

Burst 2

Decoded Beacon Message

Hexadecimal code: **FFED08C9DFFD08DFEFFF28917861F0FABE**

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:
193BFFA11FBDFDF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111 111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct. Self-Test Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	001100100 1	Country code:	Albania - 201
37-40	1101	Protocol Code	RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	111101000 010001111 11	Last 6 digits MMSI	999999
67-75	011111111	Latitude	Default - no location (Default - no location)
76-85	011111111 1	Longitude	Default - no location (Default - no location)
86-106	111001010 001001000 101	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	101010111 110	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Low Temperature (-20°C) – RLS – Mod State 1

Decoded Beacon Message

Hexadecimal code: **FF FED08C9D FFD08FDE FFFF28917861F0FABE**

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:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111 111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct. Self-Test Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	001100100 1	Country code:	Albania - 201
37-40	1101	Protocol Code	RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	111101000 010001111 11	Last 6 digits MMSI	999999
67-75	011111111	Latitude	Default - no location (Default - no location)
76-85	011111111 1	Longitude	Default - no location (Default - no location)
86-106	111001010 001001000 101	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	101010111 110	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



High Temperature (+55°C) – RLS – Mod State 0

Decoded Beacon Message

Hexadecimal code: **FFED08C9DFFD08DFEFFF28917861F0FABE**

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:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111 111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct. Self-Test Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	001100100 1	Country code:	Albania - 201
37-40	1101	Protocol Code	RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	111101000 010001111 11	Last 6 digits MMSI	999999
67-75	011111111	Latitude	Default - no location (Default - no location)
76-85	011111111 1	Longitude	Default - no location (Default - no location)
86-106	111001010 001001000 101	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	101010111 110	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Ambient Temperature – SLP – Mod State 3

Decoded Beacon Message

Hexadecimal code: FFFED08C9EF9C0637FDFF83D15B783E0F66C

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.0.

Unique identifier:
193DF380C6FFBFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111 1111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct: Self-Test Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code: For associated SAR Points of Contact (SPOC) related to Albania - 201 ;	Albania - 201 Search Contact list here
37-40	1110	Protocol Code	Standard Location Protocol - Test
41-64	1111001110 0000001100 011	Test protocol	No Decode information in bits 41 to 64
65-74	0111111111	Latitude	Default - no location (Default - no location)
75-85	0111111111	Longitude	Default - no location (Default - no location)
86-106	0000011110 1000101011 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-110	1101	Validity	107-110 should be 1101
111	1	Encoded position	Encoded position data is provided by an internal navigation device
112	1	121.5 Mhz Homing Device	Included in beacon
113-122	1000001111	Latitude offset	Default value
123-132	1000001111	Longitude offset	Default value
133-144	0110011011 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Low Temperature (-20°C) – SLP – Mod State 1

Decoded Beacon Message

Hexadecimal code: FFFED08C9EF9C0637FDFF83D15B783E0F66C

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.0.

Unique identifier:
193DF380C6FFBFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111 1111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct: Self-Test Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code: For associated SAR Points of Contact (SPOC) related to Albania - 201 ;	Albania - 201 Search Contact list here
37-40	1110	Protocol Code	Standard Location Protocol - Test
41-64	1111001110 0000001100 011	Test protocol	No Decode information in bits 41 to 64
65-74	0111111111	Latitude	Default - no location (Default - no location)
75-85	0111111111	Longitude	Default - no location (Default - no location)
86-106	0000011110 1000101011 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-110	1101	Validity	107-110 should be 1101
111	1	Encoded position	Encoded position data is provided by an internal navigation device
112	1	121.5 Mhz Homing Device	Included in beacon
113-122	1000001111	Latitude offset	Default value
123-132	1000001111	Longitude offset	Default value
133-144	0110011011 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



High Temperature (+55°C) – SLP – Mod State 1

Decoded Beacon Message

Hexadecimal code: FFFED08C9EF9C0637FDFF83D15B783E0F66C

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.0.

Unique identifier:
193DF380C6FFBFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111 1111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct: Self-Test Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code: For associated SAR Points of Contact (SPOC) related to Albania - 201 ;	Albania - 201 Search Contact list here
37-40	1110	Protocol Code	Standard Location Protocol - Test
41-64	1111001110 0000001100 011	Test protocol	No Decode information in bits 41 to 64
65-74	0111111111	Latitude	Default - no location (Default - no location)
75-85	0111111111	Longitude	Default - no location (Default - no location)
86-106	0000011110 1000101011 0	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-110	1101	Validity	107-110 should be 1101
111	1	Encoded position	Encoded position data is provided by an internal navigation device
112	1	121.5 Mhz Homing Device	Included in beacon
113-122	1000001111	Latitude offset	Default value
123-132	1000001111	Longitude offset	Default value
133-144	0110011011 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Ambient Temperature – NLP – Mod State 3

Decoded Beacon Message

Hexadecimal code: FFFED08C9F00C05FC0FF06728BF79F3C0010

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.5.

Unique identifier:
193E0180BF81FE0

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111 1111	Bit-synchronization pattern consisting of "1"s shall occupy the first 16-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct. Self-Test 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	1111	Protocol Code	Nat Loc Test Location / National Location
41-58	000000011 00000001	Identification Data (decimal)	#789
59-71	01111111000 00	Latitude	Default - no location (Default - no location)
72-85	01111111100 000	Longitude	Default - no location (Default - no location)
86-106	1100111001 0100010111 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-109	110	Validity	Bits 107-109 should be 110. Passed.
110	1	Location check	bits 113-126 for location. 127-132 for national use
111	1	Location source	Encoded position data is provided by an internal navigation device
112	1	Aux device	Included in beacon
113-119	1001111	Latitude offset	Default value
120-126	1001111	Longitude offset	Default value
127-132	000000	National use	
133-144	0000000100 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Low Temperature (-20°C) – NLP – Mod State 2

Decoded Beacon Message

Hexadecimal code: FFFED08C9F00C05FC0FF06728BF79F3C0010

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.5.

Unique identifier:
193E0180BF81FE0

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111 1111	Bit-synchronization pattern consisting of "1"s shall occupy the first 16-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct Self-Test 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	1111	Protocol Code	Nat Loc Test Location / National Location
41-58	000000011 00000001	Identification Data (decimal)	#789
59-71	01111111000 00	Latitude	Default - no location (Default - no location)
72-85	01111111100 000	Longitude	Default - no location (Default - no location)
86-106	1100111001 0100010111 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-109	110	Validity	Bits 107-109 should be 110. Passed.
110	1	Location check	bits 113-126 for location. 127-132 for national use
111	1	Location source	Encoded position data is provided by an internal navigation device
112	1	Aux device	Included in beacon
113-119	1001111	Latitude offset	Default value
120-126	1001111	Longitude offset	Default value
127-132	000000	National use	
133-144	0000000100 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



High Temperature (+55°C) – NLP – Mod State 2

Decoded Beacon Message

Hexadecimal code: FFFED08C9F00C05FC0FF06728BF79F3C0010

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:
193E0180BF81FE0

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111 1111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	011010000	Frame Synchronization Pattern	Correct. Self-Test 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	1111	Protocol Code	Nat Loc Test Location/ National Location
41-58	0000000011 00000001	Identification Data (decimal)	#789
59-71	01111111000 00	Latitude	Default - no location (Default - no location)
72-85	0111111100 000	Longitude	Default - no location (Default - no location)
86-106	1100111001 0100010111 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107-109	110	Validity	Bits 107-109 should be 110. Passed.
110	1	Location check	bits 113-126 for location. 127-132 for national use
111	1	Location source	Encoded position data is provided by an internal navigation device
112	1	Aux device	Included in beacon
113-119	1001111	Latitude offset	Default value
120-126	1001111	Longitude offset	Default value
127-132	000000	National use	
133-144	0000000100 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Table F-E.3: Self-test Mode Actions and Indications

No.	Action/Indication	Time-stamp (HH:MM:SS)	Description of action/indication	Duration of action/indication (sec)	Notes
1	Self-Test mode initiation (distinct action)	00:00:00	Press and hold Test button	1	
2	Distinct indication of the Self-test initiation	00:00:02	Red LED starts flashing	1	
3	Self-test single burst transmission	00:00:04	406, 121 & AIS Bursts	1	
4	Self-test message default values	00:00:04	-	-	-
5	Distinct indication of RF transmission	00:00:07	A White LED strobe	1	-
6	Distinct indication of the Self-test PASS result	00:00:07	A Blue LED flashes (if RLS) or Green LED flashes (if NON RLS)	1	Dependent on number of flashes. See User Manual for description of self-test indications.
7	Distinct indication of the Self-test FAIL result	00:00:07	A Red LED sequence flashes	Up to 9 seconds.	Dependent on number of flashes. See User Manual for description of self-test indications.
8	Distinct indication of Insufficient Battery Energy	00:00:07	A Magenta (if RLS) or Orange (if non RLS) LED flashes	1	Dependent on number of flashes. See User Manual for description of self-test indications.
9	Automatic termination of the Self-test mode, irrespectively of the switch position	-	The EUT goes into a programming mode when the Test button is held down. It then self terminates.	21 seconds	-
10	Duration of the Self-test mode	00:00:16	-	-	-



Table F-E.5: Indication of Insufficient Battery Energy

Parameter	Units	Declared by beacon manufacturer	Verified and evaluated by accepted test Facility	Notes
Minimum duration of continuous operation (CCO)	hours	25h	-	CCO is declared in Annex G as "Operating Lifetime". CCO is required for the test. 24 hours plus 1 hour before PIE indication Minimum duration of continuous operation (CCO)
Full Battery Pack Capacity (CBP)	hours	67.07	-	If needed to calculate CSP-AMB Battery Capacity (3500mAh) / Average operating current (52.18mA mode A4)
Battery Pre-Operational Losses (CPO)	hours	6.29	-	Corresponds to LCDC, as defined in the Table F- E.2 LCDC = 0.328 Ah / Average operating current (52.18mA)
Spare Battery Capacity at ambient temperature (CSP-AMB)	hours	35.78	-	CSP-AMB is required for the test and shall be defined by testing (see Footnote 4 to section A.3.6.2.2), or by calculation, as follows: CSP-AMB = CBP – (CPO + CCO)
Criteria and conditions to trigger PIE indication	-	*See Description Below	-	Description of PIE criteria and conditions to be met to trigger PIE indication. Use a separate sheet if needed
Step-1: battery pack discharge	hours	-	0.5h	Battery discharge shall correspond to: CPO - 30 minutes, or the value declared by the beacon manufacturer less 30 minutes
Step-1: beacon conditions (if applicable)	-	-	The battery was discharged in the EUT for 0.5 hours	Description of conditions recreated during the Step-1 for which the PIE criteria is not met
Step-1: observations of self-test indication	-	-	The LED indicator blink once blue and then repeats. If RLS is not enabled the LED indicator will blink once green and then repeats.	Test facility observations of self-test indication: time, duration, type of indication
Step-2: battery pack discharge	hours	-	Step-1: battery pack discharge + Step-2: battery pack discharge = 1.5h	Total battery discharge shall correspond to: CPO + CSP-AMB + 30 minutes or the value declared by the beacon manufacturer plus 30 minutes
Step-2: beacon conditions (if applicable)	-	-	The battery was discharged in the EUT for a further 1 hour	Description of conditions recreated during the Step-2 for which the PIE criteria is met
Step-2: observations of distinct PIE indication	-	-	The LED indicator blink once magenta and then repeats. If RLS is not enabled the LED indicator will blink once orange and then repeats.	Test facility observations of PIE indication: time, duration, type of indication



***PIE Indication**

If the PIE criteria has been met the pass indication of the Self-Test shall change from a flashing GREEN LED to a flashing AMBER LED. For this criterion to be met the beacon must have been operated for 1 hour. This operation time can be accumulated through Self-Testing, GNSS Self-Testing and activation. The AMBER LED indicates that the beacon may not have sufficient capacity to last 24 hours operation and the battery should be replaced.

For non RLS protocols, green and orange will be replaced with blue and magenta LEDs respectively.

GNSS Self-test mode

General

All duration measurements below include activation method time, i.e. they start from test switch press and include any “hold for x seconds” requirement and they end when all visual and audible activity appeared to cease.

All positional accuracy values below were calculated using the Haversine Formula; the Earth’s radius was taken as 6367 km.

