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VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment; Part 4: Point-to-point functions

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**VHF air-ground and air-air Digital Link (VDL)
Mode 4 radio equipment;
Technical characteristics and methods of measurement
for aeronautical mobile (airborne) equipment;
Part 4: Point-to-point functions**

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Aeronautics (AERO).

The present document is part 4 of a multi-part deliverable covering the VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment, as identified below:

- Part 1: "Physical layer";
- Part 2: "General description and data link layer";
- Part 3: "Additional broadcast aspects";
- Part 4: "Point-to-point functions".**

The present document is accompanied by an equivalent ground-based standard, ETSI EN 301 842 [i.1] parts 1 to 5, covering the VHF air-ground Data Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment.

NOTE: Minimum Operational Performance Specifications (MOPS) are also being developed for VDL Mode 4. EUROCAE have previously published Interim MOPS for VDL Mode 4 [i.2] which are a sub set of ETSI EN 302 842-1 [5], ETSI EN 302 842-2 [6], ETSI EN 302 842-3 [7] and ETSI EN 302 842-4 (the present document). ETSI EN 302 842-1 [5], ETSI EN 302 842-2 [6], ETSI EN 302 842-3 [7] and ETSI EN 302 842-4 (the present document) comply with the requirements of EC Mandate M/318 [i.3].

National transposition dates	
Date of adoption of this EN:	6 April 2015
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2016
Date of withdrawal of any conflicting National Standard (dow):	31 January 2017

Modal verbs terminology

In the present document **"shall"**, **"shall not"**, **"should"**, **"should not"**, **"may"**, **"need not"**, **"will"**, **"will not"**, **"can"** and **"cannot"** are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"must" and **"must not"** are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document states the technical specifications for Very High Frequency (VHF) Digital Link (VDL) Mode 4 aeronautical mobile (airborne) radio transmitters, transceivers and receivers for air-ground and air-air communications operating in the VHF band, using Gaussian Filtered Frequency Shift Keying (GFSK) modulation with 25 kHz channel spacing and capable of tuning to any of the 25 kHz channels from 112,000 MHz to 136,975 MHz as defined in ICAO VDL SARPs [2].

The present document may be used to produce tests for the assessment of the performance of the equipment. The performance of the equipment submitted for type testing should be representative of the performance of the corresponding production model.

The present document has been written on the assumption that:

- the type test measurements will be performed only once, in an accredited test laboratory and the measurements accepted by the various authorities in order to grant type approval;
- if equipment available on the market is required to be checked it will be tested in accordance with the methods of measurement specified in the present document or a documented alternative approved by the certifying authority;
- equipment comply with ETSI EN 302 842-1 [5] and ETSI EN 302 842-2 [6].

NOTE: The present document has been produced with a view to maintaining consistency of numbering with the equivalent standard for ground equipment (ETSI EN 301 842 [i.1]). Where requirements are the same, they have been given the same number. Some new airborne requirements have been inserted between requirements that were sequential in ETSI EN 301 842 [i.1]. This has led to a non-standard form of numbering for new requirements in some places.

1 Scope

The present document applies to the following radio equipment types:

- Very High Frequency (VHF) Digital Link (VDL) Mode 4 aeronautical mobile (airborne) radio transmitters, transceivers and receivers for air-ground and air-air communications operating in the VHF band, using Gaussian Filtered Frequency Shift Keying (GFSK) modulation with 25 kHz channel spacing and capable of tuning to any of the 25 kHz channels from 112,000 MHz to 136,975 MHz as defined in ICAO VDL SARPs [2].

The present document provides part 4 of the technical specifications.

The present document is designed to ensure that equipment certified to it will be compatible with the relevant ICAO VDL SARPs [2] and ICAO VDL4 Technical Manual [1].

Manufacturers should note that in future the tuning range for the transmitter and receiver may also cover any 25 kHz channel from 108,000 MHz to 111,975 MHz.

The present document applies to "aeronautical mobile (airborne and as applicable also ground vehicles)" equipment which will hereinafter be referred to as "mobile" equipment.

The scope of the present document is limited to mobile stations. The equivalent specification for ground stations is ETSI EN 301 842 [i.1].

A description of the scope of the VDL Mode 4 system is provided in part 2 of ETSI EN 302 842-2 [6], clause 1.

ETSI EN 302 842-1 [5] deals with tests of the physical layer, ETSI EN 302 842-2 [6] deals with core link layer functionality and ETSI EN 302 842-3 [7] with additional broadcast functionality. The present document deals with tests of the datalink layer (DLS) and the link layer sufficient to support point-to-point functionality. Note that, as described in ETSI EN 302 842-2 [6], a system supporting point-to-point functionality is required to conform to ETSI EN 302 842-1 [5], ETSI EN 302 842-2 [6] and the specification in the present document.

The present document is organized as follows:

- clause 2 provides references to relevant documents;
- clause 3 provides general definitions, abbreviations and symbols used;
- clause 4 describes the VDL Mode 4 mobile station point-to-point functions;
- clause 5 provides performance specifications for the VDL Mode 4 mobile station;
- clause 6 provides general design requirements;
- clause 7 provides protocol tests for the point-to-point functions of the system;
- annex A provides a detailed cross-reference to the relevant requirements contained in ICAO VDL4 Technical Manual [1].

Note that the system can support a very wide range of functions. It is not practical to provide specific tests for all aspects of functionality. The approach used is to provide detailed tests for the core point-to-point functionality and to provide tests of those remaining requirements which, if wrongly implemented, could cause a deterioration in the service offered by other VDL Mode 4 stations.

Mandating and Recommendation Phrases

- a) "Shall":
 - The use of the word "Shall" indicates a mandated criterion; i.e. compliance with the particular procedure or specification is mandatory and no alternative may be applied.

b) "Should":

- The use of the word "Should" (and phrases such as "It is recommended that...", etc.) indicates that though the procedure or criterion is regarded as the preferred option, alternative procedures, specifications or criteria may be applied, provided that the manufacturer, installer or tester can provide information or data to adequately support and justify the alternative.

2 References

2.1 Normative references

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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

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

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| [1] | ICAO Doc 9816 (First Edition 2004): "Manual on VHF Digital Link (VDL) Mode 4 - Part 2: Detailed Technical Specifications". |
| [2] | ICAO Annex 10 to the Convention on International Civil Aviation: "Aeronautical Telecommunications, Volume III: Communication Systems, Part I: Digital Data Communication Systems, chapter 6", including Amendment 88 (applicable 14/11/13)". |
| [3] | ICAO 9705-CD: "Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN)". |
| [4] | Void. |
| [5] | ETSI EN 302 842-1 (V1.3.1): "VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment; Part 1: Physical layer". |
| [6] | ETSI EN 302 842-2 (V1.4.1): "VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment; Part 2: General description and data link layer". |
| [7] | ETSI EN 302 842-3 (V1.4.1): "VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment; Part 3: Additional broadcast aspects". |

2.2 Informative references

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

- | | |
|-------|--|
| [i.1] | ETSI EN 301 842 (all parts): "VHF air-ground Data Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment". |
| [i.2] | EUROCAE ED-108A: "MOPS for VDL Mode 4 Aircraft Transceiver for ADS-B", July 2001. |

- [i.3] EC Mandate M/318: "Mandate to CEN/CENELEC/ETSI for standardisation in the field of air traffic management systems and Galileo local components".
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