Figure 9.1 – View of the EUT in the water during the Leakage Test

Figure 9.2 – View of immersion test site (Manometer of immersion test site indicates 1 bar)

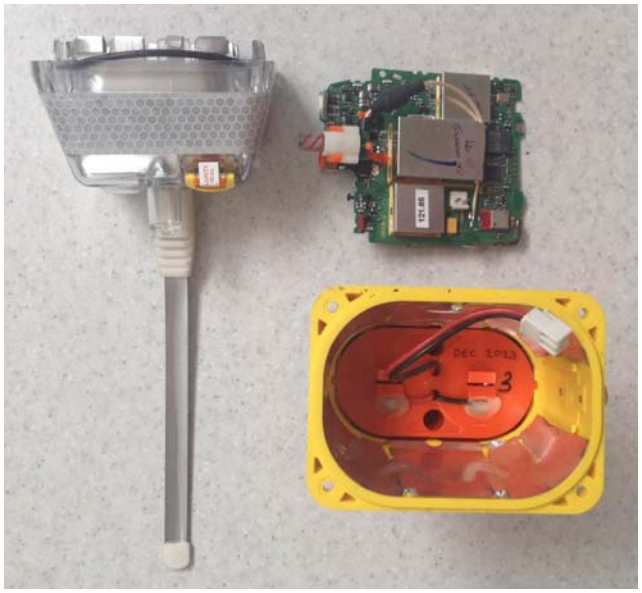


Figure 9.3 – View of the EUT upon completion of the Leakage test

Figure 9.4 – The PCB after leakage and immersion tests. There is no water ingress.

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.0400196	PASS
- Power Output	35 - 39	dBm	36.33	PASS
- Digital message		√	√	PASS
• Interior Inspection	No water	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
2.	Climatic chamber	KPK 400V	015	08.2016
3.	Temperature meter	gradient 2002	078	01.2017
4.	Hygrometer digital	HP 22-A	60974546	09.2016
5.	Beacon tester	BT100AVS	2315	07.2016
6.	Beacon tester	BT-611	1005	11.2016
7.	Spectrum analyzer	FSH8	105763	09.2016
8.	Tuned dipole antenna	FCC-4	587A	09.2016
9.	Set of immersion	-	102070	08.2017

ANNEX 10.
SPURIOUS EMISSIONS TEST (A10.0)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 17.05.2016
Test Conditions:

- Ambient temperature 21.6 °C
- Relative humidity: 52 %
- Atmospheric pressure: 755 mm/Hg

