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Your reference/letter of	Our reference/name	Tel.-Extension/E-Mail	Date	Page
55299-5	75958514-02	+44 (0) 1489 558 317 Aneliya.Nikolova@tuvsud.com	09-June-2023	1 of 10

RF Gap Analysis

Dear Sirs,

This report provides a gap analysis between:

1. The testing out on KANNAD ULTIMA-S-03 to the requirements of EUROCAE ED-62B as documented in Report 75952168-01.

and

2. The technical requirements of FCC 47 CFR Part 87 and RSS-287

The differences between the standards are identified in the Radio Gap Analysis report below.

This report concludes that:

- The product (KANNAD ULTIMA-S-03) is compliant with the testing requirements of FCC Part 87 and RSS-287 for 406 MHz Transmitter;
- The product (KANNAD ULTIMA-S-03) is compliant with* the testing requirements of EUROCAE ED-62B for 121.5 MHz / 243 MHz Homer Transmitter, which is equivalent to RTCA/DO-204B as evidenced in the below Radio Gap Analysis test report.

* With the exception of clause 2.2.2.5 of RTCA/DO-183 as per 1.5.b.(2) of RTCA/DO-204. See deviation stated in section 2.3 of this document.

This report is issued as a consultants' opinion and does not form part of a Notified Body procedure.

Yours sincerely,

Matthew Russell
Chief Engineer – RF (TÜV SÜD)

Martin Hardy
Authorised Signatory (TÜV SÜD)

Radio Gap Analysis

Safran Electronics & Defense Beacon SAS ELT, Model: KANNAD ULTIMA-S-03

In accordance with FCC 47 CFR Part 87 and RSS-287

Prepared for: Safran Electronics & Defense Beacon SAS
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Document 75958514-02 Issue 1

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NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Martin Hardy	Senior Engineer	Authorised Signatory	11-September-2023

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

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Document Author	Matt Russell	11-September-2023	

1 Introduction

1.1 Introduction

This document has been prepared as a proposal of testing requirements of a Safran Electronics & Defence Beacon SAS, KANNAD ULTIMA-S-03 to the limited testing requirements of FCC 47 CFR Part 87 and ISED RSS-287 as outlined in quotation RH/190506 Rev 0.:

1.5	Gap analysis of ED-62B compared to the technical requirements of FCC CFR 47 Part 87.199(a) and RSS-287. • FCC CFR 47 Part 87 Clause 87.199(a) states: 406.0–406.1 MHz ELTs must meet all the technical and performance standards contained in the Radio Technical Commission for Aeronautics document titled "Minimum Operational Performance Standards 406 MHz Emergency Locator Transmitters (ELT)" Document No.RTCA/DO–204 dated September 29, 1989. • RSS-287 Clause 7.1 states: ELT shall comply with all the requirements in the standard AWM 551.104 and with the applicable TSO standards for its operating frequencies. Any additional testing that is identified to be required will be charged separately and is not covered by this quotation.	UKAS	€ 1,734.00
1.6	Test report for item 1.4 or 1.5.	UKAS	€ 540.00

The KANNAD ULTIMA-S-03 has been already assessed by TÜV SÜD to the requirements of EUROCAE ED-62B as documented in Report 75952168-01.

This report documents any test requirements where differences in the technical requirements of either FCC 47 CFR Part 87 or RSS-287 differ to those in EUROCAE ED 62B that may require further evidence in order to demonstrate conformity.

1.2 Technical Description of the Equipment Under Test (EUT)

The OROLIA KANNAD ULTIMA-S-03 ELT is an emergency locating transmitter device with built-in 406 Cospas-Sarsat transmitter, 121.5 MHz and 243 MHz Homer frequencies. It is used to assist in the locating and recovery of aircraft when in grave and imminent danger.

Figure 1 – Photograph of EUT

1.3 Brief Summary of Results

A brief summary of the review carried out in accordance with EUROCAE ED-62B is shown below.

Section	Test Description	Summary
2.1	406 MHz Transmitter (FCC Part 87)	No further testing as ELT approved to C/S T.007.
2.2	406 MHz Transmitter (RSS-287)	No further testing as ELT approved to C/S T.007.
2.3	121.5 MHz / 243 MHz Homer Transmitter (FCC Part 87)	See comments in section 2.3 regarding a deviation the requirements of clause 2.2.2.5 of RTCA/DO-183 as per 1.5.b.(2) of RTCA/DO-204.
2.4	121.5 MHz /243 MHz Homer Transmitter (RSS-287)	As per section 2.3.

Table 1

2 Test Requirements

2.1 406 MHz Transmitter (FCC Part 87)

2.1.1 Specification Reference

FCC 47 CFR Part 87.199

2.1.2 Test Requirements

As specified in clause 87.199 c) part of the declaration of conformity (DoC) must include type approval in accordance with Cospas Sarsat T.007.

For an ELT approved to the above, no further testing is required.

2.1.3 Documentation Review Summary

It was confirmed that the Safran Electronics & Defence Beacon SAS KANNAD ULTIMA-S-03 has type approval to C/S T.007.

