

FCC Testing of the
ELTA S.A.
Emergency Locator Transmitter, Model: Elite
In accordance with FCC 47 CFR Part 87 and
FCC 47 CFR Part 2

Prepared for: ELTA S.A.
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31702
France

FCC ID: LYJELiTe

COMMERCIAL-IN-CONFIDENCE

Date: September 2017
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Product Service

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Project Management	Sarah Jones	29 September 2017	
Authorised Signatory	Matthew Russell	29 September 2017	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 87 and FCC 47 CFR Part 2. The sample tested was found to comply with the requirements defined in the applied rules.

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Testing	Dan Ralley	29 September 2017	
Testing	Graeme Lawler	29 September 2017	

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with FCC 47 CFR Part 87:2016 and FCC 47 CFR Part 2: 2016.



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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	29 September 2017

Table 1

1.2 Introduction

Applicant	ELTA S.A.
Manufacturer	ELTA S.A.
Model Number(s)	Elite
Serial Number(s)	16-0014
Hardware Version(s)	E
Software Version(s)	1.0.30
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 87: 2016 FCC 47 CFR Part 2: 2016
Order Number	170464
Date	09-June-2017
Date of Receipt of EUT	15-June-2017
Start of Test	28-June-2017
Finish of Test	26-July-2017
Name of Engineer(s)	Dan Ralley and Graeme Lawler
Related Document(s)	KDB 971168 D01 v02r02 ANSI C63.26: 2015



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 87 and FCC 47 CFR Part 2 is shown below.

Section	Specification Clause		Test Description	Result	Comments/Base Standard
	Part 87	Part 2			
Configuration: 121.5 MHz Homing Transmitter					
2.1	87.131	-	Power and Emissions	Pass	KDB 971168 D01
2.2	87.133	2.1055	Frequency Stability	Pass	KDB 971168 D01 ANSI C63.26
2.3	87.135	2.1049	Bandwidth of Emission	Pass	ANSI C63.26
2.4	87.137	-	Types of Emission	Pass	
2.5	87.139	2.1051	Spurious Emissions at Antenna Terminals	Pass	KDB 971168 D01
2.6	87.139	2.1051	Radiated Spurious Emissions	Pass	KDB 971168 D01
2.7	87.141	-	Modulation Requirements	Pass	KDB 971168 D01

Table 2



1.4 Application Form

EQUIPMENT DESCRIPTION									
Model Name/Number		ELiTe ELT							
Part Number		12N67880							
Hardware Version		E							
Software Version		1.0.30							
FCC ID (if applicable)				LYJELiTe					
Industry Canada ID (if applicable)									
Technical Description (Please provide a brief description of the intended use of the equipment)				COSPAS/SARSAT ELT (Emergency Locator Transmitter)					

INTENTIONAL RADIATORS									
Technology	Frequency Band (MHz)	Conducted Declared Output Power (dBm)	Antenna Gain (dBi)	Supported Bandwidth (s) (MHz)	Modulation Scheme(s)	ITU Emission Designator	Test Channels (MHz)		
							Bottom	Middle	Top
	406,000 406,100	37,5	3,7	406,040 +/-0,001	Bi-Phase	16K0G1D	NA	406,04	NA
	121,5 +/-0,050	26	-5,5	121,5 +/-0,006	Amplitude Modulation	3K20A3X	NA	121,5	NA

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	None

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
External DC	Nominal Voltage		Maximum Current
Battery	Nominal Voltage		Battery Operating End Point Voltage
	6V		3V
Can EUT transmit whilst being charged?			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

EXTREME CONDITIONS			
Maximum temperature	+55°C	°C	Minimum temperature
			-20°C °C

Ancillaries
Please list all ancillaries which will be used with the device.
AF BRACKET : 12N67900 for Automatic version



Product Service

ANTENNA CHARACTERISTICS				
<input checked="" type="checkbox"/>	Antenna connector		State impedance	50 Ohm
<input type="checkbox"/>	Temporary antenna connector		State impedance	Ohm
<input checked="" type="checkbox"/>	Integral antenna	Type	Survival version (Cospas/Sarsat Approved)	
<input checked="" type="checkbox"/>	External antenna	Type	Automatic version (Cospas/Sarsat Approved)	

I hereby declare that the information supplied is correct and complete.

Name: ABADIE Jean-Paul
Position held: System Engineering Manager

Date: August 21,2017

1.5 Product Information

1.5.1 Technical Description

COSPAS/SARSAT ELT (Emergency Locator Transmitter).

1.6 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.
The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: 16-0014			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 3

1.8 Test Location

TÜV SÜD Product Service conducted the following tests at our Fareham Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration: 121.5 MHz Homing Transmitter		
Power and Emissions	Dan Ralley	UKAS
Frequency Stability	Dan Ralley	UKAS
Bandwidth of Emission	Dan Ralley	UKAS
Types of Emission	Dan Ralley	UKAS
Spurious Emissions at Antenna Terminals	Dan Ralley	UKAS
Radiated Spurious Emissions	Graeme Lawler	UKAS
Modulation Requirements	Dan Ralley	UKAS

Table 4

Office Address:

Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire
PO15 5RL
United Kingdom



2 Test Details

2.1 Power and Emissions

2.1.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.131

2.1.2 Equipment Under Test and Modification State

Elite, S/N: 16-0014 - Modification State 0

2.1.3 Date of Test

29-June-2017

2.1.4 Test Method

This test was performed in accordance with KDB 971168 D01, clause 5.2.2.1.