TEST DESCRIPTION

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

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

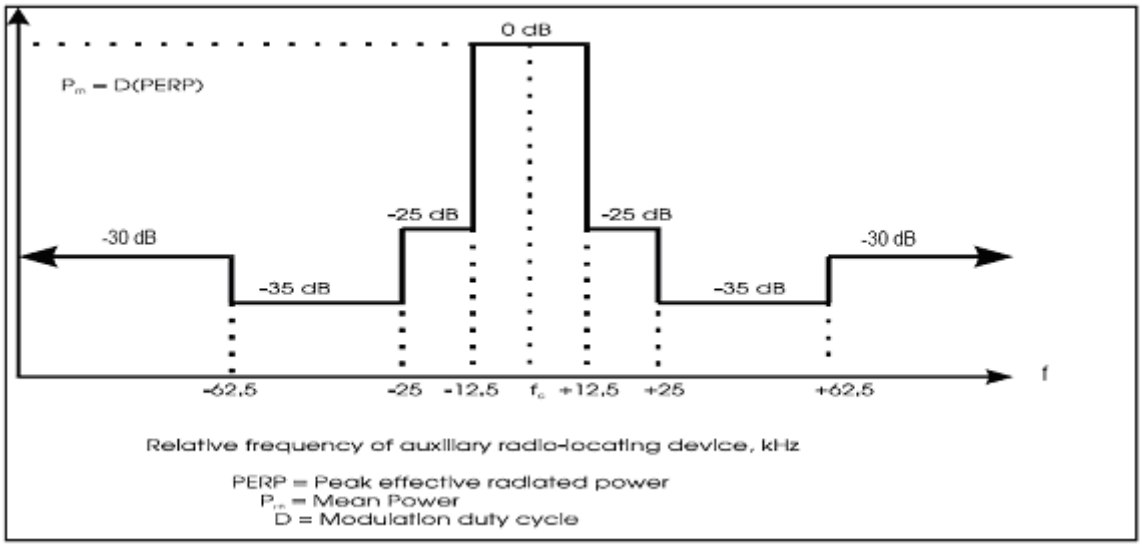


Figure 10.2 – Required Spurious Emissions for 121.5 MHz

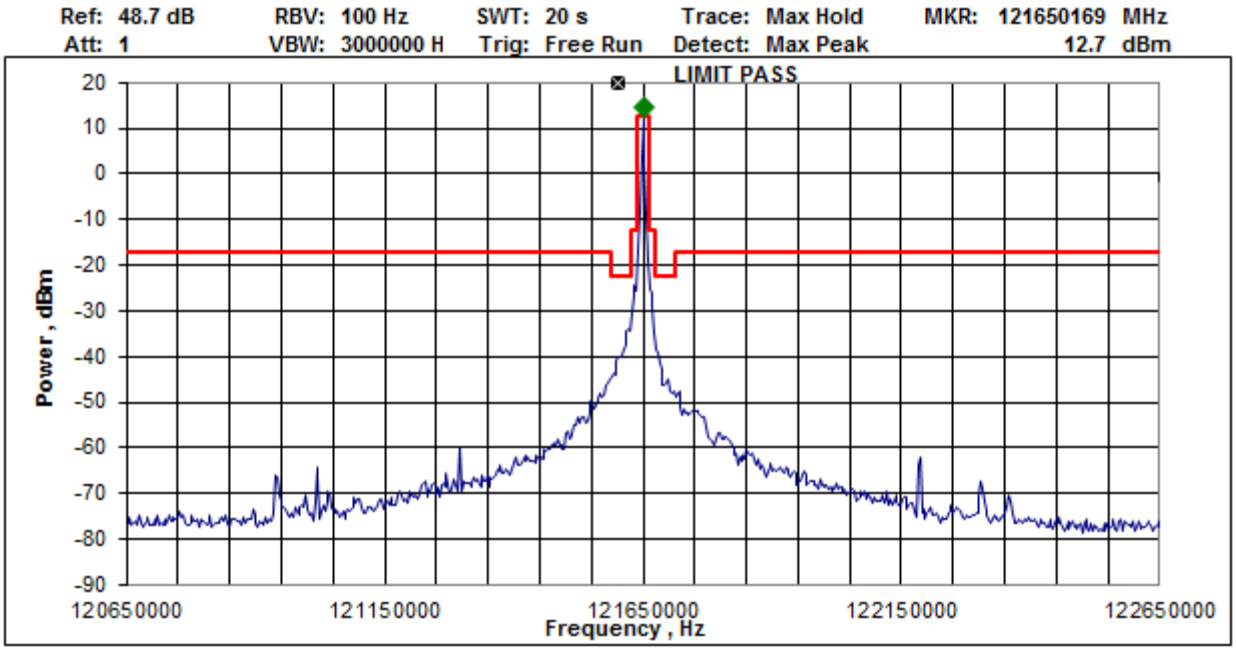


Figure 10.3 – MT603FG Spurious Emissions for 121.5 MHz at Minimum Temperature

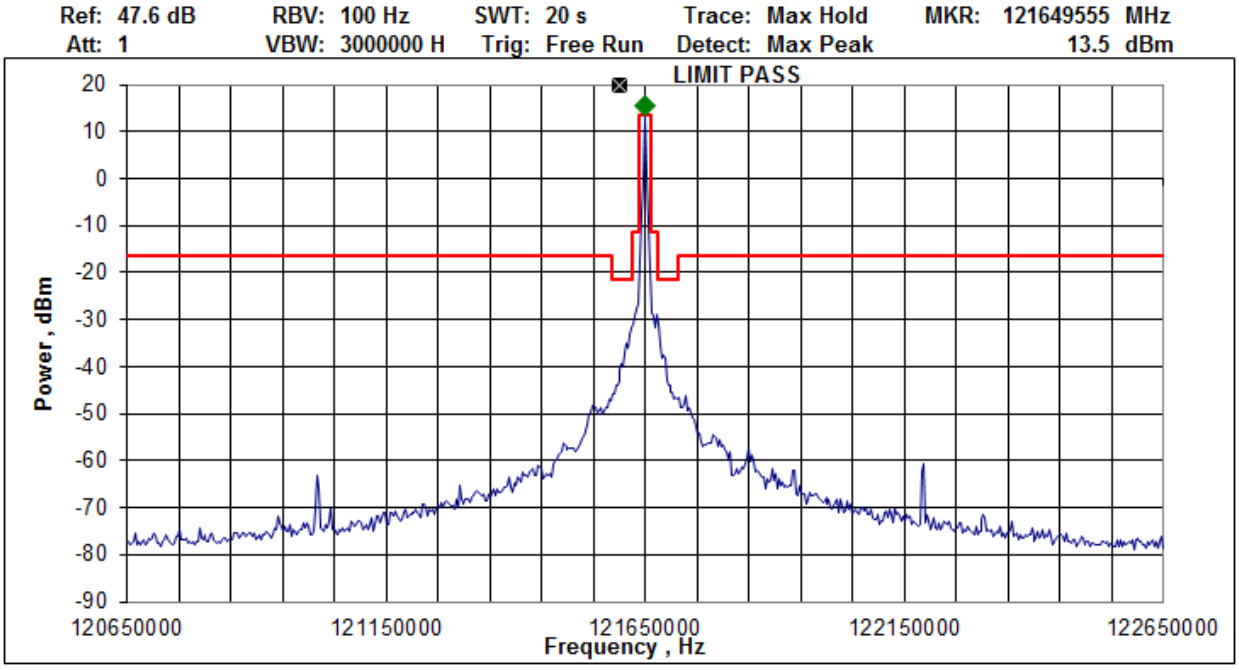


Figure 10.4 – MT603FG Spurious Emissions for 121.5 MHz at Ambient Temperature

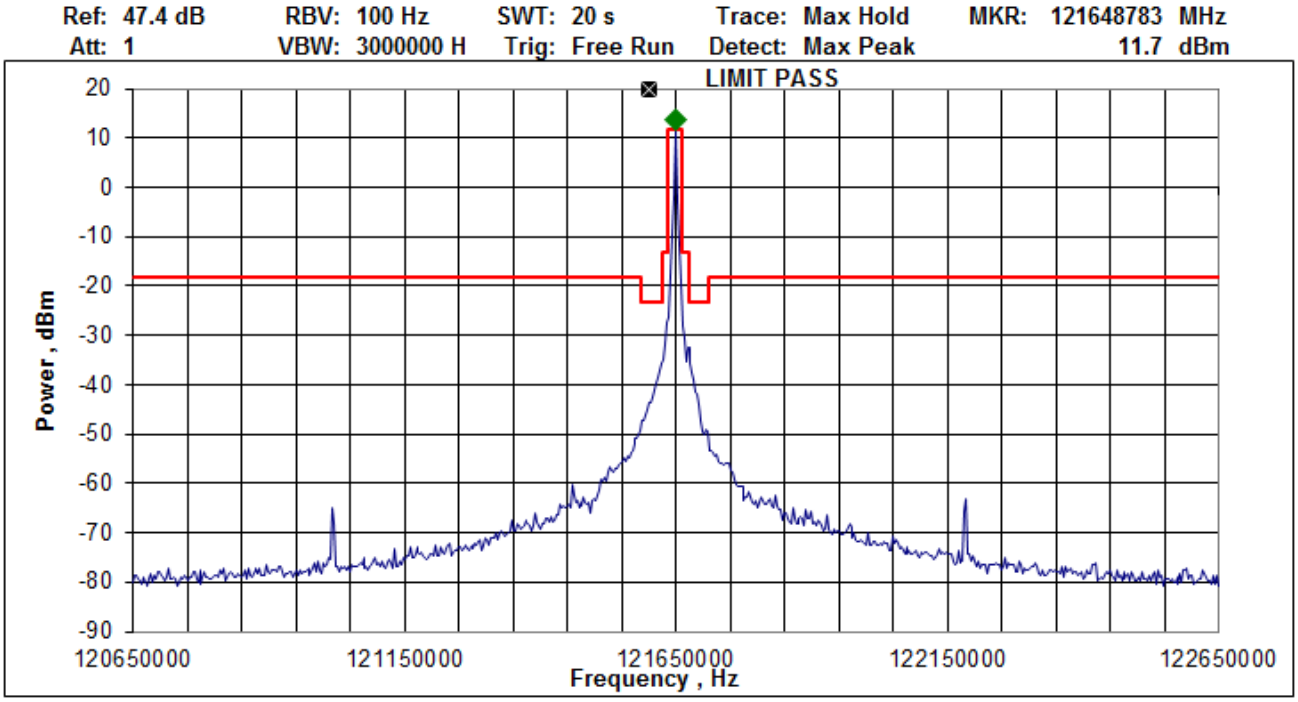


Figure 10.5 – MT603FG Spurious Emissions for 121.5 MHz at Maximum Temperature

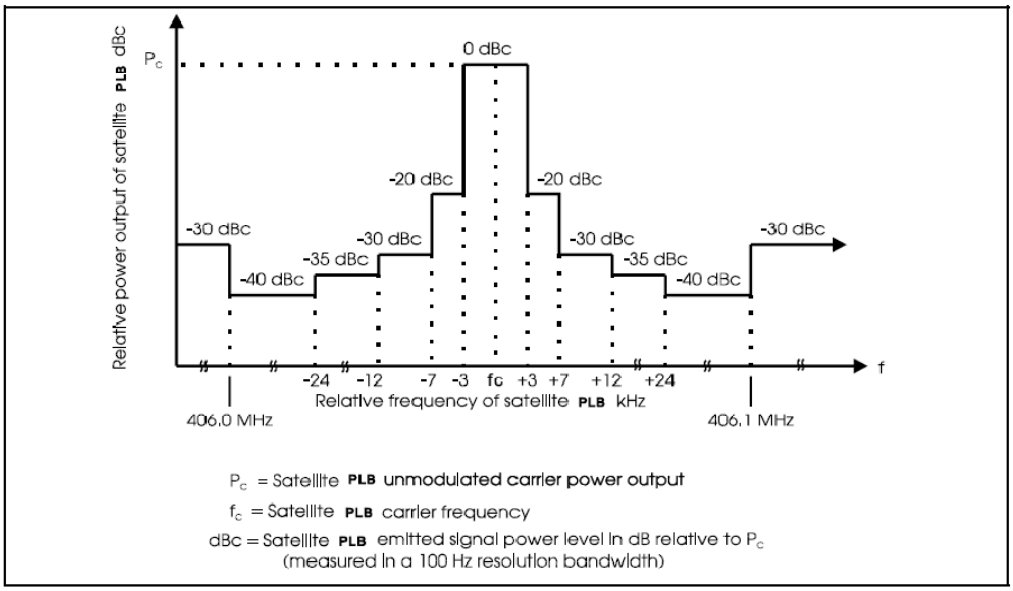


Figure 10.6 – Required Spurious Emissions for 406 MHz

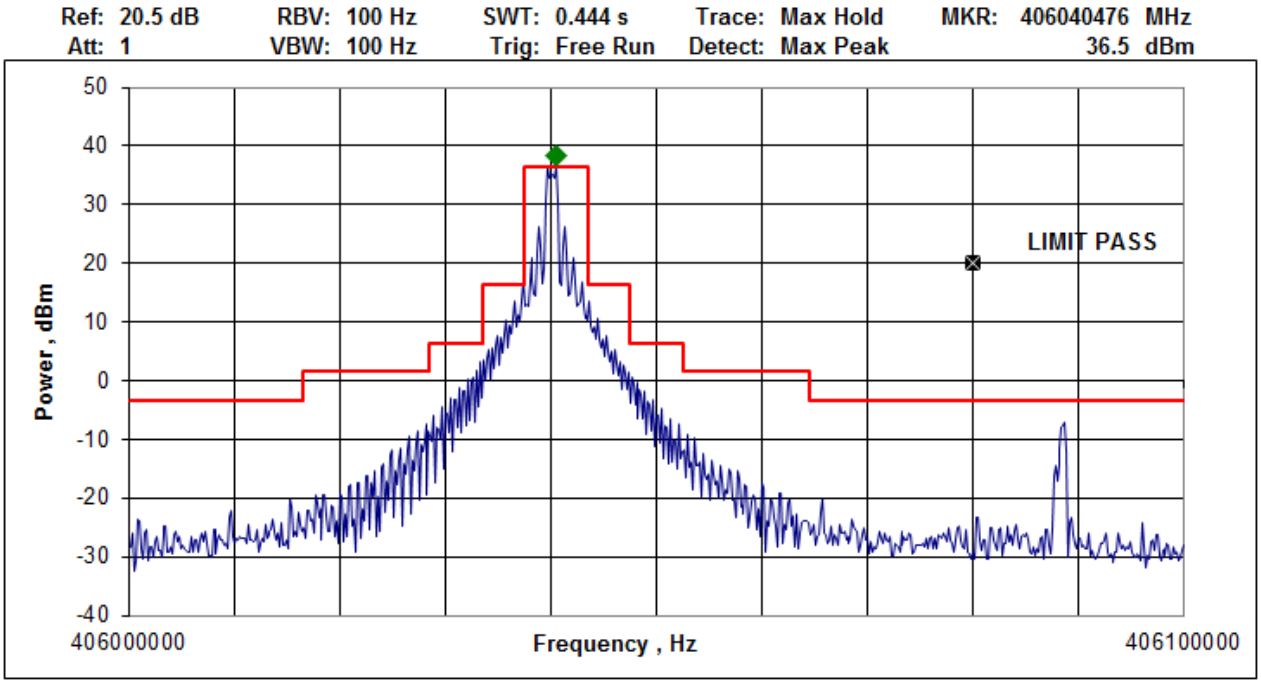


Figure 10.7 - MT603FG Spurious Emissions for 406 MHz at Minimum Temperature

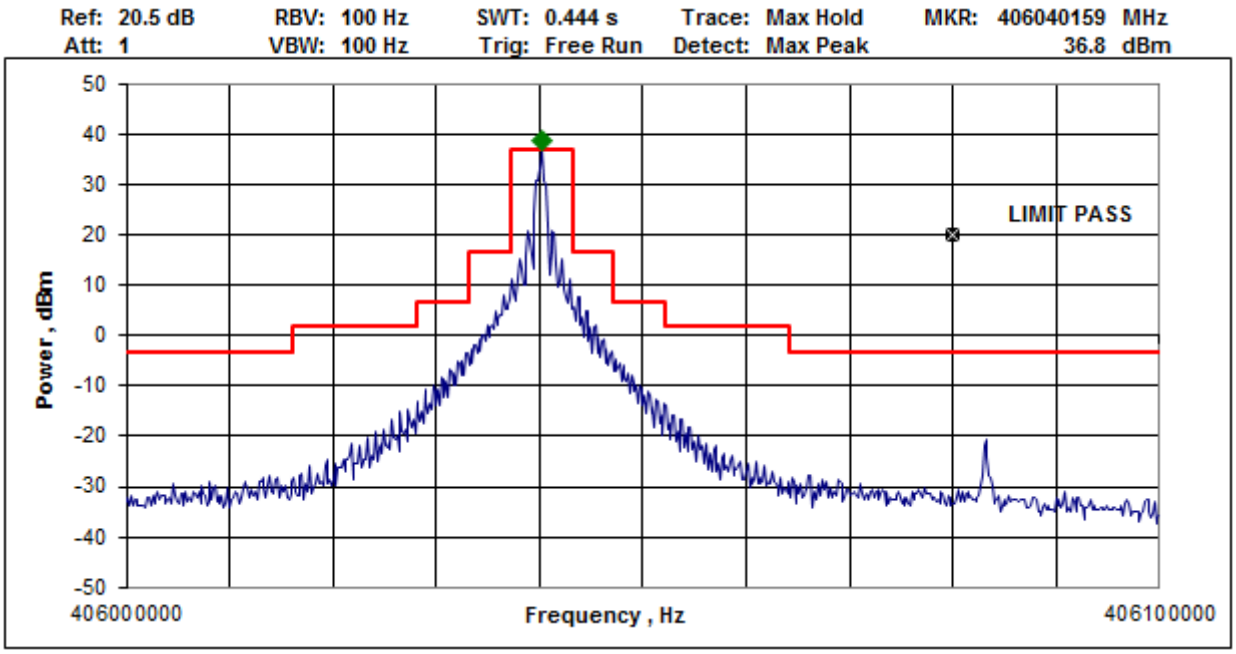


Figure 10.8 – MT603FG Spurious Emissions for 406 MHz at Ambient Temperature

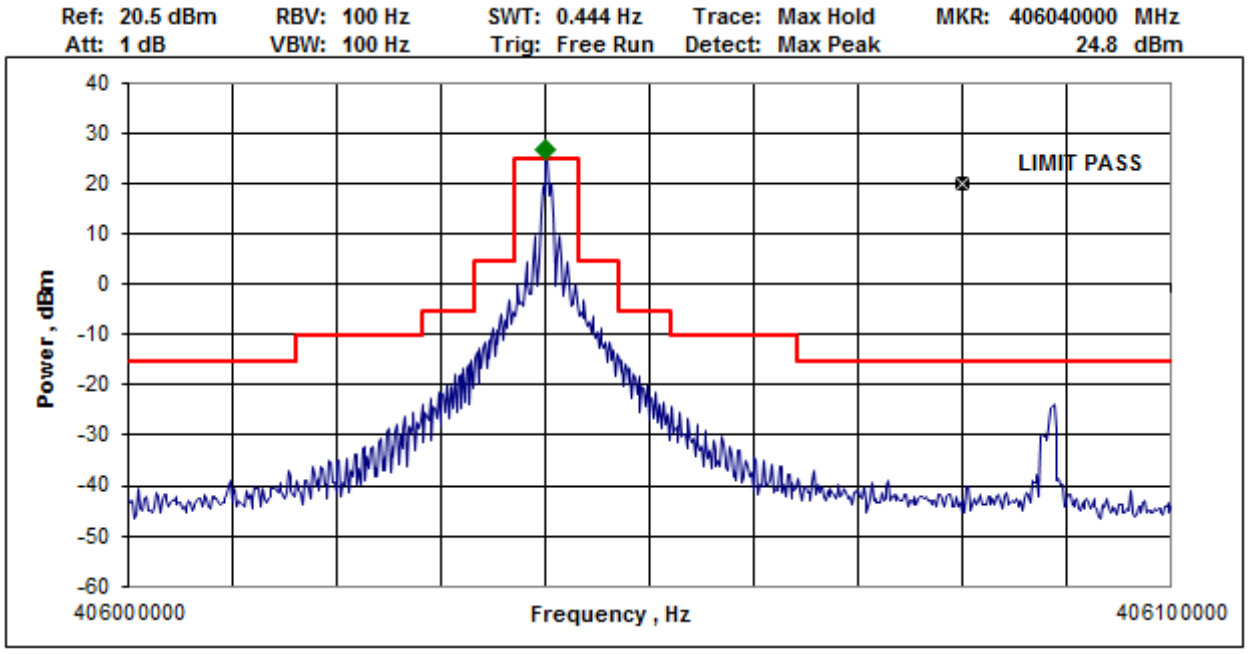


Figure 10.9 - MT603FG Spurious Emissions for 406 MHz at Maximum Temperature

FINAL RESULTS OF SPURIOUS EMISSIONS TEST (A10.0 RTCM 11000.2 Version 2.1) EPIRB1:				
PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAIL)
Spurious Emissions 121.5 MHz at minimum temperature	Fig. 10.2	dBm	Fig. 10.3	PASS
Spurious Emissions 121.5 MHz at ambient temperature	Fig. 10.2	dBm	Fig. 10.4	PASS
Spurious Emissions 121.5 MHz at maximum temperature	Fig. 10.2	dBm	Fig. 10.5	PASS
Spurious Emissions 406 MHz at min-imum temperature	Fig. 10.6	dBm	Fig.10.7	PASS
Spurious Emissions 406 MHz at am-bient temperature	Fig. 10.6	dBm	Fig.10.8	PASS
Spurious Emissions 406 MHz at maximum temperature	Fig. 10.6	dBm	Fig.10.9	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
2.	Temperature meter	gradient 2002	078	02.2017
3.	Hygrometer digital	HP 22-A	60974546	12.2016
4.	Beacon tester	BT100AVS	2315	07.2016
5.	Beacon tester	BT-611	1005	11.2016
6.	Semi-anechoic chamber	«Don»	1	08.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016
8.	Antenna logoperiodic	VULB9163	9163244	09.2018

ANNEX 11.
THERMAL SHOCK (A11.0)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 26.01.2016
Test Conditions:
- Ambient temperature: 23.4-25.6°C
- Relative humidity: 50-67%
- Atmospheric pressure: 752-762mm/Hg

TEST DESCRIPTION

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

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

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

Figure 11.1 – View of the EUT in the temperature test chamber upon completion of the Thermal Shock Test

Table 11.1 — Detailed measurement results of MT603FG upon completion of high-temperature thermal shock test

Test duration 0 h 20 m	Bursts received 25	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.931	406039.931	406039.931
Power, dBm	35	39	36.28	36.28	36.34
Slope(E-9)	-1.00	1.00	–0.973	–0.456	–0.0954
Residual variations (E-9)	0.00	3.00	1.38	2.03	2.70
Short term variations (E-9)	0.00	2.00	0.175	0.215	0.246
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121648935				
Power, dBm	13.16				
Message					
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C				

Table 11.2 — Detailed measurement results of MT603FG upon completion of low-temperature thermal shock test

Test duration 0 h 20 m	Bursts received 26	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	406039.864	406039.901	406039.998
Power, dBm	35	39	36.38	36.39	36.47
Slope(E-9)	-1.00	1.00	0.293	0.519	0.966
Residual variations (E-9)	0.00	3.00	0.276	1.51	2.95
Short term variations (E-9)	0.00	2.00	0.0386	0.0665	0.28
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121649665				
Power, dBm	12.63				
Message					
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C				

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

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Self-activation in fresh water	5	minutes	0.117	PASS
• Self-activation in salt water	5	minutes	0.117	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039901	PASS
- Power Output	35 - 39	dBm	36.39	PASS
- Digital message	Correct	√	√	PASS
• Frequency Stability				
- short term stability	≤0.002	ppm in 100 ms	0.0000665	PASS
- medium term stability				
mean slope	-0.001 to 0.001	ppm/ minute	0.000519	PASS
residual frequency variation	≤0.003	parts/ million	0.00151	PASS

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Self-activation in fresh water	5	minutes	0.083	PASS
• Self-activation in salt water	5	minutes	0.083	PASS
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039931	PASS
- Power Output	35 - 39	dBm	36.28	PASS
- Digital message	Correct	√	√	PASS
• Frequency Stability				
- short term stability	≤0.002	ppm in 100 ms	0.000215	PASS
- medium term stability				
mean slope	-0.001 to 0.001	ppm/ minute	-0.000456	PASS
residual frequency variation	≤0.003	ppm	0.00203	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
2.	Climatic chamber	KPK 400V	015	08.2016
3.	Climatic chamber	NZ-350/75	24625a	10.2016
4.	Temperature meter	gradient 2002	078	01.2017
5.	Hygrometer digital	HP 22-A	60974546	09.2016
6.	Beacon tester	BT100AVS	2315	07.2016
7.	Beacon tester	BT-611	1005	11.2016
8.	Spectrum analyzer	FSH8	105763	09.2016
9.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 12.
OPERATIONAL LIFE TEST (A13.1)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 15.02.2016-18.02.2016
Test Conditions:

- Ambient temperature: 16.2…21.5°C
- Atmospheric pressure: 756…758 mm/Hg
- Relative air humidity: 45…69 %

TEST DESCRIPTION:

- Beacon manufacturer provided operating currents and calculations of the extension Factor (F hrs).
- EPIRB was placed in a chamber at normal room temperature. Then the temperature was reduced to and maintained at minus 30°C for period of 10 hours.
- The chamber was heated to minus 20°C, the heating of the chamber was completed within 20 minutes.
- The equipment has been manually activated in 30 minutes after the end of the period specified in the subclause above and then kept working continuously until power of 406 MHz transmitter was reduced to the minimal acceptable value.
- Parameters were measured immediately after activation of beacon except for the Medium Term Frequency Stability (the mean slope of the frequency and the residual frequency variation about the mean slope), which were computed after 15 minutes according to T.001 section 2.3.1;
- The total duration of the lifetime test was 77 hours 39 minutes since activation EUT till the power was reduced to 36.32 dBm;
- Matching network was used;
- GNSS signal was not available during the test.

TEST RESULT:

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

Operational currents were verified by the testing laboratory with measurement results reported in Table 12.1 below.

During operating current measurement GNSS signal was not available.

Measured values do not exceed values provided by manufacturer.

Table 12.1: Beacon Operating Current

No.	Beacon Operating Modes	Mode: Manually selectable or Automatic	Measurement interval, sec	Average Current, mA	Peak Current, mA
1.	406 + 121 + GNSS Search	Automatic	102.5	89	2864
2.	406 + 121 + GNSS Sleep	Automatic	102.5	69	2789
3.	GNSS Self-test	Manual	130.2	46.5	2770
4.	Self-test	Manual	8.24	217.8	2780
5.	Stand-by	Automatic	20	0.001	0.001

Conclusion:
The beacon mode: when the beacon is mode at which beacon has the highest current consumption.
Current consumption was measured using circuit shown on Figure 12.1.

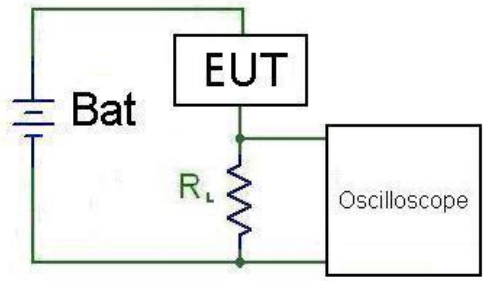


Figure 12.1 - The Circuit for Current Consumption Measurement

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

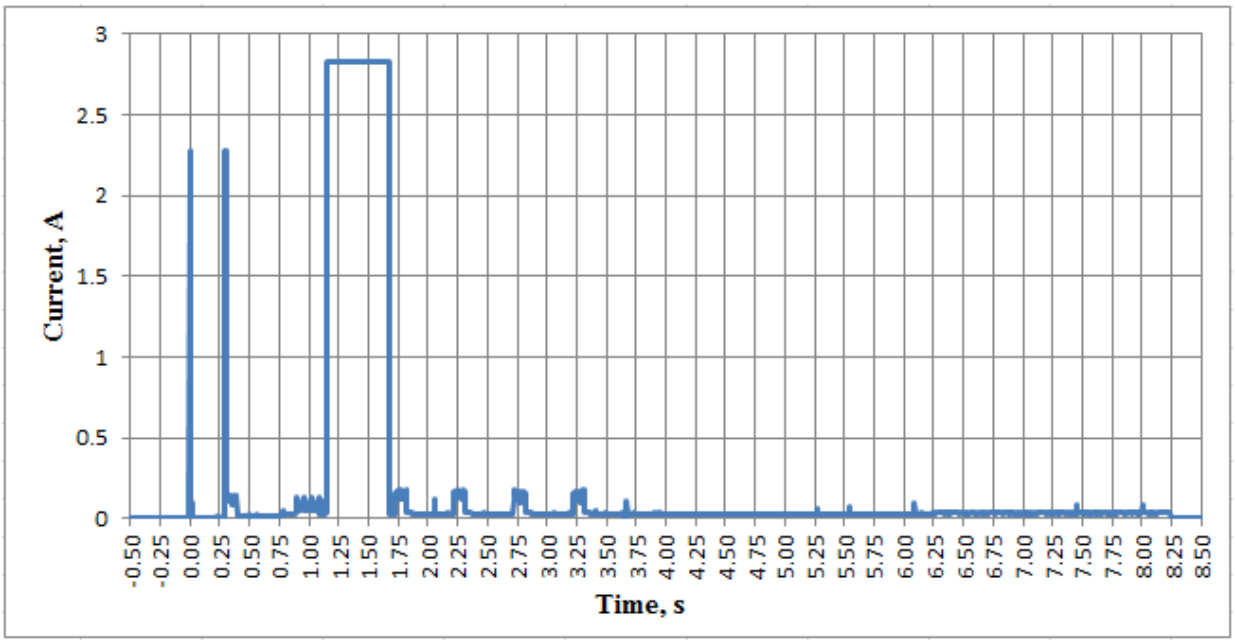


Figure 12.2 - Current during self-test

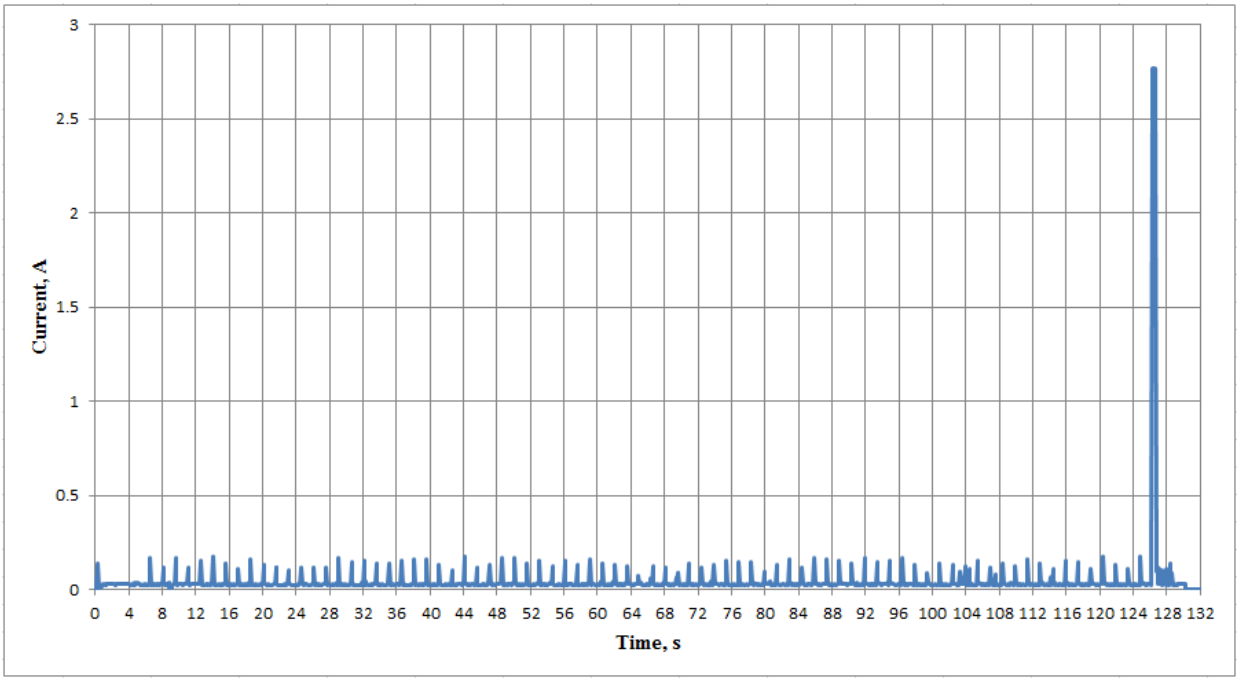


Figure 12.3 - Current during GNSS self-test

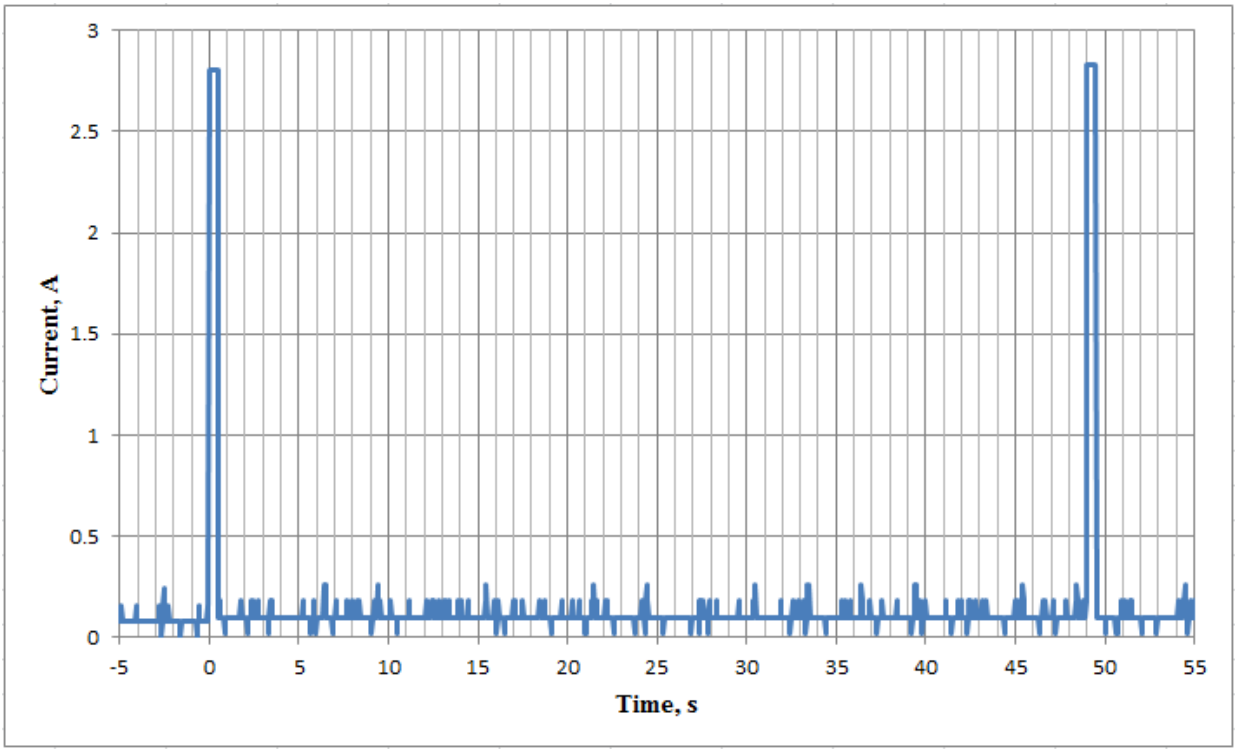


Figure 12.4 - GPS receiver is switching to GNSS search mode.

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

Characteristic	Designation	Units	Value	Comments
Beacon manufacturers declared maximum allowed cell shelf-life (from date of cell manufacture to date of battery pack installation in the beacon)	T_{CS} or TCS	Years	1	
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	T_{BR} or TBR	Years	7	
Battery pack electrical configuration	2 x D Cells series wired			
Cell model and cell chemistry	Saft LO26SX, $LiSO_2$			
Nominal cell capacity		A-hrs	7.75	
Nominal battery pack capacity	C_{BN}	A-hrs	7.75	
Annual battery cell capacity loss (self-discharge) due to aging, as specified by cell manufacturer at ambient temperature	L_{SDC}	%	3	
Calculated battery pack capacity loss due to self-discharge: $L_{CBN} = C_{BN} - [C_{BN} * (1 - L_{SDC}/100)^{TBR+TCS}]$	L_{CBN}	A-hrs	1.68	
Number of self-tests per year	N_{ST}		12	
Average battery current during a self-test	I_{ST}	mA	221	
Maximum duration of a self-test	T_{ST}	sec	8.25	
Calculated battery pack capacity loss due to self-tests during battery replacement period: $L_{ST} = I_{ST} * T_{ST} * T_{BR} * N_{ST} / 3600$	L_{ST}	mA-hrs	42.5	
Maximum Number of GNSS self-tests between battery replacements	N_{GST}		7	
Average battery current during a GNSS self-test of maximum duration	I_{GST}	mA	48	
Maximum duration of a GNSS self-test	T_{GST}	sec	130.2	
Calculated battery pack capacity loss due to GNSS self-tests during battery replacement period: $L_{GST} = I_{GST} * T_{GST} * N_{GST} / 3600$	L_{GST}	mA-hrs	12.2	
Average stand-by battery pack current	I_{SB}	mA	0.001	
Battery pack capacity loss due to constant operation of circuitry prior to beacon activation: $L_{ISB} = I_{SB} * T_{BR} * 8760$	L_{ISB}	mA-hrs	61.3	
Calculated value of the battery pack pre-test discharge $L_{CDC} = L_{CBN} + 1.65 * (L_{ST} + L_{GST} + L_{ISB})/1000 + L_{OTH}/1000$	L_{CDC}	A-hrs	1.87	

The pre-test battery discharge is calculated based on a discharge current approximating the maximum operational current (nominal 100mA).
Production date of cells installed in the battery: 2013.03.
Duration of storage prior to the test: 2.92 years.
The loss of energy due to the battery ageing:

$L_{AGEING} = C_{BN} - [C_{BN} * (1 - L_{SDC}/100)^{2.92}] = 0.66$ A-hrs.
Before the start of pre-discharge, the battery was discharged with current pulse 2 A duration of 10 seconds by the manufacturer's recommendations, because the battery was kept in the the test laboratory over 1 year.
$L_{PRE-DISCHARGE} = 2 * 10 / 3600 = 5.56$ mA-hrs

The final value of the discharge to take into account the cell ageing:
$L_{CDC} - L_{AGEING\_total} - L_{PRE-DISCHARGE} = 1.87$ A-hrs – 0.66 A-hrs – 0.00556 = 1.205 A-hrs.
The discharge current is 97.7 mA.
The time of pre-discharge of battery is:
1.205 A-hrs / 0.0977 A = 12.334 hrs.

