Appendix A12

Water tightness and thermal shock

(Immersion test (100 kPa 5 min) was associated with this test)

Standard	Standard IEC 61097-1 item 3.2 h), 3.2 g)

Model SART	SafeSea S100
Serial number	No. 003
Sample number of battery pack	No. 2
Date of test	10.08.2010
The temperature of the climate chamber	+65 °C and minus 10 °C
Temperature of water in device for hydrostatic testing	19.2°C и 19.6°C

Document by manufacturer Search and Rescue Transponder "SafeSea S100" Serial No 003. Owner's manual.

Test conditions.
SART was thermally soaked for period of 3 hours at temperature 65 ±2°C.
Then SART was then immersed into device for hydrostatic testing with the water on a depth 0.5 m with temperature 19.7 °C to a pressure of 100 kPa for at 1 hour.
After decompressing to normal atmosphere SART was extracted from water, dried and water was removed from crevices.
SART was thermally soaked for period of 3 hours at temperature minus 10 ±2°C.
Then SART was immersed into device for hydrostatic testing with the water on a depth 0.5 m with temperature 19.6 °C to a pressure of 100 kPa for at 1 hour.
After decompressing to normal atmosphere SART was extracted from water, dried and water was removed from crevices.
At completion of immersion the SART was tested for leakage and a functional test was carried out.

The results of measurements are shown in the table below:

Item	Parameter	Requirements	Results
5.1	High frequency	(9500+60) MHz	9521,3 MHz
5.1	Low frequency	(9200-60) MHz	9170,0 MHz
5.6	RF pulse emission	100 μs	94,0 μs
5.5	Forward sweep time	(7,5±1) μs	7,46 μs
5.5	Return sweep time	(0,4±0,1) μs	0,324μs
5.4	Response signal	12	12

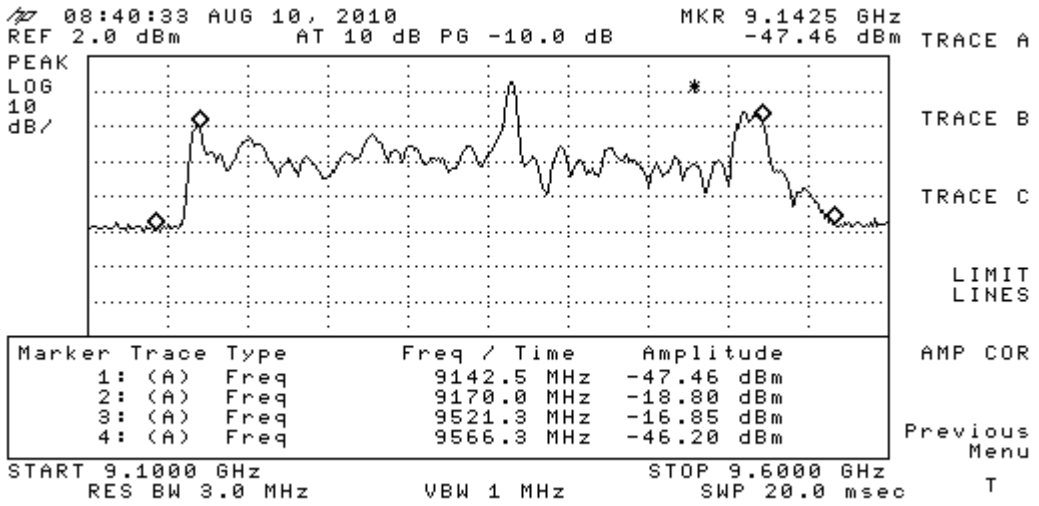


Figure 42– Spectrogram measurement frequency range SART “SafeSea S100”

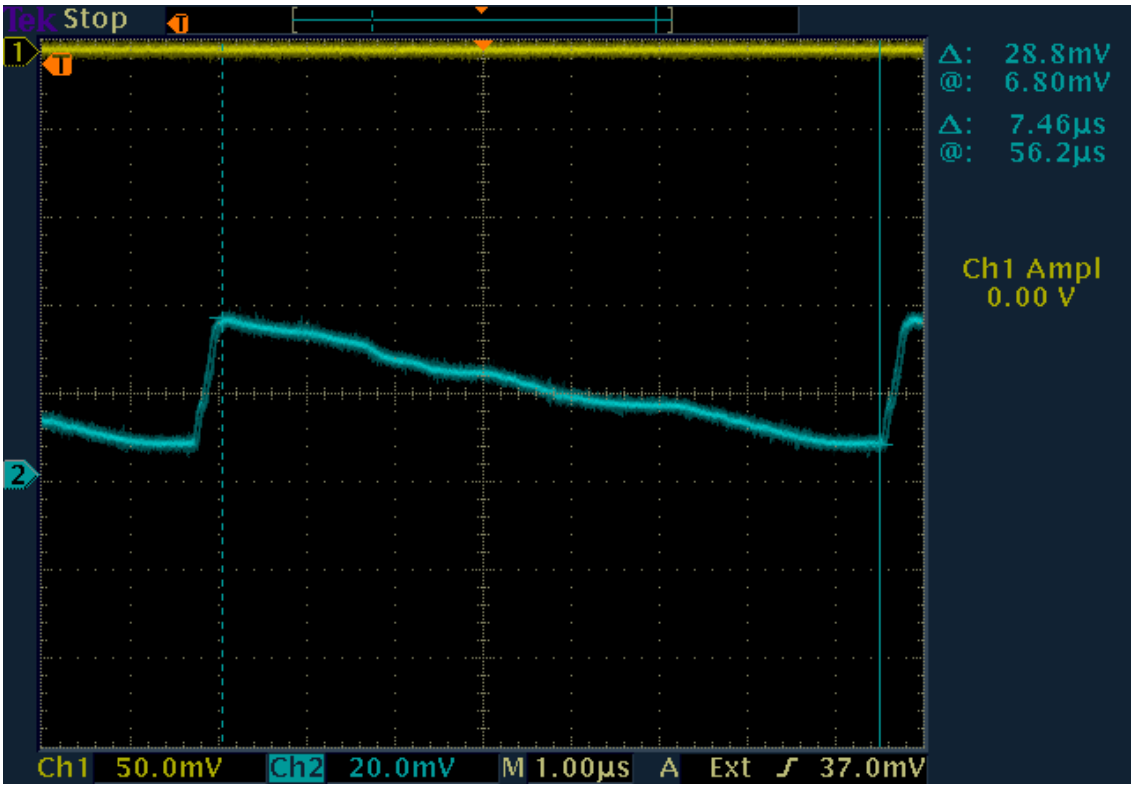


Figure 43 – Forward sweep time.

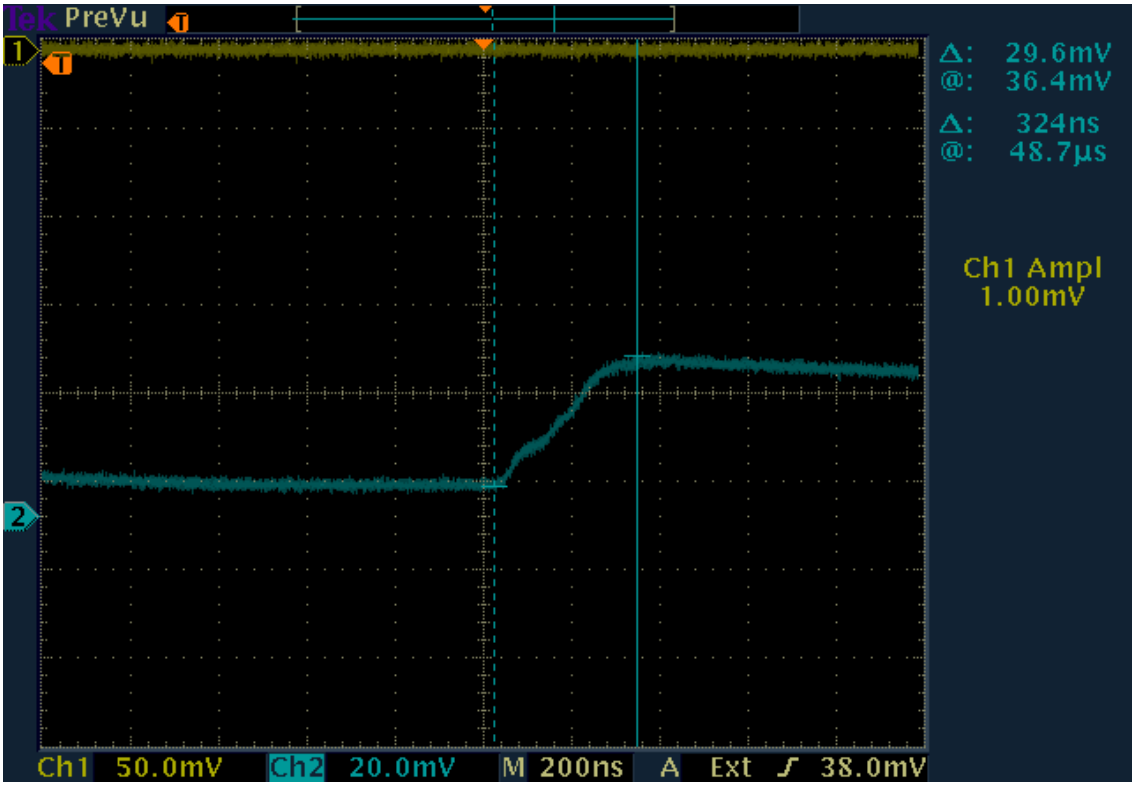


Figure 44 – Return sweep time

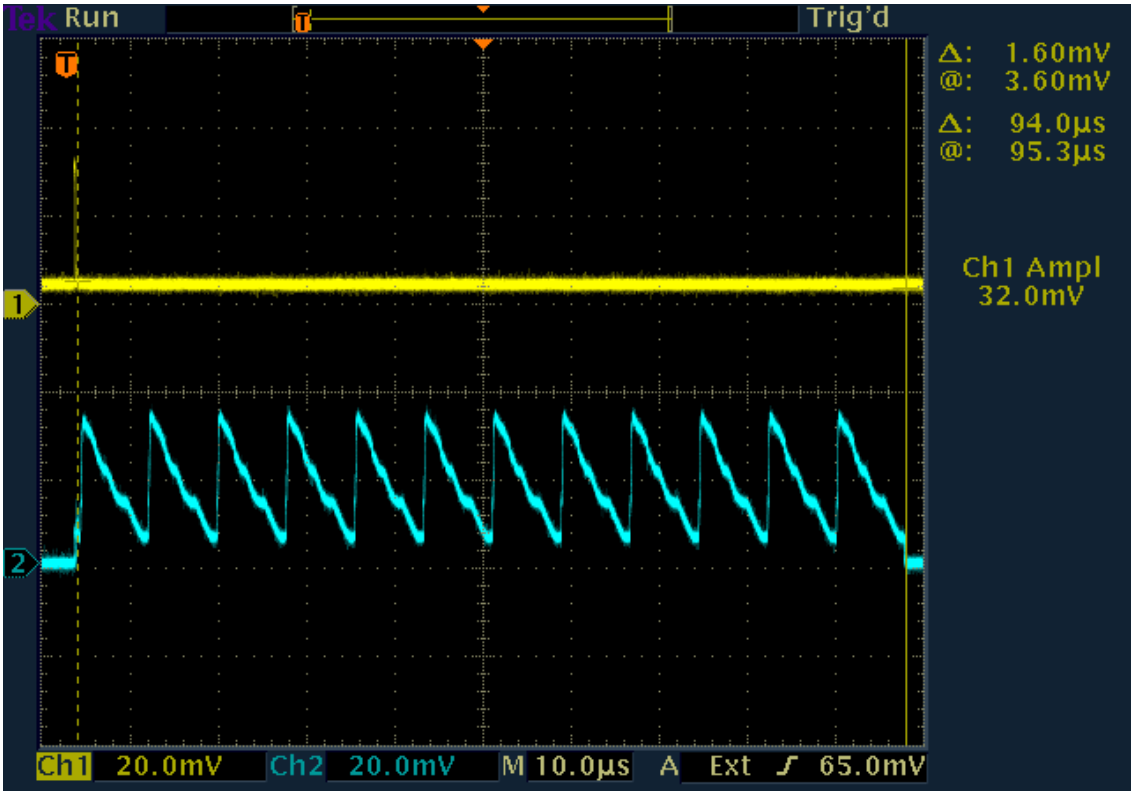


Figure 45 – 12 sweeps of the response signal

Photo 27 – Device for hydrostatic testing.

Photo 28 – The manometer value.

.

Test results:

Inspection after test confirmed watertightness SART and absent of leakage into the SART. Functioning SART is equal to the requirements of technical specifications on items 3.2 h), 3.2 g) of the standard IEC 61097-1 , items 8.5, 8.9.2 of the standard IEC 60945.

Requirements of the standard IEC 61097-1 items 3.2 h, 3.2 g , the standard IEC 60945 items 8.5, 8.9.2

SART should maintain watertightness when subjected to a thermal shock under specified conditions of immersion.

TEST EQUIPMENT USED:
8, 9, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 32, 39.

CONCLUSION

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of the standard IEC 61097-1 items 3.2 h), 3.2 g), standard IEC 60945 items 8.5, 8.9.2
Sample No 1	yes

Appendix A13

Check of radiated emissions from enclosure port

Standard	IEC 60945 items 9.3.2, 9.3.3

Model SART	SafeSea S100
Serial number	No. 003
Sample number of battery pack	No. 2
Date of test	11.08.2010
Ambient temperature	30 °C
Ambient humidity	54 %

Test conditions:
Distance from SART to test antenna 3 m.

Test results (standby mode):

Frequency, MHz	radiation limit, dBμV/m, not above	correction factor, dB	Measurement value, dBμV (QP)	Level of radio interferences, dBμV/m	Difference between a possible level and level of radio interferences, dBμV/m**
0,15	80	-25,6	19	44,9	35,1
0,3	52	-25,8	12,7	38,4	13,6
1	47,2	-25,7	1,8	27,6	19,6
2	44,6	-25,6	-0,8	25,1	19,5
6	40,3	-25,6	-2,6	23,3	17
10	38,3	-25,7	-1,5	24,3	14
11,28	37,8	-25,7	-3	22,8	15
30	34	-24,8	-2,9	23,8	10,2
45	54	13,07	7,6	20,67	33,33
65	54	10,23	7,4	17,63	36,37
90	54	11,42	7	18,42	35,58
150	54	8,11	6,7	14,81	39,19
180	54	9,77	6,7	16,47	37,53
220	54	11,52	6	17,52	36,48
300	54	13,66	5,8	19,46	34,54
450	54	16,45	6,5	22,95	31,05
600	54	19,47	3,5	22,97	31,03
750	54	20,54	3,7	24,24	29,76
900	54	22,26	3,9	26,16	27,84
1000	54	22,94	4,2	27,14	26,86
1200	54	24,46	4,5	28,96	25,04
1500	54	26,74	4,6	31,34	22,66

Frequency, MHz	radiation limit, dBμV/m, not above	correction factor, dB	Measurement value, dBμV (QP)	Level of radio interferences, dBμV/m	Difference between a possible level and level of radio interferences, dBμV/m**
1750	54	28,1	5,2	33,3	20,7
1900	54	29,36	5,5	34,86	19,14
2000	54	28,78	6,5	35,28	18,72
156	30(PK) 24(QP)	7,77	1,9 (PK)	9,67	20,33
165	30(PK) 24(QP)	8,41	2,7 (PK)	11.11	18,86

In measurements on other frequencies range were not detected interference field strength above the noise level measurement system. Noise level of measurement system during the measurement of field strength interference in the frequency range is:

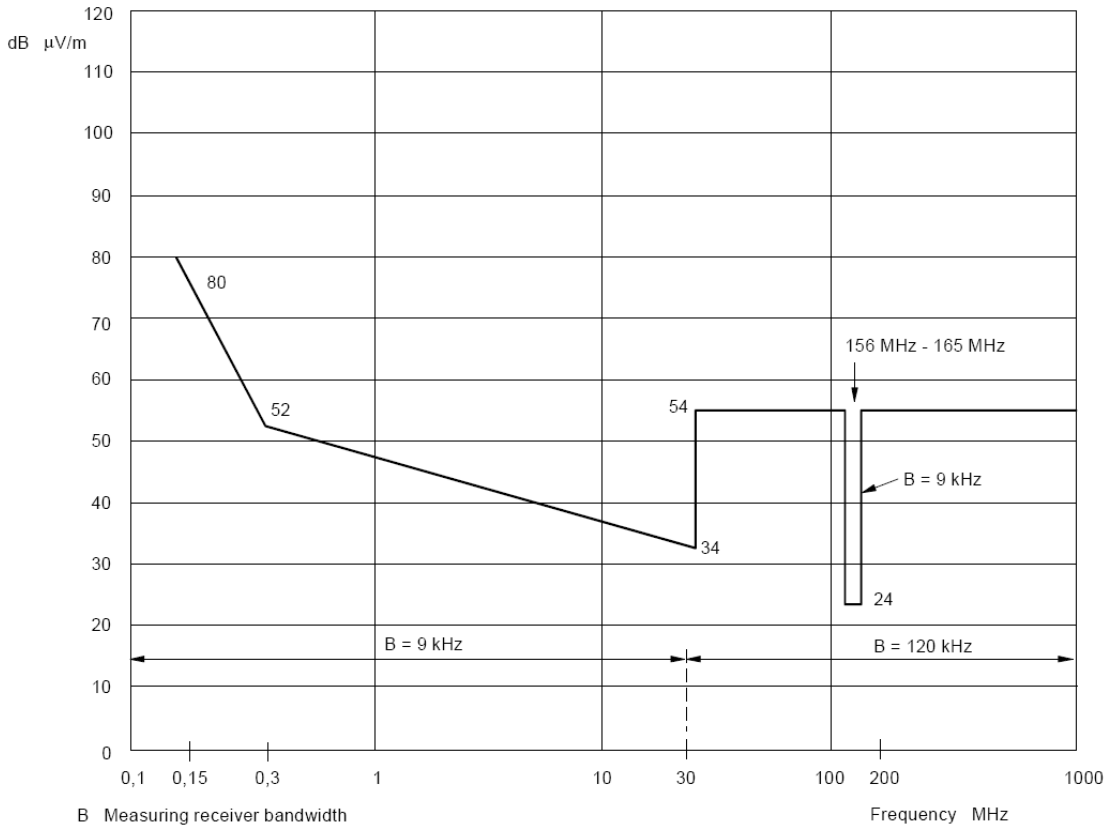
-from 0,15 MHz to 30 MHz inclusive no more then 15,5 dBμV/m;
-above 30 MHz to 60 MHz inclusive no more then 13,6 dBμV/m;
- above 60 MHz to 120 MHz inclusive no more then 10,7 dBμV/m
- above 120 MHz to 300 MHz inclusive no more then 20,0 dBμV/m
- above 300 MHz to 600 MHz inclusive no more then 25,6 dBμV/m;
- above 600 MHz to 2000 MHz inclusive no more then 32,5 dBμV/m

Test results:

Check the level of field strength interference SART in the range from 150 kHz to 2000 MHz did not reveal any values above the noise level measurement system.

Noise level measurement in the range from 30 MHz to 300 MHz does not exceed 20 dBμV/m, from 600 MHz to 2000 MHz does not exceed 32,5 dBμV/m

The requirements of the standard IEC 60945 item 9.3.2



All reasonable and practicable steps should be taken to ensure electromagnetic compatibility between the equipment concerned and other radiocommunication and navigational equipment carried on board in compliance with the relevant requirements of chapter IV and chapter V of the 1974 SOLAS convention.

TEST EQUIPMENT USED:
10, 12, 40, 42, 43, 44.

CONCLUSION

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of the standard IEC 60945 items 9.3.2, 9.3.3
Sample No 1	yes

Appendix A14

Battery capacity at normal condition temperature

Standard	IEC 61097-1 item 3.3, 6.3.2 b)

Sample Number of battery pack	No. 3
Date of Tests	7-11.08.2010
The temperature inside of the climatic chamber	25 °C
Lowest voltage for SART correct operation	4.5 V
Average Current of SART in Standby mode at Vnom – I_1	17 mA
Average Current of SART during interrogation at Vnom – I_2	78 mA

Measurements for battery pack No. 3:

The temperature	Initial voltage, V	Voltage after 96 hours at I_1 =17 mA	Voltage after further 8 hours at I_2 = 78 mA
25 °C	6.803	6.203	5.86 V

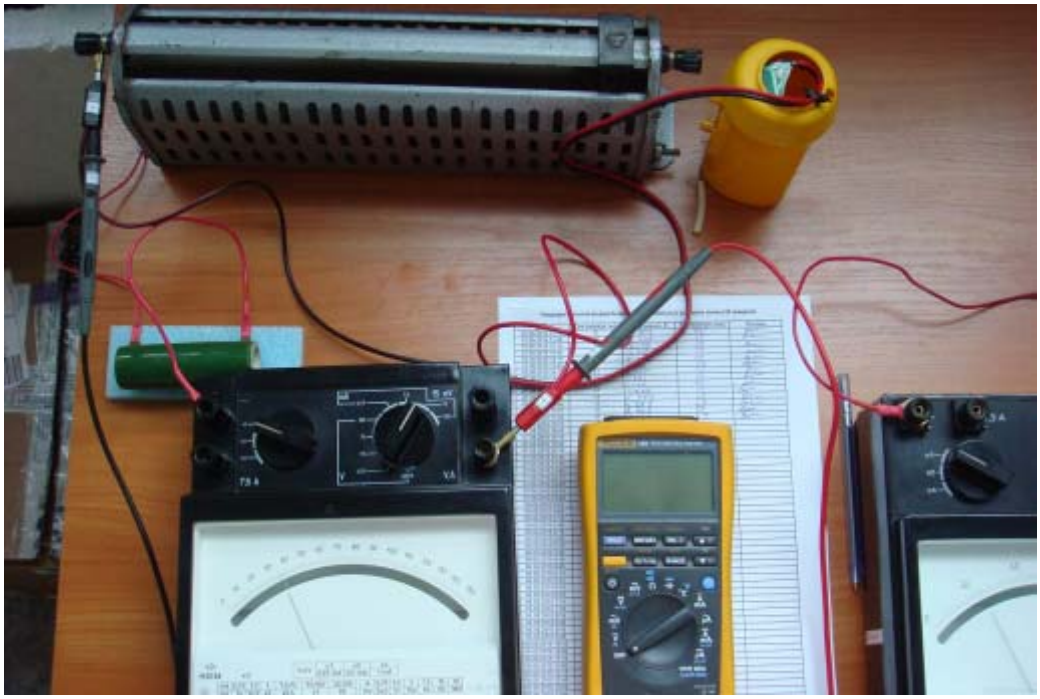


Photo 29 – The battery discharge

Test results:

The battery pack LB1S was discharged by average current I_1 during 96 h and then by average current I_2 during 8 h.

Final voltage after 104 hours is more than rated limit of 4,5 V.

Requirements of IEC 61097-1 3.3

The SART shall have sufficient battery capacity to operate in the stand-by conditions for 96 h and, in addition, following the stand-by period, to provide transponder transmissions for 8 h when being continuously interrogated with a pulse repetition frequency of 1 kHz.

Requirements of IEC 61097-1 п.6.3.2

The on-load terminal voltage measured during the last 15 min of the capacity tests shall not be less than the lowest voltage at which the functional test in 6.3.1.a was carried out.

TEST EQUIPMENT USED:
28, 29, 30, 31.

Conclusion

The battery pack LB1S	conforms to the requirements of IEC 61097-1 3.3, 5.9, 6.3.2
Sample No. 3	yes

Appendix A15

Battery capacity at minus 20 ˚C

Standard	IEC 61097-1 item 3.3, 6.3.2 b)

Sample Number of battery pack	No. 4
Date of Tests	7-11.08.2010
The temperature inside od the climatic chamber	minus 20 °C
Lowest voltage for SART correct operation	4.5 V
Average Current of SART in Standby mode at Vnom – I_1	17 mA
Average Current of SART during interrogation at Vnom – I_2	78 mA

Measurements for battery pack No. 4:

The temperature	Initial voltage, V	Voltage after 96 hours at I_1 =17 mA	Voltage after further 8 hours at I_2 = 78 mA
minus 20 °C	6.637	5.548	5.07 V

Test results:

The battery pack LB1S was discharged by average current I_1 during 96 h and then by average current I_2 during 8 h.

Final voltage after 104 hours is more than rated limit of 4,5 V.

Requirements of IEC 61097-1 3.3

The SART shall have sufficient battery capacity to operate in the stand-by conditions for 96 h and, in addition, following the stand-by period, to provide transponder transmissions for 8 h when being continuously interrogated with a pulse repetition frequency of 1 kHz.

Requirements of IEC 61097-1 п.6.3.2

The on-load terminal voltage measured during the last 15 min of the capacity tests shall not be less than the lowest voltage at which the functional test in 6.3.1.a was carried out.

TEST EQUIPMENT USED:
28, 29, 30, 31.

Conclusion

The battery pack LB1S	conforms to the requirements of IEC 61097-1 3.3, 5.9, 6.3.2
Sample No. 4	yes

Appendix A16

Battery capacity at + 55 ˚C

Standard	IEC 61097-1 3.3, 6.3.2 b)

Sample Number of battery pack	No. 5
Date of Tests	7-11.08.2010
The temperature inside of the climatic chamber	+55 °C
Lowest voltage for SART correct operation	4.5 V
Average Current of SART in Standby mode at Vnom – I1	17 mA
Average Current of SART during interrogation at Vnom – I2	78 mA

Measurements for battery pack No. 5:

The temperature	Initial voltage, V	Voltage after 96 hours at I_1 =17 mA	Voltage after further 8 hours at I_2 = 78 mA
55 °C	6.98	6.789	6.07 V

Test results:

The battery pack LB1S was discharged by average current I1 during 96 h and then by average current I2 during 8 h.

Final voltage after 104 hours is more than rated limit of 4.5 V.

Requirements of IEC 61097-1 3.3

The SART shall have sufficient battery capacity to operate in the stand-by conditions for 96 h and, in addition, following the stand-by period, to provide transponder transmissions for 8 h when being continuously interrogated with a pulse repetition frequency of 1 kHz.

Requirements of IEC 61097-1 6.3.2

The on-load terminal voltage measured during the last 15 min of the capacity tests shall not be less than the lowest voltage at which the functional test in 6.3.1.a was carried out.

TEST EQUIPMENT USED:
28, 29, 30, 31.

Conclusion

The battery pack LB1S	conforms to the requirements of IEC 61097-1 3.3, 6.3.2
Sample No. 5	yes

Appendix A17

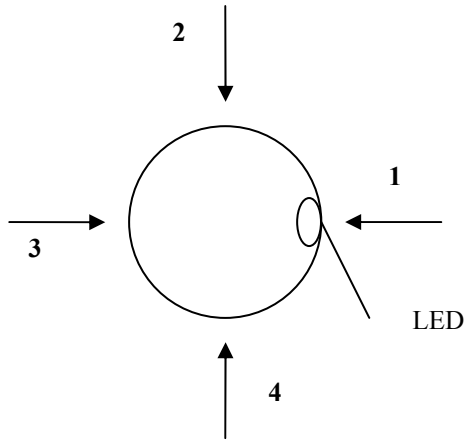
Immunity to radiated radiofrequency disturbance of 10 V/m in band 80 to 2000 MHz

Standard	IEC 60945 items 10.1, 10.4

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No.2
Date of test	11.08.2010
Ambient temperature	30 °C
Ambient humidity	53 %

Test conditions:
Port input noise: case;
Test configuration: desktop layout (80 cm from the floor);
SART operates in standby mode;
The orientation of the radiating antenna: horizontal and vertical;
Distance from SART to radiating antenna – 3 m;
The test was performed on all sides;
The test was carried with the generating antenna facing each of the four sides of the SART;
The height of the sample from the floor level – 0.8 m.

Successive irradiation SART from four sides.



The volume of tests and parameters of exposure:

No.	Parameter	Values
1.	Frequency range	from 80 MHz to 2000 MHz
2.	Field strength	10 V/m
3.	Modulation	Sinusoidal
4.	Modulation frequency	400 HZ
5.	Modulation depth	80 %
6.	Frequency step	1,5 x 10^{-3} decades/s for the frequency range 80 MHz to 1000 MHz; 0,5 x 10^{-3} decades/s for the frequency range 1000 MHz to 2000 MHz;
7.	Time of exposure at each frequency	5 s

Test results:

During the exposure the SART was in three modes alternately: off, in standby mode and in response to the test signal, and in each of the three cases did not change its state. After exposure SART was able to work and did not change its characteristics. Check the SART characteristics were carried after each of its three states (off, in standby mode and in response to the test signal).

SART was operated as intended during and after the test. No degradation of performance or loss of function was fixed accordance requirement item 10.4 Standard IEC 60945

Results required

SART should be resistant to radiated radio frequency interference.

The results of measurements after the tests are shown in the table below:

Item	Parameter	Requirements	Results
5.1	High frequency	(9500+60) MHz	9512,5 MHz
5.1	Low frequency	(9200-60) MHz	9170,0 MHz
5.6	RF pulse emission	100 µs	94,0 µs
5.5	Forward sweep time	(7,5±1) µs	7,48 µs
5.5	Return sweep time	(0,4±0,1) µs	0,316 µs
5.4	Response signal	12	12

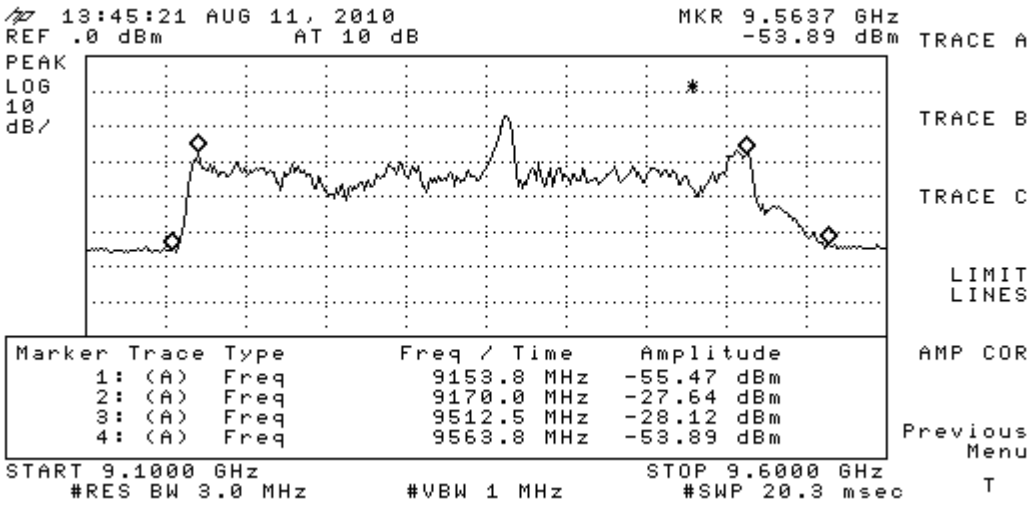


Figure 46 – Spectrogram measurement frequency range SART "SafeSea S100"