2.2 406 MHz Transmitter (RSS-287)

2.2.1 Specification Reference

ISED RSS-287, Clause 3.4

2.2.2 Test Requirements

Clause 3.4 states "*The certification application for ELT devices shall provide information required, where applicable, in the test report specified in RSS-Gen, and a DOC to state that the devices meet all the requirements in section 104 of the standard AWM 551 and the applicable TSO standards for its operating frequencies*."

To summarise the requirements of Airworthiness Chapter 551 Subchapter C, Section 104 the ELT must have obtained a Cospas-Sarsat type approval certificate.

2.2.3 Documentation Review Summary

It was confirmed that the Safran Electronics & Defence Beacon SAS KANNAD ULTIMA-S-03 has type approval to C/S T.007.

2.3 121.5 MHz / 243 MHz Homer Transmitter (FCC Part 87)

2.3.1 Specification Reference

FCC Part 87.199 (a)

2.3.2 Test Requirements

87.199 (a) states "*ELT's must meet all the technical and performance standards contained in the Radio Technical Commission for Aeronautics document titled "Minimum Operational Performance Standards 406 MHz Emergency Locator Transmitters (ELT)" Document No. RTCA/DO–204".*

RTCA/DO-204 refers to RTCA/DO-183 for the requirements of a homing transmitter on 121.5 MHz or 243 MHz.

RTCA/DO-183 Section 2.2.2 details performance requirements for the transmitter including:

- Operating Frequencies
- Modulation Characteristics
- Modulation Duty Cycle
- Transmitter Duty Cycle
- Peak Effective Radiated Power (PERP)

2.3.3 Documentation Review Summary

Clause 2.2.2.1 - Operating Frequencies

The requirements of RTCA/DO-183 clause 2.2.2.1 and EUROCAE ED-62B clause 3.8.1 are identical and therefore as compliance has been demonstrated as documented in Report 75954177-01 section 2.1, no further evidence is necessary.

Clause 2.2.2.2 - Modulation Characteristics

The requirements of RTCA/DO-183 clause 2.2.2.2 and EUROCAE ED-62B clause 3.8.2 for modulation characteristics are identical and therefore as compliance has been demonstrated as documented in Report 75954177-01 section 2.1, no further evidence is necessary.

Clause 2.2.2.3 - Modulation Duty Cycle

The requirements of RTCA/DO-183 clause 2.2.2.3 and EUROCAE ED-62B clause 3.8.2 for modulation duty cycle are identical and therefore as compliance has been demonstrated as documented in Report 75954177-01 section 2.1, no further evidence is necessary.

Clause 2.2.2.4 - Transmitter Duty Cycle

RTCA DO-183 states the transmission duty cycle shall not be interrupted except were stated in clause 2.2.2.2.

ED-62B clause 3.8.3.1 b) permits a 'keyed' duty cycle where the duty cycle should be:

- For a 33% Duty Cycle the transmitter shall be on for a period of not less than 0.75 seconds and then off for not more than 1.5 seconds repeating.
- For duty cycles between 33% and 100% the on time shall be increased beyond 0.75 seconds and the off time reduced accordingly. The carrier signal may be further interrupted to permit the transmission of 406 MHz satellite transmissions and/or 406 MHz homing transmissions as defined by Cospas-Sarsat or Morse code transmissions as defined in § 3.8.3.5.

Section 2.3 of report 75952168-01 demonstrates that the ELT does NOT implement a continuous carrier. The ULTIMA-S ELT is designed to meet the requirements of EUROCAE ED-62B, which is equivalent to RTCA/DO-204B, no further evidence is required.

Clause 2.2.2.5 – Peak Effective Radiated Power (PERP)

Clause 2.2.2.5 states that the operational period for an ELT should be at least 50 hours whereas this is stated as a minimum of 48 hours in EUROCAE ED-62B. However, the evidence recorded in report 75949596-01 demonstrates that the ELT continued to operate for a period in excess of 50 hours*.

Both test standards state the minimum PERP shall be at least 17 dBm (50 mW).

* The evidence in Report 75949596-01 is based on conducted power measurements made at the minimum declared operating temperature of the EUT, and not a PERP measurement as stated in clause 2.2.2.5 of RTCA/D0-183. The results from Report 75949596-01 indicate that the conducted output power at 121.65 MHz was measured at >17 dBm** for 64.8 hours. The manufacturer has declared an EUT antenna gain of +2dBi. This is considered as a deviation from the requirements of clause 2.2.2.5 of RTCA/DO183.

** See testing notes in section 2.10 of Report 75949596-01.

2.4 121.5 MHz /243 MHz Homer Transmitter (RSS-287)

2.4.1 Specification Reference

ISED RSS-287 Clause 7.1.

2.4.2 Test Requirements

Clause 7.1 states that *"ELT shall comply with all the requirements in the standard AWM 551.104 and with the applicable TSO standards for its operating frequencies."*

Airworthiness Chapter 551, subchapter C, clause 104 states the criteria for acceptance for installation as *"an integrated 121.5 MHz transmission as described in RTCA/DO-204A"*

2.4.3 Documentation Review Summary

The requirements for an ELT are harmonised for FCC 47 CFR Part 87 and ISED RSS-287, therefore refer to the summary documented in section 2.3