The pre-test battery discharge was carried out before Lifetime test at room temperature on the unused battery. Discharge was carried out on resistive load using battery analyzer UBA5 (Vencon Technologies Inc., Canada). The discharge current was 97.7 mA, as current similar to beacon operational current. Discharge current 97.7 mA was confirmed by manufacturer. Duration of preliminary battery discharge with discharge current 97.7 mA was 12:20:01.

Lifetime test at minimum temperature -20°C with preliminary discharged battery was carried out for 77 hours 39 minutes. Mode of beacon peration during the Lifetime Test was 406MHz + Homer + GPS ON + Strobe Light ON. List of parameters measured during lifetime test are shown below.

List of test parameters

Measured parameters	**page No.**
Transmission frequency 406 MHz:	
Nominal frequency value	79
Short and average frequency stability	80
Maximum and minimum frequency stability values during test	77
Transmitter power output:	
Diagram of power output values during test	83
Maximum and minimum power output values during test	77
Message:	
Message contents	84

Table of measured parameters.

Message	
Contents (full)	:FFFE2F8C9F0018DFC0FF04F9E4379F3C0010

Test duration 77:39:27	Bursts received 5587	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, MHz	406.039	406.041	406.039949	406.039957	406.039957
Power, dBm	35	39	36.30	36.32	36.47
Slope	-1.00E-09	1.00E-09	-1.71E-10	-6.34E-12	1.76E-10
Residual variations	0.00E-09	3.00E-09	7.82E-11	1.20E-10	7.42E-10
Short term variations	0.00E-09	2.00E-09	2.77E-11	8.37E-11	1.26E-10
Power, dBm (at 48:00:06)	35	39	36.30	36.30	36.47

121.5 MHz Transmitter Parameters at the beginning of the test 00:15:00			
Carrier Frequency, Hz	121649700	**Low Sweep Frequency, Hz**	369
Power, dBm	12.63-12.70	**High Sweep Frequency, Hz**	1166
Sweep Period, sec	0.3	**Sweep Range, Hz**	797
Modulation Index, %	100		
121.5 MHz Transmitter Parameters at 48:00:00			
Carrier Frequency, Hz	121649681	**Low Sweep Frequency, Hz**	367
Power, dBm	12.61-12.72	**High Sweep Frequency, Hz**	1166
Sweep Period, sec	0.3	**Sweep Range, Hz**	799
Modulation Index, %	100		
121.5 MHz Transmitter Parameters at the end of the test 77:39:27			
Carrier Frequency, Hz	121649688	**Low Sweep Frequency, Hz**	370
Power, dBm	12.64-12.69	**High Sweep Frequency, Hz**	1166
Sweep Period, sec	0.3	**Sweep Range, Hz**	796
Modulation Index, %	100		

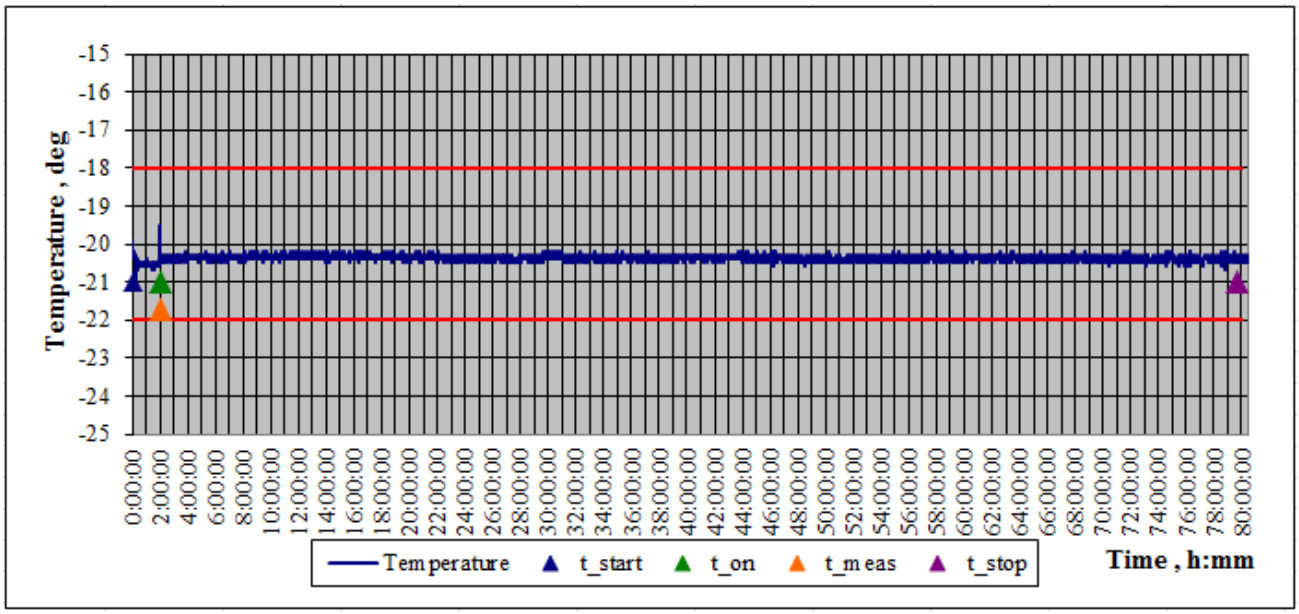


Figure 12.5 – Temperature During The Test

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

Time (h:mm:ss)	Rep. period (s)	Power (dBm)	Frequency (MHz)	Slope	Residual variations	Short term variations	Digital message
0:01:00	0	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:01:48	48.4563	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:02:39	51.0027	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:03:31	51.4539	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:04:20	49.2996	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:05:10	49.4294	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:06:00	50.2289	36.44	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:06:49	49.4139	36.45	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:07:41	51.218	36.45	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:08:29	48.4904	36.46	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:09:20	50.754	36.46	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:10:11	50.9155	36.46	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:11:01	50.1545	36.46	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:11:50	48.7944	36.46	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:12:39	49.003	36.47	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:13:26	47.7733	36.47	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:14:19	52.443	36.46	_	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:15:09	50.2859	36.46	406.039957	-	-	-	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:15:59	49.7992	36.46	406.039955	-4.55E-09	1.35E-08	5.75E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:16:49	49.6549	36.47	406.039954	-3.53E-09	1.21E-08	5.75E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:17:37	48.3882	36.46	406.039952	-2.56E-09	1.01E-08	5.73E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:18:27	50.2726	36.46	406.039951	-1.71E-09	7.51E-09	5.67E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:19:20	52.3156	36.38	406.039950	-1.02E-09	4.73E-09	5.59E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:20:12	52.4012	36.38	406.039950	-5.47E-10	2.06E-09	5.90E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:21:01	49.2905	36.38	406.039949	-3.37E-10	1.06E-09	5.91E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:21:52	50.3604	36.39	406.039949	-2.28E-10	5.69E-10	5.40E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:22:43	51.5993	36.39	406.039949	-1.71E-10	3.63E-10	5.42E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:23:32	48.9854	36.39	406.039949	-1.25E-10	4.33E-10	5.44E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:24:23	50.3605	36.39	406.039949	-7.98E-11	5.12E-10	4.73E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:25:14	51.708	36.39	406.039949	-3.30E-11	6.23E-10	5.18E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:26:05	50.9864	36.39	406.039949	8.59E-12	6.92E-10	5.49E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:26:55	49.6959	36.38	406.039949	4.82E-11	6.67E-10	6.17E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:27:43	47.8306	36.38	406.039949	7.57E-11	6.70E-10	6.13E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:28:31	48.67	36.39	406.039949	1.00E-10	6.62E-10	5.86E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:29:19	47.5135	36.39	406.039949	1.37E-10	5.68E-10	6.32E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010
0:30:07	47.8781	36.39	406.039949	1.68E-10	4.58E-10	5.96E-11	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010

Note:

Column “Time”	Time from EPIRB activation.
Column “Rep. Period”	Values of repetition period measured after first message.
Columns Slope, Residual variations	Measured values met the requirements after allowing 15-minutes for beacon warm-up
Column Short-Term variations	Short-Term Frequency variations measurements

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

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

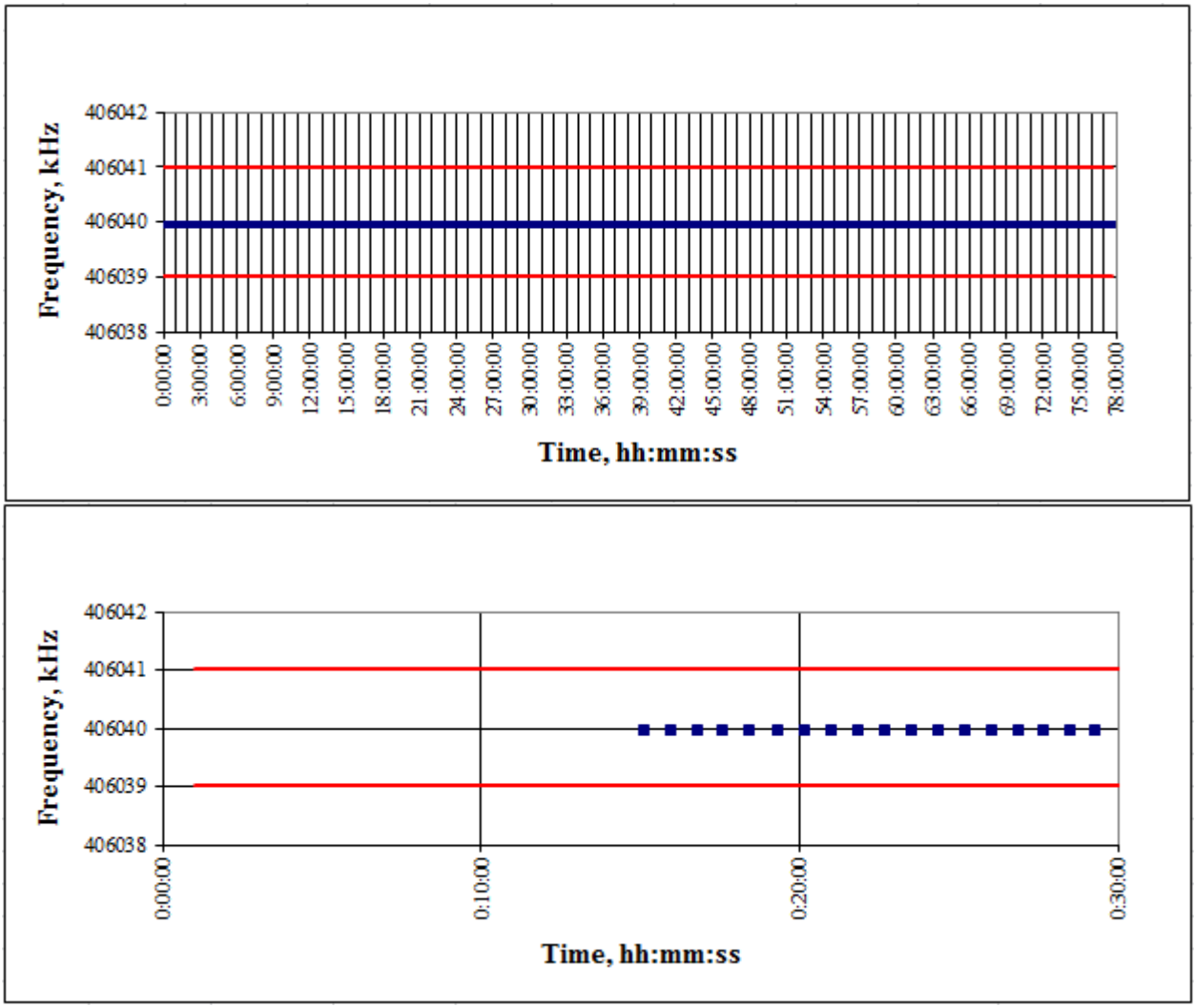


Figure 12.6 – Nominal Value of frequency

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

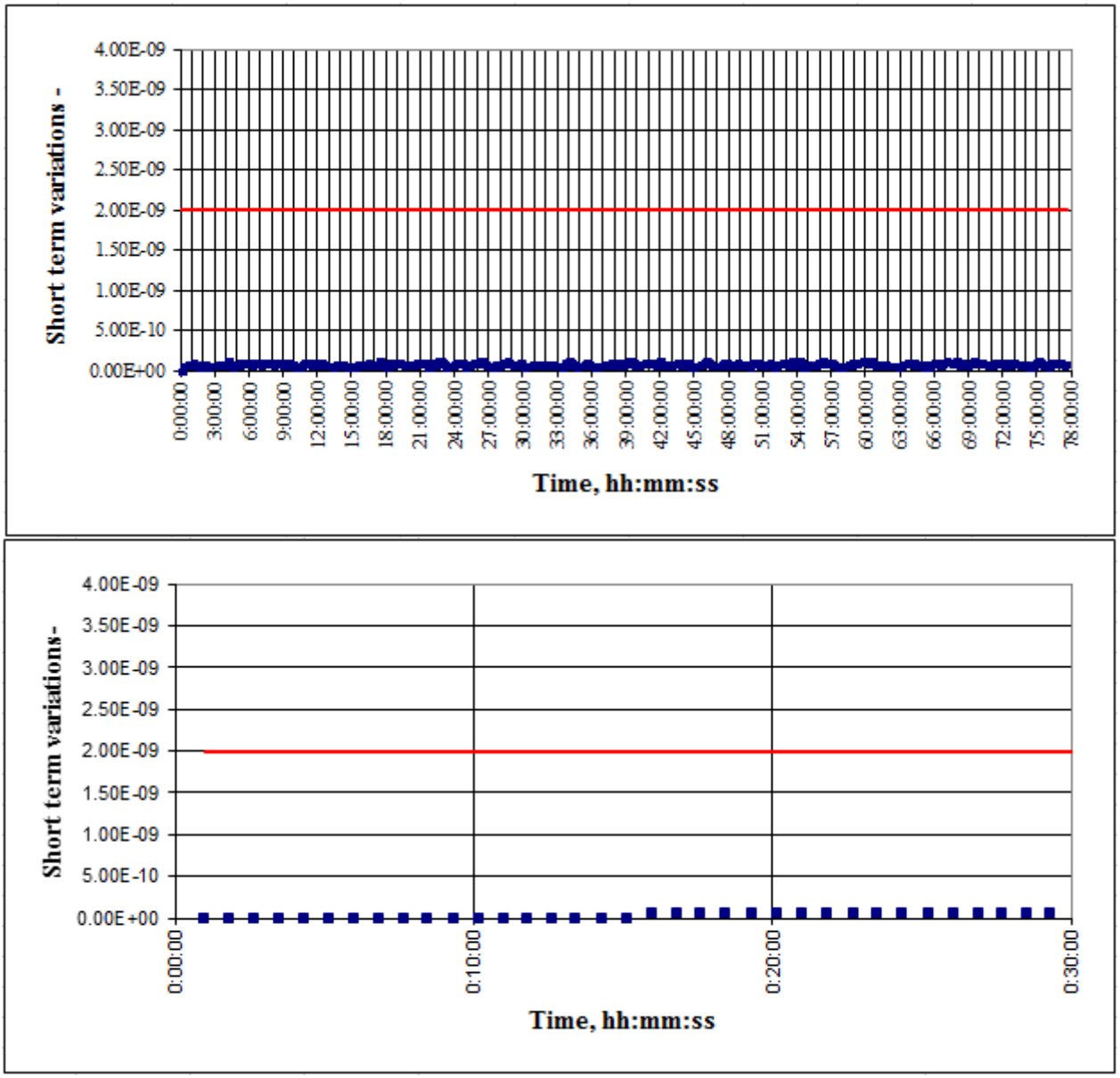


Figure 12.7 – Short-Term Stability

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

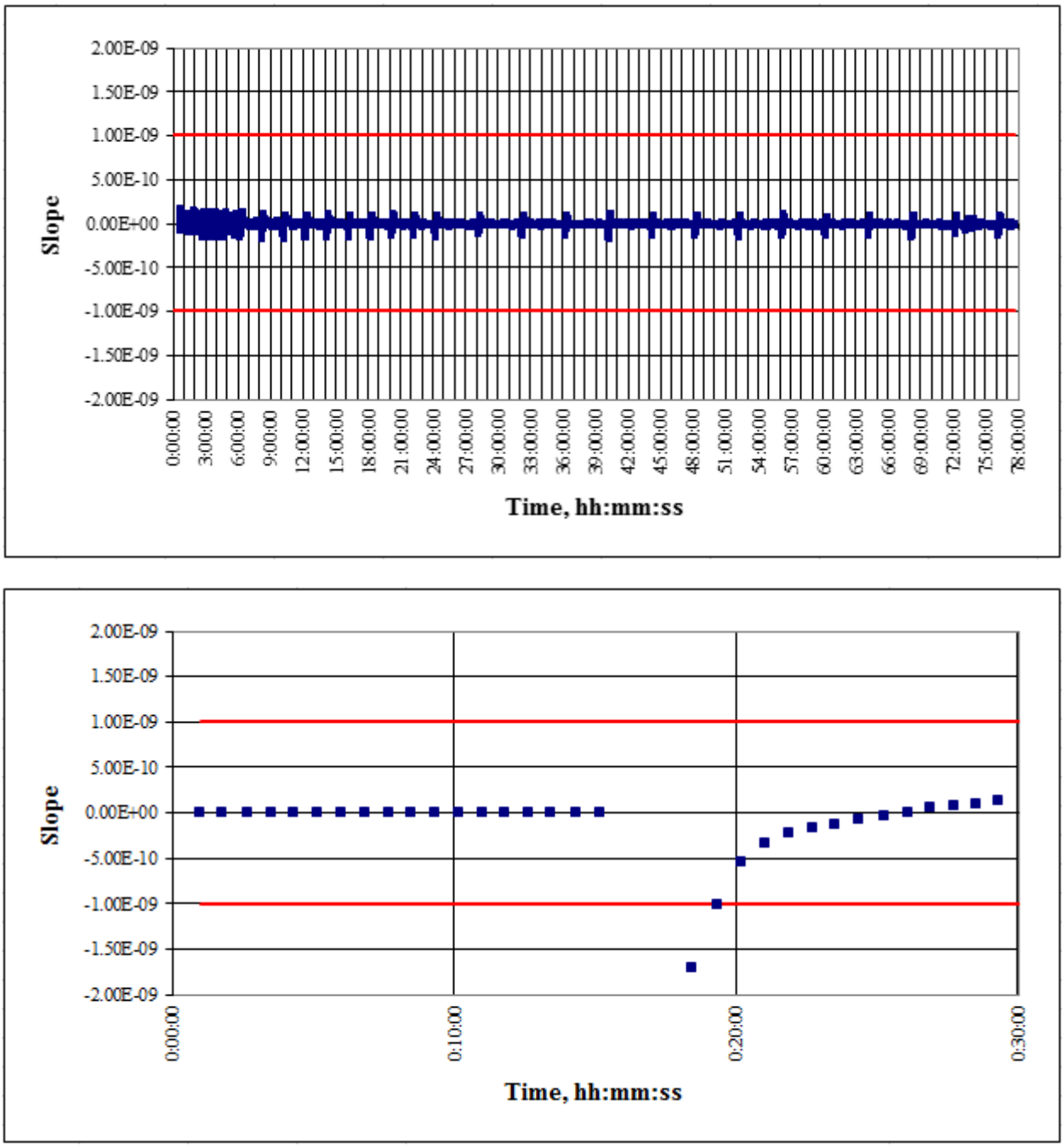
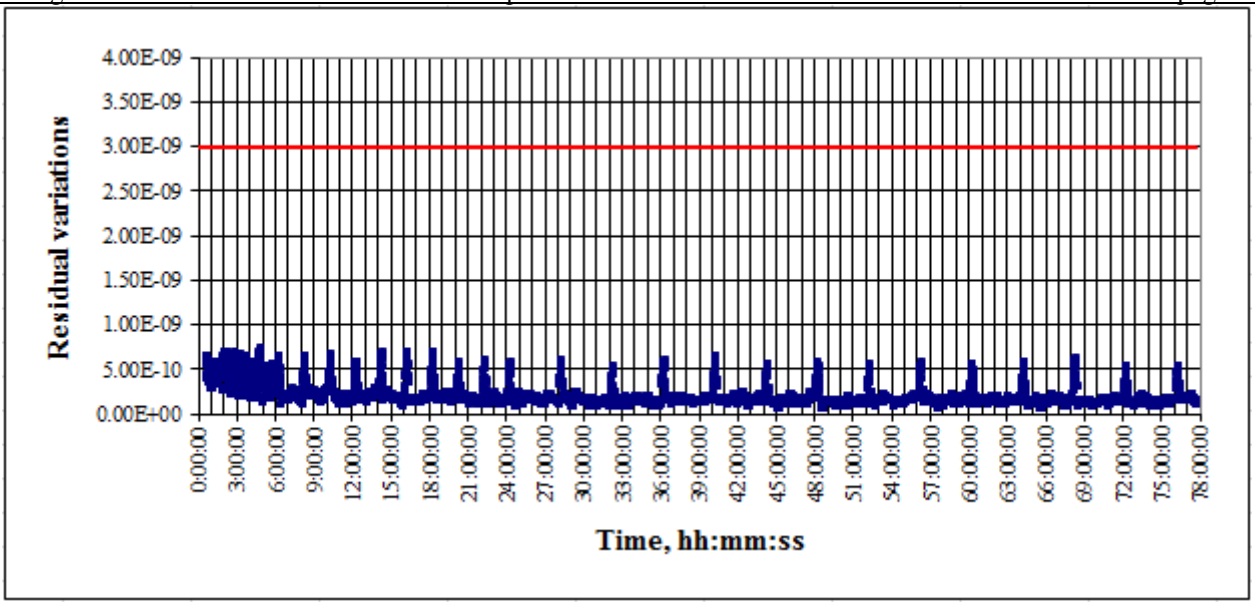


