Annex 11

THERMAL SHOCK TEST (A11.0 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): 1) No.1 EPIRB SafeSea E100G class2
Software release for EUT: 00.00.28
Sample No.1 Serial No 0001200013 I
Test Date: 29.10.2010
Test Conditions:

– Atmospheric pressure: 756 mm/Hg.
– Relative air humidity: 57 %.
– Minimum temperature in the chamber
  -50 ^{O}C (Class 1): NO
  -30 ^{O}C (Class 2): YES
– Maximum temperature in the chamber +70 ^{O}C
– EUT is included the satellite EPIRB without its
  release mechanism (Category 1): NO
  stowage bracket (Category 2): NO
– Test equipment:
  - Climatic chamber KPK-400V No 15
  - Climatic chamber SNOL-58/350 No 61686
  - Thermometer TGL11998 11998
– Test duration is 18 hours.
– Measurement duration is 3x15 minutes.
– Step
  No. 1 Detailed measurements are of EUT (EPIRB) before of thermal shock test
  No. 2 Condition: EPIRB is OFF; ambient temperature is minimum in the chamber with EUT duration 3 hours;
  No. 3 Condition: fresh water temperature is of 0 ^{O}C to +5 ^{O}C; EUT self-activation in fresh water;
  No. 4 Condition: EPIRB is OFF; ambient temperature is minimum in the chamber with EUT duration 3 hours;
  No. 5 Condition: salt water (5 % NaCl) temperature is of -2 ^{O}C to +5 ^{O}C; EUT self-activation in salt water;
  No. 6 Condition: salt water (5 % NaCl) temperature is of -2 ^{O}C to +5 ^{O}C; duration 20 minutes;
  No. 7 Detailed measurements are of EUT (EPIRB) upon completion of low-temperature thermal shock test
  No. 8 Condition: EPIRB is OFF; ambient temperature is maximum in the chamber with EUT duration 3 hours;
  No. 9 Condition: fresh water temperature is of +25 ^{O}C to +35 ^{O}C; EUT self-activation in fresh water;
  No. 10 Condition: EPIRB is OFF; ambient temperature is maximum in the chamber with EUT duration 3 hours;
  No. 11 Condition: salt water (5 % NaCl) temperature is of 25 ^{O}C to +35 ^{O}C; EUT self-activation in salt water;
  No. 12 Condition: salt water (5 % NaCl) temperature is of 25 ^{O}C to +35 ^{O}C; duration 20 minutes;
  No. 13 Detailed measurements are of EUT (EPIRB) upon completion of high-temperature thermal shock test

Figure 11.1 - View of the EUT (EPIRB) before thermal shock test

Test duration 0 h 17 m	Bursts received 22	BCH error 0	Self-Test 22		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406036.000	406038.000	406036.853	406036.853	406036.857
+Phase deviation, rad	1.00	1.20	1.08	1.09	1.11
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.13	-1.13
Phase time rise, mcs	50.00	250.00	148.85	153.53	155.01
Phase time fall, mcs	50.00	250.00	162.69	167.01	170.16
Power, Wt	3.16	7.94	6.24	6.28	6.33
Power rise, ms	0.00	0.00	0.00	0.76	0.00
Bit Rate, bps	396.00	404.00	399.87	400.02	400.02
Asymmetry, %	0.00	5.00	0.33	0.37	0.51
CW Preamble, ms	158.40	161.60	160.10	160.12	160.12
Total burst duration, ms	514.80	525.20	518.50	518.60	518.70
Repetition period, s	47.50	52.50	47.61	47.81	52.41
Delta Rep. period, s		>4.00	4.80	4.80	4.80
Slope(E-9)	-1.00	1.00	-0.676	-0.676	-0.676
Residual variations (E-9)	0.00	3.00	0.304	0.304	0.749
Short term variations (E-9)	0.00	2.00	0.111	0.111	0.111

121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121500600	**Low Sweep Frequency, Hz**	345
Power, mW	91.0	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 11.2 - Detailed measurement results of EUT (EPIRB) before thermal shock test

LOW-TEMPERATURE THERMAL SHOCK TEST

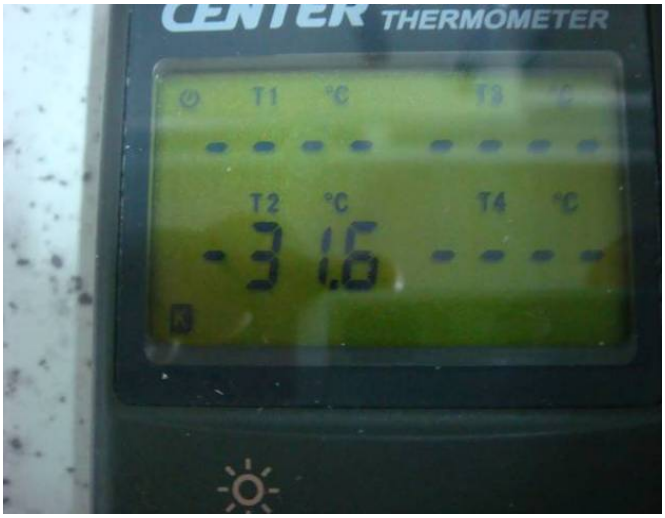

Figure 11.3 - View of minimum temperature soaking of EUT (EPIRB) in chamber before immersion in fresh water.

Figure 11.4 – View floated EUT (EPIRB) in fresh water

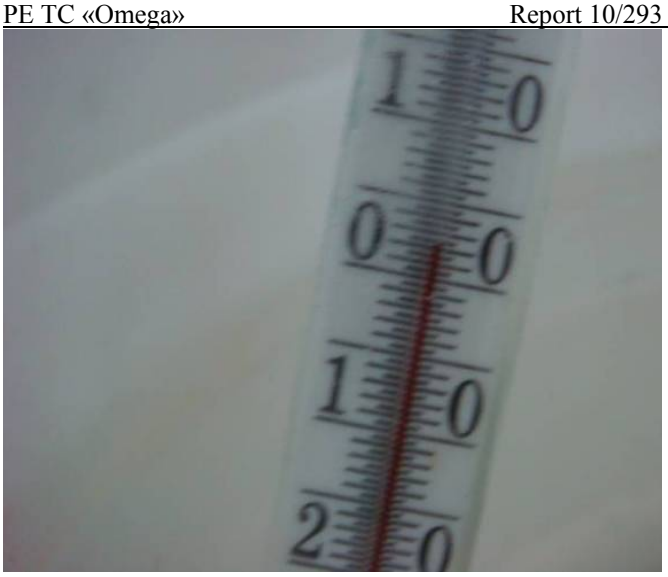

Figure 11.5 – The temperature of fresh water for EUT (EPIRB) immersion (+2.5 ºC).

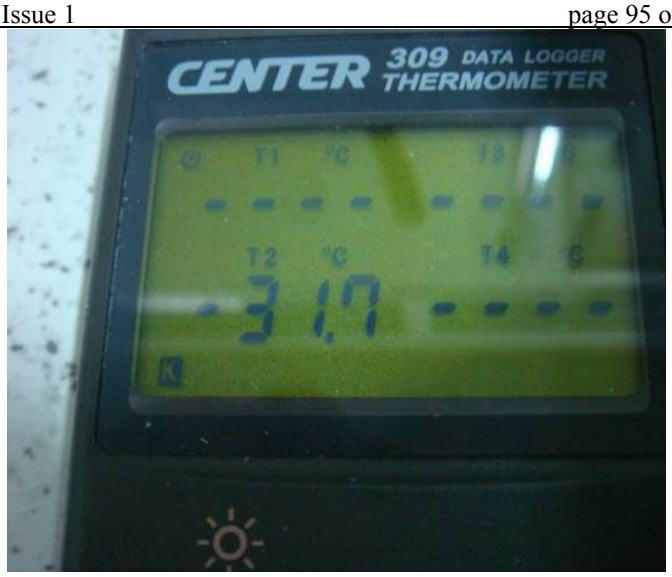

Figure 11.6 - View of minimum temperature soaking of EUT (EPIRB) in chamber before immersion in salt water.

Figure 11.7 – View floated EUT (EPIRB) in salt water

Figure 11.8 – The temperature of salt water for EUT (EPIRB) immersion (+2.0 ºC).

Test duration 0 h 16 m	Bursts received 21	BCH error 0	Self-Test 21		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406036.000	406038.000	406036.826	406036.827	406036.828
+Phase deviation, rad	1.00	1.20	1.08	1.09	1.12
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.12	-1.13
Phase time rise, mcs	50.00	250.00	145.47	149.44	152.43
Phase time fall, mcs	50.00	250.00	158.35	165.35	169.78
Power, Wt	3.16	7.94	6.18	6.27	6.35
Power rise, ms	0.00	0.00	0.00	0.65	0.00
Bit Rate, bps	396.00	404.00	399.87	400.01	400.01
Asymmetry, %	0.00	5.00	0.46	0.49	0.66
CW Preamble, ms	158.40	161.60	160.10	160.12	160.12
Total burst duration, ms	514.80	525.20	518.05	518.15	518.30
Repetition period, s	47.50	52.50	47.55	47.60	52.41
Delta Rep. period, s		>4.00	4.80	4.80	4.85
Slope(E-9)	-1.00	1.00	0.268	0.268	0.268
Residual variations (E-9)	0.00	3.00	0.891	0.891	1.445
Short term variations (E-9)	0.00	2.00	0.058	0.058	0.066

121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121501387	**Low Sweep Frequency, Hz**	345
Power, mW	90.0	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 11.9 – Detailed measurement results of EUT (EPIRB) upon completion of low-temperature thermal shock test

HIGH-TEMPERATURE THERMAL SHOCK TEST

Figure 11.10 - View of maximum temperature soaking of EUT (EPIRB) in chamber before immersion in fresh water.

Figure 11.11 – View floated EUT (EPIRB) in fresh water.

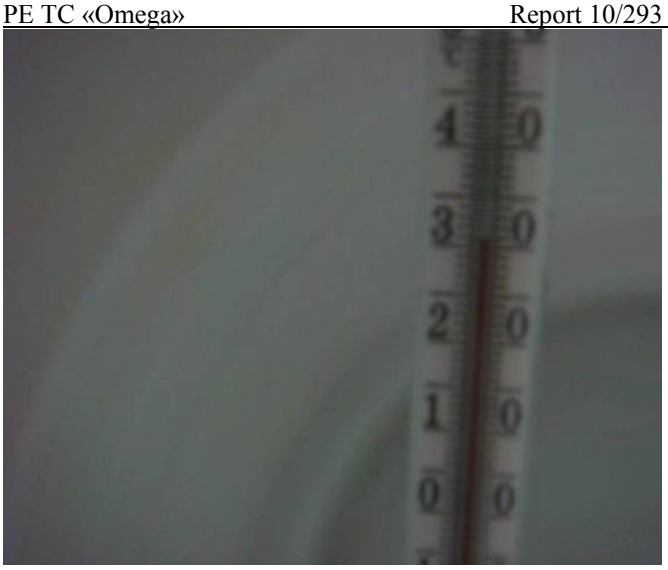

Figure 11.12– The temperature of fresh water for EUT (EPIRB) immersion (+31 ºC).

Figure 11.13 - View of maximum temperature soaking of EUT (EPIRB) in chamber before immersion in salt water.

Figure 11.14 – View floated EUT (EPIRB) in salt water

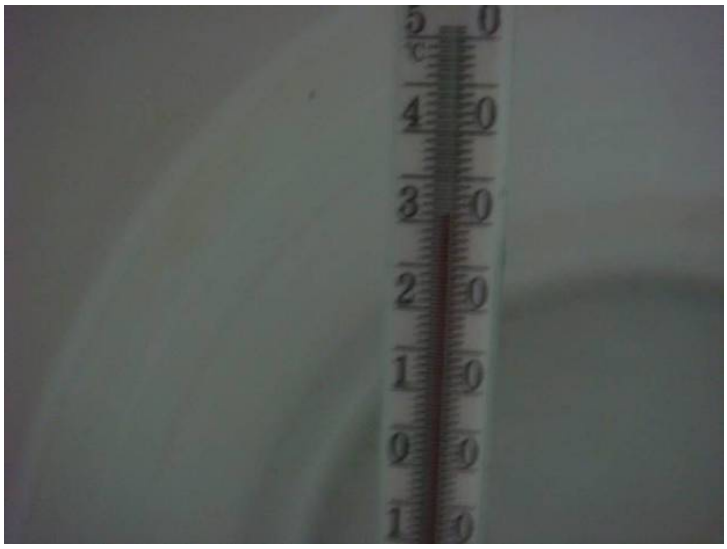

Figure 11.15– The temperature of salt water for EUT (EPIRB) immersion (+31 ºC).

Test duration 0 h 17 m	Bursts received 22	BCH error 0	Self-Test 22		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406036.000	406038.000	406036.853	406036.853	406036.857
+Phase deviation, rad	1.00	1.20	1.05	1.13	1.13
-Phase deviation, rad	-1.00	-1.20	-1.10	-1.12	-1.13
Phase time rise, mcs	50.00	250.00	148.39	151.52	154.21
Phase time fall, mcs	50.00	250.00	162.69	167.01	170.16
Power, Wt	3.16	7.94	6.19	6.22	6.36
Power rise, ms	0.00	0.00	0.00	0.75	0.00
Bit Rate, bps	396.00	404.00	399.87	400.02	400.02
Asymmetry, %	0.00	5.00	0.33	0.38	0.45
CW Preamble, ms	158.40	161.60	160.10	160.12	160.12
Total burst duration, ms	514.80	525.20	518.50	518.70	518.80
Repetition period, s	47.50	52.50	47.61	47.81	52.41
Delta Rep. period, s		>4.00	4.90	4.90	4.90
Slope(E-9)	-1.00	1.00	-0.731	-0.731	-0.429
Residual variations (E-9)	0.00	3.00	0.312	0.312	0.752
Short term variations (E-9)	0.00	2.00	0.113	0.113	0.121

121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121500984	**Low Sweep Frequency, Hz**	345
Power, mW	90.3	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 11.16 – Detailed measurement results of EUT (EPIRB) 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	1.11	PASS
• Self-activation in salt water	5	minutes	0.65	PASS
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	406036.826 – 406036.828	PASS
- Power Output	35 - 39	dBm	37.91 – 38.03	PASS
• Frequency Stability				
- short term stability	≤0.002	parts/ million in 100 ms	0.000058 – 0.000066	PASS
medium term stability				
- mean slope	≤+0.001	parts/ million/ minute	0.000268	PASS
- residual frequency variation	≤0.003	parts/ million	0.000891 – 0.001445	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	1.05	PASS
• Self-activation in salt water	5	minutes	0.94	PASS
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	406036.853 – 406036.857	PASS
- Power Output	35 - 39	dBm	37.92 – 38.03	PASS
• Frequency Stability				
- short term stability	≤0.002	parts/ million in 100 ms	0.000113 – 0.000121	PASS
- medium term stability				
mean slope	≤±0.001	parts/ million/ minute	-0.000731 to - 0.000429	PASS
residual frequency variation	≤0.003	parts/ million	0.000312 – 0.000752	PASS

CRITERIA OF COMPLIANCE THERMAL SHOCK TEST (A11.0 RTCM 11000.2 Version 2.1):

1) successful self-activation in fresh water upon completion of low-temperature thermal shock test.
2) successful self-activation in salt water upon completion of low-temperature thermal shock test..
3) successful aliveness test conducted upon completion of low-temperature thermal shock test.
4) successful short-term frequency stability upon completion of low-temperature thermal shock test..
5) successful medium-term frequency stability upon completion of low-temperature thermal shock test.
6) successful self-activation in fresh water upon completion of high-temperature thermal shock test..
7) successful self-activation in salt water upon completion of high-temperature thermal shock test.
8) successful aliveness test conducted upon completion of high-temperature thermal shock test.
9) successful short-term frequency stability upon completion of high-temperature thermal shock test.
10) successful medium-term frequency stability upon completion of high-temperature thermal shock test..

Annex 12

OPERATIONAL LIFE (A13.1 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): 1) No.1 EPIRB SafeSea E100G class 2
EUT Software Release: issue 00.00.23
Note.
The difference between issue 00.00.28 and issue 00.00.23 is concerned bug fixes to improve user related performance and other performance enhancements.
All changes made between 00.00.23 and 00.00.28 do not affect the operation of the EPIRB transmissions
Sample No.1 Serial No 0001200014 I
Test Date: 04.02.2010 - 06.02.2010
Test Conditions:
– Atmospheric pressure: 760 mm/Hg
– Relative air humidity: 64%

– EUT were included	the satellite EPIRB with release mechanism (Category 1):	NO
	the satellite EPIRB with mounting device (Category 2):	YES
– EUT were included	the temperature Class 1 device:	NO
	the temperature Class 2 device:	YES
– Temperature	Minimum: Class 2: -20 °C	
	Maximum: +55 °C	
	Ambient: 18 °C	

Test Extension Factor: F = 0,052
Test Method:
Using a fresh battery pack, the EUT was turned ON (at the ambient temperature) and the initial set of measurements was made to ensure that EUT operated properly at the very beginning of the test.

The EUT (battery pack) was preliminary discharged for a period of time equal to the extension interval (F x 48 h). The other measurements were made 24 hours after the EUT had been turned ON and then each 6 hours until total time of (F x 48 hours) was reached.

The EUT then was turned OFF and subjected to a cold soak (at the minimum operating temperature) for a period of at least 2 hours. The EUT then was turned ON and maintained at the minimum operating temperature throughout the remaining 48 hours of the test period. After that the last measurement set was made.

– Test equipment:
- Climatic chamber NZ-350 No 24625a
- Beacon tester BT-611 No 1005
- Spectrum analyzer HP8593E No 3831U02306
- Temperature meter Center-309 No 50310908

Figure 12.1 – View EUT (EPIRB SafeSea E100G class 2) before the OPERATIONAL LIFE TEST

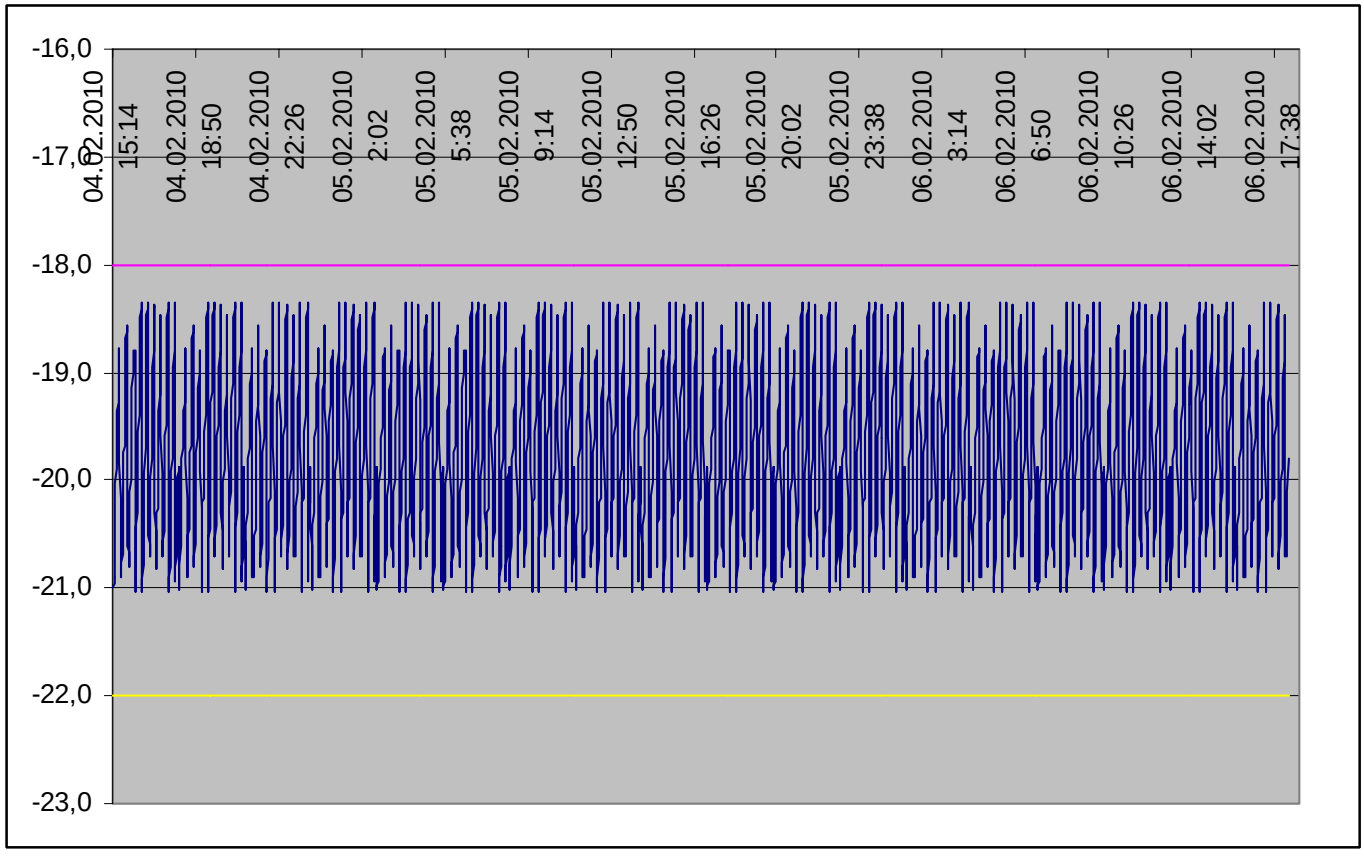

Figure 12.2 – Conditions Plot

RESULTS OF OPERATIONAL LIFE TEST (A13.1 RTCM 11000.2 Version 2.1)

The Initial Measurement (at the start of the extension interval (F x 48 h) test)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406.036946	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000059	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	-0.000315	PASS
Residual Variation	≤0.003	parts/ million	0.001827	PASS
Strobe Light Flash Rate	20-30	/min	25	PASS
RF Output power (406 MHz)	37 ± 2	dBm	37.77	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.59	PASS

The 1-st measurement (commencement 48 hours period after the EUT carried out extension interval (F x 48 h) test)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406.036950	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000058	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	-0.000253	PASS
Residual Variation	≤0.003	parts/ million	0.002878	PASS
Strobe Light Flash Rate	20-30	/min	25	PASS
RF Output power (406 MHz)	37 ± 2	dBm	37.82	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.68	PASS

The 2nd measurement (24 hours after the EUT was turned ON)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406.036942	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000049	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	-0.000654	PASS
Residual Variation	≤0.003	parts/ million	0.001966	PASS
Strobe Light Flash Rate	20-30	/min	26	PASS
RF Output power (406 MHz)	37 ± 2	dBm	37.77	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.65	PASS

The 3d measurement (30 hours after the EUT was turned ON)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406.036943	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000055	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	-0.000263	PASS
Residual Variation	≤0.003	parts/ million	0.001641	PASS
Strobe Light Flash Rate	20-30	/min	25	PASS
RF Output power (406 MHz)	37 ± 2	dBm	37.71	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.64	PASS

The 4th measurement (36 hours after the EUT was turned ON)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406.036941	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000119	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	-0.000500	PASS
Residual Variation	≤0.003	parts/ million	0.001879	PASS
Strobe Light Flash Rate	20-30	/min	26	PASS
RF Output power (406 MHz)	37 ± 2	dBm	37.08	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.62	PASS

The 5th measurement (42 hours after the EUT was turned ON)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406.036944	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000050	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	0.000079	PASS
Residual Variation	≤0.003	parts/ million	0.000312	PASS
Strobe Light Flash Rate	20-30	/min	26	PASS
RF Output power (406 MHz)	37 ± 2	dBm	37.07	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.59	PASS

The 6th measurement (48 hours after the EUT was turned ON)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406036.947	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000052	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	0.000073	PASS
Residual Variation	≤0.003	parts/ million	0.000302	PASS
Strobe Light Flash Rate	20-30	/min	25	PASS
RF Output power (406 MHz)	37 ± 2	dBm	36.99	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.57	PASS

The last measurement (after the second 49 hours cycle)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Nominal Carrier Frequency	406.037 ±0.001	MHz	406036.940	PASS
Short-term frequency stability	≤0.002	parts/ million in 100 ms	0.000073	PASS
Medium-term frequency stability				
Mean Slope	≤0.001	parts/ million/ minute	-0.000519	PASS
Residual Variation	≤0.003	parts/ million	0.001499	PASS
Strobe Light Flash Rate	20-30	/min	25	PASS
RF Output power (406 MHz)	37 ± 2	dBm	36.95	PASS
Auxiliary radio-locating peak envelope output power (121.5 MHz)	14-20	dBm	19.54	PASS

Annex 13

STROBE LIGHT TEST (A 13.2 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): sample No.1 EPIRB SafeSea E100 class 1
sample No.2 EPIRB SafeSea E100 class 2
Software release for EUT: issue 00.00.28
Sample No.1 Serial No 0001200001 I
Sample No.2 Serial No 0001200011 I
Test Date: 26-27.05.2010
Test Conditions:
– Atmospheric pressure: 770 mm/Hg.
– Relative air humidity: 75 %.
– EUT were included
the satellite EPIRB with its release mechanism (Category 1): NO
the satellite EPIRB with its mounting device (Category 2): NO
– EPIRB is ON during the test
– EPIRB homing transmitter operating status is OFF
– EUT in the performance position without automatic realize mechanism
– Test equipment:
- Graphic lux meter LG-05 No 17
- Climatic chamber KTK-800 No 280707
- Rotation and inclination device

2.2.8 Strobe Light Test

The EUT was turned OFF and thermally soaked for at least 3 hours at the required operating temperature. Then the EUT was turned ON and the strobe light flash rate and effective intensity requirements of section 2.2.8 was verified.
The strobe light test was performed at the ambient temperature, at the minimum operating temperature and at the maximum operating temperature.

