PUBLIC ENTERPRISE TESTING CENTER «OMEGA»

Approved by

Director

PE TC "OMEGA"

Belikov N.I.

August 11, 2014

TEST REPORT No. 14/507

Issue 1

Emergency Position Indicating Radio Beacon (EPIRB)
for compliance with RTCM Standard 11000.2

Model **EPIRB1**

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

Sevastopol
2014

PUBLIC ENTERPRISE TESTING CENTER «OMEGA»

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ACCREDITATION

COSPAS-SARSAT Secretariat
Reference No. CS497/F530 dated 21/09/1994

National Accreditation Agency of Ukraine
Certificate of accreditation for compliance DSTU ISO 17025:2006 No. 2H339 valid until 17.05.2019

Letter of FCC acceptance #181479 dated July 24, 2014

IC registration of 3/10m OATS #8780A-1 dated May 29, 2013

IC registration of 3m alternative test site #8780A-2 dated May 29, 2013

BABT Certificate of Recognition testing laboratory No.LAB/033 dated 30.06.2013 valid until 30.06.2015

Letter of USCG Acceptance for testing EPIRBs #16714/161.011/OMEGA dated February 7, 2008

Accreditation certificate No. AAC.T.00130 dated 28.10.2011 valid until 28.10.2014 issued by AAC "Analitica", Full Member and Signatory to ILAC and APLAC Mutual Recognitions Arrangements (www.aac-analitica.ru)

Report on:	Emergency Position Indicating Radio Beacon (EPIRB) 406 MHz COSPAS–SARSAT model EPIRB1
Prepared for:	Beacon Manufacturer: Ocean Signal Limited, Unit 4, Ocivan Way, Margate, Kent, CT9 4NN, United Kingdom Manufacturer representative: David Sheekey Product and Approvals Manager Telephone number: +44 (0) 1843 282930 david.sheekey@oceansignal.com
Test commencement date	17.02.2014
Test completion date	08.08.2014

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

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Report Issue History		
No	**Data of issue**	**Report reissue reason**
1	August 11, 2014	The initial issue

1. EQUIPMENT UNDER TEST

1.1 Equipment category	Emergency Position Indicating Radio Beacon (EPIRB) 406 MHz COSPAS–SARSAT
1.2 Equipment type	Emergency Position Indicating Radio Beacon (EPIRB)
1.3 Equipment model	EPIRB1
1.4 Cospas-Sarsat equipment class	Class 2 (operating temperature range - 20°C to +55°C)
1.5 RTCM EPIRB category	EPIRB without a float-free mechanism (Category 2): - with Manual Release Housing (MRH) - with Manual bracket
1.6 Equipment serial number	002 (EPIRB1 conducted unit configured so that antenna port could connect to the 50 Ohms test system using coaxial cable), 006 (EPIRB1 radiated unit which is similar to the proposed production beacons equipped with its proper antenna) 004 (EPIRB1 radiated unit which is similar to the proposed production beacons equipped with its proper antenna)
1.7 Equipment destination	Alarm message transmission of distressed accident via COSPAS-SARSAT satellite system
1.8 Equipment software/firmware version	Issue 00.04

2. MODIFICATIONS OF THE TEST SAMPLES DURING TESTING

2.1 Manual Release Housing (MRH) was added for testing since 18 of July 2014.

3. TEST PURPOSE

The purpose of tests is to confirm compliance of EPIRB model EPIRB1 with RTCM Standard 11000.2 (2002) for 406 MHz satellite Emergency Position Indicating Radio Beacon (EPIRBs).

4. TEST CONDITIONS AND METHODS

Procedures, conditions and methods of testing correspond to requirements and methods of RTCM Standard 11000.2 (2002).

5. TEST PROGRAM

No.	Test name	Requirements RTCM 11000.2	Methods RTCM 11000.2
1.	Initial Aliveness Test	A1.0	A1.0
2.	Dry heat cycle	A3.0	A3.0
3.	Damp heat cycle	A4.0	A4.0
4.	Vibration test	A5.0	A5.0
5.	Bump test	A6.0	A6.0
6.	Salt fog test [1)]	A7.0	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	A9.0	A9.0
10.	Spurious emissions test	A10.0	A10.0
11.	Thermal shock test	A11.0	A11.0
12.	COSPAS-SARSAT type approval tests	A12.0	C/S T.007
13.	Operational life test	A13.1	A13.1
14.	Strobe light test	A13.2	A13.2
15.	Self test	A13.3	A13.3
16.	Stability and buoyancy test	A15.0	A15.0
17.	Inadvertent activation test	A16.0	A16.0
18.	Auxiliary radio-locating device transmitter test	A17.0	A17.0
19.	Humidity test	A18.0	A18.0
20.	Orientation test	A19.0	A19.0

[1)] The testing of Manual Release Housing (MRH) was waived by the manufacturer as MRH has been testing together EPIRB models E100, E100G. The test results are in the Test Report 10/881 Issue 1.

6. TEST SCHEDULE

No.	Test name	Dates of test	Notes
1.	Initial Aliveness Test	06.05.2014, 19.05.2014	
2.	Dry heat cycle	19.05.2014 - 20.05.2014	
3.	Damp heat cycle	21.05.2014 - 22.05.2014	
4.	Vibration test	22.05.2014, 06.08.2014, 07.08.14	
5.	Bump test	23.05.2014, 05.06.2014	
6.	Salt fog test	23.05.2014 - 27.05.2014	
7.	Drop test (on hard surface)	28.05.2014	
8.	Drop test (in water)	29.05.2014	
9.	Leakage and immersion test	02.06.2014 - 04.06.2014	
10.	Spurious emissions test	17.02.2014-19.02.2014, 16.04.2014-17.04.2014, 30.06.2014	
11.	Thermal shock test	30.05.2014, 02.06.2014	
12.	COSPAS-SARSAT type approval tests	17.02.2014-10.06.2014	Note 2
13.	Operational life test	25.02.2014-28.02.2014	Note 1
14.	Strobe light test	25.04.2014 - 29.04.2014	
15.	Self test	17.02.2014 - 19.02.2014	
16.	Stability and buoyancy test	17.06.2014	
17.	Inadvertent activation test	18.07.2014	
18.	Auxiliary radio-locating device transmitter test	24.03.2014, 16.04.2014-17.04.2014	
19.	Humidity test	16.06.2014	
20.	Orientation test	06.05.2014	

Note 1. Test was combined with A.2.3 C/S T007 as it is allowed in RTCM 11000.2.
Note 2. C/S type approval tests for EPIRB1 were conducted separately and test report 14/171 was issued.

7. CONCLUSION

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

Date of Submission for Testing: **17.02.2014**

Applicable Standard:

Document	Edition
RTCM 11000.2	Version 2.1 (2002)

I hereby confirm that the 406 MHz beacon model EPIRB1 described above have been successfully tested in accordance with the applicable standard and complies with the requirements as demonstrated in the attached report.

Dated August 11, 2014 Signed

V. Kovalenko
Department manager

8. SUMMARY OF TEST RESULTS

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C)	Tamb (+20°C)	Tmax (+55°C)	
1. INITIAL ALIVENESS TEST (A1.0)						
EPIRB1, s/n 006						Result: Pass, Annex 1
• Carrier Frequency	406.040 ± 0.001	MHz		406.040005		
• Power Output	35 - 39	dBm		√		
• Digital message	Correct	√		√		
EPIRB1, s/n 002						Result: Pass, Annex 1
• Carrier Frequency	406.040 ± 0.001	MHz		406.039972		
• Power Output	35 - 39	dBm		√		
• Digital message	Correct	√		√		
EPIRB1, s/n 004						Result: Pass, Annex 1
• Carrier Frequency	406.040 ± 0.001	MHz		406.040004		
• Power Output	35 - 39	dBm		√		
• Digital message	Correct	√		√		
2. DRY HEAT CYCLE (A3.0)						
EPIRB1, s/n 006						Result: Pass, Annex 2
• Aliveness Test (during 2 hour period)						
- Carrier Frequency	406.040 ± 0.001	MHz			406.039994	
- Power Output	35 - 39	dBm			35.74	
- Digital message	Correct	√			√	
• Aliveness test (at end of 2 hour period)						
- Carrier Frequency	406.040 ± 0.001	MHz			406.040003	
- Power Output	35 - 39	dBm			35.79	
- Digital message	Correct	√			√	
3. DAMP HEAT CYCLE (A4.0)						
EPIRB1, s/n 006						Result: Pass, Annex 3
• Aliveness Test (during 2 hour period)					√	The test was carried out at 40 °C
- Carrier Frequency	406.040 ± 0.001	MHz			406.039981	
- Power Output	35 - 39	dBm			35.71	
- Digital message	Correct	√			√	
• Aliveness Test (at end of 2 hour period)						
- Carrier Frequency	406.040 ± 0.001	MHz			406.039983	
- Power Output	35 - 39	dBm			35.67	
- Digital message	Correct	√			√	
4. VIBRATION TEST (A5.0)						
EPIRB1, s/n 006						Result: Pass, Annex 4
• Exterior Mechanical Inspection	No damage	√		√		
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.040100		
- Power Output	35 - 39	dBm		35.73 … 35.80		
- Digital message	Correct	√		√		
• Activation	No activation during test	√		√		
5. BUMP TEST (A6.0)						
EPIRB1, s/n 006						Result: Pass, Annex 5
• Exterior Mechanical Inspection	No damage	√		√		
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.039982		

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C)	Tamb (+20°C)	Tmax (+55°C)	
- Power Output	35 - 39	dBm		35.67		
- Digital message	Correct	√		√		
• Activation	No activation during test	√		√		
6. SALT FOG TEST (A7.0)						
EPIRB1, s/n 006						Result: Pass, Annex 6
• Exterior Mechanical Inspection	No damage	√		√		
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.039989		
- Power Output	35 - 39	dBm		35.50		
- Digital message	Correct	√		√		
7-A. DROP TEST (A8.1) On Hard Surface						
EPIRB1, s/n 006						Result: Pass, Annex 7
• Exterior Mechanical Inspection	No damage	√	√			The test was carried out at -30°C
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz	406.039992			
- Power Output	35 - 39	dBm	35.44			
- Digital message	Correct	√	√			
• Activation	No activation during test	√	√			
7-B. DROP TEST (A8.2) In Water						
EPIRB1, s/n 006						Result: Pass, Annex 8
• Exterior Mechanical Inspection	No damage	√		√		
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.039985		
- Power Output	35 - 39	dBm		35.55		
- Digital message	Correct	√		√		
8. LEAKAGE AND IMMERSION TEST (A9.0)						
EPIRB1, s/n 006						Result: Pass, Annex 9
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.040100		
- Power Output	35 - 39	dBm		35.59		
- Digital message	Correct	√		√		
Exterior Inspection	No water	√		√		
9. SPURIOUS EMISSIONS TEST (A10.0)						
EPIRB1, s/n 002						Result: Pass, Annex 10
• 406 MHz	Figure 2-1	√	√	√	√	
• 121.5 MHz	Figure 2-6	√	√	√	√	
10. THERMAL SHOCK TEST (A11.1)						
EPIRB1, s/n 006						Result: Pass, Annex 11
• Self-activation in fresh water	5	minutes	0.083		0.067	
• Self-activation in salt water	5	minutes	0.083		0.067	
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz	406.039999		406.0340133	
- Power Output	35 - 39	dBm	35.47		35.55	
- Digital message	Correct	√	√		√	
• Frequency Stability						
- short term stability	≤0.002	ppm in 100 ms	0.000288		0.000008	
- medium term stability mean slope	≤0.001	ppm/ minute	-0.000786		-0.000912	

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C)	Tamb (+20°C)	Tmax (+55°C)	
residual frequency variation	≤0.003	ppm	0.001867		0.002521	
11. COSPAS-SARSAT TYPE APPROVAL TESTS (A12.0)	C/S Certificate					C/S Test report No.14/171
12. OPERATIONAL LIFE, STROBE LIGHT AND SELF TESTS (A13.0)						
EPIRB1, s/n 002						Result: Pass, Annex 12
Operational Life (A13.1)						
• Frequency						
- Nominal Carrier	406.040 ± 0.001	MHz	406.0369			
- Short term stability	≤0.002	ppm in 100 ms	0.000124-0. 000371			
• Medium-term stability						
- Mean slope	≤0.001	ppm/ minute	-0.00000087 to 0.0000255			
- Residual variation	≤0.003	ppm	0. 00003-0.000389			
• RF output power	35 - 39	dBm	36.76-36.87			
• Strobe flash rate	20 - 30	/min	26-27			
• Auxiliary radio-locating Peak envelope output power	14 - 20	dBm	15.89-16.60			
13. STROBE LIGHT TEST (A13.2)						
EPIRB1, s/n 006						Result: Pass, Annex 13
• Flash rate	20 - 30	/min	24	24	24	
• Effective intensity	0.75	cd	6.36	6.05	5.40	
• Pulse duration	10^{-6} to 10^{-2}	s	10^{-2}	10^{-2}	10^{-2}	
14. SELF TEST (A13.3)						
EPIRB1, s/n 002						Result: Pass, Annex 14
• RF pulse duration	0.444 sec or 0.525 sec	√	√	√	√	
• Frame synchronization pattern	011010000	√	√	√	√	
• Number of RF bursts	1-burst	√	√	√	√	
15. STABILITY AND BUOYANCY TEST (A15.0)						
EPIRB1, s/n 006						Result: Pass, Annex 15
• Time to upright	2	s		1.23		
• Reserve Buoyancy	5	%		35		
• Float upright; Antenna base	> 4	cm		4.4		
16. INADVERTENT ACTIVATION TEST (A16.0)						
EPIRB1, s/n 004						Result: Pass, Annex 16
• Activation/Release	EUT should not release from bracket or automatically activate	√		√		
17. AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0)						
EPIRB1, s/n 002						Result: Pass, Annex 17
• Carrier Frequency	121.5 ± 0.006	MHz	121.497679	121.497979	121.497973	
• PERP	14 - 20	dBm		14.16-14.46		
• Modulation						
- Frequency	700 Hz within range of 300 – 1600 Hz	Hz	350 – 1119	350 – 1119	350 – 1119	
- Direction	Upward	√	√	√	√	
- Duty cycle	33 - 55	%	36.05 – 37.21	36.61 – 38.99	36.82 – 39.67	
- Factor	0.85 – 1.0		0.98	0.98	0.98	

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			Tmin (-20°C)	Tamb (+20°C)	Tmax (+55°C)	
- Sweep repetition rate	2 - 4	Hz	3.03	3.03	3.02	
- Frequency Coherence	at least 30% of the total power emitted should be contained within ± 30 Hz of the carrier frequency	%	33.83	34.28	34.79	
Frequency Shift	< ± 30 Hz	Hz	-0.3	2.3	4.6	
• Antenna						
- Pattern	Omnidirectional	√		√		
- Polarization	Vertical	√		√		
- VSWR	1.5:1	√		Not applicable		
•						
18. HUMIDITY TEST (A18.0)						
EPIRB1, s/n 006						Result: Pass, Annex 18
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz			406.039977	
- Power Output	35 - 39	dBm			36.72	
- Digital message	Correct	√			√	
19. ORIENTATION TEST (A19.0)						
EPIRB1, s/n 006						Result: Pass, Annex 18
VERTICAL						
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.040002		
- Power Output	35 - 39	dBm		36.75		
- Digital message	Correct	√		√		
UPSIDE DOWN						
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.040001		
- Power Output	35 - 39	dBm		36.71		
- Digital message	Correct	√		√		
HORIZONTAL						
• Aliveness Test:						
- Carrier Frequency	406.040 ± 0.001	MHz		406.040000		
- Power Output	35 - 39	dBm		36.72		
- Digital message	Correct	√		√		

Test Engineer  D.Vasilev

ANNEX 1.
INITIAL ALIVENESS TEST (A1.0)

Equipment Under Test (EUT): 1) EPIRB1, s/n 006
2) EPIRB1, s/n 002
3) EPIRB12, s/n 004

SW version: Issue 00.04

Test Date: 06.05.2014, 19.05.2014
Test Conditions:

- Ambient temperature: 17.4 - 19.8 °C
- Relative humidity: 55 - 67 %
- Atmospheric pressure: 758 - 759 mm/Hg

Figure 1.1 – View of EPIRB1, s/n 006

Figure 1.2 – View of EPIRB1, s/n 002

Figure 1.3 – View of EPIRB12, s/n 004

Test Results

Test duration 0 h 30 m	Bursts received 37	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.005	406040.005	406040.009
Power, Wt	3.16	7.94	3.75	3.81	3.81
Slope(E-9)	-1.00	1.00	-0.865	-0.307	-0.307
Residual variations (E-9)	0.00	3.00	0.219	0.219	1.119
Short term variations (E-9)	0.00	2.00	0.009	0.009	0.136
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498325				
Power, mW	63.20				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 1.4 – EPIRB1 S/N 006

Test duration 0 h 30 m	Bursts received 37	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.972	406039.972	406039.9721
Power, Wt	3.16	7.94	4.05	4.22	4.32
Slope(E-9)	-1.00	1.00	0.004	0.008	0.109
Residual variations (E-9)	0.00	3.00	0.191	0.239	0.367
Short term variations (E-9)	0.00	2.00	0.008	0.008	0.121
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498149				
Power, mW	66.15				
Message					
Digital message	:FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 1.5 - EPIRB1 S/N 002

Test duration 0 h 30 m	Bursts received 37	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.002	406040.004	406040.011
Power, Wt	3.16	7.94	3.85	3.95	4.01
Slope(E-9)	-1.00	1.00	-0.725	-0.290	-0.290
Residual variations (E-9)	0.00	3.00	0.189	0.189	1.255
Short term variations (E-9)	0.00	2.00	0.010	0.010	0.141
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498325				
Power, mW	63.40				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 1.6 - EPIRB1 S/N 004

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 RE-SULTS	COMMENTS (PASS/FAIL)
- Carrier Frequency	406.040 ± 0.001	MHz	No.1 406.040005 No.2 406.039972 No.3 406.040004	PASS PASS PASS
- Power Output	35 - 39	dBm	No.1 35.74-35.81 No.2 36.08-36.35 No.3 35.85-36.03	PASS PASS PASS
- Digital message	Correct	√	No.1 √ No.2 √ No.3 √	PASS PASS PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Temperature meter	gradient 2002	078	02.2015
3.	Hygrometer digital	HP 22-A	60974546	12.2014
4.	Beacon tester	BT100AVS	2315	07.2015
5.	Beacon tester	BT-611	1005	06.2015
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016
8.	Semi-anechoic chamber	«Don»	1	08.2014

ANNEX 2.
DRY HEAT CYCLE (A3.0)

Equipment Under Test (EUT): 1) EPIRB1, s/n 006 with Manual bracket
2) EPIRB1, s/n 002 with Manual bracket

SW version: Issue 00.04

Test Date: from 19.05.2014 until 20.05.2014
Test Conditions:

- Ambient temperature: 22.4-24.6°C
- Relative humidity: 51-58%
- Atmospheric pressure: 757-758 mm/Hg

TEST DESCRIPTION

The EUT should be placed in a chamber of normal room temperature. Then the temperature should be raised to and maintained at 70° ± 3° C for a period of 10 hours.
At the end of the 10 hour period, any climatic control devices provided in the equipment may be switched on and the chamber cooled to 55° ± 3° C. The cooling of the chamber should be completed within 30 minutes.
The equipment should be switched on 30 minutes after the end of the 10 hour period and remain on for a period of at least 2 hours in the 55° ± 3° C chamber.
An aliveness check should be performed during and at the end of the 2 hour period.

TEST RESULT

- STEP 1. The EUT1 and EUT2 were switched OFF and were placed in the temperature test chamber at ambient temperature. The chamber temperature was raised to 70°C.
- STEP 2. During the next 10-hour period, the temperature was maintained in the test chamber 70 ± 3°C.
- STEP 3. The chamber cooled to 55° ± 3° C. The cooling of the chamber was completed within 30 minutes.
- STEP 4. The EUT1 and EUT2 were switched on 30 minutes after the end of the 10 hour period and remain on for a period of at least 2 hours in the 55° ± 3° C chamber.
- STEP 4. An aliveness check was performed during and at the end of the 2 hour period

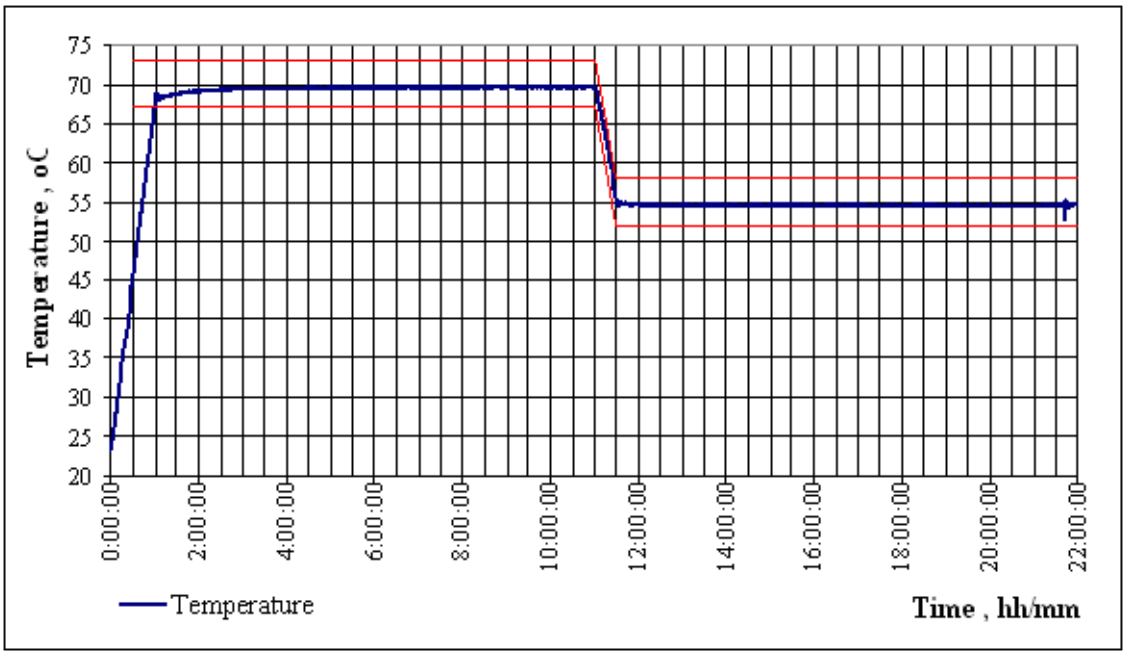


Figure 2.1 – Schedule of chamber temperature during Dry Heat Cycle

Test duration 0 h 3 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.994	406039.994	406039.994
Power, Wt	3.16	7.94	3.75	3.75	3.75
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499499				
Power, mW	63.15				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 2.5 – Detailed measurement results of EPIRB1 S/N 006
during of the 2 hour period in the +55 °C chamber

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	406039.000	406041.000	406039.969	406039.969	406039.969
Power, Wt	3.16	7.94	3.86	3.86	3.86
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498131				
Power, mW	66.07				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 2.6 – Detailed measurement results of EPIRB1 S/N 002
during of the 2 hour period in the +55 °C chamber

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	406039.000	406041.000	406040.003	406040.003	406040.003
Power, Wt	3.16	7.94	3.79	3.79	3.79
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499594				
Power, mW	68.25				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 2.7 – Detailed measurement results of EPIRB1 S/N 006
at the end of the 2 hour period in the +55 °C chamber

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	406039.000	406041.000	406039.970	406039.970	406039.970
Power, Wt	3.16	7.94	3.95	3.95	3.95
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498145				
Power, mW	72.44				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 2.8 – Detailed measurement results of EPIRB1 S/N 002
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)
Aliveness test (during of 2 hour period):				
- Carrier Frequency	406.040 ± 0.001	MHz	No.1 406.039994 No.2 406.039969	PASS PASS
- Power Output	35 - 39	dBm	No.1 35.74 No.2 35.87	PASS PASS
- Digital message	Correct	√	No.1 √ No.2 √	PASS PASS
Aliveness test (at end of 2 hour period):				
- Carrier Frequency	406.040 ± 0.001	MHz	No.1 406.040003 No.2 406.039970	PASS PASS
- Power Output	35 - 39	dBm	No.1 35.79 No.2 35.97	PASS PASS
- Digital message	Correct	√	No.1 √ No.2 √	PASS PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
9.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
10.	Temperature meter	gradient 2002	078	02.2015
11.	Hygrometer digital	HP 22-A	60974546	12.2014
12.	Beacon tester	BT100AVS	2315	07.2015
13.	Beacon tester	BT-611	1005	06.2015
14.	Spectrum analyzer	FSH8	105763	10.2016
15.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 3.
DAMP HEAT CYCLE (A4.0)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: from 21.05.2014 until 22.05.2014
Test Conditions:

- Ambient temperature: 23.8-26.0°C
- Relative humidity: 54-58 %
- Atmospheric pressure: 755-756 mm/Hg

TEST DESCRIPTION

The EUT should be placed in a chamber of normal room temperature and humidity which, steadily, over a period of 3 ± 0.5 hours, should be heated to 40°± 3° C and should during this period be brought to a relative humidity of 93% ±2% so that excessive condensation is avoided. These conditions should be maintained for a period of 10 hours.
At the conclusion of the 10 hours, the satellite EPIRB and any climatic control devices provided in the equipment should be switched on and remain on for a period of at least 2 hours in the 40° ± 3° C and 93% ± 2% relative humidity chamber. An aliveness check should be performed during and at the end of the 2 hour period. At the end of the test the EUT shall be returned to normal environmental conditions.

TEST RESULT:

- STEP 1. The EUT was switched OFF and placed in the climatic test chamber at ambient temperature and relative humidity.
  The temperature was raised to +40°C, and the relative humidity was raised to 93 % over the period of 3 h.
- STEP 2. During the next 10-hour 25 min period, the temperature were maintained in the climatic test chamber 40 ± 2°C and the relative humidity 93 % ± 3 %.
- STEP 3. After period of 10 h 25 m the EUT was switched ON and was kept operational at the temperature 40 ± 2°C and the relative humidity 93 % ± 3 % for 2 h. During and at the end of this period the EUT was subjected to aliveness check.
- STEP 4. At the end of the test period and with the EUT still in the chamber, the chamber was brought to room temperature during 3 hours.

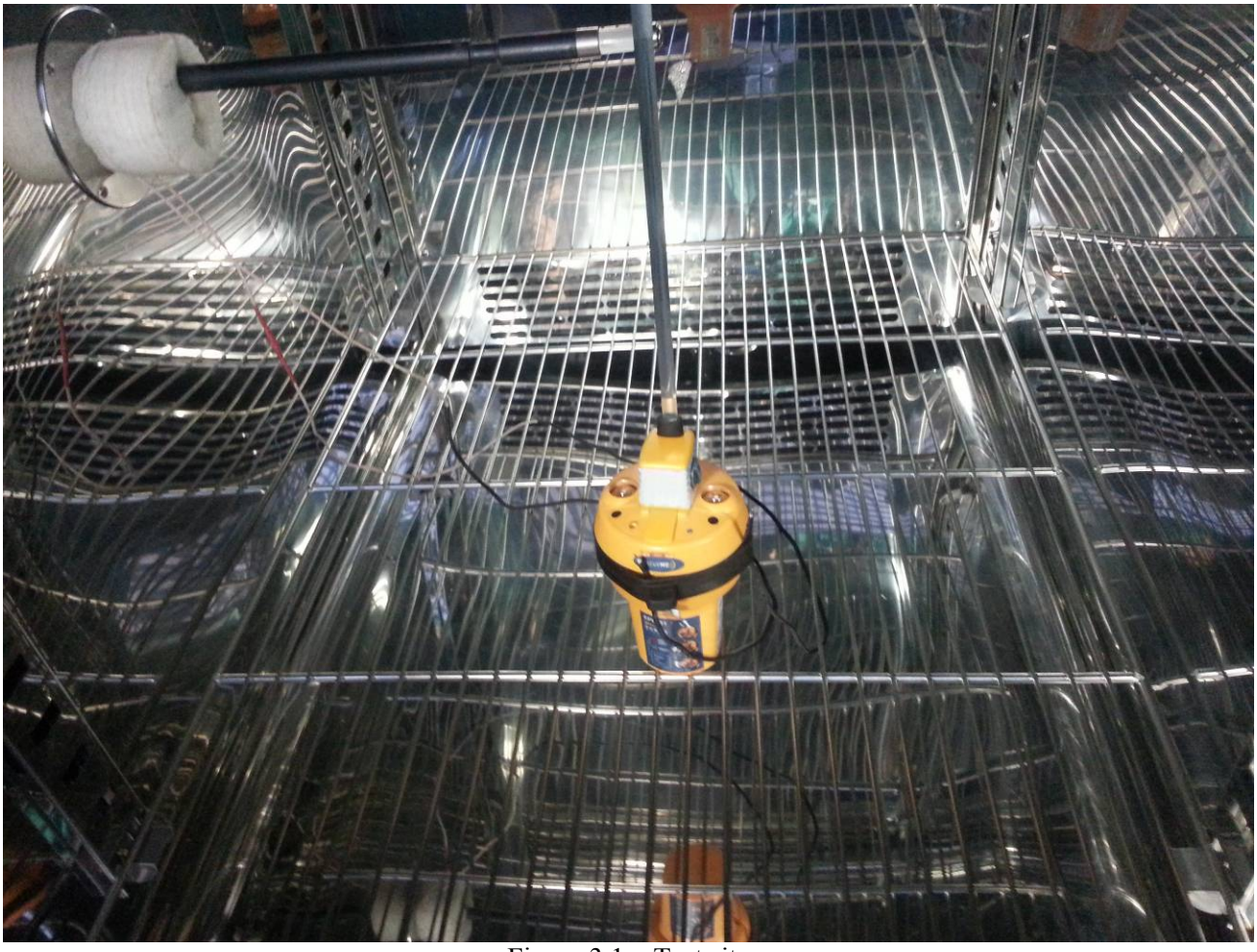


Figure 3.1 – Test site

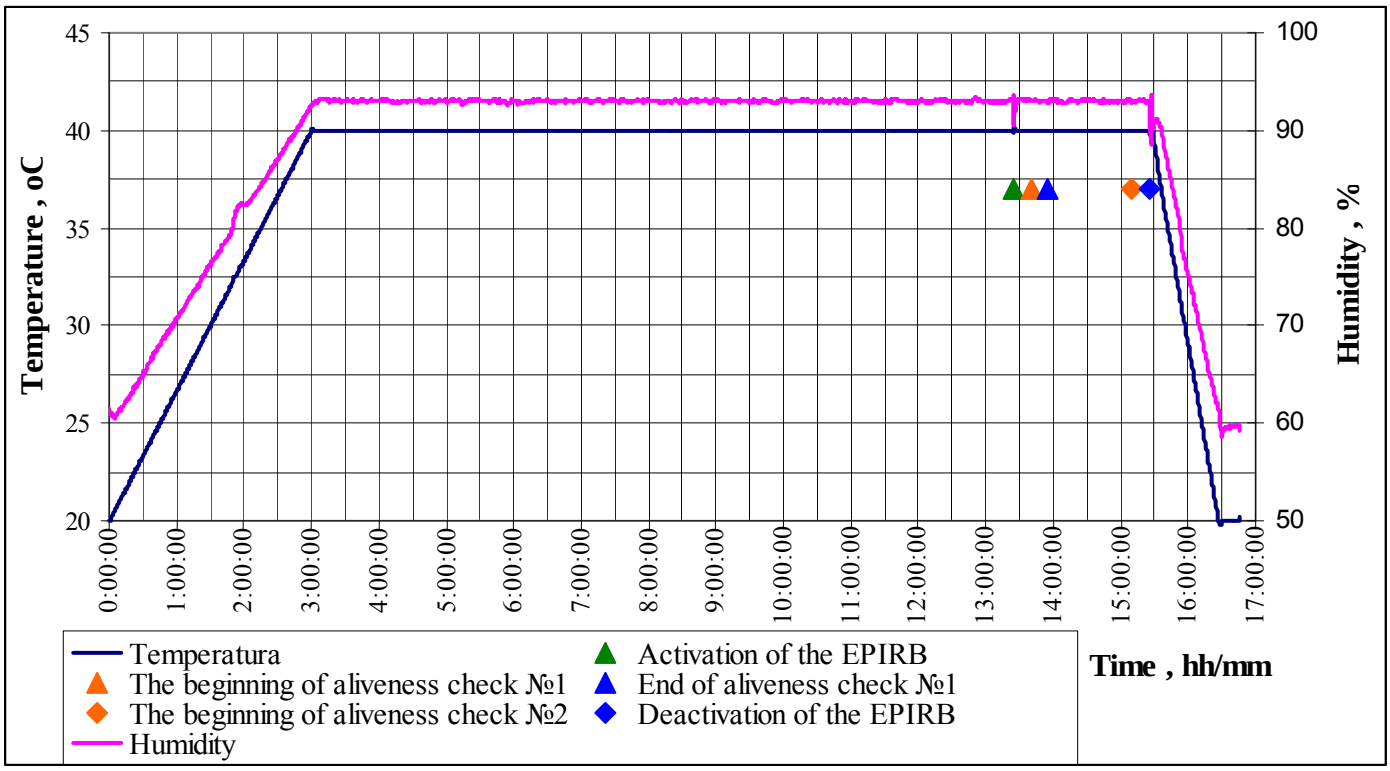


Figure 3.2 – Damp heat cycle conditions plot

Test duration 0 h 3 m	Bursts received 5	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.981	406039.981	406039.981
Power, Wt	3.16	7.94	3.72	3.72	3.72
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499024				
Power, mW	62.10				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 3.5 - Detailed measurement results of EPIRB1 s/n006 during of the 2 hour period in the +40 °C and 93 % relative humidity chamber

Test duration 0 h 3 m	Bursts received 5	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.983	406039.983	406039.983
Power, Wt	3.16	7.94	3.69	3.69	3.69
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499045				
Power, mW	62.25				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 3.6 – Detailed measurement results of EPIRB1 s/n006 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	406.040 ± 0.001	MHz	406.039981	PASS
- Power Output	35 - 39	dBm	35.71	PASS
- Data Message	Correct		√	PASS
Aliveness test (at end of 2 hour period):				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039983	PASS
- Power Output	35 - 39	dBm	35.67	PASS
- Data Message	Correct		√	PASS

TEST EQUIPMENT USED

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Temperature meter	gradient 2002	078	02.2015
3.	Hygrometer digital	HP 22-A	60974546	12.2014
4.	Beacon tester	BT100AVS	2315	07.2015
5.	Beacon tester	BT-611	1005	06.2015
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 4.
VIBRATION TEST (A6.0)

Equipment Under Test (EUT): EPIRB1, s/n 006 with Manual bracket
EPIRB1, s/n 006 with MRH

SW version: Issue 00.04

Test Date: 22.05.2014, 06.08.2014, 07.08.14
Test Conditions:

- Ambient temperature: 23.5-29.5 °C
- Relative humidity: 45-55 %
- Atmospheric pressure: 749-754 mm/Hg

TEST DESCRIPTION

The EUT was secured to the vibration table through its normal attachments. 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.

Frequency (Hz)	**Peak Amplitude (mm)**
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 31 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 RESULT:

For vertical vibration in Z vertical axis EUT was fastened to the vibration table in its normal attitude using special bracket (see Figure 5.1).

For horizontal vibration in X horizontal axis, EUT was then fastened to the vibration table in its normal attitude using special bracket (see Figure 5.4).
For horizontal vibration in Y axis, EUT was fastened to the vibration table in its normal attitude using special bracket (see Figure 5.7).