Figure 12.8 – Medium-Term Stability. Slope



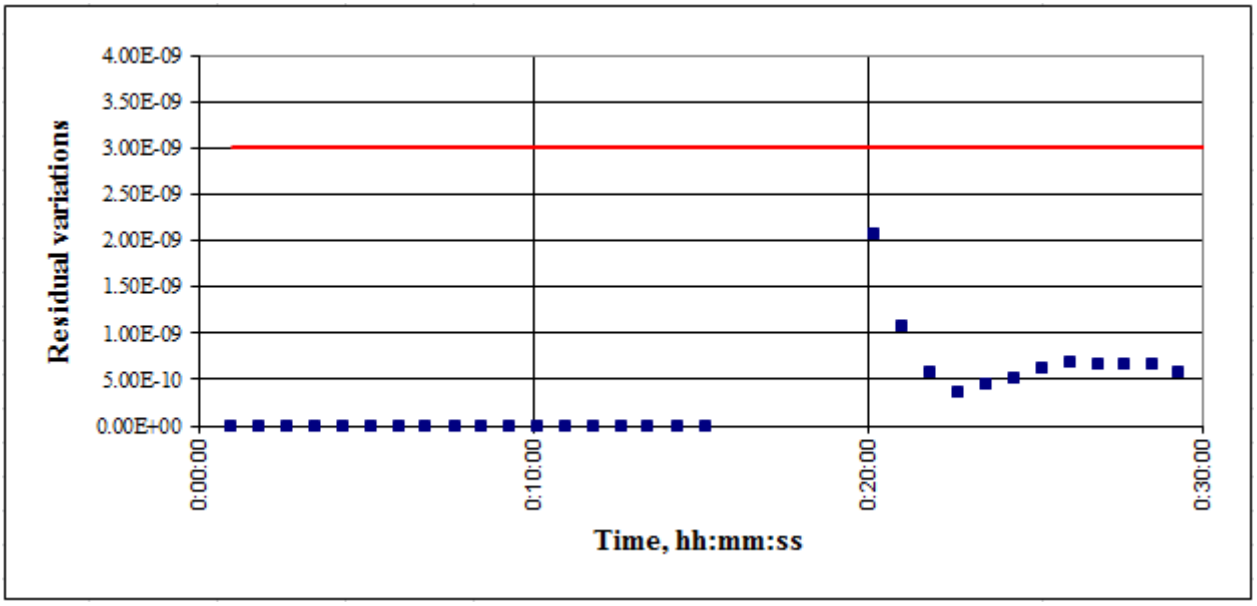


Figure 12.9 – Medium-Term Stability. Residual variations

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

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

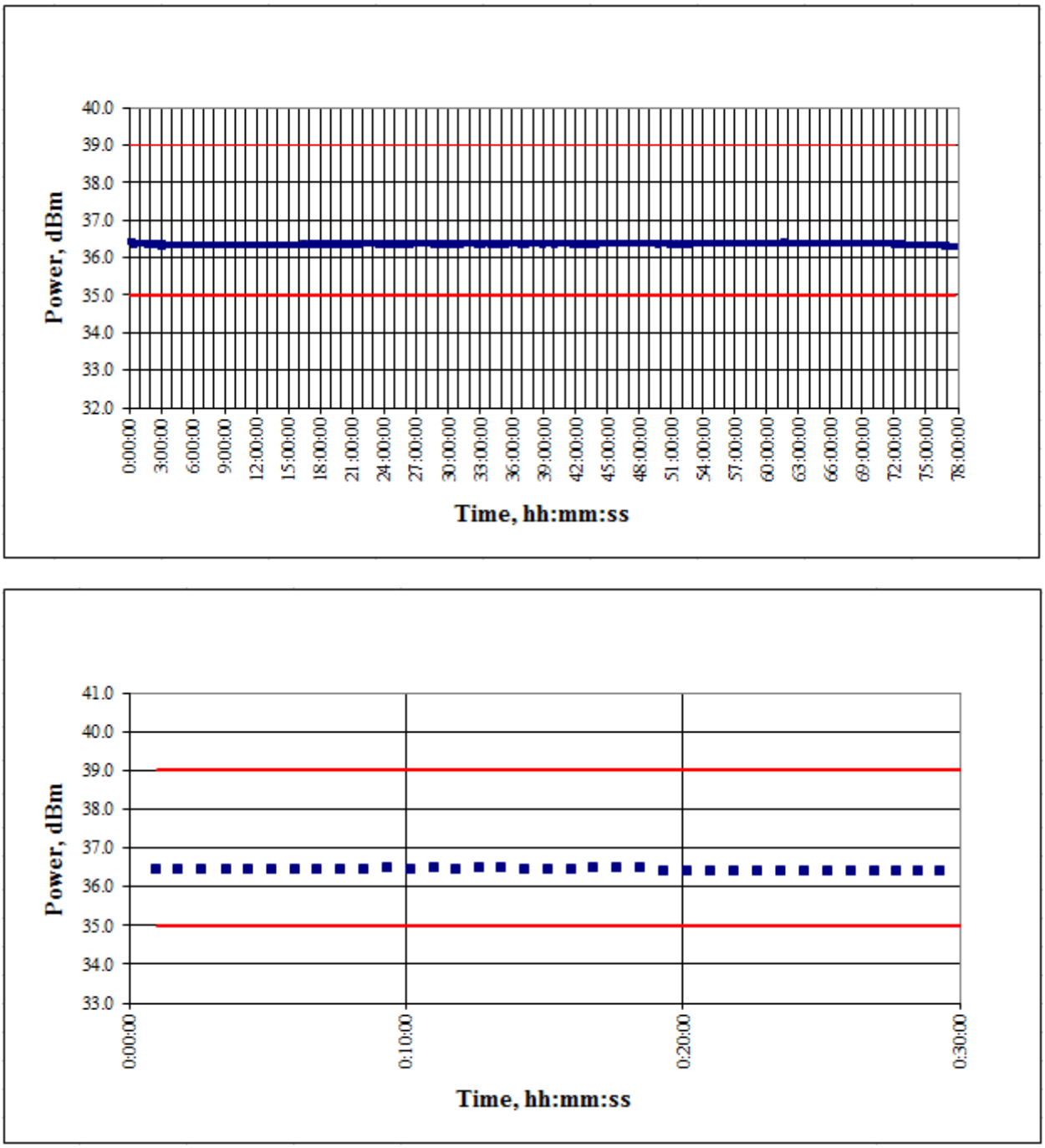


Figure 12.10– Transmitter power during test

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

Bursts received	5588
BCH error	0
Self test message	0
Full HEX message	FFFE2F8C9F0018DFC0FF04F9E4379F3C0010

Decoding Beacon Message
Full Hex message: FFFE2F8C9F0018DFC0FF04F9E4379F3C0010

ITEM	BITS	VALUE
Bit synchronization: 0x7FFF	1- 15	111 1111 1111 1111
Frame synchronization: 0x2F	16- 24	0 0010 1111
Protocol: Long National Location Protocol		
Format Flag: Long Message	25	1
Protocol Flag: Standard/National Protocol	26	0
Country Code: 201 - Albania	27- 36	00 1100 1001
Identification type (protocol code): National Test Location Protocol	37- 40	1111
National ID Number (18 bits, i.e. max=0x3 FFFF): 0x0 0063	41- 58	00 0000 0000 0110 0011
Latitude: Undefined		
Latitude Base: Undefined	59- 71	0 1111 1110 0000
Longitude: Undefined		
Lonitude Base: Undefined	72- 85	01 1111 1110 0000
BCH1: 0x13 E790	86-106	1 0011 1110 0111 1001 0000
Fixed bits (3 bits = 110): 6	107-109	110
Additional data type: Position Delta	110	1
Position data source: Internal	111	1
Auxiliary Radio Locating Device: 121.5 MHz Radio Locating Device Included	112	1
Latitude Delta: Undefined	113-119	100 1111
Longitude Delta: Undefined	120-126	100 1111
Additional Beacon Identification (6bit, i.e. max value - 0x3F): 0x00	127-132	00 0000
BCH2: 0x010	133-144	0000 0001 0000

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Temperature meter	gradient 2002	078	01.2017
2	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
3	Hygrometer digital	HP 22-A	60974546	09.2016
4	Beacon tester	BT100AVS	2315	09.2016
5	Beacon tester	BT-611	1005	11.2016
6	Spectrum analyzer	FSH8	105763	03.2019

ANNEX 13.
STROBE LIGHT TEST (A13.2)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 24.05.2016-25.05.2016
Test Conditions:

- Ambient temperature: 22.2-24.2°C
- Atmospheric pressure: 746-751 mm/Hg
- Relative air humidity: 45-60 %

TEST DESCRIPTION:

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

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

TEST RESULTS:

The measurements of effective luminous intensity were performed according to IEC 61097-2, clause 5.3.3.3.
The EUT was turned OFF and thermally soaked for 3 hours at the required operating temperature. Then the EUT was turned ON and the strobe light flash rate and effective luminous intensity were measured at 49 points over the upper hemisphere of the EUT.
The strobe light test was performed at the ambient temperature, at the minimum operating temperature and at the maximum operating temperature.

– Step 1. Condition: The EUT was turned OFF and thermally soaked at the temperature 20 °C for 3 hours.
– Step 2. Condition: The EUT was turned ON and the strobe light flash rate and effective intensity were measured at 20°C.
– Step 3. Condition: The EUT was turned OFF and thermally soaked at the temperature -20 °C for 3 hours
– Step 4. Condition: The EUT was turned ON and the strobe light flash rate and effective intensity were measured at -20°C.
– Step 5. Condition: The EUT was turned OFF and thermally soaked at the temperature +55 °C for 3 hours.
– Step 6. Condition: The EUT was turned ON and the strobe light flash rate and effective intensity were measured at +55°C.

TEST DETAILS

Figure 13.1 – General view of test equipment for low-duty cycle light test

Figure 13.2 – General view of graphic luxmeter

Figure 13.3 – General view of rotation and inclination device inside of the climatic chamber

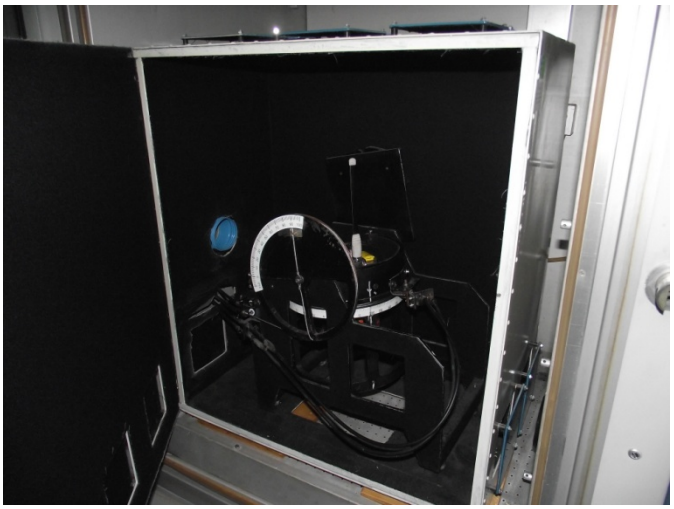


Figure 13.4 – Inside view of rotation and inclination device

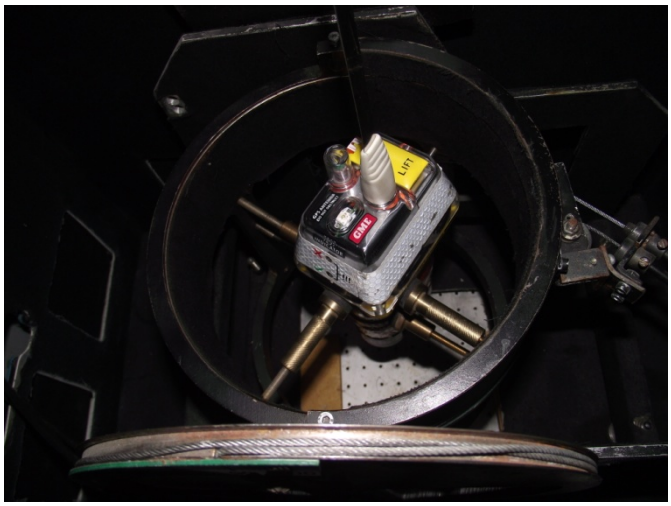


Figure 13.5 –The EUT in the climatic chamber

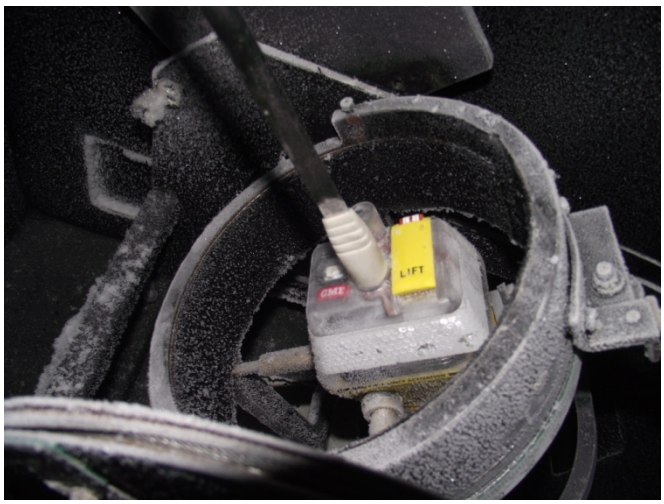


Figure 13.6 – View of the EUT upon completion of the low-duty cycle test at minimum temperature

Effective luminous intensity at -20°C

	Elevation								
Azimuth	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1.14	2.05	2.79	3.09	3.43	2.75	2.66	2.97	3.11
45°	0.92	1.51	2.00	2.88					
90°	0.20	0.22	0.29	2.25	2.34	2.43	2.43	2.70	
135°	0.32	0.50	1.04	1.96					
180°	0.52	1.53	2.12	2.57	2.66	2.34	2.91	1.03	
225°	0.62	0.83	1.65	2.59					
270°	0.90	1.62	2.00	2.39	3.52	3.20	3.24	3.34	
315°	1.03	2.03	1.75	1.98					

Effective luminous intensity at 20°C

	Elevation								
Azimuth	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1.08	1.72	3.20	3.61	3.83	3.06	2.79	2.97	3.15
45°	1.03	1.28	1.75	2.88					
90°	0.20	0.23	0.32	2.34	2.25	2.43	3.20	2.78	
135°	0.25	0.88	1.01	2.39					
180°	0.42	1.27	1.85	2.43	2.36	2.30	2.82	2.61	
225°	0.56	0.71	1.63	2.57					
270°	0.81	1.14	3.79	2.36	3.92	2.97	2.84	3.20	
315°	0.90	1.98	1.44	1.91					

Effective luminous intensity at 55°C

	Elevation								
Azimuth	10°	20°	30°	40°	50°	60°	70°	80°	90°
0°	1.02	1.89	3.11	3.56	3.70	2.97	2.70	2.84	3.15
45°	0.96	1.32	1.75	2.79					
90°	0.20	0.21	0.41	1.75	2.21	2.39	3.29	2.77	
135°	0.23	0.67	2.97	2.97					
180°	0.72	1.26	1.90	2.36	2.79	2.35	2.93	3.02	
225°	0.54	0.72	1.37	2.52					
270°	0.84	1.45	2.21	2.14	3.83	3.02	3.11	3.47	
315°	0.89	1.93	1.64	1.93					

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICA-TION	UNITS	TEST RESULTS			COM-MENTS (PASS/FAIL)
			Tmin (- 20 °C)	Tamb (+ 20 °C)	Tmax (+ 55 °C)	
• Flash rate	20-30	/min	20	20	20	PASS
• Effective luminous intensity	≥0.75	Cd	≥1.97	≥2.03	≥2.06	PASS
• Pulse duration	10^{-6} to 10^{-2}	s	10^{-2}	10^{-2}	10^{-2}	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Graphic luxmeter	LG-05	17	06.2016
2.	Climatic chamber	КРК-400V	015	01.2017
3.	Rotation and inclination device	RD-360/90	01	05.2016
4.	Temperature meter	Gradient -2002	078	01.2017
5.	Oscilloscope	TDS-3052	B011258	02.2017

ANNEX 14.
SELF- TEST (A13.3)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 27.01.2016-29.01.2016
Test Conditions:
- Atmospheric pressure: 758 – 760 mm/Hg
- Relative air humidity: 45 – 57 %
- Temperature
  Minimum: -20 °C
  Maximum: +55 °C
  Ambient: +20 °C

TEST DESCRIPTION

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

TEST RESULT

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

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

Table of measured parameters MT603FG at Ambient Temperature

Message			
Contents (full)	FFFED08C9E0000007FDFFA79ED3783E0F66C		
15 HEX ID	193C000000FFBFF		
Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1
406 MHz Transmitter Parameters	**Limits**		**Measured**
	min	**max**	**current**
Frequency, MHz	406.039	406.041	406.039967
Power, dBm	35	39	36.32
Total burst duration, ms	514.80	525.20	520.45
121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121649850		
Power, dBm	12.96		
Self test 121.5 MHz transmission (<1 second or 3 sweeps)	Pass		

Table of measured parameters MT603FG at Maximum Temperature

Message			
Contents (full)	FFFED08C9E0000007FDFFA79ED3783E0F66C		
15 HEX ID	193C000000FFBFF		
Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1
406 MHz Transmitter Parameters	**Limits**		**Measured**
	min	**max**	**current**
Frequency, MHz	406.039	406.041	406.039926
Power, dBm	35	39	36.33
Total burst duration, ms	514.80	525.20	520.25
121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121648983		
Power, dBm	13.15		
Self test 121.5 MHz transmission (<1 second or 3 sweeps)	Pass		

Table of measured parameters MT603FG at Minimum Temperature

Message			
Contents (full)	FFFED08C9E0000007FDFFA79ED3783E0F66C		
15 HEX ID	193C000000FFBFF		
Test duration 0 h 0 m	Bursts received 1	BCH error 0	Self-Test 1
406 MHz Transmitter Parameters	**Limits**		**Measured**
	min	**max**	**current**
Frequency, MHz	406.039	406.041	406.039972
Power, dBm	35	39	36.43
Total burst duration, ms	514.80	525.20	520.40
121.5 MHz Transmitter Parameters			
Carrier Frequency, Hz	121649788		
Power, dBm	12.78		
Self test 121.5 MHz transmission (<1 second or 3 sweeps)	Pass		

Table 14.1 – Status of indication during self-test.

