atmospheric pressure: 765 mm/Hg.
- EUT were included the satellite EPIRB with ARH100 (Category 1): YES
- the satellite EPIRB with Manual bracket (Category 2): YES
- EPIRB is OFF during the test.
- EUT set up in performance position.
- Test equipment:
  - Salt fog chamber DS090-X No 20807004 having a volume 0.34 m<sup>3</sup>
  - Beacon tester BT-611 No 1005
- Preparation of salt solution: the evidence submitted by manufacturer. Resistance distilled, demineralized, deionized use water not introduce contaminants is 555 kohms/cm. Salt solution concentration is 5.2%. Salt solution containing (on dry basis) 0.02% sodium iodide and 0.07 % total impurities. Salt solution pH is 6.9. Preheat temperature compressed air (before atomizing) is 46.3 °C. Air pressure is 83.5 kPa. Reference MIL-STD-810D (19 July 1983) method 509.2 item II-2.2 on the preparation of 5% salt solution.
- Preparation of salt fog: from a 5% salt (sodium chloride) solution. Salt fog fallout such that each receptacle collects is 2.4 ml of solution per hour for each 80 cm<sup>3</sup> of horizontal collecting area (10 cm diameter) in an average test at 16 hours. Salt fog pH is 7.0. Reference MIL-STD-810D (19 July 1983) method 509.2 item II-1 on the preparation of the apparatus for generating salt fog.
- Test duration is 99.25 hours.
- Measurement duration is 2x15 minutes.
  - No. 1 Detailed measurement results of EUT (EPIRB) before of the salt fog test
  - No. 2 Condition: ambient temperature is +35 °C in the chamber with EUT duration 2 hours; no salt fog;
  - No. 3 Condition: ambient temperature is +35 °C in the salt fog chamber with EUT duration 48 hours; yes salt fog;
  - No. 4 Condition: ambient temperature is +20 °C in the chamber with EUT duration 24 hours; no salt fog;
  - Step No. 5 Condition: ambient temperature is +35 °C in the salt fog chamber with EUT duration 12 hours; yes salt fog;
  - No. 6 Condition: ambient temperature is +20 °C in the chamber with EUT; no salt fog; duration 12 hours;
  - No. 7 Corrosion, peeling paint, and other signs of deterioration are inspected;
  - No. 8 Salt deposits and water stains is wash off with clean warm water not exceeding a temperature +38 °C; the category 1 satellite EPIRB not is removed from the release mechanism for cleaning;
  - No. 9 Detailed measurements are of EUT (EPIRB) upon completion of the salt fog test.



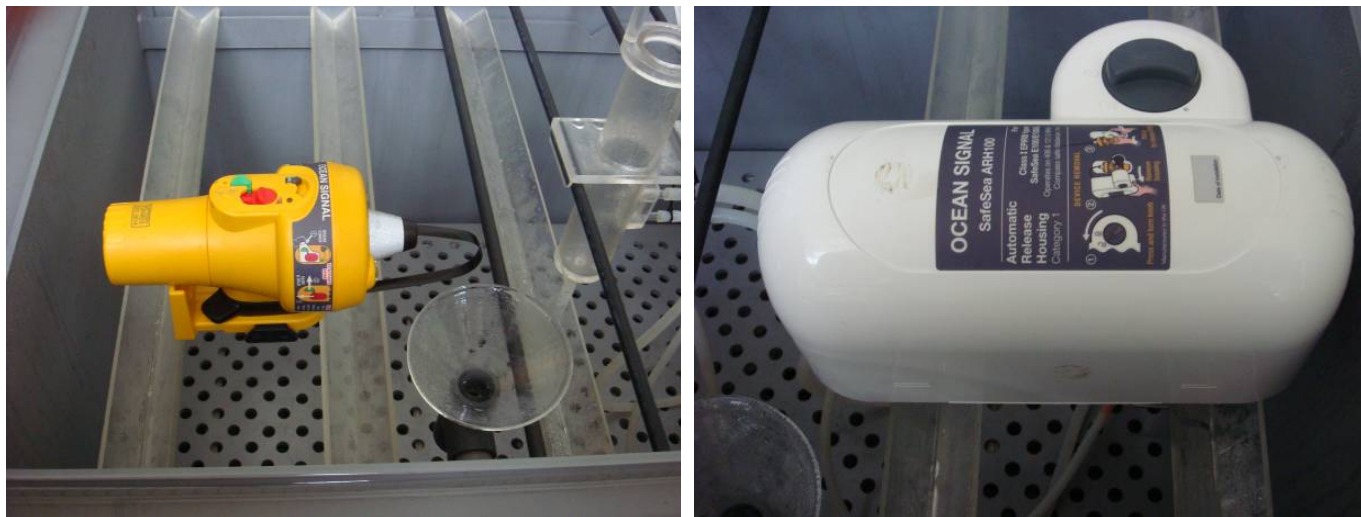


Figure 6.1 - Views of the EUT (EPIRB) before the salt fog test



Figure 6.2 - Views of the EUT (EPIRB) before the salt fog test



Figure 6.3 – View temperature of salt solution into reservoir





Figure 6.4 - View of the EUT (EPIRB) in salt fog chamber



Figure 6.5 - View exterior inspection of EUT (EPIRB) upon completion of the salt fog test



Figure 6.6 - View exterior inspection of EUT (EPIRB) upon completion of the salt fog test



Figure 6.7 - View exterior inspection of EUT (EPIRB) upon completion of the salt fog test



Figure 6.8 – View exterior inspection of EUT (EPIRB) upon completion the salt fog test

E100G class1, Serial No.: 0001200003I					
Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	0.000	406036.961	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.10	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.10	0.00
Phase time rise, mcs	50.00	250.00	0.00	146.38	0.00
Phase time fall, mcs	50.00	250.00	0.00	154.06	0.00
Power, Wt	3.16	7.94	0.00	6.25	0.00
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	0.00	399.92	0.00
Asymmetry, %	0.00	5.00	0.00	0.54	0.00
CW Preamble, ms	158.40	161.60	0.00	160.10	0.00
Total burst duration, ms	514.80	525.20	0.00	519.15	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s		>4.00	0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499852	Low Sweep Frequency, Hz		345	
Power, mW	89.0	High Sweep Frequency, Hz		1176	
Sweep Period, sec	0.3	Sweep Range, Hz		831	
Modulation Index, %	100				
Message					
Contents (full)	:FF FED0 971E0000017FDFFE527FF 683E0F00E				