2.1.5 Environmental Conditions

Ambient Temperature 19.8 - 19.9 °C

Relative Humidity 58.3 - 59.2 %

2.1.6 Test Results

121.5 MHz Homing Transmitter

Maximum Power (dBm)	Maximum Power (W)
21.907	0.155

Table 5 - Power Results

FCC 47 CFR Part 87, Limit Clause 87.131

<10 W

2.1.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	09-Sep-2017
Hygrometer	Rotronic	I-1000	2891	12	23-Aug-2017
Attenuator (30dB, 150W)	Narda	769-30	3369	12	31-May-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	15-Sep-2017
'N' - 'N' RF Cable (2m)	Rhophase	NPS-1803-2000-NPS	3698	12	12-Oct-2017
True RMS multimeter	Fluke	179	4006	12	13-Dec-2017
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	08-Sep-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	09-Sep-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	12-Jan-2018
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 6

O/P Mon – Output Monitored using calibrated equipment

2.2 Frequency Stability

2.2.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.133
FCC 47 CFR Part 2, Clause 2.1055

2.2.2 Equipment Under Test and Modification State

Elite, S/N: 16-0014 - Modification State 0

2.2.3 Date of Test

29-June-2017

2.2.4 Test Method

This test was performed in accordance with KDB 971168 D01, clause 9, FCC 47 CFR Part 2, Clause 2.1055 and ANSI C63.26 Clause 5.6.

2.2.5 Environmental Conditions

Ambient Temperature 21.0 - 23.4 °C
Relative Humidity 49.8 - 56.3 %

2.2.6 Test Results

121.5 MHz Homing Transmitter

Voltage	Frequency Error (ppm)
3 V DC	-3.2922
6 V DC	-4.5679

Table 7 - Frequency Stability Under Voltage Variations

Temperature	Frequency Error (ppm)
+50 °C	-6.7490
+40 °C	-6.6255
+30 °C	-4.5679
+20 °C	-2.3457
+10 °C	-1.2346
0 °C	0.3704
-10 °C	-0.1235
-20 °C	-0.8642

Table 8 - Frequency Stability Under Temperature Variations

FCC 47 CFR Part 87, Limit Clause 87.133(a)

± 50 ppm.

2.2.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Climatic Chamber	Votsch	VT4002	161	-	O/P Mon
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	09-Sep-2017
Hygrometer	Rotronic	I-1000	2891	12	23-Aug-2017
Thermocouple Thermometer	Fluke	51	3174	12	22-Dec-2017
Attenuator (30dB, 150W)	Narda	769-30	3369	12	31-May-2018
'N' - 'N' RF Cable (2m)	Rhophase	NPS-1803-2000-NPS	3698	12	12-Oct-2017
TRUE RMS MULTIMETER	Fluke	179	4006	12	13-Dec-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	09-Sep-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	12-Jan-2018
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 9

O/P Mon – Output Monitored using calibrated equipment



Product Service

2.3 Bandwidth of Emission

2.3.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.135
FCC 47 CFR Part 2, Clause 2.1049

2.3.2 Equipment Under Test and Modification State

Elite, S/N: 16-0014 - Modification State 0

2.3.3 Date of Test

26-July-2017

2.3.4 Test Method

This test was performed in accordance with ANSI C63.26, clause 5.4.4 and FCC 47 CFR Part 2, Clause 2.1049.

