Parameters to be Measured	Range of Specification	Units	Test Results			Comments
			Tmin	Tamb	Tmax	
			(-40°C)	(+21°C)	(+55°C)	
8(a). Self-test Mode						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol with 3LD						
Frame sync	011010000	P / F	P	P	P	
Format flag	1 / 0	bit value	1	1	1	
Single radiated burst	≤440 / 520 (±1%)	ms	520.633	520.672	520.703	
Default position data (if applicable)	correct	P / F	P	P	P	
Description	provided	Y / N	Y			
Design data on protection against repetitive self-test mode transmissions	provided	Y / N	Y			
Single burst verification	one burst	P / F	P	P	P	
Provides for 15 Hex ID	correct	P / F	P	P	P	
121.5 MHz RF power (if applicable)	verify that RF power emitted	P / F	P	P	P	
406 MHz power	verify that RF power emitted	P / F	P	P	P	
Distinct indication of Self-Test	provided	Y / N	Y	Y	Y	
Distinct indication of RF power being emitted	provided	Y / N	Y	Y	Y	
Indication of Self-Test result	provided	Y / N	Y	Y	Y	
Distinct indication of insufficient battery capacity	provided	Y / N	Y			
Distinct indication if the beacon is coded with the RLS Location protocol (i.e. if the RLS function is enabled), and the RLS and RLM indicator(s) are operating as described in section 4.5.4 e) of document C/S T.001	provided	Y / N	N/A			For RLS-capable beacons
Maximum duration of Self-Test mode	≤ maximum duration of Self-Test	sec	32	32	32	
Automatic termination of Self-Test mode upon completion of Self-Test and indication of Self-Test results	verify automatic termination, irrespective of the switch position	Y / N	Y			See Battery Current measurements (section 2.9.6)

Parameters to be Measured	Range of Specification	Units	Test Results			Comments
			Tmin	Tamb	Tmax	
			(-40°C)	(+21°C)	(+55°C)	
8 (b). GNSS Self-Test Mode (if applicable)						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol with 3LD						
Frame sync	011010000	P / F	P	P	P	
Format flag	1 / 0	bit value	1	1	1	
Radiated burst duration	≤ 520 (+1%)	ms	520.633	520.672	520.703	
Position data for ELT(DT)	must be within 200 m of the actual horizontal position and 700 m of the altitude	P / F	P	P	P	
Design data showing how GNSS Self-test is limited in number of transmissions and duration	provided	Y / N	Y			
Single burst verification (if applicable)	one burst	P / F	P	P	P	
121.5 MHz RF power (if applicable)	verify that RF power is emitted	Y / N	Y	Y	Y	
406 MHz power (if applicable)	verify that RF power is emitted	Y / N	Y	Y	Y	
Maximum duration of GNSS Self-tests	Manufacturer to specify value	s	190	190	190	Manufacturer specified value: 190
Actual duration of Self-test with encoded location	Less than maximum duration	s	36	36	36	
Maximum number of GNSS Self-tests (only beacons with internal navigation devices)	Manufacturer to specify number	Number	60			Manufacturer specified number: 60
Distinct indication to register successful completion or failure of the GNSS self-test	must be provided	Y/N	Y	Y	Y	
Distinct indication that a maximum number of GNSS self-tests has been attained after GNSS self-test mode activation and without transmission of a test message or further GNSS receiver current drain	must be provided	Y/N	Y			
Automatic termination of the GNSS self-test mode upon completion of the GNSS self-test cycle and indication of the results	verify automatic termination of GNSS self-test mode, irrespective of the switch position	Y/N	Y			See Battery Current measurements (section 2.9.6)

Parameters to be Measured	Range of Specification	Units	Test Results			Comments
			Tmin	Tamb	Tmax	
			(-40°C)	(+21°C)	(+55°C)	
8(a). Self-test Mode						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol						
Frame sync	011010000	P / F	P	P	P	
Format flag	1 / 0	bit value	1	1	1	
Single radiated burst	≤440 / 520 (±1%)	ms	520.609	520.672	520.703	
Default position data (if applicable)	correct	P / F	P	P	P	
Description	provided	Y / N	Y			
Design data on protection against repetitive self-test mode transmissions	provided	Y / N	Y			
Single burst verification	one burst	P / F	P	P	P	
Provides for 15 Hex ID	correct	P / F	P	P	P	
121.5 MHz RF power (if applicable)	verify that RF power emitted	P / F	P	P	P	
406 MHz power	verify that RF power emitted	P / F	P	P	P	
Distinct indication of Self-Test	provided	Y / N	Y	Y	Y	
Distinct indication of RF power being emitted	provided	Y / N	Y	Y	Y	
Indication of Self-Test result	provided	Y / N	Y	Y	Y	
Distinct indication of insufficient battery capacity	provided	Y / N	Y			
Distinct indication if the beacon is coded with the RLS Location protocol (i.e. if the RLS function is enabled), and the RLS and RLM indicator(s) are operating as described in section 4.5.4 e) of document C/S T.001	provided	Y / N	N/A			For RLS-capable beacons
Maximum duration of Self-Test mode	≤ maximum duration of Self-Test	sec	32	32	32	
Automatic termination of Self-Test mode upon completion of Self-Test and indication of Self-Test results	verify automatic termination, irrespective of the switch position	Y / N	Y			See Battery Current measurements (section 2.9.6)

Parameters to be Measured	Range of Specification	Units	Test Results			Comments
			Tmin	Tamb	Tmax	
			(-40°C)	(+21°C)	(+55°C)	
8 (b). GNSS Self-Test Mode (if applicable)						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol						
Frame sync	011010000	P / F	P	P	P	
Format flag	1 / 0	bit value	1	1	1	
Radiated burst duration	≤ 520 (+1%)	ms	520.609	520.672	520.711	
Position data for ELT(DT)	must be within 200 m of the actual horizontal position and 700 m of the altitude	P / F	P	P	P	
Design data showing how GNSS Self-test is limited in number of transmissions and duration	provided	Y / N	Y			
Single burst verification (if applicable)	one burst	P / F	P	P	P	
121.5 MHz RF power (if applicable)	verify that RF power is emitted	Y / N	Y	Y	Y	
406 MHz power (if applicable)	verify that RF power is emitted	Y / N	Y	Y	Y	
Maximum duration of GNSS Self-tests	Manufacturer to specify value	s	190	190	190	Manufacturer specified value: 190
Actual duration of Self-test with encoded location	Less than maximum duration	s	36	36	36	
Maximum number of GNSS Self-tests (only beacons with internal navigation devices)	Manufacturer to specify number	Number	60			Manufacturer specified number: 60
Distinct indication to register successful completion or failure of the GNSS self-test	must be provided	Y/N	Y	Y	Y	
Distinct indication that a maximum number of GNSS self-tests has been attained after GNSS self-test mode activation and without transmission of a test message or further GNSS receiver current drain	must be provided	Y/N	Y			
Automatic termination of the GNSS self-test mode upon completion of the GNSS self-test cycle and indication of the results	verify automatic termination of GNSS self-test mode, irrespective of the switch position	Y/N	Y			See Battery Current measurements (section 2.9.6)

Parameters to be Measured	Range of Specification	Units	Test Results		Comments
9. Thermal Shock					**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol					
Soak Temperature	50°C difference	°C	23		
Measurement Temperature		°C	-30		
Transmitted Frequency			Min	Max	
Nominal value	C/S T.001	MHz	406.0310337	406.0310529	
Short-term stability	≤ $2x10^{-9}$	/100ms	9.01E-11	1.65E-10	
Medium-term stability – Slope	(-2 to +2)$x10^{-9}$	/min	N/A	N/A	Not applicable to ELT(DT)
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		N/A	N/A	
Transmitter power output	36 - 39	dBm	37.45	37.71	
Digital message	correct	P/F	P		

Note: the parameters above are to be met immediately after beacon activation and maintained for 2 hours.

Parameters to be Measured	Range of Specification	Units	Test Results		Comments
10. Operating Lifetime at Minimum Temperature					**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol with 3LD					
Pre-test battery discharge duration (at 94mA) required		Hours	8.55		
Pre-test battery discharge duration (at 94mA)		Hours	7.62		
Duration	>370	min	1450.8 mins at Tmin = -40°C		
Effective Operating Lifetime duration	>370	min	1450.8 mins at Tmin = -40°C		
Transmitted Frequency			Min	Max	Min/Max results are up to the manufacturer declared lifetime of 24hrs.
Nominal value	C/S T.001	MHz	406.0310727	406.0311382	
Short-term stability	≤ $2x10^{-9}$	/100ms	5.18E-11	3.84E-10	
Medium-term stability – Slope	(-1 to +1)$x10^{-9}$	/min	N/A	N/A	Not applicable to ELT(DT)
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		N/A	N/A	
Transmitter power output	36 - 39	dBm	36.83	37.18	
Pt_{EOL} is the minimum transmitter power output observed during the operating lifetime at minimum temperature test	36 - 39	dBm	36.83		
Digital message	correct	P/F	P		
Homer transmitter continuous operation during the lifetime test		hours	64.56*		*Calculated based on updated discharge required for F-E.2 (See Annex B.)
			Start of Test	End of Test	End of test taken as 54h10m (Manufacturer declared worst case scenario (48hrs + 6h10m)).
Homer frequency		MHz	121.6495	121.6485	
Homer peak power level		dBm	20.7	20.8	
Homer transmitter duty cycle		%	36.93	37.25	

Parameters to be Measured	Range of Specification	Units	Test Results			Comments
11. Temperature Gradient (33°C/hr)						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol						
Full Test						
Transmitted Frequency			Min	Max		
Nominal value	C/S T.007	MHz	406.0311122	406.0309778		
Short-term stability	≤ $2x10^{-9}$	/100ms	8.72E-11	1.83E-10		
Medium-term stability – Slope[1]	(-1 to +1)$x10^{-9}$	/min	N/A	N/A		Not applicable to ELT(DT)
	(-2 to +2)$x10^{-9}$	/min	N/A	N/A		
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		N/A	N/A		
Transmitter power output	36 – 39	dBm	37.1	37.67		
Digital message	correct	P/F	P			
12. Oscillator Aging						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0						
5-year carrier nominal frequency variation	C/S T.001, section 2.3.1	kHz	0.0203*			*See manufactures provided information: Exhibit 5i-vii Rev00 RTR112 E7913LF MTS 5-year prediction
MTS analysis	Must demonstrate compliance	Pass/Fail	N/A			Not Applicable to ELT(DT)s
13. Protection Against Continuous Transmission						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0						
Description	provided	Y / N	Y			Applicant's data, see Annex A for details
14. Satellite Qualitative Tests						**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol with 3LD						
Test Configuration	As per C/S T.007		Configuration 6			
			Test 1	Test 2	Test 3	
Produce an alert with a complete valid beacon message at least once per minute for >90% of the time	≥ 90	%	100	100	100	
Encoded location provided accurate within 200m 2D for >90% of the alerts	≥ 90	%	98.7	98.7	100	
Encoded location provided by the MEOLUT as per the pass/fail criteria A.2.5 c) (i, ii, and iii) for altitude	≥ 90	%	100	100	100	