Figure 5.1 - General view of the test site vertical Z vibration (EPIRB1 with Manual Bracket)

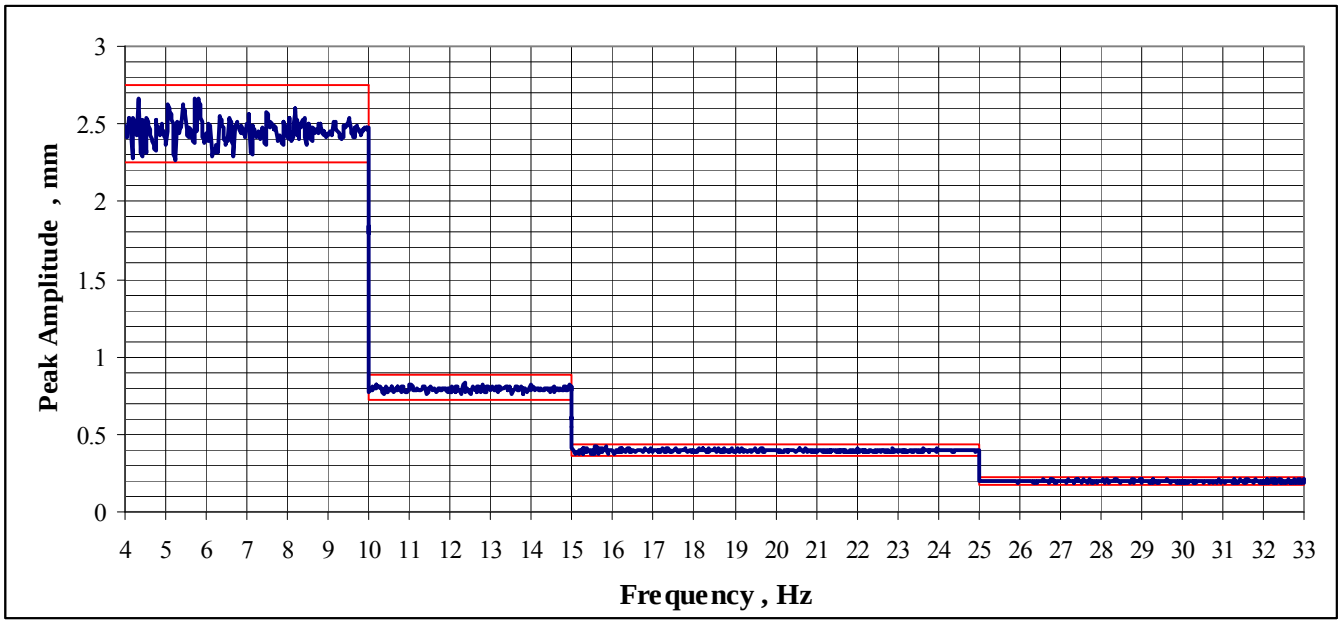


Figure 5.2 - Peak Amplitude vs. frequency during first sweep on vertical axis Z (EPIRB1 with Manual Bracket)

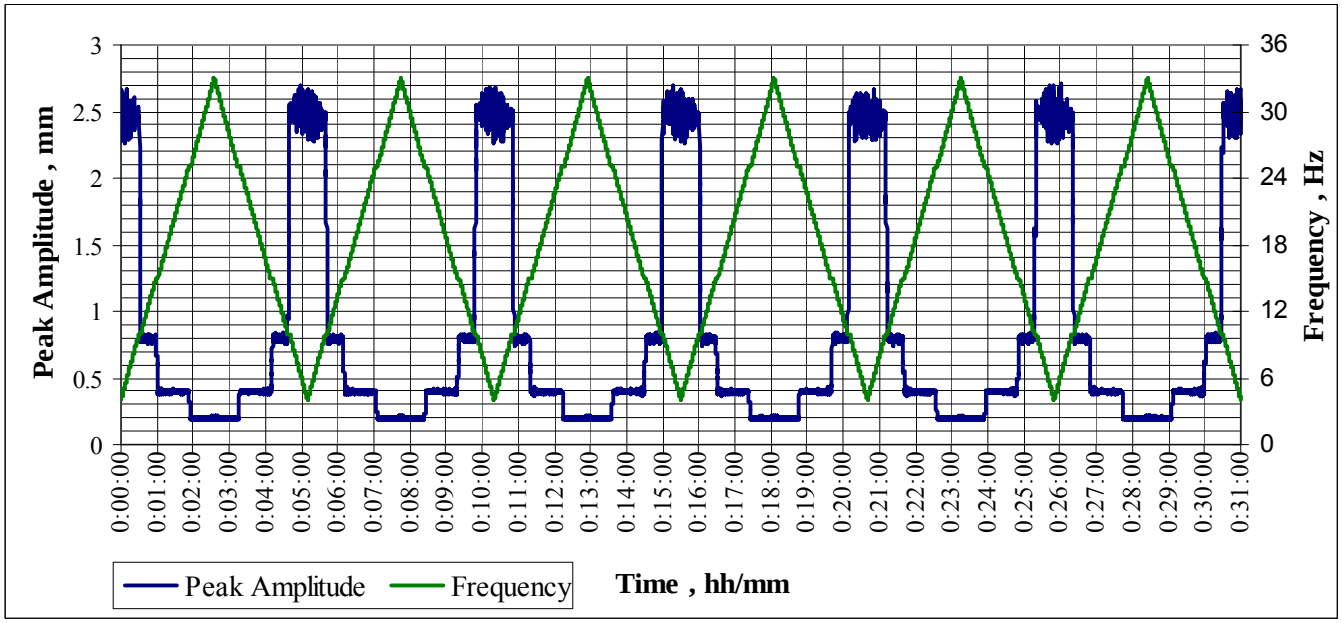


Figure 5.3 - Peak Amplitude vs. time during vibration on vertical axis Z (EPIRB1 with Manual Bracket)

Figure 5.4 - General view of the test site vertical Z vibration (EPIRB1 with MRH)

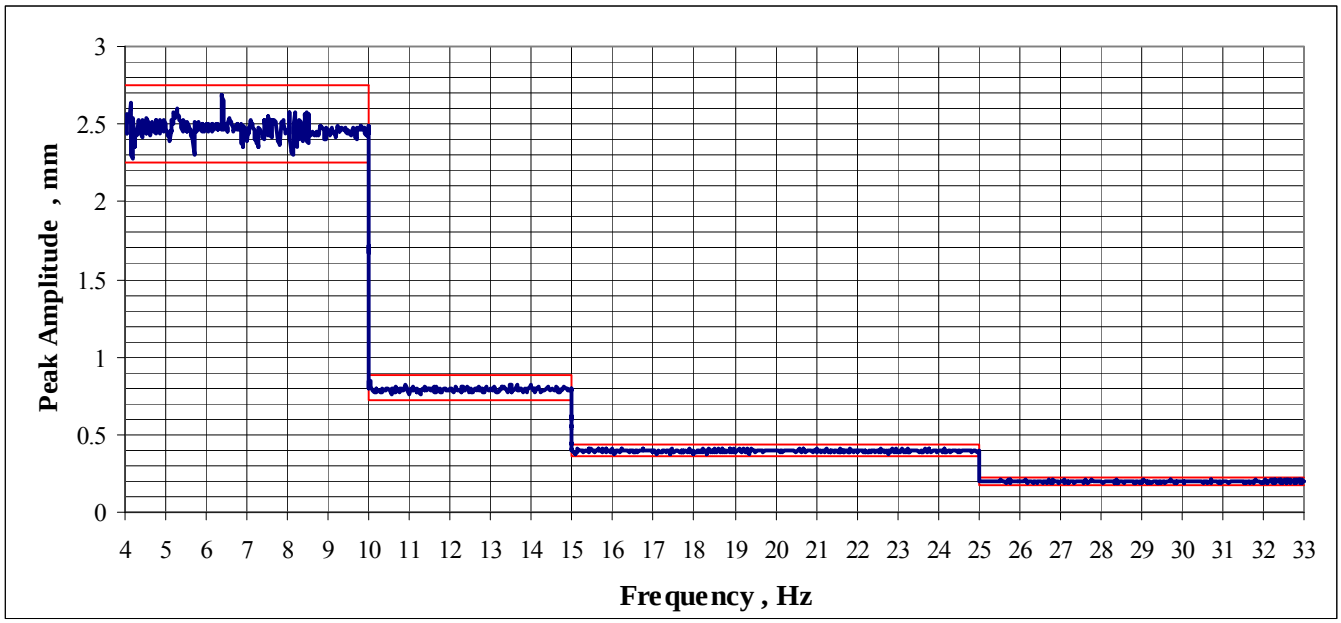


Figure 5.5 - Peak Amplitude vs. frequency during first sweep on vertical axis Z (EPIRB1 with MRH)

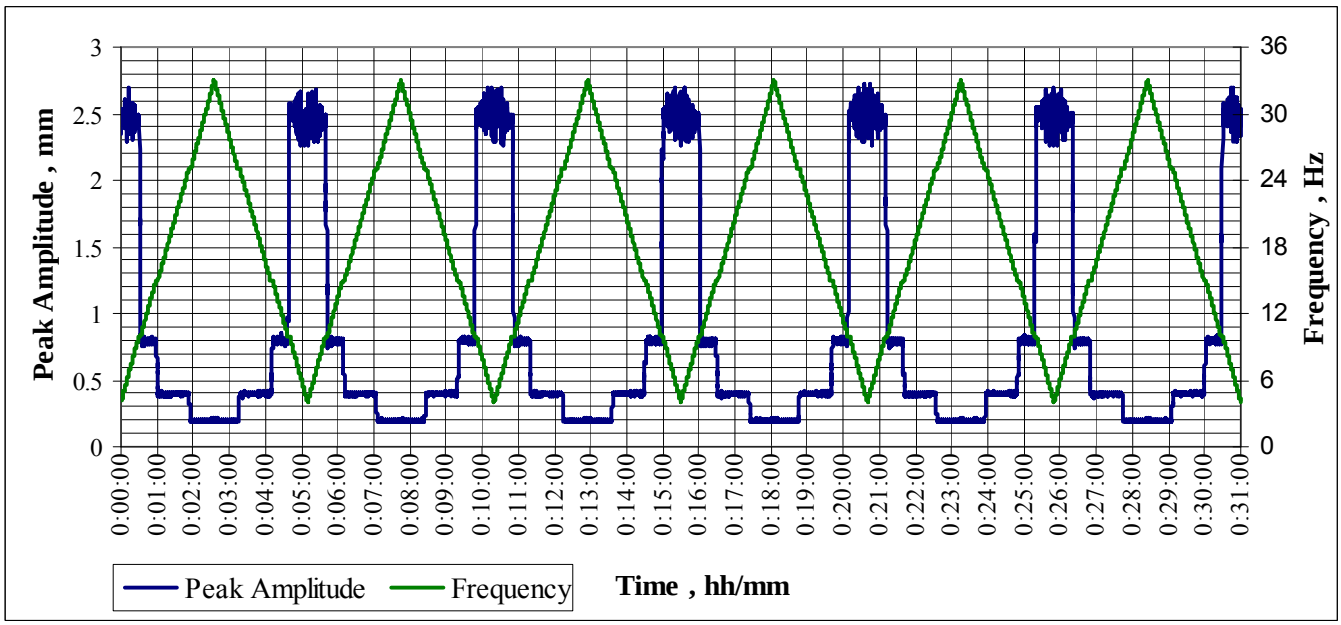


Figure 5.6 - Peak Amplitude vs. time during vibration on vertical axis Z (EPIRB1 with MRH)

Figure 5.7 - General view of the horizontal X vibration test (EPIRB1 with Manual Bracket)

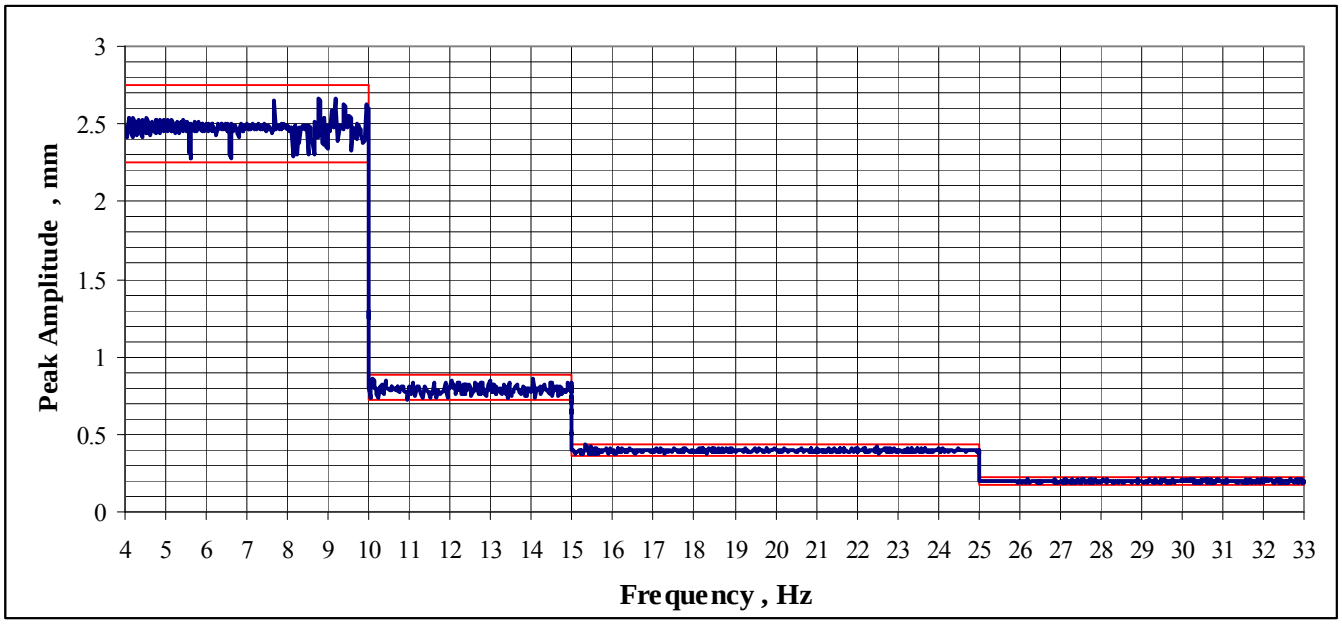


Figure 5.8 - Peak Amplitude vs. frequency during first sweep on horizontal axis X (EPIRB1 with Manual Bracket)

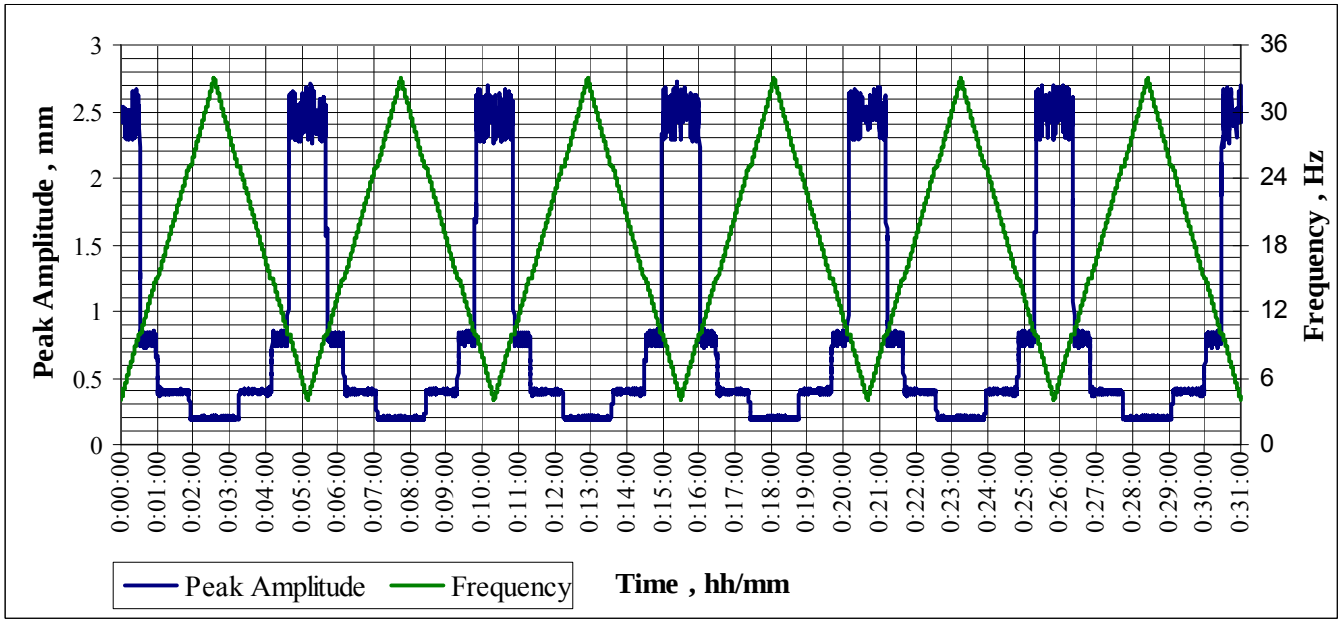


Figure 5.9 - Peak Amplitude vs. time during vibration on horizontal axis X (EPIRB1 with Manual Bracket)

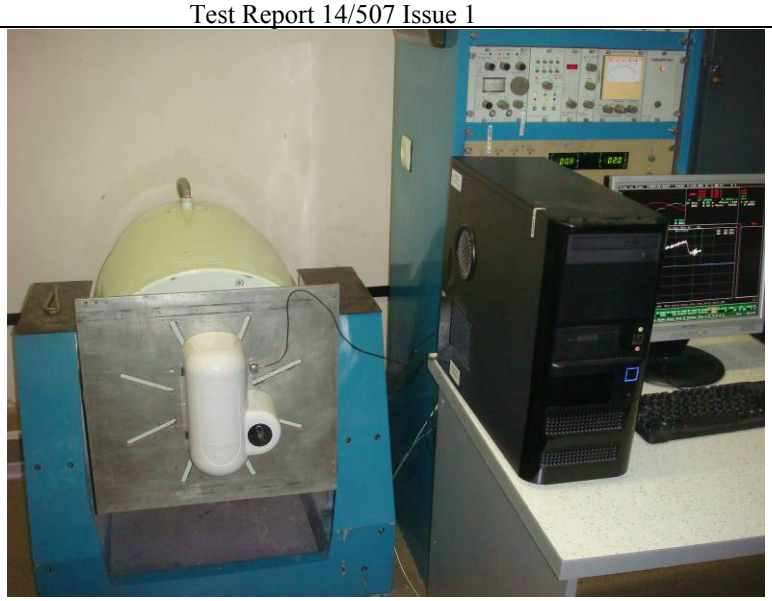


Figure 5.10 - General view of the horizontal X vibration test (EPIRB1 with MRH)

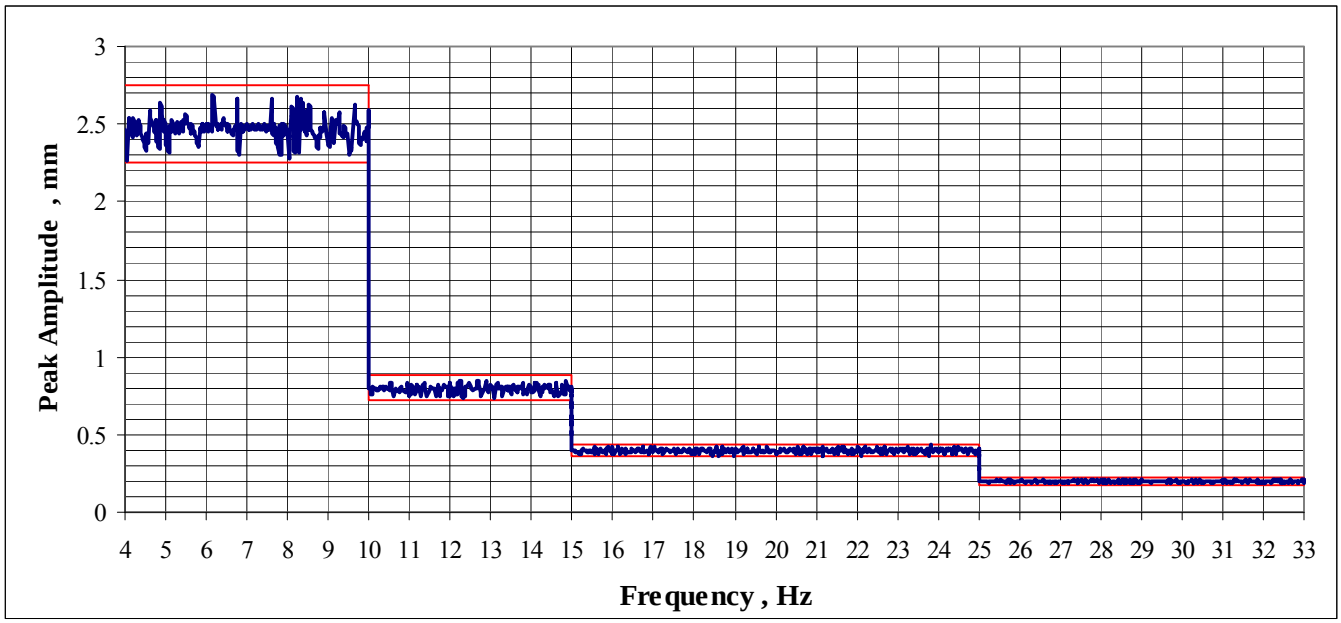


Figure 5.11 - Peak Amplitude vs. frequency during first sweep on horizontal axis X (EPIRB1 with MRH)

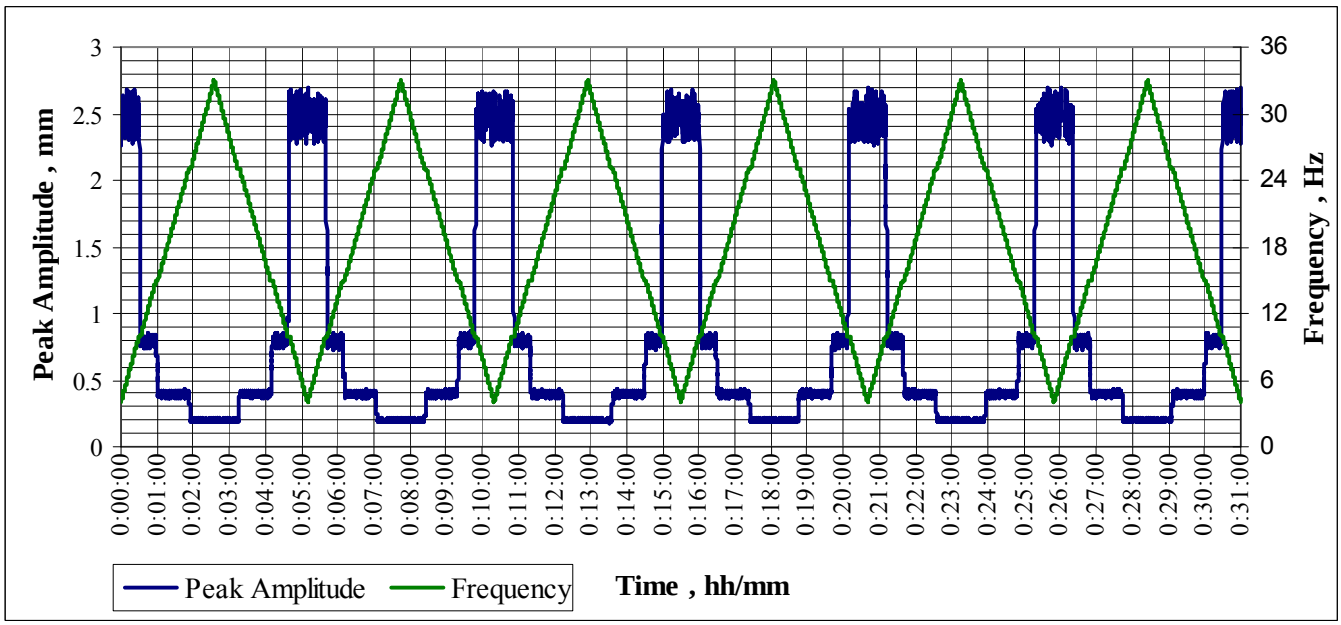


Figure 5.12 - Peak Amplitude vs. time during vibration on horizontal axis X (EPIRB1 with MRH)

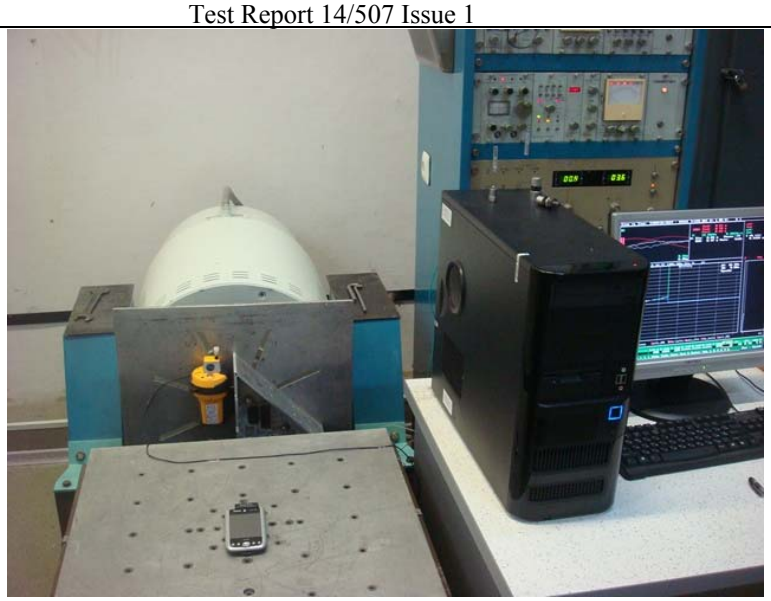


Figure 5.13 - General view of the horizontal Y vibration test (EPIRB1 with Manual Bracket)

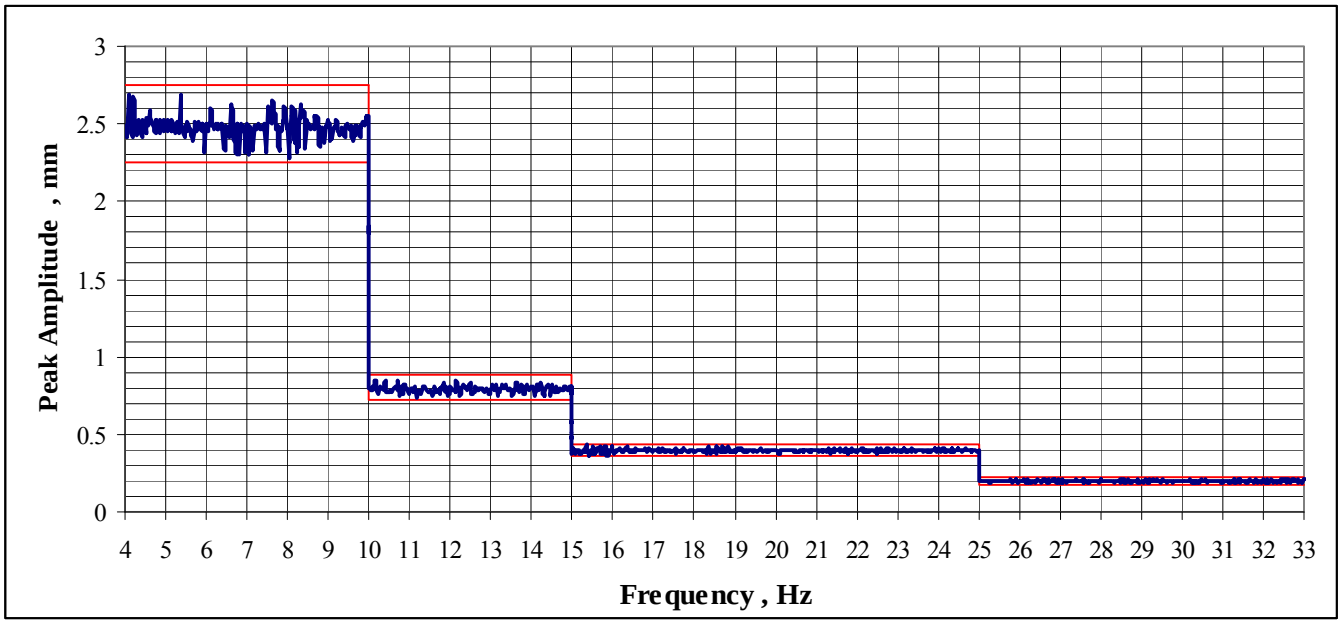


Figure 5.14 - Peak Amplitude vs. frequency during first sweep on horizontal axis Y (EPIRB1 with Manual Bracket)

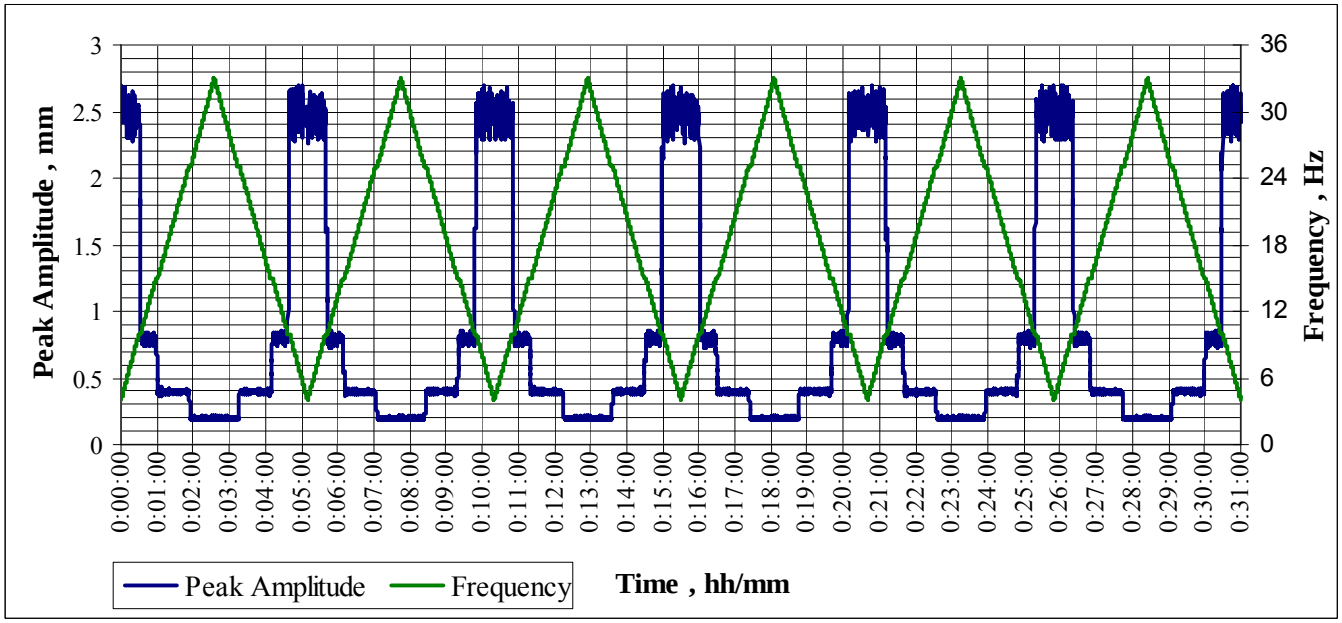


Figure 5.15 - Peak Amplitude vs. time during vibration on horizontal axis Y (EPIRB1 with Manual Bracket)

Figure 5.16 - General view of the horizontal Y vibration test (EPIRB1 with MRH)

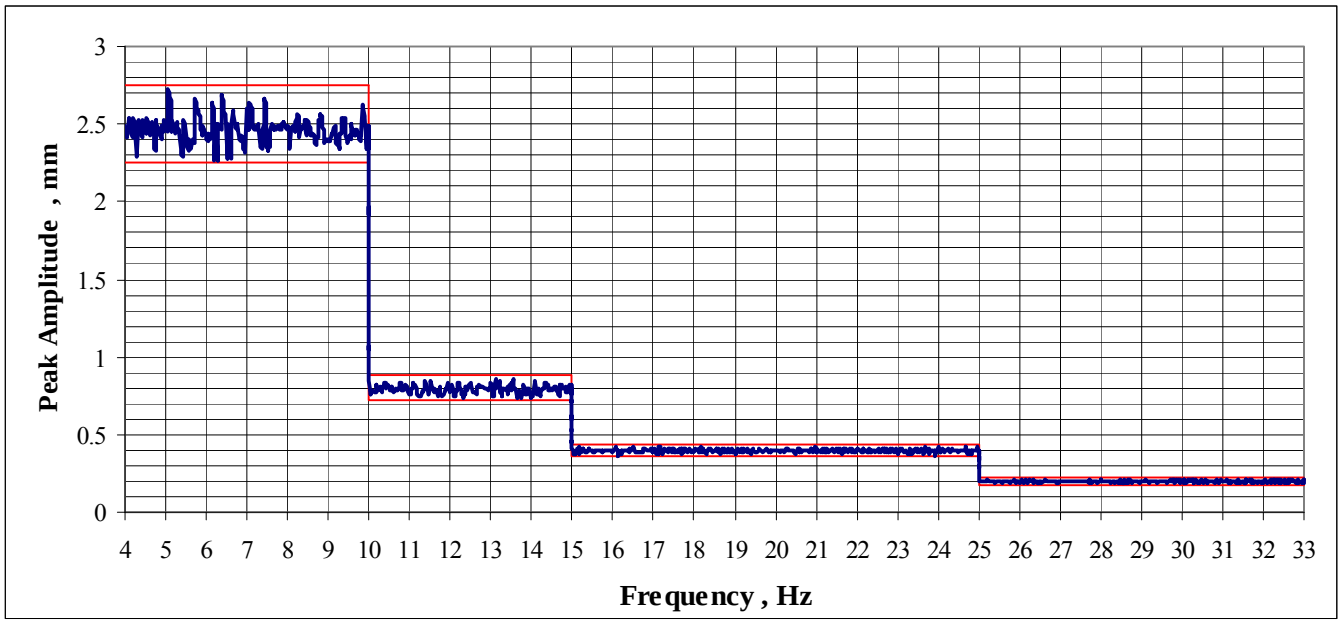


Figure 5.17 - Peak Amplitude vs. frequency during first sweep on horizontal axis Y (EPIRB1 with MRH)

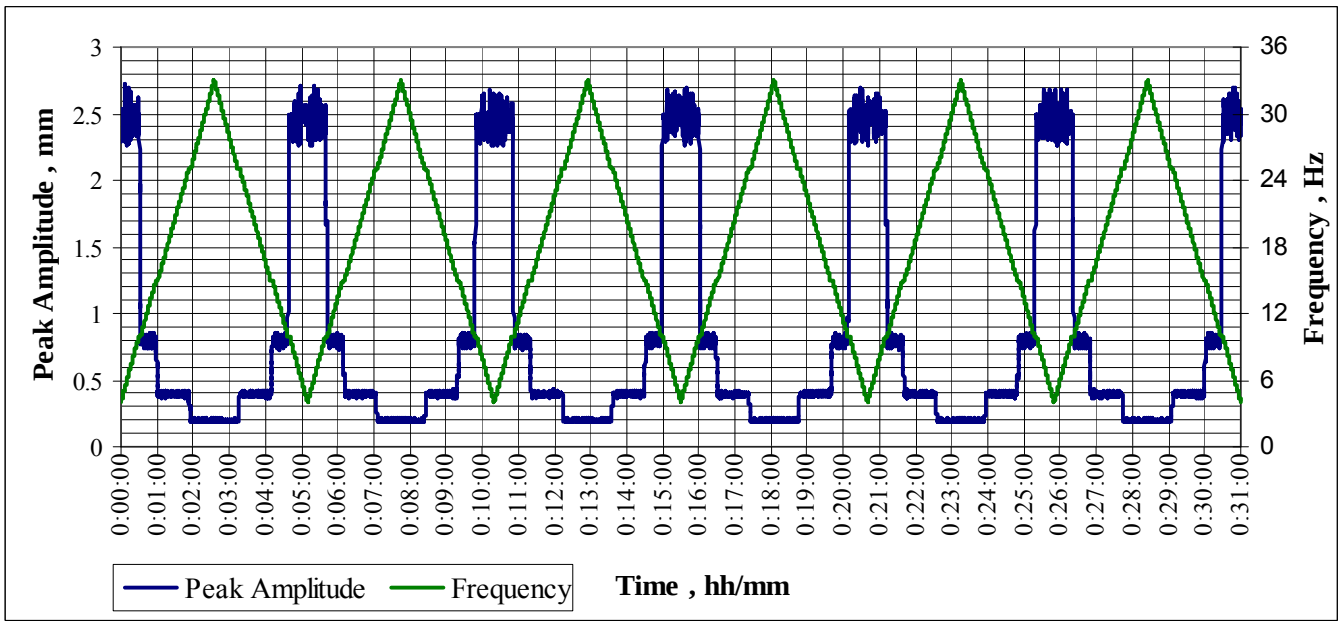


Figure 5.18 - Peak Amplitude vs. time during vibration on horizontal axis Y (EPIRB1 with MRH)

The EPIRB did not activate during all the vibration tests.

Test duration 0 h 3 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.100	406040.100	406040.100
Power, Wt	3.16	7.94	3.74	3.74	3.74
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498729				
Power, mW	63.35				
Message					
Digital message	: FFFE2F 8F7EF9C0637FDFFAB0B5B783E0F66C				

Figure 5.10 – Aliveness Test: Carrier Frequency & Power Output (upon completion of the vertical axis vibration test)

Test duration 0 h 3 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.100	406040.100	406040.100
Power, Wt	3.16	7.94	3.75	3.75	3.75
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498935				
Power, mW	63.30				
Message					
Digital message	: FFFE2F 8F7EF9C0637FDFFAB0B5B783E0F66C				

Figure 5.11 – Aliveness Test: Carrier Frequency & Power Output (upon completion of the horizontal (X) axis vibration test)

Test duration 0 h 3 m	Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.100	406040.100	406040.100
Power, Wt	3.16	7.94	3.80	3.80	3.80
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499905				
Power, mW	63.40				
Message					
Digital message	: FFFE2F 8F7EF9C0637FDFFAB0B5B783E0F66C				

Figure 5.12 – Aliveness Test: Carrier Frequency & Power Output (upon completion of the horizontal (Y) 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	√	√	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.040100	PASS
- Power Output	35 - 39	dBm	35.73 35.74 35.80	PASS
- Data Message	Correct		√	PASS
• Activation	No activation dur-ing test	√	No activation during test	PASS

TEST EQUIPMENT USED

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Vibration table	Tiravib 5142	26/88	07.2015
2.	Digital vibration meter	V-1103A	1013/2	09.2015
3.	Digital system of impact control	Santek-Vibro	7-25	04.2015
4.	Oscilloscope	TDS 1002	C041673	06.2015
5.	Temperature meter	gradient 2002	078	02.2015
6.	Hygrometer digital	HP 22-A	60974546	12.2014
7.	Beacon tester	BT100AVS	2315	07.2015
8.	Beacon tester	BT-611	1005	06.2015
9.	Spectrum analyzer	FSH8	105763	10.2016
10.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 5.
BUMP TEST (A6.0)

Equipment Under Test (EUT): EPIRB1, s/n 006 with Manual bracket
EPIRB1, s/n 006 with MRH

SW version: Issue 00.04

Test Date: 23.03.2014, 05.06.2014
Test Conditions:

- Ambient temperature: 22.5-30.4°C
- Relative humidity: 48-63 %
- Atmospheric pressure: 748-753 mm/Hg

TEST DESCRIPTION
The EUT was secured to the bump testing equipment through its normal attachments, 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^2
- 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 RESULT
Activation of the EUT during the bump tests was monitored. The EUT was not switched on during the test and the EUT did not inadvertently activate during the test.

