

Test report issued under the responsibility of:

EMITECH MONTPELLIER laboratory

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RADIO TEST REPORT

EUROCAE ED-62 Revision B, December 2018

+ Change 1, June 2020

(§3.8.5 & §5.5.6)

(Partial tests)

Qualification Test Plan DRD23114, index A V0, April 11, 2023

Company : **SAFRAN ELECTRONICS & DEFENSE BEACONS**Address..... : ZI DES CINQ CHEMINS
56520 GUIDEL
FRANCE**Test item description.** : **Emergency Locator Transmitter Distress Tracking (ELT-DT)**Trade Mark. : 

Manufacturer..... : SAFRAN ELECTRONICS & DEFENSE BEACONS

Model/Type reference..... : KANNAD ULTIMA-DT-05

Ratings..... : 17-42 Vdc

Testing Laboratory : **EMITECH MONTPELLIER laboratory**Address..... : 145 rue de Massacan
34740 VENDARGUES
FRANCE**Report Reference No.** : **RR-EVE-23C799-1A**

Test procedure. : Qualification Test Plan DRD23114 §5

Diffusion..... : M. DAVENEL

Applicant's name. : SAFRAN ELECTRONICS & DEFENSE BEACONS

Date of issue..... : June 16, 2023

Total number of pages..... : 17

Revision. : 0

Compiled by..... : Célien FOUGEROLLE

Approved by (+ signature). : David MONTAULON (Technical Manager)



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REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	June 16, 2023	/	Creation

1. GENERAL INFORMATION

This document submits the results of Radio tests performed on the equipment **Emergency Locator Transmitter Distress Tracking (ELT-DT) KANNAD ULTIMA-DT-05** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

TESTING PROCEDURE AND TESTING LOCATION:					
Testing Location		Open Area Test Site of EMITECH MONTPELLIER laboratory			
Address.		Route de Quissac 30250 SALINELLES FRANCE			
Test procedure.		Qualification Test Plan DRD23114 §5			
Tested by		Célien FOUGEROLLE & Olivier AELBRECHT			
Test supervisor		David MONTAULON			
Date of receipt of test item		From May 12, 2023			
Date (s) of performance of tests		May 16 and 30, 2023			
APPLICANT'S GENERAL INFORMATION:					
Company name		SAFRAN ELECTRONICS & DEFENSE BEACONS			
Company address.		ZI DES CINQ CHEMINS 56520 GUIDEL FRANCE			
Person(s) present during the tests.		M. GARCIA-MELGARES, M. LEDUC (May 16, 2023)			
Responsible.		M. DAVENEL			
GENERAL REMARKS:					
The information in italics is declared by the manufacturer and is under his responsibility The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report the decimal separator is point.					
POSSIBLE TEST CASE VERDICTS:					
Test case does not apply to the test object.:		N/A			
Test case not performed.....		N/P			
Test object does meet the requirement.....		P (Pass)			
Test object does not meet the requirement.		F (Fail)			
DEFINITIONS AND ABBREVIATIONS:					
E.U.T.	Equipment Under Test	AE	Ancillary Equipment	Pk	Peak detector
RBW	Resolution BandWidth	VBW	Video BandWidth	QP	Quasi-peak detector
FSOATS	Free Space Open Area Test Site	FAR	Full Anechoic Room	Av	Average detector
VP	Vertical Polarization	HP	Horizontal Polarization	RMS	Root Mean Square
RF	Radio Frequency	N.T.R	Nothing To Report	N/C	Not Communicated
SAC	Semi Anechoic Chamber				

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:

The following referenced documents are necessary for the application of the present test report.

EUROCAE ED-62 Revision B, December 2018

+ Change 1, June 2020

MINIMUM OPERATIONAL PERFORMANCE STANDARD FOR AIRCRAFT EMERGENCY LOCATOR TRANSMITTERS 406 MHZ

Qualification Test Plan DRD23114, index A V0, April 11, 2023

RAVEN / TAUCETI FCC & ISED Qualification Test Plan

INFORMATIVE REFERENCES:

The following referenced documents are not necessary for the application of the present test report but they assist the user with regard to a particular subject area.