Parameter	Result
Distinct indication of self-test start	The BUT beeps once and simultaneously the flashes by white stro-belight once indicating that the self-test has started.
Distinct indication of RF-power being emit-	The BUT flashes by green LED indicating that the RF-power has

ted	emitted.
Indication of the self-test result	A long green LED indicates the EPIRB has completed and passed all the tests.
Distinct indication of insufficient battery capacity	After start the self-test the BUT beeps and flashes by red LED with simultaneously flashes by green LED indicating that the excessive number of self tests have been preformed.
Automatic termination of the self-test mode upon completion of the self-test and indication of the self-test results	The self-test mode automatically terminates upon completion of the self-test and indication of the self-test results.

Decoding Beacon Message
Full-HEX: FFFED08C9E0000007FDFFA79ED3783E0F66C

ITEM	**BITS**	**VALUE**
Bit synchronization: 0x7FFF	1- 15	1111 111 1111 1111
Frame synchronization: 0x2F	16- 24	0 1101 0000
Protocol: Long Standard Location Protocol		
Format Flag: Long Message	25	1
Protocol Flag: Standard/National Protocol	26	0
Country Code: 201 - Albania	27- 36	00 1100 1001
Identification type (protocol code): Standard Test Location Protocol	37- 40	1110
Binary data (24 bits, i.e. max=0xFF FFFF): 0x00 0000	41- 64	0000 0000 0000 0000 0000 0000
Latitude: Undefined		
Latitude Base: Undefined	65- 74	01 1111 1111
Longitude: Undefined		
Lonitude Base: Undefined	75- 85	011 1111 1111
BCH1: 0x09 E7B4	86-106	0 1001 1110 0111 1011 0100
Fixed bits (4 bits = 1101): 0xD	107-110	1101
Position data source: Internal	111	1
Auxiliary Radio Locating Device: 121.5 MHz Radio Locating Device Included	112	1
Latitude Delta: Undefined	113-122	10 0000 1111
Longitude Delta: Undefined	123-132	10 0000 1111
BCH2: 0x66C	133-144	0110 0110 1100

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	KTK-800	24708	10.2016
2.	Temperature meter	gradient 2002	078	01.2017
3.	Hygrometer digital	HP 22-A	60974546	09.2016
4.	Beacon tester	BT100AVS	2315	07.2016
5.	Beacon tester	BT-611	1005	11.2016
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 15.
AUTOMATIC RELEASE MECHANISM AND AUTOMATIC ACTIVATION TESTS (A14.0)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 21.04.2016-22.04.2016
Test Conditions:
- Atmospheric pressure: 755 – 758 mm/Hg
- Relative air humidity: 57 – 65 %
- Temperature
  Minimum: -30 °C
  Maximum: +70 °C
  Ambient: +21.5 °C

TEST DESCRIPTION

The automatic release mechanism and the assembly should be mounted on a fixture simulating a deck or a bulkhead as per manufacturer's installation instructions. The fixture should then be submerged in water as specified below.

The EUT should float free before reaching a depth of 4 meters and should automatically activate.

The test should then be conducted at ambient temperature except as specified below with the EUT rotated in each instance prior to immersion.
1. Normal mounted orientation
a. EUT (including automatic release mechanism and assembly) at minimum stowage temperature
b. EUT (including automatic release mechanism and assembly) at maximum stowage temperature
c. EUT (including automatic release mechanism and assembly) at ambient temperature
2. Rolling 90° starboard
3. Rolling 90° port
4. Pitching 90° bow down
5. Pitching 90° stern down
6. Upside down

Activation should be verified by observing operation of the strobe light.

TEST RESULT

During the tests at the extreme temperatures EUT was installed in a climatic chamber and maintained for 2 hours at the extreme temperatures. Tests for float-free arrangements were performed during 5 minutes after extracting EUT from the climatic chamber.

Activation was verified by observing operation of the strobe light.

TEST DETAILS

Figure 15.1 – The satellite EPIRB automatically released at normal orientation after maintained at minimum storage temperature.

Figure 15.2 - The satellite EPIRB automatically released at normal orientation after maintained at maximum storage temperature.

Figure 15.3 - The satellite EPIRB automatically released at normal orientation at ambient temperature.

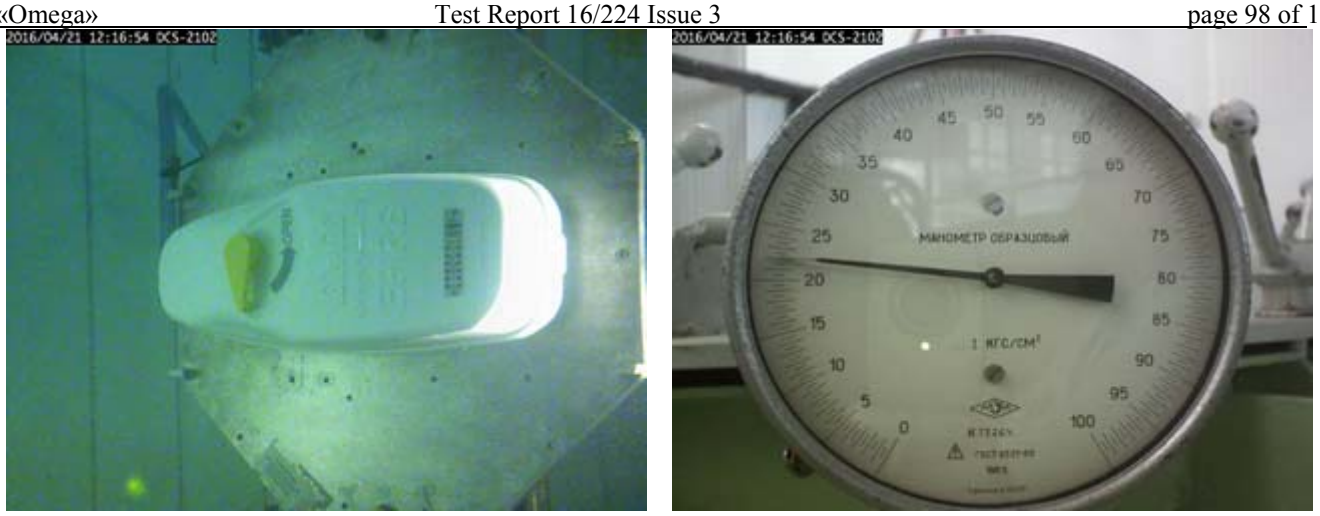


Figure 15.4 - The satellite EPIRB automatically released at Rolling 90° starboard orientation

Figure 15.5 - The satellite EPIRB automatically released at Rolling 90° port orientation

Figure 15.6 - The satellite EPIRB automatically released at Pitching 90° bow down orientation

Figure 15.7 - The satellite EPIRB automatically released at Pitching 90° stern down orientation

Figure 15.8 - The satellite EPIRB automatically released at Upside down orientation

FINAL RESULTS OF AUTOMATIC RELEASE MECHANISM AND AUTOMATIC ACTIVATION TESTS (A15.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COM-MENTS (PASS/FAULT)
Normal mounted orientation (after min stowage temperature)	< 4	m	3.56	PASS
Normal mounted orientation (after max stowage temperature)	< 4	m	0.80	PASS
Normal mounted orientation	< 4	m	2.50	PASS
Rolling 90° starboard	< 4	m	2.20	PASS
Rolling 90° port	< 4	m	2.20	PASS
Pitching 90° bow down	< 4	m	3.32	PASS
Pitching 90° stern down	< 4	m	2.37	PASS
Upside down	< 4	m	2.15	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Manometer	MO	77264	06.2016
2	Set of hydrostatic testing	EDVIGA	101456	12.2018
3	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
4	Temperature meter	gradient 2002	078	01.2017

ANNEX 16.
STABILITY AND BUOYANCY TEST (A15.0)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 19.04.2016
Test Conditions:

- Ambient temperature: 20.9 °C
- Atmospheric pressure: 753 mm/Hg
- Relative air humidity: 57 %

TEST DESCRIPTION

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

TEST RESULT

- Step 1. The EUT was, when rotated to a horizontal position about any axis, submerged just below the surface.
- Step 2. The EUT was released and passes through an upright position within 1.22 seconds.
- Step 3. The distance from the waterline to the base the antenna was measured while the EUT floated upright in calm fresh water.
- Step 4. The EUT was submerged in water.
- Step 5. The buoyant force was measured with dynamometer:
  Buoyancy force: 1.47 N (i.e. 0.150 kg)
  The EUT weight: 0.556 kg
- Step 6. The reserve buoyancy was calculated by dividing the measured buoyant force by the weight of the unit.
  0.150 / 0.556 = 0.269

Figure 16.1 – Buoyancy test

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

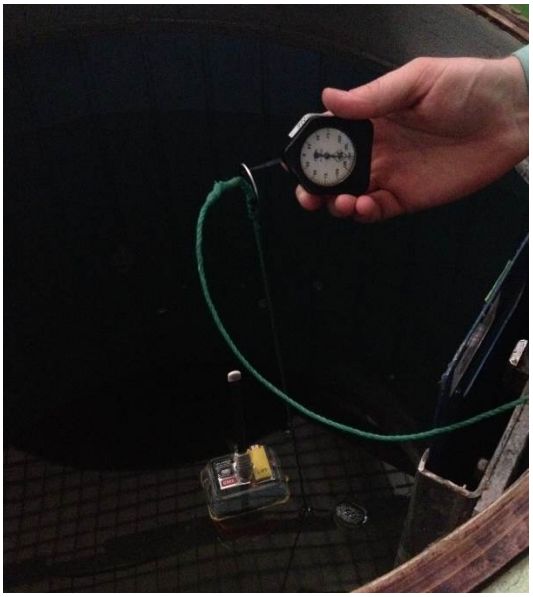


Figure 16.3 – Measuring of buoyant force

Figure 16.4 – Dynamometer

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Stability	≤ 2	s	1.22	PASS
• Buoyancy	> 5	%	27	PASS
• Float upright; Antenna base	> 40	mm	78	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Set of buoyancy	-	101173	01.2018
2	Set of stability	-	101175	05.2019
3	Scale	CAS AD-10H	60400410	12.2016
4	Dynamometer	Г25-150	13465	12.2016
5	Ruler	Lineyka-1000	64	12.2016

ANNEX 17.
INADVERTENT ACTIVATION TEST (A16.0)

Equipment Under Test (EUT): MT603G
MT603FG
SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 18.04.2016
Test Conditions:

- Ambient temperature: 23 °C
- Atmospheric pressure: 753 mm/Hg
- Relative air humidity: 54 %

TEST DESCRIPTION

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

TEST RESULT

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

Figure 17.1 – EUT (MT603G) mounted on the rotatable support before test.

Figure 17.2 – EUT (MT603FG) mounted on the rotatable support before test.

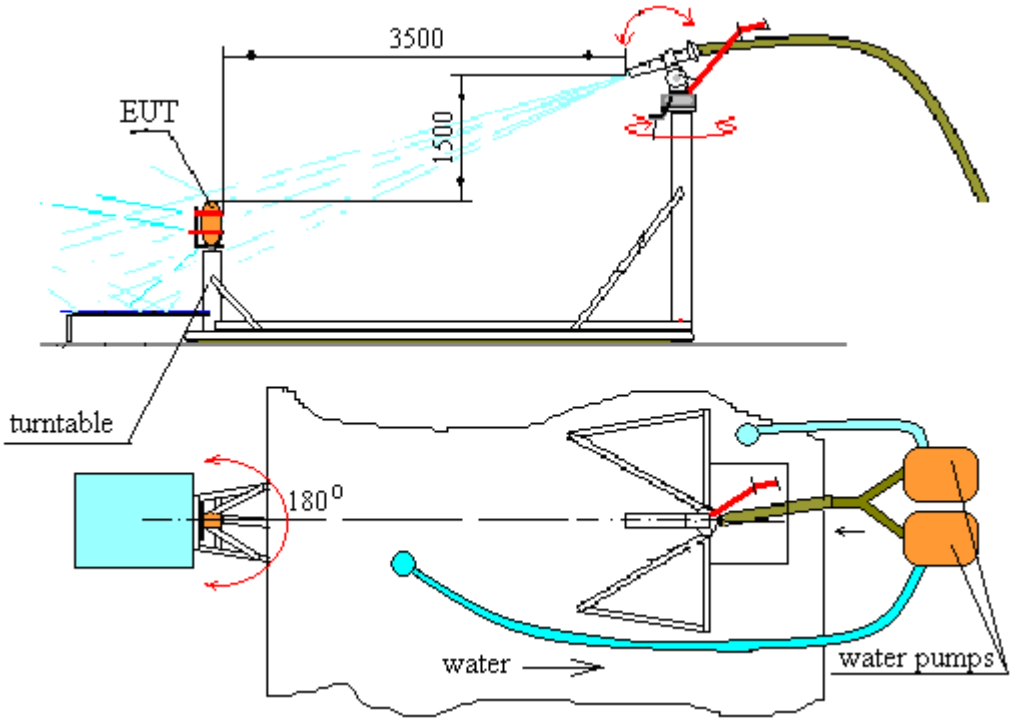


Figure 17.3 – General view of the test setup MT603G

Figure 17.4 – General view of the test setup MT603FG

Figure 17.5 - The water strikes EUT (MT603G) in an arc of 180º.

Figure 17.6 - The water strikes EUT (MT603FG) in an arc of 180º.

Figure 17.7 - View of EUT (MT603G) upon completion of inadvertent activation test

Figure 17.8 - View of EUT (MT603FG) upon completion of inadvertent activation test

FINAL RESULTS OF THE MT603G AND MT603FG OF INADVERTENT ACTIVATION TEST (A16.0 RTCM 11000.2 Version 2.1):

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

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1	Beacon tester	BT-611	1005	11.2016
2	Installation of water washing	-	101174	04.2018
3	Stopwatch	SOSpr-2b-2	2388	10.2018

ANNEX 18.
121.5 MHz AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 18.05.2016
Test Conditions:
– Atmospheric pressure: 753-755 mm/Hg
– Relative air humidity: 51-58 %
– Temperature
Minimum: -20 °C
Maximum: +55 °C
Ambient: +20 °C

TEST DESCRIPTION

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

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

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

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

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

4. Off ground plane radiated power test
This test is effectively a repeat of the peak effective radiated power test except that the satellite EPIRB is raised off the ground plane.
The measurement procedure included a determination of four values of PERP made by direct measurement of radiated power. Four measurements were taken every 90° ± 3° in azimuth. The four azimuth PERP measurements were made at the same elevation angle; the elevation used was the angle between 5° and 20° for which the EUT exhibits a maximum antenna gain.

– StepNo. 1
Carrier Frequency Test(D.3 a)
Condition: The carrier frequency was measured at the minimum and maximum operating temperatures.

– Step No. 2
Transmitter Duty Cycle(D.3 c)
Condition: During the observation of the transmitted signal the carrier was not interrupted (except for up to two seconds during transmission of the 406 MHz pulse).

– Step No. 3

Modulation Characteristics(D.3 d)

Condition for Modulation Frequency and Sweep Repetition Rate Measurement: During the observation of the modulation envelope the upper and lower audio-frequency sweep limits and sweep repetition rate were measured.

– Step No. 4

Modulation Characteristics(D.3 d)

Condition for Modulation Duty Cycle Measurement: The modulation duty cycle was measured near the start, midpoint, and end of the modulation sweep period. Modulation duty cycle was calculated using the following formula

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

– Step No. 5

Modulation Characteristics(D.3 d)

Condition for Modulation Factor Measurement: The modulation factor was defined with respect to the maximum and minimum amplitudes of the modulation envelope, by the following formula

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

– Step No. 6

Modulation Characteristics(D.3 d)

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 MHzburst.

– Step No. 7

Peak Effective Radiated Power (D.3 b)

Condition for Peak Effective Radiated Power Measurement: This test was performed at ambient temperature for the EUT whose battery had been ON for a minimum of 44 hours.

The test site was positioned on the ground with uniform electrical characteristics. The site was clear of metal objects, overhead wires, etc., and was as free as possible from undesired signals such as ignition noise or other RF carriers. The distance from the EUT, or the search antenna to reflecting objects was more than 30 m. The EUT was placed in the center of a ground plane with a radius of 75 cm ± 5 cm mounted on the ground level.The EUT was positioned vertically such that the ground plane was at the nominal waterline. The ground plane was resting on the ground and extended so that it completely enclosed and presented a snug fit to the below waterline portion of the EUT.

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

Note. The PERP measurement was performed on OATS which is compliant with CISPR requirements.

– Step No. 8

Off ground plane radiated power test (D.4.3)

Condition for off ground plane 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 the same as used in C/S T.007 Figure B.5 except that the distancebetween the Beacon Under Test and the RF Receiver was10 m (not 3 m). The RFAMmaterial was positioned such that the centre of the 3.6 m by 2.4 m section of RFAM was positioned at the specular reflection point for the ground reflected path signal between the EUT and the spectrum analyzer positioned at the elevation angle between 5° and 20°for which the EUT exhibits a maximum antenna gain. The EUTwas mounted on a nonconductivewooden stand that raised the height of the base ofthe EUT450 mm ± 25 mm above ground level.

The method of measurement was the same as in Step No.6 except that only 4 azimuthmeasurements were made at 90° ± 3°intervals.

TEST RESULT

Minimum Operating Temperature

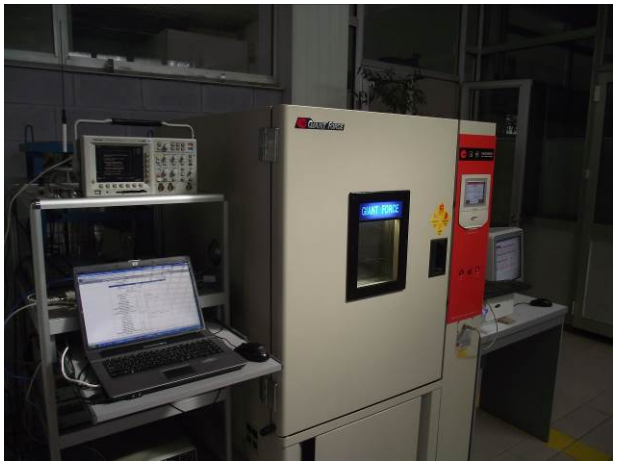


Figure 18.1 – Site for Carrier Frequency Test and Modulation Characteristic Measurement at the minimum, ambient and maximum operating temperatures

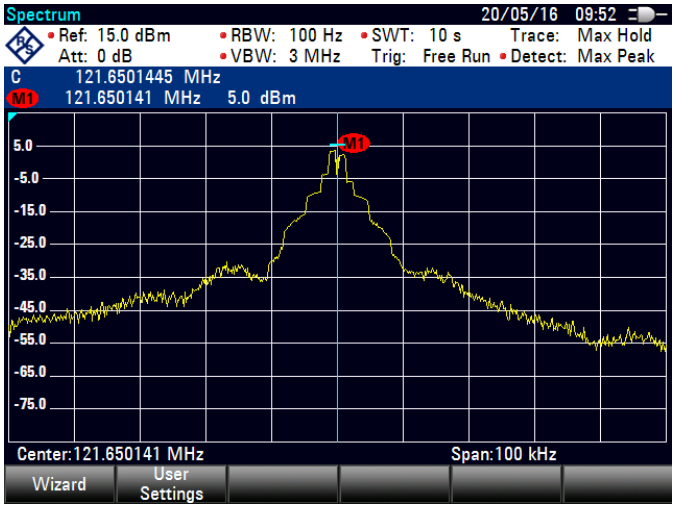


Figure 18.2 – Screenshot of Carrier Frequency Test Result at the minimum operating temperature

Frequency Coherence Measurement Test Result:
(i) Set the spectrum analyzer controls as follows:

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

(ii) Record the amplitude in dBm. (Figure 18.3)

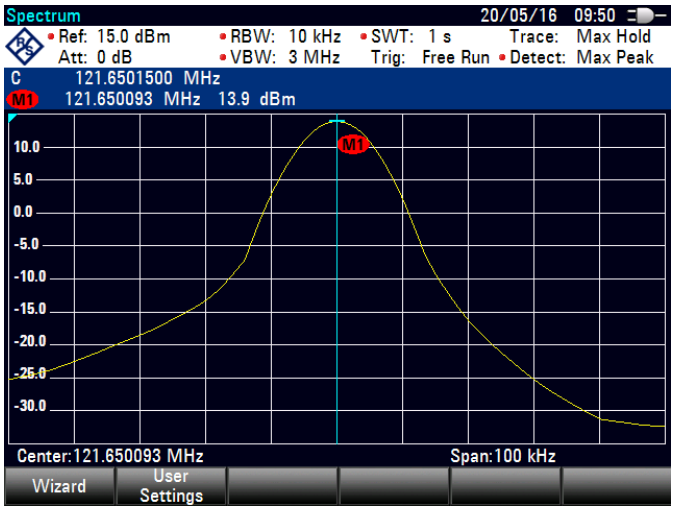


Figure 18.3 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the minimum operating temperature

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

(iv) Set the spectrum analyzer controls as follows:

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

(v) Measure and record the carrier power dBm as displayed on the spectrum analyzer (Figure 18.4).