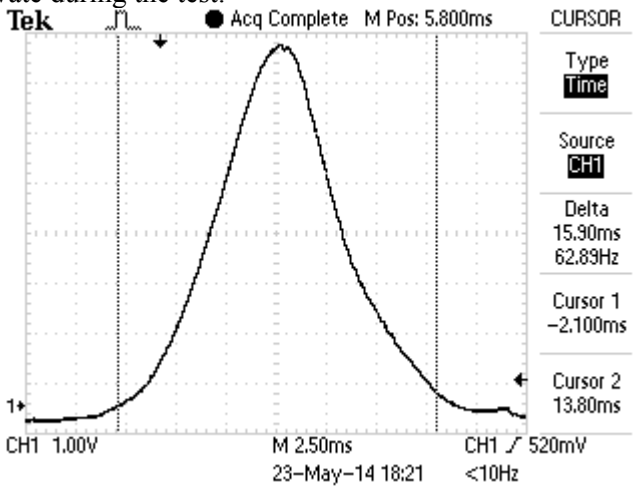


Figure 6.1 – Diagram of the bump testing equipment control channel (15.9 ms, 98.1 m/s^2)

Figure 6.2 - Test Set-up. Vertical axis of the EUT with Manual bracket

Figure 6.3 - Test Set-up. Vertical axis of the EUT with MRH

Figure 6.3 – View of the EUT upon completion of the Bump Test

Figure 6.4 – View of the EUT upon completion of the Bump Test

Figure 6.5 – View of the EUT upon completion of the Bump Test

Figure 6.6 – View of the EUT upon completion of the Bump Test

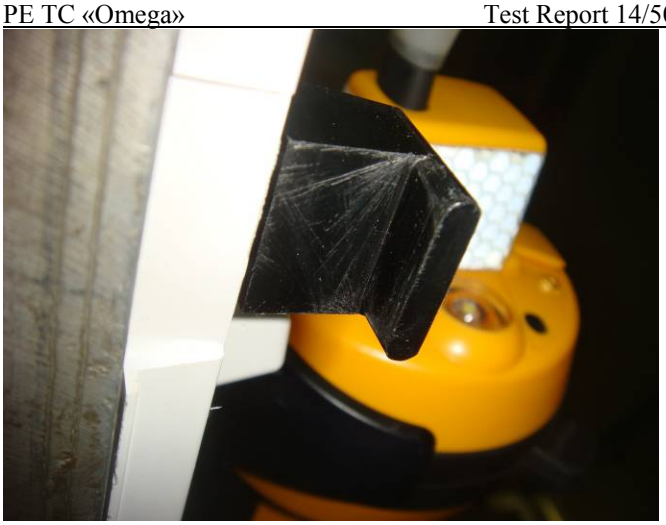


Figure 6.7 – View of the EUT upon completion of the Bump Test (MRH)

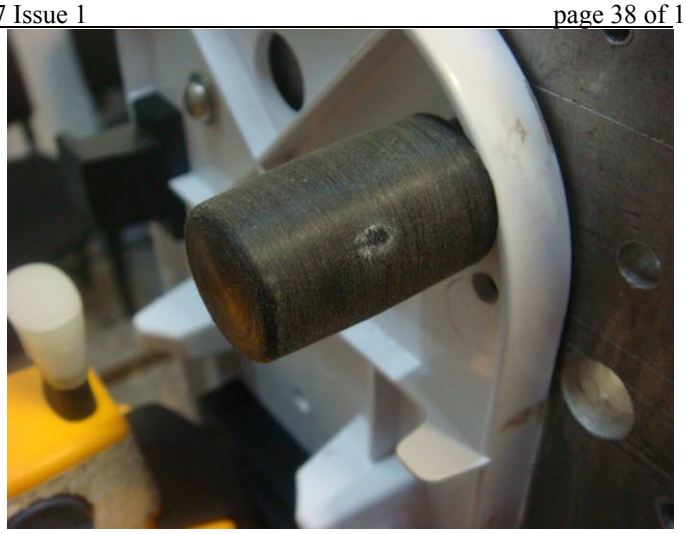


Figure 6.8 – View of the EUT upon completion of the Bump Test (MRH)

Test duration 0 h 2 m		Bursts received 3	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters		**Limits**		**Measured**		
		min	**max**	**min**	**current**	**max**
Frequency, kHz		406039.000	406041.000	406039.982	406039.982	406039.986
Power, Wt		3.16	7.94	3.69	3.69	3.69
121.5 MHz Transmitter Parameters						
Carrier Frequency, Hz		121498480				
Power, mW		63.00				
Message						
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C					

Figure 6.9 – Aliveness Test: Carrier Frequency & Power Output (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	406.040 ± 0.001	MHz	406.039982	PASS
- Power Output	35 - 39	dBm	35.67	PASS
- Digital message	Correct	√	√	PASS
• Activation	No activation dur-ing test	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Shock table	Tirashock 4110	41/88	06.2014
2.	Digital vibration meter	V-1103A	1013/2	09.2015
3.	Digital system of impact control	Santek-Vibro	7-25	04.2015
4.	Oscilloscope	TDS 1002	C041673	06.2015
5.	Temperature meter	gradient 2002	078	02.2015
6.	Hygrometer digital	HP 22-A	60974546	12.2014
7.	Beacon tester	BT100AVS	2315	07.2015
8.	Beacon tester	BT-611	1005	06.2015
9.	Spectrum analyzer	FSH8	105763	10.2016
10.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 6.
SALT FOG TEST (A7.0)

Including extraction from

TEST REPORT No. 10/881 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., United Kingdom

Equipment Under Test (EUT): EPIRB1, s/n 006 with Manual Bracket

SW version: Issue 00.04

Test Date: from 23.05.2014 until 27.05.2014
Test Conditions:

- Ambient temperature: 23.8-25.0°C
- Relative humidity: 53-66 %
- Atmospheric pressure: 750-755 mm/Hg

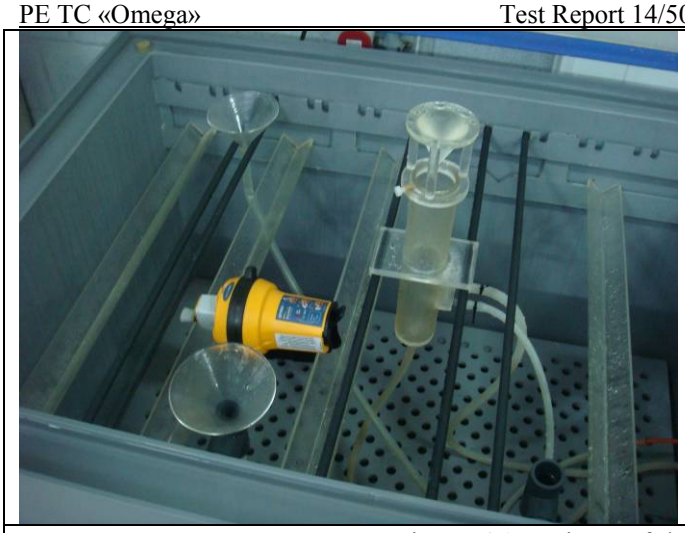
TEST DESCRIPTION

The salt fog test should be conducted on a Category 2 satellite EPIRBs with its mounting device. The EUT should be turned OFF during the test.
Before exposing the EUT to salt fog, it should be conditioned for duration of at least 2 hours at a temperature of 35° C ± 2° C. After this conditioning and with the ambient temperature maintained at 35° C, salt fog should be added and maintained at the saturation point for 48 hours.
The salt fog should be prepared from a 5% ± 1% salt (sodium chloride) solution.
After exposure to salt fog, the EUT should be permitted to dry at room temperature (20° C ± 5° C) for 24 hours before being exposed to another period of 12 hours of salt fog exposure at 35° C.
Upon completion of this exposure and after a 12 hour drying period at room temperature, the exterior of the unit should be inspected for corrosion, peeling paint, and other signs of deterioration and the aliveness test conducted.

TEST RESULT

– EPIRB is OFF during the test.
– Preparation of salt solution: Resistance distilled, demineralized, deionized use water not introduces 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^3 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.

Step 1 Condition: temperature +35 °C in the chamber with EUT duration 2 hours; no salt fog;
Step 2 Condition: temperature +35 °C in the salt fog chamber with EUT duration 48 hours; exposed to salt fog;
Step 3 Condition: temperature is +20 °C in the chamber with EUT duration 24 hours; no salt fog;
Step 4 Condition: temperature is +35 °C in the salt fog chamber with EUT duration 12 hours; exposed to salt fog;
Step 5 Condition: temperature is +20 °C in the chamber with EUT; no salt fog; duration 12 hours;
Step 6 Corrosion, peeling paint, and other signs of deterioration are inspected;
Step 7 Salt deposits and water stains is wash off with clean warm water not exceeding a temperature +38 °C;
Step 8 Aliveness test of EUT upon completion of the salt fog test.



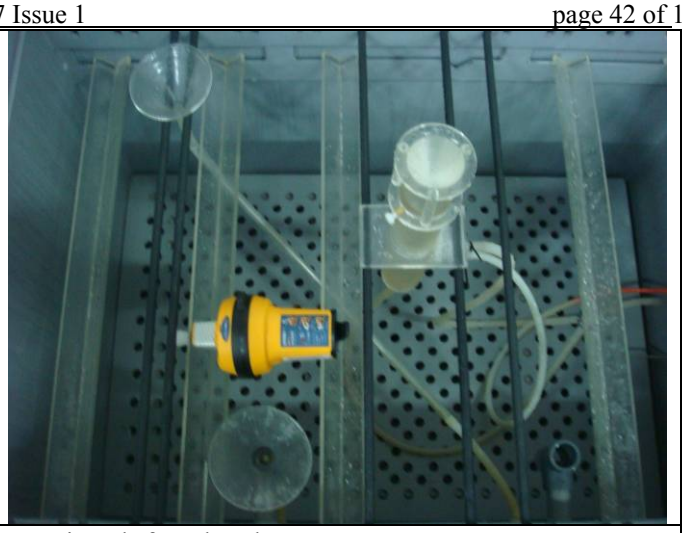


Figure 6.1 – Views of the EUT in salt fog chamber

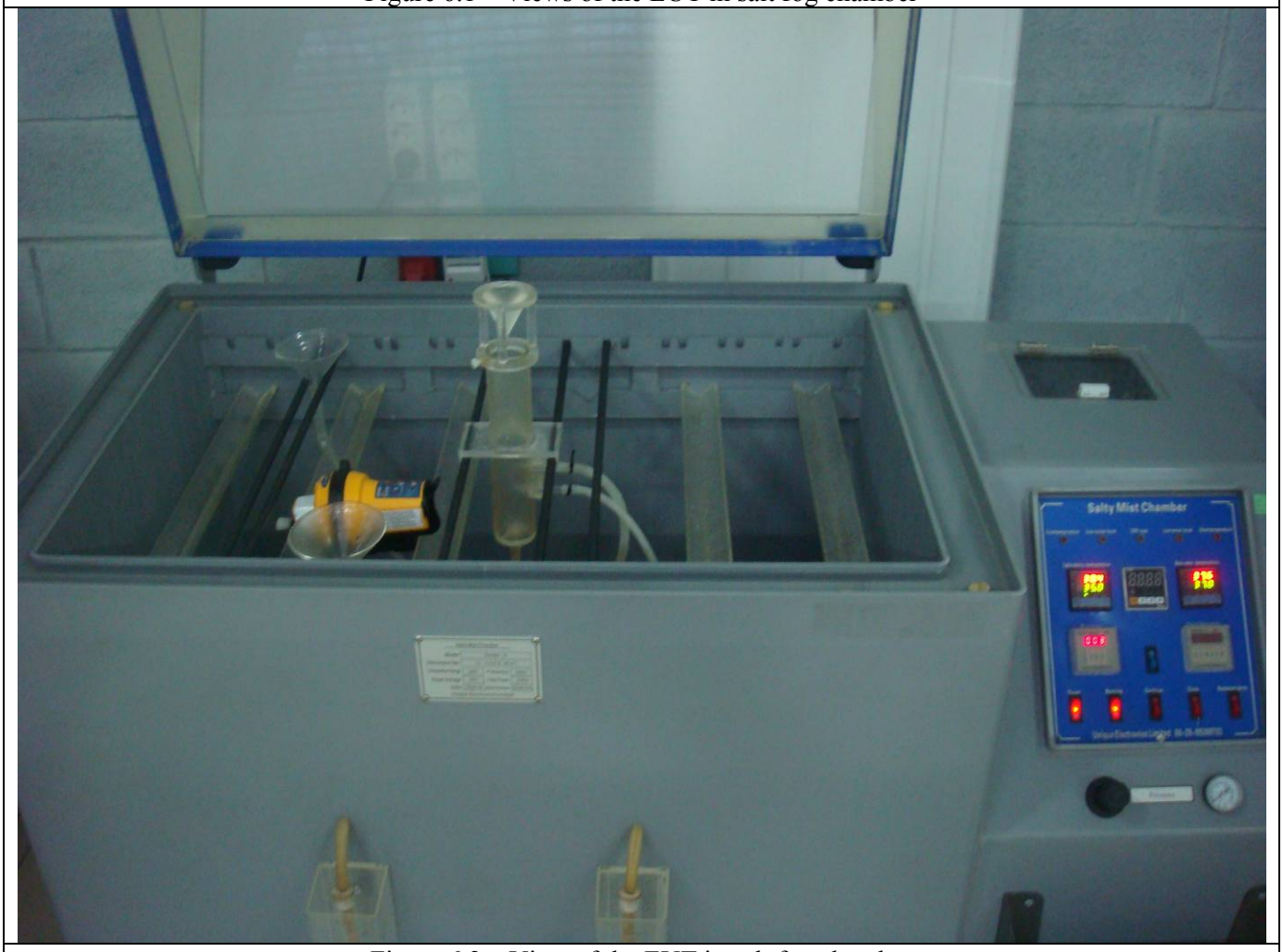


Figure 6.2 – View of the EUT in salt fog chamber

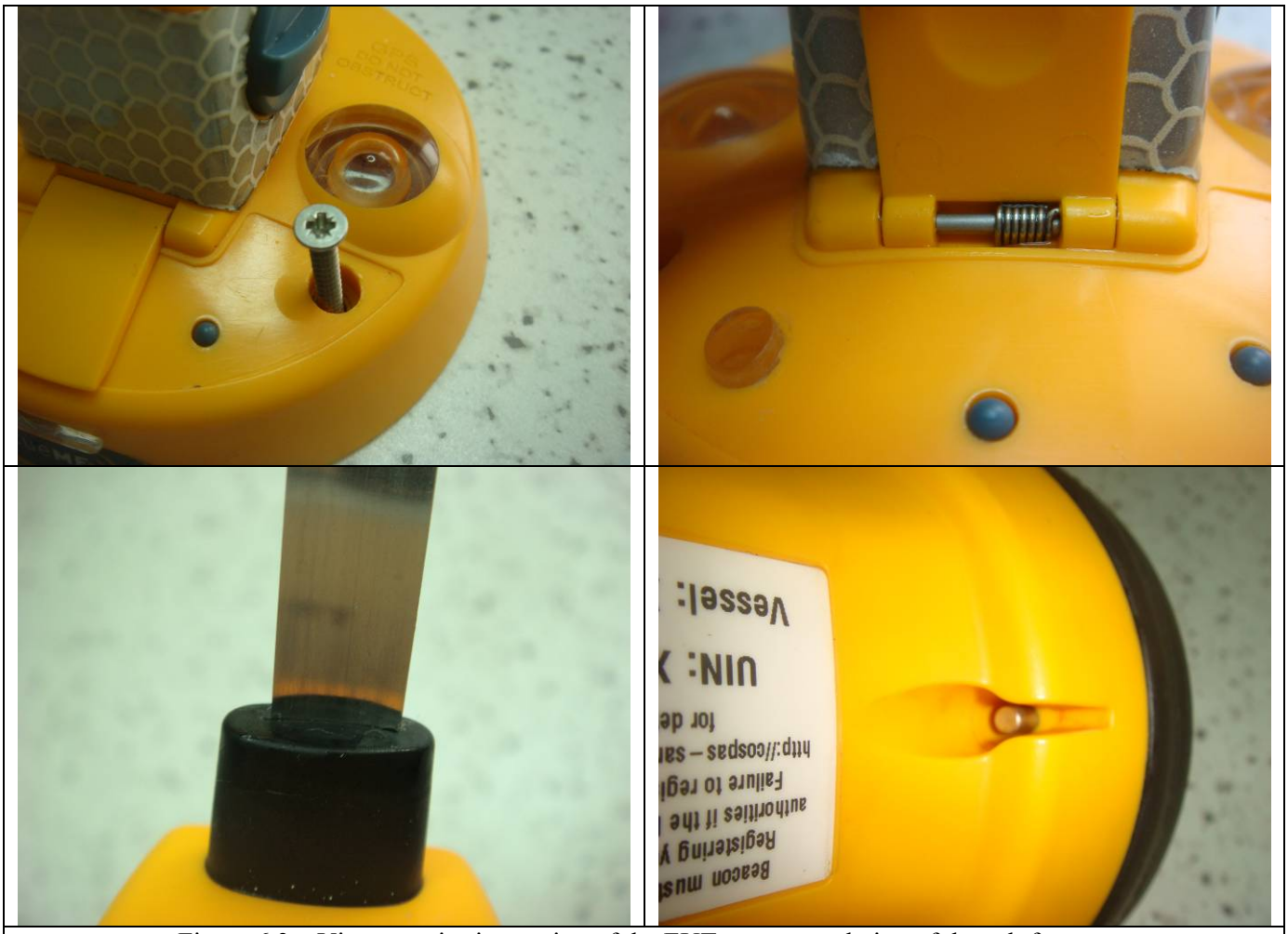


Figure 6.3 – View exterior inspection of the EUT upon completion of the salt fog test

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		406039.000	406041.000	406039.989	406039.989	406039.989
Power, Wt		3.16	7.94	3.55	3.55	3.55
121.5 MHz Transmitter Parameters						
Carrier Frequency, Hz	121499049					
Power, mW	62.25					
Message						
Digital message	:FFFE2F 8C9EF423F07FDFFA53F7F 783E0F66C					

Figure 6.4 - Detailed measurement results of EUT after of the salt fog test

FINAL RESULTS OF SALT FOG TEST (A7.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Exterior Inspection	No corrosion, peeling paint, and other signs of deterioration	√	√	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039989	PASS
- Power Output	35 - 39	dBm	35.50	PASS
- Digital message	Correct	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
11.	Salt Fog Chamber	DS090-X	20807004	06.2014
12.	Temperature meter	gradient 2002	078	02.2015
13.	Hygrometer digital	HP 22-A	60974546	12.2014
14.	Beacon tester	BT100AVS	2315	07.2015
15.	Beacon tester	BT-611	1005	06.2015
16.	Spectrum analyzer	FSH8	105763	10.2016
17.	Tuned dipole antenna	FCC-4	587A	09.2016

----------Extraction from Test Report No.10/293 ----------

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 00012000013I
Sample No.2 Serial No 0001200003I
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^3
  - 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 ^{O}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^3 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.
– Step
  No. 1 Detailed measurement results of EUT (EPIRB) before of the salt fog test
  No. 2 Condition: ambient temperature is +35 ^{O}C in the chamber with EUT duration 2 hours; no salt fog;
  No. 3 Condition: ambient temperature is +35 ^{O}C in the salt fog chamber with EUT duration 48 hours; yes salt fog;
  No. 4 Condition: ambient temperature is +20 ^{O}C in the chamber with EUT duration 24 hours; no salt fog;
  No. 5 Condition: ambient temperature is +35 ^{O}C in the salt fog chamber with EUT duration 12 hours; yes salt fog;
  No. 6 Condition: ambient temperature is +20 ^{O}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 ^{O}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

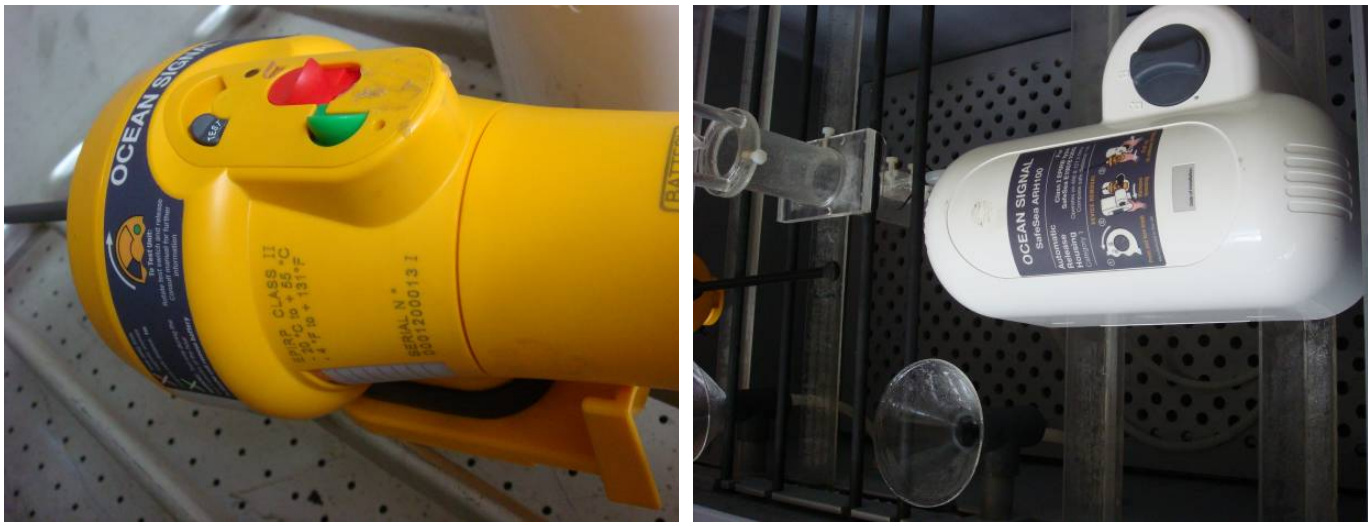


Figure 6.2 - Views of the EUT (EPIRB) before the salt fog test

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)	:FFFED0 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)	:FFFED0 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.

----------End of Extraction of Test Report No.10/293 ----------

ANNEX 7.
DROP TEST (A8.1, on hard surface)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 28.05.2014
Test Conditions:

- Ambient temperature: 25.0-26.5°C
- Relative humidity: 53-61 %
- Atmospheric pressure: 750-751 mm/Hg

TEST DESCRIPTION
The EUT should be soaked at minimum stowage temperature for 2 hours. The drop test should then be performed within five minutes after removal from a temperature chamber.
The EUT should be dropped from a height of 1 meter (± 10 mm) above the test surface. The orientation of the EUT when dropped should be the normal floating position.
The test surface should consist of a piece of solid wood with a thickness of at least 150 mm and a mass of 30 kg or more.
At the conclusion of the drop, the EUT should be subjected to an aliveness check.

TEST RESULT
The EUT was soaked at minimum stowage temperature -30°C for 2 hours. EUT antenna was secured in its normal stowage position for this test.
The drop test was then performed within two minutes (less than the five minutes requirement) after removal from a temperature chamber. One drop was carried out with orientation in the normal floating position.

The test surface consists of a piece of solid hard wood with a thickness of at least 150 mm and a mass of 30 kg
The height of the lowest part of the EUT relative to the test surface at the moment of release was 1000 mm ± 10 mm.

The EUT did not activate during the test.

At the end of the test the EUT was subjected to aliveness test and was examined for external signs of damage.

Figure 7.1 - Total view of test site of the drop from a height of 1 m above the test surface

Figure 7.2 - Thickness of wood test surface

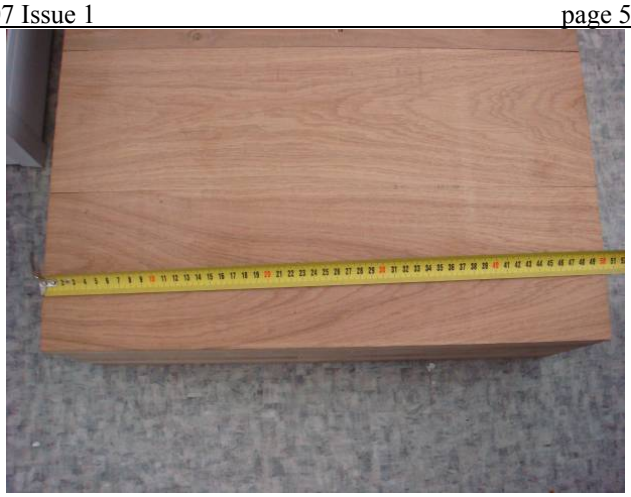


Figure 7.2 - Dimensions of the wood test surface

Figure 7.4 - View EUT upon completion of the drop test

Figure 7.5 - View EUT upon completion of the drop test

Figure 7.6 - View EUT upon completion of the drop test

Figure 7.7 - View EUT upon completion of the drop test

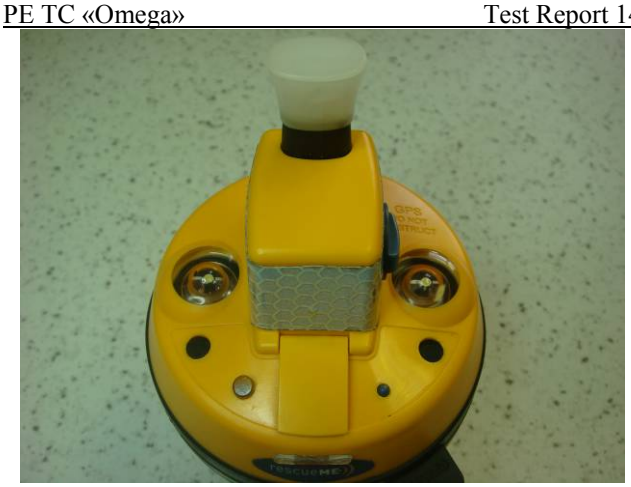


Figure 7.8 - View EUT upon completion of the drop test

Figure 7.9 - View EUT upon completion of 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	406039.000	406041.000	406039.992	406039.992	406039.992
Power, Wt	3.16	7.94	3.50	3.50	3.50
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499068				
Power, mW	60.13				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 7.9 - Results of the EUT 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	√	√	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039992	PASS
- Power Output	35 - 39	dBm	35.44	PASS
- Digital message	Correct	√	√	PASS
• Activation	No activation during test	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Temperature meter	gradient 2002	078	02.2015
3.	Hygrometer digital	HP 22-A	60974546	12.2014
4.	Beacon tester	BT100AVS	2315	07.2015
5.	Beacon tester	BT-611	1005	06.2015
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016
8.	Wooden drop installation	-	101231	05.2014

ANNEX 8.
DROP TEST (A8.2, in water)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 29.05.2014
Test Conditions:

- Ambient temperature: 26.5 °C
- Relative humidity: 45 %
- Atmospheric pressure: 751 mm/Hg

TEST DESCRIPTION

This test should be conducted on the EUT removed from the stowage bracket. Category 2 satellite EPIRB should be manually activated prior to the drop.
The EUT should be dropped three times from a height of at least 20 m into water.
Each drop should be initiated from a different orientation as follows:
antenna vertical up; antenna vertical down; antenna horizontal.
Upon completion of the drop test, an exterior mechanical inspection should be performed and the aliveness test should be made.

TEST RESULT

– The EUT was removed from the removed from the stowage bracket;
– The EUT was dropped three times. Each drop was initiated from a different orientation as follows: antenna vertical up; antenna vertical down; antenna horizontal.
– The EUT was manually activated prior to the drop.

Figure 8.1 – View EPIRB1 before of the drop test in water

Figure 8.2 – Total view of test site of the drop test in water of EPIRB1 from a height of 20 m

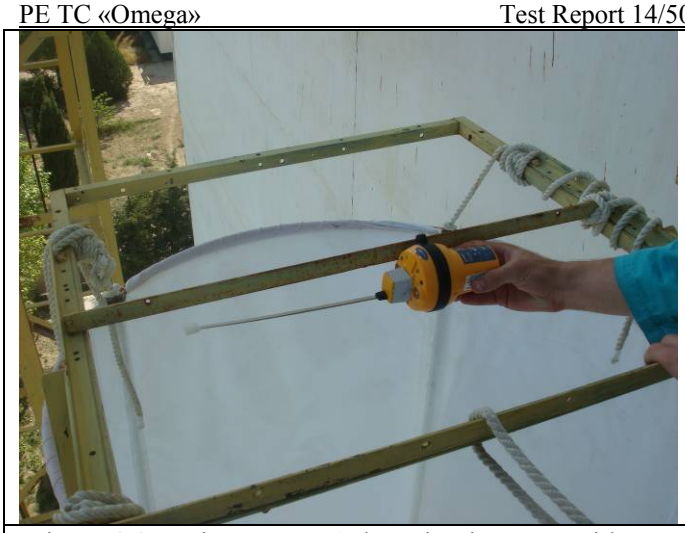


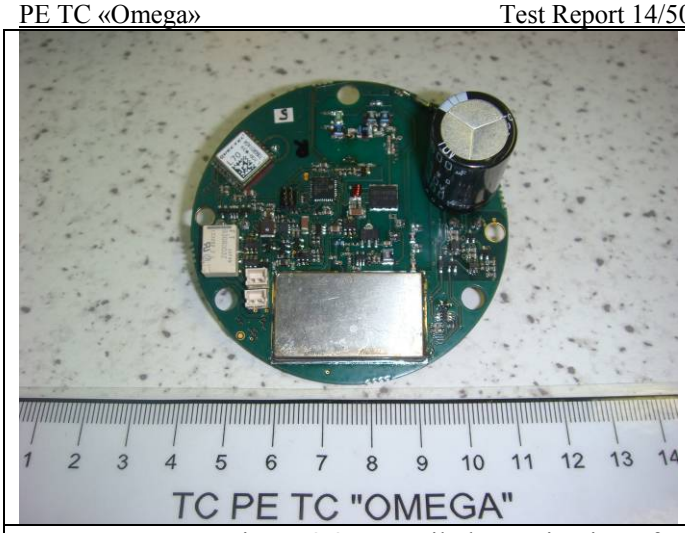
Figure 8.3 – View EPIRB1 dropping in water with antenna horizontal

Figure 8.4 – View EPIRB1 dropping in water with antenna vertical up

Figure 8.5 – View EPIRB1 dropping in water with antenna vertical down

Figure 8.6 – Detailed examination of EPIRB1 upon completion of the drop test.
There is no water inside.

Figure 8.7 – Detailed examination of EPIRB1 upon completion of the drop test. There is no water inside.



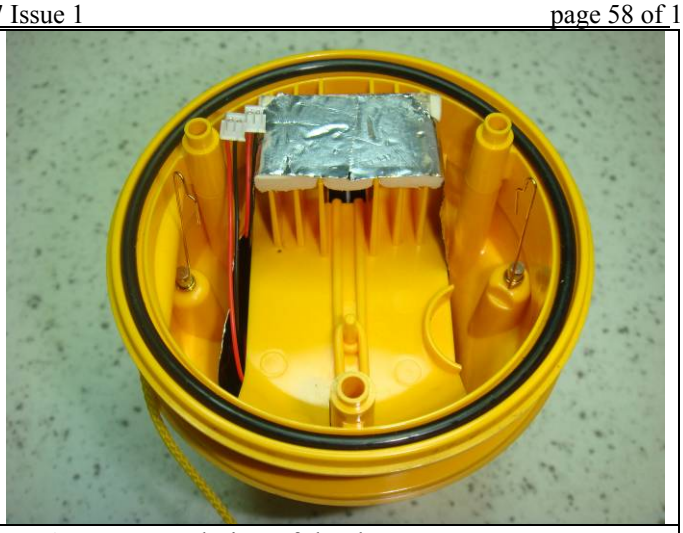


Figure 8.8 – Detailed examination of EPIRB1 upon completion of the drop test.
There is no water inside.

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	406039.000	406041.000	406039.985	406039.985	406039.985
Power, Wt	3.16	7.94	3.59	3.59	3.59
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499534				
Power, mW	60.22				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 8.9 – Results of the EPIRB1 Aliveness Test (after the Drop Tests)

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	√	√	PASS
• Interior Inspection	No water ingress	√	√	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039985	PASS
- Power Output	35 - 39	dBm	35.55	PASS
- Digital message	Correct	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Beacon tester	BT-611	1005	06.2011
2	Free fall installation	SAPB-20	101377	05.2013

ANNEX 9.
LEAKAGE AND IMMERSION TEST (A9.0)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: from 02.06.2014 until 04.06.2014

Test Conditions:

- Ambient temperature: 23.4-25.6°C
- Relative humidity: 50-67 %
- Atmospheric pressure: 752-762 mm/Hg

TEST DESCRIPTION

The EUT should be turned OFF during the leakage and immersion tests and the tests performed in the following sequence.

1. The equipment should be placed in an atmosphere of +65° ± 3° C for one hour. It should then immediately be immersed in water at +20° ± 3° C to a depth of 100 ± 5 mm, measured from the highest point of the equipment to the surface of the water, for a period of 48 hours.
2. The EUT should be immersed under a 10 meter head of water for 5 minutes.
3. At the end of the test period the equipment should be subjected to a performance check, and then be inspected for damage and visible ingress of water viewed with the unaided eye.

TEST RESULT:

- STEP 1. The EUT was switched OFF and placed in the climatic test chamber at temperature + 68°C* for 1 hour.
- STEP 2. The EUT was then immersed in water at +23°C* to a depth of 100 mm, measured from the highest point of the EUT to the surface of the water, for a period of 48 hours.
- STEP 3. After period of 48 hours the EUT was removed from the water.
- STEP 4. The EUT was then examined for damage and for obvious unwanted ingress of water without opening as agreed with manufacturer.
- STEP 5. The EUT was immersed into the pressure vessel which had been filled with water. Then pressure was increased to 0,981 bar (relative to atmospheric pressure) that corresponds total depth of immersion of 10 meters and maintained for 5 minutes.
- STEP 6. The EUT was removed from the water and wiped dry.
- STEP 7. At the end of the test period:
  - the EUT was subjected to a performance check,
  - the EUT was opened and inspected for signs of any ingress of water.

*This temperature was used to cover requirements of IEC 61097-2 which requires +70°C ± 3°C for the EUT soaking and +25°C ± 3°C for the EUT thermal shock.

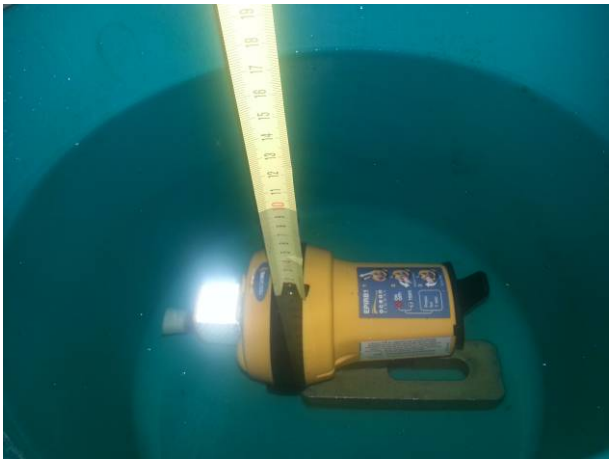


Figure 8.1 – View of the EUT in the water during the Leakage Test

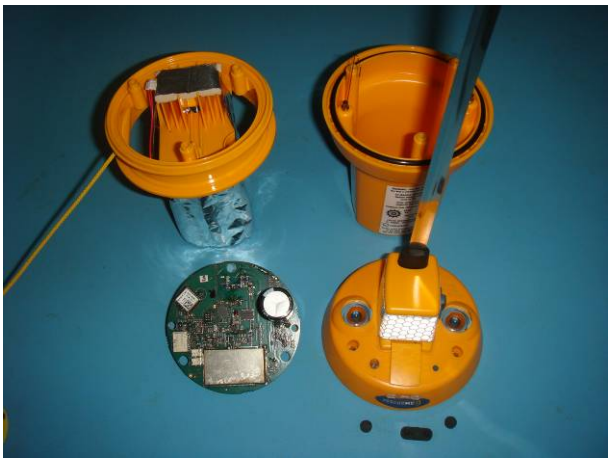


Figure 8.2 – View of the EUT upon completion of the Leakage test.

Figure 9.1 – View of immersion test site
(Manometer of immersion test site indicates 1 bar)

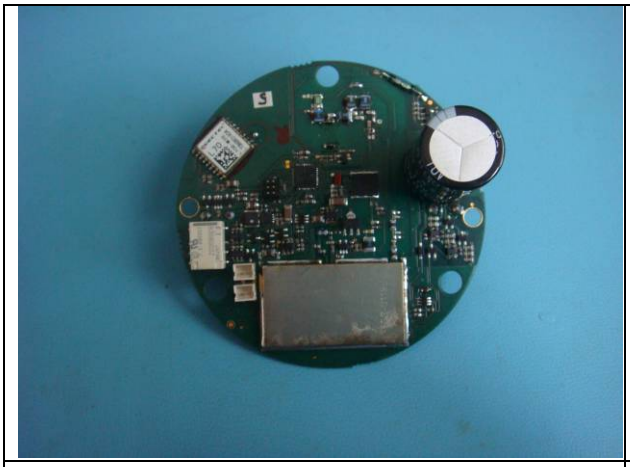


Figure 9.2 – The PCB after leakage and immersion tests. There is no water ingress.

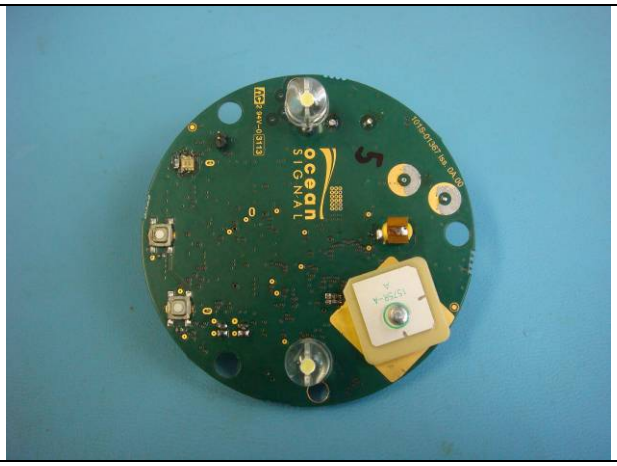


Figure 9.2 – The PCB (back view) after leakage and immersion tests. There is no water ingress.

Test duration 0 h 3 m	Bursts received 5	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.100	406040.100	406040.100
Power, Wt	3.16	7.94	3.62	3.62	3.62
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499539				
Power, mW	60.13				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 9.3 - Results of the EPIRB1Aliveness Test (after the Leakage & 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	406.040 ± 0.001	MHz	406.040100	PASS
- Power Output	35 - 39	dBm	35.59	PASS
- Digital message		√	√	PASS
• Interior Inspection	No water	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Climatic chamber	KPK 400V	015	08.2014
3.	Temperature meter	gradient 2002	078	02.2015
4.	Hygrometer digital	HP 22-A	60974546	12.2014
5.	Beacon tester	BT100AVS	2315	07.2015
6.	Beacon tester	BT-611	1005	06.2015
7.	Spectrum analyzer	FSH8	105763	10.2016
8.	Tuned dipole antenna	FCC-4	587A	09.2016
9.	Set of immersion	-	102070	08.2014

ANNEX 10.
SPURIOUS EMISSIONS TEST (A10.0)

Equipment Under Test (EUT): EPIRB1, s/n 002, 006

SW version: Issue 00.04

Test Date: 17.02.2014-19.02.2014, 16.04.2014-17.04.2014, 30.06.2014

Test Conditions:

- Ambient temperature: 17.4-19.9°C
- Relative humidity: 45-57 %
- Atmospheric pressure: 758-760 mm/Hg

TEST DESCRIPTION

The spurious and harmonic emissions measurements for the 406 MHz and 121.5 MHz signals should be performed with the EUT at the minimum, maximum, and ambient temperatures. These emissions should not exceed the limits given in Figures 2-1 and 2-5, respectively, when measured in a nominal 100 Hz resolution bandwidth.