2.3.5 Environmental Conditions

Ambient Temperature 20.7 - 21.0 °C
Relative Humidity 56.0 - 59.8 %

2.3.6 Test Results

121.5 MHz Homing Transmitter

99% Occupied Bandwidth (kHz)
4.051

Table 10 - Occupied Bandwidth Results

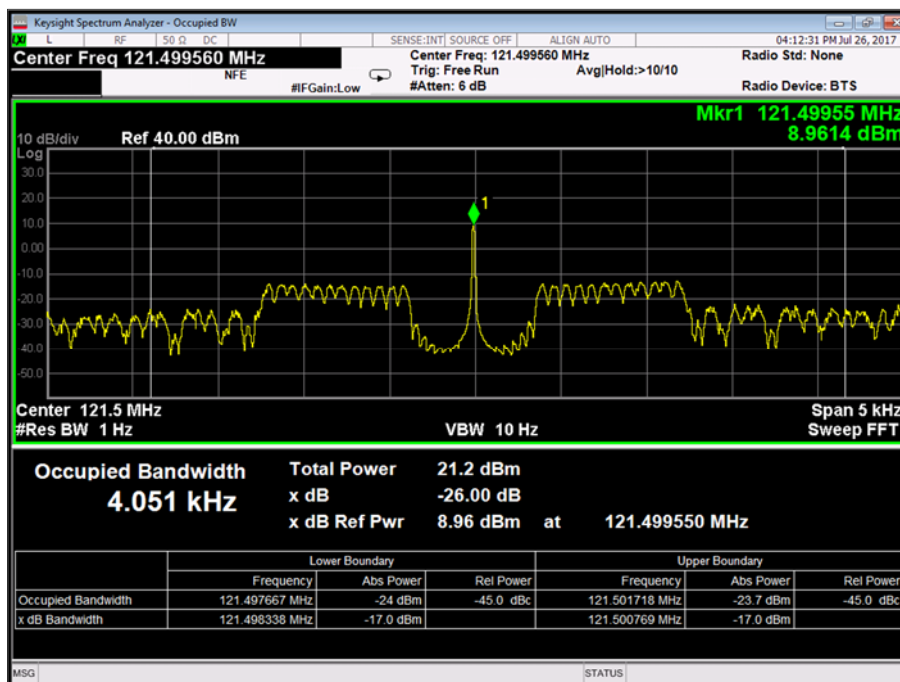


Figure 1 - Occupied Bandwidth - 121.5 MHz

FCC 47 CFR Part 87, Limit Clause 87.135(a)

The authorized bandwidth is the maximum occupied bandwidth authorised to be used by a station.

The authorized bandwidth declared by the manufacturer is: 25 kHz

2.3.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	09-Sep-2017
Hygrometer	Rotronic	I-1000	2891	12	23-Aug-2017
Attenuator (30dB/50W)	Aeroflex / Weinschel	47-30-34	3164	12	11-Jul-2018
DC - 12.4 GHz 10 dB Attenuator 1 W	Suhner	6810.17.A	3964	12	25-Oct-2017
TRUE RMS MULTIMETER	Fluke	179	4006	12	13-Dec-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	09-Sep-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4654	12	06-Oct-2017
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	TU

Table 11

O/P Mon – Output Monitored using calibrated equipment



Product Service

2.4 Types of Emission

2.4.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.137

2.4.2 Test Method

Declaration

2.4.3 Test Results

121.5 MHz Homing Transmitter

The emission designator used by the equipment was declared by the manufacturer as: 3K20A3X



2.5 Spurious Emissions at Antenna Terminals

2.5.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.139
FCC 47 CFR Part 2, Clause 2.1051

2.5.2 Equipment Under Test and Modification State

Elite, S/N: 16-0014 - Modification State 0

2.5.3 Date of Test

28-June-2017 to 29-June-2017

2.5.4 Test Method

This test was performed in accordance with KDB 971168 D01, clause 6 and ANSI C.63.26, clause 5.7.3 (4), with a max hold trace to determine the worst case level.

The spurious domain measurements were performed in accordance with KDB 971168 D01, clause 6 and 5.3.