E100G class2, Serial No.: 0001200013I

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	0.000	406036.988	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.10	0.00
Phase time rise, mcs	50.00	250.00	0.00	149.15	0.00
Phase time fall, mcs	50.00	250.00	0.00	164.10	0.00
Power, Wt	3.16	7.94	0.00	6.35	0.00
Power rise, ms	0.00	0.00	0.00	0.35	0.00
Bit Rate, bps	396.00	404.00	0.00	400.05	0.00
Asymmetry, %	0.00	5.00	0.00	0.63	0.00
CW Preamble, ms	158.40	161.60	0.00	160.10	0.00
Total burst duration, ms	514.80	525.20	0.00	519.15	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s	4.00	0.00	0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499689		Low Sweep Frequency, Hz		345
Power, mW	92.3		High Sweep Frequency, Hz		1176
Sweep Period, sec	0.3		Sweep Range, Hz		831
Modulation Index, %	100				
Message					
Contents (full)	:FF FED0 8C92F423F07FDFFB2BF03 683E0F00E				

Figure 6.9 - Detailed measurement results of EUT (EPIRB) before of the salt fog test

FINAL RESULTS OF SALT FOG TEST (A7.0 RTCM 11000.2 Version 2.1, upper result – for EPIRB s/n 00012000013 I, below result – for EPIRB s/n 0001200003 I):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Exterior Mechanical Inspection	No damage	√	√	PASS
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.036961 406.036988	PASS
- Power Output	35 - 39	dBm	37.96 38.03	PASS

CRITERIA OF COMPLIANCE SALT FOG TEST (A7.0 RTCM 11000.2 Version 2.1):

- 1) no corrosion, peeling paint, and other signs of deterioration.
- 2) successful aliveness test conducted.

## Annex 7

## DROP TEST on Hard Surface (A8.1 RTCM 11000.2 Version 2.1)

**Equipment Under Test (EUT):** 1) No.1 EPIRB SafeSea E100G class 2

**Software release for EUT:** Issue 00.00.28

**Sample No.1** Serial No 0001200013 I

**Test Date:** 20.10.2010

**Test Conditions:**

– Ambient temperature at open area test site: +19 °C .

– Minimum temperature in the chamber ..... -30 °C (Class 2): YES

– Relative air humidity: 63 %.

– Atmospheric pressure: 769 mm/Hg.

– EPIRB is OFF before test.

– Test duration is 0.5 hours.

– Measurement duration is 2x15 minutes.

– EUT were included the satellite EPIRB without its ..... ARH100 (Category 1): YES  
Manual bracket (Category 2): YES

– EUT is dropped one time.

– Test equipment:

- Climatic chamber NZ-350 No 24625a

- Beacon tester BT-611 No 1005



Figure 7.1 - View of the EUT (EPIRB E100G class 2) before the drop test





Figure 7.2 - View of the EUT (EPIRB E100G class 2) before the drop test



Figure 7.3 - View of the EUT (EPIRB E100G class 2) before the drop test. (Bottom)



Figure 7.4 - Detailed measurement of the EUT (EPIRB E100G class 2) temperature before the drop test



Figure 7.5 - Total view of test site of the drop from a height of 1 m above the test surface



Figure 7.6 - Thickness of wood test surface



Figure 7.7 -Dimension of the wood test surface





Figure 7.8- View of the orientation the EUT (EPIRB E100G class 2) before the drop test



Figure 7.9 - View of the EUT (EPIRB E100G class 2) upon completion the drop test



Figure 7.10 - View of the EUT (EPIRB E100G class 2) upon completion the drop test

Test duration 0 h 1 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406037.059	406037.059	406037.059
+Phase deviation, rad	1.00	1.20	1.09	1.09	1.09
-Phase deviation, rad	-1.00	-1.20	-1.12	-1.12	-1.12
Phase time rise, mcs	50.00	250.00	150.90	150.90	150.90
Phase time fall, mcs	50.00	250.00	166.02	166.02	166.02
Power, Wt	3.16	7.94	6.65	6.65	6.65
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	400.02	400.02	400.02
Asymmetry, %	0.00	5.00	0.42	0.42	0.42
CW Preamble, ms	158.40	161.60	160.11	160.11	160.11
Total burst duration, ms	514.80	525.20	519.00	519.00	519.00
Repetition period, s	47.50	52.50	47.61	47.61	47.61
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500492	Low Sweep Frequency, Hz			345
Power, mW	90.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 7.11 - Results of the EUT (EPIRB) Aliveness Test (after the Drop Tests)



## FINAL RESULTS OF DROP TEST on Hard Surface (A8.1 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Exterior Mechanical Inspection	No damage	√	No damage	PASS
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.037059	PASS
- Power Output	35 - 39	dBm	38.23	PASS
• Activation	No activation during test	√	√	PASS

## CRITERIA OF COMPLIANCE DROP TEST on Hard Surface (A8.1 RTCM 11000.2 Version 2.1):

- 1) no damage.
- 2) successful aliveness test conducted.
- 3) no activation during test.

## Annex 8

## DROP TEST in Water (A8.2 RTCM 11000.2 Version 2.1)

**Equipment Under Test (EUT):** 1) No.1 EPIRB SafeSea E100G class 2

**Software release for EUT:** Issue 00.00.28

**Sample No.1** Serial No 0001200013 I

**Test Date:** 20.10.2010

**Test Conditions:**

- Ambient temperature at open area test site: +18 °C.
- Relative air humidity: 64 %.
- Atmospheric pressure: 769 mm/Hg.
- Test duration is 2 hours.
- Measurement duration is 2x15 minutes upon completion each drop in water.
- EUT is OFF without its ARH100 (Category 1) before of the drop test; YES  
the EPIRB is automatically activated during each drop in water: YES
- EUT is OFF without its Manual bracket (Category 2) before of the drop test; NO  
the EPIRB is manually activated prior to the each drop in water: NO
- EUT was dropped three times. Each drop is initiated from a different orientation as follows:  
antenna vertical up; antenna vertical down; antenna horizontal.
- Test equipment:
  - Free fall installation SAPB-20 No 101377
  - Beacon tester BT-611 No 1005



Figure 8.1 - View of the EUT (EPIRB E100G class 2) before the drop test in water



Figure 8.2 - View of the EUT (EPIRB E100G class 2) before the drop test in water



Figure 8.3- Total view of test site of the drop test in water of EUT (EPIRB E100G class 2) from a height of 20 m



Figure 8.4 - View of the EUT (EPIRB E100G class 2) dropping in water of orientation antenna vertical up.