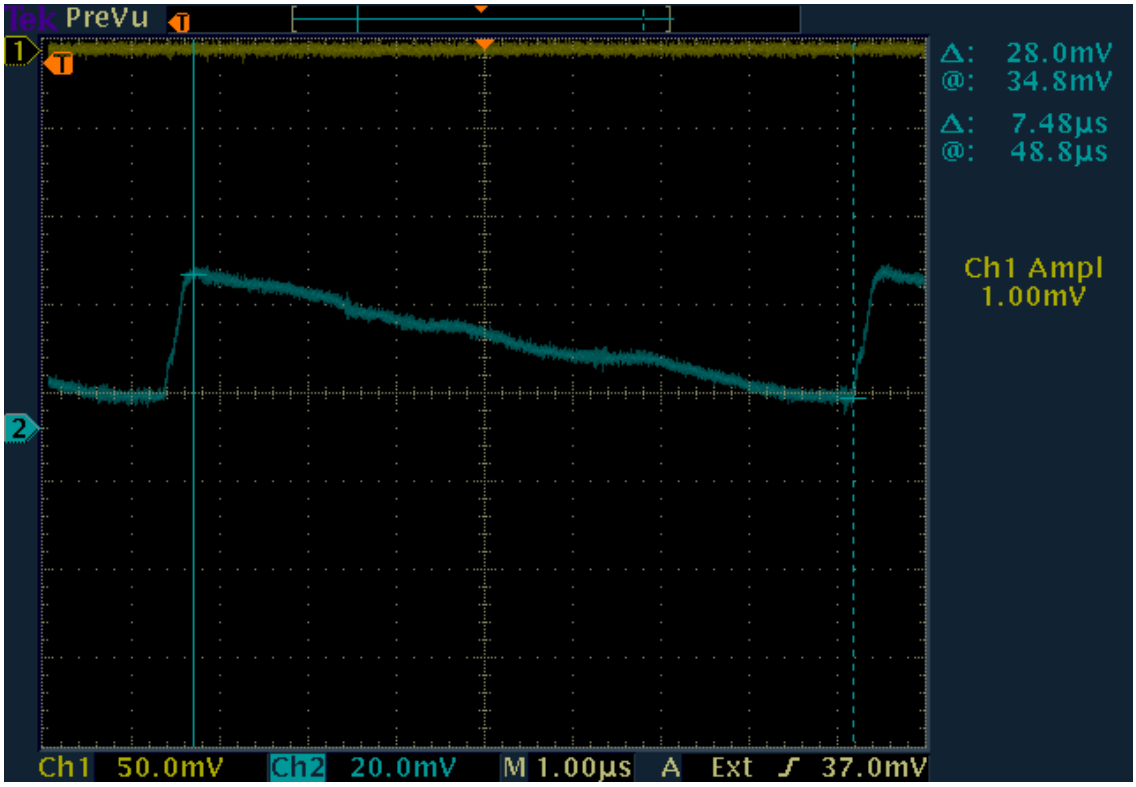


Figure 47 – Forward sweep time

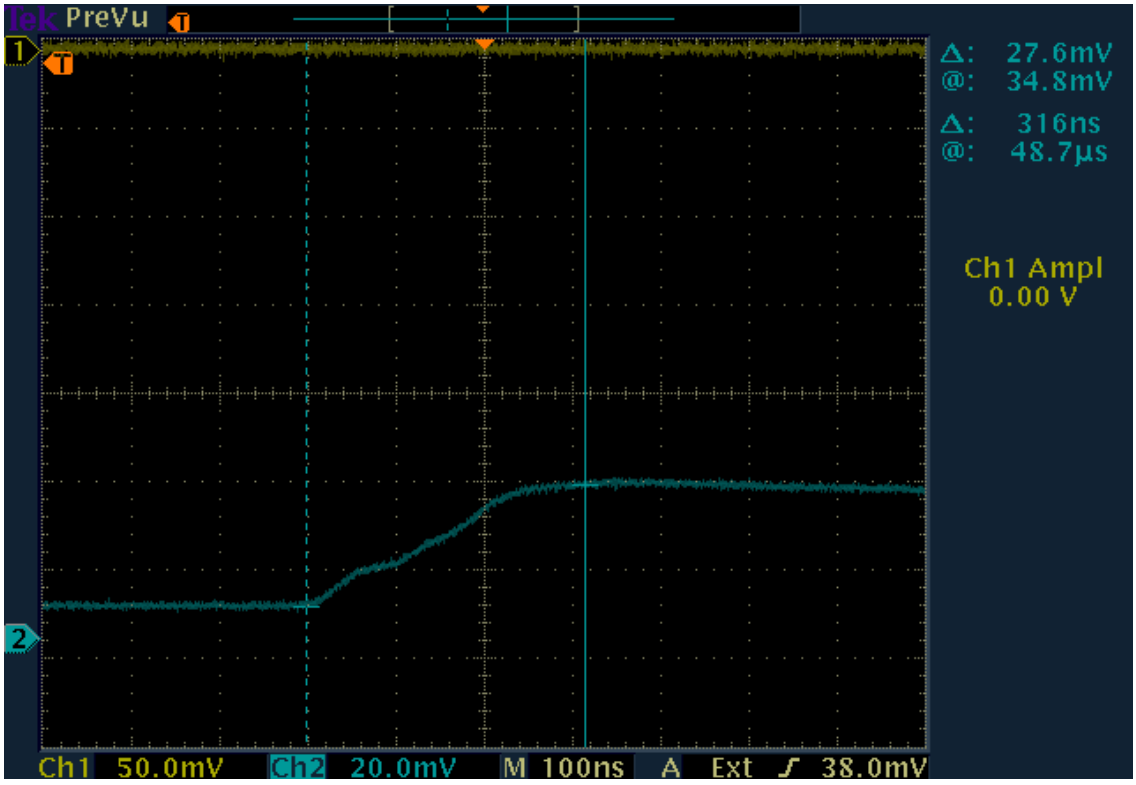


Figure 48– Return sweep time

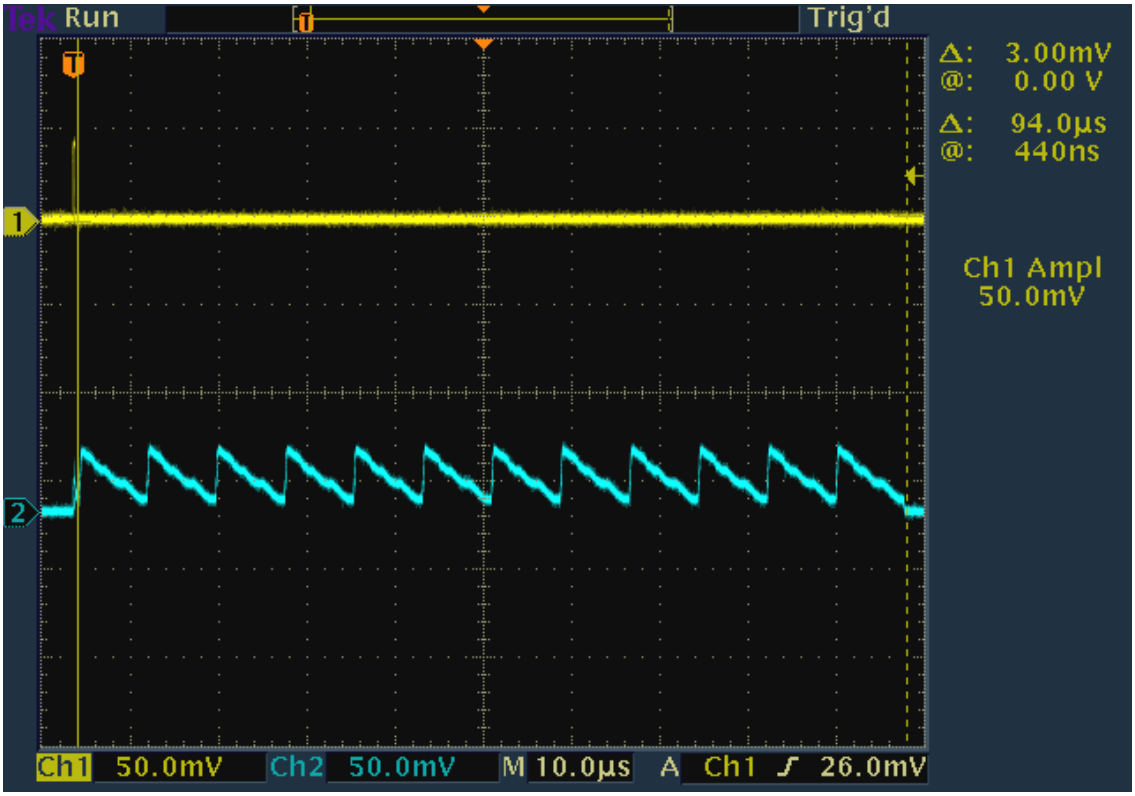


Figure 49 – 12 sweeps of the response signal

TEST EQUIPMENT USED:
8, 9, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40.

CONCLUSION

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of the standard IEC 60945 items 10.1, 10.4
Sample No 1	yes

Appendix A18

Testing of immunity to electrostatic discharge.

Standard	IEC 60945 items 10.1, 10.9

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 2
Date of test	11.08.2010
Ambient temperature	30 °C
Ambient humidity	52%

Test conditions
SART operates in stand-by mode.
Port input noise: case;
1. Contact discharge was applied to the metallic parts of case and to the fastening screws.
The test level was 6 kV contact discharge for both polarities.
2. The test level was 8 kV air discharge for both polarities.
3. Indirect exposure was carried out on vertical and horizontal coupling plane connection with both polarities (+/-) level: 6 kV.
4. Each position was tested with 10 discharges positive and negative with intervals 1 s between discharges.

Points of contact electrostatic discharge		Discharge			
		Contact		Air	
		Positive	Negative	Positive	Negative
1.	Case	No	No	No	No
2.	Fastening screws	No	No	N/A	N/A
3.	Vertical coupling plane	No	No	N/A	N/A
4.	Horizontal coupling plane	No	No	N/A	N/A

N/A – not applicable; No – a reaction on discharge is absent

Test results:

SART was operating correctly after the test without changing the parameters and without loss of function and conforms to the requirements of items 10.1, 10.9 standard IEC 60945.

Results required

SART shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed.

During the test, degradation or loss of function or performance which is self-recoverable is however, allowed, but no change of actual operating state or stored data is allowed.

The results of measurements after the tests shown in the table below:

Item	Parameter	Requirements	Results
5.1	High frequency	(9500+60) MHz	9515,0 MHz
5.1	Low frequency	(9200-60) MHz	9166,5 MHz
5.6	RF pulse emission	100 μs	94,4 μs
5.5	Forward sweep time	(7,5±1) μs	7,42 μs
5.5	Return sweep time	(0,4±0,1) μs	0,332 μs
5.4	Response signal	12	12

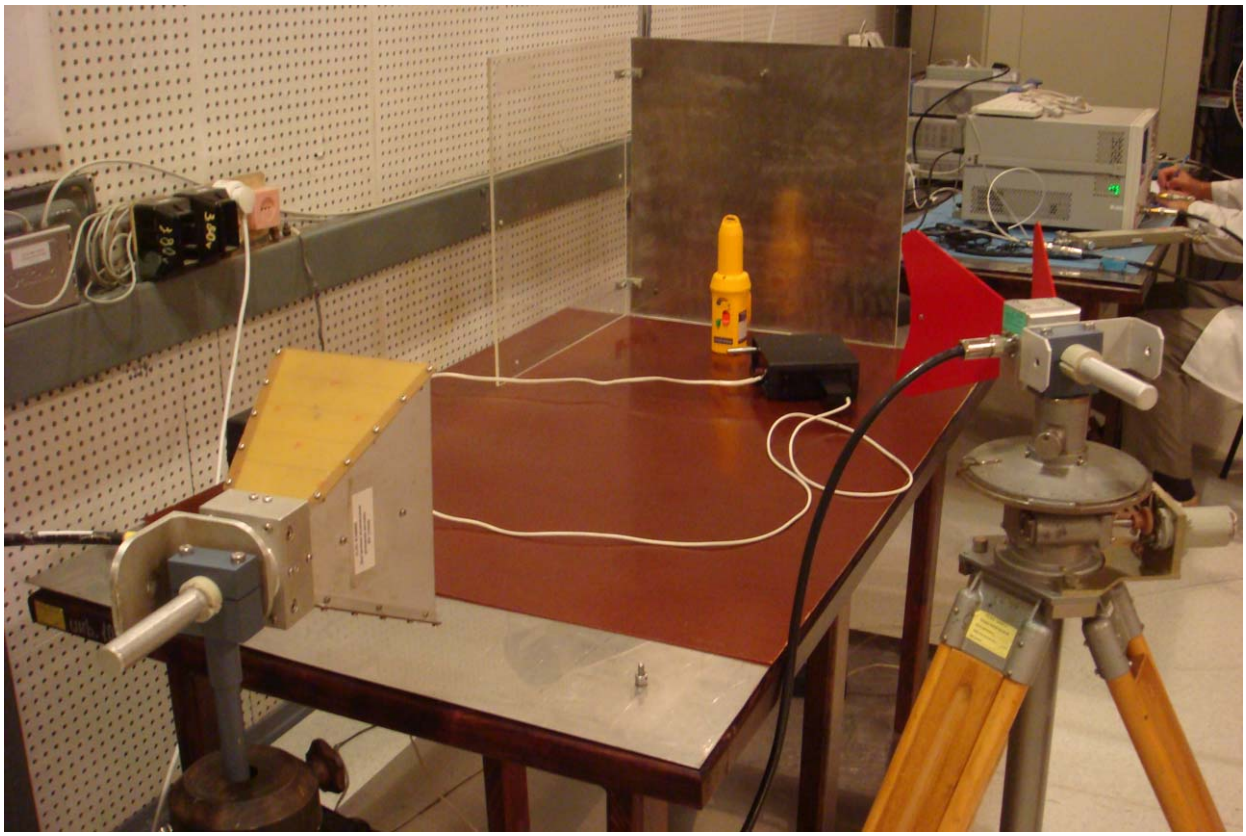


Photo 30 Test site

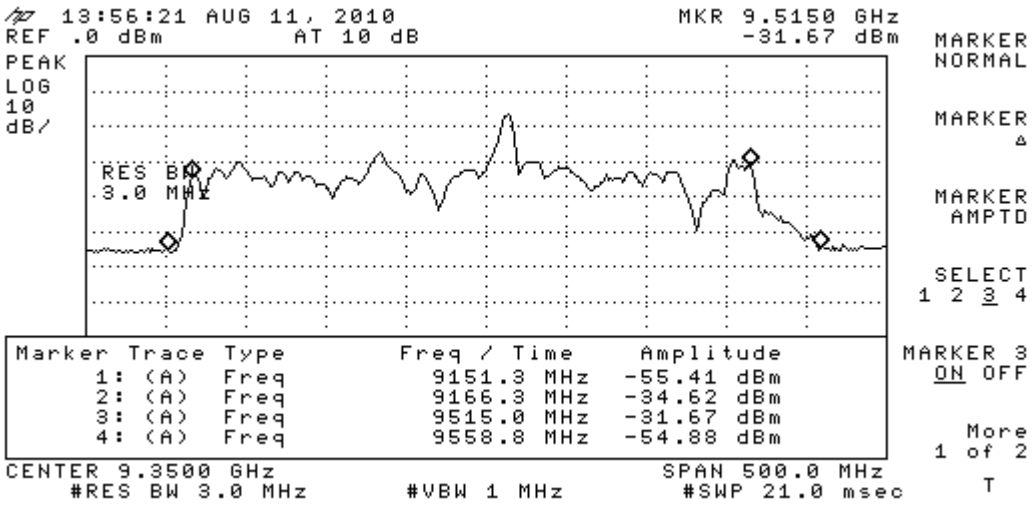


Figure 50– Spectrogram measurement frequency range SART « SafeSea S100»