2.5.5 Environmental Conditions

Ambient Temperature 19.4 - 20.5 °C
Relative Humidity 57.9 - 60.1 %

2.5.6 Test Results

121.5 MHz Homing Transmitter

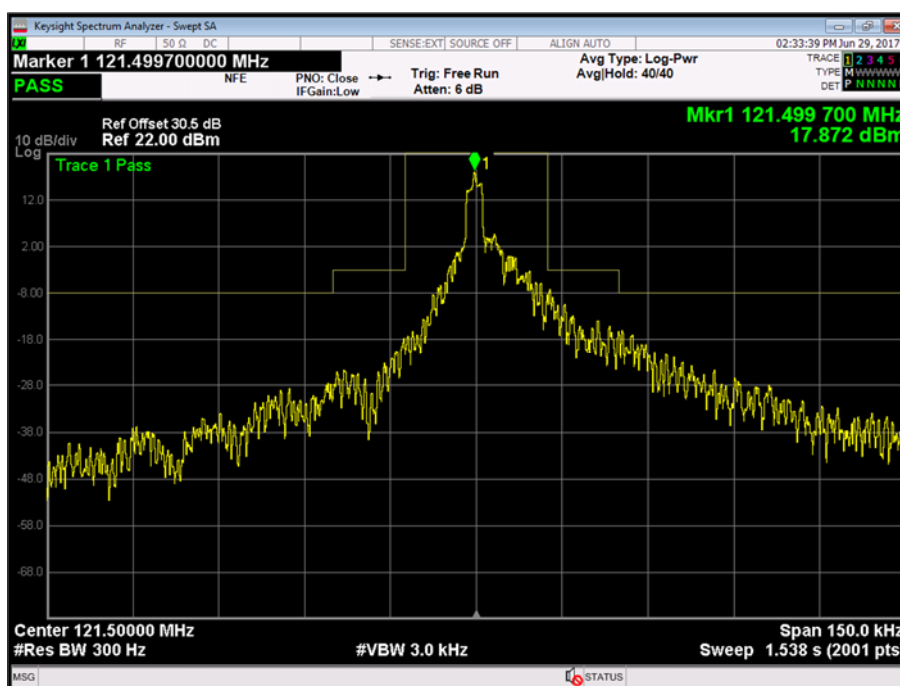


Figure 2 - Transmitter Spectrum Mask

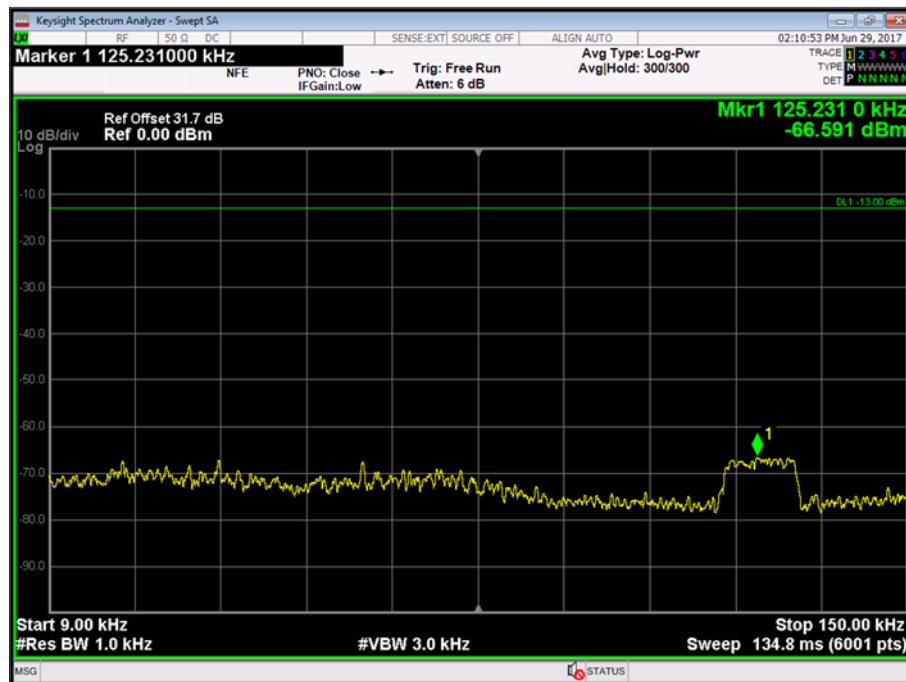


Figure 3 - 9 kHz to 150 kHz

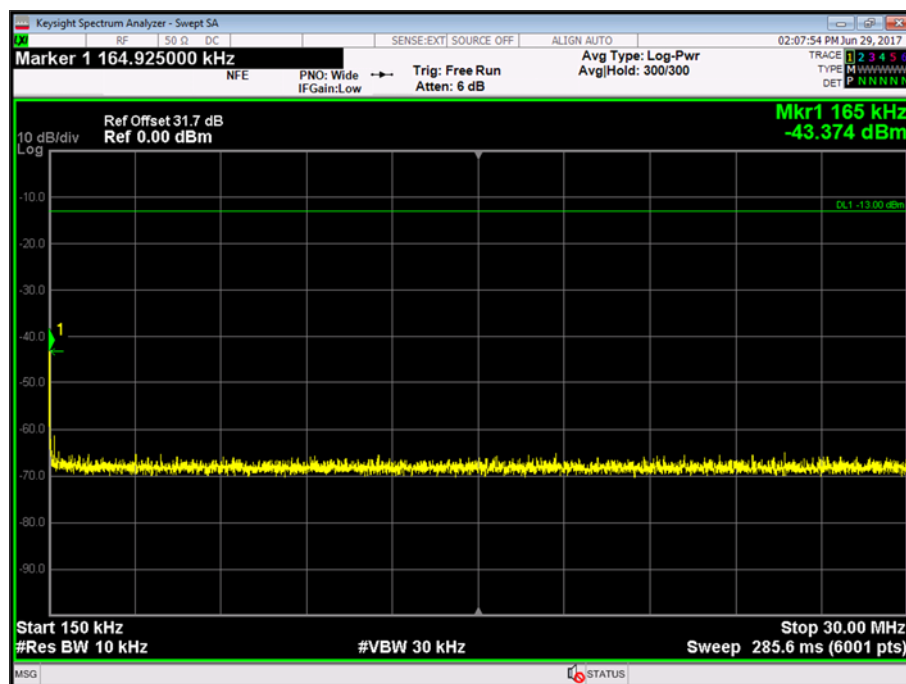


Figure 4 - 150 kHz to 30 MHz