Figure 10.1 – View of the test setup for the Spurious Emissions Test

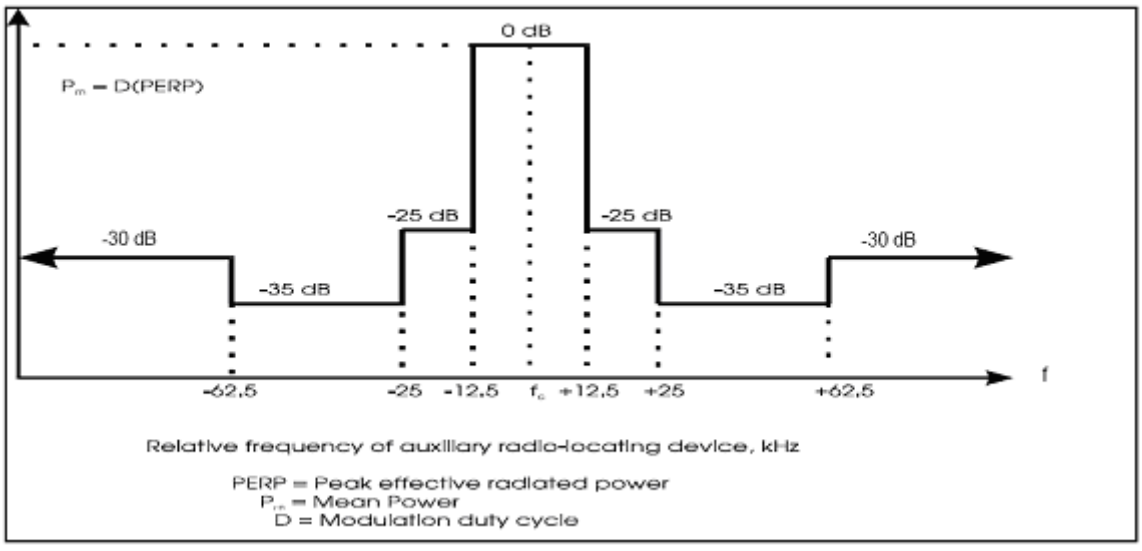


Figure 10.2 – Required Spurious Emissions for 121.5 MHz

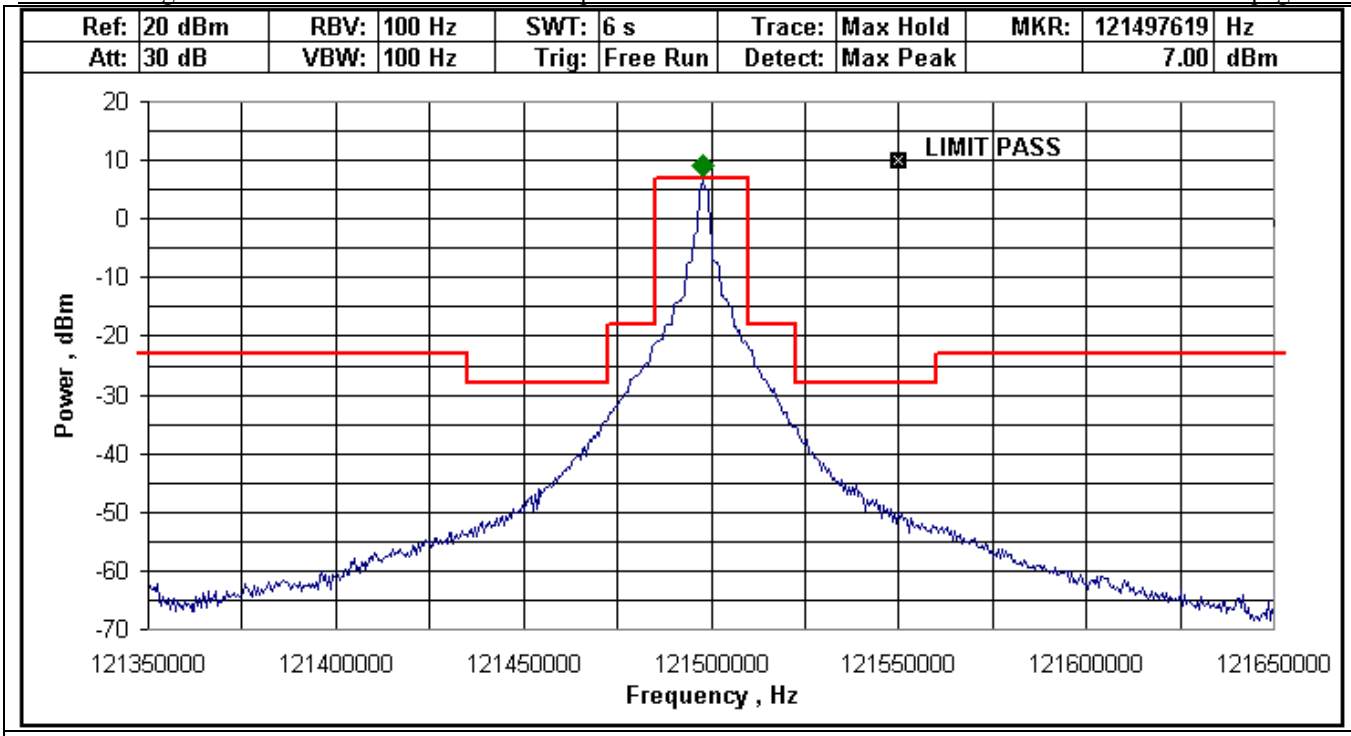


Figure 10.3 – EPIRB1 s/n 002 Spurious Emissions for 121.5 MHz at Minimum Temperature

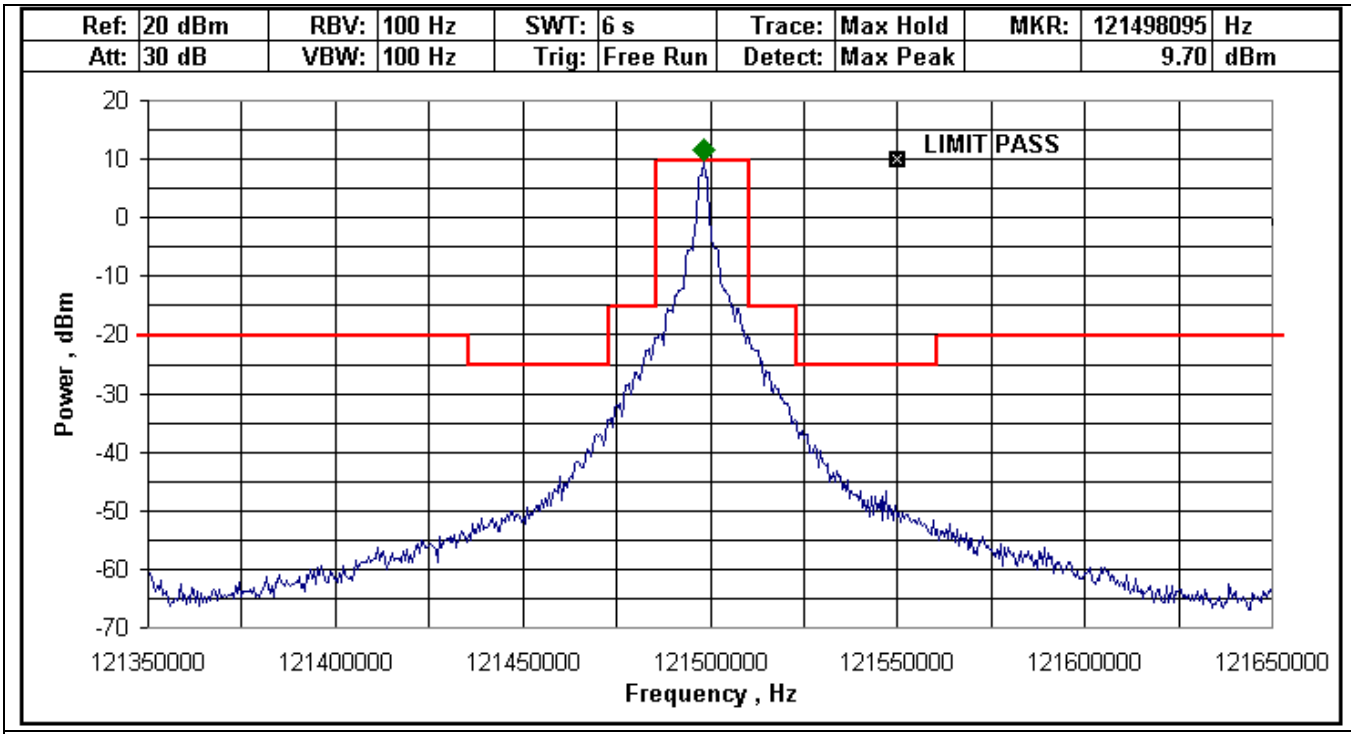


Figure 10.4 – EPIRB1 s/n 002 Spurious Emissions for 121.5 MHz at Ambient Temperature

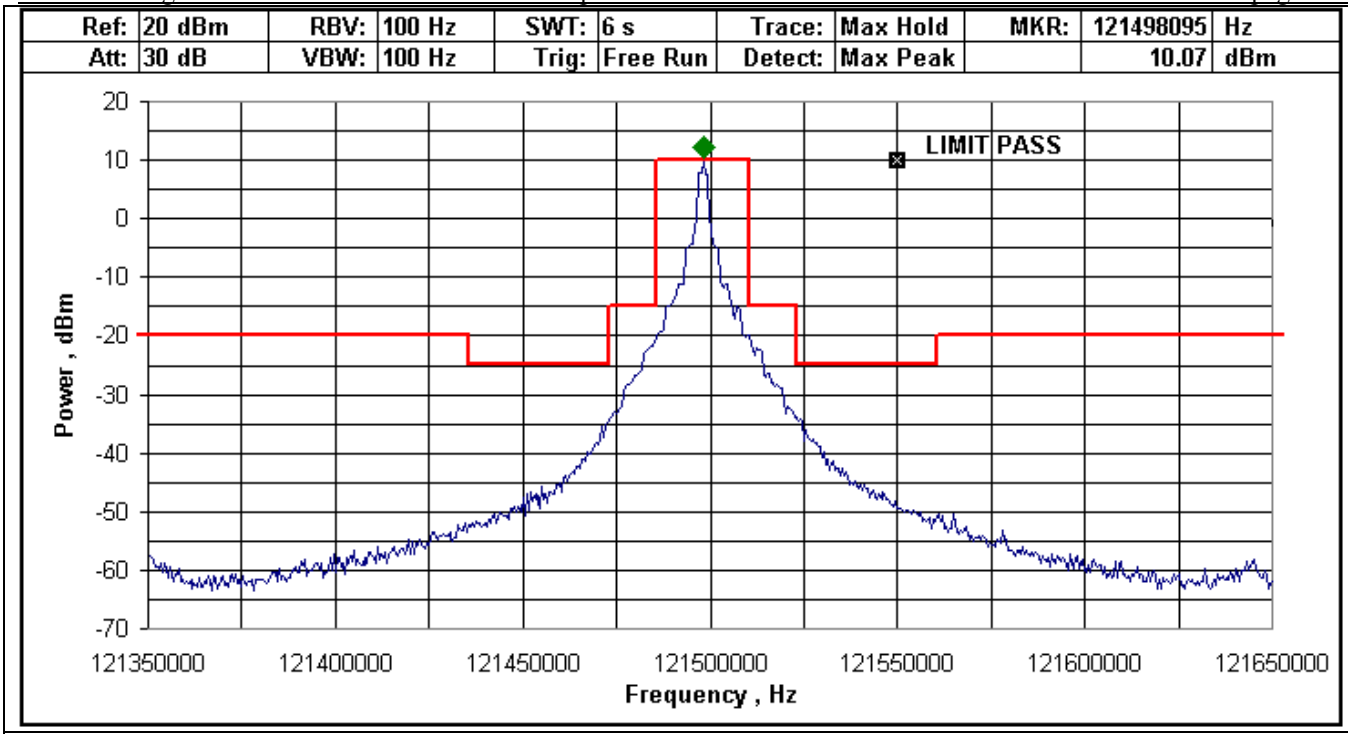


Figure 10.5 – EPIRB1 s/n 002 Spurious Emissions for 121.5 MHz at Maximum Temperature

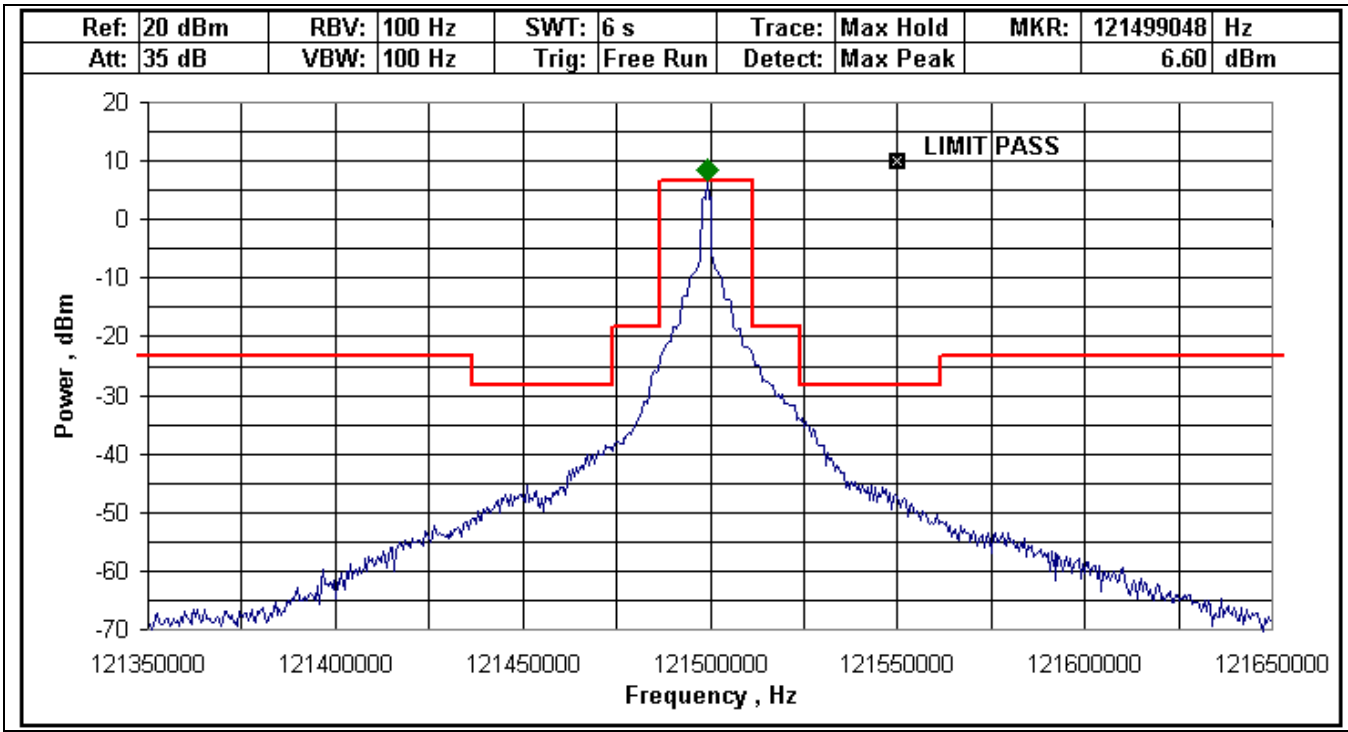


Figure 10.6 – EPIRB1, s/n 006 Spurious Emissions for 121.5 MHz at Minimum Temperature

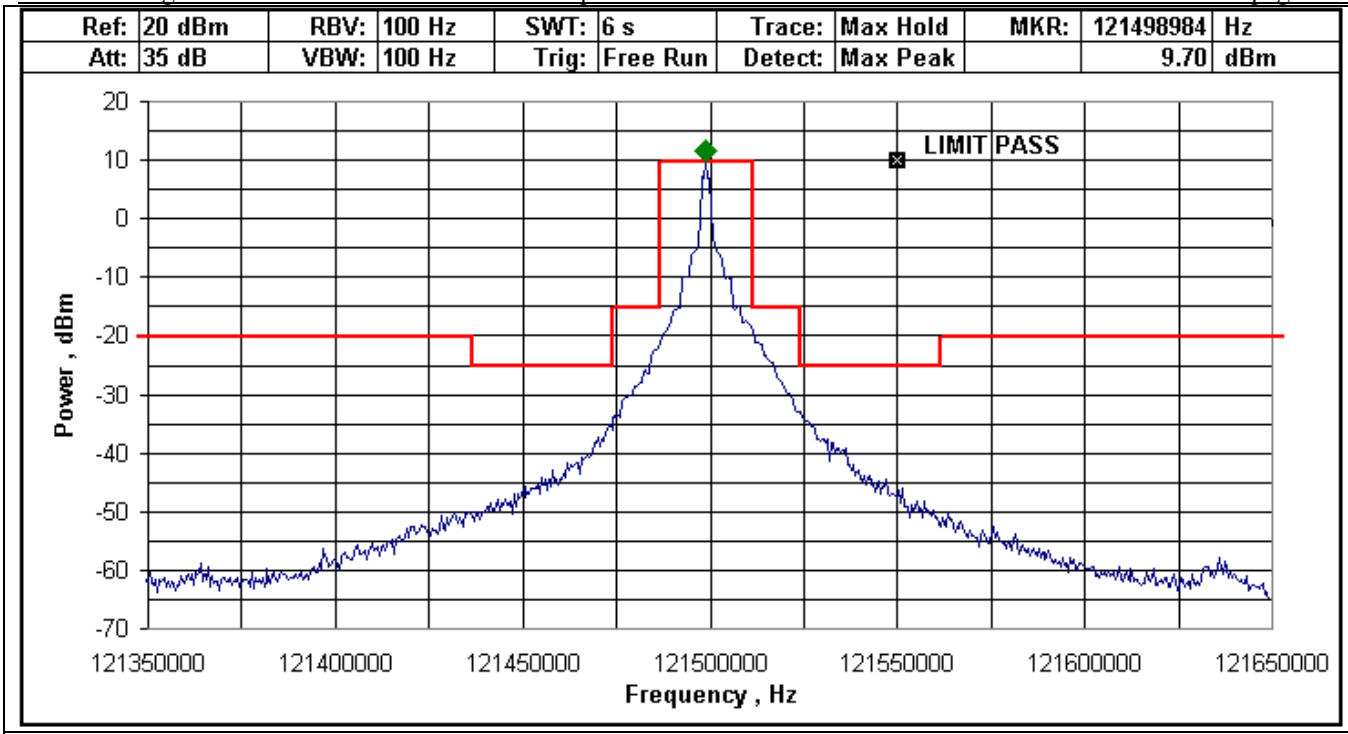


Figure 10.7 – EPIRB1, s/n 006 Spurious Emissions for 121.5 MHz at Ambient Temperature

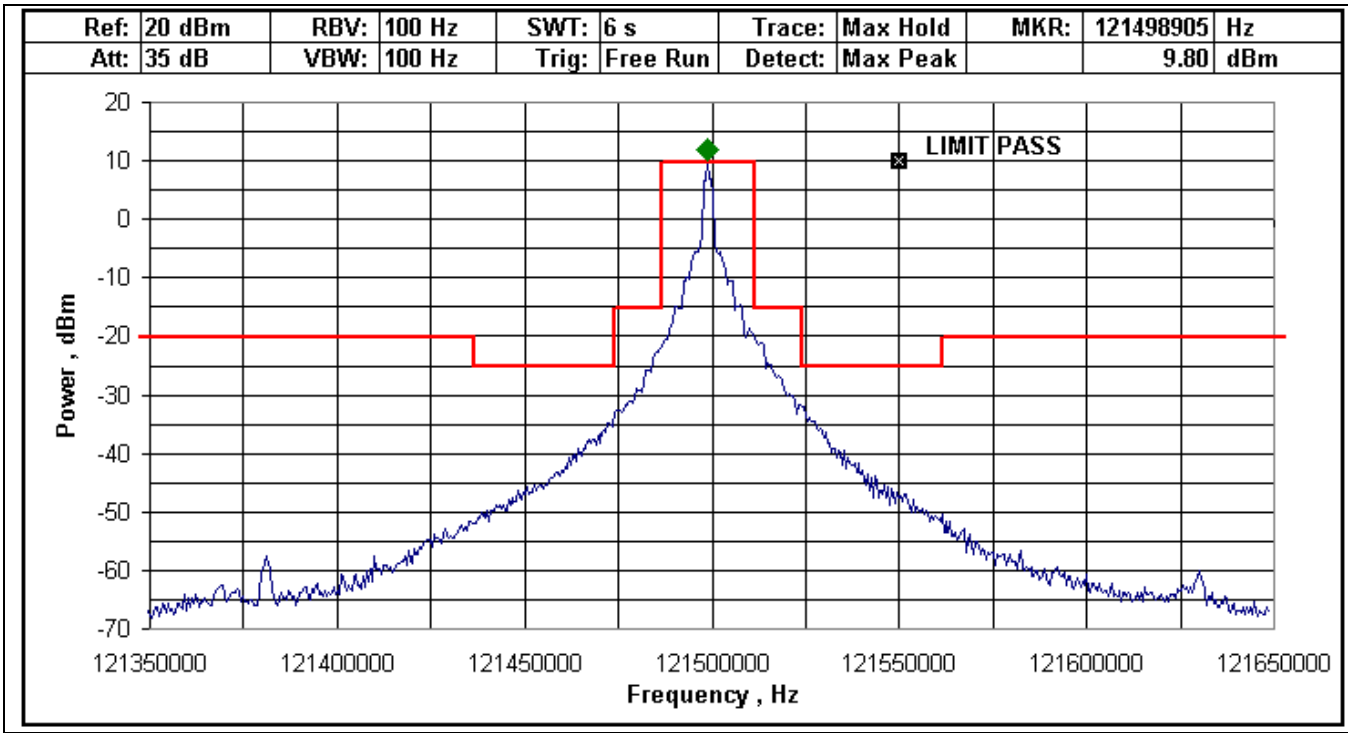


Figure 10.8 – EPIRB1, s/n 006 Spurious Emissions for 121.5 MHz at Maximum Temperature

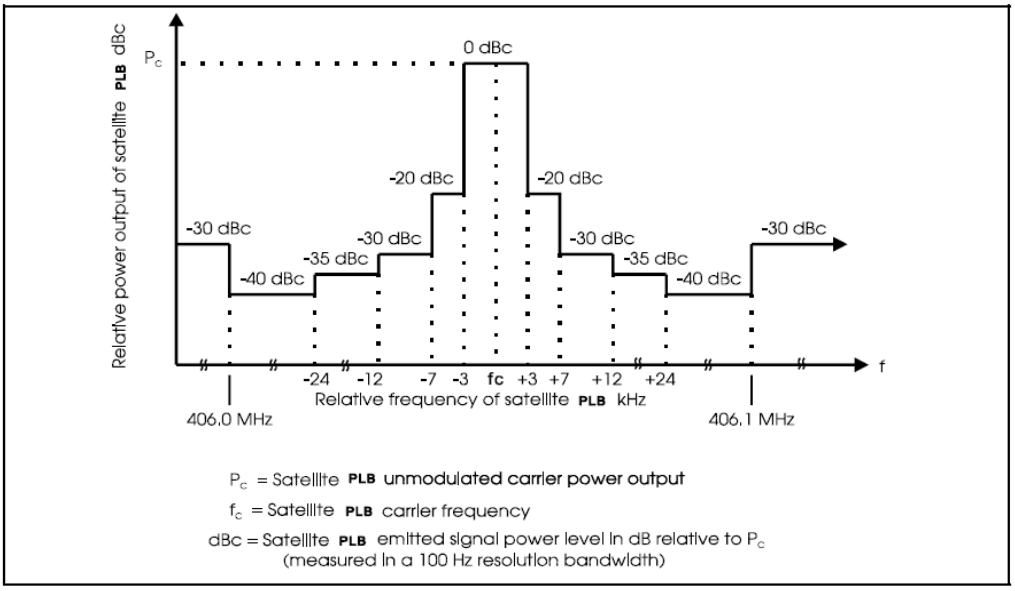


Figure 10.9 – Required Spurious Emissions for 406 MHz

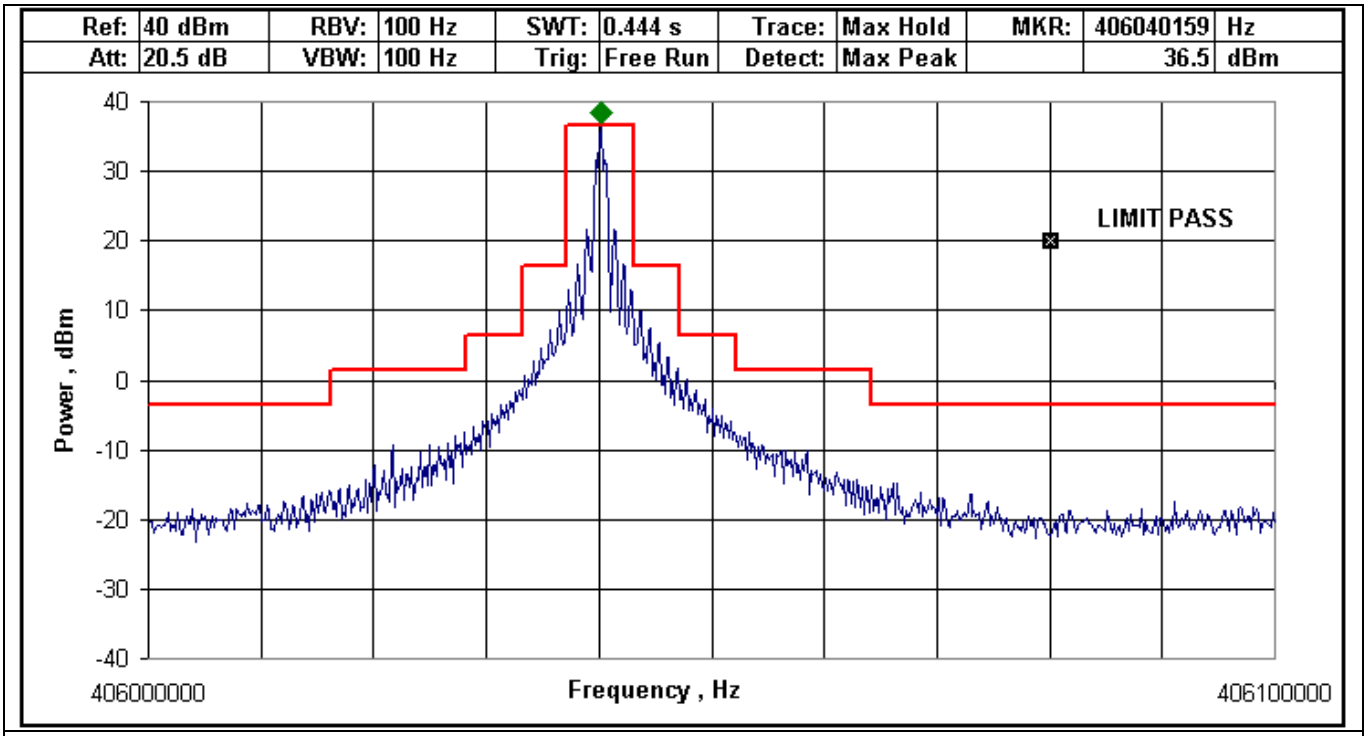


Figure 10.10 - EPIRB1, s/n 002 Spurious Emissions for 406 MHz at Minimum Temperature

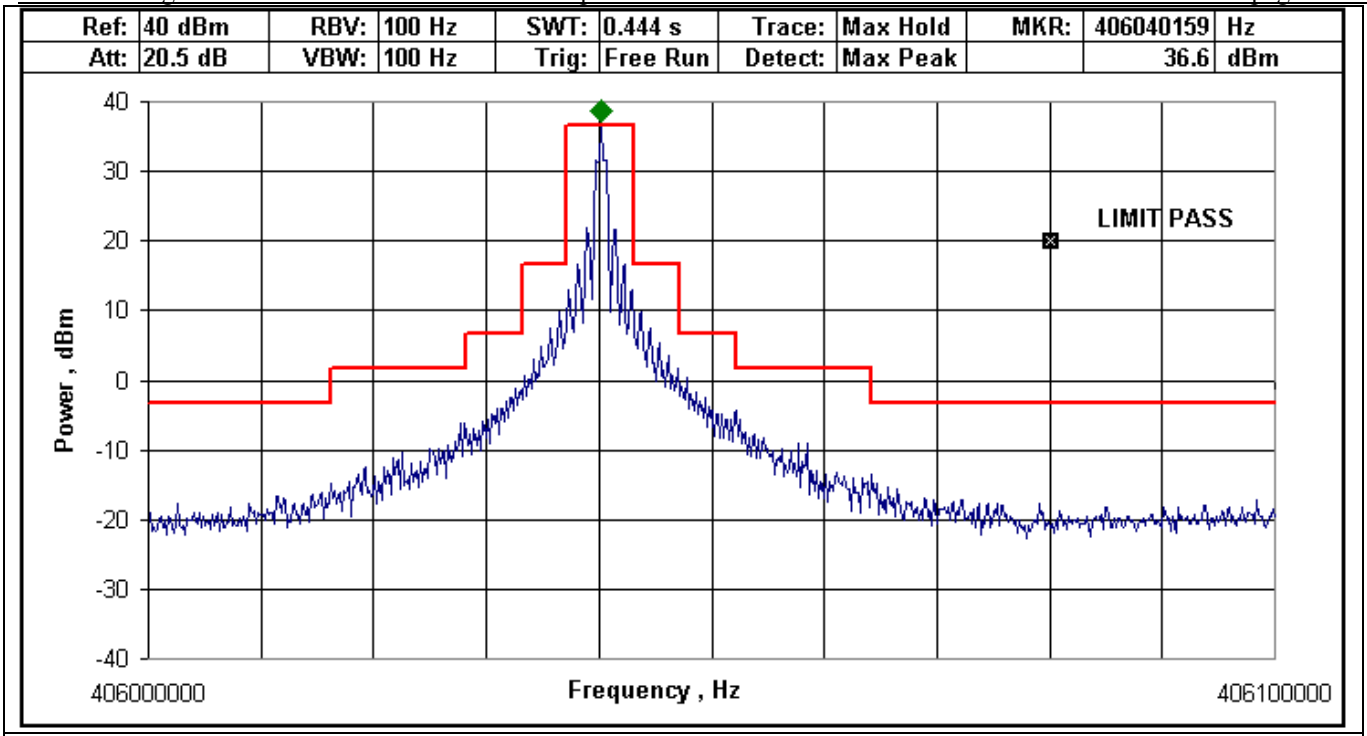


Figure 10.11 – EPIRB1, s/n 002 Spurious Emissions for 406 MHz at Ambient Temperature

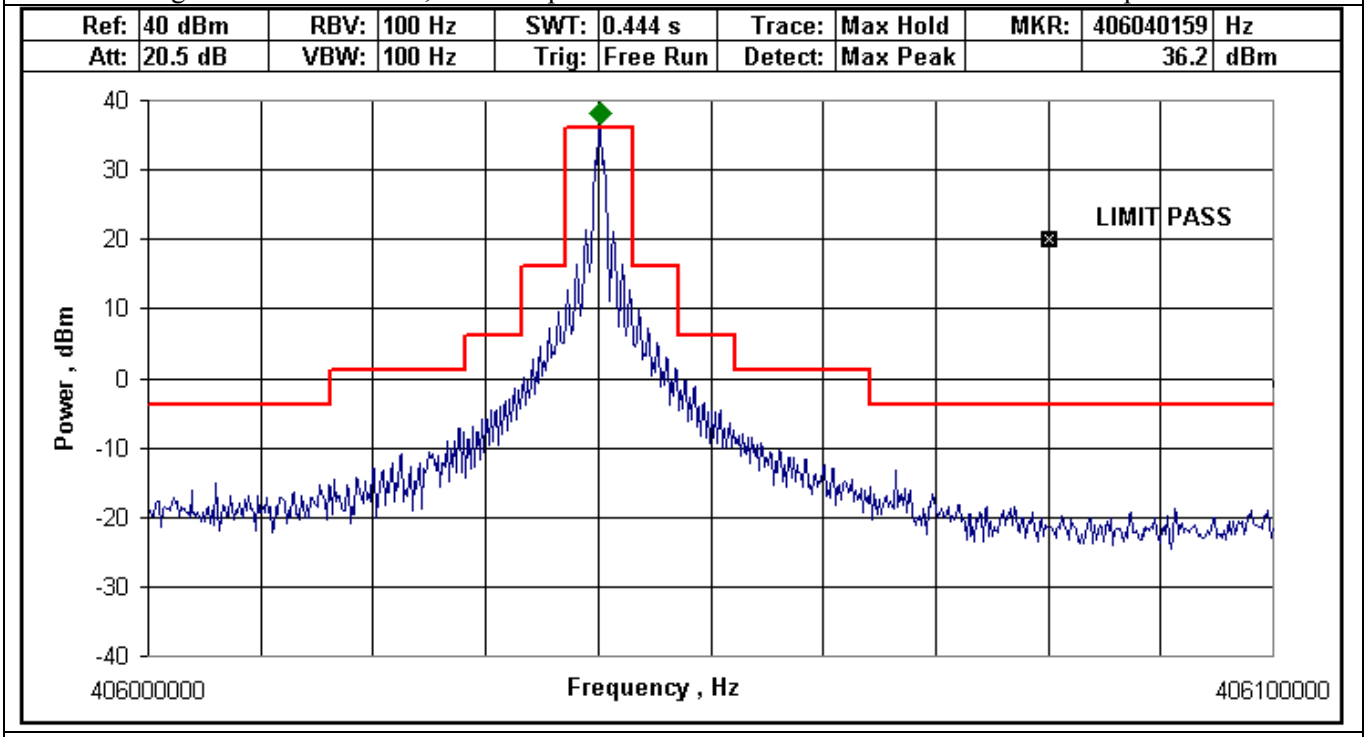


Figure 10.12 - EPIRB1, s/n 002 Spurious Emissions for 406 MHz at Maximum Temperature

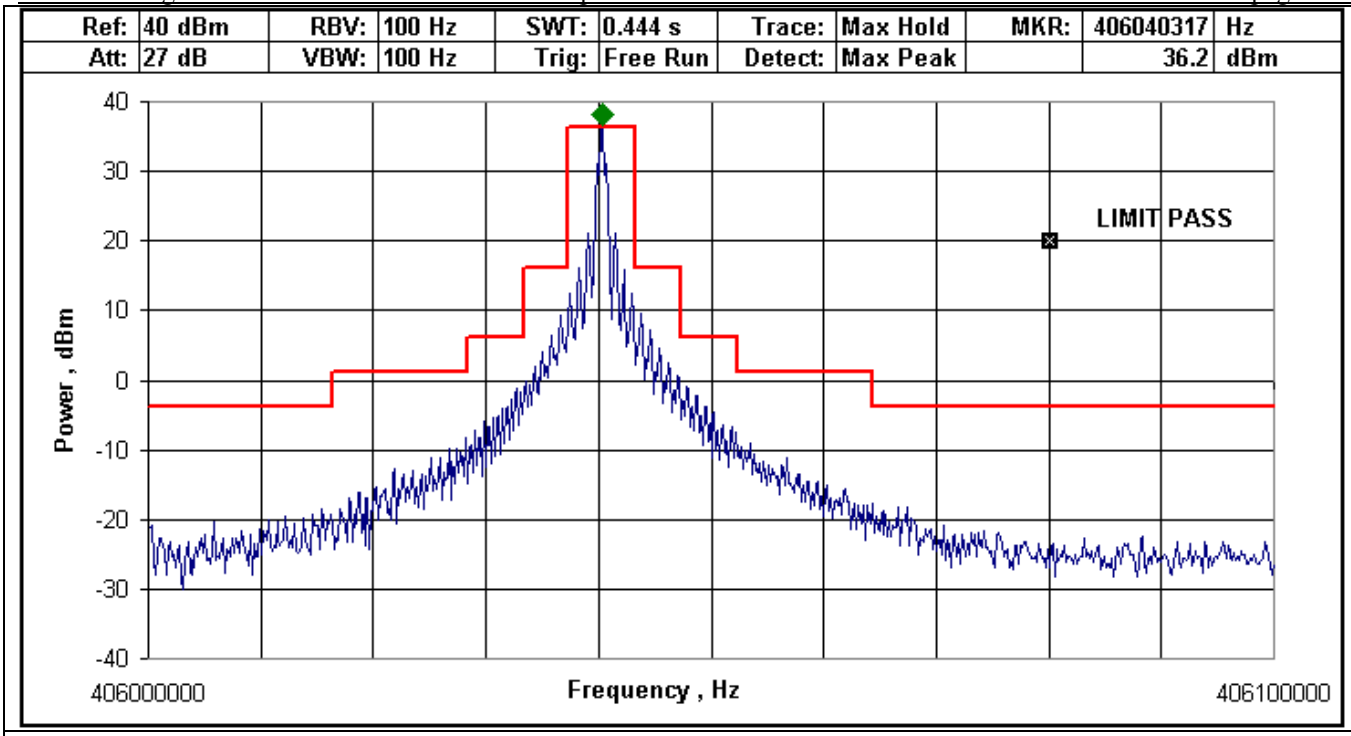


Figure 10.13 - EPIRB1, s/n 006 Spurious Emissions for 406 MHz at Minimum Temperature

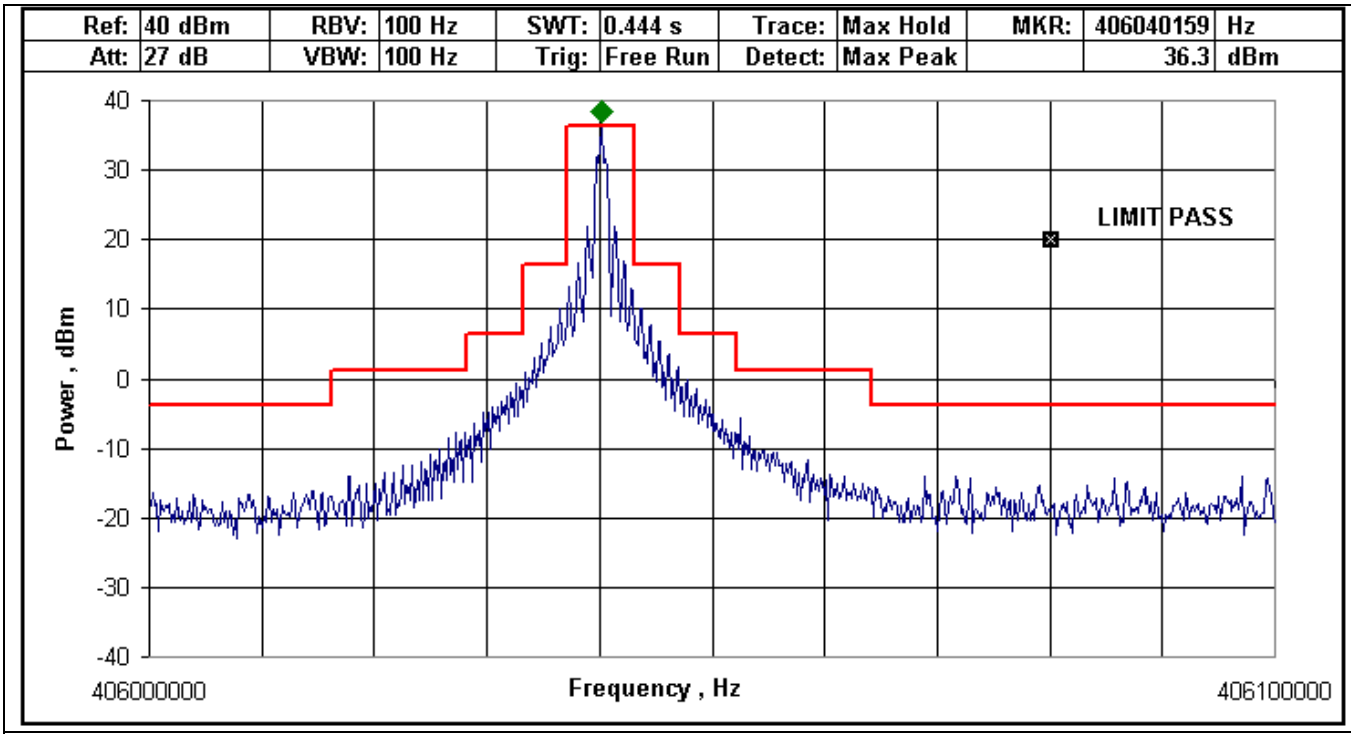


Figure 10.14 – EPIRB1, s/n 006 Spurious Emissions for 406 MHz at Ambient Temperature

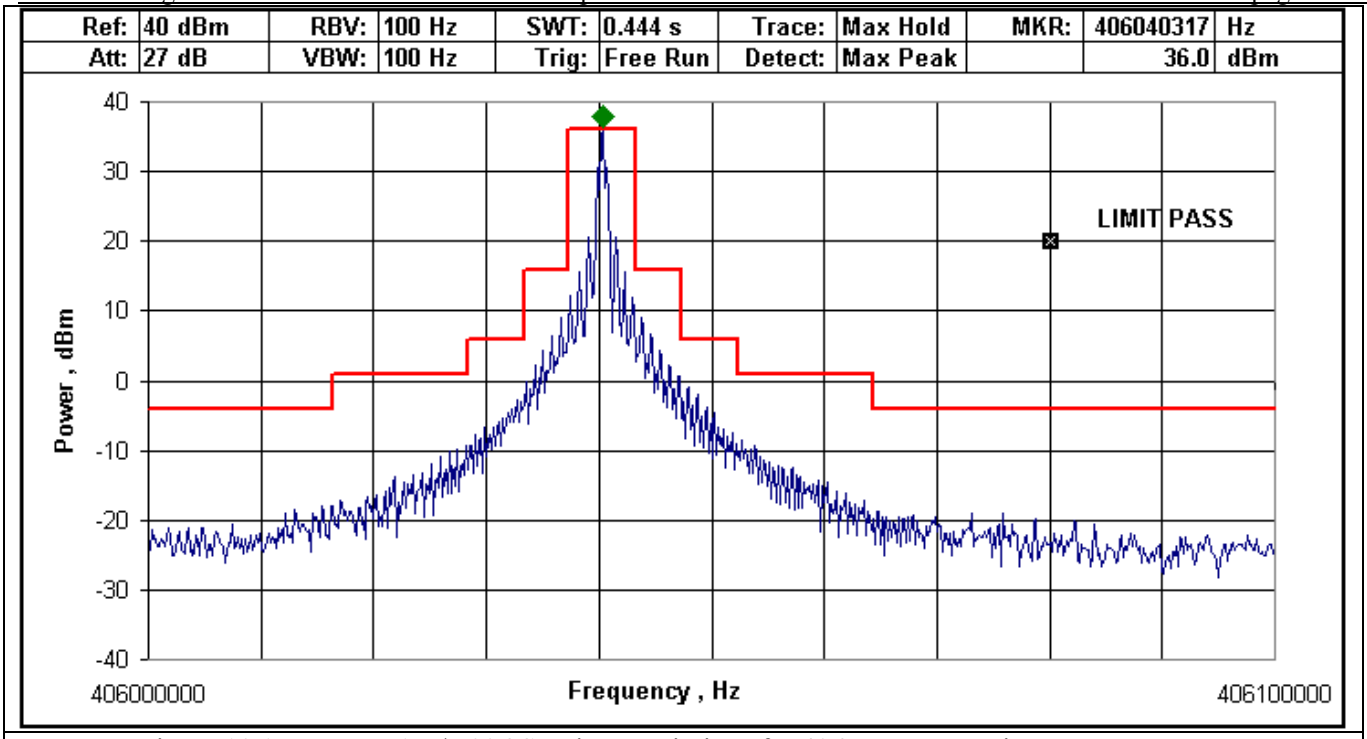


Figure 10.15 - EPIRB1, s/n 006 Spurious Emissions for 406 MHz at Maximum Temperature

FINAL RESULTS OF SPURIOUS EMISSIONS TEST (A10.0 RTCM 11000.2 Version 2.1) EPIRB1:

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Spurious Emissions 121.5 MHz at ambient temperature	Fig. 10.2	dBm	Fig. 10.4, Fig. 10.7	PASS
Spurious Emissions 121.5 MHz at minimum temperature	Fig. 10.2	dBm	Fig. 10.3, Fig. 10.6	PASS
Spurious Emissions 121.5 MHz at maximum temperature	Fig. 10.2	dBm	Fig. 10.5, Fig. 10.8	PASS
Spurious Emissions 406 MHz at ambient temperature	Fig. 10.9	dBm	Fig.10.11, Fig.10.14	PASS
Spurious Emissions 406 MHz at minimum temperature	Fig. 10.9	dBm	Fig.10.10, Fig.10.13	PASS
Spurious Emissions 406 MHz at maximum temperature	Fig. 10.9	dBm	Fig.10.12, Fig.10.15	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Temperature meter	gradient 2002	078	02.2015
3.	Hygrometer digital	HP 22-A	60974546	12.2014
4.	Beacon tester	BT100AVS	2315	07.2015
5.	Beacon tester	BT-611	1005	06.2015
6.	Semi-anechoic chamber	«Don»	1	08.2014
7.	Tuned dipole antenna	FCC-4	587A	09.2016
8.	Antenna logoperiodic	VULB9163	9163244	09.2018

ANNEX 11.
THERMAL SHOCK (A11.0)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: from 30.05.2014 until 02.06.2014
Test Conditions:
- Ambient temperature: 23.5-25.0°C
- Relative humidity: 58-62 %
- Atmospheric pressure: 749-752 mm/Hg

TEST DESCRIPTION

Low-Temperature Thermal Shock Test (A11.1)
The EUT should be in the READY condition and thermally soaked at least 3 hours at the minimum stowage temperature or colder (reference Table 2-1). The EUT should then be totally immersed in fresh water at a temperature of 0° C to +5° C for 5 - 10 seconds, then floated in water that is maintained at that temperature. The EUT should self-activate within 5 minutes.
The EUT should be removed from the water, deactivated, made ready for automatic activation, set to the READY position and thermally soaked at least 3 hours at the minimum stowage temperature or colder (reference (Table 2-1).
The EUT should then be totally immersed in salt water (5% NaCl) at a temperature of -2° C to +5° C for 5 - 10 seconds, then float in the water maintained at that temperature. The EUT should self-activate within 5 minutes.
After 20 minutes, the following measurements should be conducted (the EUT should remain in the water throughout the test):
1. Aliveness test
2. Short-term frequency stability (0.002 parts/million in 100 ms)
3. Medium-term frequency stability
a. Mean slope
b. Residual frequency variation

High-Temperature Thermal Shock Test (A11.2)
The high temperature thermal shock test should be performed similarly to section A11.1 except that the EUT should be thermally soaked at the maximum stowage temperature (or hotter) and floated in water maintained between 25° C and 35° C.