– Test duration: 18 hours.
– Measurement duration: 360 minutes.
– Step
No. 1 Condition: EUT was turned OFF and thermally soaked for at least 3 hours at the ambient operating temperature
No. 2 Condition: EUT was turned ON and the strobe light flash rate and effective intensity at the ambient operating temperature were verified. Duration 60 minutes
No. 3 Condition: EUT was turned OFF and thermally soaked for at least 3 hours at the minimum operating temperature minus 40 (minus 20)°C
No. 4 Condition: EUT was turned ON and the strobe light flash rate and effective intensity at the minimum operating temperature were verified. Duration 60 minutes
No. 5 Condition: EUT was turned OFF and thermally soaked for at least 3 hours at the maximum operating temperature + 55°C
No. 6 Condition: EUT was turned ON and the strobe light flash rate and effective intensity at the maximum operating temperature were verified. Duration 60 minutes

Figure 13.1 - Total view of equipment for strobe light test

Figure13.2 - Strobe light test. The EUT placed in the climatic chamber

Ambient operating temperature (+19 ºC)

Table 13.1 – Flash rate &pulse duration - ambient operating temperature

	Sample 1	Sample 2
Pulse Duration, ms	9,95	9,97
Flash rate, times per minutes	25	25

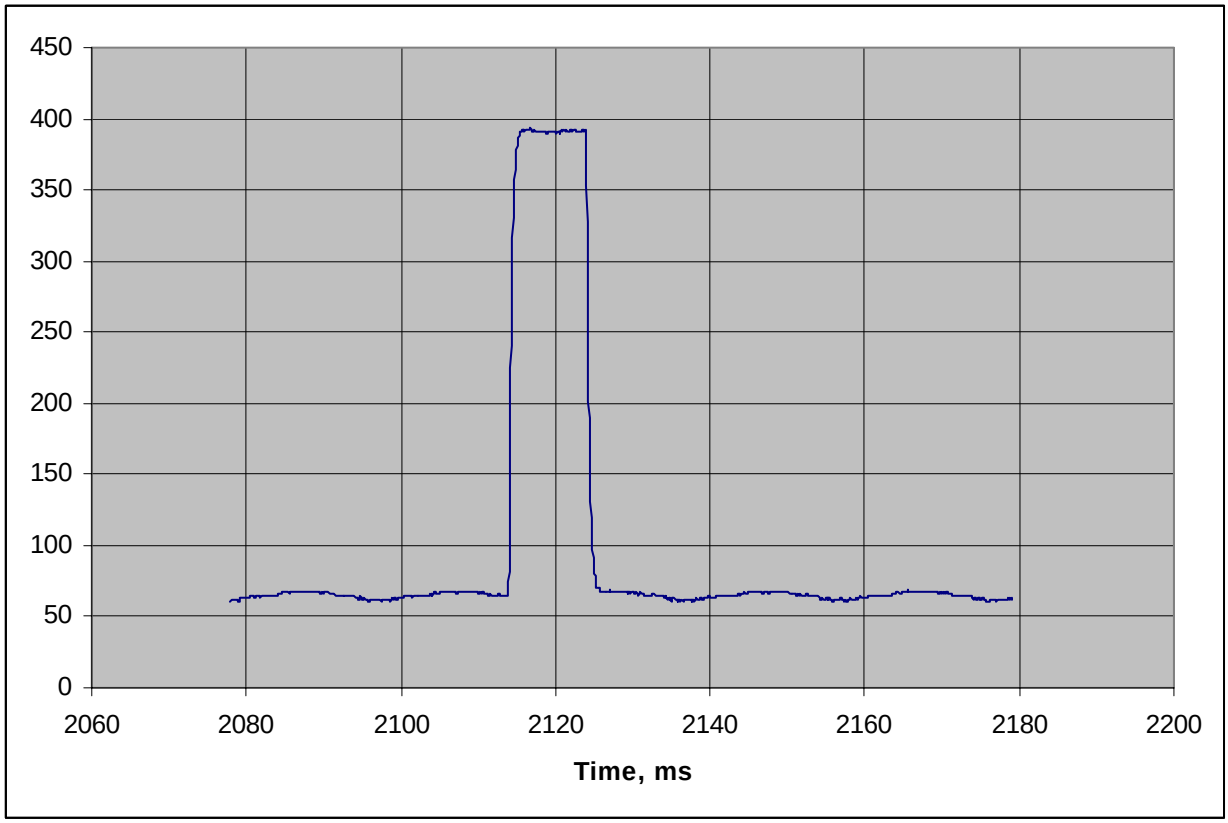

Figure 13.3 – Pulse Duration - Ambient operating temperature, sample 1

Table13.2 – Strobe light test at the ambient operating temperature. Effective intensity measurement results

Angle of elevation 30 º		
Sample 1		Sample 2
Azimuth º	Intensity, cd,	Intensity, cd,
0	1,77	1,77
90	1,40	1,28
180	1,58	1,98
270	1,14	1,61

Table 13.3 – Flash rate &pulse duration - minimum operating temperature

	Sample 1	Sample 2
Pulse Duration, ms	9,94	9,98
Flash rate, times per minutes	25	25

Table 13.4 - Strobe light test at the minimum operating temperature. Effective intensity measurement results

Angle of elevation 30 º		
Sample 1		Sample 2
Azimuth º	Intensity, cd	Intensity, cd
0	1,44	1,47
90	1,79	2,23
180	1,44	1,42
270	1,67	1,54

Maximum operating temperature (+55 ºC)

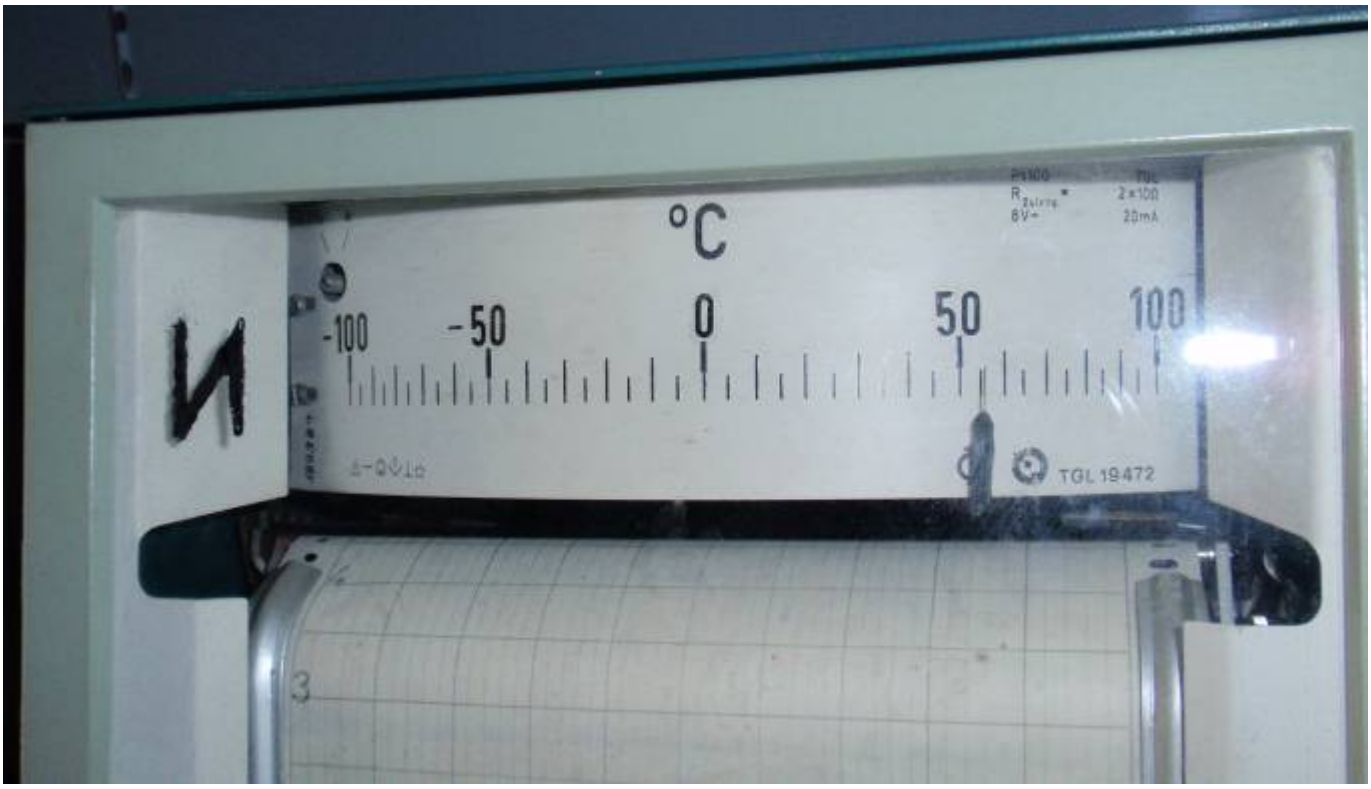

Figure 13.6 Maximum operating temperature for sample 1&sample 2(+55 ºC)

Table 13.5 – Flash rate &pulse Duration - Maximum operating temperature

	Sample 1	Sample 2
Pulse Duration, ms	9,96	9,96
Flash rate, times per minutes	25	25

Table 13.6 – Strobe light test at the maximum operating temperature. Effective intensity measurement results

Angle of elevation 30 º		
Sample 1		Sample 2
Azimuth º	Intensity, cd,	Intensity, cd,
0	1,28	1,16
90	1,42	1,81
180	1,21	1,35
270	1,51	1,42

FINAL RESULTS OF STROBE LIGHT TEST (A 13.2 RTCM 11000.2 Version 2.1)

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS (PASS/FAIL)
			Tmin (-40°C for sample 1) (-20°C for sample 2)	Tamb (+ 19°C)	Tmax (+ 55°C)	
• Flash rate Sample 1	20-30	/min	25	25	25	PASS
• Flash rate Sample 2	20-30	/min	25	25	25	PASS
• Effective intensity Sample 1	0.75	Cd	min. value =1.44 max. value =1.79	min. value =1.14 max. value =1.77	min. value =1.21 max. value =1.51	PASS
• Effective intensity Sample 2	0.75	Cd	min. value =1.42 max. value =2.23	min. value =1.93 max. value =1.28	min. value =1.16 max. value =1.81	PASS
• Pulse duration Sample 1	10^{-6} to 10^{-2}	s	9.94x10-3	9.95x10-3	9.96x10-3	PASS
• Pulse duration Sample 2	10^{-6} to 10^{-2}	s	9.98x10-3	9.97x10-3	9.96x10-3	PASS

STROBE LIGHT TEST CRITERIA OF COMPLIANCE (A 13.2 RTCM 11000.2 Version 2.1):

1) required value of Flash rate – 20-30 per minute
2) required value of Effective intensity- 0.75 cd
3) required value of Pulse duration - 10^{-6} to 10^{-2} s

Annex 14

SELF TEST (A13.3 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): 1) sample No.1 EPIRB SafeSea E100G class 1
2) sample No.2 EPIRB SafeSea E100 class 2
EUT Software Release: issue 000028
Sample No.1 Serial No 0001200004 I
Sample No.2 Serial No 0001200012 I
Test Date: 7.08.2010
Test Conditions:
– Atmospheric pressure: 746…748 mm/Hg
– Relative air humidity: 65…68 %

– EUT were included	the satellite EPIRB with ARH100 (Category 1):	NO
	the satellite EPIRB with Mounting bracket (Category 2):	YES
– EUT were included	the temperature Class 1 device:	YES
	the temperature Class 2 device:	YES
– Temperature	Minimum: (Class 1: -40 °C, Class 2: -20 °C)	Class 1: -40 °C Class 2: -20 °C
	Maximum: +55 °C	
	Ambient: +30…+32 °C	

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 then was turned ON and the aliveness test performed. Upon successful completion of the aliveness test, the EUT was turned OFF. After a period of at least 5 minutes, the EUT 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

– Test equipment:
- Temperature meter Center-309 No 100074/1
- Climatic Chamber T-25 No 24604
- Climatic Chamber NZ-350 No 24625a
- Beacon tester BT-611 No 1005

Test duration 0 h 0 m	Bursts received 0	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	406036.959	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.11	0.00
Phase time rise, mcs	50.00	250.00	0.00	152.92	0.00
Phase time fall, mcs	50.00	250.00	0.00	170.40	0.00
Power, Wt	3.16	7.94	0.00	5.54	0.00
Power rise, ms	0.00	0.00	0.00	0.69	0.00
Bit Rate, bps	396.00	404.00	0.00	399.92	0.00
Asymmetry, %	0.00	5.00	0.00	0.44	0.00
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00
Total burst duration, ms	514.80	525.20	0.00	518.40	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	0.00	0.00	0.00
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	121498367	**Low Sweep Frequency, Hz**	345
Power, mW	92.2	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	: FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 14.1 - Detailed measurement results of EUT (EPIRB E100G class 1) minimum temperature

Test duration 0 h 0 m	Bursts received 0	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	406036.978	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.10	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.11	0.00
Phase time rise, mcs	50.00	250.00	0.00	147.90	0.00
Phase time fall, mcs	50.00	250.00	0.00	163.30	0.00
Power, Wt	3.16	7.94	0.00	6.54	0.00
Power rise, ms	0.00	0.00	0.00	0.40	0.00
Bit Rate, bps	396.00	404.00	0.00	399.97	0.00
Asymmetry, %	0.00	5.00	0.00	0.48	0.00
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00
Total burst duration, ms	514.80	525.20	0.00	519.25	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	0.00	0.00	0.00
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	121499739	**Low Sweep Frequency, Hz**	344
Power, mW	91.9	**High Sweep Frequency, Hz**	1173
Sweep Period, sec	0.3	**Sweep Range, Hz**	829
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 14.2 - Detailed measurement results of EUT (EPIRB E100G class 1) ambient temperature

Test duration 0 h 0 m	Bursts received 0	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	406036.925	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	146.05	0.00
Phase time fall, mcs	50.00	250.00	0.00	160.41	0.00
Power, Wt	3.16	7.94	0.00	6.30	0.00
Power rise, ms	0.00	0.00	0.00	0.45	0.00
Bit Rate, bps	396.00	404.00	0.00	399.95	0.00
Asymmetry, %	0.00	5.00	0.00	0.49	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	519.30	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	0.00	0.00	0.00
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	121499737	**Low Sweep Frequency, Hz**	345
Power, mW	91.5	**High Sweep Frequency, Hz**	1175
Sweep Period, sec	0.3	**Sweep Range, Hz**	830
Modulation Index, %	100		

Message	
Contents (full)	: FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 14.3 - Detailed measurement results of EUT (EPIRB E100G class 1) maximum temperature

Test duration 0 h 0 m	Bursts received 0	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	406036.944	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	149.50	0.00
Phase time fall, mcs	50.00	250.00	0.00	165.97	0.00
Power, Wt	3.16	7.94	0.00	5.31	0.00
Power rise, ms	0.00	0.00	0.00	0.75	0.00
Bit Rate, bps	396.00	404.00	0.00	399.99	0.00
Asymmetry, %	0.00	5.00	0.00	0.48	0.00
CW Preamble, ms	158.40	161.60	0.00	160.10	0.00
Total burst duration, ms	435.60	444.40	0.00	438.75	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	0.00	0.00	0.00
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	121500575	**Low Sweep Frequency, Hz**	345
Power, mW	91.3	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED04C972000C6007CE8871250

Figure 14.4 - Detailed measurement results of EUT (EPIRB E100 class 2) minimum temperature

Test duration 0 h 0 m	Bursts received 0	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	406036.978	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.09	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.11	0.00
Phase time rise, mcs	50.00	250.00	0.00	147.60	0.00
Phase time fall, mcs	50.00	250.00	0.00	161.92	0.00
Power, Wt	3.16	7.94	0.00	6.42	0.00
Power rise, ms	0.00	0.00	0.00	0.45	0.00
Bit Rate, bps	396.00	404.00	0.00	399.97	0.00
Asymmetry, %	0.00	5.00	0.00	0.39	0.00
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00
Total burst duration, ms	435.60	444.40	0.00	439.20	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. Period, s		>4.00	0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.00	0.00	0.00
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	121500690	**Low Sweep Frequency, Hz**	345
Power, mW	93.7	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED04C972000C6007CE8871250

Figure 14.5 – Detailed measurement results of EUT (EPIRB E100 class 2) ambient temperature

Test duration 0 h 0 m	Bursts received 0	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	406036.924	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.09	0.00
Phase time rise, mcs	50.00	250.00	0.00	144.35	0.00
Phase time fall, mcs	50.00	250.00	0.00	159.58	0.00
Power, Wt	3.16	7.94	0.00	6.19	0.00
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	0.00	399.96	0.00
Asymmetry, %	0.00	5.00	0.00	0.51	0.00
CW Preamble, ms	158.40	161.60	0.00	160.10	0.00
Total burst duration, ms	435.60	444.40	0.00	439.20	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s		>4.00	0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.00	0.00	0.00
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	121499899	**Low Sweep Frequency, Hz**	345
Power, mW	92.1	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED04C972000C6007CE8871250

Figure 14.6 - Detailed measurement results of EUT (EPIRB E100 class 2) maximum temperature

RESULTS OF SELF TEST (A13.3 RTCM 11000.2 Version 2.1)

The measurement at the minimum temperature

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Initial Aliveness Test				
Carrier Frequency	406.037 ±0.001	MHz	No.1 406036.959 No.2 406036.944	PASS PASS
Power Output	35-39	dBm	No.1 37.44 No.2 37.25	PASS PASS
Self Test				
RF Pulse Duration	≤0.444	sec	No.1 518.40 No.2 438.75	PASS PASS
Frame Syncronization Pattern	0 1101 0000	-	No.1 0 1101 0000 No.2 0 1101 0000	PASS PASS
Number of RF bursts	1	burst	No.1 1 No.2 1	PASS PASS

The measurement at the ambient temperature

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Initial Aliveness Test				
Carrier Frequency	406.037 ±0.001	MHz	No.1 406036.978 No.2 406036.978	PASS PASS
Power Output	35-39	dBm	No.1 38.16 No.2 38.08	PASS PASS
Self Test				
RF Pulse Duration	≤0.444	sec	No.1 519.25 No.2 439.20	PASS PASS
Frame Syncronization Pattern	0 1101 0000	-	No.1 0 1101 0000 No.2 0 1101 0000	PASS PASS
Number of RF bursts	1	burst	No.1 1 No.2 1	PASS PASS

The measurement at the maximum temperature

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Initial Aliveness Test				
Carrier Frequency	406.037 ±0.001	MHz	No.1 406036.925 No.2 406036.924	PASS PASS
Power Output	35-39	dBm	No.1 37.99 No.2 37.92	PASS PASS
Self Test				
RF Pulse Duration	≤0.444	sec	No.1 519.30 No.2 439.20	PASS PASS
Frame Syncronization Pattern	0 1101 0000	-	No.1 0 1101 0000 No.2 0 1101 0000	PASS PASS
Number of RF bursts	1	burst	No.1 1 No.2 1	PASS PASS

Annex 15

AUTOMATIC RELEASE MECHANISM TEST AND AUTOMATIC ACTIVATION TESTS FOR CATEGORY 1 SATELLITE EPIRB (A14.0 RTCM 11000.2 VERSION 2.1)

Equipment Under Test (EUT): No.1: EPIRB SafeSea E100 class 1 Category 1 (with ARH100 class 1)
No.2: EPIRB SafeSea E100 class 2 Category 1 (with ARH100 class 2)
Software release for EUT: issue 00.00.28
Sample No.1 Serial No 0001200001 I
Sample No.2 Serial No 0001200011 I
Test Date: 09-10.09.2010
Test Conditions:
– Ambient temperature at open area test site: +27^{O} C.
– Relative air humidity: 58%.
– Atmospheric pressure: 755 mm/Hg.
– EUT is OFF before test.
– 1-st stage:
– Ambient temperature (EPIRB normal condition temperature) +27 ^{O}C
– 2-nd stage:
– Minimum in the chamber (low storage temperature of EPIRB class 2) minus 30 ^{O}C
– 3-rd stage:
– Minimum temperature in the chamber (low storage temperature of EPIRB class 1) minus 50 ^{O}C
– 4-th stage:
– Maximum temperature in the chamber (EPIRB high storage temperature) +70 ^{O}C
– Retention interval of EPIRB at chamber before immersion into water was no less 2 hours

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

– At ambient temperature Test was conducted with the EUT in 6 position, as described in the standard section A.14.0 item 1 c) and 2, 3, 4, 5, 6.
– At minimum and maximum temperature test was conducted with the EUT in 1 performance position, as described in the manufacturer's instruction.
– Test equipment:
- Climatic chamber KPK-400V No 15
- Tank for testing HRU EDVIGA No 101456

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
EPIRB E100 class 1 Category 1 (with ARH100 class 1) at Ambient temperature +27^{O} C				
Normal mounted orientation	Release and float free before 4 meters;	meter	2.35	Value hydrostatic pressure = 0,235 (see figure 14.6)
	automatic EPIRB activation (appearance of strobe light	√	√	
Rolling 90° starboard	Release and float free before 4 meters;	meter	2.2	
	automatic EPIRB activation (appearance of strobe light	√	√	

Rolling 90° port	Release and float free before 4 meters;	meter	2.25	
	automatic EPIRB activation (appearance of strobe light	√	√	
Rolling 90° bow down	Release and float free before 4 meters;	meter	2.15	
	automatic EPIRB activation (appearance of strobe light	√	√	
Rolling 90° stern down	Release and float free before 4 meters;	meter	2.4	
	automatic EPIRB activation (appearance of strobe light	√	√	
Upside down	Release and float free before 4 meters;	meter	2.2	
	automatic EPIRB activation (appearance of strobe light	√	√	
EPIRB E100 class 1 Category 1 (with ARH100 class 1) at low storage temperature of EPIRB class 1 minus 50 ^{O}C				
Normal mounted orientation	Release and float free before 4 meters;	meter	2.9	
	automatic EPIRB activation (appearance of strobe light	√	√	
EPIRB E100 class 1 Category 1 (with ARH100 class 1) at EPIRB high storage temperature) +70 ^{O}C				
Normal mounted orientation	Release and float free before 4 meters;	meter	0.4	Value hydrostatic pressure = 0,19(see figure 14.14
	automatic EPIRB activation (appearance of strobe light	√	√	
EPIRB E100 class 2 Category 1 (with ARH100 class 2) at Ambient temperature +27^{O} C				
Normal mounted orientation	Release and float free before 4 meters;	meter	1.9	
	automatic EPIRB activation (appearance of strobe light	√	√	
Rolling 90° starboard	Release and float free before 4 meters;	meter	1.9	
	automatic EPIRB activation (appearance of strobe light	√	√	

Rolling 90° port	Release and float free before 4 meters;	meter	2.1	
	automatic EPIRB activation (appearance of strobe light	√	√	
Rolling 90° bow down	Release and float free before 4 meters;	meter	2.0	
	automatic EPIRB activation (appearance of strobe light	√	√	
Rolling 90° stern down	Release and float free before 4 meters;	meter	1.95	
	automatic EPIRB activation (appearance of strobe light	√	√	
Upside down	Release and float free before 4 meters;	meter	2.0	
	automatic EPIRB activation (appearance of strobe light	√	√	
EPIRB E100 class 2 Category 1 (with ARH100 class 2) at low storage temperature of EPIRB class 2 minus 30 ^{O}C				
Normal mounted orientation	Release and float free before 4 meters;	meter	2.8	
	automatic EPIRB activation (appearance of strobe light	√		
EPIRB E100 class 2 Category 1 (with ARH100 class 2) at EPIRB high storage temperature) +70 ^{O}C				
Normal mounted orientation	Release and float free before 4 meters;	meter	0.4	
	automatic EPIRB activation (appearance of strobe light	√	√	
		√		

CRITERIA OF COMPLIANCE AUTOMATIC RELEASE MECHANISM TEST AND AUTOMATIC ACTIVATION TESTS (A14.0 RTCM 11000.2 Version 2.1):
1) The EUT should float free before reaching a depth of 4 meters and should automatically activate..
2) Activation should be verified by observing operation of the strobe light.

Conclusion	
Automatic release mechanism AND EPIRB SafeSea S100 Category 1 class 1 and class 2	conforms to the requirements standard RTCM 11000.2 Version 2.1 (pass/fail)
Samples No.1 and No.2	pass

Figure 15.1 — Total view of equipment.

Figure 15.2 - View of mounting automatic release mechanism in performance position before activation test

Figure 15.3 - View of EPIRB in mounting automatic release mechanism in performance position before activation test for EPIRB class 1

Figure 15.4 - View of mounting automatic release mechanism class 1 in performance position before activation test

Figure 15.5 - View of mounting automatic release mechanism immersed into water in performance position before activation test

Figure 15.6 - View of mounting automatic release mechanism immersed into water in performance position before activation test

Figure 15.7 - View of manometer at the moment of activation

Figure 15.8 – View of automatic release mechanism in performance position at the moment of activation

Figure 15.9 - View of automatic release mechanism in performance position after releasing and EPIRB activation

Figure 15.10 - View of mounting automatic release mechanism immersed into water in Rolling 90° starboard position before activation test

Figure 15.11- View of automatic release mechanism in Rolling 90° starboard position during activation

Figure 15.12 – View of mounting automatic release mechanism immersed into water in Rolling 90° port position before activation test

Figure 15.13 - View of automatic release mechanism in Rolling 90° port position during activation

Figure 15.14 - View of mounting automatic release mechanism immersed into water in Rolling 90° bow down position before activation test

Figure 15.15 - View of automatic release mechanism in Rolling 90° bow down position during activation

Figure 15.16– View of mounting automatic release mechanism immersed into water in Rolling 90° stern down position before activation test

Figure 15.17 - View of automatic release mechanism in Rolling 90° stern down position during activation test

Figure 15.18 - View of mounting automatic release mechanism immersed into water in Upside down position before activation test

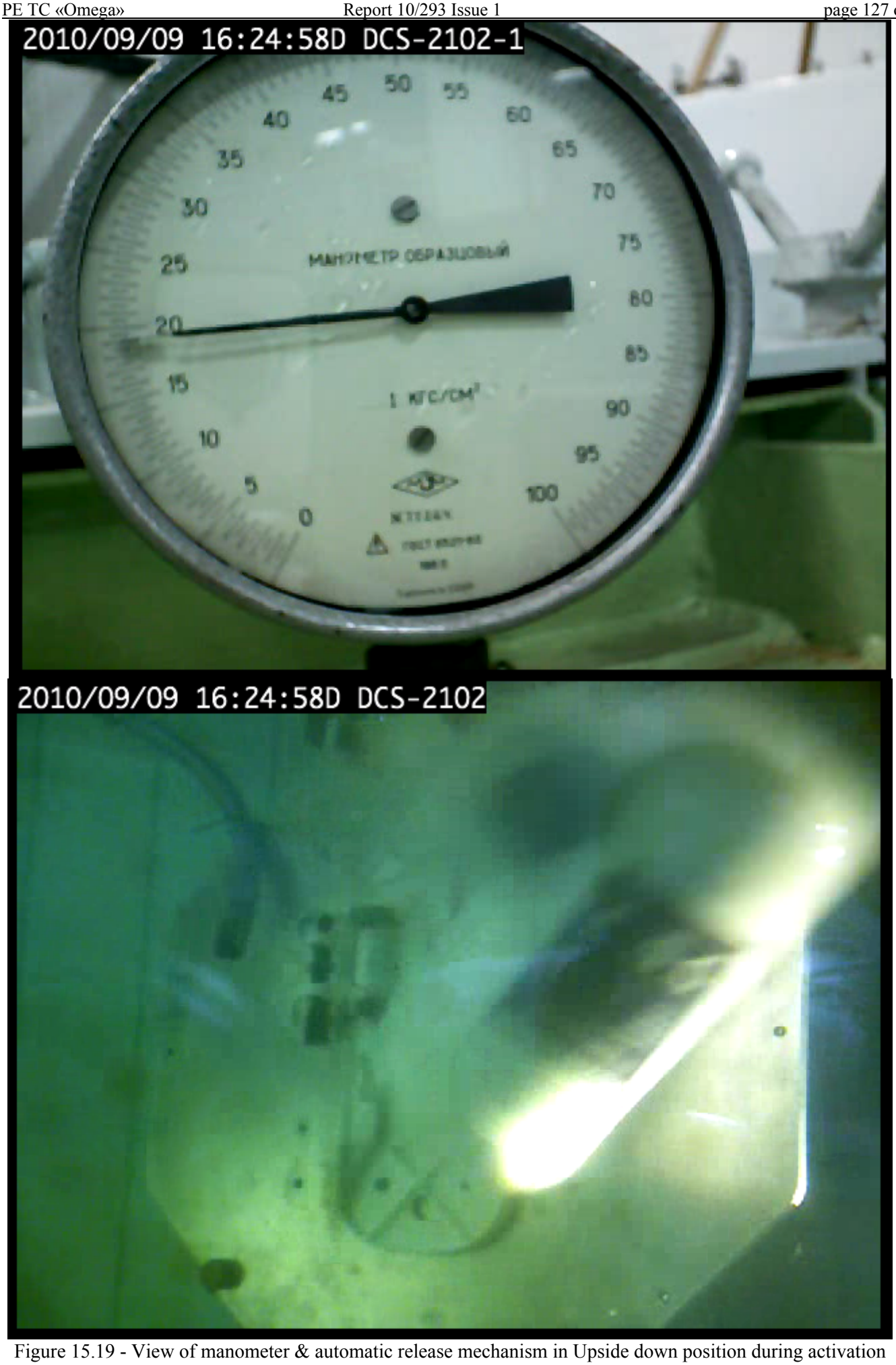

Figure 15.19 - View of manometer & automatic release mechanism in Upside down position during activation test

Figure 15.20 - View of automatic release mechanism in performance Upside down position after releasing and EPIRB activation

Figure 15.21 - View of EPIRB in mounting automatic release mechanism in performance position before activation test for EPIRB class 2

Figure 15.22 View of mounting automatic release mechanism class 2 in performance position before activation test

Figure 15.23 – View of mounting automatic release mechanism class 2 immersed into water in performance position before activation test

Figure 15.24 - View of manometer & automatic release mechanism in class 2 performance position during activation test

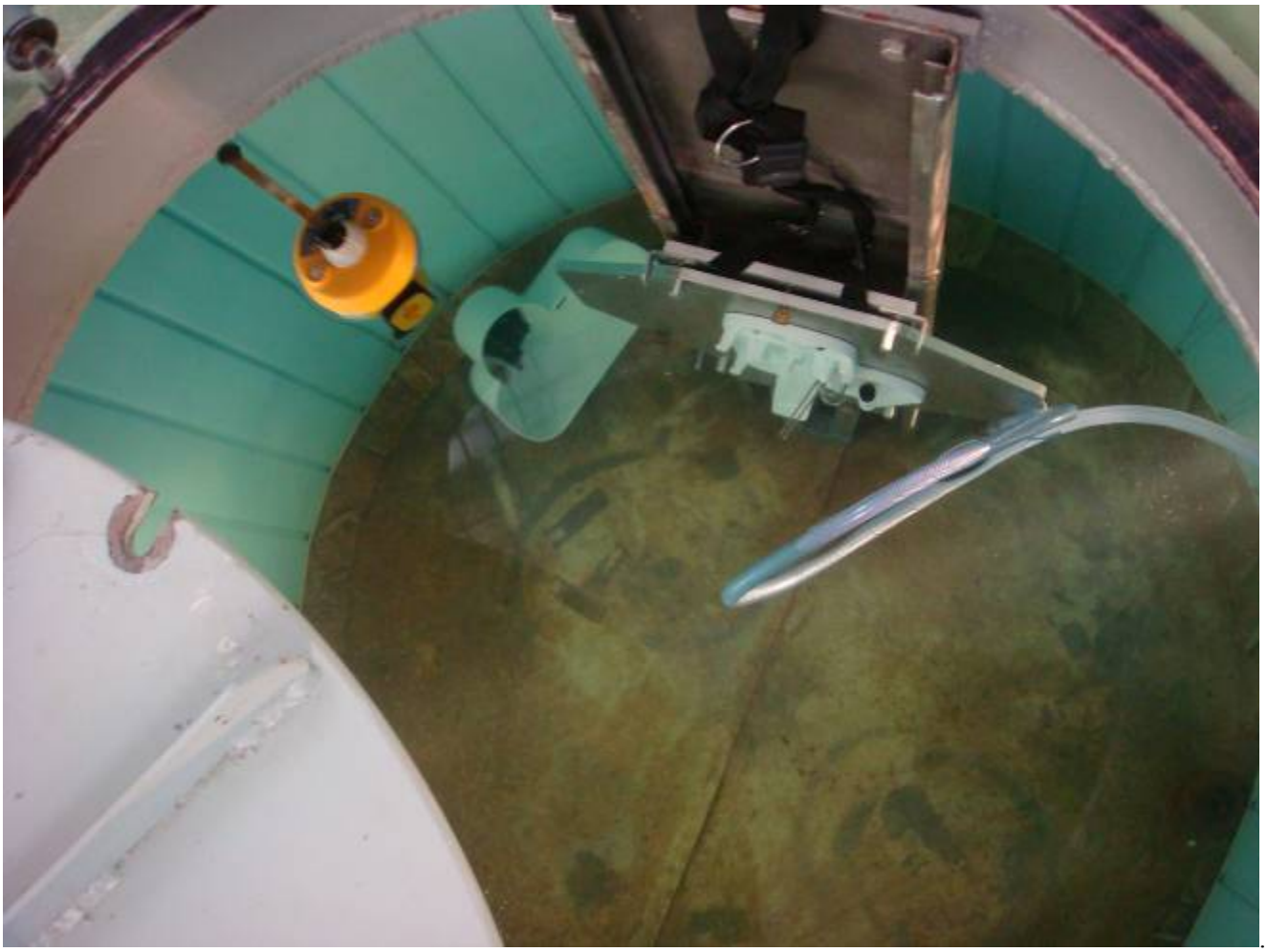

Figure 15.25 - View of automatic release mechanism class 2 in performance position after releasing and EPIRB activation

Annex 16

STABILITY AND BUOYANCY TEST (A 15.0 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): 1) No.1 EPIRB SafeSea E100G class 1
2) No.2 EPIRB SafeSea E100G class 2
Software release for EUT: issue 00.00.28
Sample No.1 Serial No 0001200004 I
Sample No.2 Serial No 0001200014 I
Test Date: 05.11.2010
Test Conditions:
– Atmospheric pressure: 752 mm/Hg.
– Relative air humidity: 63 %.