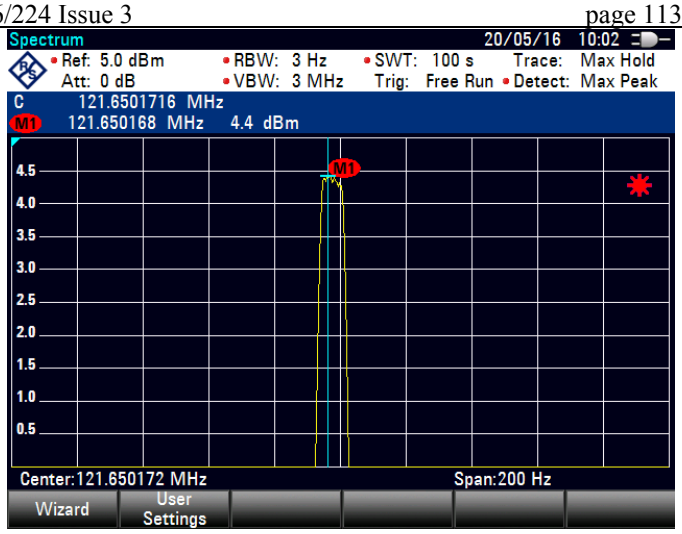


Figure 18.4 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at narrow band) at the minimum operating temperature

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

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

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

TEST RESULTS

Output power measurement at the antenna connector as persteps (i)and (ii) is 13.9dBm.

Mean power calculated as perstep (iii) is 13.9 + 10log(D), where D is the modulationduty cycle. In the worst case D is 32.00%, therefore mean power is 13.9 + 10 log(0.32) = 8.95dBm
Carrier power that measured with 3 Hz I.F. bandwidth is 5dBm.
Ratio of carrierpower to mean power is 40.27 %.

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{\text{dBc-dBmean}}{10}} = 10^{\frac{5-8.95}{10}} = 0.4027$$

Carrier power is below of the mean power by 3.95dB.
40.27% of the total power is shown to be within ±3Hz of the carrier frequency.

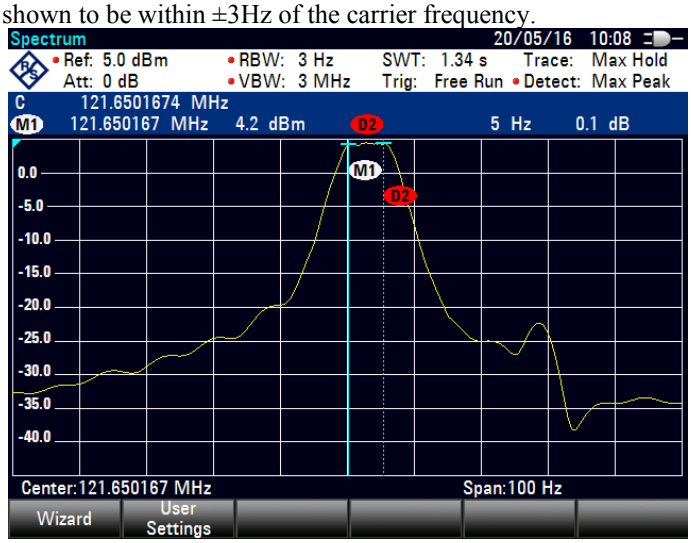
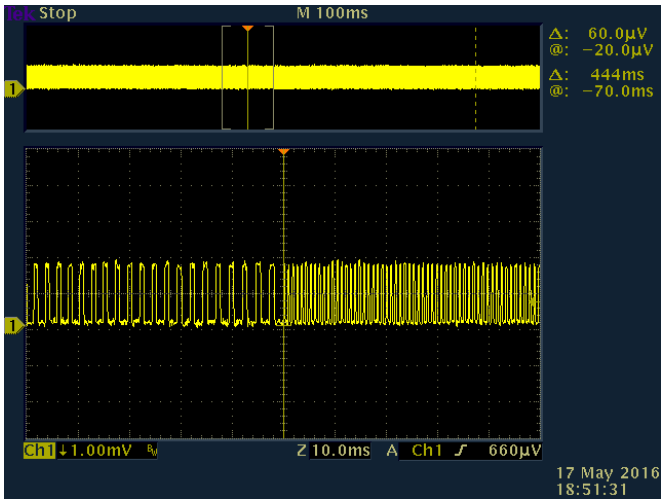


Figure 18.5 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the minimum operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst (M1) and after the interruption for the 406 MHz RF burst (D2)

The carrier frequency does not vary by more than ±5Hz during the interruption for a 406MHz transmission. See Figures 18.5.



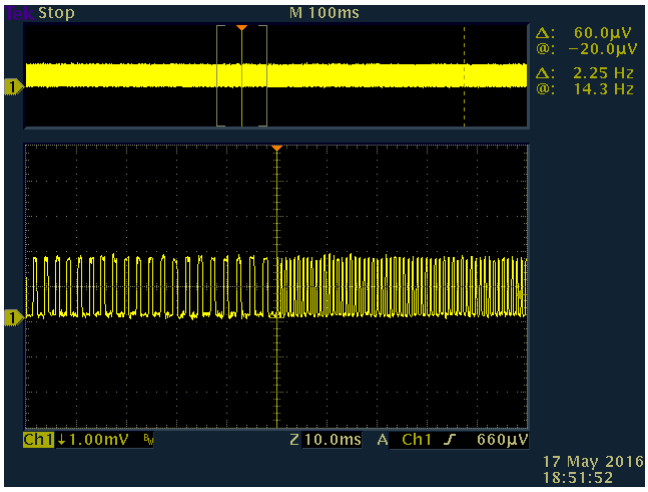


Figure 18.6 – Screenshot of Sweep repetition rate Test Result at the minimum operating temperature

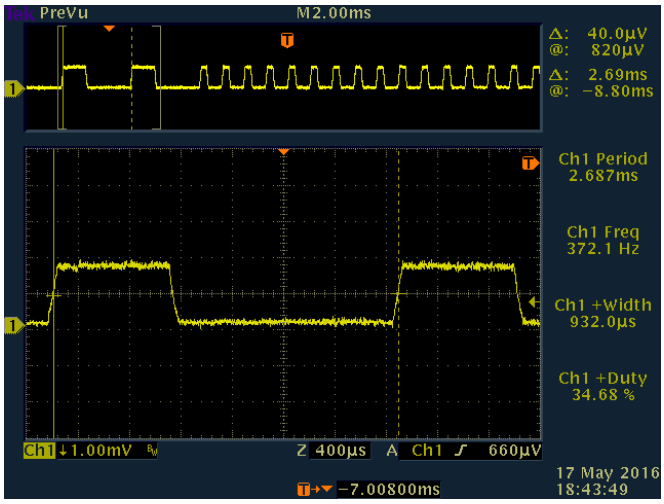


Figure 18.7 – Screenshot of Demodulation Waveform (A) measured start of the modulation sweep period at the minimum operating temperature

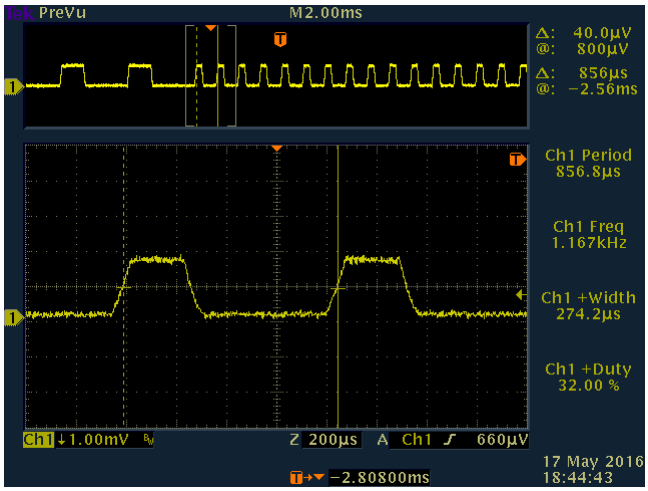


Figure 18.8 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the minimum operating temperature

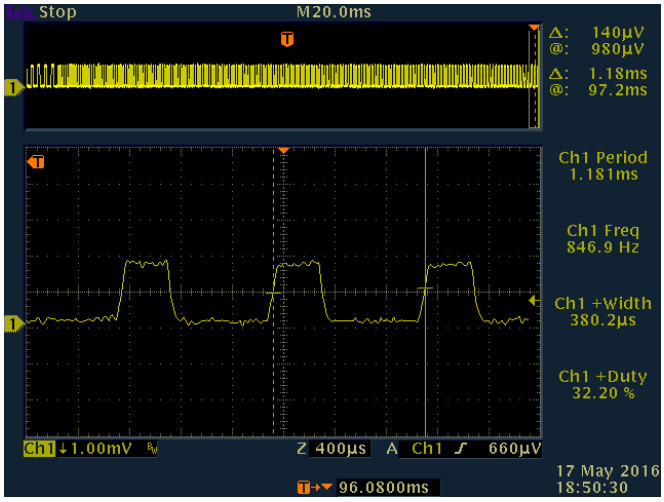


Figure 18.9 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the minimum operating temperature

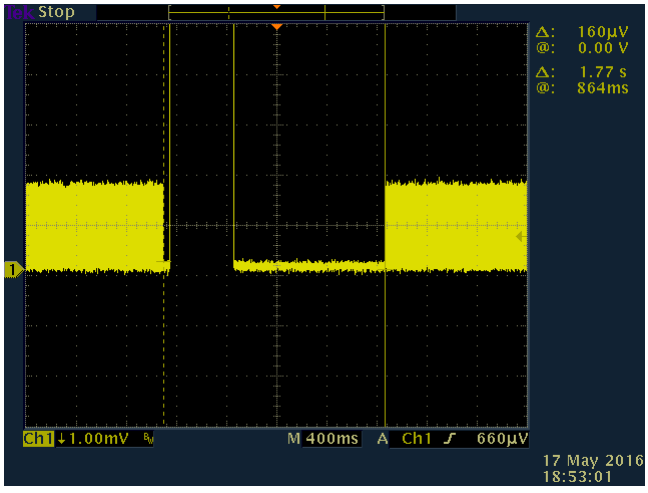


Figure 18.10 – Screenshot of Transmitter Duty Cycle Test Result at the minimum operating temperature

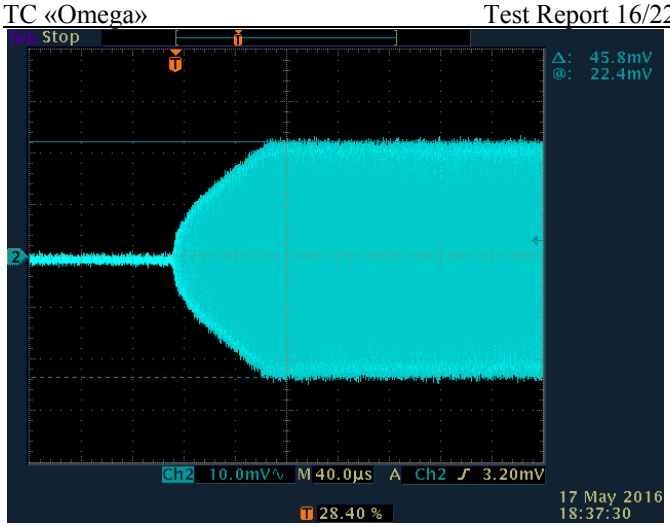


Figure 18.11 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the minimum operating temperature

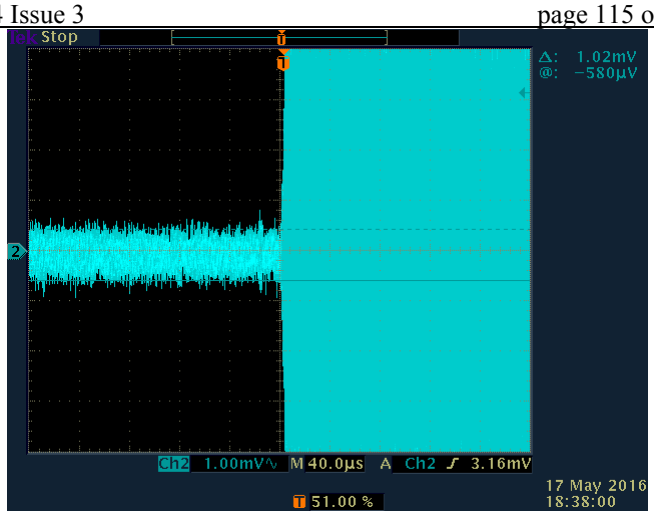


Figure 18.12 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the minimum operating temperature

$$Modulation\ \ Factor = \frac{A-B}{A+B} = \frac{45.8-1.02}{45.8+1.02} = 95.27\%$$

Maximum Temperature

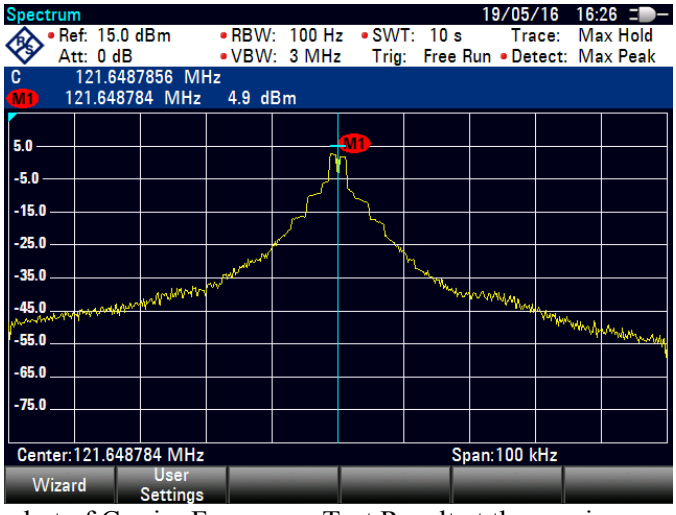


Figure 18.13 – Screenshot of Carrier Frequency Test Result at the maximum operating temperature

Frequency Coherence Measurement Test Result:

(i) Set the spectrum analyzer controls as follows:

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

(ii) Record the amplitude in dBm. (Figure 18.14)

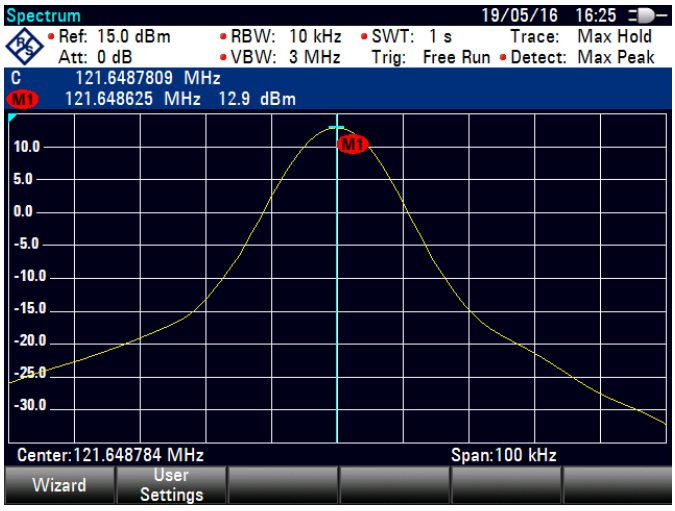


Figure 18.14 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the maximum operating temperature

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

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

(v) Measure and record the carrier power dBm as displayed on the spectrum analyzer (Figure 18.15).

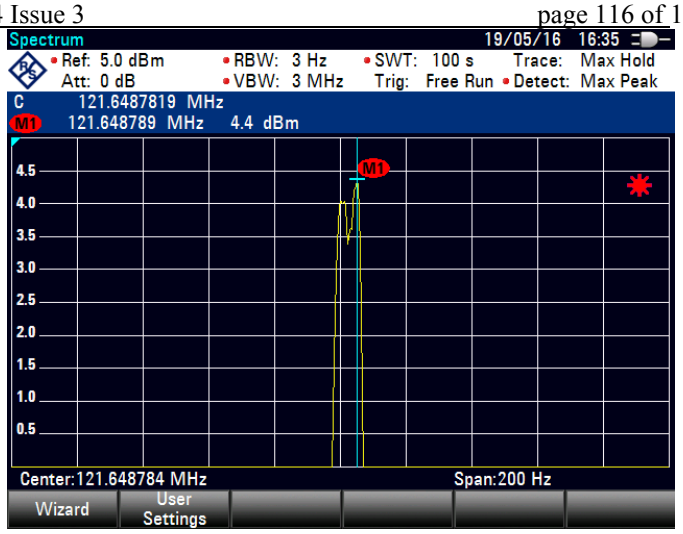


Figure 18.15 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at narrow band) at the maximum operating temperature

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

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

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

TEST RESULTS

Output power measurement at the antenna connector as per steps (i) and (ii) is 12.9dBm.

Mean power calculated as perstep (iii) is 12.9 + 10log(D), where D is the modulation duty cycle. In the worst case D is 36.41%, therefore mean power is 12.9 + 10 log(0.3641) = 8.51dBm

Carrier power that measured with 3 Hz I.F. bandwidth is 4.9dBm.

Ratio of carrier power to mean power is 43.55%.

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{\text{dBc-dBmean}}{10}} = 10^{\frac{4.9-8.51}{10}} = 0.4355$$

Carrier power is below of the mean power by 3.61dB.
43.55% of the total power is shown to be within ±3Hz of the carrier frequency.

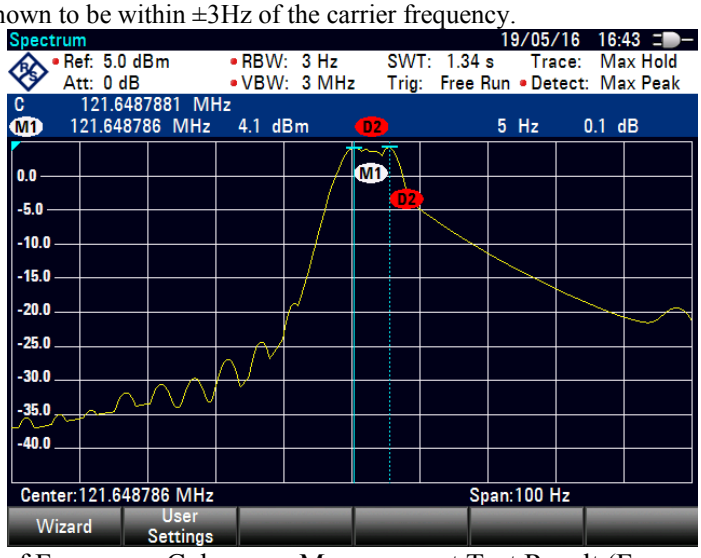
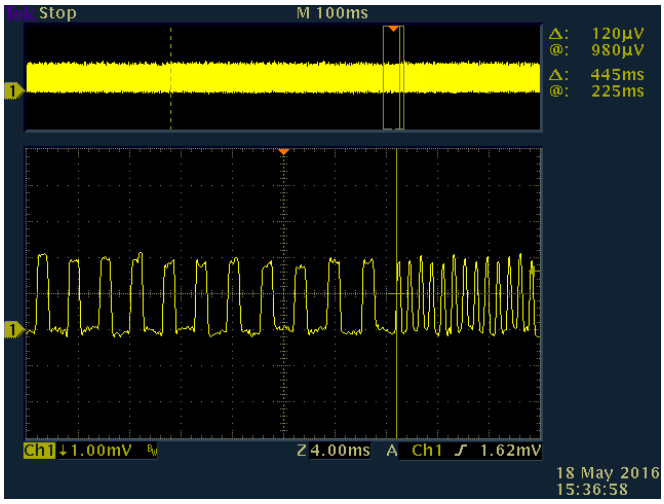


Figure 18.16 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the maximum operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst (M1) and after the interruption for the 406 MHz RF burst (D2)

The carrier frequency does not vary by more than ±5Hz during the interruption for a 406MHz transmission. See Figures 18.16.