Parameters to be Measured	Range of Specification	Units	Test Results				Comments
15. Antenna Characteristics (Raw Results)							**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol							
Test Configuration	As per C/S T.007		Configuration				
			1	2	3	4	
Polarisation	linear or RHCP		-	Linear	-	-	
VSWR	≤ 1.5		-	1.12	-	-	Detachable Antennas Only
$EIRP_{LOSS}$		dB	-	1.17	-	-	
$EIRP_{maxEOL}$	≤ 45	dBm	-	40.23	-	-	Cable Loss = 0.69dB
$EIRP_{minEOL}$	≥ 34	dBm	-	35.73	-	-	Cable Loss = 0.69dB
15. Antenna Characteristics (Adjusted for Minimum Cable Loss)							**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol							
Test Configuration	As per C/S T.007		Configuration				
			1	2	3	4	
Polarisation	linear or RHCP		-	Linear	-	-	
VSWR	≤ 1.5		-	1.12	-	-	Detachable Antennas Only
$EIRP_{LOSS}$		dB	-	1.17	-	-	
$EIRP_{maxEOL}$	≤ 45	dBm	-	42.1	-	-	Cable Loss = 0dB
$EIRP_{minEOL}$	≥ 34	dBm	-	36.5	-	-	Cable Loss = 0dB
15. Antenna Characteristics (Adjusted for Maximum Cable Loss)							**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol							
Test Configuration	As per C/S T.007		Configuration				
			1	2	3	4	
Polarisation	linear or RHCP		-	Linear	-	-	
VSWR	≤ 1.5		-	1.12	-	-	Detachable Antennas Only
$EIRP_{LOSS}$		dB	-	1.17	-	-	
$EIRP_{maxEOL}$	≤ 45	dBm	-	40.3	-	-	Cable Loss = 1.8dB
$EIRP_{minEOL}$	≥ 34	dBm	-	34.7	-	-	Cable Loss = 1.8dB

16. Beacon Coding Software				**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000005, TUV Ref: TSR8 and Modification State 0, Protocol: ELT DT Location Protocol and ELT DT Location Protocol with 3LD				
Sample message provide for each coding option of the applicable coding type	Correct	P/F	P	Applicant's data, see Annex A for details
Sample self-test message provided for each coding option of the applicable coding types	Correct	P/F	P	

Parameters to be Measured	Range of Specification	Units	Test Results	Comments
17. Navigation System				**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol with 3LD **Model: KANNAD ULTIMA-DT-05, S/N: TO0010000005, TUV Ref: TSR8 and Modification State 0, Protocol: ELT DT Location Protocol and ELT DT Location Protocol with 3LD (for position data encoding)**				
Location protocol	C/S T.001		ELT(DT) Location Protocol with 3LD	
Position data default values	correct	P / F	P	
Freshness of the encoded position	C/S T.001	P / F	P	
Configuration 6				
Position accuracy - A.3.8.2.1	<200	m	22.7	
Position Acquisition Time - A.3.8.2.1	<3	sec	4.72*	*First burst encoded with Navigation data. This meets the position acquisition time of <3 seconds as the beacon checks position 2 seconds prior to transmission.
Position accuracy - A.3.8.2.2	<200	m	35.7	
Position Acquisition Time - A.3.8.2.2	<3	sec	4.76*	
Encoded position data update interval	>every burst	P / F	P	See Annex K – Completed in ELT(DT) Location Protocol
Position clearance after deactivation	cleared	P / F	P	
Information provided on manufacturers location data update scheme	must be provided	Y/N	Y	
Internal navigation device update intervals	as per C/S T.001, section 4.5.5.6	P/F	P	
Position data input update interval (as applicable)	<2 sec	P/F	P	
Stored position cleared within interval	5 – 5.25 min**	P/F	P	** Limits stated in section A.3.8.5 of T.007
External Input				
Position accuracy - A.3.8.2.1	<200	m	16.3	
Position Acquisition Time - A.3.8.2.1	<3	sec	4.81*	
Position accuracy - A.3.8.2.2	<200	m	60.1	
Position Acquisition Time - A.3.8.2.2	<3	Sec	4.74*	
Position data encoding	correct	P / F	P	Applicant's data, see Annex A for details
Retained last valid position after navigation input lost	240(±5)	min	240.25	
Default position data transmitted after 240(±5) minutes without valid position data	cleared	P / F	P	
Information on protection against beacon degradation due to navigation device, interface or signal failure or malfunction	provided	Y / N	Y	Applicant's data, see Annex A for details

Parameters to be Measured		Range of Specification	Units	Test Results	Comments
18. Return Link Service (RLS)					**Not Applicable**
19. Prevention of Continuous Transmission					**Not Applicable**
20. Activation and Cancellation Message Test (ELT (DT)) only)					**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol					
Activation and De-activation Tests		Message Bits 107-108 comply with Table A.2	P/F	P	See test results section for details
Cancellation Message Tests		Comply with A.3.9.2	P/F	P	
Nominal transmitted frequency		C/S T.001	MHz	406.0309262	Note: The results presented in this summary section are samples measured during the test. For full details, see test results section.
Transmitter Output Power		36-39	dBm	37.93	
Modulation Rise Time (min and max)	maximum minimum	50-150	µsec	115.5 112.7	
Modulation Fall Time (min and max)	maximum minimum	50-150	µsec	112 109.9	
Phase Deviation: positive (min and max)	maximum minimum	+(1.0 to 1.2)	radians	1.075 1.05	
Phase Deviation: negative (min and max)	maximum minimum	-(1.0 to 1.2)	radians	-1.092 -1.066	
Modulation Symmetry		≤0.05		0.03417	
Digital Message		Correct	P/F	P	See test results section for details
Transmission of First Cancellation Message		Within 5 seconds of deactivation	P/F	P	
Number of Cancellation Messages		10	P/F	P	See test results section for details
Interval between Cancellation Messages		10 seconds ±0.5 seconds	P/F	10.001	
Reactivation Test		Comply with section A.3.9.3	P/F	P	

Parameters to be Measured	Range of Specification	Units	Test Results	Comments
21. Testing ELT(DT)s with External Power Source (if applicable)				**Not Applicable**
22. Testing Beacon Controls				**Result: Pass**
Model: KANNAD ULTIMA-DT-05, S/N: TO0010000002, TUV Ref: TSR1 and Modification State 0, Protocol: ELT DT Location Protocol				
Self-test controls	Comply with A.3.10.1 (i)	P/F	P	
GNSS self-test controls	Comply with A.3.10.1 (ii)	P/F	P	
Operational controls	Comply with A.3.10.2	P/F	P	

2.1 POWER OUTPUT

2.1.1 Specification

Cospas-Sarsat T.007, Clause A.2.1 (a)

2.1.2 Equipment Under Test and Modification State

ULTIMA-DT-05 S/N: TO0010000002 - Modification State 0

2.1.3 Date of Test

28 January 2022, 31 January 2022, 01 February 2022, 03 February 2022 and 15 February 2022

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Laboratory Environmental Conditions

Ambient Temperature 21.5 - 25.6°C
Relative Humidity 22.7 - 34.5%

2.1.6 Test Results

Navigation Data status during test:

External Navigation Data Input: Applied

GNSS Simulator Navigation Data: Not Applied

EUT System Configuration

As per figure 1 of section 1.3.2

EUT Operating Mode

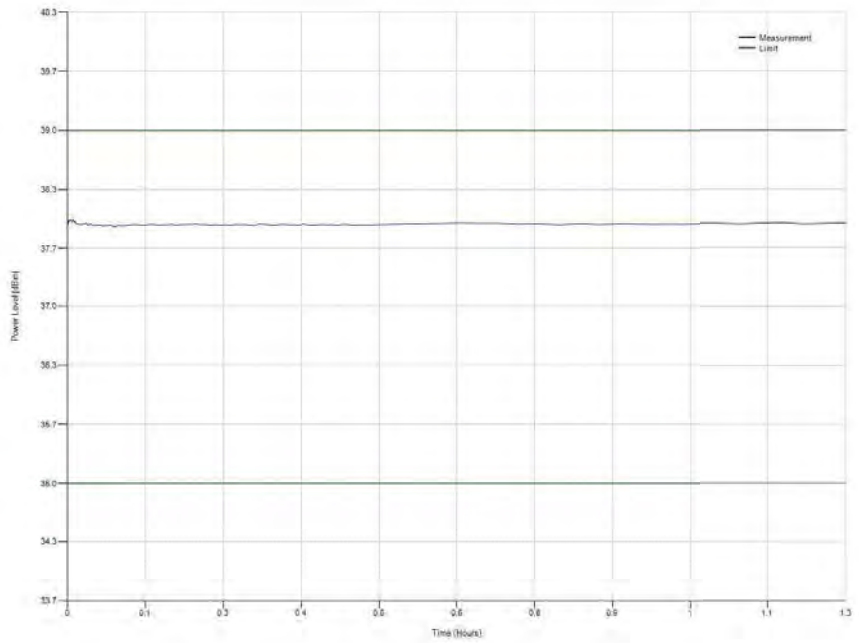
As described in section 1.3.3 ‘Operating (Active)’

Test Duration

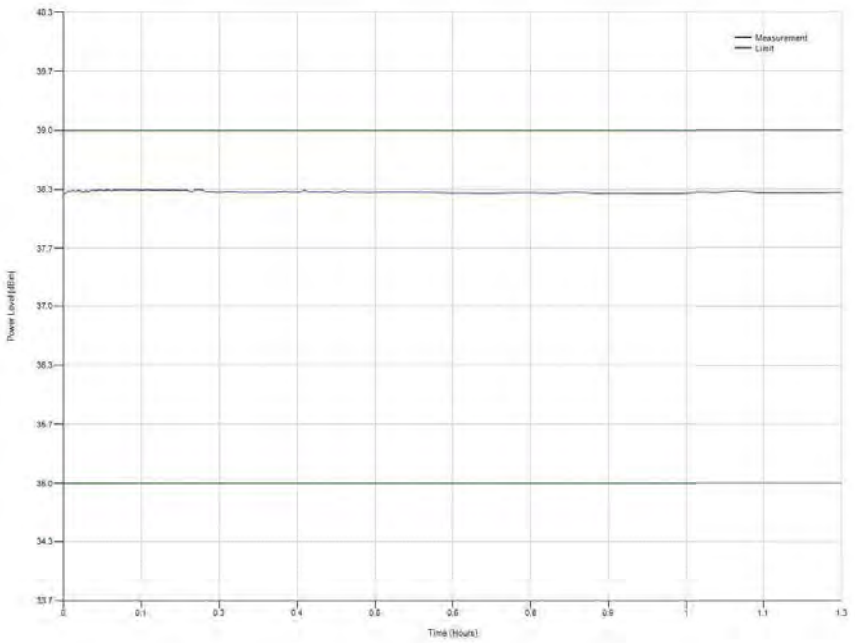
75 minutes (EUT encoded with 3LD)

30 minutes (EUT encoded with non 3LD)

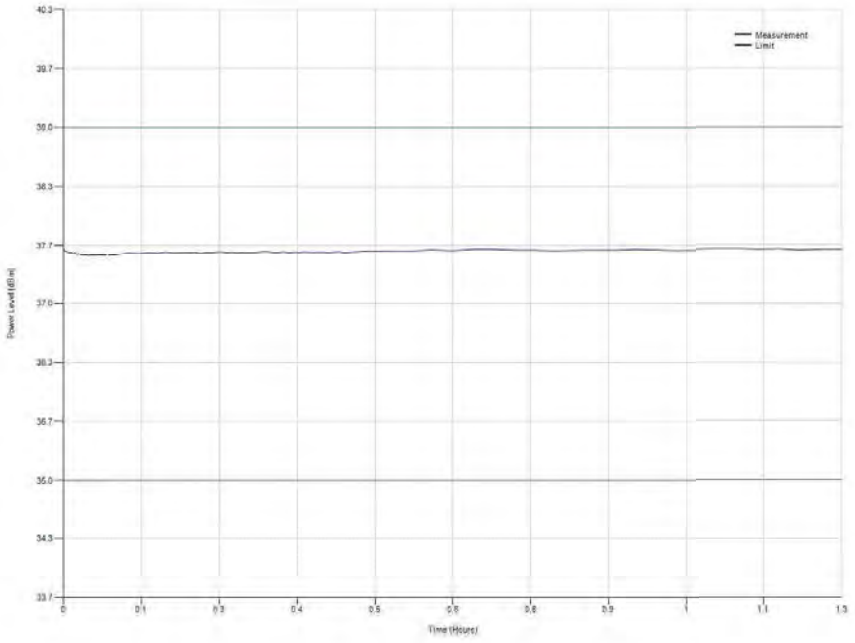
Ambient Temperature – ELT DT Location Protocol with 3LD