FCC CFR 47 Part 2, April 11, 2023

Code of Federal Regulations - Frequency Allocations and Radio Treaty Matters; General Rules and Regulations

FCC CFR 47 Part 87, April 11, 2023

Code of Federal Regulations – Aviation Services

ISED RSS-Gen, Issue 5, April 2018

Innovation, Science and Economic Development Canada - General Requirements for Compliance of Radio Apparatus

ISED RSS-287, Issue 2, March 2014

Innovation, Science and Economic Development Canada - Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD)

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

Test item description.	Emergency Locator Transmitter Distress Tracking (ELT-DT)
Model/Type reference.....	KANNAD ULTIMA-DT-05
Trade Mark.	
Serial number (S/N).....	KA0000000049
Part number (P/N).	S1865501-05 (ULTIMA-DT-05) ELT10-903 (Dayton-Granger Antenna) S1820514-15 (Dongle)
Software version.....	YLS1820A
Firmware version.	N/C
Type of sample.	Series Standard equipment
Function(s).....	The ULTIMA-DT is an Emergency Locator Transmitters of Distress Tracking type: an ELT(DT), which development is based on the improvement of the safety of flights for Fixed Wing Aircraft of commercial aviation.
Manufacturer name.	SAFRAN ELECTRONICS & DEFENSE BEACONS
Address.	ZI DES CINQ CHEMINS 56520 GUIDEL FRANCE

General product information:

An ELT(DT) is designed to be autonomously activated prior to a crash and to function in compliance with the ICAO GADSS autonomous distress tracking requirements for the location of an aeroplane in distress, aimed at establishing, to a reasonable extent, the location of an accident site within a 6 NM radius.

3.2. E.U.T. Main label



FLIGHT DIRECTION

orolia

**EMERGENCY LOCATOR TRANSMITTER
FOR EMERGENCY USE ONLY
KANNAD ULTIMA-DT-05**

**ELT(OT) ARMING
MANDATORY INFLIGHT**

**ELT(OT) DISABLING
FOR STORAGE OR DISPOSAL**

CAUTION: PULL LEVER TO UNLOCK

▶ TEST only in "ARM": Hold "TEST" for 5 s
Wait for test result: Flashing of TEST LED
— Green Steady Test OK
••••• Red Blinking Test failure
▶ OFF: Set to "OFF" before ELT removal

Front panel - Reversed view

ELT Type: ELT(OT)
COSPAS-SARSAT CLASS I APPROVAL TAC: XXXX
Capability code: T001/G/E/H/C
Operating temperature range: from -40 °C to +55 °C
Operating life time at -40 °C: 24 hours (406.031 MHz)
> 48 hours (121.5 MHz)
Presence of lithium non-rechargeable battery: 69.6 Wh
ETSO C126c ETSO C142b-5
Patent US20190252652

CSN: 467624
Last Inspection Date: 05/2023
Next Inspection Date:
Battery Expiry Date: 11/2030
Next Battery Replacement Date:
(Before expiry date and no later than 5 years after ELT installation)

ELT Identification Code (15 HEX ID):
refer to AIM label
3LD: refer to AIM label **MSN: refer to AIM label**

orolia SAS
21 rue de la Chaux CS 10028 59200 Guille-les-Bains
Country of Origin: FRANCE