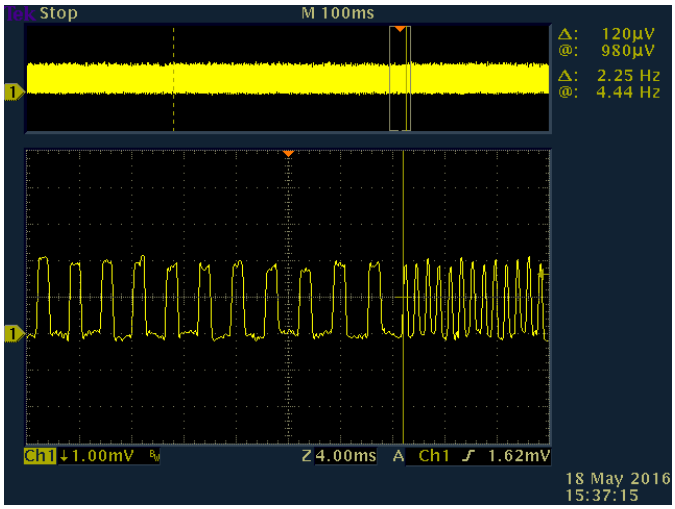


Figure 18.17 – Screenshot of Sweep repetition rate Test Result at the maximum operating temperature

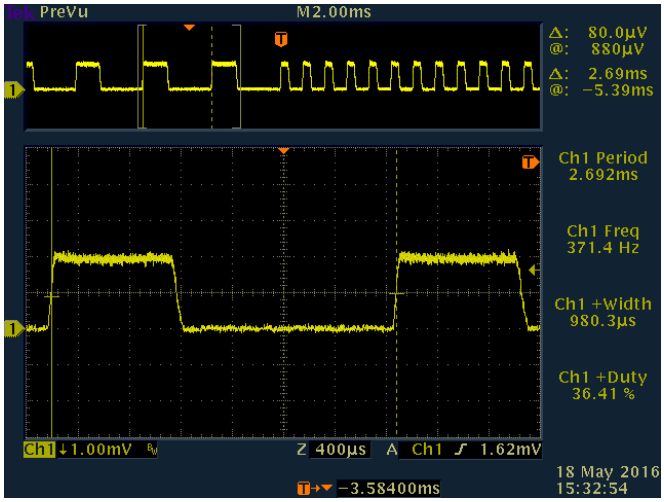


Figure 18.18 – Screenshot of Demodulation Waveform (A) measured start of the modulation sweep period at the maximum operating temperature

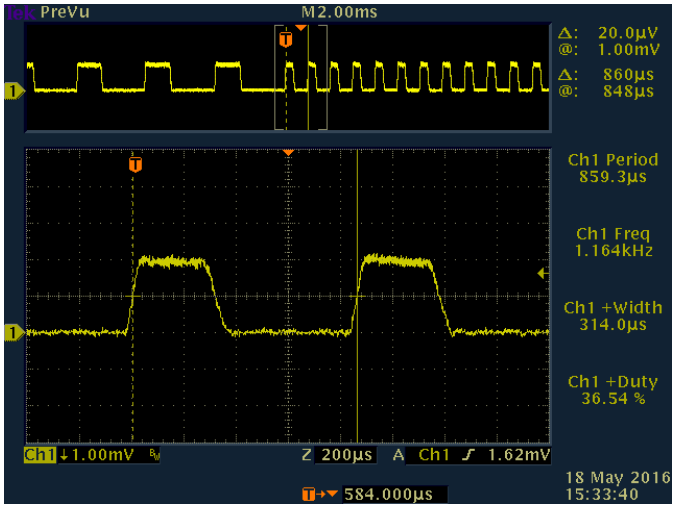


Figure 18.19 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the maximum operating temperature

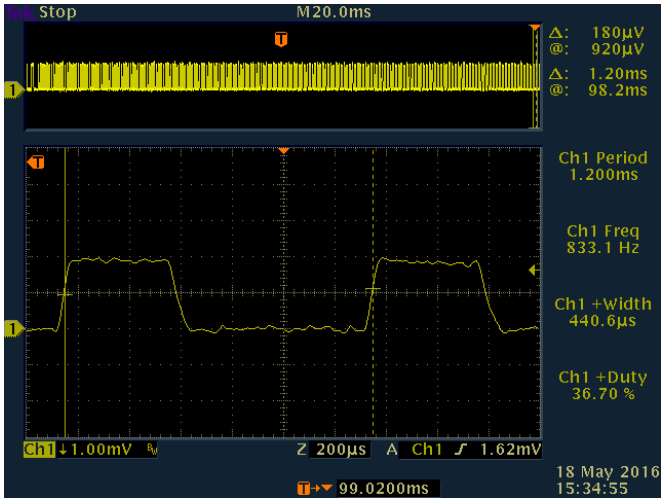


Figure 18.20 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the maximum operating temperature

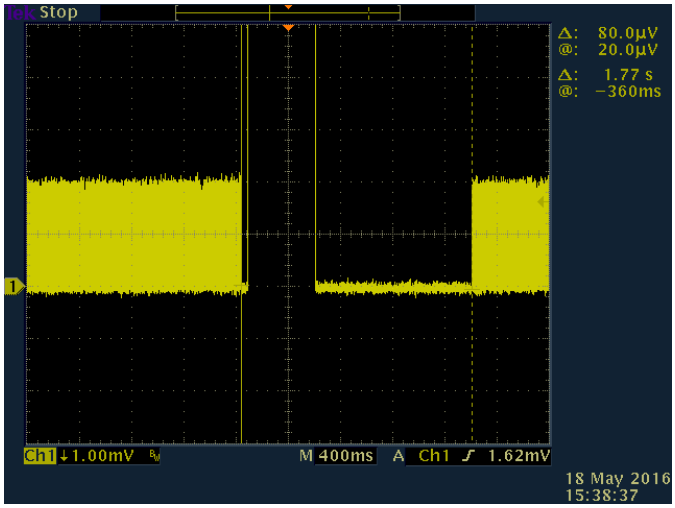


Figure 18.21 – Screenshot of Transmitter Duty Cycle Test Result at the maximum operating temperature

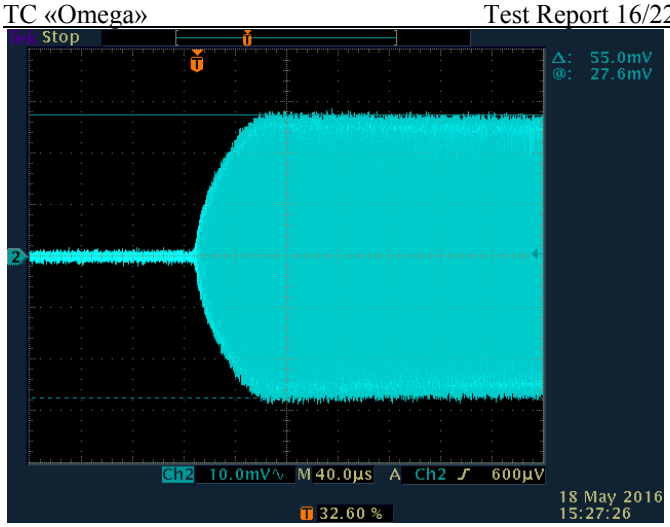


Figure 18.22 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the maximum operating temperature

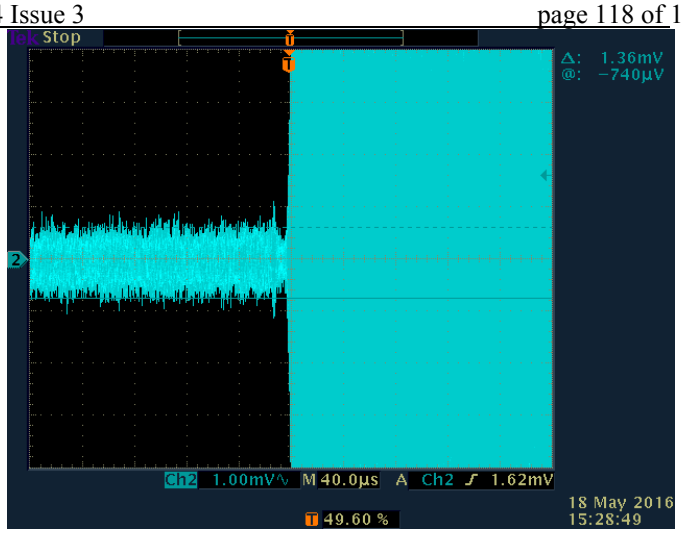


Figure 18.23 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the maximum operating temperature

$$Modulation\ \ Factor = \frac{A-B}{A+B} = \frac{55.0-1.36}{55.0+1.36} = 95.17\%$$

Ambient Temperature

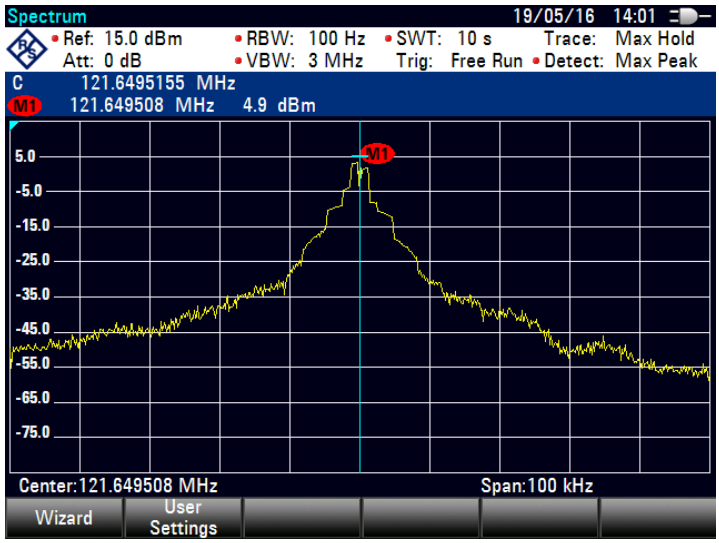


Figure 18.24 – Screenshot of Carrier Frequency Test Result at the ambient operating temperature

Frequency Coherence Measurement Test Result:

(i) Set the spectrum analyzer controls as follows:

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

(ii) Record the amplitude in dBm. (Figure 18.25)

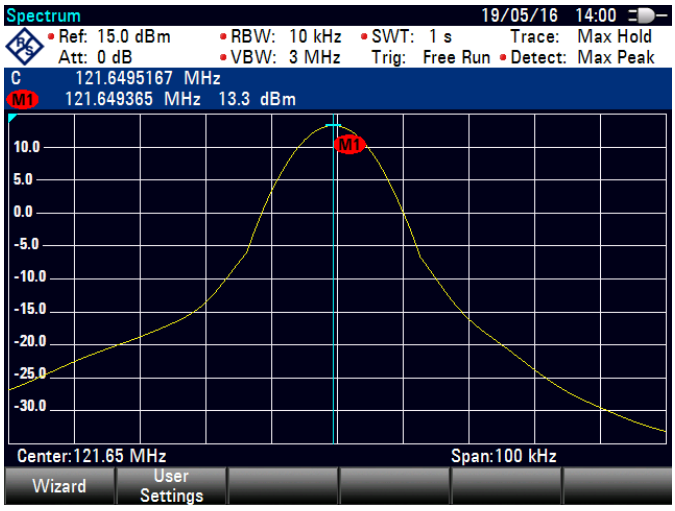


Figure 18.25 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at wide band) at the ambient operating temperature

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

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

(v) Measure and record the carrier power dBm as displayed on the spectrum analyzer (Figure 18.26).

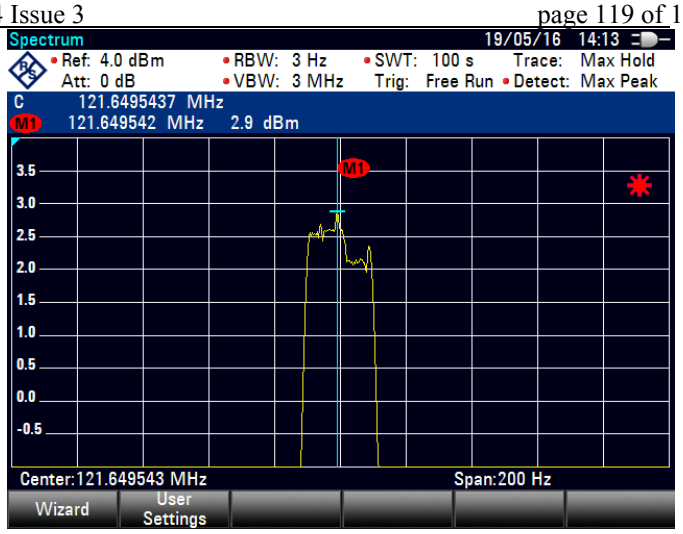


Figure 18.26 – Screenshot of Frequency Coherence Measurement Test Result (transmitted power at narrow band) at the ambient operating temperature

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

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

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

TEST RESULTS

Output power measurement at the antenna connector as per steps (i) and (ii) is 13.3dBm.
Mean power calculated as perstep (iii) is 13.3 + 10log(D), where D is the modulation duty cycle. In the worst case D is 34.02%, therefore mean power is 13.3 + 10log(0.3402) = 8.62dBm

Carrier power that measured with 3 Hz I.F. bandwidth is 4.9dBm.

Ratio of carrier power to mean power is 34.28 %.

$$\frac{Carrier\_power}{Mean\_power} = 10^{\frac{\text{dBc-dBmean}}{10}} = 10^{\frac{4,9-8,62}{10}} = 0.4246$$

Carrier power is below of the mean power by 3.72dB.
42.46% of the total power is shown to be within ±3Hz of the carrier frequency.

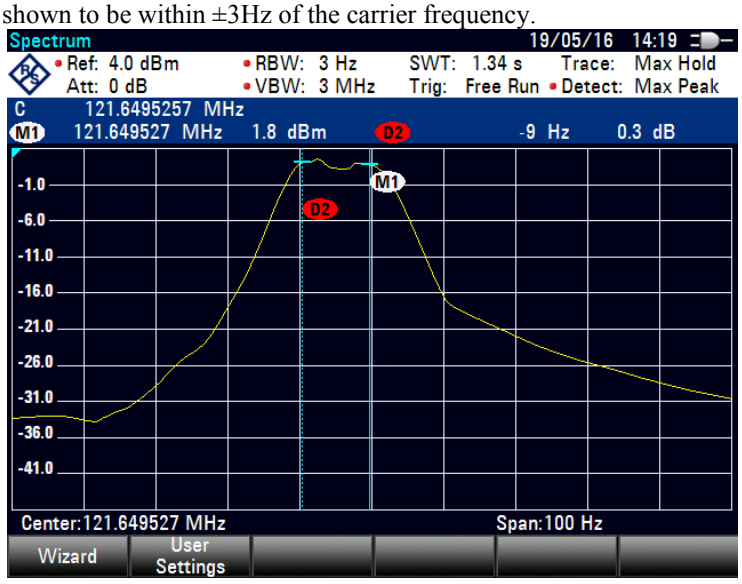
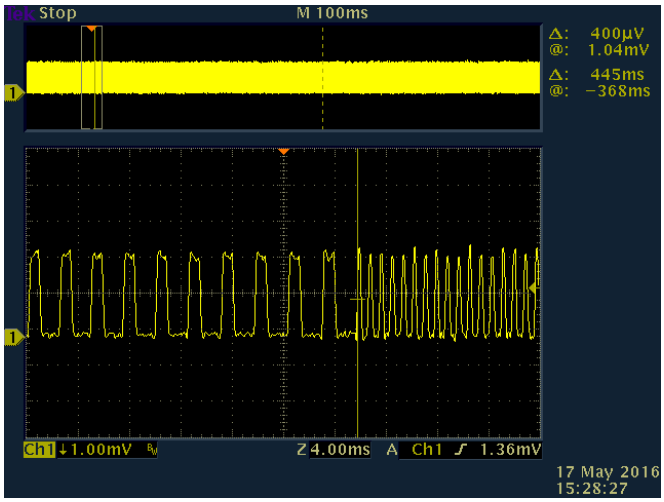


Figure 18.27 – Screenshot of Frequency Coherence Measurement Test Result (Frequency Shift) at the ambient operating temperature. Transmitted RF (121.5 MHz) before the interruption for the 406 MHz RF burst (M1) and after the interruption for the 406 MHz RF burst (D2)

The carrier frequency does not vary by more than ±5Hz during the interruption for a 406MHz transmission. See Figures 18.27.



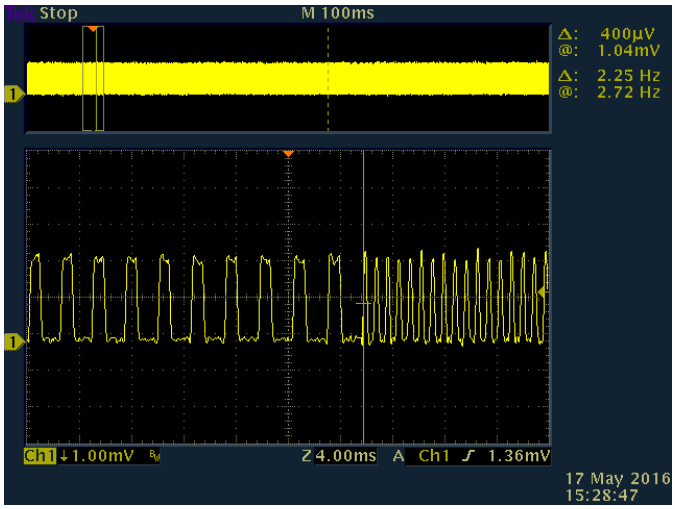


Figure 18.28 – Screenshot of Sweep repetition rate Test Result at the ambient operating temperature

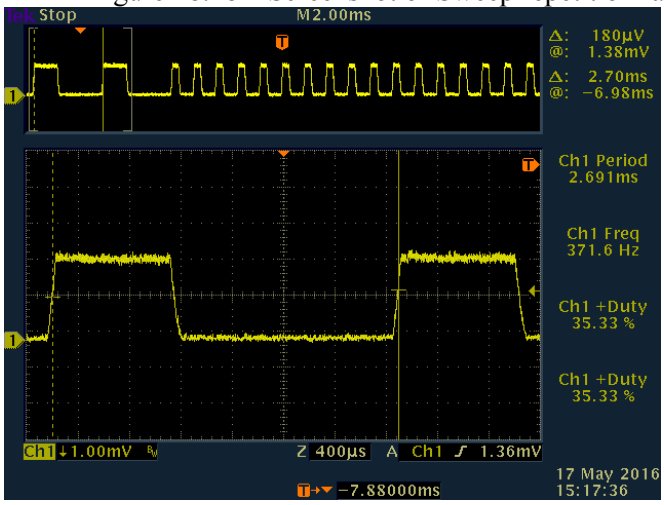


Figure 18.29 – Screenshot of Demodulation Waveform (A) measured start of the modulation sweep period at the ambient operating temperature

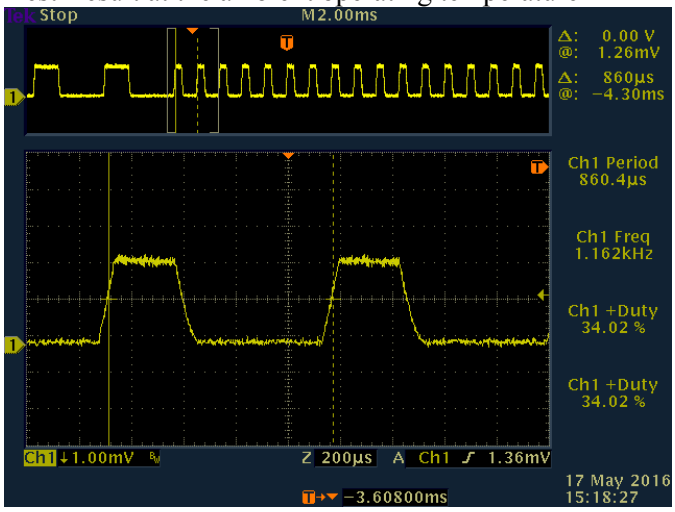


Figure 18.30 – Screenshot of Demodulation Waveform (A) measured near midpoint of the modulation sweep period at the ambient operating temperature