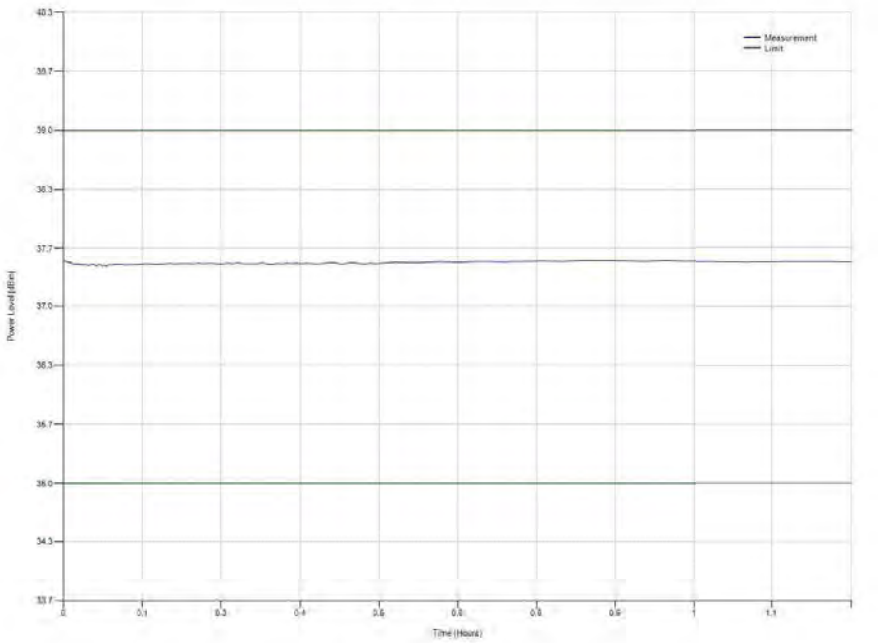
Low Temperature – ELT DT Location Protocol with 3LD



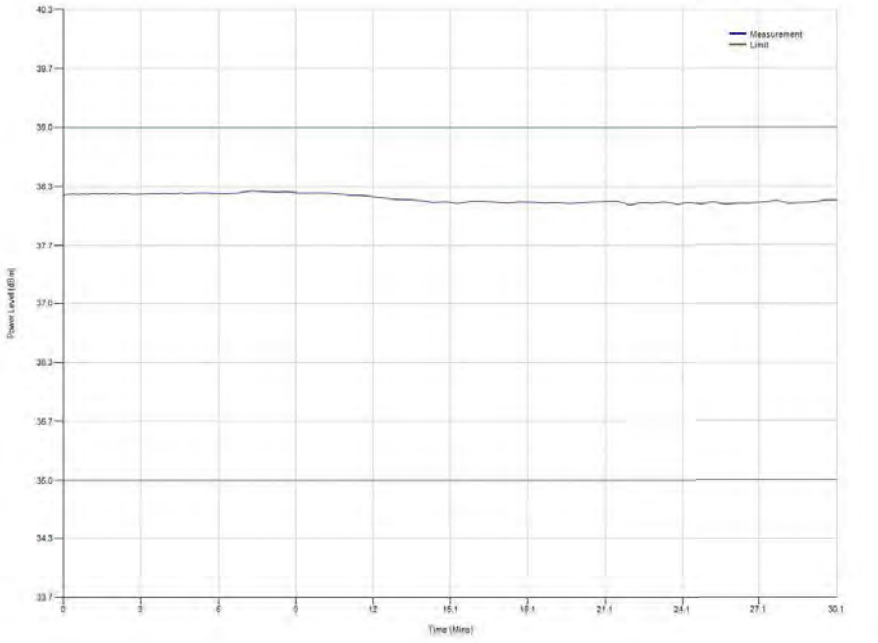
High Temperature – ELT DT Location Protocol with 3LD



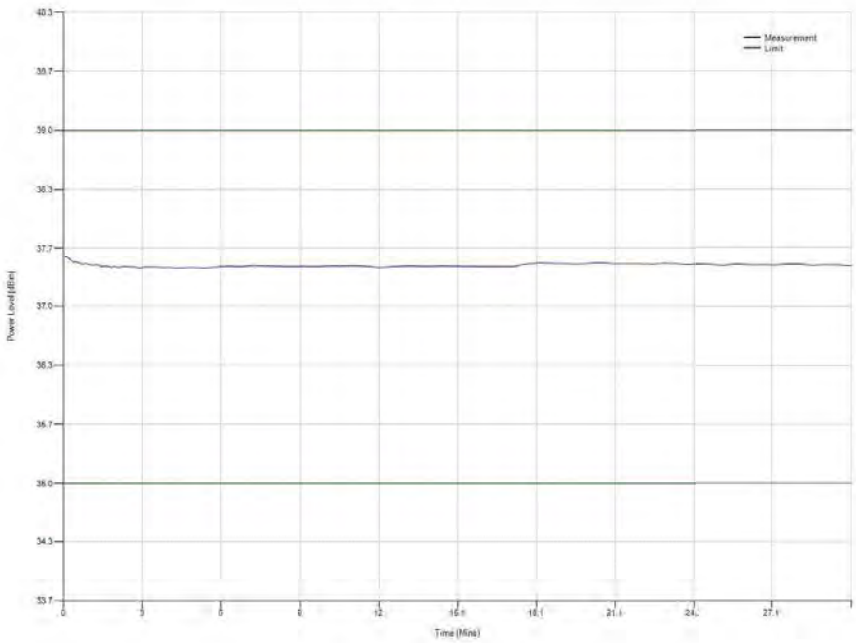
Ambient Temperature – ELT DT Location Protocol



Low Temperature – ELT DT Location Protocol



High Temperature – ELT DT Location Protocol



Summary

The EUT complies with clause A.3.2.2 of Cospas-Sarsat T.007.

2.2 DIGITAL MESSAGE

2.2.1 Specification

Cospas-Sarsat T.007, Clause A.2.1 (b)

2.2.2 Equipment Under Test and Modification State

ULTIMA-DT-05 S/N: TO0010000002 - Modification State 0

2.2.3 Date of Test

27 January 2022, 28 January 2022, 31 January 2022 and 01 February 2022

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Laboratory Environmental Conditions

Ambient Temperature 23.1 - 26.6°C
Relative Humidity 22.7 - 31.3%

2.2.6 Test Results

Navigation Data status during test:

External Navigation Data Input: Applied

GNSS Simulator Navigation Data: Not Applied

EUT System Configuration

As per figure 1 of section 1.3.2

EUT Operating Mode

As described in section 1.3.3 ‘Operating (Active)’

Test Duration

75 minutes (EUT encoded with 3LD)

30 minutes (EUT encoded with non 3LD)

Note: For the results presented in the table below, example decodes have been provided.

Message	Temperature	Activation Method	Protocol
FFFE2F8C99000000147648E3D395E00F0F75[1]	Ambient	Crash Sensor	ELT DT Location Protocol with 3LD – Normal Message
FFFE2F8C99000000147648E3D395E00F0F75[1]	Low		
FFFE2F8C99000000147648E3D395E00F0F75[1]	High		
FFFE2F8C99000000147648E3D3950452A17E[2]	Ambient	Crash Sensor	ELT DT Location Protocol with 3LD – 3LD Message
FFFE2F8C99000000147648E3D3950452A17E[2]	Low		
FFFE2F8C99000000147648E3D3950452A17E[2]	High		
FFFE2F8C99000000147648E3D385E00F02FA[3]	Ambient	Manual Activation	ELT DT Location Protocol with 3LD – Normal Message
FFFE2F8C99000000147648E3D385E00F02FA[3]	Low		
FFFE2F8C99000000147648E3D385E00F02FA[3]	High		
FFFE2F8C99000000147648E3D3850452ACF1[4]	Ambient	Manual Activation	ELT DT Location Protocol with 3LD – 3LD Message
FFFE2F8C99000000147648E3D3850452ACF1[4]	Low		
FFFE2F8C99000000147648E3D3850452ACF1[4]	High		
FFFE2F8C99000000147648E3D395E00F0F75[1]	Ambient	Crash Sensor	ELT DT Location Protocol – Normal Message
FFFE2F8C99000000147648E3D395E00F0F75[1]	Low		
FFFE2F8C99000000147648E3D395E00F0F75[1]	High		
FFFE2F8C99000000147648E3D385E00F02FA[3]	Ambient	Manual Activation	ELT DT Location Protocol – Normal Message
FFFE2F8C99000000147648E3D385E00F02FA[3]	Low		
FFFE2F8C99000000147648E3D385E00F02FA[3]	High		

Message[1]

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D395E00F0F75**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6

Unique identifier:
19320000003FDFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-86	00000000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-86 are all 0 or All 1, designates Test Protocol
87-75	010100011	Latitude	81.5 Degrees North (81.5)
76-86	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	01	means of activation	automatic activation by the beacon
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	11	Encoded location freshness or PDF-2 rotating field indicator	Encoded location in message is current (i.e., the encoded location freshness is less or equal to 2 seconds)
115-123	100000000	Latitude offset	0.0 minutes 0.0 seconds (positive)
124-132	011110000	Longitude offset	15.0 minutes 0.0 seconds (negative)
133-144	111101110101	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.250

Message[2]

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D3950452A17E**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
19320000003FDFF

- **WARNING: Location is a coarse position only, and hence has less resolution/accuracy than a message without the rotating field**

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-66	000000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-66 are all 0 or All 1, designates Test Protocol
67-75	010100011	Latitude	81.6 Degrees North (81.6)
76-85	1011001001	Longitude	100.6 Degrees West (-100.6)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	01	means of activation	automatic activation by the beacon
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	00	Encoded location freshness or PDF-2 rotating field indicator	PDF-2 rotating field indicator
115-117	000	Aircraft operator 3LD designator or Spare	Aircraft operator 3LD designation
118-132	100010100101010	Aircraft operator 3LD	ZLR
133-144	000101111110	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.600 -100.600

Message[3]

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D385E00F02FA**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
19320000003FDFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1001	Protocol Code	ELT - Location; ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-86	00000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-86 are all 0 or All 1, designates Test Protocol
87-75	0101D0011	Latitude	81.5 Degrees North (81.5)
76-85	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	00	means of activation	manual activation by user
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	11	Encoded location freshness or PDF-2 rotating field indicator	Encoded location in message is current (i.e., the encoded location freshness is less or equal to 2 seconds)
115-123	100000000	Latitude offset	0.0 minutes 0.0 seconds (positive)
124-132	011110000	Longitude offset	15.0 minutes 0.0 seconds (negative)
133-144	001011111010	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.250

Message[4]

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D3850452ACF1**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6

Unique identifier:
19320000003FDFF

- **WARNING: Location is a coarse position only, and hence has less resolution/accuracy than a message without the rotating field**

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct: Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-86	00000000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-86 are all 0 or All 1, designates Test Protocol
87-75	010100011	Latitude	81.5 Degrees North (81.5)
76-85	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	00	means of activation	manual activation by user
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	00	Encoded location freshness or PDF-2 rotating field indicator	PDF-2 rotating field indicator
115-117	000	Aircraft operator 3LD designator or Spare	Aircraft operator 3LD designation
118-132	100010100101010	Aircraft operator 3LD	ZLR
133-144	110011110001	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.500

Summary

The EUT complies with clause A.3.1.4 of Cospas-Sarsat T.007.