GNSS Self-test Observations

Parameter	Actual	Declared
GNSS Self-test count	60	60
GNSS Self-test maximum duration (s) incl. activation method	115	115.62
Indication of GNSS Self-test activation/completion	<p>A GNSS self-test activation is activated by holding the Test button until the red flashing LED remains on without flashing.</p> <p>If navigation data is detected, the LED flashes green. The number of flashes will indicate the number of GNSS self-tests remaining. The test result will then be repeated after 2 seconds.</p> <p>If no navigation data is detected the LED flashes red. The number of flashes indicates the number of GNSS Self-Tests remaining, up to a maximum of 10 times. The test result will then be repeated after 2 seconds.</p>	
Indication of GNSS Self-test count limit reached	13 fast flashes of red LED straight after releasing the Test button	



Summary: GNSS Self-test with Valid Navigation Input

Protocol	RLS Protocol		
Temperature (°C)	-20	+22.4	+55
Frame sync verification	011010000	011010000	011010000
Format Flag (1 bit)	1	1	1
Single Radiated burst (ms)	519.586	519.531	519.5
Position data	P	P	P
Single burst verification	P	P	P
Actual duration (s) incl. activation method	71	72	58
Position Input Latitude	N 50° 48.68442		
Position Input Longitude	W 1° 37.4167		
Position Output Latitude	N 50° 48' 44"	N 50° 48'44"	N 50° 48'44"
Position Output Longitude	W 1° 37' 24"	W 1° 37' 24"	W 1° 37' 24"
Position Error (m)	92.8	92.8	92.8

Protocol	Standard Location Protocol		
Temperature (°C)	-20	+24.5	+55
Frame sync verification	011010000	011010000	011010000
Format Flag (1 bit)	1	1	1
Single Radiated burst (ms)	519.602	519.492	519.609
Position data	P	P	P
Single burst verification	P	P	P
Actual duration (s) incl. activation method	52	67	70
Position Input Latitude	N 51° 22.58443		
Position Input Longitude	W 1° 49.83337		
Position Output Latitude	N 51° 22' 36"	N 51° 22'36"	N 51° 22'36"
Position Output Longitude	W 1° 49' 52"	W 1° 49' 52"	W 1° 49' 52"
Position Error (m)	48.1	48.1	48.1



Protocol	National Location Protocol		
Temperature (°C)	-20	+23.2	+55
Frame sync verification	011010000	011010000	011010000
Format Flag (1 bit)	1	1	1
Single Radiated burst (ms)	520.177	519.625	520.13
Position data	P	P	P
Single burst verification	P	P	P
Actual duration (s) incl. activation method	60	62	71
Position Input Latitude	N 51° 22.58443		
Position Input Longitude	W 1° 49.83337		
Position Output Latitude	N 51° 22' 36"	N 51° 22'36"	N 51° 22'36"
Position Output Longitude	W 1° 49' 52"	W 1° 49' 52"	W 1° 49' 52"
Position Error (m)	48.1	48.1	48.1



Summary: GNSS Self-test without Valid Navigation Input

Protocol	RLS Protocol		
Temperature (°C)	-20	+22.4	+55
Frame sync verification	N/A	N/A	N/A
Format Flag (1 bit)	N/A	N/A	N/A
Single Radiated burst (ms)	N/A	N/A	N/A
Default Position data	N/A	N/A	N/A
Single burst verification	N/A	N/A	N/A
Actual duration (s) incl. activation method	115	115	115

Protocol	Standard Location Protocol		
Temperature (°C)	-20	+22.4	+55
Frame sync verification	N/A	N/A	N/A
Format Flag (1 bit)	N/A	N/A	N/A
Single Radiated burst (ms)	N/A	N/A	N/A
Default Position data	N/A	N/A	N/A
Single burst verification	N/A	N/A	N/A
Actual duration (s) incl. activation method	115	115	115

Protocol	National Location Protocol		
Temperature (°C)	-20	+23.2	+55
Frame sync verification	N/A	N/A	N/A
Format Flag (1 bit)	N/A	N/A	N/A
Single Radiated burst (ms)	N/A	N/A	N/A
Default Position data	N/A	N/A	N/A
Single burst verification	N/A	N/A	N/A
Actual duration (s) incl. activation method	115	115	115

Note – EUT does not transmit a 406MHz burst for GNSS self-test when absence of navigation data.



Table F-E.4: GNSS Self-test Mode Actions and Indications

No.	Action/Indication	Time-stamp (HH:MM:SS)	Description of action/indication	Duration of action/indication (sec)	Notes
1	GNSS Self-test mode initiation (distinct action)	00:00:00	Hold down T button	6	
2	Distinct indication of the GNSS Self-test initiation	00:00:06	Flashing LED becomes solid	1	
3	GNSS Self-test single burst transmission			520ms	Message burst time recorded on TUV test system
4	GNSS Self-test message position encoding		GNSS self-test message structure and bit values confirmed correct	520ms (with Nav input)	Decoded using TUV test system
5	Distinct indication of the GNSS Self-test PASS result	00:01:05	LED flashes green the amount of GNSS self tests remaining and then repeats	Up to 16 seconds depending how many GNSS self tests remaining	
6	Distinct indication of the GNSS Self-test FAIL result	00:01:39	Red LED flashes the amount of GNSS self tests remaining and then repeats	Up to 16 seconds depending how many GNSS self tests remaining	If 5 remaining, it will flash 5 times, then pause, then flash 5 times.
7	Distinct indication that the manufacturer-declared limited number of GNSS Self-tests is attained	00:00:06	LED flashes red 13 times	7	As described in manufacturer's documentation
8	Automatic termination of the Self-test mode, irrespectively of the switch position		If the button is held down then it draws about 35mA for 20 seconds while it goes into a programming mode. It then powers down.	-	See Battery Current Results in section A10
9	Duration of the GNSS Self-test mode	00:01:55	LED turns off		



Full Hex Messages	
National Location Protocol with Navigation data applied	
+55°C	FF FED08C9B70464CD701CD8757379208FF77
Ambient	FF FED08C9B70464CD701CD8757379208FF77
-20°C	FF FED08C9B70464CD701CD8757379208FF77
National Location Protocol without Navigation data applied	
+55°C	N/A
Ambient	N/A
-20°C	N/A
Standard Location Protocol with Navigation data applied	
+55°C	FF FED08C9EF9C06333A03ECA66771DA4D4D0
Ambient	FF FED08C9EF9C06333A03ECA66771DA4D4D0
-20°C	FF FED08C9EF9C06333A03ECA66771DA4D4D0
Standard Location Protocol without Navigation data applied	
+55°C	N/A
Ambient	N/A
-20°C	N/A
Return Link Service with Navigation data applied	
+55°C	FF FED08C9DFFD08FCCD01BBF573856976D56
Ambient	FF FED08C9DFFD08FCCD01BBF573856976D56
-20°C	FF FE2F8C9DFFD08FCCD01BBF573856976D56
Return Link Service without Navigation data applied	
+55°C	N/A
Ambient	N/A
-20°C	N/A

N/A = EUT does not transmit a 406 burst for GNSS Self-test in the absence of navigation data.

Summary

The EUT complies with clause A.3.6 of Cospas-Sarsat T.007.



2.9 THERMAL SHOCK

2.9.1 Specification

Cospas-Sarsat T.007, Clause A.2.2

2.9.2 Equipment Under Test and Modification State

PLB3, S/N: TA000005 - Modification State 1

2.9.3 Date of Test

10 September 2021

2.9.4 Test Equipment Used

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

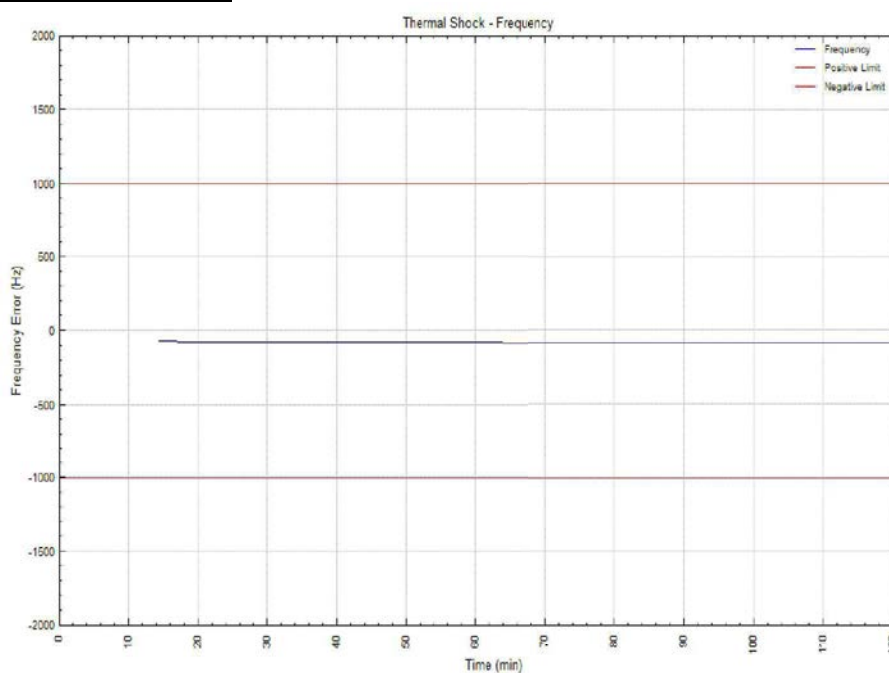
2.9.5 Laboratory Environmental Conditions

Ambient Temperature 27.1°C
Relative Humidity 48.6%

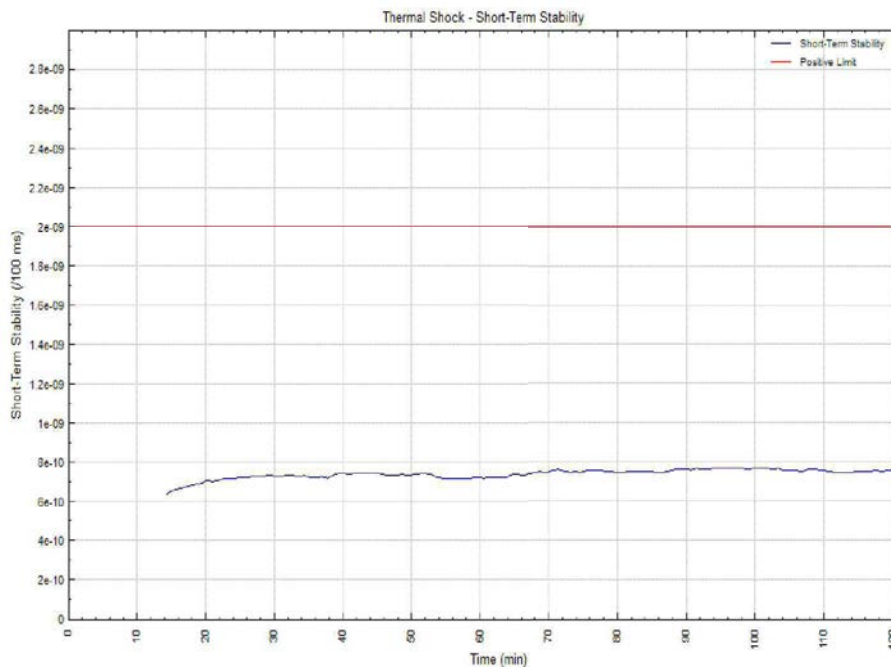
2.9.6 Test Results

Soak Temperature: 20°C
Test Temperature: -10°C

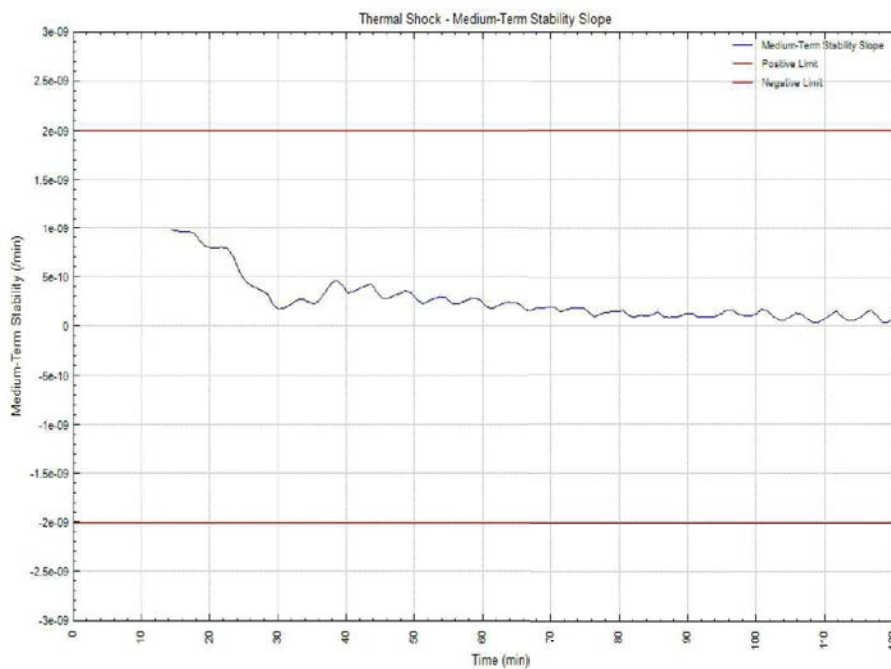
Nominal Frequency



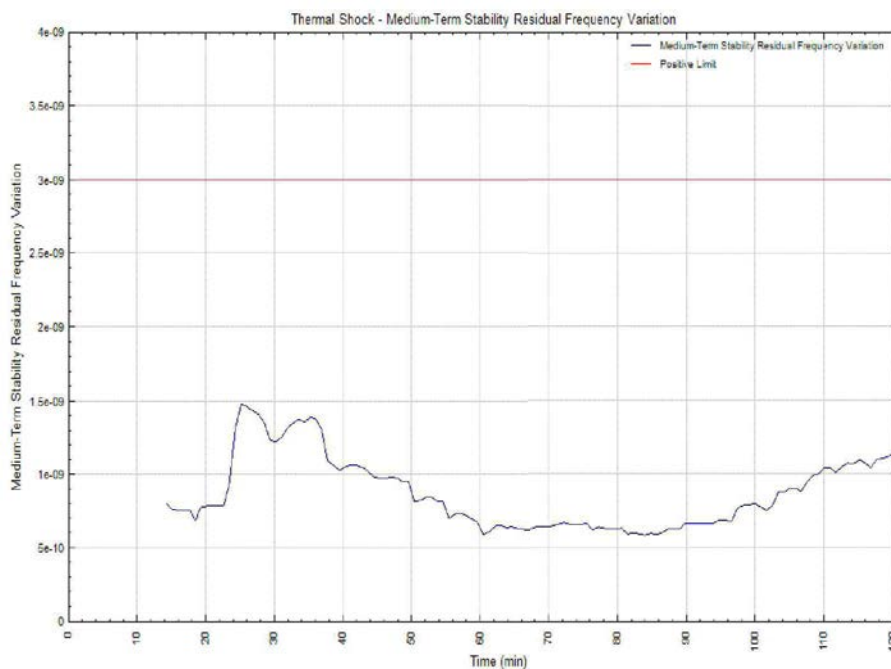
Short Term Stability



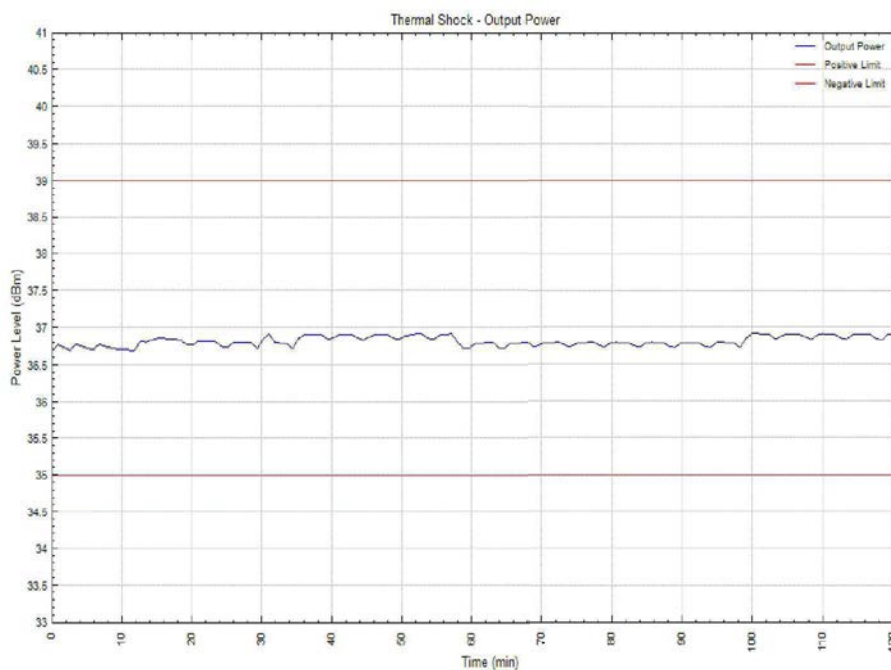
Medium Term Stability, Mean Slope



Medium Term Stability, Residual Frequency Variation



Output Power





Digital Message

Burst 1 Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08DFEFFF28917861F0FABE**