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

– EPIRB is OFF during the test.
– EUT set up in operational position.
– Test equipment:
- The unit for buoyancy measurement No 101173;
- Installation for test automatic release mechanism and stability of EPIRB No 101173

With the antenna deployed in it's normal operating position, the EUT (EPIRB) was rotated to a horizontal position about its axis, submerged just below the surface, and released to pass through an upright position.
The satellite EPIRB was floated upright in calm fresh water with the base of the antenna a minimum of 40 mm above the waterline.
The reserve buoyancy of the satellite EUT (EPIRB) was determined by the following procedure:
EUT (EPIRB) was submerged and measured the buoyant force with a scale. The measured buoyant force was divided by the weight of the unit.

– Test duration: 240 minutes.
– Measurement duration: 15 minutes.

– Step	No. 1	Detailed measurement results of EUT (EPIRB) before the stability and buoyancy test
	No. 2	Submerge EUT (EPIRB) just below the surface.
	No. 3	Rotate EUT (EPIRB) to a horizontal position about any axis.
	No. 4	Release EUT (EPIRB) to pass through an upright position.
	No. 5	Submerge the complete unit (EPIRB).
	No. 6	Measure the buoyant force with a scale
	No. 7	Divide the measured buoyant force by the weight of the unit.

Figure 16.1 – View of the EUT (EPIRB) before the stability and buoyancy test

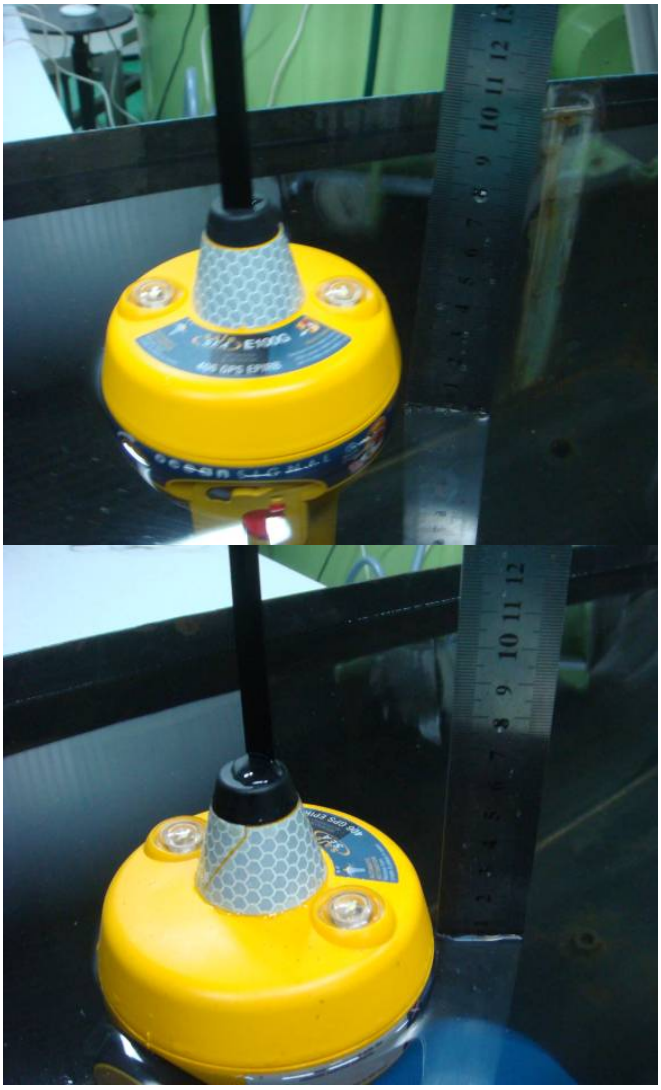

Figure 16.2 – In calm fresh water, the EUT was floating upright with the base of the antenna 40 mm above the water-line.

Figure 16.3 – The EUT (EPIRB) stability test

Figure 16.4 – The EUT (EPIRB) stability test

Figure 16.5 – The EUT (EPIRB) buoyancy test

Figure 16.5 – View of the EUT (EPIRB) upon completion of the stability and buoyancy test

FINAL RESULTS OF STABILITY AND BUOYANCY TEST (A5.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Stability	≤ 2	s	1.9	PASS
• Buoyancy	> 5	%	35	PASS

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

1) The EUT (EPIRB) should pass through an upright position within 2 seconds.
2) The reserve buoyancy of the satellite EPIRB should be at least 5%.

Annex 17

INADVERTENT ACTIVATION TEST (A16.0 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): No.1: EPIRB SafeSea E100 class 1 with ARH100 (Category 1)
No.2: EPIRB SafeSea E100 class 2 with ARH100 (Category 1)
Software release for EUT: Issue 00.00.28
Sample No.1 Serial No 0001200001 I
Sample No.2 Serial No 0001200011 I
Test Date: 02.07.2010
Test Conditions:
– Ambient temperature at open area test site: +29 ^{O}C .
– Relative air humidity: 52 %.
– Atmospheric pressure: 761 mm/Hg.
– EUT is OFF before test.
– Test duration is 5 minutes.

– EUT is included	the satellite EPIRB with ARH100 (Category 1):	YES
	the satellite EPIRB with Mounting bracket intended to be mounted in an exposed location on deck (Category 2):	NO

– Test is conducted with the EUT in 1 performance position, as described in the manufacturer's instruction.
– Test equipment:
- Beacon tester BT-611 No 1005
- Temperature meter Center-309 No 100074/1
- Set of water washes No 101174
- Trammel SHC1-0-150-S No 2157444

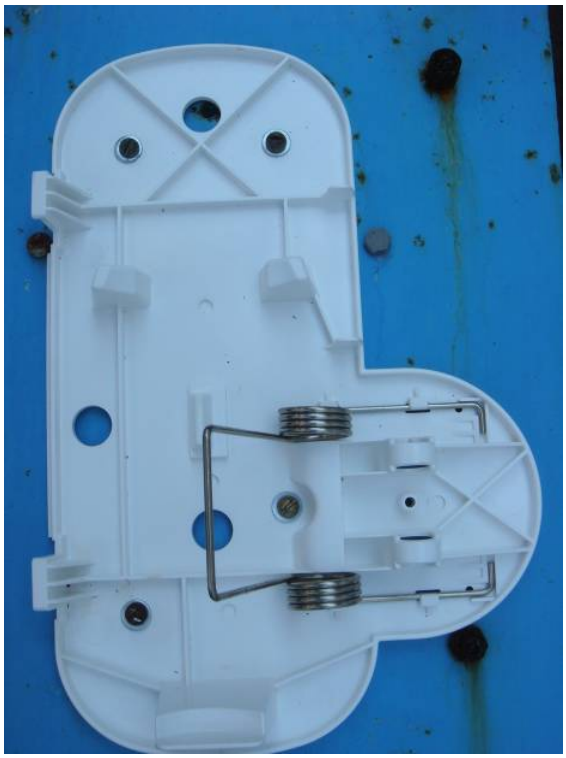

Figure 17.1 - View of mounting bracket in performance position before inadvertent activation test

Figure 17.2 - View of EUT before inadvertent activation test

Figure 17.3 - View of EUT with its housing before inadvertent activation test

Figure 17.4 - View of the end of the nozzle that was 3.50 m away from the EUT

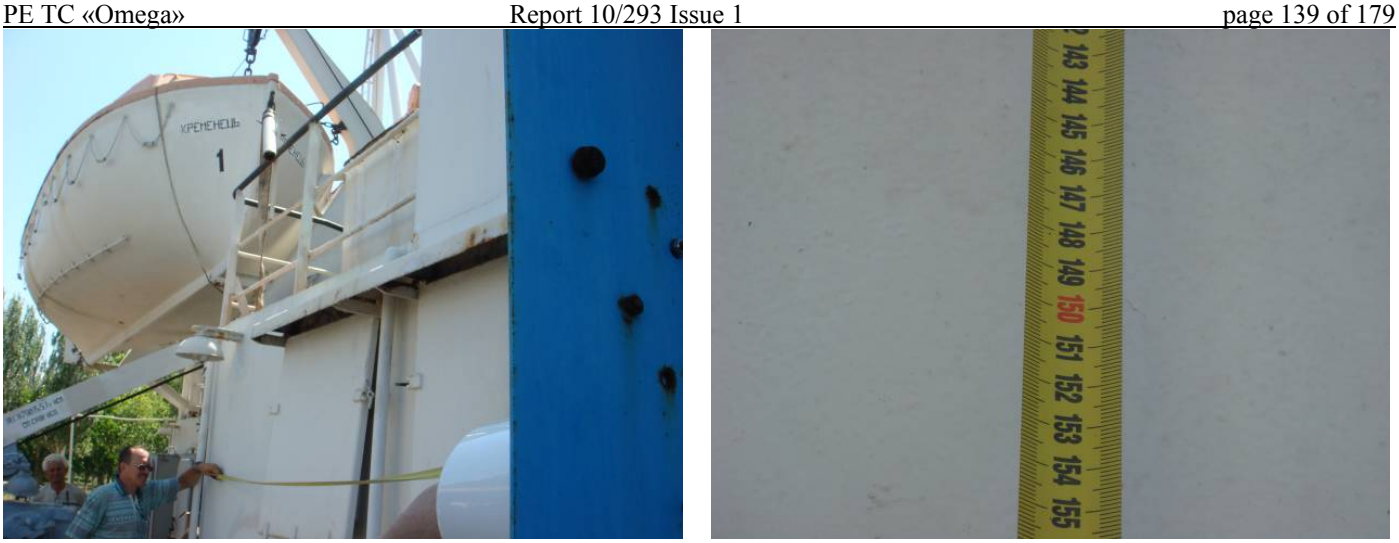

Figure 17.5 - View of the end of the nozzle that was 1.50 m above the base of the antenna

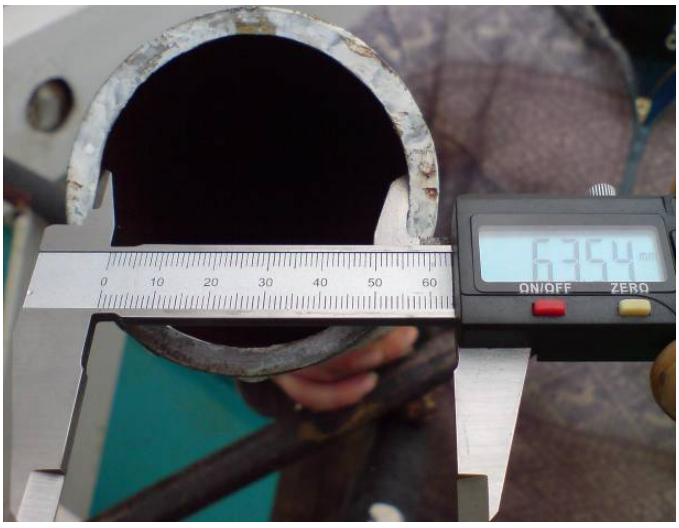

Figure 17.6 - View of the nozzle hose that has a diameter of 63.5 mm

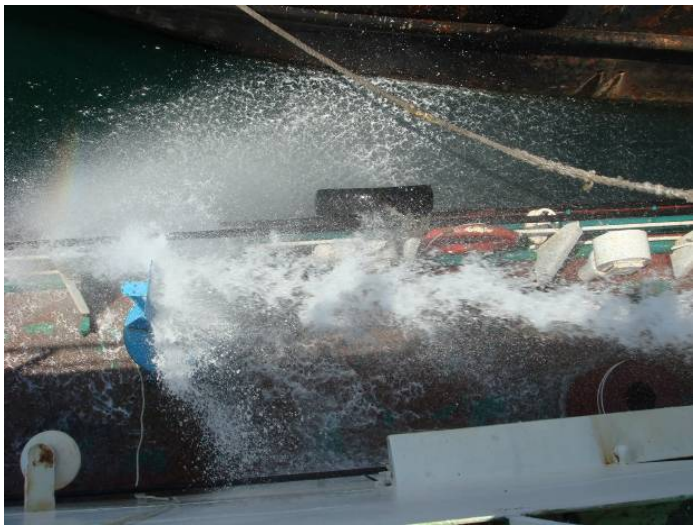

Figure 17.7 - View of EUT during the test. The water strike EUT straight

Figure 17.8 - View of EUT during the test. The water strike EUT straight

Figure 17.9 - View of EUT with its housing upon completion of inadvertent activation test

Figure 17.10 - View of the EUT (EPIRB and its release mechanism) upon completion inadvertent activation test

Figure 17.10 - View of the EUT (EPIRB and its release mechanism) upon completion inadvertent activation test

FINAL RESULTS OF INADVERTENT ACTIVATION TEST (A16.0 RTCM 11000.2 Version 2.1):
upper result – for EPIRB s/n 0001200001 I, below result – for EPIRB s/n 0001200011 I):

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

Annex 18

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

Equipment Under Test (EUT): EPIRB SafeSea E100G class 1
Software release for EUT: issue 00.00.28
Sample No.1 Serial No 0001200004I
Sample No.2 Serial No 0001200003I
Test Date:06.08.2010
26.08.2010
Test Conditions:
– Atmospheric pressure: 749…752 mm/Hg
– Relative air humidity: 59 … 71 %

– EUT were included	the satellite EPIRB with release mechanism (Category 1):	NO
	the satellite EPIRB with mounting device (Category 2):	NO
– EUT were included	the temperature Class 1 device:	YES
	the temperature Class 2 device:	NO
– Temperature	Minimum: (Class 1: – 40 °C, Class 2: – 20 °C)	– 40 °C
	Maximum: +55 °C	
	Ambient: +20…+30,4 °C	
Frequencies used:	121,5 MHz	

Description of Tests:

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 should 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).
– Test equipment:
- Beacon tester BT-611 No 1005
- Spectrum analyzerHP8593E No 3831U02306
- Oscilloscope TDS-3052 No B011258
- The radio communication service monitor CMS 54 No 834222/001
- Antenna HK116 No 100345
- Antenna mast ATR 2 No 101208
- RFAM Ternovnik MO No 1
- Ground plane Ug No 102282
- Climatic chamber SNOL 58/350 No 102353
- Climatic chamber NZ-350 No 24625a

– Step
No. 1 Self Test of the EUT (EPIRB) was made (before of Auxiliary Radio-Locating Device Transmitter Test)
No. 2 Carrier Frequency Test

Condition: The carrier frequency was measured at the minimum and maximum operating temperatures.

No. 3 Modulation Characteristics

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).

No. 4 Modulation Characteristics

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.

No. 5 Modulation Characteristics

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

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

No. 6 Modulation Characteristics

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

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

No. 7 Modulation Characteristics

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.

No. 8 Peak Effective Radiated Power

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 no less than 75 cm ± 5 cm. 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.

No. 9 Self Test of the EUT (EPIRB) was made (upon completion of Auxiliary Radio-Locating Device Transmitter test).

Figure 18.1 – View of the EUT (EPIRB) before the auxiliary radio-locating device transmitter test

Figure 18.2 – View of the EUT (EPIRB) before the auxiliary radio-locating device transmitter test

Test duration 0 h 0 m	Bursts received 0	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	406036.955	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.09	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.13	0.00
Phase time rise, mcs	50.00	250.00	0.00	144.60	0.00
Phase time fall, mcs	50.00	250.00	0.00	159.12	0.00
Power, Wt	3.16	7.94	0.00	6.91	0.00
Power rise, ms	0.00	0.00	0.00	0.30	0.00
Bit Rate, bps	396.00	404.00	0.00	399.95	0.00
Asymmetry, %	0.00	5.00	0.00	0.28	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	519.35	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	0.00	0.00	0.00
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	121498269	**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 8C96F9C0637FDFF992EF3 783E0F66C

Figure 18.3 – Results of EUT (EPIRB) Self Test (before the auxiliary radio-locating device transmitter test)

Figure 18.4 – Site for EUT (EPIRB) before Test at the minimum operating temperature

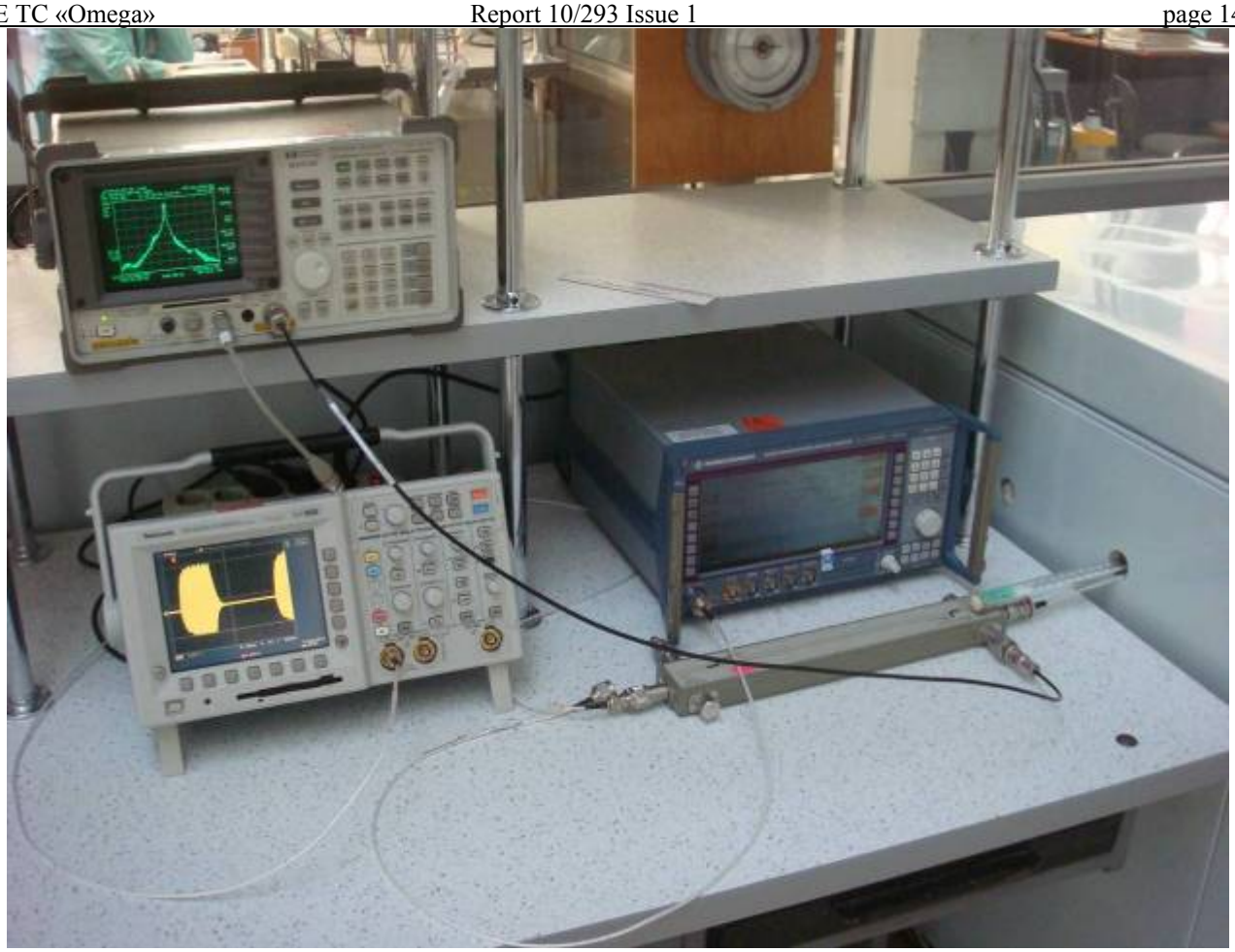

Figure 18.5 – Site for Carrier Frequency Test and Modulation Characteristic Measurement at the minimum operating temperature

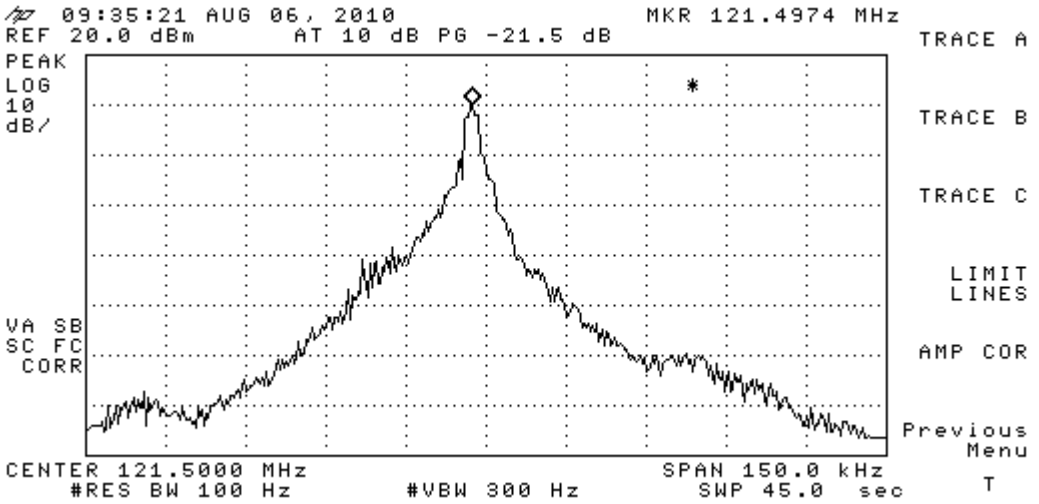

Figure 18.6 – Screenshot of Carrier Frequency Test Result at the minimum operating temperature

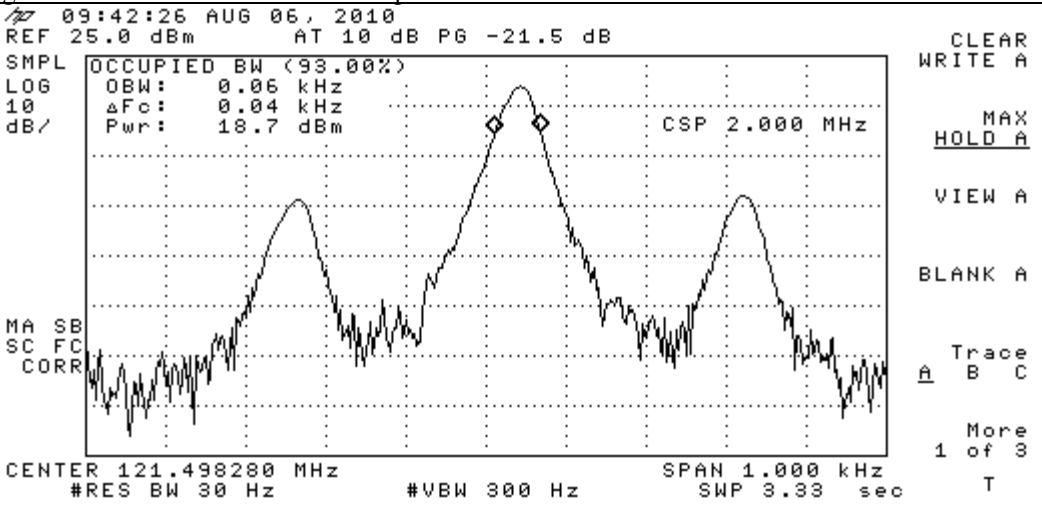

Figure 18.7 – Screenshot of Frequency Coherence Measurement Test Result (Total power emitted) at the minimum operating temperature

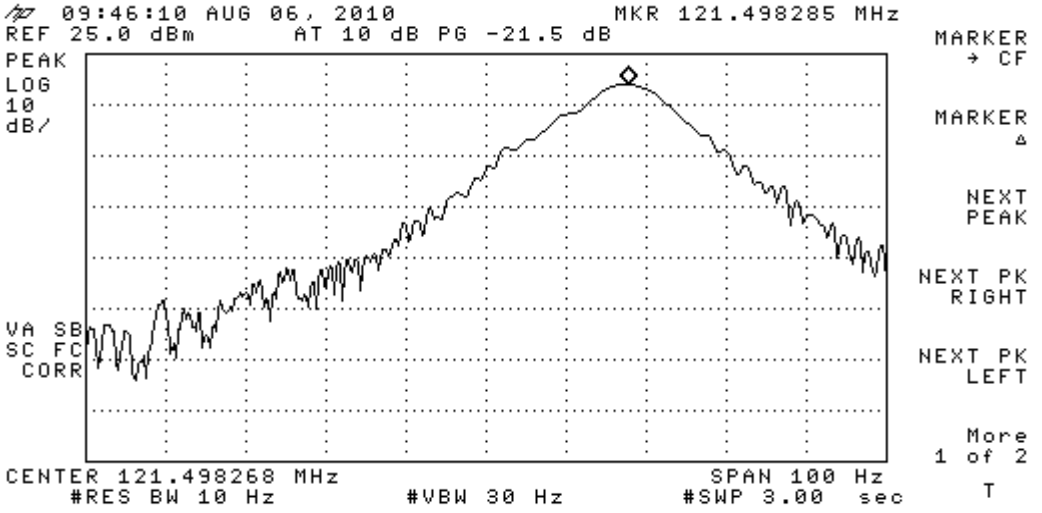

Figure 18.8 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the minimum operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst

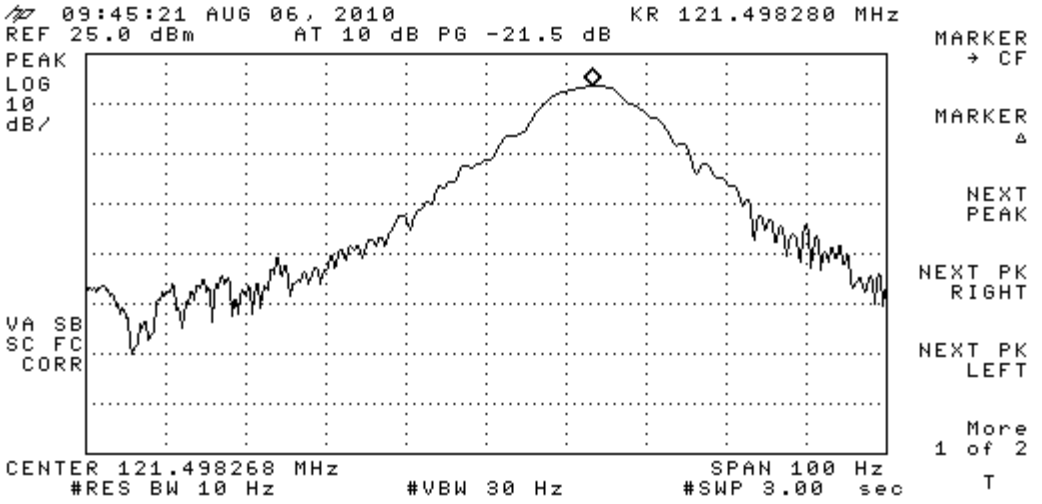

Figure 18.9 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the minimum operating temperature. Transmitted RF (121.5 MHz) after the interruption for the 406 MHz RF burst

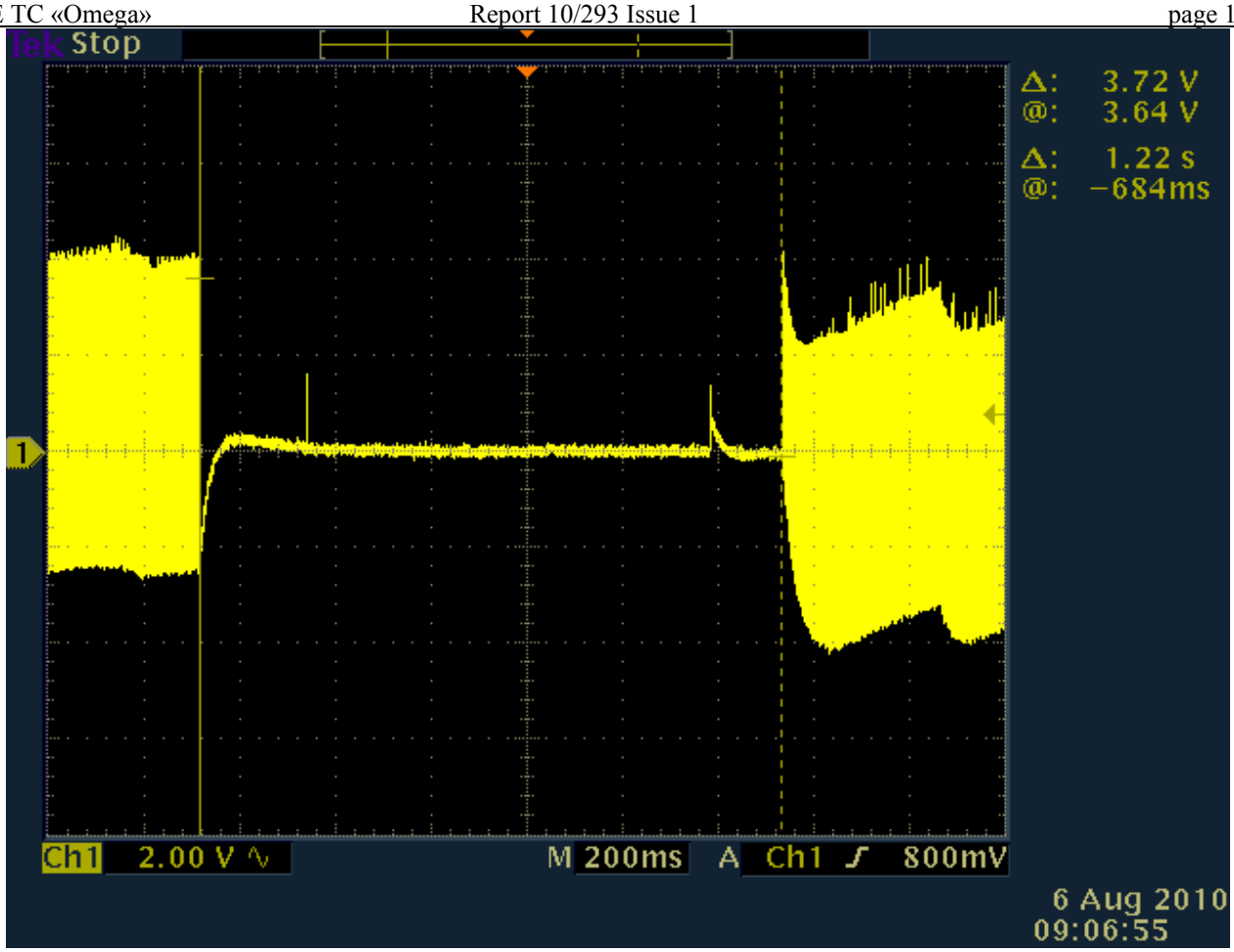

Figure 18.10 – Screenshot of Transmitter Duty Cycle Test Result at the minimum operating temperature