2.3 MODULATION

2.3.1 Specification

Cospas-Sarsat T.007, Clause A.2.1 (d)

2.3.2 Equipment Under Test and Modification State

ULTIMA-DT-05 S/N: TO0010000002 - Modification State 0

2.3.3 Date of Test

27 January 2022, 28 January 2022, 31 January 2022, 01 February 2022 and 03 February 2022

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Laboratory Environmental Conditions

Ambient Temperature 23.1 - 26.6°C
Relative Humidity 22.7 - 32.3%

2.3.6 Test Results

Navigation Data status during test:

External Navigation Data Input: Applied

GNSS Simulator Navigation Data: Not Applied

EUT System Configuration

As per figure 1 of section 1.3.2

EUT Operating Mode

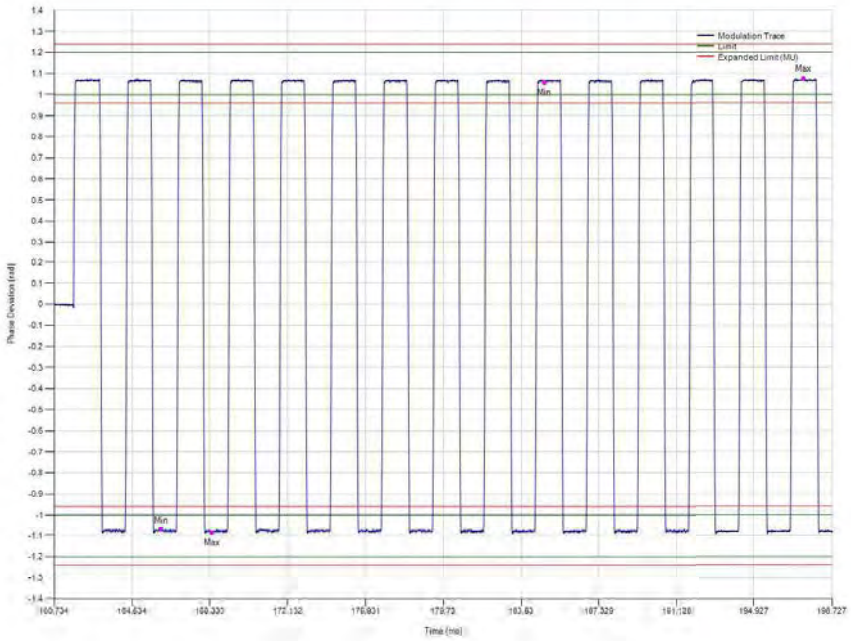
As described in section 1.3.3 'Operating (Active)'

Test Duration

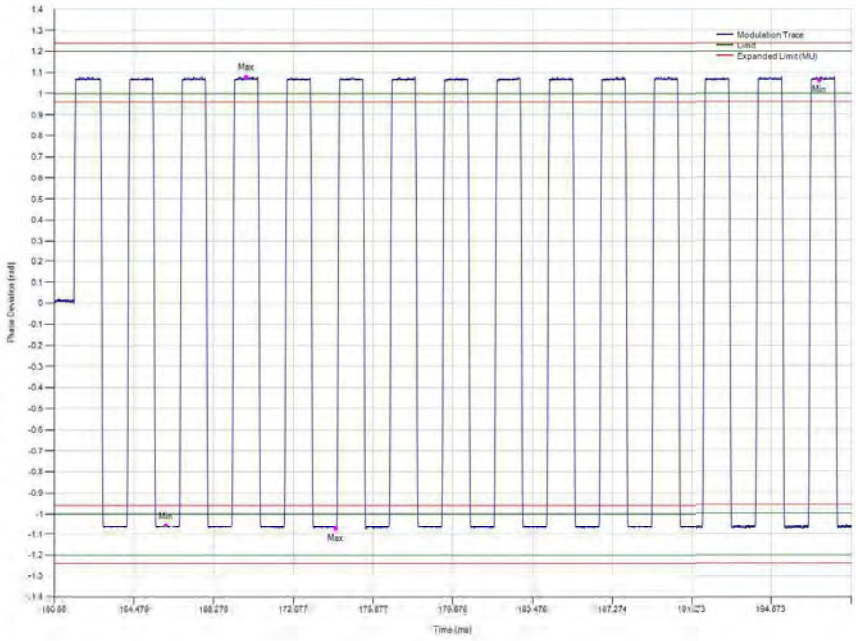
75 minutes (EUT encoded with 3LD)

30 minutes (EUT encoded with non 3LD)

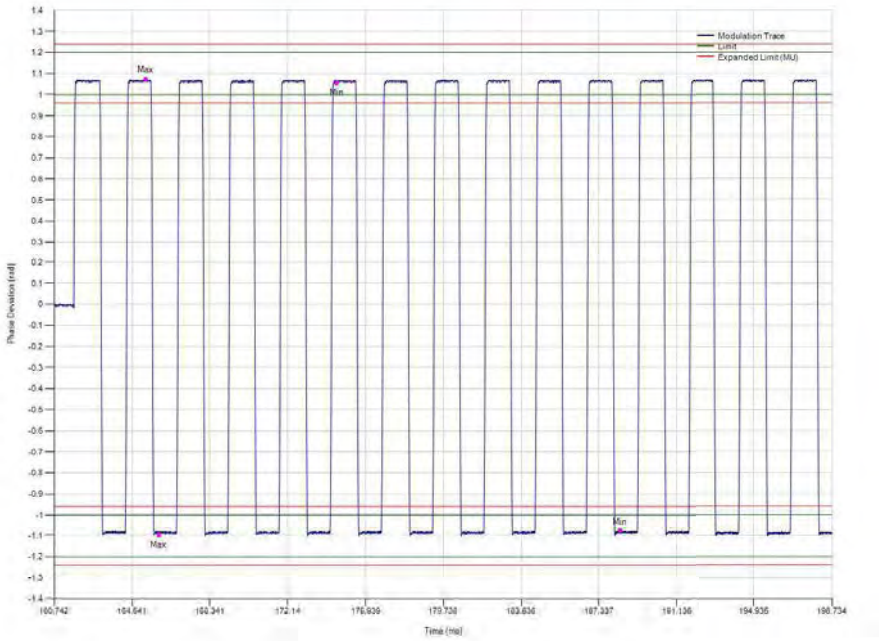
Ambient Temperature – ELT DT Location Protocol with 3LD



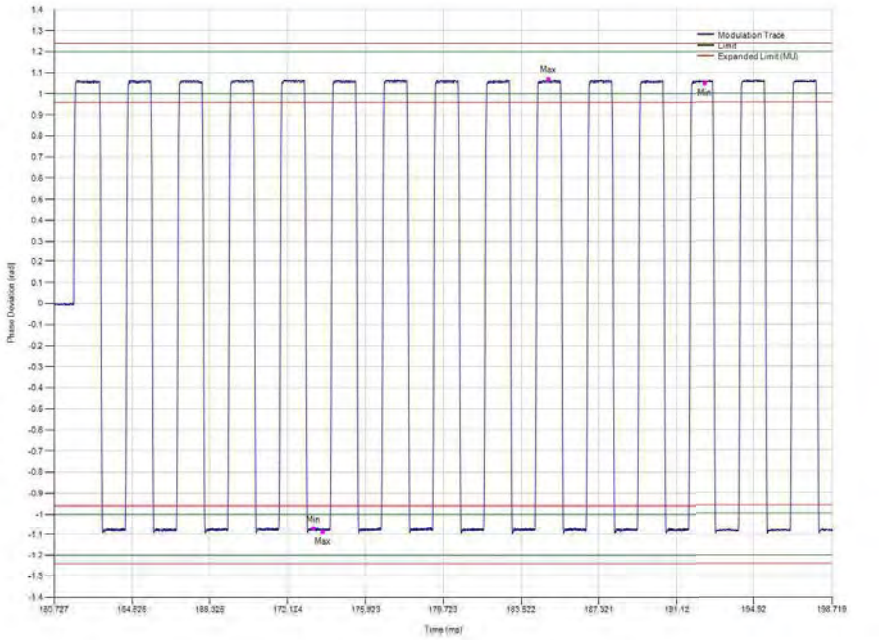
Low Temperature – ELT DT Location Protocol with 3LD



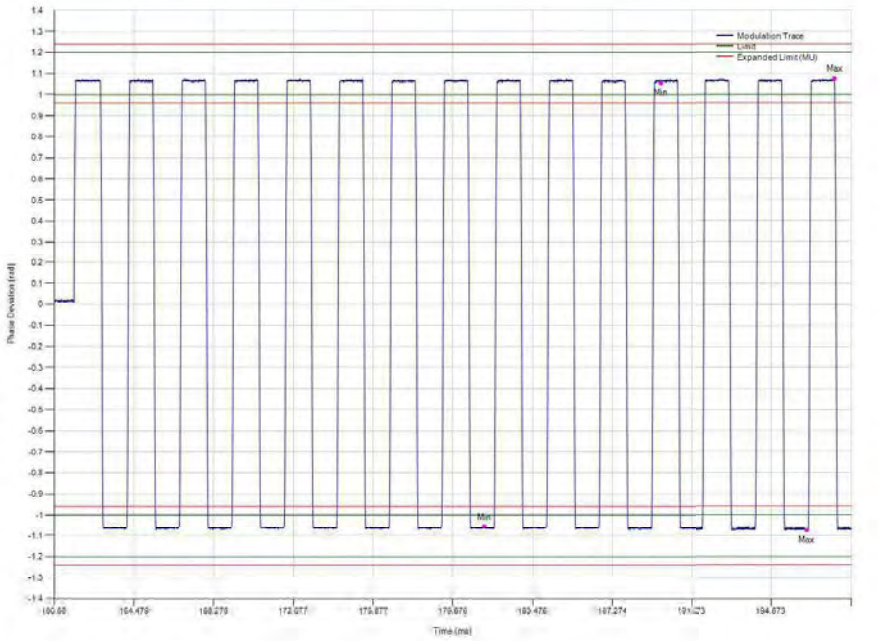
High Temperature – ELT DT Location Protocol with 3LD



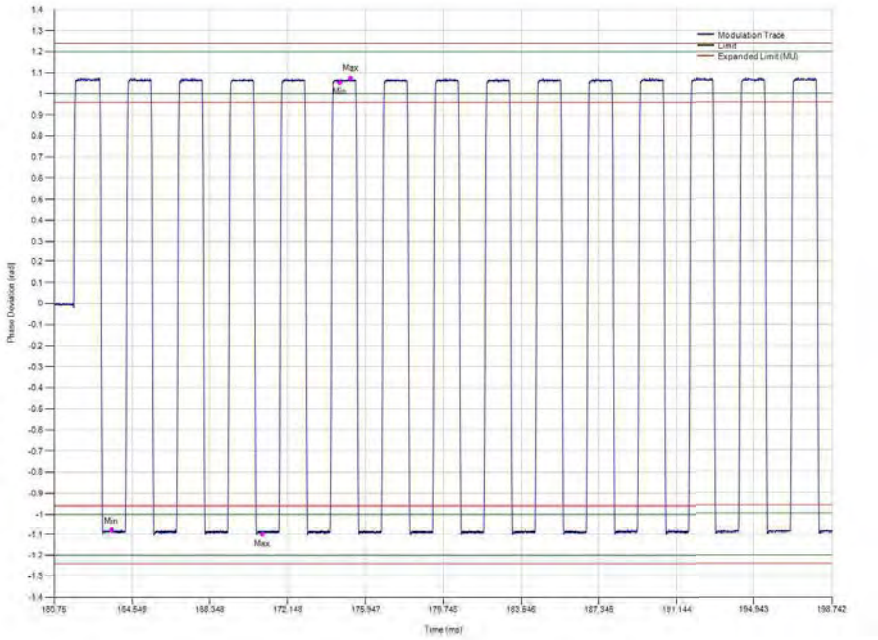
Ambient Temperature – ELT DT Location Protocol



Low Temperature – ELT DT Location Protocol



High Temperature – ELT DT Location Protocol



Summary

The EUT complies with clause A.3.2.3 of Cospas-Sarsat T.007.