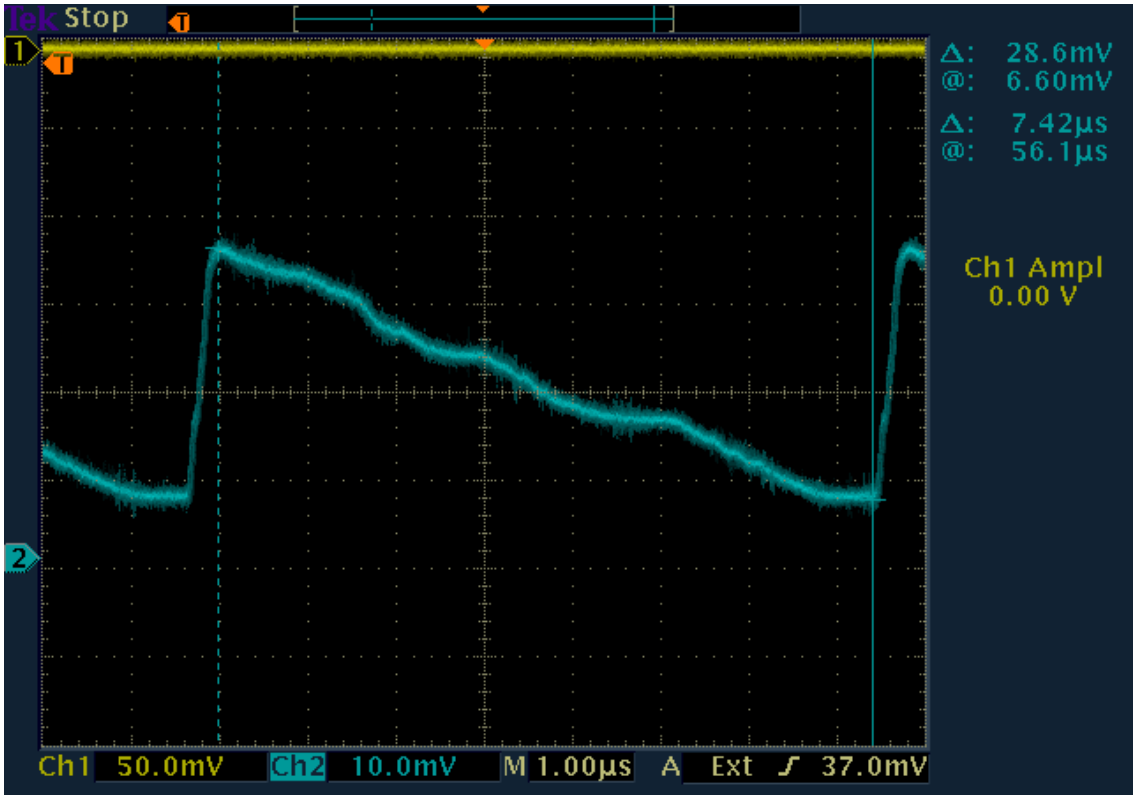


Figure 51 – Forward sweep time

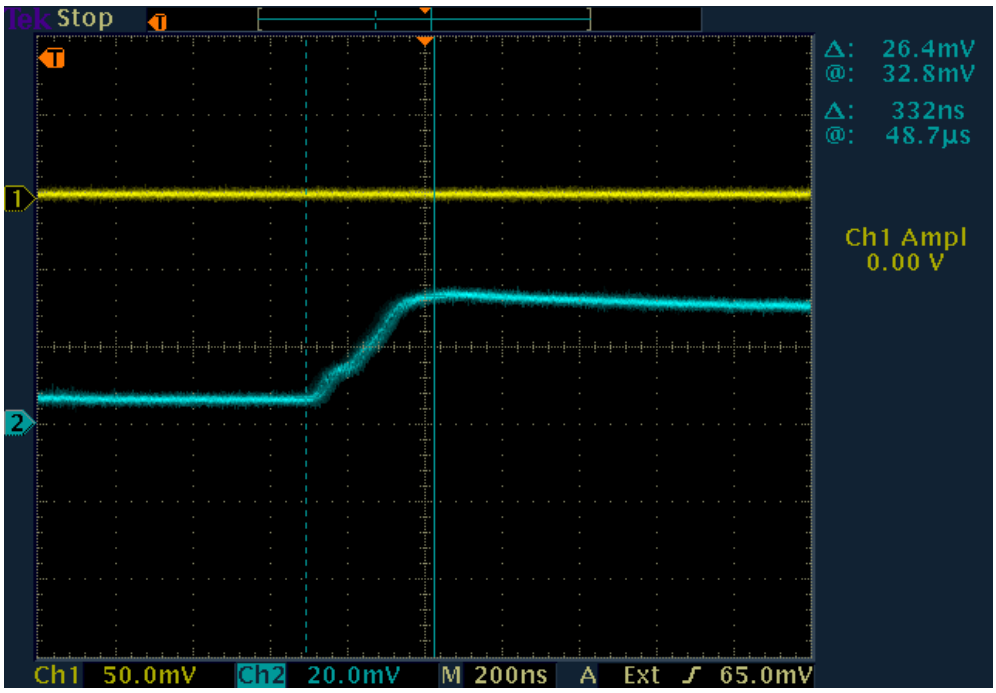


Figure 52 – Return sweep time

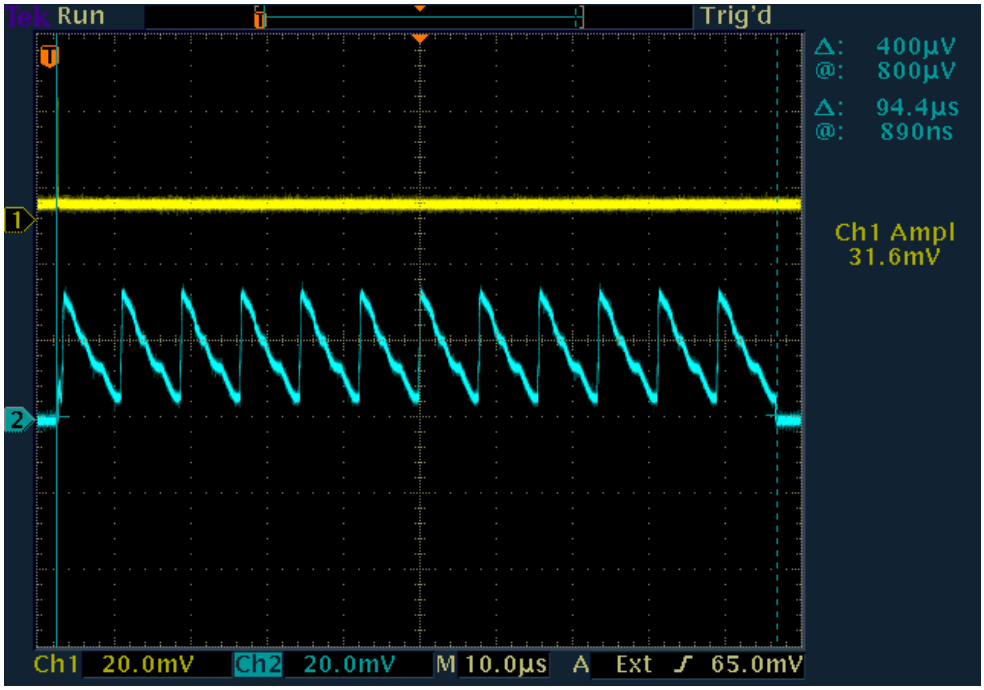


Figure 53 – 12 sweeps of the response signal

TEST EQUIPMENT USED:
8, 9, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 39.

CONCLUSION

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of the standard IEC 60945 items 10.1, 10.9
Sample No 1	yes

Appendix A19

Compass safe distance

Standard	IEC 60945 item 4.5.3, 11.2

Model SART	SafeSea S100
Serial number	003
Sample Number of battery pack	No 2
Date of test	19.08.2010
Ambient temperature	30 °C
Ambient humidity	54%

Test conditions

1. Compass safe distance test conducted on special installation (owned PE TC "Omega")
For test the magnetic compass was used, which located on that special installation.

2. In accordance with the requirement of the standard IEC 60945 item 11.2.2 was measured horizontal component of the magnetic flux density in microtesla at the place of testing.
Magnetic field meter HB0599A used for the measurements.
Horizontal component of the magnetic flux density (H) 1 m around center of compass has maximum value H=20,0 uT.

3.In accordance with the method of the standard IEC 60945 item 11.2.2 calculated maximum deflection of the main ship's compass by the formula A = 5,4 ° / H, which is a criterion in determining the safe distance from the compass.
A= 5,4°/20= 0,27°

4. SART in stand-by mode placed at distance 2 m from compass. This compass needle pointing the direction of N. SART turned around the horizontal and vertical axis at a distance of 2 meters and have not affect the position of the compass.

5. SART closer to the compass at a distance of 1,5 meters and conducted inspection at various positions of SART. Changing the position SART around the horizontal and vertical axis at a distance of 1.5 meters did not affect the position of the compass.

6. SART closer to the compass at a distance of 1,0 meters and conducted inspection at various positions of SART. Changing the position SART around the horizontal and vertical axis at a distance of 1 meter did not affect the position of the compass.

7. SART closer to the compass at a distance of 0,5 meters and conducted inspection at various positions of SART. Changing the position SART around the horizontal and vertical axis at a distance of 0.5 meters did not affect the position of the compass.

8. SART closer to the compass at a distance of 0,235 meters and conducted inspection at various positions of SART caused the deviation of the compass to 0.3 °, which exceeds the criterion of 0.27 °, as calculated in item 3.

9. In accordance with the requirement of the standard IEC 60945 item 11.2.3 compass safe distance is 0.25 m (subject to rounding to the nearest multiple of the value of 50 mm or 100 mm.)

Photo 31. Test installation.

Photo 32. Defining a safe distance from the SART to the main ship's magnetic compass. SART in stand-by mode.

Test results:

The safety distance from SART to compass is 0,21 m.

Results required IEC 60945 item 11.2.3

The greatest distance obtained under all these conditions is the safe distance. Distances are to be rounded up to the nearest 50 mm or 100 mm. The findings shall be noted in the test report.
The safe distance shall be marked on the EUT.

TEST EQUIPMENT USED:
7, 35, 37.

CONCLUSION

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of the standard IEC 60945 item 4.5.3, 11.2
Sample No 1	yes

Appendix A20

Check receiver protection (28 dBW/m2 at radar distance 20m)

Standard	IEC 61097 item 5.8 indent 2, item 6.9.9

Model SART	SafeSea S100
Serial number	003
Sample Number of battery pack	2
Date of test	16.08.2010
Ambient temperature	32 °C
Ambient humidity	52 %
Time interval excerpts SART under the influence of electromagnetic field of the ship's radar	3 minutes
Radar type	NAYADA-5
Radar impulse power	12,5 kW
The height of the radar antenna above sea level	15,3 m
Distance from the radar to the SART	19 m

Test conditions:

1. As a source of intense electromagnetic fields was used the shipborne radar Nayada-5 of the rescue tug "Kremenets", that is standing in Streletskaya Bay in the Sevastopol.
Radar installed on a platform above the upper deck on the port side at a height of 15,3 m. Similar radar installed on the starboard side.
During the tests used radar on the port side serial No. 803 produced in 1982.

Parameters of radar NAYADA-5 serial No 803
Pulsed power 12,5 kW,
Antenna Gain 32,5 dB (1800)
Height 15,3 m.

2. SART was fixed at the life boat.
Distance from the antenna’s centre to the SART was 18.9 m.

3. The level of the electromagnetic field created by the radar is calculated on the basis of radar radiation parameters corresponding to the IMO Resolution A.477 (XII), namely:
- Pulsed power 25 kW;
- Antenna Gain 30 dB;
- Height 15 m;

Ship's radar, that relevant IMO Resolution A.477(XII), creates the power level of 28 dBW/M2.

4. Used for testing and calculation of ship's navigation radar NAYADA-5 serial No 803 has:
Pulsed power 12,5 kW,
Antenna gain 32,5 dB (1800)
Height 15 m.

Antenna gain at 1.8 times more that the normalized value of the Resolution ИМО A.477(XII) and compensates the loss of power by 2 times. The level of power supplied to the antenna is 0.9 from the standard for radar, that is equal to the IMO Resolution A.477 (XII).
Since the level of power density with distance has a quadratic dependence of the decrease in the far field, the correction factor for the distance is $(0,9)^{-0.5} = 0,948$.
Power level is 28 dBW/m^2 at distance R = 20*0,948= 18.9 м.

5.-SART was fixed in a vertical position at a distance of 18.9 meters from the radar antenna.

6. 11:05 SART was switched on by turning the switch to "ON" position and the flashing indicator was in stand-by mode.

11:09 radar started work in the review mode with the scale range 250 meters.
On the indicator radar appeared circular signal flare.
Switching to the scale range 8 miles on the radar screen was clearly visible 12 points on a rotating hairline direction along its entire length.
When switching to a scale of 16 miles on the radar screen was clearly visible 12 points on the rotating direction of the cursor on half of its length.

On radar screen the length of response of SART S100 is 6.98 nm (12.9 km) for duration SART response 94 us and time interval 86 us from first till twelfth SART saw-tooth received by radar.

On radar screen with scale 8 nm SART response is indicated together with spurious responses (every third dots after each) reflected from large metal mast which was stand 300 meters behind the SART.
7. Photos of radar screen with the light on different scales are given below.

8. Irradiation SART lasted 5 minutes.

11:14 Radar was switched to the mode of rotation without radiation power.
9. 11:17 SART was examined. SART was in standby mode, the indicator SART permanent light.

10. After removal of the mast SART was delivered to the workplace measurement in a shielded chamber number 3 Test Center Omega.
SART operated correctly. All parameters were like before this test.

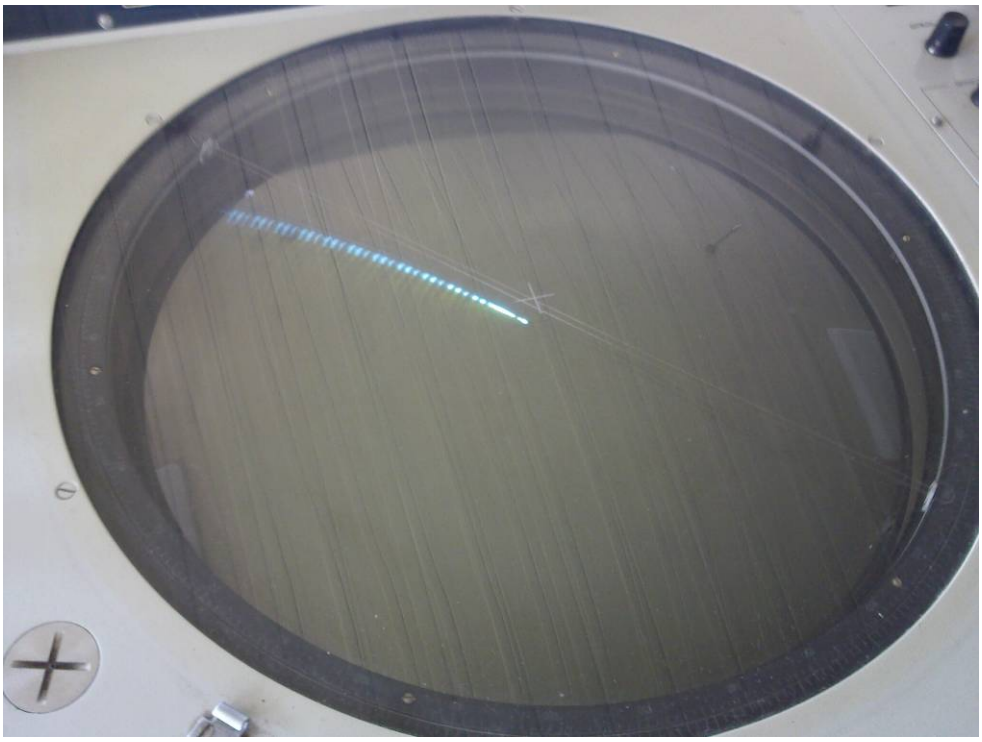


Photo 32 – View to the response signal of SART on the radar's display, scale 8 miles.

Note: On radar screen the length of response of SART S100 is 6.98 nm (12.9 km) for duration SART response 94 μs and time interval 86 μs from first till twelfth SART saw-tooth received by radar.

On radar screen with scale 8 nm the SART response is indicated together with spurious responses (every third dots after each pair) reflected from large metal mast which was at 300 meters behind the SART. SART response is summed up with reflected signal from metal mast. Delay of reflected signal was 2 μs from distance 600 meters (300 meters to mast plus 300 meters return). The first dot of reflected signal concurred with second dot of SART response. The second dot of reflected signal indicated as third dot after pair of SART dots.

.