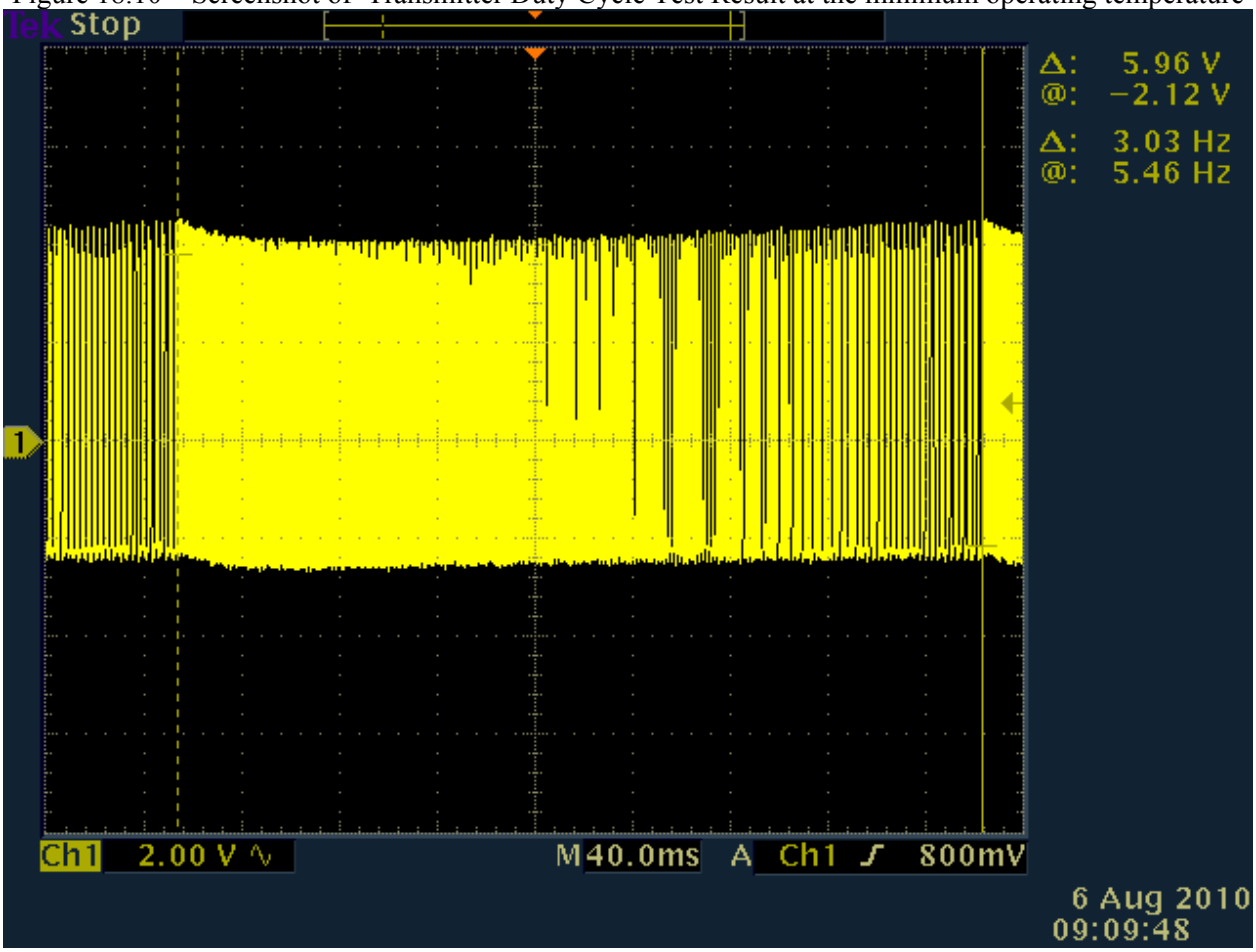

Figure 18.11 – Screenshot of Sweep repetition rate Test Result at the minimum operating temperature

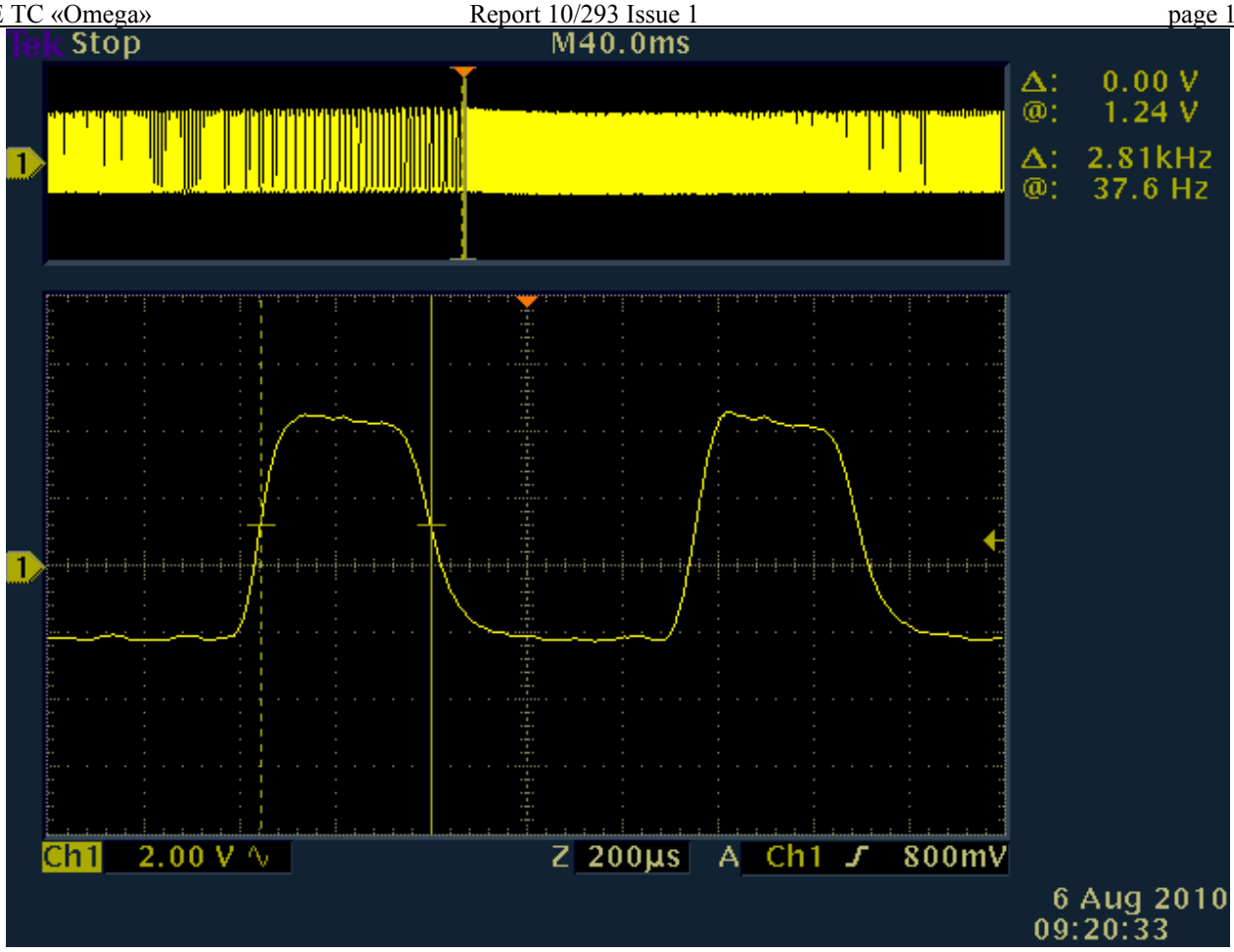

Figure 18.12 – Screenshot of Demodulation Waveform (A) measured near start of the modulation sweep period at the minimum operating temperature

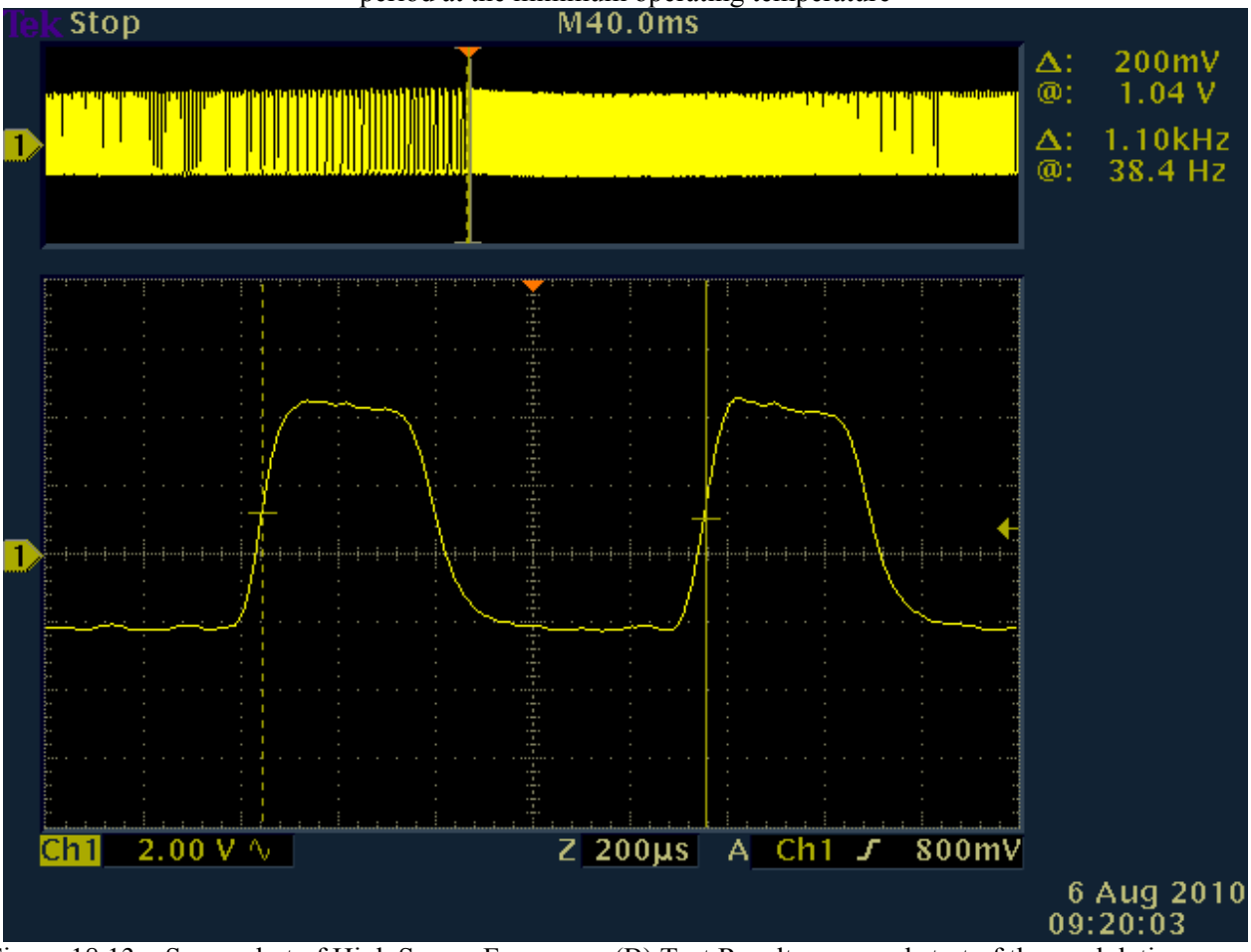

Figure 18.13 – Screenshot of High Sweep Frequency (B) Test Result measured start of the modulation sweep period at the minimum operating temperature

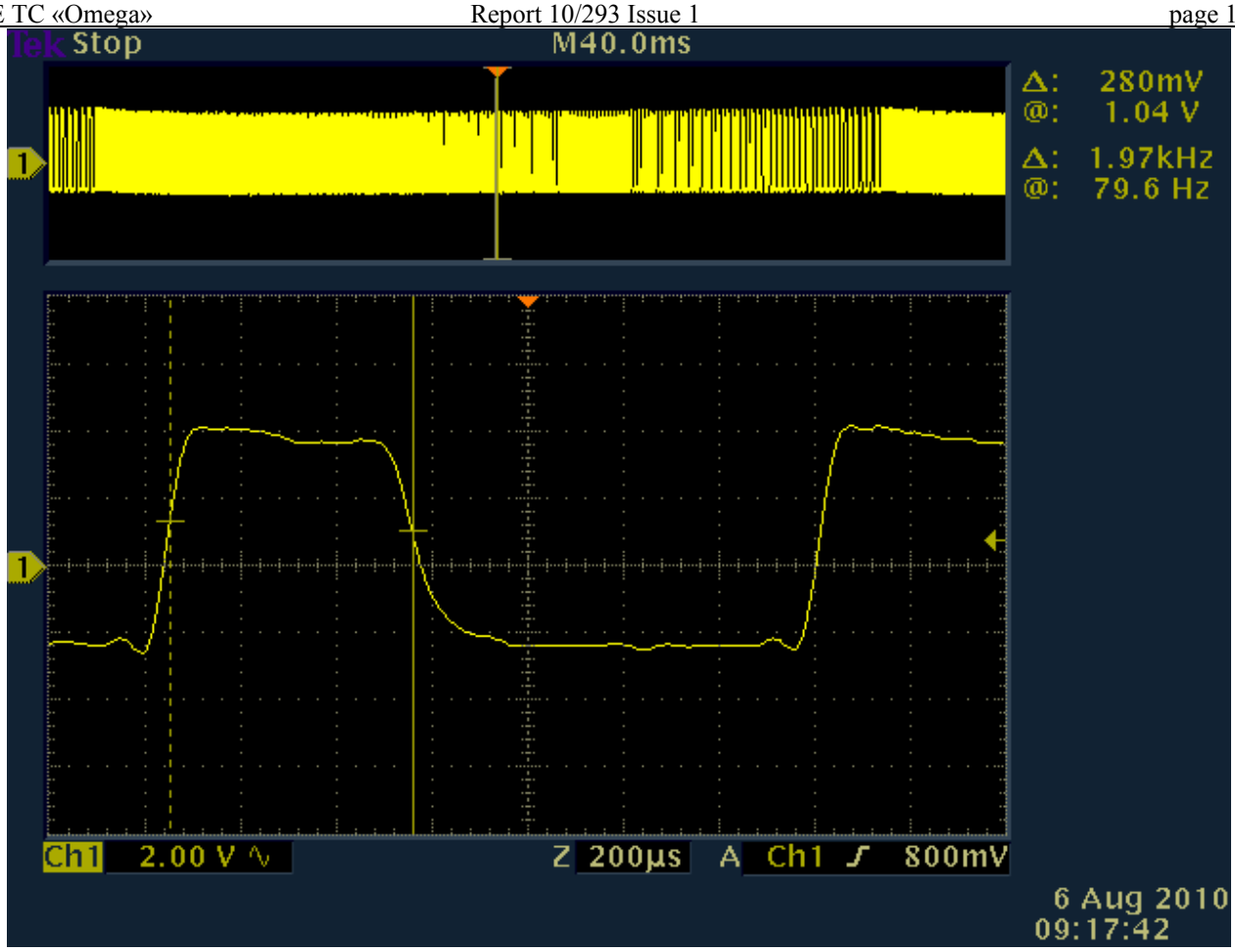

Figure 18.14 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the minimum operating temperature

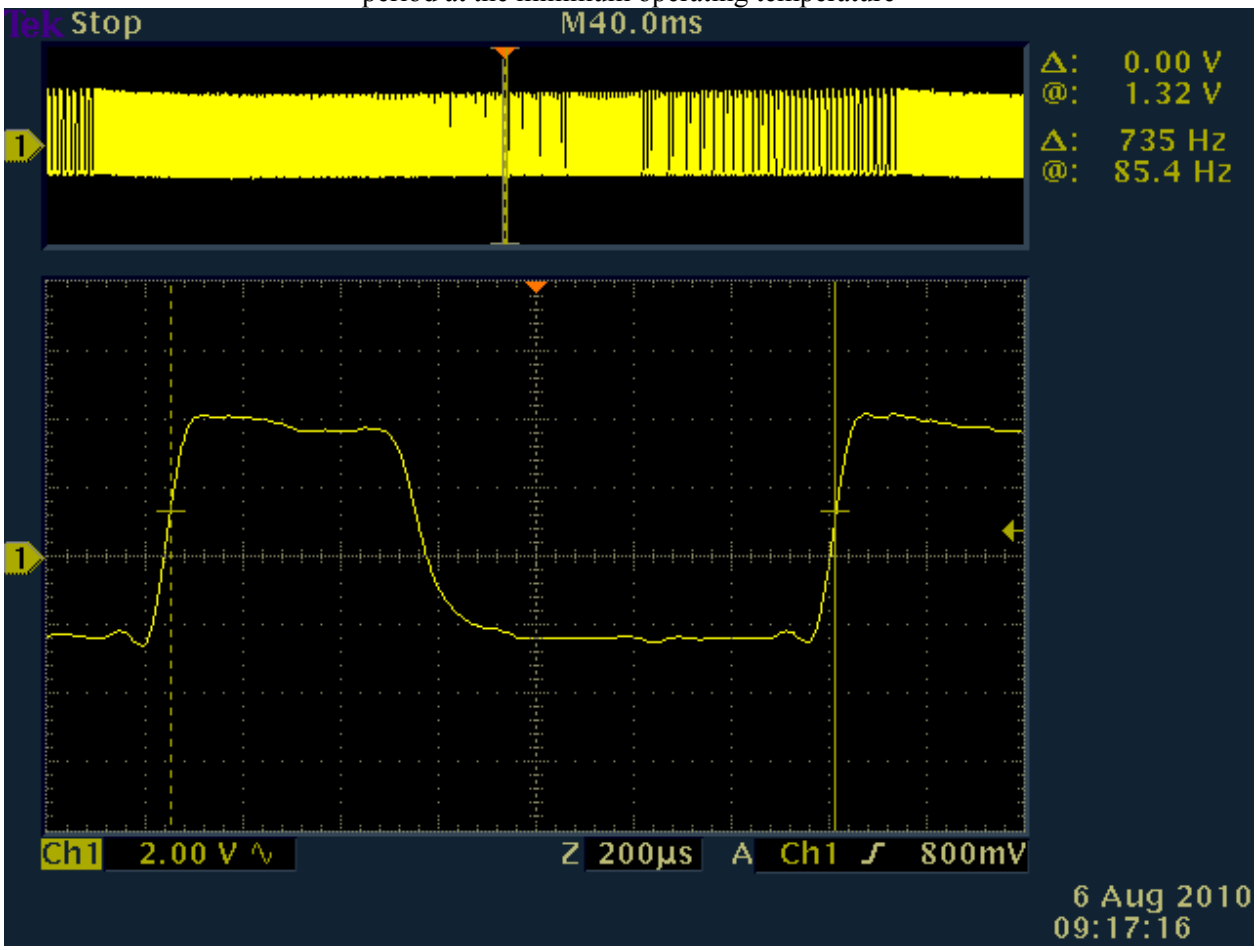

Figure 18.15 – Screenshot of Sweep Frequency (B) Test Result measured near midpoint of the modulation sweep period at the minimum operating temperature

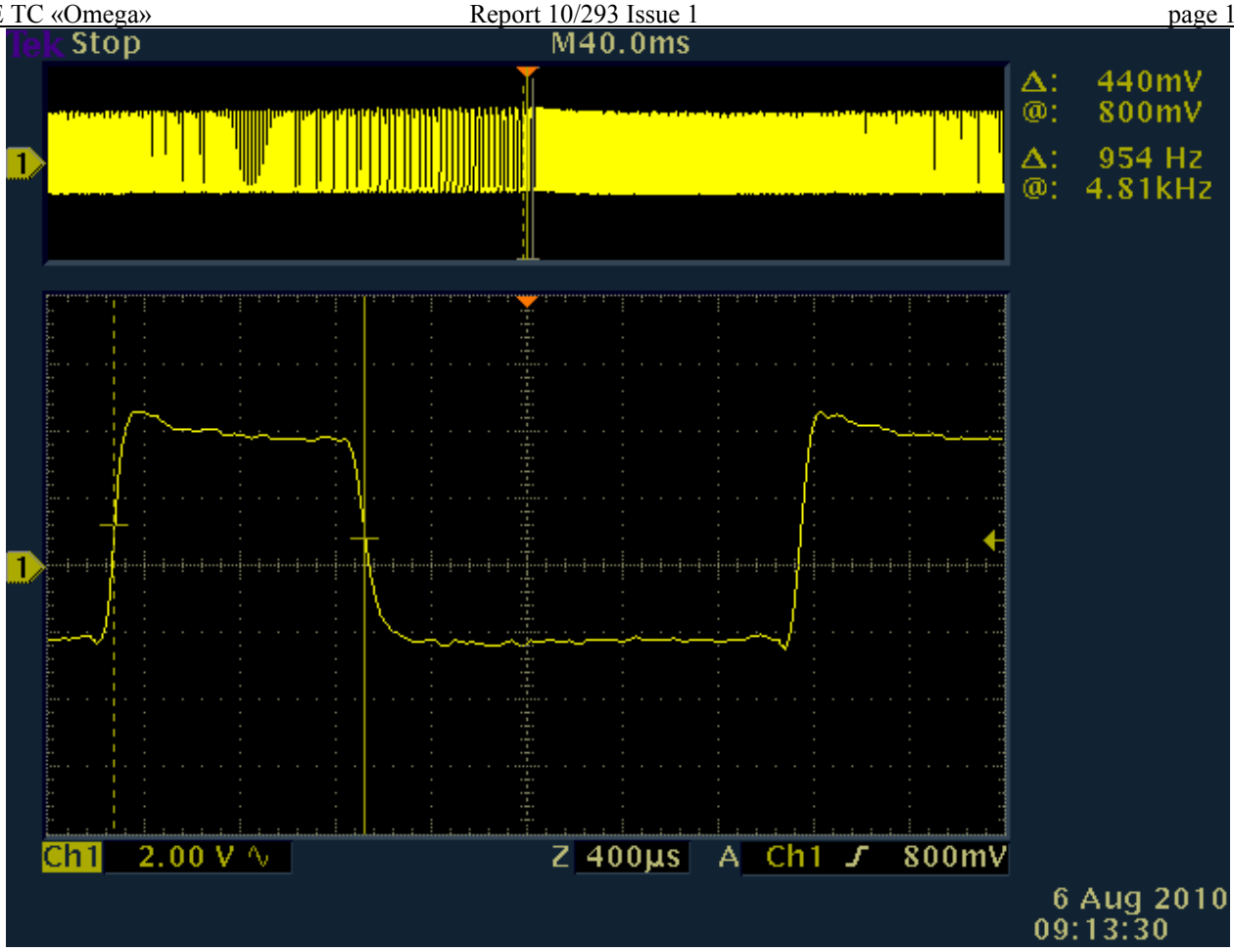

Figure 18.16 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the minimum operating temperature

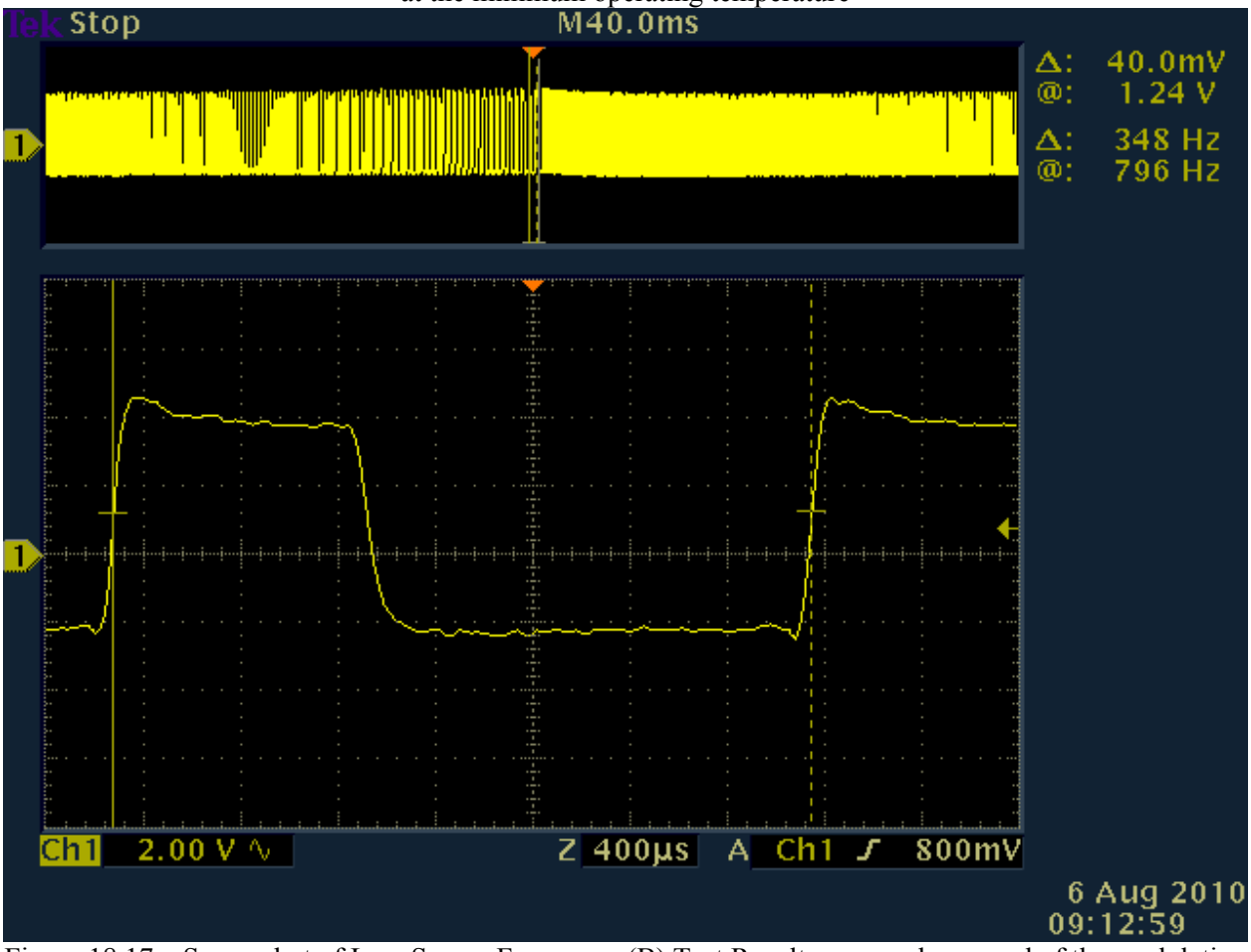

Figure 18.17 – Screenshot of Low Sweep Frequency (B) Test Result measured near end of the modulation sweep period at the minimum operating temperature

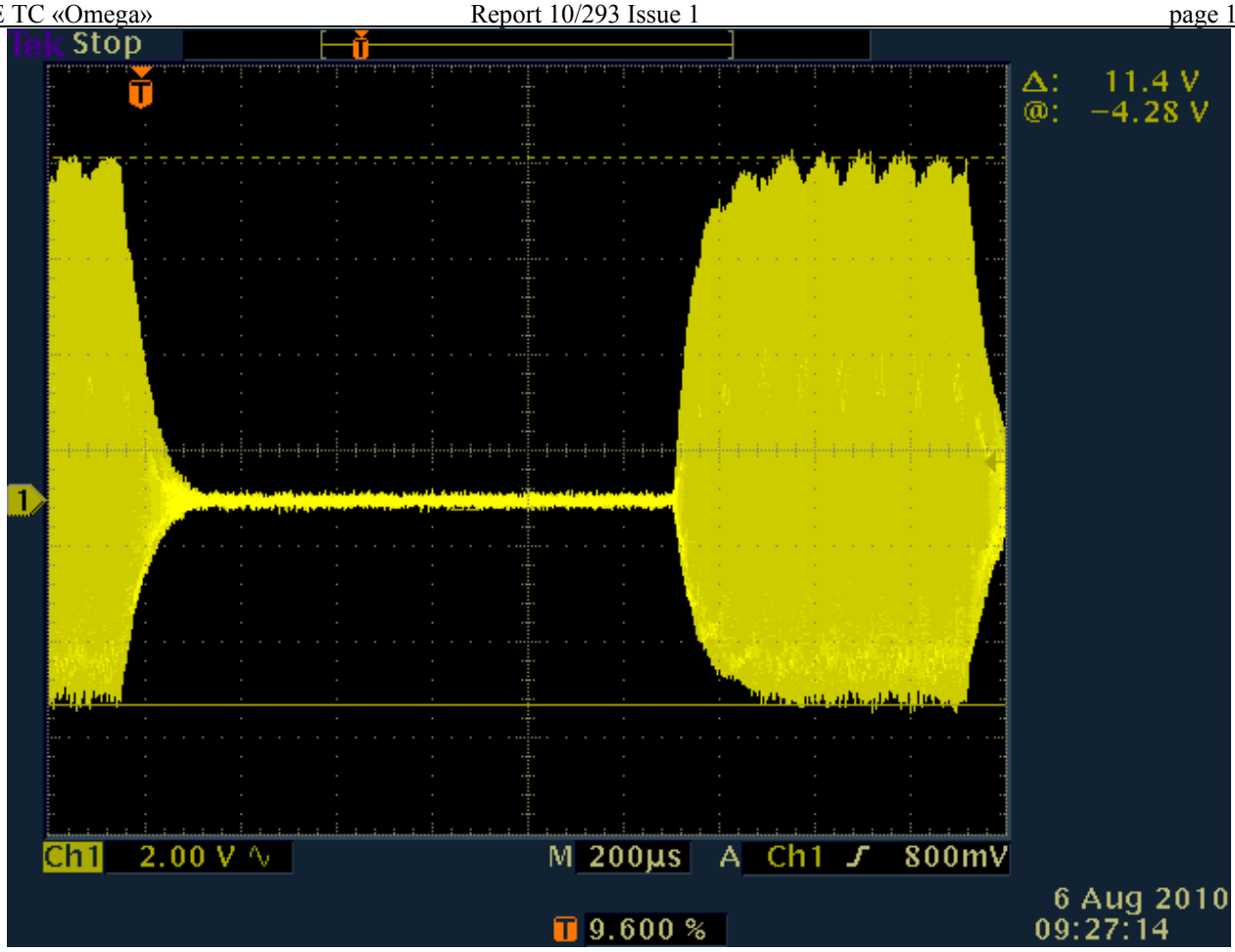

Figure 18.18 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the minimum operating temperature