2.4 406 MHZ TRANSMITTED FREQUENCY

2.4.1 Specification

Cospas-Sarsat T.007, Clause A.2.1 (e)

2.4.2 Equipment Under Test and Modification State

ULTIMA-DT-05 S/N: TO0010000002 - Modification State 0

2.4.3 Date of Test

27 January 2022, 28 January 2022, 31 January 2022, 01 February 2022 and 03 February 2022

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Laboratory Environmental Conditions

Ambient Temperature 23.1 - 25.6°C
Relative Humidity 22.7 - 32.3%

2.4.6 Test Results

Navigation Data status during test:

External Navigation Data Input: Applied

GNSS Simulator Navigation Data: Not Applied

EUT System Configuration

As per figure 1 of section 1.3.2

EUT Operating Mode

As described in section 1.3.3 ‘Operating (Active)’

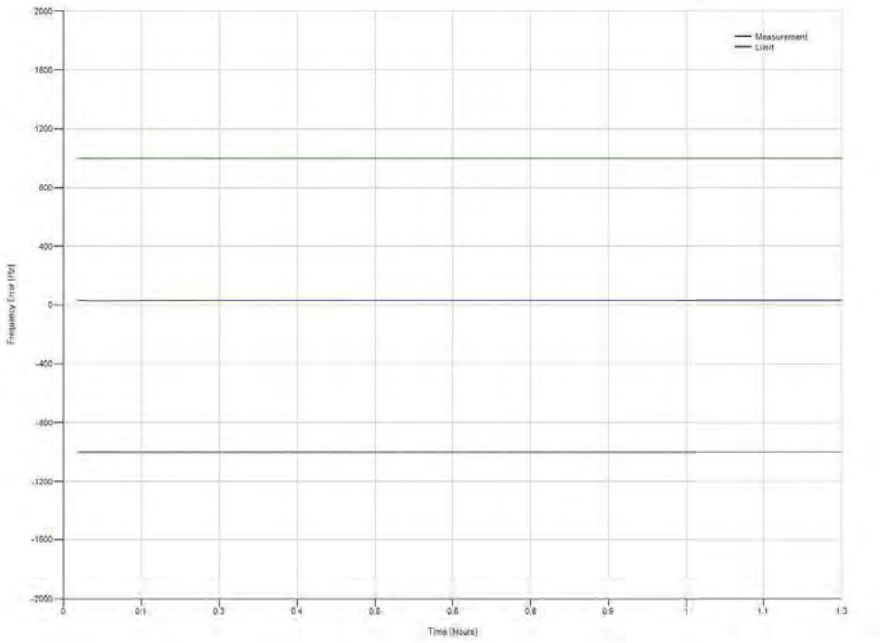
Test Duration

75 minutes (EUT encoded with 3LD)

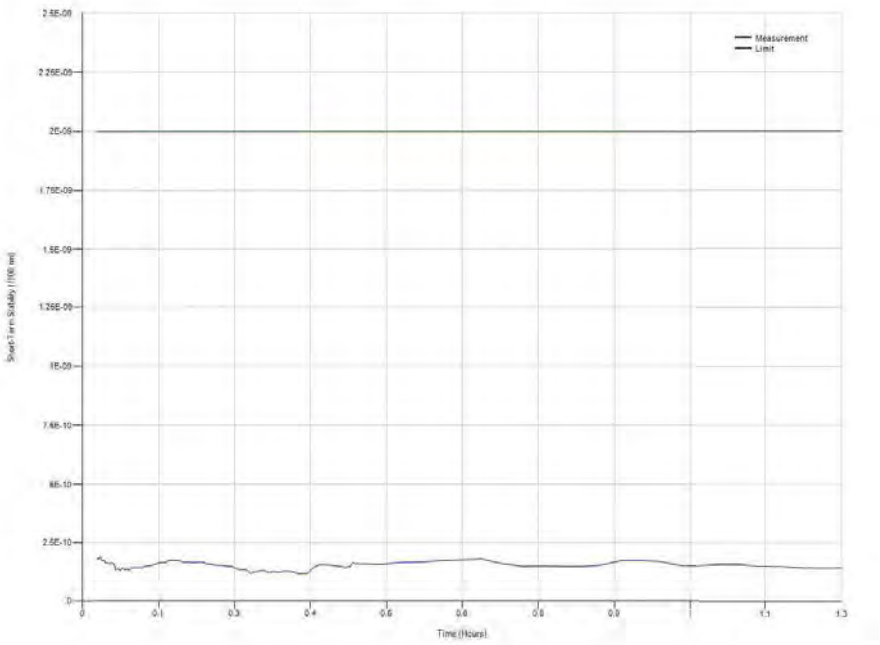
30 minutes (EUT encoded with non 3LD)