Figure 8.5 - View of the EUT (EPIRB E100G class 2) dropping in water of orientation antenna vertical down





Figure 8.6 - View of the EUT (EPIRB E100G class 2) dropping in water from orientation antenna horizontal

Test duration 0 h 1 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406037.062	406037.062	406037.062
+Phase deviation, rad	1.00	1.20	1.09	1.09	1.09
-Phase deviation, rad	-1.00	-1.20	-1.12	-1.12	-1.12
Phase time rise, mcs	50.00	250.00	150.90	150.90	150.90
Phase time fall, mcs	50.00	250.00	166.02	166.02	166.02
Power, Wt	3.16	7.94	6.67	6.67	6.67
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	400.02	400.02	400.02
Asymmetry, %	0.00	5.00	0.42	0.42	0.42
CW Preamble, ms	158.40	161.60	160.11	160.11	160.11
Total burst duration, ms	514.80	525.20	519.00	519.00	519.00
Repetition period, s	47.50	52.50	47.61	47.61	47.61
Delta Rep. period, s	>4.00		0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121500195	Low Sweep Frequency, Hz			345
Power, mW	92.0	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			831
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 8.7 - Results of the EUT (EPIRB E100G class 2) Aliveness Test (after the Drop Tests)





Figure 8.8- Detailed examination of the EUT (EPIRB E100G class 2) upon completion of the drop test. On inspection no water was found inside the case

FINAL RESULTS OF DROP TEST in Water (A8.2 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Exterior Mechanical Inspection	No damage	√	√	No damage
• Aliveness Test of a orientation antenna vertical up:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.037062	PASS
- Power Output	35 - 39	dBm	38.24	PASS

CRITERIA OF COMPLIANCE DROP TEST in Water (A8.2 RTCM 11000.2 Version 2.1):

- 1) no damage of a orientation antenna vertical up.
- 2) no damage of a orientation antenna vertical down.
- 3) no damage of a orientation antenna horizontal.
- 4) successful aliveness test.

**Annex 9****LEAKAGE AND IMMERSION TEST (A 9.0 RTCM 11000.2 Version 2.1)**

**Equipment Under Test (EUT):** 1) No.1 EPIRB SafeSea E100G class 2

**Software release for EUT:** Issue 00.00.28

**Sample No.1** Serial No 0001200013 I

**Test Date:** 21-23.10.2010

**Test Conditions:**

- Atmospheric pressure: 760 mm/Hg.
- Relative air humidity: 68 %.
- EUT is included
 

the satellite EPIRB with ARH100 (Category 1):	NO
the satellite EPIRB with Manual bracket (Category 2):	Yes
- EPIRB is OFF during the test (EPIRB installed in base of release mechanism and was not activate in water because release mechanism magnet turned off operated sealed switch in EPIRB).
- Test equipment:
  - Water tank for EPIRB tests, STC Omega, No 101175
  - Installation for immersion test, UgC.8, No102070
  - Temperature meter Center-309 No 50310908
  - Beacon tester BT-611 No 1005

The leakage and immersion tests were performed in the following sequence.

1. The equipment was placed in an atmosphere of  $+65^{\circ} \pm 3^{\circ}\text{C}$  for one hour.
2. Then EUT was immediately immersed in water at  $+20^{\circ} \pm 3^{\circ}\text{C}$  to a depth of  $100 \pm 5$  mm, measured from the highest point of the equipment to the surface of the water, for a period of 48 hours.
3. The EUT was immersed under a 10 meter head of water for 5 minutes with the battery compartment open to the water.  
 (NOTE. According to requirement of Annex 9.0 RTCM 11000.2 Version 2.1 “If the battery is user replaceable, the EUT should be immersed under a 10 meter head of water for 5 minutes with the battery compartment open to the water”).
  - The EUT was removed from the water and wiped dry

4. At the end of the test period:
  - the equipment was subjected to a performance check,
  - the equipment was opened and inspected for damage and visible ingress of water viewed with the unaided eye.

– Test duration: 50 hours.

– Measurement duration: 2 x 15 minutes.

- |        |       |   |
|--------|-------|---|
|        | No. 1 | Results of the EUT (EPIRB) Aliveness Test (before the Leakage & Immersion Test)   |
|        | No. 2 | Condition: atmosphere of $+65^{\circ} \pm 3^{\circ}\text{C}$ , duration one hour  |
|        | No. 4 | Condition: EUT (EPIRB) was immersed in water at $+20^{\circ}\text{C}$ to a depth of 100 mm, duration 48 hours   |
|        | No. 5 | Condition: with the battery compartment open to the water, EUT (EPIRB) was put into the pressure vessel which had been filled with water. The pressure was increased to +981 mbar (relative to atmospheric pressure) and maintained for 5 minutes |
| – Step | No. 6 | The EUT (EPIRB) was removed from the pressure vessel for post-test inspection. The test item was dried and its weight was recorded.   |
|        | No. 7 | Aliveness Test: Carrier Frequency   |
|        | No. 8 | Aliveness Test: Power Output  |
|        | No.9  | The EUT was opened and inspected for damage and visible ingress of water viewed with the unaided eye.   |



Figure 9.1 - View of the EUT (EPIRB) before the Leakage & Immersion Test

Test duration 0 h 1 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406037.101	406037.101	406037.101
+Phase deviation, rad	1.00	1.20	1.09	1.09	1.09
-Phase deviation, rad	-1.00	-1.20	-1.12	-1.12	-1.12
Phase time rise, mcs	50.00	250.00	150.90	150.90	150.90
Phase time fall, mcs	50.00	250.00	166.02	166.02	166.02
Power, Wt	3.16	7.94	6.64	6.64	6.64
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	400.04	400.04	400.04
Asymmetry, %	0.00	5.00	0.43	0.43	0.43
CW Preamble, ms	158.40	161.60	160.13	160.13	160.13
Total burst duration, ms	514.80	525.20	519.10	519.10	519.10
Repetition period, s	47.50	52.50	47.63	47.63	47.63
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499261	Low Sweep Frequency, Hz			346
Power, mW	91.6	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			832
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 9.2 - Results of the EUT (EPIRB) Aliveness Test (before the Leakage &amp; Immersion Test)

## Leakage Test



Figure 9.3 EUT was placed in an atmosphere as shown (+65 °C).



Figure 9.4 The temperature of the water for immersion (+22.5 °C)





Figure 9.5 EUT was immersed in water to a depth of 98 mm.



Figure 9.6 – EUT was immersed in water for a period 48 hours.



Figure 9.7 – View of the EUT (EPIRB) upon completion of the Leakage Test

#### Immersion Test



Figure 9.8 - View of the EUT (EPIRB) before the Immersion Test with the battery compartment open to the water





Figure 9.9 View of immersion test site.



Figure 9.10 Manometer of immersion test site shows 1 atm.



Figure 9.11 The EUT after immersion test.



Figure 9.12 The PCB after immersion test. There is no free water.