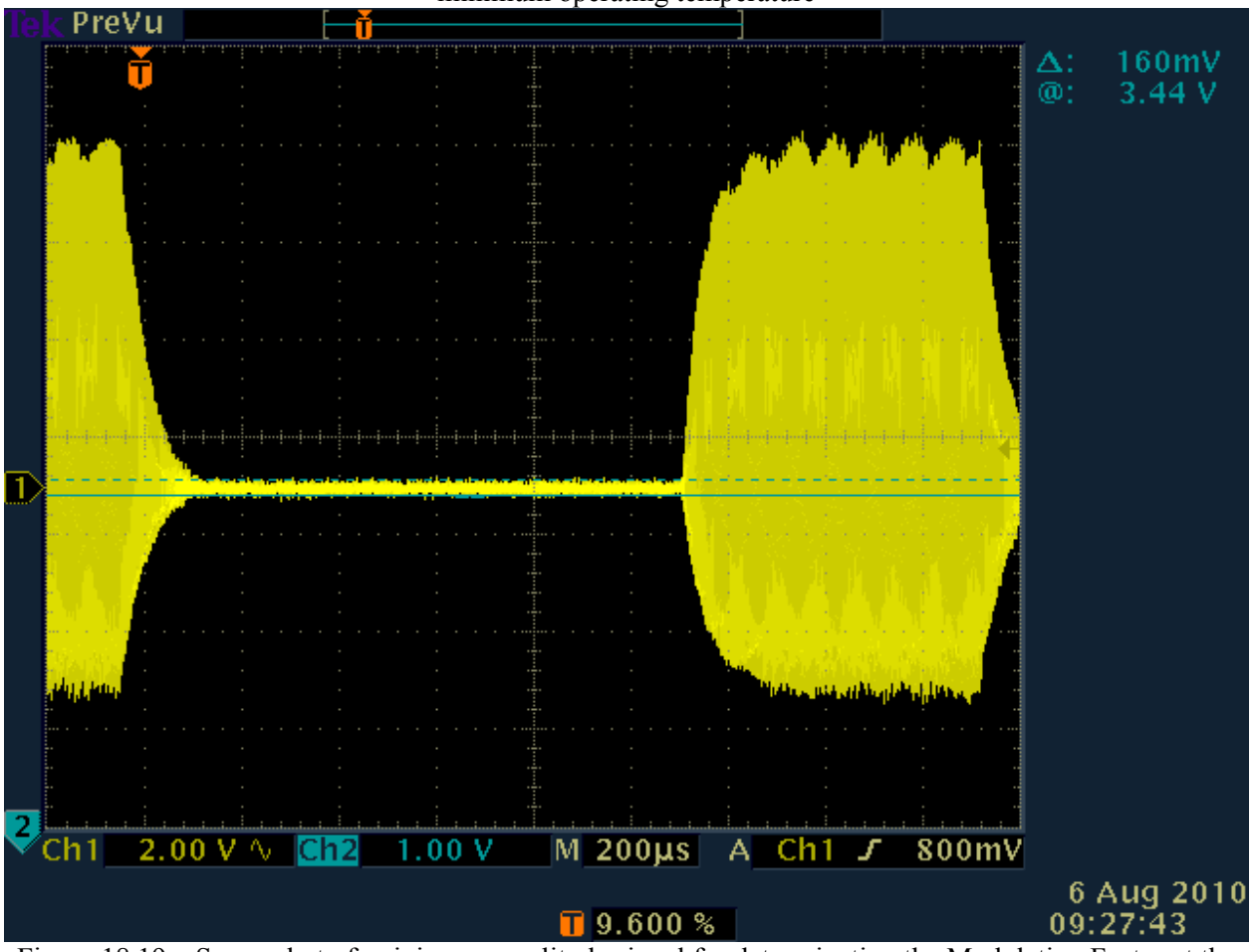

Figure 18.19 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the minimum operating temperature

Figure 18.20 – Site for EUT before Test at the ambient temperature

Figure 18.21 – Site for Carrier Frequency Test at the ambient temperature

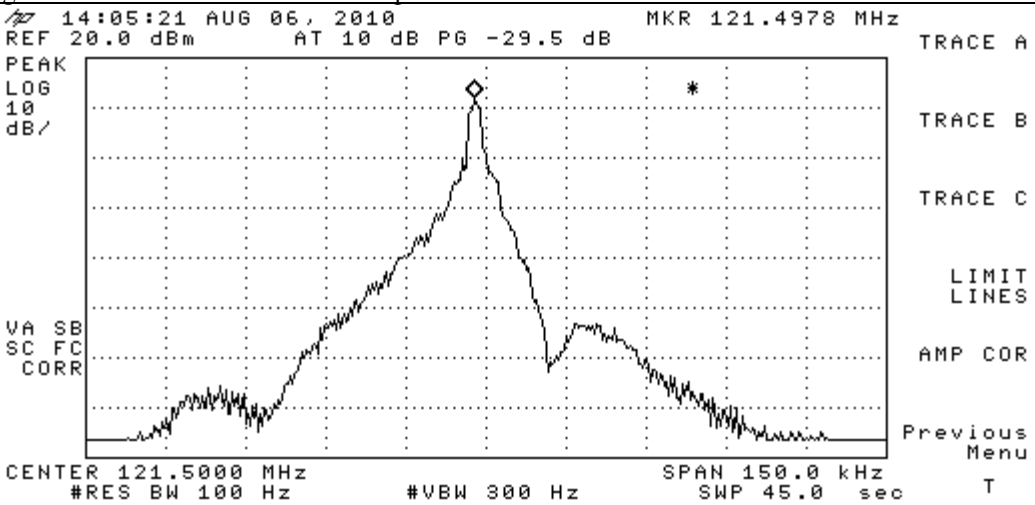

Figure 18.22 – Screenshot of Carrier Frequency Test Result at the ambient temperature

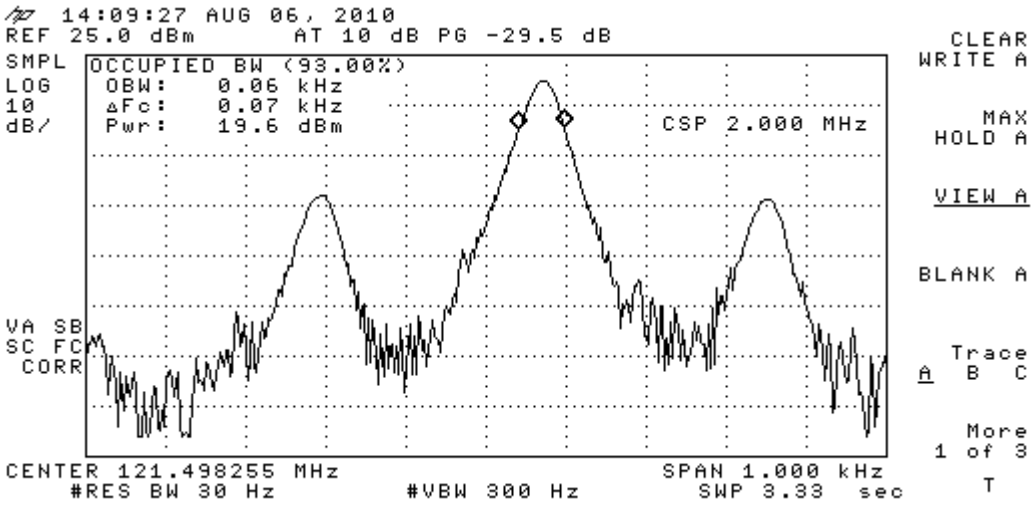

Figure 18.23 – Screenshot of Frequency Coherence Measurement Test Result (Total power emitted) at the ambient temperature

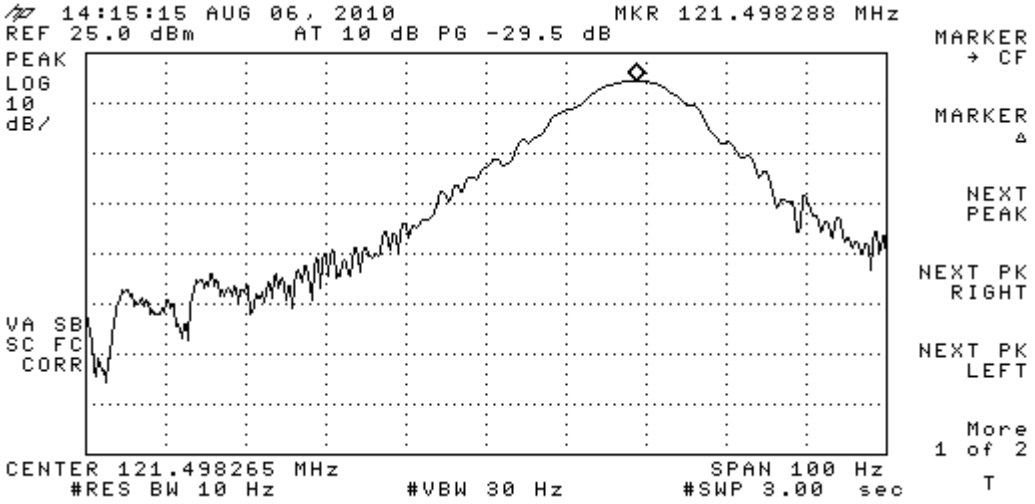

Figure 18.24 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the ambient temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst

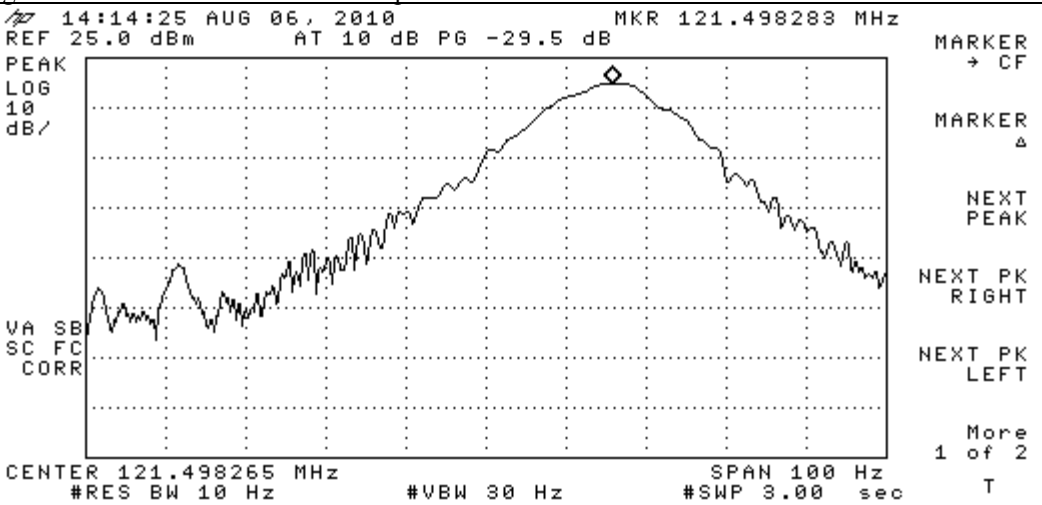

Figure 18.25 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the ambient temperature. Transmitted RF (121.5 MHz) after the interruption for the 406 MHz RF burst

Figure 18.26 – Site for Modulation Characteristic Measurement at the ambient temperature

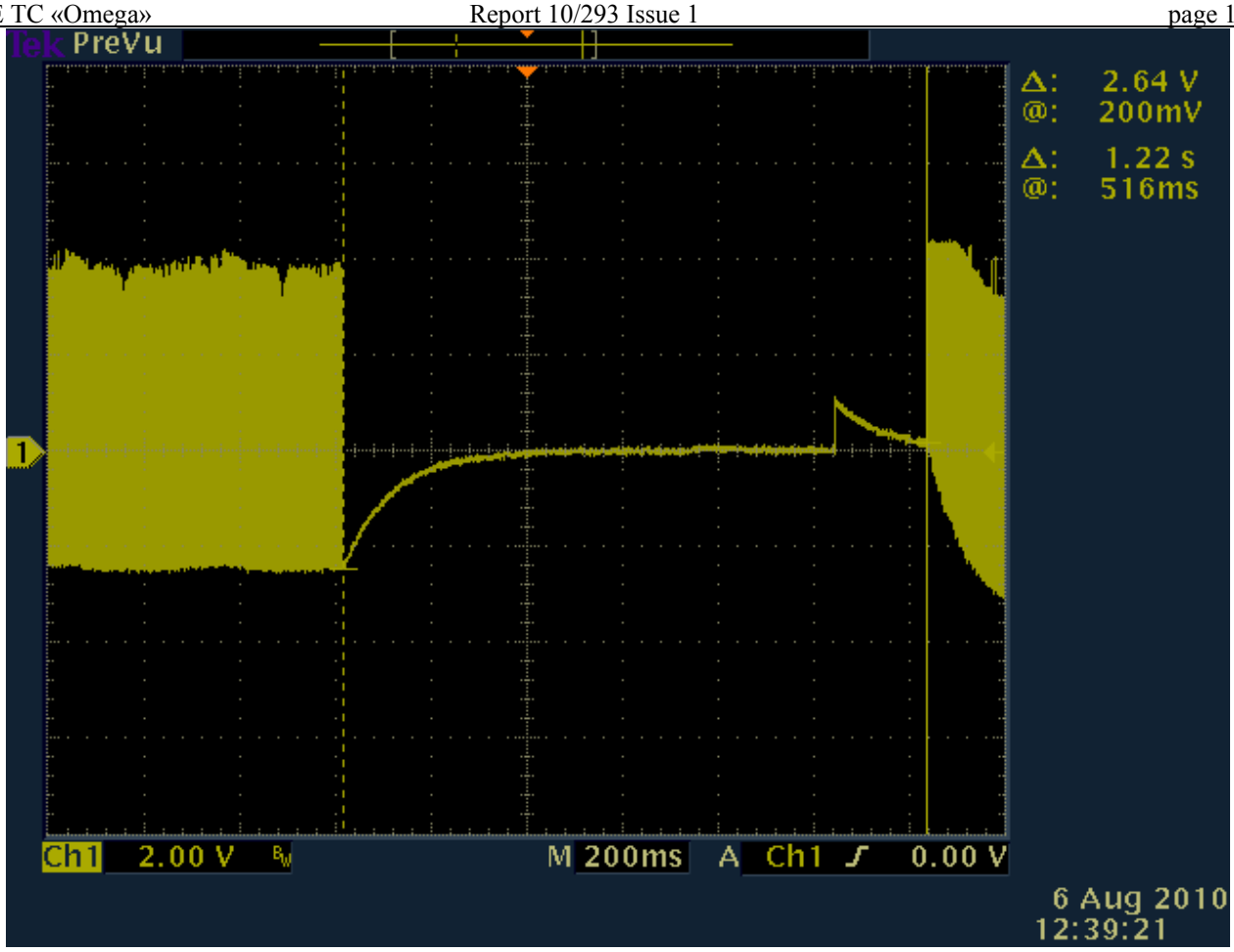

Figure 18.27 – Screenshot of Transmitter Duty Cycle Test Result at the ambient temperature

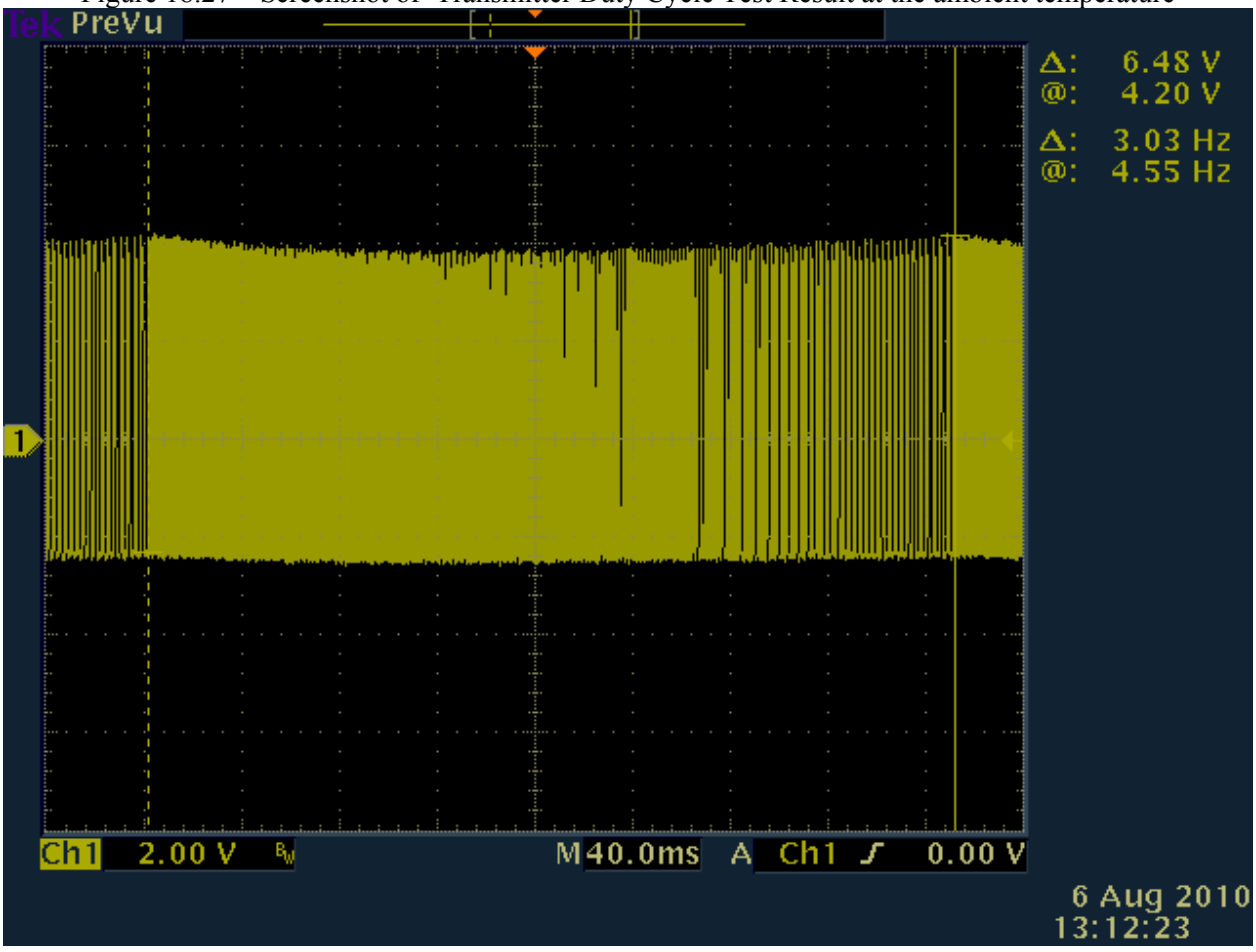

Figure 18.28 – Screenshot of Sweep repetition rate Test Result at the ambient temperature

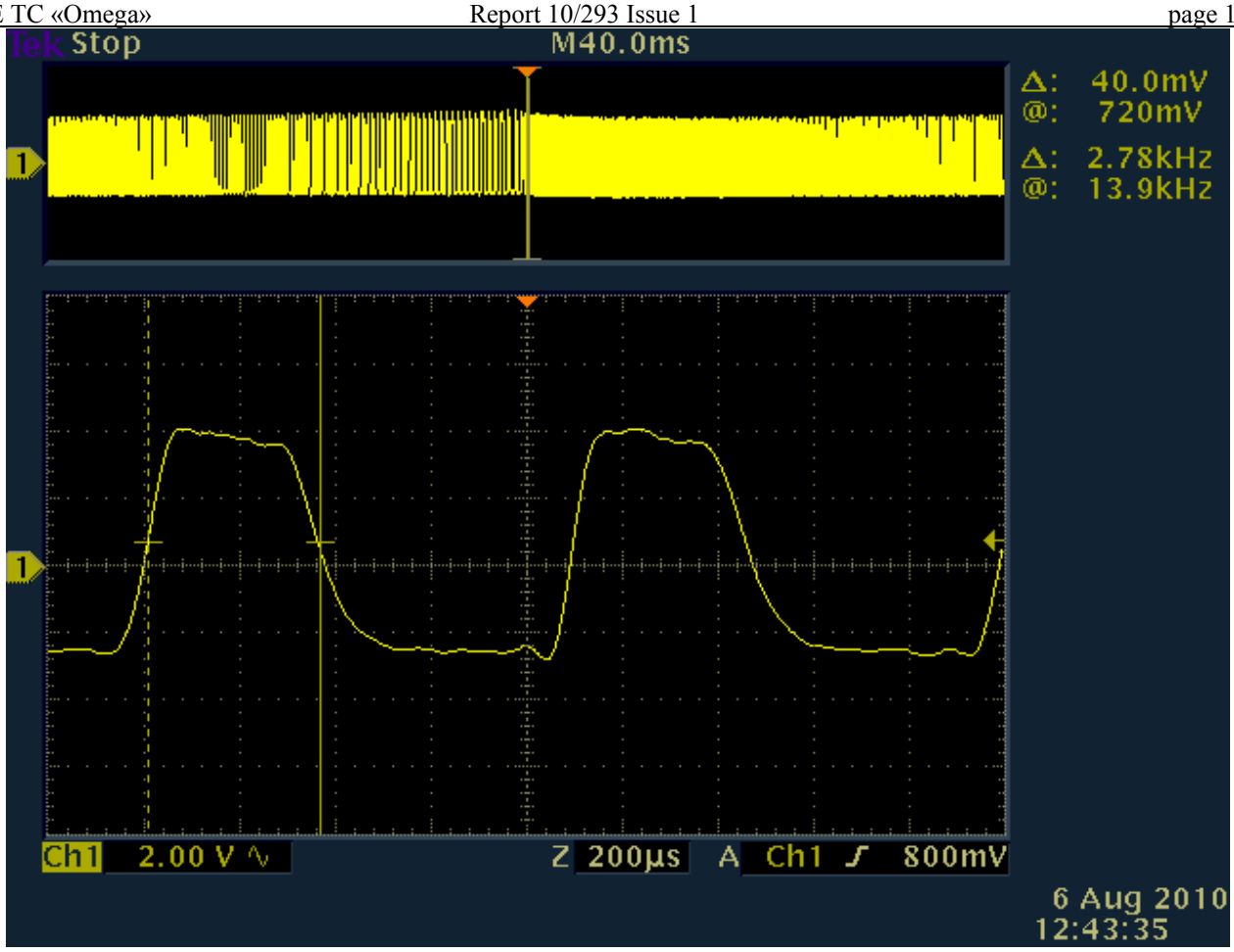

Figure 18.29 – Screenshot of Demodulation Waveform (A) measured near start of the modulation sweep period at the ambient temperature

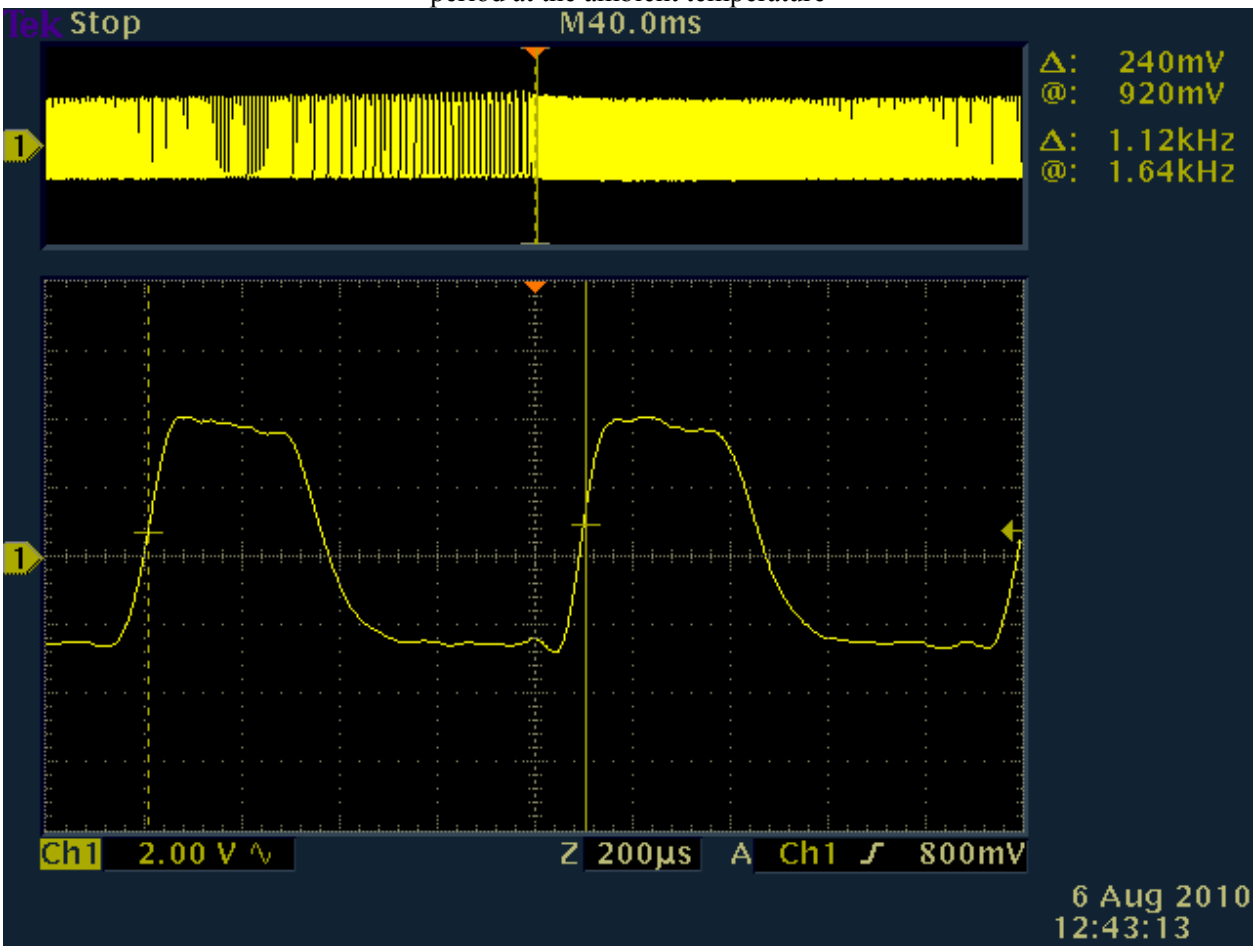

Figure 18.30 – Screenshot of High Sweep Frequency (B) Test Result measured start of the modulation sweep period at the ambient temperature

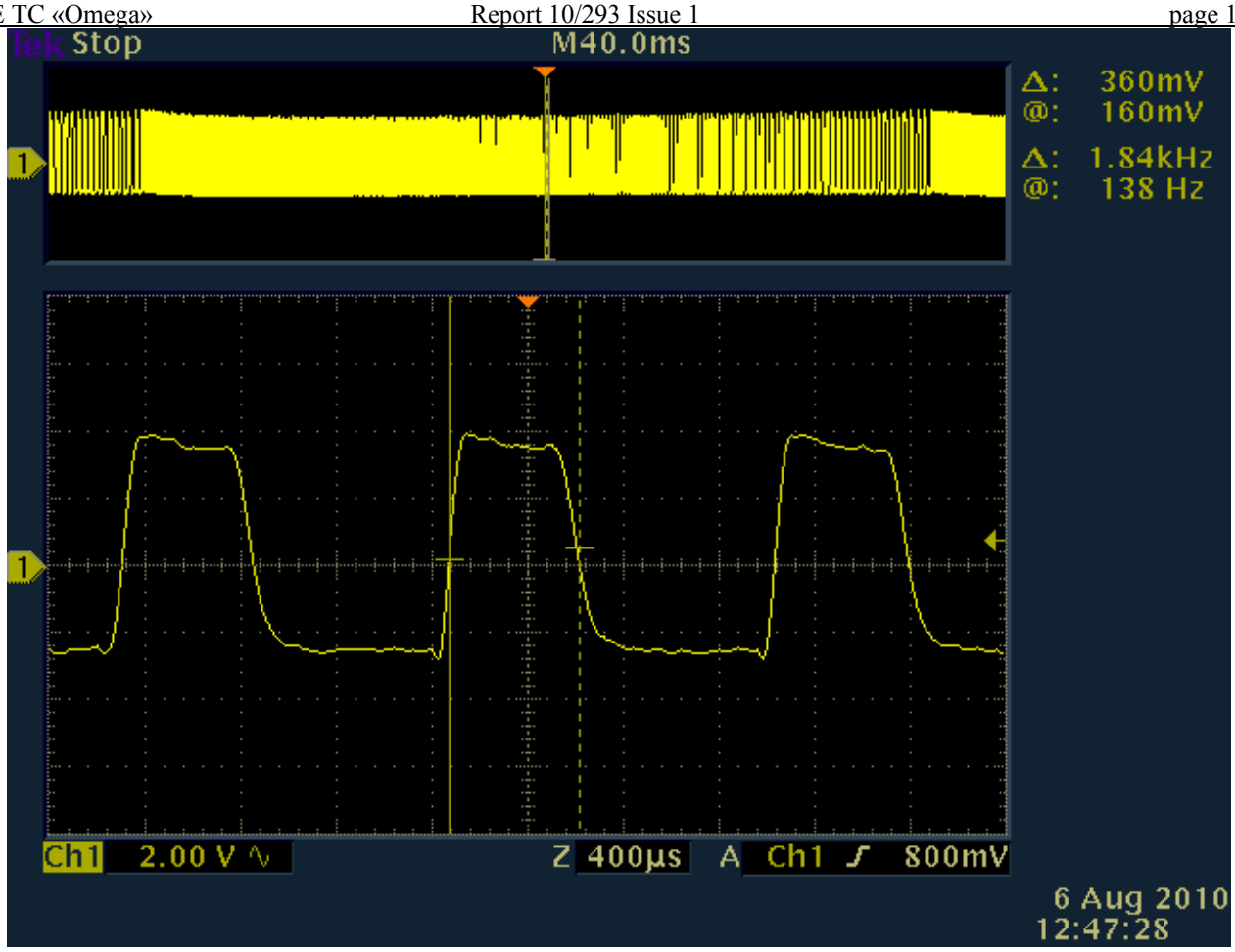

Figure 18.31 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the ambient temperature