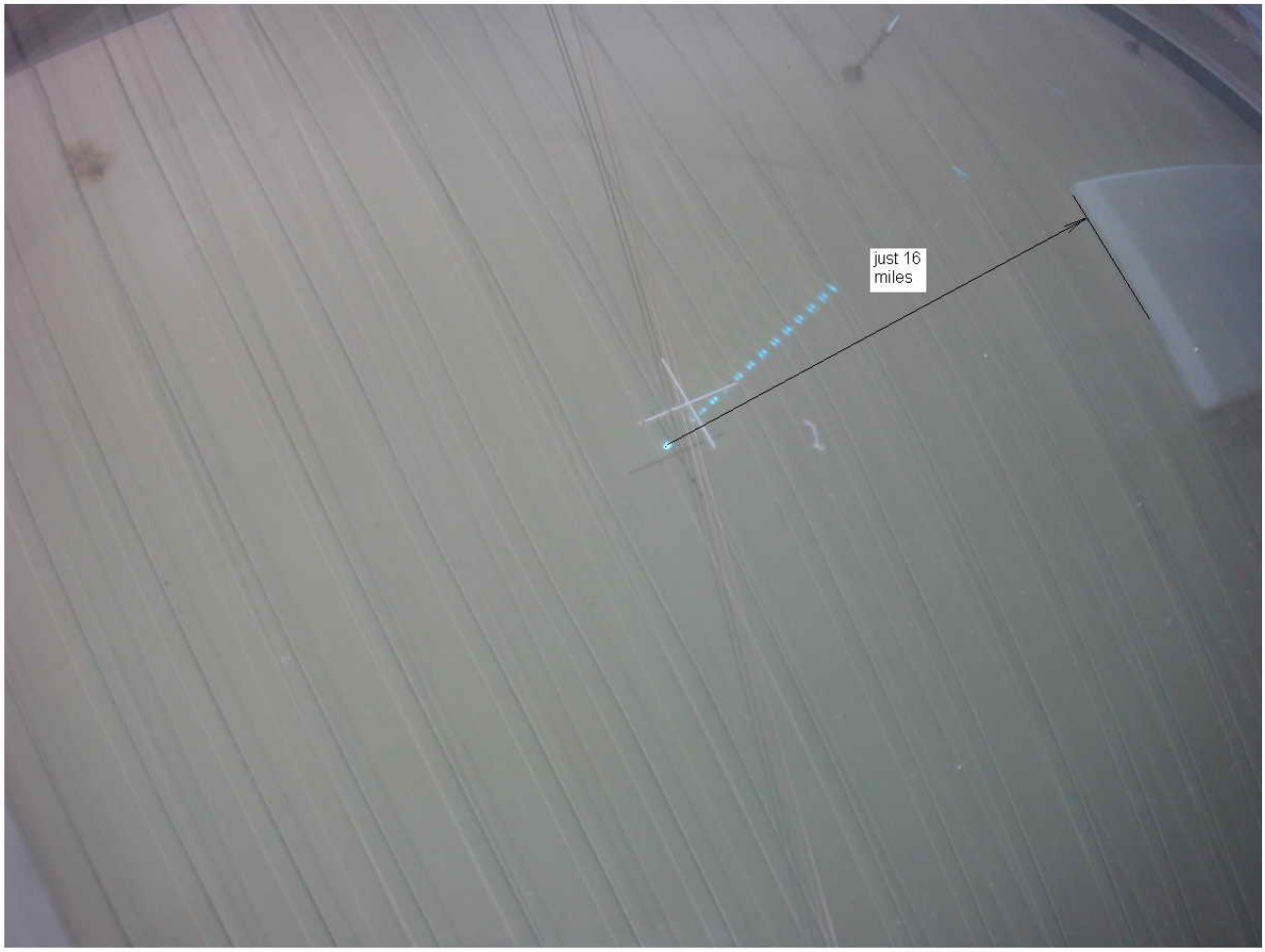


Photo 33– View to the response signal of SART on the radar’s display, scale 16 miles.

Note: Radius of observed working space of radar is represented on photo of radar screen. The radius corresponds to 16 nm for selected scale 16 miles. The radius is represented for right visual comparison with SART response with length 7 nm. The photo of convex radar screen has distortions because photo camera had close position to radar screen.

On radar screen the length of response of SART S100 is 6.98 nm (12.9 km) for duration SART response 94 μs and time interval 86 μs from first till twelfth SART saw-tooth received by radar.

Test results:

Item	Parameter	Requirements	Results
5.1	High frequency	(9500+60) MHz	9517,3 MHz
5.1	Low frequency	(9200-60) MHz	9171,0 MHz
5.6	RF pulse emission	100 μs	94,6 μs
5.5	Forward sweep time	(7,5±1) μs	7,48 μs
5.5	Return sweep time	(0,4±0,1) μs	0,34 μs
5.4	Response signal	12	12

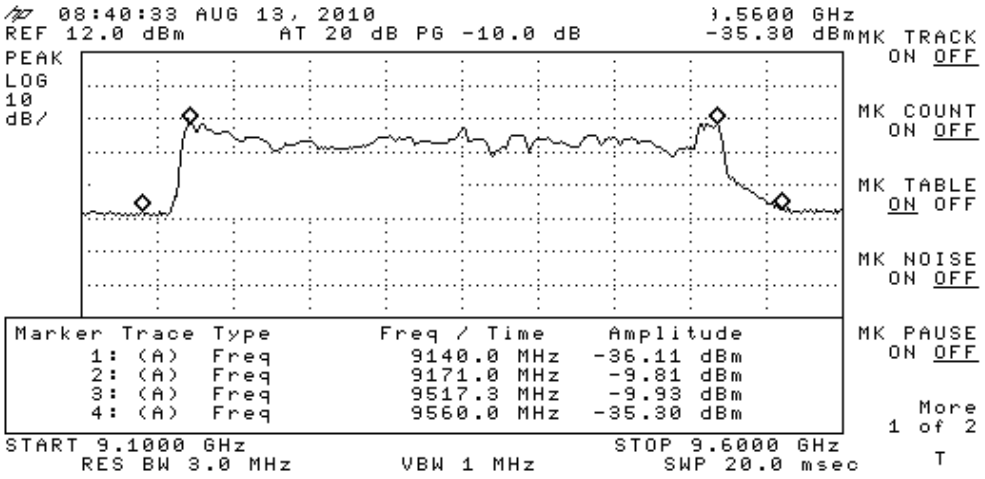


Figure 54 – Spectrogram measurement frequency range SART “SafeSea S100”

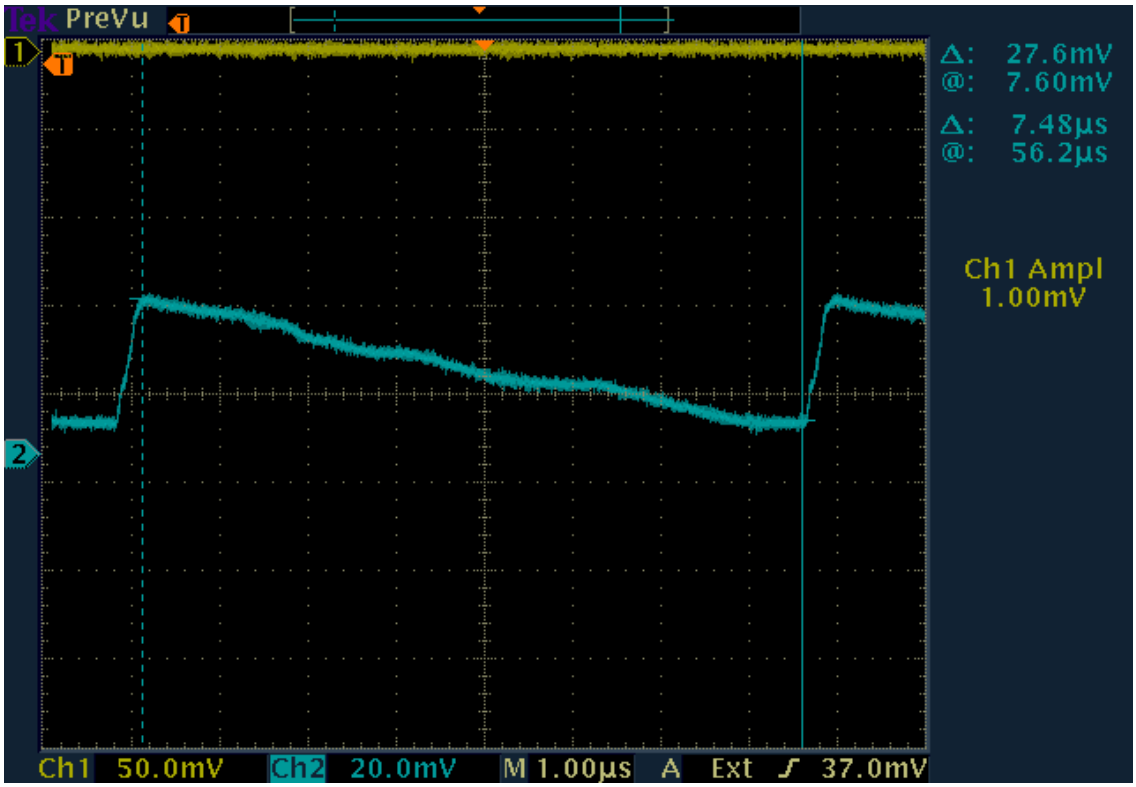


Figure 55 – Forward sweep time

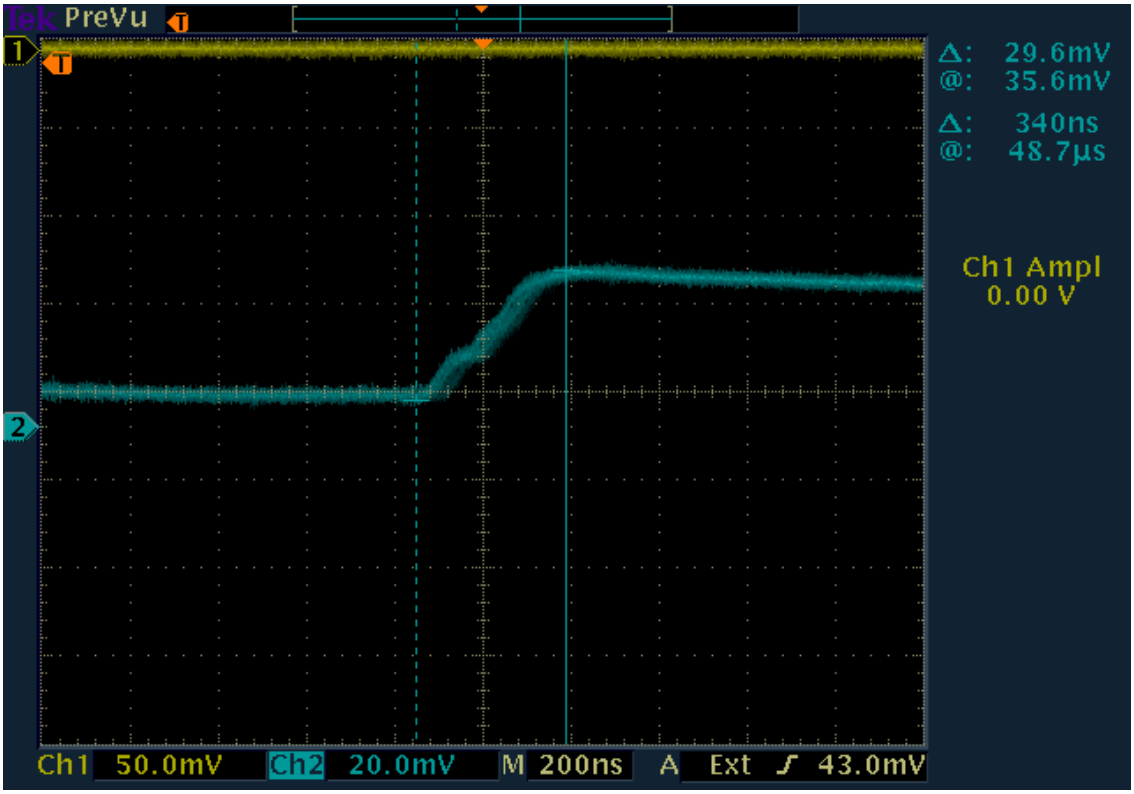


Figure 56– Return sweep time

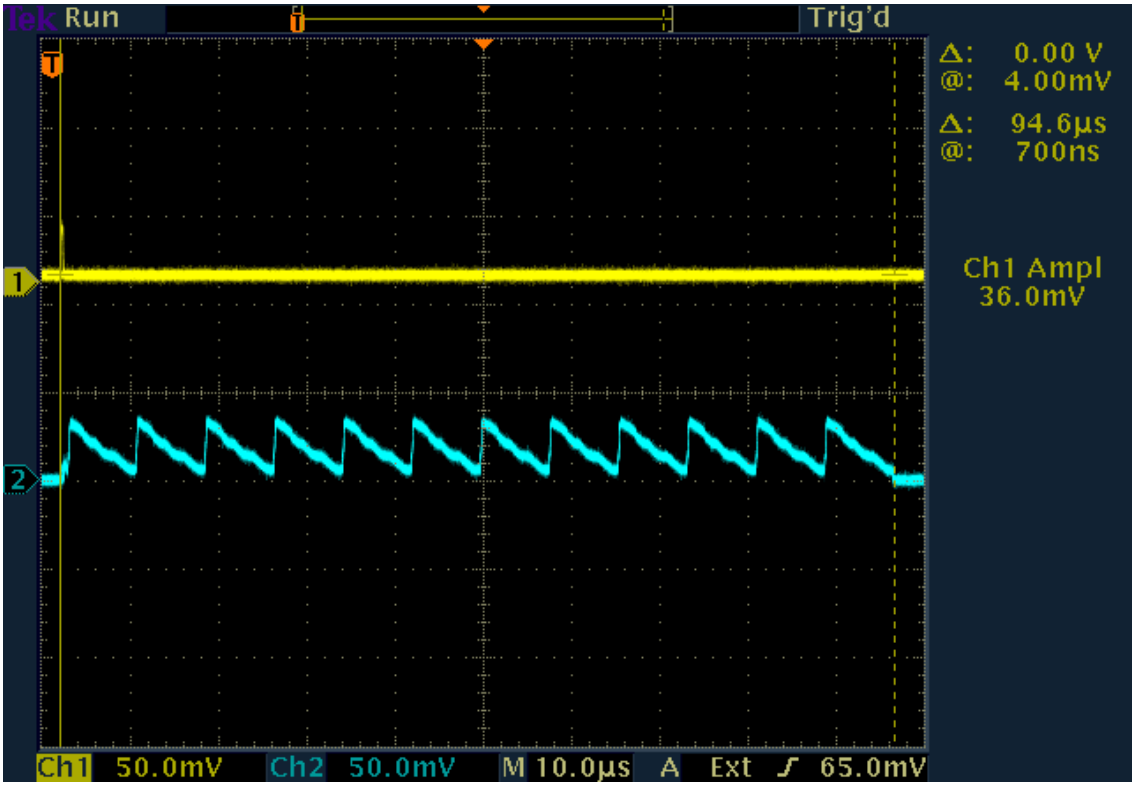


Figure 57– 12 sweeps of the response signal

Test results:

SART in the process of electromagnetic field exposure levels of 28 dBW/м2 from radar to operate correctly. The ship's radar screen recorded a mark of the required form response signal SART. After the effects of SART operated in a working mode without changing the parameters and without loss of function.

Results required

The SART shall be placed, already functioning, in the radiated field 28 dBW/m^2 of radar conforming to IMO Resolution A.477 (XII), operating in 9 GHz band, at a distance of 20 m.

TEST EQUIPMENT USED:
8, 9, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 34, 39.