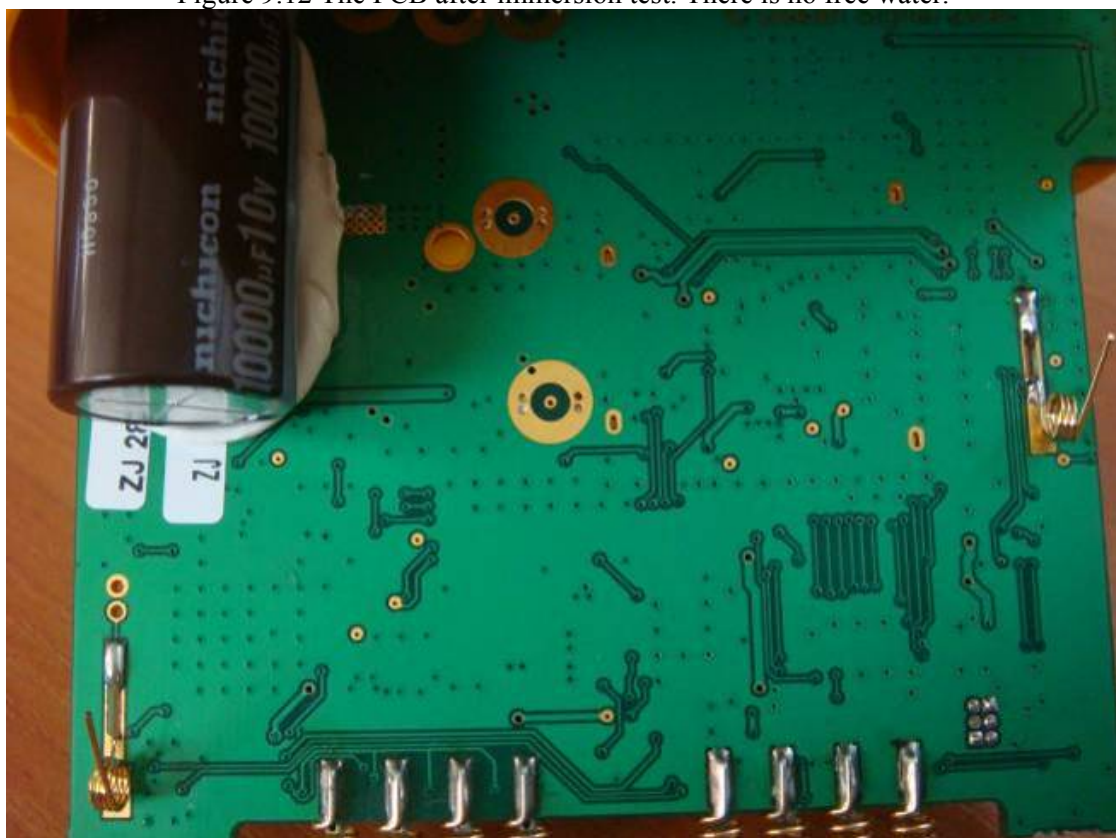


Figure 9.13 The PCB (back view) after immersion test. There is no free water.

Test duration 0 h 1 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	406036.000	406038.000	406037.091	406037.091	406037.091
+Phase deviation, rad	1.00	1.20	1.09	1.09	1.09
-Phase deviation, rad	-1.00	-1.20	-1.12	-1.12	-1.12
Phase time rise, mcs	50.00	250.00	150.90	150.90	150.90
Phase time fall, mcs	50.00	250.00	166.02	166.02	166.02
Power, Wt	3.16	7.94	6.59	6.59	6.59
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	400.04	400.04	400.04
Asymmetry, %	0.00	5.00	0.43	0.43	0.43
CW Preamble, ms	158.40	161.60	160.13	160.13	160.13
Total burst duration, ms	514.80	525.20	519.10	519.10	519.10
Repetition period, s	47.50	52.50	47.63	47.63	47.63
Delta Rep. period, s	>4.00		5.00	5.00	5.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499357	Low Sweep Frequency, Hz			346
Power, mW	93.1	High Sweep Frequency, Hz			1176
Sweep Period, sec	0.3	Sweep Range, Hz			832
Modulation Index, %	100				
Message					
Contents (full)	:FFFE2F 8C92F423F07FDFFB2BF03 783E0F66C				

Figure 9.14 - Results of the EUT (EPIRB) Aliveness Test (after the Leakage &amp; Immersion Test)

## FINAL RESULTS OF THE LEAKAGE AND IMMERSION TEST (A9.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.0021	MHz	406.037101 406.037091	PASS
- Power Output	35 - 39	dBm	38.22 38.19	PASS
• Interior Inspection	No water	√	No water	PASS

## CRITERIA OF COMPLIANCE THE LEAKAGE AND IMMERSION TEST (A9.0 RTCM 11000.2 Version 2.1):

- 1) successful aliveness test conducted.
- 2) no free water inside the compartment containing the electronic components.



## Annex 10

### SPURIOUS EMISSIONS TEST (A10, RTCM 11000.2 Version 2.1)

**Equipment Under Test (EUT):** No1 EPIRB SafeSea E100 class 1  
No2 EPIRB SafeSea E100G class 1

**EUT Software Release:** issue 00.00.28

**Sample No.1** Serial No 0001200002 I

**Sample No.2** Serial No 0001200004 I

**Test Date:** 08.06.2010-09.06.2010

**Test Conditions:**

– Atmospheric pressure: 757 mm/Hg

– Relative air humidity: 53 %

– Temperature Minimum: -40 °C

Maximum: +55 °C

Ambient: +26 °C

– EUT Category the satellite EPIRB with release mechanism (Category 1):

NO

the satellite EPIRB with mounting device (Category 2):

NO

– EUT Class the temperature Class 1 device:

YES

the temperature Class 2 device:

NO

– EPIRB is ON during the test

Test equipment:

- Beacon tester BT-611 No 1005

- Spectrum analyzer HP8593E No 3831U02306

- Climatic chamber KPK-400V No 15



Figure 10.1 – View of the EUT (EPIRB E100 class 1) before the Spurious Emissions Test