Ambient Temperature – ELT DT Location Protocol with 3LD

Nominal Frequency

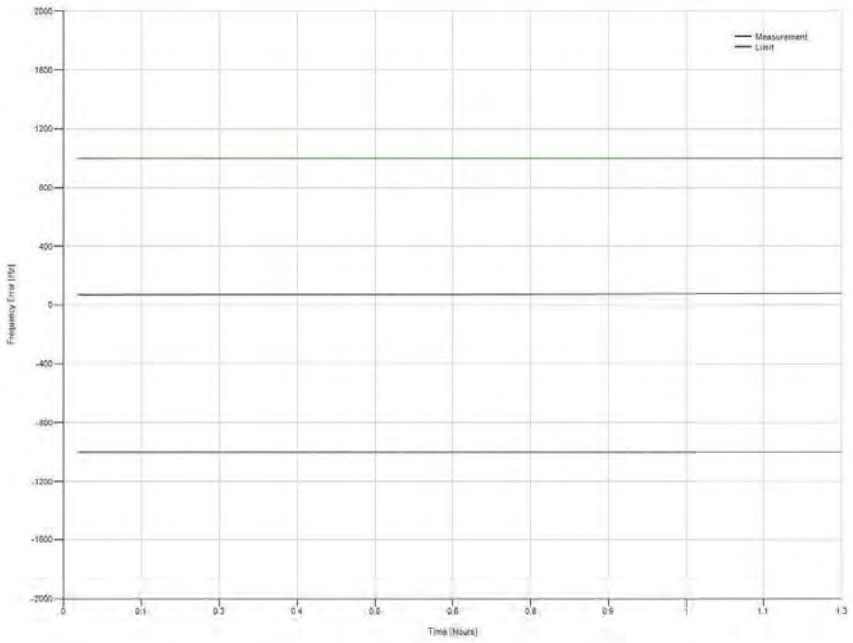


Short Term Stability

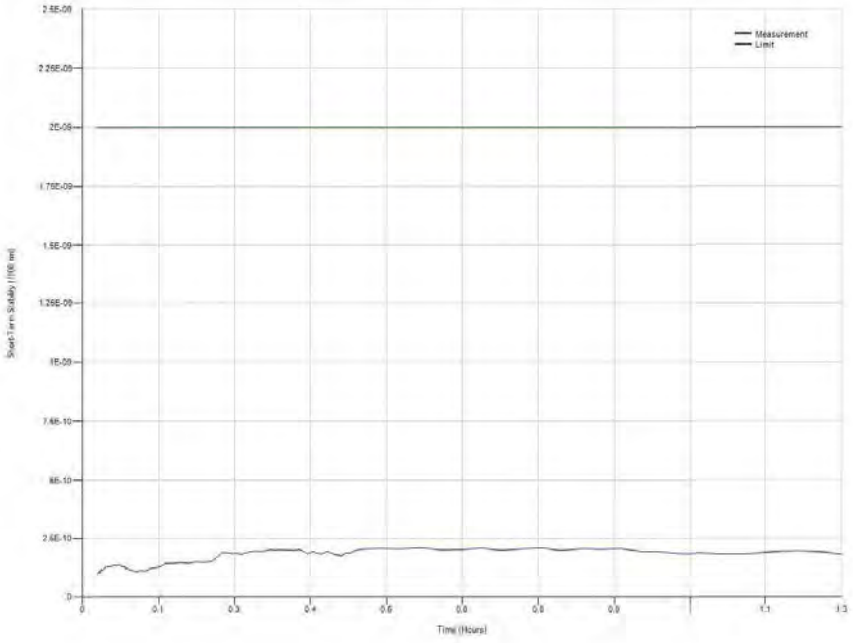


Low Temperature – ELT DT Location Protocol with 3LD

Nominal Frequency

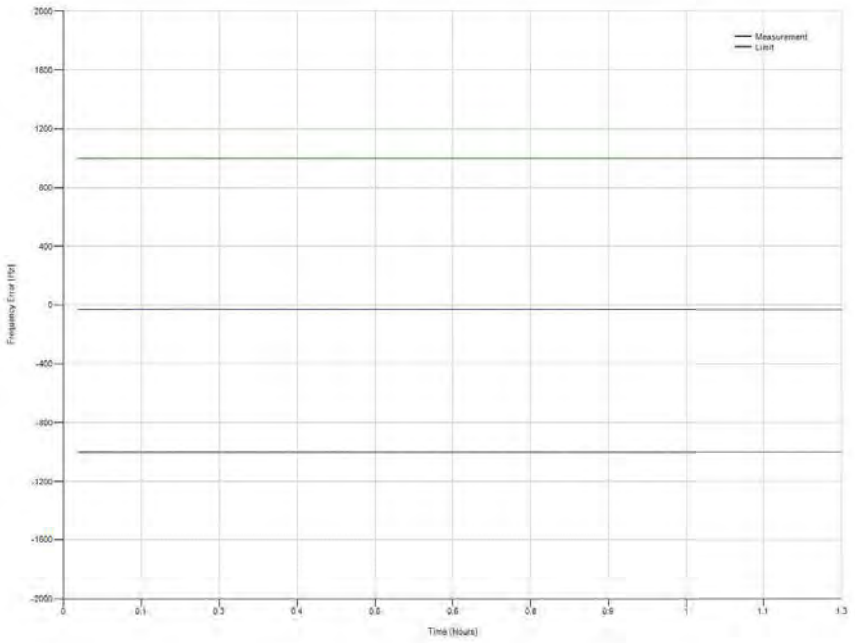


Short Term Stability

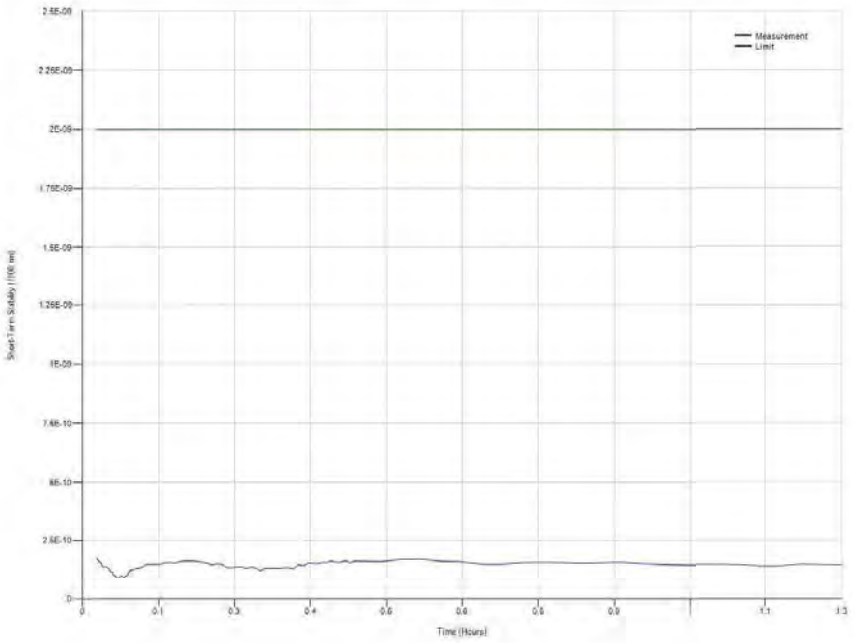


High Temperature – ELT DT Location Protocol with 3LD

Nominal Frequency

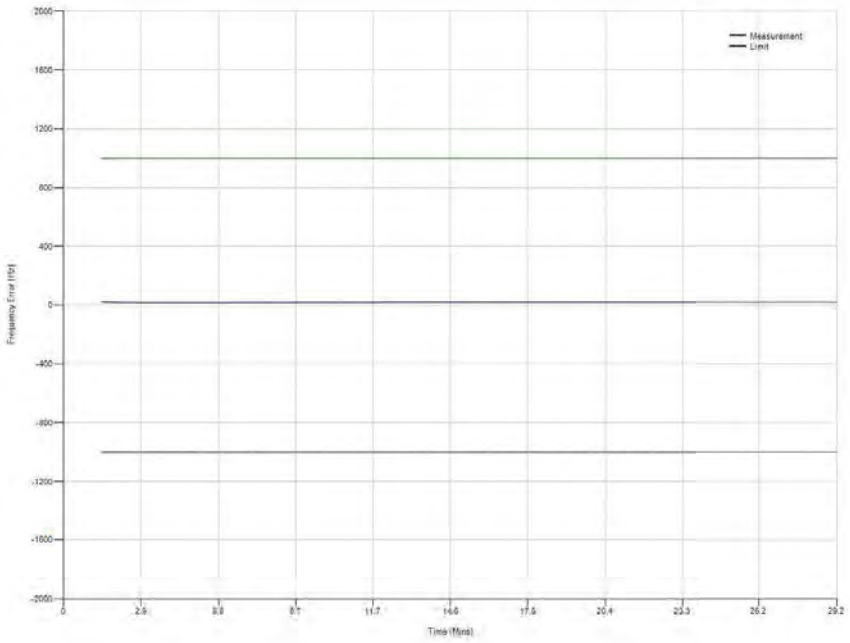


Short Term Stability

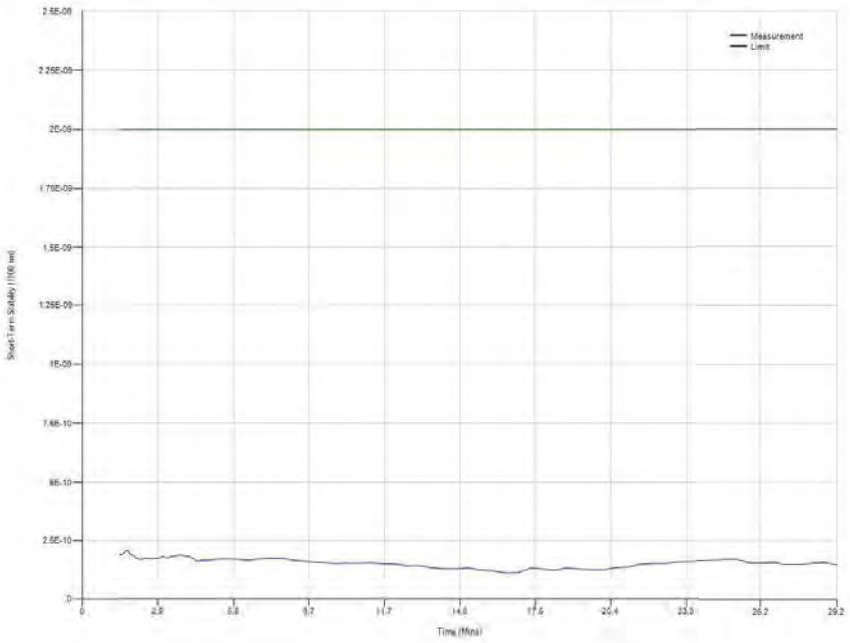


Ambient Temperature – ELT DT Location Protocol

Nominal Frequency

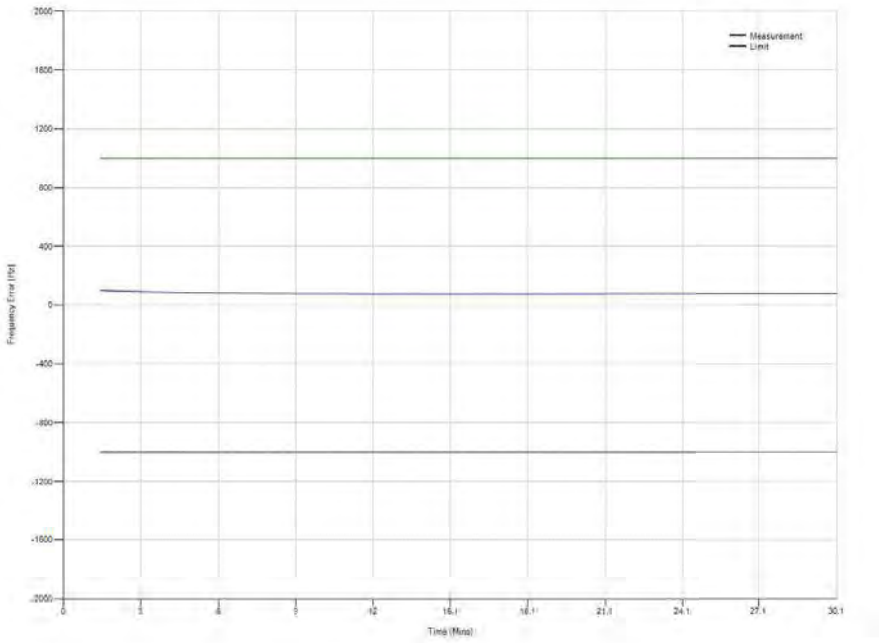


Short Term Stability

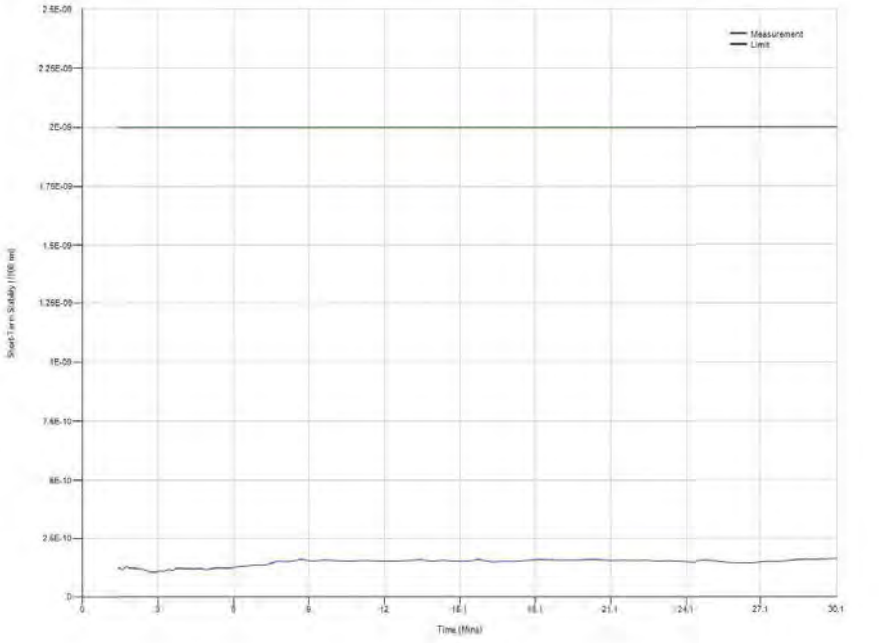


Low Temperature – ELT DT Location Protocol

Nominal Frequency

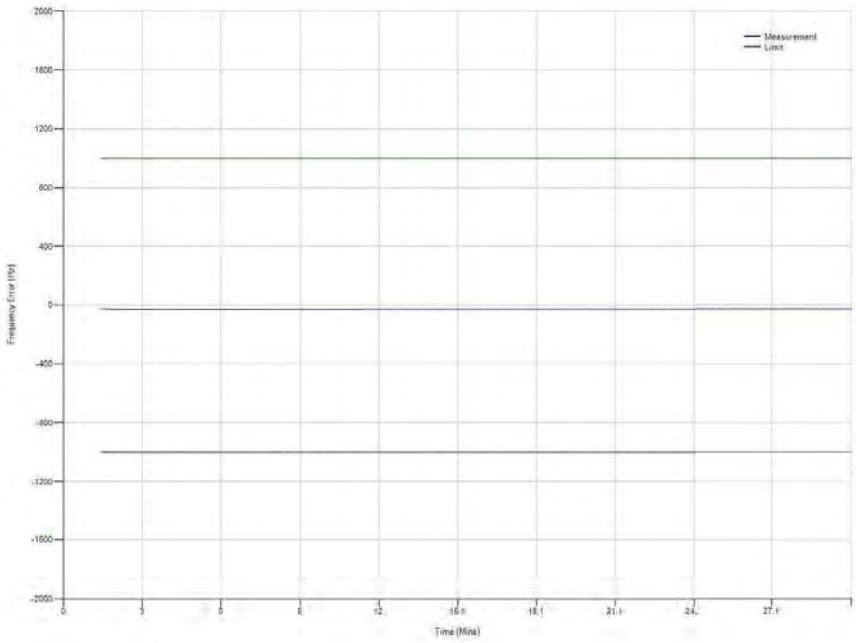


Short Term Stability

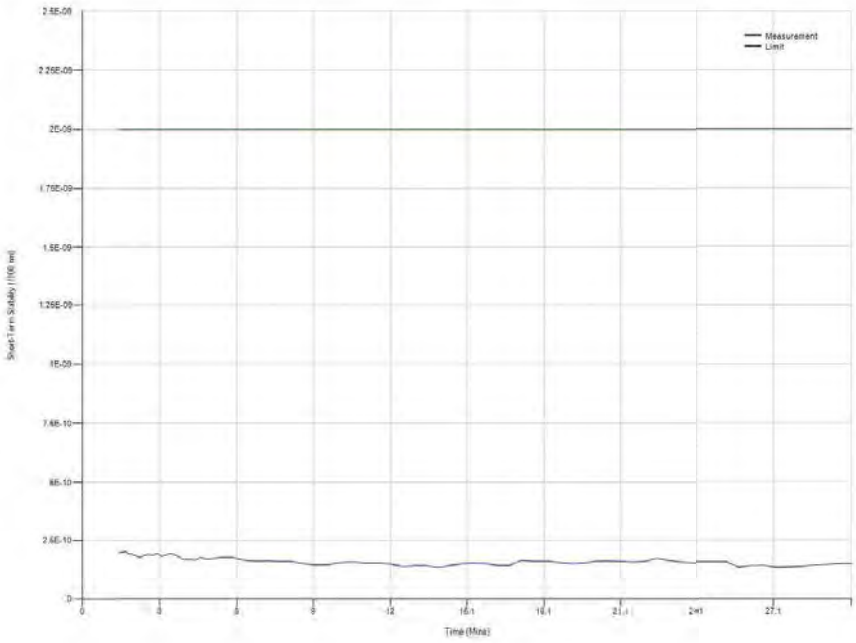


High Temperature – ELT DT Location Protocol

Nominal Frequency



Short Term Stability



Summary

The EUT complies with clause A.3.2.1 of Cospas-Sarsat T.007.