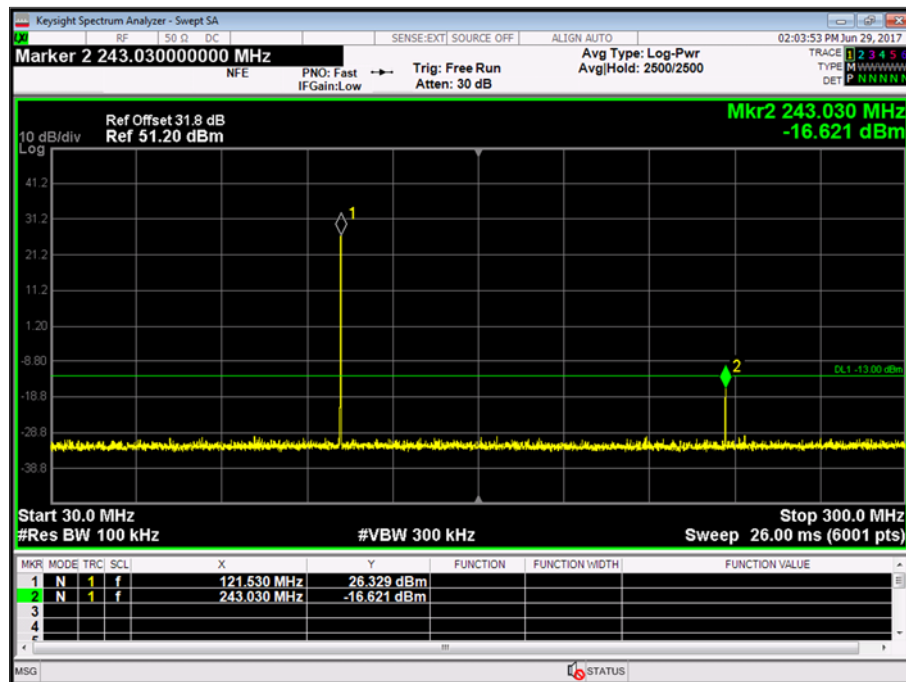


Figure 5 - 30 MHz to 300 MHz

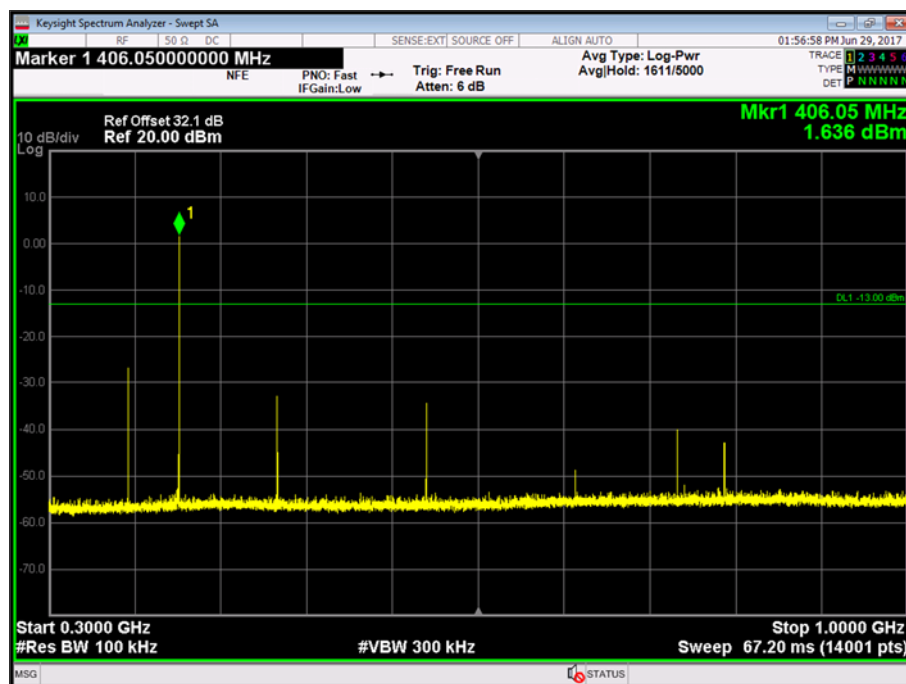


Figure 6 - 300 MHz to 1 GHz

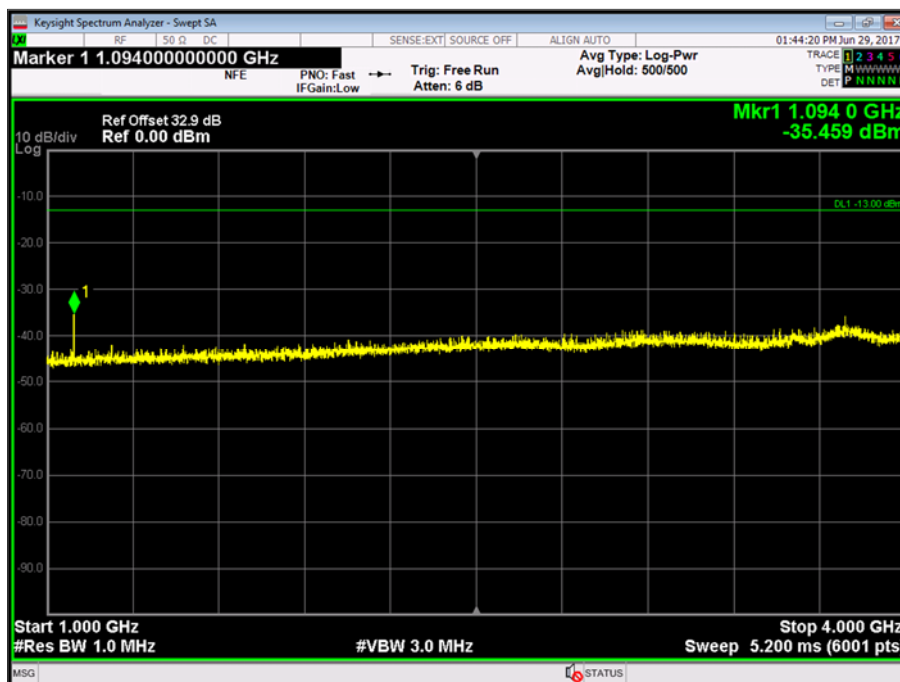


Figure 7 - 1 GHz to 4 GHz

Remarks

It was not possible to disable the 406 MHz transmitter during testing and therefore the emission at 406 MHz is evident on the plot above is not considered a spurious emission.