Figure 10.2 – View of the test setup for the Spurious Emissions Test

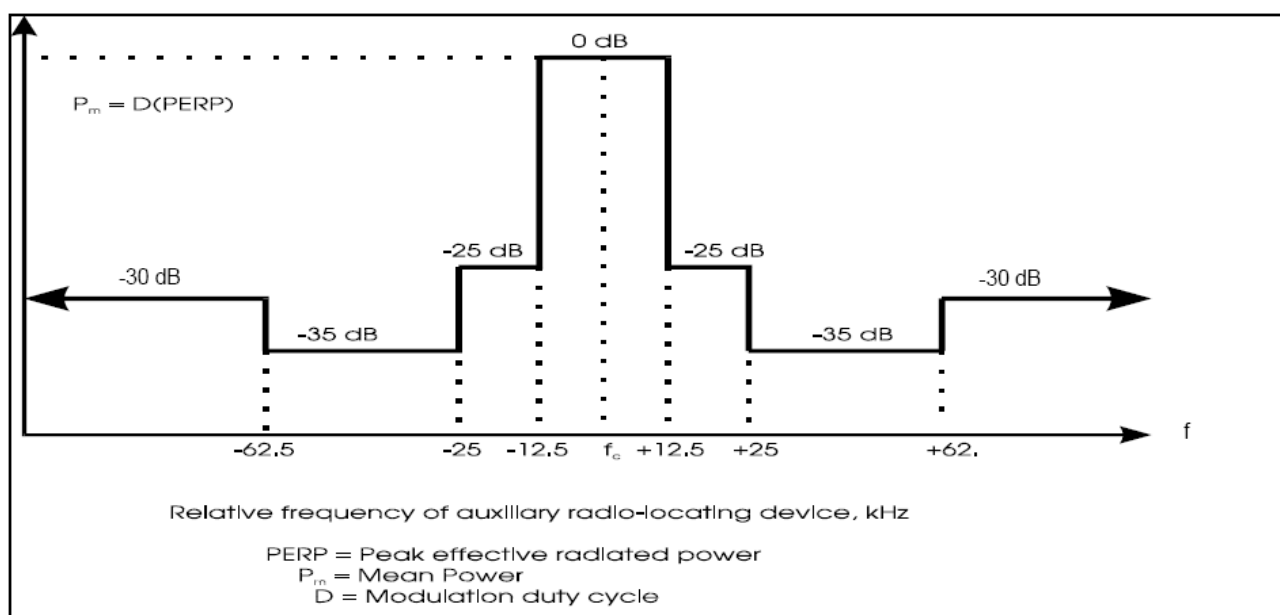


Figure 10.3 – Required Spurious Emissions for 121,5 MHz

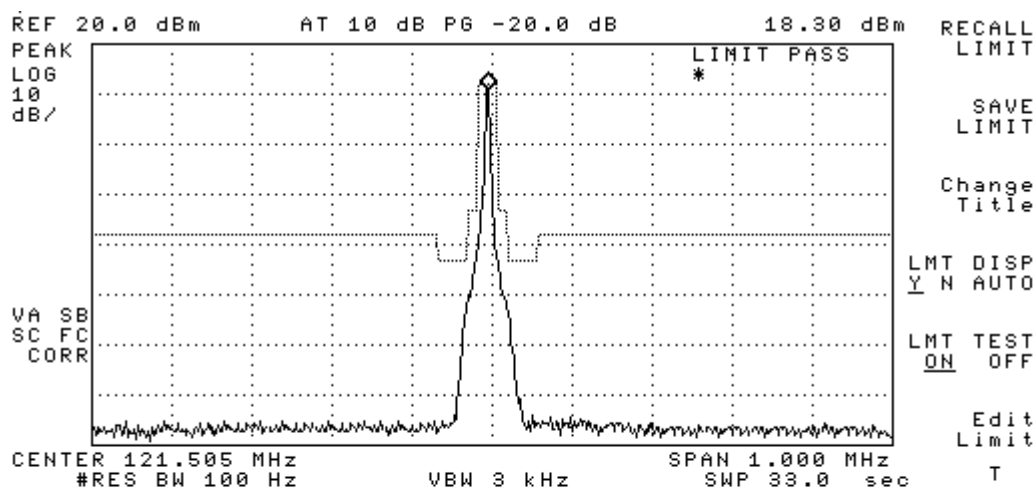


Figure 10.4 – EUT (EPIRB E100 class 1) Spurious Emissions for 121.5 MHz at Minimum Temperature



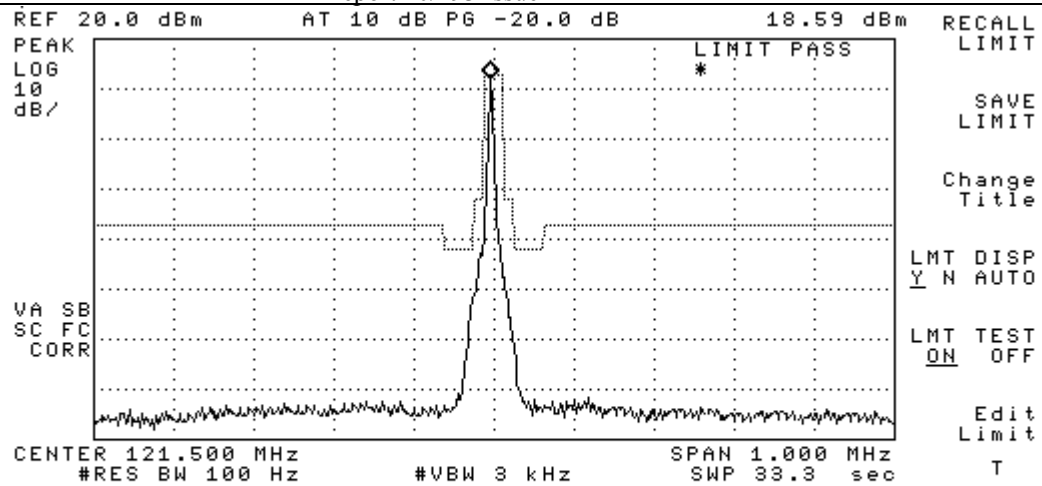


Figure 10.5 – EUT (EPIRB E100 class 1) Spurious Emissions for 121.5 MHz at Ambient Temperature

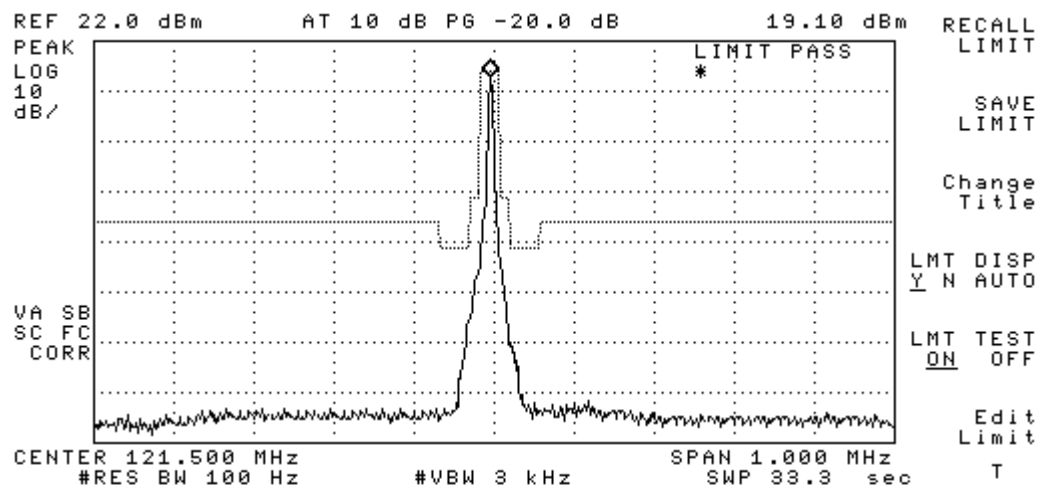


Figure 10.6 – EUT (EPIRB E100 class 1) Spurious Emissions for 121.5 MHz at Maximum Temperature