orolia SAS
PDT: ULTIMA-DT-05
PHR: S1865501-05
SET: YLS1820A
SER: KA0000000049

orolia SAS
MFR: FAU27
AMDT: A
DMF: 052023
INSPECT: ☐



3.3.E.U.T. General view of main label and identification label

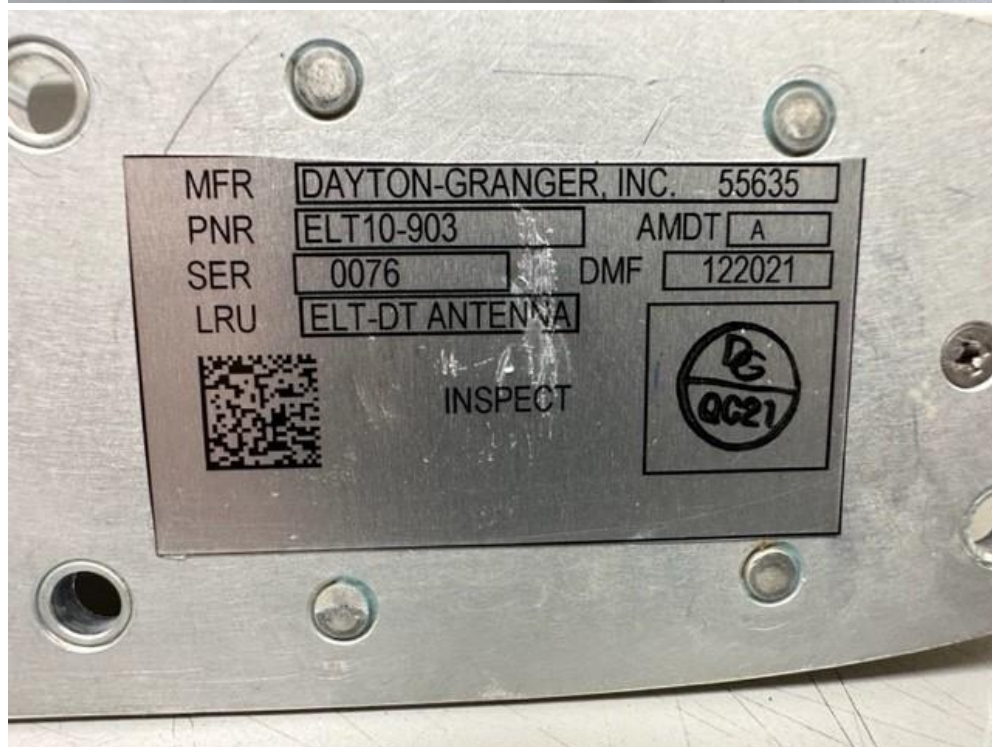


3.4.E.U.T. Dongle

TIM0000241727



3.5.E.U.T. Antenna



3.6.E.U.T. RF cable

Cable with TNC connectors



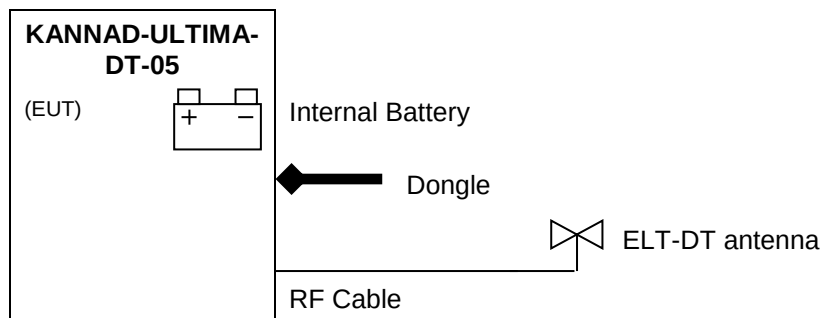
3.7.E.U.T. Mechanical and Electrical Design

Power supply.....	: 28 Vdc
Power supply range.....	: 17-42 Vdc
Power type.....	: External power supply
Power (W).....	: 5
Nominal current (A).	: 0.180
Dimensions (L x W x H) (m).	: 0.2098 x 0.1658 x 0.0616
Weight (kg).	: 1.6
Temperature range (°C).	: -40 to +55
Ground bounding strap.....	: No

Comments:

For the test, the external power source was not used. Instead, the EUT was powered with its predischarged internal battery pack as required by ED-62B.