2.5 SPURIOUS EMISSION INTO 50 OHMS

2.5.1 Specification

Cospas-Sarsat T.007, Clause A.2.1 (f)

2.5.2 Equipment Under Test and Modification State

ULTIMA-DT-05 S/N: TO0010000002 - Modification State 0

2.5.3 Date of Test

28 January 2022 and 31 January 2022

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Laboratory Environmental Conditions

Ambient Temperature 22.6 - 25.5°C
Relative Humidity 22.3 - 27.0%

2.5.6 Test Results

Navigation Data status during test:

External Navigation Data Input: Applied

GNSS Simulator Navigation Data: Not Applied

EUT System Configuration

As per figure 1 of section 1.3.2

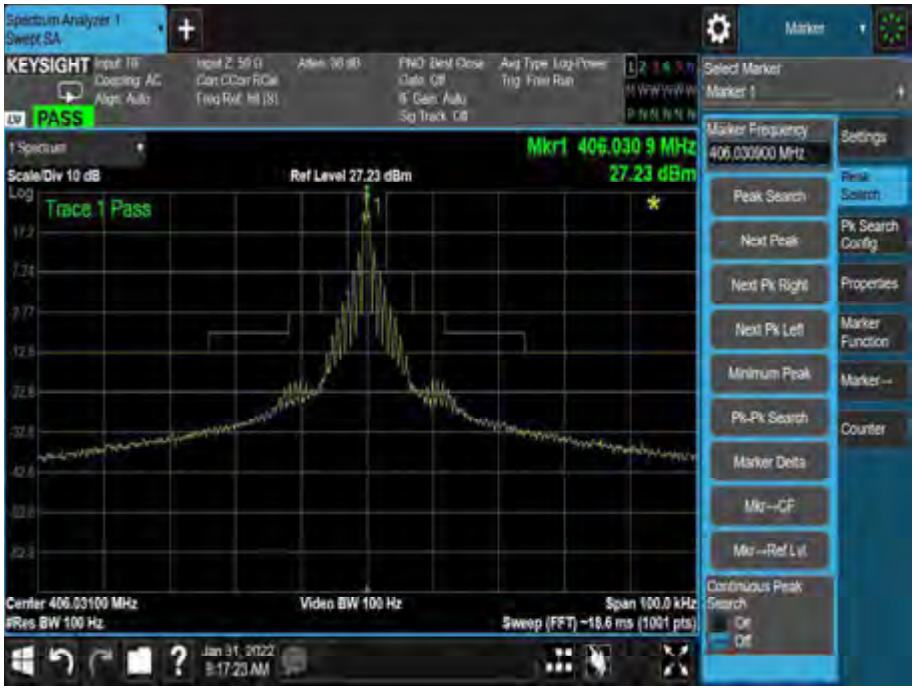
EUT Operating Mode

As described in section 1.3.3 ‘Operating (Active)’

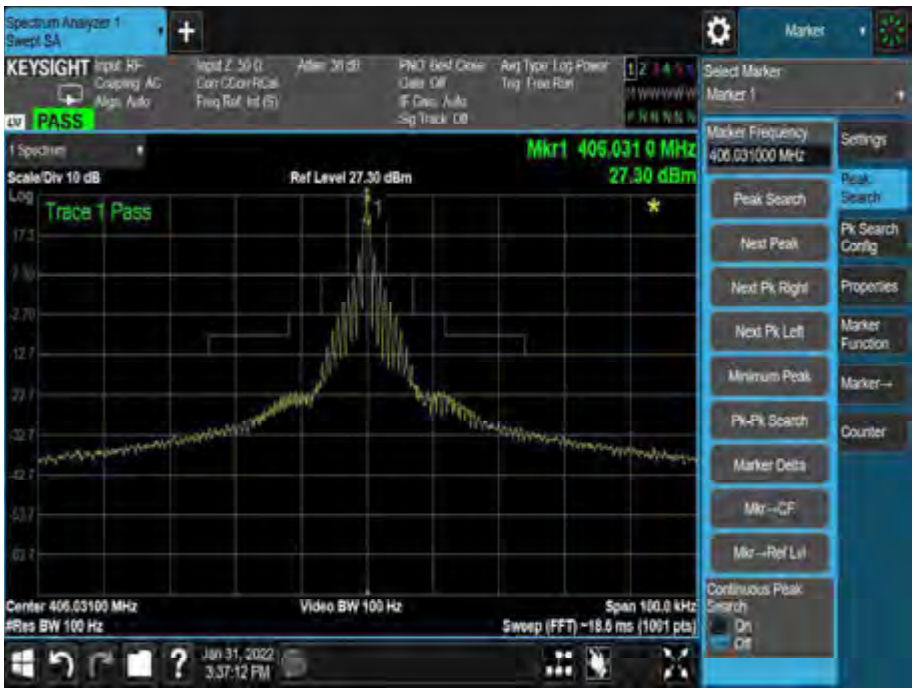
Test Duration

30 minutes

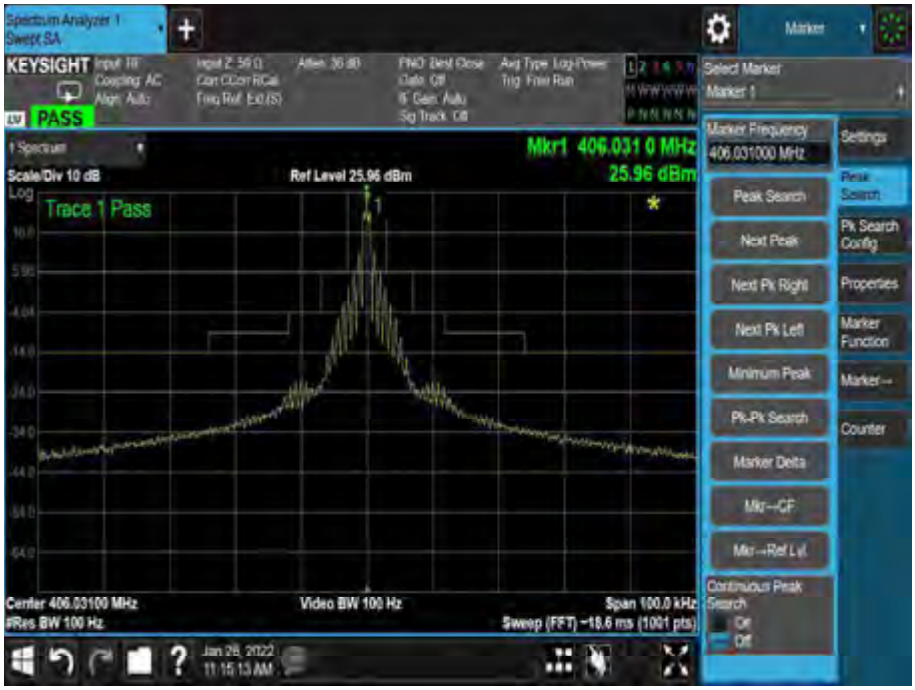
Ambient Temperature – ELT DT Location Protocol with 3LD



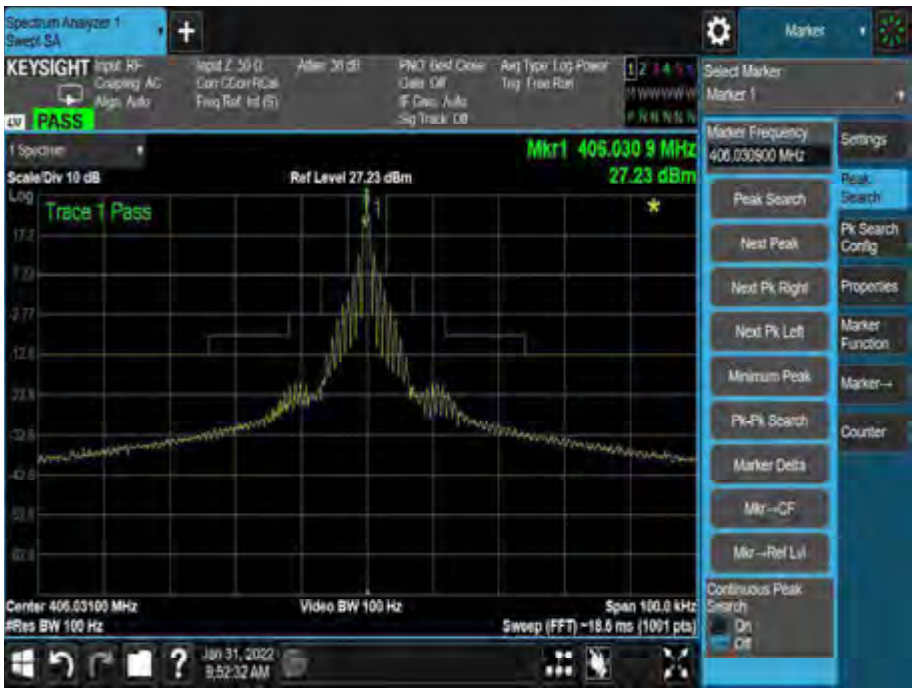
Low Temperature – ELT DT Location Protocol with 3LD



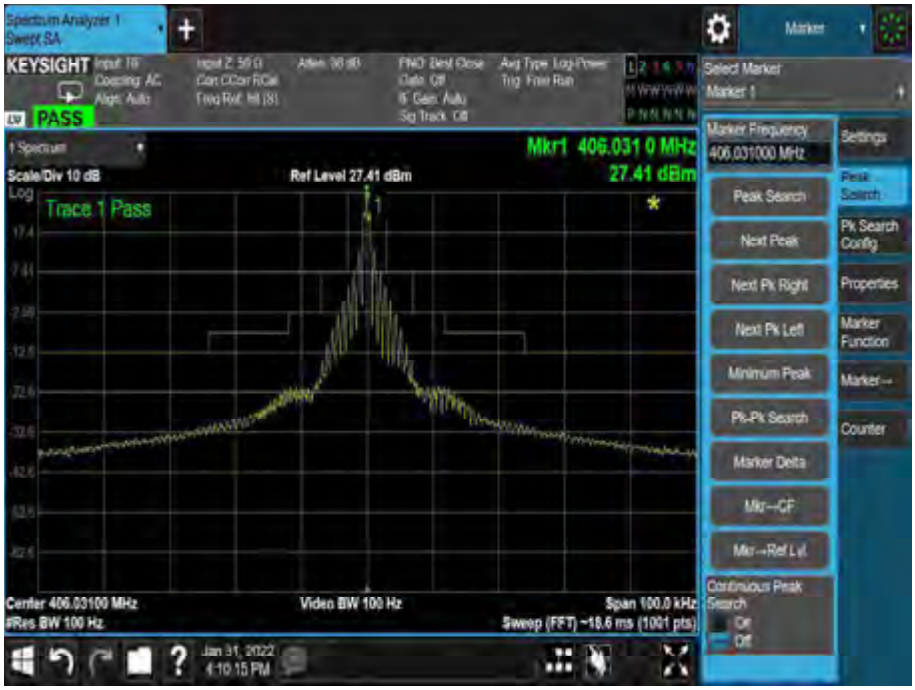
High Temperature – ELT DT Location Protocol with 3LD



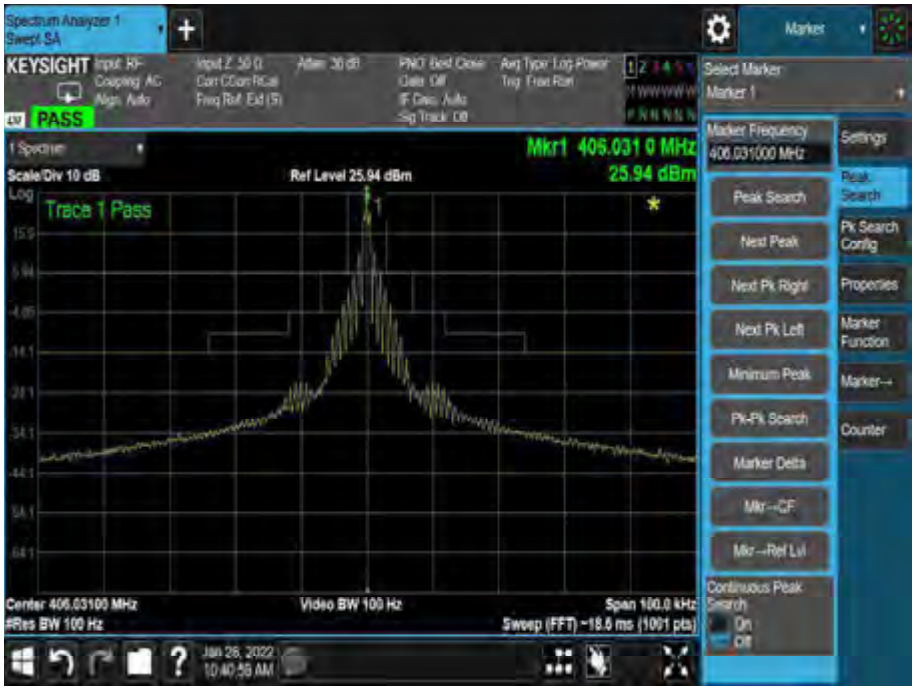
Ambient Temperature – ELT DT Location Protocol



Low Temperature – ELT DT Location Protocol



High Temperature – ELT DT Location Protocol



Summary

The EUT complies with clause A.3.2.2.4 of Cospas-Sarsat T.007.