CONCLUSION

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of the standard IEC 61097 item 5.8 indent 2, item 6.9.9
Sample No 1	yes

Appendix A21

Range performance

Standard	IEC 61097-1 item 3.7

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 2
Date of test	19.08.2010
Ambient temperature	28 °C
Ambient humidity	57 %

Test conditions

1. Test Range was carried out in accordance with the requirements of IEC 61097-1 item 6.7.1 a calculation method using the results of measurements of SART of item 6.5 (the height of the antenna), item 6.9.3 (receiver sensitivity), item 6.9.5 (radiated power).
2. Calculation range SART "SafeSea S100" is made on base of the measured parameters:

receiver sensitivity -	minus 51,92 dBm
radiated power	460 mW
antenna characteristics	omnidirectional
antenna height	1 m

3. As a result of the use of graphs of ITU-R M.628-4 Annex 2 range performance of SART "SafeSea S100" was defined, which is 7.1 nautical miles using radar that meets the requirements of resolution A.477 (XII) with the radar antenna height of 15 meters.

Note: ITU-R M.628-4 Technical characteristic for search and rescue radar transponders

Test results:

The SART operates correctly when interrogated at a distance of up to at least 7.1 nautical miles by a navigation radar complying with IMO Resolution A.477(XII) and A.222(VII) with an antenna height of 15 m.

Results required

The SART shall operate correctly when interrogated at a distance of up to at least 5 nautical miles by a navigation radar complying with IMO Resolution A.477(XII) and A.222(VII) with an antenna height of 15 m. It shall also operate correctly when interrogated at a distance of at least 30 nautical miles by a airbone radar with at least 10 kW peak output power at a height of 3 000 ft.

CONCLUSION

Search and Rescue Transponder "SafeSea S100"	conforms to the requirements of the standard IEC 61097-1 item 3.7
Sample No 1	yes

Appendix A22

Oil resistance check

Standard	IEC 61097-1 item 3.2 k)

Model of SART	SafeSea S100
Serial Numbers	No. 003
Sample Number of lithium cells	No. 1
Date of Tests	23.08.2010
Ambient temperature at open area test site:	21..24°C
Relative air humidity:	77 %
Atmospheric pressure:	762 mm/Hg
The temperature inside of the climatic chamber	+19.5 °C
Oil sort	ASTM No.1
Temperature of Oil	+ 19 °C
Test duration	3 hours

The SART has been placed into tank full of the ASTM oil No.1 in the climatic chamber in turned off condition.
The temperature inside the climatic chamber was set to +19 °C
After retention interval 3 h SART was extract from oil tank and cleaned in accordance with the manufacturer's instructions.
Then the SART has been turned on and put to the test.
Tests results are listed in the table below:

Specification item	Name of the parameter	Rated value	Measured value
5.1	High frequency of radiated power	(9500+60) MHz	9516,5 MHz
5.1	Low frequency of radiated power	(9200-60) MHz	9173,8 MHz
5.6	RF pulse emission	100 µs	93,8 µs
5.5	Forward sweep time	(7,5±1) µs	7,44 µs
5.5	Return sweep time	(0,4±0,1) µs	0,32 µs
5.4	Quantity of frequency tunings of the response signal	12	12

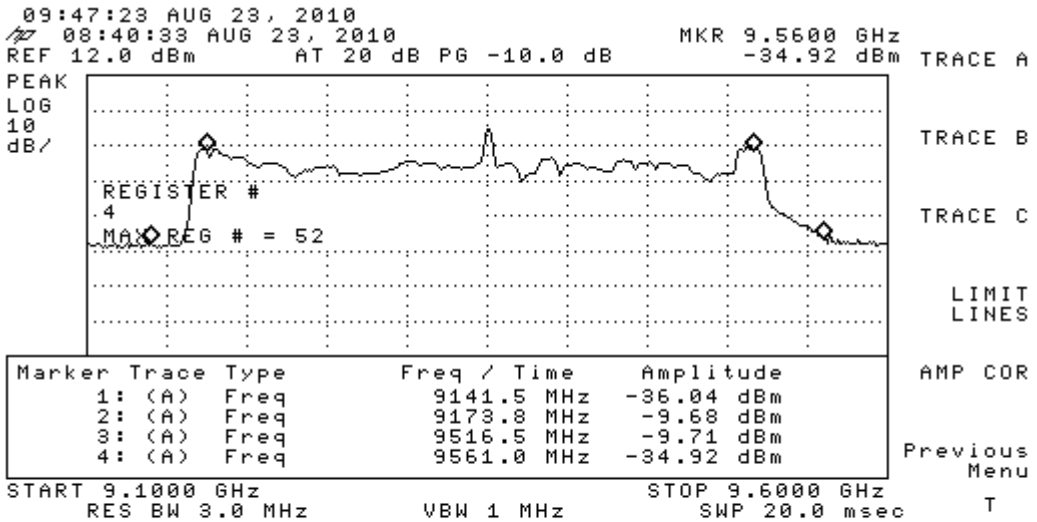


Figure 58– Spectrogram measurement frequency range SART « SafeSea S100»

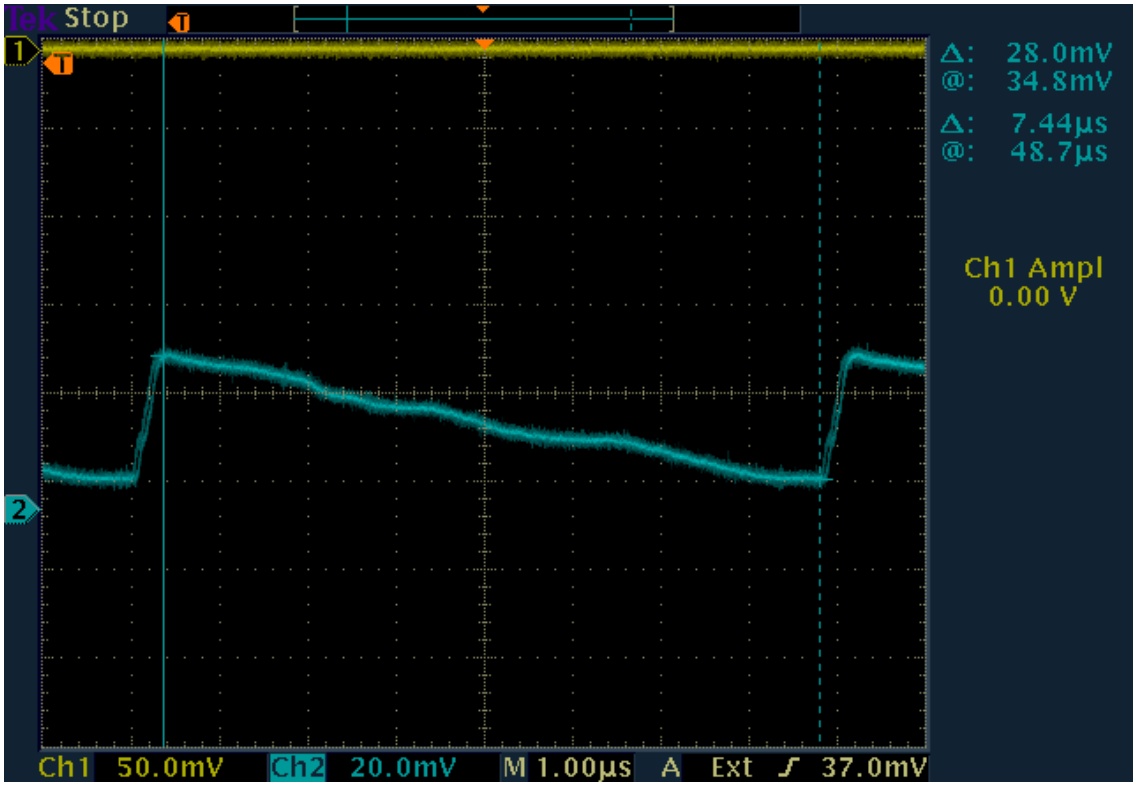


Figure 59– Forward sweep time

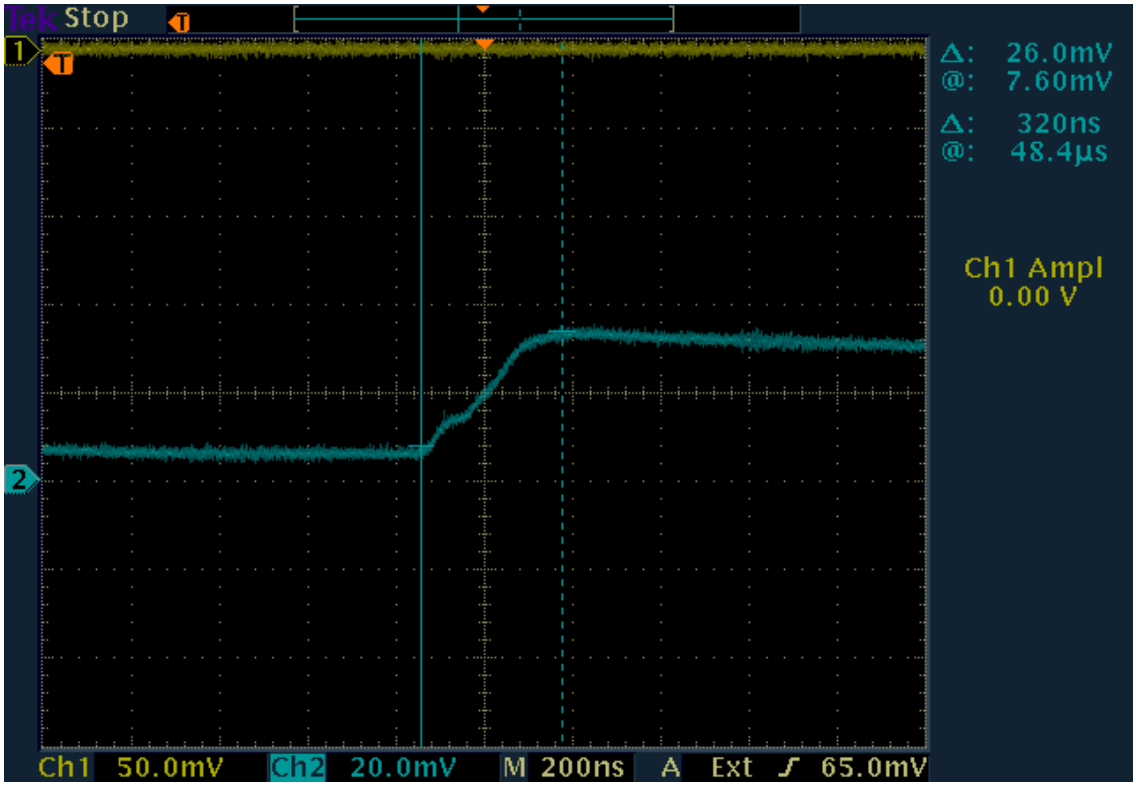


Figure 60 – Return sweep time

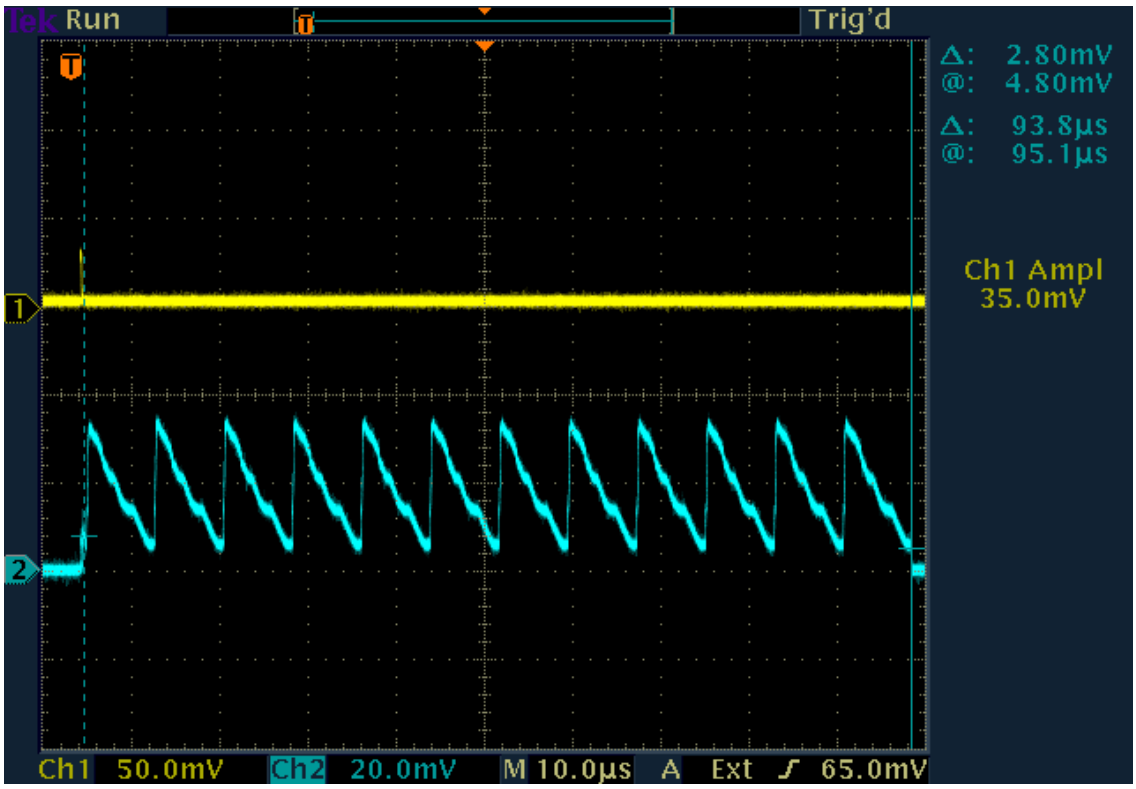


Figure 61 – 12 sweeps of the response signal

Test results:

The SART complies with IEC 61097-1 3.2 k), 6.2 k) and, IEC 60945 8.11.3

Requirements of IEC 61097-1 3.2 k), 6.2 k)

3.2 k) SART shall be not unduly affected by seawater or oil

6.2 k) SART shall comply with IEC 60945 for ….. oil resistance

Requirements of IEC 60945 8.11.3

The EUT shall then be subjected to a performance check and an examination with the naked eye.

Requirements of IEC 61097-1 3.4, IEC 60945 8.11.4

The requirements of the performance check shall be met. The EUT shall show no signs of damage such as shrinking, cracking, swelling, dissolution or change of mechanical characteristics.

Photo 34 — SART in oil

Photo 35 — Tank with oil in temperature chamber

Photo 36— SART in temperature chamber.
Temperature +19.5 °C

Photo 37— Labeling of SART after oil resistance test.

TEST EQUIPMENT USED:
8, 9, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 36, 39.

Conclusion

Search and Rescue Transponder “SafeSea S100”	conforms to the requirements of IEC 61097-1 3.2 k), 6.2 k) IEC 60945 8.11
Sample No. 1	yes

Appendix A23

Corrosion

Standard	IEC 61097-1 item 3.2 k)

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 1
Date of inspection of documents	16.09.2010
Ambient temperature	28 °C
Ambient humidity	57 %

The manufacturer submit declaration about SART S100 and EPIRB range E100 products are made from the same external materials (see Annex E).
Materials of SART were tested during corrosion test of EPIRBs E100G class 1 Category 1 and E100G class 2 Category 2 in accordance RTCM77-2002/SC110-STD section A7.0.
Test results of EPIRBs E100G class 1 Category 1 and E100G class 2 Category 2 are in Annex D.

Test results:

The SART is not unduly affected by seawater following tests to RTCM on the EPIRB.
The SART complies with IEC 61097-1 3.2 k) by way of a waiver method IEC 60945 8.12.1 with evidence provided in Appendix D that materials have been tested.

Requirements of IEC 61097-1 3.2 k)

3.2 k) SART shall be not unduly affected by seawater or oil

Conclusion

Search and Rescue Transponder "SafeSea S100"	conforms to the requirements of IEC 61097-1 3.2 k)
Sample No. 1	yes

Appendix A24

Buoyancy and length of lanyard

Standard	IEC 61097-1 item 3.2 j)

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 2
Date of test	15.09.2010
Ambient temperature	28 °C
Ambient humidity	57 %

The length of lanyard of SART has been measured. The length is 15 m.
Then buoyancy lanyard has been checked in tank with water. The lanyard is capable of floating

Test results:

The SART complies with IEC 61097-1 3.2 j)

Requirements of IEC 61097-1 3.2 j)

3.2 j) SART shall be equipped with a buoyant lanyard, suitable for use as a tether, if it is capable of floating (not less than 10m length)

TEST EQUIPMENT USED:
33, 37.