3.8.E.U.T. Input/Output ports



PORT	NAME	TYPE	LENGTH	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	-
1	Internal Battery	DC	N/A	N/A	Directly connected to ULTIMA-DT-05
2	Dongle	I/O	N/A	N/A	
3	RF cable	RF	1.5m	Shielded	
4	RF antenna	RF	N/A	N/A	

AC/DC : AC/DC Converter port AC.....: Alternative current port DC.....: Direct current port
I/O: Input or Output port TP: Telecommunication port RF: Radio frequency port
N/E: Non Electrical port

3.9. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
Metallic plate	N/A	N/A	Provided by the customer for ELT-DT antenna mounting

3.10. EUT Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	Transmitter/Receiver
Technology	N/C
Environmental profile.....	Data transmission
Temperature range.....	-40°C to +55°C
Antenna type	Dedicated external antenna
Antenna Gain.....	0.6 dBi (406MHz), -1 dBi (121.5MHz)
Comments:	
N/A	
TRANSMITTER PARAMETERS (Tx)	
Frequency bands.....	121.50 MHz and 406.00 MHz
RF Power.....	21 dBm for f = 121.50 MHz 37.5 dBm for f = 406.00 MHz
Number of channels / Separation.....	N/A refer to Cospas Sarsat Standard T.001
Modulation type	N/A refer to Cospas Sarsat Standard T.001
Duty cycle	For 121.5 MHz : 35-40 %
Tested frequency.....	121.65 MHz (121.5 MHz offset)
RECEIVER PARAMETERS (Rx)	
Frequency bands.....	1.575 GHz (GNSS)
Category/Class	Not communicated
Bandwidth.....	Not communicated

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Effective Isotropic Radiated Power (EIRP) - Maximum EIRP - Pattern deviation	See results tables	PASS PASS PASS	ED-62B §3.8.5 and §5.5.6

Sample subject to the test complies with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) specified in this document.

The uncertainty of the results was not explicitly taken into account to declare the compliance (or lack thereof) with the specification.

TEST(S) PERFORMED	MODIFICATION(S)
ED-62B §3.8.5 and §5.5.6	N/A

5. MEASUREMENT UNCERTAINTY

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
Radio frequency	$\pm 1 \times 10^{-7}$	$\pm 1 \times 10^{-7}$
Radiated emission (EIRP)		
62.5 MHz - 1 GHz	± 5.8 dB	± 6 dB
1 GHz - 18 GHz	± 5.6 dB	± 6 dB
Temperature	± 1 °C	± 1 °C
Humidity	± 5 %	± 5 %
Radiated emission (electric field)		
30MHz – 1GHz	± 5.0 dB	/
1GHz – 18GHz	± 5.3 dB	/
18GHz – 40GHz	± 6.1 dB	/
40GHz – 140GHz	± 5.7 dB	/

For the calculation of expanded uncertainty, the confidence interval is 95 % (k=2).

6. TEST CONDITIONS AND RESULTS

6.1. Effective isotropic radiated power (EIRP)

Reference standard:	EUROCAE ED-62 Revision B, December 2018 + Change 1, June 2020
Test method:	ED-62B §3.8.5 and §5.5.6
Test description: Measurements were performed in a reference test site that complies to CISPR 16-1-4 (OATS). ELT in fixed configuration is placed in the center of a ground plane with a radius of 125 cm ± 5 cm mounted at 0.75 m above ground level. Measurement of the radiated signals for all configurations is made at a point 10 m from the ELT. At this point, an insulated antenna mast with a movable boom is arranged so that a search antenna is raised and lowered through an elevation of 1m to 4m. The Power EIRP values are obtained with the following formula: $PEIRP = LOG^{-1} \frac{P_{REC} - G_{REC} + L_C + L_P}{10}$ Where: P_{REC} = Measured Power level from spectrum analyzer (dBm) G_{REC} = Antenna gain of search antenna (dB) L_C = Receive system attenuator and cable loss (dB) L_P = Free space propagation loss (dB)	

TEST CASE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Maximum EIRP – Ground plane config	121.65 MHz 243.3 MHz	>17dBm <26dBm	EMI4589	PASS
Pattern deviation – Ground plane config	121.65 MHz	-6 dB	EMI4590	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	28 °C
Relative Humidity	20 to 75 %	41 %
Atmospheric pressure	N/A	1014 hPa
Test method deviation: N/A		
Supplementary information: 406.00 MHz frequency is rejected by a notch filter.		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Electro Metrics	BIA-30HF	1107	21/08/2021	21/10/2024
Attenuator	Radiall	R412710124	17329	22/06/2020	22/08/2023
Attenuator	Radiall	R412710124	16489	05/08/2022	05/10/2025
Cable	Huber + Suhner	N-20m	8385	07/01/2022	07/03/2024
Cable	Techniwave	N-1m	18344	25/01/2022	25/03/2024