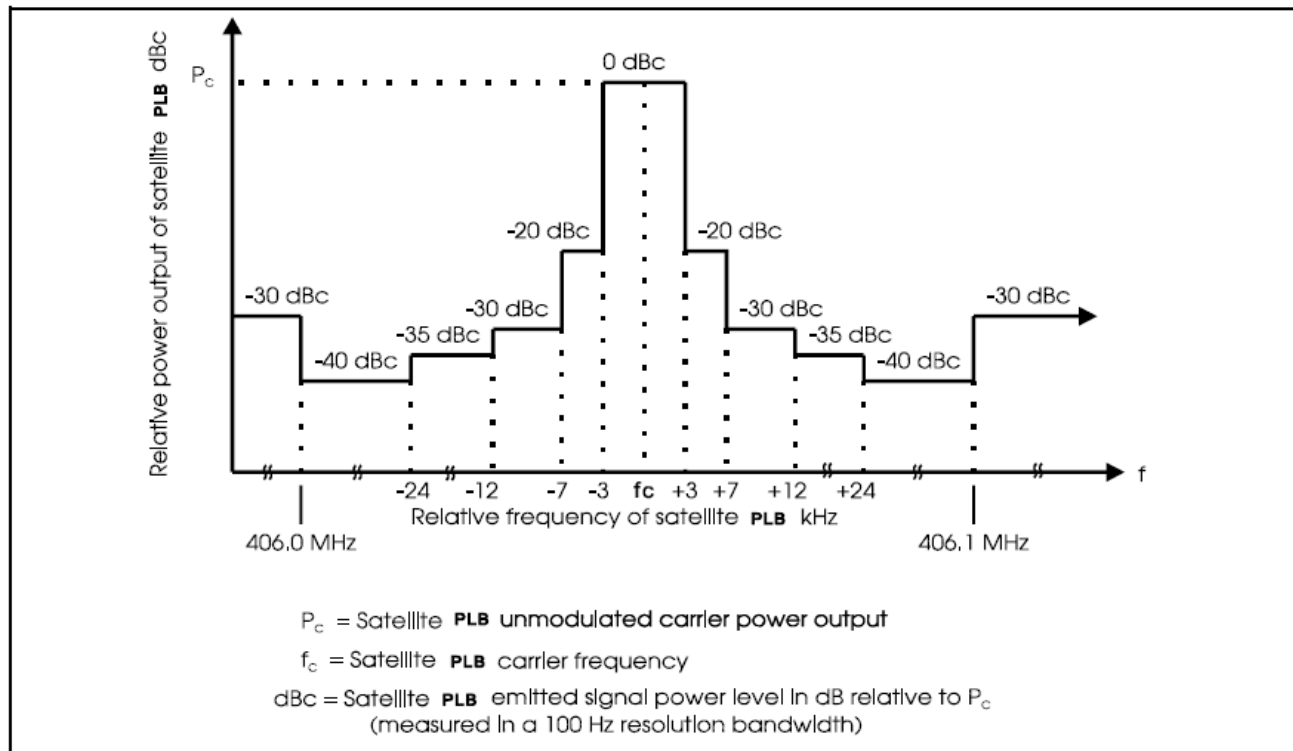


Figure 10.7 – Required Spurious Emissions for 406 MHz

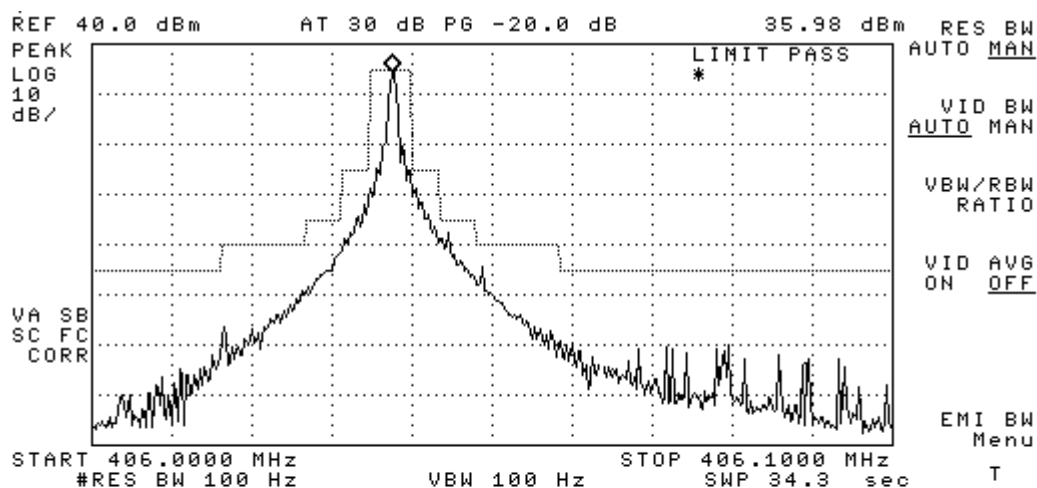


Figure 10.8 - EUT (EPIRB E100 class 1) Spurious Emissions for 406 MHz at Minimum Temperature

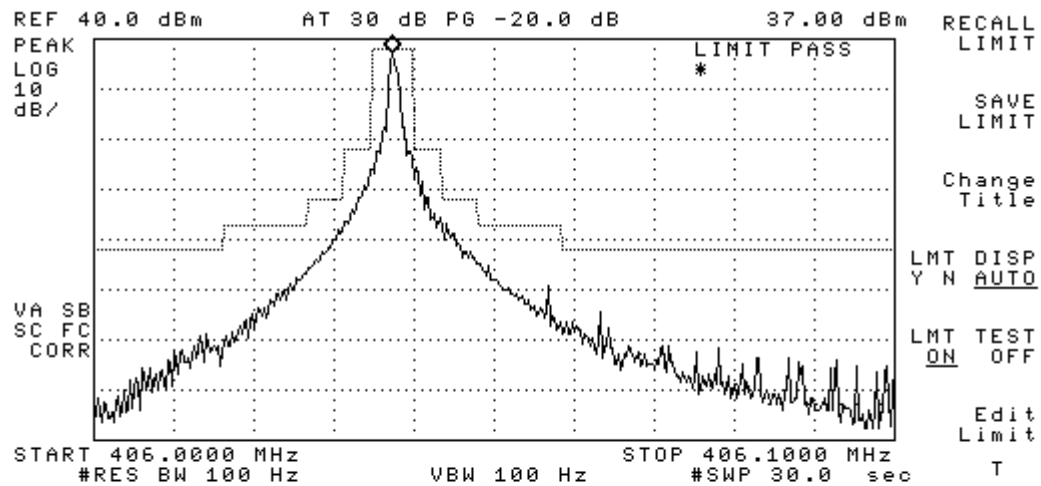


Figure 10.9 – EUT (EPIRB E100 class 1) Spurious Emissions for 406 MHz at Ambient Temperature