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:
193BFFA11FBFDF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111 1111111	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	001100100 1	Country code	Albania - 201
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	111101000 010001111 11	Last 6 digits MMSI	999999
67-75	011111111	Latitude	Default - no location (Default - no location)
76-85	011111111 1	Longitude	Default - no location (Default - no location)
86-106	111001010 001001000 101	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	101010111 110	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field

Summary

The EUT complies with clause A.2.2 of Cospas-Sarsat T.007.



2.10 OPERATING LIFETIME AT MINIMUM TEMPERATURE

2.10.1 Specification

Cospas-Sarsat T.007, Clause A.2.3

2.10.2 Equipment Under Test and Modification State

PLB3, S/N: TA000005 - Modification State 1 – Battery current measurements (see note 1)

PLB3, S/N: TA000005 - Modification State 2

2.10.3 Date of Test

14 September 2021 – 17 September 2021 - (Battery current measurements)

12 November 2021 - 14 November 2021 (Operating lifetime at minimum temperature test)

2.10.4 Test Equipment Used

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

2.10.5 Laboratory Environmental Conditions

Ambient Temperature 22.5°C

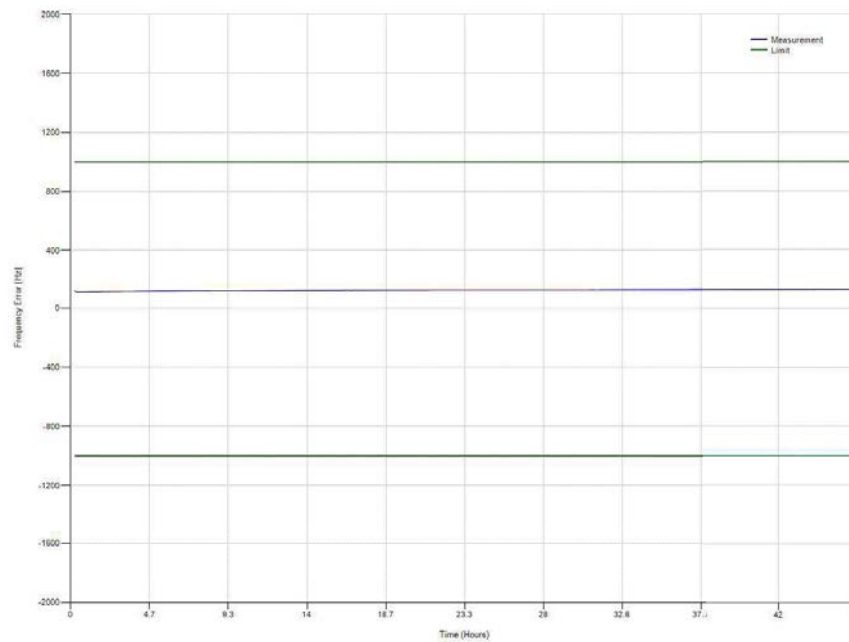
Relative Humidity 43.5%

2.10.6 Test Results

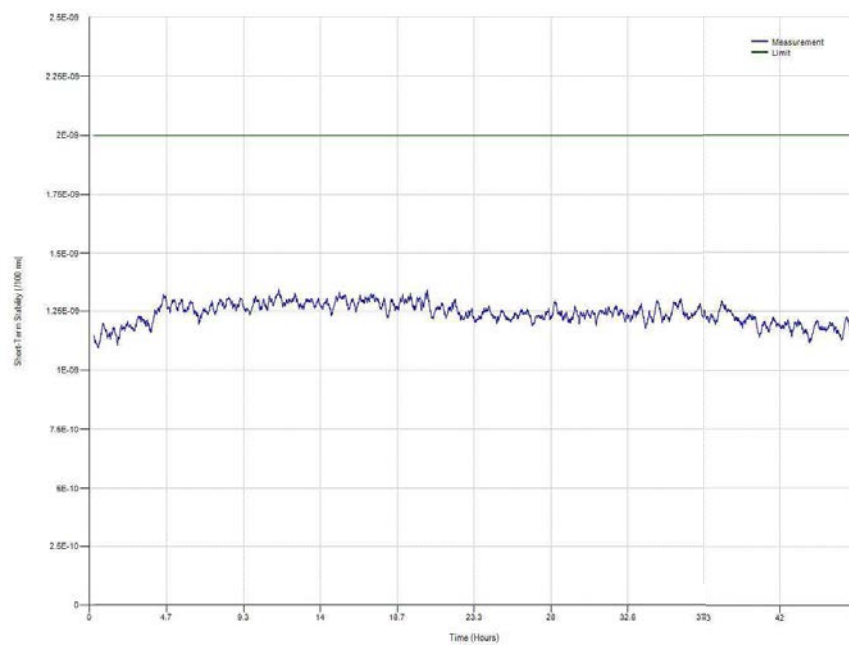
Note 1: Battery current measurements were made in Modification State 1, however comparison measurements were made to check minimal current changes between modification states. Where small changes were seen, the worse case measurement were used. See comparison data in Annex B.

Note 2: In accordance with manufacturer recommendations, navigation data was provided to the EUT at the start of the test to synchronise UTC. Once positional data was encoded in the EUT message, the navigation data was removed. The encoded position returned to default data after 4 hours.

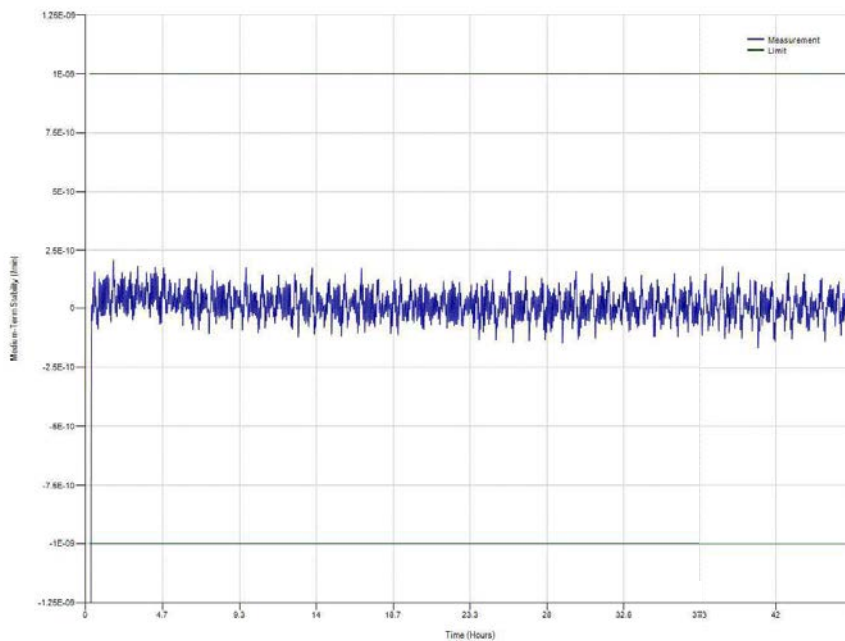
Nominal Frequency



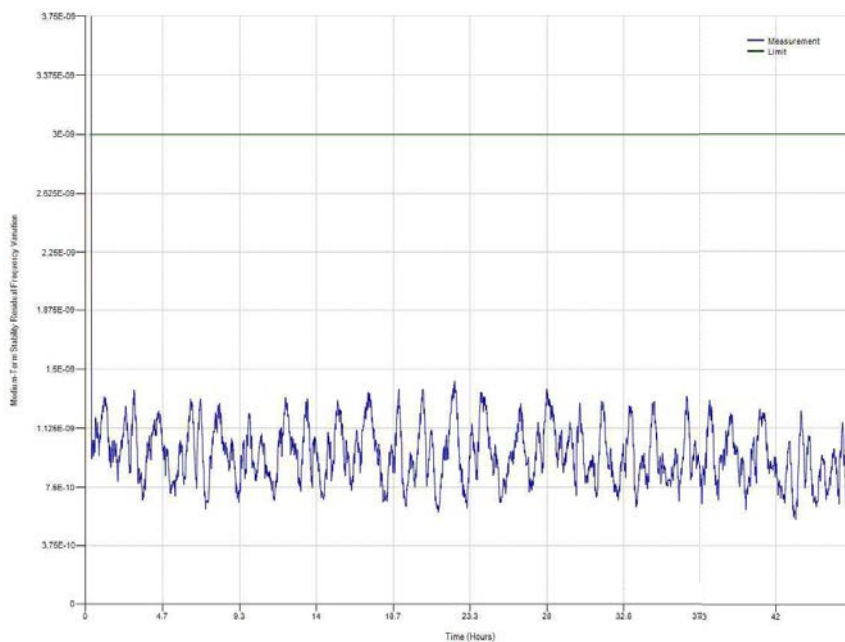
Short Term Stability



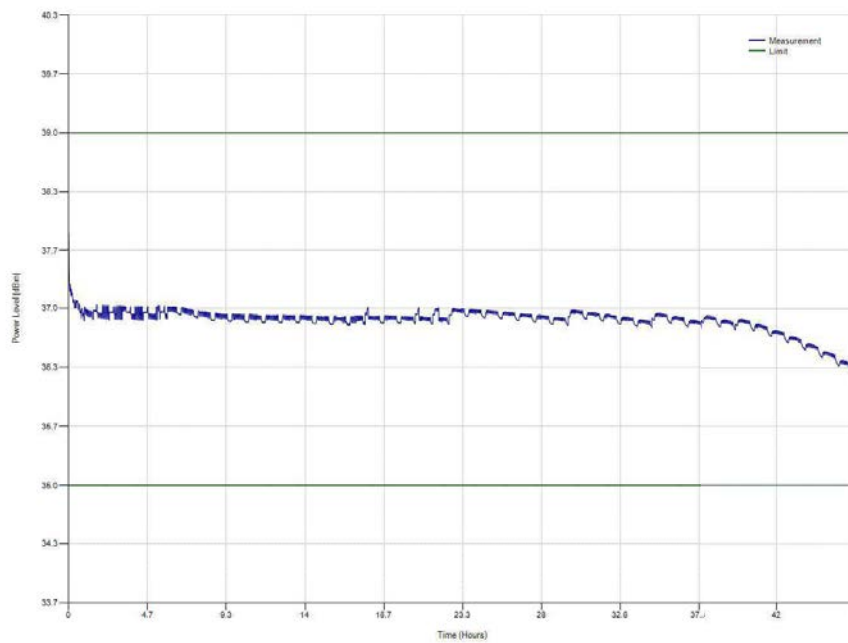
Medium Term Stability, Mean Slope



Medium Term Stability, Residual Frequency Variation



Output Power



Digital Message – Navigation provided (Start of Test)

Decoded Beacon Message

Hexadecimal code: FFFE2F8C9DFE7018CCF024AD44F84ECA2A3C

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.0.