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Notch Filter	Wainwright Instruments	WTRCDB5-375-475-2-12-50EEK	18004	02/12/2021	02/02/2024
Open Area Test Site	EMITECH	Salinelles	3482	21/08/2021	21/10/2024
Receiver	Rohde & Schwarz	FPL1007	17908	02/11/2022	02/01/2024

BAT-EMC software version: V3.18.0.26

Blank cells = Permanent validity

TEST SETUP PHOTO(S)

Measuring antenna



TEST SETUP PHOTO(S)

ELT DT antenna placed in the center of a ground plane with radius of $125\text{ cm} \pm 5\text{ cm}$



TEST SETUP PHOTO(S)

ELT-DT initial position (0°)



TEST SETUP PHOTO(S)

ELT DT antenna in line of sight of measuring antenna (0°)



TEST SETUP PHOTO(S)

ELT DT & RF cable positions



EFFECTIVE ISOTROPIC RADIATED POWER – TEST PARAMETERS						
GROUND PLANE CONFIG						
EUT mode:	ON				T (°C):	28
Test Date:	30/05/2023				H (%):	41
Test Operator:	CFO + DMO				P (hPa):	1014
POSITION	FREQUENCIES	RBW	VBW	Span	DETECTOR	
Vertical	121.65MHz	100kHz	300kHz	500kHz	Peak	
Configuration:	ELT-DT is placed underneath the ground plane. The antenna is placed directly on top of the ground plane which is set at 75cm elevation above ground.					
Comments:	N/A					
EUT modification(s): N/A						

○ MAXIMUM EFFECTIVE ISOTROPIC RADIATED POWER

EFFECTIVE ISOTROPIC RADIATED POWER – TABULATED RESULTS					
GROUND PLANE CONFIG				EMI4589	
Frequency (MHz)	Azimuth (°)	Polarization (antenna height)	Level (dBm)	Limit down (dBm)	Limit up (dBm)
121.65 MHz	Azim _{max} =180°	Vertical (elev _{max} =110cm)	21.19	17.00	26.00

○ PATTERN DEVIATION OF EFFECTIVE ISOTROPIC RADIATED POWER

The pattern deviation shall not be greater than 6 dB from the reference signal at any selected point. The **reference signal** is the maximum level of Effective Isotropic Radiated Power.

EFFECTIVE ISOTROPIC RADIATED POWER - PATTERN DEVIATION – TABULATED RESULTS					
GROUND PLANE CONFIG				EMI4590	
Frequency (MHz)	Azimuth (°)	Polarization (antenna height)	Level (dBm)	Pattern deviation (dB)	Pattern deviation Limit (dB)
121.65 MHz	0	Vertical (110cm)	20.72	-0.47	-6.00
121.65 MHz	30	Vertical (110cm)	20.78	-0.41	-6.00
121.65 MHz	60	Vertical (110cm)	20.93	-0.26	-6.00
121.65 MHz	90	Vertical (110cm)	21.11	-0.08	-6.00
121.65 MHz	120	Vertical (110cm)	20.96	-0.23	-6.00
121.65 MHz	150	Vertical (110cm)	21.03	-0.16	-6.00
121.65 MHz	180	Vertical (110cm)	21.19	0	-6.00
121.65 MHz	210	Vertical (110cm)	21.06	-0.13	-6.00
121.65 MHz	240	Vertical (110cm)	20.89	-0.3	-6.00
121.65 MHz	270	Vertical (110cm)	20.96	-0.23	-6.00
121.65 MHz	300	Vertical (110cm)	20.88	-0.31	-6.00
121.65 MHz	330	Vertical (110cm)	20.79	-0.4	-6.00

Note: Values given in grey are done for information.

○○○ End of test report ○○○