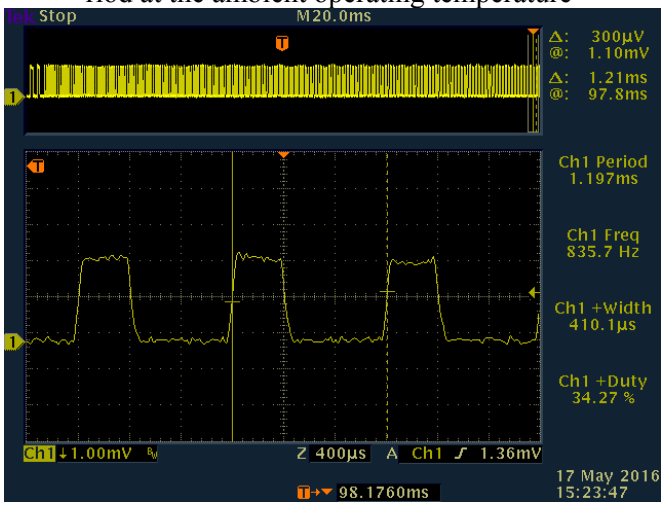


Figure 18.31 – Screenshot of Demodulation Waveform (A) measured near end of the modulation sweep period at the ambient operating temperature

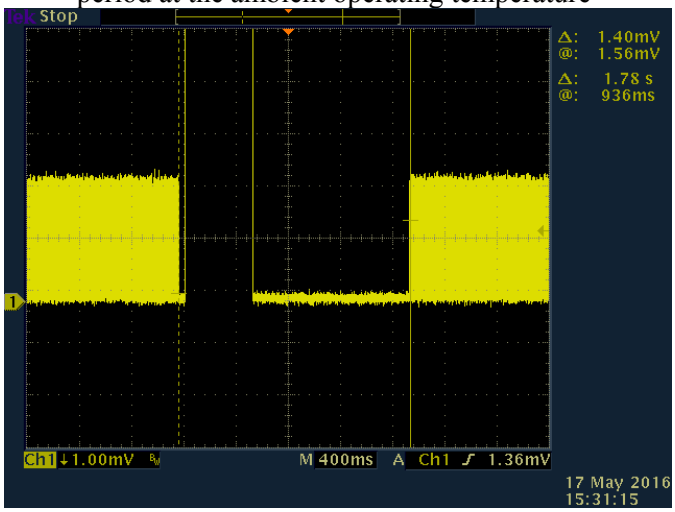


Figure 18.32 – Screenshot of Transmitter Duty Cycle Test Result at the ambient operating temperature

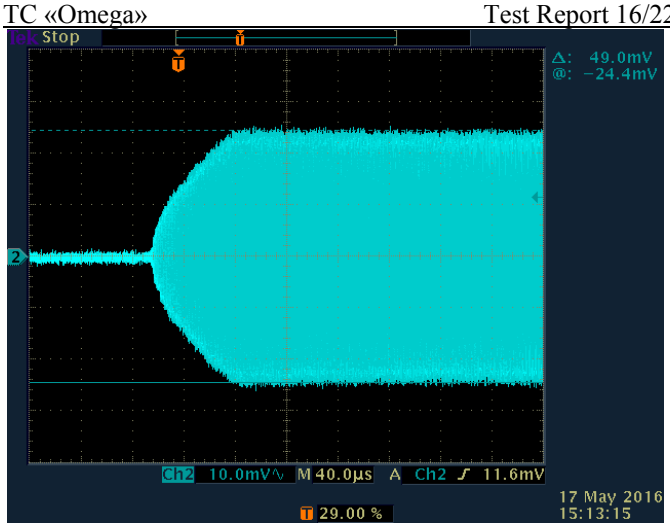


Figure 18.33 – Screenshot of maximum amplitude signal for determination of the Modulation Factor at the ambient operating temperature

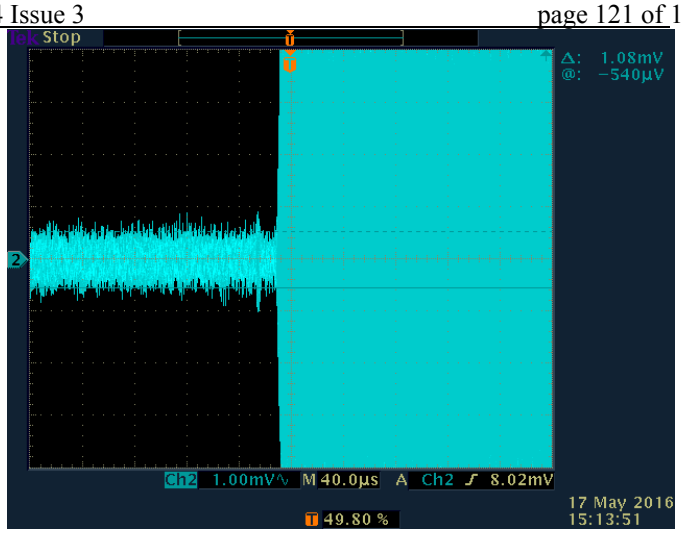


Figure 18.34 – Screenshot of minimum amplitude signal for determination the Modulation Factor at the ambient operating temperature

$$Modulation\ \ Factor = \frac{A-B}{A+B} = \frac{49.0-1.08}{49.0+1.08} = 95.68\%$$

Peak Equivalent Isotropic Radiated Power

On Ground Plane Radiated Power Test

Table 18.1 - Elevation Maximum search of Peak Equivalent Isotropic Radiated Power

Elevation, degrees	Antenna gain,dBi	Receive system attenuator and cable loss, dB	Free space propagation loss, dB	PEIRP, dBm
5	1.10	1.10	34.173	12.3
10	1.10	1.10	34.272	13.9
15	1.10	1.10	34.441	14.3
20	1.10	1.10	34.680	14.4

Table 18.2 - Peak Equivalent Isotropic Radiated Power

Elevation, degrees	Azimuth, degrees	Antenna gain,dBi	Receive system attenuator and cable loss, dB	Free space propagation loss, dB	PEIRP, mW	PEIRP, dBm
20	0	1.10	1.10	34.67	26.9	14.3
20	30	1.10	1.10	34.67	30.2	14.8
20	60	1.10	1.10	34.67	34.7	15.4
20	90	1.10	1.10	34.67	35.5	15.5
20	120	1.10	1.10	34.67	30.9	14.9
20	150	1.10	1.10	34.67	33.9	15.3
20	180	1.10	1.10	34.67	27.5	14.4
20	210	1.10	1.10	34.67	30.2	14.8
20	240	1.10	1.10	34.67	35.5	15.5
20	270	1.10	1.10	34.67	30.9	14.9
20	300	1.10	1.10	34.67	29.5	14.7
20	330	1.10	1.10	34.67	33.1	15.2

The median of twelve values was 31.5 mW (14.9 dBm).
Of the highest 11 values, the maximum was 35.5 mW and the minimum was 26.9 mW.
The ratio of maximum to minimum values is 1.3:1 (1.1 dB).

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

Parameters To Be Measured During Tests	Range Of Specification	Units	Test Results			Comments
			T_{min}. (-20 °C)	T_{amb}. (20 °C)	T_{max}. (+55 °C)	
Carrier Frequency (A17.1)	121.5 ± 0.006	MHz	121.650141	121.649508	121.648784	See fig. 17.2, 17.13, 17.24
PERP (A17.3)	14 – 20	dBm	-	14.9	-	
Modulation (A17.2)						
- Frequency	≥ 700 Hz within range of 300 – 1600 Hz	Hz	372.1 – 846.9	371.6 – 835.7	371.4 – 833.1	See fig.17.7-17.9, 17.18-17.20, 17.29-17.31
- Direction	Upward	√	√	√	√	
- Duty cycle	33 – 55	%	32.20 – 34.68	34.27 – 35.33	36.41 – 36.70	See fig. 17.7-17.9, 17.18-17.20, 17.29-17.31
- Factor	0.85 – 1.0		0.95	0.96	0.95	See fig. 17.11, 17.12, 17.22, 17.23, 17.33, 17.34
- Sweep repetition rate	2 – 4	Hz	2.25	2.25	2.25	See fig. 17.6, 17.17, 17.28
- Frequency Coherence (Total power emitted)	at least 30% of the total power emitted should be contained within ± 30 Hz of the carrier frequency	%	40.27	42.46	43.55	See fig. 17.3, 17.4, 17.14, 17.15, 17.25, 17.26
- Frequency Coherence (Frequency Shift)	< ± 30 Hz	Hz	±5	±5	±5	See fig. 17.3, 17.4, 17.14, 17.15, 17.25, 17.26
Antenna						
- Pattern	Omnidirection	√	-	√	-	
- Polarization	Vertical	√	-	√	-	
- VSWR (A17.4)	≤ 1.5:1	√	-	Not applicable	-	Antenna EPIRB not removable

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
2.	Temperature meter	Gradient -2002	078	01.2017
3.	Beacon tester	BT-611	1005	11.2016
4.	Spectrum analyzer	FSH8	105763	10.2016
5.	Oscilloscope	TDS-3052	B011258	02.2017
6.	Coaxial detector	Agilent 8471E	100104	n/a
7.	Antenna	HK116	100345	08.2016
8.	Antenna mast	ATR 2	101208	n/a
9.	OATS No.33			07.2017
10.	RFAM	Ternovnik MO	No.1	n/a
11.	Ground plane	Ug	102282	n/a

ANNEX 19.
HUMIDITY TEST (A18.0)

Equipment Under Test (EUT): MT603FG

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 05.05.2016
Test Conditions:

- Ambient temperature: 21.9 °C
- Relative humidity: 56-65 %
- Atmospheric pressure: 759 mm/Hg

TEST DESCRIPTION

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

TEST RESULT

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

Figure 19.1 - View of the MT603FG with the opened housing before the humidity test


Figure 19.2 - View of the modified MT603FG installed in climatic chamber

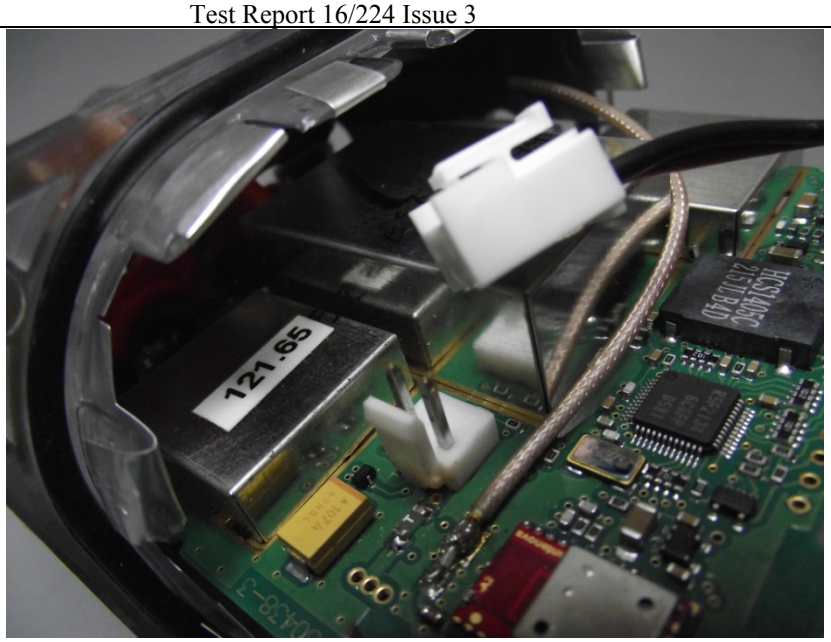


Figure 19.3 - View of the PCB upon completion of the humidity test

Table 19.1 — Results of the aliveness test of the MT603FG upon completion of the humidity test

Test duration 0 h 20 m		Bursts received 24	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters		**Limits**		**Measured**		
		min	**max**	**min**	**current**	**max**
Frequency, kHz		406039.000	406041.000	406040.030	406040.031	406039.032
Power, dBm		35	39	36.33	36.33	36.34
121.5 MHz Transmitter Parameters						
Carrier Frequency, Hz		121649524				
Power, dBm		12.91				
Message						
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C					

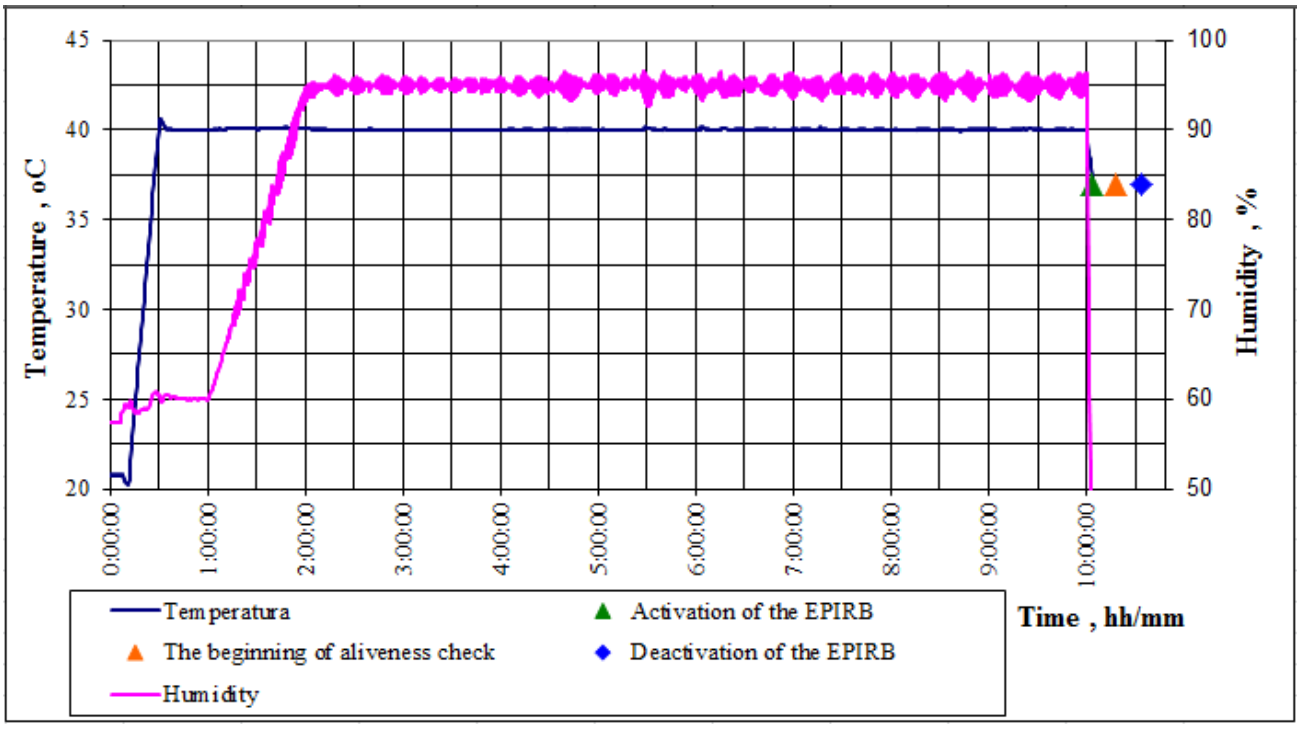


Figure 19.4 – Heat-Humidity Test Conditions Plot

FINAL RESULTS OF HUMIDITY TEST OF THE MT603FG (A18.0 RTCM 11000.2 Version 2.1):

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RE-SULTS	COMMENTS (PASS/FAULT)
• Aliveness Test:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.040031	PASS
- Power Output	35 - 39	dBm	36.33	PASS
- Digital Message	Correct	√	√	PASS

TEST EQUIPMENT

No	Name of test equipment	Type, model	ser. No	Calibration Due date
1.	Climatic chamber	GTH 408-70-CP-AR-LN2	MAA1212-004	12.2016
2.	Temperature meter	gradient 2002	078	01.2017
3.	Hygrometer digital	HP 22-A	60974546	09.2016
4.	Beacon tester	BT100AVS	2315	07.2016
5.	Beacon tester	BT-611	1005	11.2016
6.	Spectrum analyzer	FSH8	105763	10.2016
7.	Tuned dipole antenna	FCC-4	587A	09.2016

ANNEX 20.
ORIENTATION TEST (A19.0)

Equipment Under Test (EUT): MT603G

SW version: OS0021 ver 1.00 (8/12/2014)

Test Date: 15.12.2015
Test Conditions:

- Ambient temperature: 11.9 °C
- Relative humidity: 46 %
- Atmospheric pressure: 767 mm/Hg

TEST DESCRIPTION

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

TEST RESULT

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


Figure 20.1 – View of the MT603G before orientation test


Figure 20.2 – View of the MT603G in a horizontal position

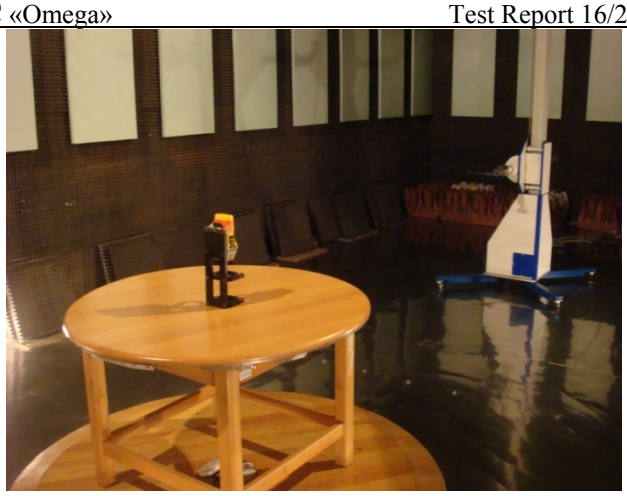


Figure 20.3 – View of the MT603G in a upside down position

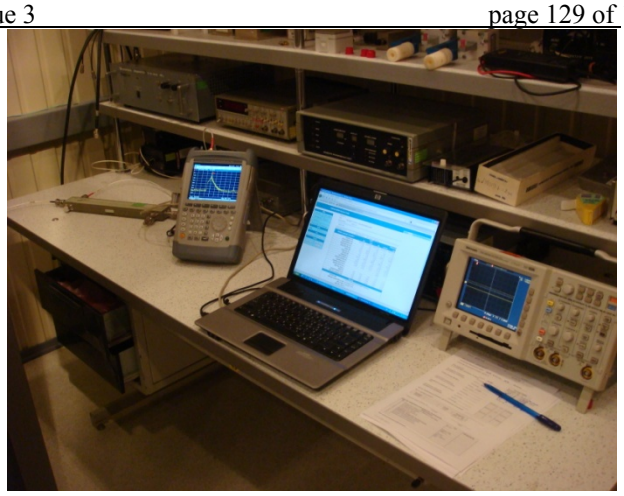


Figure 20.4 – View of the test site

Table 20.1 — Aliveness test results after EUT placed in vertical position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406039.877	0.000
Power, dBm	35	39	0.00	36.58	0.00
Total burst duration, ms	514.80	525.20	0.00	519.316	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498938				
Power, dBm	12.91				
Message					
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C				

Table 20.2 — Aliveness test results after EUT placed in horizontal position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406039.882	0.000
Power, dBm	35	39	0.00	36.56	0.00
Total burst duration, ms	514.80	525.20	0.00	519.294	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498957				
Power, dBm	12.91				
Message					
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C				

Table 20.3 — Aliveness test results after EUT placed in upside down position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406039.879	0.000
Power, dBm	35	39	0.00	36.57	0.00
Total burst duration, ms	514.80	525.20	0.00	519.859	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498941				
Power, dBm	12.91				
Message					
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C				

Table 20.4 — Aliveness test results after EUT placed in in initial vertical position

Test duration 0 h 1 m	Bursts received 2	BCH error 0	Self-Test 0		
406 MHz Transmitter Parameters	**Limits**		**Measured**		
	min	**max**	**min**	**current**	**max**
Frequency, kHz	406039.000	406041.000	0.000	406039.880	0.000
Power, dBm	35	39	0.00	36.59	0.00
Total burst duration, ms	514.80	525.20	0.00	519.881	0.00
121.5 MHz Transmitter Parameters					
Carrier Frequency, Hz	121498930				
Power, dBm	12.91				
Message					
Digital message	FFFE2F8C9E0000007FDFFA79ED3783E0F66C				

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

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS (PASS/FAULT)
• Aliveness Test of EUT in vertical position:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039877	PASS
- Power Output	35 – 39	dBm	36.58	PASS
• Aliveness Test of EUT in horizontal position				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039882	PASS
- Power Output	35 – 39	dBm	36.56	PASS
• Aliveness Test of EUT in upside down position				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039879	PASS
- Power Output	35 – 39	dBm	36.57	PASS
• Aliveness Test of EUT in initial vertical position:				
- Carrier Frequency	406.040 ± 0.001	MHz	406.039880	PASS
- Power Output	35 - 39	dBm	36.59	PASS
• Operation of the strobe light	uninterrupted operation	-	uninterrupted operation	PASS
• Operation of the auxiliary radiolocating transmitter	uninterrupted operation	-	uninterrupted operation	PASS