Unique identifier:
193BFCE031BFDFE

Bit numbers in message	Binary content	Field Name	Description
1-10	1111111111 1111	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	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	1001110000 0001100011	Last 6 digits MMSI	639075
67-76	001100111	Latitude	51.5 Degrees North (51.5)
76-85	1000000100	Longitude	2.0 Degrees West (-2.0)
86-106	1001010110 1010001001 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH 1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001110110	Latitude offset	7.0 minutes 24.0 seconds (negative)
124-132	010100010	Longitude offset	10.0 minutes 8.0 seconds (negative)
133-144	1010001111 00	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	51.377 -1.831

Digital Message – Default Navigation data after 4 hours

Decoded Beacon Message

Hexadecimal code: FFFE2F8C9DFE7018DFE7F8129DF861F0FABE

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:
193BFCE031BFDF5F

Bit numbers in message	Binary content	Field Name	Description
1-15	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	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	1001110000 0001100011	Last 6 digits MMSI	639075
67-75	011111111	Latitude	Default - no location (Default - no location)
76-85	011111111	Longitude	Default - no location (Default - no location)
86-106	000001001 0100111011 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	1010101111 10	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field

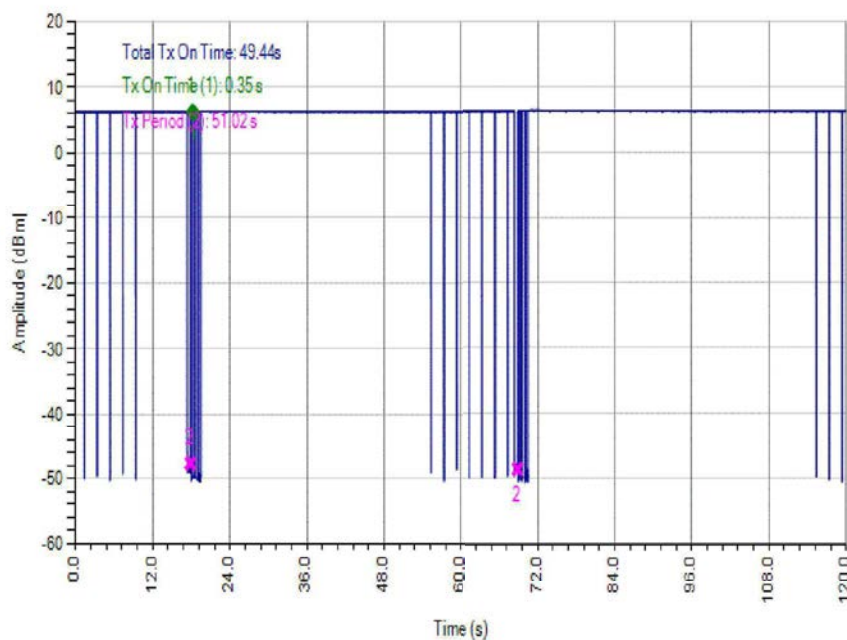


Test Data (0 min - 30 min)

#	Nominal Frequency (Hz)	Short Term Stability (/100 ms)	Medium Term Stability – Slope (/min)	Medium Term Stability – Residual Frequency Variation (no units)	Output Power (dBm)	Time (h)
1	0	0.00E+00	0.00E+00	0.00E+00	37.86	0
2	0	0.00E+00	0.00E+00	0.00E+00	37.47	0.014139
3	0	0.00E+00	0.00E+00	0.00E+00	37.32	0.028306
4	0	0.00E+00	0.00E+00	0.00E+00	37.28	0.042668
5	0	0.00E+00	0.00E+00	0.00E+00	37.23	0.056001
6	0	0.00E+00	0.00E+00	0.00E+00	37.19	0.070474
7	0	0.00E+00	0.00E+00	0.00E+00	37.27	0.084946
8	0	0.00E+00	0.00E+00	0.00E+00	37.2	0.098446
9	0	0.00E+00	0.00E+00	0.00E+00	37.17	0.112113
10	0	0.00E+00	0.00E+00	0.00E+00	37.14	0.126003
11	0	0.00E+00	0.00E+00	0.00E+00	37.22	0.140142
12	0	0.00E+00	0.00E+00	0.00E+00	37.19	0.154309
13	0	0.00E+00	0.00E+00	0.00E+00	37.16	0.16867
14	0	0.00E+00	0.00E+00	0.00E+00	37.14	0.182004
15	0	0.00E+00	0.00E+00	0.00E+00	37.17	0.196476
16	0	0.00E+00	0.00E+00	0.00E+00	37.15	0.210949
17	0	0.00E+00	0.00E+00	0.00E+00	37.12	0.224449
18	406.0311188	1.15E-09	-5.47E-09	1.20E-08	37.11	0.238116
19	406.0311171	1.15E-09	-4.62E-09	1.22E-08	37.08	0.252005
20	406.0311156	1.14E-09	-3.76E-09	1.19E-08	37.06	0.266144
21	406.0311143	1.13E-09	-2.94E-09	1.12E-08	37.09	0.280311
22	406.031113	1.12E-09	-2.18E-09	9.71E-09	37.08	0.294673
23	406.031112	1.13E-09	-1.41E-09	7.49E-09	37.07	0.308006
24	406.0311112	1.12E-09	-7.27E-10	4.84E-09	37.05	0.322479
25	406.0311107	1.12E-09	-2.51E-10	2.23E-09	37.04	0.336951
26	406.0311104	1.13E-09	-2.64E-11	9.65E-10	37.02	0.350451
27	406.0311104	1.12E-09	1.37E-11	9.32E-10	37	0.364118
28	406.0311104	1.12E-09	-4.05E-11	9.88E-10	37.09	0.378008
29	406.0311104	1.11E-09	-5.25E-11	1.00E-09	37.07	0.392147
30	406.0311104	1.11E-09	-1.62E-11	1.03E-09	37.06	0.406314
31	406.0311104	1.11E-09	1.51E-11	1.05E-09	37.04	0.420675
32	406.0311104	1.12E-09	6.21E-11	1.02E-09	37.02	0.434009
33	406.0311104	1.11E-09	8.66E-11	1.01E-09	37	0.448481
34	406.0311104	1.10E-09	3.63E-11	9.49E-10	37.08	0.462954
35	406.0311104	1.10E-09	-1.88E-11	9.97E-10	37.06	0.476615
36	406.0311104	1.10E-09	1.50E-11	1.02E-09	37.08	0.490443

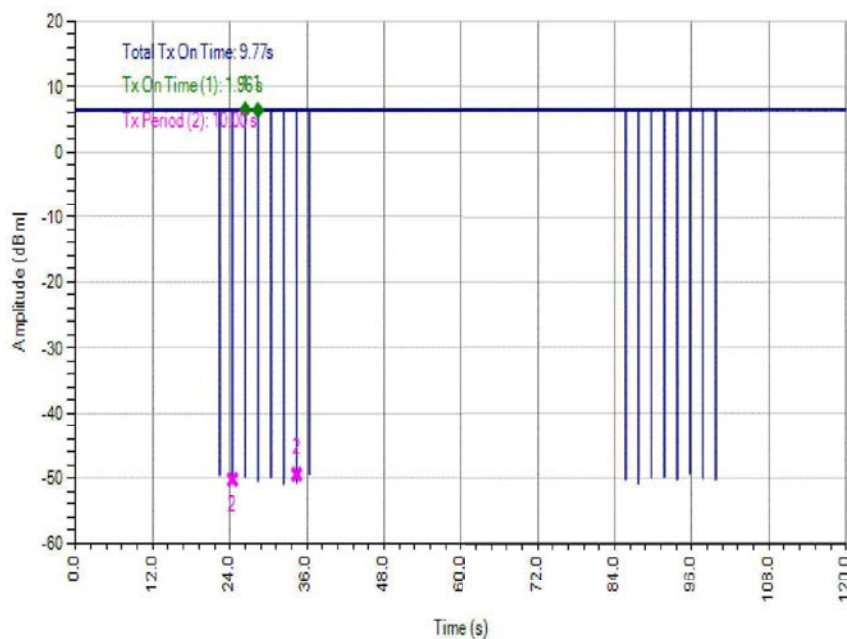
Results outside of the specification limits are marked in red text. These results are based on measurement data made within the first 15 minutes after activation and are considered acceptable.

121MHz Homing Transmitter - Duty Cycle (Start of Test)



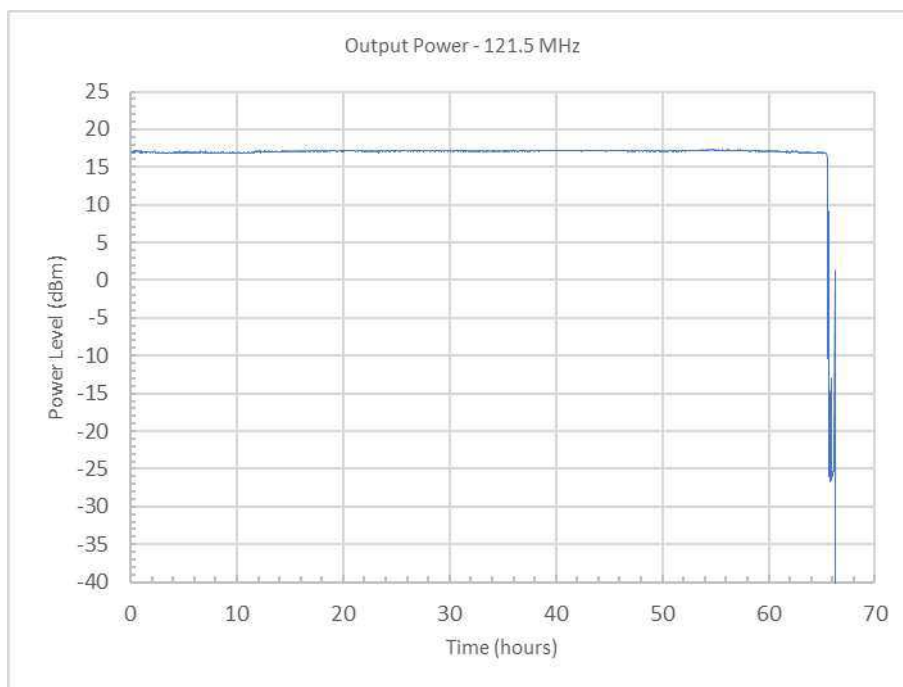
$$\text{Duty Cycle} = 49.438 / (49.438 + 1.582) = 96.9\%$$

121MHz Homing Transmitter - Duty Cycle (End of Test)

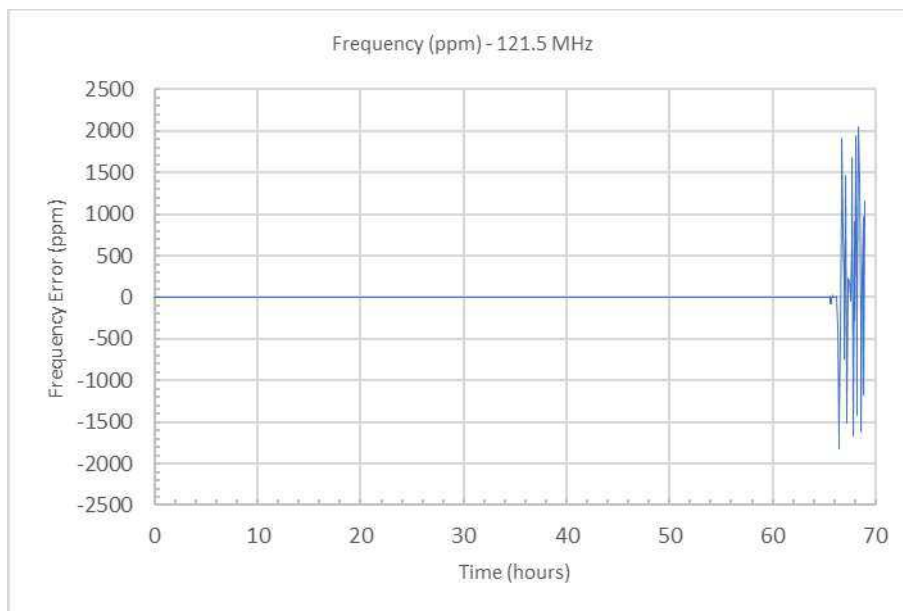


$$\text{Duty Cycle} = 9.771 / (9.771 + 0.234) = 97.66\%$$

121MHz Homing Transmitter Power



121MHz Homing Transmitter Frequency





Operating Current Measurements and Analysis

System Configurations and Operating Modes

RLS Protocol

System Configuration/Operating Mode Matrix (SCOMM):

System Configuration →	A
Operational Mode ↓	No Ancillaries Connected
1, Standby	A1
2, ON at EUT Average	A2
3, ON at EUT (GNSS Sleep)	A3
4, ON at EUT (GNSS Search)	A4
5, Waiting RLM	A5
6, RLM Acknowledged	A6
7, Self-test	A7
8, GNSS Self-Test (Burst)	A8
9, GNSS Self-Test (Timeout)	A9
10, Self-Test Held	A10
11, Standby – NFC Interrogation	A11



SCOMM Results as per C/S T.007 Table F-E.1:

Beacon Operating Mode	Mode: Manually selectable or Automatic	Measurement interval, sec	Average Current, mA	Peak Current, mA
A1	Manual	599.99	0.00001682	0.00001873
A2	Manual	1311	52.18	2030
A3	Automatic*	201.8	42.87	2027
A4	Manual	1010	54.47	2030
A5	Manual	960	53.31	1928
A6	Automatic*	1003	42.27	1934
A7	Manual	15.6	78.24	1657
A8	Manual	74.47	34.73	1658
A9	Manual	104.2	30.5	35.03
A10	Manual	29.44	0	0
A11	Manual	300	0.00001683	0.00002142

The sampling interval was a nominal 80 ms for all measurements.

*Notes: GNSS sleep denoted as Automatic; upon beacon activation the beacon enters GNSS search mode for 18 minutes. After 18 minutes the beacon automatically enters GNSS sleep mode, then it begins a cycle of 90 seconds on and then 3 minutes 30 seconds off. If the EUT is encoded with RLS protocol the initial "on search" time is increased to 30 minutes unless it receives a valid RLM response in which it reverts back to 18 minutes.



Standard Location Protocol

System Configuration/Operating Mode Matrix (SCOMM):

System Configuration →	A
Operational Mode ↓	No Ancillaries Connected
1, Standby	A1
2, ON at EUT Average	A2
3, ON at EUT (GNSS Sleep)	A3
4, ON at EUT (GNSS Search)	A4
5, Self-test	A5
6, GNSS Self-Test (Burst)	A6
7, GNSS Self-Test (Timeout)	A7
8, Self-Test Held	A8

SCOMM Results as per C/S T.007 Table F-E.1:

Beacon Operating Mode	Mode: Manually selectable or Automatic	Measurement interval, sec	Average Current, mA	Peak Current, mA
A1	Manual	599.9	0.00001645	0.00002117
A2	Manual	1212	51.32	1918
A3	Automatic*	200	40.2	1908
A4	Manual	959	54.04	1918
A5	Manual	15.6	77.2	1663
A6	Manual	79.11	34.05	1681
A7	Manual	113	28.4	32.61
A8	Manual	22.17	0	0

The sampling interval was a nominal 80 ms for all measurements.

*Notes: GNSS sleep denoted as Automatic; upon beacon activation the beacon enters GNSS search mode for 18 minutes. After 18 minutes the beacon automatically enters GNSS sleep mode, then it begins a cycle of 90 seconds on and then 3 minutes 30 seconds off. If the EUT is encoded with RLS protocol the initial time is increased to 30 minutes unless it receives a valid RLM response in which it reverts back to 18 minutes.