Conclusion

Search and Rescue Transponder "SafeSea S100"	conforms to the requirements of IEC 61097-1 3.2 j)
Sample No. 1	yes

Appendix A25

Solar radiation

Standard	IEC 61097-1 item 3.2 l)

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 1
Date of test	05.07.2010 – 08.07.10
Date of inspection of documents	16.09.2010
Ambient temperature	28 °C
Ambient humidity	57 %

Only pole of SART was exposed to solar radiation.
The manufacturer submit declaration about SART S100 and EPIRB range E100 products are made from the same external materials (see Annex E).
Materials of SART were tested during solar radiation test of EPIRB E100 class 1 Category 2.
Test results pole of SART and EPIRB E100 class 1 Category 2 are in Annex C.

Test results:

The SART complies with IEC 61097-1 3.2 l) by method IEC 60945 8.10.3

Requirements of IEC 61097-1 3.2 l)

3.2 l) SART shall be resistant to deterioration in prolonged exposure to sunlight

TEST EQUIPMENT USED:
45.

Conclusion

Search and Rescue Transponder "SafeSea S100"	conforms to the requirements of IEC 61097-1 3.2 l)
Sample No. 1	yes

Appendix A26

Antenna height

Standard	IEC 61097-1 items 3.2 o), 3.5, 5.12

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 1
Date of test	15.09.2010
Ambient temperature	24 °C
Ambient humidity	57 %

The height of SART antenna with a pole has been measured. The height installed SART antenna from the lower point of pole till the lower point of SART radome body is 109 cm.

Test results:

The SART complies with IEC 61097-1 3.2 o), 3.5, 5.12

Requirements of IEC 61097-1 3.2 o)

3.2 o) SART shall be provided with a pole or other arrangement compatible with the antenna pocket in a survival craft in order to comply with the requirements referred to in 3.5 together with illustrated instructions.

Requirements of IEC 61097-1 3.5

3.5 The height of the installed SART antenna shall be at least 1 m above sea level

Requirements of IEC 61097-1 5.12

5.12 Effective antenna height: greater or equal to 1 m

TEST EQUIPMENT USED:
37.

Conclusion

Search and Rescue Transponder "SafeSea S100"	conforms to the requirements of IEC 61097-1 3.2 o), 3.5, 5.12
Sample No. 1	yes

Appendix A27

Antenna characteristics, Polarisation

Standard	IEC 61097-1 item 3.6, 5.14, 5.15, 5.2

Model SART	SafeSea S100
Serial number	No. 003
Sample Number of battery pack	No. 2
Date of test and inspection of documents	16.09.2010
Ambient temperature	28 °C
Ambient humidity	57 %

Azimuthal and vertical beamwidths has been checked by inspection of the manufacturer's design data.
Polarisation has been checked by inspection of the manufacturer's design data. In operational position of SART the design antenna guarantee horizontal polarisation.

Figure 62 Design of antenna

Test results:

Antenna gain varied between 2.7dB and 5.4dB over 360° meeting the IEC 61097-1 requirement of omnidirectional performance, with a gain variation less than +1.35dB.
The 2dB vertical beamwidth is at over +14.5°.
Polarisation is horizontal.
The SART complies with IEC 61097-1 3.6, 5.14, 5.15, 5.2

Requirements of IEC 61097-1 3.6

3.6 The vertical antenna polar diagram and hydrodynamic characteristics of the device shall permit the SART to respond to search radars under heavy swell conditions. The antenna shall be substantially omnidirectional in the horizontal plane. Horizontal polarisation or circular polarisation shall be used for transmission and reception.

Requirements of IEC 61097-1 5.2

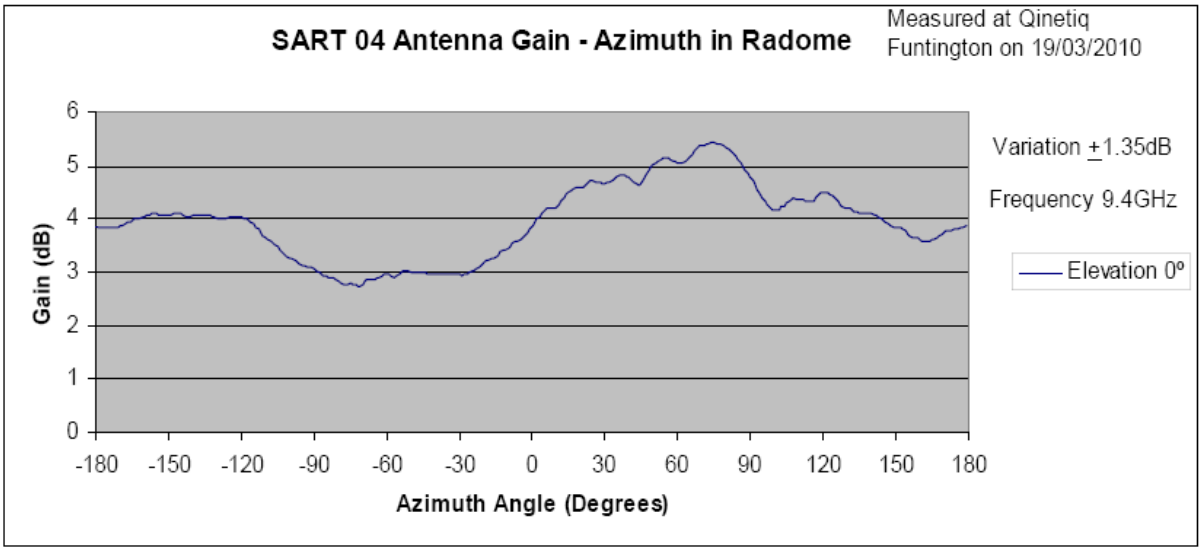
5.2 Polarisation: Horizontal or circular

Requirements of IEC 61097-1 5.14

5.14 Antenna vertical beamwidth: At least ±12,5º relative to the horizontal plane of the radar transponder.

Requirements of IEC 61097-1 5.15

5.15 Antenna azimuthal beamwidth: Omnidirectional within ±2 dB



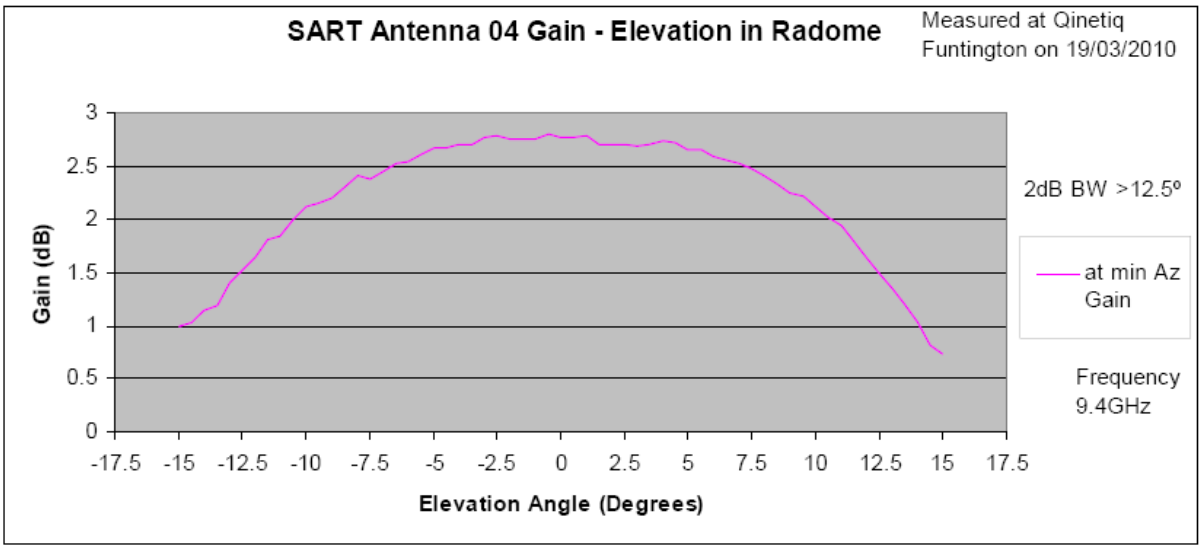


Figure 63— Manufacturer's design data for SART antenna

Conclusion

Search and Rescue Transponder "SafeSea S100"	conforms to the requirements of IEC 61097-1 3.6, 5.14, 5.15, 5.2
Sample No. 1	yes

APPENDIX B

TEST EQUIPMENT USED AND MEASUREMENT UNCERTAINTIES

TEST EQUIPMENT USED

No.	Test equipment	Type, model	Serial Number	Calibration Due date
1.	Stopwatch	СОСпр	2388	03.2011
2.	Thermometer	Center-309	50310908	02.2011
3.	Hygrometer	ВИТ-2	100105/3	02.2011
4.	Barometer	М67	2262	10.2010
5.	Climatic chamber	КРК 400V	15	08.2011
6.	Vibration Stand	G0227	19487	06.2011
7.	Magnetometer	HB0599A	12010701	09.2011
8.	Oscilloscope	TDS 3052B	B011258	11.2010
9.	Spectrum Analyzer	HP8593E	3831U02306	05.2011
10.	Susceptor	ESPC	848553/024	04.2011
11.	Antenna	ETS-Lingren 3117	110301	12.2010
12.	Antenna	HP11966E 3115	5701	10.2010
13.	Complex for testing on resistance to EMF	AICK	100093	10.2010
14.	RF generator	G4-111	100048	06.2011
15.	Electrostatic Discharge Simulator	ESR-8000K	5	04.2011
16.	The device control parameters of the SART	Ug4.138.512	No.1	06.2011
17.	Absorbed power meter	M3-22A	100149	09.2011
18.	Absorbed power meter	M3-22A	100016	09.2011
19.	Impulse generator	G5-60	24410	09.2011
20.	Impulse generator	G5-60	38160	06.2011
21.	Attenuator	D3-22A	102141	07.2011
22.	Attenuator	D3-22A	00657	07.2011
23.	RF generator	G4-109	100047	06.2011
24.	Frequency meter	Ch3-66	100015	03.2011
25.	Power supply unit	B5-7	21240	06.2011
26.	Power supply unit	B5-7	21013	06.2010
27.	Voltmeter	V7-40	123790	09.2010
28.	Millivoltmeter	M2038	1513	11.2010
29.	Millivoltmeter	M2051	1908	11.2010
30.	Millivoltmeter	FLUKE 189	100158	09.2010
31.	Rheostat	RSP No.4	29.OX-82	02.2011
32.	Device for hydrostatic testing	Ug4.138	102070	08.2011
33.	Tank for checking for a buoyancy	EDVIGA	101456	10.2012
34.	Ship's radar	NAYADA-5	803	n/a
35.	Magnetic compass	-	-	n/a
36.	Tank with oil	-	101175/2	05.2013
37.	Ruler 1 meter	-	No.1	06.2011
38.	Device for throwing down of	САРВ-20	101377	05.2013

	SART from a height a 20 m			
39.	Shielded Anechoic Chamber	«BAMBUK»	No.3	07.2011
40.	Shielded Anechoic Chamber	«DON»	No.2	06.2011
41.	Scales	Cas AD-10H	100144	09.2011
42.	Biconical Antenna	BBUK 9139	9114-214	09.2011
43.	Antenna	ADA2	101141	10.2011
44.	Antenna	APA-CP	101142	10.2011
45.	Solar radiation chamber	12KCP-04-001	12	12.2010
46.	Salt fog chamber	DS090-X	20807004	05.2012

MEASUREMENT UNCERTAINTIES

No.	**Parameter**	**Measurement uncertainties**
1.	Receiver sensitivity	± 0.5 dB
2.	Frequency range	± 5.0 MHz
3.	Sweep time	± 0.05 μs
4.	Sweep profile	± 5.0 MHz
5.	Radiated power	± 0.6 dB
6.	Recovery time following excitation	± 0.09 μs
7.	Delay - Receipt of radar interrogation and SART transmission	± 0.037 μs
8.	Radiated emissions	± 3.22 dB

APPENDIX C

Solar radiation test results

for EPIRB SafeSea E100 class 1 Category 2

and ARH100 class 1 and SART SafeSea S100 pole

for compliance with IEC60945 4-th Ed.

EXCERPT FROM

TEST REPORT No. 10/293 Emergency Position Indicating Radio Beacon model SafeSea E100 and E100G Class 1 and 2 Category 1 and 2 according to Test Program for compliance with RTCM 11000.2 standard and IEC61097-2 and IEC60945 manufacturer "Ocean Signal Ltd.", Great Britain

Solar radiation test

Standard	IEC 60945 (2002) 4-th Ed. item.8.10

TEST OBJECT

Name samples	**Model samples**	**Number samples**
EPIRB SafeSea	E100 Class 1	Sample No.1
Serial Number	No. 0001200003i	
Sample Number of battery pack	LB1E (assembled for EPIRB)	Sample No.2
EPIRB bracket (Category 2)	N/A	Sample No.3
Automatic release mechanism	ARH100 (in the interior EPIRB E100 Class 1*)	Sample No.4
SART model S100 pole	N/A	Samples No.5, No.6

TEST DATE

Dates of Tests	05.07.2010 – 08.07.10

TEST CONDITIONS

Ambient air temperature	30 °C	
Ambient air humidity	56 %	
Temperature in the solar radiation chamber	53 °C	
Test duration	80 hours	
The intensity simulated solar radiation	1155 W/m^2 (at the test point)	+3,1% refer nominal
Spectral distribution of the intensity	in the range of the requirements	

*Note: One EPIRB specimen (E100 Class 1 with fixed Antenna) was exposed to solar radiation together with bracket (category 2) and a second EPIRB (E100 Class 1 with connector in place of antenna) provided operational test modes. The second EPIRB (E100 class 1 with connector in place of antenna) was mounted in the ARH100 housing during expose to solar radiation.

STANDARD REQUIREMENTS

Requirements IEC 60945 (2002) 8.10

Item	Section headline and text	Comment
8.10.1	**Waiver** The solar radiation test shall be waived where the manufacturer is able to produce evidence that the components, materials and finishes employed in the equipment would satisfy the test.	Manufacturer didn't submitted waiver and evidence for solar resistance of materials
8.10.2	**Purpose** This test simulates the effects of continuous solar radiation on equipment which are intended to be mounted above deck levels and exposed to the weather.	
8.10.3	**Method of test** The EUT shall be placed on a suitable support and exposed continuously to a simulated solar radiation source as specified in table 4 for 80 h. The intensity at the test point, which shall also include any radiation reflected from the test enclosure, shall be 1120 W/m2 ± 10 % with a spectral distribution as given in table 4. At the end of the test, the EUT shall be subjected to a performance check and an examination with the naked eye.	Methods ware implemented fully. See photos of test workplace and test specimens before and after test
8.10.4	**Required result** The requirements of the performance check shall be met. There shall be no signs of harmful deterioration of the equipment, including labeling.	

EPIRB performance check defines in item. Of standard IEC 61097-2 (2008):

Requirements IEC 61097-2 (2008) item 5.1.10:

Item	Section headline and text	Comment
5.1.10	**Performance check** For the purpose of this standard, a performance check consists in activating the satellite EPIRB (see 5.1.7) and checking, using suitable test equipment (for example a hand held Beacon Tester),	Performance check carried out instantly after end of solar radiation.

Item	Section headline and text	Comment
	the 406 MHz transmitted frequency (single burst only), the 406 MHz digital message (15 Hex ID and all 112 or 144 Hex message bits as appropriate) and the presence of Auxiliary Radio-Location Device transmissions (Homing Transmitter output).	