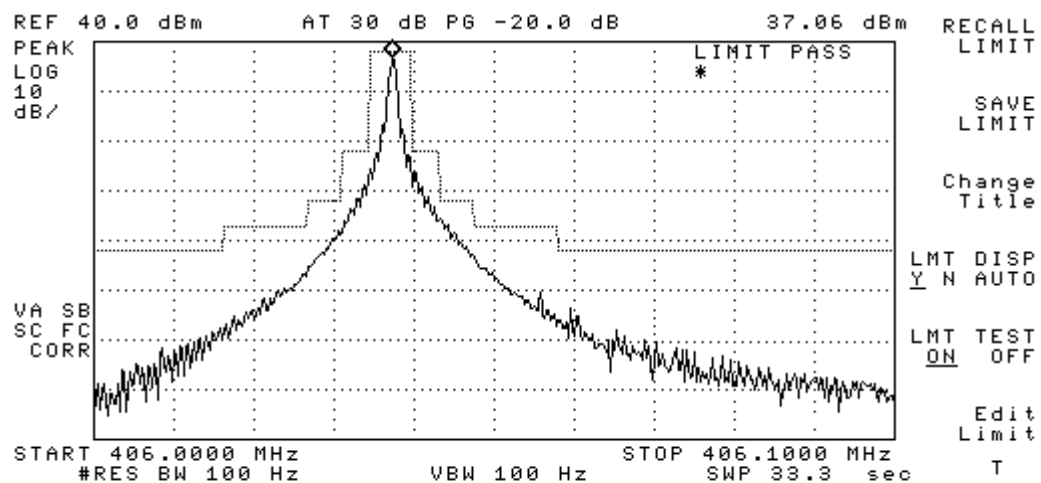


Figure 10.10 - EUT (EPIRB E100 class 1) Spurious Emissions for 406 MHz at Maximum Temperature

## FINAL RESULTS OF SPURIOUS EMISSIONS TEST (A10.0 RTCM 11000.2 Version 2.1) EPIRB E100 class 1:

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Spurious Emissions 121.5 MHz at ambient temperature	Fig 10.3	dBm	Fig 10.4	PASS
Spurious Emissions 121.5 MHz at minimum temperature	Fig 10.3	dBm	Fig 10.5	PASS
Spurious Emissions 121.5 MHz at maximum temperature	Fig 10.3	dBm	Fig 10.6	PASS
Spurious Emissions 406 MHz at ambient temperature	Fig 10.7	dBm	Fig 10.8	PASS
Spurious Emissions 406 MHz at minimum temperature	Fig 10.7	dBm	Fig 10.9	PASS
Spurious Emissions 406 MHz at maximum temperature	Fig 10.7	dBm	Fig 10.10	PASS



Figure 10.11 – View EUT (EPIRB E100G class 1) before the Spurious Emissions Test

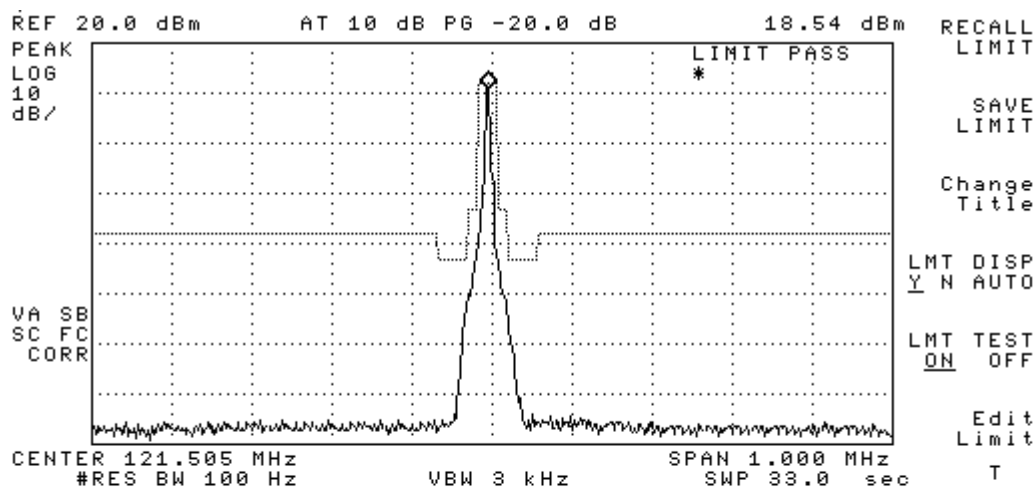


Figure 10.12 – EUT (EPIRB E100G class 1) Spurious Emissions for 121.5 MHz at Minimum Temperature



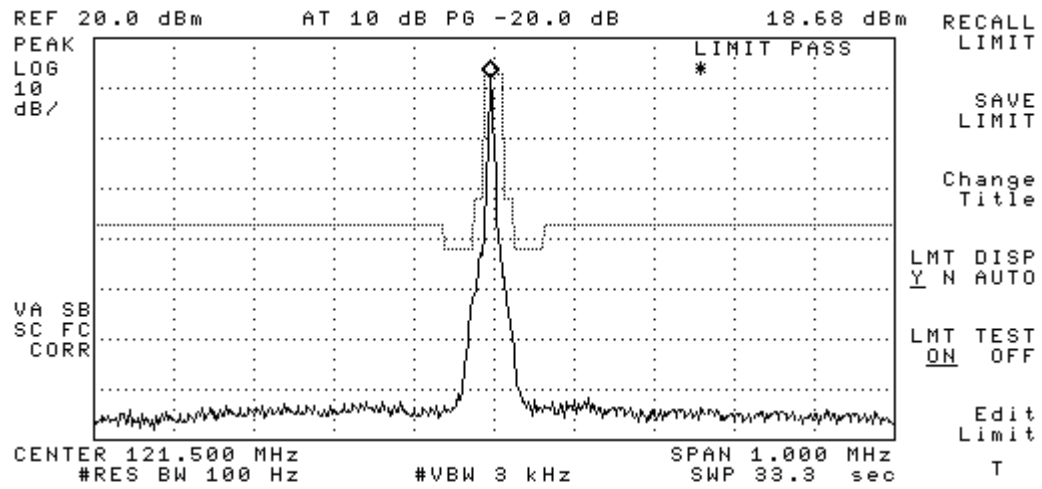


Figure 10.13 – EUT (EPIRB E100G class 1) Spurious Emissions for 121.5 MHz at Ambient Temperature

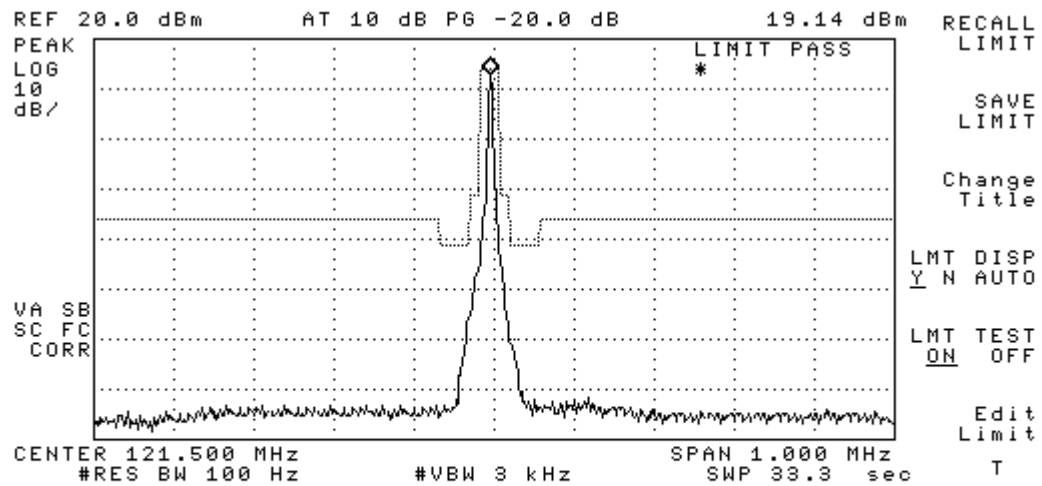


Figure 10.14 – EUT (EPIRB E100G class 1) Spurious Emissions for 121.5 MHz at Maximum Temperature