The worst case protocol is when the EUT is in RLS protocol so all further analysis is when the EUT is programmed in RLS.



Worst Case System Configurations / Operating Modes

Worst case selected mode: RLS

“Lifetime in service” drains (highest average current):

Standby: A1 – No Ancillaries, Standby

Self-test: A7 – No Ancillaries, Self-Test

GNSS Self-test (Fast Acquire): A8 - No Ancillaries, GNSS Self-Test (Burst)

GNSS Self-test (Timeout): A9 - No Ancillaries, GNSS Self-Test (Timeout)

Operating mode used for battery conditioning calculations (equal or lower average current than mode used for conditioning)

Battery discharged using constant current method at a rate of 90mAh at the recommendation of the manufacturer

Note: Battery conditioning is a flexible term used to mean either pre-test discharge and/or extension time as appropriate, see Battery Conditioning Results, below.

Operating mode during lifetime test (highest average current):

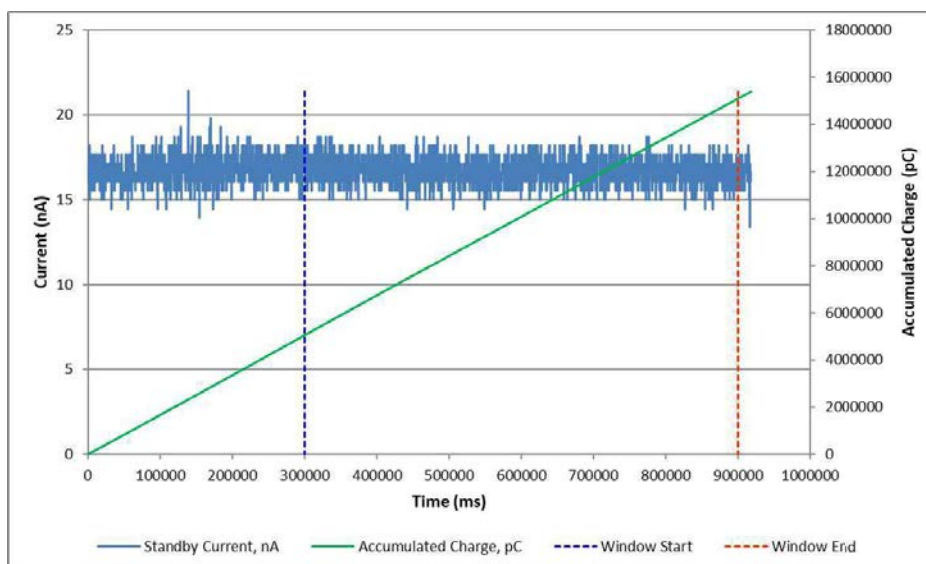
A4 – No Ancillaries, ON at EUT (GNSS Search)*

*Subject to GNSS Receiver Duty Cycle.

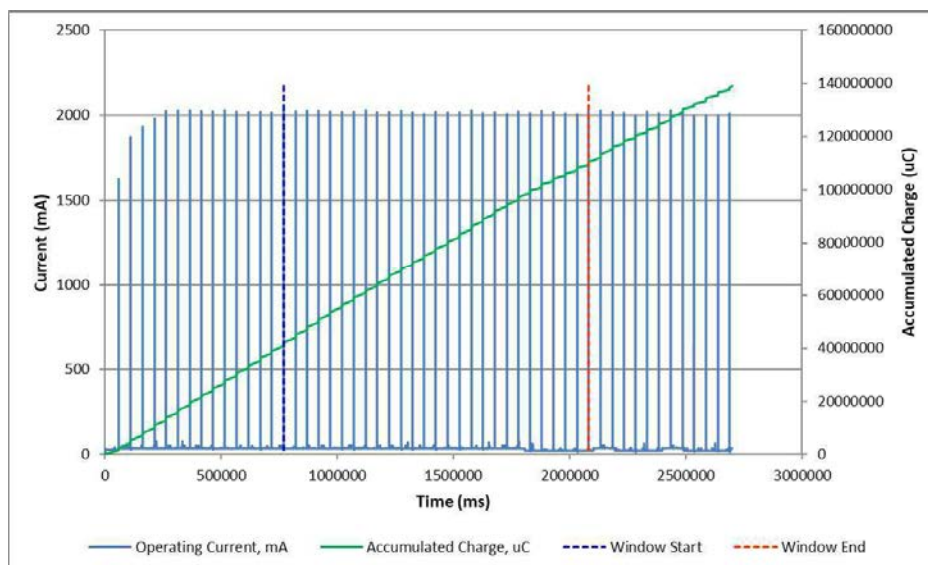
Conditions during lifetime test:

GNSS Signals: External data applied at the start of the test. Once positional data was encoded into the EUT message, the navigation data was removed for the remainder of the test.