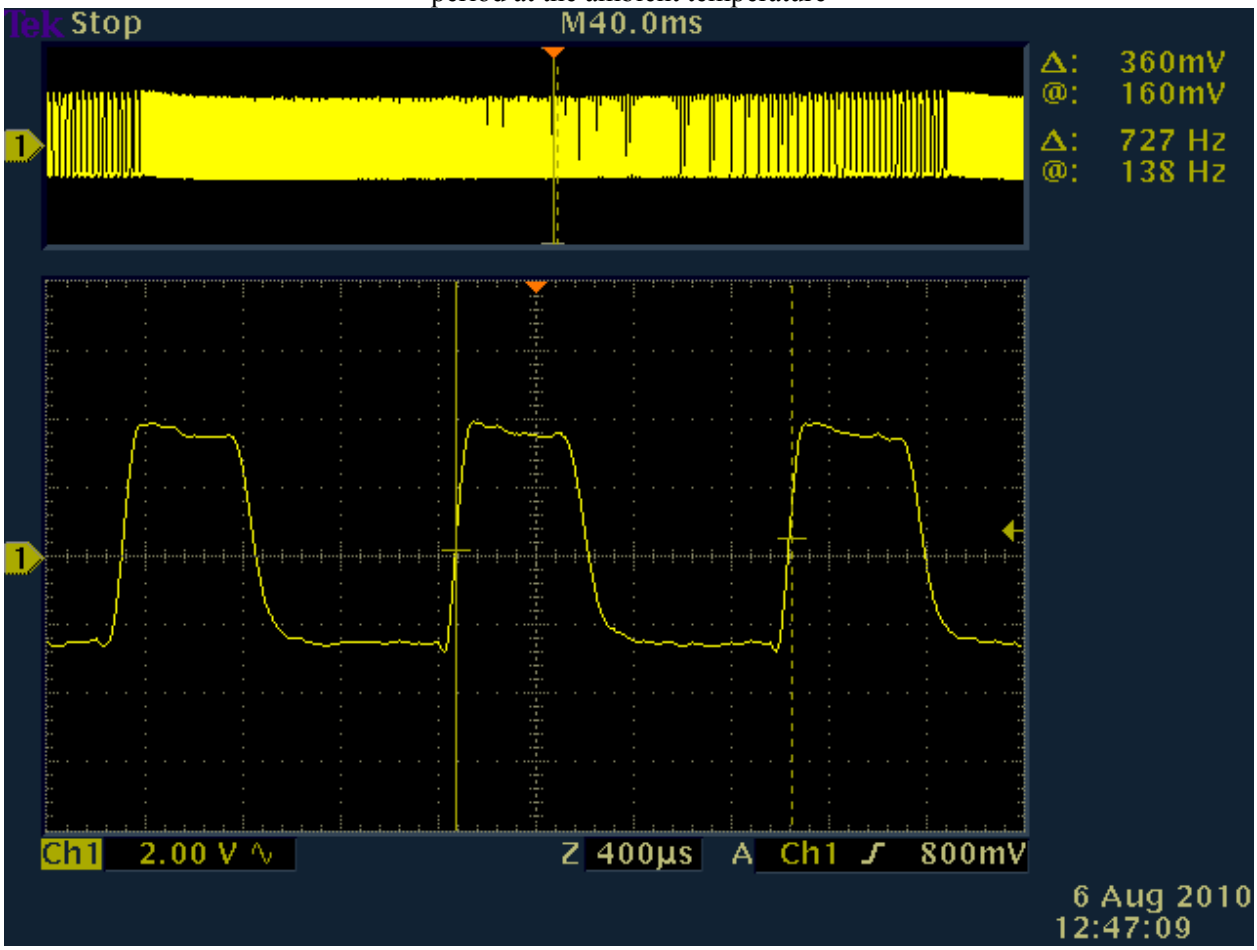

Figure 18.32 – Screenshot of Sweep Frequency (B) Test Result measured near midpoint of the modulation sweep period at the ambient temperature

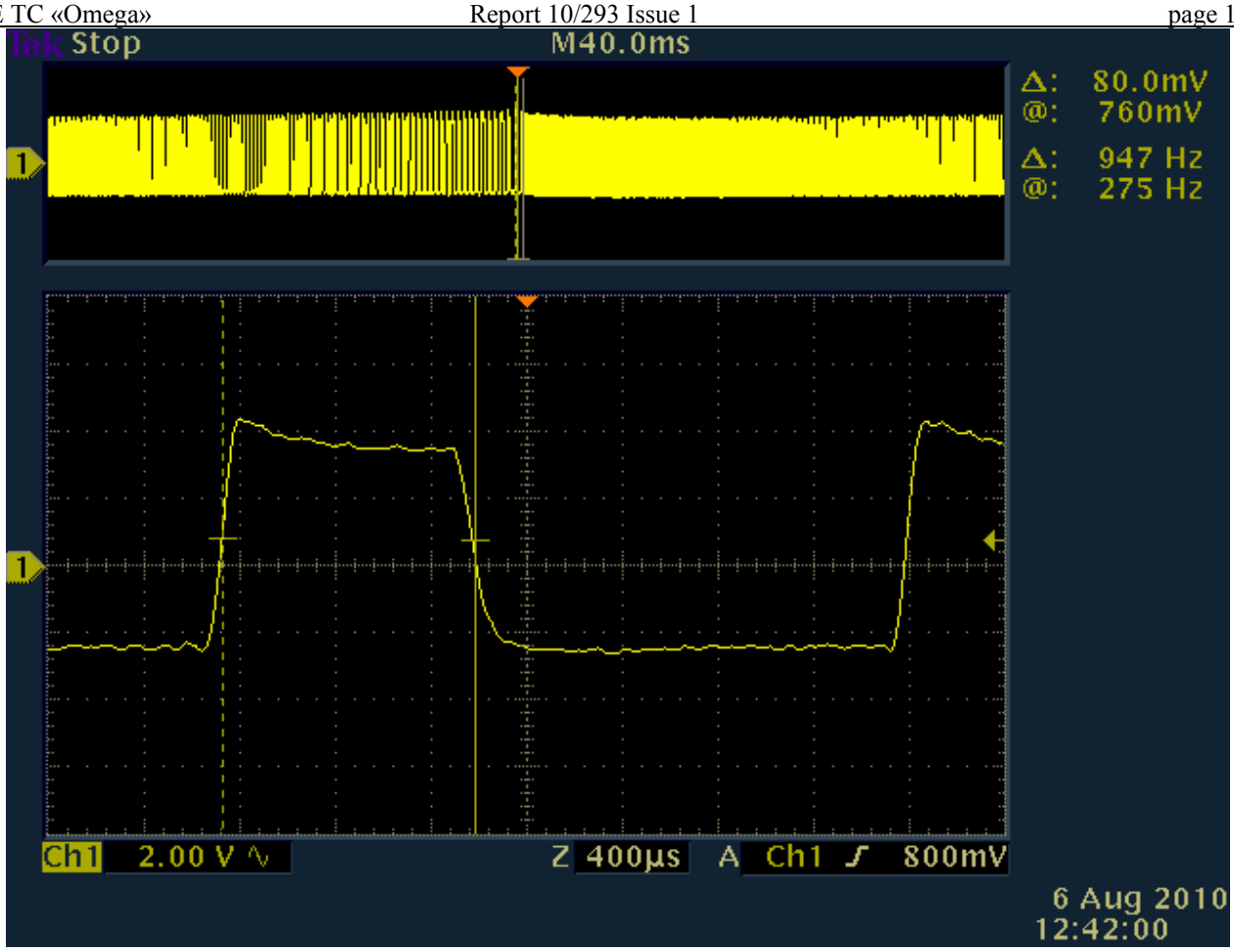

Figure 18.33 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the ambient temperature

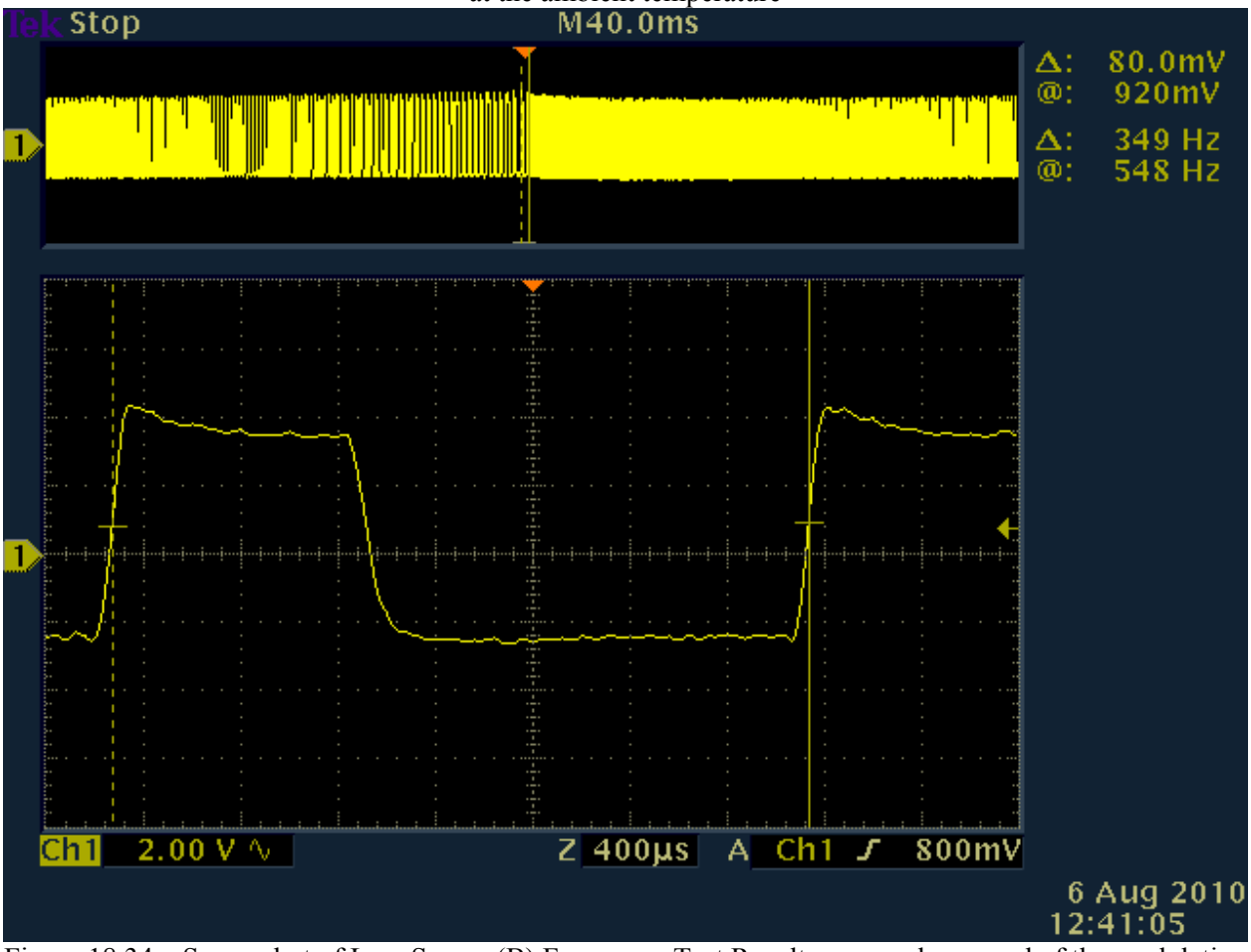

Figure 18.34 – Screenshot of Low Sweep (B) Frequency Test Result measured near end of the modulation sweep period at the ambient temperature

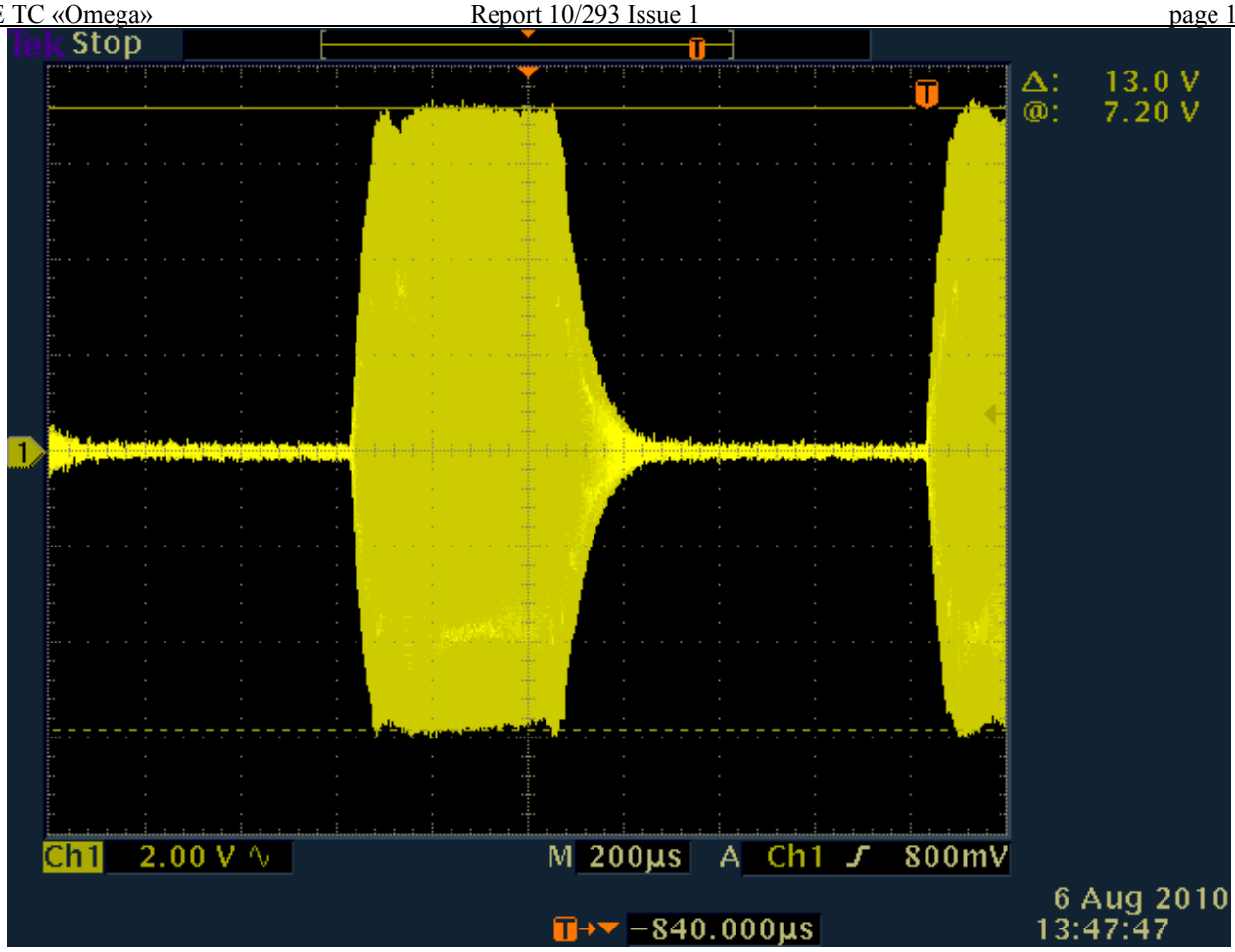

Figure 18.35 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the ambient temperature

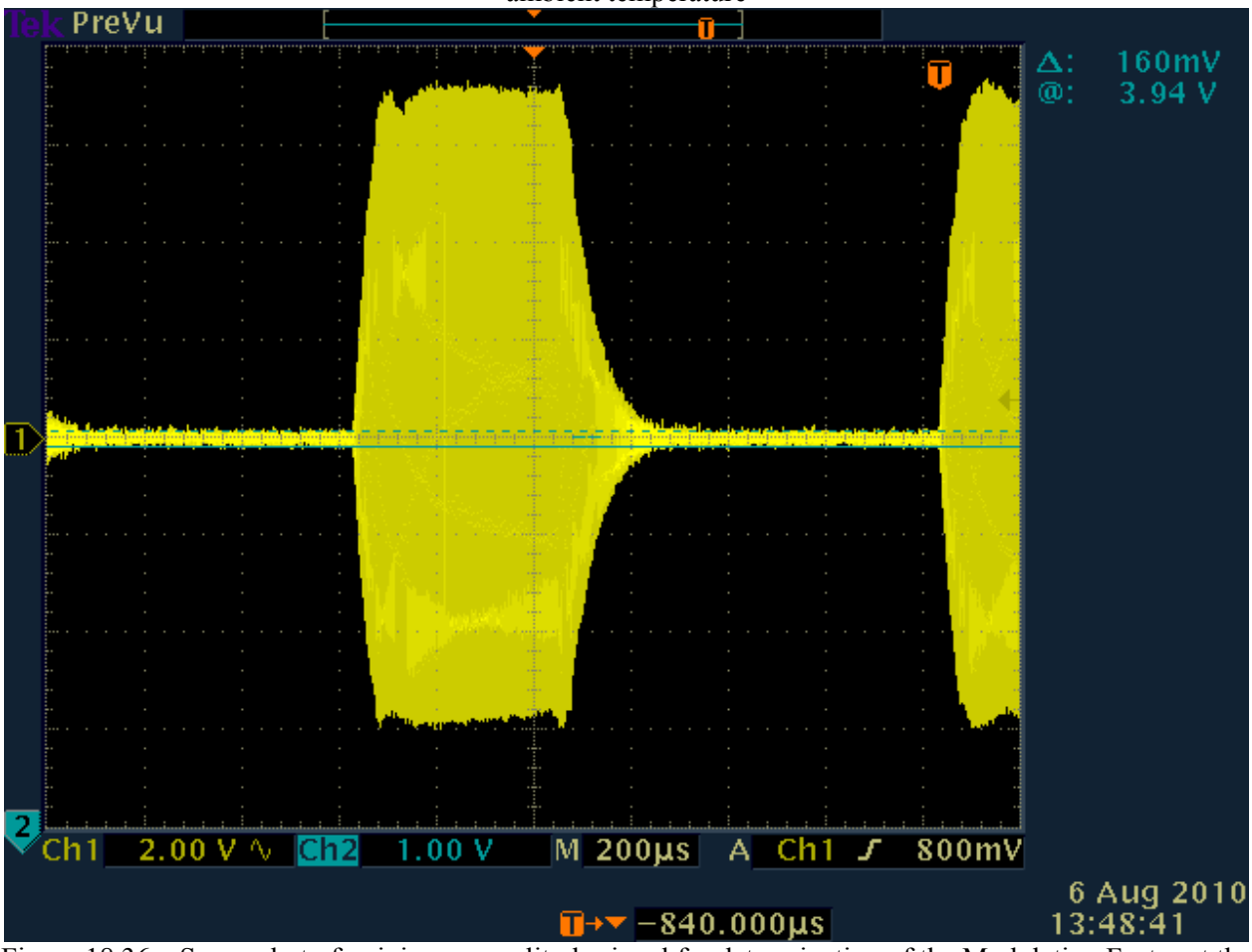

Figure 18.36 – Screenshot of minimum amplitude signal for determination of the Modulation Factor at the ambient temperature

Figure 18.37 – Site for EUT (EPIRB) before Test at the maximum operating temperature

Figure 18.38 – Site for Carrier Frequency Test at the maximum operating temperature

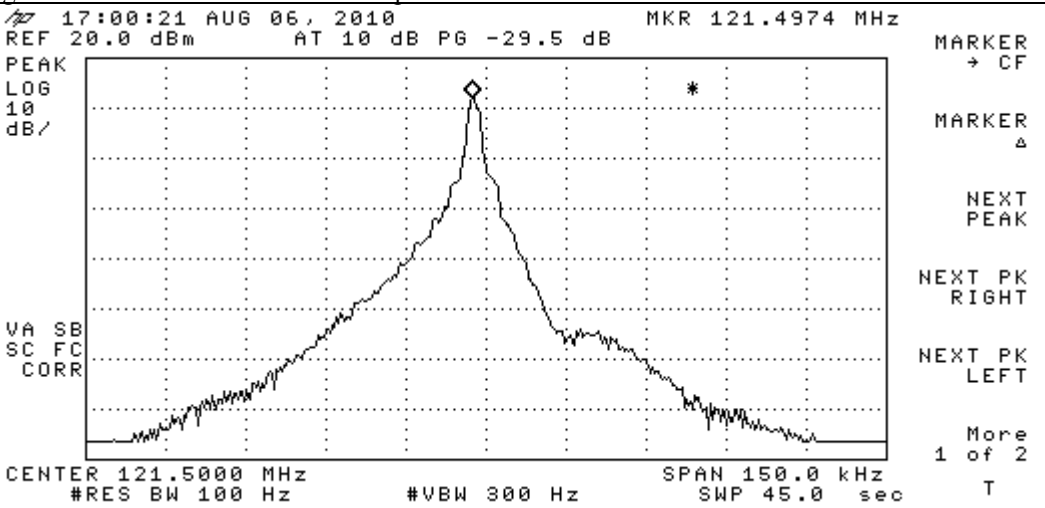

Figure 18.39 – Screenshot of Carrier Frequency Test Result at the maximum operating temperature

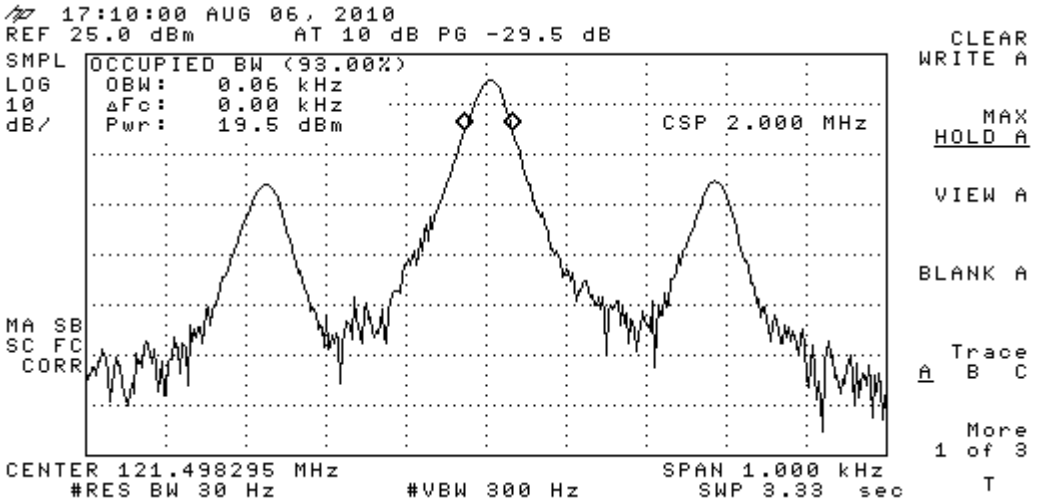

Figure 18.40 – Screenshot of Frequency Coherence Measurement Test Result (Total power emitted) at the maximum operating temperature

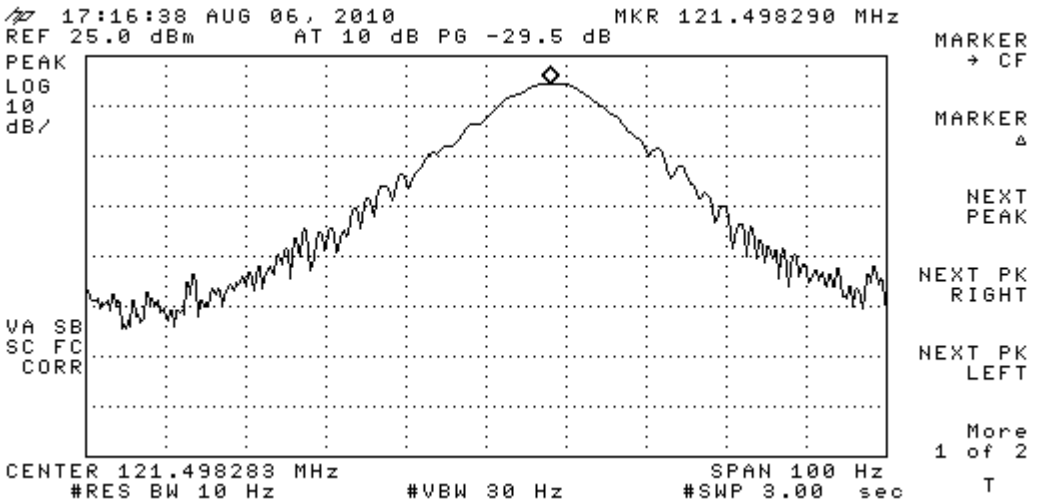

Figure 18.41 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the maximum operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst

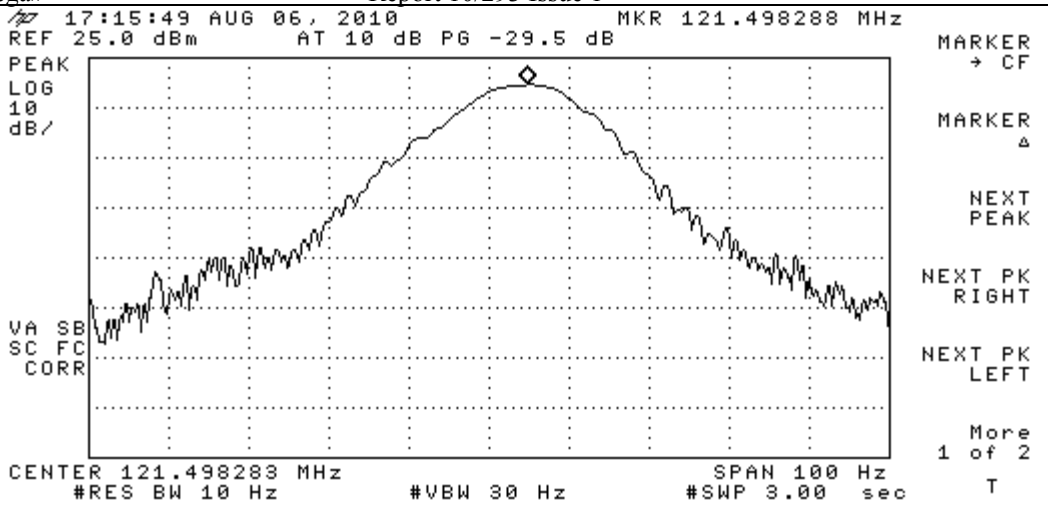

Figure 18.42 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the maximum operating temperature. Transmitted RF (121.5 MHz) after the interruption for the 406 MHz RF burst

Figure 18.43 – Site for Modulation Characteristic Measurement at the maximum operating temperature

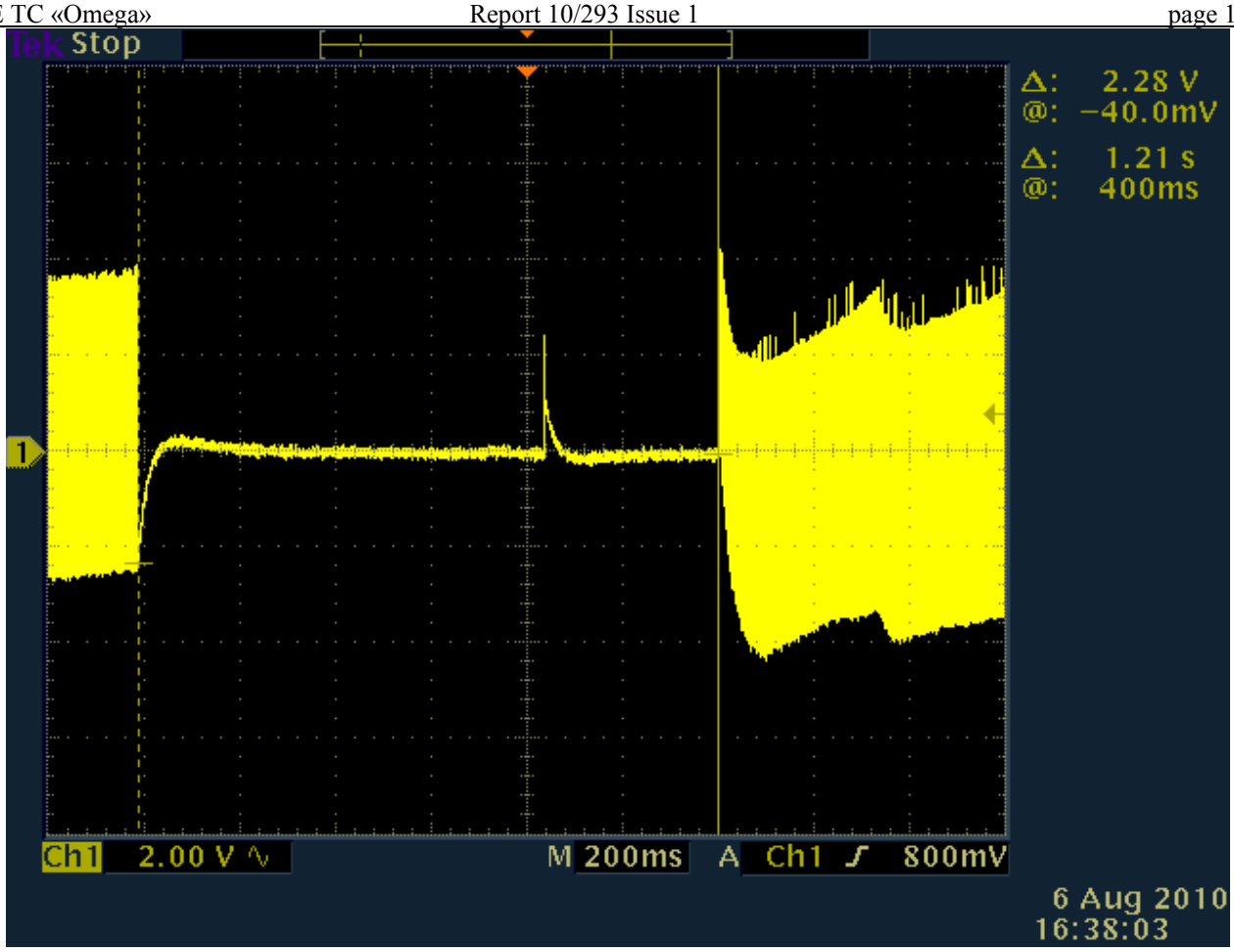

Figure 18.44 – Screenshot of Transmitter Duty Cycle Test Result at the maximum operating temperature