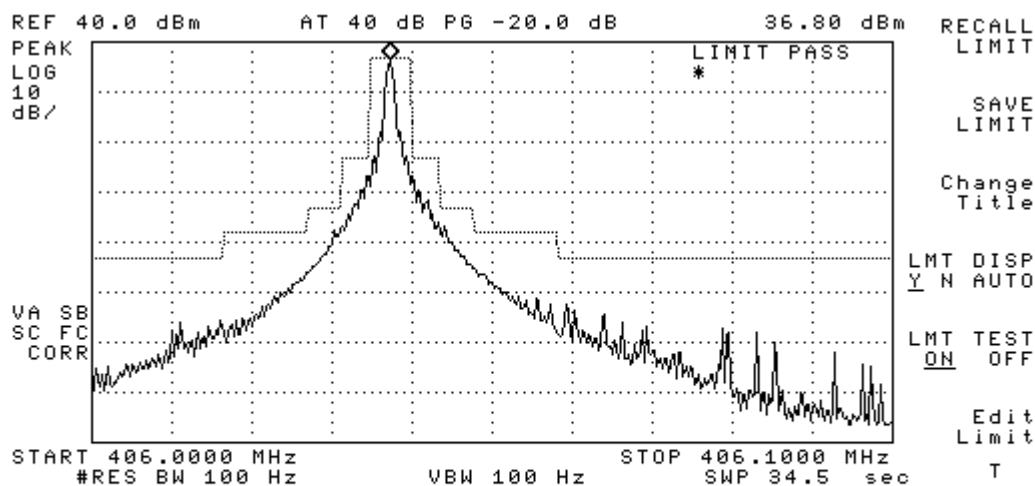


Figure 10.15 - EUT (EPIRB E100G class 1) Spurious Emissions for 406 MHz at Minimum Temperature

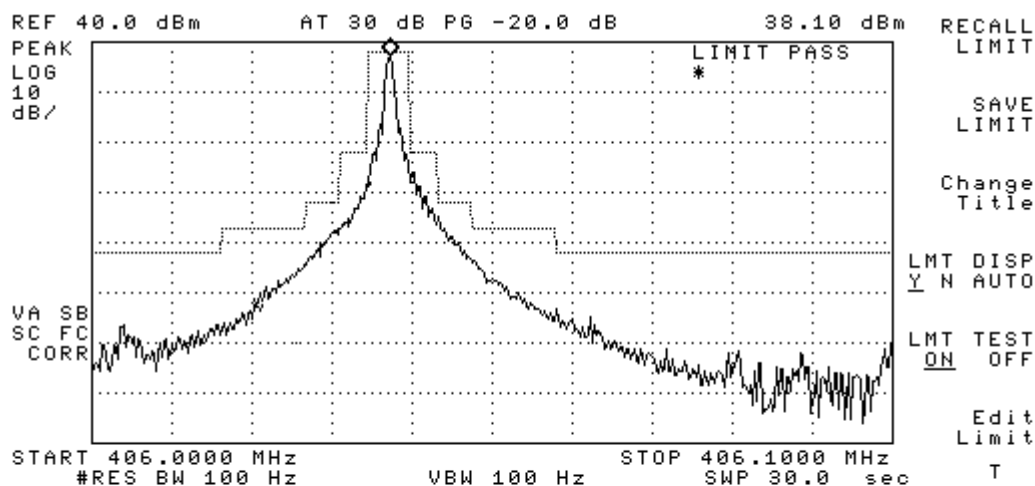


Figure 10.16 – EUT (EPIRB E100G class 1) Spurious Emissions for 406 MHz at Ambient Temperature

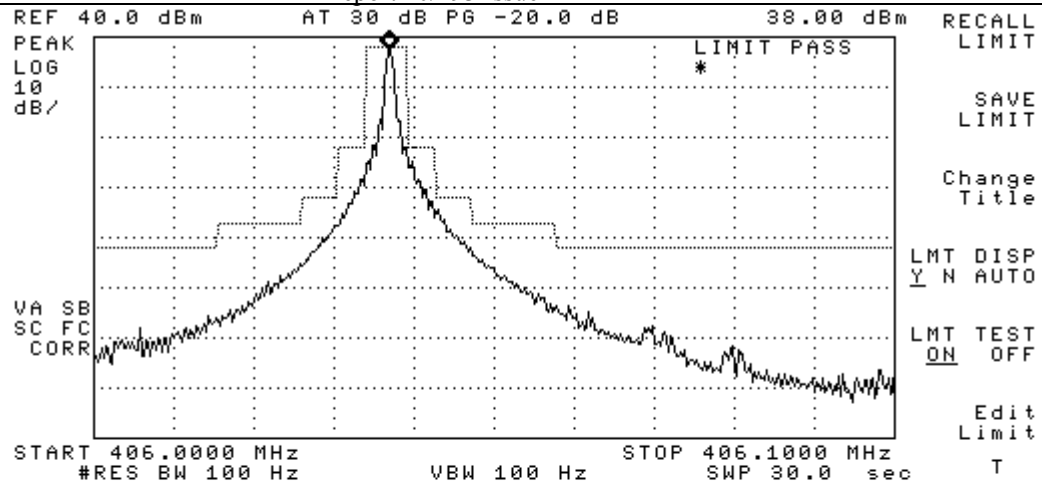


Figure 10.17 - EUT (EPIRB E100G class 1) Spurious Emissions for 406 MHz at Maximum Temperature

## FINAL RESULTS OF SPURIOUS EMISSIONS TEST (A10.0 RTCM 11000.2 Version 2.1) EPIRB E100G class 1:

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Spurious Emissions 121.5 MHz at ambient temperature	Fig 10.3	dBm	Fig 10.13	PASS
Spurious Emissions 121.5 MHz at minimum temperature	Fig 10.3	dBm	Fig 10.12	PASS
Spurious Emissions 121.5 MHz at maximum temperature	Fig 10.3	dBm	Fig 10.14	PASS
Spurious Emissions 406 MHz at ambient temperature	Fig 10.7	dBm	Fig 10.16	PASS
Spurious Emissions 406 MHz at minimum temperature	Fig 10.7	dBm	Fig 10.15	PASS
Spurious Emissions 406 MHz at maximum temperature	Fig 10.7	dBm	Fig 10.17	PASS