TEST RESULT:
- STEP 1. The EUT was switched OFF and placed in the climatic test chamber at temperature -30 °C for 3 hours.
- STEP 2. The EUT was totally immersed in fresh water at temperature of +4 °C for 5 seconds then floated in water; The EUT self-activated in fresh water within 5.5 seconds;
- STEP 3. The EUT was removed from water, deactivated and placed in the climatic test chamber at temperature -30°C for 3 hours;
- STEP 4. The EUT was totally immersed in salt water (5 % NaCl) at temperature of -1.9 °C for 5 seconds then floated in water; The EUT self- activated in salt water within 5.0 seconds;
- STEP 5. After 20 minutes following tests were conducted: aliveness test, short-term frequency stability and medium-term frequency stability;
- STEP 6. The EUT was switched OFF and placed in the climatic test chamber at temperature +70 °C for 3 hours;
- STEP 7. The EUT was totally immersed in fresh water at temperature of +26.2 °C then floated in water; The EUT self-activated in fresh water within 4 seconds;
- STEP 8. The EUT was removed from water, deactivated and placed in the climatic test chamber at temperature +70°C for 3 hours;
- STEP 9. The EUT was totally immersed in salt water (5 % NaCl) at temperature of +26.2 °C then floated in water; The EUT self-activated in salt water within 4 seconds;
- STEP 10. After 20 minutes following tests were conducted: aliveness test, short-term frequency stability and medium-term frequency stability;

Figure 11.1 – EPIRB1in water

Test duration 0 h 20 m	Bursts received 25	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.999	406039.999	406040.003
Power, Wt	3.16	7.94	3.51	3.52	3.52
Slope(E-9)	-1.00	1.00	-0.786	-0.786	-0.786
Residual variations (E-9)	0.00	3.00	1.867	1.867	1.867
Short term variations (E-9)	0.00	2.00	0.288	0.288	0.288
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499126				
Power, mW	55.9				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 11.2 – Detailed measurement results of EPIRB1
upon completion of low-temperature thermal shock test

Test duration 0 h 20 m	Bursts received 26	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406040.127	406040.133	406040.133
Power, Wt	3.16	7.94	3.59	3.59	3.59
Slope(E-9)	-1.00	1.00	0.912	0.912	0.912
Residual variations (E-9)	0.00	3.00	2.521	2.521	2.521
Short term variations (E-9)	0.00	2.00	0.008	0.008	0.008
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121499300				
Power, mW	57.4				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 11.3 – Detailed measurement results of EPIRB1
upon completion of high-temperature thermal shock test

FINAL RESULTS OF THERMAL SHOCK TEST (A11.0 RTCM 11000.2 Version 2.1):

RESULTS OF LOW-TEMPERATURE THERMAL SHOCK TEST (A11.1 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Self-activation in fresh water	5	minutes	0.083	PASS
• Self-activation in salt water	5	minutes	0.083	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039999	PASS
- Power Output	35 - 39	dBm	35.47	PASS
- Digital message	Correct	√	√	PASS
• Frequency Stability				
- short term stability	≤0.002	ppm in 100 ms	0.000288	PASS
- medium term stability				
mean slope	-0.001 to 0.001	ppm/ minute	-0.000786	PASS
residual frequency variation	≤0.003	parts/ million	0.001867	PASS

RESULTS OF HIGH-TEMPERATURE THERMAL SHOCK TEST (A11.2 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Self-activation in fresh water	5	minutes	0.067	PASS
• Self-activation in salt water	5	minutes	0.067	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.0340133	PASS
- Power Output	35 - 39	dBm	35.55	PASS
- Digital message	Correct	√	√	PASS
• Frequency Stability				
- short term stability	≤0.002	ppm in 100 ms	0.000008	PASS
- medium term stability				
mean slope	-0.001 to 0.001	ppm/ minute	-0.000912	PASS
residual frequency variation	≤0.003	ppm	0.002521	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Climatic chamber	KPK 400V	015	08.2014
3.	Climatic chamber	NZ-350/75	24625a	10.2014
4.	Temperature meter	gradient 2002	078	02.2015
5.	Hygrometer digital	HP 22-A	60974546	12.2014
6.	Beacon tester	BT100AVS	2315	07.2015
7.	Beacon tester	BT-611	1005	06.2015
8.	Spectrum analyzer	FSH8	105763	10.2016
9.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 12.
OPERATIONAL LIFE TEST (A13.1)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 25.02.2014-28.02.2014
Test Conditions:

- Ambient temperature: 17…18°C
- Atmospheric pressure: 756…758 mm/Hg
- Relative air humidity: 53…57 %

TEST DESCRIPTION:

- Beacon manufacturer provided operating currents and calculations of the extension Factor (F hrs).
- EPIRB was placed in a chamber at normal room temperature. Then the temperature was reduced to and maintained at minus 30°C for period of 10 hours.
- The chamber was heated to minus 20°C, the heating of the chamber was completed within 20 minutes.
- The equipment has been manually activated in 30 minutes after the end of the period specified in the subclause above and then kept working continuously until power of 406 MHz transmitter was reduced to the minimal acceptable value.
- Parameters were measured immediately after activation of beacon except for the Medium Term Frequency Stability (the mean slope of the frequency and the residual frequency variation about the mean slope), which were computed after 15 minutes according to T.001 section 2.3.1;
- The total duration of the lifetime test was 59 hours 55 minutes since activation EUT till the power was reduced to 35 dBm;
- The time of equivalent extension of the operating lifetime test to account reduced pre-discharge battery was 5 hours 1.4 minutes.
- The operating lifetime test without time of equivalent extension is 54 hours 53 minutes;
- Matching network was not used;
- GNSS signal was not available during the test.

TEST RESULT:

Beacon manufacturer provided operating currents and pre-test battery discharge calculations.

Operational currents were verified by the testing laboratory with measurement results reported in Table 11.1 below.

During operating current measurement in modes No. 1 - 7 GNSS signal was not available.

Measured values do not exceed values provided by manufacturer.

Table 12.1: Beacon Operating Current

No.	Beacon Operating Modes	Mode: Manually selectable or Automatic	Measurement interval, sec	Average Current, mA	Peak Current, mA
1	Operating mode switch activated with GPS receiver in search mode (406MHz + Homer + GPS Acquisition + Strobe Light)	Automatic	50	38.10	1034.20
2	Operating mode switch activated (406MHz + Homer + GPS Sleep + Strobe light)	Automatic	50	31.60	1050.00
3	Operating mode water activated with GPS receiver in search mode (406MHz + Homer + GPS Acquisition + Strobe Light)	Automatic	50	38.40	1042.10
4	Operating mode water activated (406MHz + Homer + GPS Sleep + Strobe light)	Automatic	50	31.90	1051.10
5	Self test mode	Manually	16.37	40.74	1081.51
6	GNSS Self Test (GPS Acquisition)	Manually	315.50	11.50	17.30
7	Stand-by mode	Manually / automatically	300	2.00E-05	2.00E-05

Conclusions: The beacon mode: **406MHz + Homer + GPS Acquisition + Strobe Light** when the beacon is water activated is mode at which beacon has the highest current consumption.

Current consumption was measured using circuit shown on Figure 4.4.

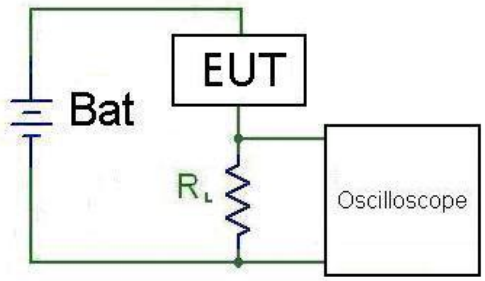


Figure 12.1 - The Circuit for Current Consumption Measurement

The value of the current calculated by equation: $I = \frac{U}{R}$, where ***I*** is a value of current (A), ***U*** is a value of voltage (V), ***R*** is a value of resistance (Ohm).
Voltage was measured by digital oscilloscope with load R=0.1 Ohm.

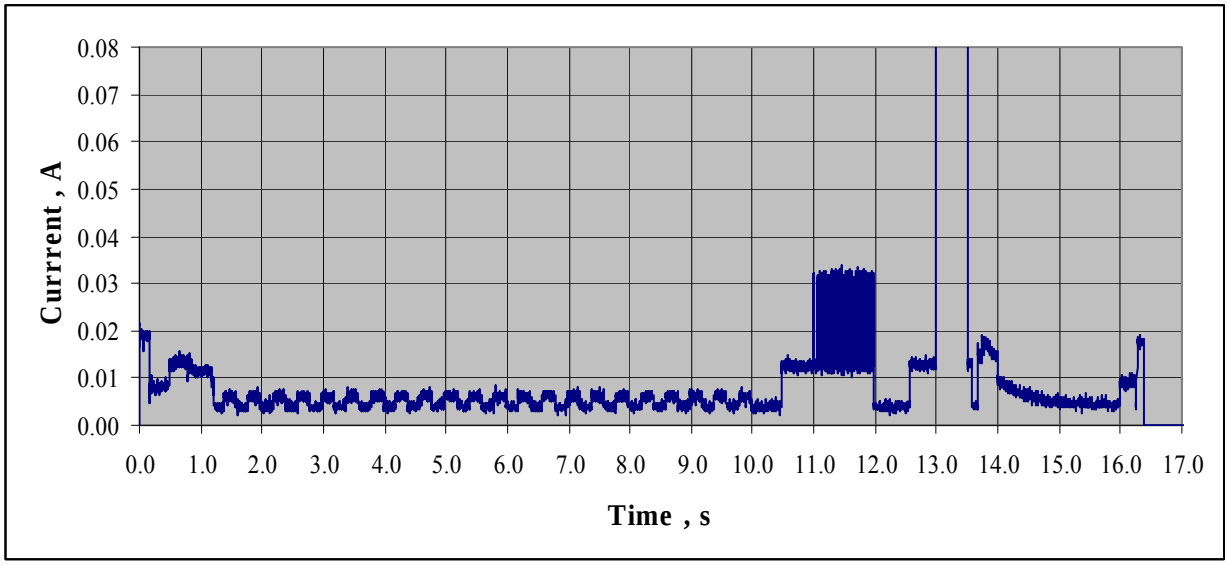


Figure 12.2 - Current during self-test

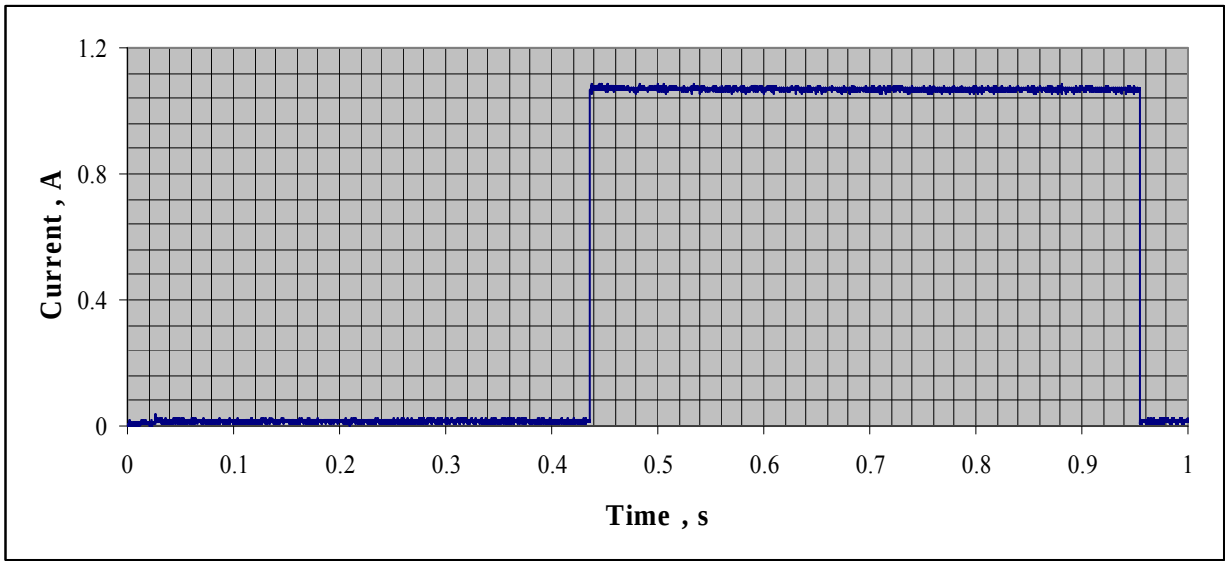


Figure 12.3 - Demonstrate maximum current during the 406 burst

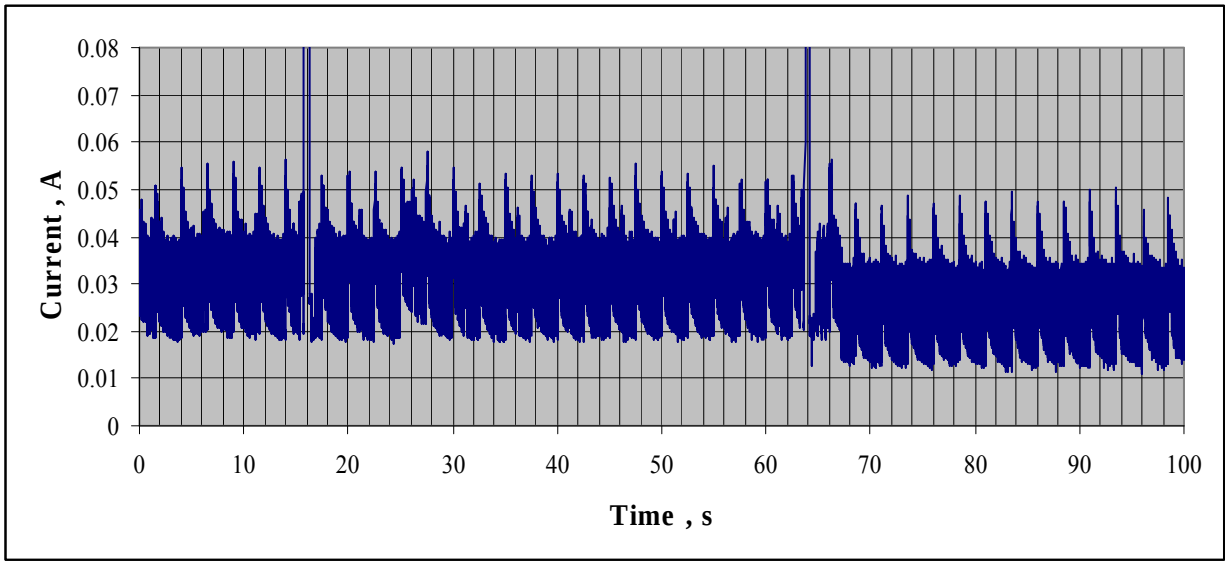


Figure 12.4 - GPS receiver is switched from on to off position. Strobe light flashes

Table 12.2: Pre-test Battery Discharge Calculations as provided by manufacturer

Characteristic	Designation	Units	Value	Comments
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	T_{BR} or TBR	Number of years	12.5	
Battery Useful Life	U_{BL} or UBL	Number of years	25	
Battery pack electrical configuration	2 parallel packs each of 3 123 cells in series			
Cell model and cell chemistry	CR123A, Lithium Manganese Dioxide			
Nominal cell capacity		A-hrs	1.7	
Nominal battery pack capacity	C_{BN}	A-hrs	3.4	
Annual battery cell capacity loss (self-discharge) due to aging, as specified by cell manufacturer at ambient temperature	L_{SDC}	%	0.46	
Calculated battery pack capacity loss due to self-discharge: $L_{CBN} = C_{BN} - [C_{BN} *(1 - L_{SDC} /100)^{UBL}]$	L_{CBN}	mA-hrs	370.16	
Number of self-tests per year	N_{ST}		12.00	
Average battery current during a self-test	I_{ST}	mA	40.75	
Maximum duration of a self-test	T_{ST}	sec	16.50	
Calculated battery pack capacity loss due to self-tests during battery replacement period: $L_{ST} = I_{ST}*T_{ST}*U_{BL}*N_{ST} / 3600$	L_{ST}	mA-hrs	56.03	
Maximum Number of GNSS self-tests between battery replacements	N_{GST}		12.00	
Average battery current during a GNSS self-test of maximum duration	I_{GST}	mA	11.50	
Maximum duration of a GNSS self-test	T_{GST}	sec	315.5	
Calculated battery pack capacity loss due to GNSS self-tests during battery replacement period: $L_{GST} = I_{GST}*T_{GST}*N_{GST} / 3600$	L_{GST}	mA-hrs	12.09	
Average stand-by battery pack current	I_{SB}	mA	2.00E-05	
Battery pack capacity loss due to constant operation of circuitry prior to beacon activation: $L_{ISB} = I_{SB}*U_{BL}*8760$	L_{ISB}	mA-hrs	4.38	
Other Capacity Losses	L_{OTH}	mA-hrs	14.4	Additional current draw when beacon is water acti-vated
Calculated value of the battery pack pre-test discharge $L_{CDC} = L_{CBN} + (L_{ST} + L_{GST} + L_{ISB})/1000$	L_{CDC}	mA-hrs	457.06	

The pre- test battery discharge is calculated for the worst case drain / operational current.
Production date of cells installed in the battery: July 2013.
Duration of storage prior to the test: 6 months.

The pre- test battery discharge was carried out before the Battery Capacity test at room temperature on the battery stored 6 month before test.
The loss of energy due to the battery ageing:
$L_{AGEING} = C_{BN} - [C_{BN} *(1 - L_{SDC} /100)^{6months/12}] = 3.4$ A-hrs -[3.4 A-hrs $*(1-0.46/100)^{6months/12} = 0.008$ A-hrs.
The final value of the discharge to take into account the cell ageing:
$L_{CDC} - L_{AGEING\_total} = 457.06$ mA-hrs – 8 mA-hrs = **449.06 mA-hrs**.

The battery was pre-discharged for 5 hours 59 minutes at the manufacturer's request (to account for Cospas-Sarsat pre-discharge calculations) with a discharge current of 48.39 mA. This is equal to a pre-discharge of 289.5 mA-hrs.

The battery capacity and low-temperature test with preliminary discharged battery was carried out in 59 hours 54.48 minutes since activation EUT till the power was reduced to 35 dBm.

For the operating lifetime test the beacon was activated manually by switch.

As depleted capacity volume during pre-test battery discharge was 289.5 mA-hrs instead 449.06 mA-hrs the additional extension of operating lifetime was calculated upon operating current values measured by Omega.

The equivalent extension upon measured operating currents is calculated as following:

$$T_{EXT} = (449.06 - 289.5) \text{ mA-hrs} / I_{ARV},$$

where

T_{EXT} time of equivalent extension, hours;

I_{ARV} average operating current of beacon, mA.

Average operate current of beacon should be estimated using values presented in Table 11.1 above in view of GPS cycle 120 minutes with on/off rate 5 to 115 after 7 hours of operation and thereafter.

$$I_{ARV} = (38.1 * 5 + 31.6 * 115) / 120 = 31.87 \text{ mA}$$

The equivalent extension is

$$T_{EXT} = (449.06 - 289.5) \text{ mA-hrs} / 31.87 \text{ mA} = 5 \text{ hours } 01.4 \text{ minutes.}$$

In accordance with calculation above 5 hours 01.4 minutes should be added to 48 hours operation requirements to ensure the beacon will meet the requirement. The minimum operating lifetime duration shall be 53 hours 01.4 minutes. During operating lifetime test the beacon operated 59 hours 54.48 minutes. Taking into account the additional extension of operating lifetime 5 hours 01.4 minutes the excess operation above the requirement is 6 hours 53 minutes.

The Ocean Signal EPIRB1 exceeds the operational Life requirement of 48 hours.

List of parameters measured during operating lifetime test are shown below.

List of test parameters

Measured parameters	**page No.**
Transmission frequency 406 MHz:	
Nominal frequency value	85
Short and average frequency stability	86
Maximum and minimum frequency stability values during test	83
Transmitter power output:	
Diagram of power output values during test	89
Maximum and minimum power output values during test	83
Message:	
Message contents	90

Table of measured parameters.

Message	
Contents (full)	:FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C

Test duration 59:54:29	Bursts received 4347		BCH error 0	Self-Test 0	
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, MHz	406.039	406.041	406.039997	406.039999	406.040017
Power, dBm	35	39	35.00	35.00	36.73
Slope	-1.00E-09	1.00E-09	-2.80E-10	3.40E-12	1.73E-10
Residual variations	0.00E-09	3.00E-09	4.06E-11	9.00E-11	8.59E-10
Short term variations	0.00E-09	2.00E-09	6.08E-11	1.48E-10	2.17E-10
Power, dBm (at 48:28:09)	35	39	36.19	36.42	36.73

121.5 MHz Transmitter Parameters at the beginning of the test 00:15:00			
Carrier Frequency, Hz	121497579	**Low Sweep Frequency, Hz**	350
Power, dBm	15.82	**High Sweep Frequency, Hz**	1118
Sweep Period, sec	0.33	**Sweep Range, Hz**	768
Modulation Index, %	100		
121.5 MHz Transmitter Parameters at 48:00:53			
Carrier Frequency, Hz	121497611	**Low Sweep Frequency, Hz**	350
Power, dBm	15.92	**High Sweep Frequency, Hz**	1118
Sweep Period, sec	0.33	**Sweep Range, Hz**	768
Modulation Index, %	100		
121.5 MHz Transmitter Parameters at the end of the test 59:54:29			
Carrier Frequency, Hz	121497634	**Low Sweep Frequency, Hz**	350
Power, dBm	17.21	**High Sweep Frequency, Hz**	1118
Sweep Period, sec	0.33	**Sweep Range, Hz**	768
Modulation Index, %	100		

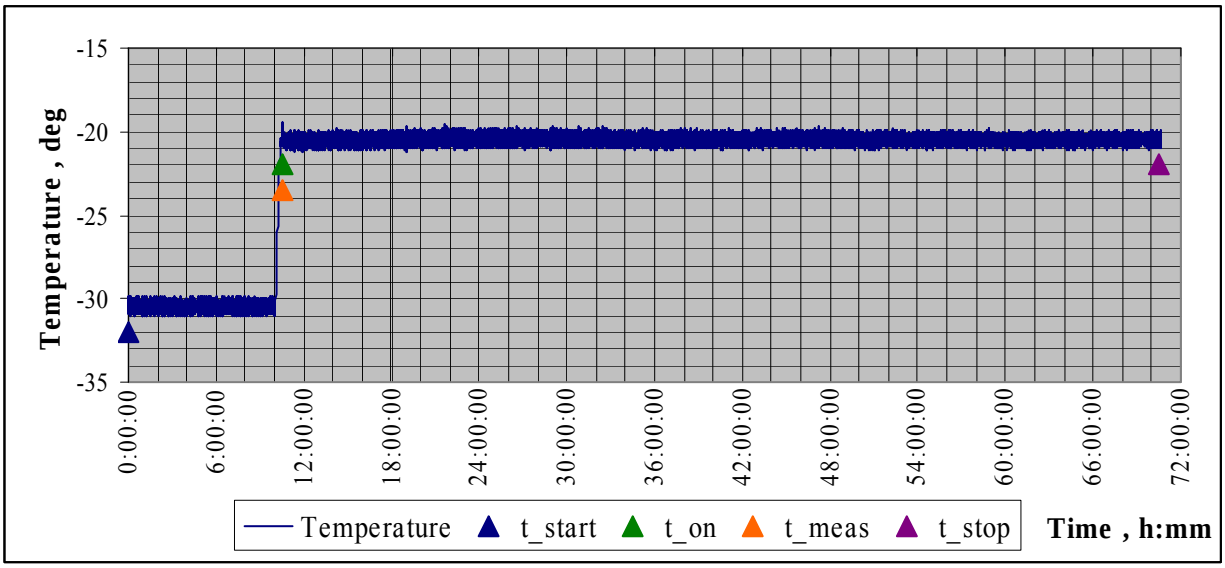


Figure 12.5 – Temperature During The Test

Table of data measured during 30 minutes after activation of EPIRB.

Time (h:mm:ss)	Rep. period (s)	Power (W)	Frequency (MHz)	Slope	Residual variations	Short term variations	Digital message
0:00:53	0.00	4.16	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:01:44	50.51	4.39	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:02:31	47.81	4.33	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:03:21	49.71	4.49	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:04:11	50.11	4.43	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:04:59	47.91	4.41	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:05:48	49.31	4.38	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:06:37	48.31	4.34	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:07:29	52.51	4.32	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:08:20	50.31	4.30	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:09:10	50.51	4.44	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:09:58	47.81	4.42	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:10:48	49.71	4.42	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:11:38	50.11	4.41	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:12:26	47.91	4.40	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:13:15	49.31	4.39	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:14:03	48.31	4.38	-	-	-	-	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:14:56	52.51	4.37	406.040017	-	-	1.34E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:15:46	50.31	4.37	406.040015	-8.85E-09	1.65E-08	1.36E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:16:37	50.51	4.36	406.040012	-7.74E-09	1.73E-08	1.37E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:17:24	47.81	4.36	406.040010	-6.56E-09	1.75E-08	1.38E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:18:14	49.71	4.36	406.040007	-5.34E-09	1.69E-08	1.36E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:19:04	50.11	4.35	406.040006	-4.11E-09	1.53E-08	1.35E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:19:52	47.91	4.35	406.040004	-2.91E-09	1.28E-08	1.46E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:20:41	49.31	4.35	406.040002	-1.81E-09	8.69E-09	1.42E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:21:30	48.31	4.35	406.040001	-9.88E-10	4.24E-09	1.41E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:22:22	52.51	4.34	406.040001	-5.75E-10	1.22E-09	1.42E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:23:13	50.31	4.34	406.040000	-5.07E-10	9.58E-10	1.37E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:24:03	50.51	4.35	406.040000	-4.63E-10	8.39E-10	1.31E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:24:51	47.81	4.35	406.040000	-4.21E-10	6.74E-10	1.31E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:25:41	49.71	4.35	406.040000	-3.79E-10	7.01E-10	1.45E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:26:31	50.11	4.35	406.040000	-3.49E-10	7.34E-10	1.45E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:27:19	47.91	4.35	406.040000	-3.31E-10	7.67E-10	1.40E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:28:08	49.31	4.35	406.039999	-3.09E-10	8.14E-10	1.40E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:28:56	48.31	4.35	406.039999	-2.99E-10	8.41E-10	1.39E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C
0:29:49	52.51	4.35	406.039999	-2.90E-10	8.64E-10	1.31E-10	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C

Note:

Column “Time”	Time from EPIRB activation.	
Column “Rep. Period”	Value of repetition period fixed after first message.	
Column Slope, Residual varia-tions		Medium Term Frequency Stability computed with Frequency measurement immediately after beacon activation and out off C/S specification limit.

a) Transmitted Frequency (according to C/S T.007 – section A.3.2.1)

- **Nominal Value (A.3.2.1.1)**

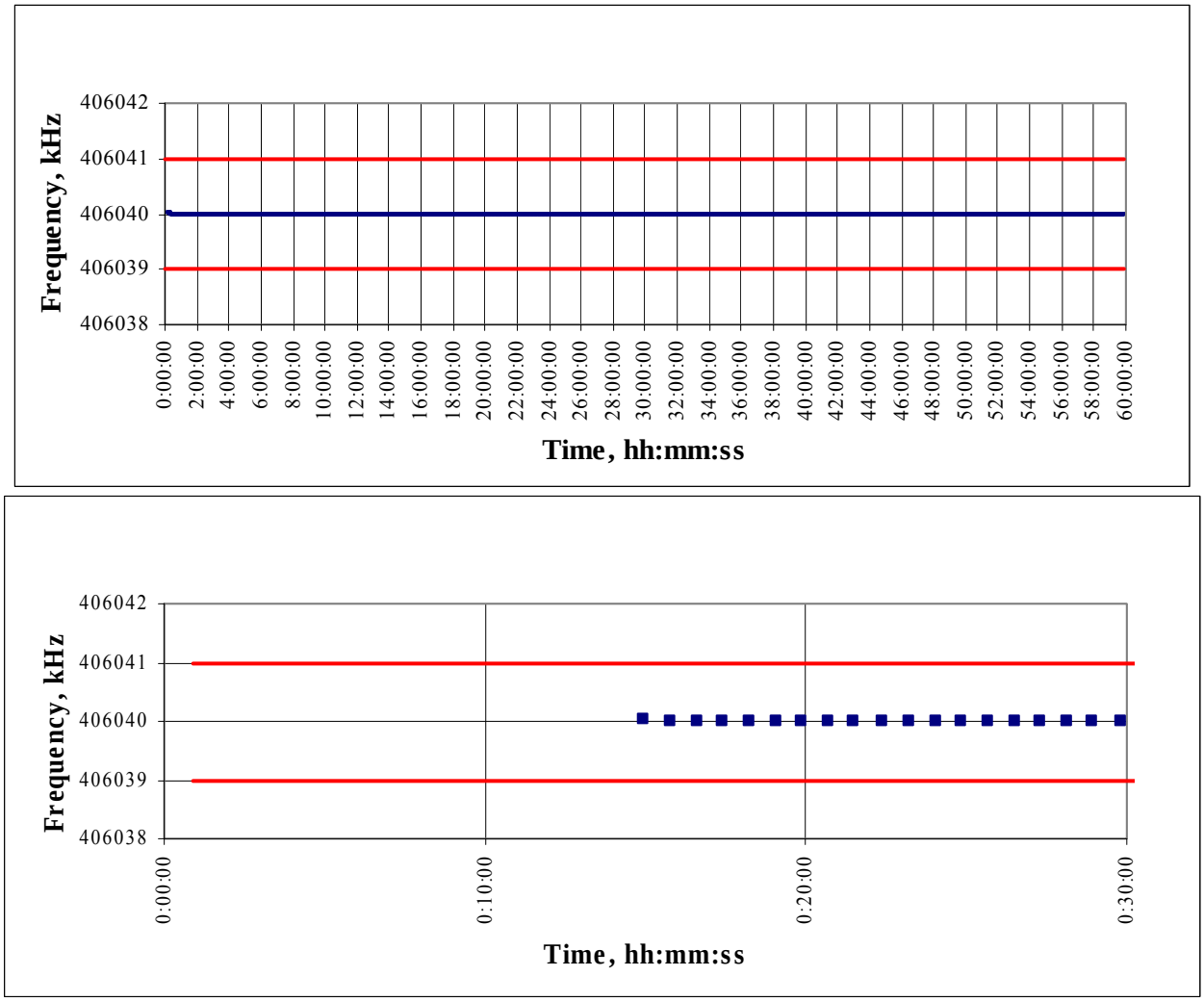


Figure 12.6 – Nominal Value of frequency

- **Short-Term Stability (A.3.2.1.2)**

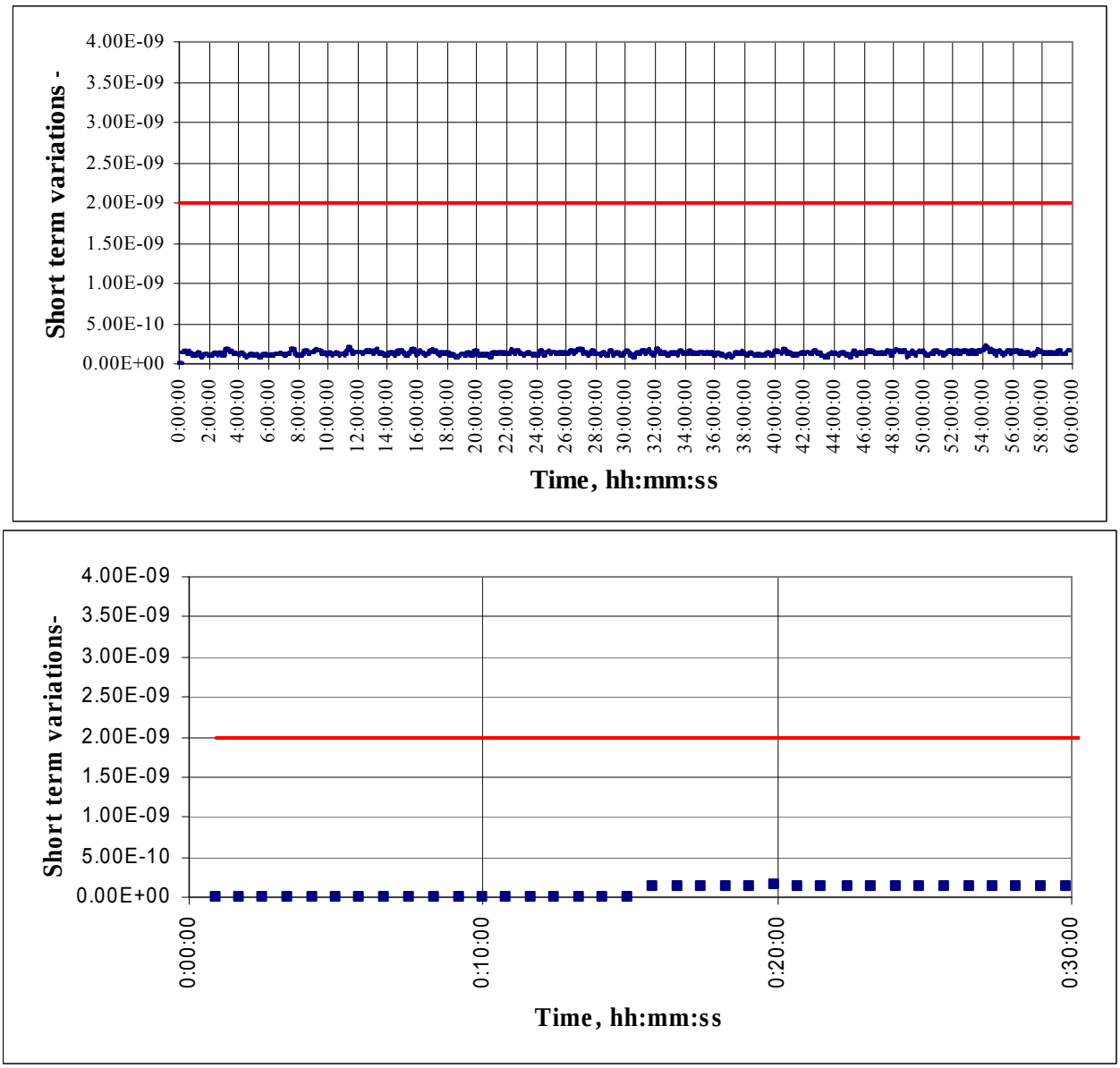
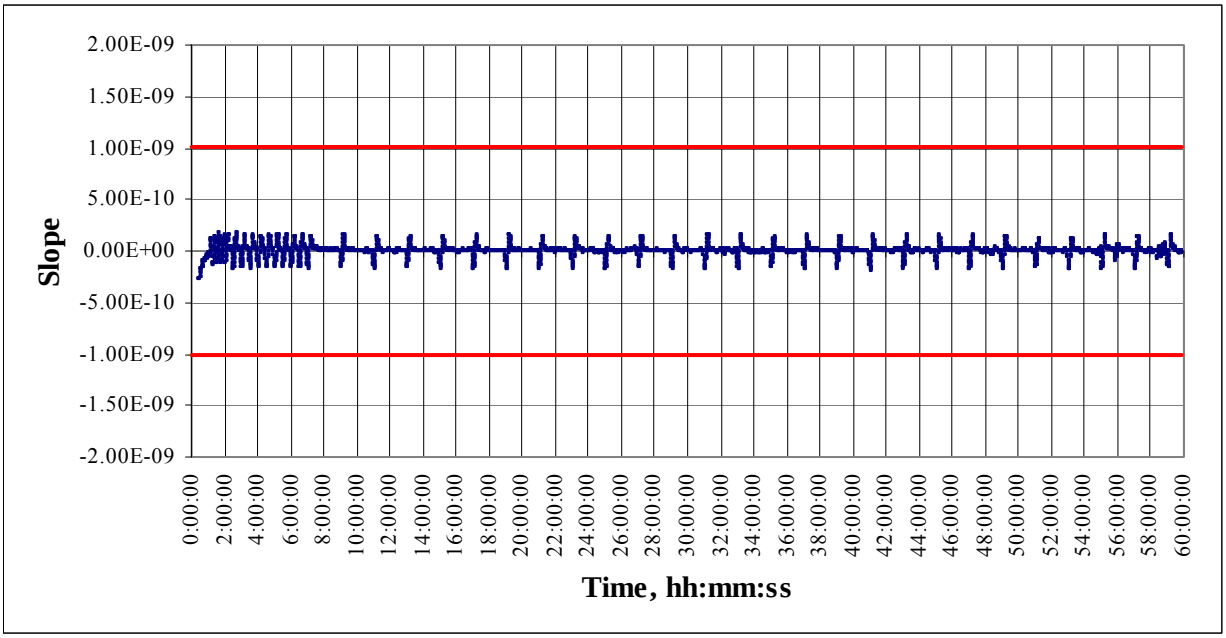