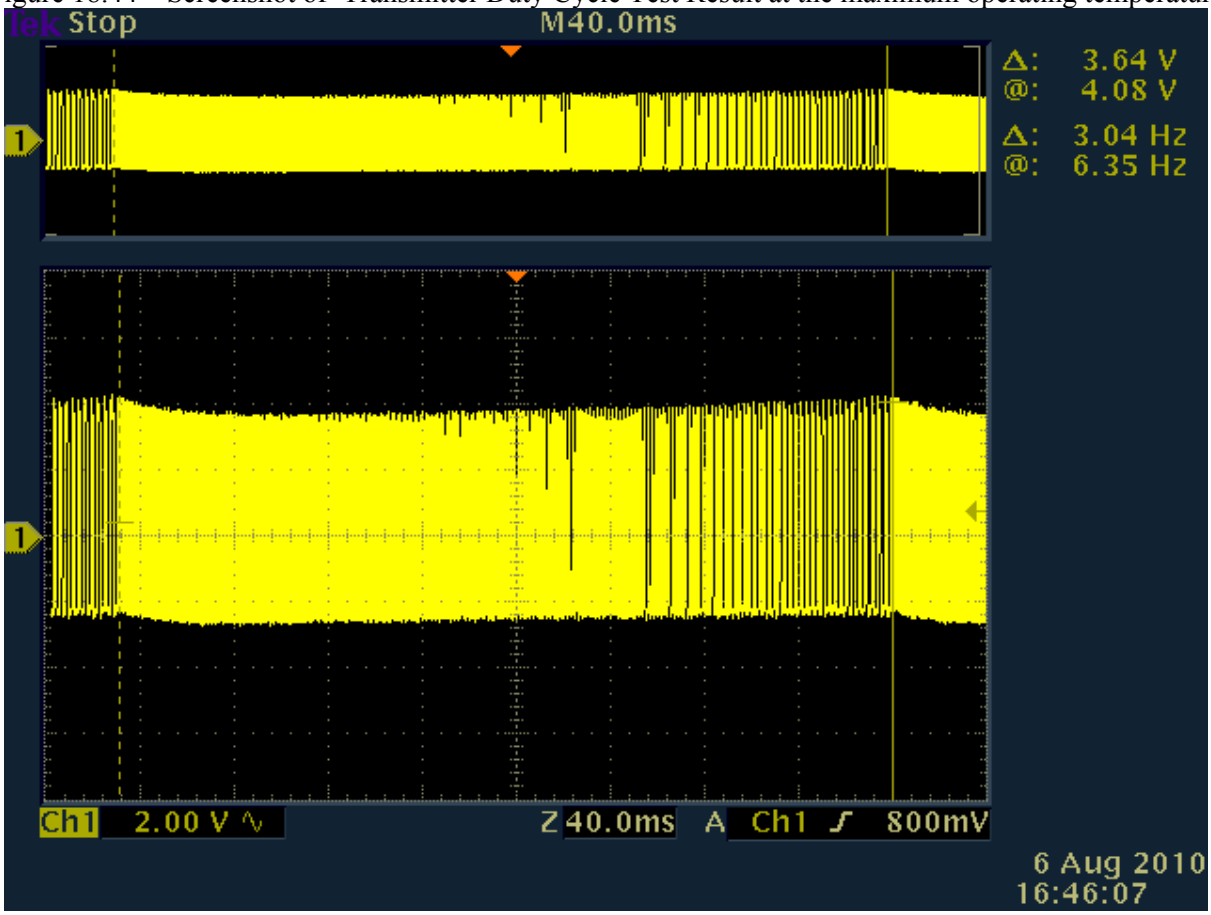

Figure 18.45 – Screenshot of Sweep repetition rate Test Result at the maximum operating temperature

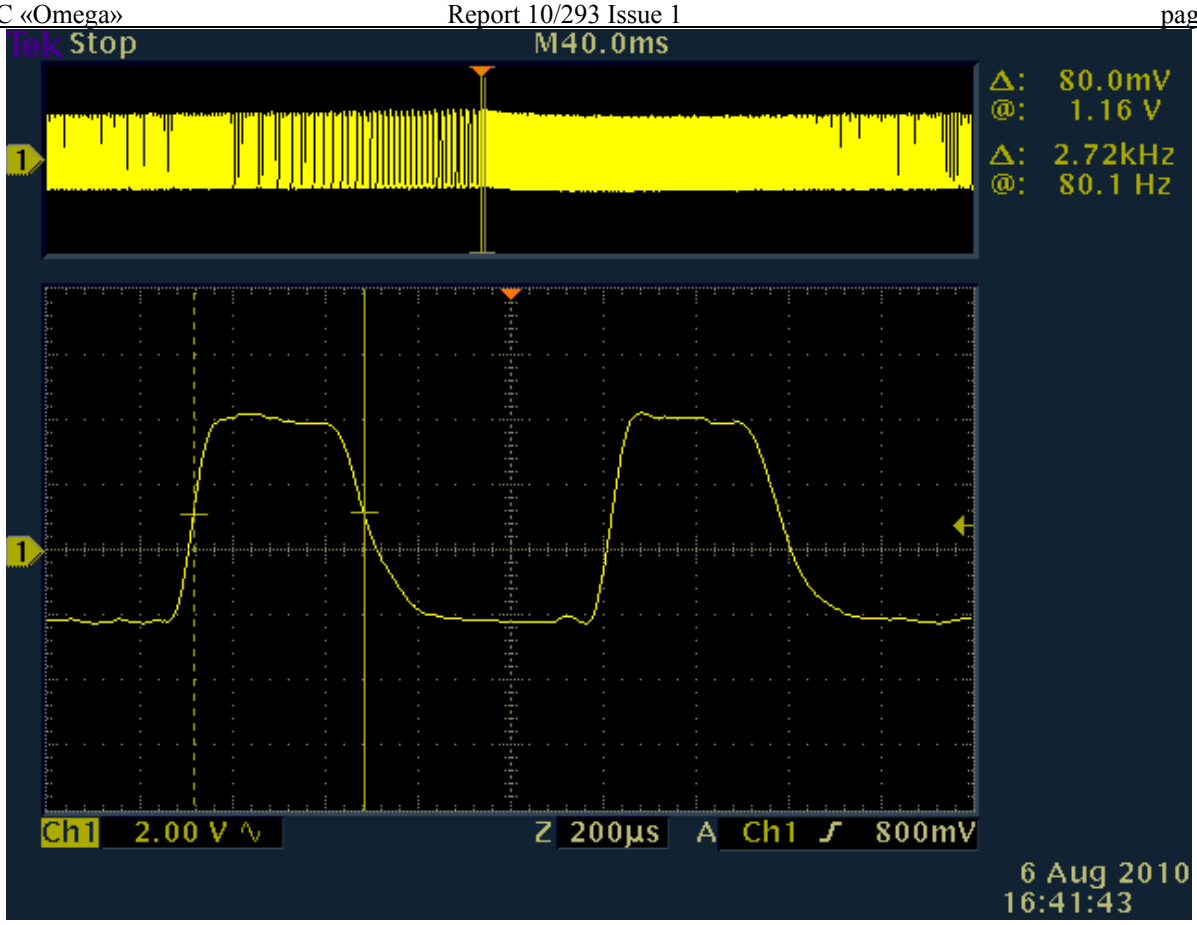

Figure 18.46 – Screenshot of Demodulation Waveform (A) measured near start of the modulation sweep period at the maximum operating temperature

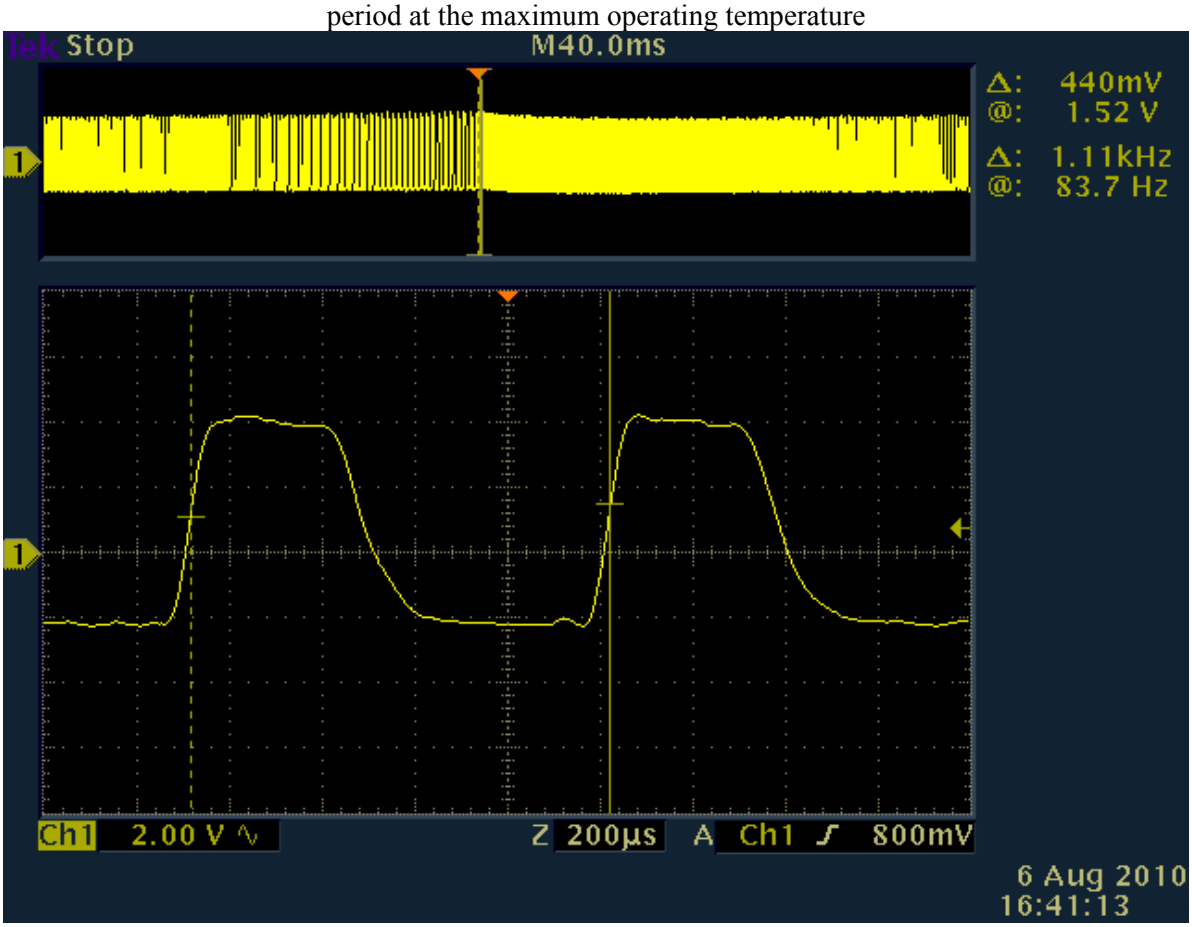

Figure 18.47 – Screenshot of High Sweep Frequency (B) Test Result measured near start of the modulation sweep period at the maximum operating temperature

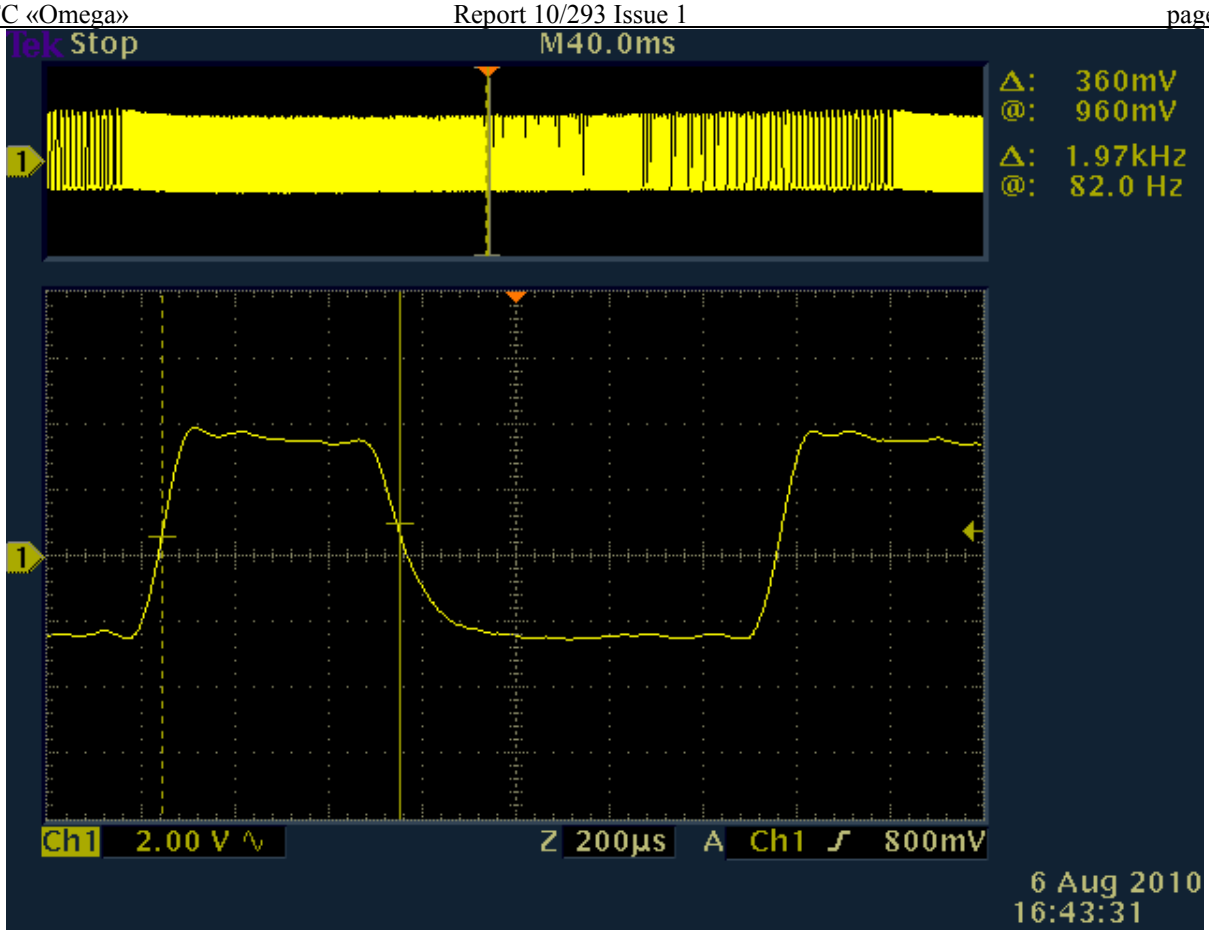

Figure 18.48 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the maximum operating temperature

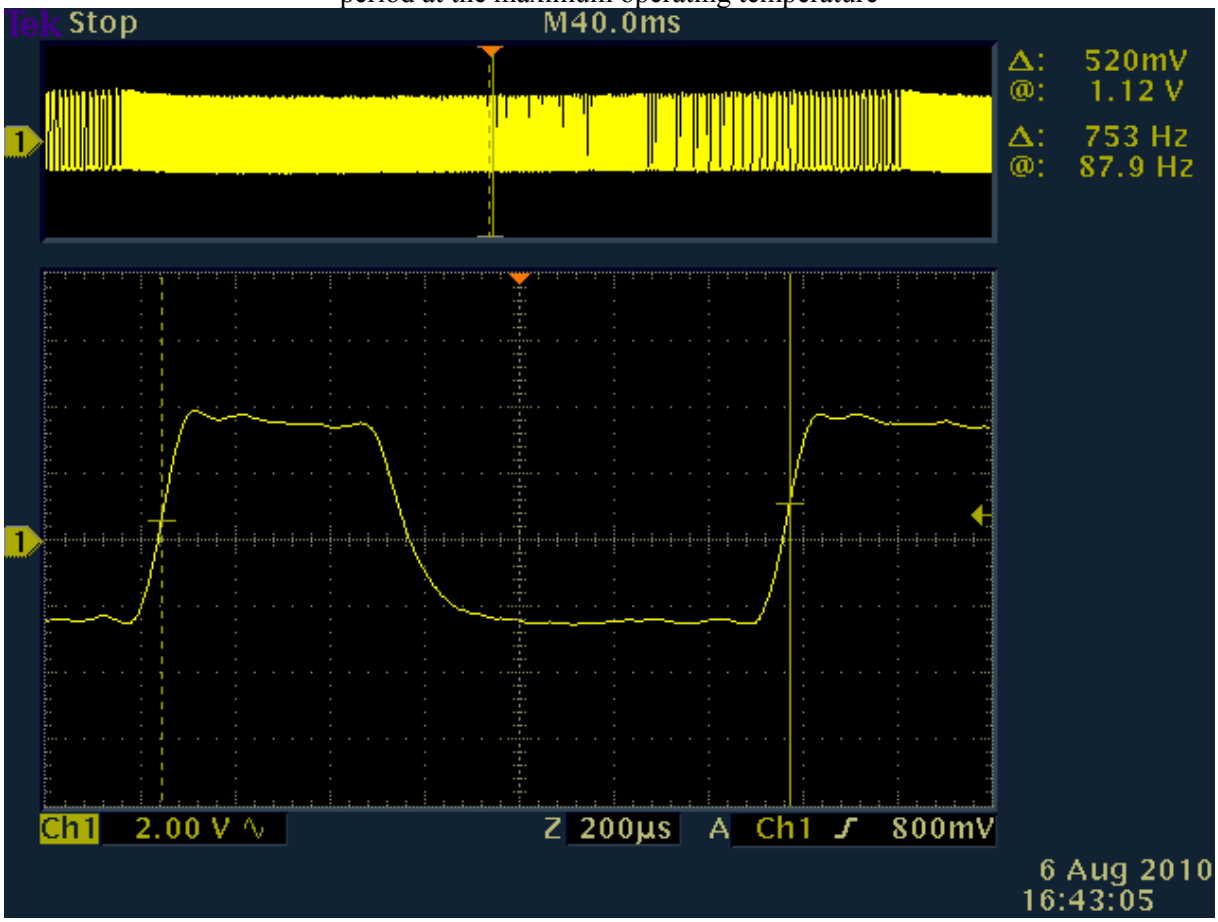

Figure 18.49 – Screenshot of Sweep Frequency (B) Test Result measured near midpoint of the modulation sweep period at the maximum operating temperature

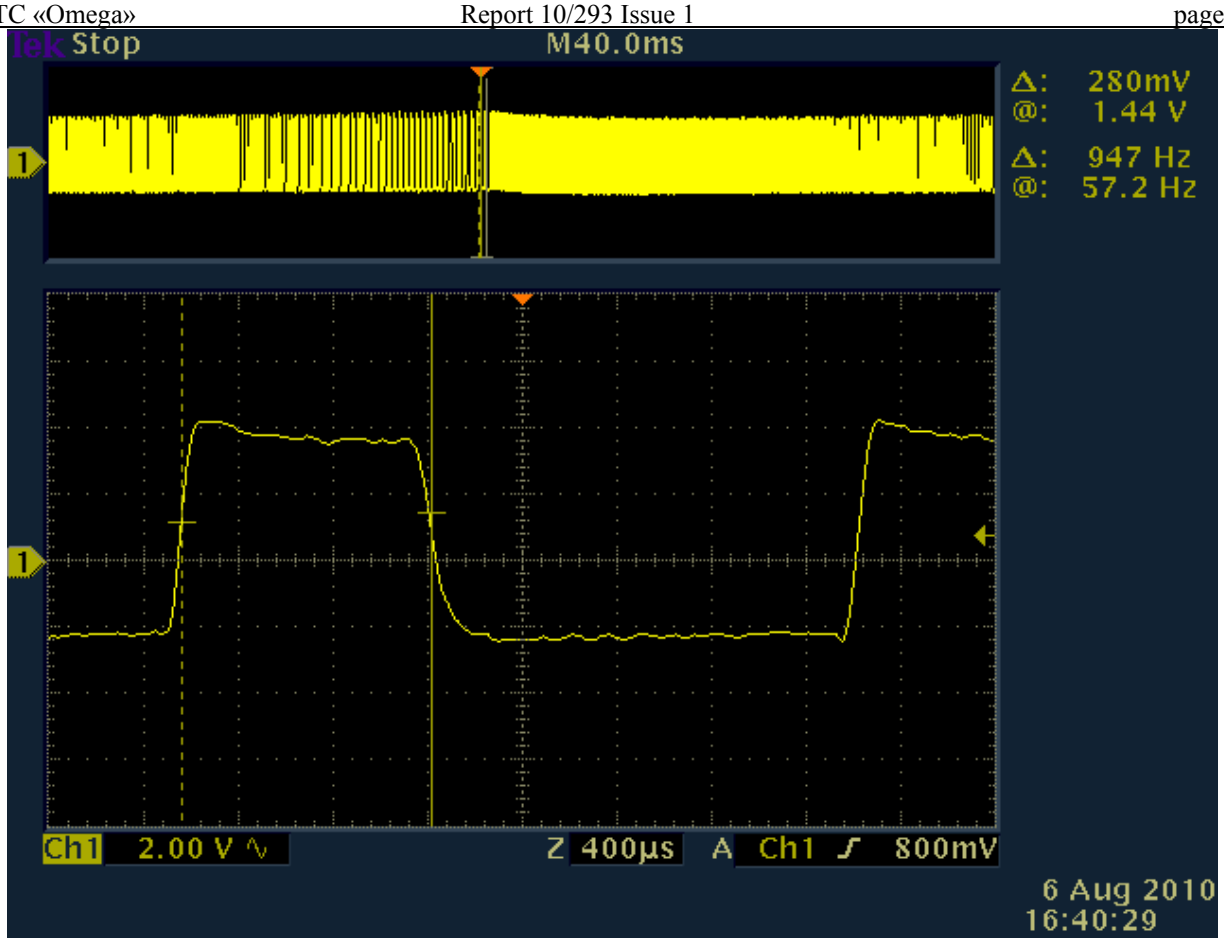

Figure 18.50 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the maximum operating temperature

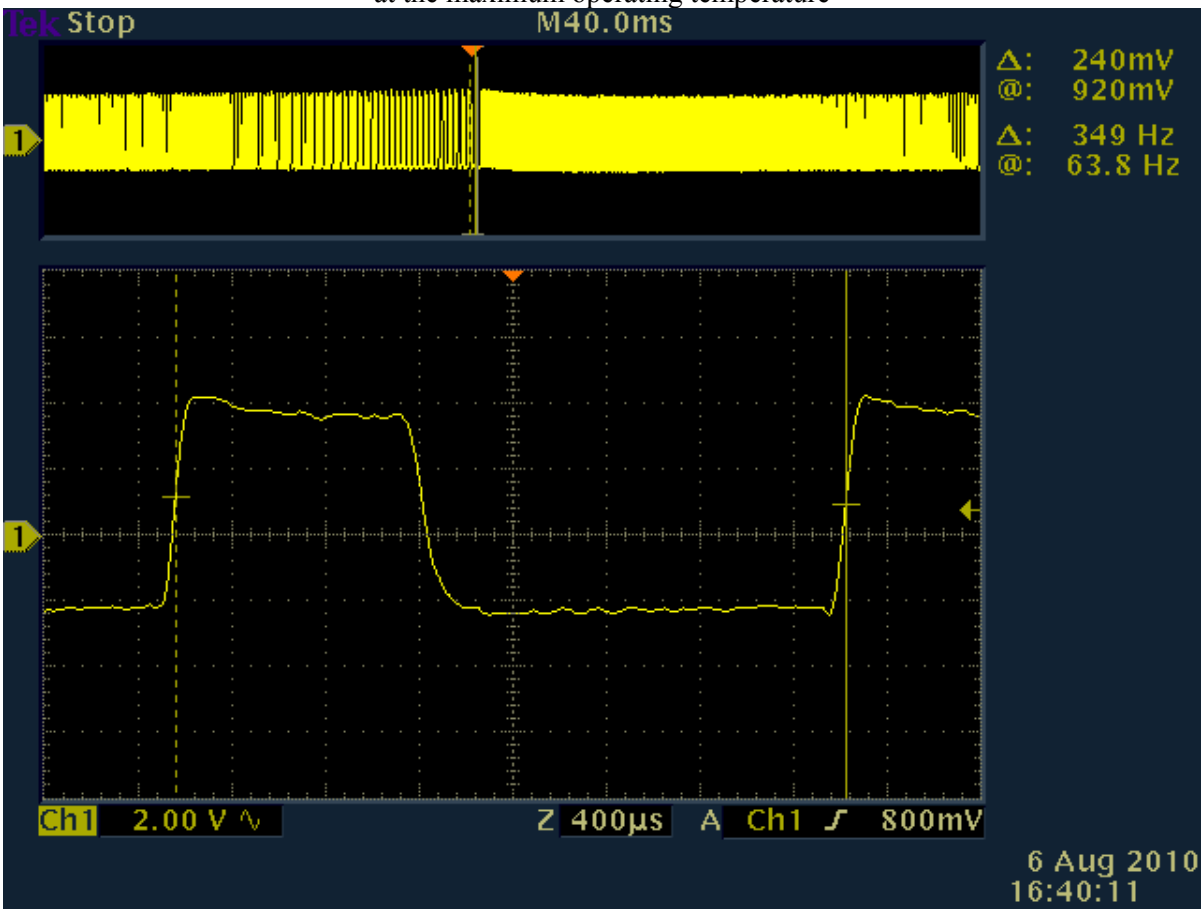

Figure 18.51 – Screenshot of Low Sweep (B) Frequency Test Result measured near end of the modulation sweep period at the maximum operating temperature

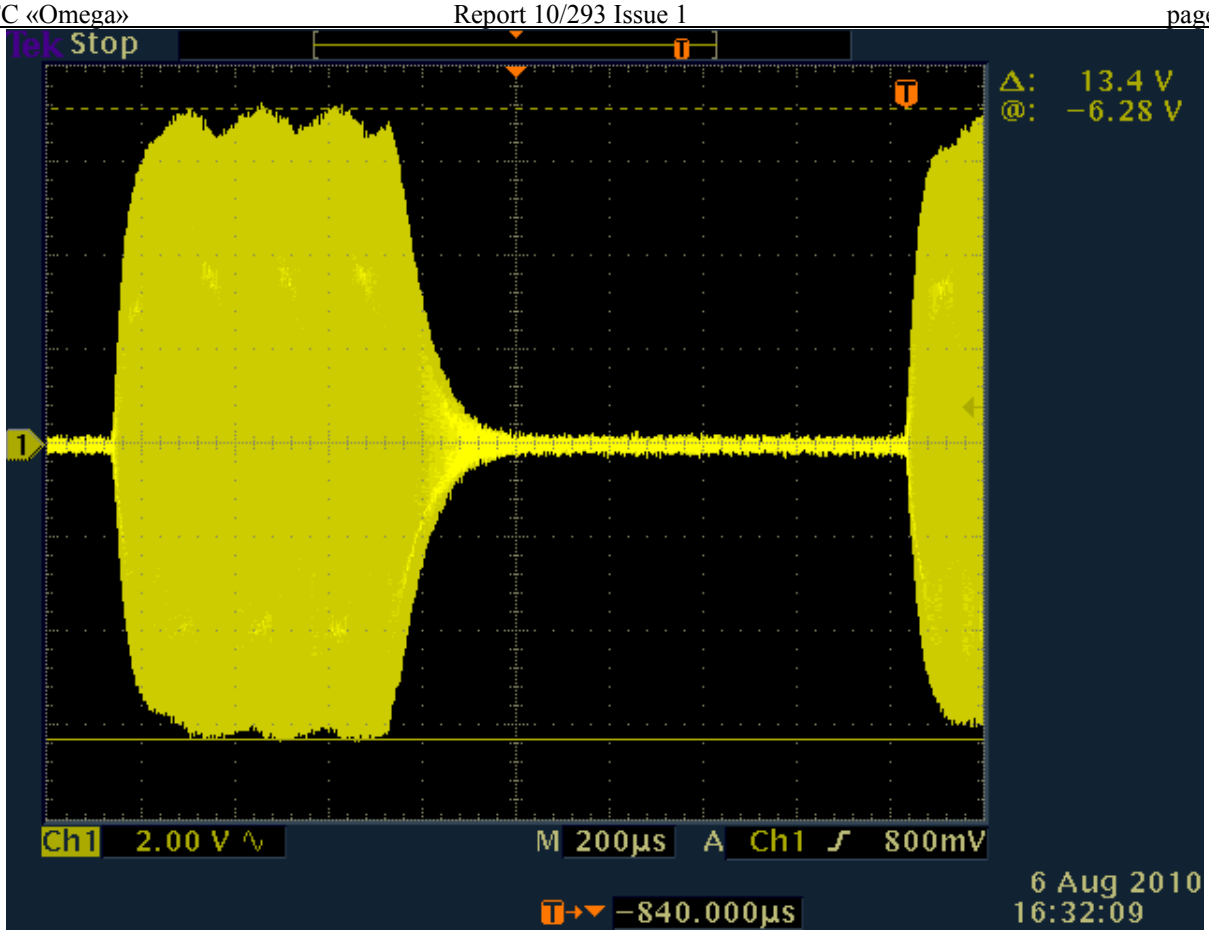

Figure 18.52 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the maximum operating temperature