TEST EQUIPMENT USED

No.	Test equipment	Type, model	Serial Number	Calibration Due date
47.	Thermometer	Center-309	50310908	02.2011
48.	Solar radiation chamber	12KCP-04-001	12	28.12.2010
49.	Beacon tester	BT-611M	1005	15.06.2011

TEST RESULTS:

item	Name of specimens	Results	Comments
1.	EPIRB SafeSea E100 Class 1	There aren't signs of harmful deterioration of the radiated specimen including labeling. Performance check carried out satisfactory (see table below).	Pass
2.	EPIRB battery pack LB1E		Pass
3.	EPIRB bracket (Category 2)		Pass
4.	Automatic release mechanism ARH100		Pass
5.	SART model S100 pole		Pass

Protocol N 56

Date 08.07.2010 Conditions Solar radiation test

Beacon Model E100 class 1 Beacon N 0001200003i

Test duration 0 h 30 m	Bursts received 38	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406036.000	406038.000	406036.915	406036.915	406036.916
+Phase deviation, rad	1.00	1.20	1.08	1.10	1.11
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.11	-1.13
Phase time rise, mcs	50.00	250.00	143.47	144.92	146.42
Phase time fall, mcs	50.00	250.00	158.21	159.58	160.56
Power, Wt	3.16	7.94	6.49	6.51	6.70
Power rise, ms	0.00	0.00	0.00	0.45	0.00
Bit Rate, bps	396.00	404.00	399.86	399.87	400.00
Asymmetry, %	0.00	5.00	0.28	0.41	0.49
CW Preamble, ms	158.40	161.60	160.10	160.12	160.12
Total burst duration, ms	435.60	444.40	439.10	439.15	439.25
Repetition period, s	47.50	52.50	47.90	47.90	52.41
Repetition period mean, s				49.69	
Repetition period rms, s				1.56	
Delta Rep. period, s	4.00			4.50	4.50
Slope(E-9)	-1.00	1.00	-0.044	-0.017	0.036
Residual variations (E-9)	0.00	3.00	0.073	0.095	0.145
Short term variations (E-9)	0.00	2.00	0.039	0.054	0.077

121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121499066	**Low Sweep Frequency, Hz**	345
Power, mW	80.1	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFE2F 4C972000C6007CE887125 0

Photo 1 – Prepare ARH100 with EPIRB to test

Photo 2 – ARH100 and EPIRB in solar chamber

Photo 3 – ARH100 and EPIRB Cat2 after test

Photo 4 – ARH100 label after test

Photo 5 – ARH100 manual release switch after test

Photo 6 – EPIRB label after test

Photo 7 – EPIRB label for selftest after test

Photo 8 – EPIRB control switches after test

Photo 9 – EPIRB antenna after test

Photo 10 – EPIRB bracket after test

Photo 11 – SART pole handle after test

Photo 12 – SART pole after test

Conclusion

EPIRB SafeSea E100 class 1 Cat.2 (assembled battery pack LB1E into bracket Category 2) and ARH100 class 1and SART pole	conforms to the requirements IEC 60945 8.10
Samples No. 1- No.6	yes

APPENDIX D

Salt fog test results

for EPIRB SafeSea E100G class 1 Category 1

(including Automatic release mechanism ARH100 class 1)

and EPIRB SafeSea E100G class 2 Category 2

for compliance with RTCM 77-2002/SC110-STD.

EXCERPT FROM

TEST REPORT No. 10/293 Emergency Position Indicating Radio Beacon model SafeSea E100 and E100G Class 1 and 2 Category 1 and 2 according to Test Program for compliance with RTCM 11000.2 standard and IEC61097-2 and IEC60945 manufacturer “Ocean Signal Ltd.”, Great Britain

Salt fog test

NORMATIVE DOCUMENTS

Standard	RTCM 77-2002/SC110-STD section A7.0

TEST OBJECT

Name samples	Model samples	Number samples
EPIRB SafeSea	E100G Class 1	Sample No.1
Serial Number E100G Class 1	No. 0001200003i	
EPIRB SafeSea	E100G Class 2	Sample No.2
Serial Number E100G Class 2	No. 0001200013i	
Battery pack class 1	LB1E (assembled for E100G Class 1)	Sample No.3
Battery pack class 2	LB2E (assembled for E100G Class 2)	Sample No.4
EPIRB bracket (Category 2)	N/A	Sample No.5
Automatic release mechanism	ARH100 (in the interior EPIRB E100 Class 1*)	Sample No.6

TEST DATE

Date of Tests	17.05.2010 – 21.05.10

TEST CONDITIONS

Ambient temperature	+20 C - +24 C	
Test duration	98 hours	5 stages
temperature rise in chamber		30 minutes
1-st stage	equalizing and soaking in chamber	2 hours
temperature in chamber	+34 C - +36 C	without salt fog
2-nd stage	salt fog	48 hours
temperature in chamber	+34 C - +36 C	
3-rd stage	dry at room temperature	24 hours
temperature at room	+21 C - +24 C	without salt fog
4-th stage	salt fog	12 hours
temperature in chamber	+34 C - +36 C	
5-th stage	dry at room temperature	12 hours
temperature at room	+20 C - +24 C	without salt fog
Inspection and aliveness test		30 minutes
temperature at room	+20 C - +23 C	

.

REQUIREMENTS

Requirements RTCM 77-2002/SC110-STD section A7.0

Item	Section headline and text	Comment
A7.0	**Salt fog test** The salt fog test should be conducted on a complete Category 1 satellite EPIRB including the release mechanism and 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 a 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.	EPIRB SafeSea E100G Class 2 Category 2has bracket. Bracket is mounting device of EPIRB SafeSea See test graph below

Item	Section headline and text	Comment
	The salt fog should be prepared from a 5% ± 1% salt (sodium chloride) solution. For detailed guidance on the preparation of the solution and the apparatus for generating salt fog, reference should be made to MIL-STD-810D (19 July 1983), method 509.2.	
	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.	See test graph below EPIRB aliveness test described in section A1.0 (paragraph 5)
	Salt deposits and water stains may be washed off with clean warm water not exceeding a temperature of 38° C. In particular, the Category 1 satellite EPIRB should not be removed from the release mechanism for cleaning.	

Requirements RTCM 77-2002/SC110-STD section A1.0 (paragraph 5)

Item	Section headline and text	Comment
A1.0	**General test conditions** paragraph 5 An aliveness test consisting of a measurement of the carrier frequency, the power output, and the data message is required at various points in the test sequence. An inability to meet the aliveness test specification or failure of any test required by the test procedure should be considered a critical failure, and the test should be terminated. When performing the aliveness test, the carrier frequency measurement may be made on a single burst of the total 406 MHz transmission.	

TEST RESULTS:

item	Name of specimens		Results	Comments
1.	EPIRB SafeSea E100G Class 1	Sample No.1	There are not corrosion, peeling paint, and other signs of the specimens. Aliveness test carried out satisfactory (see table below).	Pass
2.	EPIRB SafeSea E100G Class 2	Sample No.2		Pass
3.	Battery pack class 1	Sample No.3		Pass
4.	Battery pack class 2	Sample No.4		Pass
5.	EPIRB bracket (Category 2)	Sample No.5		Pass
	Automatic release mechanism	Sample No.6		Pass

Protocol N 43

Date 21.05.2010 Conditions Salt fog

Beacon Model E100G class 1 Beacon N 0001200003i

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1	

406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	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	23.25	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
Repetition period mean, s				0.00	
Repetition period rms, s				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	121500194	**Low Sweep Frequency, Hz**	345
Power, mW	81.2	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message			
Contents (full)	:FFFED0 971E0000017FDFFE527FF 683E0F00E		
Message contents (bits 26...85)	:2E3C000002FFBFF		
(bits 27...85)	:5C78000005FF7FF		
(bits 107...112)	:DA		
(bits 113...144)	:83E0F00E		
Bit Synchronization	:1..15	:7FFFh	:OK
Frame Synchronization	:16..24	:D0	:SELFTEST
Format Flag	:25	:1	:Long Message
Protocol Flag	:26	:0	:Standard Protocol
Country Code	:27..36	:171	:369
User Protocol Type	:37..40	:Eh	:Standard Test Location Protocol
National serial number	:41..58	:0	:0
Latitude N/S flag	:59	:0	:north
Latitude degrees(0 to 90)	:60..66	:5h	:5 deg
Latitude minutes(0 to 58) with 2 minute inc	:67..71	:1Fh	:62 min
Longitude E/W flag	:72..72	:1	:west
Longitude degrees(0 to 180)	:73..80	:DF	:223 deg
Longitude minutes(0 to 58) with 2 minute inc	:81..85	:1F	:62 min
BCH-1 code	:86..106	:1949FFh	:1657343 ok
Fixed	:107..109	:6h	:6
Additional data flag	:110	:1h	:delta position data in bits 113..132
Position Data Source	:111	:1	:encoded position data is provided by an internal device
Auxiliary radio device	:112	:0	:121.5 MHz not included
Latitude delta sign	:113..113	:1	:plus
Latitude delta minutes	:114..115	:0	:0
Latitude delta seconds	:116..119	:1	:4
Longitude delta sign	:120..120	:1	:plus
Longitude delta minutes	:121..122	:3	:3
Longitude delta seconds	:123..126	:8	:32
Additional beacon identification (national use)	:127..132	:F	:15
BCH-2 code	:133..144	:Eh	:14 ok

Protocol N 44

Date 21.05.2010 Conditions Salt fog

Beacon Model E100G class 2 Beacon N 0001200013i

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1	

406 MHz Transmitter Parameters	Limits		Measured		
	min	max	min	current	max
Frequency, kHz	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	6.66	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
Repetition period mean, s				0.00	
Repetition period rms, s				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	121499526	**Low Sweep Frequency, Hz**	351
Power, mW	77.5	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	825
Modulation Index, %	100		

Message			
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 683E0F00E		
Message contents (bits 26...85)	:1925E847E0FFBFF		
(bits 27...85)	:324BD08FC1FF7FE		
(bits 107...112)	:DA		
(bits 113...144)	:83E0F00E		
Bit Synchronization	:1..15	:7FFFh	:OK
Frame Synchronization	:16..24	:D0	:SELFTEST
Format Flag	:25	:1	:Long Message
Protocol Flag	:26	:0	:Standard Protocol
Country Code	:27..36	:C9	:201
User Protocol Type	:37..40	:2h	:EPIRB - MMSI/Location Protocol
last 6 digs of MMSI	:41..60	:F423Fh	:999999
Specific beacon number	:60..64	:0h	:0
Latitude N/S flag	:65	:0	:north
Latitude degrees(0 to 90) with 1/4 res	:66..74	:1FFh	:127 deg 45 min
Longitude E/W flag	:75..75	:0	:east
Longitude degrees(0 to 180) with 1/4 res	:76..85	:3FF	:255 deg 45 min
BCH-1 code	:86..106	:CAFC0h	:831424 ok
fixed	:107..109	:6h	:6
fixed	:110	:1h	:1
Position Data Source	:111..111	:1	:encoded position data is provided by an internal device
Auxiliary radio device	:112..112	:0	:121.5 MHz not included
Latitude delta sign	:113..113	:1	:plus
Latitude delta minutes	:114..118	:0	:0
Latitude delta seconds	:119..122	:F	:60
Longitude delta sign	:123..123	:1	:plus
Longitude delta minutes	:124..128	:0	:0
Longitude delta seconds	:129..132	:F	:60
BCH-2 code	:133..144	:Eh	:14 ok

Photo 1 – EPIRB E100G class 1 Category 1 and EPIRB E100G class 2 Category 2 in salt fog chamber

Photo 2 – EPIRB E100G class 2 Category 2 after test

Photo 3 – EPIRB E100G class 2 Category 2 label after test

Photo 4 – EPIRB E100G class 1 Category 1 label after test

♣

Photo 5 – EPIRB E100G class 1 Category 1 without cover after test

TEST EQUIPMENT USED

No.	Test equipment	Type, model	Serial Number	Calibration Due date
1.	Thermometer	Center-309	50310908	02.2011
2.	Salt fog chamber	DS090-X	20807004	05.2012
3.	Beacon tester	BT-611M	1005	15.06.2011

Conclusion

EPIRB SafeSea E100G class 1 Category.1 assembled battery pack LB1E and into ARH100 and EPIRB SafeSea E100G class 2 Category 2 assembled battery pack LB2E into bracket	conforms to the requirements RTCM 77-2002/SC110-STD section A7.0
Samples No. 1- No.6	yes

APPENDIX E

Materials Declaration

ocean SIGNAL

Unit 4
Ocivan Way
Margate
Kent
CT9 4NN

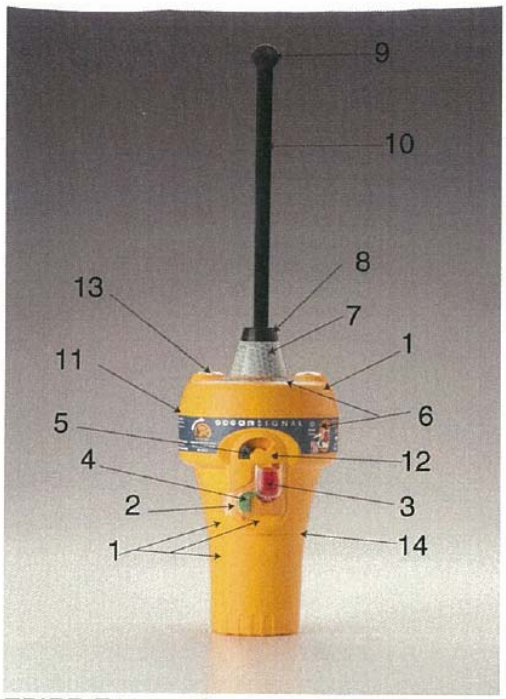
telephone
+44 (0)1843 282930

email
info@oceansignal.com

web
www.oceansignal.com

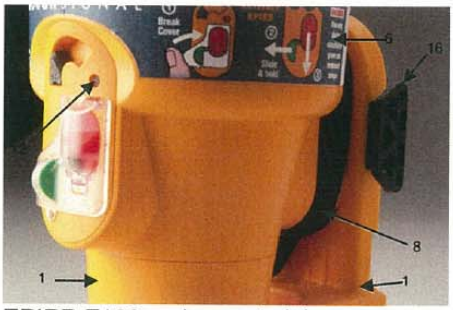
Materials Declaration

The Ocean Signal SART S100 and EPIRB range E100 products are made from the same external materials as detailed below.



EPIRB E100 series materials

SART S100 materials



EPIRB E100 series materials

SART S100 materials

Item Number	Material	Parts Description
1	Luran S 778T ASA	Main Body top/bottom, Manual bracket and switch retainer
2	Acrylic LG1855S	Break off cover
3	POM Mitsubishi F20-03 RED	On/off Key
4	POM Mitsubishi F20-03 GREEN	On/Off latch key
5	POM Mitsubishi F20-03 GREY	Test Key
6	Polycarbonate	External Labels on products
7	SOLAS Tape	Reflective tape SOLAS Approved (EPIRB only)
8	Neoprene 60 Shore A	Antenna entry rubber, Lanyard cover
9	Santoprene 101-80	Screw bungs, Antenna Over mould
10	Stainless Steel 302S25 finish Copper plated and Nylon coated	Antenna (EPIRB only)
11	Silicon 60 Shore A	Body O-ring Seals
12	Acrylic LG1855S	Light Pipe
13	Acrylic LG1855S	Light Lens (EPIRB Only)
14	Neoprene 60 Shore A	Battery Seal

15	Glass Fibre	SART Pole (SART only)
16	Acetal Grey	Manual Bracket Release (SART and EPRIB)
	Silicon 60 Shore A	Light Pipe O-ring
	A4 Grade Stainless Steel	Case fixing screws and Battery retaining screw (EPIRB and SART)
	Stainless steel 304	Latch and test spring (EPIRB and SART)
	Brass	Battery Fixing Insert (EPIRB and SART)
	Brass CZ131 finish Gold over Nickel	Power Contacts (EPIRB and SART)
	Silicon 60 Shore A	Power contact O-ring seal (EPIRB and SART)
	Neoprene 50 Shore A	Power contact Seal (EPIRB and SART)
	Polypropylene PK18	Lanyard

Simon Nolan
Technical Director
Ocean Signal Limited