Figure 12.7 – Short-Term Stability

- **Medium-Term Stability (A.3.2.1.3)**



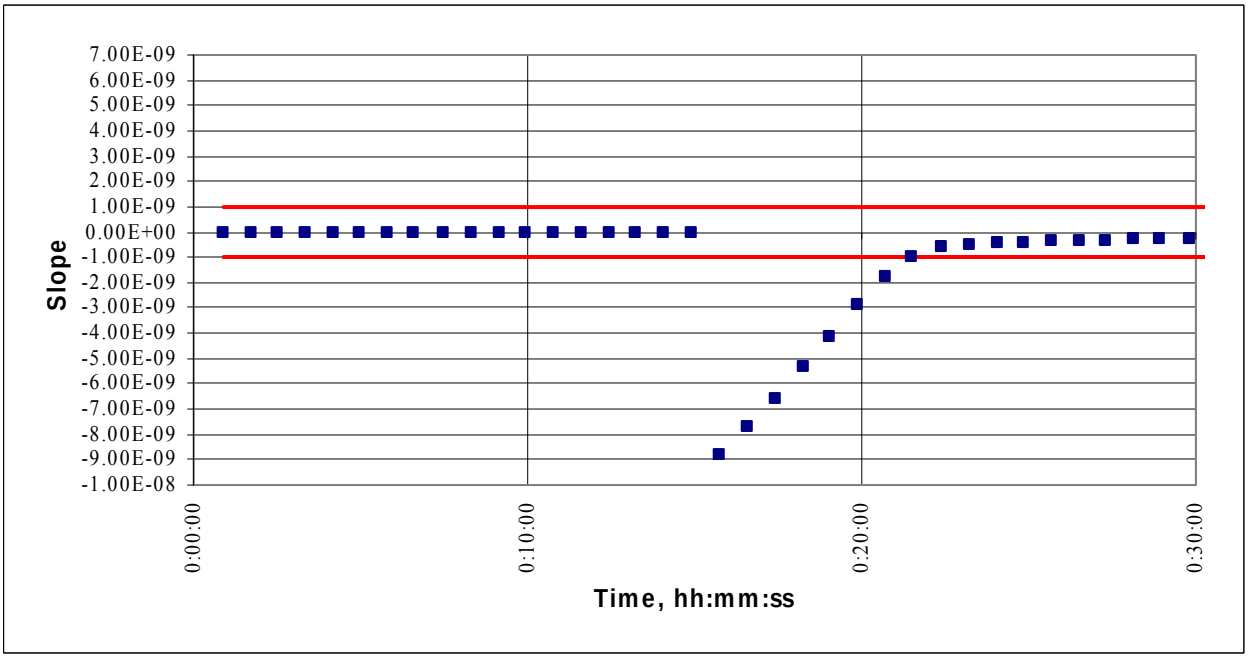
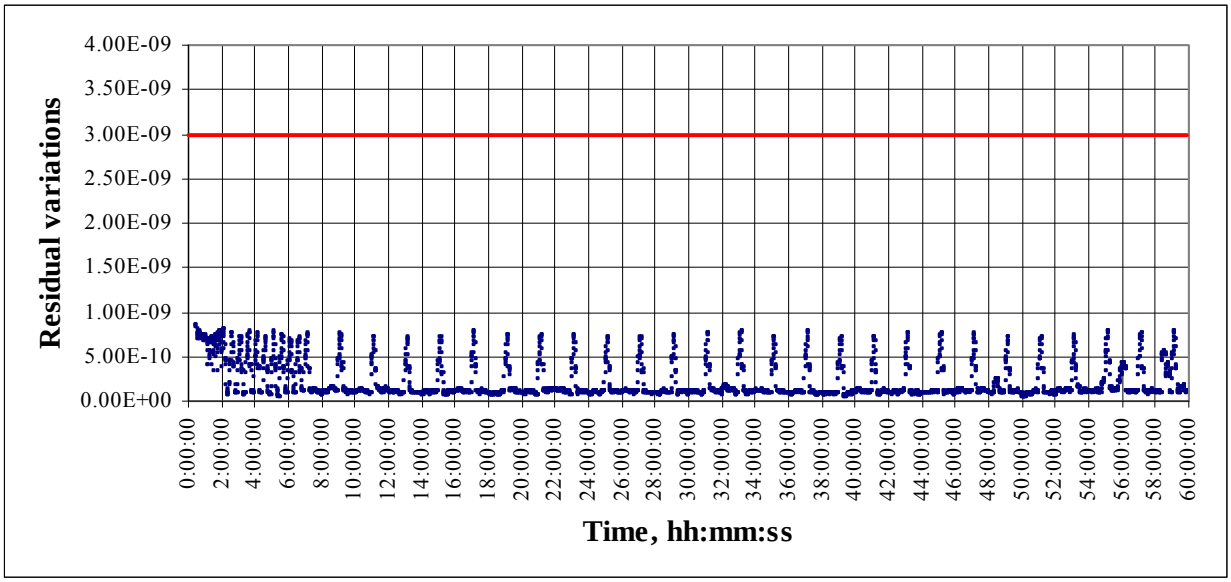


Figure 12.8 – Medium-Term Stability (Slope)



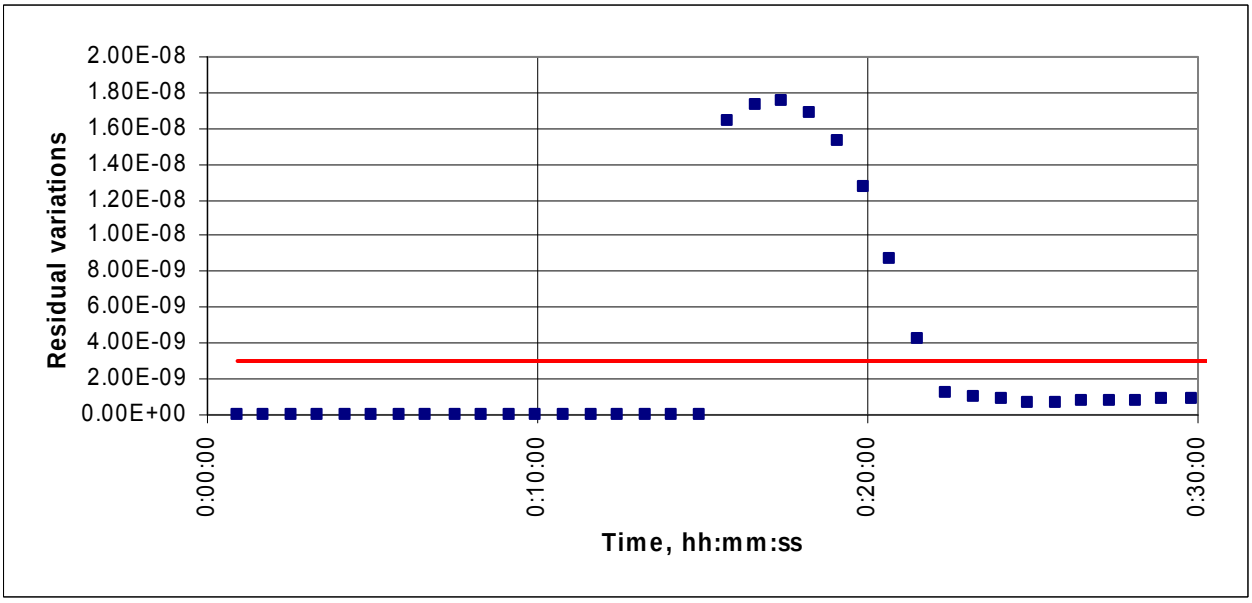
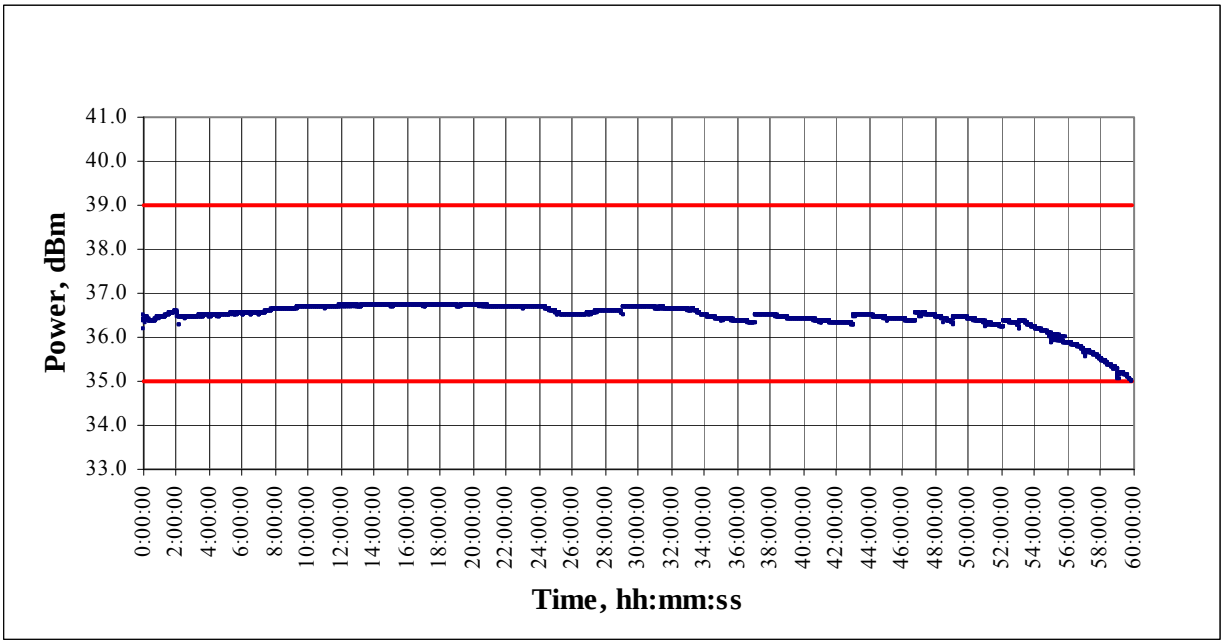


Figure 12.9 – Medium-Term Stability (Residual variations)

b) Transmitter Power Output (according to C/S T.007 – section A.3.2.2.1).

- **Transmitter Power Output Level (A.3.2.2.1)**



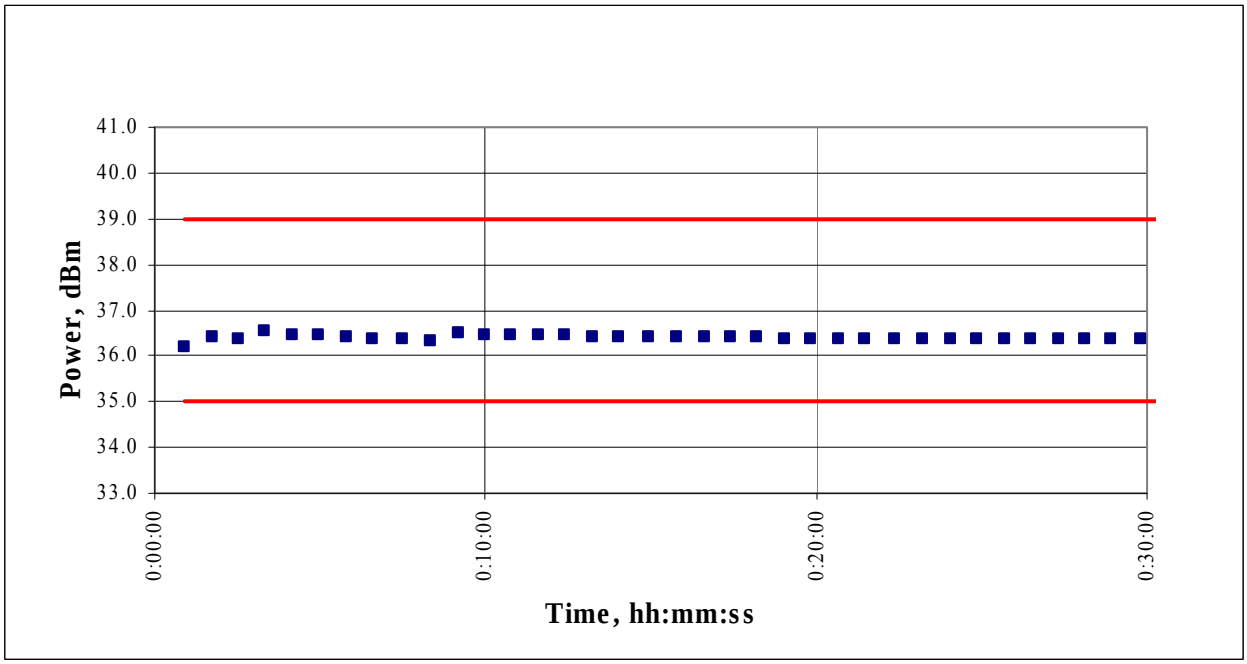


Figure 12.10– Transmitter power during test

c) Message Coding (according to C/S T.007 - A.3.1.4)

Bursts received	4347
BCH error	0
Self test message	0
Full HEX message	FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C

Decoding Beacon Message

ITEM	BITS	VALUE
Message format: long format	25	1
Protocol: Location Protocol	26	0
Country code: 201 - **Albania**	27-36	0011001001
Type of location protocol: Standard Location - Test	37-40	1110
Test Protocol: Test Protocol (No Decode information in bits 41 to 64)	41-64	11111001110000000011000 11
Latitude Sign: default	65	0
Latitude Degrees: default	66-72	1111111
Latitude Minutes: default	73-74	11
Longitude Sign: default	75	0
Longitude Degrees: default	76-83	11111111
Longitude Minutes: default	84-85	11
BCH 1 Encoded:	86-106	00000111101000101011 0
BCH 1 Calculated:	N/A	00000111101000101011 0
Fixed bits (1101): Pass	107-110	1101
Position Data: Encoded Position Data Source From Internal Navigation Device	111	1
Aux Device: 121.5 MHz homer	112	1
Latitude Offset Sign: default	113	1
Latitude Offset Minutes: default	114-118	00000
Latitude Offset Seconds: default	119-122	1111
Longitude Offset Sign: default	123	1
Longitude Offset Minutes: default	124-128	00000
Longitude Offset Seconds: default	129-132	1111
BCH 2 Encoded:	133-144	011001101100
BCH 2 Calculated:	N/A	011001101100
Composite Latitude: default	N/A	Composite Longitude: default
15 Hex ID:	N/A	193DF380C6FFBFF

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Temperature meter	gradient 2002	078	02.2015
2	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
3	Hygrometer digital	HP 22-A	60974546	12.2014
4	Beacon tester	BT100AVS	2315	07.2015
5	Beacon tester	BT-611	1005	06.2015
6	Spectrum analyzer	FSH8	105763	10.2016

ANNEX 13.
STROBE LIGHT TEST (A13.2)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 25.04.2014 - 29.04.2014
Test Conditions:
- Ambient temperature: 19.9-22.7°C
- Atmospheric pressure: 747-750 mm/Hg
- Relative air humidity: 51-60 %

TEST DESCRIPTION:

The strobe light test may be performed separately or in conjunction with the Self-test or any of the COSPAS-SARSAT Type approval tests. This test must be performed at the minimum operating temperature (or colder), at the ambient temperature, and at the maximum operating temperature (or hotter). The EUT should be turned OFF and thermally soaked for at least 3 hours at the required operating temperature.
The EUT should be turned ON and the strobe light flash rate and effective intensity requirements of section 2.2.8 should be verified at the maximum, minimum, and ambient temperatures.

The requirements of section 2.2.8:
An alerting and locating strobe light should be provided producing a white light with an effective intensity of not less than 0.75 candela, flashing at a rate of 20 to 30 times per minute. For the purpose of these standards, a strobe light should mean a light that produces a luminous flash with duration of 10^{-6} to 10^{-2} seconds.
The light should be activated concurrently with the satellite EPIRB, begin flashing within 10 seconds, and operate continuously for at least of 48 hours.

TEST RESULTS:

The measurements of effective luminous intensity were performed according to IEC 61097-2, clause 5.3.3.3.
The EUT was turned OFF and thermally soaked for 3 hours at the required operating temperature. Then the EUT was turned ON and the strobe light flash rate and effective luminous intensity were measured at 49 points over the upper hemisphere of the EUT.
The strobe light test was performed at the ambient temperature, at the minimum operating temperature and at the maximum operating temperature.
– Step 1. Condition: The EUT was turned OFF and thermally soaked at the temperature 20 °C for 3 hours.
– Step 2. Condition: The EUT was turned ON and the strobe light flash rate and effective intensity were measured at 20°C.
– Step 3. Condition: The EUT was turned OFF and thermally soaked at the temperature -20 °C for 3 hours
– Step 4. Condition: The EUT was turned ON and the strobe light flash rate and effective intensity were measured at -20°C.
– Step 5. Condition: The EUT was turned OFF and thermally soaked at the temperature +55 °C for 3 hours.
– Step 6. Condition: The EUT was turned ON and the strobe light flash rate and effective intensity were measured at +55°C.

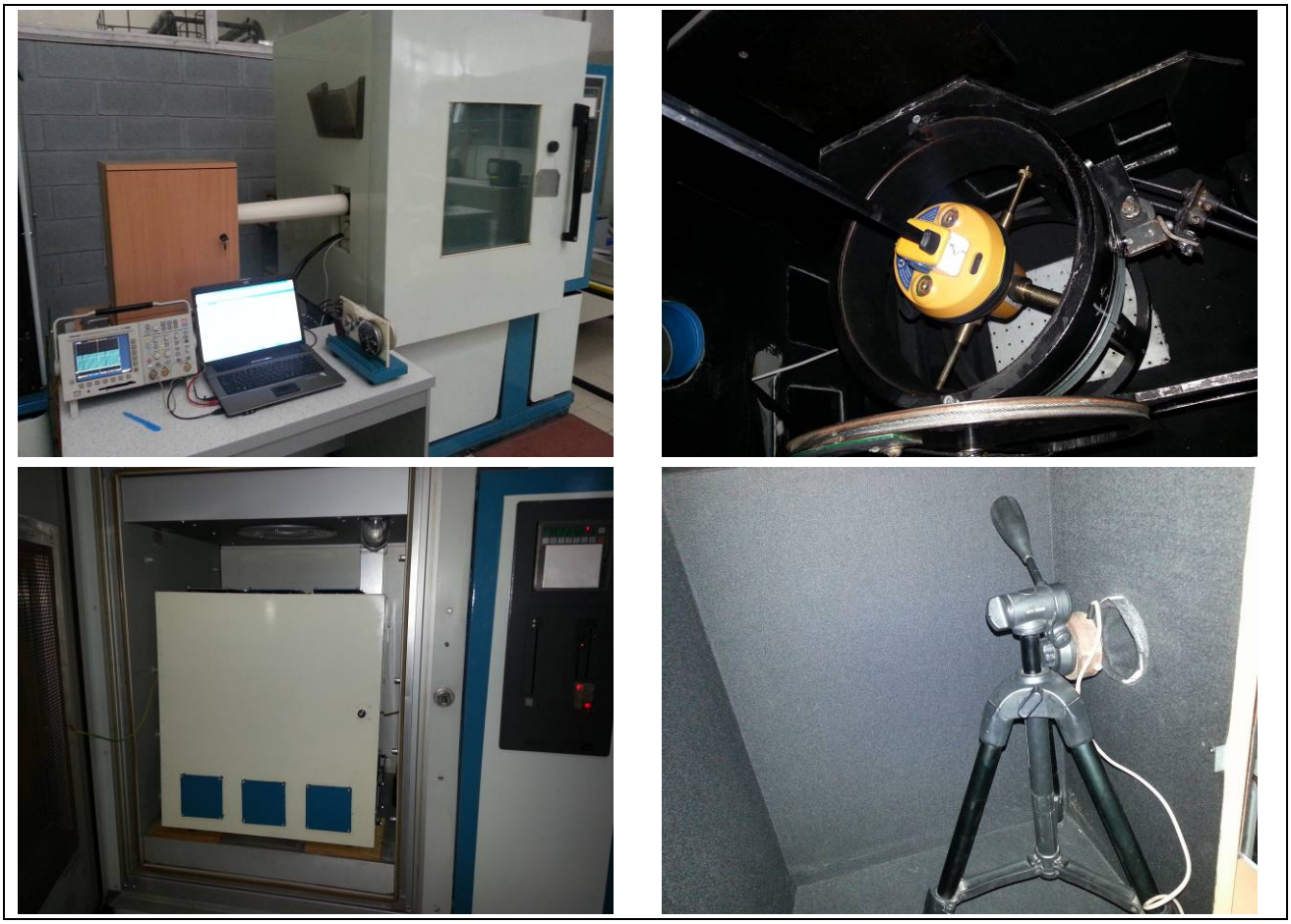


Figure 13.1 – Low-duty cycle light test. The EPIRB1 stays in the climatic chamber.
General view of test equipment for low-duty cycle light test

Effective luminous intensity at -20°C

	Elevation								
Azimuth	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1.93	6.20	7.87	8.97	9.60	10.07	10.51	11.16	7.71
45°	1.96	8.09	8.75	8.03					
90°	4.78	4.31	4.47	5.03	5.40	5.92	8.28	10.07	
135°	3.44	5.31	4.87	5.09					
180°	2.78	5.49	6.69	6.23	7.59	8.34	9.22	9.72	
225°	3.12	8.06	7.93	7.71					
270°	1.47	4.84	4.72	4.69	4.53	4.81	9.06	9.53	
315°	1.63	5.46	5.28	5.15					

Effective luminous intensity at 20°C

	Elevation								
Azimuth	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1.52	8.97	8.49	8.18	7.87	8.18	8.49	8.84	9.12
45°	1.85	8.49	8.03	7.56					
90°	3.00	5.15	4.69	4.53	4.72	5.28	10.10	9.09	
135°	3.66	5.15	4.72	4.50					
180°	2.81	6.35	6.69	6.72	7.34	8.24	8.34	8.75	
225°	2.56	7.28	7.47	7.47					
270°	1.14	4.69	4.50	4.22	4.16	4.31	8.28	8.71	
315°	1.34	5.15	5.09	4.69					

Effective luminous intensity at 55°C

Azimuth	Elevation								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1.39	8.06	7.78	7.34	7.16	7.34	7.84	8.03	8.21
45°	1.24	7.65	7.40	6.88					
90°	2.81	4.78	4.22	4.16	4.22	4.72	9.12	8.18	
135°	3.44	4.78	4.25	4.07					
180°	1.90	4.84	5.31	5.61	6.32	7.34	7.47	7.90	
225°	1.65	6.79	6.72	6.79					
270°	1.07	4.19	4.13	3.91	3.75	3.81	7.25	7.84	
315°	1.21	4.72	4.63	4.19					

FINAL RESULTS OF STROBE LIGHT TEST (A13.2 RTCM 11000.2 Version 2.1)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICA-TION	UNITS	TEST RESULTS			COM-MENTS (PASS/FAIL)
			Tmin (- 20 °C)	Tamb (+ 20 °C)	Tmax (+ 55 °C)	
• Flash rate	20-30	/min	24	24	24	PASS
• Effective luminous intensity	≥0.75	Cd	≥1.47	≥1.14	≥1.07	PASS
• Pulse duration	10^{-6} to 10^{-2}	s	10^{-2}	10^{-2}	10^{-2}	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Graphic luxmeter	LG-05	17	06.2014
2.	Climatic chamber	КРК-400V	015	08.2014
3.	Rotation and inclination device	RD-360/90	01	05.2014
4.	Temperature meter	Gradient -2002	078	02.2015
5.	Oscilloscope	TDS-3052	B011258	05.2014

ANNEX 14.
SELF- TEST (A13.3)

Equipment Under Test (EUT): EPIRB1, s/n 002

SW version: Issue 00.04

Test Date: 17.02.2014 – 19.02.2014
Test Conditions:
- Atmospheric pressure: 758 – 760 mm/Hg
- Relative air humidity: 45 – 57 %
- Temperature
  Minimum: -20 °C
  Maximum: +55 °C
  Ambient: +20 °C

TEST DESCRIPTION

The EUT should be turned OFF and thermally-soaked for at least 3 hours at the required operating temperature.
The EUT should be turned ON and the aliveness test performed. Upon successful completion of the aliveness test, the EUT should be turned OFF.
After a period of at least 5 minutes, the EUT should be placed in the self-test mode in accordance with the manufacturer's operating instructions. The EUT should indicate successful completion of the self-test and the following should be verified:
1. The 406 MHz RF output pulse duration does not exceed 0.444 seconds (for beacons that normally transmit short messages) or 0.525 seconds (for beacons that normally transmit long messages).
2. The frame synchronization pattern is 0 1101 0000.
3. Only one burst of the 406 MHz RF signal is transmitted.
4. The content of the message provides the beacon 15-Hex ID

TEST RESULT

Test Method:
The self-test was performed at the minimum operating temperature, at the ambient temperature, and at the maximum operating temperature. Before test at each temperature the EUT was turned OFF and thermally-soaked for at least 3 hours at the required operating temperature. The EUT was turned ON and the aliveness test performed. Upon successful completion of the aliveness test, the EUT was turned OFF. The EUT then was placed in the self-test mode in accordance with the manufacturer's operating instructions. The EUT was inspected to indicate successful completion of the self-test and the following parameters were verified:

1. The 406 MHz RF output pulse duration.
2. The frame synchronization pattern.
3. Quantity of bursts transmitted.
4. The content of the message.
5. Self test 121.5 MHz transmission duration.

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1	
406 MHz Transmitter Parameters	**Limits**		**Measured**	
	min	**max**	**current**	
Frequency, kHz	406.039	406.041	406.040014	
Power, Wt	3.16	7.94	4.82	
Total burst duration, ms)	514.80	525.20	548.40	
121.5 MHz Transmitter Parameters				
Carrier Frequency, Hz	121498167			
Self test 121.5 MHz transmission (<1 second or 3 sweeps)			Pass	
Message				
Digital message	FFFED08C9EF9C0637FDFF83D15B783E0F66C			
15 HEX ID	193DF380C6FFBFF			

Figure 12.1 - EPIRB1, s/n 002 at Ambient Temperature

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1	
406 MHz Transmitter Parameters	**Limits**		**Measured**	
	min	**max**	**current**	
Frequency, kHz	406.039	406.041	406.039970	
Power, Wt	3.16	7.94	4.44	
Total burst duration, ms)	514.80	525.20	518.05	
121.5 MHz Transmitter Parameters				
Carrier Frequency, Hz	121498242			
Self test 121.5 MHz transmission (<1 second or 3 sweeps)			Pass	
Message				
Digital message	FFFED08C9EF9C0637FDFF83D15B783E0F66C			
15 HEX ID	193DF380C6FFBFF			

Figure 12.2 - EPIRB1, s/n 002 at Maximum Temperature

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1	
406 MHz Transmitter Parameters	**Limits**		**Measured**	
	min	**max**	**current**	
Frequency, kHz	406.039	406.041	406.040019	
Power, Wt	3.16	7.94	4.53	
Total burst duration, ms)	514.80	525.20	518.20	
121.5 MHz Transmitter Parameters				
Carrier Frequency, Hz	121497746			
Self test 121.5 MHz transmission (<1 second or 3 sweeps)			Pass	
Message				
Digital message	FFFED08C9EF9C0637FDFF83D15B783E0F66C			
15 HEX ID	193DF380C6FFBFF			

Figure 12.3 - EPIRB1, s/n 002 at Minimum Temperature

Decoding Beacon Message

Full message: FFFED08C9EF9C0637FDFF83D15B783E0F66C

ITEM	BITS	VALUE
Message format: long format	25	1
Protocol: Location Protocol	26	0
Country code: 201 - **Albania**	27-36	0011001001
Type of location protocol: Standard Location - Test	37-40	1110
Test Protocol: Test Protocol (No Decode information in bits 41 to 64)	41-64	111110011100000001100011
Latitude Sign: default	65	0
Latitude Degrees: default	66-72	1111111
Latitude Minutes: default	73-74	11
Longitude Sign: default	75	0
Longitude Degrees: default	76-83	11111111
Longitude Minutes: default	84-85	11
BCH 1 Encoded:	86-106	00000111101000101010
BCH 1 Calculated:	N/A	00000111101000101010
Fixed bits (1101): Pass	107-110	1101
Position Data: Encoded Position Data Source From Internal Navigation Device	111	1
Aux Device: 121.5 MHz homer	112	1
Latitude Offset Sign: default	113	1
Latitude Offset Minutes: default	114-118	00000
Latitude Offset Seconds: default	119-122	1111
Longitude Offset Sign: default	123	1
Longitude Offset Minutes: default	124-128	00000
Longitude Offset Seconds: default	129-132	1111
BCH 2 Encoded:	133-144	011001101100
BCH 2 Calculated:	N/A	011001101100
Composite Latitude: default	N/A	Composite Longitude: default
15 Hex ID:	N/A	193DF380C6FFBFF

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	KTK-800	24708	12.2014
2.	Temperature meter	gradient 2002	078	02.2015
3.	Hygrometer digital	HP 22-A	60974546	12.2014
4.	Beacon tester	BT100AVS	2315	07.2015
5.	Beacon tester	BT-611	1005	06.2015
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 15.
STABILITY AND BUOYANCY TEST (A15.0)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 17.06.2014
Test Conditions:

- Ambient temperature: 23.4 °C
- Atmospheric pressure: 755 mm/Hg
- Relative air humidity: 65 %

TEST DESCRIPTION

With the antenna deployed in it's normal operating position, the EUT should, when rotated to a horizontal position about any axis, submerged just below the surface, and released, pass through an upright position within 2 seconds.
The EUT should float upright in calm fresh water with the base of the antenna a minimum of 40 mm above the water-line.
The reserve buoyancy of the satellite EUT (EPIRB) should be at least 5% when determined by the following procedure:
Submerge the complete unit and measure the buoyant force with a scale.
Divide the measured buoyant force by the weight of the unit. The result should be at least 0.05.

TEST RESULT

– Step 1. The EUT was, when rotated to a horizontal position about any axis, submerged just below the surface.
– Step 2. The EUT was released and passes through an upright position within 1.2 seconds.
– Step 3. The distance from the waterline to the base the antenna was measured while the EUT floated upright in calm fresh water.
– Step 4. The EUT was submerged in water.
– Step 5. The buoyant force was measured with dynamometer:
Buoyancy force: 1.47 N (i.e. 0.150 kg)
The EUT weight: 0.428 kg

– Step 6. The reserve buoyancy was calculated by dividing the measured buoyant force by the weight of the unit.
0.150 / 0.428= 0.35

Figure 16.1 – Buoyancy test

Figure 16.2 – Measuring of distance from water level to the base of antenna while EUT floating in calm fresh water.

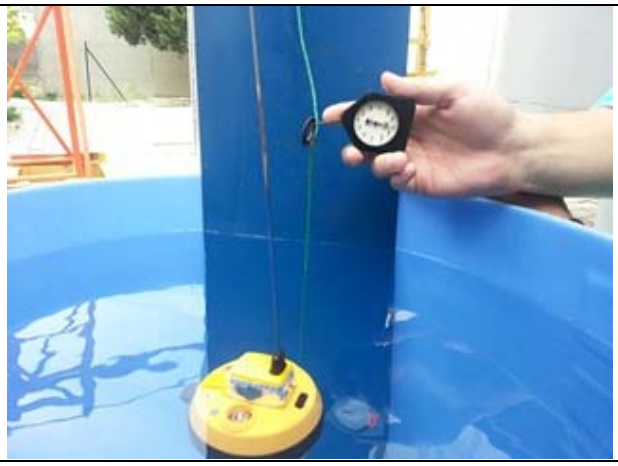


Figure 16.3 – Measuring of buoyant force

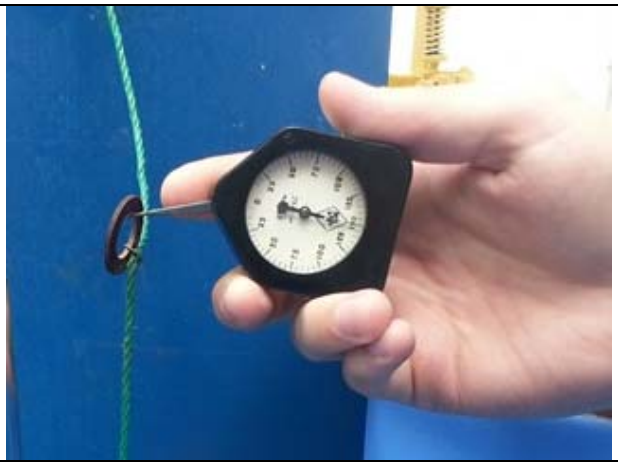


Figure 16.4 – Dynamometer

FINAL RESULTS OF STABILITY AND BUOYANCY TEST (A15.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Stability	≤ 2	s	1.2	PASS
• Buoyancy	> 5	%	35	PASS
• Float upright; Antenna base	> 40	mm	44	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Set of buoyancy	-	101173	10.2014
2	Set of stability	-	101175	05.2016
3	Scale	CAS AD-10H	60400410	03.2015
4	Dynamometer	Г25-150	13465	03.2015
5	Ruler	Lineyka-1000	64	03.2015

ANNEX 16.
INADVERTENT ACTIVATION TEST (A16.0)

Equipment Under Test (EUT): EPIRB1, s/n 004 with MRH

SW version: Issue 00.04

Test Date: 18.07.2014
Test Conditions:

- Ambient temperature: 35 °C
- Atmospheric pressure: 749 mm/Hg
- Relative air humidity: 55 %

TEST DESCRIPTION

The EUT was mounted on the rotatable support and fixed as it is described in the user's manual. A stream from a hose was directed at the EUT for a period of 5 min. The nozzle of the hose has a nominal diameter of 63.5 mm and a water-delivery rate of 2300 liters of water per minute. The end of the nozzle was 3.50 m away from the EUT and 1,50 m above the base of the antenna. EUT was rotated during the test, so that water strikes the EUT in an arc of 180° perpendicular to the normal mounting position of the EUT.

TEST RESULT

EPIRB was not released from its release mechanism. EPIRB was not automatically activated as a result of the water from the hose stream.

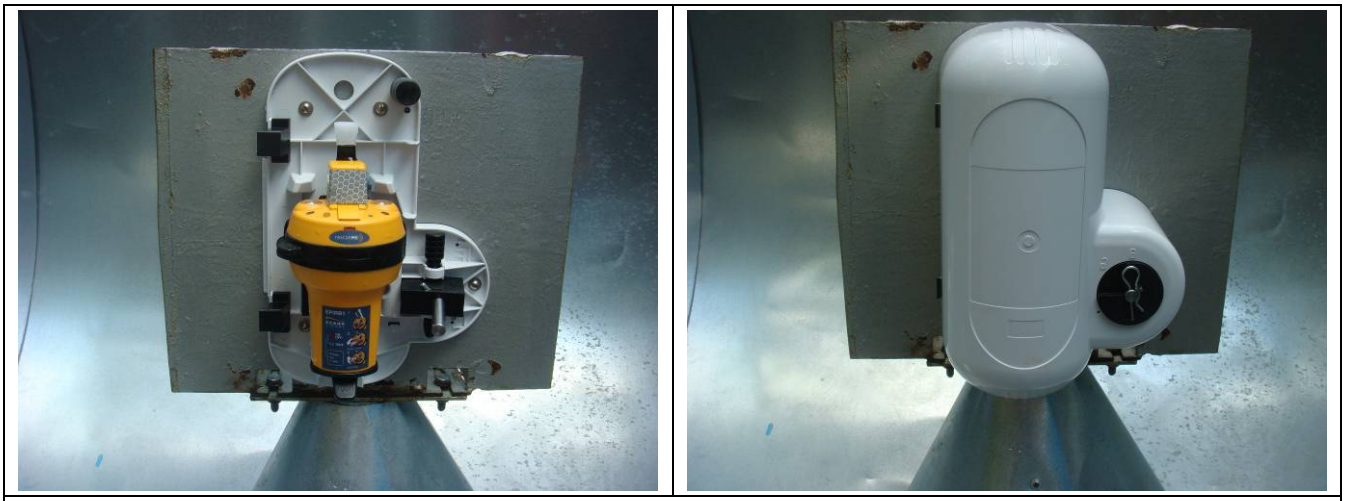


Figure 13.1 – EUT (EPIRB and release mechanism) mounted on the rotatable support before test.