FCC 47 CFR Part 87, Limit Clause 87.139 (d)(h)

For ELTs operating on 121.500 MHz, 243.000 MHz and 406.0–406.1 MHz the mean power of any emission must be attenuated below the mean power of the transmitter (pY) as follows:

- (1) When the frequency is moved from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;
- (2) When the frequency is removed from the assigned frequency by more than 100 percent of the authorized bandwidth the attenuation must be at least 30 dB.

Except for telemetry in the 1435 to 1525 MHz band, when the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth for aircraft stations above 30 MHz and all ground stations the attenuation must be at least $43 + 10 \log_{10} pY$ dB.

2.5.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	09-Sep-2017
High Pass Filter	Mini-Circuits	NHP-300	1640	12	19-Sep-2017
Attenuator (30dB, 150W)	Narda	769-30	3369	12	31-May-2018
Network Analyser	Rohde & Schwarz	ZVA 40	3548	12	15-Sep-2017
'N' - 'N' RF Cable (2m)	Rhophase	NPS-1803-2000-NPS	3698	12	12-Oct-2017
TRUE RMS MULTIMETER	Fluke	179	4006	12	13-Dec-2017
Calibration Unit	Rohde & Schwarz	ZV-Z54	4368	12	08-Sep-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	09-Sep-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	12-Jan-2018
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 12

O/P Mon – Output Monitored using calibrated equipment



2.6 Radiated Spurious Emissions

2.6.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.139
FCC 47 CFR Part 2, Clause 2.1051

2.6.2 Equipment Under Test and Modification State

Elite, S/N: 16-0014 - Modification State 0

2.6.3 Date of Test

04-July-2017

2.6.4 Test Method

This test was performed in accordance with KDB 971168 D01, clause 7.

The lines shown on the plots below show a -13 dBm (EIRP) limit.

2.6.5 Environmental Conditions

Ambient Temperature 19.5 °C
Relative Humidity 61.0 %

2.6.6 Test Results

121.5 MHz Homing Transmitter

Frequency (MHz)	Level (dBm)
*	

Table 13 - Emissions Results

*No emissions were detected within 10 dB of the limit.