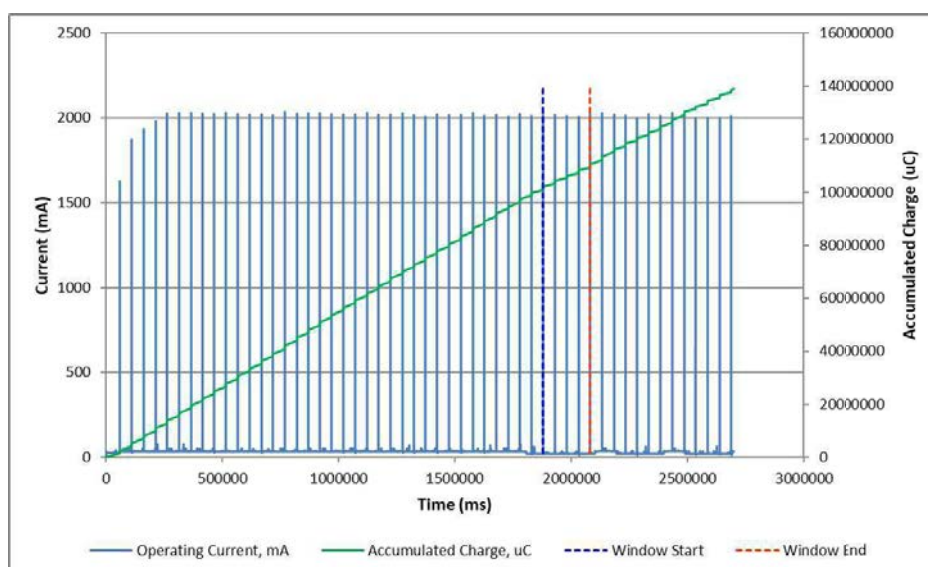
Current Measurement Plots



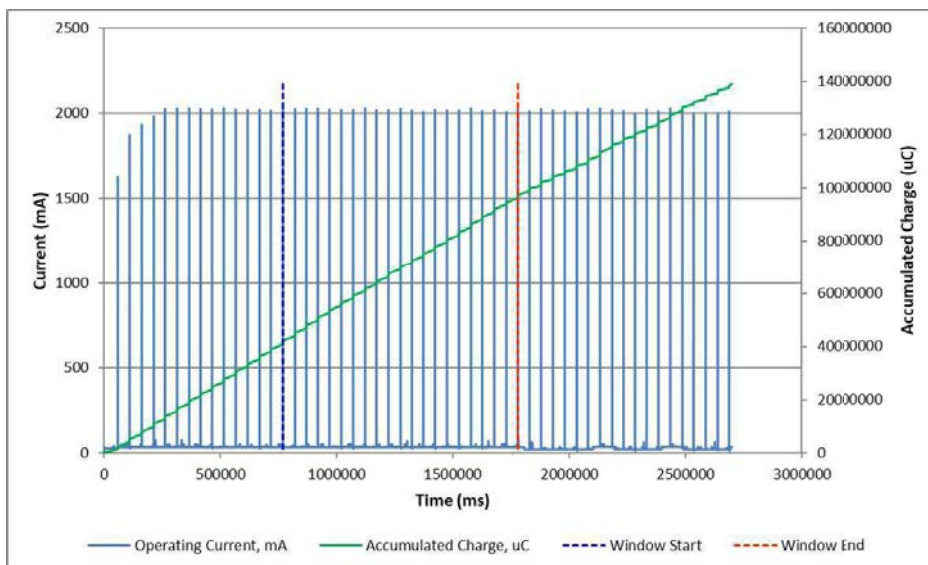
Standby: A1



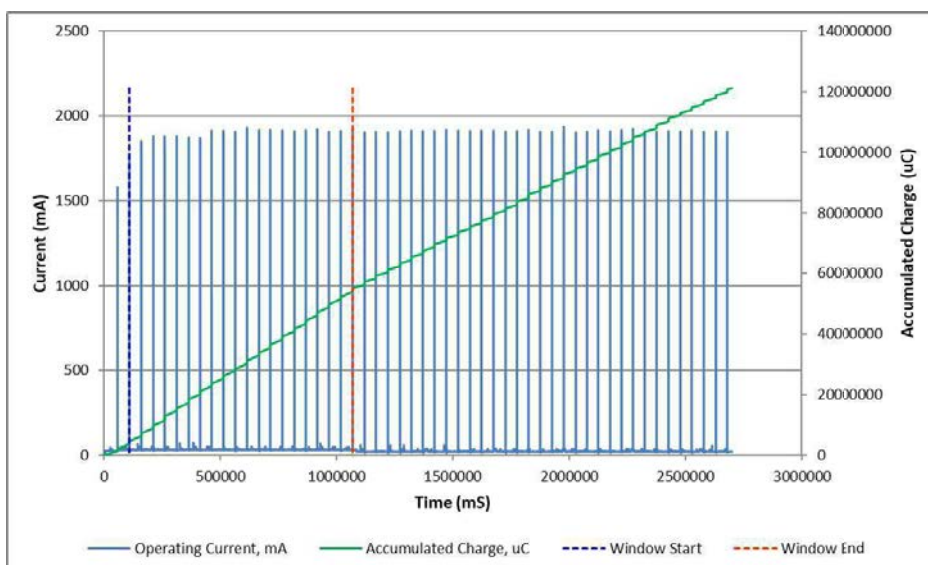
ON at EUT Average: A2



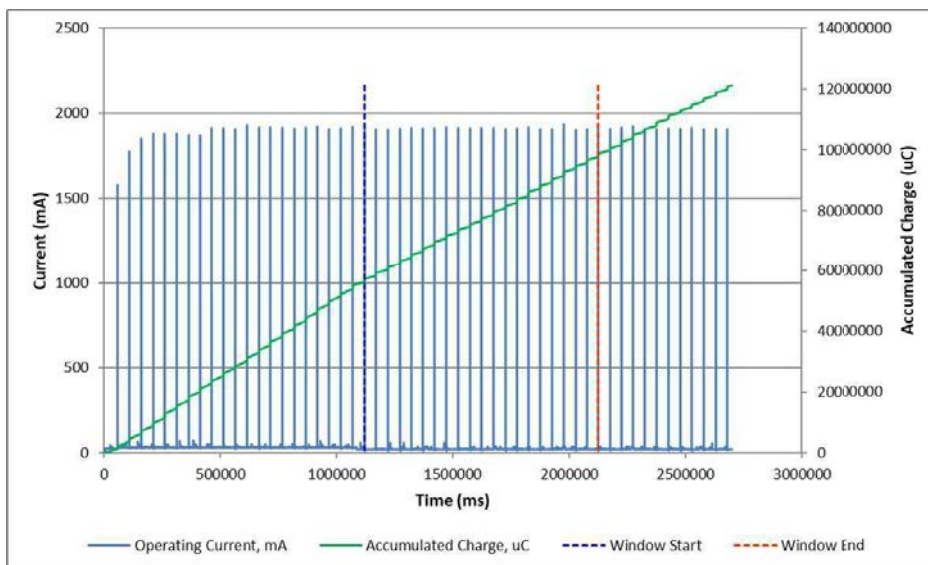
ON at EUT (GNSS Sleep): A3



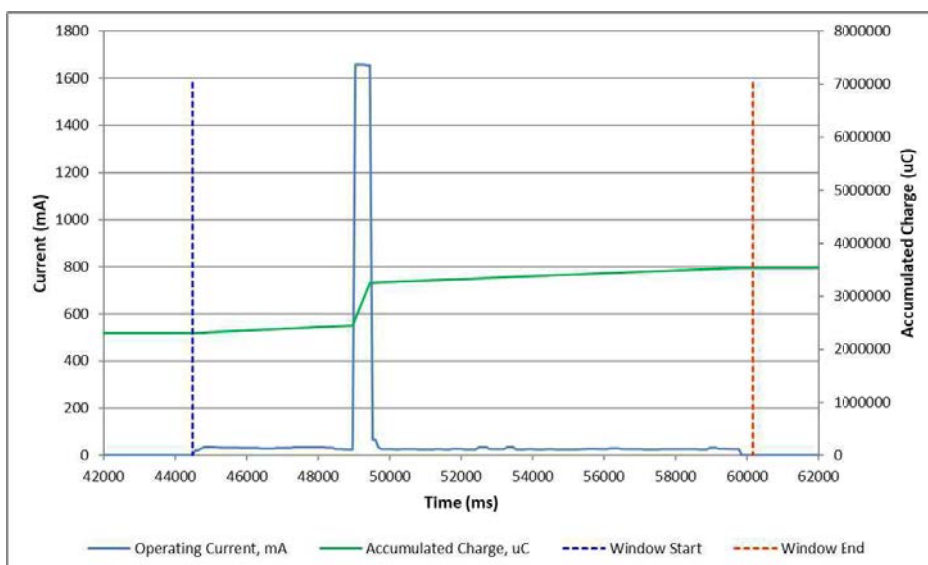
ON at EUT (GNSS Search): A4



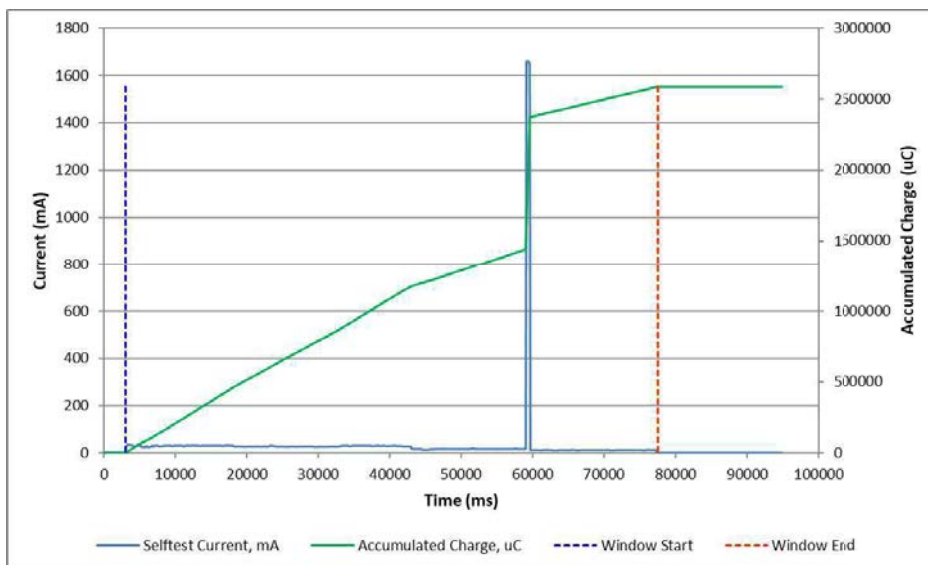
RLM Waiting: A5



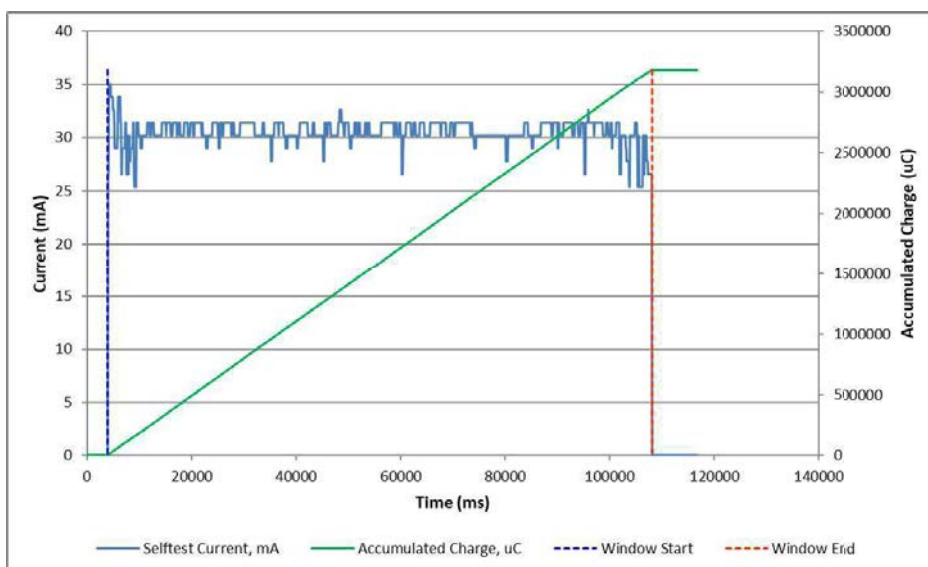
RLM Acknowledged: A6



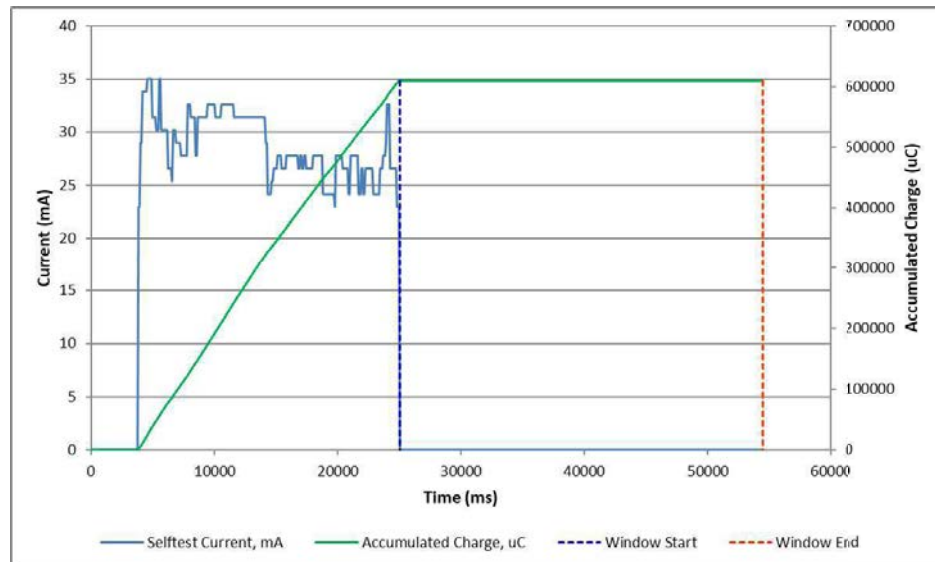
Self-Test: A7



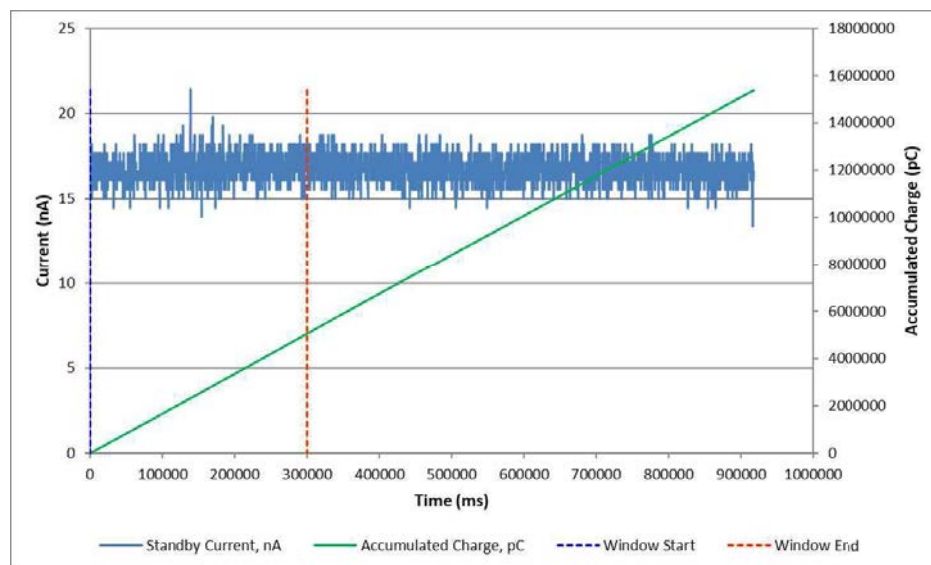
GNSS Self-Test (Burst): A8



GNSS Self-Test (Timeout): A9



Self-Test Held: A10



Standby – NFC Interogation: A11



Battery Conditioning Calculations

As per C/S T.007 Table F-E.2:

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	2	
Declared beacon battery replacement period (from date of installation in the beacon to expiry date marked on the beacon)	T _{BR} or TBR	Years	10	
Battery pack electrical configuration	-	-	2 series packs	
Cell model and cell chemistry	-	-	Energizer L91 Ultimate Lithium, Li/FeS ²	
Nominal cell capacity	-	Ah	3.5	
Nominal battery pack capacity	C _{BN}	Ah	3.5	
Annual battery cell capacity loss (self-discharge) due to aging, as specified by cell manufacturer at ambient temperature	L _{SDC}	%	0.36	Refer to battery handbook supplied by Manufacturer
Calculated battery pack capacity loss due to self-discharge: $L_{CBN} = C_{BN} - [C_{BN} * (1 - L_{SDC} / 100)^{TBR+TCS}]$	L _{CBN}	Ah	0.1482	
Number of self-tests per year	N _{ST}	-	12	Declared by Manufacturer
Average battery current during a self-test	I _{ST}	mA	78.24	
Maximum duration of a self-test	T _{ST}	s	15.6	TUV actual measurements
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}	mAh	40.68	
Maximum Number of GNSS self-tests between battery replacements	N _{GST}	-	60	Declared by Manufacturer
Average battery current during a GNSS self-test of maximum duration	I _{GST}	mA	34.73	GNSS Burst (See Comment)
Maximum duration of a GNSS self-test	T _{GST}	s	115.62	GNSS Timeout (See Comment)
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}	mAh	66.92471	
Average stand-by battery pack current	I _{SB}	mA	0.00001682	
Other Capacity Losses	L _{OTH}	mAh	0	None declared
Battery pack capacity loss due to constant operation of circuitry prior to beacon activation: $L_{ISB} = I_{SB} * T_{BR} * 8760$	L _{ISB}	mAh	1.4734	
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}	Ah	0.3282	



Comment

The EUT does not transmit a 406 MHz burst when failing to obtain navigational data during a GNSS Self-Test. As a worst case, the battery conditioning calculation includes the highest current during a GNSS Self-Test (when navigation data acquired), multiplied by the longest duration during a GNSS Self-Test (when navigation data not acquired, and the timeout counter expires).

Battery Conditioning Results

A fresh battery was used for the test; it was discharged by connection to a resistive load for the pre-test discharge duration calculated as follows:

Pre-test discharge (L_{CDC}) [mAh]	=	427.5
Constant current [mA]	=	90
Pre-test discharge duration [h]	=	$\frac{427.5}{90}$
Pre-test discharge duration [h]	=	4.75

The actual discharge duration was 4.76 h resulting in a discharge of 428.3 mAh.

L_{CDC} was increased to 427.5 mAh to comply with RTCM Standard 11010.3 with the same test. This is considered to be an over test to the requirements of Cospas-Sarsat T.007.

Summary

The EUT complies with clause A.2.3 of Cospas-Sarsat T.007.



2.11 FREQUENCY STABILITY TEST WITH TEMPERATURE GRADIENT

2.11.1 Specification

Cospas-Sarsat T.007, Clause A.2.4

2.11.2 Equipment Under Test and Modification State

PLB3, S/N: TA000005 - Modification State 1

2.11.3 Date of Test

29 September 2021, 30 September 2021, 01 October 2021 & 02 October 2021

2.11.4 Test Equipment Used

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

2.11.5 Laboratory Environmental Conditions

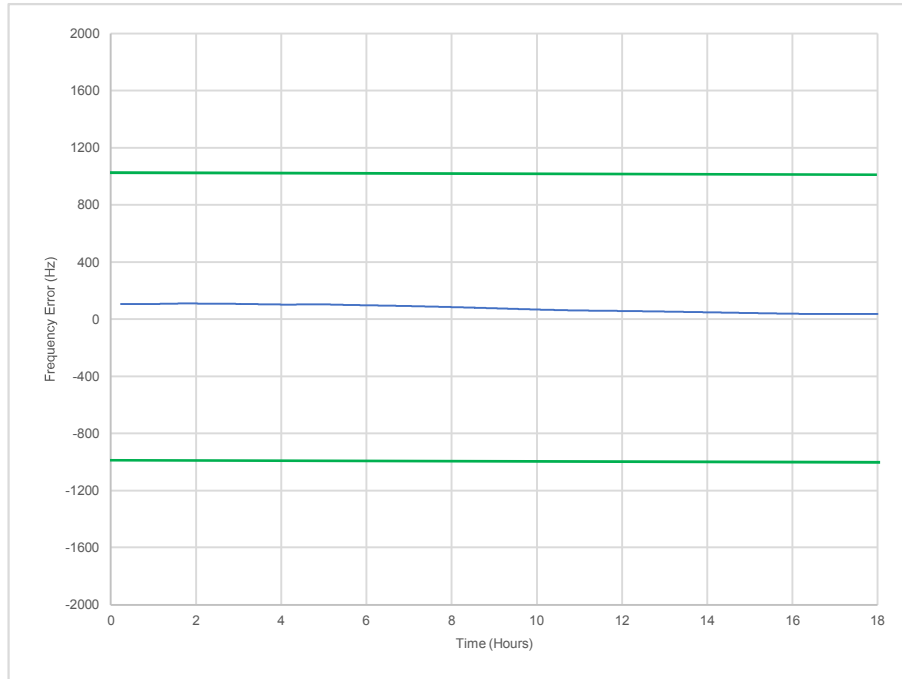
Ambient Temperature 22.1 - 23.8°C
Relative Humidity 37.4 – 45.2 %