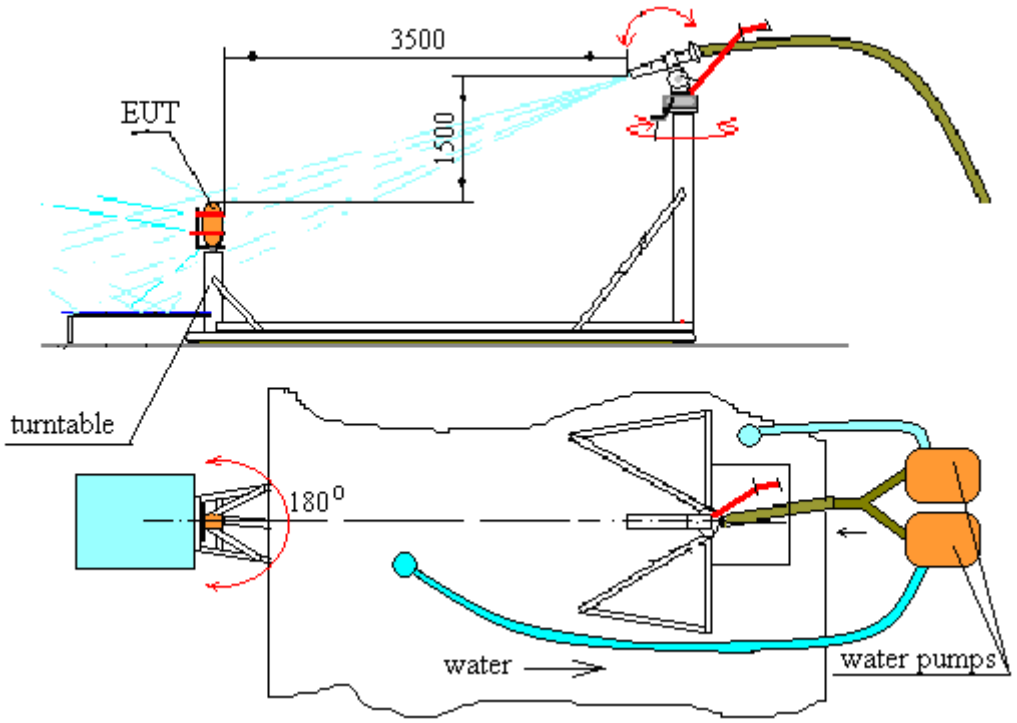


Figure 13.2 – Drawing of the test set

Figure 13.3 – General view of the test setup


Figure 13.4 – EUT (EPIRB1 in MRH) mounted on the rotatable support before test.


Figure 13.4 - The water washes EUT in an arc of 180º.

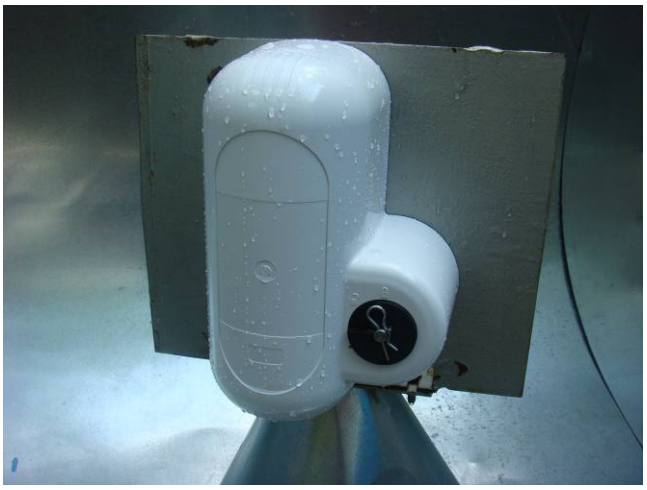



Figure 13.5 - View of EUT upon completion of inadvertent activation test

FINAL RESULTS OF INADVERTENT ACTIVATION TEST (A16.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Release	EUT should not be released from bracket	√	√	PASS
• Activation	EUT should not be automatically activated	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Beacon tester	BT-611	1005	02.2015
2	Installation of water washing	-	101174	08.2015
3	Stopwatch	SOSpr-2b-2	2388	01.2015

ANNEX 17.
121.5 MHz AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0)

Equipment Under Test (EUT): EPIRB1, s/n 002, 006

SW version: Issue 00.04

Test Date: 24.03.2014, 16.04.2014 – 17.04.2014
Test Conditions:
– Atmospheric pressure: 753-755 mm/Hg
– Relative air humidity: 51-58 %
– Temperature
Minimum: -20 °C
Maximum: +55 °C
Ambient: +20 °C

TEST DESCRIPTION

1. Carrier Frequency Test
The carrier frequency test was performed with a spectrum analyzer. The carrier frequency measured at the minimum and maximum operating temperatures.

2. Modulation Characteristics
The transmitter duty cycle, modulation frequency, modulation duty cycle, modulation factor and sweep repetition rate were determined by observing the detected RF signal with a storage oscilloscope. The frequency coherence test was performed with a spectrum analyzer.
All measurements were made at the minimum and maximum operating temperatures.
3. Peak Effective Radiated Power

The elevation angle between 5° and 20° which produces a maximum gain was determined with the EUT at an arbitrary azimuth. The peak envelope power was measured and the elevation angle was noted and should remain fixed for the remainder of the test. The remaining 11 measurements of the peak effective radiated power were obtained by rotating the EUT in increments of 30° ± 3°. For each measurement the EUT peak effective radiated power (PERP) was computed using the following equation:

$$PEIRP = LOG^{-1}\frac{P_{REC} - G_{REC} + L_C + L_P}{10},$$

Where:
P_{REC} – Measured Power level from spectrum analyzer (dBm);
G_{REC} – Antenna gain of search antenna (dB);
L_C – Receive system attenuator and cable loss (dB);
L_P – Free space propagation loss (dB).

– Step No. 1
Carrier Frequency Test (A17.1)
Condition: The carrier frequency was measured at the minimum and maximum operating temperatures.

– Step No. 2
Modulation Characteristics (A17.2)
Condition for Transmitter Duty Cycle Measurement: During the observation of the transmitted signal the carrier was not interrupted (except for up to two seconds during transmission of the 406 MHz pulse).

– Step No. 3
Modulation Characteristics (A17.2)
Condition for Modulation Frequency and Sweep Repetition Rate Measurement: During the observation of the modulation envelope the upper and lower audio-frequency sweep limits and sweep repetition rate were measured.

– Step No. 4
Modulation Characteristics (A17.2)
Condition for Modulation Duty Cycle Measurement: The modulation duty cycle was measured near the start, midpoint, and end of the modulation sweep period. Modulation duty cycle was calculated using the following formula

$$Duty\ Circle = \frac{A}{B} \times 100\%$$

– Step No. 5
Modulation Characteristics (A17.2)
Condition for Modulation Factor Measurement: The modulation factor was defined with respect to the maximum and minimum amplitudes of the modulation envelope, by the following formula

$$Modulation\ Factor = \frac{A - B}{A + B}$$

– Step No. 6
Modulation Characteristics (A17.2)
Condition for Frequency Coherence Measurement:
The measurement was made for the total power emitted during any transmission cycle with or without modulation.
The measurement was made to define the carrier frequency shift after interruption by the transmission of the 406 MHz burst.

– Step No. 7
Peak Effective Radiated Power (A17.2)
Condition for Peak Effective Radiated Power Measurement: This test was performed at ambient temperature for the EUT whose battery had been ON for a minimum of 44 hours.
The test site was positioned on the ground with uniform electrical characteristics. The site was clear of metal objects, overhead wires, etc., and was as free as possible from undesired signals such as ignition noise or other RF carriers. The distance from the EUT, or the search antenna to reflecting objects was more than 30 m. The EUT was placed in the center of a ground plane with a radius of 75 cm ± 5 cm mounted on the ground level. The EUT was positioned vertically such that the ground plane was at the nominal waterline. The ground plane was resting on the ground and extended so that it completely enclosed and presented a snug fit to the below waterline portion of the EUT.

Measurement of the radiated signals was made at a point 10 m from the EUT. At this point, a wooden pole or insulated tripod with a movable horizontal boom was arranged. The search antenna was raised and lowered through an elevation angle of 5° to 20°. It was mounted on the end of the boom with its cable lying horizontally on the boom and run back to the supporting mast. The other end of the search antenna cable was connected to a spectrum analyzer located at the foot of the mast.
Note. The PERP measurement was performed on OATS which is compliant with CISPR requirements.

TEST RESULT

Minimum Operating Temperature

Figure 13.2 – Site for Carrier Frequency Test and Modulation Characteristic Measurement at the minimum, ambient and maximum operating temperatures

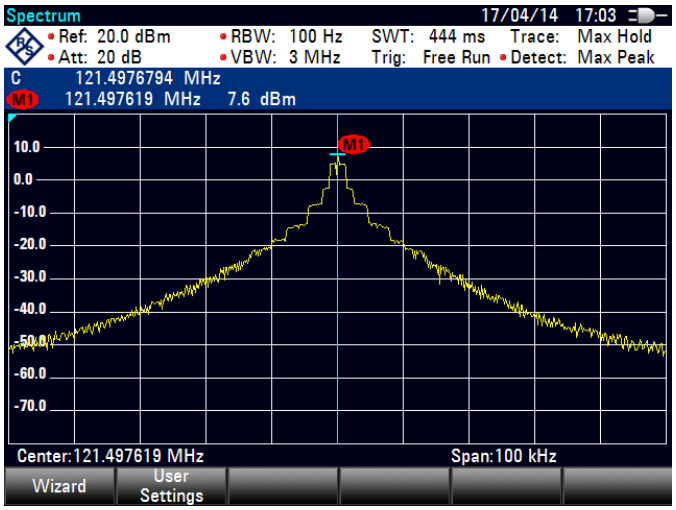
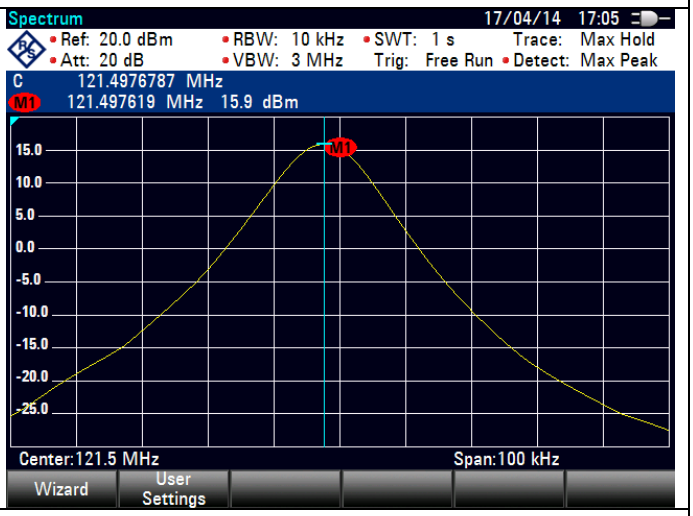


Figure 13.3 – Screenshot of Carrier Frequency Test Result at the minimum operating temperature

Frequency Coherence Measurement Test Result:	
(i) Set the spectrum analyzer controls as follows: • I.F. bandwidth: 10 kHz • Video filter: OFF or as wide as possible • Scan time: 100 ms./div. • Amplitude scale: 5 dB/div. • Scan width: 10 kHz/div. • Center frequency: 121.5 MHz (ii) Record the amplitude in dBm. (Figure 13.4)	 Figure 13.4 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the minimum operating temperature

(iii) Calculate the mean output power by adding 10 log(D), where D is the modulation duty cycle determined below, to the recorded signal level.

(iv) Set the spectrum analyzer controls as follows:

- I.F. bandwidth: 60 Hz or less
- Video filter: OFF or as wide as possible
- Scan time: 10 sec/div
- Amplitude scale: 0.5 dB/div
- Scan width: 20 Hz/div
- Center frequency: 121.5 MHz

(v) Measure and record the carrier power dBm as displayed on the spectrum analyzer (Figure 13.5).

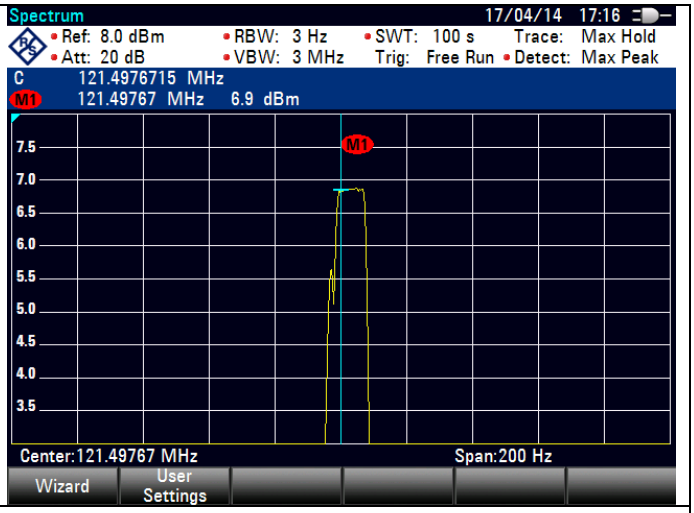


Figure 13.5 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at narrow band) at the minimum operating temperature

(vi) Calculate the ratio of carrier power to mean power from steps (iii) and (v) using the following formula:

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{dBc-dBmean}{10}}$$

dB_C = carrier power in step (v)
dB_{mean} = mean power in step (iii)

TEST RESULTS

Output power measurement at the antenna connector as per steps (i) and (ii) is 15.9 dBm.

Mean power calculated as per step (iii) is 15.9 + 10 log(D), where D is the modulation duty cycle. In the worst case D is 34.59%, therefore mean power is 15.9 + 10 log(0.3721) = 11.61 dBm
Carrier power that measured with 3 Hz I.F. bandwidth is 6.9 dBm.
Ratio of carrier power to mean power is 33.83 %.

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{dBc-dBmean}{10}} = 10^{\frac{6.9-11.61}{10}} = 0.3383$$

Carrier power is below of the mean power by 4.71 dB.
33.83 % of the total power is shown to be within ±3Hz of the carrier frequency.

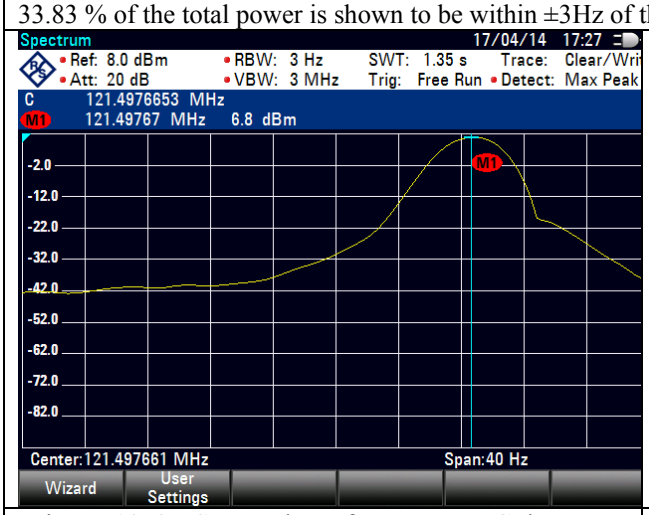


Figure 13.6 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the minimum operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst

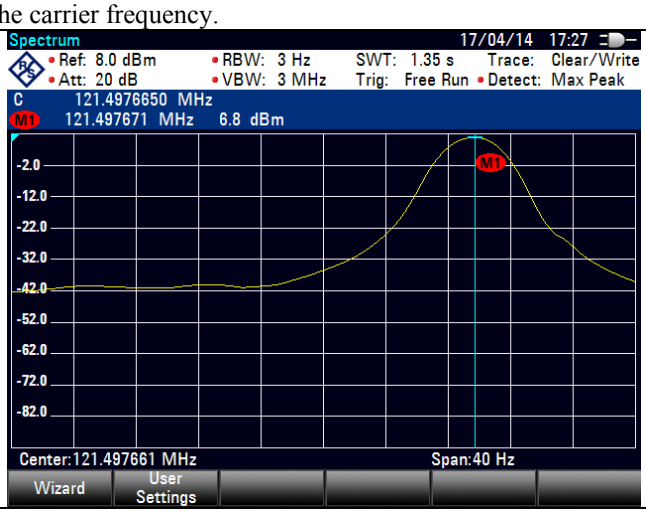
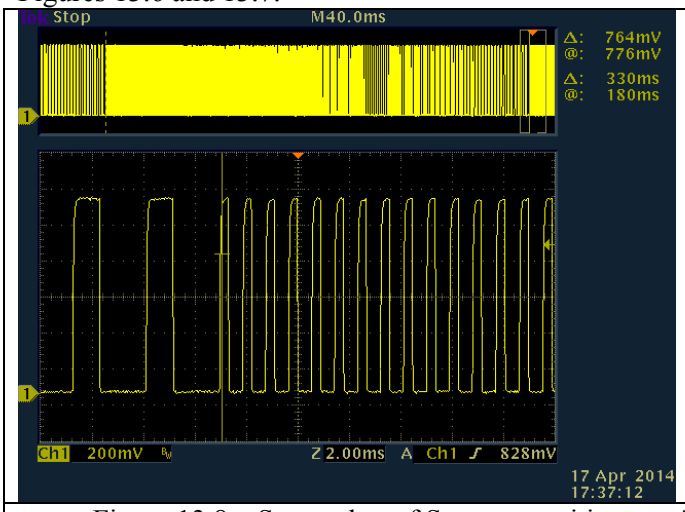


Figure 13.7 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the minimum operating temperature. Transmitted RF (121.5 MHz) after the interruption for the 406 MHz RF burst

The carrier frequency does not vary by more than +-30Hz during the interruption for a 406MHz transmission. See Figures 13.6 and 13.7.



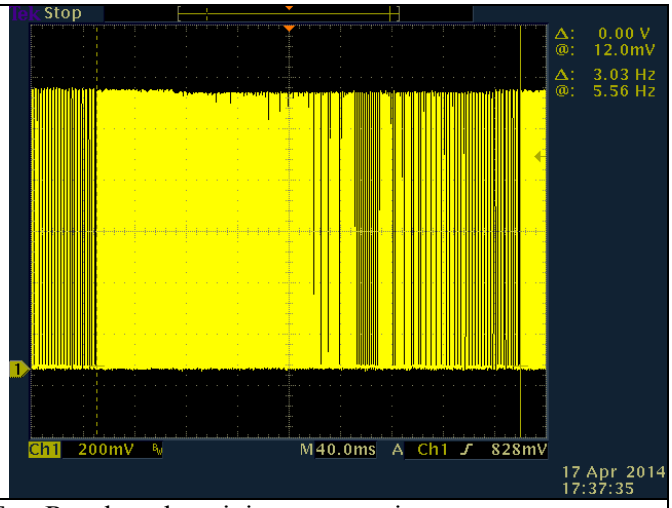


Figure 13.8 – Screenshot of Sweep repetition rate Test Result at the minimum operating temperature

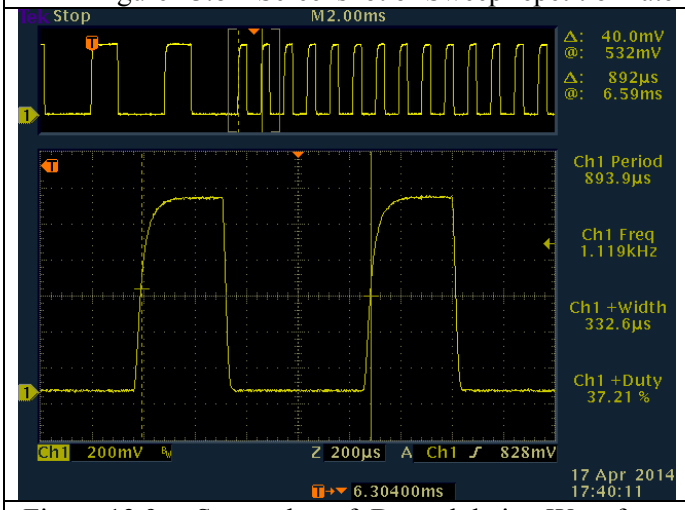


Figure 13.9 – Screenshot of Demodulation Waveform (A) measured start of the modulation sweep period at the minimum operating temperature

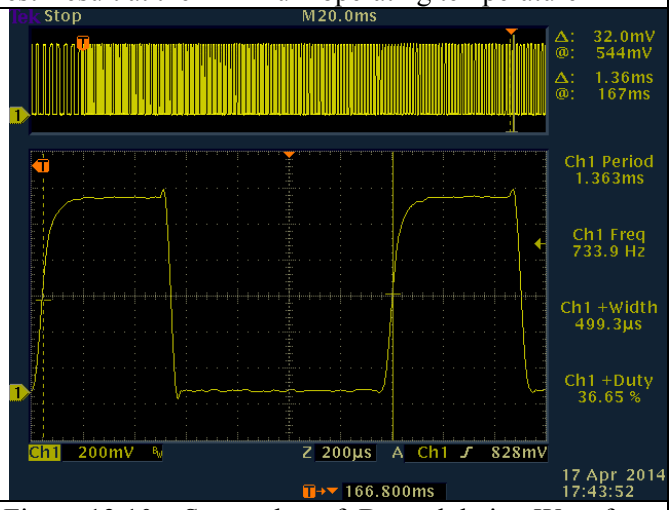


Figure 13.10 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the minimum operating temperature

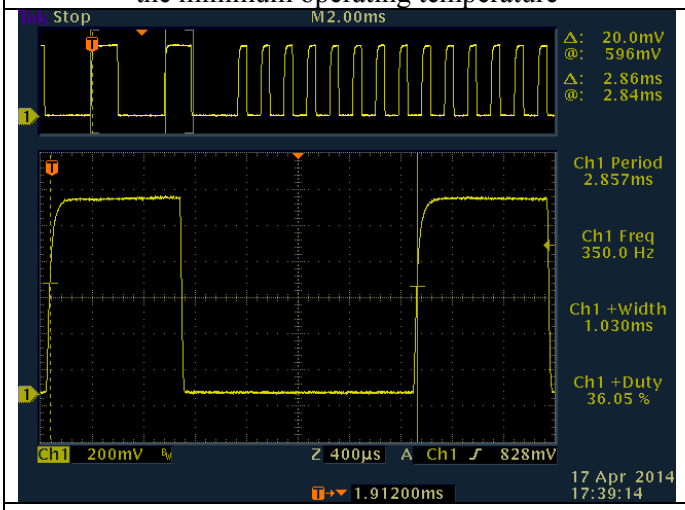


Figure 13.11 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the minimum operating temperature

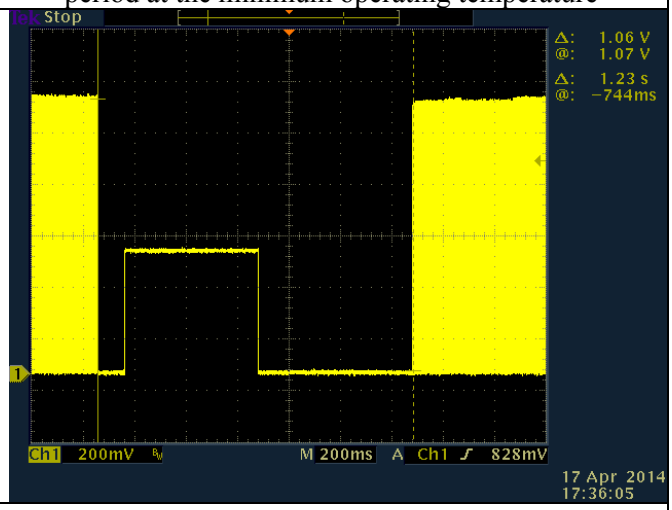


Figure 13.12 – Screenshot of Transmitter Duty Cycle Test Result at the minimum operating temperature

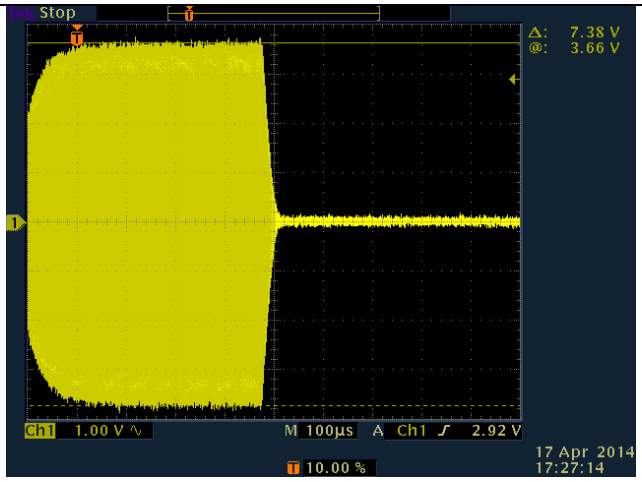


Figure 13.13 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the minimum operating temperature

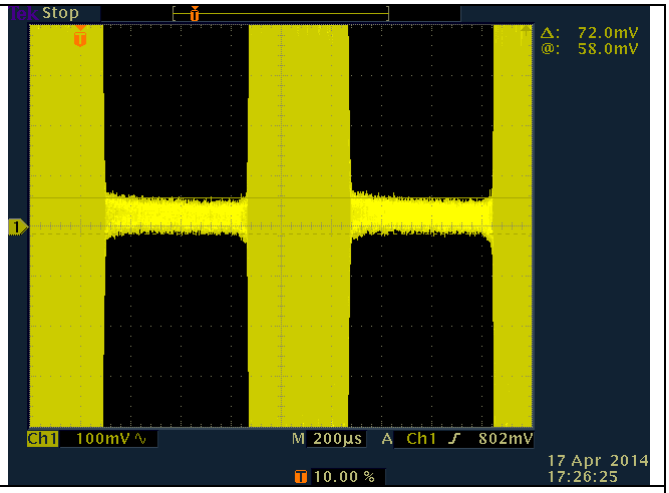


Figure 13.14 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the minimum operating temperature

$$Modulation\ Factor = \frac{A-B}{A+B} = \frac{7.38-0.072}{7.38+0.072} = 98.07\%$$

Maximum Temperature

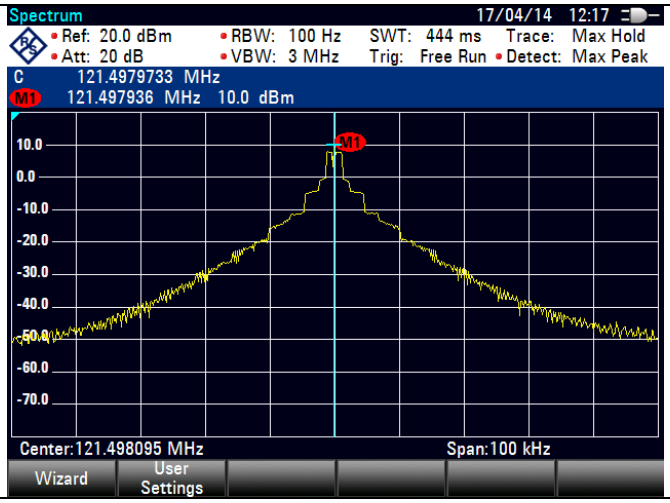


Figure 13.15 – Screenshot of Carrier Frequency Test Result at the maximum operating temperature

Frequency Coherence Measurement Test Result:

(i) Set the spectrum analyzer controls as follows:

- I.F. bandwidth: 10 kHz
- Video filter: OFF or as wide as possible
- Scan time: 100 ms./div.
- Amplitude scale: 5 dB/div.
- Scan width: 10 kHz/div.
- Center frequency: 121.5 MHz

(ii) Record the amplitude in dBm. (Figure 13.16)

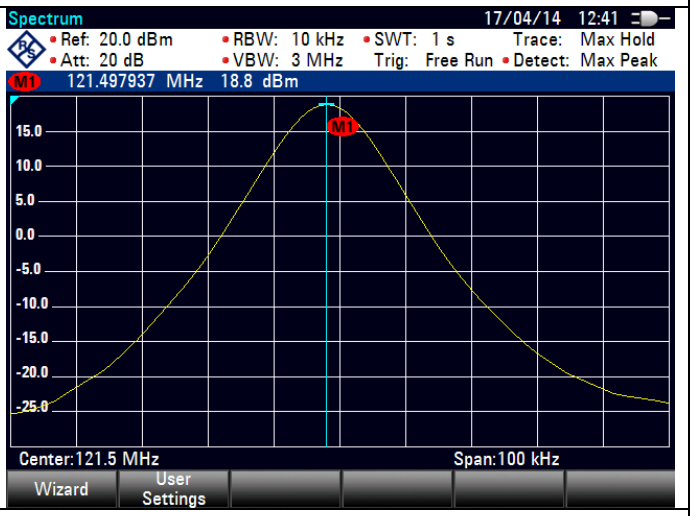


Figure 13.16 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the maximum operating temperature

(iii) Calculate the mean output power by adding 10 log(D), where D is the modulation duty cycle determined below, to the recorded signal level.
(iv) Set the spectrum analyzer controls as follows:

- I.F. bandwidth: 60 Hz or less
- Video filter: OFF or as wide as possible
- Scan time: 10 sec/div
- Amplitude scale: 0.5 dB/div
- Scan width: 20 Hz/div
- Center frequency: 121.5 MHz

(v) Measure and record the carrier power dBm as displayed on the spectrum analyzer (Figure 13.17).

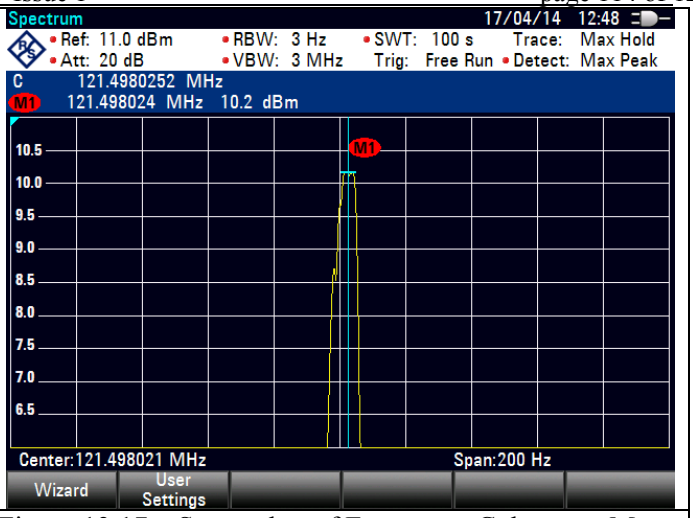


Figure 13.17 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at narrow band) at the maximum operating temperature

(vi) Calculate the ratio of carrier power to mean power from steps (iii) and (v) using the following formula:

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{\text{dBc-dBmean}}{10}}$$

dB_C = carrier power in step (v)
dB_{mean} = mean power in step (iii)

TEST RESULTS

Output power measurement at the antenna connector as per steps (i) and (ii) is 18.8 dBm.

Mean power calculated as per step (iii) is 18.8 + 10 log(D), where D is the modulation duty cycle. In the worst case D is 35.38%, therefore mean power is 18.8 + 10 log(0.3967) = 14.78 dBm

Carrier power that measured with 3 Hz I.F. bandwidth is 10.2 dBm.

Ratio of carrier power to mean power is 34.79 %.

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{\text{dBc-dBmean}}{10}} = 10^{\frac{10.2-14.78}{10}} = 0.3479$$

Carrier power is below of the mean power by 4.58 dB.
34.79 % of the total power is shown to be within ±3Hz of the carrier frequency.

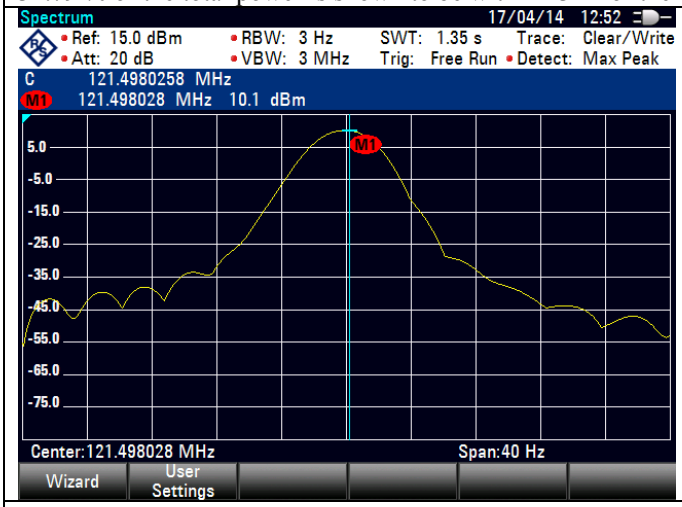


Figure 13.18 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the maximum operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst

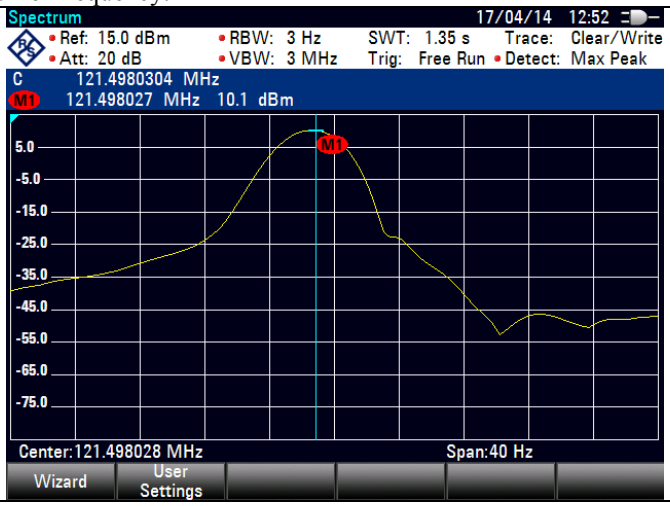
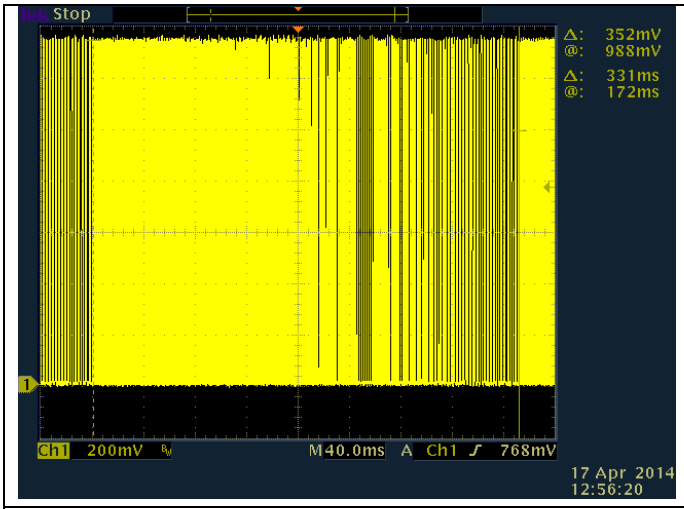


Figure 13.19 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the maximum operating temperature. Transmitted RF (121.5 MHz) after the interruption for the 406 MHz RF burst

The carrier frequency does not vary by more than +-30Hz during the interruption for a 406MHz transmission. See Figures 13.18 and 13.19.