Product Service

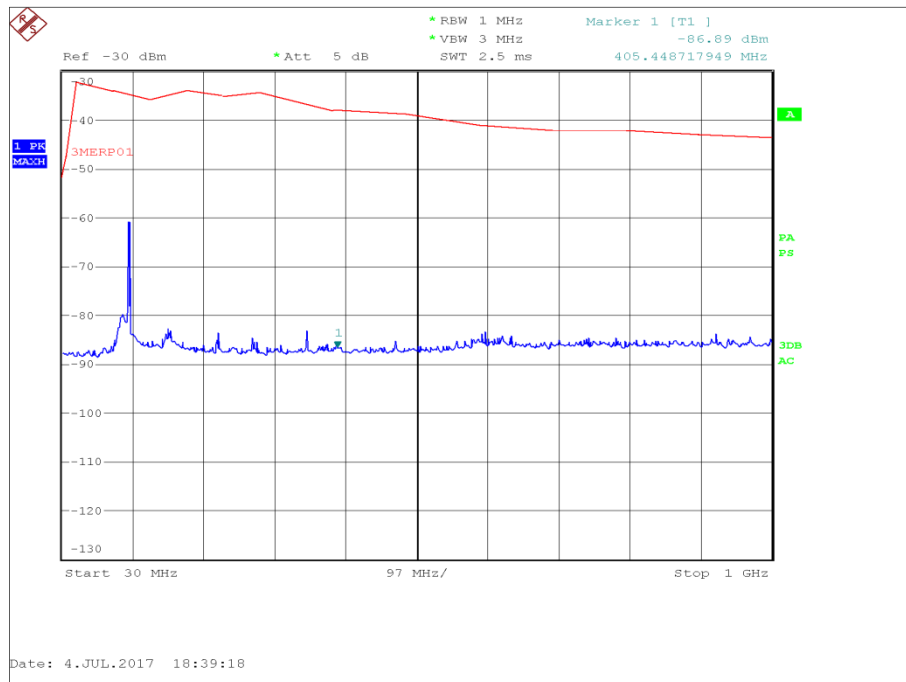


Figure 8 - 30 MHz to 1 GHz

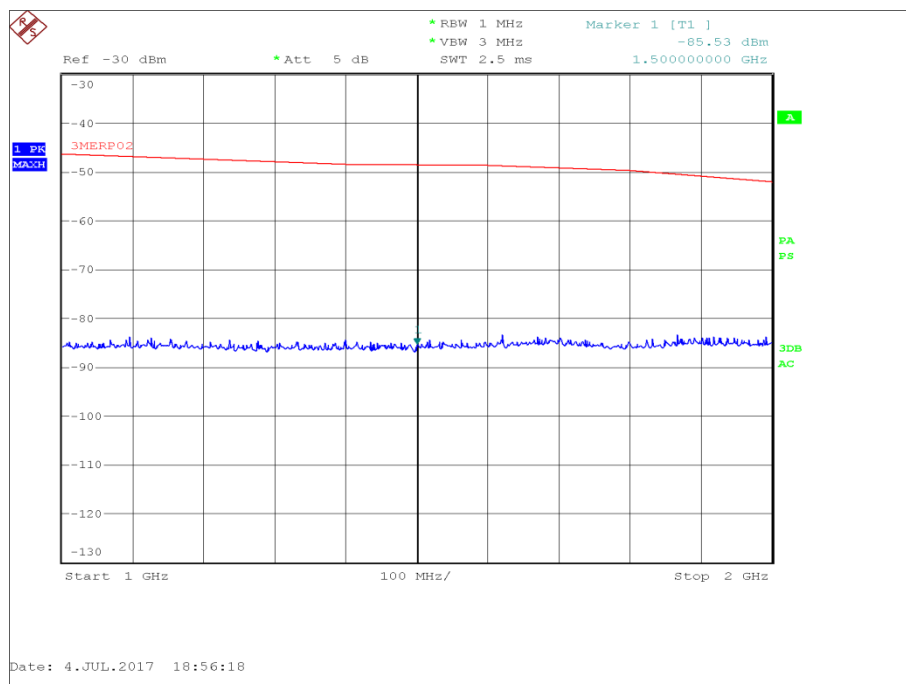


Figure 9 - 1 GHz to 2 GHz

FCC 47 CFR Part 87, Limit Clause 87.139 (d)

Except for telemetry in the 1435 to 1525 MHz band, when the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth for aircraft stations above 30 MHz and all ground stations the attenuation must be at least $43 + 10 \log_{10} P_Y$ dB.

2.6.7 Test Location and Test Equipment Used

This test was carried out in EMC Chamber 5.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Antenna (Bilog)	Schaffner	CBL6143	287	24	18-Apr-2018
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygrometer	Rotronic	A1	2138	12	02-Feb-2018
Comb Generator	Schaffner	RSG1000	3034	-	TU
Cable (N-N, 8m)	Rhophase	NPS-2302-8000-NPS	3248	12	02-May-2018
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	12-Nov-2017
Tilt Antenna Mast	maturio GmbH	TAM 4.0-P	3916	-	TU
Mast Controller	maturio GmbH	NCD	3917	-	TU
Double Ridged Waveguide Horn Antenna	ETS-Lindgren	3117	4722	12	17-Feb-2018

Table 14

TU - Traceability Unscheduled



2.7 Modulation Requirements

2.7.1 Specification Reference

FCC 47 CFR Part 87, Clause 87.141

2.7.2 Equipment Under Test and Modification State

Elite, S/N: 16-0014 - Modification State 0

2.7.3 Date of Test

29-June-2017

2.7.4 Test Method

The test was performed in accordance with KDB 971168 D01, clause 3.