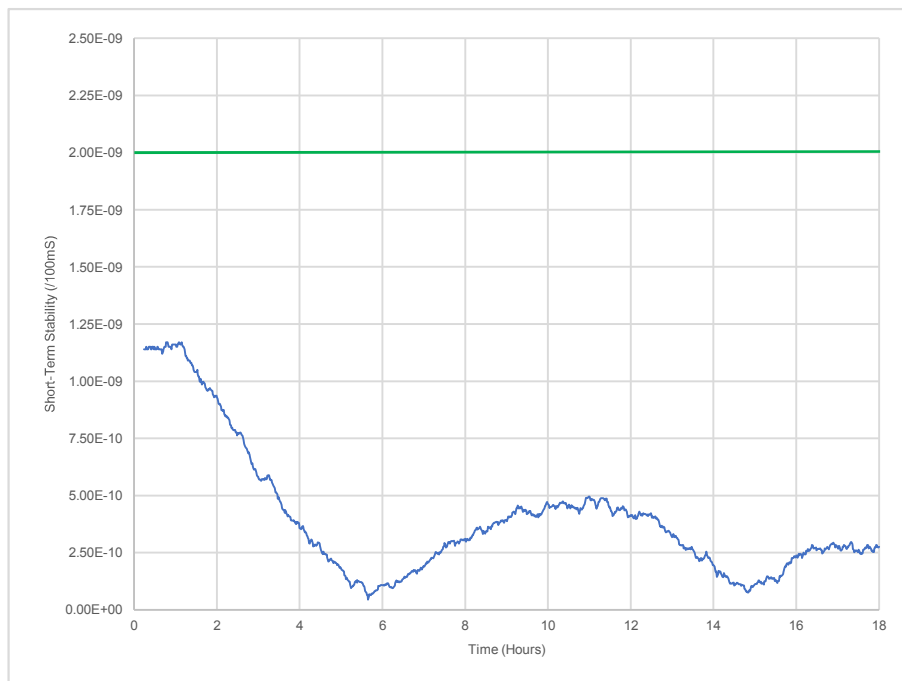
2.11.6 Test Results

Up Ramp

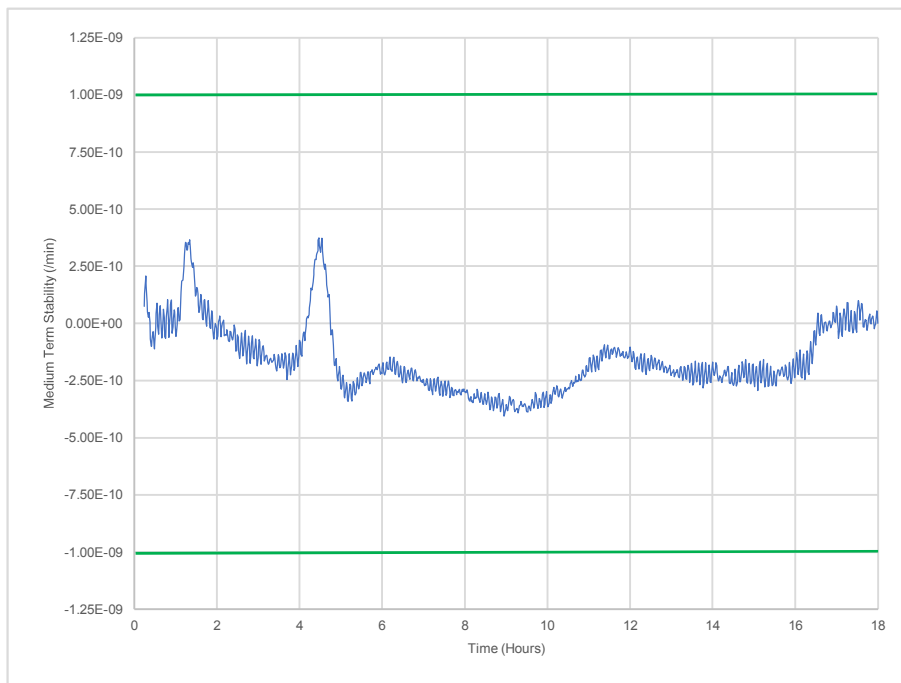
Nominal Frequency



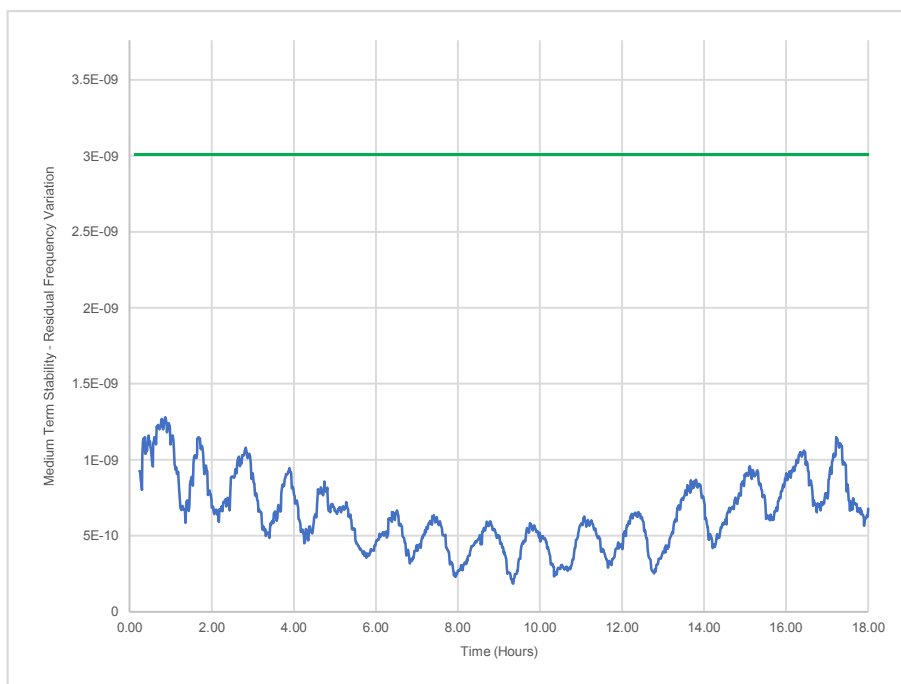
Short Term Stability



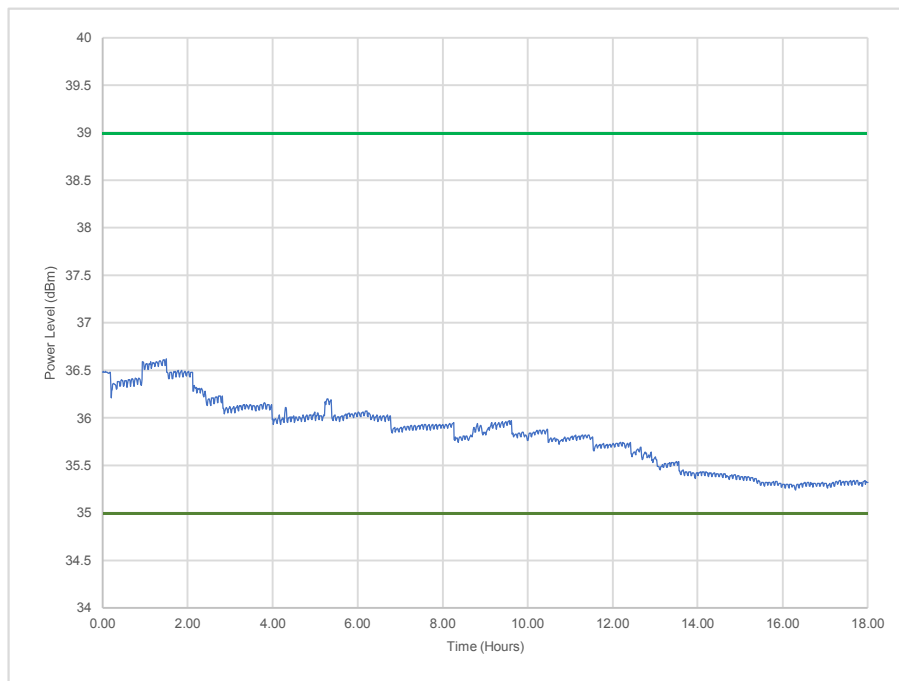
Medium Term Stability, Mean Slope



Medium Term Stability, Residual Frequency Variation



Output Power



Digital Message

Decoded Beacon Message

Hexadecimal code: FFFE2F8C9DFD08FDFEFFF28917861F0FABE

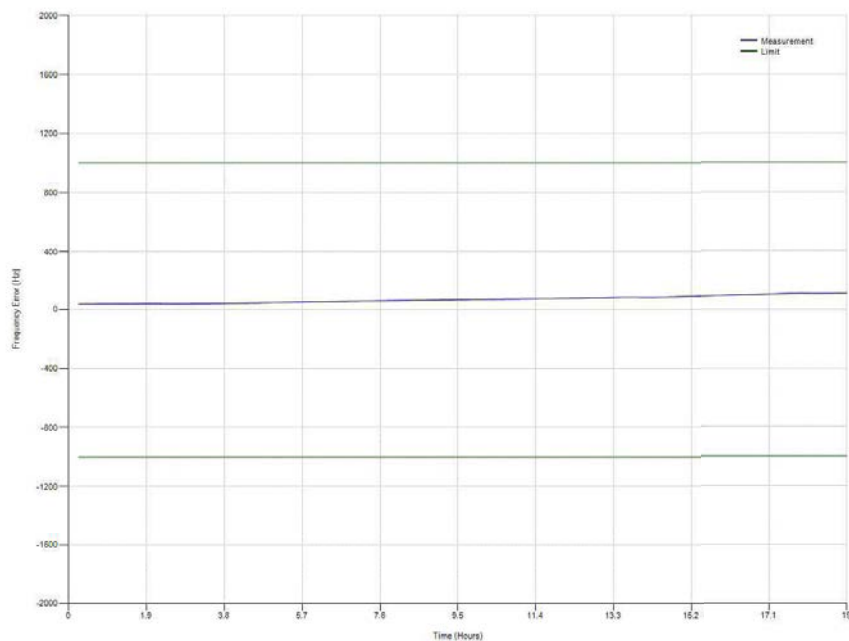
The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.8.

Unique identifier:
183BFFA11FBDFDF

1-15	1111111111111111 1111	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
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-56	1111010000 1000111111	Last 6 digits MMSI	999999
67-75	011111111	Latitude	Default - no location (Default - no location)
76-85	0111111111	Longitude	Default - no location (Default - no location)
86-106	1110010100 0100100010 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	1010101111 10	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field

Down Ramp

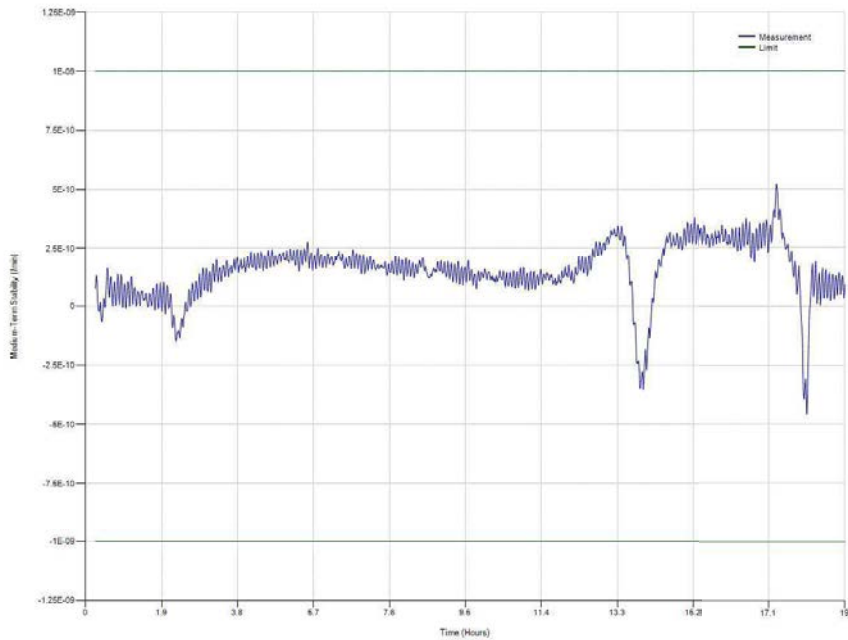
Nominal Frequency



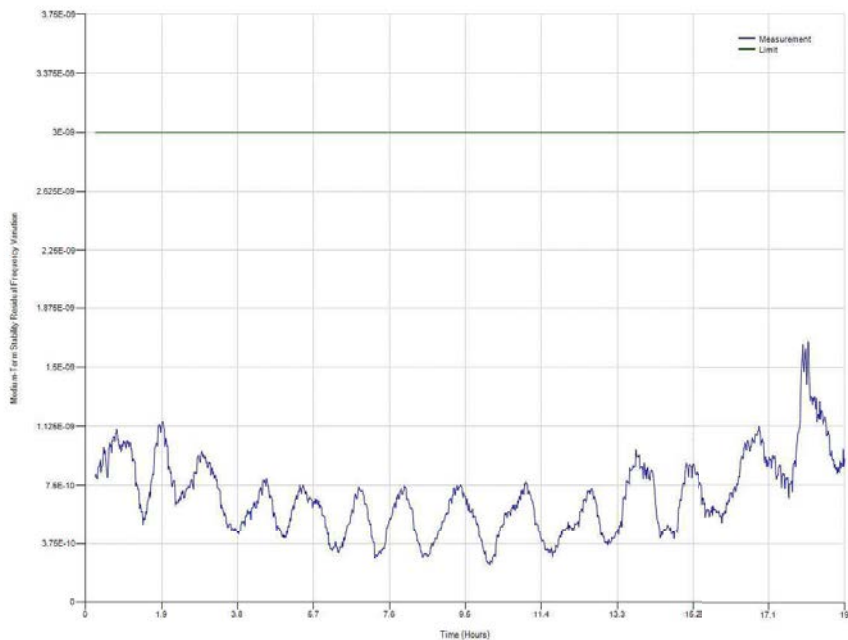
Short Term Stability



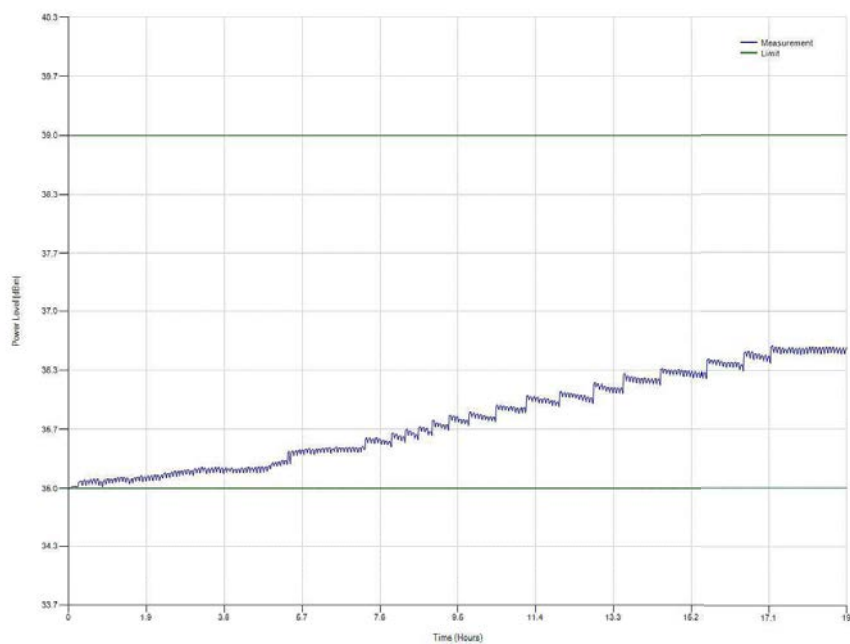
Medium Term Stability, Mean Slope



Medium Term Stability, Residual Frequency Variation



Output Power



Digital Message

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FDFFEFF26917861F0FABE**

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:

193BFFA11FBDFDF

1-15	1111111111111111 1111	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
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	1111010000 1000111111	Last 6 digits MMSI	999999
67-76	0111111111	Latitude	Default - no location (Default - no location)
76-85	0111111111	Longitude	Default - no location (Default - no location)
86-106	1110010100 0100100010 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	100001111	Latitude offset	Default value
124-132	100001111	Longitude offset	Default value
133-144	1010101111 10	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field



Interim TCXO Procedure - Up Ramp

TCXO Part Number*: E6907LF

TCXO S/N*: 371

* As advised by the Manufacturer

Table A-2: Point-By-Point Analysis

MTS Characteristic	Time (h)	Temp. (°C)	tot	osc	beacon_wc	MAX-OSC	beacon_max	Ageing factor	beacon_5 year	Limit	Result
Residual	0.87	-20.0	1.282E-09	2.076E-10	1.265E-09	2.00E-09	2.367E-09	2.00E-10	2.567E-09	3.0E-09	Pass
Static Positive Mean Slope	16.25	55.0	-2.007E-10	-3.192E-10	2.481E-10	7.00E-10	7.427E-10	1.00E-10	8.427E-10	1.0E-09	Pass
Static Negative Mean Slope	17.65	52.1	-1.530E-11	2.670E-10	-2.675E-10	-7.00E-10	-7.494E-10	-1.00E-10	-8.494E-10	-1.0E-09	Pass
Gradient Positive Mean Slope	13.75	43.4	-1.698E-10	-4.338E-10	3.992E-10	1.70E-09	1.746E-09	1.00E-10	1.846E-09	2.0E-09	Pass
Gradient Negative Mean Slope	8.94	19.2	-4.049E-10	-1.293E-10	-3.837E-10	-1.70E-09	-1.743E-09	-1.00E-10	-1.843E-09	-2.0E-09	Pass

Interim TCXO Procedure - Down Ramp

TCXO Part Number*: E6907LF

TCXO S/N*: 371

* As advised by the Manufacturer

Table A-2: Point-By-Point Analysis

MTS Characteristic	Time (h)	Temp. (°C)	tot	osc	beacon_wc	MAX-OSC	beacon_max	Ageing factor	beacon_5 year	Limit	Result
Residual	18.07	-20.0	1.664E-09	1.819E-10	1.654E-09	2.00E-09	2.595E-09	2.00E-10	2.795E-09	3.0E-09	Pass
Static Positive Mean Slope	17.29	-20.0	5.196E-10	-4.352E-11	5.214E-10	7.00E-10	8.729E-10	1.00E-10	9.729E-10	1.0E-09	Pass
Static Negative Mean Slope	18.04	-20.0	-4.556E-10	-4.352E-11	-4.535E-10	-7.00E-10	-8.341E-10	-1.00E-10	-9.341E-10	-1.0E-09	Pass
Gradient Positive Mean Slope	13.40	-6.3	3.429E-10	-2.418E-10	4.196E-10	1.70E-09	1.751E-09	1.00E-10	1.851E-09	2.0E-09	Pass
Gradient Negative Mean Slope	13.94	-9.0	-3.542E-10	1.525E-10	-3.856E-10	-1.70E-09	-1.743E-09	-1.00E-10	-1.843E-09	-2.0E-09	Pass

Summary

The EUT complies with clause A.2.4 of Cospas-Sarsat T.007.



2.12 SATELLITE QUALITATIVE TESTS

2.12.1 Specification

Cospas-Sarsat T.007, Clause A.2.5

2.12.2 Equipment Under Test and Modification State

PLB-450, S/N:TA000011 - Modification State 2 (RLS Configuration 8)
PLB-450, S/N:TA000011 - Modification State 3 (SLP Configuration 8)
PLB-450, S/N:TA000011 - Modification State 1 (SLP Configuration 7)
PLB3, S/N:TA000012 - Modification State 2 (RLS Configuration 7 and 8)

2.12.3 Date of Test

30 September 2021, 22 November 2021, 23 November 2021, 25 November 2021, 26 November 2021, 29 November 2021 and 21 April 2022

2.12.4 Test Equipment Used

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

2.12.5 Laboratory Environmental Conditions

Ambient Temperature 5.7 – 17.5°C
Relative Humidity 23.1 – 99.5%



2.12.6 Test Results

Configuration 7 (RLS protocol, TA000012 / TSR013)

Test Start: 2021-11-22 15:54 GMT
 Test End: 2021-11-23 08:52 GMT
 15 Hex ID: 1D1BFCE031BFDFF

RLM indications visually observed as below:

RLM Reception: 2021-11-22 15:56:27
 RLM Indication: 2021-11-22 15:56:27

Actual location of the test beacon: 50.86903903
 (Octagon House Car Park) -1.2446645

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	TCA	CTA (deg)	Location Error (km)
12	65926	193BF6801499A02*	50.855	-1.235	2021-11-22 16:03:46	20.711	1.701
12	65927	193BF6801499A02*	50.872	-1.242	2021-11-22 17:43:00	8.023	0.378
12	65928	193BF6801499A02*	50.871	-1.274	2021-11-22 19:23:38	-7.269	2.069
13	47638	193BF6801499A02*	50.871	-1.241	2021-11-22 19:48:00	9.62	0.337
13	47639	193BF6801499A02*	50.876	-1.251	2021-11-22 21:27:54	-5.467	0.892
10	85094	193BF6801499A02*	50.882	-1.237	2021-11-22 23:18:18	-18.437	1.537
10	85093	193BF6801499A02*	50.884	-1.251	2021-11-22 21:36:38	-2.396	1.721
10	85092	193BF6801499A02*	50.884	-1.257	2021-11-22 19:56:26	12.344	1.874
114	12404	193BF6801499A02*	50.869	-1.246	2021-11-23 02:51:01	-7.411	0.094
114	12405	193BF6801499A02*	50.87	-1.249	2021-11-23 04:30:57	7.862	0.322
12	65934	193BF6801499A02*	50.865	-1.241	2021-11-23 05:58:14	-20.393	0.517
114	12406	193BF6801499A02*	50.863	-1.304	2021-11-23 06:09:30	20.618	4.215
12	65935	193BF6801499A02*	50.87	-1.242	2021-11-23 07:40:05	-4.325	0.215

Location Errors greater than 5 km are marked in red text.

$$\begin{aligned}
 \text{Ratio of Successful Solutions} &= \frac{\text{number of Doppler solutions within 5 km with } 1^\circ < \text{CTA} < 21^\circ}{\text{number of satellite passes over test duration with } 1^\circ < \text{CTA} < 21^\circ} \\
 &= \frac{13}{13} \\
 &= 100\%
 \end{aligned}$$

*NOTE: Hex ID is provided with location - the Hex ID with default values is 1D1BFCE031BFDFF.



The LUTs and MCC, which received RLS message and generated RLM request to FMCC are listed below:

MCC Code N	Name	Associated MEOLUT	Country, City
2270	FMCC	2275	France, Toulouse
2400	GRMCC	2405	Athens, Greece
4310	JAMCC	4314	Japan, Tokyo
6050	ALMCC	6054	Algiers, Algeria



Configuration 8 (RLS protocol, TA000012 / TSR013)

Test Start: 2021-11-19 14:43 GMT
 Test End: 2021-11-20 07:06 GMT
 15 Hex ID: 1D1BFCE031BFDFD

RLM indications visually observed as below:

RLM Reception: 2021-11-19 14:45:00
 RLM Indication: 2021-11-19 14:45:00

Actual location of the test beacon: 50.86903903
 (Octagon House Car Park) -1.2446645

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	TCA	CTA (deg)	Location Error (km)
114	12355	193BF6801499A02*	50.87	-1.241	2021-11-19 15:49:33	-15.316	0.278
12	65884	193BF6801499A02*	50.871	-1.241	2021-11-19 16:38:31	16.614	0.337
12	65885	193BF6801499A02*	50.874	-1.237	2021-11-19 18:18:15	2.762	0.770
10	85049	193BF6801499A02*	50.869	-1.24	2021-11-19 18:52:39	20.236	0.327
13	47595	193BF6801499A02*	50.872	-1.241	2021-11-19 19:10:28	14.735	0.418
12	65886	193BF6801499A02*	50.872	-1.246	2021-11-19 19:59:24	-13.022	0.342
10	85050	193BF6801499A02*	50.874	-1.24	2021-11-19 20:31:57	7.326	0.641
10	85051	193BF6801499A02*	50.872	-1.247	2021-11-19 22:12:40	-8.084	0.368
13	47597	193BF6801499A02*	50.874	-1.238	2021-11-19 22:30:38	-15.402	0.723
114	12361	193BF6801499A02*	50.869	-1.247	2021-11-20 02:19:25	-12.412	0.164
114	12362	193BF6801499A02*	50.869	-1.246	2021-11-20 03:59:47	3.262	0.094
114	12363	193BF6801499A02*	50.875	-1.263	2021-11-20 05:38:46	17.02	1.446
12	65892	193BF6801499A02*	50.87	-1.243	2021-11-20 06:34:16	-14.656	0.158
10	85057	193BF6801499A02*	50.868	-1.242	2021-11-20 08:47:20	-19.29	0.220
13	47603	193BF6801499A02*	50.871	-1.257	2021-11-20 09:01:29	-12.181	0.892
12	65894	193BF6801499A02*	50.864	-1.242	2021-11-20 09:55:26	15.364	0.590
10	85058	193BF6801499A02*	50.871	-1.244	2021-11-20 10:29:05	-3.237	0.223



Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	TCA	CTA (deg)	Location Error (km)
13	47604	193BF6801499A02*	50.871	-1.247	2021-11-20 10:41:59	3.506	0.273

Location Errors greater than 5 km are marked in red text.

$$\begin{aligned}
 \text{Ratio of Successful Solutions} &= \frac{\text{number of Doppler solutions within 5 km with } 1^\circ < \text{CTA} < 21^\circ}{\text{number of satellite passes over test duration with } 1^\circ < \text{CTA} < 21^\circ} \\
 &= \frac{18}{18} \\
 &= 100\%
 \end{aligned}$$

*NOTE: Hex ID is provided with location - the Hex ID with default values is 1D1BFCE031BFDFF.

The LUTs and MCC, which received RLS message and generated RLM request to FMCC are listed below:

MCC Code	Name	Associated MEOLUT	Country, City
2270	FMCC	2275	France, Toulouse
2400	GRMCC	2405	Athens, Greece
3380	USMCC	3385	Hawaii, USA
4310	JAMCC	4314	Japan, Tokyo
2710	TRMCC	2714	Ankara, Turkey
6050	ALMCC	6054	Algiers, Algeria



Configuration 8 (RLS protocol, TA000011 / TSR014)

Test Start: 2021-11-25 16:17 GMT
 Test End: 2021-11-26 08:29 GMT
 15 Hex ID: 193BF680133FDFF

RLM indications visually observed as below:

RLM Reception: 2021-11-25 16:18:54
 RLM Indication: 2021-11-25 16:18:54

Actual location of the test beacon: 50.86903903
 (Octagon House Car Park) -1.2446645

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	TCA	CTA (deg)	Location Error (km)
12	65969	193BF6801499A02*	50.869	-1.248	2021-11-25 17:07:55	12.952	0.234
13	47680	193BF6801499A02*	50.87	-1.244	2021-11-25 18:46:41	17.738	0.117
10	85134	193BF6801499A02*	50.87	-1.246	2021-11-25 19:21:05	16.95	0.142
13	47681	193BF6801499A02*	50.872	-1.24	2021-11-25 20:25:43	4.112	0.464
10	85135	193BF6801499A02*	50.873	-1.238	2021-11-25 21:00:47	3.12	0.642
13	47682	193BF6801499A02*	50.875	-1.246	2021-11-25 22:06:09	-11.523	0.669
10	85136	193BF6801499A02*	50.87	-1.237	2021-11-25 22:41:54	-12.661	0.548
114	12446	193BF6801499A02*	50.868	-1.249	2021-11-26 01:41:34	-18.401	0.325
114	12447	193BF6801499A02*	50.869	-1.244	2021-11-26 03:22:29	-2.474	0.047
114	12448	193BF6801499A02*	50.861	-1.217	2021-11-26 05:01:58	12.244	2.136
12	65977	193BF6801499A02*	50.869	-1.246	2021-11-26 07:04:26	-10.021	0.094
12	65971	193BF6801499A02*	50.879	-1.243	2021-11-25 20:29:38	-17.66	1.113
12	65970	193BF6801499A02*	50.883	-1.254	2021-11-25 18:48:03	-1.648	1.684



Location Errors greater than 5 km are marked in red text.

$$\begin{aligned} \text{Ratio of Successful Solutions} &= \frac{\text{number of Doppler solutions within 5 km with } 1^\circ < \text{CTA} < 21^\circ}{\text{number of satellite passes over test duration with } 1^\circ < \text{CTA} < 21^\circ} \\ &= \frac{13}{13} \\ &= 100\% \end{aligned}$$

*NOTE: Hex ID is provided with location - Hex ID with default values is 193BF68014BFDFE.

The LUTs and MCC, which received RLS message and generated RLM request to FMCC are listed below:

MCC Code	Name	Associated MEOLUT	Country, City
2270	FMCC	2275	France, Toulouse
2320	UKMCC	2325	UK, Fareham
2400	GRMCC	2405	Athens, Greece
3380	USMCC	3385	Hawaii, USA
6050	ALMCC	6054	Algiers, Algeria