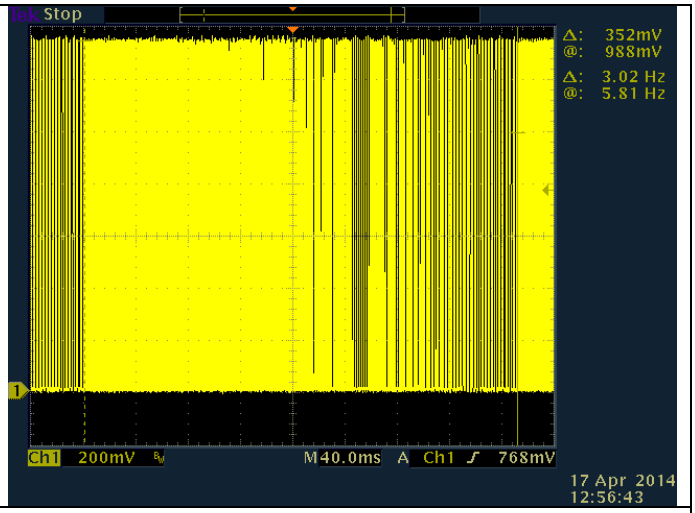


Figure 13.20 – Screenshot of Sweep repetition rate Test Result at the maximum operating temperature

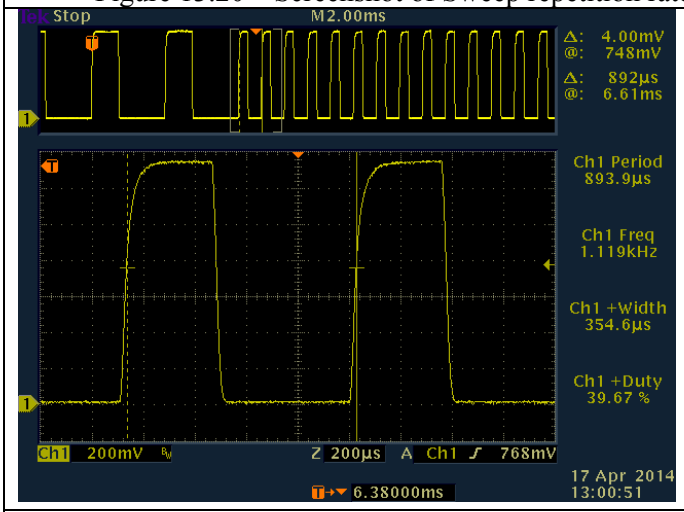


Figure 13.21 – Screenshot of Demodulation Waveform (A) measured start of the modulation sweep period at the maximum operating temperature

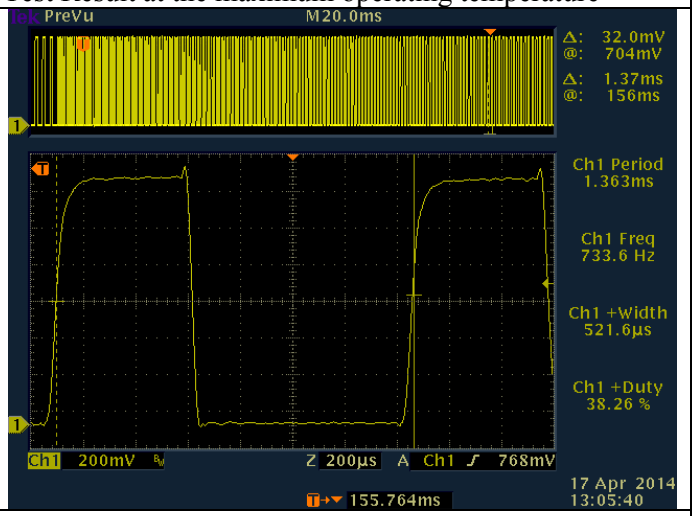


Figure 13.22 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the maximum operating temperature

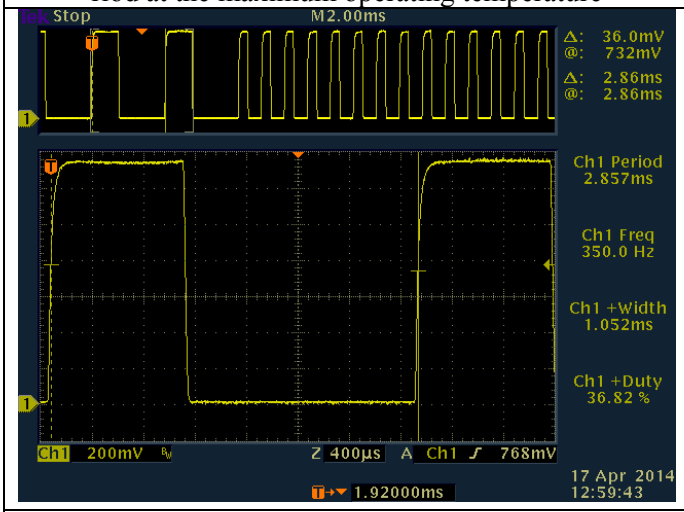


Figure 13.23 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the maximum operating temperature

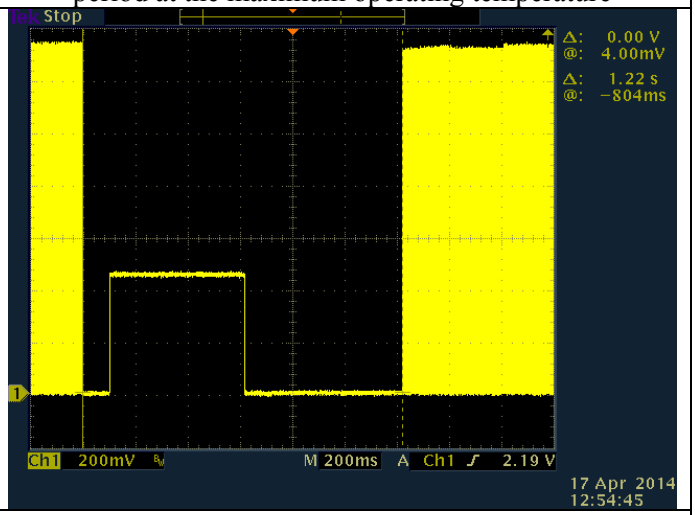


Figure 13.24 – Screenshot of Transmitter Duty Cycle Test Result at the maximum operating temperature

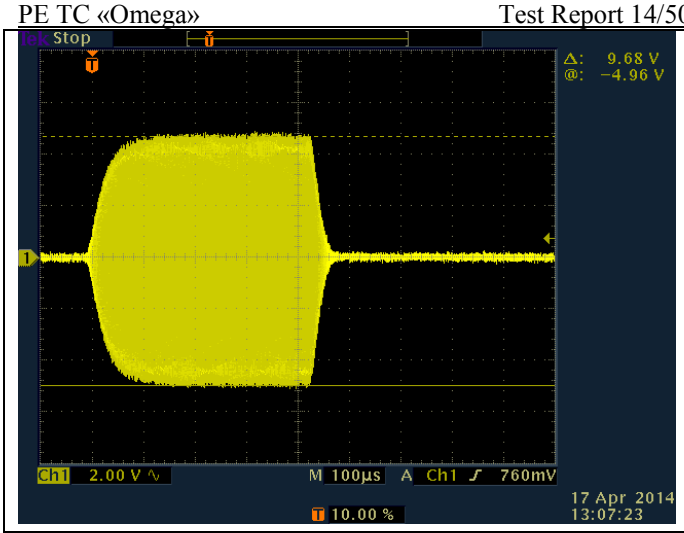


Figure 13.25 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the maximum operating temperature

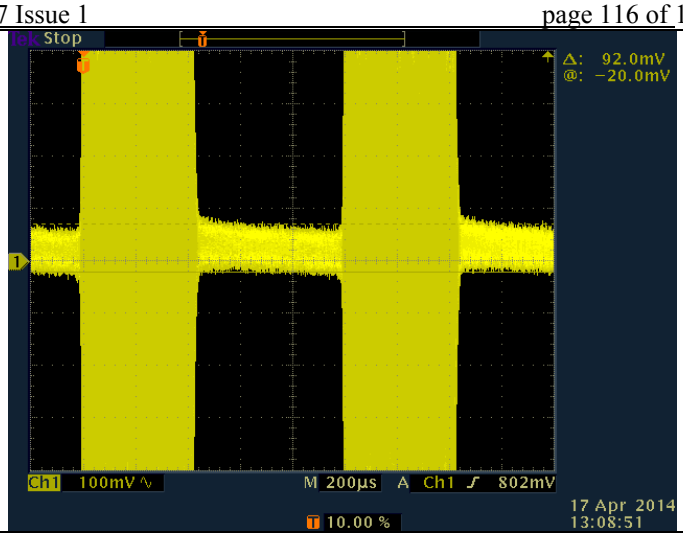


Figure 13.26 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the maximum operating temperature

$$Modulation\ Factor = \frac{A-B}{A+B} = \frac{9.68-0.092}{9.68+0.092} = 98.12\%$$

Ambient Temperature

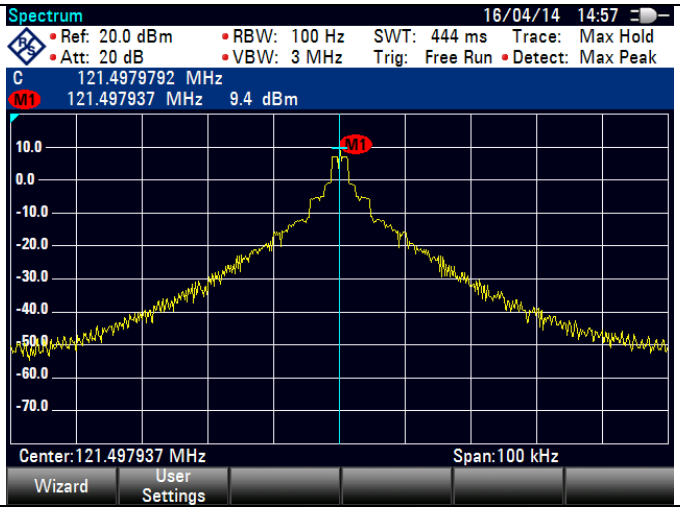


Figure 13.27 – Screenshot of Carrier Frequency Test Result at the ambient operating temperature

Frequency Coherence Measurement Test Result:

(i) Set the spectrum analyzer controls as follows:

- I.F. bandwidth: 10 kHz
- Video filter: OFF or as wide as possible
- Scan time: 100 ms./div.
- Amplitude scale: 5 dB/div.
- Scan width: 10 kHz/div.
- Center frequency: 121.5 MHz

(ii) Record the amplitude in dBm. (Figure 13.28)

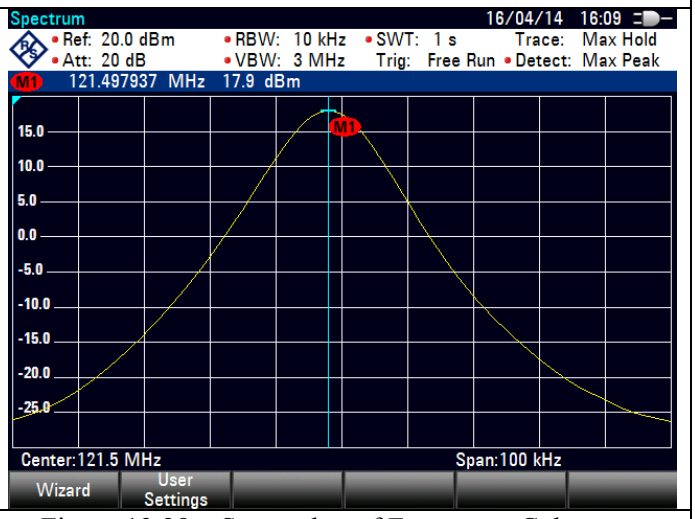


Figure 13.28 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the ambient operating temperature

(iii) Calculate the mean output power by adding 10 log(D), where D is the modulation duty cycle determined below, to the recorded signal level.
(iv) Set the spectrum analyzer controls as follows:

- I.F. bandwidth: 60 Hz or less
- Video filter: OFF or as wide as possible
- Scan time: 10 sec/div
- Amplitude scale: 0.5 dB/div
- Scan width: 20 Hz/div
- Center frequency: 121.5 MHz

(v) Measure and record the carrier power dBm as displayed on the spectrum analyzer (Figure 13.29).

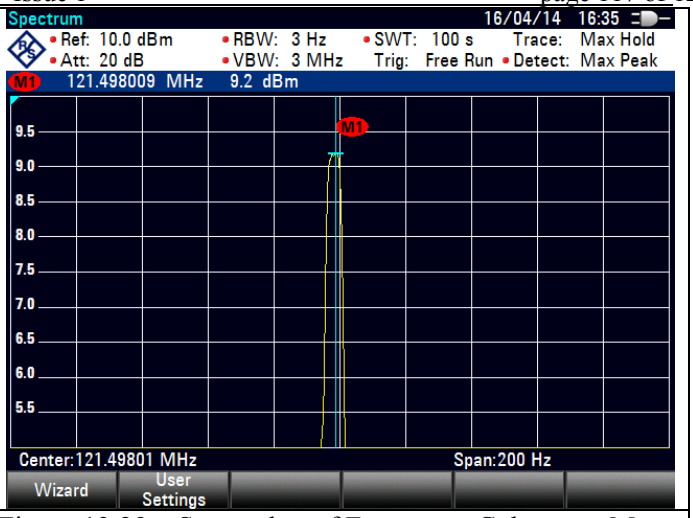


Figure 13.29 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at narrow band) at the ambient operating temperature

(vi) Calculate the ratio of carrier power to mean power from steps (iii) and (v) using the following formula:

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{dBc-dBmean}{10}}$$

dB_C = carrier power in step (v)
dB_{mean} = mean power in step (iii)

TEST RESULTS

Output power measurement at the antenna connector as per steps (i) and (ii) is 17.9 dBm.

Mean power calculated as per step (iii) is 17.9 + 10 log(D), where D is the modulation duty cycle. In the worst case D is 35.38%, therefore mean power is 17.9 + 10 log(0.3899) = 13.81 dBm

Carrier power that measured with 3 Hz I.F. bandwidth is 9.2 dBm.

Ratio of carrier power to mean power is 34.28 %.

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{dBc-dBmean}{10}} = 10^{\frac{9.2-13.81}{10}} = 0.3428$$

Carrier power is below of the mean power by 4.65 dB.
34.28 % of the total power is shown to be within ±3Hz of the carrier frequency.

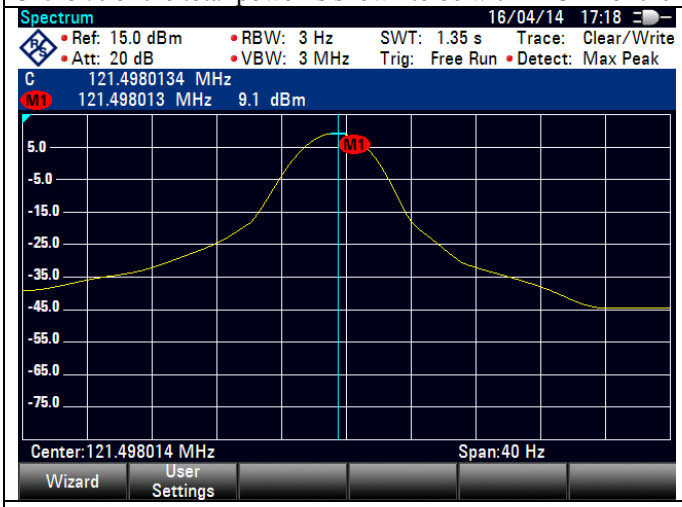


Figure 13.30 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the ambient operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst

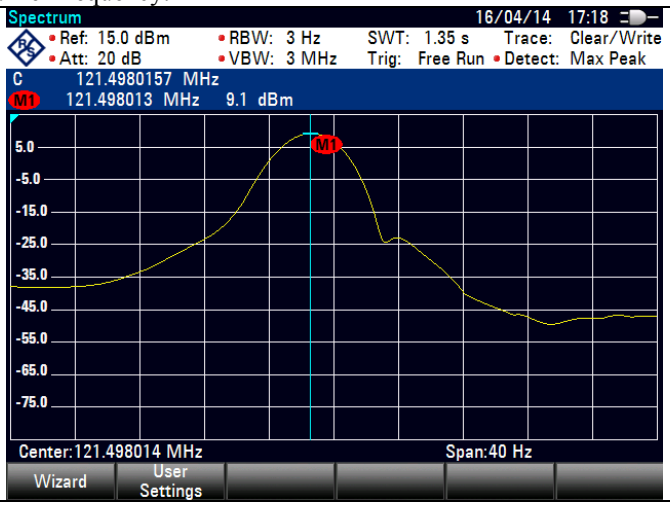
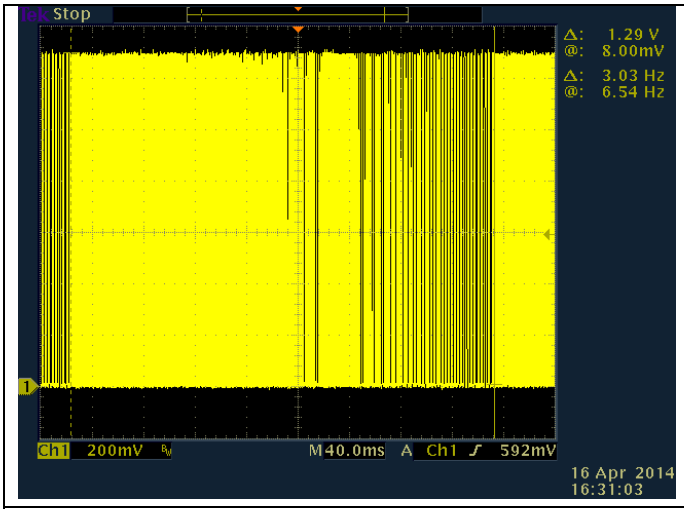


Figure 13.31 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the ambient operating temperature. Transmitted RF (121.5 MHz) after the interruption for the 406 MHz RF burst

The carrier frequency does not vary by more than +-30Hz during the interruption for a 406MHz transmission. See Figures 13.30 and 13.31.



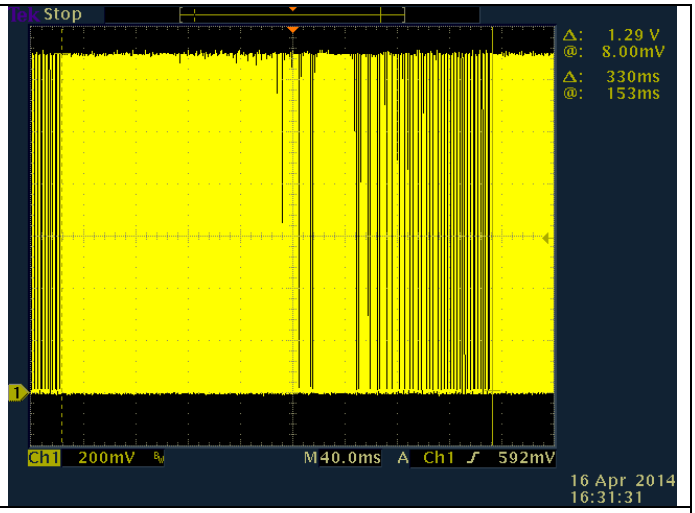


Figure 13.32 – Screenshot of Sweep repetition rate Test Result at the ambient operating temperature

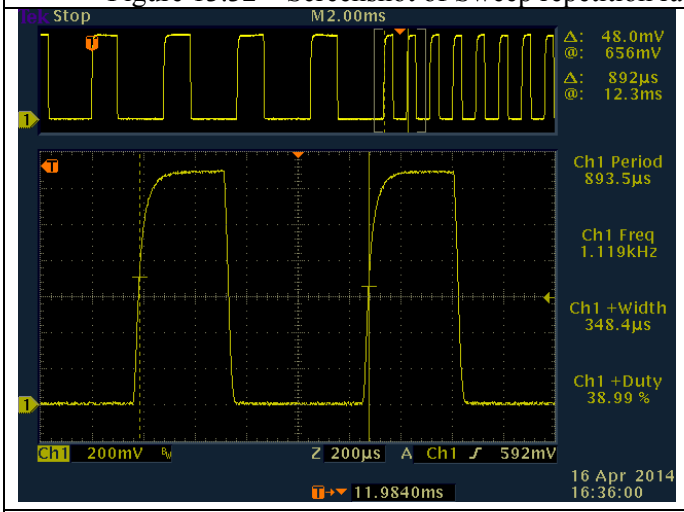


Figure 13.33 – Screenshot of Demodulation Waveform (A) measured start of the modulation sweep period at the ambient operating temperature

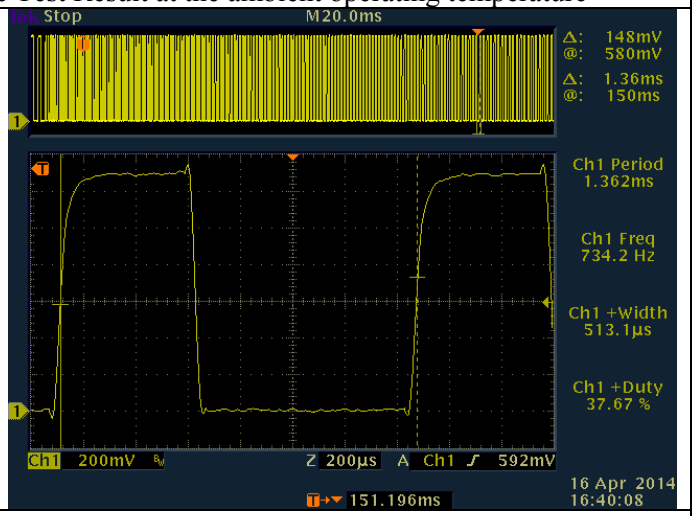


Figure 13.34 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the ambient operating temperature

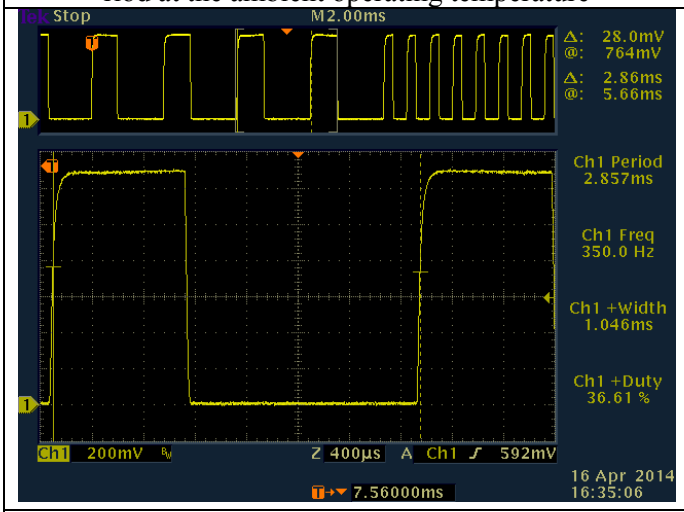


Figure 13.35 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the ambient operating temperature

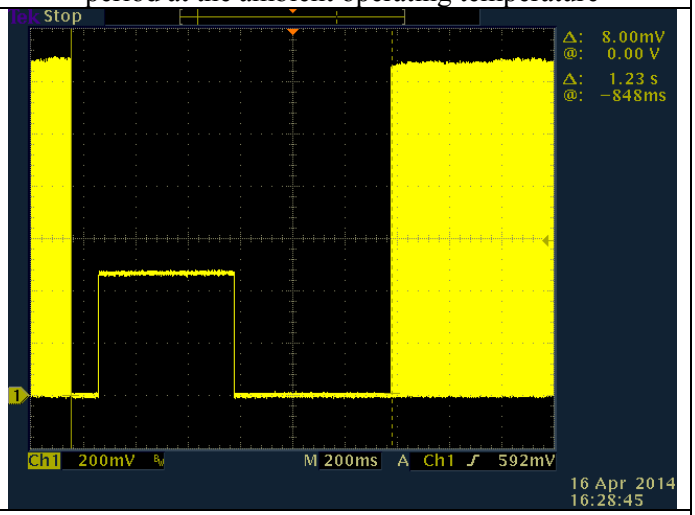


Figure 13.36 – Screenshot of Transmitter Duty Cycle Test Result at the ambient operating temperature

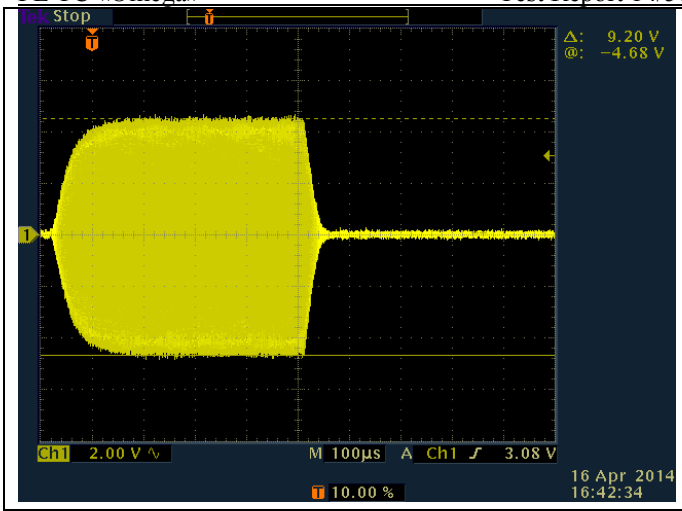


Figure 13.37 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the ambient operating temperature

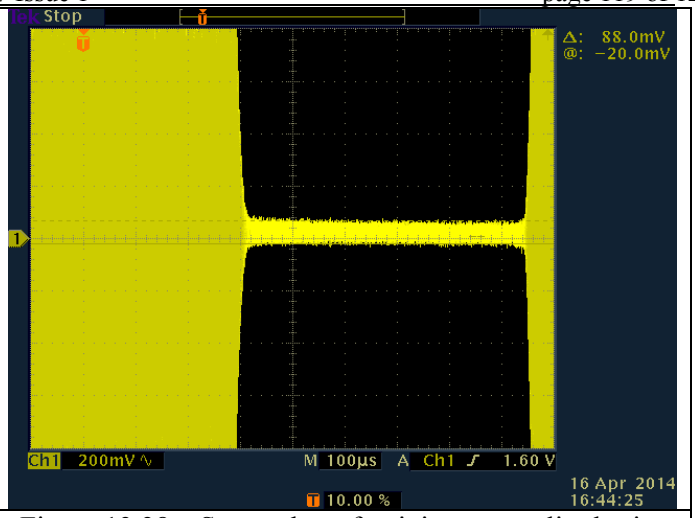


Figure 13.38 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the ambient operating temperature

$$Modulation\ Factor = \frac{A-B}{A+B} = \frac{9.20-0.088}{9.20+0.088} = 98.11\%$$

Peak Equivalent Isotropic Radiated Power

Table 13.1 - Elevation Maximum search of Peak Equivalent Isotropic Radiated Power

Elevation, degrees	Antenna gain, dBi	Receive system attenuator and cable loss, dB	Free space propagation loss, dB	PEIRP, mW
4.97	1.10	0.40	34.16	19.33
6.39	1.10	0.40	34.18	19.42
7.80	1.10	0.40	34.21	20.00
9.20	1.10	0.40	34.24	20.61
9.98	1.10	0.40	34.26	27.30
11.37	1.10	0.40	34.30	21.38
12.73	1.10	0.40	34.35	17.56
14.09	1.10	0.40	34.39	18.60
15.00	1.10	0.40	34.43	19.19
20.00	1.10	0.40	34.67	16.86

Table 13.2 - Peak Equivalent Isotropic Radiated Power

Elevation, degrees	Azimuth, degrees	Antenna gain, dBi	Receive system attenuator and cable loss, dB	Free space propagation loss, dB	PEIRP, mW	PEIRP, dBm
9.98	0	1.10	0.40	34.26	27.30	14.36
9.98	30	1.10	0.40	34.26	27.30	14.36
9.98	60	1.10	0.40	34.26	27.93	14.46
9.98	90	1.10	0.40	34.26	27.30	14.36
9.98	120	1.10	0.40	34.26	26.68	14.26
9.98	150	1.10	0.40	34.26	26.68	14.26
9.98	180	1.10	0.40	34.26	27.30	14.36
9.98	210	1.10	0.40	34.26	26.07	14.16
9.98	240	1.10	0.40	34.26	26.68	14.26
9.98	270	1.10	0.40	34.26	27.30	14.36
9.98	300	1.10	0.40	34.26	27.30	14.36
9.98	330	1.10	0.40	34.26	27.93	14.46

The median of twelve values was 27.15 mW (14.34 dBm).
Of the highest 11 values, the maximum was 27.93 mW and the minimum was 26.07 mW.
The ratio of maximum to minimum values is 1.07:1 (0.30 dB).

FINAL RESULTS OF AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0 RTCM 11000.2 Version 2.1):

Parameters To Be Measured During Tests	Range Of Specification	Units	Test Results			Comments
			$T_{min.}$ (-20 °C)	$T_{amb.}$ (20 °C)	$T_{max.}$ (+55 °C)	
Carrier Frequency (A17.1)	121.5 ± 0.006	MHz	121.497679	121.497979	121.497973	See fig. 13.3, 13.15, 13.27
PERP (A17.3)	14 – 20	dBm	-	14.16-14.46	-	
Modulation (A17.2)						
- Frequency	≥ 700 Hz within range of 300 – 1600 Hz	Hz	350 – 1119	350 – 1119	350 – 1119	See fig.13.9-13.11, 13.21-13.23, 13.33-13.35
- Direction	Upward	√	√	√	√	
- Duty cycle	33 – 55	%	36.05 – 37.21	36.61 – 38.99	36.82 – 39.67	See fig. 13.9-13.11, 13.21-13.23, 13.33-13.35
- Factor	0.85 – 1.0		0.98	0.98	0.98	See fig. 13.13, 13.14, 13.25, 13.26, 13.37, 13.38
- Sweep repetition rate	2 – 4	Hz	3.03	3.03	3.02	See fig. 13.8, 13.20, 13.32
- Frequency Coherence (Total power emitted)	at least 30% of the total power emitted should be contained within ± 30 Hz of the carrier frequency	%	33.83	34.28	34.79	See fig. 13.4, 13.5, 13.16, 13.17
- Frequency Coherence (Frequency Shift)	< ± 30 Hz	Hz	-0.3	2.3	4.6	See fig. 13.6, 13.7, 13.18, 13.19, 13.30, 13.31
Antenna						
- Pattern	Omnidirection	√	-	√	-	
- Polarization	Vertical	√	-	√	-	
- VSWR (A17.4)	≤ 1.5:1	√	-	Not applicable	-	Antenna EPIRB not removable

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Temperature meter	Gradient -2002	078	02.2015
3.	Beacon tester	BT-611	1005	06.2014
4.	Spectrum analyzer	FSH8	105763	10.2016
5.	Oscilloscope	TDS-3052	B011258	05.2014
6.	Coaxial detector	Agilent 8471E	100104	n/a
7.	Antenna	HK116	100345	08.2014
8.	Antenna mast	ATR 2	101208	n/a
9.	OATS No.33			02.2015
10.	RFAM	Ternovnik MO	No.1	n/a
11.	Ground plane	Ug	102282	n/a

ANNEX 18.
HUMIDITY TEST (A18.0)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 16.06.2014
Test Conditions:

- Ambient temperature: 24.3-25.5 °C
- Relative humidity: 52-54 %
- Atmospheric pressure: 755 mm/Hg

TEST DESCRIPTION

The humidity test was conducted with the housing opened to expose the internal components to the humid test environment.
The test chamber atmosphere was maintained at a relative humidity of 95 % and at a temperature 40 °C for a period of 8 hours.
At the end of the period, the EUT was removed from the test chamber to ambient room conditions. After removal, the EUT was turned ON within 5 minutes.
Fifteen minutes after application of power, the aliveness test was conducted.

TEST RESULT

– Step 1. The EUT was switched OFF and was placed in the climatic chamber.
– Step 2. The chamber temperature was risen to 40 ºC and allowed to stabilize for 2 hours.
– Step 3. The chamber conditions were adjusted to 95 % RH and maintained for a period of 8 hours 0 minutes.
– Step 4. The EUT was removed from the chamber into laboratory ambient conditions.
– Step 5. The housing of the EUT was assembled and the EUT was powered on within 3 minutes after being removed from the chamber.
– Step 6. Fifteen minutes after application of power, the aliveness test was conducted.

Figure 19.1 - View of the EPIRB with the opened housing before the humidity test

Figure 19.2 - View of the modified EPIRB installed in climatic chamber

Figure 19.3 - View of the PCB upon completion of the humidity test

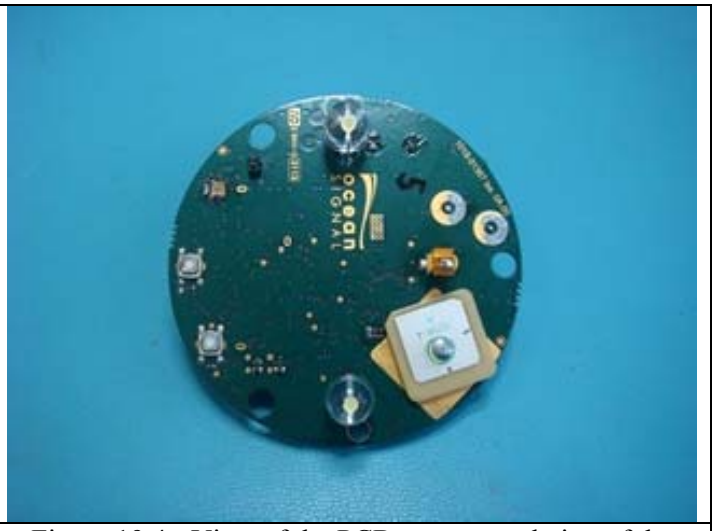


Figure 19.4 - View of the PCB upon completion of the humidity test

Test duration 0 h 20 m		Bursts received 24	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters		**Limits**		**Measured**		
		min	**max**	**min**	**current**	**max**
Frequency, kHz		406039.000	406041.000	406039.973	406039.977	406039.977
Power, Wt		3.16	7.94	4.70	4.70	4.70
121.5 MHz Transmitter Parameters						
Carrier Frequency, Hz		121498925				
Power, mW		64.20				
Message						
Digital message	: FFFE2F 8F7EF9C0637FDFFAB0B5B 783E0F66C					

Figure 19.6 – Results of the aliveness test upon completion of the humidity test

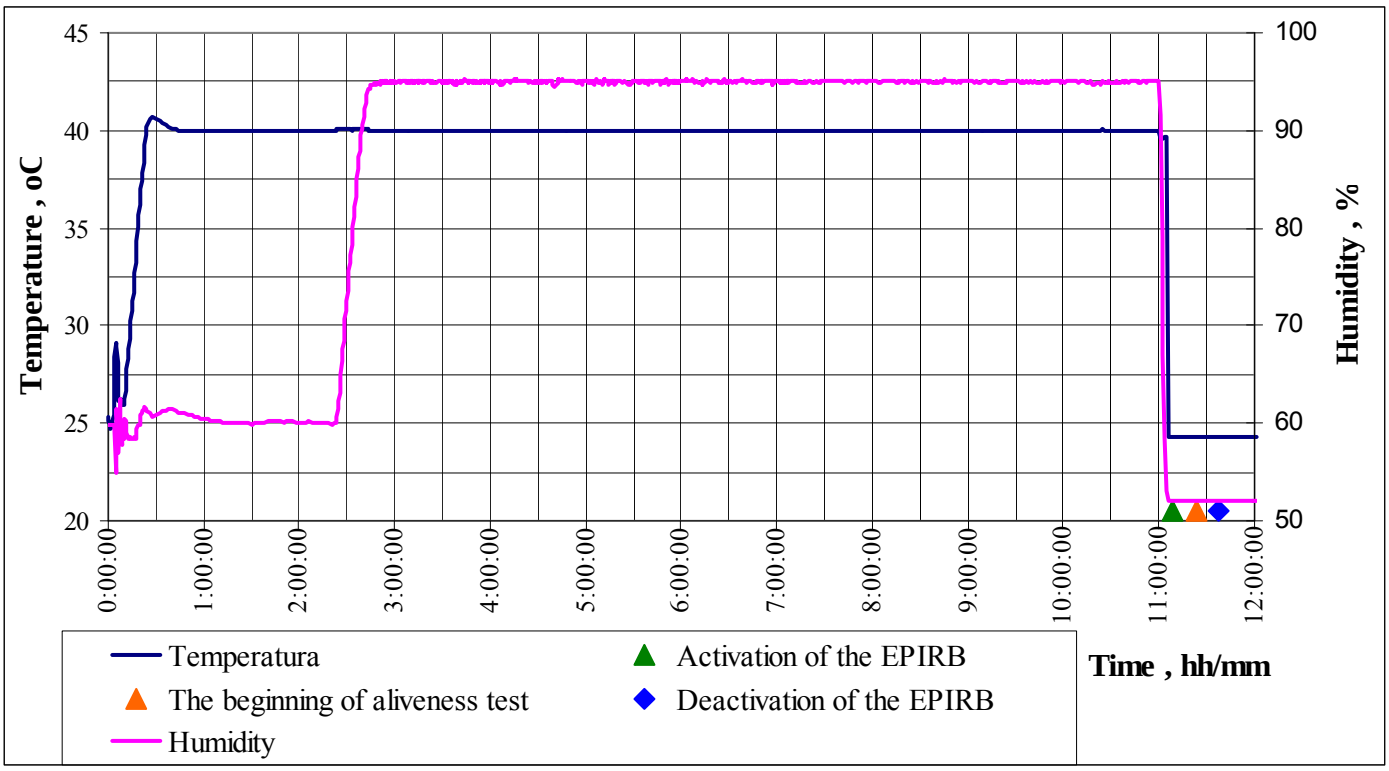


Figure 19.7 – Heat-Humidity Test Conditions Plot

FINAL RESULTS OF HUMIDITY TEST (A18.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RE-SULTS	COMMENTS (PASS/FAULT)
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039977	PASS
- Power Output	35 - 39	dBm	36.72	PASS
- Digital Message	Correct	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2014
2.	Temperature meter	gradient 2002	078	02.2015
3.	Hygrometer digital	HP 22-A	60974546	12.2014
4.	Beacon tester	BT100AVS	2315	07.2015
5.	Beacon tester	BT-611	1005	06.2015
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 19.
ORIENTATION TEST (A19.0)

Equipment Under Test (EUT): EPIRB1, s/n 006

SW version: Issue 00.04

Test Date: 06.05.2014
Test Conditions:

- Ambient temperature: 19.8 °C
- Relative humidity: 67 %
- Atmospheric pressure: 759 mm/Hg

TEST DESCRIPTION

The EUT should be activated and positioned vertically. After 15 minutes, the aliveness test should be performed. The EUT should sequentially be placed in a horizontal position, upside down, and returned to its initial upright position and the aliveness test performed 2 minutes after each orientation.
The operation of the strobe light and auxiliary radio-locating transmitter should be observed throughout the test and their uninterrupted operation verified.

TEST RESULT

– Step 1. The EUT was activated and positioned vertically
– Step 2. After 15 minutes, the aliveness test was performed.
– Step 3. The EUT was placed in a horizontal position.
– Step 4. After 2 minutes, the aliveness test was performed.
– Step 5. The EUT was placed in a upside down position.
– Step 6. After 2 minutes, the aliveness test was performed.
– Step 7. The EUT was returned to its initial upright position
– Step 8. After 2 minutes, the aliveness test was performed.
The operation of the strobe light and auxiliary radio-locating transmitter was observed throughout the test and their uninterrupted operation verified.

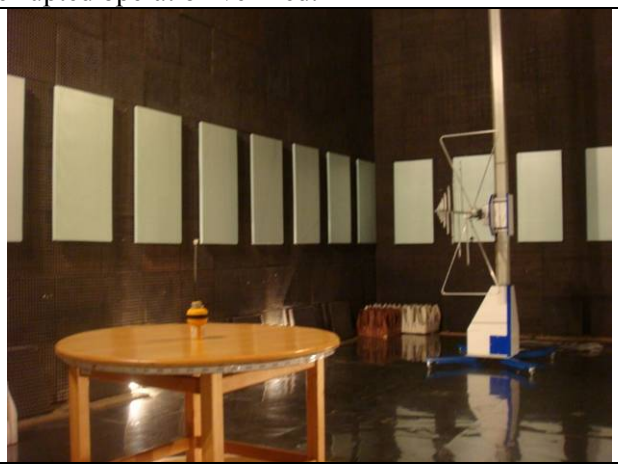


Figure 20.1 – View of the EPIRB1 before orientation test

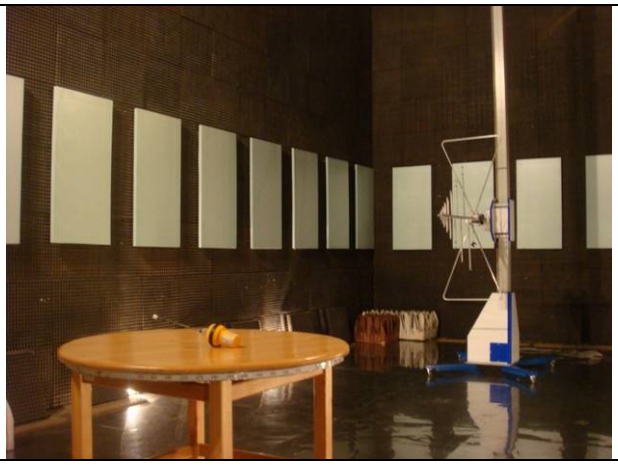


Figure 20.2 – View of the EPIRB1 in a horizontal position.

Figure 20.3 – View of the EPIRB1 in a upside down position.

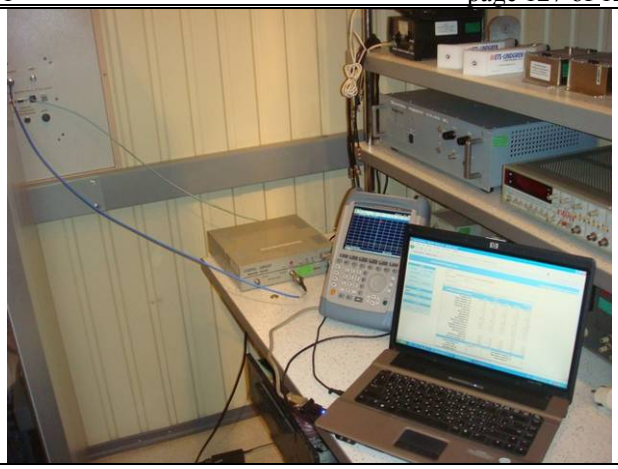


Figure 20.4 – View of the test site.

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406040.002	0.000
Power, Wt	3.16	7.94	0.00	4.73	0.00
Total burst duration, ms	514.80	525.20	0.00	518.30	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498938				
Power, mW	65.22				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 20.5 – Aliveness test results after EUT placed in vertical position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406040.000	0.000
Power, Wt	3.16	7.94	0.00	4.70	0.00
Total burst duration, ms	514.80	525.20	0.00	519.02	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498957				
Power, mW	64.95				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 20.6 – Aliveness test results after EUT placed in horizontal position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406040.001	0.000
Power, Wt	3.16	7.94	0.00	4.69	0.00
Total burst duration, ms	514.80	525.20	0.00	519.08	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498941				
Power, mW	63.20				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 20.7 – Aliveness test results after EUT placed in upside down position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406040.001	0.000
Power, Wt	3.16	7.94	0.00	4.77	0.00
Total burst duration, ms	514.80	525.20	0.00	519.05	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498930				
Power, mW	65.30				
Message					
Digital message	: FFFE2F 8C9EF9C0637FDFF83D15B 783E0F66C				

Figure 20.8 – Aliveness test results after EUT placed in initial vertical position

FINAL RESULTS OF THE ORIENTATION TEST (A19.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Aliveness Test of EUT in vertical position:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.040002	PASS
- Power Output	35 – 39	dBm	36.75	PASS
• Aliveness Test of EUT in horizontal position				
- Carrier Frequency	406.040 ± 0.001	MHz	406.040000	PASS
- Power Output	35 – 39	dBm	36.72	PASS
• Aliveness Test of EUT in upside down position				
- Carrier Frequency	406.040 ± 0.001	MHz	406.040001	PASS
- Power Output	35 – 39	dBm	36.71	PASS
• Aliveness Test of EUT in initial vertical position:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.04001	PASS
- Power Output	35 - 39	dBm	36.79	PASS
• Operation of the strobe light	uninterrupted operation	-	uninterrupted operation	PASS
• Operation of the auxiliary radiolocating transmitter	uninterrupted operation	-	uninterrupted operation	PASS