2.7.5 Environmental Conditions

Ambient Temperature 20.8 °C

Relative Humidity 56.7 %

2.7.6 Test Results

121.5 MHz Homing Transmitter

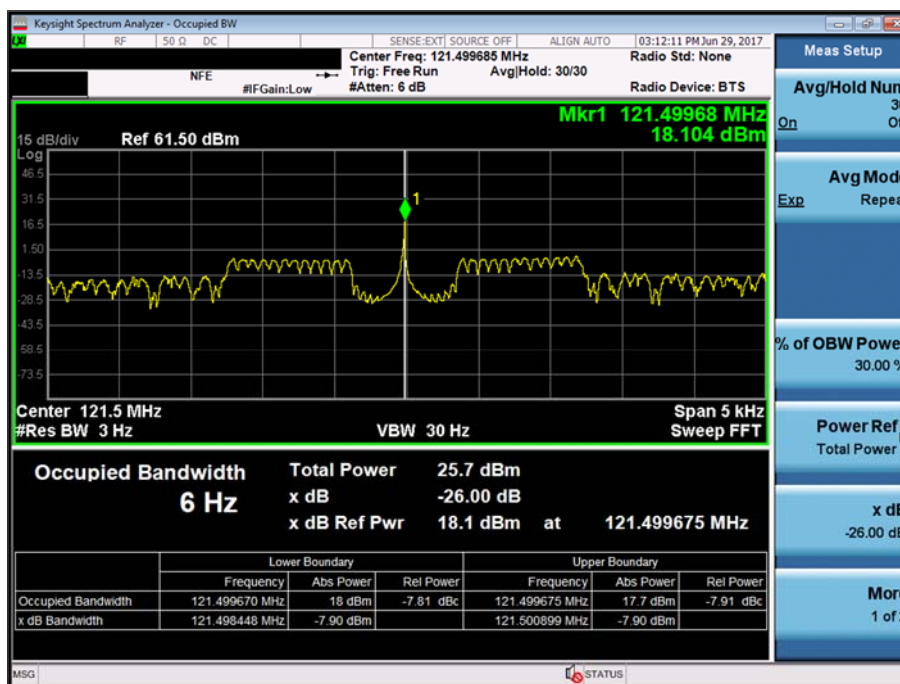


Figure 10 – 30% Occupied Bandwidth



Product Service

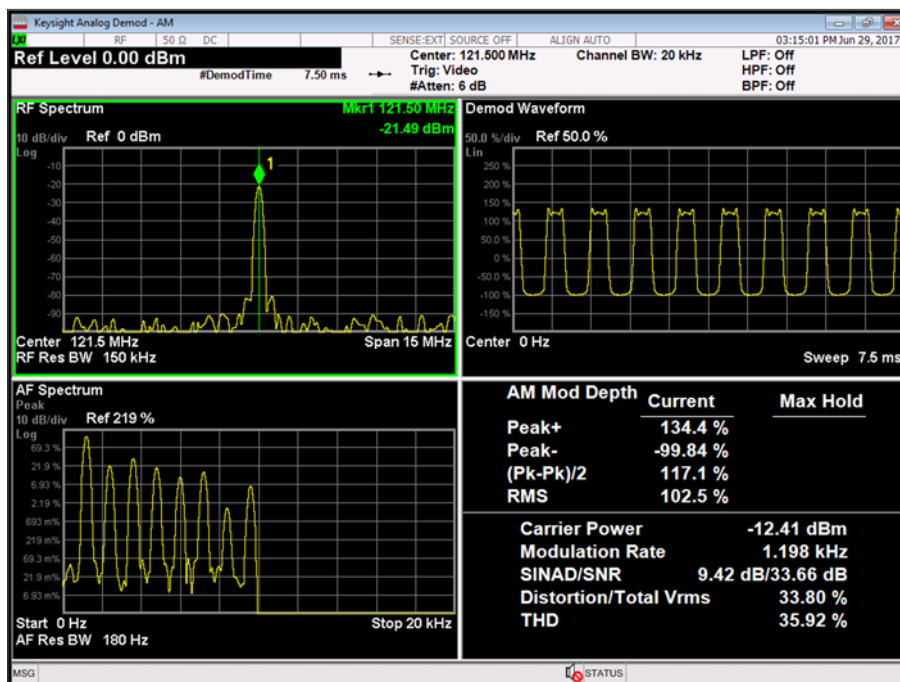


Figure 11 - Plot of the Demodulated Waveform

The following description was supplied by the manufacturer:

AM from 400 Hz, to 1200 Hz

FCC 47 CFR Part 87, Limit Clause 87.141 (i)

ELTs manufactured on or after October 1, 1988, must have a clearly defined carrier frequency distinct from the modulation sidebands for the mandatory emission, A3X, and, if used, the A3E or NON emissions.

On 121.500 MHz at least thirty per cent of the total power emitted during any transmission cycle with or without modulation must be contained within plus or minus 30 Hz of the carrier frequency.

On 243.000 MHz at least thirty percent of the total power emitted during any transmission cycle with or without modulation must be contained within plus or minus 60 Hz of the carrier frequency.

Additionally, if the type of emission is changed during transmission, the carrier frequency must not shift more than plus or minus 30 Hz on 121.500 MHz and not more than plus or minus 60 Hz on 243.000 MHz.

The long term stability of the carrier frequency must comply with the requirements in FCC 47 CFR Part 87.133.



2.7.7 Test Location and Test Equipment Used

This test was carried out in RF Laboratory 3.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due
Rubidium Standard	Rohde & Schwarz	XSRM	1316	6	09-Sep-2017
Hygrometer	Rotronic	I-1000	2891	12	23-Aug-2017
Attenuator (30dB, 150W)	Narda	769-30	3369	12	31-May-2018
'N' - 'N' RF Cable (2m)	Rhophase	NPS-1803-2000-NPS	3698	12	12-Oct-2017
True RMS multimeter	Fluke	179	4006	12	13-Dec-2017
Frequency Standard	Spectracom	Secure Sync 1200-0408-0601	4393	6	09-Sep-2017
PXA Signal Analyser	Keysight Technologies	N9030A	4653	12	12-Jan-2018
2 Channel PSU	Rohde & Schwarz	HMP2020	4735	-	O/P Mon

Table 15

O/P Mon – Output Monitored using calibrated equipment



3 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Power and Emissions	± 0.70 dB
Frequency Stability	± 8.03 Hz
Bandwidth of Emission	± 0.48 kHz
Types of Emission	-
Spurious Emissions at Antenna Terminals	± 3.45 dB
Radiated Spurious Emissions	± 3.08 dB
Modulation Requirements	-

Table 16