2.6 406 MHZ VSWR CHECK

2.6.1 Specification

Cospas-Sarsat T.007, Clause A.2.1 (g)

2.6.2 Equipment Under Test and Modification State

ULTIMA-DT-05 S/N: TO0010000002 - Modification State 0

2.6.3 Date of Test

21 January 2022, 27 January 2022, 28 January 2022 and 01 February 2022

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Laboratory Environmental Conditions

Ambient Temperature 23.9 - 27.0°C
Relative Humidity 18.5 - 31.3%

2.6.6 Test Results

Note – 3:1 load made using two T-splitter connectors and two 50ohm termination loads.

Navigation Data status during test:

External Navigation Data Input: Applied

GNSS Simulator Navigation Data: Not Applied

EUT System Configuration

As per figure 1 of section 1.3.2

EUT Operating Mode

As described in section 1.3.3 'Operating (Active)'

Test Duration

7.5 minutes Open Circuit
7.5 minutes Closed Circuit
20 minutes with 3:1 load

Ambient Temperature – ELT DT Location Protocol with 3LD Normal Message

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D385E00F02FA**

The code consists of 38 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6

Unique identifier:
19320000003FDFF

Binary Range	Binary Content	Field Name	Decoded Value
1-16	1111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct: Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-66	000000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-66 are all 0 or All 1, designates Test Protocol
67-75	010100011	Latitude	81.5 Degrees North (81.5)
76-85	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	00	means of activation	manual activation by user
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	11	Encoded location freshness or PDF-2 rotating field indicator	Encoded location in message is current (i.e., the encoded location freshness is less or equal to 2 seconds)
115-123	100000000	Latitude offset	0.0 minutes 0.0 seconds (positive)
124-132	011110000	Longitude offset	15.0 minutes 0.0 seconds (negative)
133-144	001011111010	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.250

Ambient Temperature – ELT DT Location Protocol with 3LD 3LD Message

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9900000147648E3D3850452ACF1**

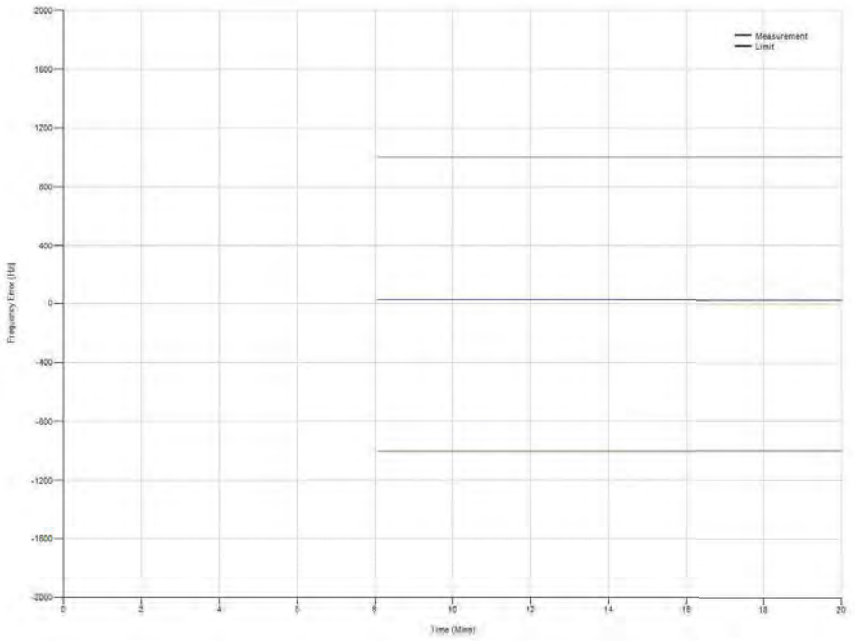
The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique Identifier:
19320000003FDFF

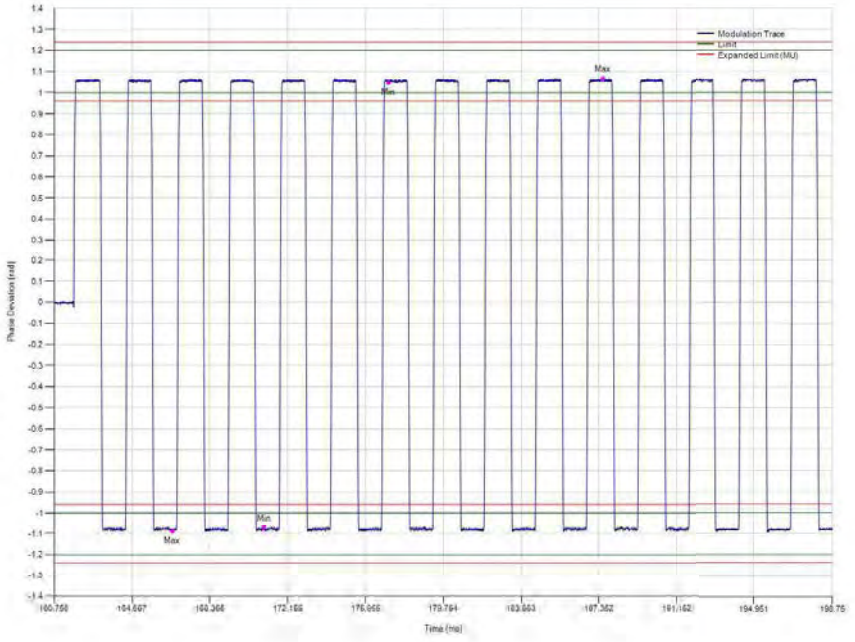
- **WARNING: Location is a coarse position only, and hence has less resolution/accuracy than a message without the rotating field**

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-86	00000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-86 are all 0 or All 1, designates Test Protocol
87-75	010100011	Latitude	81.5 Degrees North (81.5)
76-85	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	00	means of activation	manual activation by user
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	00	Encoded location freshness or PDF-2 rotating field indicator	PDF-2 rotating field indicator
115-117	000	Aircraft operator 3LD designator or Spare	Aircraft operator 3LD designation
118-132	100010100101010	Aircraft operator 3LD	ZLR
133-144	110011110001	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.500

Frequency Plot



Modulation Plot



Low Temperature – ELT DT Location Protocol with 3LD Normal Message

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D385E00F02FA**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6

Unique identifier:
19320000003FDFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-86	00000000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-86 are all 0 or All 1, designates Test Protocol
87-75	010100011	Latitude	81.5 Degrees North (81.5)
76-85	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	00	means of activation	manual activation by user
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	11	Encoded location freshness or PDF-2 rotating field indicator	Encoded location in message is current (i.e., the encoded location freshness is less or equal to 2 seconds)
115-123	100000000	Latitude offset	0.0 minutes 0.0 seconds (positive)
124-132	011110000	Longitude offset	15.0 minutes 0.0 seconds (negative)
133-144	001011111010	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.250

Low Temperature – ELT DT Location Protocol with 3LD
3LD Message

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C99000000147648E3D3850452ACF1**

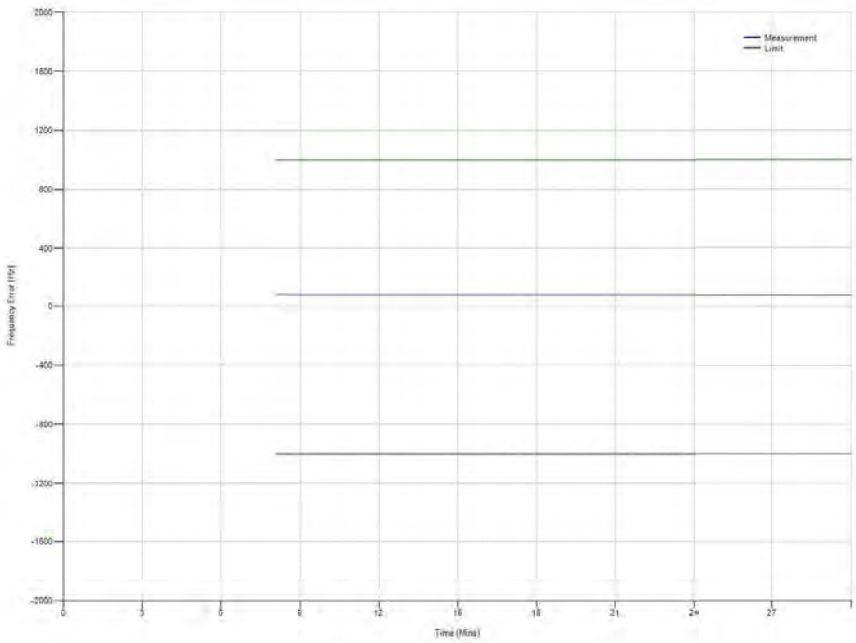
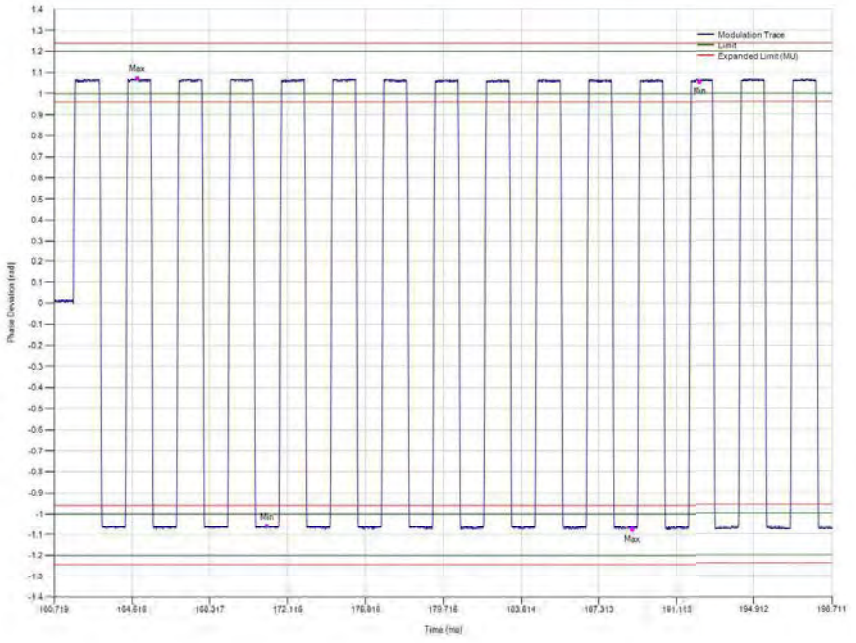
The code consists of 30 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6

Unique identifier:
19320000003FDFF

- **WARNING: Location is a coarse position only, and hence has less resolution/accuracy than a message without the rotating field**

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct: Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201	Search Contact list here
37-40	1001	Protocol Code	ELT - Location: ELT-DT Location Protocol
41-42	00	ELT Identity Type	Aircraft 24 bit address
43-86	00000000000000000000000	ELT(DT) test beacon	Test beacon type since bits 43-86 are all 0 or All 1, designates Test Protocol
87-75	010100011	Latitude	81.5 Degrees North (81.5)
76-85	1011001001	Longitude	100.5 Degrees West (-100.5)
86-106	00011100011110100111 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-108	00	means of activation	manual activation by user
109-112	0101	encoded altitude	Altitude is greater than 2200 m (7218 ft) up to and including 2800 m (9186 ft)
113-114	00	Encoded location freshness or PDF-2 rotating field indicator	PDF-2 rotating field indicator
115-117	000	Aircraft operator 3LD designator or Spare	Aircraft operator 3LD designation
118-132	100010100101010	Aircraft operator 3LD	ZLR
133-144	110011110001	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	81.500 -100.500

Frequency Plot



Modulation Plot