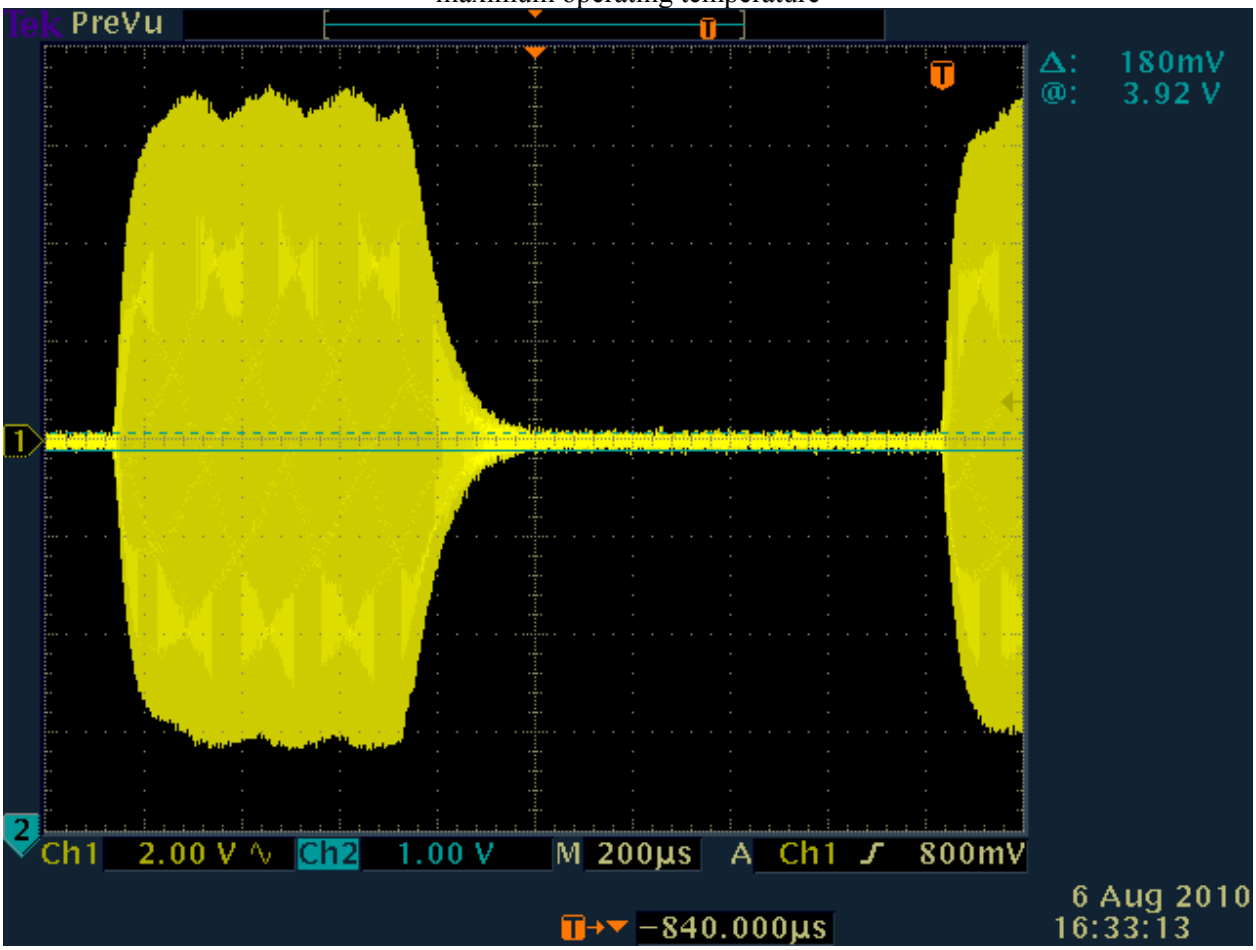

Figure 18.53 – Screenshot of minimum amplitude signal for determination of the Modulation Factor at the maximum operating temperature

Figure 18.54 – Site for Peak Effective Radiated Power Measurement

Test duration 0 h 0 m	Bursts received 0	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	406036.946	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.13	0.00
Phase time rise, mcs	50.00	250.00	0.00	151.66	0.00
Phase time fall, mcs	50.00	250.00	0.00	167.87	0.00
Power, Wt	3.16	7.94	0.00	6.48	0.00
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	0.00	399.99	0.00
Asymmetry, %	0.00	5.00	0.00	0.45	0.00
CW Preamble, ms	158.40	161.60	0.00	160.12	0.00
Total burst duration, ms	514.80	525.20	0.00	519.05	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	0.00	0.00	0.00
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	121500217	**Low Sweep Frequency, Hz**	351
Power, mW	92.2	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	825
Modulation Index, %	100		

Message	
Contents (full)	: FFFED0 8C96F9C0637FDFF992EF3 783E0F66C

Figure 18.55 – Results of EUT (EPIRB) Self Test (upon completion of the auxiliary radio-locating device transmitter test)

RESULTS OF PEAK EFFECTIVE RADIATED POWER MEASUREMENT (A17.3 RTCM 11000.2 Version 2.1):

	Elevation Angle: 20°				
Azimuth	P_{REC}, dBm	G_{REC}, dBm	L_C, dB	L_P, dB	*PEIRP*, W
0°	-21	1	2,2	34,67	0,0307
30°	-20,9	1	2,2	34,67	0,0314
60°	-21	1	2,2	34,67	0,0307
90°	-21	1	2,2	34,67	0,0307
120°	-21	1	2,2	34,67	0,0307
150°	-21	1	2,2	34,67	0,0307
180°	-20,9	1	2,2	34,67	0,0314
210°	-20,9	1	2,2	34,67	0,0314
240°	-20,8	1	2,2	34,67	0,0322
270°	-20,7	1	2,2	34,67	0,0329
300°	-20,6	1	2,2	34,67	0,0337
330°	-20,6	1	2,2	34,67	0,0337

FINAL RESULTS OF AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A7.0 RTCM 11000.2 Version 2.1):

Parameters To Be Measured During Tests	Range Of Specification	Units	Test Results			Comments
			$T_{min.}$ (-40 °C)	$T_{amb.}$ (20 °C)	$T_{max.}$ (+55 °C)	
Carrier Frequency	121.5 ± 0.006	MHz	121.4974	121.4978	121.4974	See fig. 18.6, 18.20, 18.35
PERP	14 – 20	dBm	-	15	-	
Modulation						
- Frequency	≥ 700 Hz within range of 300 – 1600 Hz	Hz	348 – 1100	349 – 1120	349 – 1110	See fig. 18.11, 18.22, 18.39
- Direction	Upward	√	√	√	√	
- Duty cycle	33 – 55	%	36.5 – 39.2	36.9 – 40.3	36.9 – 40.8	See fig. 18.10, 18.27, 18.44
- Factor	0.85 – 1.0	#	0.97	0.98	0.97	See fig. 18.18, 18.19, 18.35, 18.36, 18.52, 18.53
- Sweep repetition rate	2 – 4	Hz	3.03	3.03	3.04	See fig. 18.11, 18.28, 18.45
- Frequency Coherence (Total power emitted)	at least 30% of the total power emitted should be contained within ± 30 Hz of the carrier frequency	√	√	√	√	See fig. 18.7, 18.23, 18.40
- Frequency Coherence (Frequency Shift)	< ± 30 Hz	Hz	-5	1	-2	See fig. 18.8, 18.9, 18.24, 18.25, 18.41, 18.42
Antenna						
- Pattern	Omnidirection	√	√	√	√	
- Polarization	Vertical	√	√	√	√	
- VSWR	≤ 1.5:1	√	Not applicable	Not applicable	Not applicable	Antenna EPIRB not removable

Annex 19

HUMIDITY TEST (A 18.0 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): EPIRB SafeSea E100G class 2
Software release for EUT: issue 00.00.28
Sample No.1 Serial No 0001200014 I
Test Date: 08.10.2010
Test Conditions:

- Atmospheric pressure: 756 mm/Hg.
- Relative air humidity: 67 %.
- EUT were included
  the satellite EPIRB with its release mechanism (Category 1): NO
  the satellite EPIRB with its mounting device (Category 2): NO
- EPIRB was OFF during the test.
- EUT was set up in operational position.
- Test equipment:
  - Climatic chamber KPK-400.V, Feutron, DDR, Man.No15
  - Beacon tester BT-611 No 1005
- The humidity test was conducted with the modified housing (a hole was drilled through closure head) to expose the internal components to the humid test environment.
  The test chamber atmosphere was maintained at a relative humidity of at least 95 % and at a temperature of at least 40 °C for a period of at least 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 immediately.
  Fifteen minutes after application of power, the aliveness test was conducted.

- Test duration: 800 minutes.
- Measurement duration: 2 x 15 minutes.
- Step
  - No. 1 The EUT was switched to OFF and was placed in the climatic chamber.
  - No. 2 The chamber temperature was risen to 41 ºC and was allowed to stabilise the EUT at (41 ±0,4) ºC for two hours.
  - No. 3 The chamber conditions were adjusted to 41 °C, 96 % RH and were maintained for a period of 10 hours 20 minutes.
  - No. 4 The EUT was removed from the chamber into laboratory ambient conditions. The EUT was powered on immediately after being removed from the chamber.
  - No. 5 Fifteen minutes after application of power, the aliveness test was conducted..
  - No. 6 Aliveness Test: Carrier Frequency.
  - No. 7 Aliveness Test: Power Output.

Figure 19.1 - View of the EUT (EPIRB E100G class 2) before the humidity test

Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406036.000	406038.000	0.000	406036.961	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.08	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.08	0.00
Phase time rise, mcs	50.00	250.00	0.00	141.17	0.00
Phase time fall, mcs	50.00	250.00	0.00	155.46	0.00
Power, Wt	3.16	7.94	0.00	6.52	0.00
Power rise, ms	0.00	0.00	0.00	0.55	0.00
Bit Rate, bps	396.00	404.00	0.00	400.05	0.00
Asymmetry, %	0.00	5.00	0.00	0.46	0.00
CW Preamble, ms	158.40	161.60	0.00	160.11	0.00
Total burst duration, ms	514.80	525.20	0.00	519.10	0.00
Repetition period, s	47.50	52.50	0.00	0.00	0.00
Delta Rep. period, s		>4.00	0.00	0.00	0.00
Slope(E-9)	-1.00	1.00	0.000	0.000	0.000
Residual variations (E-9)	0.00	3.00	0.000	0.000	0.000
Short term variations (E-9)	0.00	2.00	0.000	0.000	0.000

121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121499589	**Low Sweep Frequency, Hz**	345
Power, mW	89.5	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 19.2 - Results of the EUT (EPIRB E100G class 2) Aliveness Test (before the humidity test)

Figure 19.3 – Test Set-up

Figure 19.4 – View of the EUT (EPIRB E100G class 2) upon completion of the humidity test

Test duration 0 h 24 m	Bursts received 20	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406036.000	406038.000	406036.934	406036.941	406036.941
+Phase deviation, rad	1.00	1.20	1.07	1.08	1.09
-Phase deviation, rad	-1.00	-1.20	-1.09	-1.09	-1.11
Phase time rise, mcs	50.00	250.00	139.72	142.78	144.62
Phase time fall, mcs	50.00	250.00	152.87	156.02	159.66
Power, Wt	3.16	7.94	6.14	6.14	6.26
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	399.88	400.01	400.03
Asymmetry, %	0.00	5.00	0.31	0.44	0.44
CW Preamble, ms	158.40	161.60	160.10	160.11	160.12
Total burst duration, ms	514.80	525.20	519.10	519.15	519.15
Repetition period, s	47.50	52.50	47.51	50.41	52.51
Delta Rep. period, s		>4.00	4.50	4.55	5.00
Slope(E-9)	-1.00	1.00	0.078	0.229	0.446
Residual variations (E-9)	0.00	3.00	0.899	1.899	2.122
Short term variations (E-9)	0.00	2.00	0.054	0.069	0.071

121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121499261	**Low Sweep Frequency, Hz**	345
Power, mW	89.7	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 783E0F66C

Figure 19.5 – Results of the EUT (EPIRB E100G class 2) Aliveness Test (upon completion of the humidity test)

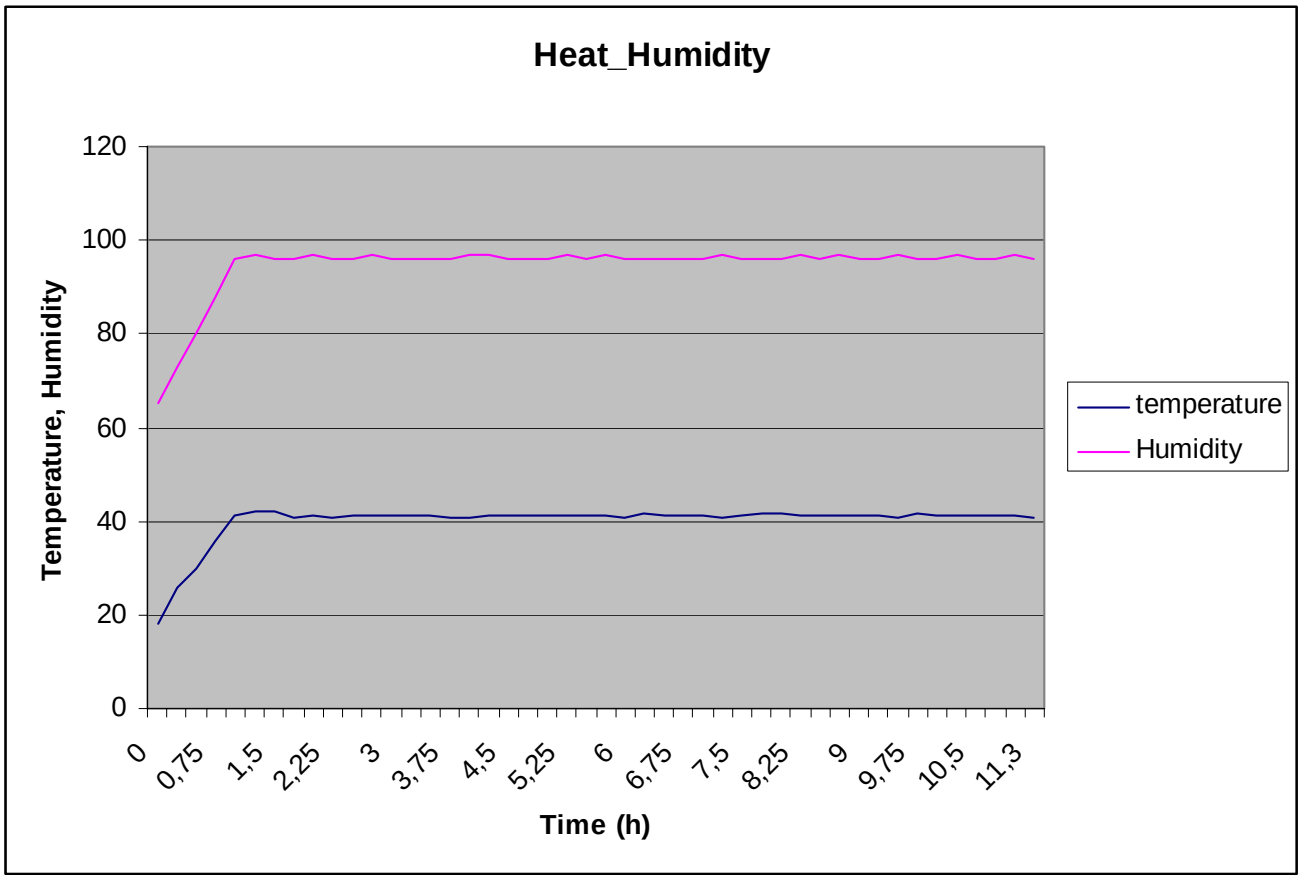

Figure 19.6 – Heat-Humidity Test Conditions Plot

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Aliveness Test:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.036934– 406.036941	PASS
- Power Output	35 - 39	dBm	37.88 – 37.97	PASS

CRITERIA OF COMPLIANCE HUMIDITY TEST (A18.0 RTCM 11000.2 Version 2.1):
successful aliveness test conducted.

Annex 20

ORIENTATION TEST (A19.0 RTCM 11000.2 Version 2.1)

Equipment Under Test (EUT): EPIRB SafeSea E100G class 2
Software release for EUT: issue 00.00.28
Sample No.1 Serial No 0001200014 I
Test Date: 05.11.2010
Test Conditions:
– Atmospheric pressure: 759mm/Hg.
– Relative air humidity: 65%.
– EPIRB is ON during the test.
– Test equipment:
- Beacon tester BT-611 No 1005

– Test duration is 15+2x3=21 minutes.

– Step
No. 1 The EUT activated and positioned vertically
No. 2 After 15 minutes, the aliveness test was performed.
No. 3 The EUT was placed in a horizontal position.
No. 4 After 2 minutes, the aliveness test was performed.
No. 5 The EUT was placed in a upside down position.
No. 6 After 2 minutes, the aliveness test was performed.
No. 7 The EUT was returned to its initial upright position
No. 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.

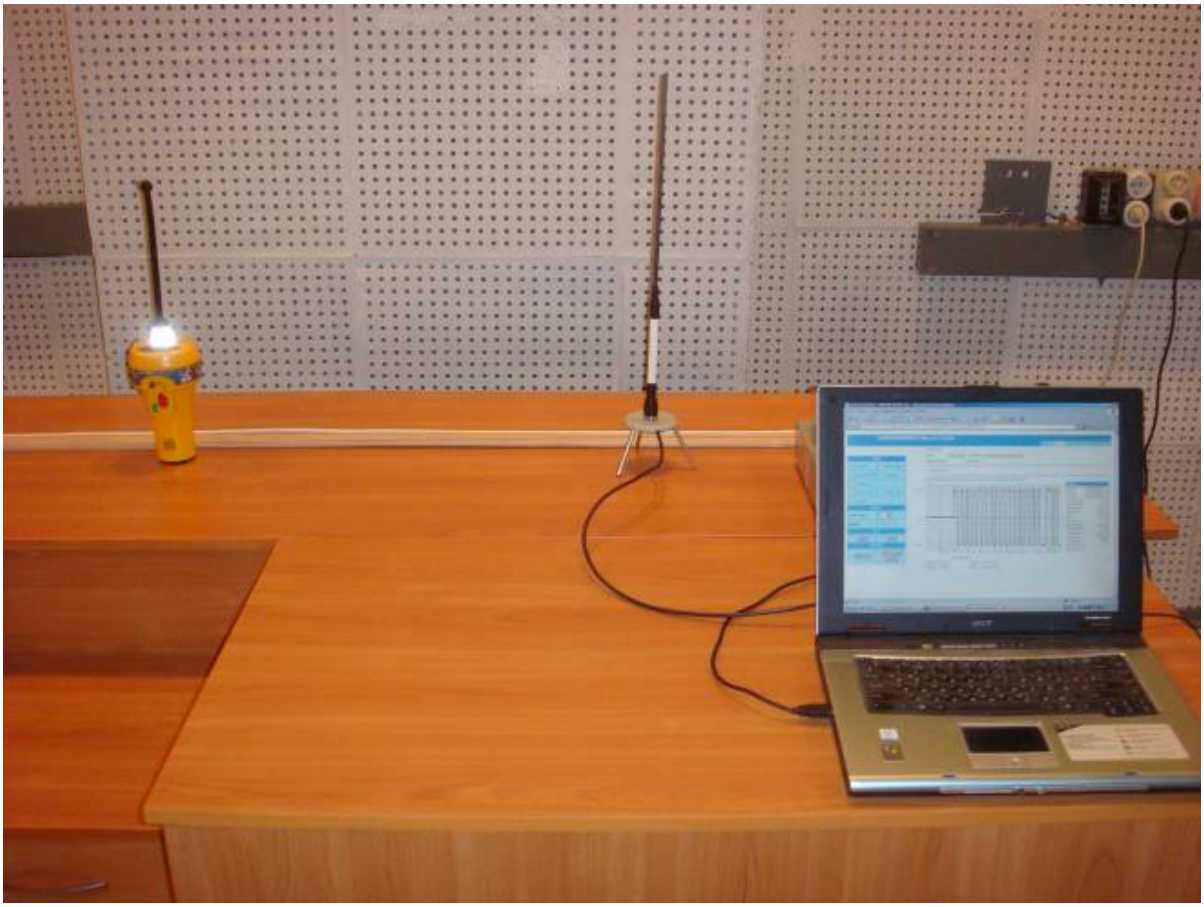

Figure 20.1 – View of the EUT (EPIRB E100G class 2) before orientation test

Figure 20.2 – View of the EUT (EPIRB E100G class 2) in a horizontal position.

Figure 20.3 – View of the EUT (EPIRB E100G class 2) in a upside down position.

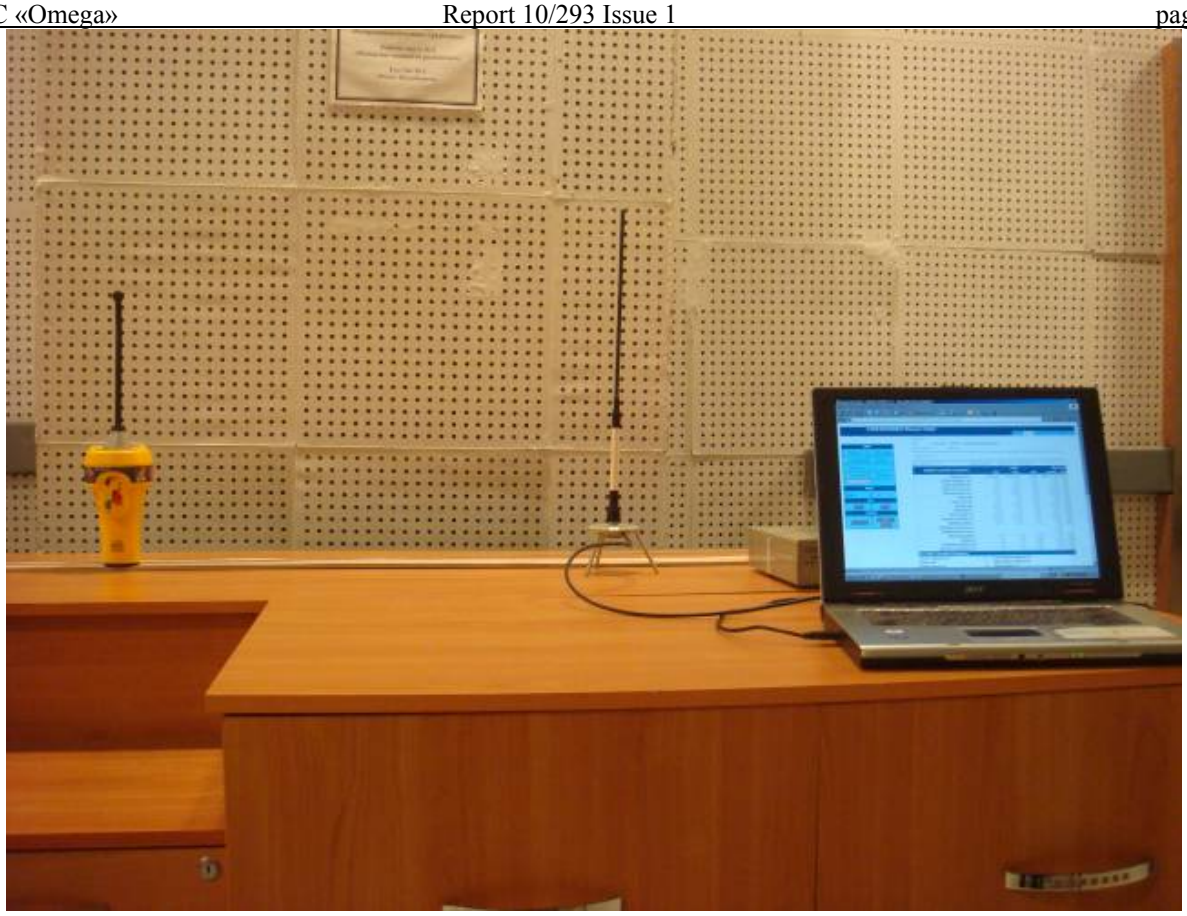

Figure 20.4 - View of the EUT (EPIRB E100G class 2) in a initial upright position

Test duration 0 h 0 m	Bursts received 2	BCH error 0	Self-Test 2		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	40600.000	40600.000	0.000	406036.922	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.09	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.13	0.00
Phase time rise, mcs	50.00	250.00	0.00	151.44	0.00
Phase time fall, mcs	50.00	250.00	0.00	163.64	0.00
Power, Wt	3.16	7.94	0.00	5.97	0.00
Power rise, ms	0.00	0.00	0.00	0.40	0.00
Bit Rate, bps	396.00	404.00	0.00	399.97	0.00
Asymmetry, %	0.00	5.00	0.00	0.37	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	520.16	0.00
Repetition period, s	47.50	52.50	0.00	50.59	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	121499967	**Low Sweep Frequency, Hz**	345
Power, mW	89.8	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 683E0F00E

Figure 20.5 – Detailed measurement results of EUT on step No.2 (EPIRB E100G class 2) upon completion of the orientation test

Test duration 0 h 0 m	Bursts received 2	BCH error 0	Self-Test 2		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	40600.000	40600.000	0.000	406036.856	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.10	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.12	0.00
Phase time rise, mcs	50.00	250.00	0.00	150.86	0.00
Phase time fall, mcs	50.00	250.00	0.00	163.83	0.00
Power, Wt	3.16	7.94	0.00	5.91	0.00
Power rise, ms	0.00	0.00	0.00	0.70	0.00
Bit Rate, bps	396.00	404.00	0.00	400.01	0.00
Asymmetry, %	0.00	5.00	0.00	0.39	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	518.70	0.00
Repetition period, s	47.50	52.50	0.00	48.81	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	121500019	**Low Sweep Frequency, Hz**	345
Power, mW	89.3	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 683E0F00E

Figure 20.6 – Detailed measurement results of EUT on step No.4 (EPIRB E100G class 2) upon completion of the orientation test

Test duration 0 h 0 m	Bursts received 2	BCH error 0	Self-Test 2		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	40600.000	40600.000	0.000	406036.853	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.09	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.13	0.00
Phase time rise, mcs	50.00	250.00	0.00	151.27	0.00
Phase time fall, mcs	50.00	250.00	0.00	159.15	0.00
Power, Wt	3.16	7.94	0.00	5.86	0.00
Power rise, ms	0.00	0.00	0.00	0.50	0.00
Bit Rate, bps	396.00	404.00	0.00	400.02	0.00
Asymmetry, %	0.00	5.00	0.00	0.39	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	520.53	0.00
Repetition period, s	47.50	52.50	0.00	50.53	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	121500043	**Low Sweep Frequency, Hz**	345
Power, mW	88.9	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 683E0F00E

Figure 20.7 – Detailed measurement results of EUT on step No.6 (EPIRB E100G class 2) upon completion of the orientation test

Test duration 0 h 0 m	Bursts received 2	BCH error 0	Self-Test 2		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	40600.000	40600.000	0.000	406036.849	0.000
+Phase deviation, rad	1.00	1.20	0.00	1.11	0.00
-Phase deviation, rad	-1.00	-1.20	0.00	-1.11	0.00
Phase time rise, mcs	50.00	250.00	0.00	148.84	0.00
Phase time fall, mcs	50.00	250.00	0.00	164.02	0.00
Power, Wt	3.16	7.94	0.00	6.01	0.00
Power rise, ms	0.00	0.00	0.00	0.45	0.00
Bit Rate, bps	396.00	404.00	0.00	400.04	0.00
Asymmetry, %	0.00	5.00	0.00	0.62	0.00
CW Preamble, ms	158.40	161.60	0.00	160.10	0.00
Total burst duration, ms	435.60	444.40	0.00	520.99	0.00
Repetition period, s	47.50	52.50	0.00	47.78	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	121499991	**Low Sweep Frequency, Hz**	345
Power, mW	89.4	**High Sweep Frequency, Hz**	1176
Sweep Period, sec	0.3	**Sweep Range, Hz**	831
Modulation Index, %	100		

Message	
Contents (full)	:FFFED0 8C92F423F07FDFFB2BF03 683E0F00E

Figure 20.8 – Detailed measurement results of EUT on step No.8 (EPIRB E100G class 2) upon completion of the orientation test

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. Step No. 2:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.036922	PASS
- Power Output	35 – 39	dBm	37.76	PASS
• Aliveness Test. Step No. 4:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.036856	PASS
- Power Output	35 – 39	dBm	37.72	PASS
• Aliveness Test. Step No. 6:				
- Carrier Frequency	406.037 ± 0.001	MHz	406.036853	PASS
- Power Output	35 – 39	dBm	37.68	PASS
• Aliveness Test. Step No. 8:				
- Carrier Frequency	406.037 ± 0.001	MHz	406036.849	PASS
- Power Output	35 - 39	dBm	37.79	PASS
• Operation of the strobe light	uninterrupted operation	-	uninterrupted operation	PASS
• Operation of the auxiliary radio-locating transmitter	uninterrupted operation	-	uninterrupted operation	PASS

CRITERIA OF COMPLIANCE ORIENTATION TEST (A19.0 RTCM 11000.2 Version 2.1):

1) uninterrupted operation of the strobe light and auxiliary radio-locating transmitter throughout the test

2) successful aliveness test conducted.